Final Massachusetts Integrated List of Waters for the Clean Water Act 2022 Reporting Cycle

Appendix 15
Ipswich River Basin and Coastal Drainage Area Assessment and Listing Decision Summary

Prepared by:
Watershed Planning Program
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Massachusetts Department of Environmental Protection

MassDEP's mission is to protect and enhance the Commonwealth's natural resources – air, water, and land – to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations. In carrying out this mission MassDEP commits to address and advance environmental justice and equity for all people of the Commonwealth; provide meaningful, inclusive opportunities for people to participate in agency decisions that affect their lives; and ensure a diverse workforce that reflects the communities we serve.

Watershed Planning Program

The Watershed Planning Program is a statewide program in the Division of Watershed Management, Bureau of Water Resources, at MassDEP. We are stewards of the water resources of Massachusetts. Together with other state environmental agencies, we share in the duty and responsibility to protect, enhance, and restore the quality and value of the waters of the Commonwealth. We are guided by the federal Clean Water Act and work to secure the environmental, recreational, and public health benefits of clean water for the residents of Massachusetts. The Watershed Planning Program is organized into five Sections that each have a different technical focus under the Clean Water Act: (1) Surface Water Quality Standards; (2) Surface Water Quality Monitoring; (3) Data Management and Water Quality Assessment; (4) Total Maximum Daily Load; and (5) Nonpoint Source Pollution.

Disclaimer

References to trade names, commercial products, manufacturers, or distributors in this report constituted neither endorsement nor recommendation by MassDEP.

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Notice of Availability

This report is available on the Massachusetts Department of Environmental Protection website: https://www.mass.gov/lists/integrated-lists-of-waters-related-reports.

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2022 Cycle Impairment Changes

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Bear Meadow Brook	MA92-07	2	2	None		Unchanged
Beaver Pond	MA92002	3	3	None		Unchanged
Berry Pond	MA92003	2	2	None		Unchanged
Black Brook	MA92-19	3	3	None		Unchanged
Boston Brook	MA92-13	2	5	Benthic Macroinvertebrates		Added
Boston Brook	MA92-13	2	5	Dissolved Oxygen		Added
Brackett Pond	MA92004	5	5	Turbidity		Unchanged
Bradford Pond	MA92005	3	3	None		Unchanged
Collins Pond	MA92010	5	5	Algae		Unchanged
Collins Pond	MA92010	5	5	Turbidity		Unchanged
Creighton Pond	MA92011	3	3	None		Unchanged
Crystal Pond	MA92013	5	5	Algae		Unchanged
Crystal Pond	MA92013	5	5	Chlorophyll-a		Unchanged
Crystal Pond	MA92013	5	5	Phosphorus, Total		Unchanged
Crystal Pond	MA92013	5	5	Transparency / Clarity		Unchanged
Devils Dishfull Pond	MA92015	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Devils Dishfull Pond	MA92015	5	5	Chlorophyll-a		Unchanged
Devils Dishfull Pond	MA92015	5	5	Dissolved Oxygen		Unchanged
Devils Dishfull Pond	MA92015	5	5	Phosphorus, Total		Unchanged
Devils Dishfull Pond	MA92015	5	5	Turbidity		Unchanged
Eisenhaures Pond	MA92016	3	3	None		Unchanged
Elginwood Pond	MA92017	3	3	None		Unchanged
Emerson Brook Reservoir (Forest Street Pond)	MA92021	3	3	None		Unchanged
Farnum Street Pond	MA92018	3	3	None		Unchanged
Field Pond	MA92019	4c	4c	(Fanwort*)		Added
Field Pond	MA92019	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Fish Brook	MA92-14	5	5	Benthic Macroinvertebrates		Added
Fish Brook	MA92-14	5	5	Dissolved Oxygen		Added
Fish Brook	MA92-14	5	5	Escherichia Coli (E. Coli)		Unchanged
Fourmile Pond	MA92022	3	3	None		Unchanged
Frye Pond	MA92023	5	5	Algae		Unchanged
Gravelly Brook	MA92-18	5	5	Benthic Macroinvertebrates		Unchanged
Gravelly Brook	MA92-18	5	5	Lack of a Coldwater Assemblage		Added
Hood Pond	MA92025	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Howlett Brook	MA92-17	5	5	(Fish Passage Barrier*)		Added
Howlett Brook	MA92-17	5	5	Dissolved Oxygen		Added
Howlett Brook	MA92-17	5	5	Escherichia Coli (E. Coli)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Howlett Brook	MA92-17	5	5	Fecal Coliform		Unchanged
Idlewild Brook	MA92-24	3	3	None		Unchanged
Ipswich River	MA92-02	5	5	Dissolved Oxygen		Added
Ipswich River	MA92-02	5	5	Fecal Coliform		Unchanged
Ipswich River	MA92-06	5	5	(Dewatering*)		Unchanged
Ipswich River	MA92-06	5	5	(Fish Passage Barrier*)		Added
Ipswich River	MA92-06	5	5	Benthic Macroinvertebrates		Added
Ipswich River	MA92-06	5	5	Dissolved Oxygen		Unchanged
Ipswich River	MA92-06	5	5	Escherichia Coli (E. Coli)		Added
Ipswich River	MA92-06	5	5	Fish Bioassessments		Added
Ipswich River	MA92-06	5	5	Mercury in Fish Tissue		Unchanged
Ipswich River	MA92-15	5	5	(Dewatering*)		Unchanged
Ipswich River	MA92-15	5	5	(Fish Passage Barrier*)		Added
Ipswich River	MA92-15	5	5	Dissolved Oxygen		Unchanged
Ipswich River	MA92-15	5	5	Fish Bioassessments		Unchanged
Ipswich River	MA92-15	5	5	Mercury in Fish Tissue		Unchanged
Kimball Brook	MA92-21	5	5	Dissolved Oxygen		Unchanged
Kimball Brook	MA92-21	5	5	Escherichia Coli (E. Coli)		Unchanged
Kimball Brook	MA92-21	5	5	Fecal Coliform		Unchanged
Kimballs Pond	MA92027	3	3	None		Unchanged
Labor in Vain Creek	MA92-22	5	5	Dissolved Oxygen		Unchanged
Labor in Vain Creek	MA92-22	5	5	Fecal Coliform		Unchanged
Long Causeway Brook	MA92-20	3	3	None		Unchanged
Longham Reservoir	MA92030	3	3	None		Unchanged
Lowe Pond	MA92034	5	5	(Fanwort*)		Added
Lowe Pond	MA92034	5	5	(Non-Native Aquatic Plants*)		Removed
Lowe Pond	MA92034	5	5	Mercury in Fish Tissue		Unchanged
Lower Four Mile Pond	MA92032	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Lubbers Brook	MA92-05	5	5	(Dewatering*)		Unchanged
Lubbers Brook	MA92-05	5	5	Dissolved Oxygen		Unchanged
Lubbers Brook	MA92-05	5	5	Escherichia Coli (E. Coli)		Unchanged
Maple Meadow Brook	MA92-04	5	5	(Dewatering*)		Unchanged
Maple Meadow Brook	MA92-04	5	5	Dissolved Oxygen		Unchanged
Martins Brook	MA92-08	5	5	Benthic Macroinvertebrates		Unchanged
Martins Brook	MA92-08	5	5	Dissolved Oxygen		Unchanged
Martins Brook	MA92-08	5	5	Escherichia Coli (E. Coli)		Unchanged
Martins Brook	MA92-08	5	5	Fecal Coliform		Unchanged
Martins Pond	MA92038	5	5	(Fanwort*)		Added
Martins Pond	MA92038	5	5	(Non-Native Aquatic Plants*)		Removed
Martins Pond	MA92038	5	5	Algae		Unchanged
Martins Pond	MA92038	5	5	Mercury in Fish Tissue	33880	Unchanged
Martins Pond	MA92038	5	5	Turbidity		Unchanged
Middleton Pond	MA92039	3	3	None		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Mile Brook	MA92-16	3	3	None		Unchanged
Miles River	MA92-03	5	5	Benthic Macroinvertebrates		Unchanged
Miles River	MA92-03	5	5	Dissolved Oxygen		Unchanged
Mill Pond	MA92041	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Nichols Brook	MA92-25	3	3	None		Unchanged
Norris Brook	MA92-11	5	5	Dissolved Oxygen		Unchanged
Pierces Pond	MA92048	3	3	None		Unchanged
Pleasant Pond	MA92049	5	5	Mercury in Fish Tissue		Unchanged
Putnamville Reservoir	MA92052	3	3	None		Unchanged
Salem Pond	MA92057	5	5	Turbidity		Unchanged
Salem Street Pond	MA92076	3	3	None		Unchanged
Silver Lake	MA92059	5	5	DDT in Fish Tissue		Unchanged
Silver Lake	MA92059	5	5	Mercury in Fish Tissue	33880	Unchanged
Spofford Pond	MA92060	3	3	None		Unchanged
Stearns Pond	MA92061	2	2	None		Unchanged
Stevens Pond	MA92062	4c	4c	(European Water Clover*)		Added
Stevens Pond	MA92062	4c	4c	(Non-Native Aquatic Plants*)		Removed
Stiles Pond	MA92063	3	3	None		Unchanged
Sudden Pond	MA92064	3	3	None		Unchanged
Suntaug Lake	MA92065	3	3	None		Unchanged
Swan Pond	MA92066	3	3	None		Unchanged
Towne Pond	MA92068	3	3	None		Unchanged
Unnamed Tributary	MA92-09	5	5	Fish Bioassessments		Unchanged
Unnamed Tributary	MA92-12	5	5	(Flow Regime Modification*)		Added
Unnamed Tributary	MA92-12	5	5	Escherichia Coli (E. Coli)		Unchanged
Unnamed Tributary	MA92-12	5	5	Fecal Coliform		Unchanged
Unnamed Tributary	MA92-12	5	5	Flocculant Masses		Unchanged
Unnamed Tributary	MA92-12	5	5	Oil and Grease		Removed
Unnamed Tributary	MA92-12	5	5	Scum/Foam		Removed
Unnamed Tributary	MA92-23	5	5	Fecal Coliform		Unchanged
Unnamed Tributary	MA92-26	5	5	Chloride		Unchanged
Wenham Lake	MA92073	5	5	DDT in Fish Tissue		Unchanged
Wenham Lake	MA92073	5	5	Mercury in Fish Tissue	33880	Unchanged
Wills Brook	MA92-10	2	2	None		Unchanged
Winona Pond	MA92077	3	3	None		Unchanged

Bear Meadow Brook (MA92-07)

Location:	Headwaters in Cedar Swamp, Reading to confluence with Ipswich River, Reading/North Reading.
AU Type:	RIVER
AU Size:	2.8 MILES
Classification/Qualifier:	B

No usable data were available for Bear Meadow Brook (MA92-07) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Beaver Pond (MA92002)

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

No usable data were available for Beaver Pond (MA92002) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Berry Pond (MA92003)

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

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aquatic Life Use of Berry Pond (MA92003) is Not Assessed.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Berry Pond, therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aesthetics Use of Berry Pond (MA92003) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Berry Pond Beach (2014-2019), the beach was closed for a maximum of 2% of the time in any year (and not closed at all in the majority of years). The Primary Contact Recreation Use of Berry Pond (MA92003) is assessed as Fully Supporting based on beach posting data.	

Beach Postings

MassDPH Beach Posting Data Summary (% Bathing Season Posted 2014-2019) (Bailey, Logan Feb. 2, 2021) (MassDEP Undated 3)

Beach ID	Beach Name/Town	Left Boundary (Latitude)	Left Boundary (Longitude)	Right Boundary (Latitude)	Right Boundary (Longitude)	2014	2015	2016	2017	2018	2019	# years> 10%
4758	Berry Pond Beach (DCR)/North Andover	42.62050	-71.08750	42.62007	-71.08730	0%	0%	0%	0%	2%	2%	0

Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Berry Pond Beach (2014-2019), the beach was closed for a maximum of 2% of the time in any year (and not closed at all in the majority of years). The Secondary Contact Recreation Use of Berry Pond (MA92003) is assessed as Fully Supporting based on beach posting data.	

Black Brook (MA92-19)

Location:	Outlet Cutler Pond, Hamilton to confluence with Ipswich River, Hamilton.
AU Type:	RIVER
AU Size:	3.6 MILES
Classification/Qualifier:	B

No usable data were available for Black Brook (MA92-19) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

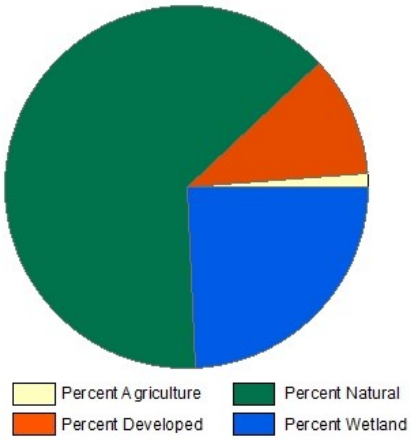
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Boston Brook (MA92-13)

Location:	Outlet of Towne Street Pond, North Andover to confluence with the Ipswich River, Middleton (excluding approximately 0.3 miles through Salem Street Pond segment MA92076), (through former 2014 segments: Upper Boston Brook Pond MA92070 and Lower Boston Brook Pond MA92031).
AU Type:	RIVER
AU Size:	7.2 MILES
Classification/Qualifier:	B

Boston Brook - MA92-13

Watershed Area: 10.88 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10.88	4.77	2.98	1.45
Agriculture	1.2%	1.4%	2.4%	3.4%
Developed	10.7%	8%	8.9%	5.7%
Natural	63.9%	64.6%	58.7%	55.6%
Wetland	24.2%	26%	30%	35.3%
Impervious Cover	5.6%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	5	Benthic Macroinvertebrates		Added
2	5	Dissolved Oxygen		Added

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Source Unknown (N)	X				
Dissolved Oxygen	Source Unknown (N)	X				

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

Fish surveys were conducted in August 2015 (6378) and August 2016 (6345), a benthic macroinvertebrate survey in July 2015 (B0941), and water quality surveys during summers 2015 and 2016 (W2542), all roughly 900 ft upstream/west of the Liberty Street crossing of Boston Brook (Middleton). The 2 fish samples were collected via backpack shocking (n= 53, 70)- the 2015 sample included several brown trout, an intolerant/fluvial species. Additionally, 70-80% of the samples were composed of intolerant/moderately tolerant macrohabitat generalists, a good indicator in this WWF stream. In contrast, the benthic community IBI score (27) was indicative of severely degraded conditions for a high gradient location. Water quality data were generally indicative of good conditions and can be summarized as follows: long-term continuous temperature data (2015, 2016) had a maximum of 27.0 °C, discrete pH ranged from 6.6-6.8 S.U., seasonal average total phosphorus was good at 0.029/0.020 mg/L, maximum Total Ammonia Nitrogen was 0.370 mg/L, maximum chloride was 110 mg/L, maximum specific conductance was 500 µs/cm (lab analyses and discrete measurements generally n=4/year). Long-term continuous DO data were measured over 112 days in the 2016 summer index period and were consistently low (103 of 106 7DADMins were <5.0 mg/L, minimum DO 0.2 mg/L). Maximum DO saturation was 50.4% in 2015 (determined from discrete data) and 37.6% in 2016. The maximum diel DO shift was 4.0 mg/L.
Additionally, 2 fish samples were collected by backpack shocking further downstream in August 2017 (6808, upstream of Liberty St, Middleton) and July 2019 (8580, downstream of Peabody St, Middleton). The 2017 sample was smaller (n=30) and only included 1 brown trout and 1 pumpkinseed (moderately tolerant) as good indicator organisms, but the 2019 sample included a large percentage (64%) of intolerant/moderately tolerant macrohabitat generalists.
Although fish community data and most water quality data for Boston Brook (MA92-13) were generally indicative of good conditions, the Aquatic Life Use for the brook is being assessed as Not Supporting. When analyzed by an IBI for high gradient streams, the benthic community sample was severely degraded so an impairment for Benthic Macroinvertebrates is being added. An impairment for Dissolved Oxygen is also being added as a protective measure, although the consistently low DO is likely heavily influenced by natural conditions (26% of the proximal watershed is comprised of wetlands and 88% of the entire watershed is comprised of natural/wetland land cover).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6345	MassDEP	Fish Community	Boston Brook	, Middleton	42.61839	-71.02113
6378	MassDEP	Fish Community	Boston Brook	, Middleton	42.61839	-71.02113
6808	MassDFG	Fish Community	Boston Brook	Liberty St US, Middleton	42.61991	-71.02011
8580	MassDFG	Fish Community	Boston Bk	Peabody st D.S., Middleton	42.61690	-71.00333
B0941	MassDEP	Benthic	Boston Brook/	[approximately 275 meters upstream/west of Liberty Street, Middleton, MA]	42.618394	-71.021129
W2542	MassDEP	Water Quality	Boston Brook	[approximately 900 feet upstream/west of Liberty Street, Middleton]	42.618394	-71.021129

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 4)

[Index Biological Condition Class: E= Exceptional, S= Satisfactory, MD= Moderately Degraded, SD= Severely Degraded; High Gradient IBI Thresholds: E= 100-75, S= 74-55, MD= 54-35, SD= 34-0; Low Gradient IBI Thresholds: E= 100-81, S= 80-62, MD= 61-38, SD= 37-0; R qualifier = Rarefaction (100ct) <55]

Station Code	Collection Date	Collection Method	Index Type	Organism Count	Index Score	Index Biological Condition Class
B0941	07/08/15	RBP kicknet	Central_Hills_300ct	320	27	SD

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

[Species List: AE = American Eel, B = Bluegill, BT = Brown Trout, CCS = Creek Chubsucker, CP = Chain Pickerel, GS = Golden Shiner, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, SD = Swamp Darter, YB = Yellow Bullhead, YP = Yellow Perch]

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
6345	08/18/16	BP	TP		5	70	0%	0	0%	0%	3	80%	Yes	No	AE, CP, GS, P, RP,
6378	08/28/15	BP	TP		8	53	0%	1	6%	6%	3	70%	No	No	AE, B, CCS, GS, P, RP, YB, YP,
6808	08/07/17	BP	TP	L	5	30	3%	1	3%	3%	1	3%	Yes	No	AE, B, BT, P, YB,
8580	07/19/19	BP	TP		4	11	0%	0	0%	9%	3	64%	No	No	AE, RBS, RP, SD,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[7DADMin= 7-Day Average of the Daily Minima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Day Count	7day Count	30day Count	DO Min (mg/L)	Min 7DADMin (mg/L)	Min 7DADA (mg/L)	Delta DO Max (mg/L)	Count CW 7DADMin <6.0	Count CW 1Day Min <5.0	Count WW Early Life Stages 7DADA <6.5	Count WW Early Life Stages 1Day Min <5.0	Count WW Other Life Stages 7DADMin <5.0	Count WW Other Life Stages 1Day Min <4.0	Count CW 30DADA <8.0	Count WW Other Life Stages 30DADA <6.0
W2542	05/12/16	08/31/16	112	106	83	0.2	0.2	0.2	4	106	107	78	76	103	101	83	83

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
W2542	06/23/15	09/17/15	4	2.5	3.4	4	4	2
W2542	06/08/16	09/27/16	3	0.6	1.8	3	3	3

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; Max Daily Mean= Maximum 24-Hour Average, 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	7day Count	Max Daily Mean (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier1 Daily Mean >23.5	Count CWTier2 7DADA >21	Count CWTier2 Daily Mean >24.1	Count WW 7DADM >27.7	Count WW Daily Mean >28.3
W2542	06/01/15	09/15/15	107	105	25.1	27.0	25.9	23.7	98	15	58	7	0	0
W2542	06/01/16	08/31/16	92	89	22.3	23.2	22.1	21.2	59	0	2	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Count Days Deployed	24hr Rolling Count	Max 24hr Avg Rolling Temp (°C)	Count CWTier1 24hr Avg Rolling >23.5 °C	Count CWTier2 24hr Avg Rolling >24.1 °C	Count WW 24hr Avg Rolling >28.3°C
W2542	06/01/15	09/15/15	107	5136	25.1	771	309	0
W2542	06/01/16	08/31/16	92	4416	22.5	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
W2542	06/23/15	09/17/15	4	3	24.5	21.7	3	1	0	0
W2542	06/08/16	09/27/16	3	3	21.3	19.6	1	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
W2542	06/23/15	09/17/15	4	6.6	6.8	0	0
W2542	06/08/16	09/27/16	3	6.7	6.8	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer seasonal total phosphorus data collected May-Sept]

Station Code	Data Year	Seasonal TP Count	Seasonal TP Min (mg/L)	Seasonal TP Max (mg/L)	Seasonal TP Avg (mg/L)	Delta DO Max (mg/L)	Delta DO Avg (mg/L)	DO Sat Max (%)	pH Max (SU)	Count Algal Obsv.	Dense/V. Dense Film/Fila. Algae
W2542	2015	4	0.016	0.048	0.029	--	--	50.4	6.8	4	0

Station Code	Data Year	Seasonal TP Count	Seasonal TP Min (mg/L)	Seasonal TP Max (mg/L)	Seasonal TP Avg (mg/L)	Delta DO Max (mg/L)	Delta DO Avg (mg/L)	DO Sat Max (%)	pH Max (SU)	Count Algal Obsv.	Dense/V. Dense Film/Fila. Algae
W2542	2016	4	0.012	0.035	0.020	4.0	0.9	37.6	6.8	3	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)
[TAN= NH3 + NH4+]

Station Code	Data Year	TAN Count	TAN Min (mg/L)	TAN Max (mg/L)	TAN Avg (mg/L)	Count TAN >Chronic	Count TAN >Acute
W2542	2015	4	0.040	0.190	0.100	0	0
W2542	2016	4	0.040	0.370	0.168	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2542	2015	4	71	110	91	0	0
W2542	2016	4	56	89	77	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
W2542	06/23/15	09/17/15	4	414	445	0	0	0	0	0	0
W2542	06/08/16	09/27/16	3	412	500	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Boston Brook, therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during 4 site visits each summer, 2015 and 2016, at station W2542 (approximately 900 feet upstream/west of Liberty Street, Middleton) on Boston Brook. Based on this information, the Aesthetics Use of Boston Brook (MA92-13) is assessed as Fully Supporting.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2542	MassDEP	Water Quality	Boston Brook	[approximately 900 feet upstream/west of Liberty Street, Middleton]	42.618394	-71.021129

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 5)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2542	Boston Brook	2015	4	MassDEP aesthetics observations for station W2542 on Boston Brook can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2015.
W2542	Boston Brook	2016	4	MassDEP aesthetics observations for station W2542 on Boston Brook can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2016.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2542	2015	4	4	0
W2542	2016	4	3	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 8)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2542	Boston Brook	2015	Color	Brownish	1	4
W2542	Boston Brook	2015	Color	Light Yellow/Tan	2	4
W2542	Boston Brook	2015	Color	None	1	4
W2542	Boston Brook	2015	Objectionable Deposits	No	4	4
W2542	Boston Brook	2015	Odor	None	4	4
W2542	Boston Brook	2015	Scum	No	4	4
W2542	Boston Brook	2015	Turbidity	Moderately Turbid	1	4
W2542	Boston Brook	2015	Turbidity	Slightly Turbid	3	4
W2542	Boston Brook	2016	Color	Brownish	1	4
W2542	Boston Brook	2016	Color	Light Yellow/Tan	3	4
W2542	Boston Brook	2016	Objectionable Deposits	No	4	4
W2542	Boston Brook	2016	Odor	Musty (Basement)	1	4
W2542	Boston Brook	2016	Odor	None	3	4
W2542	Boston Brook	2016	Scum	No	4	4
W2542	Boston Brook	2016	Turbidity	Moderately Turbid	2	4
W2542	Boston Brook	2016	Turbidity	None	2	4

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for Boston Brook (MA92-13) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for Boston Brook (MA92-13) is Not Assessed.	

Brackett Pond (MA92004)

Location:	Andover.
AU Type:	FRESHWATER LAKE
AU Size:	16 ACRES
Classification/Qualifier:	B

No usable data were available for Brackett Pond (MA92004) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Turbidity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Turbidity	Source Unknown (N)			X	X	X

Bradford Pond (MA92005)

Location:	North Reading.
AU Type:	FRESHWATER LAKE
AU Size:	14 ACRES
Classification/Qualifier:	B

No usable data were available for Bradford Pond (MA92005) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Collins Pond (MA92010)

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

No usable data were available for Collins Pond (MA92010) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Algae		Unchanged
5	5	Turbidity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Source Unknown (N)			X	X	X
Turbidity	Source Unknown (N)			X	X	X

Creighton Pond (MA92011)

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

No usable data were available for Creighton Pond (MA92011) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Crystal Pond (MA92013)

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

No usable data were available for Crystal Pond (MA92013) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Algae		Unchanged
5	5	Chlorophyll-a		Unchanged
5	5	Phosphorus, Total		Unchanged
5	5	Transparency / Clarity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Source Unknown (N)	X		X	X	X
Chlorophyll-a	Source Unknown (N)	X				
Phosphorus, Total	Source Unknown (N)	X		X	X	X
Transparency / Clarity	Source Unknown (N)			X	X	X

Devils Dishfull Pond (MA92015)

Location:	Peabody.
AU Type:	FRESHWATER LAKE
AU Size:	14 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	Chlorophyll-a		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Phosphorus, Total		Unchanged
5	5	Turbidity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X		X	X	X
Chlorophyll-a	Source Unknown (N)			X	X	X
Dissolved Oxygen	Source Unknown (N)	X				
Phosphorus, Total	Source Unknown (N)	X				
Turbidity	Source Unknown (N)			X	X	X

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
As was previously reported, MassDEP staff conducting an aquatic macrophyte survey in Devils Dishfull Pond in July 2000 observed an infestation of the non-native Eurasian water milfoil (*Myriophyllum spicatum*). The Aquatic Life Use of Devils Dishfull Pond (MA92015) will continue to be assessed as Not Supporting with the prior impairments (Dissolved Oxygen, Eurasian Water Milfoil Myriophyllum Spicatum, and Phosphorus, Total) being carried forward.	

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (Mattson 2003)

Summary Statement
As was previously reported, MassDEP staff conducting an aquatic macrophyte survey in Devils Dishfull Pond in July 2000 observed an infestation of the non-native Eurasian water milfoil (*Myriophyllum spicatum*).

Fish Consumption

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Devils Dishfull Pond, therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	**Alert**
Not Supporting	NO
2022 Use Attainment Summary	
There are no new data available, so the Aesthetics Use for Devils Dishfull Pond (MA92015) will continue to be assessed as Not Supporting with the prior impairments for Chlorophyll-a, Eurasian Water Milfoil Myriophyllum Spicatum (a high biovolume was noted in the pond during a 2000 MassDEP survey), and Turbidity being carried forward.	

Primary Contact Recreation

2022 Use Attainment	**Alert**
Not Supporting	NO
2022 Use Attainment Summary	
There are no new data available, so the Primary Contact Recreation Use for Devils Dishfull Pond (MA92015) will continue to be assessed as Not Supporting with the prior impairments for Chlorophyll-a, Eurasian Water Milfoil Myriophyllum Spicatum (a high biovolume was noted in the pond during a 2000 MassDEP survey), and Turbidity being carried forward.	

Secondary Contact Recreation

2022 Use Attainment	**Alert**
Not Supporting	NO
2022 Use Attainment Summary	
There are no new data available, so the Secondary Contact Recreation Use for Devils Dishfull Pond (MA92015) will continue to be assessed as Not Supporting with the prior impairments for Chlorophyll-a, Eurasian Water Milfoil Myriophyllum Spicatum (a high biovolume was noted in the pond during a 2000 MassDEP survey), and Turbidity being carried forward.	

Eisenhaures Pond (MA92016)

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

No usable data were available for Eisenhaures Pond (MA92016) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Elginwood Pond (MA92017)

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

No usable data were available for Elginwood Pond (MA92017) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Emerson Brook Reservoir (Forest Street Pond) (MA92021)

Location:	Middleton/North Reading.
AU Type:	FRESHWATER LAKE
AU Size:	196 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Emerson Brook Reservoir (Forest Street Pond) (MA92021) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Farnum Street Pond (MA92018)

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

No usable data were available for Farnum Street Pond (MA92018) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Field Pond (MA92019)

Location:	Andover.
AU Type:	FRESHWATER LAKE
AU Size:	57 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Fanwort*)		Added
4c	4c	(Non-Native Aquatic Plants*)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Field Pond during an August 1995 synoptic survey. Subsequently, MassDCR Lakes and Ponds staff observed the same species in the pond in 2007 as well as the non-native aquatic macrophyte, variable milfoil (*Myriophyllum heterophyllum*).
Based on this information, the Aquatic Life Use of Field Pond (MA92019) is assessed as Not Supporting. The specific impairment code for Fanwort is being added and the generic Non-Native Aquatic Plants code will be retained as a surrogate for the variable milfoil impairment.

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995) (MassDCR 2008)

Summary Statement
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Field Pond during an August 1995 synoptic survey. Subsequently, MassDCR Lakes and Ponds staff observed the same species in the pond in 2007 as well as the non-native, variable milfoil (*Myriophyllum heterophyllum*).

Fish Consumption

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No site-specific fish consumption advisory has been issued by MA DPH for Field Pond in Andover, therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available so the Aesthetics Use for Field Pond (MA92019) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available so the Primary Contact Recreation Use for Field Pond (MA92019) is Not Assessed.	

Secondary Contact Recreation

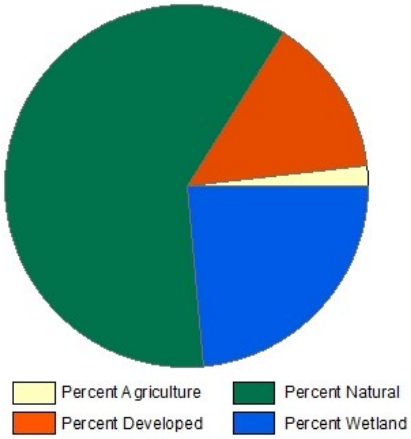
2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available so the Secondary Contact Recreation Use for Field Pond (MA92019) is Not Assessed.	

Fish Brook (MA92-14)

Location:	Headwater, outlet Stiles Pond, Boxford to confluence with Ipswich River, Topsfield/Boxford (through former 2014 segment: Howes Pond MA92026).
AU Type:	RIVER
AU Size:	8.2 MILES
Classification/Qualifier:	B

Fish Brook - MA92-14

Watershed Area: 18.12 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	18.12	5.75	5.45	2.44
Agriculture	1.8%	1.3%	1.8%	1.5%
Developed	14.2%	15.5%	12.2%	12.7%
Natural	60.5%	65.4%	55.8%	58.7%
Wetland	23.5%	17.8%	30.2%	27.2%
Impervious Cover	7.2%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Benthic Macroinvertebrates		Added
5	5	Dissolved Oxygen		Added
5	5	Escherichia Coli (E. Coli)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Source Unknown (N)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

Six backpack shocking, fish community surveys (Sample IDs 5464, 6807, 8579, 8578, 8577, 6372) were conducted throughout the downstream half of Fish Brook in July or August of 2015, 2017, or 2019. The number of individuals in the samples ranged from 8-62 and the percentage of fluvial individuals ranged from 5-69%, while the percentage of intolerant/moderately tolerant macrohabitat generalists ranged from 26-75%, all good indicators in this warmwater fishery. IRWA staff/volunteers collected discrete water quality data (DO, temperature, specific conductance) from 2013-2019 in Fish Brook at station IRWA_FB-MI (Middleton Rd., Boxford) near the most upstream couple of fish stations. All temperature data were <28.3 °C in this WWF (maximum 24.0 °C; n= 1-3 in 4 Summer Index periods). There were occasional instances of DO <4.0 mg/L (minimum DO 3.4 mg/L; n= 7-11/year in 5 years). The maximum specific conductance (SC) measurement was 741 µs/cm (n= 1-10/year in 4 years). Near the downstream end of the brook (and the most downstream fish sample), IRWA staff/volunteers collected discrete water quality data at a second station, IRWA_FB-RI (River Rd, Topsfield), from 2017-2019. Temperature and SC data were similar to the upstream station, but there were no DO concentrations <4.0 mg/L at this station (minimum DO 4.6 mg/L; n= 6-7/year). Nearby, MassDEP staff conducted a benthic macroinvertebrate survey (B0920) in July 2015 and water quality surveys (W2521) throughout summer 2015, roughly 550 ft downstream/south of the River Road/Fuller Lane crossing (Topsfield/Boxford). The benthic community IBI score (51) was indicative of moderately degraded conditions for a low gradient location. Water quality data were generally indicative of good conditions and can be summarized as follows: long-term continuous temperature data had a maximum of 26.0 °C, discrete pH was measured at 6.9 S.U. (on 3 occasions), seasonal average total phosphorus was good at 0.030 mg/L, there were no exceedances among 3 clean metals samples or 3 aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), maximum Total Ammonia Nitrogen was 0.050 mg/L, maximum chloride was 74 mg/L, maximum SC was 354 µs/cm (lab analyses and discrete measurements n= 3-5/year). Long-term continuous DO data were measured over 85 days July to September 2015, with 31 of 79 7DADMins <5.0 mg/L (8 daily minima <4.0 mg/L, minimum DO 2.7 mg/L). Maximum DO saturation was 61.8% and the maximum diel DO shift was 2.7 mg/L. Water quality data were collected at a final downstream IRWA station, IRWA_FB-WA (Washington St., Topsfield), from 2013-2016. Temperature and SC data were similar to the upstream 2 stations, and there were occasional instances of DO <4.0 mg/L (minimum DO 2.0 mg/L; n= 6-9/year).

The Aquatic Life Use of Fish Brook (MA92-14) is assessed as Not Supporting for Benthic Macroinvertebrates (based on a DEP benthic survey) and Dissolved Oxygen (based on DEP/IRWA data). Note that low DO is likely influenced by natural conditions (17.8% of the proximal watershed is comprised of wetlands and 84% of the entire watershed is comprised of natural/wetland land cover).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5464	MassDFG	Fish Community	Fish Brook	Middleton Rd US, Boxford	42.65936	-71.00568
6372	MassDEP	Fish Community	Fish Brook	, Topsfield/Boxford	42.63392	-70.97474
6807	MassDFG	Fish Community	Fish Brook	Middleton Rd US, Boxford	42.65903	-71.00468
8577	MassDFG	Fish Community	Fish Brook	Lockwood lane D.S., Boxford	42.64454	-70.98852
8578	MassDFG	Fish Community	Fish Brook	Mill rd, Boxford	42.65534	-70.99931
8579	MassDFG	Fish Community	Fish Brook	off Middleton rd, Boxford	42.65688	-71.00455

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
B0920	MassDEP	Benthic	Fish Brook/	[approximately 170 meters downstream/south of River Road/Fuller Lane, Topsfield/Boxford, MA]	42.633923	-70.974737
W2521	MassDEP	Water Quality	Fish Brook	[approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford]	42.633923	-70.974737

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_FB-MI	Ipswich River Watershed Association	Water Quality	Fish Brook	Middleton Rd., Boxford	42.65842	-71.00444
IRWA_FB-RI	Ipswich River Watershed Association	Water Quality	Fish Brook	River Rd., Topsfield	42.634808	-70.974772
IRWA_FB-WA	Ipswich River Watershed Association	Water Quality	Fish Brook	Washington St., Topsfield	42.63056	-70.97373

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 4)

[Index Biological Condition Class: E= Exceptional, S= Satisfactory, MD= Moderately Degraded, SD= Severely Degraded; High Gradient IBI Thresholds: E= 100-75, S= 74-55, MD= 54-35, SD= 34-0; Low Gradient IBI Thresholds: E= 100-81, S= 80-62, MD= 61-38, SD= 37-0; R qualifier = Rarefaction (100ct) <55]

Station Code	Collection Date	Collection Method	Index Type	Organism Count	Index Score	Index Biological Condition Class
B0920	07/22/15	RBP multihab	Statewide_Low_Gradient	338	51	MD

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

[Species List: AE = American Eel, B = Bluegill, BS = Banded Sunfish, CCS = Creek Chubsucker, CP = Chain Pickerel, CS = Common Shiner, F = Fallfish, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, RPCP = Hybrid Redfin/Chain Pickerel, SD = Swamp Darter, SL = Sea Lamprey, WS = White Sucker, YB = Yellow Bullhead, YP = Yellow Perch]

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
5464	07/14/15	BP	TP	L	6	47	0%	2	45%	23%	3	38%	No	No	AE, BS, CCS, P, SD, WS,
6372	08/21/15	BP	TP		5	8	0%	1	13%	0%	3	75%	Yes	No	AE, F, LMB, P, YP,
6807	08/07/17	BP	TP	L	8	56	0%	1	7%	7%	5	75%	No	No	AE, B, BS, CP, P, RP, SD, WS,
8577	07/16/19	BP	TP		7	39	0%	3	69%	8%	3	26%	No	No	AE, BS, CCS, CP, CS, F, P,
8578	07/16/19	BP	TP		13	62	0%	3	19%	3%	5	40%	No	No	AE, B, CCS, CP, F, GS, P, RBS, RP, SD, SL, WS, YB,
8579	07/16/19	BP	TP		6	21	0%	1	5%	0%	3	67%	No	No	AE, CP, CS, P, RP, RPCP,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[7DADMin= 7-Day Average of the Daily Minima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Day Count	7day Count	30day Count	DO Min (mg/L)	Min 7DADMin (mg/L)	Min 7DADA (mg/L)	Delta DO Max (mg/L)	Count CW 7DADMin <6.0	Count CW 1Day Min <5.0	Count WW Early Life Stages 7DADA <6.5	Count WW Early Life Stages 1Day Min <5.0	Count WW Other Life Stages 7DADMin <5.0	Count WW Other Life Stages 1Day Min <4.0	Count CW 30DADA <8.0	Count WW Other Life Stages 30DADA <6.0
W2521	07/01/15	09/23/15	85	79	56	2.7	3.8	4.4	2.7	71	28	22	0	31	8	56	48

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
W2521	08/04/15	09/24/15	3	4.9	5.3	2	2	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; Max Daily Mean= Maximum 24-Hour Average, 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	7day Count	Max Daily Mean (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier1 Daily Mean >23.5	Count CWTier2 7DADA >21	Count CWTier2 Daily Mean >24.1	Count WW 7DADM >27.7	Count WW Daily Mean >28.3
W2521	07/01/15	09/15/15	77	74	23.9	26.0	24.2	22.6	70	1	39	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Count Days Deployed	24hr Rolling Count	Max 24hr Avg Rolling Temp (°C)	Count CWTier1 24hr Avg Rolling >23.5 °C	Count CWTier2 24hr Avg Rolling >24.1 °C	Count WW 24hr Avg Rolling >28.3°C
W2521	06/30/15	09/15/15	78	3673	24.0	56	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
W2521	08/04/15	09/24/15	3	2	22.0	19.0	2	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
W2521	08/04/15	09/24/15	3	6.9	6.9	0	0

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_FB-MI	03/24/13	10/27/13	8	4.4	6.4	1	1	0
IRWA_FB-MI	03/29/15	11/15/15	7	4.0	17.0	1	1	0
IRWA_FB-MI	05/21/17	11/12/17	7	5.2	7.6	0	0	0
IRWA_FB-MI	03/25/18	10/28/18	8	5.0	6.8	0	0	0
IRWA_FB-MI	03/31/19	12/15/19	11	3.4	7.4	2	2	1
IRWA_FB-RI	04/30/17	10/29/17	7	4.6	6.5	2	2	0
IRWA_FB-RI	04/29/18	09/30/18	6	6.0	7.1	0	0	0
IRWA_FB-RI	05/19/19	12/15/19	7	4.8	6.8	1	1	0
IRWA_FB-WA	03/24/13	10/27/13	6	5.8	7.6	0	0	0
IRWA_FB-WA	03/30/14	12/14/14	9	5.0	7.9	0	0	0
IRWA_FB-WA	04/26/15	12/13/15	7	4.7	7.2	1	1	0
IRWA_FB-WA	04/24/16	11/13/16	6	2.0	6.0	2	2	2

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_FB-MI	03/24/13	10/27/13	7	2	24.0	15.3	2	1	0	0
IRWA_FB-MI	03/29/15	11/15/15	6	1	19.5	10.9	0	0	0	0
IRWA_FB-MI	03/25/18	10/28/18	8	3	22.0	15.1	1	0	0	0
IRWA_FB-MI	03/31/19	12/15/19	11	3	21.0	12.4	1	0	0	0
IRWA_FB-RI	04/30/17	10/29/17	7	3	23.0	18.3	1	1	0	0
IRWA_FB-RI	04/29/18	09/30/18	6	3	23.0	18.6	2	1	0	0
IRWA_FB-RI	05/19/19	12/15/19	7	2	20.0	12.9	0	0	0	0
IRWA_FB-WA	03/24/13	10/27/13	6	1	22.0	12.6	1	0	0	0
IRWA_FB-WA	03/30/14	12/14/14	9	2	22.5	11.9	1	1	0	0
IRWA_FB-WA	04/26/15	12/13/15	7	2	22.0	14.2	1	0	0	0
IRWA_FB-WA	04/24/16	11/13/16	7	3	24.0	15.0	3	2	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer seasonal total phosphorus data collected May-Sept]

Station Code	Data Year	Seasonal TP Count	Seasonal TP Min (mg/L)	Seasonal TP Max (mg/L)	Seasonal TP Avg (mg/L)	Delta DO Max (mg/L)	Delta DO Avg (mg/L)	DO Sat Max (%)	pH Max (SU)	Count Algal Obsv.	Dense/V. Dense Film/Fila. Algae
W2521	2015	5	0.015	0.047	0.030	2.7	1.0	61.8	6.9	4	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 8) (MassDEP Undated 5)

[CMC= Criterion Maximum Concentration, TU= Toxic Unit]

Station Code	Data Year	Metals Count	As CMC TU >1	Cd CMC TU >1	Cr III CMC TU >1	Cu CMC TU >1	Pb CMC TU >1	Ni CMC TU >1	Ag CMC TU >1	Zn CMC TU >1
W2521	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 8) (MassDEP Undated 5)

[CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Data Year	Metals Count	As CCC TU >1	Cd CCC TU >1	Cr III CCC TU >1	Cu CCC TU >1	Pb CCC TU >1	Ni CCC TU >1	Se CCC TU >1	Zn CCC TU >1
W2521	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Selected TU Calculations. (MassDEP Undated 8) (MassDEP Undated 5)

[CMC= Criterion Maximum Concentration, CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Sample Date	Cd CMC TU	Cd CCC TU	Cu CMC TU	Cu CCC TU	Pb CMC TU	Pb CCC TU
W2521	05/06/15	0.1	0.2	0.3	0.42	0.0	0.8
W2521	06/03/15	0.2	0.3	0.4	0.56	0.0	0.0

Station Code	Sample Date	Cd CMC TU	Cd CCC TU	Cu CMC TU	Cu CCC TU	Pb CMC TU	Pb CCC TU
W2521	07/09/15	0.1	0.2	0.3	0.37	0.0	0.7

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)
[Since only dissolved aluminum data were available, these data were compared to the default freshwater criteria for total recoverable aluminum (TRA), presented in Appendix E of MassDEP's 2022 CALM. As dissolved Al is a fraction of TRA, an exceedance count of 0 does not rule out violations of the TRA criteria. CMC= Criterion Maximum Concentration, CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Data Year	Dissolved Al Count	Al Min (mg/L)	Al Max (mg/L)	Al Avg (mg/L)	Al CMC TU Max	Al CCC TU Max	Al CMC TU >1	Al CCC TU >1
W2521	2015	3	0.051	0.086	0.063	0.1	0.2	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)
[TAN= NH3 + NH4+]

Station Code	Data Year	TAN Count	TAN Min (mg/L)	TAN Max (mg/L)	TAN Avg (mg/L)	Count TAN >Chronic	Count TAN >Acute
W2521	2015	4	0.040	0.050	0.043	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2521	2015	5	62	74	68	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
W2521	08/04/15	09/24/15	3	351	354	0	0	0	0	0	0

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_FB-MI	03/24/13	10/27/13	7	234	468	0	0	0	0	0	0
IRWA_FB-MI	11/15/15	11/15/15	1	671	671	0	0	0	0	0	0
IRWA_FB-MI	03/25/18	10/28/18	8	302	690	0	0	0	0	0	0
IRWA_FB-MI	03/31/19	11/17/19	10	202	741	0	0	0	0	0	0
IRWA_FB-RI	04/30/17	10/29/17	7	276	464	0	0	0	0	0	0
IRWA_FB-RI	04/29/18	09/30/18	6	339	444	0	0	0	0	0	0
IRWA_FB-RI	05/19/19	12/15/19	7	344	759	0	0	0	0	0	0
IRWA_FB-WA	03/24/13	10/27/13	6	245	565	0	0	0	0	0	0
IRWA_FB-WA	03/30/14	12/14/14	8	319	601	0	0	0	0	0	0

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_FB-WA	04/26/15	12/13/15	7	389	672	0	0	0	0	0	0
IRWA_FB-WA	04/24/16	11/13/16	7	447	712	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Fish Brook (MA92-14), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews at Fish Brook station W2521 (approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford) during 5 site visits in summer 2015. Based on this information, the Aesthetics Use of Fish Brook (MA92-14) is assessed as Fully Supporting. There were no instances of high or even moderate turbidity recorded, in comparison to those documented a short distance downstream in the 2016 IR cycle (MassDEP Undated 7), so the Alert for turbidity is being removed.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2521	MassDEP	Water Quality	Fish Brook	[approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford]	42.633923	-70.974737

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 5)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2521	Fish Brook	2015	5	MassDEP aesthetics observations for station W2521/MAP2-681 on Fish Brook can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2015.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2521	2015	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 8)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2521	Fish Brook	2015	Color	Light Yellow/Tan	5	5
W2521	Fish Brook	2015	Objectionable Deposits	No	4	5
W2521	Fish Brook	2015	Objectionable Deposits	Unobservable	1	5
W2521	Fish Brook	2015	Odor	None	5	5
W2521	Fish Brook	2015	Scum	No	4	5
W2521	Fish Brook	2015	Scum	Unobservable	1	5
W2521	Fish Brook	2015	Turbidity	None	2	5
W2521	Fish Brook	2015	Turbidity	Slightly Turbid	2	5
W2521	Fish Brook	2015	Turbidity	Unobservable	1	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

MassDEP staff collected 5 *E. coli* bacteria samples in Fish Brook (W2521- approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford) between May and September 2015. All the intervals had GMs >126 CFU/100mL and 2 samples exceeded the 410 CFU/100mL STV. The seasonal GM was 334 CFU/100 mL. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews at this station during 5 site visits in summer 2015.

Based on this information, the Primary Contact Recreational Use of Fish Brook (MA92-14) is assessed as Not Supporting. The prior impairment for Escherichia Coli (E. Coli) is being carried forward. Since there were no instances of high or even moderate turbidity recorded, in comparison to those documented a short distance downstream in the 2016 IR cycle (MassDEP Undated 7), the Alert for turbidity is being removed.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2521	MassDEP	Water Quality	Fish Brook	[approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford]	42.633923	-70.974737

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 8) (MassDEP Undated 5)

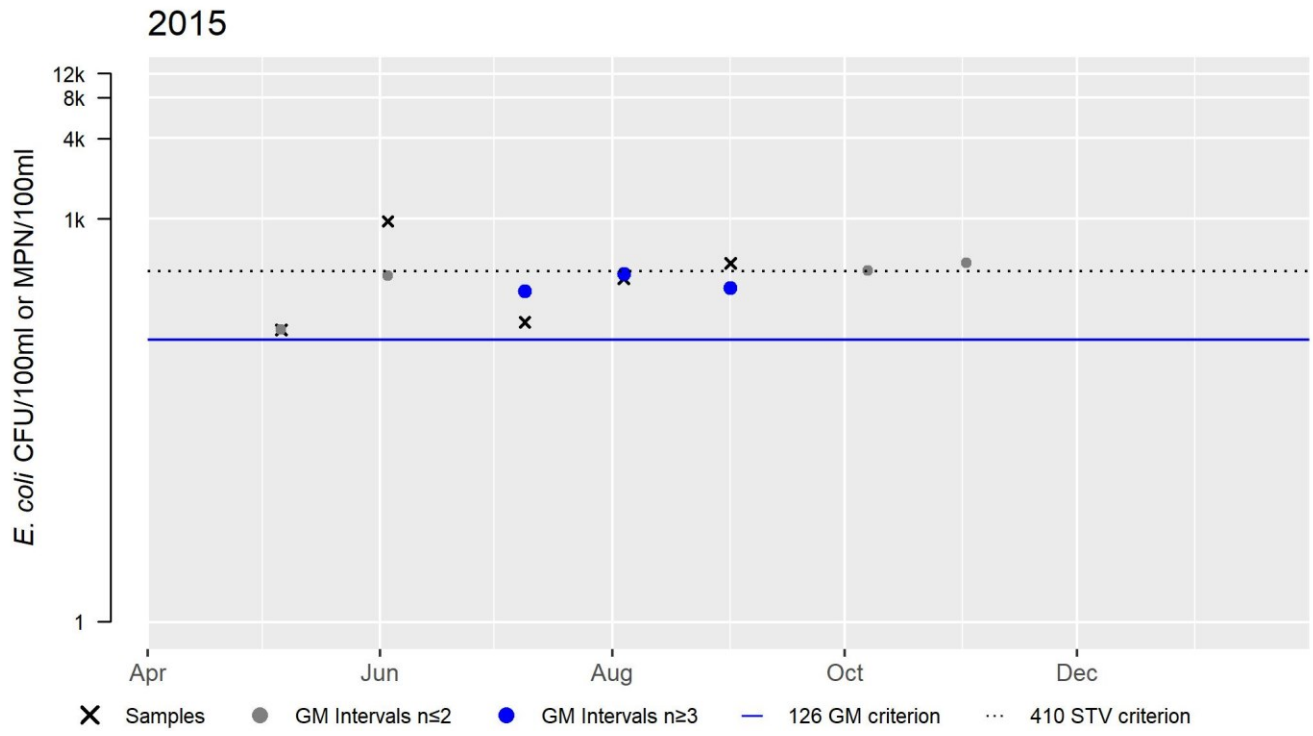
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2521	MassDEP	E. coli	05/06/15	09/01/15	5	150	960	334

W2521 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	334
#GMI	3
#GMI Ex	3
%GMI Ex	100
n>STV	2
%n>STV	40

Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Secondary Contact Recreation

2022 Use Attainment	**Alert**
Fully Supporting	NO
2022 Use Attainment Summary	
MassDEP staff collected 5 E. coli bacteria samples in Fish Brook (W2521- approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford) between May and September 2015. None of the intervals had GMs >630 CFU/100mL and there were no exceedances of the 1260 CFU/100mL STV. The annual GM was 334 CFU/100 mL. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews at this station during 5 site visits in summer 2015. Based on this information, the Secondary Contact Recreational Use of Fish Brook (MA92-14) is assessed as Fully Supporting. Since there were no instances of high or even moderate turbidity recorded, in comparison to those documented a short distance downstream in the 2016 IR cycle (MassDEP Undated 7), the Alert for turbidity is being removed.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2521	MassDEP	Water Quality	Fish Brook	[approximately 550 feet downstream/south of River Road/Fuller Lane, Topsfield/Boxford]	42.633923	-70.974737

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 8) (MassDEP Undated 5)

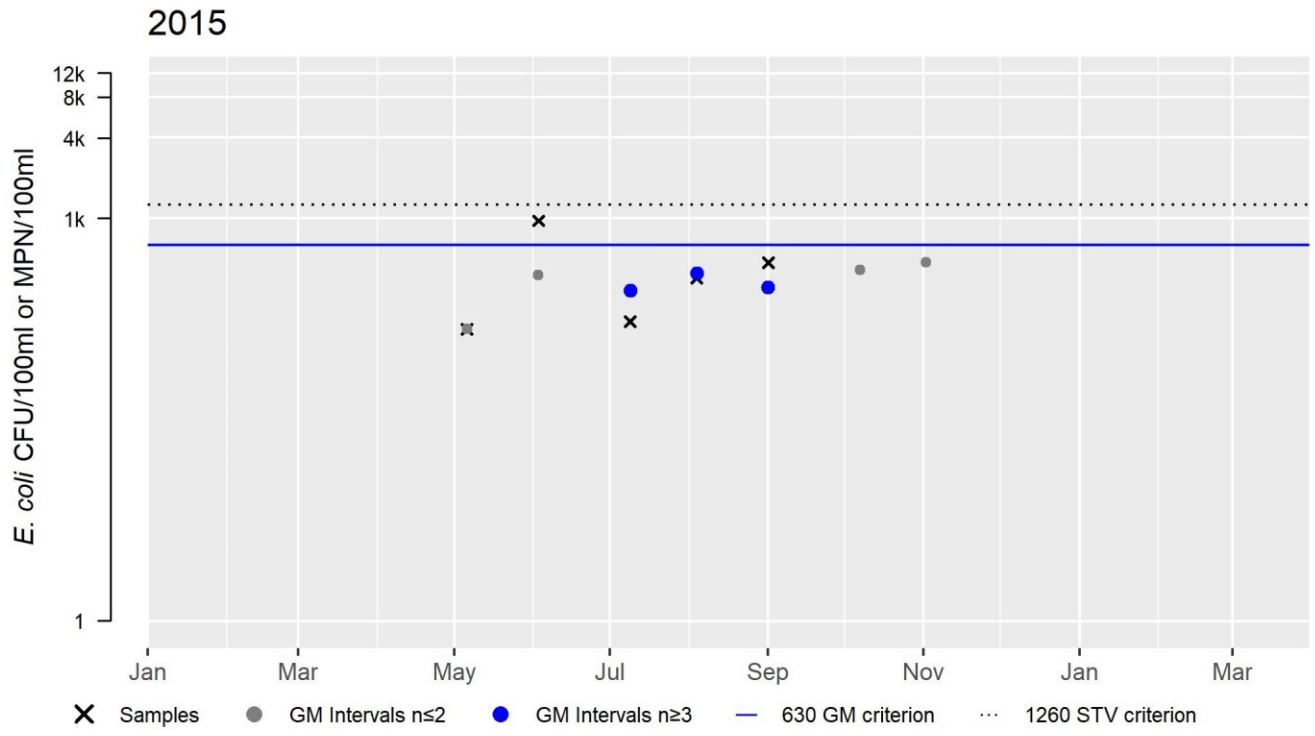
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2521	MassDEP	E. coli	05/06/15	09/01/15	5	150	960	334

W2521 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	334
#GMI	3
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Fourmile Pond (MA92022)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	29 ACRES
Classification/Qualifier:	B

No usable data were available for Fourmile Pond (MA92022) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Frye Pond (MA92023)

Location:	Andover (formerly reported as 1998 segment: Frye Pond MA84082).
AU Type:	FRESHWATER LAKE
AU Size:	7 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Algae		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Source Unknown (N)			X	X	X

Recommendations

2022 Recommendations
AES: Periodic observations and sampling of Frye Pond should be conducted to determine if the algae impairment should be carried forward or removed. The original listing information for this impairment was based solely on a synoptic survey in August 1995.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available so the Aquatic Life Use of Frye Pond (MA92023) is Not Assessed.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Frye Pond (MA92023), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

There are no new data available, so the Aesthetics Use of Frye Pond (MA92023) will continue to be assessed as Not Supporting with the prior impairment for Algae being carried forward.

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Frye Pond Beach (2014-2019), the beach was closed for a maximum of 4% of the time in any year (and not closed at all in half the years). Although beach posting data were indicative of good conditions, the Primary Contact Recreation Use for Frye Pond (MA92023) will remain assessed as Not Supporting due to a prior impairment for Algae that is being carried forward.	

Beach Postings

MassDPH Beach Posting Data Summary (% Bathing Season Posted 2014-2019) (Bailey, Logan Feb. 2, 2021) (MassDEP Undated 3)

Beach ID	Beach Name/Town	Left Boundary (Latitude)	Left Boundary (Longitude)	Right Boundary (Latitude)	Right Boundary (Longitude)	2014	2015	2016	2017	2018	2019	# years> 10%
4759	Frye Pond Beach (DCR)/North Andover	42.60620	-71.09040	42.60574	-71.09020	2%	0%	0%	0%	4%	2%	0

Secondary Contact Recreation

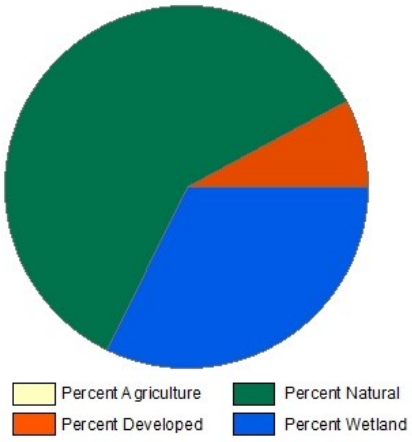
2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Frye Pond Beach (2014-2019), the beach was closed for a maximum of 4% of the time in any year (and not closed at all in half the years). Although beach posting data were indicative of good conditions, the Secondary Contact Recreation Use for Frye Pond (MA92023) will remain assessed as Not Supporting due to a prior impairment for Algae that is being carried forward	

Gravelly Brook (MA92-18)

Location:	Headwaters, Willowdale State Forest, Ipswich to confluence with Ipswich River, Ipswich.
AU Type:	RIVER
AU Size:	1.5 MILES
Classification/Qualifier:	B

Gravelly Brook - MA92-18

Watershed Area: 2.25 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.25	2.25	0.57	0.57
Agriculture	0.8%	0.8%	1.4%	1.4%
Developed	7.7%	7.7%	5.2%	5.2%
Natural	59.5%	59.5%	48.6%	48.6%
Wetland	31.9%	31.9%	44.8%	44.8%
Impervious Cover	2.8%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Lack of a Coldwater Assemblage		Added

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Source Unknown (N)	X				
Lack of a Coldwater Assemblage	Source Unknown (N)	X				

Recommendations

2022 Recommendations
ALU: Long-term continuous temperature data should be collected in Gravelly Brook upstream of Topsfield Rd in Ipswich to allow determination of whether a temperature impairment has contributed to the loss of Eastern brook trout in this subwatershed. Periodic fish community sampling should also be conducted during the July through September timeframe (especially to coincide with any continuous temperature monitoring) to evaluate whether the loss of the coldwater fish assemblage continues.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary

Two fish community surveys were conducted by MassDFG biologists in the downstream portion of Gravelly Brook, in the area upstream of Topsfield Rd, Ipswich in October 2015 (#5728) and August 2017 (#6825). The samples were somewhat small (n= 24 & 13) and did not contain any coldwater species. An August 2013 DFG sample (#4784, from the same area) that was previously described in the 2016 reporting cycle also did not contain any coldwater species (although it was noted that sampling was difficult due to shallow water and thick brush) (MassDEP Undated 7). This stream is a Tier 1 Cold Water Existing Use since multiple age classes of Eastern brook trout (a coldwater species indicative of excellent habitat and water quality conditions) were previously collected in this downstream portion of the stream by DFG staff in August 2000 (MassDFG 2020) and DEP staff in September 2005 (Maietta 2006). It is concerning that this species was not collected in any of the recent samples.

IRWA staff/volunteers collected water quality data (DO, temperature, specific conductance) in Gravelly Brook (IRWA_GB) in the vicinity of the fish surveys from 2013-2019. Although there were occasional measurements >20.0 °C during the period of record, there were no measurements >20.0 °C from 2015-2019 other than 2 elevated measurements (>22.0 °C) in 2016 when there was a drought (n= 1-3/Summer Index period). The minimum DO concentrations were <5.0 mg/L in 5 of 7 years (overall minimum DO 0.2 mg/L), with 3 such measurements in 2019 (minimum DO 3.7 mg/L in 2019; n=8). Note that low DO is likely influenced by natural conditions (31.9% of the proximal watershed is comprised of wetlands and 91.4% of the entire watershed is comprised of natural/wetland land cover, with only 2.8% impervious cover in the watershed). The overall maximum specific conductance measurement was 627 µs/cm (generally, n= 4-9/year).

Based on this information, the Aquatic Life Use of Gravelly Brook (MA92-18), a Tier 1 Cold Water Existing Use, is assessed as Not Supporting due to Lack of a Coldwater Assemblage, as well as the prior impairment for Benthic Macroinvertebrates which is being carried forward. An Alert is being added for occasional elevated temperature and a recommendation will be made to collect continuous temperature data.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5728	MassDFG	Fish Community	Gravely Brook	US of Topsfield Rd, along trail (Gravelley Brook Rd), Ipswich	42.66087	-70.90383
6825	MassDFG	Fish Community	Gravely Brook	Topsfield Rd US, Ipswich	42.66143	-70.90432

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_GB	Ipswich River Watershed Association	Water Quality	Gravelly Brook	Willowdale State Forest, Ipswich	42.66181	-70.90388

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

[Species List: AE = American Eel, BS = Banded Sunfish, F = Fallfish, RP = Redfin Pickerel, SL = Sea Lamprey, WS = White Sucker]

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
5728	10/06/15	BP	TP		6	24	0%	2	8%	4%	2	21%	No	Yes	AE, BS, F, RP, SL, WS,
6825	08/21/17	BP	TP	L	2	13	0%	0	0%	0%	1	8%	No	Yes	AE, RP,

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_GB	04/28/13	09/29/13	5	3.0	5.6	1	1	1
IRWA_GB	03/30/14	09/28/14	5	5.0	6.8	0	0	0
IRWA_GB	04/26/15	11/15/15	6	0.2	6.3	1	1	1
IRWA_GB	04/24/16	11/13/16	8	3.5	5.7	2	2	1
IRWA_GB	05/21/17	12/17/17	8	3.0	6.7	1	1	1
IRWA_GB	03/25/18	12/16/18	10	5.2	7.1	0	0	0
IRWA_GB	04/28/19	11/17/19	8	3.7	6.0	3	3	1

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_GB	04/28/13	09/29/13	5	2	25.0	18.7	1	1	0	0
IRWA_GB	03/30/14	09/28/14	5	2	22.0	14.0	1	0	0	0
IRWA_GB	04/26/15	11/15/15	5	1	20.0	13.1	0	0	0	0
IRWA_GB	04/24/16	12/18/16	9	3	24.0	14.2	2	2	0	0
IRWA_GB	03/25/18	12/16/18	9	2	20.0	9.8	0	0	0	0
IRWA_GB	04/28/19	12/16/19	9	3	20.0	11.6	0	0	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_GB	04/28/13	09/29/13	5	200	275	0	0	0	0	0	0
IRWA_GB	03/30/14	09/28/14	5	277	537	0	0	0	0	0	0
IRWA_GB	04/26/15	11/15/15	2	257	417	0	0	0	0	0	0
IRWA_GB	04/24/16	12/18/16	9	153	627	0	0	0	0	0	0
IRWA_GB	04/29/18	10/28/18	4	192	281	0	0	0	0	0	0
IRWA_GB	04/28/19	12/16/19	6	172	407	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Gravelly Brook (MA92-18), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No new data are available, so the Aesthetics Use for Gravelly Brook (MA92-18) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No new data are available, so the Primary Contact Recreation Use for Gravelly Brook (MA92-18) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No new data are available, so the Secondary Contact Recreation Use for Gravelly Brook (MA92-18) is Not Assessed.	

Hood Pond (MA92025)

Location:	Ipswich/Topsfield.
AU Type:	FRESHWATER LAKE
AU Size:	68 ACRES
Classification/Qualifier:	B

No usable data were available for Hood Pond (MA92025) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	Mercury in Fish Tissue	33880	Unchanged

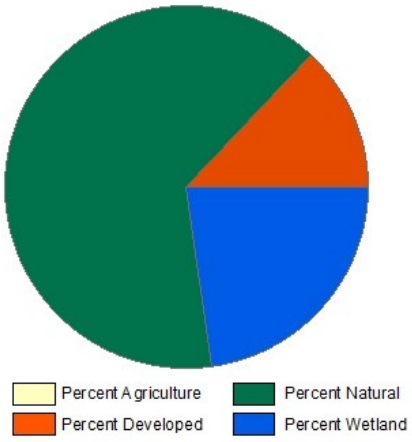
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Howlett Brook (MA92-17)

Location:	Headwaters north of Great Hill, Topsfield to confluence with Ipswich River, Topsfield.
AU Type:	RIVER
AU Size:	2.7 MILES
Classification/Qualifier:	B

Howlett Brook - MA92-17

Watershed Area: 10.44 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10.44	6.53	3.42	2.4
Agriculture	0.8%	0.8%	0.6%	0.8%
Developed	12.9%	13.1%	9.9%	8.9%
Natural	63.7%	61.1%	52.8%	49.5%
Wetland	22.6%	24.9%	36.8%	40.8%
Impervious Cover	6.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Fish Passage Barrier*)		Added
5	5	Dissolved Oxygen		Added
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Fish Passage Barrier*)	Dam or Impoundment (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

IRWA staff/volunteers collected water quality data (DO, temperature, specific conductance) in Howlett Brook (MA92-17) at station IRWA_HB-EA (East St., Topsfield) from 2017-2019 and downstream at station IRWA_HB (Ipswich Road, Topsfield) from 2013-2016. All temperature data were <28.3 °C in this WWF (maximum 25.2 °C; n= usually 3 per Summer Index period). The minimum DO concentrations were <4.0 mg/L in multiple years for both stations (overall minimum DO 3.0 mg/L at both stations; n= 7-10/year in most years both stations). The maximum specific conductance was 865 µs/cm at the upstream station and 845 µs/cm at the downstream station. DMF biologists noted one structure causing passage limitation to diadromous fish, close to the downstream end of the Howlett Brook AU. The Howlett Brook Dam (NATID# MA01610) (which creates a small impoundment called Mill Pond) was given a passage score of "10" on a 0-10 scale, indicating that the dam allows no possible passage of the targeted fish species, river herring and American eel. The population score was noted to be "1" in this area.
The Aquatic Life Use for Howlett Brook (MA92-17) is assessed as Not Supporting. Impairments are being added for Fish Passage Barrier (based on DMF recommendation) and Dissolved Oxygen (based on IRWA data). Note that low DO is likely influenced by natural conditions (24.9% of the proximal watershed is comprised of wetlands and 86.3% of the entire watershed is comprised of natural/wetland land cover).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_HB	Ipswich River Watershed Association	Water Quality	Howlett Brook	Ipswich Road, Topsfield	42.65512	-70.91711
IRWA_HB-EA	Ipswich River Watershed Association	Water Quality	Howlett Brook	East St., Topsfield	42.660726	-70.919879

Biological Monitoring Information

Habitat and Flow Data (anthropogenic alterations)

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists note one structure causing passage limitation to diadromous fish, close to the downstream end of the Howlett Brook AU. The Howlett Brook Dam (NATID# MA01610) (which creates a small impoundment called Mill Pond) was given a passage score of "10" on a 0-10 scale, indicating that the dam allows no possible passage of the targeted fish species, river herring and American eel. The population score was noted to be "1" in this area. The Aquatic Life Use for Howlett Brook (Assessment Unit MA92-17) is assessed as Not Supporting based on the barrier to diadromous fish passage at the Howlett Brook Dam.

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_HB	04/28/13	11/17/13	7	4.6	6.6	1	1	0
IRWA_HB	01/26/14	12/14/14	10	4.1	7.1	3	3	0
IRWA_HB	03/29/15	12/13/15	9	3.0	6.9	3	3	1
IRWA_HB	06/26/16	07/31/16	2	3.8	5.1	1	1	1
IRWA_HB-EA	05/21/17	12/17/17	8	3.9	5.3	5	5	1
IRWA_HB-EA	03/25/18	12/16/18	10	3.0	6.0	5	5	2
IRWA_HB-EA	03/31/19	12/15/19	9	3.8	6.0	4	4	1

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_HB	04/28/13	11/17/13	7	3	23.0	14.9	2	1	0	0
IRWA_HB	01/26/14	12/14/14	10	3	22.0	12.0	2	0	0	0
IRWA_HB	03/29/15	12/13/15	9	3	22.0	12.8	3	0	0	0
IRWA_HB	06/26/16	06/26/16	1	1	20.1	20.1	1	0	0	0
IRWA_HB-EA	05/21/17	12/17/17	8	3	25.2	14.8	1	1	0	0
IRWA_HB-EA	03/25/18	12/16/18	10	3	24.0	12.8	1	1	0	0
IRWA_HB-EA	03/31/19	12/15/19	10	3	23.0	14.1	2	1	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_HB	07/28/13	11/17/13	5	337	845	0	0	0	0	0	0
IRWA_HB	01/26/14	06/29/14	4	396	837	0	0	0	0	0	0
IRWA_HB	03/29/15	12/13/15	7	387	800	0	0	0	0	0	0
IRWA_HB	06/26/16	06/26/16	1	599	599	0	0	0	0	0	0
IRWA_HB-EA	05/21/17	12/17/17	8	408	762	0	0	0	0	0	0
IRWA_HB-EA	03/25/18	12/16/18	9	449	865	0	0	0	0	0	0
IRWA_HB-EA	03/31/19	12/15/19	9	448	796	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Howlett Brook (MA92-17), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aesthetic Use of Howlett Brook (MA92-17) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use of Howlett Brook (MA92-17) will continue to be assessed as Not Supporting with the prior impairments (Escherichia Coli (E. Coli) and Fecal Coliform) being carried forward.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use of Howlett Brook (MA92-17) is Not Assessed.	

Idlewild Brook (MA92-24)

Location:	Outlet of Pleasant Pond, Hamilton to confluence with Ipswich River, Hamilton.
AU Type:	RIVER
AU Size:	1.1 MILES
Classification/Qualifier:	B

No usable data were available for Idlewild Brook (MA92-24) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Ipswich River (MA92-02)

Location:	Ipswich Mills Dam (formerly known as Sylvania Dam), Ipswich to mouth at Ipswich Bay, Ipswich.
AU Type:	ESTUARY
AU Size:	0.39 SQUARE MILES
Classification/Qualifier:	SA: SFO

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Added
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Shellfish Harvesting	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Source Unknown (N)	X					
Fecal Coliform	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) (Y)			X			

Recommendations

2022 Recommendations
ALU: Collect continuous DO data in the vicinity of the Green St crossing (Ipswich), as well as further downstream in the AU, to better evaluate the spatial extent of the low DO conditions.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

DMF biologists noted one barrier providing adequate passage to diadromous fish at the upstream end of this Ipswich River AU (MA92-02). The Ipswich Mills Dam (NATID# MA00231) (with existing fishway), was given a passage score of "3" (on a scale out of 10), indicating that the dam is only a minor obstruction to the passage of river herring and American eel. UMass-Amherst students studying the thermal effects of the Ipswich Mills Dam collected water quality data from 2015-2017 at several locations, in the upper part of the AU, just downstream of the dam at 32 m downstream of the dam (UMassA_IPSDS), 65m downstream of the dam (UMassA_IPSDS1), and 220 m downstream of the dam (UMassA_IPSDS2). Data measured at the most upstream station, located in a turbulent reach just downstream of the Ipswich Mills Dam, are not considered representative of the AU and will not be discussed here. Continuous temperature measurements at the 2 downstream stations from 2015-2017 (n= 16-106 days/probe deploy) documented some elevated data in 2016 at both locations, but this was a drought year (Drought Management Task Force 2021). The maximum temperature in 2015 and 2017 was 28.1 °C and the maximum 24-hour rolling average in those years was 26.2 °C.
IRWA staff/volunteers collected discrete WQ data (DO, temp, SC) from 2013-2019 at 2 stations in the upstream portion of this AU (although downstream from the UMass study sites), IRWA_IP25 (Green St, Ipswich) and IRWA_IP26 (Town Landing, Ipswich). At the Green St location, multiple measurements were <6.0 mg/L in 2013, 2014, and 2018; annual minima at this station ranged from 4.0-5.7 mg/L (n= 5-9/yr). At the Town Landing station, DO data were better with multiple measurements <6.0 mg/L only in 2014; annual minima ranged from 4.9-6.7 mg/L (n= 7-10/yr). Among the temperature data from these 2 stations, none were >29.4 °C (maximum temp. 28.0 °C; n= 2-3/Summer Index period/station).
Based on these data, the Aquatic Life Use of this Ipswich River AU (MA92-02) is assessed as Not Supporting. A new impairment is being added for Dissolved Oxygen based on data collected by IRWA in the upstream portion of this Ipswich River estuarine AU (mainly around the Green St crossing, Ipswich). Additional DO data should be collected in the mid- and downstream areas to further evaluate conditions there.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_IP25	Ipswich River Watershed Association	Water Quality	Ipswich River	Green Street, Ipswich	42.67984	-70.83132
IRWA_IP26	Ipswich River Watershed Association	Water Quality	Ipswich River	Town Landing, Ipswich	42.68401	-70.82708
UMassA_IPSDS	UMass Amherst	Water Quality	Ipswich River	32m downstream dam	42.677918	-70.837652
UMassA_IPSDS1	UMass Amherst	Water Quality	Ipswich River	65m downstream dam	42.6782	-70.837583
UMassA_IPSDS2	UMass Amherst	Water Quality	Ipswich River	220m downstream dam	42.679524	-70.837307

Biological Monitoring Information

Habitat and Flow Data (anthropogenic alterations)

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists noted one barrier providing adequate passage to diadromous fish at the upstream end of this Ipswich River AU. The Ipswich Mills Dam (NATID# MA00231) (with existing fishway), was given a passage score of "3", indicating that the dam is only a minor obstruction to the passage of the targeted species, river herring and American eel. The population score in this area was noted to be "5".

Physico-chemical Water Quality Information

DO, pH, Temperature

UMass Amherst Dam Study Short-term Continuous Dissolved Oxygen Data (2015-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Note: X= 7 (or # of deploy days if less than seven days); XDADMin= XDay Average of the Daily Minima, XDADA= XDay Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Day Count	DO Min (mg/L)	Min XDADMin (mg/L)	Min XDADA (mg/L)	Delta DO Max (mg/L)	Count CW XDADMin <6.0	Count CW 1Day Min <5.0	Count WW Early Life Stages XDADA <6.5	Count WW Early Life Stages 1Day Min <5.0	Count WW Other Life Stages XDADMin <5.0	Count WW Other Life Stages 1Day Min <4.0
UMassA_IPSDS*	09/04/15	09/17/15	14	1.8	3.0	5.4	7.5	8	14	0	0	8	10
UMassA_IPSDS*	07/28/16	08/14/16	13	0.5	1.0	5.5	14.3	7	13	0	4	7	13
UMassA_IPSDS*	09/09/16	09/14/16	6	0.3	0.9	6.7	25.1	1	6	0	0	1	6

* The station is located in a turbulent reach just downstream of the Ipswich Mills Dam and is not considered representative of the rest of the AU- these data should not be used for use attainment decisions.

Ipswich River Watershed Association Estuarine Discrete Dissolved Oxygen Data (2013-2020)*. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	% Meas. <5.0	% Meas. <4.0
IRWA_IP25	03/24/13	11/17/13	9	4.6	7.2	22	0
IRWA_IP25	03/30/14	12/14/14	9	5.4	8.1	0	0
IRWA_IP25	04/26/15	12/13/15	5	5.5	8.2	0	0
IRWA_IP25	03/26/17	11/12/17	7	5.7	8.0	0	0
IRWA_IP25	03/25/18	12/16/18	9	4.0	6.8	22	0
IRWA_IP25	04/28/19	12/15/19	5	4.2	8.8	20	0
IRWA_IP26	03/24/13	09/29/13	7	6.0	8.2	0	0
IRWA_IP26	03/30/14	12/14/14	10	5.7	8.1	0	0
IRWA_IP26	03/29/15	12/13/15	7	6.7	8.8	0	0
IRWA_IP26	03/20/16	12/18/16	10	5.4	8.4	0	0
IRWA_IP26	03/26/17	11/12/17	9	4.9	8.9	11	0
IRWA_IP26	03/25/18	11/18/18	9	6.5	9.0	0	0
IRWA_IP26	03/31/19	12/15/19	10	6.2	8.7	0	0

* For IRWA_IP25, 12 of 44 measurements (27%) were <6.0 mg/L from 2013-2019 and 4 of 62 measurements (6%) at IRWA_IP26 were <6.0 mg/L over the same period (IRWA 2021) (MassDEP Undated 3).

UMass Amherst Dam Study Long-term Continuous Temperature Data (Summer Index 2014-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	Max 24hr Rolling Avg Temp (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier2 7DADA >21	Count WW 7DADM >27.7
UMassA_IPSDS*	09/04/15	09/17/15	12	25.6	26.6	26.6	24.2	9	9	0
UMassA_IPSDS*	07/28/16	09/14/16	19	28.9	31.3	31.3	26.6	4	4	4
UMassA_IPSDS1	07/08/15	12/31/15	20	25.4	27.1	25.1	24.9	20	20	0
UMassA_IPSDS1	01/01/16	12/31/16	58	27.6	31.0	28.8	28.6	63	57	9
UMassA_IPSDS1	01/01/17	11/30/17	106	26.1	26.7	25.5	25.3	93	85	0
UMassA_IPSDS2	07/08/15	12/31/15	16	25.8	28.1	25.5	25.3	10	10	0
UMassA_IPSDS2	01/01/16	12/31/16	106	27.3	30.7	27.9	27.8	105	99	3
UMassA_IPSDS2	01/01/17	11/30/17	106	26.2	27.4	25.7	25.6	93	83	0

* The station is located in a turbulent reach just downstream of the Ipswich Mills Dam and is not considered representative of the rest of the AU- these data should not be used for use attainment decisions.

Ipswich River Watershed Association Estuarine Discrete Temperature Data (2013-2019).* (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count >29.4
IRWA_IP25	03/24/13	11/17/13	9	3	24.8	15.8	0
IRWA_IP25	03/30/14	12/14/14	9	3	22.5	13.3	0
IRWA_IP25	04/26/15	12/13/15	5	2	23.0	15.9	0
IRWA_IP25	03/26/17	11/12/17	7	3	23.0	14.6	0
IRWA_IP25	03/25/18	12/16/18	9	3	23.0	14.1	0
IRWA_IP25	04/28/19	12/15/19	5	0	17.0	9.0	0
IRWA_IP26	03/24/13	09/29/13	7	3	26.0	19.3	0
IRWA_IP26	03/30/14	12/14/14	10	3	23.0	13.4	0
IRWA_IP26	03/29/15	12/13/15	7	2	24.0	13.0	0
IRWA_IP26	03/20/16	12/18/16	10	3	28.0	15.8	0
IRWA_IP26	03/26/17	11/12/17	8	3	23.0	15.9	0
IRWA_IP26	03/25/18	12/16/18	9	3	25.0	13.1	0
IRWA_IP26	03/31/19	12/15/19	10	3	26.0	14.3	0

UMass Amherst Dam Study Discrete pH Data (2016-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

Station Code	Start Date	End Date	Sample Depth	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
UMassA_IPSDS*	07/27/16	09/15/16	Surface	6	7.2	8.2	0	0

* The station is located in a turbulent reach just downstream of the Ipswich Mills Dam and is not considered representative of the rest of the AU- these data should not be used for use attainment decisions.

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in this Ipswich River AU (MA92-02), therefore the Fish Consumption Use is Not Assessed.	

Shellfish Harvesting

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
Ipswich River (MA92-02): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.3713 sq mi (95%). The approved shellfish growing area represents 0 sq mi (0%). The Shellfish Harvesting Use is assessed as not supporting because the growing area (normalized to the AU area) is < 100% approved. Based on the new growing area classifications, the fecal coliform impairment is being retained. Alert due to prohibited area >= 0.0001 sq mi.	

Shellfish Growing Area Classifications

MassDFG-Division of Marine Fisheries Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Area Name	Waterbody/Area Description	Classification	Area (Sq. Mi.)	Area (% of AU)
N4.0	Plum Island Sound	Conditionally Approved	0.00001	0.0%
N5.0	Ipswich River	Conditionally Approved	0.25466	64.9%
N5.1	Fox and Treadwell Island Creeks	Conditionally Approved	0.00015	0.0%
N5.3	Neck Cove	Conditionally Approved	0.01844	4.7%
N5.4	Neck Creek	Conditionally Approved	0.00059	0.1%
N5.5	Greenwoods	Prohibited	0.03030	7.7%
N5.6	Labor-in-Vain Creek	Conditionally Approved	0.00115	0.3%
N5.7	Upper Ipswich River	Prohibited	0.06510	16.6%
N6.1	Steep Hill Beach	Prohibited	0.00091	0.2%

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No new data are available, so the Aesthetics Use for this Ipswich River AU (MA92-02) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Little Neck and Steep Hill beaches in Ipswich (both located on this Ipswich River AU, MA92-02), neither beach was ever closed during the period, 2014-2019. The Primary Contact Recreation Use for this Ipswich River AU (MA92-02) is assessed as Fully Supporting.	

Beach Postings

MassDPH Beach Posting Data Summary (% Bathing Season Posted 2014-2019) (Bailey, Logan Feb. 2, 2021) (MassDEP Undated 3)

Beach ID	Beach Name/Town	Left Boundary (Latitude)	Left Boundary (Longitude)	Right Boundary (Latitude)	Right Boundary (Longitude)	2014	2015	2016	2017	2018	2019	# years> 10%
2925	Little Neck/Ipswich	42.69391	-70.79350	42.69400	-70.79280	0%	0%	0%	0%	0%	0%	0
2922	Steep Hill/Ipswich	42.69250	-70.78980	42.69099	-70.77950	0%	0%	0%	0%	0%	0%	0

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Summary
Ipswich River (MA92-02): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.3713 sq mi (95%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than "approved", the Primary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Secondary Contact Recreation

2022 Use Attainment	**Alert**
Fully Supporting	NO
2022 Use Attainment Summary	
According to MassDPH beach posting data for Little Neck and Steep Hill beaches in Ipswich (both located on this Ipswich River AU, MA92-02), neither beach was ever closed during the period, 2014-2019. The Secondary Contact Recreation Use for this Ipswich River AU (MA92-02) is assessed as Fully Supporting.	

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

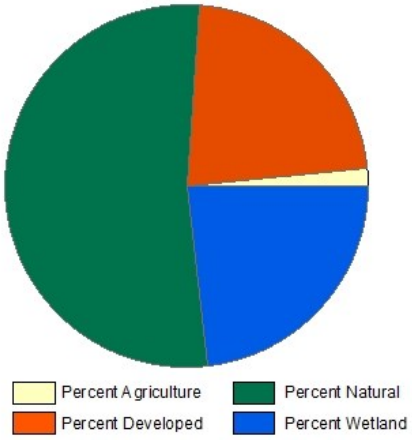
Summary
Ipswich River (MA92-02): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.3713 sq mi (95%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than "approved", the Secondary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Ipswich River (MA92-06)

Location:	Source at confluence of Maple Meadow Brook and Lubbers Brook, Wilmington, to Salem Beverly Waterway Canal, Topsfield (formerly part of 1996 segment: Ipswich River MA92-01).
AU Type:	RIVER
AU Size:	20.4 MILES
Classification/Qualifier:	B: TWS, WWF, HQW

Ipswich River - MA92-06

Watershed Area: 100.24 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	100.24	9.26	26.64	2.87
Agriculture	1.6%	5.3%	1.8%	4.6%
Developed	22.3%	24%	13.1%	18.5%
Natural	52.9%	52.1%	50.2%	41.5%
Wetland	23.2%	18.5%	34.9%	35.4%
Impervious Cover	11.7%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	(Fish Passage Barrier*)		Added
5	5	Benthic Macroinvertebrates		Added
5	5	Dissolved Oxygen		Unchanged
5	5	Escherichia Coli (E. Coli)		Added
5	5	Fish Bioassessments		Added
5	5	Mercury in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Dewatering*)	Baseflow Depletion from Groundwater Withdrawals (N)	X				
(Fish Passage Barrier*)	Dam or Impoundment (Y)	X				
Benthic Macroinvertebrates	Source Unknown (N)	X				

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Baseflow Depletion from Groundwater Withdrawals (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fish Bioassessments	Source Unknown (N)	X				
Mercury in Fish Tissue	Source Unknown (N)		X			

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in the Ipswich River (MA92-06) to track chloride trends (perhaps prioritizing measurements immediately downstream of I-93 where elevated SC already exists, as well as other locations further downstream in the AU). Given the regional trend of increasing chloride, the use of de-icing products containing chloride should be minimized by all parties (i.e., highways/roads, municipalities, businesses, residences) in this Ipswich River sub-watershed. The Fish Passage Barrier impairment should be reevaluated once removal of the Ipswich River Dam (aka Bostik Finley Dam or South Middleton Dam) is complete.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

Data were collected in this Ipswich River AU (MA92-06) by multiple organizations: MassDFG and MassDEP fish community data, MassDEP benthic community data, and water quality data from MassDEP, IRWA, and UMass Amherst. Twelve fish community samples (Sample IDs: 6407, 5249, 5485, 5486, 6838, 6837, 5487, 5248, 6835, 6836, 6839, and 6834) were collected from 2014-2017 in the Ipswich River (AUs MA92-06 and MA92-15). Percent similarity with the Ipswich Target Fish Community model was low at 24.21% (mainly due to a much smaller proportion of fluvial species and a larger proportion of tolerant species).

MassDEP staff conducted benthic macroinvertebrate and water quality (WQ) surveys during summer 2015 at 3 locations in this AU: B0925/W2526 (~175 ft downstream/E. of Chestnut St, N. Reading), B0914/W2515 (~2500 ft downstream/N. of Rt 114, Middleton/Danvers), and B0905/W2506 (~200 ft downstream/N. of Peabody St, Middleton). The benthic low gradient IBI scores (27/35) were indicative of severely degraded conditions at the 2 upstream locations (B0925/B0914) and of moderately degraded conditions (score of 47) at the downstream location (B0905). WQ data were generally indicative of good conditions: long-term continuous temp. data Summer Index max of 27.6 °C among all 3 stations, discrete pH 6.7-7.1 S.U., seasonal avg TP 0.027-0.065 mg/L, no exceedances among 2-3 clean metals or aluminum samples at each station (note, dissolved Al data were compared to total recoverable Al criteria, so exceedances cannot be ruled out), max Total Ammonia Nitrogen 0.040-0.085 mg/L, max chloride 180 mg/L, max SC 772 µs/cm (lab analyses and discrete measurements n= 2-5/year). Continuous DO data measured over 85-89 days at all 3 stations were consistently low (59-100% of 1-day minima <4.0 mg/L). Max DO saturations were 28.6-65.5%. The max diel DO shifts were 3.0-4.3 mg/L.

IRWA staff/volunteers collected discrete WQ data (DO, temp, SC) from 2013-2019 at 13 stations throughout this AU. Six stations were located in roughly the upper third (to the confluence with Unnamed Tributary MA92-09) and the rest were spaced out through the remainder of the AU. The summer index temp data (overall max 26.0 °C; generally n= 2-3/summer index/station) and annual DO data (most stations with multiple instances of DO <4.0 mg/L in multiple years; generally n= 6-12/year/station) were similar to the DEP data. Max SC was >904 µs/cm (the chronic criterion for estimated chloride) in most years at most stations and some stations had multiple elevated measurements. However, only the 2 most upstream stations (IRWA_IP00, IRWA_IP00.5) truly exceeded 2022 CALM guidance with 2 consecutive sets of elevated measurements in the last 3 years of available data.

UMass Amherst students collected WQ data at several stations upstream and downstream of the Ipswich River Dam in 2016-2017. Discrete DO, discrete pH, and continuous/discrete temp data generally matched other data sources, with some indications of elevated temperature in the Ipswich River Dam impoundment in 2016 (during a drought). There were no elevated SC data (max 746 µs/cm; n=2-5/station/depth each summer).

The Ipswich River Dam (aka Bostik Finley Dam or South Middleton Dam) does not currently allow passage of diadromous fish species (river herring, American eel), according to MassDMF biologists who rated its passage a 10 out of 10. However, removal of this dam is one of MassDER's priority projects, with an estimated completion date in 2023 (Wildman April 15, 2021).

The Aquatic Life Use of this Ipswich River AU (MA92-06) is assessed as Not Supporting. Impairments for Fish Bioassessments, Benthic Macroinvertebrates, and Fish Passage Barrier (the latter should be reevaluated once removal of the Ipswich River Dam is complete) are being added and the prior DO and Dewatering impairments are being carried forward. An Alert for Chloride is identified due to elevated specific conductance data measured by IRWA in the upstream portion of the AU.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5248	MassDFG	Fish Community	Ipswich River	Boston St DS, Middleton	42.56978	-71.02965
5249	MassDFG	Fish Community	Ipswich River	Central St US of xing, North Reading	42.57215	-71.09097
5485	MassDFG	Fish Community	Ipswich River	Off Rt 62, behind fire station, North Reading	42.57294	-71.07713
5486	MassDFG	Fish Community	Ipswich River	Off Rt 62 @ bridge to Lynnfield Pumping Station, North Reading	42.57196	-71.04748

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5487	MassDFG	Fish Community	Ipswich River	Off Pine Rd, DS of S. Middleton (Bostik) Dam, Middleton	42.57004	-71.03065
6407	MassDEP	Fish Community	Ipswich River	approximately 175 feet downstream/east of Chestnut Street, North Reading, North Reading	42.57183	-71.09626
6408	MassDEP	Fish Community	Ipswich River	approximately 200 feet downstream/north of Peabody Street, Middleton, Middleton	42.61693	-70.99641
6837	MassDFG	Fish Community	Ipswich River	Boston St DS, Peabody/Middleton	42.56939	-71.02709
6838	MassDFG	Fish Community	Ipswich River	Boston St US-DS., Middleton/Peabody	42.56997	-71.02990
7477	MassDFG	Fish Community	Ipswich River	Boston St. downstream , Middleton	42.56977	-71.02862
7595	MassDFG	Fish Community	Ipswich River	31 Riverside Dr. easement acess (between two fences), North Reading	42.57194	-71.04014
8254	MassDFG	Fish Community	Ipswich River	River St. right of way access, North Reading	42.57025	-71.03333
8255	MassDFG	Fish Community	Ipswich River	River St. right of way access, North Reading	42.57162	-71.03720
8256	MassDFG	Fish Community	Ipswich River	River St. right of way access, North Reading	42.57352	-71.04438
8588	MassDFG	Fish Community	Ipswich River	Boston St, DS, Middleton/Peabody	42.56957	-71.02735
8589	MassDFG	Fish Community	Ipswich River	Boston St, DS, Middleton/Peabody	42.56988	-71.02985
B0905	MassDEP	Benthic	Ipswich River/	[approximately 60 meters downstream/north of Peabody Street, Middleton, MA]	42.616929	-70.996412
B0914	MassDEP	Benthic	Ipswich River/	[approximately 760 meters downstream/north of Route 114, Middleton/Danvers, MA]	42.579028	-70.991536
B0925	MassDEP	Benthic	Ipswich River/	[approximately 55 meters downstream/east of Chestnut Street, North Reading, MA]	42.571829	-71.096255
W2506	MassDEP	Water Quality	Ipswich River	[approximately 200 feet downstream/north of Peabody Street, Middleton]	42.616929	-70.996412
W2515	MassDEP	Water Quality	Ipswich River	[approximately 2500 feet downstream/north of Route 114, Middleton/Danvers]	42.579028	-70.991536
W2526	MassDEP	Water Quality	Ipswich River	[approximately 175 feet downstream/east of Chestnut Street, North Reading]	42.571829	-71.096255

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_IP00	Ipswich River Watershed Association	Water Quality	Ipswich River	Woburn St., Wilmington	42.55388	-71.14382
IRWA_IP00.5	Ipswich River Watershed Association	Water Quality	Ipswich River	Reading Town Forest	42.55446	-71.12866

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_IP01	Ipswich River Watershed Association	Water Quality	Ipswich River	Mill St., Reading	42.56135	-71.11072
IRWA_IP02	Ipswich River Watershed Association	Water Quality	Ipswich River	Main St., Reading/North Reading	42.56454	-71.10798
IRWA_IP03	Ipswich River Watershed Association	Water Quality	Ipswich River	Central St., North Reading	42.57246	-71.08982
IRWA_IP04	Ipswich River Watershed Association	Water Quality	Ipswich River	Washington St., North Reading	42.57642	-71.07013
IRWA_IP06	Ipswich River Watershed Association	Water Quality	Ipswich River	Boston Street, Middleton	42.56996	-71.02928
IRWA_IP08	Ipswich River Watershed Association	Water Quality	Ipswich River	Log Bridge Road, Middleton	42.57789	-70.99328
IRWA_IP10	Ipswich River Watershed Association	Water Quality	Ipswich River	Maple St., Middleton	42.59577	-70.99637
IRWA_IP11	Ipswich River Watershed Association	Water Quality	Ipswich River	Peabody Street, Middleton	42.61649	-70.99693
IRWA_IP12	Ipswich River Watershed Association	Water Quality	Ipswich River	Thunder Bridge (East Street), Middleton	42.61959	-70.98834
IRWA_IP13	Ipswich River Watershed Association	Water Quality	Ipswich River	Rowley Bridge Road, Topsfield	42.62696	-70.96694
IRWA_IP14	Ipswich River Watershed Association	Water Quality	Ipswich River	Salem Road, Topsfield	42.62576	-70.94984
UMassA_BOSDS1	UMass Amherst	Water Quality	Ipswich River	26m downstream dam	42.569949	-71.030646
UMassA_BOSDS2	UMass Amherst	Water Quality	Ipswich River	140m downstream dam	42.569875	-71.029418
UMassA_BOSDS3	UMass Amherst	Water Quality	Ipswich River	370m downstream dam	42.569583	-71.026667
UMassA_BOSDS4	UMass Amherst	Water Quality	Ipswich River	550m downstream dam	42.569317	-71.02445

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
UMassA_BOSDS5	UMass Amherst	Water Quality	Ipswich River	1150m downstream dam	42.568083	-71.019367
UMassA_BOSIMP	UMass Amherst	Water Quality	Ipswich River	25m upstream dam	42.5701	-71.03125
UMassA_BOSUS	UMass Amherst	Water Quality	Ipswich River	2400m upstream dam	42.573517	-71.054133

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 4)

[Index Biological Condition Class: E= Exceptional, S= Satisfactory, MD= Moderately Degraded, SD= Severely Degraded; High Gradient IBI Thresholds: E= 100-75, S= 74-55, MD= 54-35, SD= 34-0; Low Gradient IBI Thresholds: E= 100-81, S= 80-62, MD= 61-38, SD= 37-0; R qualifier = Rarefaction (100ct) <55]

Station Code	Collection Date	Collection Method	Index Type	Organism Count	Index Score	Index Biological Condition Class
B0905	07/23/15	RBP multihab	Statewide_Low_Gradient	331	47	MD
B0914	07/23/15	RBP multihab	Statewide_Low_Gradient	340	35	SD
B0925	07/23/15	RBP multihab	Statewide_Low_Gradient	338	27	SD

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

[Species List: AE = American Eel, B = Bluegill, BB = Brown Bullhead, BS = Banded Sunfish, BT = Brown Trout, CCS = Creek Chubsucker, CP = Chain Pickerel, CRC = Creek Chub, CS = Common Shiner, GS = Golden Shiner, GSF = Green Sunfish, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, SD = Swamp Darter, SL = Sea Lamprey, WP = White Perch, WS = White Sucker, YB = Yellow Bullhead, YP = Yellow Perch]

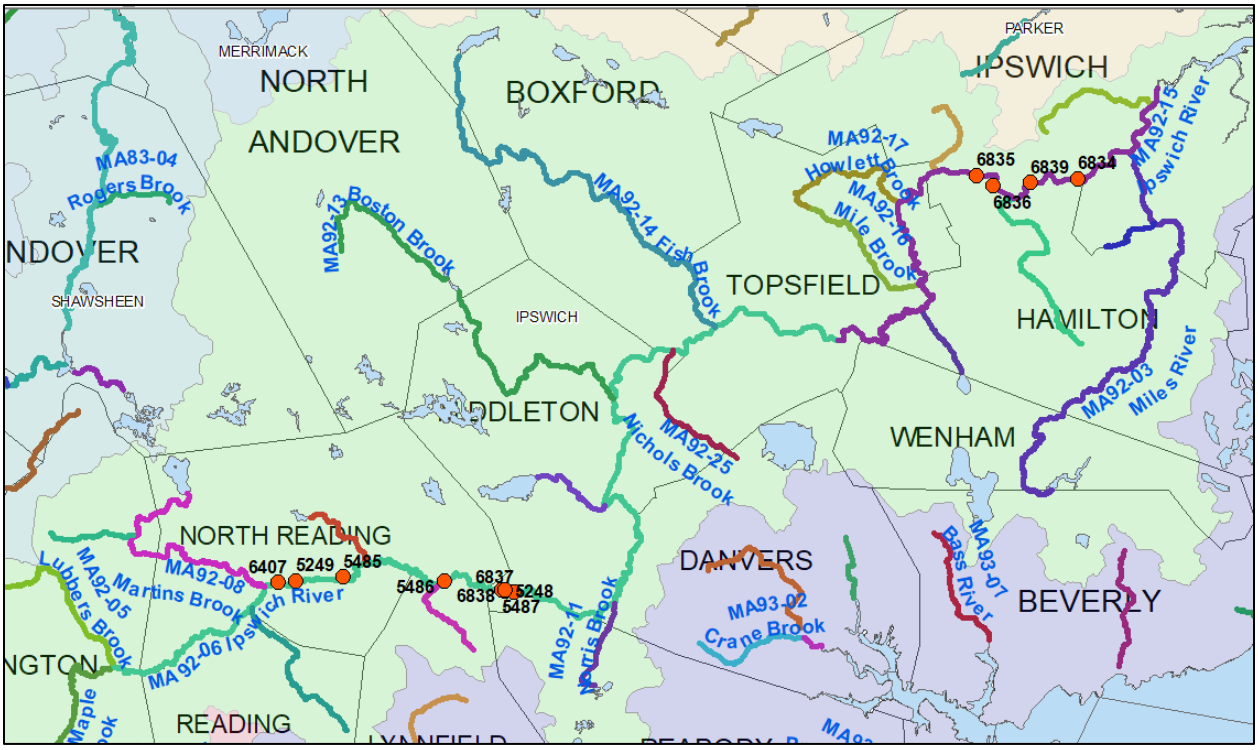
Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
5248	08/11/14	BP	TP	L	10	123	0%	1	2%	0%	4	28%	No	No	AE, B, BB, CP, GSF, LMB, P, RP, SL, WS,
5249	08/11/14	BP	TP	L	7	35	0%	1	6%	0%	4	60%	No	No	AE, LMB, P, RP, WS, YB, YP,
5485	09/25/15	BP	TP	L	10	69	0%	2	16%	14%	5	62%	Yes	No	AE, BB, CCS, CP, P, RP, SD, WS, YB, YP,
5486	09/25/15	BP	TP		6	44	0%	0	0%	0%	3	41%	Yes	No	AE, BB, P, RP, YB, YP,
5487	09/25/15	BP	TP	L	17	274	0%	2	2%	2%	9	44%	Yes	No	AE, B, BB, BS, CCS, CP, GS, LMB, P, RBS, RP, SD, SL, WP, WS, YB, YP,
6407	09/29/15	BG	TP		10	56	0%	1	2%	0%	5	43%	No	No	AE, BB, CP, CRC, GS, LMB, P, RP, YB, YP,

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
6408	09/29/15	BT	TP		9	84	0%	1	1%	0%	5	31%	No	No	AE, CP, LMB, RBS, RP, SL, WS, YB, YP,
6837	08/30/17	BP	TP	L	11	182	1%	2	1%	1%	6	33%	No	No	AE, B, BT, CP, LMB, P, RBS, RP, WS, YB, YP,
6838	08/30/17	BP	TP	L	16	346	0%	2	4%	1%	8	30%	No	No	AE, B, BB, BS, CP, CS, GSF, LMB, P, RBS, RP, SD, SL, WS, YB, YP,
7477	07/31/18	BP	TP	L	12	99	0%	0	0%	3%	7	47%	No	No	AE, B, BB, CP, GSF, LMB, P, RBS, RP, SD, YB, YP,
7595	09/04/18	BT	TP		6	13	0%	1	38%	38%	4	54%	No	No	CCS, CP, GS, LMB, P, YP,
8254	08/12/19	BT	TP		7	17	0%	0	0%	6%	4	82%	No	No	AE, B, BS, CP, P, YB, YP,
8255	08/12/19	BT	TP		8	28	0%	1	7%	0%	4	43%	No	No	B, BB, CP, CRC, GS, LMB, P, YP,
8256	08/12/19	BT	TP		9	33	0%	2	15%	0%	4	48%	No	No	AE, CP, CRC, GS, LMB, P, WS, YB, YP,
8588	08/12/19	BP	TP		9	56	0%	1	4%	5%	5	45%	No	No	AE, B, CCS, LMB, P, RP, SD, YB, YP,
8589	08/12/19	BP	TP		15	137	0%	3	8%	7%	6	15%	No	No	AE, B, BB, BS, CCS, CP, CS, GS, GSF, LMB, P, RBS, RP, WS, YB,

Comparison of fish community samples (2005-2017) to the Ipswich Target Fish Community (TFC) Model. (MassDFG 2018, MassDEP Undated 1, Kashiwagi and Richards 2009)

Twelve fish community samples (Sample IDs: 5248, 5249, 5485, 5486, 5487, 6407, 6834, 6835, 6836, 6837, 6838, and 6839) were collected from 2014-2017 in the Ipswich River (AUs MA92-06 and MA92-15). The percent similarity with the Ipswich Target Fish Community was 24.21%. The low similarity was mainly due to a much smaller proportion of fluvial species (common shiner, fallfish) and a larger proportion of tolerant species (American eel, bluegill) in the recently collected samples. Based on the comparison of fish community data with the Ipswich TFC model, these Ipswich River AUs (MA92-06, MA92-15), both WWFs, should be assessed as Not Supporting for Fish Bioassessments.

Fish Community Samples in the Ipswich River MA92-06 (upstream/southwest) and MA92-15 (downstream/northeast):



Ipswich TFC Model:

Table A8. Species percent composition for reference rivers used to develop the Ipswich River target fish community model. Species are ordered by mean rank. Non-native, stocked, and out-of-range species were deleted from the ranking and calculation of expected proportion in the target fish model. The ranks were converted to expected proportions (as a percent) using a rank-weighting technique as outlined by Bain and Meixler (2008).

Species	Lamprey River	North River	SB Piscataquog River	Willimantic River	Salmon River	Total	Rank	Expected Proportions
Common shiner	42.1	9.0	20.6	21.6	13.9	107.2	1	40.6
Fallfish	15.4	28.6	3.0	44.3	0.3	91.6	2	20.3
Blacknose dace	0.0	0.0	33.4	7.9	11.1	52.4		
Longnose dace	5.4	10.6	19.0	0.0	15.2	50.2		
Atlantic salmon	0.3	3.1	9.4	0.0	21.7	34.4		
White sucker	3.7	5.3	0.9	14.6	5.1	29.6	6	6.7
Redbreast sunfish	18.3	0.0	0.0	2.1	0.0	20.4	7	5.8
Spottail shiner	0.0	17.9	0.5	0.2	0.0	18.6		
Smallmouth bass	1.6	0.0	3.6	2.9	9.5	17.6		
American eel	5.3	2.0	0.0	0.2	10.1	17.5	10	4.1
Bridle shiner	1.4	7.8	0.0	0.0	0.0	9.2	11	3.7
Brown trout	0.1	1.4	0.4	0.6	5.2	7.7		
Chain pickerel	0.2	5.6	0.2	0.1	0.2	6.2	13	3.1
Pumpkinseed	2.4	1.4	0.5	0.7	0.2	5.2	14	2.8
Brown bullhead	0.0	4.8	0.0	0.0	0.0	4.8	15	2.7
Golden shiner	1.7	0.0	1.6	0.3	0.0	3.5	16	2.5
Yellow perch	0.6	0.0	0.0	2.6	0.0	3.2	17	2.3
Tessellated darter	0.0	0.0	0.0	1.3	1.8	3.1		
Largemouth bass	0.5	0.8	0.7	0.3	0.6	2.9		
Yellow bullhead	1.0	0.0	1.8	0.0	0.0	2.8		
Rainbow trout	0.0	0.6	0.2	0.0	0.6	1.4		
Bluegill	0.0	0.0	0.0	0.1	0.9	1.1		
Brook trout	0.0	0.0	0.0	0.0	1.0	1.0	23	1.7
Creek chubsucker	0.2	0.0	0.0	0.0	0.0	0.2	24	1.7
Rock bass	0.0	0.0	0.0	0.1	0.0	0.1		
Redfin pickerel	0.1	0.0	0.0	0.0	0.0	0.1	26	1.5

Fish Community Analysis:

Use?	(blank)
After 1-1-05?	TRUE
SampleID	(All)
Bad Sample Check	Ok

Watershed	Common Name	Value # of Fish	% of catch	Applicable TFC	TFC Difference	% Sim to TFC
Ipswich	American Brook Lamprey		0.00%	-	-	
Ipswich	American Eel	572	33.35%	4.1	29.3	
Ipswich	Atlantic Salmon		0.00%	-	-	
Ipswich	Banded Killifish		0.00%	-	-	
Ipswich	Banded Sunfish	6	0.35%	-	0.3	
Ipswich	Black Crappie		0.00%	-	-	
Ipswich	Blacknose Dace		0.00%	-	-	
Ipswich	Bluegill	239	13.94%	-	13.9	
Ipswich	Bluntnose Minnow		0.00%	-	-	
Ipswich	Bridle Shiner		0.00%	3.7	3.7	
Ipswich	Brook Trout		0.00%	1.7	1.7	
Ipswich	Brown Bullhead	23	1.34%	2.7	1.4	
Ipswich	Brown Trout	1	0.06%	-	0.1	
Ipswich	Central Mudminnow		0.00%	-	-	
Ipswich	Chain Pickerel	26	1.52%	3.1	1.6	
Ipswich	Channel Catfish		0.00%	-	-	
Ipswich	Common Carp		0.00%	-	-	
Ipswich	Common Shiner	7	0.41%	40.6	40.2	
Ipswich	Creek Chub	1	0.06%	-	0.1	
Ipswich	Creek Chubsucker	11	0.64%	1.7	1.1	
Ipswich	Cutlips Minnow		0.00%	-	-	
Ipswich	Fallfish	1	0.06%	20.3	20.2	
Ipswich	Fathead Minnow		0.00%	-	-	
Ipswich	Golden Shiner	41	2.39%	2.5	0.1	
Ipswich	Green Sunfish	7	0.41%	-	0.4	
Ipswich	Lake Chub		0.00%	-	-	
Ipswich	Largemouth Bass	129	7.52%	-	7.5	
Ipswich	Longnose Dace		0.00%	-	-	
Ipswich	Longnose Sucker		0.00%	-	-	
Ipswich	Northern Pike		0.00%	-	-	
Ipswich	Pumpkinseed	176	10.26%	2.8	7.5	
Ipswich	Rainbow Trout		0.00%	-	-	
Ipswich	Redbreast Sunfish	111	6.47%	5.8	0.7	
Ipswich	Redfin Pickerel	108	6.30%	1.5	4.8	
Ipswich	Rock Bass		0.00%	-	-	
Ipswich	Sea Lamprey	14	0.82%	-	0.8	
Ipswich	Slimy Sculpin		0.00%	-	-	
Ipswich	Smallmouth Bass		0.00%	-	-	
Ipswich	Spottail Shiner		0.00%	-	-	
Ipswich	Swamp Darter	7	0.41%	-	0.4	
Ipswich	Tadpole Madtom		0.00%	-	-	
Ipswich	Tesselated Darter		0.00%	-	-	
Ipswich	White Catfish		0.00%	-	-	
Ipswich	White Perch	1	0.06%	-	0.1	
Ipswich	White Sucker	19	1.11%	6.7	5.6	
Ipswich	Yellow Bullhead	102	5.95%	-	5.9	
Ipswich	Yellow Perch	113	6.59%	2.3	4.3	
Ipswich	(blank)		0.00%	-	-	24.21
Grand Total		1715	#####	-	100.0	

After 1-1-05?	TRUE
Use?	(blank)
Bad Sample Che	Ok

Row Label
Ipswich
5248
5249
5485
5486
5487
6407
6834
6835
6836
6837
6838
6839
Grand Total

Habitat and Flow Data (anthropogenic alterations)

Status of MassDER habitat restoration priority projects as of 2021 (Wildman April 15, 2021)

South Middleton Dam (aka Ipswich River Dam/Bostik Finley Dam)

The South Middleton Dam (aka Ipswich River Dam or Bostik Finley Dam) on the Ipswich River is located upstream of Boston St / Rt 62 in Middleton. The stone and wood dam is currently owned by Bostik, Inc and is considered a significant hazard. The dam obstructs fish passage from over 56 river miles. The removal of the South Middleton Dam can potentially restore access to over 119 acres of alewife spawning grounds. It will also allow sediment to naturally move downstream to sustain marshes and other habitats. Project partners include Bostik Inc. (owner), IRWA, NOAA Restoration Center, MA Division of Ecological Restoration, and Interfluve (IRWA Undated). The project is currently in the Engineering Design with an estimated completion date in 2023 (Wildman April 15, 2021). Studies on the thermal impact of the South Middleton Dam on the

Ipswich River were conducted by UMass students between July 2015 and September 2017. Investigators used data loggers to monitor continuous and discrete temperature and dissolved oxygen (UMass-Amherst 2018).

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists note one structure causing passage limitation to diadromous fish in the middle of this Ipswich River AU, just upstream of Boston Street in Middleton. The Bostik Finley Dam (NATID# MA01137) was given a passage score of "10", on a 0-10 scale, indicating that the dam allows no possible passage of the targeted species, river herring and American eel, with a population score of "2". DMF biologists noted that this is primarily river spawning habitat though there are significant stream flow challenges. The Aquatic Life Use for Ipswich River (Assessment Unit MA92-06) is assessed as Not Supporting based on the barrier to diadromous fish passage at the Bostik Finley Dam.

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[7DADMin= 7-Day Average of the Daily Minima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Day Count	7day Count	30day Count	DO Min (mg/L)	Min 7DADMin (mg/L)	Min 7DADA (mg/L)	Delta DO Max (mg/L)	Count CW 7DADMin <6.0	Count CW 1Day Min <5.0	Count WW Early Life Stages 7DADA <6.5	Count WW Early Life Stages 1Day Min <5.0	Count WW Other Life Stages 7DADMin <5.0	Count WW Other Life Stages 1Day Min <4.0	Count CW 30DADA <8.0	Count WW Other Life Stages 30DADA <6.0
W2506	07/01/15	09/23/15	85	79	56	1.7	2.2	3.8	4.3	79	79	28	31	79	50	56	56
W2515	06/26/15	09/22/15	89	83	60	0.2	0.2	0.2	3.4	83	89	33	36	83	89	60	60
W2526	06/26/15	09/22/15	89	83	60	0.2	0.3	0.4	3	83	89	33	36	83	87	60	60

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
W2506	08/04/15	09/24/15	3	4	4.5	2	2	0
W2515	07/30/15	09/23/15	3	1.6	2.1	3	3	3
W2526	07/30/15	09/23/15	3	4	5	2	2	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; Max Daily Mean= Maximum 24-Hour Average, 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	7day Count	Max Daily Mean (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier1 Daily Mean >23.5	Count CWTier2 7DADA >21	Count CWTier2 Daily Mean >24.1	Count WW 7DADM >27.7	Count WW Daily Mean >28.3
W2506	07/01/15	09/15/15	77	74	26.6	27.6	26.8	25.9	74	44	72	31	0	0
W2515	06/26/15	09/15/15	82	79	26.1	27.3	26.5	25.5	79	37	73	24	0	0
W2526	06/26/15	09/15/15	82	79	25.5	27.4	26.1	24.4	79	25	64	14	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Count Days Deployed	24hr Rolling Count	Max 24hr Avg Rolling Temp (°C)	Count CWTier1 24hr Avg Rolling >23.5 °C	Count CWTier2 24hr Avg Rolling >24.1 °C	Count WW 24hr Avg Rolling >28.3°C
W2506	06/30/15	09/15/15	78	3675	26.6	2072	1488	0
W2515	06/25/15	09/15/15	83	3915	26.2	1740	1189	0
W2526	06/25/15	09/15/15	83	3917	25.7	1199	685	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
W2506	08/04/15	09/24/15	3	2	25.3	22.0	2	2	0	0
W2515	07/30/15	09/23/15	3	2	26.2	22.5	2	2	0	0
W2526	07/30/15	09/23/15	3	2	25.4	21.4	2	2	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
W2506	08/04/15	09/24/15	3	7.1	7.1	0	0
W2515	07/30/15	09/23/15	3	6.7	6.8	0	0
W2526	07/30/15	09/23/15	3	6.7	6.8	0	0

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_IP00	03/24/13	10/27/13	8	0.6	3.7	6	6	5
IRWA_IP00	03/30/14	12/14/14	10	1.0	4.8	6	6	6

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_IP00	04/26/15	12/13/15	9	0.6	3.3	7	7	6
IRWA_IP00	03/20/16	12/18/16	10	2.0	5.1	5	5	4
IRWA_IP00	03/26/17	12/17/17	9	0.0	3.9	6	6	6
IRWA_IP00	03/25/18	12/16/18	9	0.4	4.0	5	5	5
IRWA_IP00	03/31/19	12/15/19	10	1.2	3.8	6	6	6
IRWA_IP00.5	03/24/13	11/17/13	9	0.8	5.0	5	5	4
IRWA_IP00.5	04/27/14	12/14/14	9	4.5	6.0	3	3	0
IRWA_IP00.5	04/26/15	12/13/15	8	0.7	4.5	3	3	3
IRWA_IP00.5	03/20/16	11/13/16	8	1.5	5.4	4	4	1
IRWA_IP00.5	03/26/17	11/12/17	9	0.5	4.1	7	7	6
IRWA_IP00.5	03/25/18	12/16/18	10	1.6	4.3	6	6	6
IRWA_IP00.5	03/31/19	12/15/19	9	1.2	5.4	3	3	2
IRWA_IP01	01/27/13	11/17/13	10	0.2	4.3	7	7	5
IRWA_IP01	03/30/14	12/14/14	10	1.7	4.5	6	6	6
IRWA_IP01	04/26/15	12/13/15	9	1.0	4.1	6	6	5
IRWA_IP01	03/20/16	08/28/16	6	2.0	4.7	4	4	2
IRWA_IP01	03/26/17	12/17/17	9	0.8	4.1	5	5	5
IRWA_IP01	03/25/18	12/16/18	9	2.7	5.6	5	5	3
IRWA_IP01	01/27/19	12/15/19	7	2.1	6.1	3	3	1
IRWA_IP02	01/27/13	11/17/13	10	0.1	5.1	4	4	4
IRWA_IP02	02/23/14	12/14/14	11	2.0	5.1	7	7	5
IRWA_IP02	03/29/15	12/13/15	9	1.2	4.8	5	5	3
IRWA_IP02	03/20/16	12/18/16	10	1.8	4.7	6	6	5
IRWA_IP02	04/30/17	11/12/17	8	0.6	3.4	6	6	4
IRWA_IP02	03/25/18	12/16/18	9	2.0	5.0	6	6	5
IRWA_IP02	01/27/19	12/15/19	11	2.0	5.7	5	5	3
IRWA_IP03	01/27/13	11/17/13	11	2.5	6.2	3	3	2
IRWA_IP03	01/26/14	12/14/14	12	3.2	5.8	6	6	3
IRWA_IP03	03/29/15	12/13/15	9	3.4	6.5	2	2	1
IRWA_IP03	03/20/16	12/18/16	8	5.1	6.9	0	0	0
IRWA_IP03	03/26/17	12/17/17	8	4.0	6.2	4	4	0
IRWA_IP03	03/25/18	12/16/18	10	2.8	6.2	3	3	1
IRWA_IP03	02/24/19	12/15/19	11	3.4	6.9	2	2	2
IRWA_IP04	03/24/13	11/17/13	8	4.0	6.3	4	4	0
IRWA_IP04	03/30/14	12/14/14	10	4.0	6.5	4	4	0
IRWA_IP04	03/29/15	12/13/15	10	4.0	6.5	4	4	0
IRWA_IP04	03/20/16	11/13/16	9	4.1	5.6	5	5	0
IRWA_IP04	03/26/17	11/12/17	9	3.8	5.9	4	4	1
IRWA_IP04	03/25/18	12/16/18	10	3.6	6.3	4	4	3
IRWA_IP04	03/31/19	12/15/19	10	3.6	6.6	4	4	2
IRWA_IP06	03/24/13	10/27/13	8	6.5	8.9	0	0	0
IRWA_IP06	03/30/14	12/14/14	10	6.2	8.8	0	0	0
IRWA_IP06	03/29/15	11/15/15	8	6.8	8.6	0	0	0
IRWA_IP06	03/20/16	12/18/16	7	6.4	9.6	0	0	0
IRWA_IP06	03/26/17	12/17/17	10	5.6	8.3	0	0	0
IRWA_IP06	03/25/18	12/16/18	10	5.5	9.0	0	0	0
IRWA_IP06	03/31/19	12/15/19	8	5.2	9.3	0	0	0

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_IP08	03/24/13	11/17/13	9	2.1	5.5	5	5	3
IRWA_IP08	02/23/14	12/14/14	11	2.4	6.2	6	6	4
IRWA_IP08	04/26/15	12/13/15	8	2.6	5.3	4	4	3
IRWA_IP08	03/20/16	12/18/16	10	1.2	4.9	6	6	3
IRWA_IP08	03/26/17	11/12/17	9	0.8	4.0	7	7	6
IRWA_IP08	03/25/18	12/16/18	10	2.0	6.3	6	6	5
IRWA_IP08	03/31/19	12/15/19	10	2.2	6.1	5	5	2
IRWA_IP10	08/25/13	11/17/13	4	3.2	5.6	1	1	1
IRWA_IP10	03/30/14	12/14/14	10	1.6	4.9	6	6	5
IRWA_IP10	05/31/15	12/13/15	7	2.6	5.2	3	3	3
IRWA_IP10	04/24/16	12/18/16	8	2.0	5.0	5	5	3
IRWA_IP10	03/26/17	12/17/17	10	0.9	4.1	7	7	7
IRWA_IP10	03/25/18	12/16/18	9	1.4	6.4	4	4	4
IRWA_IP10	03/31/19	12/15/19	9	2.0	5.5	3	3	3
IRWA_IP11	01/27/13	11/17/13	10	4.1	7.2	3	3	0
IRWA_IP11	03/30/14	12/14/14	10	4.8	7.2	1	1	0
IRWA_IP11	04/26/15	12/13/15	8	4.0	6.3	2	2	0
IRWA_IP11	03/20/16	12/18/16	9	2.6	6.0	3	3	2
IRWA_IP11	03/26/17	11/12/17	9	1.5	4.1	7	7	6
IRWA_IP11	03/25/18	10/28/18	8	1.7	4.9	5	5	3
IRWA_IP11	03/31/19	12/15/19	10	2.2	6.6	2	2	2
IRWA_IP12	03/24/13	11/17/13	9	4.0	7.0	2	2	0
IRWA_IP12	03/30/14	12/14/14	9	5.2	7.8	0	0	0
IRWA_IP12	04/26/15	11/15/15	6	5.6	6.9	0	0	0
IRWA_IP12	04/24/16	12/18/16	9	2.9	6.3	2	2	1
IRWA_IP12	03/26/17	11/12/17	9	2.4	5.1	5	5	5
IRWA_IP12	03/25/18	12/16/18	12	2.8	7.4	4	4	2
IRWA_IP12	03/31/19	12/15/19	10	2.0	6.5	3	3	3
IRWA_IP13	03/24/13	11/17/13	9	3.4	7.0	1	1	1
IRWA_IP13	03/30/14	09/28/14	7	5.0	6.9	0	0	0
IRWA_IP13	04/26/15	12/13/15	8	4.2	6.7	1	1	0
IRWA_IP13	03/20/16	12/18/16	10	3.9	6.1	3	3	1
IRWA_IP13	03/26/17	12/17/17	10	2.5	5.5	6	6	4
IRWA_IP13	03/25/18	12/16/18	8	3.8	6.8	3	3	1
IRWA_IP13	03/31/19	12/15/19	10	3.0	5.8	4	4	3
IRWA_IP14	03/24/13	11/17/13	9	3.4	6.7	1	1	1
IRWA_IP14	03/30/14	12/14/14	10	4.6	7.0	2	2	0
IRWA_IP14	04/26/15	12/13/15	8	4.0	6.6	3	3	0
IRWA_IP14	03/20/16	12/18/16	10	4.0	6.4	3	3	0
IRWA_IP14	03/26/17	12/17/17	10	3.0	5.9	7	7	1
IRWA_IP14	03/25/18	12/16/18	10	3.8	7.2	2	2	1
IRWA_IP14	03/30/19	12/15/19	10	3.8	7.0	3	3	1

UMass Amherst Dam Study Discrete Dissolved Oxygen Data (2016-2017). (UMass-Amherst 2018) (MassDEP Undated 3)
[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Sample Depth	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
UMassA_BOSIMP	07/25/16	09/14/16	surface	3	3.2	4.3	2	2	1
UMassA_BOSIMP	07/25/16	09/14/16	0.5m	3	3.1	3.9	3	3	1
UMassA_BOSIMP	07/25/16	09/14/16	1.0m	3	1.4	3.4	3	3	1
UMassA_BOSIMP	07/25/16	09/14/16	1.5m	3	0.3	1.9	3	3	3
UMassA_BOSIMP	08/25/17	09/25/17	surface	2	2.0	3.8	2	2	1
UMassA_BOSIMP	08/25/17	09/25/17	0.5m	2	3.0	3.4	2	2	2
UMassA_BOSIMP	08/25/17	09/25/17	1.0m	2	2.9	3.0	2	2	2
UMassA_BOSIMP	08/25/17	09/25/17	1.5m	2	0.3	1.2	2	2	2

UMass Amherst Dam Study Long-term Continuous Temperature Data (Summer Index 2014-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	Max 24hr Rolling Avg Temp (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier2 7DADA >21	Count WW 7DADM >27.7
UMassA_BOSDS1	07/09/15	12/31/15	69	26.4	28.5	26.7	26.5	63	63	0
UMassA_BOSDS1	01/01/16	12/31/16	106	26.5	28.3	26.7	26.5	99	85	0
UMassA_BOSDS1	01/01/17	11/30/17	106	25.6	26.6	25.0	24.9	81	74	0
UMassA_BOSDS2	07/09/15	12/31/15	69	25.8	28.0	25.9	25.7	63	62	0
UMassA_BOSDS2	01/01/16	12/31/16	106	25.9	28.0	26.2	26.0	93	84	0
UMassA_BOSDS2	01/01/17	11/30/17	106	25.4	26.5	24.8	24.6	78	71	0
UMassA_BOSDS3	07/09/15	12/31/15	69	24.7	26.9	24.5	24.3	62	45	0
UMassA_BOSDS3	01/01/16	12/31/16	106	22.2	23.7	22.3	22.2	56	21	0
UMassA_BOSDS3	01/01/17	11/30/17	106	25.4	26.4	24.9	24.7	73	58	0
UMassA_BOSDS4	07/09/15	12/31/15	62	24.6	26.2	24.3	24.3	55	53	0
UMassA_BOSDS4	01/01/16	12/31/16	106	22.7	25.4	21.9	21.7	27	10	0
UMassA_BOSDS4	01/01/17	11/30/17	106	25.8	26.9	24.4	23.9	46	41	0
UMassA_BOSDS5	07/09/15	12/31/15	69	24.1	25.1	24.0	24.0	58	34	0
UMassA_BOSDS5	01/01/16	12/31/16	74	25.6	28.9	25.2	24.9	74	56	0
UMassA_BOSDS5	01/01/17	11/30/17	106	25.3	26.4	24.7	24.5	76	69	0
UMassA_BOSIMP	07/09/15	12/31/15	69	26.7	29.0	27.1	26.9	63	60	0
UMassA_BOSIMP	01/01/16	12/31/16	106	28.6	30.0	28.5	27.8	105	93	12
UMassA_BOSIMP	01/01/17	11/30/17	50	24.8	26.4	24.4	24.0	49	21	0
UMassA_BOSUS	07/09/15	12/31/15	51	25.7	28.0	25.8	25.7	61	61	0
UMassA_BOSUS	01/01/16	12/31/16	88	27.5	30.0	27.8	27.8	99	93	2
UMassA_BOSUS	01/01/17	11/30/17	106	25.6	26.8	25.3	25.1	77	73	0

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_IP00	03/24/13	10/27/13	8	3	23.0	14.4	2	1	0	0

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_IP00	03/30/14	12/14/14	10	3	21.0	11.6	1	0	0	0
IRWA_IP00	04/26/15	12/13/15	9	3	21.0	13.1	1	0	0	0
IRWA_IP00	03/20/16	12/18/16	9	3	24.0	12.6	2	1	0	0
IRWA_IP00	03/26/17	12/17/17	9	3	22.0	12.3	1	0	0	0
IRWA_IP00	03/25/18	12/16/18	9	3	22.0	10.8	1	0	0	0
IRWA_IP00	03/31/19	12/15/19	10	3	21.0	12.4	1	0	0	0
IRWA_IP00.5	03/24/13	11/17/13	9	3	24.0	14.2	3	1	0	0
IRWA_IP00.5	04/27/14	12/14/14	9	3	25.0	14.2	2	1	0	0
IRWA_IP00.5	04/26/15	12/13/15	8	2	23.0	14.0	3	1	0	0
IRWA_IP00.5	03/20/16	11/13/16	8	3	22.0	15.1	3	0	0	0
IRWA_IP00.5	03/26/17	11/12/17	9	3	23.0	14.9	2	2	0	0
IRWA_IP00.5	03/25/18	12/16/18	10	3	25.0	12.6	1	1	0	0
IRWA_IP00.5	03/31/19	12/15/19	9	3	25.0	15.6	2	2	0	0
IRWA_IP01	01/27/13	11/17/13	10	3	23.0	11.8	2	1	0	0
IRWA_IP01	02/23/14	12/14/14	11	3	23.5	11.2	2	1	0	0
IRWA_IP01	04/26/15	12/13/15	9	3	23.0	14.1	2	1	0	0
IRWA_IP01	03/20/16	08/28/16	6	3	23.5	17.3	3	3	0	0
IRWA_IP01	03/26/17	12/17/17	9	3	22.0	13.1	2	0	0	0
IRWA_IP01	03/25/18	12/16/18	10	3	25.0	12.5	2	1	0	0
IRWA_IP01	01/27/19	12/15/19	7	2	22.5	13.4	2	1	0	0
IRWA_IP02	01/27/13	11/17/13	10	3	22.5	11.9	2	1	0	0
IRWA_IP02	02/23/14	12/14/14	11	3	21.5	11.4	1	0	0	0
IRWA_IP02	03/29/15	12/13/15	9	2	22.0	11.7	2	0	0	0
IRWA_IP02	03/20/16	12/18/16	10	3	24.0	13.0	2	1	0	0
IRWA_IP02	04/30/17	12/17/17	9	3	23.0	14.3	1	1	0	0
IRWA_IP02	03/25/18	12/16/18	9	3	24.0	12.9	1	1	0	0
IRWA_IP02	01/27/19	12/15/19	11	3	24.0	11.3	2	1	0	0
IRWA_IP03	01/27/13	11/17/13	11	3	23.0	11.1	2	2	0	0
IRWA_IP03	01/26/14	12/14/14	12	3	23.0	10.1	2	1	0	0
IRWA_IP03	03/29/15	12/13/15	9	2	22.0	11.6	2	0	0	0
IRWA_IP03	03/20/16	12/18/16	8	2	22.0	11.0	1	0	0	0
IRWA_IP03	03/26/17	12/17/17	8	3	23.4	13.9	1	1	0	0
IRWA_IP03	03/25/18	12/16/18	10	3	25.0	12.3	1	1	0	0
IRWA_IP03	02/24/19	12/15/19	11	3	22.5	12.0	2	1	0	0
IRWA_IP04	03/24/13	11/17/13	8	2	24.0	14.6	2	2	0	0
IRWA_IP04	03/30/14	12/14/14	10	3	23.2	12.8	2	2	0	0
IRWA_IP04	03/29/15	12/13/15	10	3	22.9	12.9	3	1	0	0
IRWA_IP04	03/20/16	11/13/16	9	3	23.7	15.0	3	2	0	0
IRWA_IP04	03/26/17	11/12/17	8	3	23.4	14.1	1	1	0	0
IRWA_IP04	03/25/18	12/16/18	10	3	24.7	12.6	2	1	0	0
IRWA_IP04	03/31/19	11/17/19	8	3	23.0	14.7	3	2	0	0
IRWA_IP06	03/24/13	10/27/13	8	3	22.5	15.1	2	1	0	0
IRWA_IP06	03/30/14	12/14/14	10	3	23.0	12.9	2	1	0	0
IRWA_IP06	03/29/15	11/15/15	8	2	23.0	13.3	3	2	0	0
IRWA_IP06	03/20/16	12/18/16	7	1	22.0	9.6	1	0	0	0
IRWA_IP06	03/26/17	12/17/17	10	3	23.4	13.5	1	1	0	0
IRWA_IP06	03/25/18	12/16/18	10	3	24.9	11.6	2	1	0	0
IRWA_IP06	03/31/19	12/15/19	7	2	23.0	12.7	2	1	0	0
IRWA_IP08	03/24/13	11/17/13	9	3	23.0	14.0	2	1	0	0
IRWA_IP08	02/23/14	12/14/14	11	3	23.0	11.8	2	1	0	0
IRWA_IP08	04/26/15	12/13/15	8	2	23.0	14.3	3	1	0	0
IRWA_IP08	03/20/16	12/18/16	10	3	23.0	13.2	3	1	0	0

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_IP08	03/26/17	11/12/17	9	3	23.0	13.9	1	1	0	0
IRWA_IP08	03/25/18	12/16/18	10	3	24.0	12.3	1	1	0	0
IRWA_IP08	03/31/19	12/15/19	10	3	22.0	13.2	2	0	0	0
IRWA_IP10	08/25/13	11/17/13	4	1	20.0	10.5	0	0	0	0
IRWA_IP10	03/30/14	12/14/14	10	3	23.0	12.5	2	1	0	0
IRWA_IP10	04/26/15	12/13/15	8	2	22.5	13.4	3	1	0	0
IRWA_IP10	04/24/16	12/18/16	9	3	24.0	14.2	2	2	0	0
IRWA_IP10	03/26/17	12/17/17	9	2	20.0	12.6	0	0	0	0
IRWA_IP10	03/25/18	12/16/18	10	3	25.0	13.2	2	1	0	0
IRWA_IP10	03/31/19	11/17/19	9	3	24.0	15.0	3	2	0	0
IRWA_IP11	01/27/13	11/17/13	10	3	25.0	13.7	3	2	0	0
IRWA_IP11	03/30/14	12/14/14	10	3	24.0	13.8	2	2	0	0
IRWA_IP11	04/26/15	12/13/15	8	2	24.0	15.8	3	2	0	0
IRWA_IP11	03/20/16	12/18/16	10	3	24.0	14.4	3	3	0	0
IRWA_IP11	03/26/17	11/12/17	9	3	24.0	15.8	2	1	0	0
IRWA_IP11	03/25/18	10/28/18	8	3	24.0	15.7	1	1	0	0
IRWA_IP11	03/31/19	12/15/19	10	3	24.0	14.5	2	1	0	0
IRWA_IP12	03/24/13	11/17/13	9	3	24.0	14.4	3	2	0	0
IRWA_IP12	03/30/14	12/14/14	9	3	24.0	13.4	2	2	0	0
IRWA_IP12	04/26/15	11/15/15	6	2	23.0	14.7	2	1	0	0
IRWA_IP12	04/24/16	12/18/16	9	3	24.0	15.0	3	3	0	0
IRWA_IP12	03/26/17	11/12/17	9	3	24.0	15.4	1	1	0	0
IRWA_IP12	03/25/18	12/16/18	12	3	26.0	10.9	2	1	0	0
IRWA_IP12	03/31/19	12/15/19	10	3	23.0	14.6	3	3	0	0
IRWA_IP13	03/24/13	11/17/13	9	3	23.0	14.3	2	2	0	0
IRWA_IP13	03/30/14	09/28/14	7	3	23.0	15.6	2	1	0	0
IRWA_IP13	04/26/15	12/13/15	8	2	24.0	13.9	3	1	0	0
IRWA_IP13	03/20/16	12/18/16	10	3	24.0	13.1	3	1	0	0
IRWA_IP13	03/26/17	12/17/17	10	3	24.5	14.1	2	1	0	0
IRWA_IP13	03/25/18	12/16/18	9	2	25.5	11.8	2	1	0	0
IRWA_IP13	03/31/19	12/15/19	10	3	23.0	14.0	2	2	0	0
IRWA_IP14	03/24/13	11/17/13	9	3	24.0	14.2	2	1	0	0
IRWA_IP14	03/30/14	12/14/14	10	3	24.0	12.8	2	1	0	0
IRWA_IP14	04/26/15	12/13/15	8	2	22.0	15.3	3	0	0	0
IRWA_IP14	03/20/16	12/18/16	10	3	24.0	13.5	3	2	0	0
IRWA_IP14	03/26/17	12/17/17	10	3	24.0	13.7	1	1	0	0
IRWA_IP14	03/25/18	12/16/18	10	3	25.0	13.0	2	1	0	0
IRWA_IP14	03/30/19	12/15/19	10	3	24.0	13.6	2	1	0	0

UMass Amherst Dam Study Discrete Temperature Data (2016-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Sample Depth	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
UMassA_BOSIMP	07/25/16	09/14/16	surface	3	3	26	25.0	3	3	0	0
UMassA_BOSIMP	07/25/16	09/14/16	0.5m	3	3	26	25	3	3	0	0
UMassA_BOSIMP	07/25/16	09/14/16	1.0m	3	3	25.0	24	3	3	0	0

Station Code	Start Date	End Date	Sample Depth	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
UMassA_BOSIMP	07/25/16	09/14/16	1.5m	3	3	25	23	3	2	0	0
UMassA_BOSIMP	08/25/17	09/25/17	surface	2	1	23.0	22	2	1	0	0
UMassA_BOSIMP	08/25/17	09/25/17	0.5m	2	1	23	21	1	1	0	0
UMassA_BOSIMP	08/25/17	09/25/17	1.0m	2	1	23	21	1	1	0	0
UMassA_BOSIMP	08/25/17	09/25/17	1.5m	2	1	22	20	1	0	0	0

UMass Amherst Dam Study Discrete pH Data (2016-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

Station Code	Start Date	End Date	Sample Depth	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
UMassA_BOSDS1	07/19/16	09/14/16	Surface	6	6.6	7.2	0	0
UMassA_BOSDS1	07/27/17	09/25/17	Surface	5	6.7	7.1	0	0
UMassA_BOSIMP	07/19/16	09/14/16	surface	6	6.6	7.0	0	0
UMassA_BOSIMP	07/25/16	09/14/16	0.5m	3	6.7	6.9	0	0
UMassA_BOSIMP	07/25/16	09/14/16	1.0m	3	6.6	6.9	0	0
UMassA_BOSIMP	07/25/16	09/14/16	1.5m	3	6.5	6.6	0	0
UMassA_BOSIMP	07/27/17	09/25/17	surface	5	6.5	6.7	0	0
UMassA_BOSIMP	08/25/17	09/25/17	0.5m	2	6.4	6.7	1	0
UMassA_BOSIMP	08/25/17	09/25/17	1.0m	2	6.5	6.7	0	0
UMassA_BOSIMP	08/25/17	09/25/17	1.5m	2	6.5	6.5	0	0
UMassA_BOSUS	07/19/16	09/14/16	Surface	6	6.5	6.8	0	0
UMassA_BOSUS	07/27/17	09/25/17	Surface	5	6.3	6.6	2	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Summer seasonal total phosphorus data collected May-Sept]

Station Code	Data Year	Seasonal TP Count	Seasonal TP Min (mg/L)	Seasonal TP Max (mg/L)	Seasonal TP Avg (mg/L)	Delta DO Max (mg/L)	Delta DO Avg (mg/L)	DO Sat Max (%)	pH Max (SU)	Count Algal Obsv.	Dense/V. Dense Film/Fila. Algae
W2506	2015	5	0.012	0.049	0.027	4.3	2.9	63.2	7.1	1	0
W2515	2015	5	0.019	0.046	0.033	3.4	1.6	28.6	6.8	4	0
W2526	2015	5	0.032	0.120	0.065	3.0	1.6	65.5	6.8	3	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 8) (MassDEP Undated 5)

[CMC= Criterion Maximum Concentration, TU= Toxic Unit]

Station Code	Data Year	Metals Count	As CMC TU >1	Cd CMC TU >1	Cr III CMC TU >1	Cu CMC TU >1	Pb CMC TU >1	Ni CMC TU >1	Ag CMC TU >1	Zn CMC TU >1
W2506	2015	3	0	0	0	0	0	0	0	0

Station Code	Data Year	Metals Count	As CMC TU >1	Cd CMC TU >1	Cr III CMC TU >1	Cu CMC TU >1	Pb CMC TU >1	Ni CMC TU >1	Ag CMC TU >1	Zn CMC TU >1
W2515	2015	2	0	0	0	0	0	0	0	0
W2526	2015	2	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 8) (MassDEP Undated 5)

[CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Data Year	Metals Count	As CCC TU >1	Cd CCC TU >1	Cr III CCC TU >1	Cu CCC TU >1	Pb CCC TU >1	Ni CCC TU >1	Se CCC TU >1	Zn CCC TU >1
W2506	2015	3	0	0	0	0	0	0	0	0
W2515	2015	2	0	0	0	0	0	0	0	0
W2526	2015	2	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Selected TU Calculations. (MassDEP Undated 8) (MassDEP Undated 5)

[CMC= Criterion Maximum Concentration, CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Sample Date	Cd CMC TU	Cd CCC TU	Cu CMC TU	Cu CCC TU	Pb CMC TU	Pb CCC TU
W2526	05/05/15	0.1	0.2	0.2	0.33	0.0	0.6
W2526	06/02/15	0.1	0.3	0.3	0.45	0.0	0.9

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[Since only dissolved aluminum data were available, these data were compared to the default freshwater criteria for total recoverable aluminum (TRA), presented in Appendix E of MassDEP's 2022 CALM. As dissolved Al is a fraction of TRA, an exceedance count of 0 does not rule out violations of the TRA criteria. CMC= Criterion Maximum Concentration, CCC= Criterion Continuous Concentration, TU= Toxic Unit]

Station Code	Data Year	Dissolved Al Count	Al Min (mg/L)	Al Max (mg/L)	Al Avg (mg/L)	Al CMC TU Max	Al CCC TU Max	Al CMC TU >1	Al CCC TU >1
W2506	2015	3	0.051	0.051	0.051	0.1	0.1	0	0
W2515	2015	2	0.051	0.059	0.055	0.1	0.1	0	0
W2526	2015	2	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

[TAN= NH3 + NH4+]

Station Code	Data Year	TAN Count	TAN Min (mg/L)	TAN Max (mg/L)	TAN Avg (mg/L)	Count TAN >Chronic	Count TAN >Acute
W2506	2015	5	0.033	0.040	0.039	0	0
W2515	2015	5	0.040	0.070	0.050	0	0
W2526	2015	5	0.040	0.085	0.049	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2506	2015	5	110	160	134	0	0
W2515	2015	5	130	160	146	0	0

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2526	2015	5	100	180	148	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
W2506	08/04/15	09/24/15	3	676	707	0	0	0	0	0	0
W2515	07/30/15	09/23/15	3	678	716	0	0	0	0	0	0
W2526	07/30/15	09/23/15	3	724	772	0	0	0	0	0	0

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_IP00	03/24/13	09/29/13	7	427	1055	1	1	0	0	0	0
IRWA_IP00	03/30/14	12/14/14	10	528	1078	1	1	0	0	0	0
IRWA_IP00	04/26/15	12/13/15	9	622	1125	3	3	0	0	2	2
IRWA_IP00	03/20/16	11/13/16	8	735	1293	5	1	0	0	2	0
IRWA_IP00	03/26/17	12/17/17	9	628	1540	4	4	0	0	2	2
IRWA_IP00	03/25/18	12/16/18	9	571	1224	2	2	0	0	0	0
IRWA_IP00	03/31/19	12/15/19	10	554	1260	1	1	0	0	0	0
IRWA_IP00.5	04/28/13	11/17/13	8	510	1400	2	2	0	0	1	1
IRWA_IP00.5	04/27/14	12/14/14	9	600	1214	2	1	0	0	0	0
IRWA_IP00.5	04/26/15	12/13/15	6	819	1258	4	2	0	0	2	1
IRWA_IP00.5	03/20/16	11/13/16	6	926	1517	6	4	0	0	5	2
IRWA_IP00.5	03/26/17	11/12/17	9	688	1667	5	4	0	0	3	2
IRWA_IP00.5	03/25/18	12/16/18	10	663	1517	4	4	0	0	0	0
IRWA_IP00.5	03/31/19	10/27/19	8	530	907	1	0	0	0	0	0
IRWA_IP01	05/20/18	12/16/18	7	674	1353	1	1	0	0	0	0
IRWA_IP01	01/27/19	08/25/19	6	550	1033	2	1	0	0	1	0
IRWA_IP03	03/26/17	12/17/17	7	597	1860	3	2	0	0	1	0
IRWA_IP03	03/25/18	12/16/18	10	578	1121	3	2	0	0	0	0
IRWA_IP03	02/24/19	12/15/19	10	543	1340	2	2	0	0	0	0
IRWA_IP04	03/24/13	11/17/13	7	451	1027	2	1	0	0	0	0
IRWA_IP04	03/30/14	12/14/14	10	531	928	1	0	0	0	0	0
IRWA_IP04	03/29/15	12/13/15	10	600	1097	5	5	0	0	3	3
IRWA_IP04	03/20/16	11/13/16	9	809	1390	5	3	0	0	3	2
IRWA_IP04	03/26/17	11/12/17	8	593	1338	3	3	0	0	1	1
IRWA_IP04	03/25/18	12/16/18	10	586	1153	2	2	0	0	0	0
IRWA_IP04	03/31/19	11/17/19	7	509	1121	1	1	0	0	0	0
IRWA_IP06	03/25/18	12/16/18	9	571	1171	3	2	0	0	1	0
IRWA_IP06	08/25/19	12/15/19	4	649	1056	1	1	0	0	0	0
IRWA_IP10	08/25/13	11/17/13	4	633	1121	2	1	0	0	1	0

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_IP10	03/30/14	12/14/14	10	414	946	1	0	0	0	0	0
IRWA_IP10	04/26/15	12/13/15	7	713	1145	3	3	0	0	2	2
IRWA_IP10	04/24/16	12/18/16	8	779	1440	4	3	0	0	3	2
IRWA_IP10	03/26/17	12/17/17	9	667	1520	4	3	0	0	2	1
IRWA_IP10	03/25/18	11/18/18	9	561	1276	1	1	0	0	0	0
IRWA_IP10	03/31/19	11/17/19	9	510	1160	1	1	0	0	0	0
IRWA_IP11	08/30/15	08/30/15	1	748	748	0	0	0	0	0	0
IRWA_IP12	08/26/18	09/30/18	2	519	578	0	0	0	0	0	0
IRWA_IP14	03/24/13	11/17/13	8	357	933	1	0	0	0	0	0
IRWA_IP14	03/30/14	12/14/14	10	375	875	0	0	0	0	0	0
IRWA_IP14	04/26/15	12/13/15	8	628	1078	2	1	0	0	1	0
IRWA_IP14	04/24/16	12/18/16	8	619	1280	4	2	0	0	3	1
IRWA_IP14	03/26/17	12/17/17	8	500	1340	3	3	0	0	1	1
IRWA_IP14	03/25/18	12/16/18	10	563	1085	2	1	0	0	0	0
IRWA_IP14	03/30/19	10/27/19	8	490	738	0	0	0	0	0	0

UMass Amherst Dam Study Discrete Specific Conductance Data (2016-2017) Compared to Estimated Chloride Criteria.
(UMass-Amherst 2018) (MassDEP Undated 3)

Station Code	Start Date	End Date	Sample Depth	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
UMassA_BOSDS1	07/19/16	09/14/16	surface	6	667	726	0	0	0	0	0	0
UMassA_BOSDS1	07/27/17	09/25/17	surface	5	489	635	0	0	0	0	0	0
UMassA_BOSIMP	07/19/16	09/14/16	surface	6	686	736	0	0	0	0	0	0
UMassA_BOSIMP	07/25/16	09/14/16	0.5m	3	694	736	0	0	0	0	0	0
UMassA_BOSIMP	07/25/16	09/14/16	1.0m	3	694	734	0	0	0	0	0	0
UMassA_BOSIMP	07/25/16	09/14/16	1.5m	3	695	720	0	0	0	0	0	0
UMassA_BOSIMP	07/27/17	09/25/17	surface	5	488	638	0	0	0	0	0	0
UMassA_BOSIMP	08/25/17	09/25/17	0.5m	2	629	637	0	0	0	0	0	0
UMassA_BOSIMP	08/25/17	09/25/17	1.0m	2	625	637	0	0	0	0	0	0
UMassA_BOSIMP	08/25/17	09/25/17	1.5m	2	623	623	0	0	0	0	0	0
UMassA_BOSUS	07/19/16	09/14/16	surface	6	663	746	0	0	0	0	0	0
UMassA_BOSUS	07/27/17	09/25/17	surface	5	501	677	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

The Fish Consumption Use for this Ipswich River AU (MA92-06) will continue to be assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. MA DPH advises Children under 12, pregnant women, nursing mothers, women of child-bearing age not to eat any fish from the Ipswich River (between the Bostik Findley Dam in Middleton and the Sylvania Dam in Ipswich) while the general public should limit all fish to 2 meals/month due to elevated mercury (MassDPH 2021).

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO

2022 Use Attainment Summary

MassDEP staff recorded aesthetics observations at 3 locations in this Ipswich River MA92-06 AU (W2526- approximately 175 feet downstream/east of Chestnut Street, North Reading; W2515- approximately 2500 feet downstream/north of Route 114, Middleton/Danvers; W2506- approximately 200 feet downstream/north of Peabody Street, Middleton) on 5 different occasions during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded for any of the locations.
Based on these observations, the Aesthetics Use for this Ipswich River AU (MA92-06) is assessed as Fully Supporting.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2506	MassDEP	Water Quality	Ipswich River	[approximately 200 feet downstream/north of Peabody Street, Middleton]	42.616929	-70.996412
W2515	MassDEP	Water Quality	Ipswich River	[approximately 2500 feet downstream/north of Route 114, Middleton/Danvers]	42.579028	-70.991536
W2526	MassDEP	Water Quality	Ipswich River	[approximately 175 feet downstream/east of Chestnut Street, North Reading]	42.571829	-71.096255

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 5)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2506	Ipswich River	2015	5	MassDEP aesthetics observations for station W2506/MAP2-642 on Ipswich River can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2015.
W2515	Ipswich River	2015	5	MassDEP aesthetics observations for station W2515/MAP2-665 on Ipswich River can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2015.
W2526	Ipswich River	2015	5	MassDEP aesthetics observations for station W2526/MAP2-693 on Ipswich River can be summarized as follows: there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2015.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 8) (MassDEP Undated 5)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2506	2015	5	1	0
W2515	2015	5	4	0
W2526	2015	5	3	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 8)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2506	Ipswich River	2015	Color	Light Yellow/Tan	4	5
W2506	Ipswich River	2015	Color	None	1	5
W2506	Ipswich River	2015	Objectionable Deposits	No	3	5
W2506	Ipswich River	2015	Objectionable Deposits	Unobservable	2	5
W2506	Ipswich River	2015	Odor	None	5	5
W2506	Ipswich River	2015	Scum	No	4	5
W2506	Ipswich River	2015	Scum	Unobservable	1	5
W2506	Ipswich River	2015	Turbidity	None	2	5
W2506	Ipswich River	2015	Turbidity	Slightly Turbid	3	5
W2515	Ipswich River	2015	Color	Light Yellow/Tan	5	5
W2515	Ipswich River	2015	Objectionable Deposits	No	5	5
W2515	Ipswich River	2015	Odor	None	5	5
W2515	Ipswich River	2015	Scum	No	5	5
W2515	Ipswich River	2015	Turbidity	None	2	5
W2515	Ipswich River	2015	Turbidity	Slightly Turbid	3	5
W2526	Ipswich River	2015	Color	Light Yellow/Tan	4	5
W2526	Ipswich River	2015	Color	Reddish	1	5
W2526	Ipswich River	2015	Objectionable Deposits	No	4	5
W2526	Ipswich River	2015	Objectionable Deposits	Unobservable	1	5
W2526	Ipswich River	2015	Odor	None	5	5
W2526	Ipswich River	2015	Scum	No	4	5
W2526	Ipswich River	2015	Scum	Yes	1	5
W2526	Ipswich River	2015	Turbidity	Moderately Turbid	2	5
W2526	Ipswich River	2015	Turbidity	None	2	5
W2526	Ipswich River	2015	Turbidity	Slightly Turbid	1	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

MassDEP staff collected 5 *E. coli* bacteria samples in this Ipswich River MA92-06 AU at each of 3 stations (W2526- approximately 175 feet downstream/east of Chestnut Street, North Reading; W2515- approximately 2500 feet downstream/north of Route 114, Middleton/Danvers; W2506- approximately 200 feet downstream/north of Peabody Street, Middleton) between May and September 2015. Data analysis indicated all the intervals for the upstream station (W2526) had GMs >126 CFU/100mL and 3 samples exceeded the 410 CFU/100mL STV. The seasonal GM was 316 CFU/100 mL. In contrast, the 2 downstream stations (W2515 and W2506) had 0% of intervals exceeding the GM criterion, 1 STV exceedance apiece, and low seasonal GMs. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in the field notes for any of the locations.
The Primary Contact Recreation Use for this Ipswich River AU (MA92-06) is assessed as Not Supporting for Escherichia Coli (E. Coli), based on the elevated bacteria concentrations measured downstream of Chestnut St in North Reading (at station W2526). Note that bacteria concentrations at the 2 downstream stations were indicative of good conditions.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2506	MassDEP	Water Quality	Ipswich River	[approximately 200 feet downstream/north of Peabody Street, Middleton]	42.616929	-70.996412
W2515	MassDEP	Water Quality	Ipswich River	[approximately 2500 feet downstream/north of Route 114, Middleton/Danvers]	42.579028	-70.991536
W2526	MassDEP	Water Quality	Ipswich River	[approximately 175 feet downstream/east of Chestnut Street, North Reading]	42.571829	-71.096255

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 8) (MassDEP Undated 5)

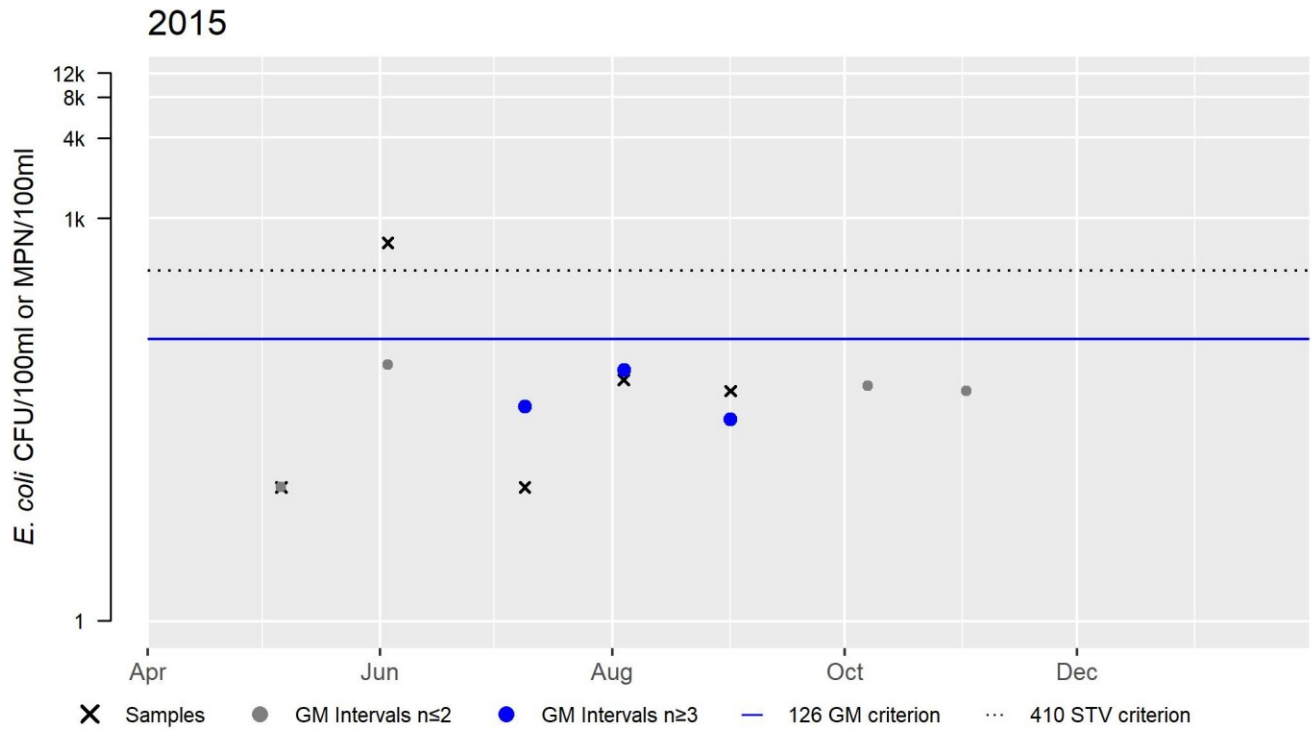
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2506	MassDEP	E. coli	05/06/15	09/01/15	5	10	660	46
W2515	MassDEP	E. coli	05/05/15	08/27/15	5	31	960	75
W2526	MassDEP	E. coli	05/05/15	08/27/15	5	41	1900	316

W2506 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	46
#GMI	3
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	20

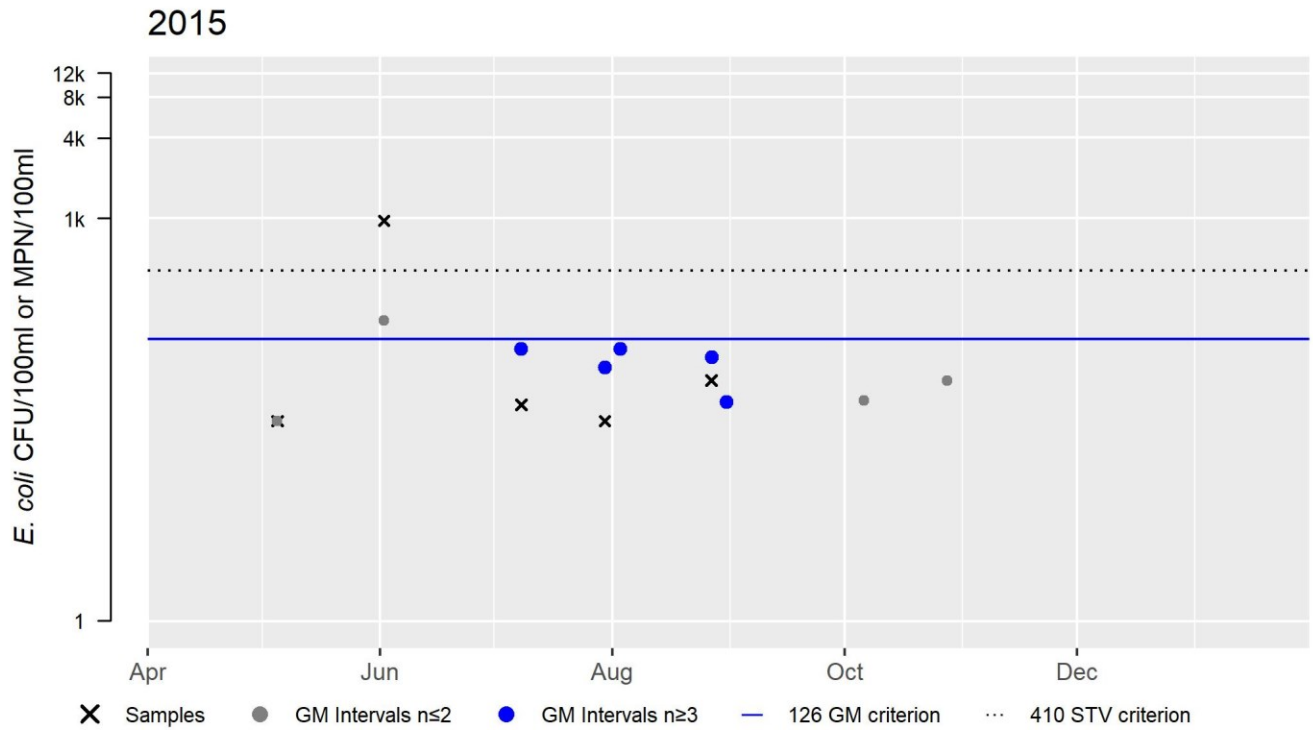
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



W2515 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	75
#GMI	5
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	20

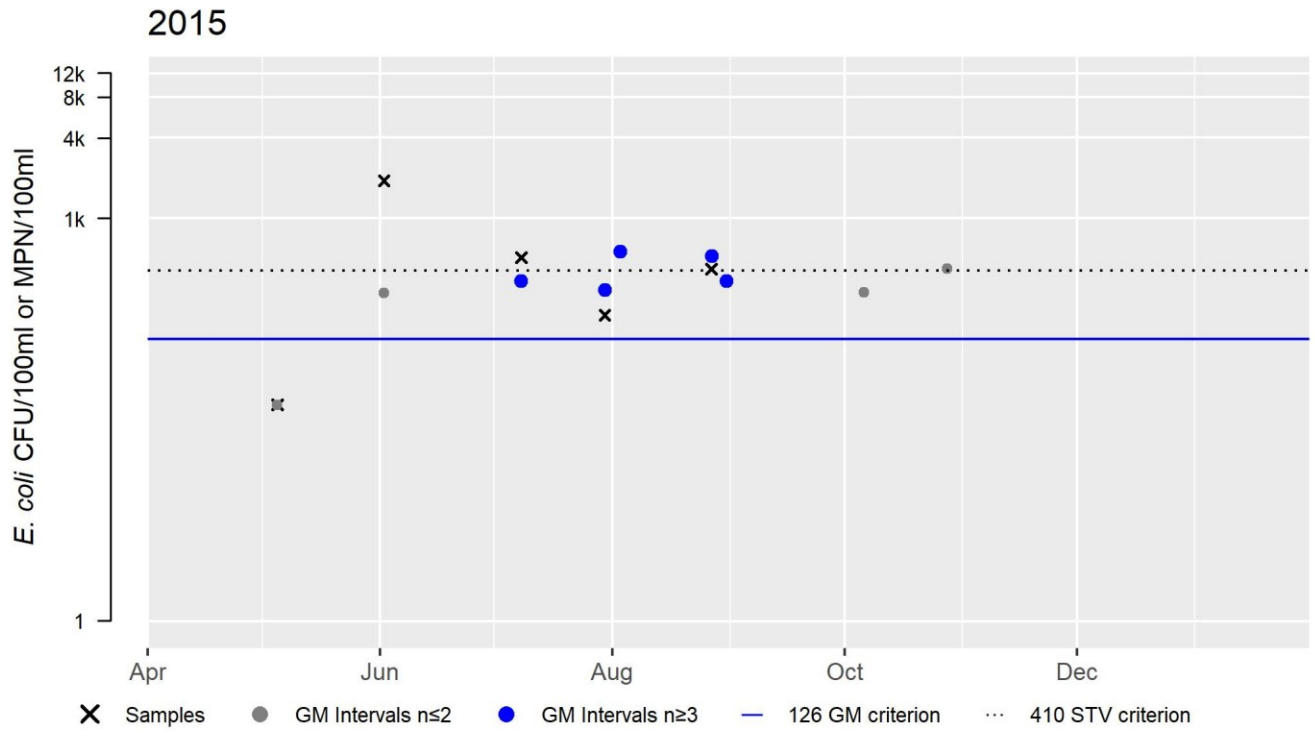
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



W2526 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	316
#GMI	5
#GMI Ex	5
%GMI Ex	100
n>STV	3
%n>STV	60

Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO

2022 Use Attainment Summary

MassDEP staff collected 5 *E. coli* bacteria samples in this Ipswich River MA92-06 AU at each of 3 stations (W2526- approximately 175 feet downstream/east of Chestnut Street, North Reading; W2515- approximately 2500 feet downstream/north of Route 114, Middleton/Danvers; W2506- approximately 200 feet downstream/north of Peabody Street, Middleton) between May and September 2015. Data analysis indicated none of the intervals for any of the stations had GMs >630 CFU/100mL and all the annual GMs were also <630 CFU/100mL. There was only 1 sample at the upstream station (W2526) which exceeded the 410 CFU/100mL STV (with a concentration of 1900 CFU/100mL). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in the field notes for any of the locations.

Based on these data, the Secondary Contact Recreation Use for this Ipswich River AU (MA92-06) is assessed as Fully Supporting.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2506	MassDEP	Water Quality	Ipswich River	[approximately 200 feet downstream/north of Peabody Street, Middleton]	42.616929	-70.996412
W2515	MassDEP	Water Quality	Ipswich River	[approximately 2500 feet downstream/north of Route 114, Middleton/Danvers]	42.579028	-70.991536
W2526	MassDEP	Water Quality	Ipswich River	[approximately 175 feet downstream/east of Chestnut Street, North Reading]	42.571829	-71.096255

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 8) (MassDEP Undated 5)

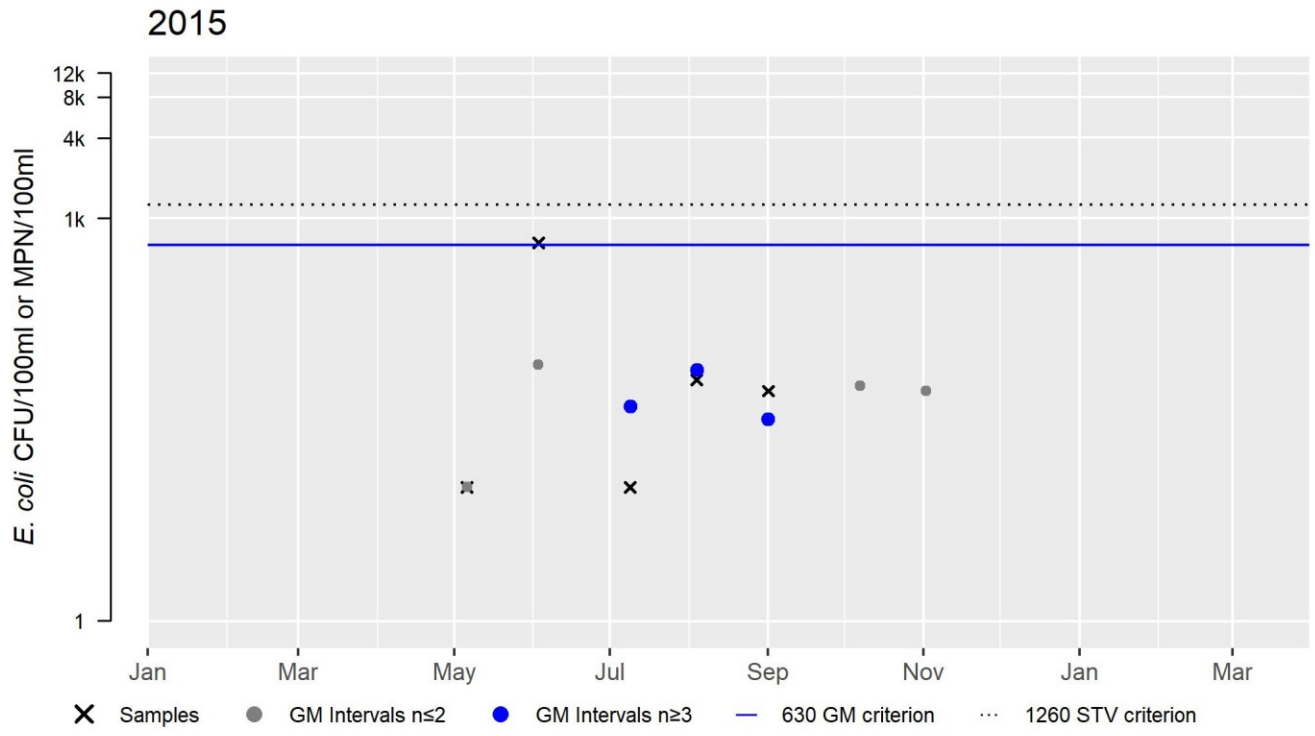
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2506	MassDEP	E. coli	05/06/15	09/01/15	5	10	660	46
W2515	MassDEP	E. coli	05/05/15	08/27/15	5	31	960	75
W2526	MassDEP	E. coli	05/05/15	08/27/15	5	41	1900	316

W2506 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	46
#GMI	3
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

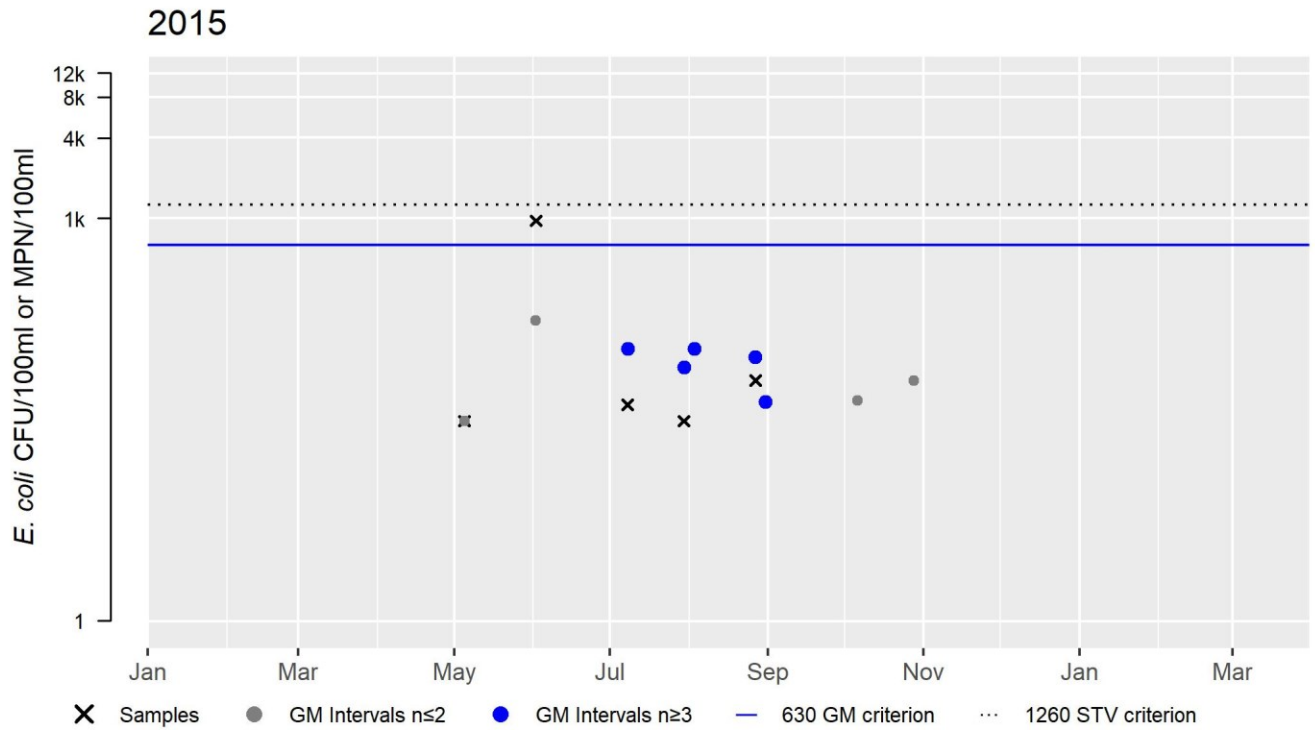
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



W2515 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	75
#GMI	5
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

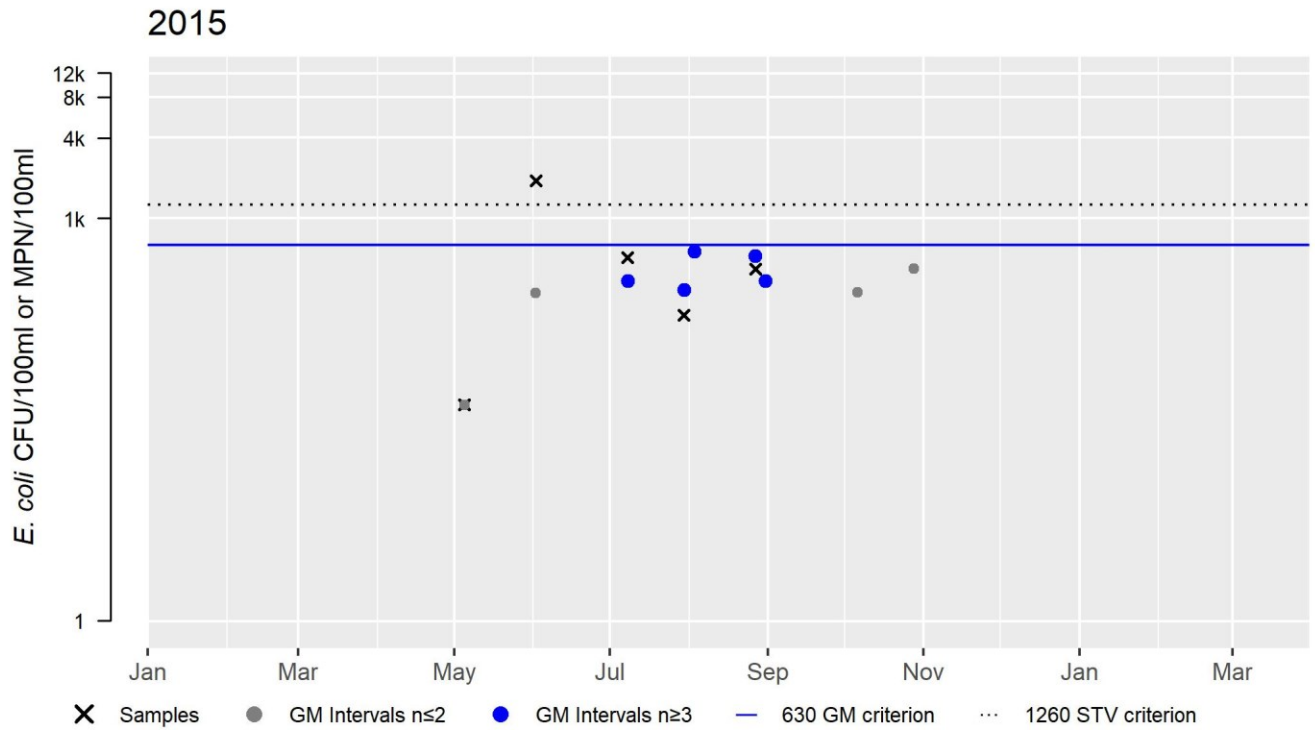
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



W2526 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	316
#GMI	5
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	20

Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exeedances; %GMI Ex = percent GMI Exeedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

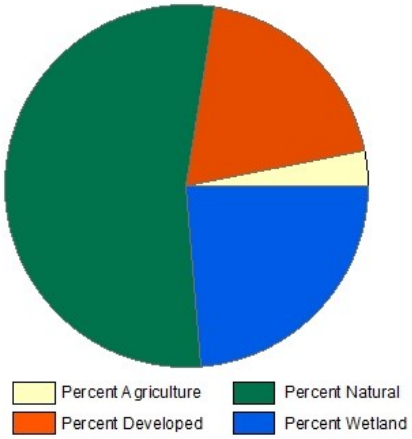


Ipswich River (MA92-15)

Location:	Salem Beverly Waterway Canal, Topsfield to Ipswich Mills Dam (formerly known as Sylvania Dam), Ipswich (formerly part of 1996 segment: Ipswich River MA92-01).
AU Type:	RIVER
AU Size:	11 MILES
Classification/Qualifier:	B: WWF, HQW

Ipswich River - MA92-15

Watershed Area: 149.35 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	149.35	9.89	42.23	3.01
Agriculture	3.1%	17.2%	3.2%	16.8%
Developed	19.5%	12.9%	12%	9.4%
Natural	53.6%	48.8%	49.4%	39.2%
Wetland	23.8%	21.1%	35.5%	34.6%
Impervious Cover	10%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	(Fish Passage Barrier*)		Added
5	5	Dissolved Oxygen		Unchanged
5	5	Fish Bioassessments		Unchanged
5	5	Mercury in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Dewatering*)	Baseflow Depletion from Groundwater Withdrawals (N)	X				
(Fish Passage Barrier*)	Dam or Impoundment (Y)	X				
Dissolved Oxygen	Baseflow Depletion from Groundwater Withdrawals (N)	X				
Fish Bioassessments	Source Unknown (N)	X				
Mercury in Fish Tissue	Source Unknown (N)		X			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Twelve fish community samples (Sample IDs: 5248, 5249, 5485, 5486, 5487, 6407, 6834, 6835, 6836, 6837, 6838, and 6839) were collected from 2014-2017 in the Ipswich River (AUs MA92-06 and MA92-15). The percent similarity with the Ipswich Target Fish Community model was 24.21%. The low similarity was mainly due to a much smaller proportion of fluvial species (common shiner, fallfish) and a larger proportion of tolerant species (American eel, bluegill) in the recently collected samples. IRWA staff/volunteers collected discrete WQ data (DO, temp, SC) from 2013-2019 at 7 stations throughout this AU (IRWA_IP16, IRWA_IP18, IRWA_IP19A, IRWA_IP19, IRWA_IP20, IRWA_IP22, IRWA_IP24). At many stations, there were multiple years with multiple DO measurements <4.0 mg/L and the overall station minima ranged from 0.8 mg/L-3.5 mg/L (generally, n=5-10/station/year). The maximum temperature measured among all stations in this WWF was 27.0 °C (generally, n= 2-3/Summer Index period/station). Specific conductance was only measured at 4 stations (IRWA_IP16 2018-2020, IRWA_IP18 2017-2019, IRWA_IP20 2015, IRWA_IP24 2017-2019)- the maximum SC was >904 µs/cm (the chronic criterion for estimated chloride) in 2 years for 3 stations with SC data but not IRWA_IP20 (n= 1-10/year/station). MassDMF biologists noted two structures (in the middle and downstream end of the AU) causing passage limitation to diadromous fish in the Ipswich River. The Willowdale Dam (NATID# MA00276) (with existing fishway), in the middle of the AU just upstream of Willowdale Road in Ipswich, was given a passage score of "5", on a 0-10 scale, indicating that the dam restricts the passage of diadromous fish, including river herring and American eel. DMF biologists noted that the fishway is being re-designed over the next few years. The Ipswich Mills Dam (NATID# MA00231) (with existing fishway) located at the downstream end of the AU, was given a passage score of "3", indicating that the dam is only a minor obstruction to the passage of the same diadromous species. According to MassDER, the Ipswich Mills Dam is ranked in the top 5% of all Massachusetts dams for removal priority due to the potential for ecological benefits. The removal of this dam would open 49.19 miles of habitat and restore freshwater tidal habitat. Project partners include the Town of Ipswich (owner), IRWA, NOAA Restoration Center, MA Division of Ecological Restoration, and Interfluve (IRWA Undated). The project (called the Lower Ipswich River Restoration project) is currently in the Engineering Design stage but has no expected completion date (Wildman April 15, 2021). UMass-Amherst students studying the thermal effects of the Ipswich Mills Dam collected water quality data 3900 m upstream of the dam (UMassA_IPSUS) and roughly 100 m upstream of the dam (UMassA_IPSIMP) in 2015 and 2016. Probes were deployed 3 or 4 times (6-14 day periods) at both locations to measure continuous DO. Minimum 6-7DADMins ranged from 3.9-6.2 mg/L with 2 such calculations <5.0 mg/L in 2016 at the upstream site (a year in which there was a drought (Drought Management Task Force 2021)) and 6 such measurements <5.0 mg/L in 2015 at the downstream site. Probes also recorded continuous temperature during deploys lasting 70-106 days in the Summer Index periods of 2015-2017. In most years there were no 7DADMs >27.7 °C, but there were 16 such instances in 2016 (the drought year) at the downstream station; the maximum 7DADM that year was 28.9 °C. pH and specific conductance data were collected 6 times in 2016 at the upstream station with a maximum SC of 476 µs/cm and pH ranged from 7.0-7.4 S.U. Based on all these data and information, the Aquatic Life Use of this Ipswich River AU (MA92-15) is assessed as Not Supporting with the prior impairments for Fishes Bioassessments, Dissolved Oxygen, and Dewatering being carried forward. A Fish Passage Barrier impairment is being added because of the impediment to migration posed by the Willowdale Dam.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6834	MassDFG	Fish Community	Ipswich River	Mill Rd DS, Ipswich/Hamilton	42.65810	-70.86139
6835	MassDFG	Fish Community	Ipswich River	Winthrop Rd US, Ipswich	42.65889	-70.89107
6836	MassDFG	Fish Community	Ipswich River	Off Winthrop Rd, Ipswich	42.65679	-70.88622
6839	MassDFG	Fish Community	Ipswich River	Off Topsfield Rd, Ipswich	42.65731	-70.87530
8200	MassDFG	Fish Community	Ipswich River	Peatfield Landing @ impoundment , Ipswich	42.67537	-70.83828
8201	MassDFG	Fish Community	Ipswich River	Peatfield Landing, just upstream , Ipswich	42.67333	-70.84090
8202	MassDFG	Fish Community	Ipswich River	Peatfield Landing, Ipswich	42.66570	-70.84393

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_IP16	Ipswich River Watershed Association	Water Quality	Ipswich River	Ipswich River Wildlife Sanctuary Canoe Launch	42.62718	-70.91798
IRWA_IP18	Ipswich River Watershed Association	Water Quality	Ipswich River	Asbury Street, Topsfield	42.65385	-70.91183
IRWA_IP19	Ipswich River Watershed Association	Water Quality	Ipswich River	Below Willowdale Dam, Topsfield Road. Ipswich	42.65975	-70.89379
IRWA_IP19A	Ipswich River Watershed Association	Water Quality	Ipswich River	100' Above Willowdale Dam, Ipswich	42.65999	-70.89451
IRWA_IP20	Ipswich River Watershed Association	Water Quality	Ipswich River	Winthrop Street, Ipswich	42.65874	-70.89051
IRWA_IP22	Ipswich River Watershed Association	Water Quality	Ipswich River	MIll Road, Ipswich	42.65829	-70.86208
IRWA_IP24	Ipswich River Watershed Association	Water Quality	Ipswich River	Ipswich Mills Dam (upstream of impoundment), Ipswich	42.67777	-70.83806
UMassA_IPSIMP	UMass Amherst	Water Quality	Ipswich River	100m upstream dam	42.676767	-70.83815
UMassA_IPSUS	UMass Amherst	Water Quality	Ipswich River	3900m upstream dam	42.658216	-70.862165

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

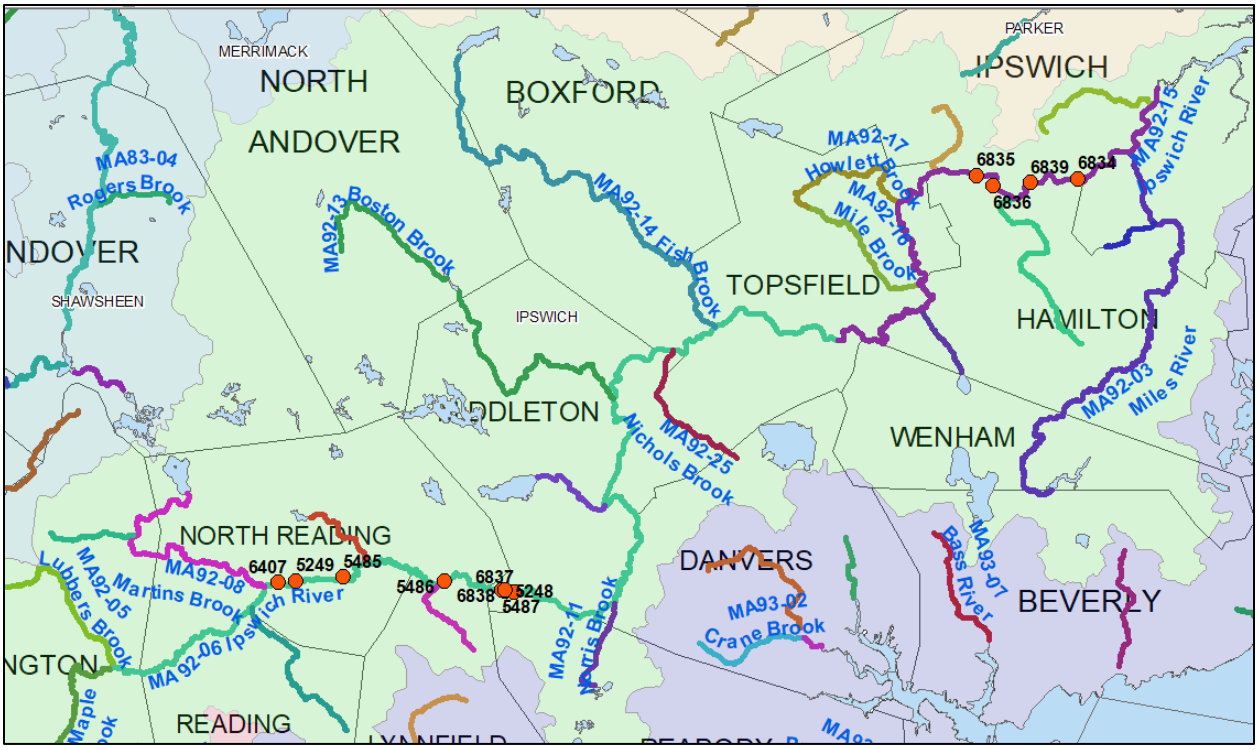
[Species List: AE = American Eel, B = Bluegill, BB = Brown Bullhead, BS = Banded Sunfish, CP = Chain Pickerel, F = Fallfish, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, RT = Rainbow Trout, SD = Swamp Darter, SL = Sea Lamprey, WS = White Sucker, YB = Yellow Bullhead, YP = Yellow Perch]

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
6834	08/28/17	BP	TP	L	8	107	0%	0	0%	0%	4	32%	No	No	AE, B, LMB, P, RBS, RP, SL, YB,
6835	08/29/17	BP	TP	L	14	245	0%	1	0%	1%	7	38%	No	No	AE, B, BB, BS, CP, F, GS, P, RBS, RP, SD, SL, YB, YP,
6836	08/29/17	BP	TP	L	9	70	0%	0	0%	1%	5	43%	Yes	No	AE, B, BB, BS, LMB, P, RBS, RP, YB,
6839	08/31/17	BP	TP	L	11	164	0%	1	1%	0%	6	57%	No	No	AE, B, CP, LMB, P, RBS, RP, SL, WS, YB, YP,
8200	06/26/19	BT	TP		8	29	0%	0	0%	0%	3	45%	Yes	No	AE, B, BB, CP, GS, LMB, P, SL,
8201	06/26/19	BT	TP		9	46	2%	1	2%	2%	3	63%	Yes	No	AE, B, BB, CP, GS, LMB, P, RT, SL,
8202	06/26/19	BT	TP		7	16	6%	2	13%	13%	3	50%	Yes	No	B, BS, CP, GS, P, RT, WS,

Comparison of fish community samples (2005-2017) to the Ipswich Target Fish Community (TFC) Model. (MassDFG 2018, MassDEP Undated 1, Kashiwagi and Richards 2009)

Twelve fish community samples (Sample IDs: 5248, 5249, 5485, 5486, 5487, 6407, 6834, 6835, 6836, 6837, 6838, and 6839) were collected from 2014-2017 in the Ipswich River (AUs MA92-06 and MA92-15). The percent similarity with the Ipswich Target Fish Community was 24.21%. The low similarity was mainly due to a much smaller proportion of fluvial species (common shiner, fallfish) and a larger proportion of tolerant species (American eel, bluegill) in the recently collected samples. Based on the comparison of fish community data with the Ipswich TFC model, these Ipswich River AUs (MA92-06, MA92-15), both WWFs, should be assessed as Not Supporting for Fish Bioassessments.

Fish Community Samples in the Ipswich River MA92-06 (upstream/southwest) and MA92-15 (downstream/northeast):



Ipswich TFC Model:

Table A8. Species percent composition for reference rivers used to develop the Ipswich River target fish community model. Species are ordered by mean rank. Non-native, stocked, and out-of-range species were deleted from the ranking and calculation of expected proportion in the target fish model. The ranks were converted to expected proportions (as a percent) using a rank-weighting technique as outlined by Bain and Meixler (2008).

Species	Lamprey River	North River	SB Piscataquog River	Willimantic River	Salmon River	Total	Rank	Expected Proportions
Common shiner	42.1	9.0	20.6	21.6	13.9	107.2	1	40.6
Fallfish	15.4	28.6	3.0	44.3	0.3	91.6	2	20.3
Blacknose dace	0.0	0.0	33.4	7.9	11.1	52.4		
Longnose dace	5.4	10.6	19.0	0.0	15.2	50.2		
Atlantic salmon	0.3	3.1	9.4	0.0	21.7	34.4		
White sucker	3.7	5.3	0.9	14.6	5.1	29.6	6	6.7
Redbreast sunfish	18.3	0.0	0.0	2.1	0.0	20.4	7	5.8
Spottail shiner	0.0	17.9	0.5	0.2	0.0	18.6		
Smallmouth bass	1.6	0.0	3.6	2.9	9.5	17.6		
American eel	5.3	2.0	0.0	0.2	10.1	17.5	10	4.1
Bridle shiner	1.4	7.8	0.0	0.0	0.0	9.2	11	3.7
Brown trout	0.1	1.4	0.4	0.6	5.2	7.7		
Chain pickerel	0.2	5.6	0.2	0.1	0.2	6.2	13	3.1
Pumpkinseed	2.4	1.4	0.5	0.7	0.2	5.2	14	2.8
Brown bullhead	0.0	4.8	0.0	0.0	0.0	4.8	15	2.7
Golden shiner	1.7	0.0	1.6	0.3	0.0	3.5	16	2.5
Yellow perch	0.6	0.0	0.0	2.6	0.0	3.2	17	2.3
Tessellated darter	0.0	0.0	0.0	1.3	1.8	3.1		
Largemouth bass	0.5	0.8	0.7	0.3	0.6	2.9		
Yellow bullhead	1.0	0.0	1.8	0.0	0.0	2.8		
Rainbow trout	0.0	0.6	0.2	0.0	0.6	1.4		
Bluegill	0.0	0.0	0.0	0.1	0.9	1.1		
Brook trout	0.0	0.0	0.0	0.0	1.0	1.0	23	1.7
Creek chubsucker	0.2	0.0	0.0	0.0	0.0	0.2	24	1.7
Rock bass	0.0	0.0	0.0	0.1	0.0	0.1		
Redfin pickerel	0.1	0.0	0.0	0.0	0.0	0.1	26	1.5

Fish Community Analysis:

Use?	(blank)
After 1-1-05?	TRUE
SampleID	(All)
Bad Sample Check	Ok

Watershed	Common Name	Value # of Fish	% of catch	Applicable TFC	TFC Difference	% Sim to TFC
Ipswich	American Brook Lamprey		0.00%	-	-	
Ipswich	American Eel	572	33.35%	4.1	29.3	
Ipswich	Atlantic Salmon		0.00%	-	-	
Ipswich	Banded Killifish		0.00%	-	-	
Ipswich	Banded Sunfish	6	0.35%	-	0.3	
Ipswich	Black Crappie		0.00%	-	-	
Ipswich	Blacknose Dace		0.00%	-	-	
Ipswich	Bluegill	239	13.94%	-	13.9	
Ipswich	Bluntnose Minnow		0.00%	-	-	
Ipswich	Bridle Shiner		0.00%	3.7	3.7	
Ipswich	Brook Trout		0.00%	1.7	1.7	
Ipswich	Brown Bullhead	23	1.34%	2.7	1.4	
Ipswich	Brown Trout	1	0.06%	-	0.1	
Ipswich	Central Mudminnow		0.00%	-	-	
Ipswich	Chain Pickerel	26	1.52%	3.1	1.6	
Ipswich	Channel Catfish		0.00%	-	-	
Ipswich	Common Carp		0.00%	-	-	
Ipswich	Common Shiner	7	0.41%	40.6	40.2	
Ipswich	Creek Chub	1	0.06%	-	0.1	
Ipswich	Creek Chubsucker	11	0.64%	1.7	1.1	
Ipswich	Cutlips Minnow		0.00%	-	-	
Ipswich	Fallfish	1	0.06%	20.3	20.2	
Ipswich	Fathead Minnow		0.00%	-	-	
Ipswich	Golden Shiner	41	2.39%	2.5	0.1	
Ipswich	Green Sunfish	7	0.41%	-	0.4	
Ipswich	Lake Chub		0.00%	-	-	
Ipswich	Largemouth Bass	129	7.52%	-	7.5	
Ipswich	Longnose Dace		0.00%	-	-	
Ipswich	Longnose Sucker		0.00%	-	-	
Ipswich	Northern Pike		0.00%	-	-	
Ipswich	Pumpkinseed	176	10.26%	2.8	7.5	
Ipswich	Rainbow Trout		0.00%	-	-	
Ipswich	Redbreast Sunfish	111	6.47%	5.8	0.7	
Ipswich	Redfin Pickerel	108	6.30%	1.5	4.8	
Ipswich	Rock Bass		0.00%	-	-	
Ipswich	Sea Lamprey	14	0.82%	-	0.8	
Ipswich	Slimy Sculpin		0.00%	-	-	
Ipswich	Smallmouth Bass		0.00%	-	-	
Ipswich	Spottail Shiner		0.00%	-	-	
Ipswich	Swamp Darter	7	0.41%	-	0.4	
Ipswich	Tadpole Madtom		0.00%	-	-	
Ipswich	Tesselated Darter		0.00%	-	-	
Ipswich	White Catfish		0.00%	-	-	
Ipswich	White Perch	1	0.06%	-	0.1	
Ipswich	White Sucker	19	1.11%	6.7	5.6	
Ipswich	Yellow Bullhead	102	5.95%	-	5.9	
Ipswich	Yellow Perch	113	6.59%	2.3	4.3	
Ipswich	(blank)		0.00%	-	-	24.21
Grand Total		1715	#####	-	100.0	

After 1-1-05?	TRUE
Use?	(blank)
Bad Sample Che	Ok

Row Label
Ipswich
5248
5249
5485
5486
5487
6407
6834
6835
6836
6837
6838
6839
Grand Total

Habitat and Flow Data (anthropogenic alterations)

Status of MassDER habitat restoration priority projects as of 2021 (Wildman April 15, 2021)

Ipswich Mills Dam

The Ipswich Mills Dam forms the boundary with the saltwater portion of the Ipswich River. The granite block dam was originally built to power adjacent mills but has outlived its original purpose. A fishway installed in 1995 does not effectively allow passage of all migratory fish species. According to DER, the Ipswich Mills Dam is ranked in the top 5% of all Massachusetts dams for removal priority due to the potential for ecological benefits. The removal of this dam would open 49.19 miles of habitat and restore freshwater tidal habitat. Project partners include the Town of Ipswich (owner), IRWA, NOAA Restoration Center, MA Division of Ecological Restoration, and Interfluve (IRWA Undated). The project (called the

Lower Ipswich River Restoration project) is currently in the Engineering Design stage but has no expected completion date (Wildman April 15, 2021). Studies on the thermal impact of the Ipswich Mills Dam on the Ipswich River were conducted by UMass students between July 2015 and November 2017. Investigators used data loggers to monitor continuous and discrete temperature and dissolved oxygen (UMass-Amherst 2018).

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists note two structures causing passage limitation to diadromous fish throughout this Ipswich River AU. From upstream to downstream: The Willowdale Dam (NATID# MA00276) (with existing fishway), in the middle of the AU just upstream of Willowdale Road in Ipswich, was given a passage score of "5", on a 0-10 scale, indicating that the dam restricts the passage of the targeted species, river herring and American eel, with a population score of "3". DMF biologists note that the fishway is being re-designed over the next few years. The Ipswich Mills Dam (NATID# MA00231) (with existing fishway) located at the downstream end of the AU, was given a passage score of "3", indicating that the dam is only a minor obstruction to the passage of the targeted species, river herring and American eel. The population score in this area was noted to be "5". The Aquatic Life Use for Ipswich River (Assessment Unit MA92-15) is assessed as Not Supporting based on the barrier to diadromous fish passage at the Willowdale Dam.

Physico-chemical Water Quality Information

DO, pH, Temperature

UMass Amherst Dam Study Short-term Continuous Dissolved Oxygen Data (2015-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Note: X= 7 (or # of deploy days if less than seven days); XDADMin= XDay Average of the Daily Minima, XDADA= XDay Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Day Count	DO Min (mg/L)	Min XDADMin (mg/L)	Min XDADA (mg/L)	Delta DO Max (mg/L)	Count CW XDADMin <6.0	Count CW 1Day Min <5.0	Count WW Early Life Stages XDADA <6.5	Count WW Early Life Stages 1Day Min <5.0	Count WW Other Life Stages XDADMin <5.0	Count WW Other Life Stages 1Day Min <4.0
UMassA_IPSIMP	09/04/15	09/17/15	14	3.2	3.9	4.6	2.4	8	8	0	0	6	4
UMassA_IPSIMP	07/28/16	08/14/16	13	5.6	6	7	3.3	0	0	0	0	0	0
UMassA_IPSIMP	09/09/16	09/14/16	6	5.6	6.2	7	2.1	0	0	0	0	0	0
UMassA_IPSUS	09/04/15	09/17/15	14	4.9	5.3	6.2	2.5	8	1	0	0	0	0
UMassA_IPSUS	07/28/16	08/03/16	7	3.3	4.2	5.6	4.2	1	6	0	3	1	2
UMassA_IPSUS	08/09/16	08/14/16	6	4.1	4.7	6.2	3.7	1	4	0	0	1	0
UMassA_IPSUS	09/09/16	09/14/16	6	4.9	5.7	7.8	7	1	1	0	0	0	0

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_IP16	03/24/13	11/17/13	9	3.2	6.6	2	2	2
IRWA_IP16	03/30/14	12/14/14	10	1.5	5.2	5	5	2
IRWA_IP16	04/26/15	12/13/15	8	2.5	5.3	4	4	3
IRWA_IP16	03/20/16	12/18/16	10	3.4	6.5	2	2	1
IRWA_IP16	03/26/17	11/12/17	9	2.2	4.9	7	7	4
IRWA_IP16	03/25/18	12/16/18	8	3.0	5.4	4	4	3
IRWA_IP16	03/31/19	12/15/19	10	2.8	6.4	3	3	2
IRWA_IP16	02/27/20	02/27/20	1	10.2	10.2	0	0	0
IRWA_IP18	03/24/13	11/17/13	6	0.8	6.3	1	1	1
IRWA_IP18	04/26/15	12/13/15	7	3.2	5.6	3	3	1
IRWA_IP18	05/22/16	10/30/16	5	2.6	4.3	3	3	2
IRWA_IP18	03/25/18	11/18/18	7	2.2	5.5	4	4	3
IRWA_IP18	03/31/19	12/15/19	8	2.2	6.5	2	2	2
IRWA_IP19	03/24/13	11/17/13	7	4.8	7.7	1	1	0
IRWA_IP19	03/29/15	12/13/15	9	6.0	9.9	0	0	0
IRWA_IP19	03/20/16	12/18/16	8	4.7	7.6	1	1	0
IRWA_IP19	03/26/17	12/17/17	9	3.6	6.5	2	2	1
IRWA_IP19	04/29/18	12/16/18	8	3.5	7.1	2	2	2
IRWA_IP19	01/27/19	10/27/19	9	5.5	7.4	0	0	0
IRWA_IP19A	03/24/13	11/17/13	6	3.4	6.9	1	1	1
IRWA_IP19A	03/30/14	12/14/14	10	3.8	6.7	3	3	1
IRWA_IP19A	03/29/15	12/13/15	8	3.8	8.2	1	1	1
IRWA_IP19A	03/20/16	12/18/16	9	4.2	6.6	2	2	0
IRWA_IP19A	03/26/17	12/17/17	9	2.8	5.0	6	6	3
IRWA_IP19A	04/29/18	12/16/18	8	3.0	6.4	2	2	1
IRWA_IP19A	01/27/19	10/27/19	9	2.5	6.5	2	2	2
IRWA_IP20	03/24/13	11/17/13	9	3.2	7.3	2	2	1
IRWA_IP20	02/23/14	10/26/14	9	5.1	7.5	0	0	0
IRWA_IP20	04/26/15	11/15/15	8	5.4	7.5	0	0	0
IRWA_IP20	03/20/16	12/18/16	9	3.6	7.8	1	1	1
IRWA_IP20	03/26/17	10/29/17	8	3.8	6.2	2	2	1
IRWA_IP20	03/25/18	11/18/18	9	5.0	7.7	0	0	0
IRWA_IP20	01/27/19	12/15/19	9	4.7	7.7	2	2	0
IRWA_IP22	04/28/13	07/28/13	3	5.0	6.5	0	0	0
IRWA_IP22	03/30/14	12/14/14	10	1.4	5.9	4	4	1
IRWA_IP22	06/28/15	12/13/15	5	5.9	7.7	0	0	0
IRWA_IP22	03/20/16	12/18/16	8	4.2	7.4	1	1	0
IRWA_IP22	03/26/17	10/29/17	6	3.0	5.8	1	1	1
IRWA_IP22	04/29/18	12/16/18	8	7.0	8.6	0	0	0
IRWA_IP22	03/31/19	12/15/19	9	3.6	6.8	1	1	1
IRWA_IP24	03/24/13	11/17/13	9	3.3	6.8	2	2	1
IRWA_IP24	03/30/14	12/14/14	10	4.4	6.8	1	1	0
IRWA_IP24	04/26/15	12/13/15	8	4.6	6.5	2	2	0
IRWA_IP24	03/20/16	11/13/16	8	4.9	6.6	1	1	0
IRWA_IP24	03/26/17	12/17/17	10	3.4	6.7	2	2	1
IRWA_IP24	03/25/18	12/16/18	10	4.1	7.2	3	3	0
IRWA_IP24	01/27/19	12/15/19	11	3.0	7.1	4	4	1

UMass Amherst Dam Study Long-term Continuous Temperature Data (Summer Index 2014-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; 7DADM= 7-Day Average of the Daily Maxima, 7DADA= 7-Day Average of the Daily Average, CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Index Count	Max 24hr Rolling Avg Temp (°C)	Max Temp (°C)	Max 7DADM (°C)	Max 7DADA (°C)	Count CWTier1 7DADM >20	Count CWTier2 7DADA >21	Count WW 7DADM >27.7
UMassA_IPSIMP	07/08/15	12/31/15	70	27.1	30.0	27.5	27.3	64	64	0
UMassA_IPSIMP	01/01/16	12/31/16	106	29.1	31.6	28.9	28.5	105	103	16
UMassA_IPSIMP	01/01/17	11/30/17	106	26.8	29.2	26.4	26.3	93	87	0
UMassA_IPSUS	07/08/15	12/31/15	70	26.0	28.2	26.3	26.1	64	64	0
UMassA_IPSUS	01/01/16	12/31/16	106	26.3	27.6	26.2	26.1	104	98	0
UMassA_IPSUS	01/01/17	11/30/17	106	26.0	27.2	25.5	25.4	78	75	0

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_IP16	03/24/13	11/17/13	9	3	24.0	16.1	3	1	0	0
IRWA_IP16	03/30/14	12/14/14	10	3	23.0	14.3	2	1	0	0
IRWA_IP16	04/26/15	12/13/15	8	2	24.0	14.9	3	2	0	0
IRWA_IP16	03/20/16	12/18/16	10	3	24.5	15.0	3	3	0	0
IRWA_IP16	03/25/18	10/28/18	7	3	25.5	15.5	2	1	0	0
IRWA_IP16	03/31/19	12/15/19	10	3	24.0	13.8	3	2	0	0
IRWA_IP16	02/27/20	02/27/20	1	0	3.5	3.5	0	0	0	0
IRWA_IP18	03/24/13	11/17/13	5	0	17.0	10.8	0	0	0	0
IRWA_IP18	04/26/15	12/13/15	7	1	24.0	14.3	2	2	0	0
IRWA_IP18	05/22/16	10/30/16	5	2	25.0	19.5	2	2	0	0
IRWA_IP18	03/26/17	11/12/17	8	3	25.2	15.9	3	1	0	0
IRWA_IP18	03/25/18	10/28/18	6	2	27.0	14.5	1	1	0	0
IRWA_IP18	03/31/19	12/15/19	8	2	25.0	12.3	2	1	0	0
IRWA_IP19	03/24/13	11/17/13	7	2	24.0	14.3	2	2	0	0
IRWA_IP19	03/29/15	12/13/15	9	2	26.0	13.8	3	3	0	0
IRWA_IP19	03/20/16	12/18/16	9	2	25.0	12.9	2	2	0	0
IRWA_IP19	03/26/17	12/17/17	9	3	23.0	14.6	2	1	0	0
IRWA_IP19	04/29/18	12/16/18	8	3	25.0	11.9	1	1	0	0
IRWA_IP19	01/27/19	10/27/19	9	3	24.0	14.9	3	1	0	0
IRWA_IP19A	03/24/13	11/17/13	6	2	24.0	12.7	1	1	0	0
IRWA_IP19A	03/30/14	12/14/14	10	3	26.0	14.5	3	3	0	0
IRWA_IP19A	03/29/15	12/13/15	8	2	25.0	12.5	1	1	0	0
IRWA_IP19A	03/20/16	12/18/16	8	2	25.0	13.7	2	1	0	0
IRWA_IP19A	03/26/17	12/17/17	9	3	22.0	14.8	1	0	0	0
IRWA_IP19A	04/29/18	12/16/18	8	3	25.0	12.6	1	1	0	0
IRWA_IP19A	01/27/19	10/27/19	9	3	23.0	14.6	3	1	0	0
IRWA_IP20	03/24/13	11/17/13	7	2	23.0	13.5	2	2	0	0
IRWA_IP20	02/23/14	10/26/14	9	3	23.5	14.0	3	2	0	0
IRWA_IP20	04/26/15	11/15/15	8	3	23.4	15.6	3	2	0	0
IRWA_IP20	03/20/16	12/18/16	10	3	23.0	13.1	3	1	0	0

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_IP20	03/26/17	10/29/17	8	3	23.0	16.6	1	1	0	0
IRWA_IP20	03/25/18	11/18/18	8	3	25.0	14.5	2	1	0	0
IRWA_IP20	01/27/19	12/15/19	10	2	23.0	11.2	2	2	0	0
IRWA_IP22	04/28/13	07/28/13	3	1	21.0	17.9	1	0	0	0
IRWA_IP22	03/30/14	12/14/14	9	3	21.0	12.2	2	0	0	0
IRWA_IP22	05/31/15	12/13/15	7	2	24.0	13.6	2	1	0	0
IRWA_IP22	03/20/16	12/18/16	10	3	24.0	13.7	2	2	0	0
IRWA_IP22	03/26/17	10/29/17	5	2	24.0	16.2	2	1	0	0
IRWA_IP22	04/29/18	12/16/18	8	2	25.0	14.6	1	1	0	0
IRWA_IP22	03/31/19	12/15/19	9	2	25.0	13.6	2	2	0	0
IRWA_IP24	03/24/13	11/17/13	9	3	23	14.2	3	1	0	0
IRWA_IP24	03/30/14	12/14/14	10	3	23	13.1	3	1	0	0
IRWA_IP24	04/26/15	12/13/15	8	2	23	14.3	3	1	0	0
IRWA_IP24	03/20/16	11/13/16	8	2	26	13.9	1	1	0	0
IRWA_IP24	03/26/17	12/17/17	10	3	24	14	2	1	0	0
IRWA_IP24	03/25/18	12/16/18	10	3	26	13.1	2	1	0	0
IRWA_IP24	01/27/19	12/15/19	11	3	23	11.2	3	2	0	0

UMass Amherst Dam Study Discrete pH Data (2016-2017). (UMass-Amherst 2018) (MassDEP Undated 3)

Station Code	Start Date	End Date	Sample Depth	pH Count	pH Min (SU)	pH Max (SU)	pH Count <6.5 & >8.3	pH Count <6.0 & >8.8
UMassA_IPSUS	07/27/16	09/15/16	Surface	6	7.0	7.4	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_IP16	03/25/18	10/28/18	7	550	1034	1	1	0	0	0	0
IRWA_IP16	03/31/19	12/15/19	9	439	944	1	0	0	0	0	0
IRWA_IP16	02/27/20	02/27/20	1	895	895	0	0	0	0	0	0
IRWA_IP18	05/21/17	11/12/17	5	278	1036	1	1	0	0	0	0
IRWA_IP18	03/25/18	10/28/18	5	500	953	1	0	0	0	0	0
IRWA_IP18	03/31/19	12/15/19	7	460	902	0	0	0	0	0	0
IRWA_IP20	05/31/15	09/27/15	2	541	757	0	0	0	0	0	0
IRWA_IP24	03/26/17	12/17/17	9	439	1058	3	2	0	0	1	0
IRWA_IP24	03/25/18	12/16/18	10	500	897	0	0	0	0	0	0
IRWA_IP24	02/24/19	12/15/19	9	438	1038	1	1	0	0	0	0

UMass Amherst Dam Study Discrete Specific Conductance Data (2016-2017) Compared to Estimated Chloride Criteria. (UMass-Amherst 2018) (MassDEP Undated 3)

Station Code	Start Date	End Date	Sample Depth	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
UMassA_IPSUS	07/27/16	09/15/16	surface	6	336	476	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
The Fish Consumption Use for this Ipswich River AU (MA92-15) will continue to be assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. MA DPH advises Children under 12, pregnant women, nursing mothers, women of child-bearing age not to eat any fish from the Ipswich River (between the Bostik Findley Dam in Middleton and the Sylvania Dam in Ipswich) while the general public should limit all fish to 2 meals/month due to elevated mercury (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent data available, so the Aesthetics Use for this Ipswich River AU (MA92-15) is Not Assessed.	

Primary Contact Recreation

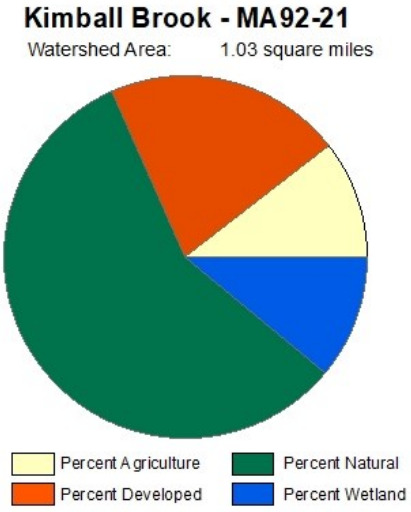
2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for this Ipswich River AU (MA92-15) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for this Ipswich River AU (MA92-15) is Not Assessed.	

Kimball Brook (MA92-21)

Location:	Headwaters, west of Scott Hill, Ipswich to confluence with Ipswich River, Ipswich.
AU Type:	RIVER
AU Size:	2.2 MILES
Classification/Qualifier:	B



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.03	1.03	0.28	0.28
Agriculture	10.5%	10.5%	17.2%	17.2%
Developed	21.2%	21.2%	21.1%	21.1%
Natural	57.3%	57.3%	37.9%	37.9%
Wetland	11%	11%	23.7%	23.7%
Impervious Cover	11.3%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert

Not Supporting	NO
2022 Use Attainment Summary	
MassDFG staff visited the Safford St crossing (Ipswich) of Kimball Brook in August 2014 but could not conduct a fish survey since the stream was dry. Of note, there was no drought during this time period (Drought Management Task Force 2021) and there are no groundwater withdrawals in this subwatershed (MassGIS 2021) so it is unknown why the stream was dry. The Aquatic Life Use of Kimball Brook (MA92-21) will continue to be assessed as Not Supporting with the Dissolved Oxygen impairment being carried forward.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5263	MassDFG	Fish Community	Kimball Brook	Safford Rd, Ipswich	42.67396	-70.84558

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG: Fishless Samples. (MassDFG 2020)

[Method: BP= Backpack Shocking, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net]

Sample ID	Sample Date	Method	No Fish Reason
5263	08/04/14		No Sample Attempted - Dry/Low Water

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Kimball Brook (MA92-21), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no recent data available, so the Aesthetics Use for Kimball Brook (MA92-21) is Not Assessed. The prior alert for turbidity is being carried forward.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for Kimball Brook (MA92-21) will continue to be assessed as Not Supporting with the prior impairments for Escherichia Coli (E. Coli) and Fecal Coliform being carried forward. The prior alert for turbidity is also being carried forward.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for Kimball Brook (MA92-21) is Not Assessed. The prior alert for turbidity is being carried forward.	

Kimballs Pond (MA92027)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	8 ACRES
Classification/Qualifier:	B

No usable data were available for Kimballs Pond (MA92027) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
-3	3	None		Unchanged

Labor in Vain Creek (MA92-22)

Location:	Headwaters (excluding intermittent portion) south of Argilla Road, Ipswich to confluence with estuarine portion of Ipswich River, Ipswich.
AU Type:	ESTUARY
AU Size:	0.03 SQUARE MILES
Classification/Qualifier:	SA: SFO

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Unchanged
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Shellfish Harvesting	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Source Unknown (N)	X					
Fecal Coliform	Source Unknown (N)			X			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No new data are available so the Aquatic Life Use of Labor in Vain Creek (MA92-22) will continue to be assessed as Not Supporting with the Dissolved Oxygen impairment being carried forward.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Labor in Vain Creek (MA92-22), therefore the Fish Consumption Use is Not Assessed.	

Shellfish Harvesting

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Labor in Vain Creek (MA92-22): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.0212 sq mi (68%). The approved shellfish growing area represents 0 sq mi (0%). The Shellfish Harvesting Use is assessed as not supporting because the growing area (normalized to the AU area) is < 100% approved. Based on the new growing area classifications, the existing fecal coliform impairment is being carried forward.	

Shellfish Growing Area Classifications

MassDFG-Division of Marine Fisheries Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Area Name	Waterbody/Area Description	Classification	Area (Sq. Mi.)	Area (% of AU)
N5.6	Labor-in-Vain Creek	Conditionally Approved	0.02120	67.9%
N5.7	Upper Ipswich River	Prohibited	0.00000	0.0%

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aesthetics Use of Labor in Vain Creek (MA92-22) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Primary Contact Recreation Use of Labor in Vain Creek (MA92-22) is Not Assessed.	

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Summary
Labor in Vain Creek (MA92-22): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.0212 sq mi (68%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than “approved”, the Primary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Secondary Contact Recreation Use of Labor in Vain Creek (MA92-22) is Not Assessed.	

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Summary
Labor in Vain Creek (MA92-22): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.0212 sq mi (68%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than “approved”, the Secondary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Long Causeway Brook (MA92-20)

Location:	Headwaters (excluding intermittent portion) near Boston & Maine Railroad, south of Pigeon Hill, Hamilton to confluence with Miles River, Hamilton/Ipswich.
AU Type:	RIVER
AU Size:	1 MILES
Classification/Qualifier:	B

No usable data were available for Long Causeway Brook (MA92-20) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Longham Reservoir (MA92030)

Location:	Wenham/Beverly.
AU Type:	FRESHWATER LAKE
AU Size:	34 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Longham Reservoir (MA92030) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Lowe Pond (MA92034)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	36 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Fanwort*)		Added
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	Mercury in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Aquatic Plants	Clarification of listing cause	The generic "Non-Native Aquatic Plants" is not needed since the specific macrophyte Fanwort (*Cabomba caroliniana*), has been utilized.

Non-Native Aquatic Plants

The generic "Non-Native Aquatic Plants" impairment is being removed since the specific macrophyte Fanwort (*Cabomba caroliniana*) impairment is being added.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Lowe Pond during a September 1995 synoptic survey. The Aquatic Life Use for Lowe Pond (MA92034) will continue to be assessed as Not Supporting. The generic Non-Native Aquatic Plants impairment is being removed since the non-native aquatic macrophyte species impairment fanwort (*Cabomba caroliniana*) is being added.	

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995)

Summary Statement
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Lowe Pond during a September 1995 synoptic survey.

Fish Consumption

2022 Use Attainment	**Alert**
Not Supporting	NO
2022 Use Attainment Summary	
The Fish Consumption Use for Lowe Pond (MA92034) will continue to be assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. MA DPH advises Children under 12, pregnant women, nursing mothers, women of child-bearing age not to eat any fish from Lowe Pond while the general public should not eat any largemouth bass and should limit consumption of other species to 2 meals/month due to elevated mercury (MassDPH 2021).	

Aesthetic

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Aesthetics Use for Lowe Pond (MA92034) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Primary Contact Recreation Use for Lowe Pond (MA92034) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Secondary Contact Recreation Use for Lowe Pond (MA92034) is Not Assessed.	

Lower Four Mile Pond (MA92032)

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

No usable data were available for Lower Four Mile Pond (MA92032) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Non-Native Aquatic Plants*)		Unchanged

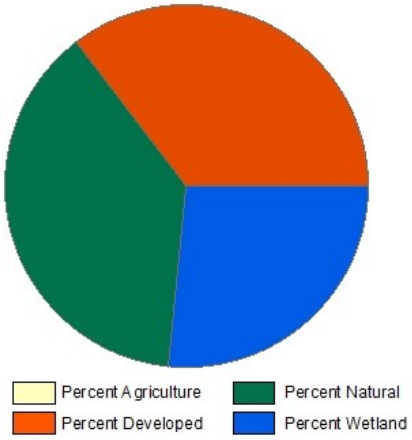
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (N)	X				

Lubbers Brook (MA92-05)

Location:	Headwaters (excluding intermittent portion) Billerica to confluence with Maple Meadow Brook forming headwaters of Ipswich River, Wilmington (through former 2014 segments: Lubber Pond West MA92036 and Lubber Pond East MA92035).
AU Type:	RIVER
AU Size:	5.6 MILES
Classification/Qualifier:	B

Lubbers Brook - MA92-05

Watershed Area: 5.87 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	5.87	4.55	1.02	0.78
Agriculture	0%	0%	0%	0%
Developed	35.4%	36.5%	16.4%	19.6%
Natural	38%	37.5%	32.8%	32%
Wetland	26.6%	25.9%	50.8%	48.4%
Impervious Cover	18.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Dewatering*)	Baseflow Depletion from Groundwater Withdrawals (N)	X				
Dissolved Oxygen	Baseflow Depletion from Groundwater Withdrawals (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in Lubbers Brook (MA92-05) to track chloride trends. Given the regional trend of increasing chloride, the use of de-icing products containing chloride should be minimized in the Lubbers Brook sub-watershed by all parties (i.e., highways/roads, municipalities, businesses, residences).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary
IRWA staff/volunteers collected water quality data (DO, temperature, specific conductance) in Lubbers Brook (MA92-05) at station IRWA_LB (Glenn Rd., Wilmington) from 2013-2016 and downstream at station IRWA_LB-MI (Middlesex Ave., Wilmington) from 2017-2019. All temperature data were <28.3 °C in this WWF (maximum 26.0 °C; n= 1-3 per Summer Index period). The minimum DO concentrations were <4.0 mg/L in 2 years at the upstream station (overall minimum 1.4 mg/L; n= 4-7/year) and in 1 year at the downstream station (overall minimum 1.9 mg/L; n= 3-7/year). Four of the six years of specific conductance (SC) data (2013-15, 2017-19; n= 3-7/year) among the two stations had annual maximum SC values >904 µs/cm (the chronic criterion for estimated chloride), with an overall maximum of 1467 µs/cm. Based on these data, the Aquatic Life Use of Lubbers Brook (MA92-05) is assessed as Not Supporting. The data collected by IRWA indicate that the prior impairment for Dissolved Oxygen should be carried forward (the prior impairment for Dewatering is also being carried forward). A new Alert for chloride is also being identified due to multiple instances of elevated specific conductance data over six years of monitoring by IRWA.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_LB	Ipswich River Watershed Association	Water Quality	Lubber's Brook	Glenn Rd., Wilmington	42.56598	-71.18279
IRWA_LB-MI	Ipswich River Watershed Association	Water Quality	Lubbers Brook	Middlesex Ave., Wilmington	42.57028	-71.15797

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_LB	03/24/13	09/29/13	7	2.2	6.5	1	1	1

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_LB	03/30/14	11/16/14	7	1.4	4.6	4	4	2
IRWA_LB	04/26/15	10/25/15	4	5.4	6.7	0	0	0
IRWA_LB	04/24/16	12/18/16	5	5.8	8.1	0	0	0
IRWA_LB-MI	03/26/17	10/29/17	7	1.9	5.5	3	3	2
IRWA_LB-MI	03/25/18	10/28/18	5	4.0	7.0	1	1	0
IRWA_LB-MI	03/31/19	08/22/19	3	4.2	6.0	1	1	0

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_LB	03/24/13	09/29/13	7	3	24.0	16.3	2	1	0	0
IRWA_LB	05/18/14	11/16/14	5	1	23.0	15.2	1	1	0	0
IRWA_LB	04/26/15	10/25/15	4	2	19.0	13.1	0	0	0	0
IRWA_LB	03/20/16	12/18/16	7	2	21.0	12.0	1	0	0	0
IRWA_LB-MI	04/30/17	10/29/17	6	2	24.0	18.1	1	1	0	0
IRWA_LB-MI	03/25/18	10/28/18	5	1	26.0	13.2	1	1	0	0
IRWA_LB-MI	03/31/19	12/29/19	4	1	21.0	12.8	1	0	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_LB	03/24/13	09/29/13	7	457	983	2	0	0	0	0	0
IRWA_LB	05/18/14	11/16/14	5	510	783	0	0	0	0	0	0
IRWA_LB	04/26/15	10/25/15	4	778	1467	2	1	0	0	1	0
IRWA_LB-MI	05/21/17	10/29/17	5	551	959	1	0	0	0	0	0
IRWA_LB-MI	03/25/18	10/28/18	5	575	1150	1	1	0	0	0	0
IRWA_LB-MI	03/31/19	08/22/19	3	541	696	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Lubbers Brook (MA92-05), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	

The Aesthetics Use for Lubbers Brook (MA92-05) is Not Assessed since there are no new data available. The prior Alerts (for occasional objectionable conditions including turbidity and macrophyte growths recorded by DEP field crews at station W0139 in 2005) are being carried forward.

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
There are no new bacteria data available with which to assess the Primary Contact Recreation Use for Lubbers Brook (MA92-05). This use will continue to be assessed as Not Supporting with the prior impairment for *E. coli* bacteria being carried forward. Alerts for occasional objectionable conditions including turbidity and macrophyte growths recorded by DEP field crews at station W0139 in 2005 are also being carried forward.	

Secondary Contact Recreation

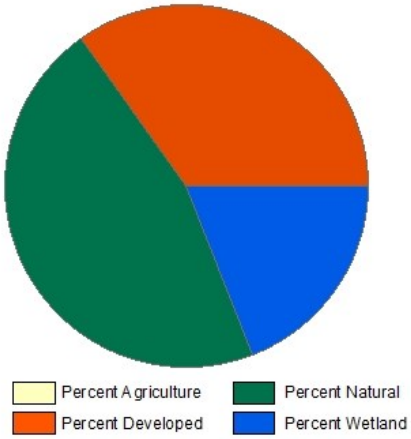
2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
In the 2016 IR cycle, the Secondary Contact Recreation Use for Lubbers Brook (MA92-05) was erroneously assessed as Not Supporting, when it should have been assessed as Fully Supporting (the annual geometric mean of the samples collected at station W0139 in 2005 was 129 CFU/100mL). Without any more recent bacteria sample data available for the 2022 reporting cycle, the Secondary Contact Recreation Use for Lubbers Brook (MA92-05) is being changed to Not Assessed. The prior E. coli impairment is being removed from this use to correct the error that occurred during the 2016 IR reporting cycle. The Alerts for occasional objectionable conditions including turbidity and macrophyte growths recorded by DEP field crews at station W0139 in 2005 are being carried forward.	

Maple Meadow Brook (MA92-04)

Location:	Headwaters outlet of Mill Pond, Burlington to confluence with Lubbers Brook forming headwaters of Ipswich River, Wilmington.
AU Type:	RIVER
AU Size:	4.2 MILES
Classification/Qualifier:	B

Maple Meadow Brook - MA92-04

Watershed Area: 8.53 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	8.53	6.07	1.96	1.3
Agriculture	0%	0%	0.1%	0.1%
Developed	34.9%	32.8%	19.8%	15%
Natural	46%	42.5%	43.4%	37%
Wetland	19.1%	24.7%	36.7%	48%
Impervious Cover	19.2%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	Dissolved Oxygen		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Dewatering*)	Baseflow Depletion from Groundwater Withdrawals (N)	X				
Dissolved Oxygen	Baseflow Depletion from Groundwater Withdrawals (N)	X				

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in Maple Meadow Brook (MA92-04) to track chloride trends. Given the regional trend of increasing chloride, the use of de-icing products containing chloride should be minimized in the Maple Meadow Brook sub-watershed by all parties (i.e., highways/roads, municipalities, businesses, residences).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
IRWA staff/volunteers collected water quality data (DO, temperature, specific conductance) in Maple Meadow Brook (MA92-04) at station IRWA_MMB (Wildwood St., Wilmington) from 2013-2019. All temperature data were <28.3 °C in this WWF (maximum 24.0 °C; n=3 per Summer Index period). The minimum DO concentrations were all <1.0 mg/L with more than half of the measurements (5-7/year) <4.0 mg/L. The maximum specific conductance measurements each year were all >994 µs/cm (the estimated chloride chronic criterion plus the 10% margin of error; n= 7-10/year) with multiple measurements >994 µs/cm in 2015, 2016, and 2017; however, the data in the last 3 years of record indicate that a use impairment decision is not warranted at this time. Based on these data, the Aquatic Life Use of Maple Meadow Brook (MA92-04) will continue to be assessed as Not Supporting with the Dissolved Oxygen and Dewatering impairments being carried forward. (The DO data collected by IRWA continue to confirm the DO impairment decision). An Alert is also being identified for chloride due to multiple instances of elevated specific conductance data in seven years of IRWA monitoring data.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_MMB	Ipswich River Watershed Association	Water Quality	Maple Meadow Brook	Wildwood St., Wilmington	42.55276	-71.15662

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_MMB	03/24/13	10/27/13	8	0.4	3.1	6	6	6

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_MMB	03/30/14	12/14/14	10	0.4	4.0	6	6	6
IRWA_MMB	04/26/15	12/13/15	9	0.4	2.5	7	7	7
IRWA_MMB	03/20/16	12/18/16	10	0.0	4.5	6	6	5
IRWA_MMB	03/26/17	11/12/17	9	0.2	3.2	7	7	6
IRWA_MMB	03/25/18	11/18/18	9	0.2	3.6	7	7	6
IRWA_MMB	03/31/19	12/15/19	10	0.0	3.6	6	6	5

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_MMB	03/24/13	10/27/13	8	3	24.0	15.6	3	1	0	0
IRWA_MMB	03/30/14	12/14/14	10	3	22.0	12.8	3	0	0	0
IRWA_MMB	04/26/15	12/13/15	9	3	22.0	13.8	2	0	0	0
IRWA_MMB	03/20/16	12/18/16	10	3	24.0	13.3	3	2	0	0
IRWA_MMB	03/26/17	11/12/17	9	3	24.0	15.1	1	1	0	0
IRWA_MMB	03/25/18	11/18/18	9	3	22.5	13.1	1	1	0	0
IRWA_MMB	03/31/19	12/15/19	10	3	22.0	12.9	1	0	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_MMB	03/24/13	09/29/13	7	520	1025	1	1	0	0	0	0
IRWA_MMB	03/30/14	12/14/14	10	535	1058	1	1	0	0	0	0
IRWA_MMB	04/26/15	12/13/15	9	660	1196	4	2	0	0	3	1
IRWA_MMB	03/20/16	12/18/16	10	796	1480	9	5	0	0	7	1
IRWA_MMB	03/26/17	11/12/17	9	622	1339	4	2	0	0	1	0
IRWA_MMB	03/25/18	11/18/18	9	570	1362	2	1	0	0	0	0
IRWA_MMB	03/31/19	12/15/19	10	564	1255	2	1	0	0	1	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Maple Meadow Brook (MA92-04), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no new data available, so the Aesthetics Use for Maple Meadow Brook (MA92-04) is Not Assessed. The prior Alert for occasional objectionable conditions (odors, deposits, growths, or turbidity observed by WPP crews at W0143 in 2005) is being carried forward.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for Maple Meadow Brook (MA92-04) is Not Assessed. The prior Alert for occasional objectionable conditions (odors, deposits, growths, or turbidity observed by WPP crews at W0143 in 2005) is being carried forward.	

Secondary Contact Recreation

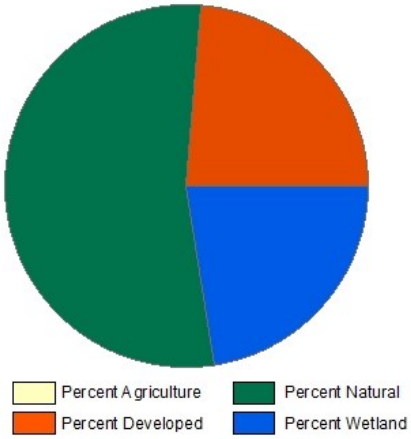
2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for Maple Meadow Brook (MA92-04) is Not Assessed. The prior Alert for occasional objectionable conditions (odors, deposits, growths, or turbidity observed by WPP crews at W0143 in 2005) is being carried forward.	

Martins Brook (MA92-08)

Location:	Outlet of Martins Pond, North Reading to the confluence with the Ipswich River, North Reading.
AU Type:	RIVER
AU Size:	4.6 MILES
Classification/Qualifier:	B

Martins Brook - MA92-08

Watershed Area: 13.19 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	13.19	9.59	3.53	2.78
Agriculture	0.4%	0%	0.1%	0%
Developed	23.7%	26.7%	15%	16.6%
Natural	53.4%	50.3%	49.5%	46.7%
Wetland	22.5%	23%	35.4%	36.7%
Impervious Cover	12.2%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Streambank Modifications/Destabilization (N)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in Martins Brook (MA92-08) to track chloride trends. Given the regional trend of increasing chloride, the use of de-icing products containing chloride should be minimized in the Martins Brook sub-watershed by all parties (i.e., highways/roads, municipalities, businesses, residences). Continue to coordinate with the Ipswich River Watershed Association to track streamflow measurements and any reports of low/no flow events, particularly during non-drought periods.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
IRWA staff/volunteers collected water quality data (DO, temperature, specific conductance) in Martins Brook (MA92-08) at station IRWA_MB-62 (Rt 62, Wilmington) from 2013-2018 and at station IRWA_MB-PS (Park St., North Reading) from 2014-2019. All temperature data were <28.3 °C in this WWF (maximum 26.0 °C; n= generally 1-3 per Summer Index period, each station). The minimum DO concentrations were <4.0 mg/L in most years for both stations (n= 5-10/year, each station). Furthermore, there were 3-5 instances of low DO <4.0 mg/L in 4 years of measurements at the upstream station and each of the last 2 years at the downstream station. The maximum specific conductance measurements were >904 µs/cm (the estimated chloride chronic criterion) in 3 years at the upstream station and all 6 years at the downstream station, with 2 elevated measurements at both stations in 2016 and 2017 (max SC >1400 µs/cm). IRWA staff provided MassDEP with RIFLS streamflow gage data for the Martins Brook gage at Park Street in North Reading (O'Donnell February 2, 2023). IRWA staff noted the occurrence of several low flow periods between 2015 and 2020 in comparison with the watershed area-corrected streamflow recorded at the USGS Ipswich River South Middleton gage. However, only one of these low flow events occurred during a non-drought period, in September 2015 (the others occurred during summer 2016 and fall 2020 during drought periods (Drought Management Task Force 2021)). Review of pumping records for the municipal wells located adjacent to Martins Brook revealed that overall, pumping rates have decreased since 2015, or in some cases wells have been taken entirely off-line (Persky February 14, 2023, Kickham February 15, 2023). The Aquatic Life Use of Martins Brook (MA92-08) will continue to be assessed as Not Supporting with the Dissolved Oxygen and Benthic Macroinvertebrates impairments being caried forward. The recent data collected by IRWA confirm the Dissolved Oxygen impairment. The prior Alert for Low Flow Alterations (now called Dewatering) is also being carried forward (given the recent reduction in groundwater withdrawals near Martins Brook, a Dewatering impairment is not considered to be appropriate at this time) while a new Alert is being identified for chloride due to multiple instances of elevated specific conductance data in seven years of IRWA monitoring data.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_MB-62	Ipswich River Watershed Association	Water Quality	Martin's Brook	Rt. 62, Wilmington	42.57977	-71.13894
IRWA_MB-PS	Ipswich River Watershed Association	Water Quality	Martin's Brook	Park St., North Reading	42.57147	-71.10123

Biological Monitoring Information

Habitat and Flow Data (anthropogenic alterations)

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists note one structure at the upstream end of the Martins Brook AU, causing passage limitation to diadromous fish between the brook and Martins Pond (MA92038). The culvert at the Martins Pond outlet, was given a passage score of "10", on a 0-10 scale, indicating that the culvert allows no possible passage of the targeted species, river herring and American eel. The population score in this area was noted to be "0". Because the population score was "0" (no run present), no use impairment decision can be made at this time for the Aquatic Life Use of Martins Brook (Assessment Unit MA92-08) based on diadromous fish passage.

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_MB-62	03/24/13	10/27/13	8	0.5	3.6	5	5	4
IRWA_MB-62	03/30/14	11/16/14	9	1.3	4.5	6	6	5
IRWA_MB-62	04/26/15	12/13/15	7	1.2	4.0	5	5	5
IRWA_MB-62	03/20/16	11/13/16	5	4.2	6.1	1	1	0
IRWA_MB-62	03/26/17	12/17/17	9	1.2	4.8	5	5	5
IRWA_MB-62	03/25/18	10/28/18	8	2.0	5.2	4	4	3
IRWA_MB-PS	04/27/14	12/14/14	8	4.0	6.1	3	3	0
IRWA_MB-PS	03/29/15	12/13/15	6	5.6	8.1	0	0	0
IRWA_MB-PS	03/20/16	12/18/16	7	3.4	6.6	1	1	1
IRWA_MB-PS	03/26/17	12/17/17	8	1.9	5.7	4	4	1
IRWA_MB-PS	03/25/18	12/16/18	10	2.8	5.8	5	5	3
IRWA_MB-PS	03/31/19	12/15/19	10	2.2	5.4	5	5	4

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_MB-62	03/24/13	10/27/13	8	3	24.0	15.8	2	2	0	0
IRWA_MB-62	03/30/14	11/16/14	9	3	26.0	15.1	3	1	0	0
IRWA_MB-62	04/26/15	12/13/15	7	1	23.0	13.2	2	1	0	0

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_MB-62	03/20/16	11/13/16	5	0	17.5	9.5	0	0	0	0
IRWA_MB-62	03/26/17	12/17/17	8	2	24.0	14.4	3	2	0	0
IRWA_MB-62	03/25/18	10/28/18	8	3	22.0	15.4	1	0	0	0
IRWA_MB-PS	04/27/14	12/14/14	8	3	23.0	13.0	2	1	0	0
IRWA_MB-PS	03/29/15	12/13/15	6	2	23.0	14.0	2	2	0	0
IRWA_MB-PS	03/20/16	12/18/16	7	1	20.3	10.7	1	0	0	0
IRWA_MB-PS	03/26/17	12/17/17	8	3	23.0	14.4	1	1	0	0
IRWA_MB-PS	03/25/18	12/16/18	10	3	25.0	12.7	1	1	0	0
IRWA_MB-PS	03/31/19	12/15/19	10	3	23.0	13.3	2	2	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_MB-62	03/24/13	10/27/13	8	367	780	0	0	0	0	0	0
IRWA_MB-62	03/30/14	11/16/14	9	441	683	0	0	0	0	0	0
IRWA_MB-62	04/26/15	12/13/15	7	510	968	1	0	0	0	0	0
IRWA_MB-62	03/20/16	11/13/16	5	635	1357	2	2	0	0	1	1
IRWA_MB-62	03/26/17	12/17/17	8	510	1411	2	1	0	0	1	0
IRWA_MB-62	03/25/18	10/28/18	8	532	833	0	0	0	0	0	0
IRWA_MB-PS	05/18/14	12/14/14	7	510	944	1	0	0	0	0	0
IRWA_MB-PS	03/29/15	12/13/15	6	625	1060	1	1	0	0	0	0
IRWA_MB-PS	03/20/16	11/13/16	4	806	1413	2	1	0	0	0	0
IRWA_MB-PS	03/26/17	09/24/17	6	563	1278	2	1	0	0	0	0
IRWA_MB-PS	03/25/18	12/16/18	10	540	1052	1	1	0	0	0	0
IRWA_MB-PS	03/31/19	12/15/19	10	521	1100	1	1	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Martins Brook (MA92-08), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aesthetics Use for Martins Brook (MA92-08) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for Martins Brook (MA92-08) will continue to be assessed as Not Supporting with the Escherichia Coli (E. Coli) and Fecal Coliform impairments being carried forward.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for Martins Brook (MA92-08) is Not Assessed.	

Martins Pond (MA92038)

Location:	North Reading.
AU Type:	FRESHWATER LAKE
AU Size:	89 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Fanwort*)		Added
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	Algae		Unchanged
5	5	Mercury in Fish Tissue	33880	Unchanged
5	5	Turbidity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Source Unknown (N)			X	X	X
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			
Turbidity	Source Unknown (N)			X	X	X

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Aquatic Plants	Clarification of listing cause	The generic "Non-Native Aquatic Plants" impairment is not needed since the specific macrophyte "Fanwort" (*Cabomba caroliniana*) has been utilized.

Non-Native Aquatic Plants

The generic "Non-Native Aquatic Plants" impairment is being removed since the specific macrophyte "Fanwort" (*Cabomba caroliniana*) impairment is being added.

Recommendations

2022 Recommendations
ALU: An aquatic macrophyte survey of Martins Pond should be conducted to confirm the presence of any non-native species of *Najas* (confirmation of any non-native species should be made by a qualified state agency/taxonomist); AES: Periodic observations and sampling of Martins Pond should be conducted to determine if the algae and turbidity impairments should be carried forward or removed. The original listing information for these impairments was based solely on a synoptic survey in August 1995.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Martins Pond during an August 1995 synoptic survey. A 2003 report of the non-native brittle naiad (*Najas minor*) should be confirmed. A C-HAB posting for Martins Pond (MA92038) was reported to MassDPH for 36 days in 2017, but none were reported in recent years. The Aquatic Life Use of Martins Pond (MA92038) will continue to be assessed as Not Supporting. The generic Non-Native Aquatic Plants impairment is being removed since Fanwort (*Cabomba caroliniana*) is being added. Alerts are also being identified for a possible infestation of *Najas minor* and for C-HABs.	

Biological Monitoring Information

Habitat and Flow Data (anthropogenic alterations)

MassDMF Status of Priority Diadromous Fish Passage Barriers. (Chase 2020)

Assessment Summary
DMF biologists note one structure at the downstream end of Martins Pond, causing passage limitation to diadromous fish moving between the pond and the brook AU below (MA92-08). The culvert at the Martins Pond outlet, was given a passage score of "10", on a 0-10 scale, indicating that the culvert allows no possible passage of the targeted species, river herring and American eel. The population score in this area was noted to be “0”. Because the population score was “0” (no run present), no use impairment decision can be made at this time for the Aquatic Life Use of Martins Pond (Assessment Unit MA92038) based on diadromous fish passage.

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995) (Merrimack College and Malcolm Pirnie Engineers 2003)

Summary Statement	Assessment Recommendation
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, fanwort (*Cabomba caroliniana*), in Martins Pond during an August 1995 synoptic survey. A 2003 report of the non-native brittle naiad (*Najas minor*) should be confirmed.	An aquatic macrophyte survey of Martins Pond should be conducted to confirm the presence of any non-native species of *Najas*.

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
The Fish Consumption Use for Martins Pond (MA92038) will continue to be assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. MA DPH advises Children under 12, pregnant women, nursing mothers, women of child-bearing age not to eat Black Crappie, Largemouth Bass, or Yellow Perch from Martins Pond while the general public should limit their consumption of Black Crappie, Largemouth Bass, and Yellow Perch to 2 meals/month due to elevated mercury (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary

C-HAB postings for Martins Pond (MA92038) were reported to MassDPH for 36 days in 2017. Since no blooms were reported in recent years, an impairment decision will not be made at this time. However, an Alert is identified for C-HABs.
The Aesthetics Use of Martins Pond (MA92038) is assessed as Not Supporting with the Algae and Turbidity impairments being carried forward. Based on review of the historical field sheet, only the Aquatic Life Use should have been impaired for Non-Natives (now converted to Fanwort).

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 3)

C-HAB Summary Statement
C-HAB postings for Martins Pond (MA92038) were reported to MassDPH for 36 days in 2017. Since no blooms were reported in recent years, an impairment decision will not be made at this time. However, an Alert is identified for C-HABs.

Cyanobacteria Harmful Algal Bloom (C-HAB) Data (2015-2019) Provided by MassDPH (Bailey, Logan April 15, 2021)

Waterbody	Sample Analysis Used in Issuing Advisory	Bloom Days, 2015	Bloom Days, 2016	Bloom Days, 2017	Bloom Days, 2018	Bloom Days, 2019	# Years with >20 Days of Closure	>1 Posting Per Year
Martins Pond	Not issued or confirmed by sampling			36			1	no

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary

C-HAB postings for Martins Pond (MA92038) were reported to MassDPH for 36 days in 2017. Since no blooms were reported in recent years, an impairment decision will not be made at this time. However, an Alert is identified for C-HABs.
The Primary Contact Recreation Use of Martins Pond (MA92038) is assessed as Not Supporting with the Algae and Turbidity impairments being carried forward. Based on review of the historical field sheet, only the Aquatic Life Use should have been impaired for Non-Natives (now converted to Fanwort).

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary

C-HAB postings for Martins Pond (MA92038) were reported to MassDPH for 36 days in 2017. Since no blooms were reported in recent years, an impairment decision will not be made at this time. However, an Alert is identified for C-HABs.
The Secondary Contact Recreation Use of Martins Pond (MA92038) is assessed as Not Supporting with the Algae and Turbidity impairments being carried forward. Based on review of the historical field sheet, only the Aquatic Life Use should have been impaired for Non-Natives (now converted to Fanwort).

Middleton Pond (MA92039)

Location:	Middleton.
AU Type:	FRESHWATER LAKE
AU Size:	129 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Middleton Pond (MA92039) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
-3	3	None		Unchanged

Mile Brook (MA92-16)

Location:	Headwaters, east of North Street, Topsfield to confluence with Ipswich River, Topsfield (includes Mile Brook Pond).
AU Type:	RIVER
AU Size:	2.5 MILES
Classification/Qualifier:	B

No usable data were available for Mile Brook (MA92-16) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

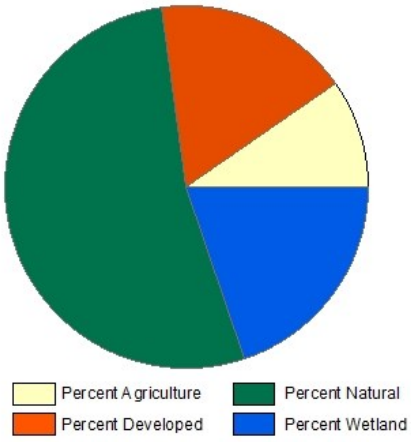
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Miles River (MA92-03)

Location:	Headwaters outlet Longham Reservoir, Beverly to confluence with Ipswich River, Ipswich.
AU Type:	RIVER
AU Size:	8.9 MILES
Classification/Qualifier:	B

Miles River - MA92-03

Watershed Area: 17.11 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	17.11	6.24	6.1	1.75
Agriculture	9.7%	18%	9.2%	19%
Developed	17.5%	11.7%	11.3%	6.5%
Natural	53.1%	44.6%	46.9%	30%
Wetland	19.8%	25.7%	32.5%	44.5%
Impervious Cover	8.2%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Dissolved Oxygen		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Source Unknown (N)	X				
Dissolved Oxygen	Source Unknown (N)	X				

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

MassDFG biologists conducted fish surveys in the Miles River in the reach downstream of Rt 1A, Ipswich in October 2015 (#5727) and August 2017 (#6833). Both samples were of a reasonable size (n= 42 & 51, respectively) but did not contain any fluvial taxa. However, 50% and 76% of the samples, respectively, were comprised of intolerant/moderately tolerant macrohabitat generalists, a good indicator in this warmwater fishery. In this same area, IRWA staff/volunteers collected discrete WQ data (DO, temp, specific conductance) from 2013-2019 (Station IRWA_MR-1A). The temperature and specific conductance data were indicative of adequate conditions, with maxima of 24.0 °C (n= 2-3/Summer Index period) and 900 µs/cm (n= 2-11/year), respectively. Multiple DO measurements were <4.0 mg/L in most years and annual minima ranged from 0.9-5.4 mg/L. This supports the retention of the prior DO impairment.
Based on these data, the Aquatic Life Use of the Miles River (MA92-15) will continue to be assessed as Not Supporting with the Benthic Macroinvertebrates and Dissolved Oxygen impairments being carried forward. The prior Alert for Low Flow Alterations is also being carried forward.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5727	MassDFG	Fish Community	Miles River	Pulloff @ Rt 1A xing, just N of Waldingfield Rd, Ipswich	42.65884	-70.84362
6833	MassDFG	Fish Community	Miles River	RT 1A DS, Ipswich	42.65841	-70.84338

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
IRWA_MR-1A	Ipswich River Watershed Association	Water Quality	Miles River	Route 1A, Ipswich	42.65837	-70.84333

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 2)

[Sample Type: TP= Total Pickup, SP= Selective Pickup, Method: BT=Boat Shocking, BP= Backpack Shocking, BG= Barge Shocking, SE= Seine, SL= Snorkel, NS= Not Stated, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net, Gradient: H = High, L = Low; I/MT MG= Intolerant/Moderately Tolerant Macrohabitat Generalist]

[Species List: AE = American Eel, B = Bluegill, BB = Brown Bullhead, GS = Golden Shiner, P = Pumpkinseed, RP = Redfin Pickerel]

Sample ID	Sample Date	Method	Sample Type	Gradient	Total Taxa	Total Ind	Cold Ind %	Fluvial Taxa	Fluvial Ind %	Intol Ind %	I/MT MG Taxa	I/MT MG Ind %	Notables	CFR	Species List
5727	10/06/15	BP	TP		4	42	0%	0	0%	0%	2	50%	Yes	No	AE, GS, P, RP,
6833	08/28/17	BP	TP	L	6	51	0%	0	0%	0%	2	76%	Yes	No	AE, B, BB, GS, P, RP,

Physico-chemical Water Quality Information

DO, pH, Temperature

Ipswich River Watershed Association Freshwater Discrete Dissolved Oxygen Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	DO Count	DO Min (mg/L)	DO Avg (mg/L)	Count CW <5.0	Count WW Early Life Stages <5.0	Count WW Other Life Stages <4.0
IRWA_MR-1A	03/24/13	11/17/13	8	1.5	4.9	5	5	4
IRWA_MR-1A	03/30/14	04/27/14	2	5.4	8.1	0	0	0
IRWA_MR-1A	04/26/15	12/13/15	8	3.1	5.6	3	3	2
IRWA_MR-1A	03/20/16	11/13/16	8	2.2	5.0	3	3	3
IRWA_MR-1A	03/26/17	12/17/17	9	0.9	5.3	5	5	3
IRWA_MR-1A	03/25/18	12/16/18	10	2.0	5.8	5	5	2
IRWA_MR-1A	01/27/19	12/15/19	11	0.9	4.5	6	6	4

Ipswich River Watershed Association Freshwater Discrete Temperature Data (2013-2020). (IRWA 2021) (MassDEP Undated 3)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater]

Station Code	Start Date	End Date	Temp Count	Index Count	Temp Max (°C)	Temp Avg (°C)	Count CW >20	Count CW >22	Count WW >28.3	Count WW >30.3
IRWA_MR-1A	03/24/13	10/27/13	7	2	22.0	14.3	1	0	0	0
IRWA_MR-1A	03/30/14	04/27/14	2	0	9.0	6.3	0	0	0	0
IRWA_MR-1A	04/26/15	12/13/15	7	2	23.0	13.6	2	1	0	0
IRWA_MR-1A	03/20/16	11/13/16	9	3	24.0	15.3	3	2	0	0
IRWA_MR-1A	03/26/17	12/17/17	9	3	24.0	15.1	3	1	0	0
IRWA_MR-1A	03/25/18	12/16/18	10	3	24.0	13.1	2	1	0	0
IRWA_MR-1A	01/27/19	12/15/19	11	3	24.0	12.7	3	2	0	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)

Ipswich River Watershed Association Discrete Specific Conductance Data (2013-2020) Compared to Estimated Chloride Criteria. (IRWA 2021) (MassDEP Undated 3)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (µs/cm)	SpCond Max (µs/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
IRWA_MR-1A	03/30/14	04/27/14	2	368	544	0	0	0	0	0	0
IRWA_MR-1A	04/26/15	12/13/15	6	479	742	0	0	0	0	0	0
IRWA_MR-1A	03/20/16	11/13/16	7	523	900	0	0	0	0	0	0
IRWA_MR-1A	03/26/17	11/12/17	8	351	870	0	0	0	0	0	0
IRWA_MR-1A	03/25/18	12/16/18	9	453	722	0	0	0	0	0	0
IRWA_MR-1A	01/27/19	12/15/19	11	361	750	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in the Miles River (MA92-03), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent data available, so the Aesthetics Use for the Miles River (MA92-03) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Primary Contact Recreation Use for the Miles River (MA92-03) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent bacteria data available, so the Secondary Contact Recreation Use for the Miles River (MA92-03) is Not Assessed.	

Mill Pond (MA92041)

Location:	Burlington.
AU Type:	FRESHWATER LAKE
AU Size:	59 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Mill Pond (MA92041) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	Mercury in Fish Tissue	33880	Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Nichols Brook (MA92-25)

Location:	Headwaters (near Rowley Hill Street and Route 95 and Newburyport Turnpike) in Danvers, to confluence with the Ipswich River, Middleton (Middleton/Boxford town line).
AU Type:	RIVER
AU Size:	2.4 MILES
Classification/Qualifier:	B

No usable data were available for Nichols Brook (MA92-25) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

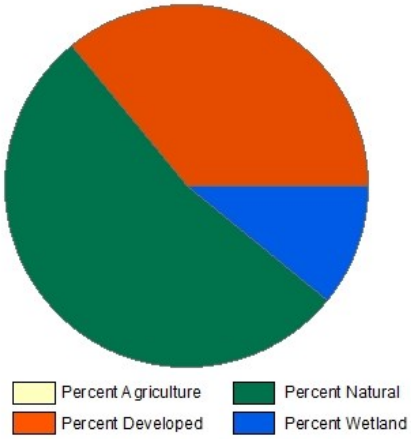
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Norris Brook (MA92-11)

Location:	Headwaters outlet of Elginwood Pond, Peabody to confluence with Ipswich River, Danvers (Danvers/Middleton town line).
AU Type:	RIVER
AU Size:	1.5 MILES
Classification/Qualifier:	B

Norris Brook - MA92-11

Watershed Area: 4.51 square miles



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.51	4.21	0.8	0.8
Agriculture	0.1%	0.2%	0.2%	0.2%
Developed	35.9%	36.8%	17.3%	17.3%
Natural	53.1%	51.7%	53.1%	53.1%
Wetland	10.9%	11.4%	29.5%	29.5%
Impervious Cover	19.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Source Unknown (N)	X				

Recommendations

2022 Recommendations
ALU: An aquatic macrophyte survey of Norris Brook should be conducted in the vicinity of the Russell St. crossing to confirm the presence of curly-leaf pondweed, *Potamogeton crispus* (confirmation of any non-native species should be made by a qualified state agency/taxonomist).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
During validation of MassDEP aquatic invasive species records, it was found that the 1997 field sheet for the Elginwood Pond synoptic survey had a side note indicating the non-native aquatic macrophyte, curly-leaf pondweed (*Potamogeton crispus*) was present at the Norris Brook Russell St. crossing (downstream of the pond) on 21 June 1995. The Aquatic Life Use for Norris Brook (MA92-11) will continue to be assessed as Not Supporting with the Dissolved Oxygen impairment being carried forward. Prior Alerts are also being carried forward (for the small drainage area (<10 square miles), the water withdrawals, and the lack of recharge to the subwatershed). An Alert is also being added for a possible infestation of the non-native curly-leaf pondweed (*Potamogeton crispus*).	

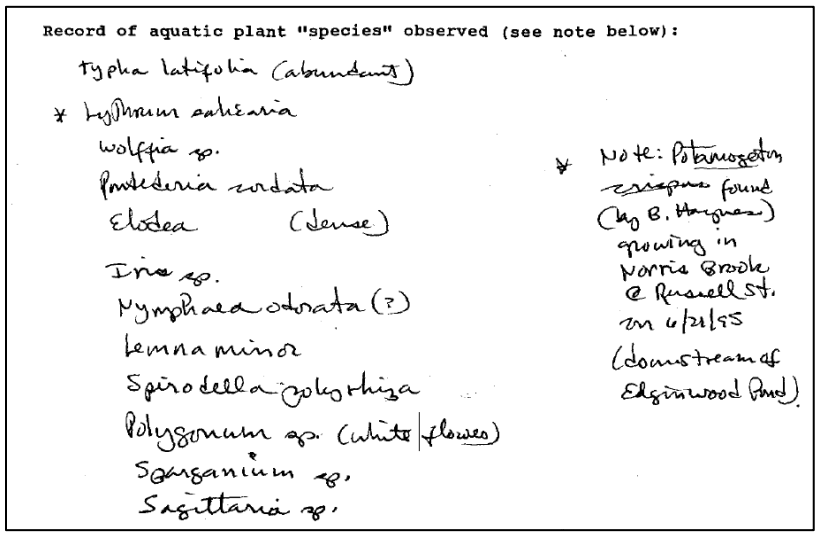
Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995)

Summary Statement	Assessment Recommendation
During validation of MassDEP aquatic invasive species records, it was observed that the 1997 field sheet for the Elginwood Pond synoptic survey noted the non-native aquatic macrophyte, curly-leaf pondweed (*Potamogeton crispus*) had been found at the Norris Brook Russell St. crossing (downstream of the pond) on 21 June 1995.	Conduct an aquatic macrophyte survey in Norris Brook in the vicinity of the Russell St. crossing to confirm whether curly-leaf pondweed (*Potamogeton crispus*) is infesting the brook.

MassDEP 1997 synoptic survey field sheet for Elginwood Pond


Record of aquatic plant "species" observed (see note below):

typha latifolia (abundant)
* Lythrum salicaria
wolffia sp.
Pontederia cordata
Elodea (dense)
Iris sp.
Nymphaea odorata (?)
Lemna minor
Spirodella polyrhiza
Polygonum sp. (white flowers)
Sparganium sp.
Sagittaria sp.

* Note: Potamogeton crispus found (by B. Haynes) growing in Norris Brook @ Russell St. on 6/21/95 (downstream of Elginwood Pond)

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	

No fish toxics sampling has been conducted in Norris Brook (MA92-11), therefore the Fish Consumption Use is Not Assessed.

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Aesthetics Use for Norris Brook (MA92-11) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Primary Contact Recreation Use for Norris Brook (MA92-11) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Secondary Contact Recreation Use for Norris Brook (MA92-11) is Not Assessed.	

Pierces Pond (MA92048)

Location:	Peabody.
AU Type:	FRESHWATER LAKE
AU Size:	3 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

No usable data were available for Pierces Pond (MA92048) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Pleasant Pond (MA92049)

Location:	(Idlewood Lake) Wenham/Hamilton.
AU Type:	FRESHWATER LAKE
AU Size:	26 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Mercury in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Mercury in Fish Tissue	Source Unknown (N)		X			

Recommendations

2022 Recommendations
ALU: An aquatic macrophyte survey of Pleasant Pond should be conducted to confirm the presence of any non-native species of *Myriophyllum* (confirmation of any non-native species should be made by a qualified state agency/taxonomist).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
As was previously reported, MassDEP staff noted the presence of *Myriophyllum* sp. in Pleasant Pond during a September 1995 synoptic survey. An aquatic macrophyte survey should be conducted to determine whether any of the non-native species of *Myriophyllum* are present in the pond. The Aquatic Life Use of Pleasant Pond (MA92049) is Not Assessed since no new data are available. The prior Alert for a possible non-native infestation (a species of *Myriophyllum*) is being carried forward.	

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995)

Summary Statement	Assessment Recommendation
As was previously reported, MassDEP staff noted the presence of *Myriophyllum* sp. in Pleasant Pond during a September 1995 synoptic survey. An aquatic macrophyte survey should be conducted to determine whether any of the non-native species of *Myriophyllum* are present in the pond and the prior Alert should be retained.	MassDEP staff should conduct an aquatic macrophyte survey in Pleasant Pond when flowering heads are present to determine if any non-native species of *Myriophyllum* are infesting the pond. Also determine the identity of any *Najas* spp. encountered, with special attention paid to distinguishing between *Najas guadalupensis* (native) and *Najas minor* (non-native) specimens.

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
The Fish Consumption Use of Pleasant Pond (MA92049) will continue to be assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. MA DPH advises Children under 12, pregnant women, nursing mothers, women of child-bearing age not to largemouth bass from Pleasant Pond while the general public should limit consumption of largemouth bass to 2 meals/month due to elevated mercury (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Aesthetics Use of Pleasant Pond (MA92049) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no bacteria data available, so the Primary Contact Recreation Use of Pleasant Pond (MA92049) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no bacteria data available, so the Secondary Contact Recreation Use of Pleasant Pond (MA92049) is Not Assessed.	

Putnamville Reservoir (MA92052)

Location:	Danvers.
AU Type:	FRESHWATER LAKE
AU Size:	283 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Putnamville Reservoir (MA92052) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Salem Pond (MA92057)

Location:	North Andover/Andover.
AU Type:	FRESHWATER LAKE
AU Size:	15 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

No usable data were available for Salem Pond (MA92057) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Turbidity		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Turbidity	Source Unknown (N)			X	X	X

Salem Street Pond (MA92076)

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

No usable data were available for Salem Street Pond (MA92076) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Silver Lake (MA92059)

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

No usable data were available for Silver Lake (MA92059) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	DDT in Fish Tissue		Unchanged
5	5	Mercury in Fish Tissue	33880	Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
DDT in Fish Tissue	Source Unknown (N)		X			
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Spofford Pond (MA92060)

Location:	Boxford.
AU Type:	FRESHWATER LAKE
AU Size:	28 ACRES
Classification/Qualifier:	B

No usable data were available for Spofford Pond (MA92060) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Stearns Pond (MA92061)

Location:	North Andover.
AU Type:	FRESHWATER LAKE
AU Size:	43 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

No usable data were available for Stearns Pond (MA92061) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Stevens Pond (MA92062)

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

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(European Water Clover*)		Added
4c	4c	(Non-Native Aquatic Plants*)		Removed

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(European Water Clover*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Aquatic Plants	Clarification of listing cause	The generic "Non-Native Aquatic Plants" is not needed since the specific macrophytes European Water Clover (*Marsilea quadrifolia*) has been utilized.

Non-Native Aquatic Plants

The generic "Non-Native Aquatic Plants" impairment is being removed since the specific macrophytes European Water Clover (Marsilea quadrifolia) impairment is being added.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, European water clover (*Marsilea quadrifolia*), in Stevens Pond during an August 1995 synoptic survey. The Aquatic Life Use for Stevens Pond (MA92062) will continue to be assessed as Not Supporting. The generic Non-Native Aquatic Plants impairment is being removed since European Water Clover is being added.	

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995)

Summary Statement
As was previously reported, MassDEP staff identified an infestation of the non-native aquatic macrophyte, European water clover (*Marsilea quadrifolia*), in Stevens Pond during an August 1995 synoptic survey.

Fish Consumption

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Stevens Pond (MA92062), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No new data are available, so the Aesthetics Use for Stevens Pond (MA92062) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available, so the Primary Contact Use for Stevens Pond (MA92062) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	**Alert**
Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available, so the Secondary Contact Use for Stevens Pond (MA92062) is Not Assessed.	

Stiles Pond (MA92063)

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

No usable data were available for Stiles Pond (MA92063) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Sudden Pond (MA92064)

Location:	North Andover.
AU Type:	FRESHWATER LAKE
AU Size:	5 ACRES
Classification/Qualifier:	A: PWS, ORW (Tributary)

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Recommendations

2022 Recommendations
ALU: An aquatic macrophyte survey of Sudden Pond should be conducted when flowering heads are present to confirm the presence of any non-native species of *Myriophyllum* (confirmation of any non-native species should be made by a qualified state agency/taxonomist).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
During validation of MassDEP aquatic invasive species records, it was noted that DEP biologists listed "*Myriophyllum* sp. (looks very much like *M. spicatum*, but is not. too few leaflets (up to 8 or 9) on either side of midrib)" on the field sheet for the August 1995 synoptic survey of Sudden Pond. The Aquatic Life Use of Sudden Pond (MA92064) is Not Assessed but an Alert is being added due to newly discovered notes indicating there might be a non-native species of *Myriophyllum* infesting the pond.	

Biological Monitoring Information

Non-native Aquatic Species Presence

MassDEP Non-Native Aquatic Invasive Species Records as of May 2021. (MassDEP 1995)

Summary Statement	Assessment Recommendation
During validation of MassDEP aquatic invasive species records, it was noted that DEP biologists listed "*Myriophyllum* sp. (looks very much like *M. spicatum*, but is not. too few leaflets (up to 8 or 9) on either side of midrib)" on the field sheet for an August 1995 synoptic survey of Sudden Pond. DEP biologists should conduct an aquatic macrophyte survey when flowering heads are present to determine whether any non-native species of *Myriophyllu*m infest the pond, and an Alert should be issued in the interim.	DEP staff should conduct an aquatic macrophyte survey in Sudden Pond when flowering heads are present to determine if any non-native species of *Myriophyllum* are infesting the pond.

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in Sudden Pond (MA92064), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Aesthetics Use of Sudden Pond (MA92064) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no bacteria data available, so the Primary Contact Recreation Use of Sudden Pond (MA92064) is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no bacteria data available, so the Secondary Contact Recreation Use of Sudden Pond (MA92064) is Not Assessed.	

Suntaug Lake (MA92065)

Location:	Lynnfield/Peabody.
AU Type:	FRESHWATER LAKE
AU Size:	151 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Suntaug Lake (MA92065) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Swan Pond (MA92066)

Location:	North Reading.
AU Type:	FRESHWATER LAKE
AU Size:	42 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Swan Pond (MA92066) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Towne Pond (MA92068)

Location:	Boxford/North Andover.
AU Type:	FRESHWATER LAKE
AU Size:	23 ACRES
Classification/Qualifier:	B

No usable data were available for Towne Pond (MA92068) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Unnamed Tributary (MA92-09)

Location:	Unnamed tributary to Ipswich River, outlet of Eisenhaures Pond, North Reading to confluence with Ipswich River, North Reading.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA92-09) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Fish Bioassessments		Unchanged

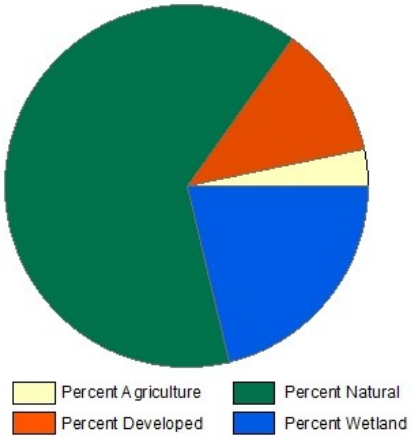
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Fish Bioassessments	Dam or Impoundment (Y)	X				

Unnamed Tributary (MA92-12)

Location:	Unnamed tributary to Ipswich River, outlet of Middleton Pond, Middleton to confluence with Ipswich River, Middleton.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA92-12

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	2.59	1.83	1.3
Agriculture	3.2%	4.3%	1.3%	1.8%
Developed	11.9%	13.4%	7.5%	8.7%
Natural	63.7%	63.3%	61.1%	61.2%
Wetland	21.2%	19%	30.1%	28.3%
Impervious Cover	5.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Flow Regime Modification*)		Added
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Flocculant Masses		Unchanged
5	5	Oil and Grease		Removed
5	5	Scum/Foam		Removed

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Flow Regime Modification*)	Dam or Impoundment (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	X
Fecal Coliform	Source Unknown (N)				X	
Flocculant Masses	Source Unknown (N)			X	X	X

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Oil and Grease	Clarification of listing cause	The ADB impairment "Foam/Flocs/Scum/Oil Slicks" was previously applied to Unnamed Tributary (MA92-12) during the 2016 reporting cycle. The impairment was based on field observations by MassDEP staff at station W0105 (Unnamed tributary to Ipswich River at Mt. Vernon Street, Middleton) during summer 2005. Observations noted a flocculent "on everything" on one occasion. The "Foam/Flocs/Scum/Oil Slicks" impairment code was subsequently divided into more specific codes and applied automatically to this AU for the final 2016 reporting cycle submittal to EPA's new ATTAINS database. Since there was no mention of "Oil and Grease" in the field observations, this impairment is being removed (the impairment for "Flocculant Masses" is being carried forward).
Scum/Foam	Clarification of listing cause	The ADB impairment "Foam/Flocs/Scum/Oil Slicks" was previously applied to Unnamed Tributary (MA92-12) during the 2016 reporting cycle. The impairment was based on field observations by MassDEP staff at station W0105 (Unnamed tributary to Ipswich River at Mt. Vernon Street, Middleton) during summer 2005. Observations noted a flocculent "on everything" on one occasion. The "Foam/Flocs/Scum/Oil Slicks" impairment code was subsequently divided into more specific codes and applied automatically to this AU for the final 2016 reporting cycle submittal to EPA's new ATTAINS database. Since there was no mention of "Scum/Foam" in the field observations, this impairment is being removed (the impairment for "Flocculant Masses" is being carried forward).

Oil and Grease

Table summarizing MassDEP WPP staff's field observations from the 2005 Ipswich surveys. (Reardon 2012)
[Note: The table has been modified to fit this page, with the removal of extraneous information]

UniqueID	Date	Flow Status	Water Clarity	Floating Scum	Obj. Deposits	Summary of Comments
W0105	5/24/2005	Flowing	Moderately Turbid	No	No	
W0105	6/21/2005	Flowing	Slightly Turbid	No	Yes	Obj. deposits: Flocculent mass (bottom had fine deposits) *
W0105	7/27/2005	Flowing	Moderately Turbid	No	No	Plants: Loosestrife, Catttails
W0105	8/24/2005	Flowing	Slightly Turbid	Unobservable	No	Plants: Purple Loosestrife, Cattail
W0105	9/27/2005	Flowing	Clear	No	No	Plants: Loosestrife, Catttails

* In the 2016 IR repository document for the Ipswich basin (MassDEP Undated 7), the field sheet comment was included: "water grey-like, septage looking, there was a film on everything, did not want to touch".

Scum/Foam

Please see the table provided for the Oil and Grease delisting above.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	**Alert**
Not Supporting	NO
2022 Use Attainment Summary	
MassDFG staff attempted to collect a fish sample in Unnamed Tributary MA92-12 (known locally as Middleton Brook) off Rt 62 in Middleton on 7/30/2018 (Sample ID 7478). No fish were collected and the habitat comment noted "bottom silt and only 2" of water" (MassDFG 2020). This stream is directly downstream of Middleton Pond, which is used as a water supply for Middleton and Danvers. This was not a drought year (Drought Management Task Force 2021) and there are no groundwater withdrawals in this area (MassGIS 2021). It is likely that adequate water is not being released from the pond, leading to inadequate flow. The Aquatic Life Use of this Unnamed Tributary (MA92-12) is assessed as Not Supporting based on the lack of fish/compromised habitat quality in the stream below Middleton Pond related to the lack of adequate flow (flow regime modification identified as the impairment).	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
7478	MassDFG	Fish Community	Middleton Brook	off rt 62, east of 114 intersection, Middleton	42.59471	-71.01348

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2014-2019) Provided by MassDFG: Fishless Samples. (MassDFG 2020)

[Method: BP= Backpack Shocking, MT= Minnow Trap, GN= Gillnet, FY= Fyke Net]

Sample ID	Sample Date	Method	No Fish Reason
7478	07/30/18	BP	Sample Attempted - No Fish

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in this Unnamed Tributary (MA92-12), therefore the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
Although there are no new data available, the Aesthetics Use for this Unnamed Tributary (MA92-12) will continue to be assessed as Not Supporting with the Flocculant Masses impairment being carried forward. The historical Oil and Grease and Scum/Foam impairments were applied in error and are being removed. The prior Alert for aquatic plant macrophyte growth is also being carried forward.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
Although there are no new data available, the Primary Contact Recreation Use for this Unnamed Tributary (MA92-12) will continue to be assessed as Not Supporting with the prior impairments (Escherichia Coli (E. Coli), Fecal Coliform, Flocculant Masses) being carried forward. The historical Oil and Grease and Scum/Foam impairments were applied in error and are being removed. The prior Alert for aquatic plant macrophyte growth is also being carried forward.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

Although there are no new data available, the Secondary Contact Recreation Use for this Unnamed Tributary (MA92-12) will continue to be assessed as Not Supporting with the Escherichia Coli (E. Coli) and Flocculant Masses impairments being carried forward. The historical Oil and Grease and Scum/Foam impairments were applied in error and are being removed. The prior Alert for aquatic plant macrophyte growth is also being carried forward.

Unnamed Tributary (MA92-23)

Location:	Unnamed tributary to Ipswich River (locally known as Greenwood Creek), headwaters, east of Jeffreys Neck Road/north of Newmarch Street, Ipswich to confluence with estuarine portion of Ipswich River, Ipswich.
AU Type:	ESTUARY
AU Size:	0.03 SQUARE MILES
Classification/Qualifier:	SA: SFO

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Fecal Coliform		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Shellfish Harvesting	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Fecal Coliform	Source Unknown (N)			X			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no new data available, so the Aquatic Life Use of this Unnamed Tributary (MA92-23) is Not Assessed.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No fish toxics sampling has been conducted in this Unnamed Tributary (MA92-23), therefore the Fish Consumption Use is Not Assessed.	

Shellfish Harvesting

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
Unnamed Tributary (MA92-23): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.023 sq mi (85%). The approved shellfish growing area represents 0 sq mi (0%). The prohibited shellfish growing area represents 0.0229 sq mi (85%). There is insufficient information available to assess the Shellfish Harvesting Use because the growing areas within this AU are classified as either entirely prohibited or a combination of approved and prohibited. Alert due to prohibited area >= 0.0001 sq mi. There is insufficient information available to delist the existing Fecal Coliform impairment so the Shellfish Harvesting Use is evaluated as not supporting.	

Shellfish Growing Area Classifications

MassDFG-Division of Marine Fisheries Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Area Name	Waterbody/Area Description	Classification	Area (Sq. Mi.)	Area (% of AU)
N5.0	Ipswich River	Conditionally Approved	0.00004	0.1%
N5.5	Greenwoods	Prohibited	0.02293	85.3%

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available, so the Aesthetics Use of this Unnamed Tributary (MA92-23) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no Enterococci bacteria data available, so the Primary Contact Recreation Use of this Unnamed Tributary (MA92-23) is Not Assessed.	

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Summary
Unnamed Tributary (MA92-23): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.023 sq mi (85%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than “approved”, the Primary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no Enterococci bacteria data available, so the Secondary Contact Recreation Use of this Unnamed Tributary (MA92-23) is Not Assessed.	

Shellfish Growing Area Classifications

MassDEP Summary Statement for MassDFG Shellfish Growing Area Classification Data (Bettencourt August 25, 2021) (MassDEP Undated 6)

Summary
Unnamed Tributary (MA92-23): The total of all shellfish growing area classifications (Bettencourt August 25, 2021) within this AU is 0.023 sq mi (85%). The approved shellfish growing area represents 0 sq mi (0%). Because the total of all shellfish growing area classifications is anything less than “approved”, the Secondary Contact Recreational Use cannot be assessed for 2022 using the shellfish classification data.

Unnamed Tributary (MA92-26)

Location:	Unnamed intermittent tributary to Martins Brook, from source in wetland west of the Route 93/Route 125 intersection, Wilmington to confluence with Martins Brook, Wilmington.
AU Type:	RIVER
AU Size:	1.3 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA92-26) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Chloride		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (N)	X				

Wenham Lake (MA92073)

Location:	Beverly/Wenham.
AU Type:	FRESHWATER LAKE
AU Size:	243 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Wenham Lake (MA92073) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	DDT in Fish Tissue		Unchanged
5	5	Mercury in Fish Tissue	33880	Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
DDT in Fish Tissue	Source Unknown (N)		X			
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Wills Brook (MA92-10)

Location:	Headwaters, north of Lowell Street (excluding intermittent portion), Lynnfield to confluence with Ipswich River, Lynnfield (Lynnfield/North Reading townline).
AU Type:	RIVER
AU Size:	1.5 MILES
Classification/Qualifier:	B

No usable data were available for Wills Brook (MA92-10) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Winona Pond (MA92077)

Location:	Peabody.
AU Type:	FRESHWATER LAKE
AU Size:	92 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Winona Pond (MA92077) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Data Sources

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MassDEP. "Open file analysis of DFG 2014-2019 fish community data using 2022 CALM guidance." Division of Watershed Management, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 2.

MassDEP. "Open file analysis of external water quality data (potential date range 2011-2020) using 2022 CALM guidance." Division of Watershed Management, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 3.

MassDEP. "Open file analysis of MassDEP WPP benthic survey data (2011-2018) using 2022 CALM guidance." Watershed Planning Program, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 4.

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