

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

**Appendix 8
Concord River Basin
Assessment and Listing Decision Summary**

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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
Allowance Brook	MA82A-37	2	2	None		Unchanged
Ashland Reservoir	MA82003	4a	4a	(Non-Native Aquatic Plants*)		Unchanged
Ashland Reservoir	MA82003	4a	4a	Mercury in Fish Tissue	42396	Unchanged
Assabet Brook	MA82B-17	3	5	Benthic Macroinvertebrates		Added
Assabet River	MA82B-01	5	5	(Dewatering*)		Unchanged
Assabet River	MA82B-01	5	5	Benthic Macroinvertebrates		Unchanged
Assabet River	MA82B-01	5	5	Fish Bioassessments		Unchanged
Assabet River	MA82B-02	5	5	(Aquatic Plants (Macrophytes)*)		Unchanged
Assabet River	MA82B-02	5	5	(Curly-leaf Pondweed*)		Unchanged
Assabet River	MA82B-02	5	5	Algae	35104	Unchanged
Assabet River	MA82B-02	5	5	Benthic Macroinvertebrates		Unchanged
Assabet River	MA82B-02	5	5	Escherichia Coli (E. Coli)		Unchanged
Assabet River	MA82B-02	5	5	Fecal Coliform		Unchanged
Assabet River	MA82B-02	5	5	Nutrient/Eutrophication Biological Indicators	35104	Unchanged
Assabet River	MA82B-03	5	5	(Curly-leaf Pondweed*)		Unchanged
Assabet River	MA82B-03	5	5	(Debris*)		Unchanged
Assabet River	MA82B-03	5	5	Algae	35105	Unchanged
Assabet River	MA82B-03	5	5	Ambient Bioassays - Chronic Aquatic Toxicity		Unchanged
Assabet River	MA82B-03	5	5	Escherichia Coli (E. Coli)		Unchanged
Assabet River	MA82B-03	5	5	Fecal Coliform		Unchanged
Assabet River	MA82B-03	5	5	Nutrient/Eutrophication Biological Indicators	35105	Unchanged
Assabet River	MA82B-03	5	5	Odor		Unchanged
Assabet River	MA82B-03	5	5	Phosphorus, Total	35105	Unchanged
Assabet River	MA82B-03	5	5	Trash		Unchanged
Assabet River	MA82B-04	5	5	(Water Chestnut*)		Unchanged
Assabet River	MA82B-04	5	5	Algae	35106	Unchanged
Assabet River	MA82B-04	5	5	Benthic Macroinvertebrates		Unchanged
Assabet River	MA82B-04	5	5	Dissolved Oxygen	35106	Unchanged
Assabet River	MA82B-04	5	5	Escherichia Coli (E. Coli)		Unchanged
Assabet River	MA82B-04	5	5	Fecal Coliform		Unchanged
Assabet River	MA82B-04	5	5	Fish Bioassessments		Unchanged
Assabet River	MA82B-04	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Assabet River	MA82B-04	5	5	Phosphorus, Total	35106	Unchanged
Assabet River	MA82B-05	5	5	(Curly-leaf Pondweed*)		Unchanged
Assabet River	MA82B-05	5	5	(Debris*)		Unchanged
Assabet River	MA82B-05	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Assabet River	MA82B-05	5	5	(Fanwort*)		Unchanged
Assabet River	MA82B-05	5	5	(Water Chestnut*)		Unchanged
Assabet River	MA82B-05	5	5	Algae	35107	Unchanged
Assabet River	MA82B-05	5	5	Dissolved Oxygen	35107	Unchanged
Assabet River	MA82B-05	5	5	Escherichia Coli (E. Coli)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Assabet River	MA82B-05	5	5	Fecal Coliform		Unchanged
Assabet River	MA82B-05	5	5	Nutrient/Eutrophication Biological Indicators	35107	Unchanged
Assabet River	MA82B-05	5	5	Odor		Unchanged
Assabet River	MA82B-05	5	5	Phosphorus, Total	35107	Unchanged
Assabet River	MA82B-05	5	5	Trash		Unchanged
Assabet River	MA82B-06	5	5	(Curly-leaf Pondweed*)		Unchanged
Assabet River	MA82B-06	5	5	(Fanwort*)		Unchanged
Assabet River	MA82B-06	5	5	(Water Chestnut*)		Unchanged
Assabet River	MA82B-06	5	5	Dissolved Oxygen	35108	Unchanged
Assabet River	MA82B-06	5	5	Escherichia Coli (E. Coli)		Added
Assabet River	MA82B-06	5	5	Other Organics		Unchanged
Assabet River	MA82B-06	5	5	Unspecified Metals in Sediment		Unchanged
Assabet River	MA82B-07	5	5	Escherichia Coli (E. Coli)		Unchanged
Assabet River	MA82B-07	5	5	Fecal Coliform		Unchanged
Assabet River Reservoir	MA82004	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Assabet River Reservoir	MA82004	5	5	(Water Chestnut*)		Unchanged
Assabet River Reservoir	MA82004	5	5	Algae		Unchanged
Assabet River Reservoir	MA82004	5	5	Dissolved Oxygen		Unchanged
Assabet River Reservoir	MA82004	5	5	Dissolved Oxygen Supersaturation		Unchanged
Assabet River Reservoir	MA82004	5	5	Mercury in Fish Tissue	33880	Unchanged
Assabet River Reservoir	MA82004	5	5	Turbidity		Unchanged
Bartlett Pond	MA82007	4c	4c	(Curly-leaf Pondweed*)		Unchanged
Bartlett Pond	MA82007	4c	4c	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Bartlett Pond	MA82007	4c	4c	(Fanwort*)		Unchanged
Bartlett Pond	MA82007	4c	4c	(Water Chestnut*)		Unchanged
Batemans Pond	MA82008	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Beaver Brook	MA82A-34	5	5	Dissolved Oxygen		Unchanged
Beaver Brook	MA82A-34	5	5	Escherichia Coli (E. Coli)		Unchanged
Boons Pond	MA82011	4a	4a	(Fanwort*)		Unchanged
Boons Pond	MA82011	4a	4a	(Non-Native Aquatic Plants*)		Unchanged
Boons Pond	MA82011	4a	4a	Algae	2353	Unchanged
Boons Pond	MA82011	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Broad Meadow Brook	MA82A-39	3	5	Benthic Macroinvertebrates		Added
Broad Meadow Brook	MA82A-39	3	5	Dissolved Oxygen		Added
Broad Meadow Brook	MA82A-39	3	5	Escherichia Coli (E. Coli)		Added
Broad Meadow Brook	MA82A-39	3	5	Fish Bioassessments		Added

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Carding Mill Pond	MA82015	5	5	(Aquatic Plants (Macrophytes)*)		Changed
Carding Mill Pond	MA82015	5	5	(Curly-leaf Pondweed*)		Unchanged
Carding Mill Pond	MA82015	5	5	(Water Chestnut*)		Unchanged
Carding Mill Pond	MA82015	5	5	Algae		Unchanged
Carding Mill Pond	MA82015	5	5	Dissolved Oxygen Supersaturation		Unchanged
Carding Mill Pond	MA82015	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Carding Mill Pond	MA82015	5	5	Phosphorus, Total		Unchanged
Cedar Swamp Pond	MA82016	3	3	None		Unchanged
Chauncy Lake	MA82017	4c	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Chauncy Lake	MA82017	4c	5	Harmful Algal Blooms		Added
Clamshell Pond	MA82018	4c	4c	(Water Chestnut*)		Unchanged
Cold Harbor Brook	MA82B-18	2	2	None		Unchanged
Cold Spring Brook	MA82A-18	3	5	Benthic Macroinvertebrates		Added
Cold Spring Brook	MA82A-18	3	5	Dissolved Oxygen		Added
Coles Brook	MA82B-22	5	5	Chloride		Unchanged
Coles Brook	MA82B-22	5	5	Escherichia Coli (E. Coli)		Unchanged
Concord River	MA82A-07	5	5	(Asian Clam*)		Added
Concord River	MA82A-07	5	5	(Curly-leaf Pondweed*)		Unchanged
Concord River	MA82A-07	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Concord River	MA82A-07	5	5	(European Water Clover*)		Added
Concord River	MA82A-07	5	5	(Fanwort*)		Unchanged
Concord River	MA82A-07	5	5	(Non-Native Aquatic Plants*)		Removed
Concord River	MA82A-07	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
Concord River	MA82A-07	5	5	(Water Chestnut*)		Unchanged
Concord River	MA82A-07	5	5	Escherichia Coli (E. Coli)		Unchanged
Concord River	MA82A-07	5	5	Fecal Coliform		Unchanged
Concord River	MA82A-07	5	5	Mercury in Fish Tissue		Unchanged
Concord River	MA82A-08	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Concord River	MA82A-08	5	5	(European Water Clover*)		Added
Concord River	MA82A-08	5	5	(Fanwort*)		Unchanged
Concord River	MA82A-08	5	5	(Fish Passage Barrier*)		Unchanged
Concord River	MA82A-08	5	5	(Non-Native Aquatic Plants*)		Removed
Concord River	MA82A-08	5	5	(Water Chestnut*)		Unchanged
Concord River	MA82A-08	5	5	Chloride		Added
Concord River	MA82A-08	5	5	Escherichia Coli (E. Coli)		Added
Concord River	MA82A-08	5	5	Mercury in Fish Tissue		Unchanged
Concord River	MA82A-08	5	5	Trash		Added
Concord River	MA82A-09	5	5	(Debris*)		Unchanged
Concord River	MA82A-09	5	5	Algae		Unchanged
Concord River	MA82A-09	5	5	Escherichia Coli (E. Coli)		Unchanged
Concord River	MA82A-09	5	5	Fecal Coliform		Unchanged
Concord River	MA82A-09	5	5	Mercury in Fish Tissue		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Concord River	MA82A-09	5	5	Trash		Unchanged
Concord River	MA82A-09	5	5	Turbidity		Unchanged
Danforth Brook	MA82B-19	2	2	None		Unchanged
Dean Park Pond	MA82026	5	5	Harmful Algal Blooms		Unchanged
Denny Brook	MA82A-27	3	3	None		Unchanged
Dudley Pond	MA82029	5	5	(Curly-leaf Pondweed*)		Unchanged
Dudley Pond	MA82029	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Dudley Pond	MA82029	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Unchanged
Dudley Pond	MA82029	5	5	Dissolved Oxygen		Unchanged
Dudley Pond	MA82029	5	5	Turbidity		Unchanged
Eames Brook	MA82A-13	5	5	(Debris*)		Unchanged
Eames Brook	MA82A-13	5	5	Algae		Unchanged
Eames Brook	MA82A-13	5	5	Benthic Macroinvertebrates		Unchanged
Eames Brook	MA82A-13	5	5	Odor		Unchanged
Eames Brook	MA82A-13	5	5	Trash		Unchanged
Elizabeth Brook	MA82B-12	5	5	Escherichia Coli (E. Coli)		Unchanged
Elm Street Pond	MA82032	3	3	None		Unchanged
Farm Pond	MA82035	5	5	(Curly-leaf Pondweed*)		Unchanged
Farm Pond	MA82035	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Farm Pond	MA82035	5	5	(Fanwort*)		Unchanged
Farm Pond	MA82035	5	5	Algae		Unchanged
Farm Pond	MA82035	5	5	Turbidity		Unchanged
Farrar Pond	MA82036	5	5	Mercury in Fish Tissue		Unchanged
Fisk Pond	MA82038	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Fisk Pond	MA82038	4c	4c	(Water Chestnut*)		Unchanged
Fiske Street Pond	MA82037	3	3	None		Unchanged
Fort Meadow Brook	MA82B-11	3	2	None		Unchanged
Fort Meadow Reservoir	MA82042	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Fort Meadow Reservoir	MA82042	5	5	(Fanwort*)		Unchanged
Fort Meadow Reservoir	MA82042	5	5	(Non-Native Aquatic Plants*)		Unchanged
Fort Meadow Reservoir	MA82042	5	5	Chlordane in Fish Tissue		Unchanged
Fort Meadow Reservoir	MA82042	5	5	Phosphorus, Total		Unchanged
Fort Pond	MA82043	3	3	None		Unchanged
Fort Pond Brook	MA82B-13	2	2	None		Unchanged
Framingham Reservoir #1	MA82044	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Framingham Reservoir #1	MA82044	5	5	(Non-Native Aquatic Plants*)		Unchanged
Framingham Reservoir #1	MA82044	5	5	(Water Chestnut*)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Framingham Reservoir #1	MA82044	5	5	Mercury in Fish Tissue		Unchanged
Framingham Reservoir #2	MA82045	5	5	Mercury in Fish Tissue		Unchanged
Framingham Reservoir #2	MA82045	5	5	Turbidity		Unchanged
Framingham Reservoir #3	MA82046	4c	4c	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Gates Pond	MA82047	3	3	None		Unchanged
Gates Pond Brook	MA82B-10	3	2	None		Unchanged
Gleasons Pond	MA82048	3	3	None		Unchanged
Great Brook	MA82B-29	2	5	Escherichia Coli (E. Coli)		Added
Great Meadows Pond #3	MA82053	4c	4c	(Water Chestnut*)		Unchanged
Grist Mill Pond	MA82055	5	5	(Curly-leaf Pondweed*)		Unchanged
Grist Mill Pond	MA82055	5	5	(Water Chestnut*)		Unchanged
Grist Mill Pond	MA82055	5	5	Algae		Unchanged
Grist Mill Pond	MA82055	5	5	Dissolved Oxygen Supersaturation		Unchanged
Grist Mill Pond	MA82055	5	5	Fecal Coliform		Unchanged
Grist Mill Pond	MA82055	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Grist Mill Pond	MA82055	5	5	Phosphorus, Total		Unchanged
Hager Pond	MA82056	5	5	(Curly-leaf Pondweed*)		Unchanged
Hager Pond	MA82056	5	5	(Water Chestnut*)		Unchanged
Hager Pond	MA82056	5	5	Algae		Unchanged
Hager Pond	MA82056	5	5	Dissolved Oxygen Supersaturation		Unchanged
Hager Pond	MA82056	5	5	Fecal Coliform		Unchanged
Hager Pond	MA82056	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Hager Pond	MA82056	5	5	Phosphorus, Total		Unchanged
Hager Pond	MA82056	5	5	Turbidity		Unchanged
Heard Pond	MA82058	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Heard Pond	MA82058	5	5	(Fanwort*)		Unchanged
Heard Pond	MA82058	5	5	(Water Chestnut*)		Unchanged
Heard Pond	MA82058	5	5	Algae		Unchanged
Heard Pond	MA82058	5	5	Mercury in Fish Tissue		Unchanged
Heard Pond	MA82058	5	5	Transparency / Clarity		Unchanged
Heart Pond	MA82059	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Unchanged
Heart Pond	MA82059	5	5	(Water Chestnut*)		Unchanged
Heart Pond	MA82059	5	5	Escherichia Coli (E. Coli)		Unchanged
Heart Pond	MA82059	5	5	Mercury in Fish Tissue		Unchanged
Hocomonco Pond	MA82060	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Hocomonco Pond	MA82060	5	5	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Hop Brook	MA82A-05	5	5	(Water Chestnut*)		Unchanged
Hop Brook	MA82A-05	5	5	Algae		Unchanged
Hop Brook	MA82A-05	5	5	Benthic Macroinvertebrates		Unchanged
Hop Brook	MA82A-05	5	5	Dissolved Oxygen		Unchanged
Hop Brook	MA82A-05	5	5	Dissolved Oxygen Supersaturation		Unchanged
Hop Brook	MA82A-05	5	5	Escherichia Coli (E. Coli)		Unchanged
Hop Brook	MA82A-05	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Hop Brook	MA82A-05	5	5	Phosphorus, Total		Unchanged
Hop Brook	MA82A-05	5	5	Turbidity		Unchanged
Hop Brook	MA82A-06	5	5	Dissolved Oxygen		Unchanged
Hop Brook	MA82A-06	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Hop Brook	MA82A-06	5	5	Phosphorus, Total		Unchanged
Hop Brook	MA82B-20	2	5	Benthic Macroinvertebrates		Added
Hop Brook	MA82B-20	2	5	Chloride		Added
Hopkinton Reservoir	MA82061	5	5	(Non-Native Aquatic Plants*)		Unchanged
Hopkinton Reservoir	MA82061	5	5	Dissolved Oxygen		Unchanged
Hopkinton Reservoir	MA82061	5	5	Harmful Algal Blooms		Added
Howard Brook	MA82B-26	3	3	None		Unchanged
Indian Brook	MA82A-23	2	2	None		Unchanged
Indian Brook	MA82A-24	2	2	None		Unchanged
Jackstraw Brook	MA82A-28	3	3	None		Unchanged
Jackstraw Brook	MA82A-32	2	2	None		Unchanged
Lake Cochituate	MA82020	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Lake Cochituate	MA82020	5	5	Dissolved Oxygen		Unchanged
Lake Cochituate	MA82020	5	5	PCBs in Fish Tissue		Unchanged
Lake Cochituate	MA82125	5	5	(Asian Clam*)		Added
Lake Cochituate	MA82125	5	5	(Curly-leaf Pondweed*)		Unchanged
Lake Cochituate	MA82125	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Lake Cochituate	MA82125	5	5	(Non-Native Aquatic Plants*)		Unchanged
Lake Cochituate	MA82125	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
Lake Cochituate	MA82125	5	5	Dissolved Oxygen		Unchanged
Lake Cochituate	MA82125	5	5	Enterococcus		Removed
Lake Cochituate	MA82125	5	5	PCBs in Fish Tissue		Unchanged
Lake Cochituate	MA82126	5	5	(Asian Clam*)		Added
Lake Cochituate	MA82126	5	5	(Curly-leaf Pondweed*)		Unchanged
Lake Cochituate	MA82126	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Lake Cochituate	MA82126	5	5	(Non-Native Aquatic Plants*)		Unchanged
Lake Cochituate	MA82126	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
Lake Cochituate	MA82126	5	5	(Water Chestnut*)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Lake Cochituate	MA82126	5	5	PCBs in Fish Tissue		Unchanged
Lake Cochituate	MA82127	5	5	(Curly-leaf Pondweed*)		Unchanged
Lake Cochituate	MA82127	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Lake Cochituate	MA82127	5	5	(Non-Native Aquatic Plants*)		Unchanged
Lake Cochituate	MA82127	5	5	(Water Chestnut*)		Unchanged
Lake Cochituate	MA82127	5	5	Dissolved Oxygen		Unchanged
Lake Cochituate	MA82127	5	5	PCBs in Fish Tissue		Unchanged
Learned Pond	MA82069	3	3	None		Unchanged
Little Chauncy Pond	MA82070	5	5	(Curly-leaf Pondweed*)		Unchanged
Little Chauncy Pond	MA82070	5	5	(Non-Native Aquatic Plants*)		Unchanged
Little Chauncy Pond	MA82070	5	5	Mercury in Fish Tissue		Unchanged
Long Pond	MA82072	5	5	Algae		Unchanged
Long Pond	MA82072	5	5	Dissolved Oxygen		Unchanged
Long Pond	MA82072	5	5	Phosphorus, Total		Unchanged
Meadow Pond	MA82129	3	3	None		Unchanged
Milham Reservoir	MA82077	3	3	None		Unchanged
Mill Brook	MA82A-20	4c	4c	(Habitat Assessment*)		Unchanged
Nagog Pond	MA82082	3	3	None		Unchanged
Nashoba Brook	MA82B-14	5	5	(Dewatering*)		Unchanged
Nashoba Brook	MA82B-14	5	5	Benthic Macroinvertebrates		Added
Nashoba Brook	MA82B-14	5	5	Escherichia Coli (E. Coli)		Unchanged
Nashoba Brook	MA82B-14	5	5	Temperature		Unchanged
North Brook	MA82B-21	5	5	(Curly-leaf Pondweed*)		Unchanged
North Brook	MA82B-21	5	5	Temperature		Unchanged
North Great Meadows	MA82084	4c	4c	(Water Chestnut*)		Unchanged
Nutting Lake	MA82088	5	5	(Water Chestnut*)		Unchanged
Nutting Lake	MA82088	5	5	Escherichia Coli (E. Coli)		Unchanged
Nutting Lake	MA82088	5	5	Mercury in Fish Tissue	33880	Unchanged
Nutting Lake	MA82124	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Pantry Brook	MA82A-19	5	5	Fecal Coliform		Unchanged
Piccadilly Brook	MA82A-30	3	5	Fish Bioassessments		Added
Piccadilly Brook	MA82A-30	3	5	Temperature		Added
Pine Brook	MA82A-14	2	2	None		Unchanged
Puffers Pond	MA82092	5	5	Mercury in Fish Tissue		Unchanged
River Meadow Brook	MA82A-10	5	5	(Debris*)		Unchanged
River Meadow Brook	MA82A-10	5	5	(Water Chestnut*)		Unchanged
River Meadow Brook	MA82A-10	5	5	Benthic Macroinvertebrates		Added
River Meadow Brook	MA82A-10	5	5	Chloride		Added
River Meadow Brook	MA82A-10	5	5	Dissolved Oxygen		Added

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
River Meadow Brook	MA82A-10	5	5	Escherichia Coli (E. Coli)		Unchanged
River Meadow Brook	MA82A-10	5	5	Fecal Coliform		Unchanged
River Meadow Brook	MA82A-10	5	5	Temperature		Unchanged
River Meadow Brook	MA82A-10	5	5	Trash		Unchanged
Rocky Pond	MA82095	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Rutters Brook	MA82A-29	3	3	None		Unchanged
Saxonville Pond	MA82097	5	5	(Aquatic Plants (Macrophytes)*)		Changed
Saxonville Pond	MA82097	5	5	(European Water Clover*)		Added
Saxonville Pond	MA82097	5	5	(Fanwort*)		Unchanged
Saxonville Pond	MA82097	5	5	(Non-Native Aquatic Plants*)		Removed
Saxonville Pond	MA82097	5	5	(Water Chestnut*)		Unchanged
Saxonville Pond	MA82097	5	5	Mercury in Fish Tissue		Unchanged
Saxonville Pond	MA82097	5	5	Nutrient/Eutrophication Biological Indicators		Added
Second Division Brook	MA82B-09	2	2	None		Unchanged
Sheep Fall Brook	MA82B-25	2	2	None		Unchanged
Smith Pond	MA82099	3	3	None		Unchanged
Solomon Pond	MA82100	3	3	None		Unchanged
Spencer Brook	MA82B-15	2	2	None		Unchanged
Stony Brook	MA82A-33	2	2	None		Unchanged
Sudbury Reservoir	MA82106	4a	4a	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Sudbury Reservoir	MA82106	4a	4a	(Water Chestnut*)		Unchanged
Sudbury Reservoir	MA82106	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Sudbury River	MA82A-01	2	2	None		Unchanged
Sudbury River	MA82A-03	5	5	(Asian Clam*)		Added
Sudbury River	MA82A-03	5	5	(Curly-leaf Pondweed*)		Unchanged
Sudbury River	MA82A-03	5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Sudbury River	MA82A-03	5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
Sudbury River	MA82A-03	5	5	(Water Chestnut*)		Unchanged
Sudbury River	MA82A-03	5	5	Escherichia Coli (E. Coli)		Unchanged
Sudbury River	MA82A-03	5	5	Fish Bioassessments		Unchanged
Sudbury River	MA82A-03	5	5	Mercury in Fish Tissue		Unchanged
Sudbury River	MA82A-04	5	5	(Water Chestnut*)		Unchanged
Sudbury River	MA82A-04	5	5	Dissolved Oxygen		Added
Sudbury River	MA82A-04	5	5	Mercury in Fish Tissue		Unchanged
Sudbury River	MA82A-25	5	5	(Water Chestnut*)		Unchanged
Sudbury River	MA82A-25	5	5	Escherichia Coli (E. Coli)		Unchanged
Sudbury River	MA82A-25	5	5	Mercury in Fish Tissue		Unchanged
Sudbury River	MA82A-26	5	5	(Water Chestnut*)		Unchanged
Sudbury River	MA82A-26	5	5	Benthic Macroinvertebrates		Unchanged
Sudbury River	MA82A-26	5	5	Mercury in Fish Tissue		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Taylor Brook	MA82B-08	3	3	None		Unchanged
Tripp Pond	MA82107	3	3	None		Unchanged
Unnamed Tributary	MA82A-15	5	5	Algae		Unchanged
Unnamed Tributary	MA82A-15	5	5	Ambient Bioassays - Chronic Aquatic Toxicity		Unchanged
Unnamed Tributary	MA82A-15	5	5	Dissolved Oxygen		Unchanged
Unnamed Tributary	MA82A-15	5	5	Phosphorus, Total		Unchanged
Unnamed Tributary	MA82A-15	5	5	Total Suspended Solids (TSS)		Unchanged
Unnamed Tributary	MA82A-16	5	5	Algae		Unchanged
Unnamed Tributary	MA82A-16	5	5	Dissolved Oxygen		Unchanged
Unnamed Tributary	MA82A-16	5	5	Dissolved Oxygen Supersaturation		Unchanged
Unnamed Tributary	MA82A-16	5	5	pH, High		Unchanged
Unnamed Tributary	MA82A-16	5	5	Phosphorus, Total		Unchanged
Unnamed Tributary	MA82A-16	5	5	Total Suspended Solids (TSS)		Unchanged
Unnamed Tributary	MA82A-17	5	5	Algae		Unchanged
Unnamed Tributary	MA82A-17	5	5	Dissolved Oxygen		Unchanged
Unnamed Tributary	MA82A-17	5	5	Dissolved Oxygen Supersaturation		Unchanged
Unnamed Tributary	MA82A-17	5	5	Phosphorus, Total		Unchanged
Unnamed Tributary	MA82A-17	5	5	Total Suspended Solids (TSS)		Unchanged
Unnamed Tributary	MA82A-22	5	5	(Curly-leaf Pondweed*)		Unchanged
Unnamed Tributary	MA82A-22	5	5	(Debris*)		Unchanged
Unnamed Tributary	MA82A-22	5	5	Benthic Macroinvertebrates		Unchanged
Unnamed Tributary	MA82A-22	5	5	Escherichia Coli (E. Coli)		Unchanged
Unnamed Tributary	MA82A-22	5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
Unnamed Tributary	MA82A-22	5	5	Trash		Unchanged
Unnamed Tributary	MA82A-31	4c	4c	(Flow Regime Modification*)		Unchanged
Unnamed Tributary	MA82A-31	4c	4c	(Water Chestnut*)		Unchanged

Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Unnamed Tributary	MA82A-35	2	2	None		Unchanged
Unnamed Tributary	MA82A-36	2	2	None		Unchanged
Unnamed Tributary	MA82B-16	3	3	None		Unchanged
Unnamed Tributary	MA82B-23	2	2	None		Unchanged
Unnamed Tributary	MA82B-24	2	2	None		Unchanged
Unnamed Tributary	MA82B-27	2	3	None		Unchanged
Unnamed Tributary	MA82B-28	3	3	None		Unchanged
Unnamed Tributary	MA82B-31	3	5	Benthic Macroinvertebrates		Added
Unnamed Tributary	MA82B-31	3	5	Chloride		Added
Unnamed Tributary	MA82B-31	3	5	Dissolved Oxygen		Added
Unnamed Tributary	MA82B-31	3	5	Escherichia Coli (E. Coli)		Added
Unnamed Tributary	MA82B-32	2	2	None		Unchanged
Walden Pond	MA82109	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Warners Pond	MA82110	4a	4a	(Water Chestnut*)		Unchanged
Warners Pond	MA82110	4a	4a	Mercury in Fish Tissue	33880	Unchanged
Waushakum Pond	MA82112	5	5	(Non-Native Aquatic Plants*)		Unchanged
Waushakum Pond	MA82112	5	5	Chlorophyll-a		Unchanged
Waushakum Pond	MA82112	5	5	Dissolved Oxygen		Unchanged
Waushakum Pond	MA82112	5	5	Phosphorus, Total		Unchanged
Waushakum Pond	MA82112	5	5	Turbidity		Unchanged
West Pond	MA82115	3	3	None		Unchanged
Westborough Reservoir	MA82114	3	3	None		Unchanged
White Pond	MA82118	5	5	Dissolved Oxygen		Unchanged
White Pond	MA82118	5	5	Harmful Algal Blooms		Unchanged
White Pond	MA82119	3	3	None		Unchanged
Whitehall Brook	MA82A-11	2	5	Benthic Macroinvertebrates		Added
Whitehall Brook	MA82A-11	2	5	Dissolved Oxygen		Added
Whitehall Reservoir	MA82120	5	5	(Fanwort*)		Unchanged
Whitehall Reservoir	MA82120	5	5	(Non-Native Aquatic Plants*)		Unchanged
Whitehall Reservoir	MA82120	5	5	Dissolved Oxygen		Unchanged
Whitehall Reservoir	MA82120	5	5	Mercury in Fish Tissue	33880	Unchanged
Whitehall Reservoir	MA82120	5	5	Phosphorus, Total		Unchanged

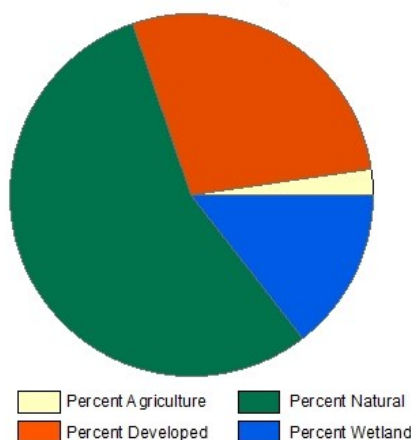
Waterbody	AU_ID	2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
Williams Lake	MA82121	3	3	None		Unchanged
Willis Pond	MA82122	3	3	None		Unchanged
Winning Pond	MA82123	4c	4c	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
Winning Pond	MA82123	4c	4c	(Non-Native Aquatic Plants*)		Unchanged
Winning Pond	MA82123	4c	4c	(Water Chestnut*)		Unchanged

Allowance Brook (MA82A-37)

Location:	(locally known as Landham Brook) From outlet small unnamed pond south of Hiram Road, Framingham to mouth at confluence with Hop Brook, Sudbury.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B

Allowance Brook - MA82A-37

Watershed Area: 4.49 square miles including areas outside Massachusetts



Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	4.49	4.29	1.17	1.1
Agriculture	2.3%	1.6%	4.9%	3.5%
Developed	28%	28.4%	18.8%	19.4%
Natural	55.2%	55.3%	44.8%	44.8%
Wetland	14.5%	14.8%	31.5%	32.3%
Impervious Cover	14.5%			

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
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDFG biologists conducted backpack electrofishing at two locations in Allowance Brook (locally known as Landham Brook) in July of 2018. The sample (n=24) collected upstream of Colonial Drive in Framingham (Sample ID 7457) was comprised of 75% Eastern brook trout, including 15 individuals ≤ 140 mm in length. The Eastern brook trout is an intolerant fluvial specialist of cold waters considered to be indicative of excellent water quality conditions. Downstream of Colonial Drive (Sample ID 7458), 66 fish were captured, including 24 Eastern brook trout ≤ 140 mm in length, as well as a number of intolerant banded sunfish (a macrohabitat generalist species).</p> <p>The Aquatic Life Use of Allowance Brook (MA82A-37, locally known as Landham Brook) is assessed as Fully Supporting based on the presence of a reproducing Eastern brook trout population.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
7457	MassDFG	Fish Community	Landham Brook	Colonial Drive up stream, Framingham. [DEP water body name is Allowance Brook]	42.34373	-71.42699
7458	MassDFG	Fish Community	Landham Brook	Colonial Drive down stream, Framingham. [DEP water body name is Allowance Brook]	42.34491	-71.42646

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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]

[Species List: BS = Banded Sunfish, EBT = Brook Trout, RP = Redfin Pickerel, WS = White Sucker]

Sample ID	Sample Date	Method	Sample Type	Total Taxa	Total Ind	EBT Ind	EBT Min Length (mm)	EBT Max Length (mm)	EBT ≤140mm Ind	SC Ind	Cold Ind %	Fluvial Ind %	Notables	CFR	Species List
7457	07/09/18	BP	TP	3	24	18	68	240	15	0	75%	79%	Yes	Yes	EBT, RP, WS,
7458	07/10/18	BP	TP	3	66	33	56	216	24	0	50%	50%	No	Yes	BS, EBT, RP,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Allowance Brook (MA82A-37, locally known as Landham Brook), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Recent data are not available for Allowance Brook (MA82A-37, locally known as Landham Brook), so the Aesthetics Use is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Recent data are not available for Allowance Brook (MA82A-37, locally known as Landham Brook), so the Primary Contact Recreational Use is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Recent data are not available for Allowance Brook (MA82A-37, locally known as Landham Brook), so the Secondary Contact Recreational Use is Not Assessed.	

Ashland Reservoir (MA82003)

Location:	Ashland.
AU Type:	FRESHWATER LAKE
AU Size:	168 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Non-Native Aquatic Plants*)		Unchanged
4a	4a	Mercury in Fish Tissue	42396	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) (Y)	X				
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		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	
No recent data are available so the Aquatic Life Use of Ashland Reservoir (MA82003) will remain assessed as Not Supporting with the prior Non-Native Aquatic Plants impairment being carried forward.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in Ashland Reservoir (MA82003), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory recommends that <i>children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body</i> and also that <i>the general public should limit consumption of all fish from this water body to two meals per month</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO

2022 Use Attainment Summary
No recent data are available, so the Aesthetics Use of Ashland Reservoir (MA82003) is Not Assessed.

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>The Ashland Reservoir Main Beach was posted 11% of the time in 2019 (0-7% of the time 2014-2018).</p> <p>The Primary Contact Recreational Use of Ashland Reservoir (MA82003) is assessed as Fully Supporting since the Ashland Reservoir Main Beach was posted <10% of the time in all but 2019 (postings slightly exceeded the 10% guidance at 11% in 2019 so an Alert is being identified).</p>	

Beach Postings

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

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%
4533	Ashland Reservoir-Main Beach (DCR)/Ashland	42.24410	-71.46570	42.24380	-71.46690	4%	0%	7%	2%	6%	11%	1

Secondary Contact Recreation

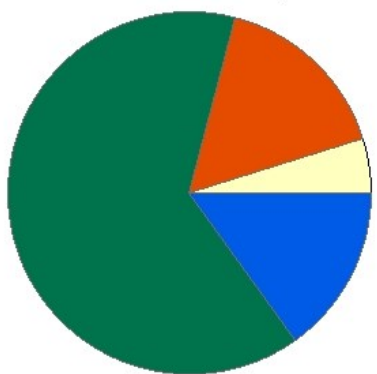
2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>The Ashland Reservoir Main Beach was posted 0-7% of the time 2014-2018 and 11% of the time in 2019.</p> <p>The Secondary Contact Recreational Use of Ashland Reservoir (MA82003) is assessed as Fully Supporting since there were few, if any, swimming advisory postings (posted <10% of the time) at the Ashland Reservoir Main Beach in most years from 2014 to 2019.</p>	

Assabet Brook (MA82B-17)

Location:	(locally known as Elizabeth Brook) Headwaters, outlet Fletchers Pond, Stow to mouth at confluence with the Assabet River, Stow.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B

Assabet Brook - MA82B-17

Watershed Area: 19.9 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	19.9	4.34	6.34	1.25
Agriculture	4.9%	3.8%	4%	4.9%
Developed	16.1%	20.8%	12.6%	18%
Natural	64%	54.6%	54.9%	43.8%
Wetland	15.1%	20.8%	28.4%	33.3%
Impervious Cover	6.6%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Benthic Macroinvertebrates		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				

Recommendations

2022 Recommendations

ALU: Continuous dissolved oxygen data need to be collected in Assabet Brook in the vicinity of MassDEP station W2511 to determine whether an impairment is warranted and potentially to understand the effect of wetlands on water quality in the stream. Other water quality data, as well as biological data, may be collected as appropriate.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted fish (Sample ID 6410), benthic (Station B0910), and water quality (W2511/MAP2-655) surveys in Assabet Brook (MA82B-17) west of White Pond Road, Stow ~4200 ft upstream of the confluence with the Assabet River during summer 2015. The fish sample (n=21) was collected by barge shocking in early October and included 62% intolerant/moderately tolerant macrohabitat generalists (but no fluvial species). The July benthic sample had an IBI score of 51, indicating that conditions were moderately degraded for a low gradient location. Discrete DO measurements (n=3) had a minimum of 3.3 mg/L (with the one measurement <4.0 mg/L). A deployed probe recorded continuous temperature data over 70 days in the summer index period. None of the 7DADMs were >27.7 °C and the maximum 24-hr rolling average temperature was good at 26.4 °C. Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.5-6.6 S.U. (n=3), there was little indication of nutrient enrichment (seasonal TP average was 0.019 mg/L with n=5, maximum DO saturation was 56.5%, only 1 observation of excessive filamentous algae), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), the maximum Total Ammonia Nitrogen was 0.070 mg/L (n=5), the maximum chloride concentration was 120 mg/L (n=5), and the maximum specific conductance was 479 µs/cm (n=5).</p> <p>The Aquatic Life Use of Assabet Brook (MA82B-17) is assessed as Not Supporting for Benthic Macroinvertebrates (although the moderately degraded IBI score may be at least partially indicative of the relatively high percentage of wetlands in the proximal stream buffer ~33%). The prior Alert for occasional low DO is being carried forward since the only available DO measurements were extremely limited discrete data. The prior Alert for elevated total phosphorus is being removed since the seasonal average was quite low (0.019 mg/L).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6410	MassDEP	Fish Community	Elizabeth Brook	west of White Pond Road, Stow approximately 4200 feet upstream of mouth at confluence with Assabet River, Stow, MA. [DEP water body name is Assabet Brook]	42.42764	-71.48545
B0910	MassDEP	Benthic	Assabet Brook/	[west of White Pond Road, Stow approximately 1280 meters upstream of mouth at confluence with Assabet River, Stow, MA]	42.427641	-71.485449
W2511	MassDEP	Water Quality	Assabet Brook	[west of White Pond Road, Stow approximately 4200 feet upstream of mouth at confluence with Assabet River, Stow]	42.427641	-71.485449

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0910	07/29/15	RBP multihab	Statewide_Low_Gradient	307	51	MD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: BB = Brown Bullhead, CP = Chain Pickerel, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, YB = Yellow Bullhead]

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
6410	10/02/15	BG	TP		8	21	0%	0	0%	0%	5	62%	No	No	BB, CP, GS, LMB, P, RBS, RP, YB,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	08/11/15	10/01/15	3	3.3	4.5	2	2	1

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2511	07/08/15	09/15/15	70	67	26.3	28.8	27.0	24.9	67	31	55	24	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2511	07/07/15	09/15/15	71	3337	26.4	1469	1084	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	08/11/15	10/01/15	3	2	21.4	19.5	2	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2511	08/11/15	10/01/15	3	6.5	6.6	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	2015	5	0.014	0.027	0.019	--	--	56.5	6.6	5	1

Toxics and other pollutants (metals, ammonia, chloride, chlorine)**MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations.** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Selected TU Calculations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	05/14/15	0.1	0.2	0.3	0.41	0.0	0.8
W2511	06/10/15	0.1	0.2	0.3	0.40	0.0	0.8
W2511	07/16/15	0.1	0.2	0.3	0.38	0.0	0.7

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2511	2015	5	0.040	0.070	0.052	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2511	2015	5	99	120	108	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2511	08/11/15	10/01/15	3	348	479	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Assabet Brook (MA82B-17), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	

MassDEP staff conducted field surveys of Assabet Brook west of White Pond Road, Stow ~4200 ft upstream of the confluence with the Assabet River (Station W2511/MAP2-655) during summer 2015 (n=5). Generally, no odors, deposits, or turbidity were noted.

The Aesthetics Use for Assabet Brook (MA82B-17) is assessed as Fully Supporting based on the general lack of objectionable conditions noted by MassDEP staff at the W2511 site sampled in the summer of 2015. However, the use is identified with an Alert status since field crews noted on one occasion a floating algal mat that “covers approximately 90% of stream” (MassDEP Undated 6).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2511	MassDEP	Water Quality	Assabet Brook	[west of White Pond Road, Stow approximately 4200 feet upstream of mouth at confluence with Assabet River, Stow]	42.427641	-71.485449

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2511	Assabet Brook	2015	5	The Aesthetics use for Assabet Brook is assessed as Fully Supporting based on observations (generally no odors, deposits, or turbidity) by MassDEP staff during field surveys at station W2511/MAP2-655 in summer 2015 (n=5). However, the use is identified with an Alert status since field crews noted on one occasion a floating algal mat that “covers approximately 90% of stream”.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2511	2015	5	5	1

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2511	Assabet Brook	2015	Color	Light Yellow/Tan	4	5
W2511	Assabet Brook	2015	Color	None	1	5
W2511	Assabet Brook	2015	Objectionable Deposits	No	5	5
W2511	Assabet Brook	2015	Odor	None	5	5
W2511	Assabet Brook	2015	Scum	No	3	5
W2511	Assabet Brook	2015	Scum	Yes	2	5
W2511	Assabet Brook	2015	Turbidity	None	4	5
W2511	Assabet Brook	2015	Turbidity	Slightly Turbid	1	5

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys of Assabet Brook west of White Pond Road, Stow ~4200 ft upstream of the confluence with the Assabet River (Station W2511/MAP2-655) during summer 2015 (n=5). Generally, no odors, deposits, or turbidity were noted. <i>E. coli</i> bacteria samples were collected during all these site visits. Analysis of these low frequency data indicated that none of the intervals had GMs >126 cfu/100mL and none of the samples exceeded the 410 cfu/100mL STV. The seasonal GM was 72 cfu/100mL.</p> <p>The Primary Contact Recreational Use for Assabet Brook (MA82B-17) is assessed as Fully Supporting based on the low <i>E. coli</i> concentration data and general observations. However, the use is identified with an Alert status since field crews noted on one occasion a floating algal mat that “covers approximately 90% of stream” (MassDEP Undated 6).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2511	MassDEP	Water Quality	Assabet Brook	[west of White Pond Road, Stow approximately 4200 feet upstream of mouth at confluence with Assabet River, Stow]	42.427641	-71.485449

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

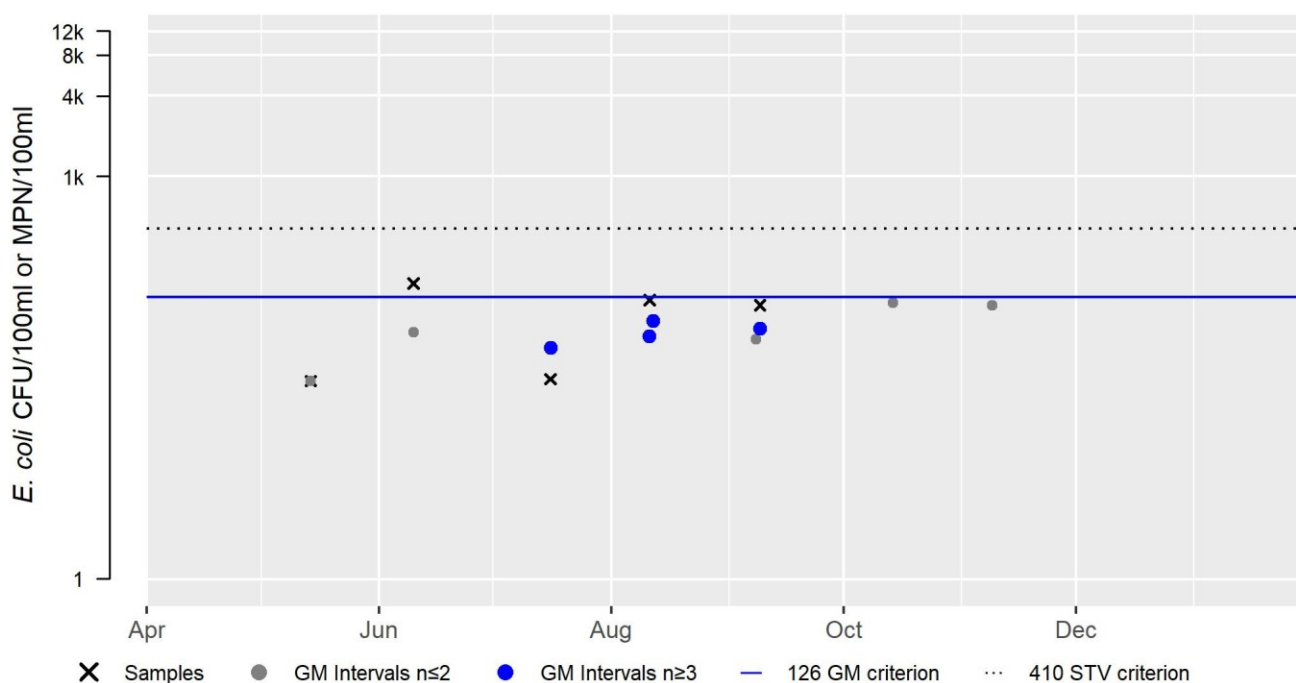
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2511	MassDEP	E. coli	05/14/15	09/09/15	5	30	160	72

W2511 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	72
#GMI	4
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys of Assabet Brook west of White Pond Road, Stow ~4200 ft upstream of the confluence with the Assabet River (Station W2511/MAP2-655) during summer 2015 (n=5). Generally, no odors, deposits, or turbidity were noted. <i>E. coli</i> bacteria samples were collected during all these site visits. Analysis of these low frequency data indicated that none of the intervals had GMs >630 cfu/100mL and none of the samples exceeded the 1260 cfu/100mL STV. The seasonal GM was 72 cfu/100mL.</p> <p>The Secondary Contact Recreational Use for Assabet Brook (MA82B-17) is assessed as Fully Supporting based on the low <i>E. coli</i> concentration data and general observations. However, the use is identified with an Alert status since field crews noted on one occasion a floating algal mat that “covers approximately 90% of stream” (MassDEP Undated 6).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2511	MassDEP	Water Quality	Assabet Brook	[west of White Pond Road, Stow approximately 4200 feet upstream of mouth at confluence with Assabet River, Stow]	42.427641	-71.485449

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)**

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

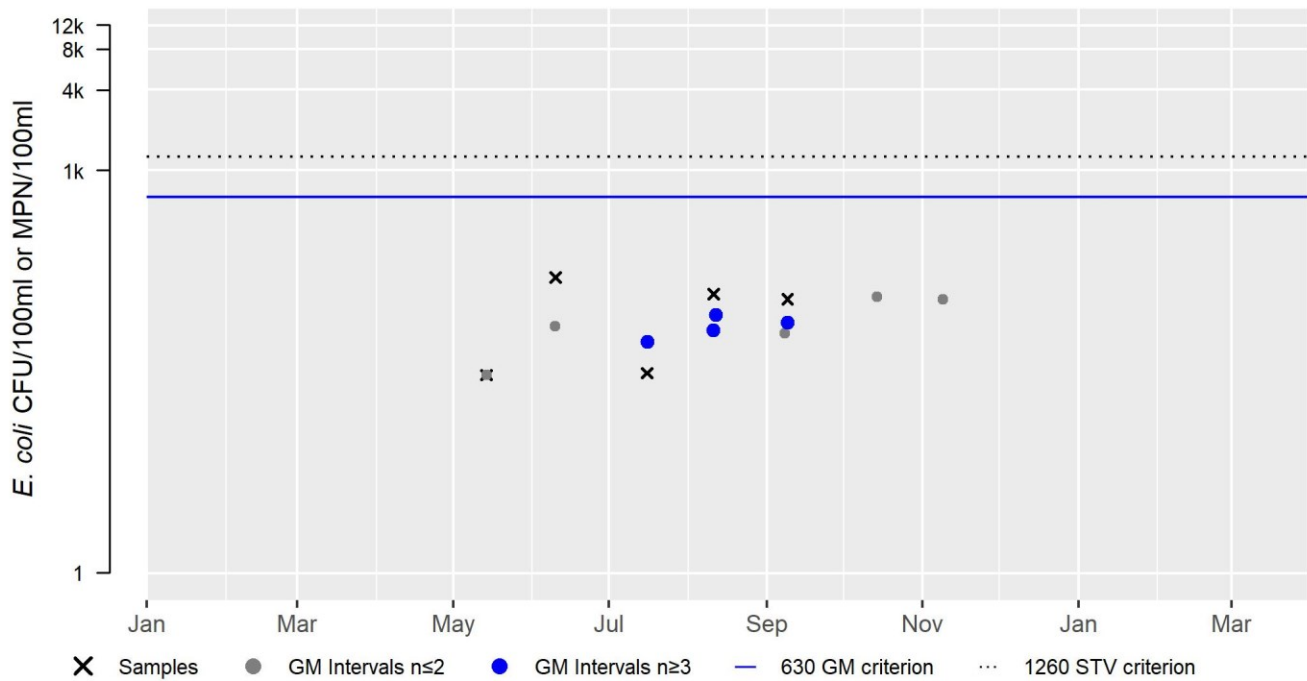
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2511	MassDEP	E. coli	05/14/15	09/09/15	5	30	160	72

W2511 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	72
#GMI	4
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015

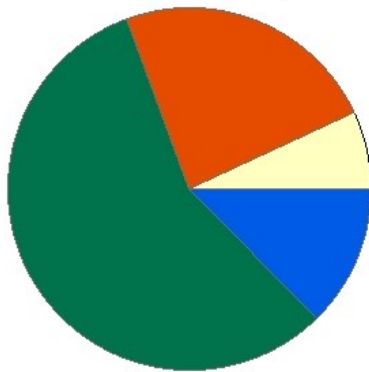


Assabet River (MA82B-01)

Location:	Headwaters, outlet Assabet River Reservoir, Westborough to the Westborough WWTP discharge (NPDES: MA0100412), Westborough.
AU Type:	RIVER
AU Size:	1.2 MILES
Classification/Qualifier:	B: WWF, HQW

Assabet River - MA82B-01

Watershed Area: 8.38 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Developed
 Percent Natural
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	8.38	7.51	2.02	1.92
Agriculture	6.9%	6.8%	4.5%	4.5%
Developed	23.8%	23.2%	16.3%	16.9%
Natural	56.6%	57.5%	56%	56.5%
Wetland	12.7%	12.5%	23.2%	22%
Impervious Cover	10%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
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
(Dewatering*)	Source Unknown (N)	X				
Benthic Macroinvertebrates	Source Unknown (N)	X				
Benthic Macroinvertebrates	Unspecified Urban Stormwater (Y)	X				
Fish Bioassessments	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	
<p>MassDFG biologists conducted backpack electrofishing in this Assabet River AU (MA82B-01) ~30 ft upstream of the Mill Rd crossing, Westborough in May 2016. The sample (n=60) was comprised of 13% fluvial individuals (white sucker) and 22% intolerant/moderately tolerant macrohabitat generalist species. Although the fish community, as represented by this one sample, is considered adequate for a warmwater stream, data from this AU were previously compared unfavorably to the Concord Target Fish Community Model (MassDEP 2021).</p> <p>The Aquatic Life Use of this Assabet River AU (MA82B-01) is assessed as Not Supporting, with the prior Benthic Macroinvertebrates, Dewatering, and Fish Bioassessments impairments being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5827	MassDFG	Fish Community	Assabet River	^ 30 ft Mill Rd crossing., Westborough	42.26932	-71.63383

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, CP = Chain Pickerel, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, WS = White Sucker, YB = Yellow Bullhead]

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
5827	05/04/16	BP	TP		9	60	0%	1	13%	0%	3	22%	No	No	AE, B, BB, CP, GS, LMB, P, WS, YB,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Recent fish toxics sampling has not been conducted and no site-specific advisory has been issued, so the Fish Consumption Use of this Assabet River AU (MA82B-01) is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	

No recent data are available, so the Aesthetics Use of this Assabet River AU (MA82B-01) is Not Assessed.
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Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available, so the Primary Contact Recreational Use of this Assabet River AU (MA82B-01) is Not Assessed.	

Secondary Contact Recreation

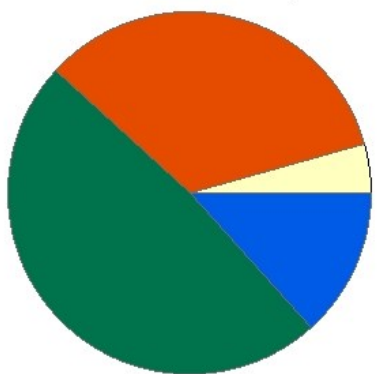
2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available, so the Secondary Contact Recreational Use of this Assabet River AU (MA82B-01) is Not Assessed.	

Assabet River (MA82B-02)

Location:	From the Westborough WWTP discharge (NPDES: MA0100412), Westborough to the dam (NATID: MA02843) Route 20, Northborough.
AU Type:	RIVER
AU Size:	3.8 MILES
Classification/Qualifier:	B: WWF

Assabet River - MA82B-02

Watershed Area: 19.96 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	19.96	7.63	5.92	2.86
Agriculture	4.4%	3.4%	3.3%	3.7%
Developed	33.9%	37.5%	25.1%	25.1%
Natural	48.5%	41.8%	45.8%	38.6%
Wetland	13.3%	17.4%	25.8%	32.5%
Impervious Cover	15.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Aquatic Plants (Macrophytes)*)		Unchanged
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	Algae	35104	Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators	35104	Unchanged

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

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Benthic Macroinvertebrates	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Benthic Macroinvertebrates	Municipal Point Source Discharges (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	
Nutrient/Eutrophication Biological Indicators	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)	X		X	X	X

Recommendations

2022 Recommendations
ALU: Chloride and continuous specific conductance data should be collected in this Assabet River AU (MA82B-02) to track chloride trends.; OTHER: 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 Assabet River (MA82B-02) sub-watershed.; OTHER: Biological (benthic) and water quality data (emphasis on biological and physicochemical indicators of nutrient enrichment) should be collected in this Assabet River AU (MA82B-02) to reevaluate the status of historical enrichment-related impairments applied to multiple uses.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

MassDEP conducted limited (discrete) water quality data collection from 2011-2013 in this Assabet River AU (MA82B-02) at the School Street crossing in Northborough (Station W0695) as part of the SMART monitoring program. Although these data (with the exception of *E. coli* bacteria data, summarized under the recreational use sections) were previously reported on in the 2018/2020 IR (MassDEP 2021), they are being included here for the sake of completeness. Discrete dissolved oxygen (DO) measurements had an overall minimum of 5.6 mg/L (n= 5/yr), while the maximum temperature measured during the summer index period was 21.4 °C (n= 1-2/yr). pH ranged from 6.5-7.3 S.U (n= 5-6/yr). There was little indication of nutrient enrichment after March 2012 when upgrades were made to the Westborough WWTP for enhanced nutrient treatment (Beaudoin 2017). Total phosphorus seasonal averages were 0.044 mg/L (n=2) and 0.042 mg/L (n=3) in 2012 and 2013, respectively. The maximum DO saturations were all <93%. There were three observations of dense/very dense filamentous algae in 2012 (the year the enhanced wastewater treatment was implemented) but none in 2013. There were no exceedances among Total Ammonia Nitrogen samples (maximum TAN post-construction 0.12 mg/L in 2013; n= 4-5/yr). Chloride concentrations exceeded 230 mg/L (the chronic toxicity criterion) once in 2011, twice in 2012, and not at all in 2013 (maximum chloride 210-270 mg/L; n= 4-6/yr). Similarly, 1-2 specific conductance measurements (of 5-6/yr) each year exceeded 994 µs/cm (the estimated chloride chronic criterion plus a 10% margin of error), with yearly maxima ranging from 1110-1246 µs/cm.

The Aquatic Life Use of this Assabet River AU (MA82B-02) will continue to be assessed as Not Supporting, with the prior Benthic Macroinvertebrates, Curly-leaf Pondweed, and Nutrient/Eutrophication Biological Indicators impairments being carried forward. Collection of biological data and indicators of nutrient enrichment should be conducted in the future to reevaluate these impairments. The Alert for chloride toxicity, first applied in the 2018/2020 cycle, will also be carried forward.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0695	MassDEP	Water Quality	Assabet River	[School Street, Northborough]	42.304853	-71.628451

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0695	01/19/11	11/16/11	5	6.1	9.6	0	0	0
W0695	02/22/12	10/24/12	5	5.6	7.5	0	0	0
W0695	01/28/13	09/25/13	5	6.8	9.4	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0695	01/19/11	11/16/11	6	1	21.4	11.1	1	0	0	0
W0695	02/22/12	10/24/12	5	2	20.5	13.9	1	0	0	0
W0695	01/28/13	09/25/13	5	1	20.8	11.2	1	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W0695	01/19/11	11/16/11	6	6.5	7	0	0
W0695	02/22/12	10/24/12	5	7	7.1	0	0
W0695	01/28/13	09/25/13	5	6.8	7.3	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0695	2011	3	0.1	0.260	0.180	--	--	90.4	7.0	6	0
W0695	2012	2	0.04	0.048	0.044	--	--	85.5	7.1	5	3
W0695	2013	3	0.022	0.070	0.042	--	--	92.3	7.3	4	0

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

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0695	2011	6	0.040	0.350	0.128	0	0
W0695	2012	5	0.020	0.100	0.050	0	0
W0695	2013	4	0.020	0.120	0.055	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W0695	2011	6	78	270	155	1	0
W0695	2012	5	140	250	200	2	0
W0695	2013	4	170	210	190	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W0695	01/19/11	11/16/11	6	370	1110	1	1	0	0	0	0
W0695	02/22/12	10/24/12	5	606	1246	2	2	0	0	1	1
W0695	01/28/13	09/25/13	5	655	1047	2	2	0	0	1	1

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in this Assabet River AU (MA82B-02), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 (School St, Northborough) on this Assabet River AU (MA82B-02), three instances of dense/very dense filamentous algae were recorded in 2012 (however, this was the year that enhanced nutrient treatment was implemented at the Westborough WWTP (Beaudoin 2017)).</p> <p>The Aesthetics Use of this Assabet River AU (MA82B-02) will continue to be assessed as Not Supporting with all prior impairments (Algae, Aquatic Plants (Macrophytes), Nutrient/Eutrophication Biological Indicators) being carried forward. Now that time has passed since upgrades to the Westborough WWTP, data should be collected that will allow reevaluation of these impairments. Additionally, the prior Alerts for effluent odors, the discharge documented near the Juniper Hill Golf Course, as well as localized areas of trash and algal growth near the Route 20 dam (MassDEP Undated 5), are also being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0695	MassDEP	Water Quality	Assabet River	[School Street, Northborough]	42.304853	-71.628451

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0695	Assabet River	2011	6	While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 on this Assabet River AU (MA82B-02), 3 instances of dense/very dense filamentous algae were recorded in 2012.
W0695	Assabet River	2012	5	While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 on this Assabet River AU (MA82B-02), 3 instances of dense/very dense filamentous algae were recorded in 2012.

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0695	Assabet River	2013	5	While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 on this Assabet River AU (MA82B-02), 3 instances of dense/very dense filamentous algae were recorded in 2012.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W0695	2011	6	6	0
W0695	2012	5	5	3
W0695	2013	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0695	Assabet River	2011	Color	Light Yellow/Tan	3	6
W0695	Assabet River	2011	Color	None	2	6
W0695	Assabet River	2011	Color	Reddish	1	6
W0695	Assabet River	2011	Objectionable Deposits	No	6	6
W0695	Assabet River	2011	Odor	None	6	6
W0695	Assabet River	2011	Scum	No	5	6
W0695	Assabet River	2011	Scum	Yes	1	6
W0695	Assabet River	2011	Turbidity	None	6	6
W0695	Assabet River	2012	Color	Light Yellow/Tan	2	5
W0695	Assabet River	2012	Color	None	3	5
W0695	Assabet River	2012	Objectionable Deposits	No	4	5
W0695	Assabet River	2012	Objectionable Deposits	Yes	1	5
W0695	Assabet River	2012	Odor	Effluent (Treated)	1	5
W0695	Assabet River	2012	Odor	Musty (Basement)	2	5
W0695	Assabet River	2012	Odor	None	2	5
W0695	Assabet River	2012	Scum	No	5	5
W0695	Assabet River	2012	Turbidity	Moderately Turbid	1	5
W0695	Assabet River	2012	Turbidity	None	4	5
W0695	Assabet River	2013	Color	None	4	5
W0695	Assabet River	2013	Color	Reddish	1	5
W0695	Assabet River	2013	Objectionable Deposits	No	4	5
W0695	Assabet River	2013	Objectionable Deposits	Unobservable	1	5
W0695	Assabet River	2013	Odor	Musty (Basement)	2	5
W0695	Assabet River	2013	Odor	None	3	5
W0695	Assabet River	2013	Scum	No	5	5
W0695	Assabet River	2013	Turbidity	None	5	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 (School St, Northborough) on this Assabet River AU (MA82B-02), three instances of dense/very dense filamentous algae were recorded in 2012 (however, this was the year that enhanced nutrient treatment was implemented at the Westborough WWTP (Beaudoin 2017)). Limited <i>E. coli</i> bacteria samples were collected at this location each year during the recreational season (n= 3/4/3 in 2011/2012/2013, respectively). The <i>E. coli</i> data were too limited in 2011 and 2012 to evaluate under 2022 CALM guidance (MassDEP 2022), but in 2013, 100% of intervals had GMs >126 cfu/100mL and the seasonal GM was 202 cfu/100mL. None of the samples from that year exceeded the 410 cfu/100mL STV.</p> <p>The Primary Contact Recreational Use of this Assabet River AU (MA82B-02) will continue to be assessed as Not Supporting with all prior impairments (Algae, Aquatic Plants (Macrophytes), Escherichia Coli (E. Coli), Fecal Coliform, Nutrient/Eutrophication Biological Indicators) being carried forward. Now that time has passed since upgrades to the Westborough WWTP, data should be collected that will allow reevaluation of the enrichment-related impairments.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0695	MassDEP	Water Quality	Assabet River	[School Street, Northborough]	42.304853	-71.628451

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0695	MassDEP	E. coli	05/17/11	09/21/11	3	65	435	198
W0695	MassDEP	E. coli	04/11/12	10/24/12	4	19	121	68
W0695	MassDEP	E. coli	05/20/13	09/25/13	3	130	345	202

W0695 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

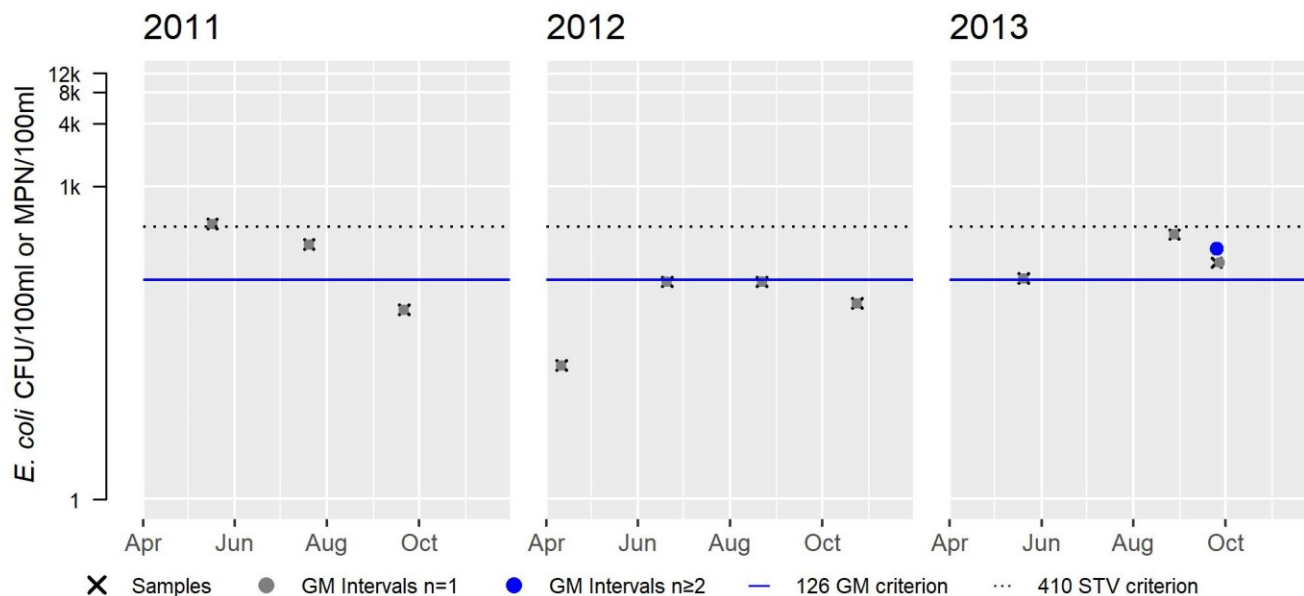
Var	Res
Samples	3
SeasGM	198
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	33

Var	Res
Samples	4
SeasGM	68
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	3
SeasGM	202
#GMI	1
#GMI Ex	1
%GMI Ex	100
n>STV	0
%n>STV	0

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

Variable	Cumulative %GMI Ex (all years)
Result	100



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>While there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during summer 2011, 2012, and 2013 at station W0695 (School St, Northborough) on this Assabet River AU (MA82B-02), three instances of dense/very dense filamentous algae were recorded in 2012 (however, this was the year that enhanced nutrient treatment was implemented at the Westborough WWTP (Beaudoin 2017)). Limited <i>E. coli</i> bacteria samples were collected at this location each year (n= 6/5/5 in 2011/2012/2013, respectively), but the <i>E. coli</i> data were too limited to evaluate under 2022 CALM guidance (MassDEP 2022).</p> <p>The Secondary Contact Recreational Use of this Assabet River AU (MA82B-02) will continue to be assessed as Not Supporting with all prior impairments (Algae, Aquatic Plants (Macrophytes), Nutrient/Eutrophication Biological Indicators) being carried forward. Now that time has passed since upgrades to the Westborough WWTP, data should be collected that will allow reevaluation of these impairments.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0695	MassDEP	Water Quality	Assabet River	[School Street, Northborough]	42.304853	-71.628451

Bacteria Data
Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

[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)
W0695	MassDEP	E. coli	01/19/11	11/16/11	6	13	2419.6	131
W0695	MassDEP	E. coli	02/22/12	10/24/12	5	2	121	33
W0695	MassDEP	E. coli	01/28/13	09/25/13	5	18	345	96

W0695 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

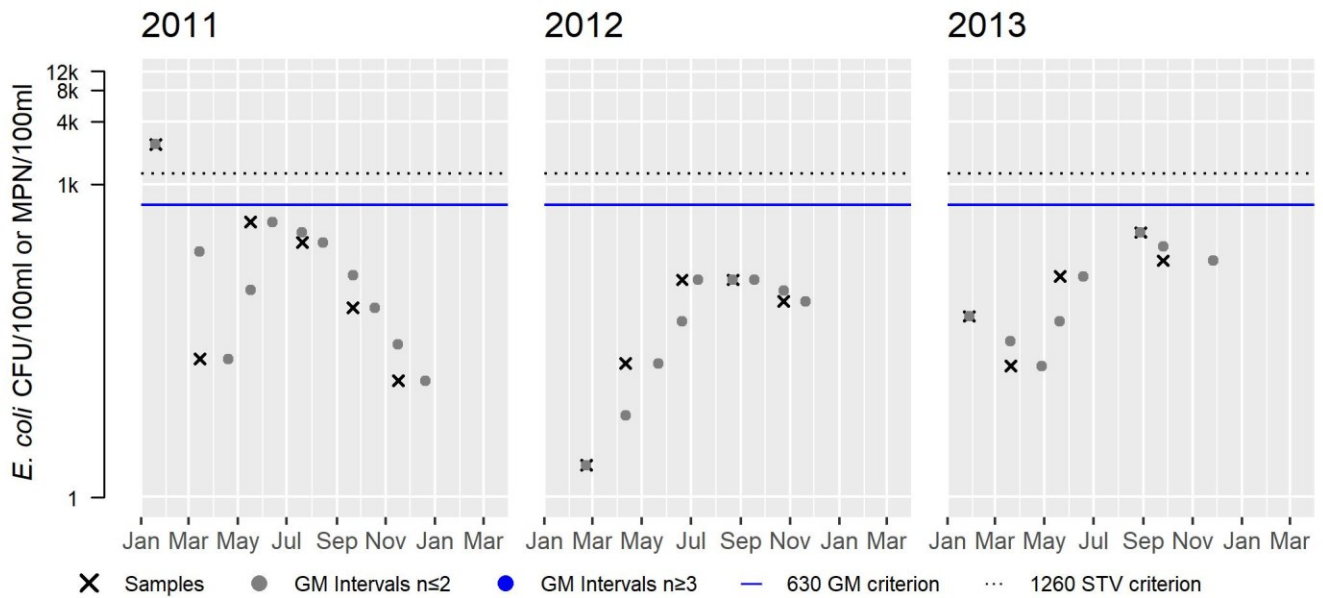
Var	Res
Samples	6
SeasGM	131
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	17

Var	Res
Samples	5
SeasGM	33
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	96
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0



Assabet River (MA82B-03)

Location:	From the dam (NATID: MA02843) Route 20, Northborough to the Marlborough West WWTP discharge (NPDES: MA0100480), Marlborough.
AU Type:	RIVER
AU Size:	2.4 MILES
Classification/Qualifier:	B: WWF

No usable data were available for Assabet River (MA82B-03) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Debris*)		Unchanged
5	5	Algae	35105	Unchanged
5	5	Ambient Bioassays - Chronic Aquatic Toxicity		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators	35105	Unchanged
5	5	Odor		Unchanged
5	5	Phosphorus, Total	35105	Unchanged
5	5	Trash		Unchanged

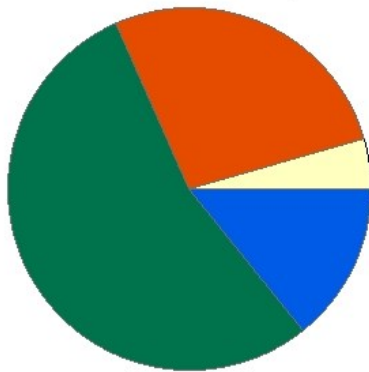
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Debris*)	Municipal Point Source Discharges (Y)			X	X	X
(Debris*)	Source Unknown (N)			X	X	X
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Ambient Bioassays - Chronic Aquatic Toxicity	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)			X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)			X	X	X
Odor	Municipal Point Source Discharges (Y)			X	X	X
Odor	Source Unknown (N)			X	X	X
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Trash	Municipal Point Source Discharges (Y)			X	X	X
Trash	Source Unknown (N)			X	X	X

Assabet River (MA82B-04)

Location:	From the Marlborough West WWTP discharge (NPDES: MA0100480), Marlborough to the Hudson WWTP discharge (NPDES: MA0101788), Hudson.
AU Type:	RIVER
AU Size:	8 MILES
Classification/Qualifier:	B: WWF

Assabet River - MA82B-04

Watershed Area: 73.98 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	73.98	9.2	25.81	3.08
Agriculture	4.5%	1.1%	3.6%	0.6%
Developed	27.2%	37.9%	21%	29.2%
Natural	54%	47.9%	48.7%	44.1%
Wetland	14.3%	13.1%	26.7%	26.1%
Impervious Cover	13.1%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Water Chestnut*)		Unchanged
5	5	Algae	35106	Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Dissolved Oxygen	35106	Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Fish Bioassessments		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
5	5	Phosphorus, Total	35106	Unchanged

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

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X		X	X	X
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Benthic Macroinvertebrates	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Benthic Macroinvertebrates	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Municipal Point Source Discharges (Y)				X	
Fecal Coliform	Municipal Point Source Discharges (Y)				X	
Fish Bioassessments	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Fish Bioassessments	Municipal Point Source Discharges (Y)	X				
Nutrient/Eutrophication Biological Indicators	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)	X		X	X	X
Phosphorus, Total	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				

Recommendations

2022 Recommendations
ALU: Conduct biological and water quality surveys in riverine and impounded portions of this Assabet River AU (MA82B-04) to further evaluate the effects of reduced total phosphorus inputs (following upgrades to the Westborough and Marlborough WWTPs in 2012). Additionally, an aquatic macrophyte survey should be conducted to confirm the presence of the non-native Curly-leaf Pondweed in this AU (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	

There are no recent data available for this Assabet River AU (MA82B-04), so the Aquatic Life Use will continue to be assessed as Not Supporting with all prior impairments (Algae, Benthic Macroinvertebrates, Dissolved Oxygen, Fish Bioassessments, Nutrient/Eutrophication Biological Indicators, "Phosphorus, Total," Water Chestnut) being carried forward. Additionally, the prior Alert for potential infestation by the non-native aquatic macrophyte, Curly-leaf Pondweed (present in both the upstream and downstream Assabet River AUs) (MassDEP 2021), is being carried forward.

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
There are no recent fish toxics sampling data available for this Assabet River AU (MA82B-04) and a site-specific advisory has not been issued, so the Fish Consumption Use is Not Assessed. However, the prior Alert for Mercury in Fish Tissue (due to mercury measured in largemouth bass filets that was very close to the MassDPH trigger concentration (O'Brien-Clayton 2005)) is being carried forward.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
No recent data are available, so the Aesthetics Use of this Assabet River AU (MA82B-04) will continue to be assessed as Not Supporting with the prior Algae and Nutrient/Eutrophication Biological Indicators impairment being carried forward. The prior Alert for elevated total phosphorus is also being carried forward.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
OARS volunteers/staff collected <i>E. coli</i> bacteria samples in this Assabet River AU (MA82B-04) at the Cox St crossing in Hudson during the 2019 and 2020 summers. Analysis of these high frequency datasets (n= 15/season) indicated that 89% and 93%, respectively, of intervals had GMs >126 cfu/100mL. Cumulatively, 91% of the intervals from both years had GMs exceeding the criterion. However, >10% of samples (13%) exceeded the 410 cfu/100mL STV only in 2020. The Primary Contact Recreational Use for this Assabet River AU (MA82B-04) will continue to be assessed as Not Supporting with the prior Algae, Escherichia Coli (<i>E. Coli</i>), Fecal Coliform, and Nutrient/Eutrophication Biological Indicators impairments being carried forward (the OARS bacteria data collected in 2019 and 2020 corroborate the <i>E. coli</i> impairment). The prior Alert for elevated total phosphorus is also being carried forward.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-ABT-162	OARS	Water Quality	Assabet River	Cox St, Hudson	42.399671	-71.545983

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (OARS 2021)
(MassDEP Undated 2)

[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
OARS_OARS-ABT-162	OARS	E. coli	06/17/19	09/23/19	15	88	560	161
OARS_OARS-ABT-162	OARS	E. coli	06/08/20	09/14/20	15	96	1100	203

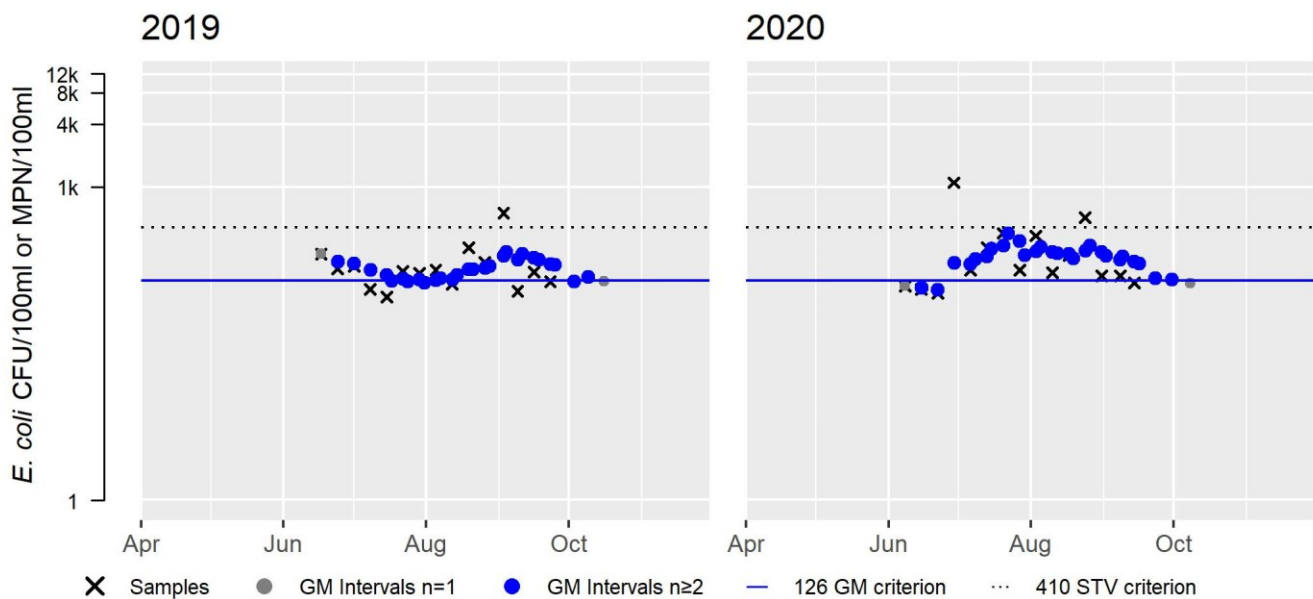
OARS_OARS-ABT-162 E. coli (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	161
#GMI	27
#GMI Ex	24
%GMI Ex	89
n>STV	1
%n>STV	7

Var	Res
Samples	15
SeasGM	203
#GMI	27
#GMI Ex	25
%GMI Ex	93
n>STV	2
%n>STV	13

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

Variable	Cumulative %GMI Ex (all years)
Result	91



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

OARS volunteers/staff collected *E. coli* bacteria samples in this Assabet River AU (MA82B-04) at the Cox St crossing in Hudson during the 2019 and 2020 summers. Analysis of these high frequency datasets (n= 15/season) indicated that none of the intervals in either year had GMs >630 cfu/100mL and none of the samples exceeded the 1260 cfu/100mL STV.

Although bacteria concentrations measured at the OARS site in 2019 and 2020 were indicative of good conditions, the Secondary Contact Recreational Use of this Assabet River AU (MA82B-04) will continue to be assessed as Not Supporting with the prior Algae and Nutrient/Eutrophication Biological Indicators impairments being carried forward. The prior Alert for elevated total phosphorus is also being carried forward.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-ABT-162	OARS	Water Quality	Assabet River	Cox St, Hudson	42.399671	-71.545983

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (OARS 2021)

(MassDEP Undated 2)

[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)
OARS_OARS-ABT-162	OARS	E. coli	06/17/19	09/23/19	15	88	560	161
OARS_OARS-ABT-162	OARS	E. coli	06/08/20	09/14/20	15	96	1100	203

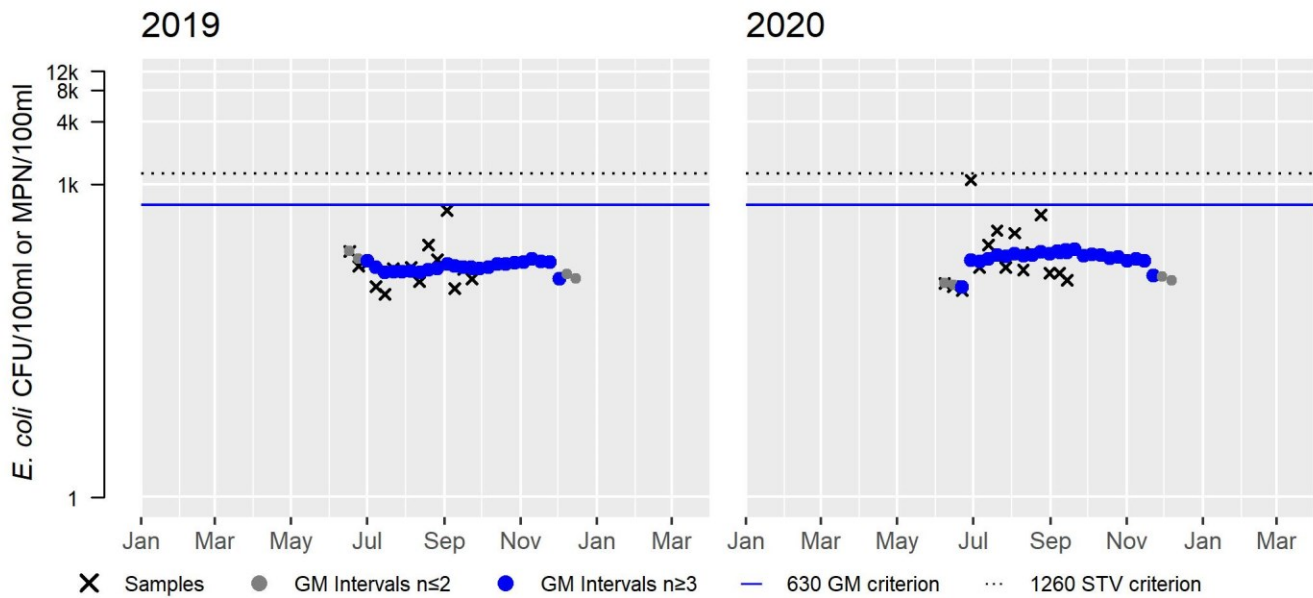
OARS_OARS-ABT-162 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	161
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	203
#GMI	25
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

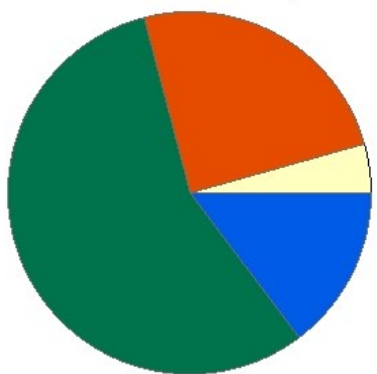


Assabet River (MA82B-05)

Location:	From the Hudson WWTP discharge (NPDES: MA0101788), Hudson to the USGS gage (#01097000) at Routes 27/62, Maynard.
AU Type:	RIVER
AU Size:	8.2 MILES
Classification/Qualifier:	B: WWF

Assabet River - MA82B-05

Watershed Area: 115.49 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	115.49	10.12	38.37	2.72
Agriculture	4.3%	1.9%	3.5%	2.2%
Developed	24.8%	19.1%	18.9%	13.8%
Natural	56.3%	58.6%	50%	51.6%
Wetland	14.7%	20.3%	27.5%	32.3%
Impervious Cover	11.6%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Debris*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Fanwort*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae	35107	Unchanged
5	5	Dissolved Oxygen	35107	Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators	35107	Unchanged
5	5	Odor		Unchanged
5	5	Phosphorus, Total	35107	Unchanged
5	5	Trash		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Debris*)	Municipal Point Source Discharges (Y)			X	X	X
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Dissolved Oxygen	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Odor	Municipal Point Source Discharges (Y)			X	X	X
Phosphorus, Total	Impacts from Hydrostructure Flow Regulation/Modification (Y)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Trash	Municipal Point Source Discharges (Y)			X	X	X

Recommendations

2022 Recommendations
ALU: Since upgrades were completed in 2012 to the wastewater treatment facilities discharging to this Assabet River AU (MA82B-05) and other upstream AUs, biological and water quality surveys should be conducted in riverine and impounded reaches of this AU to reevaluate total phosphorus concentrations and the appropriateness of all enrichment related impairments.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP staff collected water quality data in this Assabet River AU (MA82B-05) from 2011-2013 as part of the SMART monitoring program. Most of this data has already been discussed as part of the 2018/2020 IR (MassDEP 2021) but is being summarized here for the sake of completeness. Water quality data were collected at the USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard (Station W0697, on the border with the downstream AU). Among discrete dissolved oxygen (DO) data (n= 5/yr), the minimum DO was 7.4 mg/L. Discrete temperature measurements, collected during the summer index period (n= 1-2/yr), had a maximum of 25.6 °C. pH ranged from 6.6-8.0 S.U. (n= 5-6/yr). The Hudson WWTF at the upstream end of this AU was upgraded with enhanced nutrient treatment in 2009 but other facilities upstream of this AU did not have their upgrades completed until 2012 (Beaudoin 2017). Thus, total phosphorus seasonal average concentrations dropped from 2011-2013, with an average of 0.047 mg/L (n=3) in that last year. The maximum DO saturation was 104% in 2013, the maximum Total Ammonia Nitrogen was 0.050 mg/L (n=4) and there were no observations of excessive filamentous algae that year. The maximum chloride concentration was 160 mg/L (n= 4-6/yr) and the maximum specific conductance was 675 µs/cm (n= 5-6/yr). The Aquatic Life Use of this Assabet River AU (MA82B-05) will continue to be assessed as Not Supporting with all prior impairments (Algae, Curly-leaf Pondweed, Dissolved Oxygen, Eurasian Water Milfoil, Fanwort, Nutrient/Eutrophication Biological Indicators, “Phosphorus, Total,” Water Chestnut) being carried forward. With upgrades completed to the wastewater treatment facilities discharging to this AU and other upstream AUs, biological and water quality surveys should be conducted in riverine and impounded reaches of this AU to reevaluate total phosphorus concentrations and the appropriateness of all enrichment related impairments.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0697	MassDEP	Water Quality	Assabet River	[at USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard]	42.432064	-71.449741

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0697	01/19/11	11/16/11	5	7.4	11.6	0	0	0
W0697	02/22/12	10/24/12	5	8	10.7	0	0	0
W0697	01/28/13	09/25/13	5	8	11.2	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0697	01/19/11	11/16/11	6	1	25.6	11.5	1	1	0	0
W0697	02/22/12	10/24/12	5	2	23.6	14.8	2	2	0	0
W0697	01/28/13	09/25/13	5	1	23.5	12.2	1	1	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W0697	01/19/11	11/16/11	6	6.6	7.6	0	0
W0697	02/22/12	10/24/12	5	7.4	8	0	0
W0697	01/28/13	09/25/13	5	7	7.9	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0697	2011	3	0.062	0.082	0.073	--	--	105.6	7.6	3	0
W0697	2012	2	0.063	0.071	0.067	--	--	115.8	8.0	5	4
W0697	2013	3	0.041	0.051	0.047	--	--	104.4	7.9	5	0

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

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0697	2011	6	0.020	0.320	0.105	0	0
W0697	2012	5	0.020	0.060	0.032	0	0
W0697	2013	4	0.020	0.050	0.033	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W0697	2011	6	84	160	117	0	0
W0697	2012	5	93	140	107	0	0
W0697	2013	4	120	160	133	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6)

(MassDEP Undated 4)

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
W0697	01/19/11	11/16/11	6	332	675	0	0	0	0	0	0
W0697	02/22/12	10/24/12	5	409	605	0	0	0	0	0	0
W0697	01/28/13	09/25/13	5	463	673	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in this Assabet River AU (MA82B-05) and there is no site-specific advisory, so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff surveyed one station W0697 (at USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard) in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). Observations at this site included dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4).</p> <p>The Aesthetics use for this Assabet River AU (MA82B-05) will continue to be assessed as Not Supporting with all prior impairments (Algae, Debris, Nutrient/Eutrophication Biological Indicators, Odor, Trash) being carried forward. With enhanced nutrient treatment upgrades completed in 2012 to the wastewater treatment facilities discharging to this AU and other upstream AUs (Beaudoin 2017), biological and water quality surveys should be conducted in riverine and impounded reaches of this AU to reevaluate the appropriateness of all enrichment related impairments.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0697	MassDEP	Water Quality	Assabet River	[at USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard]	42.432064	-71.449741

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0697	Assabet River	2011	6	The Aesthetics use for this Assabet River AU (MA82B-05) continues to be assessed as Not Supporting based on observations by MassDEP staff during field surveys at station W0697 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). These include observations of dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4).
W0697	Assabet River	2012	5	The Aesthetics use for this Assabet River AU (MA82B-05) continues to be assessed as Not Supporting based on observations by MassDEP staff during field surveys at station W0697 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). These include observations of dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4).

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0697	Assabet River	2013	5	The Aesthetics use for this Assabet River AU (MA82B-05) continues to be assessed as Not Supporting based on observations by MassDEP staff during field surveys at station W0697 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). These include observations of dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4).

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W0697	2011	6	3	0
W0697	2012	5	5	4
W0697	2013	5	5	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0697	Assabet River	2011	Color	Light Yellow/Tan	1	6
W0697	Assabet River	2011	Color	None	2	6
W0697	Assabet River	2011	Color	Reddish	2	6
W0697	Assabet River	2011	Color	Unobservable	1	6
W0697	Assabet River	2011	Objectionable Deposits	Unobservable	4	6
W0697	Assabet River	2011	Objectionable Deposits	Yes	2	6
W0697	Assabet River	2011	Odor	Effluent (Treated)	1	6
W0697	Assabet River	2011	Odor	Musty (Basement)	2	6
W0697	Assabet River	2011	Odor	None	2	6
W0697	Assabet River	2011	Odor	Other	1	6
W0697	Assabet River	2011	Scum	Yes	6	6
W0697	Assabet River	2011	Turbidity	Moderately Turbid	1	6
W0697	Assabet River	2011	Turbidity	None	2	6
W0697	Assabet River	2011	Turbidity	Unobservable	3	6
W0697	Assabet River	2012	Color	Light Yellow/Tan	2	5
W0697	Assabet River	2012	Color	None	2	5
W0697	Assabet River	2012	Color	Reddish	1	5
W0697	Assabet River	2012	Objectionable Deposits	Unobservable	4	5
W0697	Assabet River	2012	Objectionable Deposits	Yes	1	5
W0697	Assabet River	2012	Odor	Musty (Basement)	1	5
W0697	Assabet River	2012	Odor	None	2	5
W0697	Assabet River	2012	Odor	Other	2	5
W0697	Assabet River	2012	Scum	No	2	5
W0697	Assabet River	2012	Scum	Yes	3	5
W0697	Assabet River	2012	Turbidity	Moderately Turbid	1	5
W0697	Assabet River	2012	Turbidity	None	2	5

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0697	Assabet River	2012	Turbidity	Slightly Turbid	1	5
W0697	Assabet River	2012	Turbidity	Unobservable	1	5
W0697	Assabet River	2013	Color	None	5	5
W0697	Assabet River	2013	Objectionable Deposits	Unobservable	1	5
W0697	Assabet River	2013	Objectionable Deposits	Yes	4	5
W0697	Assabet River	2013	Odor	None	4	5
W0697	Assabet River	2013	Odor	Other	1	5
W0697	Assabet River	2013	Scum	No	2	5
W0697	Assabet River	2013	Scum	Yes	3	5
W0697	Assabet River	2013	Turbidity	None	5	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted field surveys in this Assabet River AU (MA82B-05), at the downstream border of the AU, at station W0697 (USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard) during 2011 (n=6), 2012 (n=5), and 2013 (n=5). Observations included notes of dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4). <i>E. coli</i> bacteria samples were also collected each year (n= 3/season) during the recreational season (Apr 1 – Oct 31) but only the 2013 data were of sufficient frequency to evaluate. Analysis of this low frequency data indicated that 100% of intervals had GMs >126 cfu/100mL and one sample exceeded the 410 cfu/100mL STV. The seasonal GM was 201 cfu/100mL that year. Staff/volunteers from the OARS watershed association collected <i>E. coli</i> samples nearby (at their OARS_OARS-ABT-077 station) in 2019 and 2020. Analysis of this high frequency data (n= 15/season) indicated that 33% and 100% of intervals, respectively, had GMs >126 cfu/100mL and cumulatively, 67% of intervals had GMs exceeding the criterion. However, >10% of samples (13%) exceeded the 410 cfu/100mL STV only in 2020.</p> <p>The Primary Contact Recreational Use of this Assabet River AU (MA82B-05) will continue to be assessed as Not Supporting with all prior impairments (Algae, Debris, Escherichia Coli (<i>E. Coli</i>), Fecal Coliform, Nutrient/Eutrophication Biological Indicators, Odor, Trash) being carried forward (the OARS 2019 and 2020 data corroborate the appropriateness of the <i>E. coli</i> impairment). Since enhanced nutrient treatment upgrades were completed in 2012 to the wastewater treatment facilities discharging to this AU and other upstream AUs (Beaudoin 2017), biological and water quality surveys should be conducted in riverine and impounded reaches of this AU to reevaluate the appropriateness of all enrichment related impairments.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0697	MassDEP	Water Quality	Assabet River	[at USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard]	42.432064	-71.449741
OARS_OARS-ABT-077	OARS	Water Quality	Assabet River	Rte 27/USGS, Maynard	42.432356	-71.449407

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)

[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
W0697	MassDEP	E. coli	05/17/11	09/21/11	3	178	613	406
W0697	MassDEP	E. coli	04/11/12	10/24/12	3	488	687	568
W0697	MassDEP	E. coli	05/20/13	09/25/13	3	48	435	201
OARS_OARS-ABT-077	OARS	E. coli	06/17/19	09/23/19	15	72	280	121
OARS_OARS-ABT-077	OARS	E. coli	06/08/20	09/14/20	15	100	2640	289

W0697 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

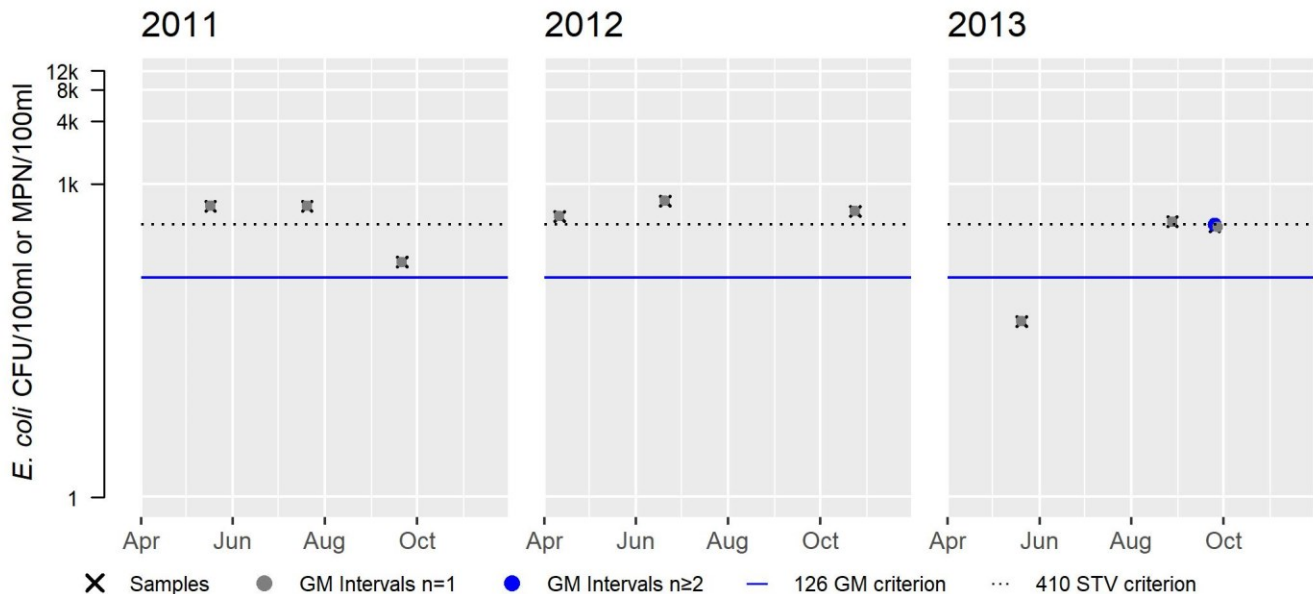
Var	Res
Samples	3
SeasGM	406
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	2
%n>STV	67

Var	Res
Samples	3
SeasGM	568
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	3
%n>STV	100

Var	Res
Samples	3
SeasGM	201
#GMI	1
#GMI Ex	1
%GMI Ex	100
n>STV	1
%n>STV	33

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

Variable	Cumulative %GMI Ex (all years)
Result	100



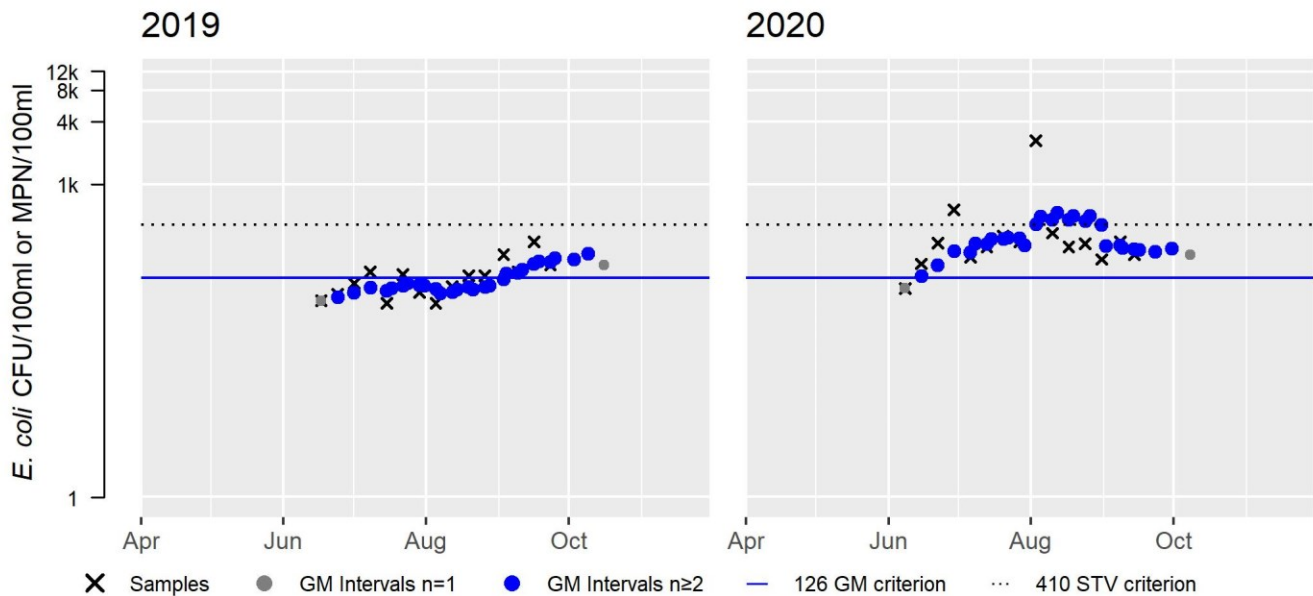
OARS_OARS-ABT-077 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	121
#GMI	27
#GMI Ex	9
%GMI Ex	33
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	289
#GMI	27
#GMI Ex	27
%GMI Ex	100
n>STV	2
%n>STV	13

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

Variable	Cumulative %GMI Ex (all years)
Result	67



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP field crews conducted field surveys in this Assabet River AU (MA82B-05), at the downstream border of the AU, at station W0697 (USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard) during 2011 (n=6), 2012 (n=5), and 2013 (n=5). Observations included notes of dense/very dense filamentous algae (n=3) in 2012, and objectionable deposits (minor amounts of trash) observed in 2011 (n=2) and 2013 (n=4). *E. coli* bacteria samples were also collected each year (n= 6/4/5 in 2011/2012/2013) but the data were not of sufficient frequency to evaluate. Staff/volunteers from the OARS watershed association collected *E. coli* samples nearby (at their OARS_OARS-ABT-077 station) in 2019 and 2020. Analysis of this high frequency data (n= 15/yr) indicated that none of the intervals had GMs >630 cfu/100mL and only 7% of samples (i.e., 1 sample) exceeded the 1260 cfu/100mL STV in 2020. The Secondary Contact Recreational Use of this Assabet River AU (MA82B-05) will continue to be assessed as Not Supporting with the prior Algae, Debris, Nutrient/Eutrophication Biological Indicators, Odor, and Trash impairments being carried forward. The Escherichia Coli (*E. Coli*) impairment is being removed based on OAR's recent (2019 and 2020) *E. coli* results that did not exceed the use attainment impairment thresholds for multi-year high frequency data collected at the downstream end of the AU (the original impairment was based on 1985 data collected ~1 mile upstream (MassDEP 2002)). With enhanced nutrient treatment upgrades being completed in 2012 to the wastewater treatment facilities discharging to this AU and other upstream AUs (Beaudoin 2017), biological and water quality surveys should be conducted in riverine and impounded reaches of this AU to reevaluate the appropriateness of all enrichment related impairments.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0697	MassDEP	Water Quality	Assabet River	[at USGS flow gaging station #01097000 near the Route 27/62 bridge, Maynard]	42.432064	-71.449741
OARS_OARS-ABT-077	OARS	Water Quality	Assabet River	Rte 27/USGS, Maynard	42.432356	-71.449407

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)

[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)
W0697	MassDEP	<i>E. coli</i>	01/19/11	11/16/11	6	105	613	246
W0697	MassDEP	<i>E. coli</i>	02/22/12	10/24/12	4	49	687	308
W0697	MassDEP	<i>E. coli</i>	01/28/13	09/25/13	5	36	435	117
OARS_OARS-ABT-077	OARS	<i>E. coli</i>	06/17/19	09/23/19	15	72	280	121
OARS_OARS-ABT-077	OARS	<i>E. coli</i>	06/08/20	09/14/20	15	100	2640	289

W0697 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

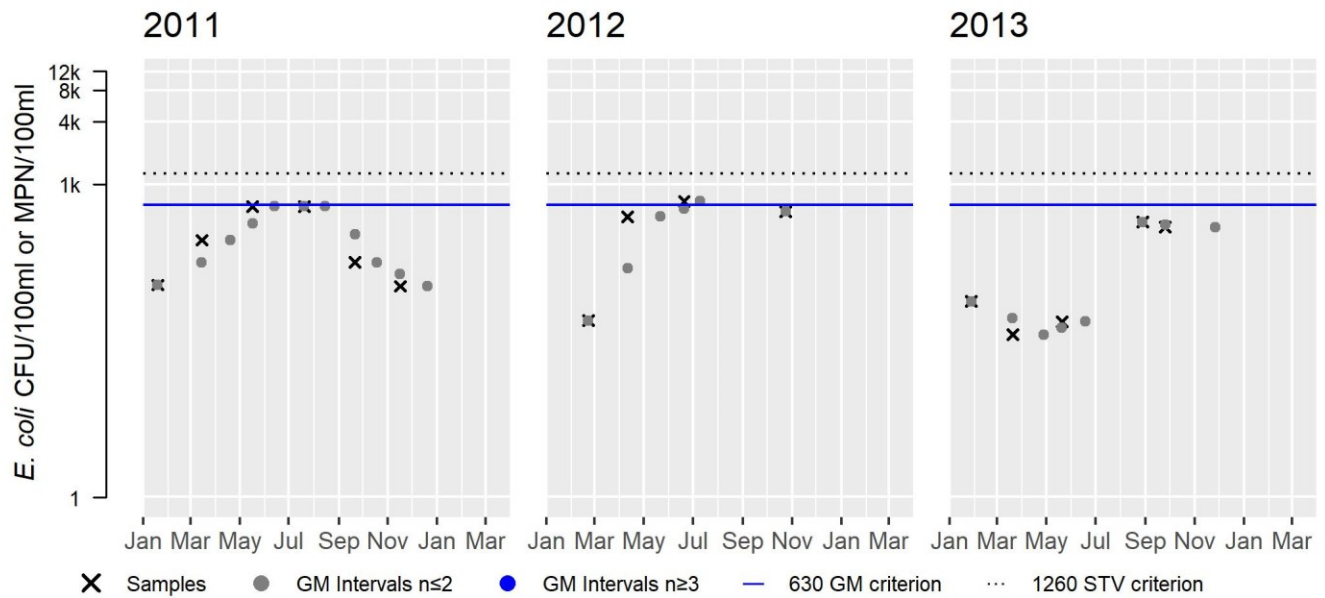
Var	Res
Samples	6
SeasGM	246
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	4
SeasGM	308
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	117
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0



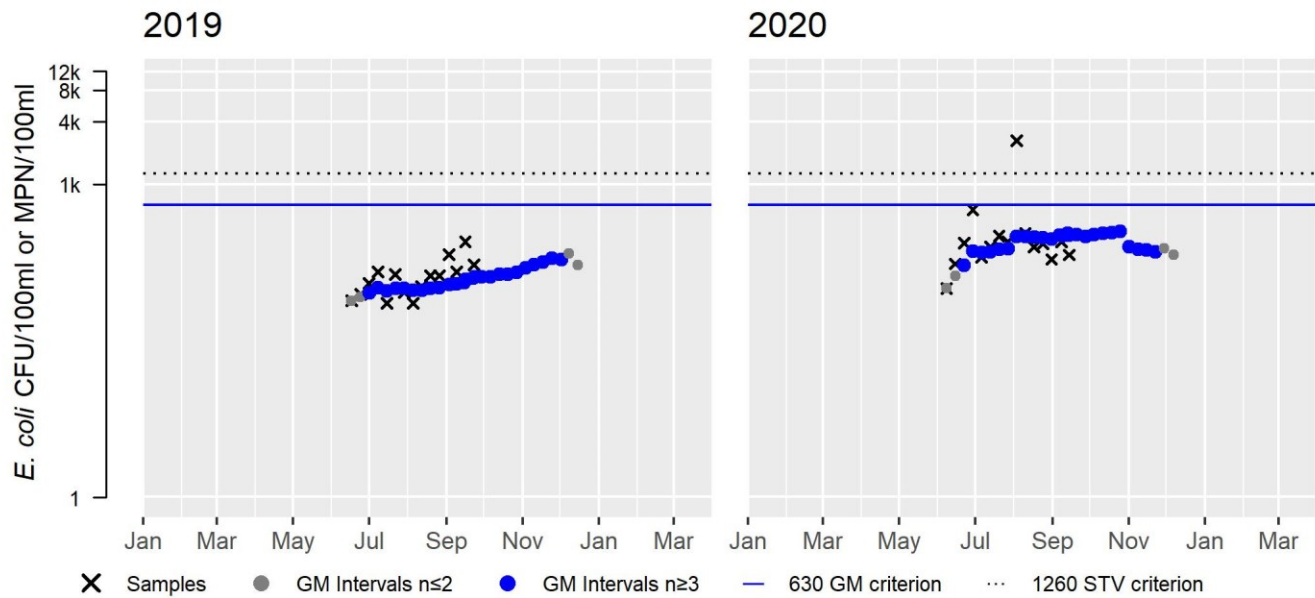
OARS_OARS-ABT-077 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	121
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	289
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	7

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

Variable	Cumulative %GMI Ex (all years)
Result	0



Assabet River (MA82B-06)

Location:	From the USGS gage (#01097000) at Routes 27/62, Maynard to the Powdermill Dam (NATID: MA00128), Acton.
AU Type:	RIVER
AU Size:	1.2 MILES
Classification/Qualifier:	B: WWF

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Fanwort*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Dissolved Oxygen	35108	Unchanged
5	5	Escherichia Coli (E. Coli)		Added
5	5	Other Organics		Unchanged
5	5	Unspecified Metals in Sediment		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Dissolved Oxygen	Internal Nutrient Recycling (Y)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Other Organics	Source Unknown (N)	X				
Unspecified Metals in Sediment	Municipal Point Source Discharges (Y)	X				
Unspecified Metals in Sediment	Source Unknown (N)	X				

Recommendations

2022 Recommendations
REC: Conduct water quality sampling in this Assabet River AU (MA82B-06), particularly bacterial sampling of adequate frequency to allow reevaluation of the 2022 <i>E. coli</i> impairment extrapolated from the upstream AU.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary

The Aquatic Life Use will continue to be assessed as Not Supporting for this Assabet River AU (MA82B-06) with all prior impairments (Curly-leaf Pondweed, Fanwort, Water Chestnut, Dissolved Oxygen, Other Organics, and Unspecified Metals in Sediment) being carried forward.

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no recent fish toxics sampling data available for this Assabet River AU (MA82B-06) and a site-specific advisory has not been issued, so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
The Aesthetics Use for this Assabet River AU (MA82B-06) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>OARS staff/volunteers collected high frequency <i>E. coli</i> bacteria data at station OARS-ABT-077 (Rt 27/USGS, Maynard) on the border between the Assabet River AU MA82B-05 and this MA82B-06 AU during summers 2019 and 2020. Analysis of this high frequency data (n= 15/season) indicated that 33% and 100% of intervals, respectively, had GMs >126 cfu/100mL, and cumulatively, 67% of intervals had GMs exceeding the criterion. However, more than 10% of samples (13%) exceeded the 410 cfu/100mL STV only in 2020. Although these bacteria data were collected at the upstream border of the MA82B-06 AU they can be used to extrapolate an impairment of the Primary Contact Recreational Use from the upstream AU to this short (~1 mile in length) downstream MA82B-06 AU. Also, historical <i>E. coli</i> data collected by MassDEP in summer 2006 a short distance downstream into the MA82B-07 AU (Station W1479, at the first Rt 62 bridge crossing below the "Powdermill Dam," Acton) indicated elevated bacteria levels (geometric mean 708 cfu/100mL) (MassDEP Undated 5).</p> <p>The Primary Contact Recreational Use for this Assabet River AU (MA82B-06), is assessed as Not Supporting and an Escherichia Coli (<i>E. Coli</i>) impairment is being added.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-ABT-077	OARS	Water Quality	Assabet River	Rte 27/USGS, Maynard	42.432356	-71.449407

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)
 [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
OARS_OARS-ABT-077	OARS	E. coli	06/17/19	09/23/19	15	72	280	121
OARS_OARS-ABT-077	OARS	E. coli	06/08/20	09/14/20	15	100	2640	289

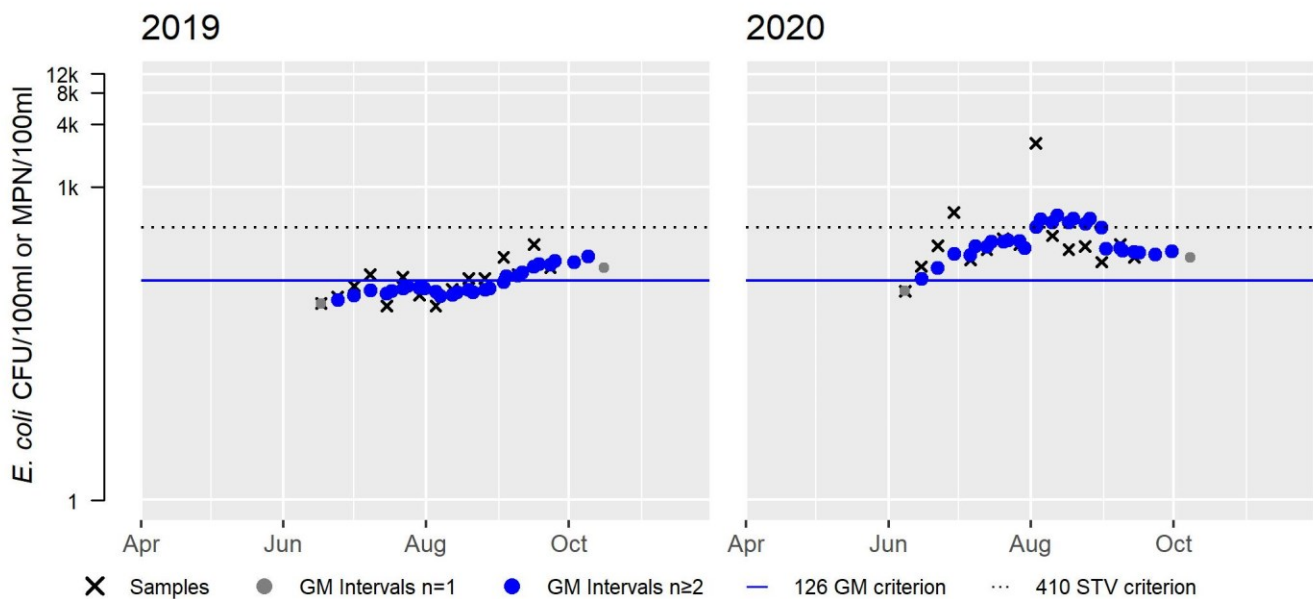
OARS_OARS-ABT-077 E. coli (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	121
#GMI	27
#GMI Ex	9
%GMI Ex	33
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	289
#GMI	27
#GMI Ex	27
%GMI Ex	100
n>STV	2
%n>STV	13

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

Variable	Cumulative %GMI Ex (all years)
Result	67



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

OARS staff/volunteers collected high frequency *E. coli* bacteria data at station OARS-ABT-077 (Rt 27/USGS, Maynard) on the border between the Assabet River AU MA82B-05 and this MA82B-06 AU during summers 2019 and 2020. Analysis of this high frequency data (n= 15/yr) indicated that none of the intervals had GMs >630 cfu/100mL and only 7% of samples (i.e., 1 sample) exceeded the 1260 cfu/100mL STV in 2020.

The Secondary Contact Recreational Use of this Assabet River AU (MA82B-06) is assessed as Fully Supporting based on the OARS 2019 and 2020 *E. coli* data.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-ABT-077	OARS	Water Quality	Assabet River	Rte 27/USGS, Maynard	42.432356	-71.449407

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)

[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)
OARS_OARS-ABT-077	OARS	E. coli	06/17/19	09/23/19	15	72	280	121
OARS_OARS-ABT-077	OARS	E. coli	06/08/20	09/14/20	15	100	2640	289

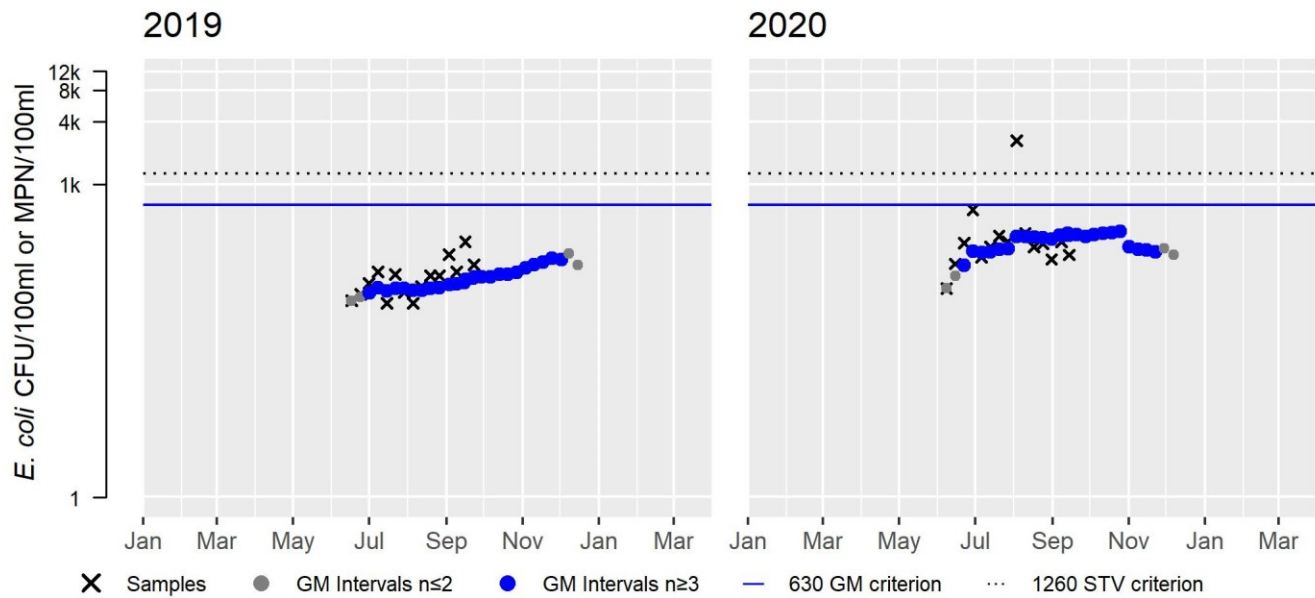
OARS_OARS-ABT-077 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	121
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	289
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	7

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

Variable	Cumulative %GMI Ex (all years)
Result	0



Assabet River (MA82B-07)

Location:	From the Powdermill Dam (NATID: MA00128), Acton to mouth at confluence with the Sudbury River (forming headwaters Concord River), Concord.
AU Type:	RIVER
AU Size:	6.4 MILES
Classification/Qualifier:	B: WWF

For the 2022 Integrated Reporting cycle, the category, use attainments, impairments, associated actions, and sources remain unchanged for Assabet River (MA82B-07) from the previous IR reporting cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
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
Escherichia Coli (E. Coli)	Source Unknown (N)				X	X
Fecal Coliform	Source Unknown (N)				X	

Assabet River Reservoir (MA82004)

Location:	Westborough.
AU Type:	FRESHWATER LAKE
AU Size:	355 ACRES
Classification/Qualifier:	B

No usable data were available for Assabet River Reservoir (MA82004) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Dissolved Oxygen Supersaturation		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
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X		X	X	X
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Source Unknown (N)	X		X	X	X
Dissolved Oxygen	Source Unknown (N)	X				
Dissolved Oxygen Supersaturation	Source Unknown (N)	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	X

Bartlett Pond (MA82007)

Location:	Northborough.
AU Type:	FRESHWATER LAKE
AU Size:	52 ACRES
Classification/Qualifier:	B

No usable data were available for Bartlett Pond (MA82007) 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	(Curly-leaf Pondweed*)		Unchanged
4c	4c	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
4c	4c	(Fanwort*)		Unchanged
4c	4c	(Water Chestnut*)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

Batemans Pond (MA82008)

Location:	Concord.
AU Type:	FRESHWATER LAKE
AU Size:	25 ACRES
Classification/Qualifier:	B

No usable data were available for Batemans Pond (MA82008) 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) (Y)	X				

Beaver Brook (MA82A-34)

Location:	Headwaters south at Rack Road, Chelmsford to mouth at confluence with River Meadow Brook, Chelmsford.
AU Type:	RIVER
AU Size:	6.3 MILES
Classification/Qualifier:	B

No usable data were available for Beaver Brook (MA82A-34) 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	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
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Boons Pond (MA82011)

Location:	Stow/Hudson.
AU Type:	FRESHWATER LAKE
AU Size:	174 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4a	4a	(Fanwort*)		Unchanged
4a	4a	(Non-Native Aquatic Plants*)		Unchanged
4a	4a	Algae	2353	Unchanged
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
(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		X	X	X
Algae	Discharges from Municipal Separate Storm Sewer Systems (MS4) (Y)	X		X	X	X
Algae	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) (Y)	X		X	X	X
Algae	Rural (Residential Areas) (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		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	YES
2022 Use Attainment Summary	
<p>C-HAB postings for Boons Pond (MA82011; called Lake Boone by MassDPH) were reported to MassDPH for an estimated 11 days in 2019 (according to Town of Stow personnel, the 2019 Aug 23 advisory was not formally lifted since it became too cold for swimming (Gendron July 8, 2021); Sept 2, the date of Labor Day in 2019, was used to calculate the estimated bloom duration). Since no blooms of extended duration (>20 days) were reported, an impairment decision should not be made at this time.</p> <p>The Aquatic Life Use of Boons Pond (MA82011) remains assessed as Not Supporting with all prior impairments (Algae, Fanwort, Non-Native Aquatic Plants) being carried forward. Also, an Alert is being identified due to the C-HABs bloom in 2019.</p>	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Recent fish toxics sampling has not been conducted in Boons Pond (MA82011; called Lake Boone by MassDPH), so the Fish Consumption Use will remain assessed as Not Supporting with the Mercury in Fish Tissue impairment being carried forward. The MassDPH fish advisory recommends that <i>“Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any of the affected fish species (largemouth bass, black crappie) from this water body.”</i> Additionally, the <i>“general public should limit consumption of affected fish species (largemouth bass, black crappie) to two meals per month”</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
C-HAB postings for Boons Pond (MA82011; called Lake Boone by MassDPH) were reported to MassDPH for an estimated 11 days in 2019 (according to Town of Stow personnel, the 2019 Aug 23 advisory was not formally lifted since it became too cold for swimming (Gendron July 8, 2021); Sept 2, the date of Labor Day in 2019, was used to calculate the estimated bloom duration). Since no blooms of extended duration (>20 days) were reported, an impairment decision should not be made at this time. The Aesthetics Use of Boons Pond (MA82011) remains assessed as Not Supporting with prior impairments (Algae, Non-Native Aquatic Plants) being carried forward. Also, an Alert is being identified due to the C-HABs bloom in 2019.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Lake Boone (MA82011) were reported to MassDPH for an estimated 11 days in 2019 (according to Town of Stow personnel, the 2019 Aug 23 advisory was not formally lifted since it became too cold for swimming (Gendron July 8, 2021); Sept 2, the date of Labor Day in 2019, was used to calculate the estimated bloom duration). Since no blooms of extended duration (>20 days) were reported, 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
Lake Boone	Not issued or confirmed by sampling					11	0	no

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

C-HAB postings for Boons Pond (MA82011; called Lake Boone by MassDPH) were reported to MassDPH for an estimated 11 days in 2019 (according to Town of Stow personnel, the 2019 Aug 23 advisory was not formally lifted since it became too cold for swimming (Gendron July 8, 2021); Sept 2, the date of Labor Day in 2019, was used to calculate the estimated bloom duration). Since no blooms of extended duration (>20 days) were reported, an impairment decision should not be made at this time.

The Primary Contact Recreational Use of Boons Pond (MA82011) remains assessed as Not Supporting with prior impairments (Algae, Non-Native Aquatic Plants) being carried forward. Also, an Alert is being identified due to the C-HABs bloom in 2019.

Secondary Contact Recreation

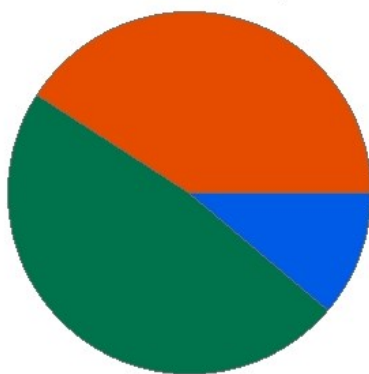
2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>C-HAB postings for Boons Pond (MA82011; called Lake Boone by MassDPH) were reported to MassDPH for an estimated 11 days in 2019 (according to Town of Stow personnel, the 2019 Aug 23 advisory was not formally lifted since it became too cold for swimming (Gendron July 8, 2021); Sept 2, the date of Labor Day in 2019, was used to calculate the estimated bloom duration). Since no blooms of extended duration (>20 days) were reported, an impairment decision should not be made at this time.</p>	
<p>The Secondary Contact Recreational Use of Boons Pond (MA82011) remains assessed as Not Supporting with prior impairments (Algae, Non-Native Aquatic Plants) being carried forward. Also, an Alert is being identified due to the C-HABs bloom in 2019.</p>	

Broad Meadow Brook (MA82A-39)

Location:	Headwaters east of Concord Road, Marlborough to mouth at inlet Sudbury Reservoir, Marlborough.
AU Type:	RIVER
AU Size:	1.2 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

Broad Meadow Brook - MA82A-39

Watershed Area: 0.94 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.94	0.94	0.29	0.29
Agriculture	0%	0%	0%	0%
Developed	40.9%	40.9%	34.3%	34.3%
Natural	47.9%	47.9%	43.9%	43.9%
Wetland	11.2%	11.2%	21.8%	21.8%
Impervious Cover	19.6%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Benthic Macroinvertebrates		Added
3	5	Dissolved Oxygen		Added
3	5	Escherichia Coli (E. Coli)		Added
3	5	Fish Bioassessments		Added

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

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in Broad Meadow Brook (MA82A-39) to track chloride trends.; OTHER: 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 the Broad Meadow Brook sub-watershed.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted fish (Sample ID 6361), benthic (Station B0919), and water quality (W2520) surveys in Broad Meadow Brook (MA82A-39) roughly 680 ft downstream/south of Rt 20, Marlborough during summer 2015. The small fish community sample (n=6), collected the end of June, included only golden shiners, a tolerant species. Field notes indicated that the sampled reach was “straight” and “channelized,” and that the bottom was “all soft sand” (MassDFG 2020). Similarly, the July benthic sample had an extremely low IBI score of 16, indicating that conditions were severely degraded for a low gradient location. A probe was deployed to measure DO for 85 days from July through the end of September. All 79 7DADMin for the DO measurements were <5.0 mg/L (minimum 7DADMin 0.2 mg/L) and most of the daily minima were <4.0 mg/L (note that all DO data had “i” and “r” qualifiers). Continuous temperature measurements were recorded over 70 days in the summer index period with a maximum temperature of 26.7 °C (good for a WWF). Other water quality indicators are summarized as follows and most were indicative of good conditions: pH ranged from 6.1-6.7 S.U. (with 2 of 3 measurements <6.5 S.U.), there was little indication of nutrient enrichment (seasonal TP average was 0.031 mg/L with n=5, maximum DO saturation was 70.3%, no observations of excessive filamentous algae; however, maximum DO diel shift was 12.0 mg/L), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), and the maximum Total Ammonia Nitrogen was 0.430 mg/L (n=5). Of five chloride samples, two had concentrations greater than the 230 mg/L chronic criterion (maximum 280 mg/L), and two of three specific conductance measurements were greater than 904 µs/cm, the chronic criterion for estimated chloride.</p> <p>The Aquatic Life Use of Broad Meadow Brook (MA82A-39) is assessed as Not Supporting. Impairments are being added for Fish Bioassessments, Benthic Macroinvertebrates, and Dissolved Oxygen based on the survey data collected during the summer of 2015. An Alert is also being identified for elevated chloride.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6361	MassDEP	Fish Community	Broad Meadow Brook	Behind bunker storage. From site 100m US., Marlborough	42.34770	-71.51794
B0919	MassDEP	Benthic	Broad Meadow Brook/	[approximately 210 meters downstream/south of Route 20, Marlborough, MA]	42.347696	-71.517940
W2520	MassDEP	Water Quality	Broad Meadow Brook	[approximately 680 feet downstream/south of Route 20, Marlborough]	42.347696	-71.517940

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0919	07/29/15	RBP multihab	Statewide_Low_Gradient	363	16	SD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: GS = Golden Shiner]

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
6361	06/30/15	BP	TP		1	6	0%	0	0%	0%	0	0%	Yes	No	GS,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	07/08/15	09/30/15	85	79	56	0.2	0.2	0.2	12	79	82	21	21	79	80	56	56

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	08/11/15	10/01/15	3	1.7	4.6	1	1	1

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2520	07/08/15	09/15/15	70	67	24.1	26.7	23.7	21.3	37	1	3	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2520	07/07/15	09/15/15	71	3339	24.3	69	21	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	08/11/15	10/01/15	3	2	24.3	19.0	1	1	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2520	08/11/15	10/01/15	3	6.1	6.7	2	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)
MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	2015	5	0.02	0.040	0.031	12.0	4.3	70.3	6.7	4	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2520	2015	5	0.040	0.430	0.160	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2520	2015	5	120	280	196	2	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2520	08/11/15	10/01/15	3	427	948	2	0	0	0	1	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted, so the Fish Consumption Use of Broad Meadow Brook (MA82A-39) is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys (W2520) of Broad Meadow Brook (MA82A-39) roughly 680 ft downstream/south of Rt 20, Marlborough during summer 2015 (n=5). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews.</p> <p>The Aesthetics Use of Broad Meadow Brook (MA82A-39) is assessed as Fully Supporting based on the general lack of objectionable conditions noted by MassDEP staff at the site (W2520) sampled during the summer of 2015.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2520	MassDEP	Water Quality	Broad Meadow Brook	[approximately 680 feet downstream/south of Route 20, Marlborough]	42.347696	-71.517940

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2520	Broad Meadow Brook	2015	5	MassDEP aesthetics observations for station W2520/MAP2-680 on Broad Meadow 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2520	2015	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2520	Broad Meadow Brook	2015	Color	Light Yellow/Tan	2	5

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2520	Broad Meadow Brook	2015	Color	None	3	5
W2520	Broad Meadow Brook	2015	Objectionable Deposits	No	3	5
W2520	Broad Meadow Brook	2015	Objectionable Deposits	Yes	2	5
W2520	Broad Meadow Brook	2015	Odor	None	5	5
W2520	Broad Meadow Brook	2015	Scum	No	4	5
W2520	Broad Meadow Brook	2015	Scum	Yes	1	5
W2520	Broad Meadow Brook	2015	Turbidity	None	5	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys (W2520) of Broad Meadow Brook (MA82A-39) roughly 680 ft downstream/south of Rt 20, Marlborough during summer 2015 (n=5). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews. <i>E. coli</i> bacteria samples were collected during these surveys and analysis of this low frequency dataset indicated that 100% of intervals had GMs >126 cfu/100mL. Additionally, four samples exceeded the 410 cfu/100mL STV and the seasonal GM was 766 cfu/100mL. The Primary Contact Recreational Use of Broad Meadow Brook (MA82A-39) is assessed as Not Supporting since the <i>E. coli</i> concentrations for the single year limited frequency dataset exceeded the use attainment impairment thresholds. An Escherichia Coli (<i>E. Coli</i>) impairment is being added.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2520	MassDEP	Water Quality	Broad Meadow Brook	[approximately 680 feet downstream/south of Route 20, Marlborough]	42.347696	-71.517940

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

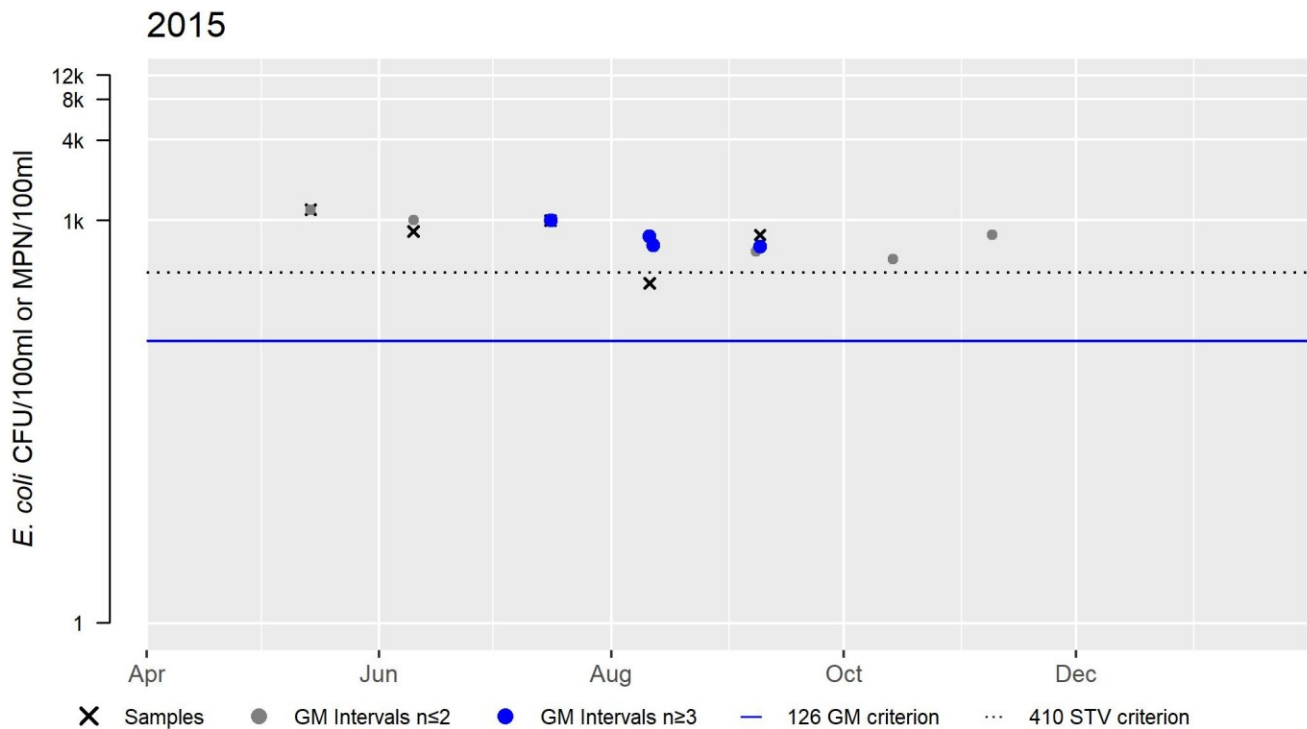
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2520	MassDEP	E. coli	05/14/15	09/09/15	5	340	1200	766

W2520 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	766
#GMI	4
#GMI Ex	4
%GMI Ex	100
n>STV	4
%n>STV	80

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



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys (W2520) of Broad Meadow Brook (MA82A-39) roughly 680 ft downstream/south of Rt 20, Marlborough during summer 2015 (n=5). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews. <i>E. coli</i> bacteria samples were collected during these surveys and analysis of this low frequency dataset indicated that 100% of intervals had GMs >630 cfu/100mL. None of the samples exceeded the 1260 cfu/100mL STV and the overall GM was 766 cfu/100mL.</p> <p>The Secondary Contact Recreational Use of Broad Meadow Brook (MA82A-39) is assessed as Not Supporting since the <i>E. coli</i> concentrations for the single year limited frequency dataset exceeded the use attainment impairment thresholds. An Escherichia Coli (<i>E. Coli</i>) impairment is being added.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2520	MassDEP	Water Quality	Broad Meadow Brook	[approximately 680 feet downstream/south of Route 20, Marlborough]	42.347696	-71.517940

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)**

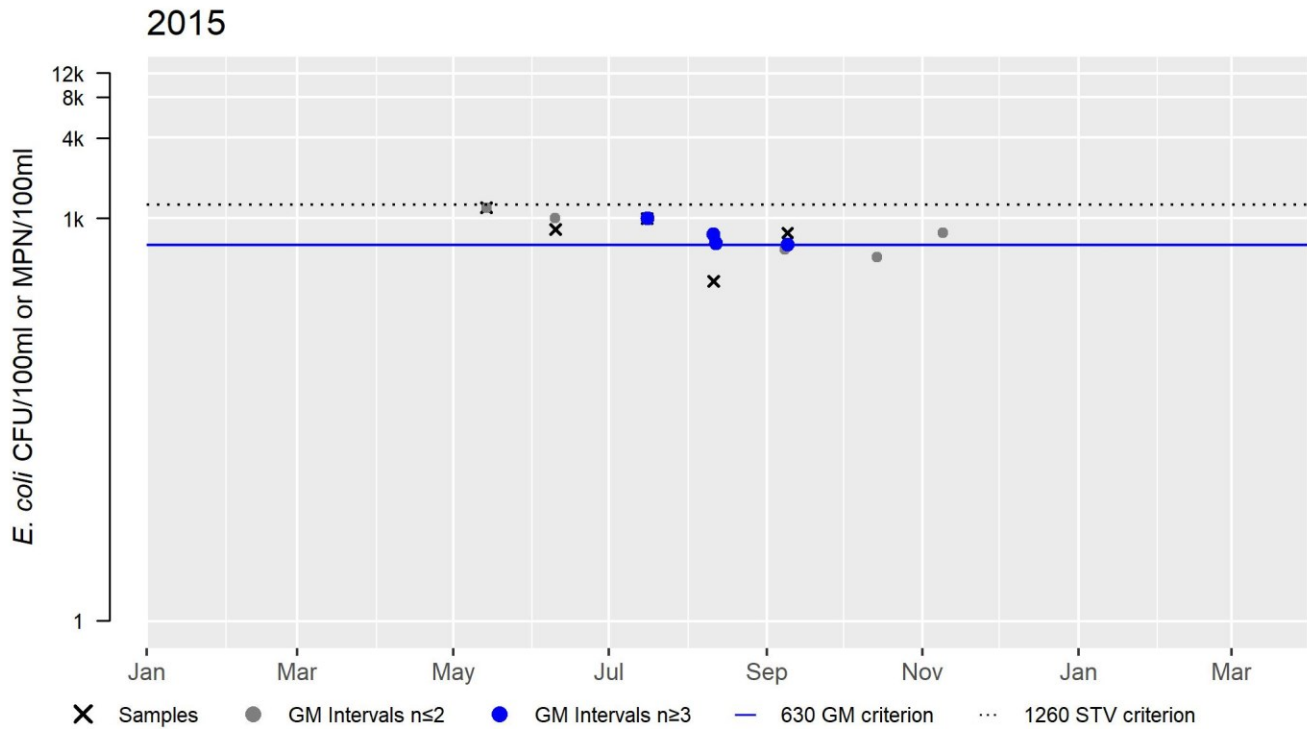
[Result units are CFU/100ml or MPN/100ml]

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)
W2520	MassDEP	E. coli	05/14/15	09/09/15	5	340	1200	766

W2520 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	766
#GMI	4
#GMI Ex	4
%GMI Ex	100
n>STV	0
%n>STV	0

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



Carding Mill Pond (MA82015)

Location:	Sudbury.
AU Type:	FRESHWATER LAKE
AU Size:	40 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Aquatic Plants (Macrophytes)*)		Changed
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
5	5	Phosphorus, Total		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Aquatic Plants (Macrophytes)*)	Municipal Point Source Discharges (Y)			X	X	X
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Municipal Point Source Discharges (Y)			X	X	X
Dissolved Oxygen Supersaturation	Municipal Point Source Discharges (Y)	X				
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Aquatic Plants (Macrophytes)	Not caused by a pollutant (4c)	<p>As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Carding Mill Pond (MA82015) was first listed as impaired for Noxious Aquatic Plants in 1992 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). Although the original data triggering the impairment could not be located, during an August 1996 synoptic survey conducted by MassDEP staff it was noted that at least the lower half of the pond was 100% covered with very dense aquatic plants, including likely the non-rooted, floating species, <i>Lemna</i> sp. as well as filamentous green algae (MassDEP 1996, MassDEP 2002). In Google Earth images from September 2014 and June 2015, more than half of the pond is covered in dense vegetation (Google Earth Pro Undated).</p> <p>Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of a non-rooted, floating, aquatic macrophyte species (<i>Lemna</i> sp.). Additionally, Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years. Note: Carding Mill Pond will remain an impaired lake segment for the 2022 cycle. However, it is very shallow (1.2 m at deep hole), according to data collected in 1979 (MassDEQE 1980), and likely should not be represented as a lake segment (From 314 CMR 4.0 Definition for Lakes and Ponds --waterbodies having open water, situated in a topographical depression, generally with a maximum depth of greater than two meters). The topic of lake vs. wetland will require a structured evaluation procedure likely to be developed as part of a future CALM guidance manual.</p>

Aquatic Plants (Macrophytes)

1979 Concord and Sudbury River Basin Survey Data (MassDEQE 1980):

This is the background image for an Adobe Acrobat Capture
OCR page with image plus hidden text.

SUDBURY

BATHYMETRIC MAP AND LOCATION OF SAMPLING STATIONS

45 ACRES

△ SAMPLING STATION LOCATION



FIGURE 24

TABLE 41
CARDING MILLPOND
1979 MORPHOMETRIC DATA

Maximum Length	2,390 feet
Maximum Effective Length	2,080 feet
Maximum Width	1,200 feet
Maximum Effective Width	1,120 feet
Maximum Depth	4 feet
Mean Depth	1.7 feet
Mean Width	820 feet
Area	45 acres
Volume	75 acre feet
Shoreline	7,392 feet (1.4 miles)
Development of Shoreline	1.5
Development of Volume	1.3
Mean to Maximum Depth Ratio	.04
Drainage Area	896 acres (1.4 sq. mile)

1998 WBS Coding Sheet (MassDEP 2002):

WBID: MA 82015 WATERSHED: Concord
 NAME: Carding Mill Pond TYPE: Lake/Pond
 CODE: SIZE: 40.0 acres
 CLASS: B/
 ORW?: Yes or No
 Water Supply?: Yes or No

LATITUDE:
 LONGITUDE:
 Lake/Pond Name:
 Ecoregion Name:
 Description: Carding Mill Pond, Sudbury

Assessment Date: 9706 / Begin Sampling: 9608 Water Quality Limited?: YES or NO
 Cycle: 96298 / End Sampling: 9608 303(d) List?: YES or NO

Lake Specific Information
 Significantly Publicly Owned: 1996
 Trophic Status: Y or N
 Trophic Trend: O M E H D U
 Acidity/Toxics Trend: I S D U
 Acidity Effects: I V N U

Uses	Support	Threat	Partial	Non-Sup	Not-Asses	Not-Attain
OVERALL USE SUPPORT				40.0 /		
ALUS					40.0 /	
FISH CONSUMPTION					40.0 /	
PRIMARY CONTACT				40.0 /		
SECONDARY CONTACT				40.0 /		
Aesthetics				40.0 /		
ALUS Bio						
ALUS Chem/Phys						
ALUS Toxicity						

Nonattainment Causes
 Code Size Magnitude
 2200 40.0 H

Nonattainment Sources
 Code Size Magnitude
 0200 40.0 H

Assessment Type
 1996 Assessment Category = > M E NA
 R35

Media/Pollutants Assessed
 1996 Toxics Monitoring = > YES or NO

Comments:
 1998: 26 August 1996 synoptic survey indicated pond entirely covered with very dense floating leaf plants and algae.

1996 Synoptic Survey Field Sheet (MassDEP 1996):

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Lake/Pond Carding Mill Pond Date 26 Aug 96Town/City Sudbury Observers Halterman/McVoyRiver Basin SuAs CoUSGS Topo Maynard PALIS NO. 82015

Location/type of access (be specific, e.g., public boat ramp at
 At a distance from west cove area off Simpson Street):
 private around pond Dutton Rd - only lower end visible; all

Ownership of Location/Access (specify public or private, name of
 owner(s), and any use restrictions):
 Private

Posted signs (re aquatic plants, fish advisories, access, etc.):
 No Trespassing

Water quality observations (clarity, dissolved organic
 staining, blooms, et cetera):
 N/A

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

likely Lemna + Hydrodictyon (fil. green algae)

Observed aquatic plant density (at observation site and across lake or pond, if practicable):

100% v. dense at least lower 1/2 of pond

Other notes (e.g., overt pollution, construction, and water uses:

Trophic - Eutrophic

1^o Contact - 40 acres - Non-support2^o Contact - 40 " - " "

Aesthetics - 40 " - " "

Causes - 40.0 acres - Noxious plants

Note: record suspect M. heterophyllum plants that may require confirmation once emergent flowering stalks are evident.

Google Earth image of Carding Mill Pond while clear of vegetation, 12/31/2000 (Google Earth Pro Undated):



Google Earth image of Carding Mill Pond, 9/2014 (Google Earth Pro Undated):



Google Earth image of Carding Mill Pond, 6/2015 (Google Earth Pro Undated):



Recommendations

2022 Recommendations

Carding Mill Pond should be evaluated to determine whether it is a lake or a wetland once such an evaluation procedure has been developed as part of a future CALM guidance manual.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

Recent data are not available for Carding Mill Pond (MA82015), so the Aquatic Life Use of the pond continues to be assessed as Not Supporting, with all prior impairments (Curly-leaf Pondweed, Dissolved Oxygen Supersaturation, Nutrient/Eutrophication Biological Indicators, "Phosphorus, Total", Water Chestnut) being carried forward.

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Carding Mill Pond (MA82015), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Carding Mill Pond (MA82015) was first listed as impaired for Noxious Aquatic Plants in 1992 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). Although the original data triggering the impairment could not be located, during an August 1996 synoptic survey conducted by MassDEP staff it was noted that at least the lower half of the pond was 100% covered with very dense aquatic plants, including likely the non-rooted, floating species, <i>Lemna</i> sp. as well as filamentous green algae (MassDEP 1996, MassDEP 2002). In Google Earth images from September 2014 and June 2015, more than half of the pond is covered in dense vegetation (Google Earth Pro Undated).</p> <p>The Aesthetics Use of Carding Mill Pond (MA82015) is assessed as Not Supporting, with the prior Algae impairment being carried forward. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of a non-rooted, floating, aquatic macrophyte species (<i>Lemna</i> sp.). Additionally, Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years. Note: Carding Mill Pond will remain an impaired lake segment for the 2022 cycle. However, it is very shallow (1.2 m at deep hole), according to data collected in 1979 (MassDEQ 1980), and likely should not be represented as a lake segment (From 314 CMR 4.0 Definition for Lakes and Ponds --waterbodies having open water, situated in a topographical depression, generally with a maximum depth of greater than two meters). The topic of lake vs. wetland will require a structured evaluation procedure likely to be developed as part of a future CALM guidance manual.</p>	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Carding Mill Pond (MA82015) was first listed as impaired for Noxious Aquatic Plants in 1992 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). Although the original data triggering the impairment could not be located, during an August 1996 synoptic survey conducted by MassDEP staff it was noted that at least the lower half of the pond was 100% covered with very dense aquatic plants, including likely the non-rooted, floating species, *Lemna* sp. as well as filamentous green algae (MassDEP 1996, MassDEP 2002). In Google Earth images from September 2014 and June 2015, more than half of the pond is covered in dense vegetation (Google Earth Pro Undated).

The Primary Contact Recreational Use of Carding Mill Pond (MA82015) is assessed as Not Supporting, with the prior Algae impairment being carried forward. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of a non-rooted, floating, aquatic macrophyte species (*Lemna* sp.). Additionally, Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years. Note: Carding Mill Pond will remain an impaired lake segment for the 2022 cycle. However, it is very shallow (1.2 m at deep hole), according to data collected in 1979 (MassDEQE 1980), and likely should not be represented as a lake segment (From 314 CMR 4.0 Definition for Lakes and Ponds --waterbodies having open water, situated in a topographical depression, generally with a maximum depth of greater than two meters). The topic of lake vs. wetland will require a structured evaluation procedure likely to be developed as part of a future CALM guidance manual.

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Carding Mill Pond (MA82015) was first listed as impaired for Noxious Aquatic Plants in 1992 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). Although the original data triggering the impairment could not be located, during an August 1996 synoptic survey conducted by MassDEP staff it was noted that at least the lower half of the pond was 100% covered with very dense aquatic plants, including likely the non-rooted, floating species, <i>Lemna</i> sp. as well as filamentous green algae (MassDEP 1996, MassDEP 2002). In Google Earth images from September 2014 and June 2015, more than half of the pond is covered in dense vegetation (Google Earth Pro Undated).</p> <p>The Secondary Contact Recreational Use of Carding Mill Pond (MA82015) is assessed as Not Supporting, with the prior Algae impairment being carried forward. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of a non-rooted, floating, aquatic macrophyte species (<i>Lemna</i> sp.). Additionally, Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years. Note: Carding Mill Pond will remain an impaired lake segment for the 2022 cycle. However, it is very shallow (1.2 m at deep hole), according to data collected in 1979 (MassDEQE 1980), and likely should not be represented as a lake segment (From 314 CMR 4.0 Definition for Lakes and Ponds --waterbodies having open water, situated in a topographical depression, generally with a maximum depth of greater than two meters). The topic of lake vs. wetland will require a structured evaluation procedure likely to be developed as part of a future CALM guidance manual.</p>	

Cedar Swamp Pond (MA82016)

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

No usable data were available for Cedar Swamp Pond (MA82016) 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

Chauncy Lake (MA82017)

Location:	Westborough.
AU Type:	FRESHWATER LAKE
AU Size:	173 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
4c	5	Harmful Algal Blooms		Added

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				
Harmful Algal Blooms	Source Unknown (N)			X	X	X

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
C-HAB postings for Chauncy Lake (MA82017) were reported to MassDPH for 67 days in 2016, 53 days in 2017, and 11 days in 2019. Since no other recent data are available, the Aquatic Life Use of Chauncy Lake (MA82017) will remain assessed as Not Supporting with the prior Eurasian Water Milfoil impairment being carried forward. Additionally, an Alert for Harmful Algal Blooms is being added since blooms of extended duration (>20 days) were reported in multiple years.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in Chauncy Lake (MA82017) and a site-specific advisory has not been issued, so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

C-HAB postings for Chauncy Lake (MA82017) were reported to MassDPH for 67 days in 2016, 53 days in 2017, and 11 days in 2019. Since blooms of extended duration (>20 days) were reported in multiple recent years, the Aesthetics Use of Chauncy Lake is assessed as Not Supporting. An impairment for Harmful Algal Blooms is being added and the former Alert for Harmful Algal Blooms is being removed.

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Chauncy Lake (MA82017) were reported to MassDPH for 67 days in 2016, 53 days in 2017, and 11 days in 2019. Since blooms of extended duration (>20 days) were reported in multiple years, the Primary/Secondary Contact Recreational Uses and Aesthetics Use are assessed as Not Supporting.

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
Chauncy Lake	Not issued or confirmed by sampling			53		11	1	no
Lake Chauncy	Not issued or confirmed by sampling		67				1	no

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
C-HAB postings for Chauncy Lake (MA82017) were reported to MassDPH for 67 days in 2016, 53 days in 2017, and 11 days in 2019. Since blooms of extended duration (>20 days) were reported in multiple recent years, the Primary Contact Recreational Use of Chauncy Lake is assessed as Not Supporting. An impairment for Harmful Algal Blooms is being added and the former Alert for Harmful Algal Blooms is being removed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
C-HAB postings for Chauncy Lake (MA82017) were reported to MassDPH for 67 days in 2016, 53 days in 2017, and 11 days in 2019. Since blooms of extended duration (>20 days) were reported in multiple recent years, the Secondary Contact Recreational Use of Chauncy Lake is assessed as Not Supporting. An impairment for Harmful Algal Blooms is being added and the former Alert for Harmful Algal Blooms is being removed.	

Clamshell Pond (MA82018)

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

No usable data were available for Clamshell Pond (MA82018) 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	(Water Chestnut*)		Unchanged

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

Cold Harbor Brook (MA82B-18)

Location:	Headwaters, outlet Rocky Pond, Boylston to mouth at confluence with Howard Brook, Northborough.
AU Type:	RIVER
AU Size:	6.1 MILES
Classification/Qualifier:	B

No usable data were available for Cold Harbor Brook (MA82B-18) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

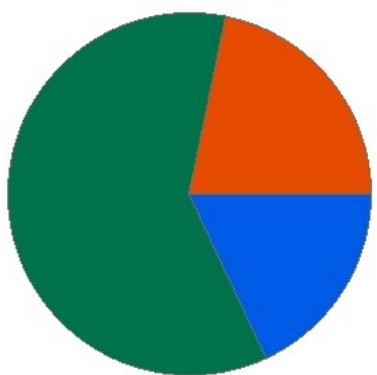
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Cold Spring Brook (MA82A-18)

Location:	Headwaters outlet Bloods Pond, Hopkinton to inlet Ashland Reservoir, Ashland.
AU Type:	RIVER
AU Size:	1.8 MILES
Classification/Qualifier:	B

Cold Spring Brook - MA82A-18

Watershed Area: 5.46 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	5.46	5.46	1.67	1.67
Agriculture	0.8%	0.8%	0.5%	0.5%
Developed	21.6%	21.6%	14.6%	14.6%
Natural	59.6%	59.6%	49.9%	49.9%
Wetland	17.9%	17.9%	35%	35%
Impervious Cover	8.8%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Benthic Macroinvertebrates		Added
3	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				

Recommendations

2022 Recommendations
ALU: Conduct follow-up sampling to further evaluate lead concentrations in Cold Spring Brook in the vicinity of MassDEP station W2508 (roughly 340 ft upstream/south of Clinton St, Hopkinton).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted fish (Sample ID 6359), benthic (Station B0907), and water quality (WQ) (W2508) surveys in Cold Spring Brook roughly 340 ft upstream/south of Clinton St, Hopkinton during summer 2015. The fish community sample, collected the end of June, was on the smaller side (n=16) but included 44% intolerant, fluvial individuals (creek chubsucker) and an additional 38% intolerant/moderately tolerant macrohabitat generalist species (good for a WWF). However, the July benthic sample had an IBI score of 42, indicating that conditions were moderately degraded for a low gradient location. A probe was deployed to measure DO for 95 days from July through October. Eighty-eight of 89 7DADMin for the DO measurements were <5.0 mg/L (minimum 7DADMin 0.6 mg/L) (note that all DO data had the “I” qualifier). Continuous temperature measurements were recorded over 75 days in the summer index period. The maximum 7DADM was 26.9 °C and the maximum 24-hr rolling average temperature was 26.2 °C (no violation of acute/chronic temperature thresholds). Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.5-6.7 S.U. (n=3), there was little indication of nutrient enrichment (seasonal TP average was 0.027 mg/L with n=5, maximum DO saturation was 65.6%, no observations of excessive filamentous algae; however, maximum DO diel shift was 7.6 mg/L), there were no exceedances among three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however) or three clean metals samples (however, two of the samples had CCC TUs of 1.0 for lead), the maximum Total Ammonia Nitrogen was 0.070 mg/L (n=5), the maximum chloride was 98 mg/L (n=5), and the maximum specific conductance was 417 µs/cm (n=3).</p> <p>The Aquatic Life Use of Cold Spring Brook (MA82A-18) is assessed as Not Supporting based on the data collected by MassDEP staff during the summer of 2015. Impairments are being added for Benthic Macroinvertebrates and Dissolved Oxygen. Although low DO concentrations may be due to natural conditions (77.5% natural/wetlands landcover in the subwatershed, 35% wetlands in the proximal stream buffer; however, impervious cover is high at 8.8%), a DO impairment is being added as a protective measure. Additionally, an Alert is being added for lead since two of three samples had TUs at 1.0 (edge of exceedance threshold).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6359	MassDEP	Fish Community	Cold Spring Brook	, Hopkinton	42.22478	-71.47767
B0907	MassDEP	Benthic	Cold Spring Brook/	[approximately 105 meters upstream/south of Clinton Street, Hopkinton, MA]	42.224779	-71.477671
W2508	MassDEP	Water Quality	Cold Spring Brook	[approximately 340 feet upstream/south of Clinton Street, Hopkinton]	42.224779	-71.477671

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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	
B0907	07/16/15	RBP multihab	Statewide_Low_Gradient	310	42	MD	

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: CCS = Creek Chubsucker, CP = Chain Pickerel, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RP = Redfin Pickerel, YB = Yellow Bullhead]

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
6359	06/25/15	NS	TP		7	16	0%	1	44%	44%	4	38%	No	No	CCS, CP, GS, LMB, P, RP, YB,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	07/03/15	10/05/15	95	89	66	0.2	0.6	2.1	7.6	89	86	26	25	88	79	66	66

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	08/06/15	10/06/15	3	2.7	5	1	1	1

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2508	07/03/15	09/15/15	75	72	26.2	29.0	26.9	24.0	69	15	49	10	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2508	07/02/15	09/15/15	75	3576	26.2	762	417	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	08/06/15	10/06/15	3	2	21.8	18.0	2	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2508	08/06/15	10/06/15	3	6.5	6.7	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	2015	5	0.018	0.030	0.027	7.6	3.5	65.6	6.7	5	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Selected TU Calculations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	05/13/15	0.1	0.3	0.3	0.44	0.0	0.9
W2508	06/09/15	0.1	0.3	0.3	0.47	0.0	1.0
W2508	07/15/15	0.1	0.3	0.3	0.48	0.0	1.0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2508	2015	5	0.040	0.070	0.052	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2508	2015	5	54	98	73	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Start Date	End Date	SpCond Count	SpCond Min (μ S/cm)	SpCond Max (μ S/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
W2508	08/06/15	10/06/15	3	236	417	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Cold Spring Brook (MA82A-18), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys of Cold Spring Brook roughly 340 ft upstream/south of Clinton St, Hopkinton during summer 2015 (Station W2508/MAP2-651). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews during these site visits (n=5).</p> <p>The Aesthetics Use of Cold Spring Brook (MA82A-18) is assessed as Fully Supporting based on the general lack of objectionable conditions noted by MassDEP staff at the W2508 site sampled in the summer of 2015.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2508	MassDEP	Water Quality	Cold Spring Brook	[approximately 340 feet upstream/south of Clinton Street, Hopkinton]	42.224779	-71.477671

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2508	Cold Spring Brook	2015	5	MassDEP aesthetics observations for station W2508/MAP2-651 on Cold Spring 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2508	2015	5	5	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2508	Cold Spring Brook	2015	Color	Light Yellow/Tan	4	5
W2508	Cold Spring Brook	2015	Color	Reddish	1	5
W2508	Cold Spring Brook	2015	Objectionable Deposits	No	4	5
W2508	Cold Spring Brook	2015	Objectionable Deposits	Yes	1	5
W2508	Cold Spring Brook	2015	Odor	None	5	5
W2508	Cold Spring Brook	2015	Scum	No	4	5
W2508	Cold Spring Brook	2015	Scum	Yes	1	5
W2508	Cold Spring Brook	2015	Turbidity	None	3	5
W2508	Cold Spring Brook	2015	Turbidity	Slightly Turbid	2	5

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys of Cold Spring Brook roughly 340 ft upstream/south of Clinton St, Hopkinton during summer 2015 (Station W2508/MAP2-651). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during these site visits (n=5). During these surveys, <i>E. coli</i> bacteria samples were collected: analysis of this limited frequency dataset indicated that no intervals had GMs exceeding 126 cfu/100mL, none of the sample concentrations exceeded the 410 cfu/100mL STV, and that the seasonal GM was 82 cfu/100mL.</p> <p>The Primary Contact Recreational Use of Cold Spring Brook (MA82A-18) is assessed as Fully Supporting based on the low <i>E. coli</i> concentration data and lack of aesthetically objectionable conditions.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2508	MassDEP	Water Quality	Cold Spring Brook	[approximately 340 feet upstream/south of Clinton Street, Hopkinton]	42.224779	-71.477671

Bacteria Data**Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)**

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

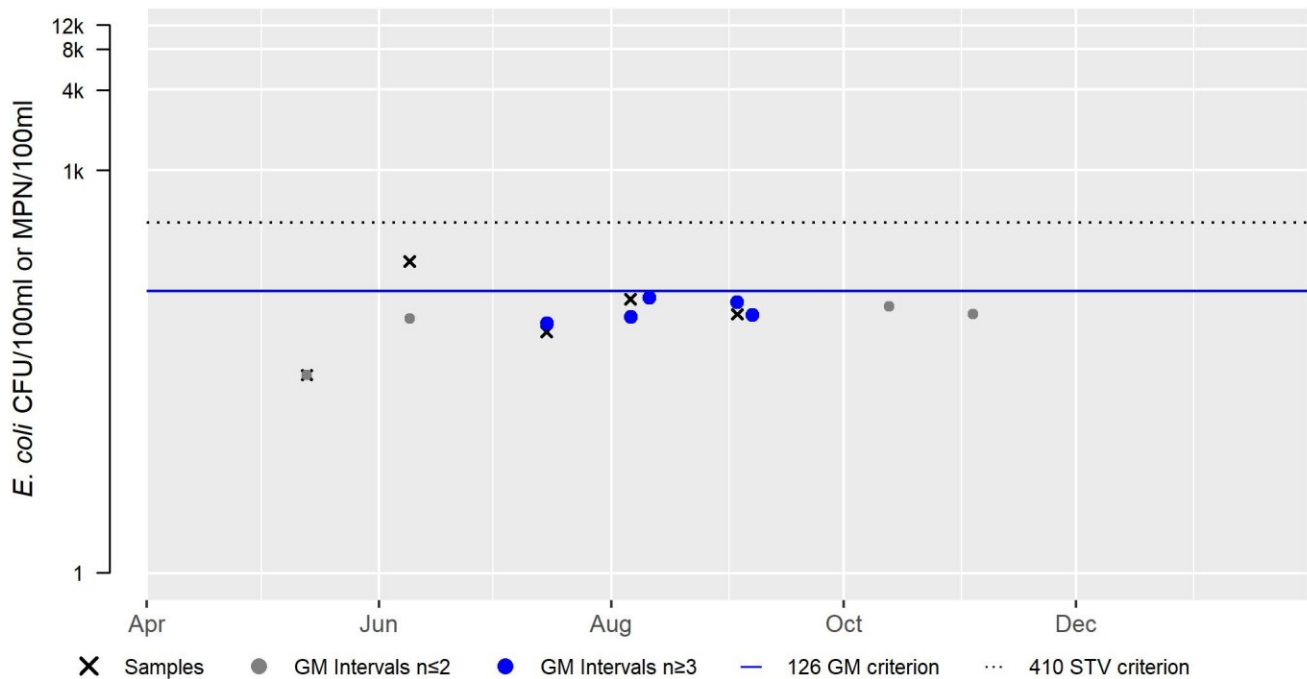
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2508	MassDEP	E. coli	05/13/15	09/03/15	5	30	210	82

W2508 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	82
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys of Cold Spring Brook roughly 340 ft upstream/south of Clinton St, Hopkinton during summer 2015 (Station W2508/MAP2-651). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during these site visits (n=5). During these surveys, <i>E. coli</i> bacteria samples were collected: analysis of this limited frequency dataset indicated that no intervals had GMs exceeding 630 cfu/100mL, none of the sample concentrations exceeded the 1260 cfu/100mL STV, and that the overall GM was 82 cfu/100mL.</p> <p>The Secondary Contact Recreational Use of Cold Spring Brook (MA82A-18) is assessed as Fully Supporting based on the low <i>E. coli</i> concentration data and lack of aesthetically objectionable conditions.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2508	MassDEP	Water Quality	Cold Spring Brook	[approximately 340 feet upstream/south of Clinton Street, Hopkinton]	42.224779	-71.477671

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)**

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

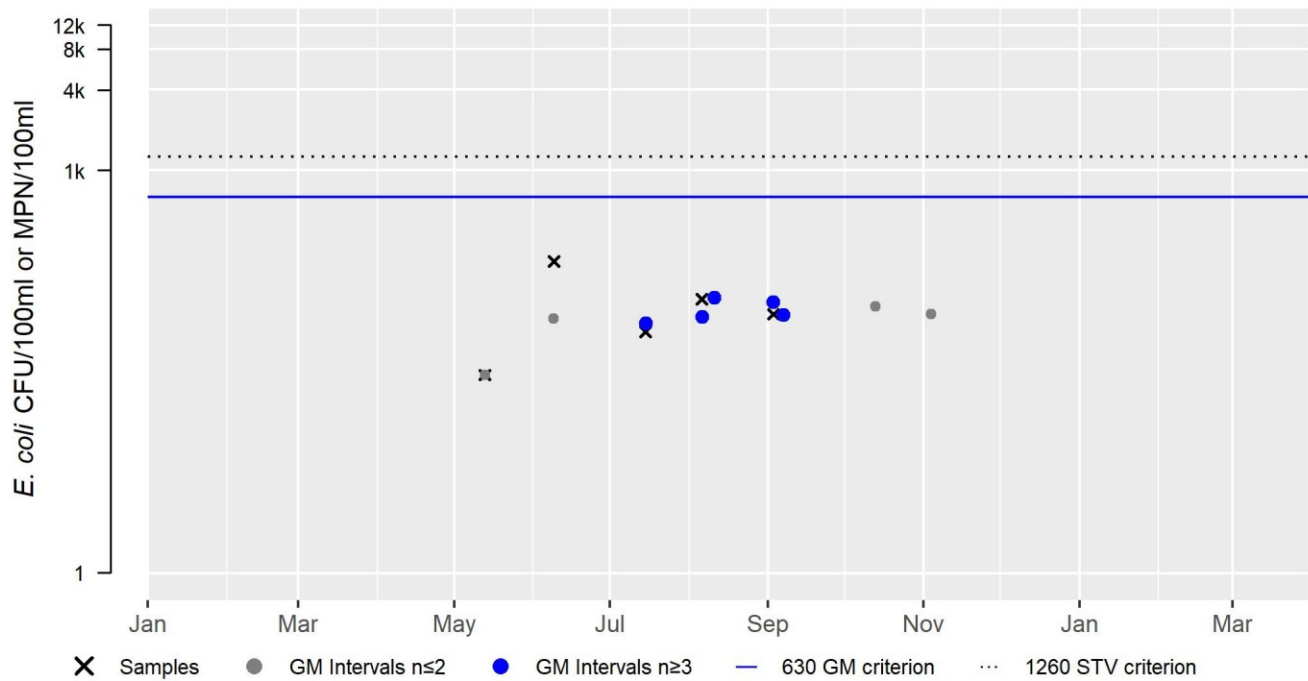
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2508	MassDEP	E. coli	05/13/15	09/03/15	5	30	210	82

W2508 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	82
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Coles Brook (MA82B-22)

Location:	Headwaters, east of Francine Road, Acton to mouth at confluence with Fort Pond Brook, Acton.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B

No usable data were available for Coles Brook (MA82B-22) 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
5	5	Escherichia Coli (E. Coli)		Unchanged

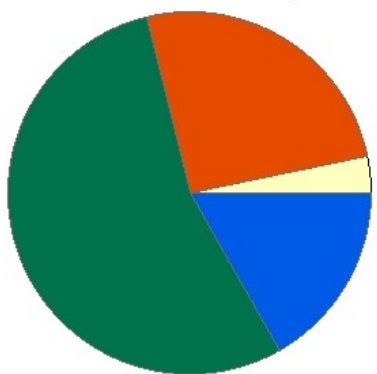
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (Y)	X				
Chloride	Impervious Surface/Parking Lot Runoff (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Concord River (MA82A-07)

Location:	Headwaters, confluence Assabet and Sudbury rivers, Concord to Billerica Water Supply intake, Billerica.
AU Type:	RIVER
AU Size:	10.4 MILES
Classification/Qualifier:	B: TWS, WWF

Concord River - MA82A-07

Watershed Area: 366.49 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	366.49	7.97	111.39	1.7
Agriculture	3.2%	1.7%	2.8%	2.9%
Developed	25.6%	38.6%	18.4%	25.3%
Natural	54.4%	45.8%	47.6%	45.2%
Wetland	16.7%	13.8%	31.2%	26.5%
Impervious Cover	12.8%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Asian Clam*)		Added
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(European Water Clover*)		Added
5	5	(Fanwort*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
5	5	(Water Chestnut*)		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		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
(Asian Clam*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(European Water Clover*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Escherichia Coli (E. Coli)	Municipal Point Source Discharges (N)				X	
Escherichia Coli (E. Coli)	Unspecified Urban Stormwater (N)				X	
Fecal Coliform	Municipal Point Source Discharges (N)				X	
Fecal Coliform	Unspecified Urban Stormwater (N)				X	
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (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 impairment is being removed from this Concord River AU (MA82A-07) and replaced with the specific European Water Clover (<i>Marsilea quadrifolia</i>) impairment.
Non-Native Fish/Shellfish/Zooplankton	Clarification of listing cause	The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed from this Concord River AU (MA82A-07) and replaced with the specific Asian Clam (<i>Corbicula fluminea</i>) impairment.

Non-Native Aquatic Plants

The generic Non-Native Aquatic Plants impairment is being removed from this Concord River AU (MA82A-07) and replaced with the specific European Water Clover (*Marsilea quadrifolia*) impairment.

Non-Native Fish/Shellfish/Zooplankton

The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed from this Concord River AU (MA82A-07) and replaced with the specific Asian Clam (*Corbicula fluminea*) impairment.

Recommendations

2022 Recommendations
REC: For a potential delisting of this Concord River AU (MA82A-07), collect bacteria data of sufficient frequency in the vicinity of the Monument St crossing in Concord (MassDEP station W1482, where elevated <i>E. coli</i> data were collected in 2006) and at the Rt 225 crossing in Bedford (MassDEP station W1483 and OARS station CND-110).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDFG biologists conducted boat electrofishing at 11 stations (Sample IDs 6580, 6583, 6581, 6582, 7311, 7310, 6570, 6579, 6578, 6577, 6576) throughout this Concord River AU (MA82A-07). Although MassDEP typically only uses data collected from wadeable streams to make use assessment decisions (MassDEP 2022), it is of note that these samples all included a fair amount (17-81%) of intolerant/moderately tolerant macrohabitat generalists.</p> <p>With no other recent data available for this Concord River AU (MA82A-07), the Aquatic Life Use will continue to be assessed as Not Supporting with Curly-leaf Pondweed, Eurasian Water Milfoil, Fanwort, and Water Chestnut impairments being carried forward. The generic Non-Native Aquatic Plants and Non-Native Fish/Shellfish/Zooplankton impairments are being removed and replaced with the specific European Water Clover (<i>Marsilea quadrifolia</i>) and Asian Clam (<i>Corbicula fluminea</i>) impairments.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6570	MassDFG	Fish Community	Concord River	Put in at Lowell St boat ramp, concord, can also put in at boat ramp on Rt 225., Concord/Bedford	42.50241	-71.31761
6576	MassDFG	Fish Community	Concord River	South of 12A bridge., Billerica	42.56923	-71.28187
6577	MassDFG	Fish Community	Concord River	, Billerica	42.56589	-71.28249
6578	MassDFG	Fish Community	Concord River	DS HWY 3 bridge, Billerica	42.55294	-71.28354
6579	MassDFG	Fish Community	Concord River	Rt 4 bridge, Billerica	42.53490	-71.29963
6580	MassDFG	Fish Community	Concord River	Start at Lowell Rd bridge, Concord, Concord	42.46796	-71.35205
6581	MassDFG	Fish Community	Concord River	Below old North Bridge, Concord	42.47162	-71.34757
6582	MassDFG	Fish Community	Concord River	, Concord	42.47392	-71.34427
6583	MassDFG	Fish Community	Concord River	, Concord	42.47169	-71.34739
7310	MassDFG	Fish Community	Concord River	Put in at Lowell St boat ramp, concord. Can also put in at ramp on Rt 225., Concord	42.48335	-71.33144
7311	MassDFG	Fish Community	Concord River	Put in at Lowell St boat ramp, concord. Can also put in at ramp on Rt 225., Concord	42.47599	-71.33822

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, BC = Black Crappie, C = Common Carp, CP = Chain Pickerel, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, WC = White Catfish, WP = White Perch, WS = White Sucker, 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
6570	06/08/17	BT	TP		3	9	0%	1	11%	0%	1	78%	Yes	No	C, WS, YP,
6576	08/02/17	BT	TP		8	101	0%	0	0%	0%	4	20%	No	No	AE, B, BC, C, GS, LMB, P, YP,
6577	08/02/17	BT	TP		3	3	0%	0	0%	0%	2	67%	No	No	C, WP, YP,
6578	08/02/17	BT	TP		7	90	0%	0	0%	0%	4	26%	No	No	AE, B, BC, C, LMB, P, WC,
6579	08/02/17	BT	TP		8	112	0%	0	0%	0%	3	28%	No	No	AE, B, BB, BC, C, GS, LMB, P,
6580	08/01/17	BT	TP		8	26	0%	0	0%	0%	6	81%	No	No	AE, B, BC, CP, LMB, P, WP, YP,
6581	08/01/17	BT	TP		6	83	0%	0	0%	0%	4	52%	No	No	AE, B, LMB, P, WP, YP,
6582	08/01/17	BT	TP		8	112	0%	0	0%	0%	5	38%	No	No	AE, B, BC, GS, LMB, P, RBS, YP,
6583	08/01/17	BT	TP		6	49	0%	0	0%	0%	4	57%	No	No	AE, B, LMB, P, WP, YP,
7310	06/08/17	BT	TP		3	3	0%	0	0%	0%	2	67%	No	No	BC, C, YP,
7311	06/08/17	BT	TP		3	12	0%	0	0%	0%	2	17%	No	No	BC, C, YP,

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in this Concord River AU (MA82A-07), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisories recommend that from the confluence of the Sudbury and Assabet Rivers to the Faulkner Dam in Billerica, 1) <i>Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body;</i> 2) <i>The general public should not consume any of the affected fish species (largemouth bass) from this water body;</i> and 3) <i>The general public should limit consumption of non-affected fish from this water body to two meals per month.</i>	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available, so the Aesthetics Use of this Concord River AU (MA82A-07) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

OARS watershed association staff/volunteers collected *E. coli* bacteria samples in this Concord River AU (MA82A-07) at Rt 225, Bedford (OARS_OARS-CND-110) during the summers of 2019 and 2020. Analysis of these high frequency data (n= 15/season) indicated that none of the intervals had GMs >126 cfu/100mL and none of the samples exceeded the 410 cfu/100mL STV.

The Primary Contact Recreational Use of this Concord River AU (MA82A-07) will continue to be assessed as Not Supporting for Escherichia Coli (*E. Coli*) and Fecal Coliform, as delisting is not appropriate without data from near the Monument Street crossing in Concord where elevated levels of *E. coli* bacteria were documented in summer 2006.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-CND-110	OARS	Water Quality	Concord River	Rte 225, Bedford	42.50916	-71.313342

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (OARS 2021)

(MassDEP Undated 2)

[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
OARS_OARS-CND-110	OARS	<i>E. coli</i>	06/17/19	09/23/19	15	12	92	40
OARS_OARS-CND-110	OARS	<i>E. coli</i>	06/08/20	09/14/20	15	10	120	27

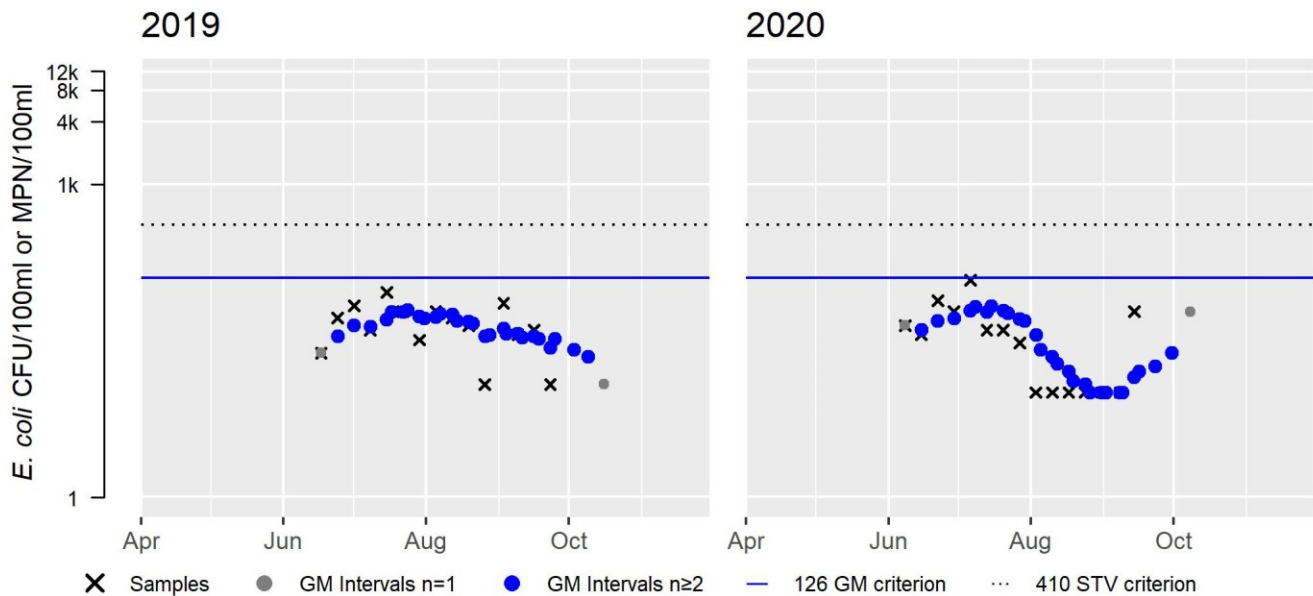
OARS_OARS-CND-110 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	40
#GMI	27
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	27
#GMI	27
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>OARS watershed association staff/volunteers collected <i>E. coli</i> bacteria samples at Rt 225, Bedford (OARS_OARS-CND-110) during the summers of 2019 and 2020. Analysis of these high frequency data (n= 15/yr) indicated that none of the intervals had GMs >630 cfu/100mL and none of the samples exceeded the 1260 cfu/100mL STV.</p> <p>Since the <i>E. coli</i> concentrations in the 2019 and 2020 high frequency datasets collected by OARS staff/volunteers were below the use attainment impairment thresholds, the Secondary Contact Recreation Use of this Concord River AU (MA82A-07) is assessed as Fully Supporting.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-CND-110	OARS	Water Quality	Concord River	Rte 225, Bedford	42.50916	-71.313342

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (OARS 2021)

(MassDEP Undated 2)

[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)
OARS_OARS-CND-110	OARS	E. coli	06/17/19	09/23/19	15	12	92	40
OARS_OARS-CND-110	OARS	E. coli	06/08/20	09/14/20	15	10	120	27

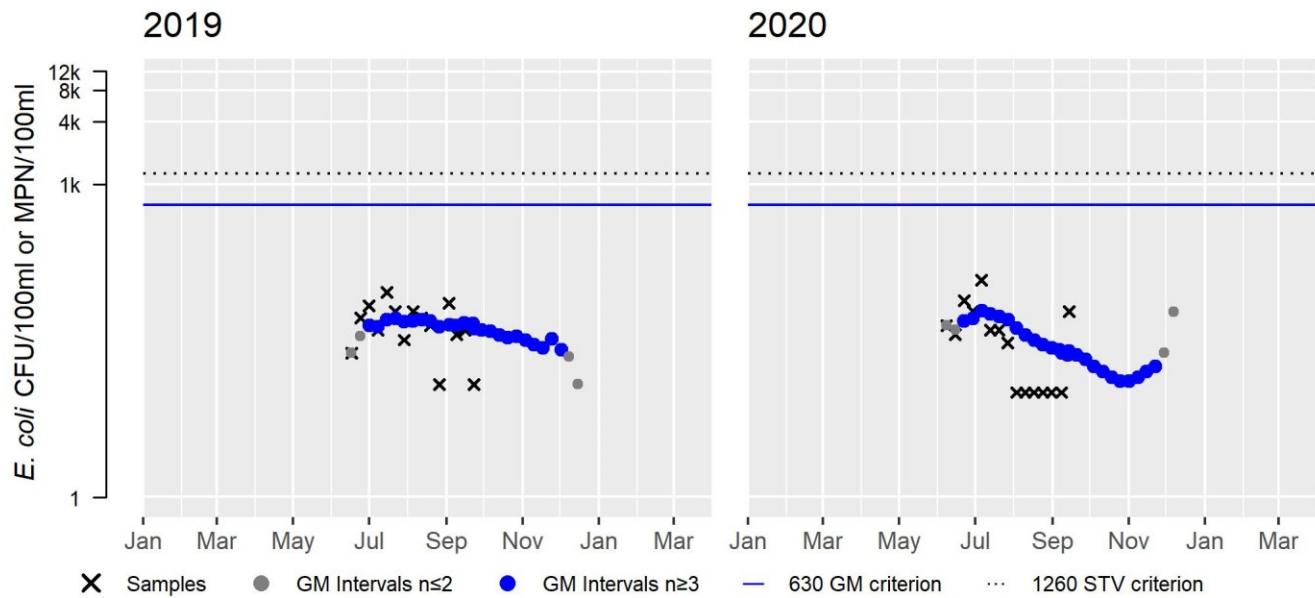
OARS_OARS-CND-110 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	40
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	27
#GMI	25
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

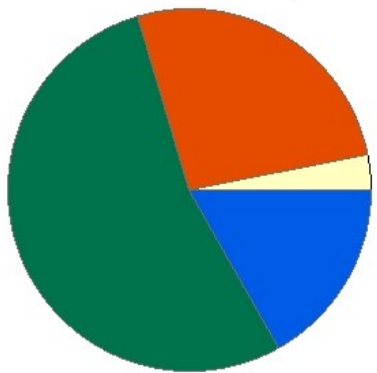


Concord River (MA82A-08)

Location:	From Billerica Water Supply intake, Billerica to Rogers Street bridge, Lowell.
AU Type:	RIVER
AU Size:	5.1 MILES
Classification/Qualifier:	B: WWF

Concord River - MA82A-08

Watershed Area: 399.31 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	399.31	9.69	119.61	2.58
Agriculture	3.1%	0.1%	2.9%	0.3%
Developed	26.5%	52.8%	18.8%	35%
Natural	53.6%	32.5%	47%	34.7%
Wetland	16.8%	14.6%	31.3%	29.9%
Impervious Cover	13.4%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(European Water Clover*)		Added
5	5	(Fanwort*)		Unchanged
5	5	(Fish Passage Barrier*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	(Water Chestnut*)		Unchanged
5	5	Chloride		Added
5	5	Escherichia Coli (E. Coli)		Added
5	5	Mercury in Fish Tissue		Unchanged
5	5	Trash		Added

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				

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				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fish Passage Barrier*)	Dam or Impoundment (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (Y)	X				
Chloride	Impervious Surface/Parking Lot Runoff (Y)	X				
Escherichia Coli (E. Coli)	Discharges from Municipal Separate Storm Sewer Systems (MS4) (Y)				X	
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			
Trash	Municipal (Urbanized High Density Area) (Y)			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 for this Concord River AU (MA82A-08) is being removed and replaced with the specific European Water Clover impairment (for <i>Marsilea quadrifolia</i>).

Non-Native Aquatic Plants

The generic Non-Native Aquatic Plants impairment for this Concord River AU (MA82A-08) is being removed and replaced with the specific European Water Clover impairment (for *Marsilea quadrifolia*).

Recommendations

2022 Recommendations
OTHER: Given the regional trend of increasing chloride and the newly identified chloride impairment, the use of de-icing products containing chloride should be minimized by all parties (i.e., highways/roads, municipalities, businesses, residences) in the sub-watershed of this Concord River AU (MA82A-08).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP staff conducted water quality monitoring in 2015 and 2016 as part of a special chloride study in this Concord River AU (MA82A-08) near the downstream end of the AU ~50 feet upstream from the mouth of River Meadow Brook, Lowell (W2549), and at a second location at Rogers Street, Lowell (W2227). Note that data collected from 2011-2013 at Rogers St (W2227) as part of the SMART monitoring project was already discussed as part of the 2018/2020 IR (MassDEP 2021) but is being summarized here for the sake of completeness. Among discrete dissolved oxygen (DO) measurements at both locations (n= 3-5/station/yr), the overall minimum DO was 7.2 mg/L, which is excellent. Probes were deployed to measure continuous temperature data at both stations during the 2016 summer index period (W2549 n=86; W2227 n=89). The 7DADMs were >27.7 °C 35 and 45 times, respectively, while the maximum 24-hour rolling average temperatures were both high at 29.6 °C. Although a regional drought occurred in 2016 (Drought Management Task Force 2021), 14 of the 7DADM exceedances at the upstream station and 18 at the downstream station occurred on dates when streamflow was above 7Q10 (MassDEP Undated 6, USGS 2022). pH measurements from both locations ranged from 6.5-8.4 S.U. (n= 3-5/station/yr). There was a little indication of enrichment at the downstream W2227 station (less data and no indication at W2549) such as two observations of dense/very dense filamentous algae in 2013 and 2016 and elevated maximum DO saturation of 146% in 2016. However, the wastewater treatment facilities upstream in the Assabet River had enhanced nutrient treatment upgrades completed in 2012 (Beaudoin 2017) and it again should be noted that 2016 was a drought year. With the passage of time since the plant upgrades, enrichment indicators should be reevaluated in a non-drought year. There were no exceedances among 2011-2013 Total Ammonia Nitrogen data from the Rogers St site (overall maximum 0.090 mg/L, n= 4-5/yr). Chloride was sampled in 2015-2016 at the upstream station with no exceedances (maximum 230 mg/L, n= 3-6/yr) and at the Rogers St station (W2227) where sampling occurred in 2011-2013 and 2015-2016, there were two exceedances in 2016 (maximum 250 mg/L, n= 3-6/yr). Note that minimum/maximum/average chloride concentrations from W2227 appeared to increase over time from 2011-2016. Continuous specific conductance (SC) was measured from Oct-Dec 2015 and Jan through early Sept 2016 at both stations. Both stations had extended periods in August 2016 (W2549 ~23 days; W2227 ~16 days) when rolling 4-day averages exceeded the estimated chloride chronic criterion (904 µs/cm) every day. While these extended chronic exceedances were observed during a drought year (Drought Management Task Force 2021), it is likely that increasing frequency of droughts brought on by climate change will exacerbate the frequency of episodes of chronically toxic chloride levels. The overall maximum SC at the upstream station (W2549) was 1084 µs/cm in 2016 and it was 1774 µs/cm at the downstream Rogers St station (W2227).

The Aquatic Life Use of this Concord River AU (MA82A-08) is assessed as Not Supporting, with prior impairments for Eurasian Water Milfoil, Fanwort, Fish Passage Barrier, and Water Chestnut being carried forward. The generic Non-Native Aquatic Plants impairment is being removed and replaced with the specific European water clover (*Marsilea quadrifolia*) impairment. New for this cycle, a Chloride impairment is being added based on continuous specific conductance data measured at two stations in the downstream portion of the AU; the prior Alert for chloride is being removed. A Temperature impairment is also being added based on chronic/acute exceedances occurring at the same two stations. The subwatershed is highly developed, with 13% impervious cover, and the river is crossed by I-495 upstream of the sampling stations.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2227	MassDEP	Water Quality	Concord River	[Rogers Street, Lowell]	42.635950	-71.301487
W2549	MassDEP	Water Quality	Concord River	[approximately 50 feet upstream from mouth of River Meadow Brook, Lowell]	42.633818	-71.300533

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2227	01/19/11	11/16/11	4	7.7	10.5	0	0	0
W2227	02/22/12	10/24/12	4	9.6	11.3	0	0	0
W2227	01/28/13	09/25/13	5	8.2	11.1	0	0	0
W2227	10/06/15	12/03/15	3	9.3	10.3	0	0	0
W2227	01/21/16	09/07/16	4	7.3	9.5	0	0	0
W2549	10/06/15	12/03/15	3	9.4	10.3	0	0	0
W2549	01/21/16	09/07/16	4	7.2	8.5	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2227	06/01/16	09/06/16	89	74	29.4	33.2	31.7	28.6	74	75	74	67	45	10
W2549	06/01/16	09/03/16	86	71	29.3	30.6	29.4	28.5	71	79	71	73	35	9

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2227	06/01/16	09/07/16	99	4271	29.6	3603	3266	413
W2549	06/01/16	09/07/16	99	4101	29.6	3760	3541	370

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2227	01/19/11	11/16/11	5	1	26.8	14.1	1	1	0	0
W2227	02/22/12	10/24/12	4	1	25.1	13.5	1	1	0	0
W2227	01/28/13	09/25/13	5	1	25.0	12.8	1	1	0	0
W2227	10/06/15	12/03/15	3	0	15.4	10.9	0	0	0	0
W2227	01/21/16	09/07/16	6	3	29.4	15.8	3	3	1	0
W2549	10/06/15	12/03/15	3	0	15.2	10.8	0	0	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
W2549	01/21/16	09/07/16	6	3	25.8	15.0	3	3	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2227	01/19/11	11/16/11	5	6.5	7.4	0	0
W2227	02/22/12	10/24/12	4	7.1	8.4	1	0
W2227	01/28/13	09/25/13	5	7	7.5	0	0
W2227	10/06/15	12/03/15	3	7.2	7.2	0	0
W2227	01/21/16	09/07/16	4	7	8.3	0	0
W2549	10/06/15	12/03/15	3	7.2	7.3	0	0
W2549	01/21/16	09/07/16	4	7	7.6	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2227	2011	3	0.054	0.076	0.063	--	--	105.5	7.4	2	0
W2227	2012	2	0.07	0.072	0.071	--	--	116.3	8.4	2	1
W2227	2013	3	0.039	0.065	0.053	--	--	103.3	7.5	3	2
W2227	2015	--	--	--	--	--	--	95.3	7.2	3	1
W2227	2016	--	--	--	--	--	--	146.3	8.3	4	2
W2549	2015	--	--	--	--	--	--	95.6	7.3	3	0
W2549	2016	--	--	--	--	--	--	101.4	7.6	2	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)**MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2227	2011	5	0.020	0.060	0.044	0	0
W2227	2012	5	0.020	0.040	0.026	0	0
W2227	2013	4	0.030	0.090	0.053	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2227	2011	5	92	140	107	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
W2227	2012	5	92	120	106	0	0
W2227	2013	4	130	160	138	0	0
W2227	2015	3	180	190	187	0	0
W2227	2016	6	160	250	203	2	0
W2549	2015	3	170	180	173	0	0
W2549	2016	6	150	230	188	0	0

MassDEP Long-term Continuous Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria.

(MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Start Date	End Date	SpCond Min (µs/cm)	SpCond Max (µs/cm)	SpCond Avg (µs/cm)	Max 4day Avg (µs/cm)	Max 1hr Avg (µs/cm)	4Day Count	1hr Count	Count 4day Avg >904	Count 1hr Avg >3193
W2227	10/06/15	12/31/15	455	940	695	752	925	3948	4138	0	0
W2227	01/01/16	09/07/16	504	1774	719	994	1749	10976	11356	769	0
W2549	10/06/15	12/31/15	524	760	687	740	760	3308	3752	0	0
W2549	01/01/16	09/07/16	451	1084	699	989	997	9333	10208	1157	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6)

(MassDEP Undated 4)

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
W2227	01/19/11	11/16/11	5	382	613	0	0	0	0	0	0
W2227	02/22/12	10/24/12	4	425	490	0	0	0	0	0	0
W2227	01/28/13	09/25/13	5	522	587	0	0	0	0	0	0
W2227	10/06/15	12/03/15	3	639	716	0	0	0	0	0	0
W2227	01/21/16	09/07/16	6	568	975	2	0	0	0	1	0
W2549	10/06/15	12/03/15	3	625	704	0	0	0	0	0	0
W2549	01/21/16	09/07/16	6	541	922	1	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>No recent fish toxics sampling has been conducted in this Concord River AU (MA82A-08), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisories recommend that from the confluence of the Sudbury and Assabet Rivers to the Faulkner Dam in Billerica (located in the upstream portion of this AU), 1) <i>Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body;</i> 2) <i>The general public should not consume any of the affected fish species (largemouth bass) from this water body;</i> and 3) <i>The general public should limit consumption of non-affected fish from this water body to two meals per month.</i></p>	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys in 2015 and 2016 as part of a special chloride study in this Concord River AU (MA82A-08) near the downstream end of the AU ~50 feet upstream from the mouth of River Meadow Brook, Lowell (W2549), and at a second location at Rogers Street, Lowell (W2227). Note that data were also collected from 2011-2013 at Rogers St (W2227) as part of the SMART monitoring project (some of which were presented in an earlier IR but are being described here for the sake of completeness). Generally, no odors, growths, or turbidity were noted at the upstream station W2549 in summer 2015 (n=3) and 2016 (n=6), however, observations of objectionable deposits (i.e., trash) were recorded for the majority of site visits. At the downstream station, observations of objectionable deposits of trash were also recorded during site visits in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Moderate/high turbidity was noted for a few visits in 2012 and 2013, as was excessive algal growth on occasion (two observations of dense/very dense filamentous algae in 2013 and two observations of dense/very dense film algae in 2016).</p> <p>The Aesthetics Use of this Concord River AU (MA82A-08) is assessed as Not Supporting with a new impairment being added for Trash based on observations at sites sampled by MassDEP staff between 2011 and 2016. Alerts are also being identified for turbidity and algae.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2227	MassDEP	Water Quality	Concord River	[Rogers Street, Lowell]	42.635950	-71.301487
W2549	MassDEP	Water Quality	Concord River	[approximately 50 feet upstream from mouth of River Meadow Brook, Lowell]	42.633818	-71.300533

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2227	Concord River	2011	5	The Aesthetics use for the Concord River is assessed as Not Supporting based on observations of objectionable deposits (i.e., trash) during field surveys MassDEP staff conducted at station W2227 in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Additionally, the use is identified with an Alert status due to moderate/high turbidity in 2012 and 2013, as well as an Alert for excessive algal growths (2 observations of dense/very dense filamentous algae in 2013 and 2 observations of dense/very dense film algae in 2016).

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2227	Concord River	2012	5	The Aesthetics use for the Concord River is assessed as Not Supporting based on observations of objectionable deposits (i.e., trash) during field surveys MassDEP staff conducted at station W2227 in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Additionally, the use is identified with an Alert status due to moderate/high turbidity in 2012 and 2013, as well as an Alert for excessive algal growths (2 observations of dense/very dense filamentous algae in 2013 and 2 observations of dense/very dense film algae in 2016).
W2227	Concord River	2013	5	The Aesthetics use for the Concord River is assessed as Not Supporting based on observations of objectionable deposits (i.e., trash) during field surveys MassDEP staff conducted at station W2227 in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Additionally, the use is identified with an Alert status due to moderate/high turbidity in 2012 and 2013, as well as an Alert for excessive algal growths (2 observations of dense/very dense filamentous algae in 2013 and 2 observations of dense/very dense film algae in 2016).
W2227	Concord River	2015	3	The Aesthetics use for the Concord River is assessed as Not Supporting based on observations of objectionable deposits (i.e., trash) during field surveys MassDEP staff conducted at station W2227 in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Additionally, the use is identified with an Alert status due to moderate/high turbidity in 2012 and 2013, as well as an Alert for excessive algal growths (2 observations of dense/very dense filamentous algae in 2013 and 2 observations of dense/very dense film algae in 2016).
W2227	Concord River	2016	6	The Aesthetics use for the Concord River is assessed as Not Supporting based on observations of objectionable deposits (i.e., trash) during field surveys MassDEP staff conducted at station W2227 in summer 2011 (n=2 of 5), 2013 (n=3 of 5), 2015 (n=3 of 3), and 2016 (n=5 of 6). Additionally, the use is identified with an Alert status due to moderate/high turbidity in 2012 and 2013, as well as an Alert for excessive algal growths (2 observations of dense/very dense filamentous algae in 2013 and 2 observations of dense/very dense film algae in 2016).
W2549	Concord River	2015	3	The Aesthetics use for this Concord River AU (MA82A-08) is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W2549 in summer 2015 (n=3) and 2016 (n=6). However, the use is identified with an Alert status due to observations of objectionable deposits (i.e., trash) during the majority of site visits.
W2549	Concord River	2016	6	The Aesthetics use for this Concord River AU (MA82A-08) is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W2549 in summer 2015 (n=3) and 2016 (n=6). However, the use is identified with an Alert status due to observations of objectionable deposits (i.e., trash) during the majority of site visits.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2227	2011	5	2	0
W2227	2012	5	2	1
W2227	2013	5	3	2
W2227	2015	3	3	1
W2227	2016	6	4	2
W2549	2015	3	3	0
W2549	2016	6	2	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2227	Concord River	2011	Color	Light Yellow/Tan	2	5
W2227	Concord River	2011	Color	Reddish	3	5
W2227	Concord River	2011	Objectionable Deposits	Unobservable	3	5
W2227	Concord River	2011	Objectionable Deposits	Yes	2	5
W2227	Concord River	2011	Odor	Musty (Basement)	1	5
W2227	Concord River	2011	Odor	None	3	5
W2227	Concord River	2011	Odor	Other	1	5
W2227	Concord River	2011	Scum	Yes	5	5
W2227	Concord River	2011	Turbidity	Moderately Turbid	1	5
W2227	Concord River	2011	Turbidity	Slightly Turbid	1	5
W2227	Concord River	2011	Turbidity	Unobservable	3	5
W2227	Concord River	2012	Color	Brownish	1	5
W2227	Concord River	2012	Color	Light Yellow/Tan	2	5
W2227	Concord River	2012	Color	Reddish	1	5
W2227	Concord River	2012	Color	Rusty	1	5
W2227	Concord River	2012	Objectionable Deposits	Unobservable	5	5
W2227	Concord River	2012	Odor	Fishy	1	5
W2227	Concord River	2012	Odor	None	3	5
W2227	Concord River	2012	Odor	Other	1	5
W2227	Concord River	2012	Scum	No	5	5
W2227	Concord River	2012	Turbidity	Highly Turbid	2	5
W2227	Concord River	2012	Turbidity	Moderately Turbid	1	5
W2227	Concord River	2012	Turbidity	None	1	5
W2227	Concord River	2012	Turbidity	Unobservable	1	5
W2227	Concord River	2013	Color	Brownish	1	5
W2227	Concord River	2013	Color	Light Yellow/Tan	1	5
W2227	Concord River	2013	Color	None	1	5
W2227	Concord River	2013	Color	Reddish	1	5
W2227	Concord River	2013	Color	Unobservable	1	5
W2227	Concord River	2013	Objectionable Deposits	Unobservable	2	5
W2227	Concord River	2013	Objectionable Deposits	Yes	3	5
W2227	Concord River	2013	Odor	Musty (Basement)	2	5
W2227	Concord River	2013	Odor	None	3	5

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2227	Concord River	2013	Scum	No	1	5
W2227	Concord River	2013	Scum	Yes	4	5
W2227	Concord River	2013	Turbidity	Moderately Turbid	2	5
W2227	Concord River	2013	Turbidity	None	1	5
W2227	Concord River	2013	Turbidity	Slightly Turbid	1	5
W2227	Concord River	2013	Turbidity	Unobservable	1	5
W2227	Concord River	2015	Color	None	3	3
W2227	Concord River	2015	Objectionable Deposits	Yes	3	3
W2227	Concord River	2015	Odor	Musty (Basement)	1	3
W2227	Concord River	2015	Odor	None	2	3
W2227	Concord River	2015	Scum	No	3	3
W2227	Concord River	2015	Turbidity	None	3	3
W2227	Concord River	2016	Color	Light Yellow/Tan	4	6
W2227	Concord River	2016	Color	None	2	6
W2227	Concord River	2016	Objectionable Deposits	No	1	6
W2227	Concord River	2016	Objectionable Deposits	Yes	5	6
W2227	Concord River	2016	Odor	None	3	6
W2227	Concord River	2016	Odor	Other	1	6
W2227	Concord River	2016	Odor	Unobservable	2	6
W2227	Concord River	2016	Scum	No	4	6
W2227	Concord River	2016	Scum	Yes	2	6
W2227	Concord River	2016	Turbidity	None	3	6
W2227	Concord River	2016	Turbidity	Slightly Turbid	3	6
W2549	Concord River	2015	Color	None	3	3
W2549	Concord River	2015	Objectionable Deposits	No	1	3
W2549	Concord River	2015	Objectionable Deposits	Yes	2	3
W2549	Concord River	2015	Odor	None	3	3
W2549	Concord River	2015	Scum	No	3	3
W2549	Concord River	2015	Turbidity	None	2	3
W2549	Concord River	2015	Turbidity	NR	1	3
W2549	Concord River	2016	Color	Light Yellow/Tan	4	6
W2549	Concord River	2016	Color	None	2	6
W2549	Concord River	2016	Objectionable Deposits	No	1	6
W2549	Concord River	2016	Objectionable Deposits	Yes	5	6
W2549	Concord River	2016	Odor	None	4	6
W2549	Concord River	2016	Odor	Other	1	6
W2549	Concord River	2016	Odor	Unobservable	1	6
W2549	Concord River	2016	Scum	No	6	6
W2549	Concord River	2016	Turbidity	None	4	6
W2549	Concord River	2016	Turbidity	Slightly Turbid	1	6
W2549	Concord River	2016	Turbidity	Unobservable	1	6

Primary Contact Recreation

2022 Use Attainment	Alert
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Not Supporting	YES
2022 Use Attainment Summary	
<p>OARS staff/volunteers and MassDEP staff collected <i>E. coli</i> bacteria samples in this Concord River AU (MA82A-08) at a number of stations. The OARS station at Muldoon Park, Lowell (OARS_OARS-CND-017) was sampled during summer 2020 (n=6) with data indicating adequate conditions (33% of intervals had GMs exceeding 126 cfu/100mL, one sample exceeded the 410 cfu/100mL STV, seasonal GM of 104 cfu/100mL). The OARS station at Centennial Island East, Lowell (OARS_OARS-CND-012) also had low frequency data (n=6) that was collected in summer 2020 and did not meet the threshold for an impaired condition (67% of intervals had GMs exceeding 126 cfu/100mL, one sample exceeded the 410 cfu/100mL STV, seasonal GM of 172 cfu/100mL). The OARS station at Rogers St, Lowell (OARS_OARS-CND-009) was sampled with high frequency (n= 15/yr) during the summers of 2019 and 2020 and data at this site did meet the threshold for impairment- in both years >10% of intervals (56% & 100%) had GMs exceeding 126 cfu/100mL and the cumulative percentage of intervals with exceedances was 78%. Of note, >10% of samples (13%) exceeded the 410 cfu/100mL STV only in 2020. MassDEP staff collected <i>E. coli</i> samples at this Rogers St location (W2227) that were too limited to evaluate in 2011 and 2012, but the limited 2013 data (n=3) also indicated an impaired condition. MassDEP staff recorded aesthetic observations near the downstream end of the AU ~50 feet upstream from the mouth of River Meadow Brook, Lowell (W2549), and at a second location at Rogers Street, Lowell (W2227). Aesthetic degradation related to trash deposits between 2011 and 2016 was identified as a problem while infrequent observations of turbidity and algae were also noted.</p> <p>The Primary Contact Recreational Use of this Concord River AU (MA82A-08) is assessed as Not Supporting with new impairments being added for Escherichia Coli (<i>E. Coli</i>) (based on high frequency data collected at OARS' Rogers St station) and Trash (observed by MassDEP field crews at W2549 and W2227). Alerts are also being identified for turbidity and algae.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2227	MassDEP	Water Quality	Concord River	[Rogers Street, Lowell]	42.635950	-71.301487
OARS_OARS-CND-009	OARS	Water Quality	Concord River	Rogers St, Lowell	42.635909	-71.301809
OARS_OARS-CND-012	OARS	Water Quality	Concord River	Centennial Island East, Lowell	42.632793	-71.29959
OARS_OARS-CND-017	OARS	Water Quality	Concord River	Muldoon Park, Lowell	42.625878	-71.295905

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)
 [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
W2227	MassDEP	<i>E. coli</i>	05/17/11	09/21/11	3	308	980	453
W2227	MassDEP	<i>E. coli</i>	04/11/12	10/24/12	4	25	148	86
W2227	MassDEP	<i>E. coli</i>	05/20/13	09/25/13	3	99	613	191
OARS_OARS-CND-009	OARS	<i>E. coli</i>	06/17/19	09/23/19	15	56	432	147
OARS_OARS-CND-009	OARS	<i>E. coli</i>	06/08/20	09/14/20	15	110	1650	216
OARS_OARS-CND-012	OARS	<i>E. coli</i>	06/08/20	07/13/20	6	40	2650	172
OARS_OARS-CND-017	OARS	<i>E. coli</i>	06/08/20	07/13/20	6	60	580	104

W2227 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

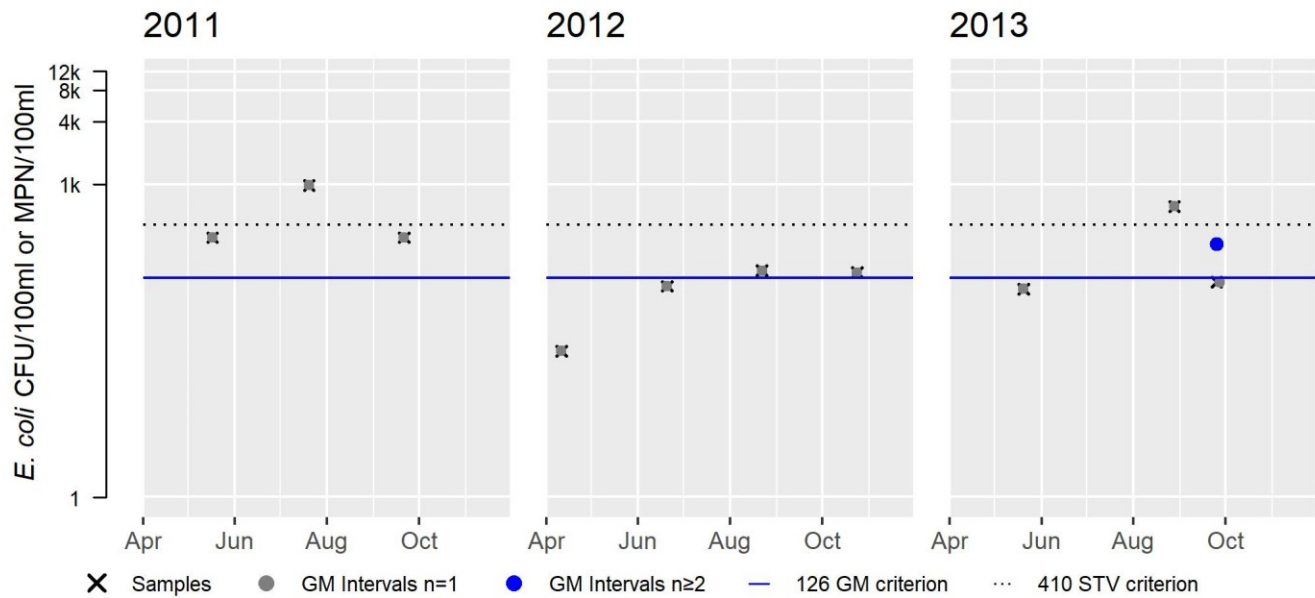
Var	Res
Samples	3
SeasGM	453
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	33

Var	Res
Samples	4
SeasGM	86
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	3
SeasGM	191
#GMI	1
#GMI Ex	1
%GMI Ex	100
n>STV	1
%n>STV	33

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

Variable	Cumulative %GMI Ex (all years)
Result	100



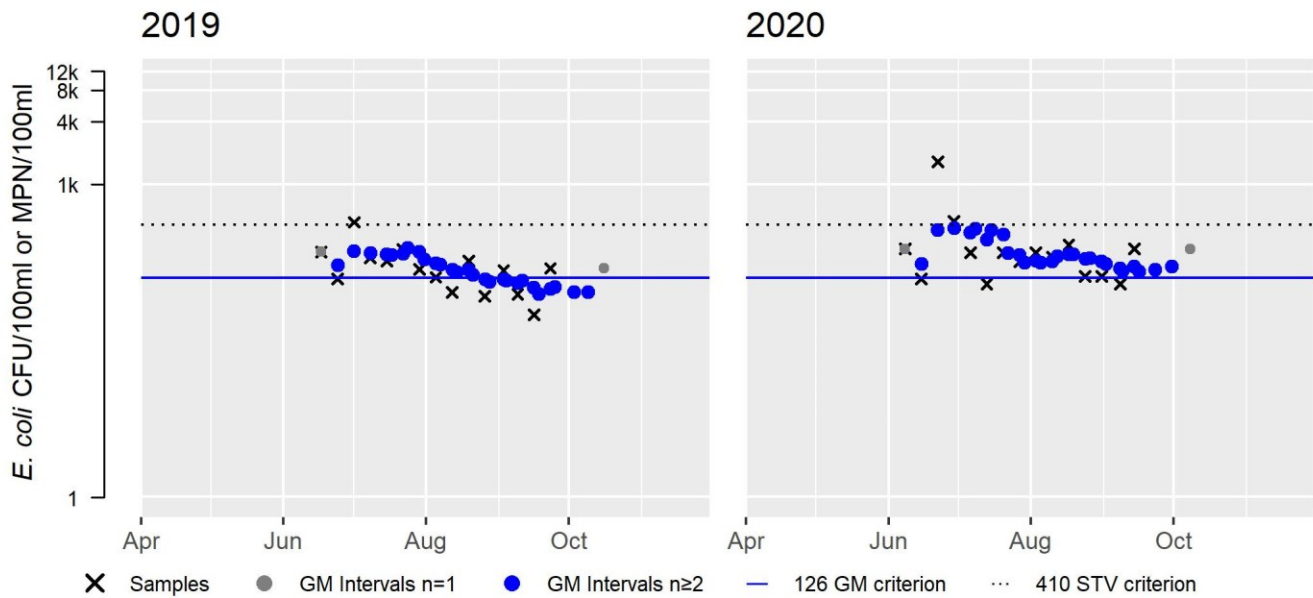
OARS_OARS-CND-009 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	147
#GMI	27
#GMI Ex	15
%GMI Ex	56
n>STV	1
%n>STV	7

Var	Res
Samples	15
SeasGM	216
#GMI	27
#GMI Ex	27
%GMI Ex	100
n>STV	2
%n>STV	13

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

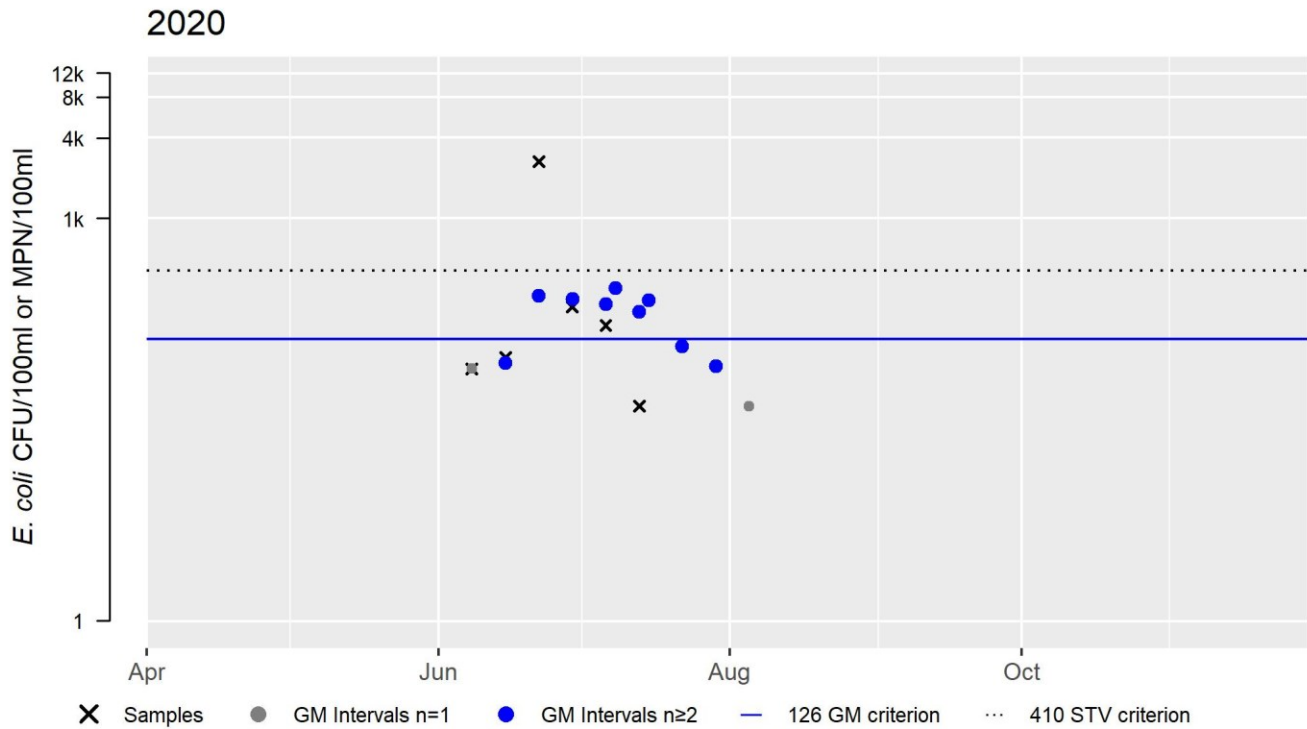
Variable	Cumulative %GMI Ex (all years)
Result	78



OARS_OARS-CND-012 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	172
#GMI	9
#GMI Ex	6
%GMI Ex	67
n>STV	1
%n>STV	17

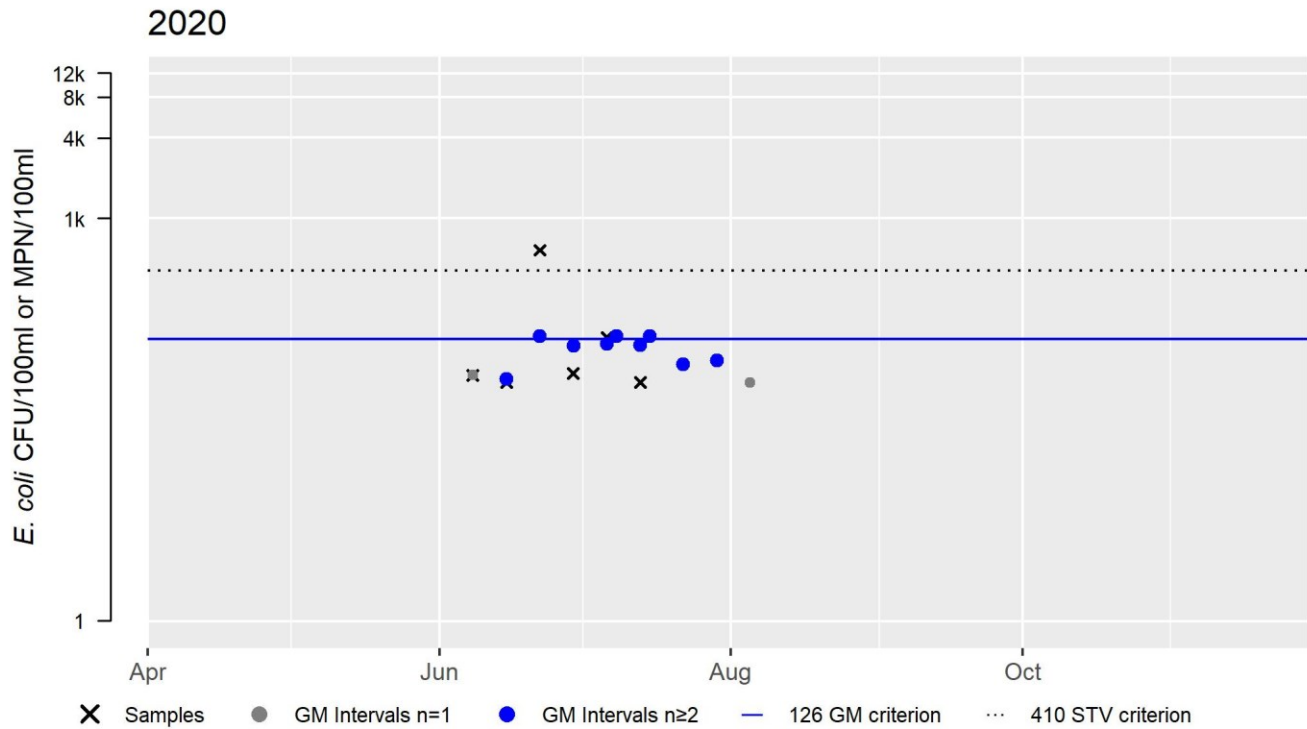
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-CND-017 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	104
#GMI	9
#GMI Ex	3
%GMI Ex	33
n>STV	1
%n>STV	17

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



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

OARS staff/volunteers collected *E. coli* bacteria samples in this Concord River AU (MA82A-08) at three stations during summer 2019/2020. The stations/data are described upstream to downstream as follows: low frequency data (n=6) were collected at Muldoon Park, Lowell (OARS_OARS-CND-017) during summer 2020, low frequency data (n=6) were collected at Centennial Island East, Lowell (OARS_OARS-CND-012) during summer 2020, and high frequency data were collected at Rogers St, Lowell (OARS_OARS-CND-009) during the summers of 2019 and 2020 (n= 15/yr). Overall, none of the intervals in these datasets had GMs >630 cfu/100mL and generally none of the samples exceeded the 1260 cfu/100mL STV (occasionally there was one exceedance in a data-year). Low frequency data were also collected by MassDEP staff at Rogers St (W2227) from 2011-2013, but these data were too limited to evaluate. MassDEP staff recorded aesthetic observations near the downstream end of the AU ~50 feet upstream from the mouth of River Meadow Brook, Lowell (W2549), and at a second location at Rogers Street, Lowell (W2227). Aesthetic degradation related to trash deposits between 2011 and 2016 was identified as a problem while infrequent observations of turbidity and algae were also noted. Although *E. coli* bacteria data did not exceed use attainment impairment thresholds, the Secondary Contact Recreational Use of this Concord River AU (MA82A-08) is assessed as Not Supporting with a new impairment being added for Trash. Alerts are also being identified for turbidity and algae.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2227	MassDEP	Water Quality	Concord River	[Rogers Street, Lowell]	42.635950	-71.301487
OARS_OARS-CND-009	OARS	Water Quality	Concord River	Rogers St, Lowell	42.635909	-71.301809
OARS_OARS-CND-012	OARS	Water Quality	Concord River	Centennial Island East, Lowell	42.632793	-71.29959
OARS_OARS-CND-017	OARS	Water Quality	Concord River	Muldoon Park, Lowell	42.625878	-71.295905

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)
 [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)
W2227	MassDEP	E. coli	03/15/11	11/16/11	5	45	980	205
W2227	MassDEP	E. coli	02/22/12	10/24/12	5	25	148	73
W2227	MassDEP	E. coli	01/28/13	09/25/13	5	20	613	96
OARS_OARS-CND-009	OARS	E. coli	06/17/19	09/23/19	15	56	432	147
OARS_OARS-CND-009	OARS	E. coli	06/08/20	09/14/20	15	110	1650	216
OARS_OARS-CND-012	OARS	E. coli	06/08/20	07/13/20	6	40	2650	172
OARS_OARS-CND-017	OARS	E. coli	06/08/20	07/13/20	6	60	580	104

W2227 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

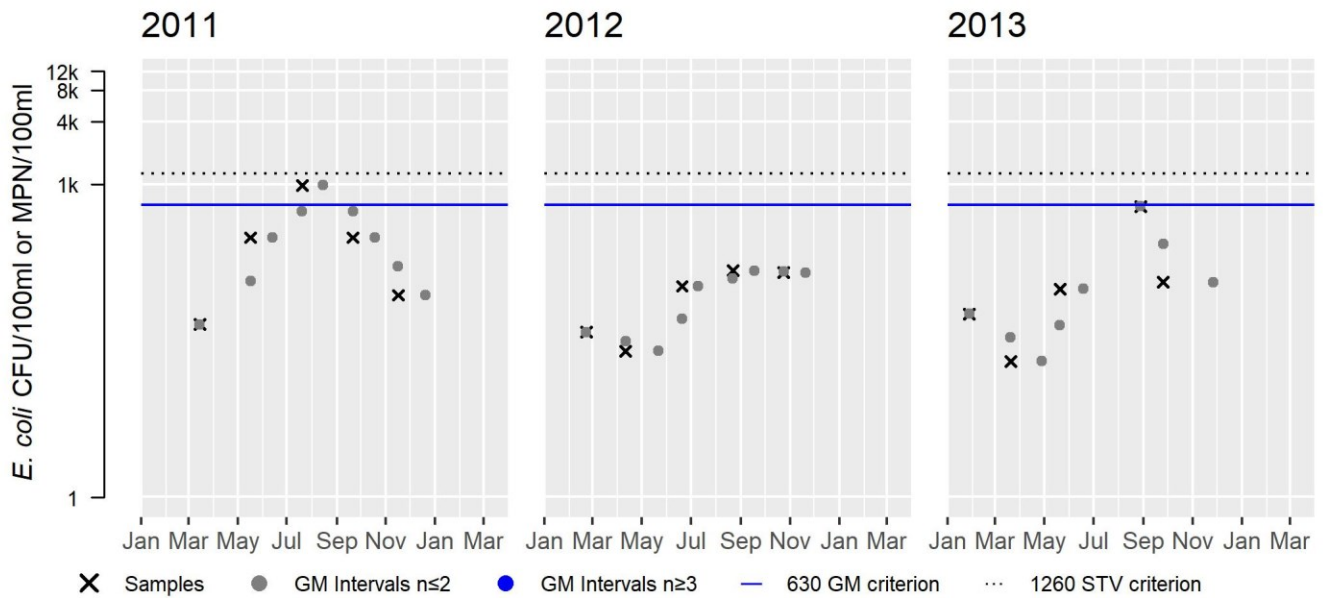
Var	Res
Samples	5
SeasGM	205
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	73
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	96
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0



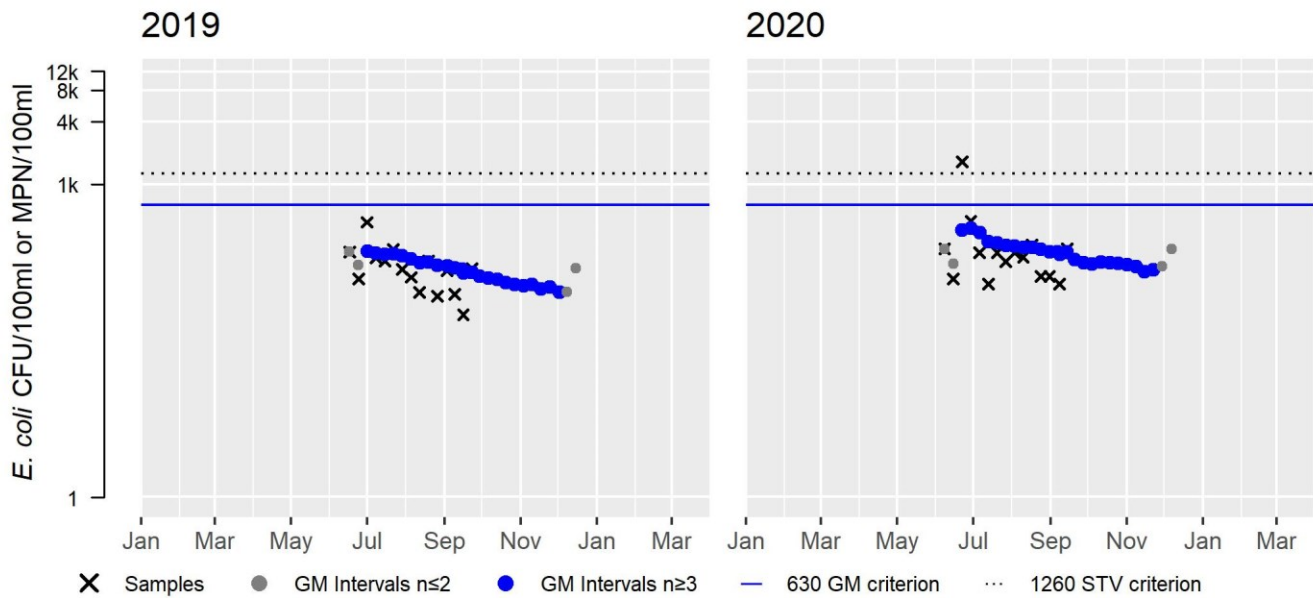
OARS_OARS-CND-009 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	147
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	216
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	7

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

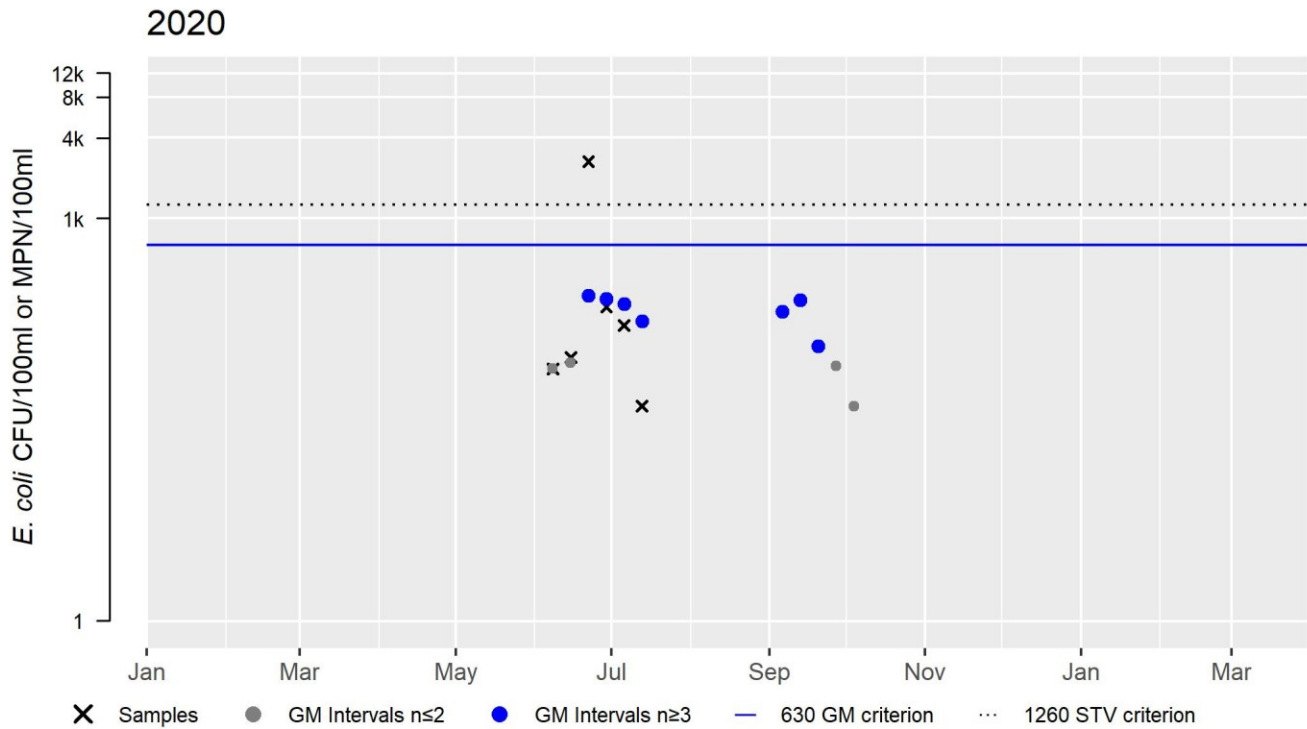
Variable	Cumulative %GMI Ex (all years)
Result	0



OARS_OARS-CND-012 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	172
#GMI	7
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	17

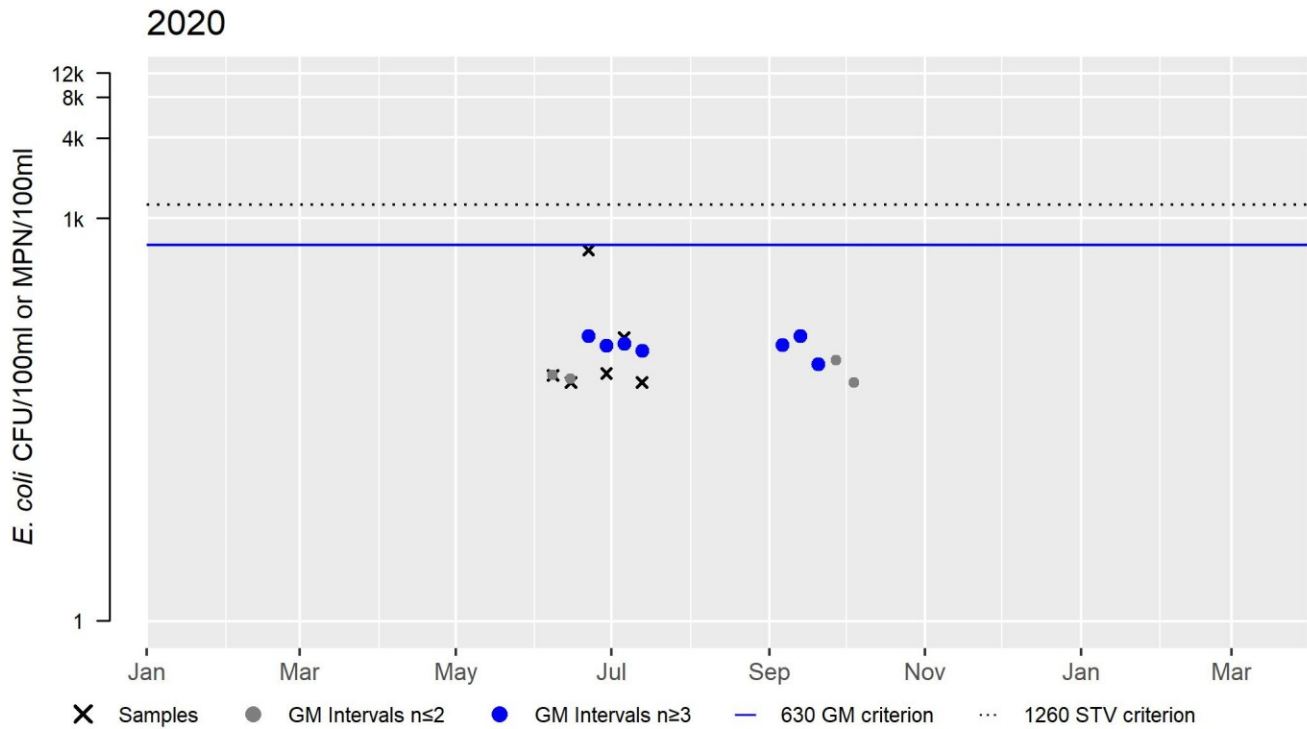
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-CND-017 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	104
#GMI	7
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Concord River (MA82A-09)

Location:	From Rogers Street bridge, Lowell to mouth at confluence with the Merrimack River, Lowell.
AU Type:	RIVER
AU Size:	0.9 MILES
Classification/Qualifier:	B: WWF, CSO

No usable data were available for Concord River (MA82A-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	(Debris*)		Unchanged
5	5	Algae		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Mercury in Fish Tissue		Unchanged
5	5	Trash		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
(Debris*)	Combined Sewer Overflows (N)			X	X	X
Algae	Combined Sewer Overflows (N)			X	X	X
Escherichia Coli (E. Coli)	Combined Sewer Overflows (N)				X	X
Fecal Coliform	Combined Sewer Overflows (N)				X	X
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			
Trash	Combined Sewer Overflows (N)			X	X	X
Turbidity	Source Unknown (N)			X	X	X

Danforth Brook (MA82B-19)

Location:	Headwaters, confluence of Mill Brook and an unnamed tributary draining from Little Pond, Bolton to mouth at inlet of Bruces Pond, Hudson.
AU Type:	RIVER
AU Size:	2.4 MILES
Classification/Qualifier:	B

For the 2022 Integrated Reporting cycle, the category, use attainments, impairments, associated actions, and sources remain unchanged for Danforth Brook (MA82B-19) from the previous IR reporting cycle.

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

Dean Park Pond (MA82026)

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

No usable data were available for Dean Park Pond (MA82026) 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	Harmful Algal Blooms		Unchanged

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

Denny Brook (MA82A-27)

Location:	Headwaters, perennial portion, outlet unnamed pond west of South Street, Westborough to mouth at confluence with Jackstraw Brook, Westborough.
AU Type:	RIVER
AU Size:	0.6 MILES
Classification/Qualifier:	B: ORW

No usable data were available for Denny Brook (MA82A-27) 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

Dudley Pond (MA82029)

Location:	Wayland.
AU Type:	FRESHWATER LAKE
AU Size:	83 ACRES
Classification/Qualifier:	B

No usable data were available for Dudley Pond (MA82029) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Unchanged
5	5	Dissolved Oxygen		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
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Fish/Shellfish/Zooplankton*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Turbidity	Source Unknown (N)			X	X	X

Eames Brook (MA82A-13)

Location:	Headwaters, outlet Farm Pond, Framingham to mouth at confluence with the Sudbury River, Framingham.
AU Type:	RIVER
AU Size:	0.6 MILES
Classification/Qualifier:	B

No usable data were available for Eames Brook (MA82A-13) 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	(Debris*)		Unchanged
5	5	Algae		Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Odor		Unchanged
5	5	Trash		Unchanged

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

Elizabeth Brook (MA82B-12)

Location:	From the outlet of an unnamed pond (Delaney Project on Stow/Harvard border) west of Harvard Road, Stow to mouth at inlet of Fletchers Pond, Stow.
AU Type:	RIVER
AU Size:	3.7 MILES
Classification/Qualifier:	B

No usable data were available for Elizabeth Brook (MA82B-12) 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	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
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Elm Street Pond (MA82032)

Location:	Chelmsford/Carlisle.
AU Type:	FRESHWATER LAKE
AU Size:	65 ACRES
Classification/Qualifier:	B

No usable data were available for Elm Street Pond (MA82032) 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

Farm Pond (MA82035)

Location:	Framingham.
AU Type:	FRESHWATER LAKE
AU Size:	139 ACRES
Classification/Qualifier:	B

No usable data were available for Farm Pond (MA82035) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Fanwort*)		Unchanged
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
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Source Unknown (N)			X	X	X
Turbidity	Source Unknown (N)			X	X	X

Farrar Pond (MA82036)

Location:	Lincoln.
AU Type:	FRESHWATER LAKE
AU Size:	83 ACRES
Classification/Qualifier:	B

No usable data were available for Farrar Pond (MA82036) 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	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	Atmospheric Deposition (N)		X			

Fisk Pond (MA82038)

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

No usable data were available for Fisk Pond (MA82038) 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
4c	4c	(Water Chestnut*)		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) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

Fiske Street Pond (MA82037)

Location:	Carlisle/Chelmsford.
AU Type:	FRESHWATER LAKE
AU Size:	38 ACRES
Classification/Qualifier:	B

No usable data were available for Fiske Street Pond (MA82037) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

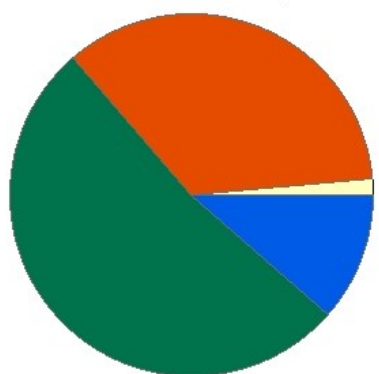
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Fort Meadow Brook (MA82B-11)

Location:	Headwaters, outlet Fort Meadow Reservoir, Marlborough/Hudson to mouth at confluence with Assabet River, Hudson.
AU Type:	RIVER
AU Size:	2.7 MILES
Classification/Qualifier:	B

Fort Meadow Brook - MA82B-11

Watershed Area: 6.31 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	6.31	4.54	1.63	1.29
Agriculture	1.4%	1.9%	1.5%	1.9%
Developed	35%	32.2%	22.8%	21%
Natural	52.2%	54.1%	51.7%	52%
Wetland	11.4%	11.8%	24.1%	25.1%
Impervious Cover	17.8%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	2	None		Unchanged

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDFG biologists conducted backpack electrofishing in Fort Meadow Brook at two locations in August 2017- upstream of Shay Rd, Hudson (Sample ID 6813) and upstream of Chestnut St, Hudson (Sample ID 6812). The upstream sample (n= 50) was comprised of 46% fluvial individuals, as well as an additional 40% intolerant/moderately tolerant macrohabitat generalists, excellent for a warmwater fishery. The downstream sample, although it did not include any fluvial species, was comprised of 81% intolerant/moderately tolerant macrohabitat generalists.</p> <p>The Aquatic Life Use of Fort Meadow Brook (MA82B-11) is assessed as Fully Supporting based on the 2017 fish community data. The prior Alert for habitat degradation and riparian zone disturbances is being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6812	MassDFG	Fish Community	Fort Meadow Brook	Chestnut St US, Hudson	42.38895	-71.52177
6813	MassDFG	Fish Community	Fort Meadow Brook	Shay Rd US, Hudson	42.38599	-71.52901

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, P = Pumpkinseed, RP = Redfin Pickerel, SD = Swamp Darter, WS = White Sucker, YB = Yellow Bullhead]

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
6812	08/09/17	BP	TP	L	10	113	0%	0	0%	12%	5	81%	No	No	AE, B, BB, BS, CP, GS, P, RP, SD, YB,
6813	08/09/17	BP	TP	L	8	50	0%	2	46%	2%	3	40%	No	No	AE, B, CP, F, P, SD, WS, YB,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Fort Meadow Brook (MA82B-11), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No data are available, so the Aesthetics Use of Fort Meadow Brook (MA82B-11) 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 Recreational Use of Fort Meadow Brook (MA82B-11) 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 Recreational Use of Fort Meadow Brook (MA82B-11) is Not Assessed.	

Fort Meadow Reservoir (MA82042)

Location:	Marlborough/Hudson.
AU Type:	FRESHWATER LAKE
AU Size:	254 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	(Fanwort*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	Chlordane in Fish Tissue		Unchanged
5	5	Phosphorus, Total		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				
(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				
Chlordane in Fish Tissue	Source Unknown (N)		X			
Phosphorus, Total	Source Unknown (N)	X				
Phosphorus, Total	Unspecified Urban Stormwater (N)	X				

Recommendations

2022 Recommendations
ALU: A survey of Fort Meadow Reservoir (MA82042) should be conducted to confirm the presence of live specimens of the non-native Asian clam (<i>Corbicula fluminea</i>) (identifications 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	

C-HAB postings for Fort Meadow Reservoir (MA82042) were reported to MassDPH for 20 days in 2017 but no blooms were reported in any other recent years. No other recent data are available.

The Aquatic Life Use of Fort Meadow Reservoir (MA82042) is assessed as Not Supporting with all prior impairments (Eurasian Water Milfoil, Fanwort, Non-Native Aquatic Plants, "Phosphorus, Total") being carried forward. A new Alert is identified for C-HABs and the prior Alert for the non-native Asian clam (*Corbicula fluminea*) is being carried forward.

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Recent fish toxics sampling has not been conducted in Fort Meadow Reservoir (MA82042), so the Fish Consumption Use will remain assessed as Not Supporting with the Chlordane in Fish Tissue impairment being carried forward. The MassDPH fish advisory recommends that <i>"Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any of the affected fish species (white sucker) from this water body."</i> Additionally, the <i>"general public should limit consumption of affected fish species (white sucker) to two meals per month"</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Fort Meadow Reservoir (MA82042) were reported to MassDPH for 20 days in 2017. Since no blooms were reported in any other recent years, nor was the bloom in 2017 >20 days, an impairment decision should not be made at this time.	
There is Insufficient Information to assess the Aesthetics Use of Fort Meadow Reservoir (MA82042), but the 2017 CHAB bloom supports the retention of the prior Alert for Harmful Algal Blooms.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Fort Meadow Reservoir (MA82042) were reported to MassDPH for 20 days in 2017. Since no blooms were reported in recent years (nor blooms >20 days), 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
Fort Meadow Reservoir	Not issued or confirmed by sampling			20			0	no

Primary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	

C-HAB postings for Fort Meadow Reservoir (MA82042) were reported to MassDPH for 20 days in 2017. Since no blooms were reported in any other recent years, nor was the bloom in 2017 >20 days, an impairment decision should not be made at this time.

Without bacteria data, there is Insufficient Information to assess the Primary Contact Recreational Use of Fort Meadow Reservoir (MA82042), but the 2017 CHAB bloom supports the retention of the prior Alert for Harmful Algal Blooms.

Secondary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
<p>C-HAB postings for Fort Meadow Reservoir (MA82042) were reported to MassDPH for 20 days in 2017. Since no blooms were reported in any other recent years, nor was the bloom in 2017 >20 days, an impairment decision should not be made at this time.</p> <p>Without bacteria data, there is Insufficient Information to assess the Secondary Contact Recreational Use of Fort Meadow Reservoir (MA82042), but the 2017 CHAB bloom supports the retention of the prior Alert for Harmful Algal Blooms.</p>	

Fort Pond (MA82043)

Location:	Littleton.
AU Type:	FRESHWATER LAKE
AU Size:	102 ACRES
Classification/Qualifier:	B

No usable data were available for Fort Pond (MA82043) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

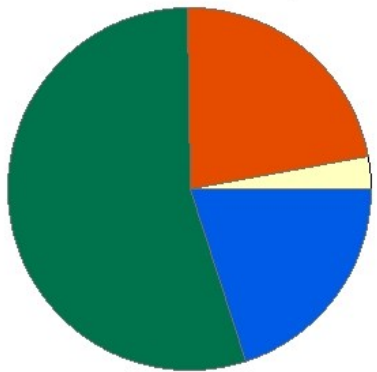
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Fort Pond Brook (MA82B-13)

Location:	From source in a wetland just west of Fort Pond, Littleton to mouth at inlet Warners Pond, Concord.
AU Type:	RIVER
AU Size:	10.2 MILES
Classification/Qualifier:	B

Fort Pond Brook - MA82B-13

Watershed Area: 46.13 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	46.13	11.84	14.21	3.59
Agriculture	2.9%	3.2%	2.5%	2.3%
Developed	22.3%	26.8%	15.5%	18.8%
Natural	54.9%	51.6%	44.2%	42.9%
Wetland	19.9%	18.4%	37.8%	36%
Impervious Cover	10.3%			

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

Recommendations

2022 Recommendations

ALU: Collect water quality data to provide a fuller picture of conditions in Fort Pond Brook.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

MassDFG conducted backpack electrofishing at two locations on Fort Pond Brook (MA82B-13) in 2018: the first site, sampled the end of June, was at the upstream end of the AU downstream of Coughlin Rd, Littleton (Sample ID 7427) and field notes indicated the water was stagnant (MassDFG 2020); the second site, sampled in early July, was located roughly two miles from the downstream end of the AU at Heritage Rd in Acton. Both samples were pretty small (n= 12 & 11) but included 50% or 100%, respectively, intolerant/moderately tolerant macrohabitat generalists, which is considered adequate for a warmwater fishery.

The Aquatic Life Use of Fort Pond Brook (MA82B-13) will continue to be assessed as Fully Supporting based on the 2018 fish community data.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
7427	MassDFG	Fish Community	Fort Pond Brook	Coughlin Rd. downstream, Littleton	42.50529	-71.47373
7430	MassDFG	Fish Community	Fort Pond Brook	Heritage Rd., Acton	42.46027	-71.42531

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: B = Bluegill, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RBS = Redbreast Sunfish, RP = Redfin Pickerel, SS = Spottail Shiner]

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
7427	06/27/18	BP	TP	L	3	12	0%	0	0%	0%	1	50%	Yes	No	B, GS, RP,
7430	07/05/18	BP	TP	L	4	11	0%	0	0%	0%	4	100%	No	No	LMB, P, RBS, SS,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Fort Pond Brook (MA82B-13), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No data are available for Fort Pond Brook (MA82B-13), so the Aesthetics Use is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment		Alert
Not Assessed		NO
2022 Use Attainment Summary		
No bacteria data are available for Fort Pond Brook (MA82B-13), so the Primary Contact Recreational Use is Not Assessed.		

Secondary Contact Recreation

2022 Use Attainment		Alert
Not Assessed		NO
2022 Use Attainment Summary		
No bacteria data are available for Fort Pond Brook (MA82B-13), so the Secondary Contact Recreational Use is Not Assessed.		

Framingham Reservoir #1 (MA82044)

Location:	Framingham.
AU Type:	FRESHWATER LAKE
AU Size:	117 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

No usable data were available for Framingham Reservoir #1 (MA82044) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	(Water Chestnut*)		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
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Mercury in Fish Tissue	Source Unknown (N)		X			

Framingham Reservoir #2 (MA82045)

Location:	Framingham/Ashland.
AU Type:	FRESHWATER LAKE
AU Size:	114 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

No usable data were available for Framingham Reservoir #2 (MA82045) 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	Mercury in Fish Tissue		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
Mercury in Fish Tissue	Source Unknown (N)		X			
Turbidity	Source Unknown (N)			X	X	X

Framingham Reservoir #3 (MA82046)

Location:	Framingham.
AU Type:	FRESHWATER LAKE
AU Size:	222 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Framingham Reservoir #3 (MA82046) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		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) (N)	X				

Gates Pond (MA82047)

Location:	Berlin.
AU Type:	FRESHWATER LAKE
AU Size:	73 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Gates Pond (MA82047) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

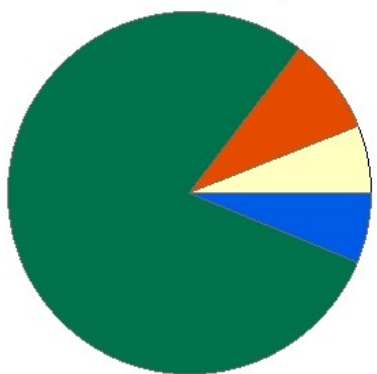
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Gates Pond Brook (MA82B-10)

Location:	Headwaters, outlet Gates Pond, Berlin to mouth at confluence with the Assabet River, Berlin.
AU Type:	RIVER
AU Size:	1 MILES
Classification/Qualifier:	B

Gates Pond Brook - MA82B-10

Watershed Area: 0.98 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	0.98	0.98	0.49	0.49
Agriculture	6%	6%	6.8%	6.8%
Developed	8.7%	8.7%	8.2%	8.2%
Natural	79.1%	79.1%	75.8%	75.8%
Wetland	6.2%	6.2%	9.3%	9.3%
Impervious Cover	3.2%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	2	None		Unchanged

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDFG biologists conducted backpack electrofishing in Gates Pond Brook at the River Rd crossing in Berlin (Sample ID 8348) in July 2019. The sample (n=29) was comprised of 7% fluvial individuals (blacknose dace), as well as 31% intolerant/moderately tolerant macrohabitat generalist taxa.</p> <p>The Aquatic Life Use of Gates Pond Brook (MA82B-10) is assessed as Fully Supporting based on the 2019 fish sampling data. The prior Alert for benthic macroinvertebrates (O'Brien-Clayton 2005) is being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
8348	MassDFG	Fish Community	Gates Pond Brk.	River Rd. Crossing , Berlin	42.36220	-71.61010

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: B = Bluegill, BB = Brown Bullhead, BND = Blacknose Dace, LMB = Largemouth Bass, 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
8348	07/24/19	BP	TP	L	6	29	0%	1	7%	0%	3	31%	No	No	B, BB, BND, LMB, P, RP,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Gates Pond Brook (MA82B-10), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No data are available, so the Aesthetics Use of Gates Pond Brook (MA82B-10) 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 Recreational Use of Gates Pond Brook (MA82B-10) 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 Recreational Use of Gates Pond Brook (MA82B-10) is Not Assessed.	

Gleasons Pond (MA82048)

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

No usable data were available for Gleasons Pond (MA82048) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

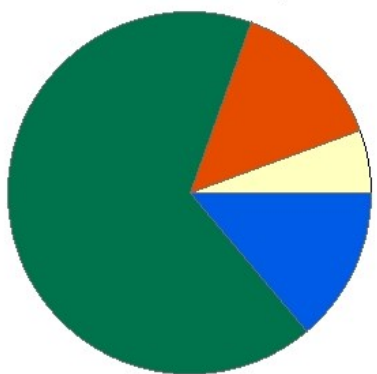
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Great Brook (MA82B-29)

Location:	Headwaters, perennial portion east of Harvard Road, Bolton to mouth at inlet Delaney Pond (impoundment of Elizabeth Brook), Stow.
AU Type:	RIVER
AU Size:	5.7 MILES
Classification/Qualifier:	B

Great Brook - MA82B-29

Watershed Area: 7.99 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.99	6.93	2.77	2.45
Agriculture	5.6%	4.3%	4.2%	4.1%
Developed	13.9%	13.8%	12.3%	11.8%
Natural	66.6%	67.3%	56.2%	55.7%
Wetland	13.8%	14.6%	27.3%	28.5%
Impervious Cover	6.1%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	5	Escherichia Coli (E. Coli)		Added

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

Recommendations

2022 Recommendations

ALU: Conduct fisheries and water quality surveys in Great Brook upstream of the 2015 station (fish sample 6363, WQ Station W2525), in reaches not under the influence of beaver dams, to better evaluate the extent of the coldwater habitat in this brook and whether water quality conditions support this kind of community.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff surveyed two locations in Great Brook (a CFR and Tier 1 Cold Water Existing Use stream): 1) at the Rt 117 crossing nearest Meadow Rd in Bolton where fish (Sample 6363), benthic (Station B0924), and water quality (WQ) (Station W2525) sampling was conducted during summer 2015 and 2) north of Rt 117, Bolton ~1400 ft upstream of the inlet to Delaney Pond (impoundment of Elizabeth Br. in Stow) where fish (Samples 6387, 6344), benthic (Station B0945), and WQ (Station W2541) surveys were conducted in 2015 and 2016. The fish community sample (n=27) from the upstream location included one Eastern brook trout (EBT) >140 mm (notes did not indicate whether it was wild caught, as were the EBT collected just downstream of this sampling reach in June 2001 - Sample 531) (MassDFG 2020)), as well as 78% fluvial species. Fish samples from the downstream site were fairly similar to each other, despite the drought in 2016 (Drought Management Task Force 2021); the samples (n= 46 and 56) contained 28 and 20% fluvial species plus another 52 or 71% intolerant/moderately tolerant macrohabitat generalists. The July benthic sample at the upstream site (B0924) had an IBI score of 40, indicating that conditions were moderately degraded for a Central Hills high gradient location. The downstream benthic sample, collected in Aug 2015, had a score of 50 (indicating moderate degradation for a Central Hills high gradient site), while the Sept 2016 sample, analyzed with the low gradient IBI, had a score of 70 (indicating satisfactory conditions). Since the gradient classification was on the border, MassDEP biologists judged the low gradient IBI analysis to be more accurate for this site condition. DO was measured with deployed probes during all 3 station-years over periods ranging from 85-135 days. The 7DADMin were <6.0 mg/L 79 times near Rt 117 (W2525) and 2/11 times in 2015/2016 near the inlet to Delaney Pond (W2541) (7DADMin all >5.0 mg/L at this site). Although there are quite a few non-community groundwater wells fairly close to the stream, it is of note that multiple beaver dams are present upstream of the Rt 117 site. Temperature was measured via deployed probes in all 3 station-years, from 70-107 days during the summer index periods. The 7DADMin were >20.0 °C 67-98 times but never >27.7 °C. Other data are summarized as follows and were generally indicative of good conditions: pH 6.4-7.1 S.U. (n= 3-4/station-yr), there was little indication of nutrient enrichment (total phosphorus seasonal averages 0.012-0.022 mg/L with n= 4-5/station-yr, max DO saturation 92%, only one observation of excessive filamentous algae at the Rt 117 site; however, the max DO diel shift was 5.6 mg/L this site and 3.1 mg/L in 2016 near the inlet to Delaney Pond), there were no exceedances among three clean metals samples (both stations; 2015 only) or the three aluminum samples collected only at Rt 117 (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), max Total Ammonia Nitrogen was 0.080 mg/L (n= 4-5/station-yr), max chloride was 170 mg/L (n= 4-5/station-yr), and max specific conductance was 690 µs/cm (n= 3-4/station-yr).</p> <p>The Aquatic Life Use of Great Brook (MA82B-29) is assessed as Fully Supporting but with a number of Alerts. Eastern brook trout were only historically collected (Sample 531) near the upstream site (Sample 6363) and this location is now impacted by beaver dams, so it is not clear whether cold water habitat still exists in the stream (this influences interpretation of water quality data). Since human stressors do exist in the subwatershed (non-community groundwater wells, 6.1% impervious cover), Alerts for Benthic Macroinvertebrates, low DO and elevated temperature are being identified, and the Alert for a lack of coldwater fish will be carried forward. Future sampling should be conducted farther upstream in the subwatershed in reaches not under the influence of beaver dams.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6344	MassDEP	Fish Community	Great Brook	, Bolton	42.44442	-71.55170
6363	MassDEP	Fish Community	Great Brook	50 m DS/50m US of site, Bolton	42.43570	-71.57041
6387	MassDEP	Fish Community	Great Brook	, Bolton	42.44442	-71.55170

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
B0924	MassDEP	Benthic	Great Brook/	[Route 117 crossing nearest the Meadow Road intersection, Bolton, MA]	42.435696	-71.570410
B0945	MassDEP	Benthic	Great Brook/	[north of Route 117, Bolton approximately 425 meters upstream of mouth at inlet of Delaney Pond, Stow, MA]	42.444418	-71.551697
W2525	MassDEP	Water Quality	Great Brook	[Route 117 crossing nearest the Meadow Road intersection, Bolton]	42.435696	-71.570410
W2541	MassDEP	Water Quality	Great Brook	[north of Route 117, Bolton approximately 1400 feet upstream of mouth at inlet of Delaney Pond, Stow]	42.444418	-71.551697

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0924	07/21/15	RBP kicknet	Central_Hills_300ct	300	40	MD
B0945	08/05/15	RBP kicknet	Central_Hills_300ct	323	50	MD
B0945	09/07/16	RBP multihab	Statewide_Low_Gradient	313	70	S

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, BND = Blacknose Dace, BS = Banded Sunfish, CCS = Creek Chubsucker, CP = Chain Pickerel, EBT = Brook Trout, LMB = Largemouth Bass, P = Pumpkinseed, RP = Redfin Pickerel, 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
6344	08/18/16	BP	TP		9	56	0%	2	20%	27%	6	71%	Yes	Yes	BND, BS, CCS, CP, LMB, P, RP, YB, YP,
6363	06/30/15	BP	TP		5	27	4%	3	78%	4%	1	11%	No	Yes	AE, BND, EBT, RP, WS,
6387	09/08/15	BP	TP		8	46	0%	3	28%	11%	4	52%	No	Yes	BND, BS, CCS, CP, P, RP, WS, YB,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	07/08/15	09/30/15	85	79	56	0.2	0.3	0.7	5.6	79	40	21	9	44	18	56	56
W2541	05/28/15	09/16/15	111	99	82	4.7	5.5	6.3	2.2	2	1	1	1	0	0	82	0
W2541	05/12/16	09/26/16	135	116	105	4.2	5.6	6.5	3.1	11	2	0	0	0	0	99	0

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	08/11/15	10/01/15	3	6.5	7	0	0	0
W2541	06/23/15	09/17/15	4	7	7.3	0	0	0
W2541	06/08/16	09/27/16	4	6.9	7.6	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2525	07/08/15	09/15/15	70	67	24.5	29.0	27.5	23.4	67	4	51	1	0	0
W2541	06/01/15	09/15/15	107	105	24.6	26.2	25.7	24.1	98	12	68	9	0	0
W2541	06/01/16	09/15/16	106	100	25.6	28.3	25.6	23.5	85	8	45	5	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2525	07/07/15	09/15/15	70	3336	24.4	287	45	0
W2541	06/01/15	09/15/15	107	5136	24.8	615	368	0

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
W2541	06/01/16	09/15/16	107	5092	25.9	375	178	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	08/11/15	10/01/15	3	2	23.0	19.5	1	1	0	0
W2541	06/23/15	09/17/15	4	3	24.7	22.6	4	2	0	0
W2541	06/08/16	09/27/16	4	3	23.8	21.1	3	2	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2525	08/11/15	10/01/15	3	6.7	6.9	0	0
W2541	06/23/15	09/17/15	4	6.7	7.1	0	0
W2541	06/08/16	09/27/16	3	6.4	7	1	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	2015	5	0.017	0.031	0.022	5.6	1.3	78.4	6.9	5	1
W2541	2015	4	0.009	0.017	0.014	2.2	0.6	92.0	7.1	4	0
W2541	2016	4	0.01	0.018	0.012	3.1	1.0	89.3	7.0	3	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)**MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations.** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2525	2015	5	0.040	0.080	0.064	0	0
W2541	2015	4	0.040	0.040	0.040	0	0
W2541	2016	4	0.040	0.050	0.043	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2525	2015	5	130	170	146	0	0
W2541	2015	4	73	140	116	0	0
W2541	2016	4	56	100	73	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2525	08/11/15	10/01/15	3	467	690	0	0	0	0	0	0
W2541	06/23/15	09/17/15	4	410	595	0	0	0	0	0	0
W2541	06/08/16	09/27/16	4	296	420	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 Great Brook (MA82B-29), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys in Great Brook (MA82B-29) at two locations: at the Rt 117 crossing nearest the Meadow Rd intersection in Bolton (Station W2525) during summer 2015 and north of Rt 117, Bolton ~ 1400 ft upstream of the mouth at the inlet to Delaney Pond (impoundment of Elizabeth Brook in Stow) (Station W2541) in summer 2015 and 2016. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews at either location.</p> <p>The Aesthetics Use of Great Brook (MA82B-29) is assessed as Fully Supporting based on the lack of objectionable conditions observed by MassDEP staff during the summers of 2015 and/or 2016.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2525	MassDEP	Water Quality	Great Brook	[Route 117 crossing nearest the Meadow Road intersection, Bolton]	42.435696	-71.570410
W2541	MassDEP	Water Quality	Great Brook	[north of Route 117, Bolton approximately 1400 feet upstream of mouth at inlet of Delaney Pond, Stow]	42.444418	-71.551697

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2525	Great Brook	2015	5	MassDEP aesthetics observations for station W2525/MAP2-692 on Great 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.
W2541	Great Brook	2015	4	MassDEP aesthetics observations for station W2541 on Great 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.
W2541	Great Brook	2016	4	MassDEP aesthetics observations for station W2541 on Great 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2525	2015	5	5	1
W2541	2015	4	4	0
W2541	2016	4	3	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2525	Great Brook	2015	Color	Light Yellow/Tan	5	5
W2525	Great Brook	2015	Objectionable Deposits	No	5	5
W2525	Great Brook	2015	Odor	None	4	5
W2525	Great Brook	2015	Odor	Petroleum	1	5
W2525	Great Brook	2015	Scum	No	5	5
W2525	Great Brook	2015	Turbidity	None	3	5
W2525	Great Brook	2015	Turbidity	Slightly Turbid	2	5
W2541	Great Brook	2015	Color	Light Yellow/Tan	2	4
W2541	Great Brook	2015	Color	None	2	4
W2541	Great Brook	2015	Objectionable Deposits	No	4	4
W2541	Great Brook	2015	Odor	None	4	4
W2541	Great Brook	2015	Scum	No	4	4
W2541	Great Brook	2015	Turbidity	None	4	4
W2541	Great Brook	2016	Color	Brownish	1	4
W2541	Great Brook	2016	Color	Light Yellow/Tan	2	4
W2541	Great Brook	2016	Color	None	1	4
W2541	Great Brook	2016	Objectionable Deposits	No	4	4
W2541	Great Brook	2016	Odor	None	4	4
W2541	Great Brook	2016	Scum	No	3	4
W2541	Great Brook	2016	Scum	Yes	1	4
W2541	Great Brook	2016	Turbidity	None	3	4
W2541	Great Brook	2016	Turbidity	Slightly Turbid	1	4

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys in Great Brook (MA82B-29) at two locations: at the Rt 117 crossing nearest the Meadow Rd intersection in Bolton (Station W2525) during summer 2015 and north of Rt 117, Bolton ~ 1400 ft upstream of the mouth at the inlet to Delaney Pond (impoundment of Elizabeth Brook in Stow) (Station W2541) in summer 2015 and 2016. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews at either location. <i>E. coli</i> bacteria samples were collected only at the upstream location (W2525). Analysis of this low frequency data (n=5) indicated that 100% of intervals had GMs >126 cfu/100mL and one sample exceeded the 410 cfu/100mL STV. The seasonal GM was 352 cfu/100mL.</p> <p>Since <i>E. coli</i> concentrations exceeded the use attainment impairment thresholds for the single year limited frequency dataset, the Primary Contact Recreational Use for Great Brook (MA82B-29) is assessed as Not Supporting.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2525	MassDEP	Water Quality	Great Brook	[Route 117 crossing nearest the Meadow Road intersection, Bolton]	42.435696	-71.570410

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

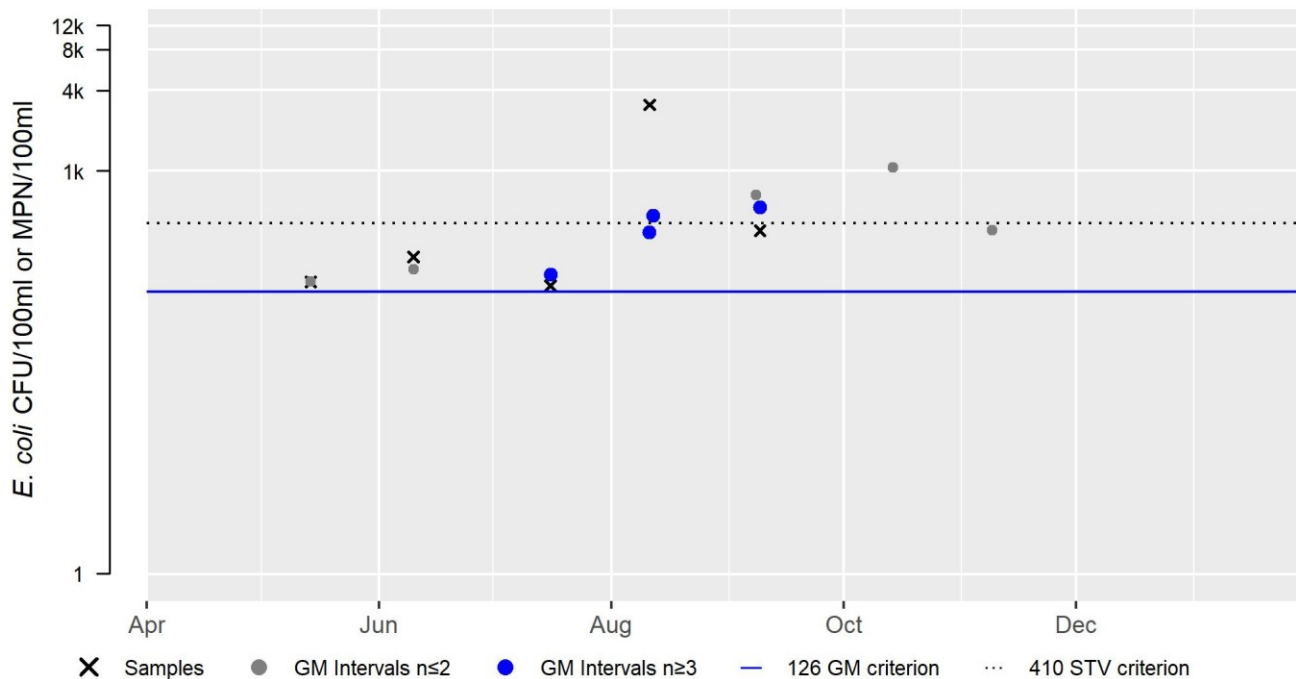
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2525	MassDEP	E. coli	05/14/15	09/09/15	5	140	3100	352

W2525 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	352
#GMI	4
#GMI Ex	4
%GMI Ex	100
n>STV	1
%n>STV	20

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

2015



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

MassDEP field crews conducted surveys in Great Brook (MA82B-29) at two locations: at the Rt 117 crossing nearest the Meadow Rd intersection in Bolton (Station W2525) during summer 2015 and north of Rt 117, Bolton ~ 1400 ft upstream of the mouth at the inlet to Delaney Pond (impoundment of Elizabeth Brook in Stow) (Station W2541) in summer 2015 and 2016. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by field sampling crews at either location. *E. coli* bacteria samples were collected only at the upstream location (W2525). Analysis of this low frequency data (n=5) indicated that none of the intervals had GMs >630 cfu/100mL but one sample exceeded the 1260 cfu/100mL STV. The seasonal GM was 352 cfu/100mL.

The Secondary Contact Recreational Use of Great Brook (MA82B-29) is assessed as Fully Supporting since *E. coli* concentrations did not exceed the use attainment impairment thresholds for this single year limited frequency dataset.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2525	MassDEP	Water Quality	Great Brook	[Route 117 crossing nearest the Meadow Road intersection, Bolton]	42.435696	-71.570410

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

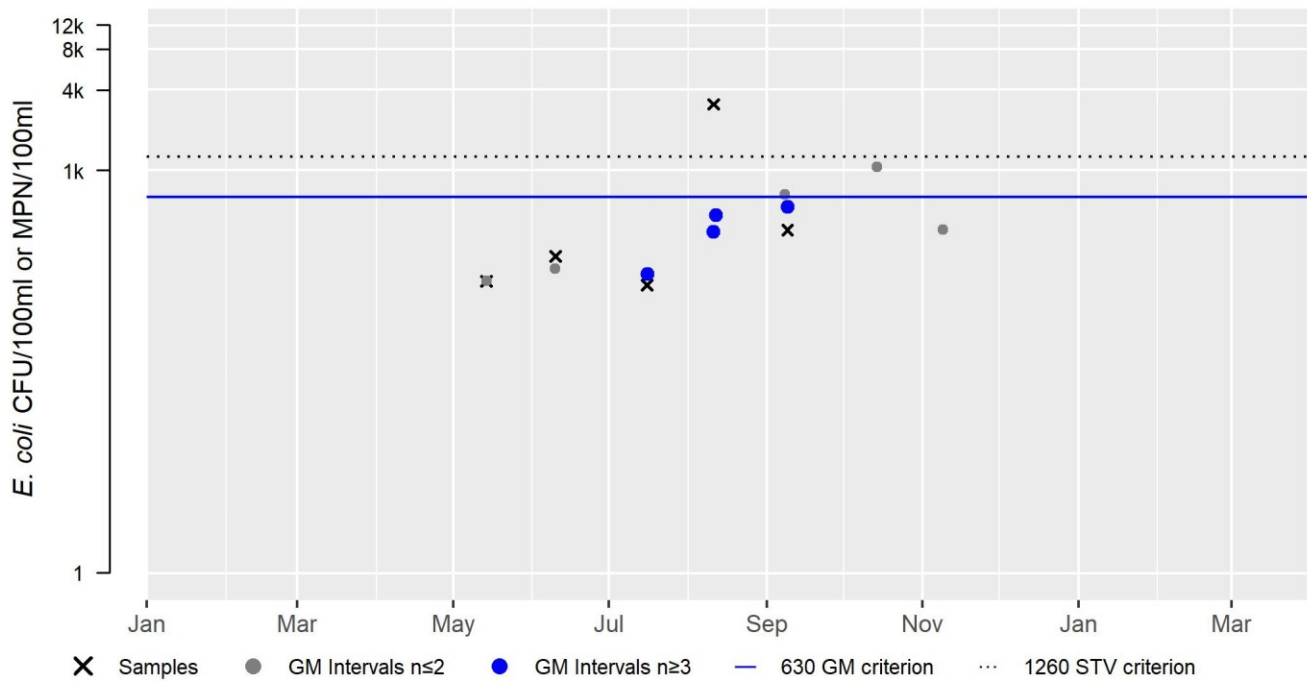
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2525	MassDEP	E. coli	05/14/15	09/09/15	5	140	3100	352

W2525 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	352
#GMI	4
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Great Meadows Pond #3 (MA82053)

Location:	Concord.
AU Type:	FRESHWATER LAKE
AU Size:	53 ACRES
Classification/Qualifier:	B

No usable data were available for Great Meadows Pond #3 (MA82053) 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	(Water Chestnut*)		Unchanged

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

Grist Mill Pond (MA82055)

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

No usable data were available for Grist Mill Pond (MA82055) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
5	5	Phosphorus, Total		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Dissolved Oxygen Supersaturation	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen Supersaturation	Source Unknown (N)	X				
Fecal Coliform	Municipal Point Source Discharges (Y)				X	X
Fecal Coliform	Source Unknown (N)				X	X
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)	X		X	X	X
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Phosphorus, Total	Source Unknown (N)	X				

Hager Pond (MA82056)

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

No usable data were available for Hager Pond (MA82056) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		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
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Dissolved Oxygen Supersaturation	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen Supersaturation	Source Unknown (N)	X				
Fecal Coliform	Municipal Point Source Discharges (Y)				X	X
Fecal Coliform	Source Unknown (N)				X	X
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X		X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)	X		X	X	X
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Phosphorus, Total	Source Unknown (N)	X				
Turbidity	Municipal Point Source Discharges (Y)			X	X	X
Turbidity	Source Unknown (N)			X	X	X

Heard Pond (MA82058)

Location:	Wayland.
AU Type:	FRESHWATER LAKE
AU Size:	76 ACRES
Classification/Qualifier:	B

No usable data were available for Heard Pond (MA82058) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Fanwort*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Mercury in Fish Tissue		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
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Source Unknown (N)	X		X	X	X
Mercury in Fish Tissue	Source Unknown (N)		X			
Transparency / Clarity	Source Unknown (N)			X	X	X

Heart Pond (MA82059)

Location:	Chelmsford/Westford.
AU Type:	FRESHWATER LAKE
AU Size:	94 ACRES
Classification/Qualifier:	B

No usable data were available for Heart Pond (MA82059) 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	(Non-Native Fish/Shellfish/Zooplankton*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Escherichia Coli (E. Coli)		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
(Non-Native Fish/Shellfish/Zooplankton*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Escherichia Coli (E. Coli)	Waterfowl (Y)				X	
Mercury in Fish Tissue	Atmospheric Deposition (N)		X			

Hocomonco Pond (MA82060)

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

No usable data were available for Hocomonco Pond (MA82060) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)		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				
Polycyclic Aromatic Hydrocarbons (PAHs) (Aquatic Ecosystems)	CERCLA NPL (Superfund) Sites (Y)		X			

Hop Brook (MA82A-05)

Location:	Headwaters, outlet Carding Mill Pond, Sudbury to confluence with Allowance Brook, Sudbury (through former 2014 segment: Stearns Mill Pond MA82104) (prior to 1987, USGS topographic quadrangles depicted Allowance Brook as Landham Brook) (prior to 1998 this segment included waters between Marlborough East WWTP and Carding Mill Pond outlet).
AU Type:	RIVER
AU Size:	6.7 MILES
Classification/Qualifier:	B: WWF

For the 2022 Integrated Reporting cycle, the category, use attainments, impairments, associated actions, and sources remain unchanged for Hop Brook (MA82A-05) from the previous IR reporting cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Water Chestnut*)		Unchanged
5	5	Algae		Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Algae	Municipal Point Source Discharges (Y)	X		X	X	X
Algae	Source Unknown (N)	X		X	X	X
Benthic Macroinvertebrates	Source Unknown (N)	X				
Dissolved Oxygen	Dam or Impoundment (Y)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen Supersaturation	Dam or Impoundment (Y)	X				
Dissolved Oxygen Supersaturation	Municipal Point Source Discharges (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)	X				
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Turbidity	Municipal Point Source Discharges (Y)			X	X	X
Turbidity	Source Unknown (N)			X	X	X

Hop Brook (MA82A-06)

Location:	From the confluence of Allowance Brook, Sudbury to mouth at confluence with the Sudbury River, Wayland (MA82A-06 changed from Wash Brook to Hop Brook in 2006: prior to 1987 USGS topographic quadrangles depicted this stretch of river as Wash Brook and Allowance Brook as Landham Brook).
AU Type:	RIVER
AU Size:	3 MILES
Classification/Qualifier:	B: WWF

For the 2022 Integrated Reporting cycle, the category, use attainments, impairments, associated actions, and sources remain unchanged for Hop Brook (MA82A-06) from the previous IR reporting cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Dissolved Oxygen		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
5	5	Phosphorus, Total		Unchanged

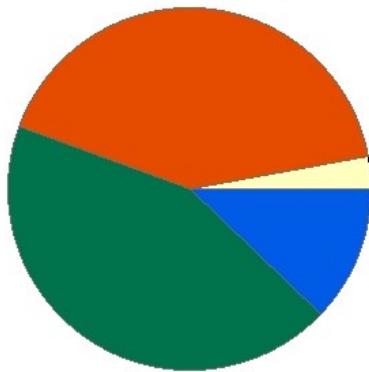
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Dissolved Oxygen	Dam or Impoundment (Y)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Nutrient/Eutrophication Biological Indicators	Municipal Point Source Discharges (Y)			X	X	X
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)			X	X	X
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				

Hop Brook (MA82B-20)

Location:	Outlet Smith Pond, Northborough to mouth at confluence with the Assabet River, Northborough.
AU Type:	RIVER
AU Size:	1.3 MILES
Classification/Qualifier:	B

Hop Brook - MA82B-20

Watershed Area: 7.85 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.85	6.61	2.6	2.35
Agriculture	2.9%	3.4%	3.1%	3.4%
Developed	41.5%	38.9%	31.4%	30.4%
Natural	43.4%	44.1%	42.3%	42.3%
Wetland	12.2%	13.6%	23.1%	23.9%
Impervious Cover	20%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	5	Benthic Macroinvertebrates		Added
2	5	Chloride		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				
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (Y)	X				
Chloride	Impervious Surface/Parking Lot Runoff (Y)	X				

Recommendations

2022 Recommendations
OTHER: Given the regional trend of increasing chloride and the new chloride impairment identified for Hop Brook (MA82B-20), the use of de-icing products containing chloride should be minimized by all parties (i.e., highways/roads, municipalities, businesses, residences) in the Hop Brook sub-watershed. While MassDFG maps this Hop Brook AU (MA82B-20) as a CFR, young of the year Eastern brook trout were captured in a reach much farther upstream (and upstream of two dams) in 2001 (Sample ID 371). MassDEP should work with DFG to determine whether CFR mapping should be updated downstream of the Hop Brook and Smith Pond dams.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted fish (Sample ID 6367), benthic (Station B0930), and water quality (W2531/MAP2-703) surveys of this Hop Brook AU (MA82B-20) east of Otis St, Northborough and approximately 2900 ft upstream of the confluence with the Assabet River during summer 2015. The fish community sample, collected in mid-August, was on the smaller side (n=14) and included 7% fluvial individuals (white sucker), as well as an additional 29% intolerant/moderately tolerant macrohabitat generalist species (adequate for a WWF). However, the August benthic sample had an IBI score of 50, indicating that conditions were moderately degraded for a low gradient location. A probe was deployed to measure DO for 85 days from July through September and the minimum DO of the entire period was 5.4 mg/L. Continuous temperature measurements were recorded over 70 days in the summer index period with a maximum of 27.5 °C (acceptable for a WWF). Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.7-7.1 S.U. (n=3), there was no indication of nutrient enrichment (total phosphorus seasonal average was 0.028 mg/L with n=5, maximum DO diel shift was 1.7 mg/L, maximum DO saturation was 78.4%, and no observations of excessive filamentous algae), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), and the maximum Total Ammonia Nitrogen was 0.090 mg/L (n=5). Among five chloride samples, two had concentrations greater than 230 mg/L (the chronic toxicity criterion), with a maximum of 250 mg/L. Similarly, one of three specific conductance measurements was >904 µs/cm (the estimated chloride chronic criterion), with a maximum of 944 µs/cm. As part of the public comment process on the draft 2022 IR, the OARS watershed association commented that this Hop Brook MA82B-20 AU should be assessed as impaired for chloride. Four of seven chloride samples OARS staff/volunteers collected from 2018-2020 at OARS-HOP-011 station (Hop Br, Northboro), downstream of Otis St, exceeded the 230 mg/L chloride chronic criterion (exceedances 258-294 mg/L) (OARS 2021). Of note, impervious cover (including highways, roads, and residential and commercial areas) comprises a large percentage (20%) of this subwatershed.</p> <p>The Aquatic Life Use of this Hop Brook AU (MA82B-20) is assessed as Not Supporting, with new impairments being added for Benthic Macroinvertebrates (the prior benthic macroinvertebrates Alert is being removed) and Chloride (4 of 7 OARS chloride samples collected 2018-2020 exceeded 230 mg/L).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6367	MassDEP	Fish Community	Hop Brook (1)	East of Otis St, Northborough, approximately 2900 ft US of mouth at confluence with Assabet River., Northborough	42.28713	-71.65129

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
B0930	MassDEP	Benthic	Hop Brook/	[east of Otis Street, Northborough approximately 885 meters upstream of mouth at confluence with Assabet River, Northborough, MA]	42.287132	-71.651289
W2531	MassDEP	Water Quality	Hop Brook	[east of Otis Street, Northborough approximately 2900 feet upstream of mouth at confluence with Assabet River, Northborough]	42.287132	-71.651289

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0930	08/05/15	RBP multihab	Statewide_Low_Gradient	311	50	MD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, BB = Brown Bullhead, P = Pumpkinseed, RP = Redfin Pickerel, WS = White Sucker, YB = Yellow Bullhead]

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
6367	08/18/15	BP	TP		6	14	0%	1	7%	0%	2	29%	No	Yes	AE, BB, P, RP, WS, YB,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	07/08/15	09/30/15	85	79	56	5.4	5.7	6.2	1.7	14	0	0	0	0	0	56	0

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	08/11/15	10/01/15	3	6.3	6.8	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2531	07/08/15	09/15/15	70	67	24.9	27.5	26.2	24.0	67	15	63	8	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2531	07/07/15	09/15/15	71	3342	25.0	699	367	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	08/11/15	10/01/15	3	2	22.3	20.2	2	1	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2531	08/11/15	10/01/15	3	6.7	7.1	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	2015	5	0.016	0.046	0.028	1.7	1.0	78.4	7.1	4	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2531	2015	5	0.040	0.090	0.064	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2531	2015	5	180	250	216	2	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6)
(MassDEP Undated 4)

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
W2531	08/11/15	10/01/15	3	466	944	1	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in this Hop Brook AU (MA82B-20), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys of this Hop Brook AU (MA82B-20) on five occasions during summer 2015. Observations of conditions at a location east of Otis Street, Northborough (Sample ID W2531/MAP2-703, approximately 2900 feet upstream of the confluence with the Assabet River) indicated there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity).</p> <p>The Aesthetics Use of this Hop Brook AU (MA82B-20) is assessed as Fully Supporting based on the lack of objectionable conditions observed by MassDEP staff during the summer of 2015.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2531	MassDEP	Water Quality	Hop Brook	[east of Otis Street, Northborough approximately 2900 feet upstream of mouth at confluence with Assabet River, Northborough]	42.287132	-71.651289

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2531	Hop Brook	2015	5	MassDEP aesthetics observations for station W2531/MAP2-703 on Hop 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2531	2015	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2531	Hop Brook	2015	Color	Light Yellow/Tan	4	5
W2531	Hop Brook	2015	Color	None	1	5
W2531	Hop Brook	2015	Objectionable Deposits	No	5	5
W2531	Hop Brook	2015	Odor	None	5	5
W2531	Hop Brook	2015	Scum	No	5	5
W2531	Hop Brook	2015	Turbidity	None	4	5
W2531	Hop Brook	2015	Turbidity	Slightly Turbid	1	5

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys of this Hop Brook AU (MA82B-20) on five occasions during summer 2015. Observations of conditions at a location east of Otis Street, Northborough (Sample ID W2531/MAP2-703, approximately 2900 feet upstream of the confluence with the Assabet River) indicated there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity). <i>E. coli</i> bacteria samples were collected on all five site visits. Analysis of this low frequency data indicated that 25% of intervals had GMs >126 cfu/100mL and one sample exceeded the 410 cfu/100mL STV. The seasonal GM was 133 cfu/100mL.</p> <p>The Primary Contact Recreational Use of this Hop Brook AU (MA82B-20) is assessed as Fully Supporting since <i>E. coli</i> concentrations did not exceed the use attainment impairment thresholds for this single year limited frequency dataset and there was a lack of objectionable conditions.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2531	MassDEP	Water Quality	Hop Brook	[east of Otis Street, Northborough approximately 2900 feet upstream of mouth at confluence with Assabet River, Northborough]	42.287132	-71.651289

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis)** (MassDEP Undated 6) (MassDEP Undated 4)

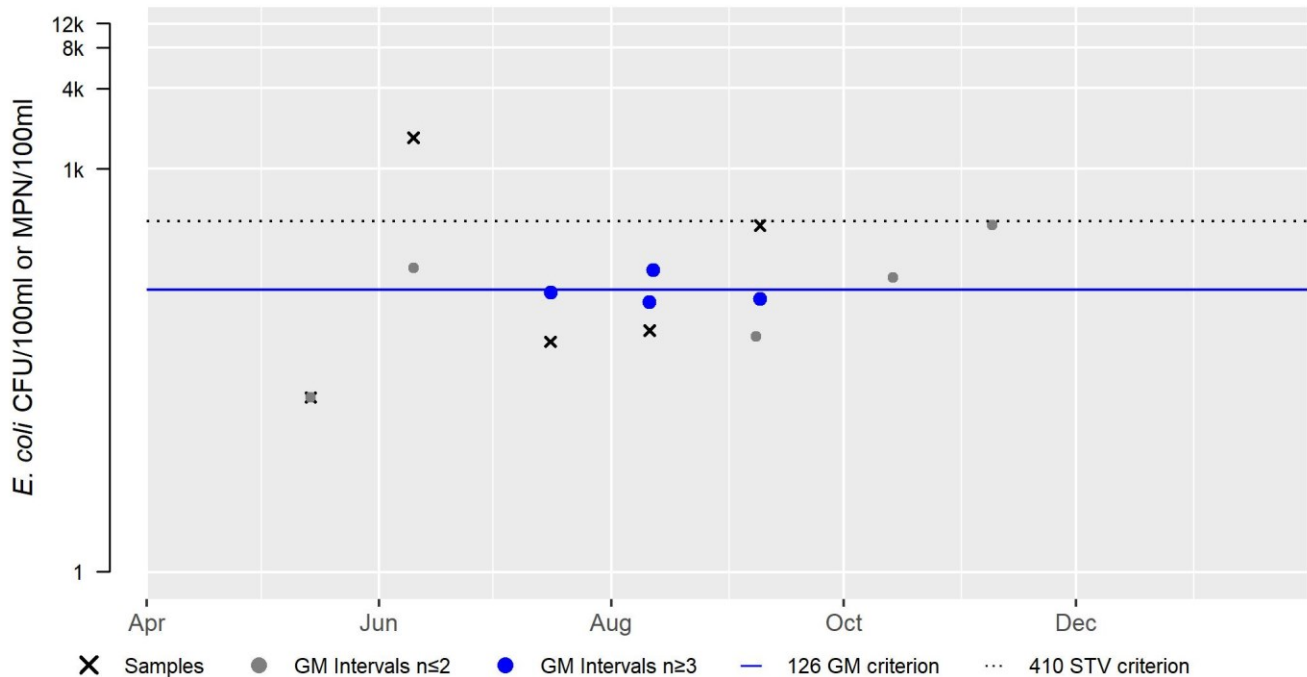
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2531	MassDEP	E. coli	05/14/15	09/09/15	5	20	1700	133

W2531 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	133
#GMI	4
#GMI Ex	1
%GMI Ex	25
n>STV	1
%n>STV	20

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

2015**Secondary Contact Recreation**

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

MassDEP field crews conducted surveys of this Hop Brook AU (MA82B-20) on five occasions during summer 2015. Observations of conditions at a location east of Otis Street, Northborough (Sample ID W2531/MAP2-703, approximately 2900 feet upstream of the confluence with the Assabet River) indicated there were generally no noted objectionable conditions (odors, deposits, growths, or turbidity). *E. coli* bacteria samples were collected on all five site visits. Analysis of this low frequency data indicated that none of the intervals had GMs >630 cfu/100mL and one sample exceeded the 1260 cfu/100mL STV. The overall GM was 133 cfu/100mL.

The Secondary Contact Recreational Use of this Hop Brook AU (MA82B-20) is assessed as Fully Supporting since *E. coli* concentrations did not exceed the use attainment impairment thresholds for this single year limited frequency dataset and there was a lack of aesthetically objectionable conditions.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2531	MassDEP	Water Quality	Hop Brook	[east of Otis Street, Northborough approximately 2900 feet upstream of mouth at confluence with Assabet River, Northborough]	42.287132	-71.651289

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

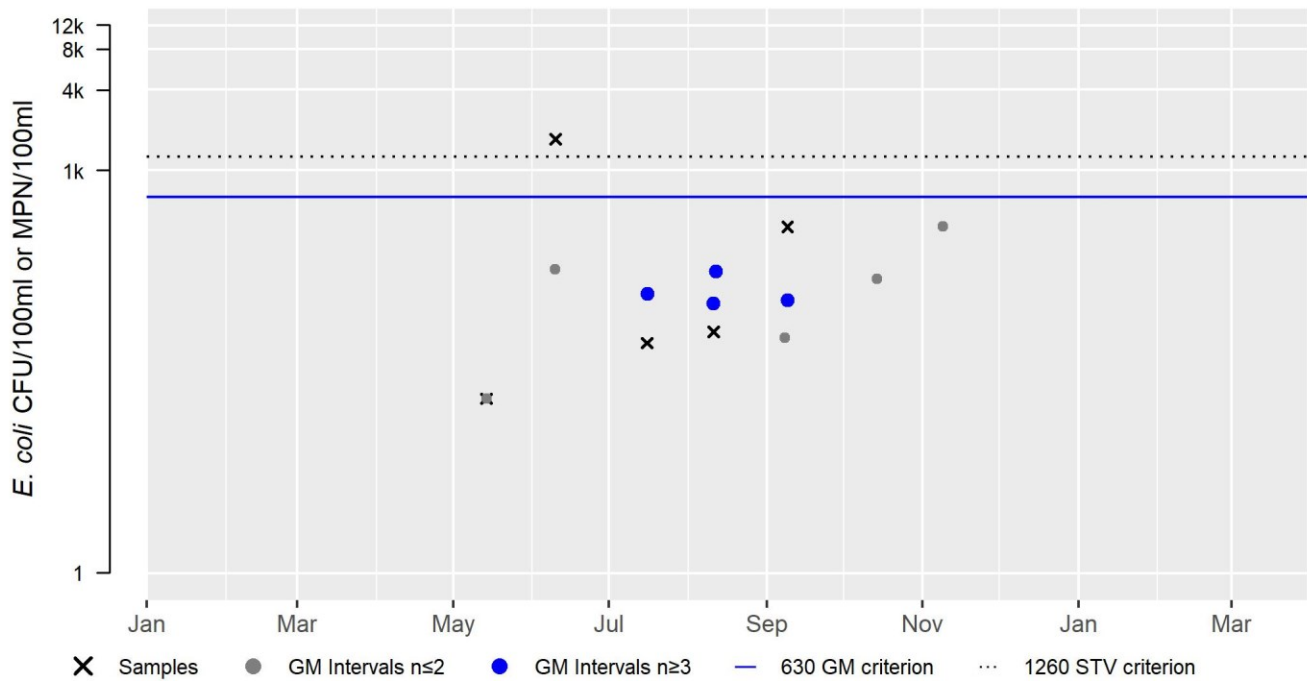
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2531	MassDEP	E. coli	05/14/15	09/09/15	5	20	1700	133

W2531 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	133
#GMI	4
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Hopkinton Reservoir (MA82061)

Location:	Hopkinton/Ashland.
AU Type:	FRESHWATER LAKE
AU Size:	161 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Harmful Algal Blooms		Added

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) (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Harmful Algal Blooms	Source Unknown (N)			X	X	X

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
C-HAB postings for Hopkinton Reservoir were reported to MassDPH for 37 days in 2019. The Aquatic Life Use of Hopkinton Reservoir (MA82061) is assessed as Not Supporting, with the prior impairments (Dissolved Oxygen, Non-Native Aquatic Plants) being carried forward. The prior Alert for low pH is also being carried forward and an Alert for Harmful Algal Blooms is being added (because of the risk of toxicity to aquatic wildlife provided by such an extended bloom, although it was not confirmed with monitoring data (Bailey, Logan April 15, 2021)).	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Hopkinton Reservoir (MA82061), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary
C-HAB postings for Hopkinton Reservoir (MA82061) were reported to MassDPH for 37 days in 2019. Since blooms >20 days in duration were reported in a recent year, the Aesthetics Use for Hopkinton Reservoir is assessed as Not Supporting with a Harmful Algal Blooms impairment being added.

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Hopkinton Reservoir (MA82061) were reported to MassDPH for 37 days in 2019. Since blooms >20 days in duration were reported in a recent year, the Primary/Secondary Contact Recreational Uses and Aesthetics Use are assessed as Not Supporting.

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
Hopkinton Reservoir	Not issued or confirmed by sampling					37	1	no

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
The Hopkinton Reservoir Upper Beach was posted 0-9% of the time 2014-2016, and in 2018-2019. The beach was posted 12% of the time in 2017. C-HAB postings for Hopkinton Reservoir were reported to MassDPH for 37 days in 2019. The Primary Contact Recreational Use of Hopkinton Reservoir (MA82061) is assessed as Not Supporting with a Harmful Algal Blooms impairment being added since blooms >20 days in duration were reported in a recent year. An Alert is also being added since beach postings exceeded 10% in one recent year.	

Beach Postings

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

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%
4935	Hopkinton Reservoir-Upper Beach (DCR)/Ashland	42.25839	-71.51670	42.25854	-71.51540	0%	0%	1%	12%	1%	9%	1

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>The Hopkinton Reservoir Upper Beach was posted <10% (0-9%) of the time from 2014-2016, and in 2018-2019. The beach was posted 12% of the time in 2017. C-HAB postings for Hopkinton Reservoir (MA82061) were reported to MassDPH for 37 days in 2019.</p> <p>The Secondary Contact Recreational Use for Hopkinton Reservoir (MA82061) is assessed as Not Supporting with a Harmful Algal Blooms impairment being added since blooms >20 days in duration were reported in a recent year.</p>	

Howard Brook (MA82B-26)

Location:	Headwaters, perennial portion east of Green Street, Northborough to mouth at confluence with Assabet River, Northborough.
AU Type:	RIVER
AU Size:	3.5 MILES
Classification/Qualifier:	B

No usable data were available for Howard Brook (MA82B-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
3	3	None		Unchanged

Indian Brook (MA82A-23)

Location:	Headwaters, outlet Icehouse Pond, Hopkinton to the inlet of Hopkinton Reservoir, Hopkinton (formerly part of 2004 segment: Indian Brook MA82A-12).
AU Type:	RIVER
AU Size:	2.3 MILES
Classification/Qualifier:	B

No usable data were available for Indian Brook (MA82A-23) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

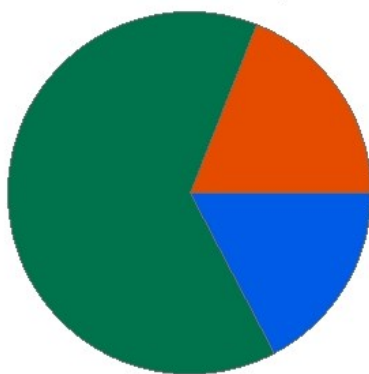
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Indian Brook (MA82A-24)

Location:	Outlet of Hopkinton Reservoir, Ashland to mouth at confluence with the Sudbury River, Ashland (formerly part of 2004 segment: Indian Brook MA82A-12).
AU Type:	RIVER
AU Size:	1.7 MILES
Classification/Qualifier:	B

Indian Brook - MA82A-24

Watershed Area: 7.84 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.84	4.62	2.72	1.17
Agriculture	0.3%	0.4%	0.2%	0.4%
Developed	18.9%	15.3%	15%	10.8%
Natural	63.6%	68.7%	54.9%	56.7%
Wetland	17.2%	15.6%	29.8%	32.1%
Impervious Cover	9.5%			

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
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDFG biologists conducted a backpack electrofishing survey in this Indian Brook AU (MA82A-24), downstream of Cross Street (Ashland), in August of 2017. The sample (n=26) included 50% fluvial individuals (white sucker) and 15% moderately tolerant macrohabitat generalists (pumpkinseed).</p> <p>The Aquatic Life Use of this Indian Brook AU (MA82A-24) is assessed as Fully Supporting based on the fish sample data collected in August 2017.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6822	MassDFG	Fish Community	Indian Brook	DS Cross St, Ashland	42.25601	-71.50208

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: B = Bluegill, P = Pumpkinseed, 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
6822	08/16/17	BP	TP	L	3	26	0%	1	50%	0%	1	15%	No	No	B, P, WS,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in this Indian Brook AU (MA82A-24), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available for this Indian Brook AU (MA82A-24), so the Aesthetics Use is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available for this Indian Brook AU (MA82A-24), so the Primary Contact Recreational Use is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available for this Indian Brook AU (MA82A-24), so the Secondary Contact Recreational Use is Not Assessed.	

Jackstraw Brook (MA82A-28)

Location:	From the most downstream crossing of Upton Road (first crossing south of Hopkinton Road), Westborough to mouth at inlet of Cedar Swamp Pond, Westborough.
AU Type:	RIVER
AU Size:	1.5 MILES
Classification/Qualifier:	B: ORW

No usable data were available for Jackstraw Brook (MA82A-28) 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

Jackstraw Brook (MA82A-32)

Location:	Headwaters, perennial portion west of Upton Road, Westborough to the most downstream crossing of Upton Road (first crossing south of Hopkinton Road), Westborough.
AU Type:	RIVER
AU Size:	0.4 MILES
Classification/Qualifier:	B: ORW, CWF

No usable data were available for Jackstraw Brook (MA82A-32) 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

Lake Cochituate (MA82020)

Location:	[North Basin] Natick/Framingham/Wayland.
AU Type:	FRESHWATER LAKE
AU Size:	196 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	Dissolved Oxygen		Unchanged
5	5	PCBs in Fish Tissue		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				
Dissolved Oxygen	Source Unknown (N)	X				
PCBs in Fish Tissue	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	
C-HAB postings for Lake Cochituate (North Basin) (MA82020) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision is not appropriate at this time. The Aquatic Life Use of Lake Cochituate (North Basin) (MA82020) will remain assessed as Not Supporting, with the prior Dissolved Oxygen and Eurasian Water Milfoil impairments being carried forward. Additionally, an Alert is being identified for C-HABs based on the 2019 short-duration bloom.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

Fish toxics sampling has not been conducted recently in Lake Cochituate (North Basin) (MA82020), so the Fish Consumption Use will remain assessed as Not Supporting with the prior PCBs in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for Lake Cochituate (including Middle, North, South, and Carling Basins) recommends that *"children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body"* and that *"the general public should not consume any of the affected fish species (American eel) from this water body"* (MassDPH 2021).

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (North Basin) (MA82020) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Aesthetics Use of Lake Cochituate (North Basin) (MA82020), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Lake Cochituate (North Basin) (MA82020) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, 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
Lake Cochituate (North Basin)	Not issued or confirmed by sampling					15	0	no

Primary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (North Basin) (MA82020) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Primary Contact Recreational Use of Lake Cochituate (North Basin) (MA82020), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Secondary Contact Recreation

2022 Use Attainment		Alert
Insufficient Information		YES
2022 Use Attainment Summary		
<p>C-HAB postings for Lake Cochituate (North Basin) (MA82020) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time.</p> <p>There is Insufficient Information to assess the Secondary Contact Recreational Use of Lake Cochituate (North Basin) (MA82020), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.</p>		

Lake Cochituate (MA82125)

Location:	[Middle Basin] Natick/Wayland.
AU Type:	FRESHWATER LAKE
AU Size:	134 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Asian Clam*)		Added
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
5	5	Dissolved Oxygen		Unchanged
5	5	Enterococcus		Removed
5	5	PCBs in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Asian Clam*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
PCBs in Fish Tissue	Source Unknown (N)		X			

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Fish/Shellfish/Zooplankton	Clarification of listing cause	The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment.
Enterococcus	Applicable WQS attained; based on new data	This Lake Cochituate (Middle Basin) AU (MA82125) was first listed as impaired for Enterococcus in the 2006 reporting cycle. The impairment decision was based on the Massachusetts Department of Public Health (MA DPH) 'beach posting' data from Cochituate Lake-North Beach (DCR)/Natick (one public beach location). The total number of days the beach was closed

2018/20 Removed Impairment	Removal Reason	Removal Comment
		<p>was 13 in 2001 and 10 in 2002. This represents a small percentage of the days in the overall beach season.</p> <p>The data available from the 2022 reporting cycle is also beach posting data for the same beach. Between 2014 to 2018, the percent of days the beach was posted ranged from 0% to 2% with no postings (0%) reported in four of six years. Beach postings that exceed 10% (an indicator of a frequent posting during a swimming season) is one of the use attainment impairment thresholds described in the CALM Guidance Document (MassDEP 2022). Since the number of beach closures in this most recent reporting cycle is well below the 10% threshold for all years with available data, and four of the six years had no beach closures at all, the Enterococcus impairment in this Lake Cochituate (Middle Basin) AU (MA82125) is being delisted.</p>

Non-Native Fish/Shellfish/Zooplankton

The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment.

Enterococcus

Beach posting data based on weekly Enterococci data collected at DCRs Cochituate Lake – North Beach

Original data summary used to make the Enterococcus impairment decision can be found in the SuAsCo Watershed 2001 Water Quality Assessment Report (O'Brien-Clayton 2005) as follows: *"The MA DCR Lake Cochituate Beach in Natick near Route 30 was closed to swimming in 2001 between 6/28 and 7/4, 8/23 and 8/25, and 8/30 and 9/1. In 2002 the beach in Natick was closed between 6/20 and 6/21, 6/26 to 6/30, and 8/14 to 8/16 due to elevated Enterococci counts. The beach was also closed between 8/13 and 8/14 due to suspected swimmer's itch".*

Current data summary used to remove Enterococcus impairment:

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

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%
4745	Cochituate Lake-North Beach (DCR)/Natick	42.30798	-71.37700	42.30901	-71.37670	2%	0%	0%	0%	0%	2%	0

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES

2022 Use Attainment Summary
C-HAB postings for Lake Cochituate (Middle Basin) (MA82125) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision is not appropriate at this time. The Aquatic Life Use of Lake Cochituate (Middle Basin) (MA82125) will remain assessed as Not Supporting, with the prior impairments for Curly-leaf Pondweed, Dissolved Oxygen, Eurasian Water Milfoil, and Non-Native Aquatic Plants being carried forward. The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment. Additionally, an Alert is being identified for C-HABs based on the 2019 short-duration bloom.

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted recently in Lake Cochituate (Middle Basin) (MA82125), so the Fish Consumption Use will remain assessed as Not Supporting with the prior PCBs in Fish Tissue impairment being carried forward. MassDPH’s fish consumption advisory for Lake Cochituate (including Middle, North, South, and Carling Basins) recommends that “ <i>children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body</i> ” and that “ <i>the general public should not consume any of the affected fish species (American eel) from this water body</i> ” (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (Middle Basin) (MA82125) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Aesthetics Use of Lake Cochituate (Middle Basin) (MA82125), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Lake Cochituate (Middle Basin) (MA82125) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, 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
Lake Cochituate (Middle Basin)	Not issued or confirmed by sampling					15	0	no

Primary Contact Recreation

2022 Use Attainment	Alert
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Fully Supporting	YES
2022 Use Attainment Summary	
<p>The Lake Cochituate North Beach was posted <10% (0-2%) of the time every year from 2014-2019. C-HAB postings for Lake Cochituate (Middle Basin) (MA82125) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision will not be made at this time.</p> <p>The Primary Contact Recreational Use of Lake Cochituate (Middle Basin) (MA82125) is assessed as Fully Supporting based on beach posting data, but an Alert is being identified for C-HABs (due to a short-duration bloom in 2019). Since the number of beach closures in this reporting cycle is well below the 10% threshold for all years with available data, and four of the six years had no beach closures at all, the Enterococcus impairment in this Lake Cochituate (Middle Basin) AU (MA82125) is being delisted.</p>	

Beach Postings

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

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%
4745	Cochituate Lake-North Beach (DCR)/Natick	42.30798	-71.37700	42.30901	-71.37670	2%	0%	0%	0%	0%	2%	0

Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>The Lake Cochituate North Beach was posted <10% (0-2%) of the time every year from 2014-2019. C-HAB postings for Lake Cochituate (Middle Basin) (MA82125) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision will not be made at this time.</p> <p>The Secondary Contact Recreational Use of Lake Cochituate (Middle Basin) (MA82125) is assessed as Fully Supporting based on beach posting data, but an Alert is being identified for C-HABs (due to a short-duration bloom in 2019).</p>	

Lake Cochituate (MA82126)

Location:	[Carling Basin] Natick.
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	(Asian Clam*)		Added
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
5	5	(Water Chestnut*)		Unchanged
5	5	PCBs in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Asian Clam*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
PCBs in Fish Tissue	Source Unknown (N)		X			

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Fish/Shellfish/Zooplankton	Clarification of listing cause	The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment.

Non-Native Fish/Shellfish/Zooplankton

The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (Carling Basin) (MA82126) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision is not appropriate at this time. The Aquatic Life Use of Lake Cochituate (Carling Basin) (MA82126) will remain assessed as Not Supporting, with prior impairments for Curly-leaf Pondweed, Eurasian Water Milfoil, Non-Native Aquatic Plants, and Water Chestnut being carried forward. The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian clam impairment. Additionally, an Alert is being identified for C-HABs based on the 2019 short-duration bloom.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted recently in Lake Cochituate (Carling Basin) (MA82126), so the Fish Consumption Use will remain assessed as Not Supporting with the prior PCBs in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for Lake Cochituate (including Middle, North, South, and Carling Basins) recommends that <i>"children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body"</i> and that <i>"the general public should not consume any of the affected fish species (American eel) from this water body"</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (Carling Basin) (MA82126) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Aesthetics Use of Lake Cochituate (Carling Basin) (MA82126), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Lake Cochituate (Carling Basin) (MA82126) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, 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
Lake Cochituate (Carling Basin)	Not issued or confirmed by sampling					15	0	no

Primary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (Carling Basin) (MA82126) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Primary Contact Recreational Use of Lake Cochituate (Carling Basin) (MA82126), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (Carling Basin) (MA82126) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Secondary Contact Recreational Use of Lake Cochituate (Carling Basin) (MA82126), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Lake Cochituate (MA82127)

Location:	[South Basin] Natick.
AU Type:	FRESHWATER LAKE
AU Size:	239 ACRES
Classification/Qualifier:	B

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	PCBs in Fish Tissue		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
PCBs in Fish Tissue	Source Unknown (N)		X			

Recommendations

2022 Recommendations
ALU: As noted in the 2018/2020 IR (MassDEP 2021), an aquatic macrophyte survey should be conducted to confirm the presence of the non-native aquatic macrophyte, <i>Egeria densa</i> , in the Lake Cochituate South Basin (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	

C-HAB postings for Lake Cochituate (South Basin) (MA82127) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, a use impairment decision is not appropriate at this time. The Aquatic Life Use of Lake Cochituate (South Basin) (MA82127) will remain assessed as Not Supporting, with all prior impairments (Curly-leaf Pondweed, Dissolved Oxygen, Eurasian Water Milfoil, Non-Native Aquatic Plants, Water Chestnut) being carried forward. Additionally, an Alert is being identified for C-HABs based on the 2019 short-duration bloom.

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted recently in Lake Cochituate (South Basin) (MA82127), so the Fish Consumption Use will remain assessed as Not Supporting with the prior PCBs in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for Lake Cochituate (including Middle, North, South, and Carling Basins) recommends that <i>"children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any fish from this water body"</i> and that <i>"the general public should not consume any of the affected fish species (American eel) from this water body"</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (South Basin) (MA82127) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Aesthetics Use of Lake Cochituate (South Basin) (MA82127), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for Lake Cochituate (South Basin) (MA82127) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, 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
Lake Cochituate (South Basin)	Not issued or confirmed by sampling					15	0	no

Primary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	

C-HAB postings for Lake Cochituate (South Basin) (MA82127) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Primary Contact Recreational Use of Lake Cochituate (South Basin) (MA82127), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.

Secondary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Lake Cochituate (South Basin) (MA82127) were reported to MassDPH for 15 days in 2019. Since no blooms of extended duration (>20 days) were reported, an impairment decision will not be made at this time. There is Insufficient Information to assess the Secondary Contact Recreational Use of Lake Cochituate (South Basin) (MA82127), but an Alert is being identified for C-HABs based on the short-duration bloom in 2019.	

Learned Pond (MA82069)

Location:	Framingham.
AU Type:	FRESHWATER LAKE
AU Size:	34 ACRES
Classification/Qualifier:	B

No usable data were available for Learned Pond (MA82069) 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

Little Chauncy Pond (MA82070)

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

No usable data were available for Little Chauncy Pond (MA82070) 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	(Curly-leaf Pondweed*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		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
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Mercury in Fish Tissue	Atmospheric Deposition (N)		X			

Long Pond (MA82072)

Location:	Littleton.
AU Type:	FRESHWATER LAKE
AU Size:	102 ACRES
Classification/Qualifier:	B

No usable data were available for Long Pond (MA82072) 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	Dissolved Oxygen		Unchanged
5	5	Phosphorus, Total		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				
Algae	Unspecified Urban Stormwater (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Dissolved Oxygen	Unspecified Urban Stormwater (Y)	X				
Phosphorus, Total	Source Unknown (N)	X				
Phosphorus, Total	Unspecified Urban Stormwater (Y)	X				

Meadow Pond (MA82129)

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

No usable data were available for Meadow Pond (MA82129) 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

Milham Reservoir (MA82077)

Location:	Marlborough.
AU Type:	FRESHWATER LAKE
AU Size:	67 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Milham Reservoir (MA82077) 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

Mill Brook (MA82A-20)

Location:	Headwaters, outlet Crosby Pond, Concord to mouth at confluence with the Concord River, Concord.
AU Type:	RIVER
AU Size:	2.7 MILES
Classification/Qualifier:	B

No usable data were available for Mill Brook (MA82A-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
4c	4c	(Habitat Assessment*)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Habitat Assessment*)	Unspecified Urban Stormwater (Y)	X				

Nagog Pond (MA82082)

Location:	Littleton/Acton.
AU Type:	FRESHWATER LAKE
AU Size:	278 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Nagog Pond (MA82082) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

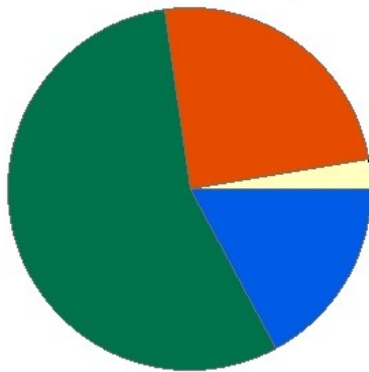
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Nashoba Brook (MA82B-14)

Location:	From source just south of Route 110, Westford to mouth at confluence with Fort Pond Brook, Concord (through former 2014 segment: Ice House Pond MA82066).
AU Type:	RIVER
AU Size:	9.4 MILES
Classification/Qualifier:	B

Nashoba Brook - MA82B-14

Watershed Area: 21.11 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	21.11	6.97	6.66	2.18
Agriculture	2.7%	1.6%	2.6%	1.4%
Developed	24.5%	25.2%	17%	18.7%
Natural	55.8%	55.9%	47.6%	47.7%
Wetland	17.1%	17.2%	32.8%	32.1%
Impervious Cover	11.3%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Dewatering*)		Unchanged
5	5	Benthic Macroinvertebrates		Added
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Temperature		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				
(Dewatering*)	Source Unknown (N)	X				
Benthic Macroinvertebrates	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Sanitary Sewer Overflows (Collection System Failures) (N)				X	
Temperature	Source Unknown (N)	X				

Recommendations

2022 Recommendations
ALU: Additional chloride data and continuous specific conductance data should be collected in Nashoba Brook (MA82B-14) to track chloride trends. OTHER: 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 the Nashoba Brook sub-watershed.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDFG biologists attempted to conduct a fish survey in the upstream portion of Nashoba Brook downstream of Powers Rd, Westford in July 2016 (Sample ID 5945) but there was not enough water. This may have been influenced by drought conditions, as the 2016 regional drought had already been officially recognized the month before (Drought Management Task Force 2021). Toward the middle of the AU, MassDEP staff conducted fish (Sample ID 6368), benthic (Station B0926), and water quality (WQ) (W2527) surveys ~4000 ft upstream/west of Main St (Rt 27) in Acton during summer 2015. The August fish sample (n=37) was comprised of 43% fluvial species (brown trout >140 mm, white sucker) and another 57% intolerant/moderately tolerant macrohabitat generalists. The benthic sample had an IBI score of 42, indicating that conditions were moderately degraded for a low gradient location. Only two discrete DO measurements were taken and the lower one was 3.3 mg/L. A deployed probe was used to measure continuous temperature data over 70 days in the summer index period with a maximum of 26.5 °C (good for a WWF). Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.4-7.5 S.U. (n=3), there was little indication of nutrient enrichment (seasonal TP average was a little elevated at 0.060 mg/L with n=4, maximum DO saturation was 66.7%, no observations of excessive filamentous algae), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), and the maximum Total Ammonia Nitrogen was 0.920 mg/L (n=3). Among four chloride samples, the maximum was 230 mg/L (the chronic toxicity criterion) and similarly, among three specific conductance measurements one was >904 µs/cm (the estimated chloride chronic criterion). Moving downstream, MassDEP staff collected water quality data roughly every other month from 2011-2013 as part of the SMART monitoring program near a footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton (Sample ID W0698). Most of these data have already been discussed as part of the 2018/2020 IR (MassDEP 2021) but is being briefly summarized here for the sake of completeness. Discrete DO data was good (n= 5/yr) with a minimum of 6.0 mg/L. Discrete temperature data collected during the summer index period (n= 1-2/season) had a maximum of 22.7 °C. pH was similar to that measured at the upstream station. Seasonal TP averages ranged from 0.038 mg/L in 2011 to 0.139 mg/L in 2013 (n= 3/season) which was elevated in that last year. However, the maximum DO saturation was 103.6% and there were no observations of excessive filamentous algae any year. There were no exceedances among TAN (maximum 0.80 mg/L), chloride (maximum 140 mg/L), or specific conductance (maximum 613 µs/cm) data.</p> <p>The Aquatic Life Use of Nashoba Brook (MA82B-14) is assessed as Not Supporting with the prior impairments for Dewatering and Temperature being carried forward (Note that the temperature impairment is being carried forward because elevated temperature was previously measured in other reaches of the brook). An impairment for Benthic Macroinvertebrates is being added based on the moderately degraded benthic sample from 2015. Additionally, the Alert for occasional low DO is also being carried forward and an Alert for elevated Total Phosphorus is being added.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5945	MassDFG	Fish Community	Nashoba Brook	Powers Rd. D.S., Westford	42.54169	-71.44176
6368	MassDEP	Fish Community	Nashoba Brook	, Acton	42.52678	-71.41342
B0926	MassDEP	Benthic	Nashoba Brook/	[approximately 1220 meters upstream/west of Main Street (Route 27), Acton, MA]	42.526778	-71.413421
W0698	MassDEP	Water Quality	Nashoba Brook	[near footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton]	42.512275	-71.404586
W2527	MassDEP	Water Quality	Nashoba Brook	[approximately 4000 feet upstream/west of Main Street (Route 27), Acton]	42.526778	-71.413421

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0926	07/21/15	RBP multihab	Statewide_Low_Gradient	340	42	MD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: BT = Brown Trout, LMB = Largemouth Bass, RP = Redfin Pickerel, 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
6368	08/20/15	BP	TP		4	37	3%	2	43%	3%	2	57%	No	No	BT, LMB, RP, WS,

Fish Community Data (2012-2019) 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
5945	07/07/16		No Sample Attempted - Dry/Low Water

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0698	01/19/11	11/16/11	5	6	10.1	0	0	0
W0698	02/22/12	10/24/12	5	6.6	9.4	0	0	0
W0698	01/28/13	09/25/13	5	7.3	10	0	0	0
W2527	08/11/15	10/01/15	2	3.3	4.9	1	1	1

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2527	07/08/15	09/15/15	70	67	24.0	26.5	24.8	22.5	64	3	35	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2527	07/07/15	09/15/15	70	3334	24.2	143	17	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0698	01/19/11	11/16/11	6	1	22.7	9.9	1	1	0	0
W0698	02/22/12	10/24/12	5	2	20.7	12.9	1	0	0	0
W0698	01/28/13	09/25/13	5	1	21.0	10.3	1	0	0	0
W2527	08/11/15	10/01/15	3	2	21.2	19.0	1	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W0698	01/19/11	11/16/11	6	6.4	6.8	2	0

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
W0698	02/22/12	10/24/12	5	6.6	7	0	0
W0698	01/28/13	09/25/13	5	6.6	6.9	0	0
W2527	08/11/15	10/01/15	3	6.4	7.5	1	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0698	2011	3	0.032	0.044	0.038	--	--	99.7	6.8	5	0
W0698	2012	2	0.058	0.065	0.062	--	--	103.6	7.0	3	0
W0698	2013	3	0.068	0.220	0.139	--	--	90.5	6.9	2	0
W2527	2015	4	0.046	0.086	0.060	--	--	66.7	7.5	2	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2527	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2527	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2527	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0698	2011	6	0.020	0.800	0.223	0	0
W0698	2012	5	0.040	0.470	0.160	0	0
W0698	2013	4	0.040	0.630	0.275	0	0
W2527	2015	3	0.640	0.920	0.750	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W0698	2011	6	94	130	110	0	0
W0698	2012	5	98	140	116	0	0
W0698	2013	4	120	140	133	0	0
W2527	2015	4	140	230	190	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W0698	01/19/11	11/16/11	6	383	536	0	0	0	0	0	0
W0698	02/22/12	10/24/12	5	413	537	0	0	0	0	0	0
W0698	01/28/13	09/25/13	5	387	613	0	0	0	0	0	0
W2527	08/11/15	10/01/15	3	660	960	1	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Nashoba Brook (MA82B-14), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys of Nashoba Brook at two locations: ~4000 ft upstream/west of Main St (Rt 27) in Acton (W2527) during summer 2015 (n=5) as well as roughly every other month from 2011-2013 (n= 5-6/yr) as part of the SMART monitoring program near a footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton (Sample ID W0698). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in any year at either site.</p> <p>The Aesthetics Use of Nashoba Brook (MA82B-14) is assessed as Fully Supporting based on the general lack of objectionable conditions at either of the two sampling locations between 2011 and 2015. The prior Alert for Odor is being removed since there were no odor issues upstream of Main St (Rt 27) nor petroleum odors in the most recent year of record in the Nashoba Brook Conservation Area southeast of Wheeler Lane.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0698	MassDEP	Water Quality	Nashoba Brook	[near footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton]	42.512275	-71.404586
W2527	MassDEP	Water Quality	Nashoba Brook	[approximately 4000 feet upstream/west of Main Street (Route 27), Acton]	42.526778	-71.413421

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0698	Nashoba Brook	2011	6	MassDEP aesthetics observations for station W0698 on Nashoba 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 2011.
W0698	Nashoba Brook	2012	5	MassDEP aesthetics observations for station W0698 on Nashoba 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 2012.
W0698	Nashoba Brook	2013	5	MassDEP aesthetics observations for station W0698 on Nashoba 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 2013.
W2527	Nashoba Brook	2015	5	MassDEP aesthetics observations for station W2527/MAP2-694 on Nashoba 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W0698	2011	6	5	0
W0698	2012	5	3	0
W0698	2013	5	2	0
W2527	2015	5	2	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0698	Nashoba Brook	2011	Color	None	1	6
W0698	Nashoba Brook	2011	Color	Reddish	5	6

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0698	Nashoba Brook	2011	Objectionable Deposits	No	5	6
W0698	Nashoba Brook	2011	Objectionable Deposits	Unobservable	1	6
W0698	Nashoba Brook	2011	Odor	None	4	6
W0698	Nashoba Brook	2011	Odor	Petroleum	2	6
W0698	Nashoba Brook	2011	Scum	No	4	6
W0698	Nashoba Brook	2011	Scum	Yes	2	6
W0698	Nashoba Brook	2011	Turbidity	None	3	6
W0698	Nashoba Brook	2011	Turbidity	Slightly Turbid	2	6
W0698	Nashoba Brook	2011	Turbidity	Unobservable	1	6
W0698	Nashoba Brook	2012	Color	Reddish	5	5
W0698	Nashoba Brook	2012	Objectionable Deposits	No	3	5
W0698	Nashoba Brook	2012	Objectionable Deposits	Unobservable	2	5
W0698	Nashoba Brook	2012	Odor	Musty (Basement)	1	5
W0698	Nashoba Brook	2012	Odor	None	2	5
W0698	Nashoba Brook	2012	Odor	Petroleum	2	5
W0698	Nashoba Brook	2012	Scum	No	2	5
W0698	Nashoba Brook	2012	Scum	Yes	3	5
W0698	Nashoba Brook	2012	Turbidity	Moderately Turbid	1	5
W0698	Nashoba Brook	2012	Turbidity	None	3	5
W0698	Nashoba Brook	2012	Turbidity	Unobservable	1	5
W0698	Nashoba Brook	2013	Color	Reddish	5	5
W0698	Nashoba Brook	2013	Objectionable Deposits	No	2	5
W0698	Nashoba Brook	2013	Objectionable Deposits	Unobservable	3	5
W0698	Nashoba Brook	2013	Odor	Musty (Basement)	2	5
W0698	Nashoba Brook	2013	Odor	None	3	5
W0698	Nashoba Brook	2013	Scum	No	3	5
W0698	Nashoba Brook	2013	Scum	Yes	2	5
W0698	Nashoba Brook	2013	Turbidity	None	4	5
W0698	Nashoba Brook	2013	Turbidity	Slightly Turbid	1	5
W2527	Nashoba Brook	2015	Color	Light Yellow/Tan	4	5
W2527	Nashoba Brook	2015	Color	Unobservable	1	5
W2527	Nashoba Brook	2015	Objectionable Deposits	No	5	5
W2527	Nashoba Brook	2015	Odor	None	5	5
W2527	Nashoba Brook	2015	Scum	No	5	5
W2527	Nashoba Brook	2015	Turbidity	Moderately Turbid	2	5
W2527	Nashoba Brook	2015	Turbidity	Slightly Turbid	3	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP field crews conducted surveys of Nashoba Brook at two locations: ~4000 ft upstream/west of Main St (Rt 27) in Acton (W2527) during summer 2015 (n=5) as well as roughly every other month from 2011-2013 (n= 5-6/yr) as part of the SMART monitoring program near a footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton (Sample ID W0698). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in any year at either site. *E. coli* bacteria samples were collected at both of these stations during the recreational season (Apr 1 – Oct 31), however the samples at the downstream site were of insufficient frequency to evaluate. Analysis of the low frequency data (n=4) from W2527 indicated that 100% of intervals had GMs >126 cfu/100mL but only one sample exceeded the 410 cfu/100mL STV. The seasonal GM was 281 cfu/100mL.

The Primary Contact Recreational Use of Nashoba Brook (MA82B-14) will continue to be assessed as Not Supporting since the *E. coli* concentrations exceeded the use attainment impairment thresholds for the single year limited frequency dataset. The prior Alert for Odor is being removed since there were no odor issues upstream of Main St (Rt 27) nor petroleum odors in the most recent year of record in the Nashoba Brook Conservation Area southeast of Wheeler Lane.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0698	MassDEP	Water Quality	Nashoba Brook	[near footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton]	42.512275	-71.404586
W2527	MassDEP	Water Quality	Nashoba Brook	[approximately 4000 feet upstream/west of Main Street (Route 27), Acton]	42.526778	-71.413421

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0698	MassDEP	E. coli	05/17/11	09/21/11	3	29	461	90
W0698	MassDEP	E. coli	04/11/12	10/24/12	4	12	64	32
W0698	MassDEP	E. coli	05/20/13	09/25/13	3	44	89	61
W2527	MassDEP	E. coli	05/14/15	08/11/15	4	140	670	281

W0698 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

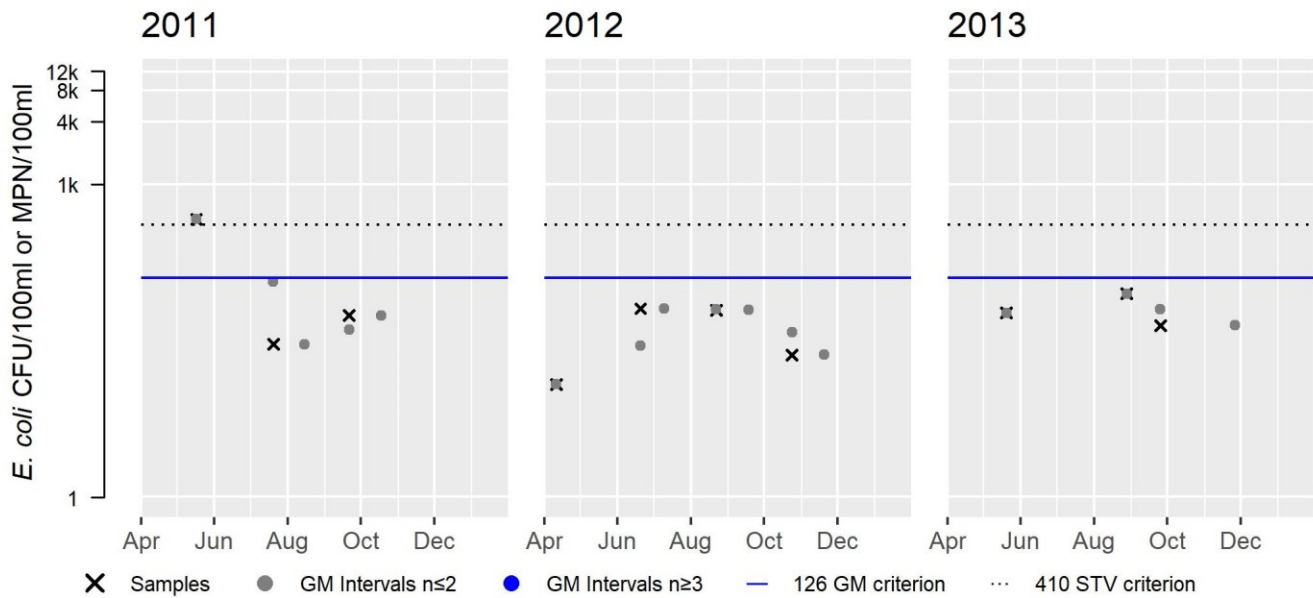
Var	Res
Samples	3
SeasGM	90
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	1
%n>STV	33

Var	Res
Samples	4
SeasGM	32
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	3
SeasGM	61
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

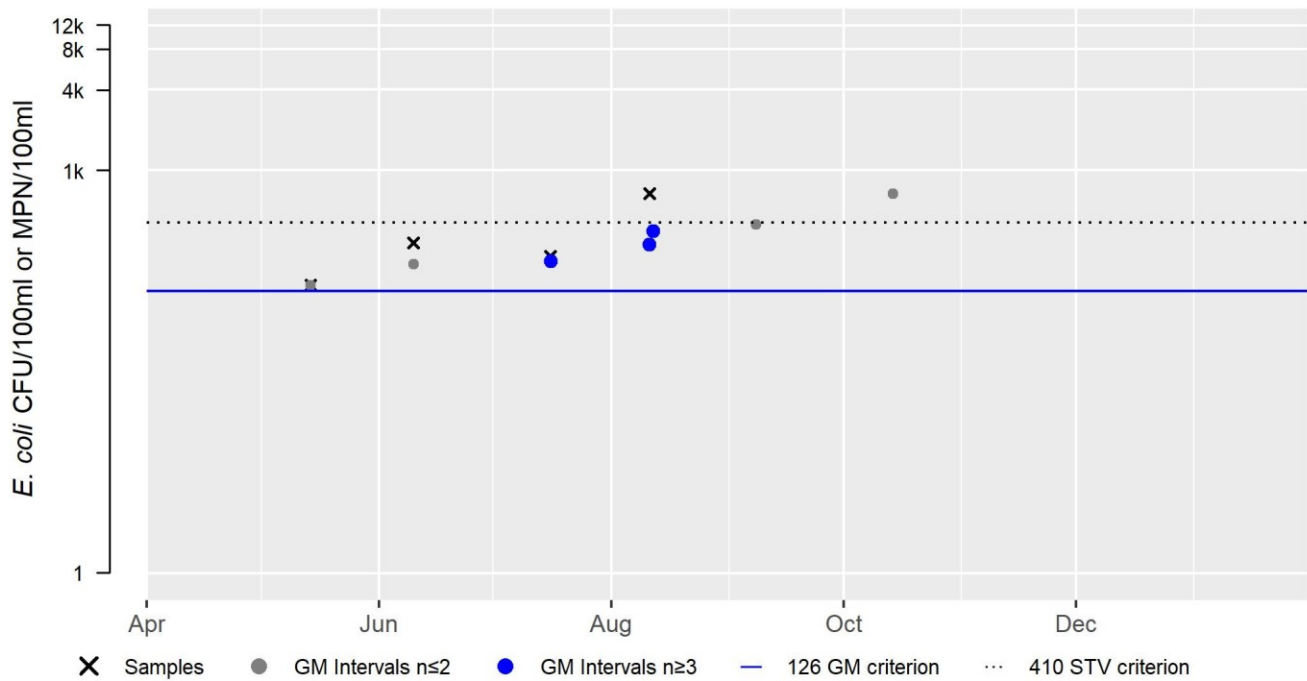


W2527 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	4
SeasGM	281
#GMI	3
#GMI Ex	3
%GMI Ex	100
n>STV	1
%n>STV	25

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

2015



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

MassDEP field crews conducted surveys of Nashoba Brook at two locations: ~4000 ft upstream/west of Main St (Rt 27) in Acton (W2527) during summer 2015 (n=5) as well as roughly every other month from 2011-2013 (n= 5-6/yr) as part of the SMART monitoring program near a footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton (Sample ID W0698). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in any year at either site. *E. coli* bacteria samples were collected at both of these stations, however the samples at the downstream site were of insufficient frequency to evaluate. Analysis of the low frequency data (n=4) from W2527 indicated that none of the intervals had GMs >630 cfu/100mL and no samples exceeded the 1260 cfu/100mL STV. The seasonal GM was 281 cfu/100mL. The Secondary Contact Recreational Use of Nashoba Brook (MA82B-14) is assessed as Fully Supporting since the *E. coli* concentrations did not exceed the use attainment impairment thresholds for this single year limited frequency dataset. The prior Alert for Odor is being removed since there were no odor issues upstream of Main St (Rt 27) nor petroleum odors in the most recent year of record in the Nashoba Brook Conservation Area southeast of Wheeler Lane.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0698	MassDEP	Water Quality	Nashoba Brook	[near footbridge and USGS flow gaging station #01097300 in Nashoba Brook Conservation Area southeast of Wheeler Lane, Acton]	42.512275	-71.404586
W2527	MassDEP	Water Quality	Nashoba Brook	[approximately 4000 feet upstream/west of Main Street (Route 27), Acton]	42.526778	-71.413421

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

[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)
W0698	MassDEP	E. coli	01/19/11	11/16/11	6	15	461	40
W0698	MassDEP	E. coli	02/22/12	10/24/12	5	9	64	25
W0698	MassDEP	E. coli	01/28/13	09/25/13	5	5	89	26
W2527	MassDEP	E. coli	05/14/15	08/11/15	4	140	670	281

W0698 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

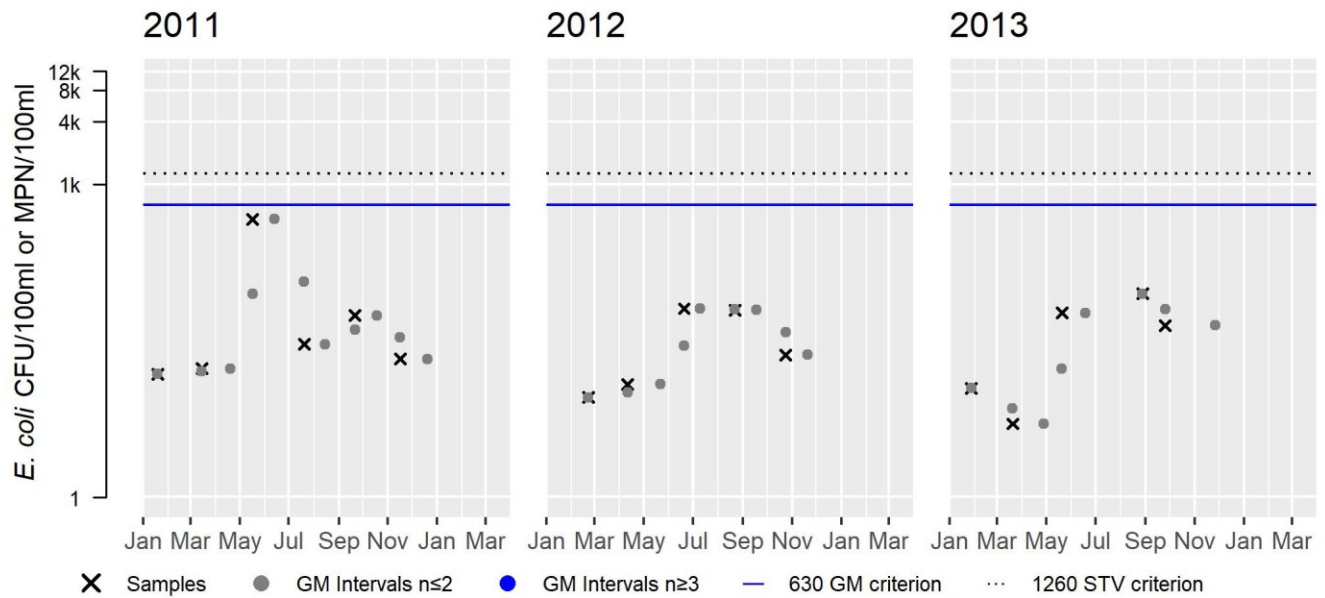
Var	Res
Samples	6
SeasGM	40
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	25
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	26
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

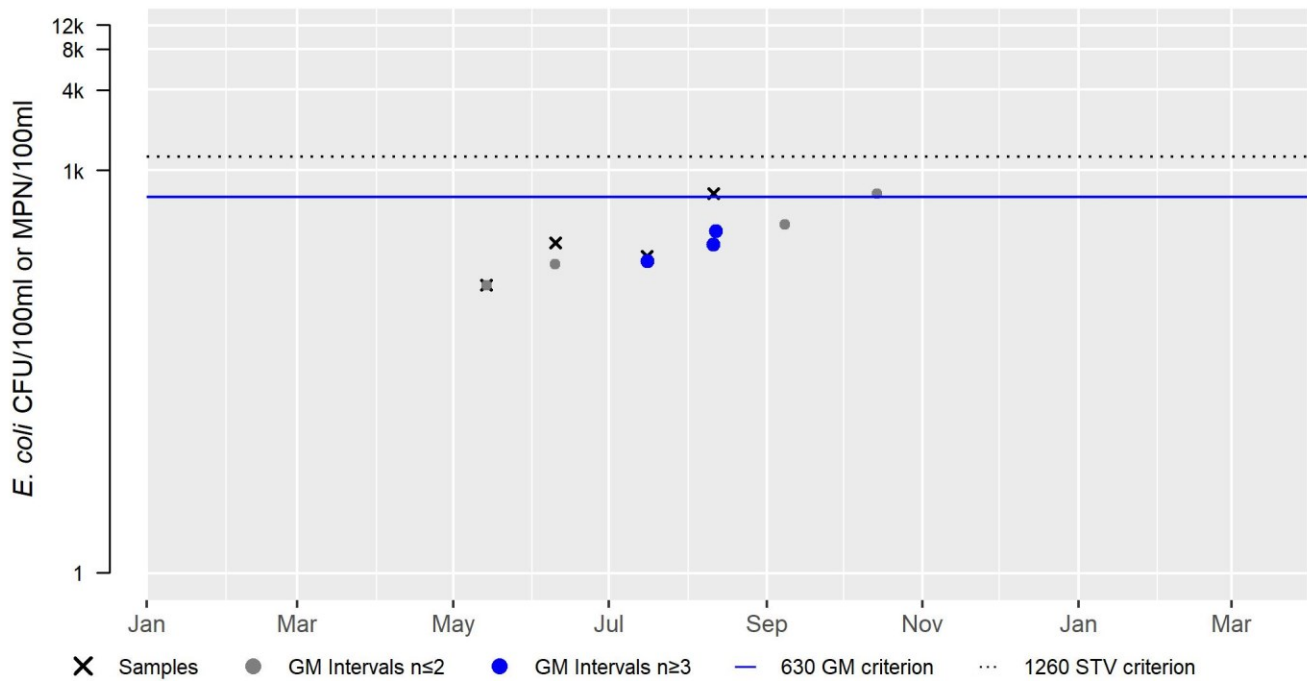


W2527 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	4
SeasGM	281
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015

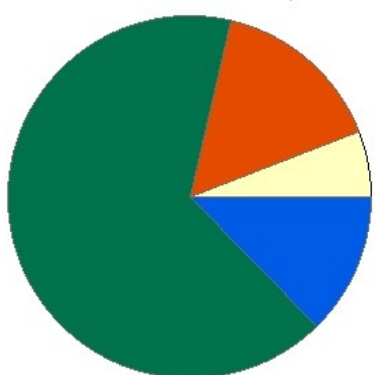


North Brook (MA82B-21)

Location:	Headwaters, east of Ballville Road and north of Wataquodock Hill Road, Bolton to mouth at confluence with the Assabet River, Berlin (excluding the approximately 0.1 mile through Wataquatic Pond (locally 'Fyfeshire Pond'), Bolton).
AU Type:	RIVER
AU Size:	7.6 MILES
Classification/Qualifier:	B

North Brook - MA82B-21

Watershed Area: 16.86 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	16.86	9.7	6.29	3.48
Agriculture	5.8%	6.9%	5.6%	6.9%
Developed	15.5%	17.7%	12.2%	15.8%
Natural	66.1%	63.4%	57.7%	53.5%
Wetland	12.6%	12%	24.6%	23.8%
Impervious Cover	6.7%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	Temperature		Unchanged

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

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>MassDFG biologists conducted backpack electrofishing in North Brook, a CFR and Tier 1 Coldwater Existing Use, at two locations near the end of June 2016: upstream of the Lancaster Rd crossing, Berlin (Sample ID 6211) and downstream of the Lancaster Rd crossing (Sample ID 6210). The upstream sample (n=40) did not contain any coldwater species but was comprised of 88% fluvial species. The field notes mentioned heavy sediment buildup (MassDFG 2020). In contrast, the downstream sample (n=138) contained 12 Eastern brook trout (an intolerant coldwater species), including 9 individuals ≤ 140 mm in length, in addition to the other two fluvial species (in this location, field notes indicated sediment buildup was "low" (MassDFG 2020)). Downstream, ~2400 ft upstream/north of Randall Rd, Berlin, MassDEP staff conducted monitoring in both summer 2015 and 2016, including fish (Sample IDs 6388, 6346), benthic (Station B0946), and water quality surveys (Station W2544). Coldwater species were not captured in either of the fish community samples, but both contained over 90% fluvial species (total n = 241, 54, respectively). Benthic samples were collected in Aug 2015 and Sept 2016 (the latter during a historic drought (Drought Management Task Force 2021)). The IBI scores were 59 and 76, indicating satisfactory and excellent conditions, respectively. Probes were deployed to measure dissolved oxygen (DO) for 112 days in 2015 and 138 days in 2016. The DO concentrations were excellent (minimums 6.0 and 6.5 mg/L). Continuous temperature was measured over 107 days in each summer index period. The temperatures were not acceptable for a coldwater existing use fishery with most 7DADMs >20.0 °C in both years and maximum 24-hr rolling average temperatures of 23.6 °C and 24.6 °C. Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.9-7.2 S.U. (n= 4/yr), there was no indication of nutrient enrichment (total phosphorus seasonal average concentrations were 0.024 and 0.020 mg/L with n=4/yr, maximum DO diel shift was 2.6 mg/L in both years, maximum DO saturation was 96%, no observations of excessive filamentous algae), the maximum Total Ammonia Nitrogen was 0.044 mg/L (n= 4/yr), maximum chloride was 48 mg/L (n= 4/yr), and maximum specific conductance was 237 $\mu\text{S}/\text{cm}$.</p> <p>The Aquatic Life Use of North Brook (MA82B-21) is assessed as Not Supporting with the prior impairments for Curly-leaf Pondweed and Temperature being carried forward. The prior Alert for low flow will be carried forward but the Alert for DO is being removed since the continuous DO data from 2015 and 2016 were indicative of excellent conditions.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6210	MassDFG	Fish Community	North Brook	Lancaster Rd - Conservation Area, Berlin	42.40690	-71.65360
6211	MassDFG	Fish Community	North Brook	Lancaster Rd xing-US, Berlin	42.40887	-71.65154
6346	MassDEP	Fish Community	North Brook	, Berlin	42.39806	-71.65825
6388	MassDEP	Fish Community	North Brook	, Berlin	42.39806	-71.65825
B0946	MassDEP	Benthic	North Brook/	[approximately 730 meters upstream/north of Randall Road, Berlin, MA]	42.398058	-71.658249
W2544	MassDEP	Water Quality	North Brook	[approximately 2400 feet upstream/north of Randall Road, Berlin]	42.398058	-71.658249

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0946	08/11/15	RBP kicknet	Central_Hills_300ct	333	59	S
B0946	09/07/16	RBP kicknet	Central_Hills_300ct	350	76	E

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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]

[Species List: BND = Blacknose Dace, EBT = Brook Trout, WS = White Sucker]

Sample ID	Sample Date	Method	Sample Type	Total Taxa	Total Ind	EBT Ind	EBT Min Length (mm)	EBT Max Length (mm)	EBT ≤140mm Ind	SC Ind	Cold Ind %	Fluvial Ind %	Notables	CFR	Species List
6210	06/30/16	BP	TP	3	138	12	68	203	9	0	9%	100%	Yes	Yes	BND, EBT, WS,

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: BB = Brown Bullhead, BND = Blacknose Dace, CP = Chain Pickerel, CS = Common Shiner, GS = Golden Shiner, P = Pumpkinseed, 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
6211	06/30/16	BP	TP		4	40	0%	3	88%	0%	1	13%	No	Yes	BND, CS, P, WS,
6346	08/19/16	BP	TP		4	54	0%	2	91%	0%	1	4%	Yes	Yes	BND, CP, GS, WS,
6388	09/08/15	BP	TP		4	241	0%	2	99%	0%	1	0%	Yes	Yes	BB, BND, P, WS,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2544	05/28/15	09/16/15	112	106	83	6	6.7	7.6	2.6	0	0	0	0	0	0	13	0
W2544	05/12/16	09/26/16	138	132	109	6.5	6.6	7	2.6	0	0	0	0	0	0	46	0

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2544	06/23/15	09/17/15	4	7.4	7.8	0	0	0
W2544	06/08/16	09/27/16	4	7.9	8.4	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2544	06/01/15	09/15/15	107	105	23.0	28.1	26.4	22.7	99	0	16	0	0	0
W2544	06/01/16	09/15/16	107	107	24.3	27.4	25.0	23.3	95	2	30	1	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2544	06/01/15	09/15/15	107	5136	23.6	8	0	0
W2544	06/01/16	09/15/16	107	5136	24.6	169	81	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2544	06/23/15	09/17/15	4	3	26.1	23.4	4	2	0	0
W2544	06/08/16	09/27/16	4	3	21.5	19.5	3	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2544	06/23/15	09/17/15	4	7	7.2	0	0
W2544	06/08/16	09/27/16	4	6.9	7.1	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2544	2015	4	0.012	0.032	0.024	2.6	1.4	96.0	7.2	4	0
W2544	2016	4	0.011	0.025	0.020	2.6	1.2	94.4	7.1	4	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)**MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)[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
W2544	2015	4	0.040	0.044	0.041	0	0
W2544	2016	4	0.040	0.040	0.040	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2544	2015	4	31	48	42	0	0
W2544	2016	4	31	44	37	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2544	06/23/15	09/17/15	4	210	237	0	0	0	0	0	0

Station Code	Start Date	End Date	SpCond Count	SpCond Min (μ S/cm)	SpCond Max (μ S/cm)	Count SpCond >904	Count SpCond >994	Count SpCond >3193	Count SpCond >3512	Consecutive sets >904	Consecutive sets >994
W2544	06/08/16	09/27/16	4	173	217	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in North Brook (MA82B-21), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted four field surveys of North Brook (MA82B-21) during the summers of 2015 and 2016, roughly 2400 ft upstream/north of Randall Rd, Berlin. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during either summer.</p> <p>The Aesthetics Use of North Brook (MA82B-21) is assessed as Fully Supporting based on the general lack of objectionable conditions observed by MassDEP staff during the summers of 2015 and 2016.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2544	MassDEP	Water Quality	North Brook	[approximately 2400 feet upstream/north of Randall Road, Berlin]	42.398058	-71.658249

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2544	North Brook	2015	4	MassDEP aesthetics observations for station W2544 on North 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.
W2544	North Brook	2016	4	MassDEP aesthetics observations for station W2544 on North 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2544	2015	4	4	0
W2544	2016	4	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2544	North Brook	2015	Color	Light Yellow/Tan	1	4
W2544	North Brook	2015	Color	None	2	4
W2544	North Brook	2015	Color	NR	1	4
W2544	North Brook	2015	Objectionable Deposits	No	4	4
W2544	North Brook	2015	Odor	None	4	4
W2544	North Brook	2015	Scum	No	4	4
W2544	North Brook	2015	Turbidity	None	4	4
W2544	North Brook	2016	Color	Light Yellow/Tan	2	4
W2544	North Brook	2016	Color	None	2	4
W2544	North Brook	2016	Objectionable Deposits	No	4	4
W2544	North Brook	2016	Odor	None	4	4
W2544	North Brook	2016	Scum	No	3	4
W2544	North Brook	2016	Scum	Yes	1	4
W2544	North Brook	2016	Turbidity	None	4	4

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
MassDEP staff conducted four field surveys of North Brook (MA82B-21) during the summers of 2015 and 2016, roughly 2400 ft upstream/north of Randall Rd, Berlin. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during either summer. No bacteria sampling was conducted. The Primary Contact Recreational Use for North Brook (MA82B-21) is Not Assessed since no recent bacteria data are available to assess the status.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
MassDEP staff conducted four field surveys of North Brook (MA82B-21) during the summers of 2015 and 2016, roughly 2400 ft upstream/north of Randall Rd, Berlin. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded by DEP field sampling crews during either summer. No bacteria sampling was conducted. The Secondary Contact Recreational Use for North Brook (MA82B-21) is Not Assessed since no recent bacteria data are available to assess the status.	

North Great Meadows (MA82084)

Location:	Concord.
AU Type:	FRESHWATER LAKE
AU Size:	73 ACRES
Classification/Qualifier:	B

No usable data were available for North Great Meadows (MA82084) 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	(Water Chestnut*)		Unchanged

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

Nutting Lake (MA82088)

Location:	[East Basin] Billerica.
AU Type:	FRESHWATER LAKE
AU Size:	30 ACRES
Classification/Qualifier:	B

No usable data were available for Nutting Lake (MA82088) 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	(Water Chestnut*)		Unchanged
5	5	Escherichia Coli (E. Coli)		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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Nutting Lake (MA82124)

Location:	[West Basin] Billerica.
AU Type:	FRESHWATER LAKE
AU Size:	51 ACRES
Classification/Qualifier:	B

No usable data were available for Nutting Lake (MA82124) 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

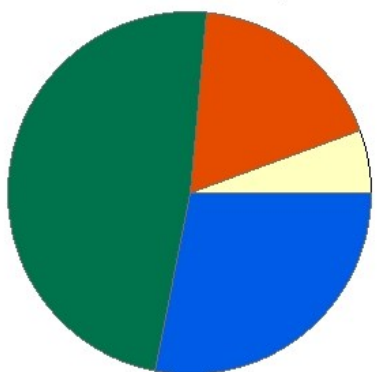
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Pantry Brook (MA82A-19)

Location:	From source west of Haynes Road, Sudbury to mouth at confluence with the Sudbury River, Sudbury.
AU Type:	RIVER
AU Size:	3.1 MILES
Classification/Qualifier:	B

Pantry Brook - MA82A-19

Watershed Area: 6.01 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	6.01	6.01	1.83	1.83
Agriculture	5.6%	5.6%	4.9%	4.9%
Developed	17.9%	17.9%	8.9%	8.9%
Natural	48.4%	48.4%	37.8%	37.8%
Wetland	28%	28%	48.5%	48.5%
Impervious Cover	7.3%			

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	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Fecal Coliform	Source Unknown (N)				X	X

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Insufficient Information	NO
2022 Use Attainment Summary	

MassDFG biologists conducted backpack electrofishing in Pantry Brook downstream of Marlboro Rd behind conservation land in Sudbury (Sample ID 5545). Only five redbfin pickerel were captured. Field notes did not indicate any notable concerns: the stream was described as “shallow” but with “good flow” (MassDEP Undated 6). Too limited data are available to assess the Aquatic Life Use of Pantry Brook (MA82A-19) so it is assessed as having Insufficient Information.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5545	MassDFG	Fish Community	Pantry Brook	DS of Marlboro Rd behind conservation land, E of Musket Ln, Sudbury	42.40646	-71.41241

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: 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
5545	07/13/15	BP	TP	L	1	5	0%	0	0%	0%	1	100%	No	No	RP,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Pantry Brook (MA82A-19), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no data available to assess the Aesthetics Use for Pantry Brook (MA82A-19), so it is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
There are no recent bacteria data available for Pantry Brook (MA82A-19), so the Primary Contact Recreational Use will continue to be assessed as Not Supporting with the prior Fecal Coliform impairment being carried forward.	

Secondary Contact Recreation

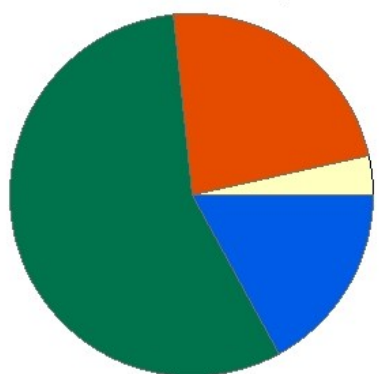
2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
There are no recent bacteria data available for Pantry Brook (MA82A-19), so the Secondary Contact Recreational Use will continue to be assessed as Not Supporting with the prior Fecal Coliform impairment being carried forward.	

Piccadilly Brook (MA82A-30)

Location:	Headwaters, outlet Westboro Reservoir, Westborough to mouth at inlet to Cedar Swamp Pond, Westborough.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B: ORW

Piccadilly Brook - MA82A-30

Watershed Area: 2.47 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	2.47	2.34	1.28	1.21
Agriculture	3.5%	3.7%	2.6%	2.8%
Developed	23.1%	24.3%	18.5%	19.5%
Natural	56.4%	54.2%	57%	54.7%
Wetland	17%	17.8%	21.8%	23.1%
Impervious Cover	12.3%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Fish Bioassessments		Added
3	5	Temperature		Added

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				
Fish Bioassessments	Erosion and Sedimentation (N)	X				
Temperature	Dam or Impoundment (Y)	X				

Recommendations

2022 Recommendations
ALU: Conduct a fisheries survey in the vicinity of Belknap St, Westborough to determine the current status of the coldwater fish population- in this area, multiple age classes of Eastern brook trout were previously collected in 2001.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>Piccadilly Brook is being assessed as a Tier 1 Existing Use Coldwater Fishery based on data collected in 2001 in which multiple age classes of Eastern brook trout were captured (MassDEP 2021). UMass students studying the effects of dams on water quality collected limited data in Piccadilly Brook downstream of Westborough Reservoir. Continuous temperature data were recorded during the summer index periods of 2014 (107 days) and 2015 (106 days) at stations 12 m downstream of the dam (UMassA_PICDS1), 247 m downstream of the dam (UMassA_PICDS2), 367 m downstream of the dam (UMassA_PICDS3), and 1574 m downstream of the dam (UMassA_PICDS4). There were no violations of the acute temperature threshold at any of the stations and no violations of the chronic temperature threshold at the three upstream stations (max temperature 19.9 °C among these three stations). However, at the most downstream location (UMassA_PICDS4), which is downstream of two small, private dams as well as Route 135, the 7DADMs were >20.0 °C 50 times in 2014 and 69 times in 2015. In July 2014, MassDFG biologists conducted a fish survey downstream of Westborough Rd and roughly 680 ft downstream of the Westborough Reservoir Dam (Westborough, MA) (Sample ID 5389), but they did not capture any fish. Field comments were as follows: <i>"No fish sampled. Stage at 9:30am=0.44'. Only 1 pass done w/ block nets, no fish captured. Ended survey reach at channel split. Stream wide US of transducer, wide but very shallow. Heavy siltation, especially in pools (what few there are)"</i> (MassDFG 2020).</p> <p>The Aquatic Life Use of Piccadilly Brook (MA82A-30) is assessed as Not Supporting. The lack of fish downstream of the Westborough Reservoir is concerning and may be due to habitat issues (flow and siltation). While the temperatures met cold water criteria/thresholds in the upstream portion of the brook (a CFR and Tier 1 Existing Use Coldwater Fishery), elevated temperatures were documented downstream of Route 135 (which is also downstream of two small, private dams). Based on these data, impairments are being added for Fish Bioassessments and Temperature.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5389	MassDFG	Fish Community	Piccadilly Brook	Downstream of Westborough Rd, Westborough	42.24455	-71.60117

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
UMassA_PICDS1	UMass Amherst	Water Quality	Picadilly Brook	12m downstream dam	42.24442	-71.602926
UMassA_PICDS2	UMass Amherst	Water Quality	Picadilly Brook	247m downstream dam	42.244777	-71.600469
UMassA_PICDS3	UMass Amherst	Water Quality	Picadilly Brook	367m downstream dam	42.245134	-71.599076
UMassA_PICDS4	UMass Amherst	Water Quality	Picadilly Brook	1574m downstream dam	42.252808	-71.591077

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) 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
5389	07/11/14	BP	Sample Attempted - No Fish

* Field sheet comments: "No fish sampled. Stage at 9:30am=0.44'. Only 1 pass done w/ block nets, no fish captured. Ended survey reach at channel split. Stream wide US of transducer, wide but very shallow. Heavy siltation, especially in pools (what few there are)"

Physico-chemical Water Quality Information

DO, pH, Temperature

UMass Amherst Dam Study Long-term Continuous Temperature Data (Summer Index 2014-2017). (UMass-Amherst 2018) (MassDEP Undated 2)

[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_PICDS1	05/28/14	12/31/14	107	16.9	19.6	17.5	17.4	0	0	0
UMassA_PICDS1	01/01/15	12/31/15	106	16.1	17.2	16.2	16.2	0	0	0
UMassA_PICDS1	01/01/16	05/05/16	0	10.4	11.8	NA	NA	NA	NA	NA
UMassA_PICDS2	05/28/14	12/31/14	107	18.1	19.9	18.2	18.0	0	0	0
UMassA_PICDS2	01/01/15	12/31/15	106	17.2	18.5	17.4	17.3	0	0	0
UMassA_PICDS2	01/01/16	05/05/16	0	NA	NA	NA	NA	NA	NA	NA
UMassA_PICDS3	05/28/14	12/31/14	107	17.7	18.4	17.4	17.3	0	0	0
UMassA_PICDS3	01/01/15	12/31/15	106	17.7	19.2	17.8	17.8	0	0	0
UMassA_PICDS3	01/01/16	05/05/16	0	14.0	16.8	NA	NA	NA	NA	NA
UMassA_PICDS4	05/28/14	12/31/14	107	22.8	24.3	22.2	21.8	50	22	0
UMassA_PICDS4	01/01/15	12/31/15	104	22.7	24.6	23.0	22.9	69	35	0
UMassA_PICDS4	01/01/16	05/05/16	0	14.6	15.9	NA	NA	NA	NA	NA

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Piccadilly Brook (MA82A-30), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Recent data are not available for Piccadilly Brook (MA82A-30), so the Aesthetics Use is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
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Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available to assess the status of the Primary Contact Recreational Use for Piccadilly Brook (MA82A-30), so it is Not Assessed.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No bacteria data are available to assess the status of the Secondary Contact Recreational Use for Piccadilly Brook (MA82A-30), so it is Not Assessed.	

Pine Brook (MA82A-14)

Location:	Headwaters, south of Route 20, just east of the Weston/Wayland border to mouth at confluence with the Sudbury River, Wayland.
AU Type:	RIVER
AU Size:	2.5 MILES
Classification/Qualifier:	B: CWF

No usable data were available for Pine Brook (MA82A-14) 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

Puffers Pond (MA82092)

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

No usable data were available for Puffers Pond (MA82092) 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	Mercury in Fish Tissue		Unchanged

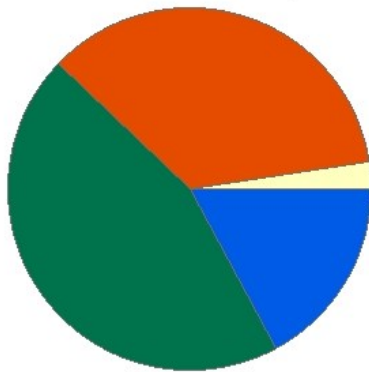
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			

River Meadow Brook (MA82A-10)

Location:	Headwaters, outlet Russell Mill Pond, Chelmsford to mouth at confluence with the Concord River, Lowell.
AU Type:	RIVER
AU Size:	6.4 MILES
Classification/Qualifier:	B

River Meadow Brook - MA82A-10

Watershed Area: 26.86 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	26.86	5.83	6.58	1.38
Agriculture	2.4%	0%	4.1%	0%
Developed	35.6%	60.7%	24.6%	43.1%
Natural	45%	27.2%	39.6%	31.2%
Wetland	17.1%	12%	31.7%	25.7%
Impervious Cover	19.6%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Debris*)		Unchanged
5	5	(Water Chestnut*)		Unchanged
5	5	Benthic Macroinvertebrates		Added
5	5	Chloride		Added
5	5	Dissolved Oxygen		Added
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Fecal Coliform		Unchanged
5	5	Temperature		Unchanged
5	5	Trash		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Debris*)	Municipal (Urbanized High Density Area) (Y)			X	X	X
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

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				
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (Y)	X				
Chloride	Impervious Surface/Parking Lot Runoff (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fecal Coliform	Source Unknown (N)				X	
Temperature	Dam or Impoundment (Y)	X				
Trash	Municipal (Urbanized High Density Area) (Y)			X	X	X

Recommendations

2022 Recommendations
ALU: Continuous temperature data should be collected in River Meadow Brook in the vicinity of MassDEP station W1488 for a potential delisting (data should be collected during a year with similar flow conditions as in 2006). OTHER: Given the regional trend of increasing chloride and the newly identified chloride impairment, the use of de-icing products containing chloride should be minimized by all parties (i.e., highways/roads, municipalities, businesses, residences) in the River Meadow Brook sub-watershed.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP staff conducted surveys of River Meadow Brook (MA82A-10) in 2015 and 2016 at multiple stations as part of a special chloride study as well as in 2015 for a probabilistic monitoring project (MAP2). From upstream (US) to downstream (DS): Mill Rd bridge, Chelmsford (W1488; chloride); ~1400 ft US of Turnpike Rd, Chelmsford (6370/B0906/W2507; MAP2); Industrial Ave, Chelmsford (W2548; chloride); apartment complex roadway bridge near mouth of river, E of Lawrence St, Lowell (W1489, chloride). The Aug backpack electrofishing sample (Sample 6370; n=57) from US of Turnpike Rd included 37% fluvial species and 49% moderately tolerant macrohabitat generalists, good for a WWF. However, the July benthic sample's (B0906) IBI score of 38 indicated moderately degraded conditions for a low gradient site. A probe was deployed here (W2507) to measure continuous dissolved oxygen (DO) (80 days in 2015)- all DO 7DADMin's were <5.0mg/L & most daily mins <4.0mg/L. Continuous temperature data recorded during the summer index periods of 2015 at W2507 (67 days) & 2016 at the other stations (88-96 days) had 7DADMin's <27.7°C and max 24-hr averages <27.2°C. pH was 6.3-7.3 S.U. in all years at all stations (n= 3-4/station/yr). Little indication of nutrient enrichment at W2507 (total phosphorus seasonal avg concentration 0.041mg/L with n=5, max DO saturation 52.3%, no observations of excessive filamentous algae; however, max DO diel shift was 7.3 mg/L). No exceedances among 3 clean metals or aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out), and the max Total Ammonia Nitrogen was 0.070mg/L (n=5). Chloride & specific conductance (SC) data were collected at all 4 stations (at chloride study sites data were collected Oct-Dec 2015 and Jan-Sept 2016). US site (W1488): no exceedances among discrete chloride or continuous SC data (2015 & 2016: max chloride 140mg/L n=3 & 6; max 4-day avg SC 620µs/cm). W2507: 1 of 5 chloride >230 mg/L (max 240mg/L) & 1 of 3 discrete SC >994µs/cm (the estimated chloride chronic criterion plus a 10% margin of error), with a max of 1010 µs/cm in 2015. More evidence of chloride toxicity at two DS sites (W2548, W1489): 2 of 3 chloride samples >230mg/L in 2015 at both sites (max 390mg/L & 320mg/L, respectively) while in 2016 3 of 6 chloride samples >230mg/L at W2548 and 5 of 6 elevated at W1489 (note higher maxima during the 2016 drought year at 590 & 520mg/L). Continuous 4-day avg SC data in 2015/2016 are summarized as follows: for W2548 36%/48% were >904µs/cm (the estimated chloride chronic criterion) & for W1489 54%/61% were >904µs/cm. Also 3 exceedances of the estimated chloride acute criterion (3,193µs/cm) at W2548 (max SC 4537µs/cm) and 7 exceedances at W1489 (max SC 3833µs/cm) in 2016. While these acute exceedances were observed during a drought year, it is likely that increasing frequency of droughts brought on by climate change will exacerbate the frequency of acutely toxic chloride levels. As part of the public comment process on the draft 2022 IR, DEP notes that OARS' June-Aug 2020 SC data (3 consecutive monthly samples ranged 1262-1823 µs/cm), collected at Thorndike St/Rt 3A, Lowell (OARS-RVM-005) (OARS 2021) provide further evidence of chloride toxicity.

The Aquatic Life Use of River Meadow Brook (MA82A-10) is assessed as Not Supporting with the prior Temperature and Water Chestnut impairments being carried forward. New impairments will be added for Benthic Macroinvertebrates, Chloride, and Dissolved Oxygen. There is a large amount of wetlands in the stream buffer upstream of where the benthic macroinvertebrate and DO data were collected (B0906/W2507), but most of the subwatershed is highly developed (19.5% impervious cover), likely contributing to chloride toxicity measured at downstream DEP/OARS sites. While 2016 temperature data were good, flow conditions were different than the year triggering impairment, so delisting is not being proposed.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6370	MassDEP	Fish Community	River Meadow Brook	, Chelmsford	42.59436	-71.34067
B0906	MassDEP	Benthic	River Meadow Brook/	[approximately 425 meters upstream/south of Turnpike Road, Chelmsford, MA]	42.594356	-71.340670
W1488	MassDEP	Water Quality	River Meadow Brook	[Mill Road bridge, Chelmsford]	42.578262	-71.332530
W1489	MassDEP	Water Quality	River Meadow Brook	[apartment complex roadway bridge near mouth of river, east of Lawrence Street, Lowell]	42.633801	-71.301197

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2507	MassDEP	Water Quality	River Meadow Brook	[approximately 1400 feet upstream/south of Turnpike Road, Chelmsford]	42.594356	-71.340670
W2548	MassDEP	Water Quality	River Meadow Brook	[Industrial Avenue, Chelmsford]	42.614582	-71.322564

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0906	07/27/15	RBP multihab	Statewide_Low_Gradient	298	38	MD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: BT = Brown Trout, CCS = Creek Chubsucker, GS = Golden Shiner, P = Pumpkinseed, RP = Redfin Pickerel, WS = White Sucker, YB = Yellow Bullhead]

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
6370	08/20/15	BP	TP		7	57	2%	3	37%	12%	2	49%	No	No	BT, CCS, GS, P, RP, WS, YB,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2507	07/02/15	09/28/15	80	68	35	0.2	1.2	2.9	7.3	68	77	27	30	68	72	35	35

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W1488	10/06/15	12/03/15	3	9.5	10.6	0	0	0
W1488	01/21/16	09/07/16	4	1.5	5.7	2	2	2
W1489	10/06/15	12/03/15	3	9.7	10.4	0	0	0
W1489	01/21/16	09/07/16	4	6.6	8.6	0	0	0
W2507	08/05/15	09/29/15	3	2.9	3.9	2	2	2
W2548	10/06/15	12/03/15	3	7.3	8.7	0	0	0
W2548	01/21/16	09/07/16	4	4.2	6.6	1	1	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W1488	06/01/16	09/06/16	96	81	26.8	29.4	26.8	25.4	81	58	76	38	0	0
W1489	06/01/16	09/06/16	88	73	26.8	28.7	27.1	25.5	73	39	63	28	0	0
W2507	07/02/15	09/15/15	67	58	25.2	29.4	27.3	24.4	58	16	58	9	0	0
W2548	06/01/16	09/06/16	96	81	26.1	29.5	27.5	24.4	76	16	52	9	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W1488	06/01/16	09/07/16	98	4628	26.8	2845	1785	0
W1489	06/01/16	09/07/16	99	4222	27.1	1868	1256	0

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
W2507	07/01/15	09/15/15	76	3141	25.8	765	383	0
W2548	06/01/16	09/07/16	98	4627	26.1	724	406	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W1488	10/06/15	12/03/15	3	0	12.5	9.1	0	0	0	0
W1488	01/21/16	09/07/16	6	3	22.2	13.3	2	1	0	0
W1489	10/06/15	12/03/15	3	0	13.7	10.3	0	0	0	0
W1489	01/21/16	09/07/16	6	3	21.5	13.1	3	0	0	0
W2507	08/05/15	09/29/15	3	2	21.6	19.6	2	0	0	0
W2548	10/06/15	12/03/15	3	0	14.4	10.2	0	0	0	0
W2548	01/21/16	09/07/16	6	3	19.6	11.9	0	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W1488	10/06/15	12/03/15	3	7	7.2	0	0
W1488	01/21/16	09/07/16	4	6.5	7.2	0	0
W1489	10/06/15	12/03/15	3	6.8	7.1	0	0
W1489	01/21/16	09/07/16	4	6.9	7.3	0	0
W2507	08/05/15	09/29/15	3	6.5	6.7	0	0
W2548	10/06/15	12/03/15	3	6.5	6.8	0	0
W2548	01/21/16	09/07/16	4	6.3	6.8	2	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W1488	2015	--	--	--	--	--	--	93.2	7.2	3	0
W1488	2016	--	--	--	--	--	--	100.7	7.2	3	0
W1489	2015	--	--	--	--	--	--	95.3	7.1	3	0
W1489	2016	--	--	--	--	--	--	107.8	7.3	5	2
W2507	2015	5	0.026	0.062	0.041	7.3	3.3	52.3	6.7	5	0
W2548	2015	--	--	--	--	--	--	87.6	6.8	3	0
W2548	2016	--	--	--	--	--	--	97.8	6.8	6	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2507	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2507	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2507	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2507	2015	5	0.040	0.070	0.055	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W1488	2015	3	78	140	106	0	0
W1488	2016	6	80	130	103	0	0
W1489	2015	3	200	320	263	2	0
W1489	2016	6	220	520	340	5	0
W2507	2015	5	130	240	166	1	0
W2548	2015	3	180	390	280	2	0
W2548	2016	6	190	590	343	3	0

MassDEP Long-term Continuous Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Start Date	End Date	SpCond Min (µs/cm)	SpCond Max (µs/cm)	SpCond Avg (µs/cm)	Max 4day Avg (µs/cm)	Max 1hr Avg (µs/cm)	4Day Count	1hr Count	Count 4day Avg >904	Count 1hr Avg >3193
W1488	10/06/15	12/31/15	319	570	428	565	568	3957	4147	0	0
W1488	01/01/16	09/07/16	308	635	404	620	635	12002	12002	0	0
W1489	10/06/15	12/31/15	253	1622	998	1599	1622	3951	4141	2142	0
W1489	01/01/16	09/07/16	285	3833	1047	1822	3692	11406	11596	6923	7
W2548	10/06/15	12/31/15	272	1624	942	1549	1623	3955	4145	1424	0
W2548	01/01/16	09/07/16	236	4537	1096	2131	4044	12003	12003	5741	3

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6)
(MassDEP Undated 4)

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
W1488	10/06/15	12/03/15	3	317	483	0	0	0	0	0	0
W1488	01/21/16	09/07/16	6	326	474	0	0	0	0	0	0
W1489	10/06/15	12/03/15	3	690	1084	2	1	0	0	1	0
W1489	01/21/16	09/07/16	6	752	1786	3	3	0	0	2	2
W2507	08/05/15	09/29/15	3	563	1010	2	1	0	0	1	0
W2548	10/06/15	12/03/15	3	625	1271	2	1	0	0	1	0
W2548	01/21/16	09/07/16	6	650	1981	3	3	0	0	2	2

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in River Meadow Brook (MA82A-10), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys of River Meadow Brook (MA82A-10) in 2015 and 2016 at multiple stations from upstream to downstream as follows: Mill Rd bridge, Chelmsford (W1488; 2015 n=3; 2016 n=6); ~1400 ft upstream/south of Turnpike Rd, Chelmsford (W2507; 2015 n=5); Industrial Ave, Chelmsford (W2548; 2015 n=3; 2016 n=6); apartment complex roadway bridge near mouth of river, east of Lawrence St, Lowell (W1489; 2015 n=3; 2016 n=6). There were generally no odors, growths, or turbidity noted at any of the sites. However, objectionable deposits (i.e., trash) were recorded during field surveys at station W2548 in 2015 (n=1 of 3) and 2016 (n=5 of 6), and at station W1489 in summer 2015 (n=2 of 3) and 2016 (n=5 of 6; one of the field notes from later in 2016 describes "major trash" (MassDEP Undated 6)).</p> <p>The Aesthetics Use of River Meadow Brook (MA82A-10) will continue to be assessed as Not Supporting with the prior Debris and Trash impairments being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W1488	MassDEP	Water Quality	River Meadow Brook	[Mill Road bridge, Chelmsford]	42.578262	-71.332530
W1489	MassDEP	Water Quality	River Meadow Brook	[apartment complex roadway bridge near mouth of river, east of Lawrence Street, Lowell]	42.633801	-71.301197
W2507	MassDEP	Water Quality	River Meadow Brook	[approximately 1400 feet upstream/south of Turnpike Road, Chelmsford]	42.594356	-71.340670
W2548	MassDEP	Water Quality	River Meadow Brook	[Industrial Avenue, Chelmsford]	42.614582	-71.322564

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W1488	River Meadow Brook	2015	3	MassDEP aesthetics observations for station W1488 on River Meadow 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.
W1488	River Meadow Brook	2016	6	MassDEP aesthetics observations for station W1488 on River Meadow 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.
W1489	River Meadow Brook	2015	3	The Aesthetics Use for River Meadow Brook should remain assessed as Not Supporting due to observations of trash during MassDEP field surveys at station W1489 in summer 2015 (n=2 of 3) and 2016 (n=5 of 6). One of the field notes from later in 2016 describes "major trash." There were generally no other noted objectionable conditions (odors, growths, or turbidity).
W1489	River Meadow Brook	2016	6	The Aesthetics Use for River Meadow Brook should remain assessed as Not Supporting due to observations of trash during MassDEP field surveys at station W1489 in summer 2015 (n=2 of 3) and 2016 (n=5 of 6). One of the field notes from later in 2016 describes "major trash." There were generally no other noted objectionable conditions (odors, growths, or turbidity).
W2507	River Meadow Brook	2015	5	MassDEP aesthetics observations for station W2507/MAP2-646 on River Meadow 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.

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2548	River Meadow Brook	2015	3	The Aesthetics use for River Meadow Brook (MA82A-10) continues to be assessed as Not Supporting based on MassDEP staff observations of objectionable deposits (i.e., trash) during field surveys at station W2548 in 2015 (n=1 of 3) and 2016 (n=5 of 6). There were generally no odors, growths, or turbidity at this station.
W2548	River Meadow Brook	2016	6	The Aesthetics use for River Meadow Brook continues to be assessed as Not Supporting based on MassDEP staff observations of objectionable deposits (i.e., trash) during field surveys at station W2548 in 2015 (n=1 of 3) and 2016 (n=5 of 6). There were generally no odors, growths, or turbidity at this station.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W1488	2015	3	3	0
W1488	2016	6	3	0
W1489	2015	3	3	0
W1489	2016	6	5	2
W2507	2015	5	5	0
W2548	2015	3	3	0
W2548	2016	6	6	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W1488	River Meadow Brook	2015	Color	None	2	3
W1488	River Meadow Brook	2015	Color	Unobservable	1	3
W1488	River Meadow Brook	2015	Objectionable Deposits	No	3	3
W1488	River Meadow Brook	2015	Odor	None	3	3
W1488	River Meadow Brook	2015	Scum	No	1	3
W1488	River Meadow Brook	2015	Scum	Yes	2	3
W1488	River Meadow Brook	2015	Turbidity	None	1	3
W1488	River Meadow Brook	2015	Turbidity	Slightly Turbid	2	3
W1488	River Meadow Brook	2016	Color	Brownish	1	6

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W1488	River Meadow Brook	2016	Color	Light Yellow/Tan	3	6
W1488	River Meadow Brook	2016	Color	None	2	6
W1488	River Meadow Brook	2016	Objectionable Deposits	No	4	6
W1488	River Meadow Brook	2016	Objectionable Deposits	Unobservable	2	6
W1488	River Meadow Brook	2016	Odor	None	5	6
W1488	River Meadow Brook	2016	Odor	Unobservable	1	6
W1488	River Meadow Brook	2016	Scum	No	3	6
W1488	River Meadow Brook	2016	Scum	Yes	3	6
W1488	River Meadow Brook	2016	Turbidity	Highly Turbid	1	6
W1488	River Meadow Brook	2016	Turbidity	None	3	6
W1488	River Meadow Brook	2016	Turbidity	Slightly Turbid	2	6
W1489	River Meadow Brook	2015	Color	None	3	3
W1489	River Meadow Brook	2015	Objectionable Deposits	No	1	3
W1489	River Meadow Brook	2015	Objectionable Deposits	Yes	2	3
W1489	River Meadow Brook	2015	Odor	None	3	3
W1489	River Meadow Brook	2015	Scum	No	2	3
W1489	River Meadow Brook	2015	Scum	NR	1	3
W1489	River Meadow Brook	2015	Turbidity	None	3	3
W1489	River Meadow Brook	2016	Color	Light Yellow/Tan	3	6
W1489	River Meadow Brook	2016	Color	None	3	6
W1489	River Meadow Brook	2016	Objectionable Deposits	No	1	6
W1489	River Meadow Brook	2016	Objectionable Deposits	Yes	5	6
W1489	River Meadow Brook	2016	Odor	None	3	6

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W1489	River Meadow Brook	2016	Odor	Other	1	6
W1489	River Meadow Brook	2016	Odor	Unobservable	2	6
W1489	River Meadow Brook	2016	Scum	No	5	6
W1489	River Meadow Brook	2016	Scum	Yes	1	6
W1489	River Meadow Brook	2016	Turbidity	None	3	6
W1489	River Meadow Brook	2016	Turbidity	Slightly Turbid	3	6
W2507	River Meadow Brook	2015	Color	Brownish	1	5
W2507	River Meadow Brook	2015	Color	Light Yellow/Tan	3	5
W2507	River Meadow Brook	2015	Color	None	1	5
W2507	River Meadow Brook	2015	Objectionable Deposits	No	4	5
W2507	River Meadow Brook	2015	Objectionable Deposits	Yes	1	5
W2507	River Meadow Brook	2015	Odor	None	5	5
W2507	River Meadow Brook	2015	Scum	No	5	5
W2507	River Meadow Brook	2015	Turbidity	None	4	5
W2507	River Meadow Brook	2015	Turbidity	Slightly Turbid	1	5
W2548	River Meadow Brook	2015	Color	None	3	3
W2548	River Meadow Brook	2015	Objectionable Deposits	No	2	3
W2548	River Meadow Brook	2015	Objectionable Deposits	Yes	1	3
W2548	River Meadow Brook	2015	Odor	None	3	3
W2548	River Meadow Brook	2015	Scum	No	3	3
W2548	River Meadow Brook	2015	Turbidity	None	2	3
W2548	River Meadow Brook	2015	Turbidity	Slightly Turbid	1	3
W2548	River Meadow Brook	2016	Color	Brownish	1	6

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2548	River Meadow Brook	2016	Color	Greyish	1	6
W2548	River Meadow Brook	2016	Color	Light Yellow/Tan	2	6
W2548	River Meadow Brook	2016	Color	None	2	6
W2548	River Meadow Brook	2016	Objectionable Deposits	No	1	6
W2548	River Meadow Brook	2016	Objectionable Deposits	Yes	5	6
W2548	River Meadow Brook	2016	Odor	Musty (Basement)	1	6
W2548	River Meadow Brook	2016	Odor	None	4	6
W2548	River Meadow Brook	2016	Odor	Unobservable	1	6
W2548	River Meadow Brook	2016	Scum	No	4	6
W2548	River Meadow Brook	2016	Scum	Unobservable	1	6
W2548	River Meadow Brook	2016	Scum	Yes	1	6
W2548	River Meadow Brook	2016	Turbidity	Highly Turbid	1	6
W2548	River Meadow Brook	2016	Turbidity	Moderately Turbid	1	6
W2548	River Meadow Brook	2016	Turbidity	None	3	6
W2548	River Meadow Brook	2016	Turbidity	Slightly Turbid	1	6

Primary Contact Recreation

2022 Use Attainment					Alert
Not Supporting					NO
2022 Use Attainment Summary					

MassDEP staff and OARS staff/volunteers collected *E. coli* bacteria samples at multiple stations in River Meadow Brook (MA82A-10) from upstream to downstream as follows: MassDEP sampled ~1400 ft upstream/south of Turnpike Road, Chelmsford (W2507) during summer 2015 (n=5); OARS sampled at Industrial Ave. at Crosspoint tower (OARS_OARS-RVM-022) during summer 2020 (n=3); OARS sampled at Industrial Ave. (behind Marshalls) (OARS_OARS-RVM-018) during summer 2020 (n=6); OARS sampled at Lincoln St., Lowell (OARS_OARS-RVM-012) during summer 2020 (n=6); OARS sampled at River Mead, Thorndike St, Lowell (OARS_OARS-RVM-005) during summer 2020 (n=15); and near the downstream end of the brook OARS sampled at 649 Lawrence St., Lowell (OARS_OARS-RVM-001) during summer 2020 (n=15). Bacteria data from all stations indicated the need for use impairment- the percentage of intervals with GMs >126 cfu/100mL ranged from 96-100% for all stations. Additionally, multiple samples exceeded the 410 cfu/100mL STV at the MassDEP station (located in the upstream third of the AU), as well as the two OARS stations with high frequency data (located near the downstream end of the AU). Seasonal GMs ranged from 207-579 cfu/100mL.

MassDEP field crews recorded notes on objectionable conditions during surveys of River Meadow Brook in 2015 and 2016 at these stations and while there were generally no odors, growths, or turbidity noted, objectionable deposits (i.e., trash) were recorded during field surveys at station W2548 in 2015 (n=1 of 3) and 2016 (n=5 of 6), and at station W1489 in summer 2015 (n=2 of 3) and 2016 (n=5 of 6; one of the field notes from later in 2016 describes “major trash” (MassDEP Undated 6)).

The Primary Contact Recreational Use of River Meadow Brook (MA82A-10) will continue to be assessed as Not Supporting, with all prior impairments (Debris, *Escherichia Coli* (*E. Coli*), Fecal Coliform, Trash) being carried forward.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2507	MassDEP	Water Quality	River Meadow Brook	[approximately 1400 feet upstream/south of Turnpike Road, Chelmsford]	42.594356	-71.340670
OARS_OARS-RVM-001	OARS	Water Quality	River Meadow Brook	649 Lawrence St., Lowell	42.633278	-71.303113
OARS_OARS-RVM-005	OARS	Water Quality	River Meadow Brook	River Mead, Thorndike, Lowell	42.631816	-71.308547
OARS_OARS-RVM-012	OARS	Water Quality	River Meadow Brook	Lincoln St., Lowell	42.628175	-71.317949
OARS_OARS-RVM-018	OARS	Water Quality	River Meadow Brook	Industrial Ave. (behind Marshalls)	42.619696	-71.318965
OARS_OARS-RVM-022	OARS	Water Quality	River Meadow Brook	Industrial Ave. at Crosspoint tower	42.614641	-71.322688

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)

[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
W2507	MassDEP	<i>E. coli</i>	05/12/15	09/02/15	5	190	1800	579
OARS_OARS-RVM-001	OARS	<i>E. coli</i>	06/08/20	09/14/20	15	164	3040	427

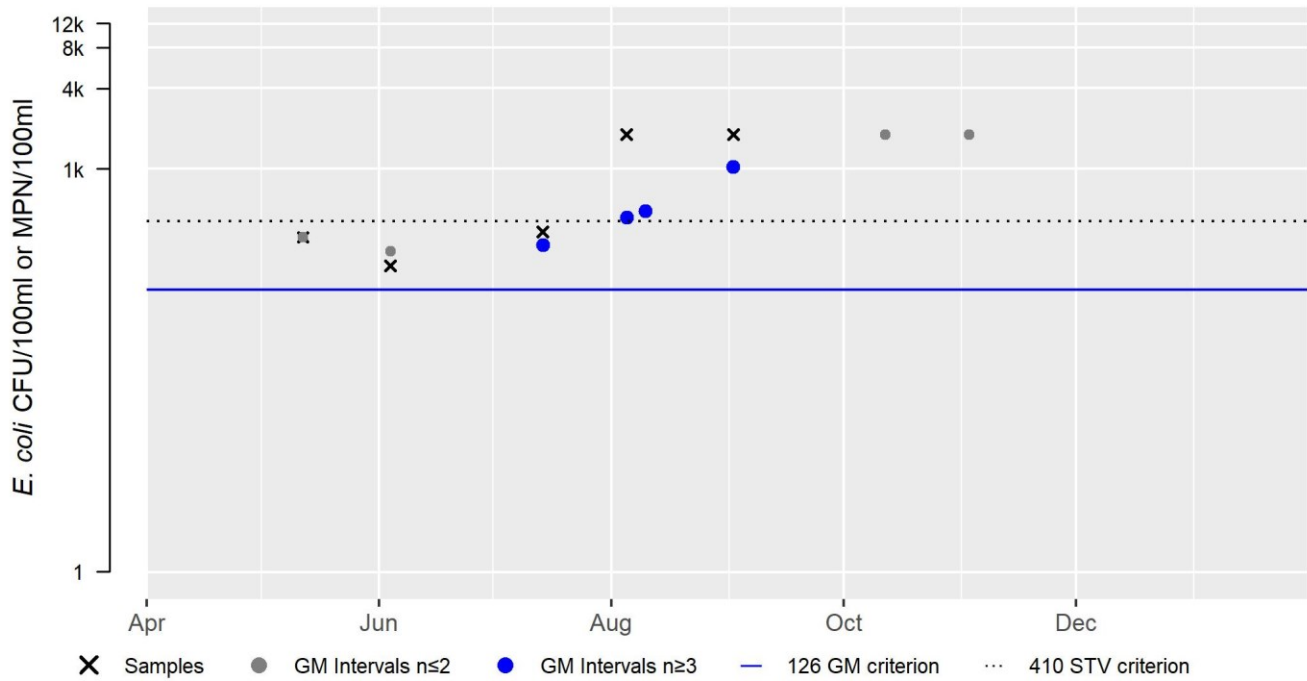
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
OARS_OARS-RVM-005	OARS	E. coli	06/08/20	09/14/20	15	60	3360	304
OARS_OARS-RVM-012	OARS	E. coli	07/20/20	08/24/20	6	110	380	231
OARS_OARS-RVM-018	OARS	E. coli	07/20/20	08/24/20	6	100	380	207
OARS_OARS-RVM-022	OARS	E. coli	08/31/20	09/14/20	3	130	880	339

W2507 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	579
#GMI	4
#GMI Ex	4
%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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

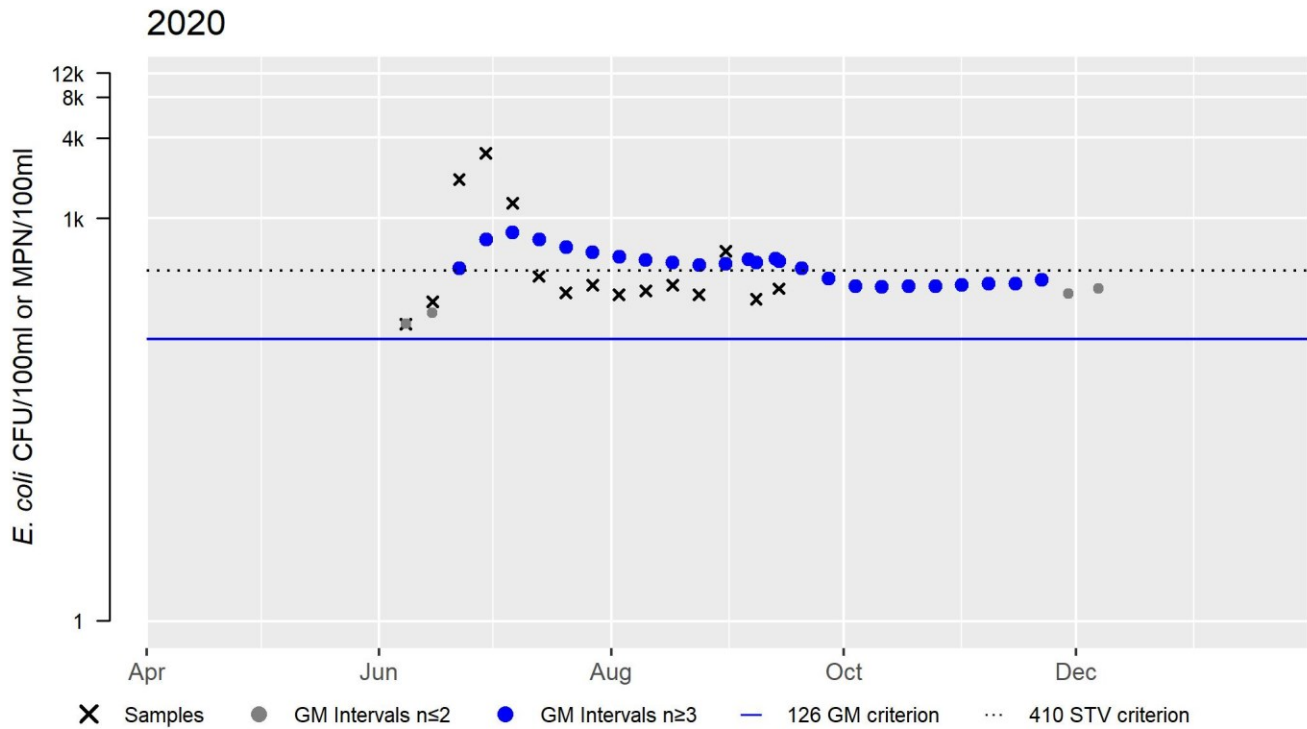
2015



OARS_OARS-RVM-001 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	427
#GMI	25
#GMI Ex	25
%GMI Ex	100
n>STV	4
%n>STV	27

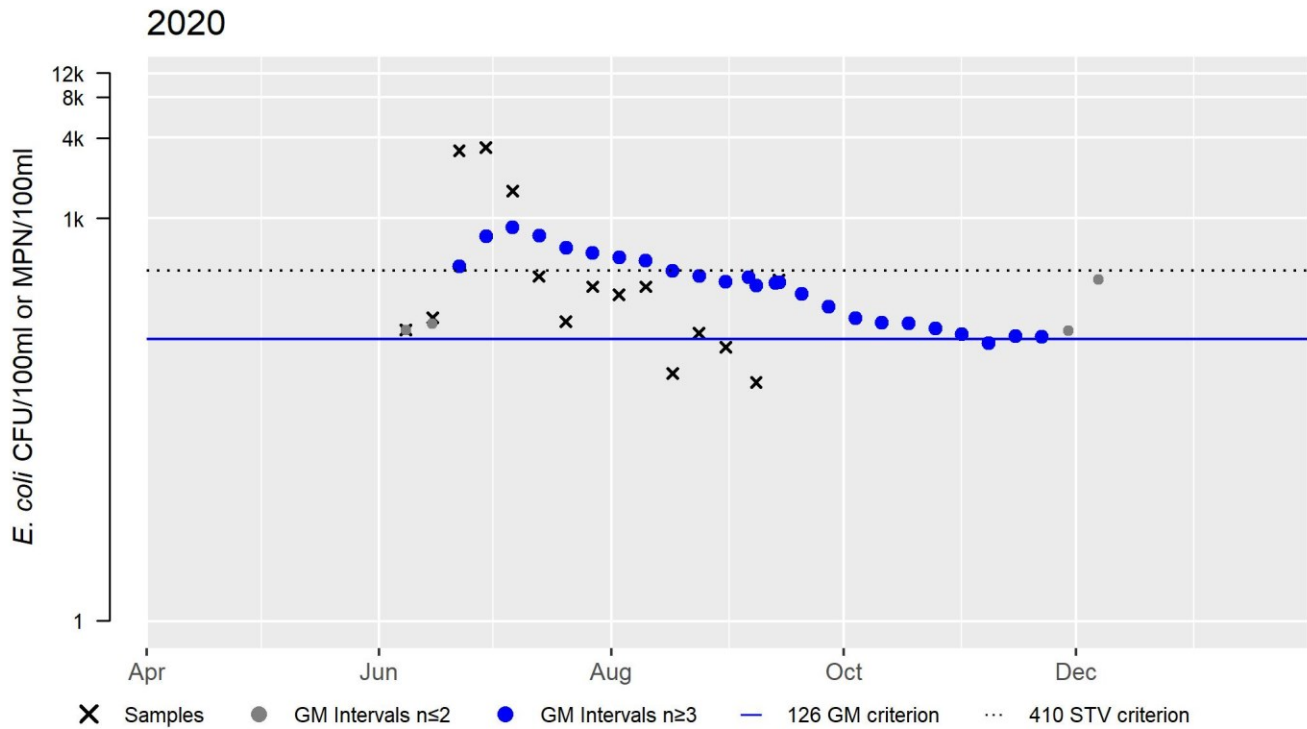
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-005 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	304
#GMI	25
#GMI Ex	24
%GMI Ex	96
n>STV	3
%n>STV	20

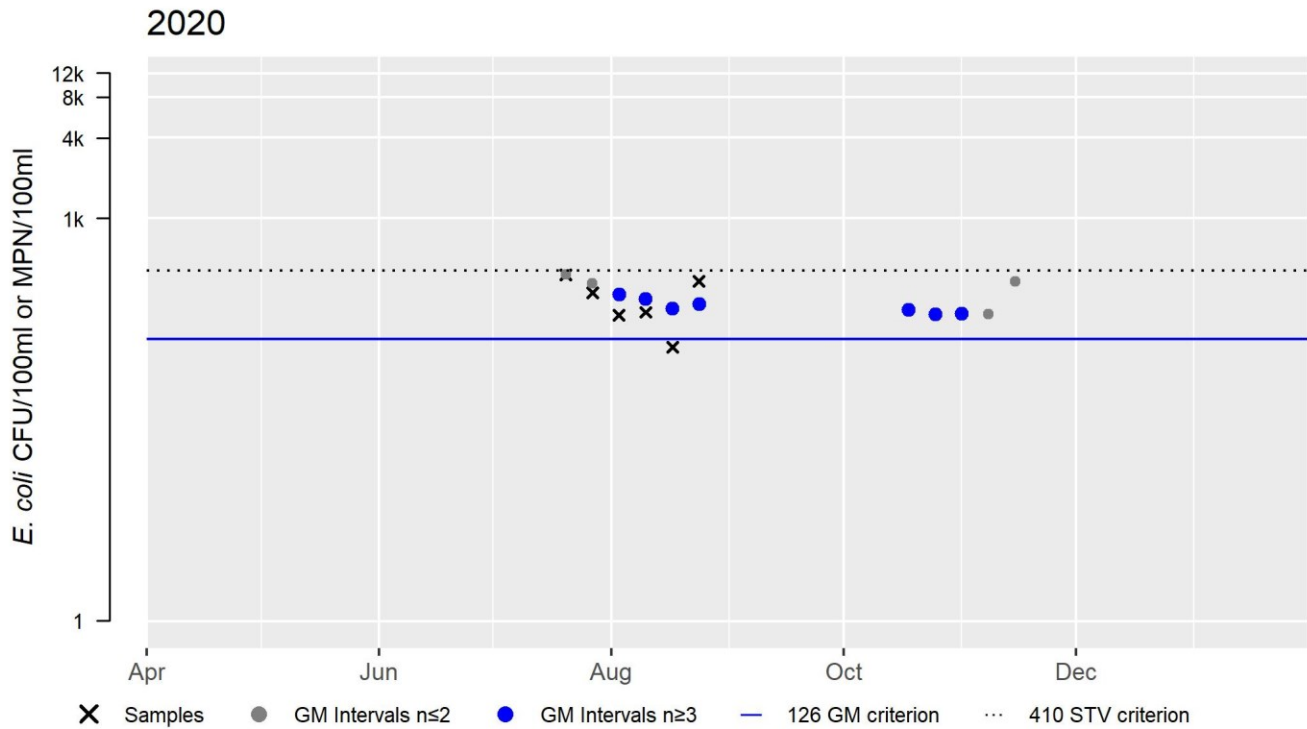
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-012 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	231
#GMI	7
#GMI Ex	7
%GMI Ex	100
n>STV	0
%n>STV	0

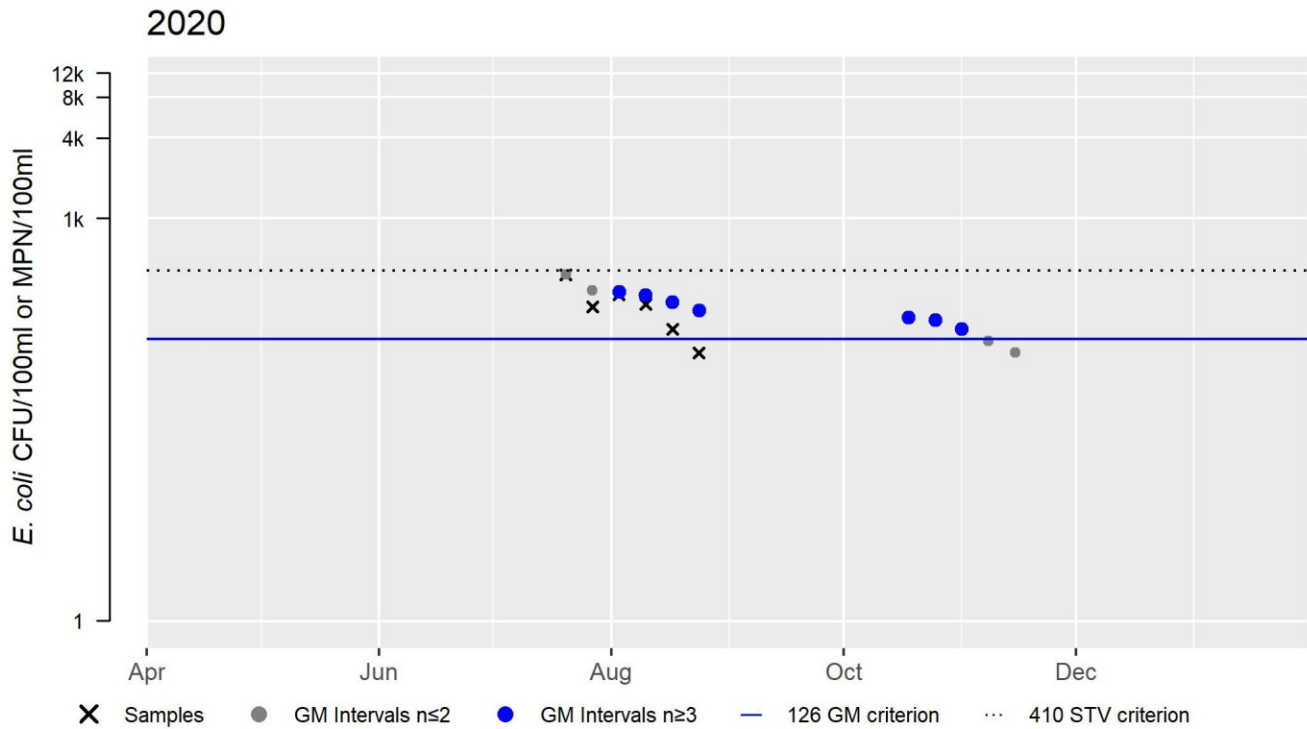
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-018 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	207
#GMI	7
#GMI Ex	7
%GMI Ex	100
n>STV	0
%n>STV	0

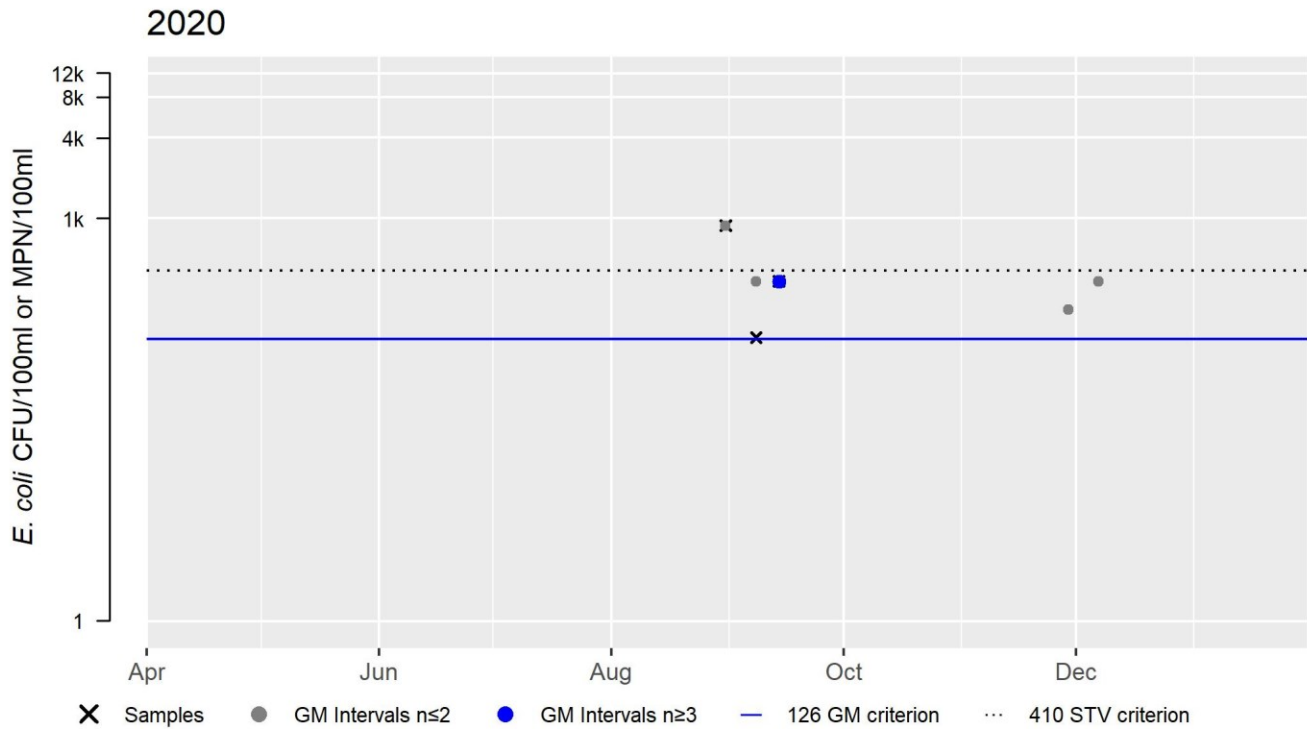
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-022 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	3
SeasGM	339
#GMI	1
#GMI Ex	1
%GMI Ex	100
n>STV	1
%n>STV	33

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



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

MassDEP staff and OARS staff/volunteers collected *E. coli* bacteria samples at multiple stations in River Meadow Brook (MA82A-10) from upstream to downstream as follows: MassDEP sampled ~1400 ft upstream/south of Turnpike Road, Chelmsford (W2507) during summer 2015 (n=5); OARS sampled at Industrial Ave. at Crosspoint tower (OARS_OARS-RVM-022) during summer 2020 (n=3); OARS sampled at Industrial Ave. (behind Marshalls) (OARS_OARS-RVM-018) during summer 2020 (n=6); OARS sampled at Lincoln St., Lowell (OARS_OARS-RVM-012) during summer 2020 (n=6); OARS sampled at River Mead, Thorndike St, Lowell (OARS_OARS-RVM-005) during summer 2020 (n=15); and near the downstream end of the brook OARS sampled at 649 Lawrence St., Lowell (OARS_OARS-RVM-001) during summer 2020 (n=15). Bacteria data did not meet use impairment guidance (MassDEP 2022) for any of the stations. For high frequency stations, the percentage of intervals with GMs >630 cfu/100mL was <30% and the percentage of samples exceeding the 1260 cfu/100mL STV did not exceed 20%. For low frequency stations, the percentage of intervals with GMs >630 cfu/100mL was well under 80%, there were usually no samples exceeding the STV, and the overall GMs were <630 cfu/100mL. Among all stations, the overall GMs (in effect, summer seasonal GMs) ranged from 207-579 cfu/100mL. MassDEP field crews recorded notes on objectionable conditions during surveys of River Meadow Brook in 2015 and 2016 at these stations and while there were generally no odors, growths, or turbidity noted, objectionable deposits (i.e., trash) were recorded during field surveys at station W2548 in 2015 (n=1 of 3) and 2016 (n=5 of 6), and at station W1489 in summer 2015 (n=2 of 3) and 2016 (n=5 of 6; one of the field notes from later in 2016 describes “major trash” (MassDEP Undated 6)).

The Secondary Contact Recreational Use of River Meadow Brook (MA82A-10) will continue to be assessed as Not Supporting, with the Debris and Trash impairments being carried forward. Since the *E. coli* concentrations did not exceed the use attainment impairment thresholds at any of the six stations where samples were collected, the Fecal Coliform and Escherichia Coli (*E. Coli*) impairments are being removed from this use, but does not warrant a delisting as the Primary Contact Recreational use is still listed for these impairments. (Note that the original pathogens impairment from 1992 referred to failing septic systems in Chelmsford (MassDEP 2002), but all the OARS stations/data were located downstream of Chelmsford, supporting the removal of this impairment from this use).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2507	MassDEP	Water Quality	River Meadow Brook	[approximately 1400 feet upstream/south of Turnpike Road, Chelmsford]	42.594356	-71.340670
OARS_OARS-RVM-001	OARS	Water Quality	River Meadow Brook	649 Lawrence St., Lowell	42.633278	-71.303113
OARS_OARS-RVM-005	OARS	Water Quality	River Meadow Brook	River Mead, Thorndike, Lowell	42.631816	-71.308547
OARS_OARS-RVM-012	OARS	Water Quality	River Meadow Brook	Lincoln St., Lowell	42.628175	-71.317949
OARS_OARS-RVM-018	OARS	Water Quality	River Meadow Brook	Industrial Ave. (behind Marshalls)	42.619696	-71.318965
OARS_OARS-RVM-022	OARS	Water Quality	River Meadow Brook	Industrial Ave. at Crosspoint tower	42.614641	-71.322688

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4) (OARS 2021) (MassDEP Undated 2)

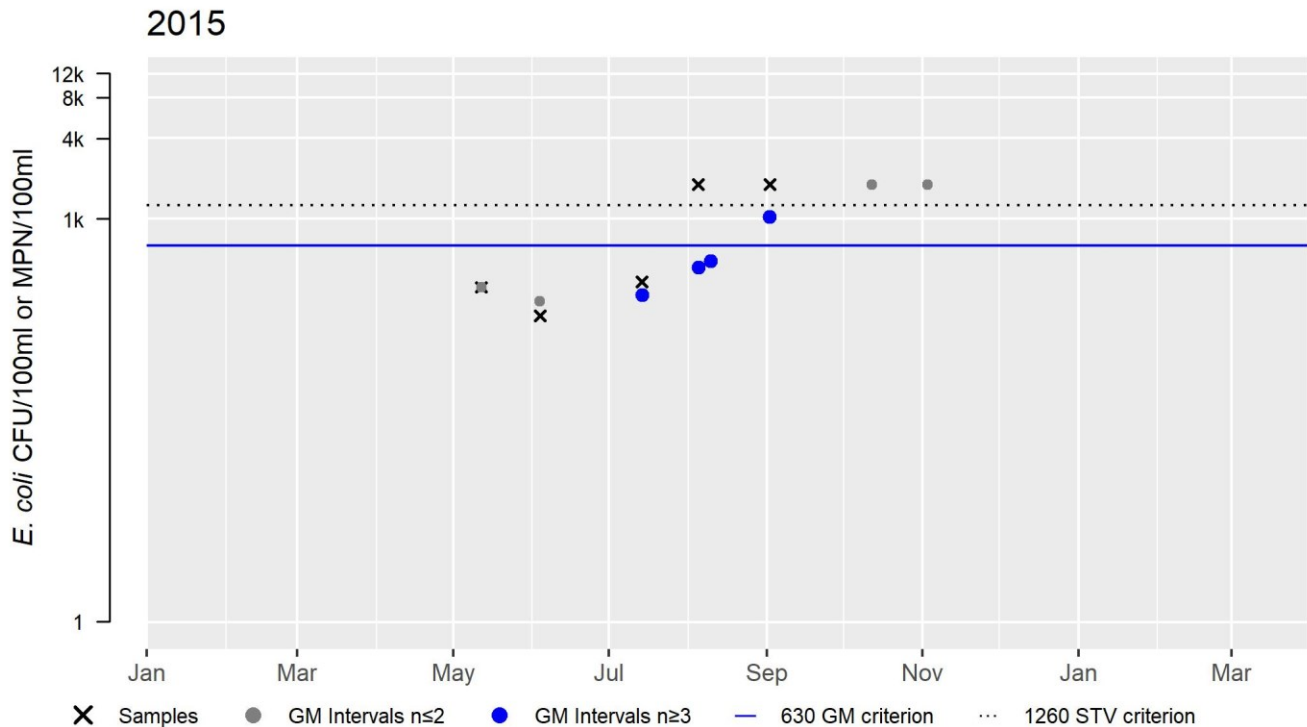
[Result units are CFU/100ml or MPN/100ml]

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)
W2507	MassDEP	E. coli	05/12/15	09/02/15	5	190	1800	579
OARS_OARS-RVM-001	OARS	E. coli	06/08/20	09/14/20	15	164	3040	427
OARS_OARS-RVM-005	OARS	E. coli	06/08/20	09/14/20	15	60	3360	304
OARS_OARS-RVM-012	OARS	E. coli	07/20/20	08/24/20	6	110	380	231
OARS_OARS-RVM-018	OARS	E. coli	07/20/20	08/24/20	6	100	380	207
OARS_OARS-RVM-022	OARS	E. coli	08/31/20	09/14/20	3	130	880	339

W2507 E. coli (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	579
#GMI	4
#GMI Ex	1
%GMI Ex	25
n>STV	2
%n>STV	40

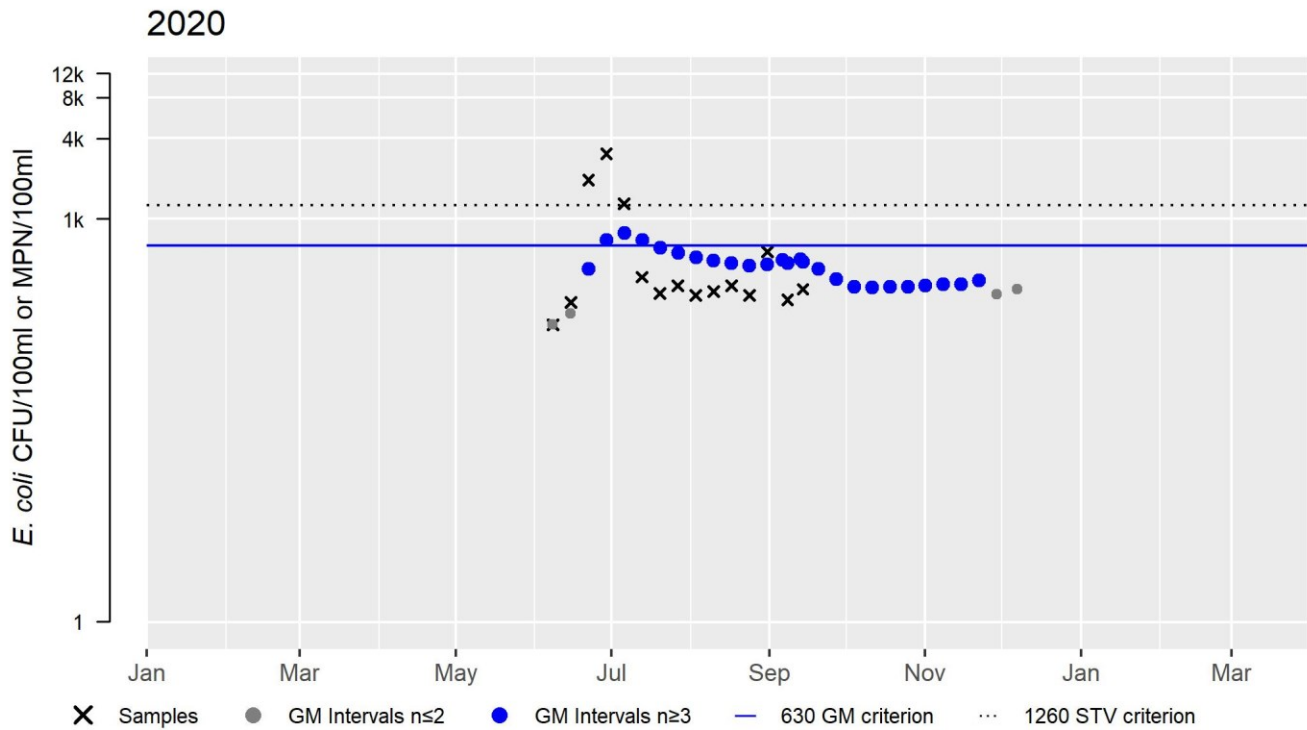
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-001 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	427
#GMI	25
#GMI Ex	3
%GMI Ex	12
n>STV	3
%n>STV	20

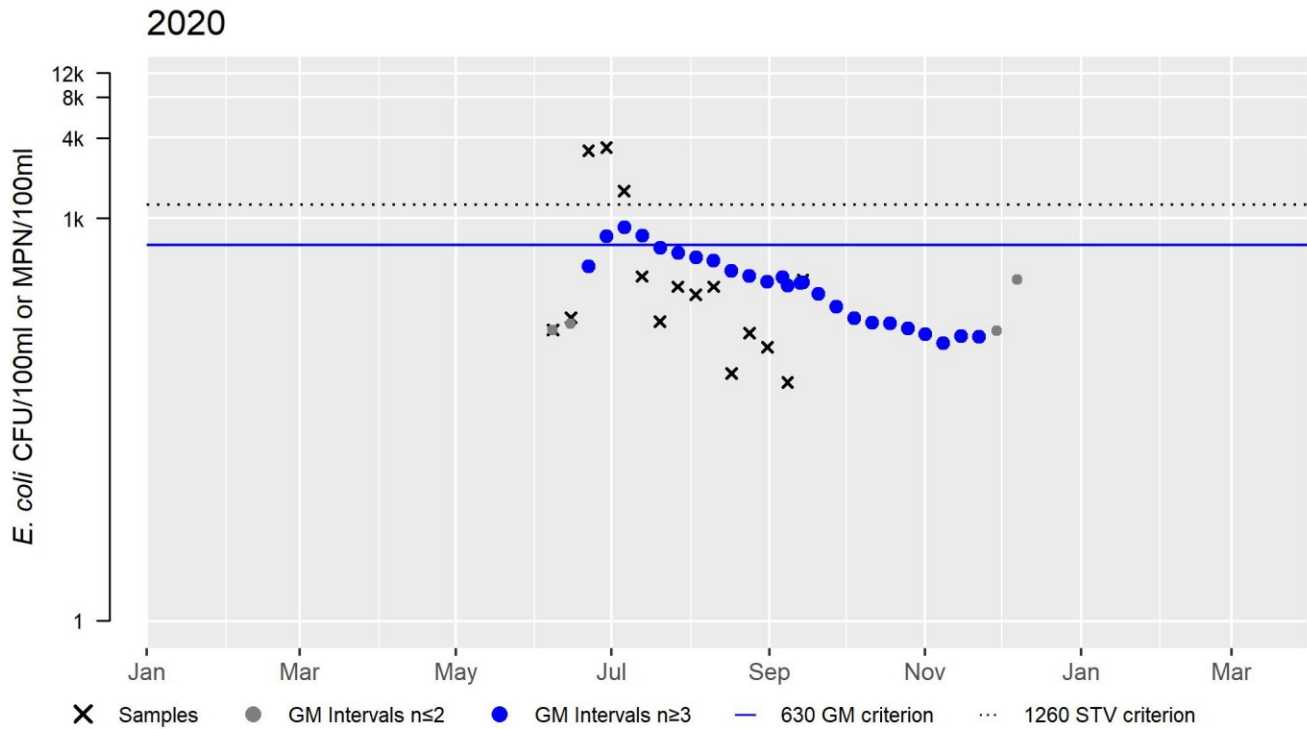
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-005 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	304
#GMI	25
#GMI Ex	3
%GMI Ex	12
n>STV	3
%n>STV	20

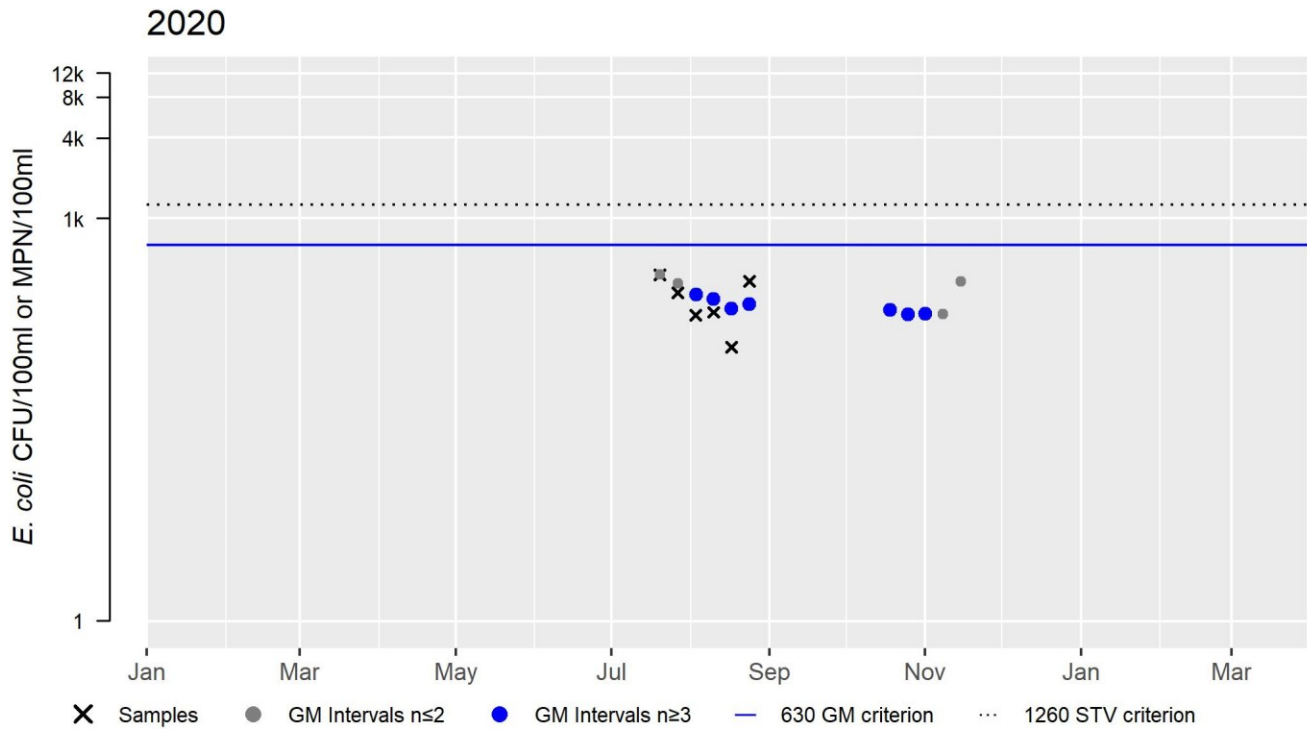
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-RVM-012 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	6
SeasGM	231
#GMI	7
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



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

E. coli CFU/100ml or MPN/100ml

12k
8k
4k
1k
1

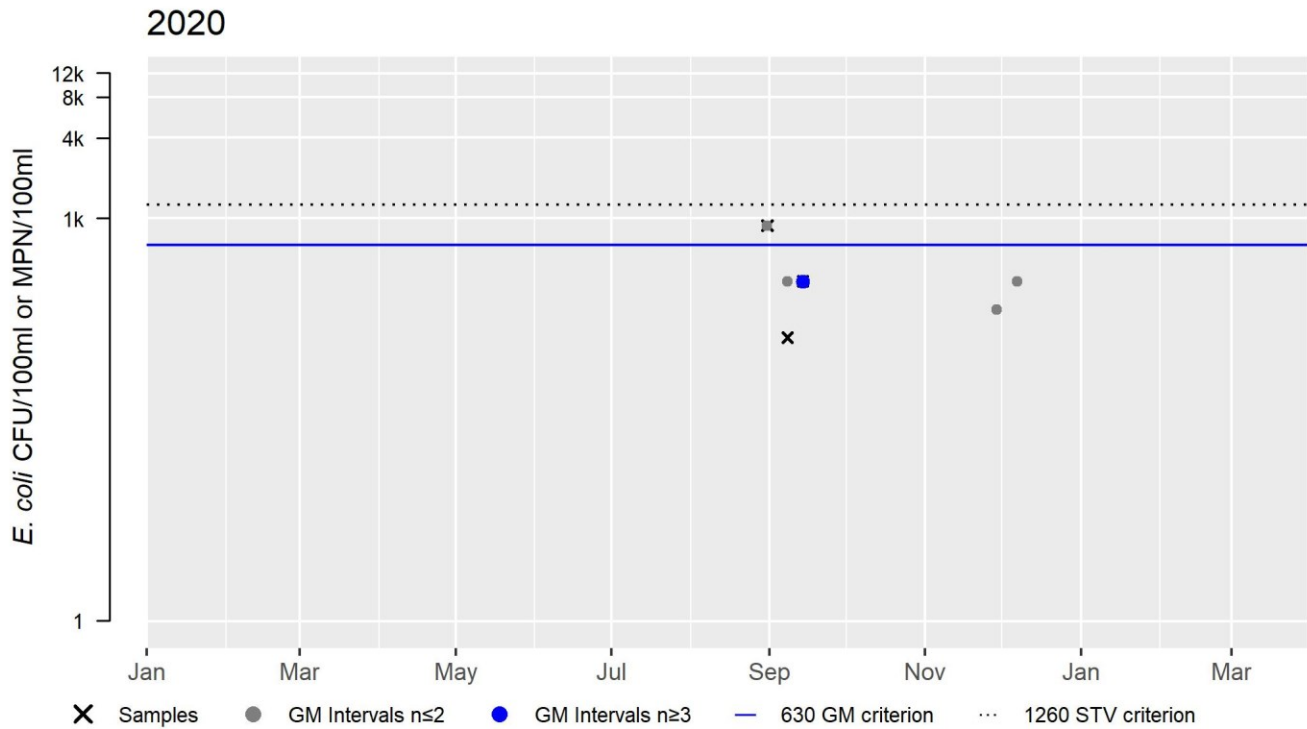
Jan Mar May Jul Sep Nov Jan Mar

× Samples ● GM Intervals $n \leq 2$ ● GM Intervals $n \geq 3$ — 630 GM criterion ... 1260 STV criterion

OARS_OARS-RVM-022 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	3
SeasGM	339
#GMI	1
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Rocky Pond (MA82095)

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

No usable data were available for Rocky Pond (MA82095) 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) (Y)	X				

Rutters Brook (MA82A-29)

Location:	From headwaters near Robin Road, Westborough to mouth at confluence with Jackstraw Brook, Westborough.
AU Type:	RIVER
AU Size:	2 MILES
Classification/Qualifier:	B: ORW

No usable data were available for Rutters Brook (MA82A-29) 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

Saxonville Pond (MA82097)

Location:	Framingham.
AU Type:	FRESHWATER LAKE
AU Size:	59 ACRES
Classification/Qualifier:	B: WWF, HQW (impoundment on river designated B/WWF/HQW)

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Aquatic Plants (Macrophytes)*)		Changed
5	5	(European Water Clover*)		Added
5	5	(Fanwort*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Removed
5	5	(Water Chestnut*)		Unchanged
5	5	Mercury in Fish Tissue		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Added

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Aquatic Plants (Macrophytes)*)	Source Unknown (N)			X	X	X
(European Water Clover*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Fanwort*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Mercury in Fish Tissue	Source Unknown (N)		X			
Nutrient/Eutrophication Biological Indicators	Source Unknown (N)			X	X	X

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Aquatic Plants (Macrophytes)	Not caused by a pollutant (4c)	As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Saxonville Pond (MA82097) was first listed as impaired for Noxious Aquatic Plants in 1998 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). The original impairment (applied to the Aesthetics and Recreational Uses) was based on an August 1996 synoptic survey conducted by MassDEP staff in which very dense vegetation was observed at three sites on the pond; this included the non-rooted, floating species, <i>Ceratophyllum demersum</i> , present at two of the locations, and <i>Lemna/Wolffia/Utricularia</i> spp., present at one location (MassDEP 1996, MassDEP 2002). In Google Earth images from August 2013 and June 2015, only a narrow channel is clear of dense vegetation (Google Earth Pro Undated). Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of non-rooted, floating, aquatic macrophyte species. Additionally, Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years.
Non-Native Aquatic Plants	Clarification of listing cause	The generic Non-Native Aquatic Plants impairment (for European water clover, <i>Marsilea quadrifolia</i>) is being removed and replaced with European Water Clover.

Aquatic Plants (Macrophytes)

1998 WBS Coding Sheet (MassDEP 2002):

WBID: MA 82097 WATERSHED: Concord
NAME: Saxonville Pond TYPE: Lake/Pond
CODE: SIZE: 59.0 acres
CLASS: B/
ORW?: Yes or No
Water Supply?: Yes or No

LATITUDE:
LONGITUDE:
Lake/Pond Name:
Ecoregion Name:
Description: Saxonville Pond, Framingham

Assessment Date: 9707 Begin Sampling: 9608 Water Quality Limited?: YES or NO
Cycle: 9809 End Sampling: 9608 303(d) List?: YES or NO

Lake Specific Information
Significantly Publicly Owned: 1996 Y or N
Trophic Status: O M E H D U
Trophic Trend: I S D U
Acidity/Toxics Trend: I S D U
Acidity Effects: I V N U

Uses	Support	Threat	Partial	Non-Sup	Not-Asses	Not-Attain
OVERALL USE SUPPORT			24.0	35.0	24.0	
ALUS			59.0	59.0	59.0	
FISH CONSUMPTION				59.0	59.0	
PRIMARY CONTACT				35.0	24.0	
SECONDARY CONTACT				35.0	24.0	
Aesthetics				35.0	24.0	
ALUS Bio						
ALUS Chem/Phys						
ALUS Toxicity						

Nonattainment Causes
Code Size Magnitude
2200 35.0 24.0 M
2600 59.0 H
0500 59.0 H
0501 59.0 M
2400 59.0 M

Nonattainment Sources
Code Size Magnitude
9000 59.0 H

Assessment Type
1996 Assessment Category = M E NA
B25, R35 B25, R35

Media/Pollutants Assessed
1996 Toxics Monitoring = YES or NO

Comments:
1996: 22 August 1996 synoptic survey indicated very dense submergent and floating leaf vegetation to varying widths on either side of the pond channel, about 60% of pond affected. Two non-native species observed, Cabomba caroliniana and Marsilea quadrifolia. Dept. of Public Health, Oak Grove station advised that there were no other plants.

1996 Synoptic Survey Field Sheet (MassDEP 1996):

Page 1 of 2

Lake/Pond Saxonville Pond Date 22 Aug 96
 Town/City Framingham Observers Kimball/McVoy
 River Basin Su As Co
 USGS Topo Framingham PALIS NO. 82097

Location/type of access (be specific, e.g., public boat ramp at

- ① Corner of Centennial Pl + Central St. west cove area off Simpson Street):
 at outlet on SW of dam - informal
 ② Water St. across from Shopping Ctr on N.E. corner

Ownership of Location/Access (specify public or private, name of owner(s), and any use restrictions):

- ① ?
 ② ?

Posted signs (re aquatic plants, fish advisories, access, etc.):

- ① None
 ② "

Water quality observations (clarity, dissolved organic staining, blooms, et cetera):

- ① Hard to observe, no apparent stain, sl. turbidity, surface scum apparent, bottom w/ much organic matter, partly decomposed
 ② same.

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

- ① *Peltandra*, *Marsilea*, *Sparganium*, *Pontederia*
Nymphaea, *Polygonum*, *Cabomba*, *Ceratophyllum*
demersum, *Lythrum* ~~(document submerged)~~
- ② *Nymphaea*, *Cabomba*, *Sparganium*, *Cephalanthus*,
Lythrum, *Peltandra*, *Polygonum*, *Ceratophyllum demersum*,
Utricularia, *Lemna*, *Wolffia*

Observed aquatic plant density

- ① (From bridge) - ~ 1/2 observed width
 v. dense submerged w/ or floating leaf

(at observation site and across lake or pond, if practicable):

- ② Upstream - left side of island 100% + filled in; channel open in middle to right
 of island; across pond mostly open except right bank; beyond island 100%
 v. dense on either side of channel.
- ③ Along Simpson St. N side + bridge to SW - v. dense along sides → entire
 width

Other notes (e.g., overt pollution, construction, and water uses:

Snails

Trophic - Eutrophic

ALUS - 59.0 acres - Partial Support

1° Contact - 35.0 acres Non-Support; 24.0 acres - Not Assessed

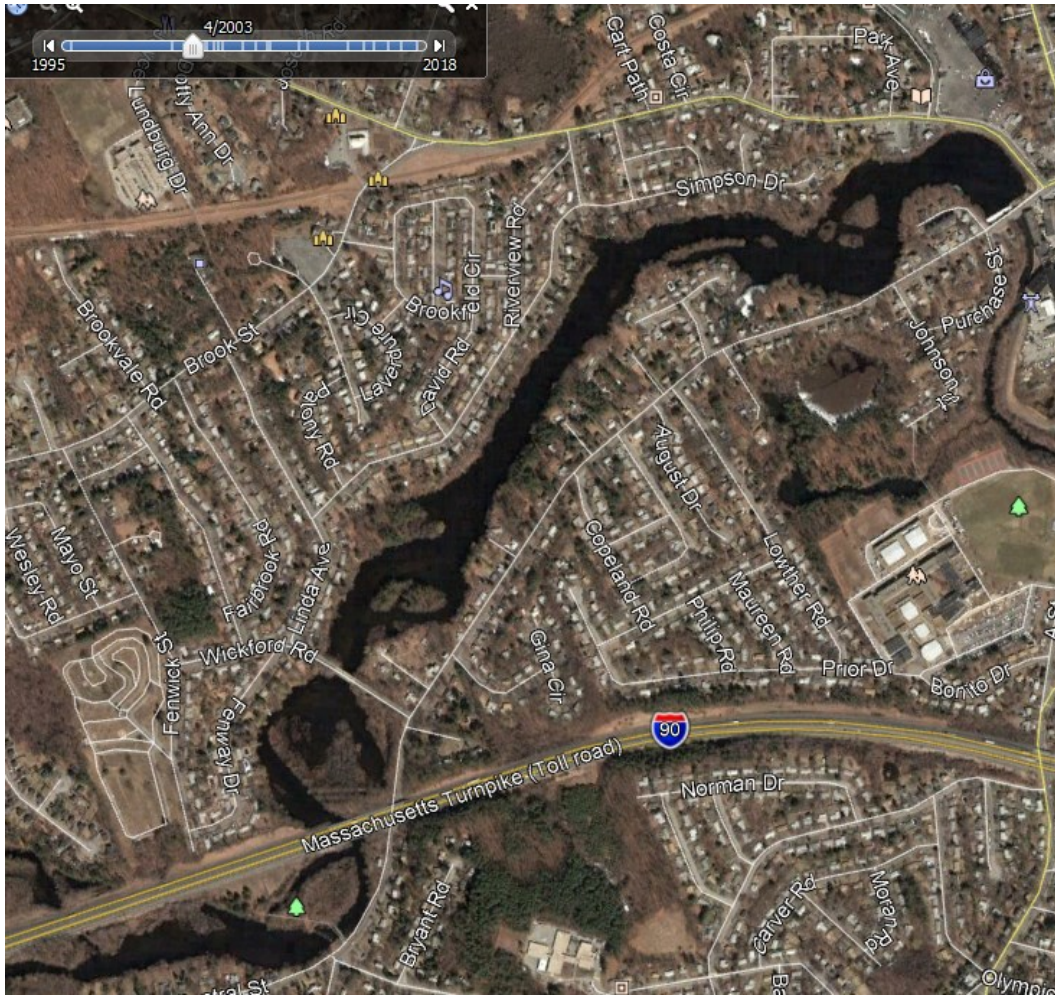
2° Contact - 35.0 acres Non-Support; 24.0 acres - Not "it"

Aesthetics - 35.0 acres Non-Support; 24.0 acres - Not "in"

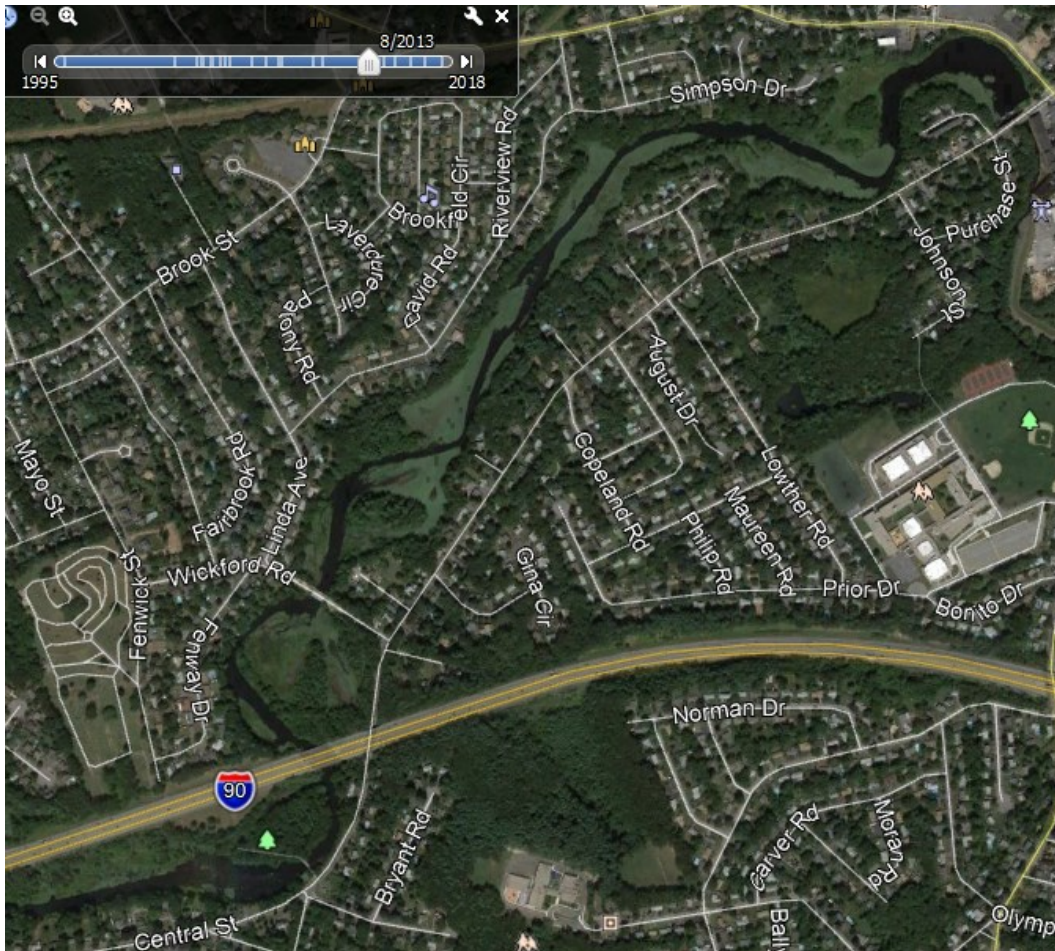
Causes - Exotics - 59.0 acres (M); Noxious plants - 35.0 acres (M)

Note: record suspect *M. heterophyllum* plants that may require confirmation once emergent flowering stalks are evident.

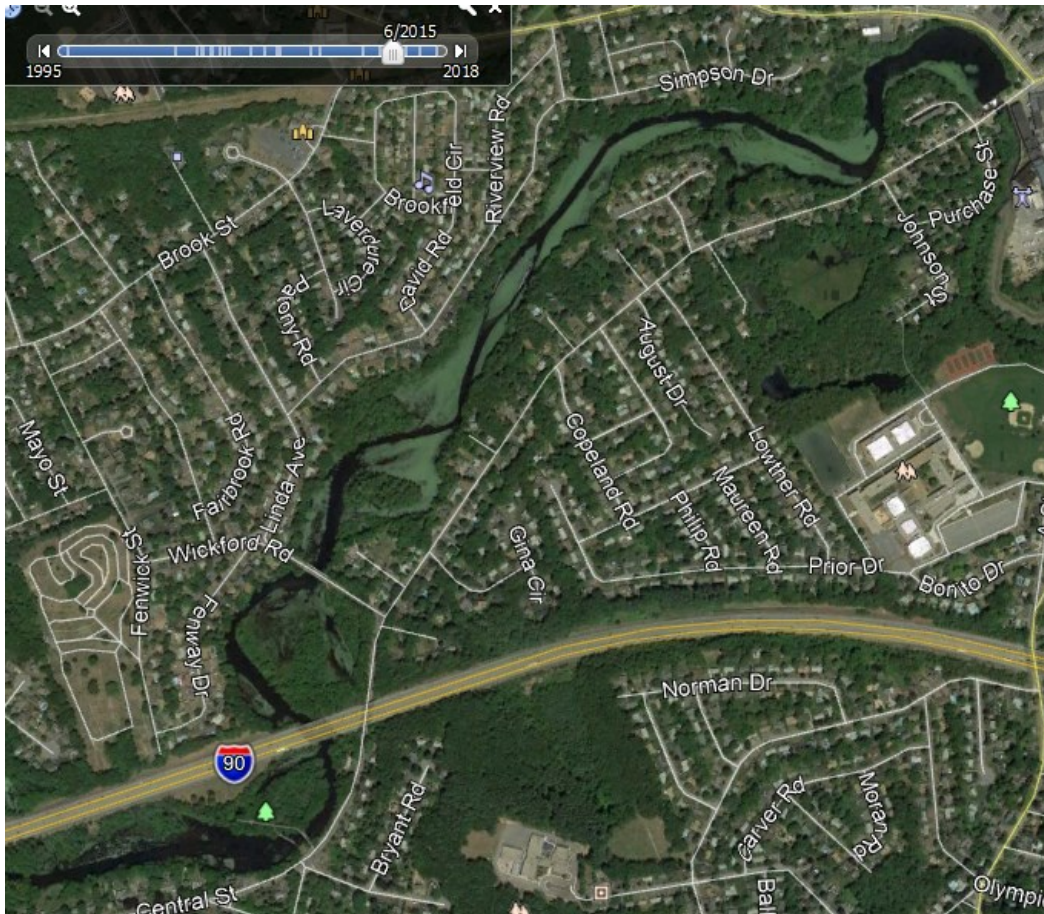
Google Earth image of Saxonville Pond with clear channel, 4/2013 (Google Earth Pro Undated):



Google Earth image of Saxonville Pond, 8/2013 (Google Earth Pro Undated):



Google Earth image of Saxonville Pond, 6/2015 (Google Earth Pro Undated):



Non-Native Aquatic Plants

The generic Non-Native Aquatic Plants impairment (for European water clover, *Marsilea quadrifolia*) is being removed and replaced with European Water Clover.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No recent data are available, so the Aquatic Life Use of Saxonville Pond (MA82097) remains assessed as Not Supporting with the prior Fanwort and Water Chestnut impairments being carried forward. The generic Non-Native Aquatic Plants impairment (for European water clover, <i>Marsilea quadrifolia</i>) is being removed and replaced with European Water Clover.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO

2022 Use Attainment Summary
No recent fish toxics sampling has been conducted in Saxonville Pond (MA82097), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for the Sudbury River (from Ashland to its confluence with the Assabet and Concord Rivers which includes the Saxonville Pond impoundment) recommends that " <i>no one should consume any fish from this water body</i> " (MassDPH 2021).

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Saxonville Pond (MA82097) was first listed as impaired for Noxious Aquatic Plants in 1998 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). The original impairment (applied to the Aesthetics and Recreational Uses) was based on an August 1996 synoptic survey conducted by MassDEP staff in which very dense vegetation was observed at three sites on the pond; this included the non-rooted, floating species, <i>Ceratophyllum demersum</i>, present at two of the locations, and <i>Lemna/Wolffia/Utricularia</i> spp., present at one location (MassDEP 1996, MassDEP 2002). In Google Earth images from August 2013 and June 2015, only a narrow channel is clear of dense vegetation (Google Earth Pro Undated). The Aesthetics Use of Saxonville Pond (MA82097) is assessed as Not Supporting. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of non-rooted, floating, aquatic macrophyte species, while Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years.</p>	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Saxonville Pond (MA82097) was first listed as impaired for Noxious Aquatic Plants in 1998 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). The original impairment (applied to the Aesthetics and Recreational Uses) was based on an August 1996 synoptic survey conducted by MassDEP staff in which very dense vegetation was observed at three sites on the pond; this included the non-rooted, floating species, <i>Ceratophyllum demersum</i>, present at two of the locations, and <i>Lemna/Wolffia/Utricularia</i> spp., present at one location (MassDEP 1996, MassDEP 2002). In Google Earth images from August 2013 and June 2015, only a narrow channel is clear of dense vegetation (Google Earth Pro Undated). The Primary Contact Recreational Use of Saxonville Pond (MA82097) is assessed as Not Supporting. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of non-rooted, floating, aquatic macrophyte species, while Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years.</p>	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	

As described in detail in the 2022 CALM guidance document (MassDEP 2022), the mapping of Aquatic Plants (Macrophytes) impairments as a pollutant is being reevaluated. Saxonville Pond (MA82097) was first listed as impaired for Noxious Aquatic Plants in 1998 and this cause was remapped to Aquatic Plants (Macrophytes) during the 2010 IR cycle (MassDEP 2015). The original impairment (applied to the Aesthetics and Recreational Uses) was based on an August 1996 synoptic survey conducted by MassDEP staff in which very dense vegetation was observed at three sites on the pond; this included the non-rooted, floating species, *Ceratophyllum demersum*, present at two of the locations, and *Lemna/Wolffia/Utricularia* spp., present at one location (MassDEP 1996, MassDEP 2002). In Google Earth images from August 2013 and June 2015, only a narrow channel is clear of dense vegetation (Google Earth Pro Undated). The Secondary Contact Recreational Use of Saxonville Pond (MA82097) is assessed as Not Supporting. Nutrient/Eutrophication Biological Indicators is being added as an impairment based on the presence of non-rooted, floating, aquatic macrophyte species, while Aquatic Plants (Macrophytes) is being delisted as a pollutant and added again as a non-pollutant since more than 25% of the pond was covered in aquatic macrophytes in recent years.

Second Division Brook (MA82B-09)

Location:	Headwaters, outlet small unnamed pond north of Waltham Street, Maynard to mouth at confluence with the Assabet River, Concord.
AU Type:	RIVER
AU Size:	2.9 MILES
Classification/Qualifier:	B

No usable data were available for Second Division Brook (MA82B-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
2	2	None		Unchanged

Sheep Fall Brook (MA82B-25)

Location:	Headwaters, perennial portion north of Ash Street, Marlborough to mouth at confluence with Flagg Brook, Marlborough.
AU Type:	RIVER
AU Size:	0.5 MILES
Classification/Qualifier:	B: CWF

No usable data were available for Sheep Fall Brook (MA82B-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
2	2	None		Unchanged

Smith Pond (MA82099)

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

No usable data were available for Smith Pond (MA82099) 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

Solomon Pond (MA82100)

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

No usable data were available for Solomon Pond (MA82100) 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

Spencer Brook (MA82B-15)

Location:	From the outlet of an unnamed pond north of Bellows Hill, Carlisle to mouth at inlet Angiers Pond, Concord.
AU Type:	RIVER
AU Size:	3.8 MILES
Classification/Qualifier:	B

No usable data were available for Spencer Brook (MA82B-15) 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

Stony Brook (MA82A-33)

Location:	Headwaters, outlet Sudbury Reservoir, Southborough to mouth at inlet Framingham Reservoir #3, Framingham.
AU Type:	RIVER
AU Size:	0.4 MILES
Classification/Qualifier:	A: PWS, ORW (Tributary)

No usable data were available for Stony Brook (MA82A-33) 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

Sudbury Reservoir (MA82106)

Location:	Southborough/Marlborough.
AU Type:	FRESHWATER LAKE
AU Size:	1181 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Sudbury Reservoir (MA82106) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
4a	4a	(Water Chestnut*)		Unchanged
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
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (N)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (N)	X				
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Sudbury River (MA82A-01)

Location:	Headwaters, outlet Cedar Swamp Pond, Westborough to the Fruit Street bridge, Hopkinton/Westborough.
AU Type:	RIVER
AU Size:	1.9 MILES
Classification/Qualifier:	B: ORW, WWF

No usable data were available for Sudbury River (MA82A-01) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

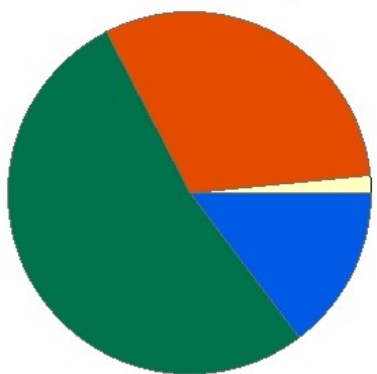
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Sudbury River (MA82A-03)

Location:	Outlet Saxonville Pond, Framingham to confluence with Hop Brook (the lower portion of Hop Brook was identified as Wash Brook on USGS quads prior to 1987), Wayland.
AU Type:	RIVER
AU Size:	5.5 MILES
Classification/Qualifier:	B: AQL, HQW

Sudbury River - MA82A-03

Watershed Area: 116.65 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	116.65	14.19	34.47	4.19
Agriculture	1.6%	2.2%	1.5%	1.1%
Developed	31%	26%	22.7%	15.9%
Natural	52.8%	53.9%	48%	43.2%
Wetland	14.7%	17.9%	27.8%	39.8%
Impervious Cover	16.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Asian Clam*)		Added
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
5	5	(Non-Native Fish/Shellfish/Zooplankton*)		Removed
5	5	(Water Chestnut*)		Unchanged
5	5	Escherichia Coli (E. Coli)		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
(Asian Clam*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Eurasian Water Milfoil, Myriophyllum Spicatum*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Fish Bioassessments	Source Unknown (N)	X				
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			

Supporting Information for Removed Impairments

2018/20 Removed Impairment	Removal Reason	Removal Comment
Non-Native Fish/Shellfish/Zooplankton	Clarification of listing cause	The generic Non-Native Fish/Shellfish/Zooplankton impairment for this Sudbury River AU (MA82A-03) is being removed and replaced with the specific Asian Clam impairment.

Non-Native Fish/Shellfish/Zooplankton

The generic Non-Native Fish/Shellfish/Zooplankton impairment for this Sudbury River AU (MA82A-03) is being removed and replaced with the specific Asian Clam impairment.

Recommendations

2022 Recommendations
REC: Collect bacteria data of adequate frequency to reevaluate the primary contact recreational use impairment in this Sudbury River AU (MA82A-03).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

MassDFG biologists conducted backpack electrofishing at two sites (Sample 5125 downstream of Danforth St crossing in Framingham; Sample 5124 in the vicinity of Little Farms Rd, Framingham/Wayland; both were previously reported on in the 2018/2020 IR (MassDEP 2021)) in this Sudbury River AU (MA82A-03) in Aug 2014 and boat shocking at one site (Sample 5123 ~2.5 mi upstream of Rt 20, Wayland) further downstream. The samples (n= 185-427) contained 6-12% fluvial individuals and 13-49% intolerant/moderately tolerant macrohabitat generalists. MassDEP staff collected discrete water quality data in the vicinity of the upstream fish sample at the Danforth St bridge (W0696) from 2011-2013 as part of the SMART monitoring program. Much of this data was previously reported on in the 2018/2020 IR (MassDEP 2021), but is presented here to be complete. Discrete dissolved oxygen (DO) measurements (n= 5/yr) had a minimum of 7.9 mg/L. Discrete temperature data collected during the summer index period (n= 1-2/yr) had a maximum of 25.6 °C. pH data (n= 5-6/yr) ranged from 6.8-7.3 S.U. There was little indication of nutrient enrichment (seasonal TP averages 0.017-0.026 mg/L with n= 2-3/season, maximum DO saturation was 110.8%, 2 observations of dense/very dense filamentous algae only in 2013). There were no exceedances of Total Ammonia Nitrogen (maximum TAN 0.042 mg/L, n= 4-6/yr), chloride (maximum chloride 200 mg/L, n= 4-6/yr), or discrete specific conductance measurements (maximum SC 698 µs/cm, n=5-6/yr).

The Aquatic Life Use of this Sudbury River AU (MA82A-03) is assessed as Not Supporting, with the prior impairments (Curly-leaf Pondweed, Eurasian Water Milfoil, Fish Bioassessments, and Water Chestnut) being carried forward. The generic Non-Native Fish/Shellfish/Zooplankton impairment is being removed and replaced with the specific Asian Clam impairment. Although individual fish samples from 2014 included good indicator organisms, the original Fish Bioassessments impairment that is being carried forward was based on an unfavorable comparison of these fish community data with the Concord Target Fish Community Model, as described in the 2018/2020 IR (MassDEP 2021). The prior Alert for mercury contamination from the Nyanza Superfund Site is being maintained.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5123	MassDFG	Fish Community	Sudbury River	Way upstream of Rt 20 (~2.5mi US), Wayland	42.34733	-71.38414
5124	MassDFG	Fish Community	Sudbury River	Little Farms Rd from mussel #3 start to top of riffle, Framingham/Wayland	42.33589	-71.39506
5125	MassDFG	Fish Community	Sudbury River	Siet #1 downstream Danforth St crossing, Framingham	42.32765	-71.39725
W0696	MassDEP	Water Quality	Sudbury River	[Danforth Street bridge, Framingham]	42.325435	-71.397364

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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, BC = Black Crappie, C = Common Carp, CP = Chain Pickerel, F = Fallfish, GS = Golden Shiner, LMB = Largemouth Bass, P = Pumpkinseed, RB = Rock Bass, RBS = Redbreast Sunfish, RP = Redfin Pickerel, SS = Spottail Shiner, 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
5123	08/19/14	BT	TP		15	427	0%	1	10%	0%	8	49%	No	No	AE, B, BB, BC, C, CP, GS, LMB, P, RBS, RP, SS, WS, YB, YP,
5124	08/12/14	BP	TP		9	185	0%	2	12%	0%	3	13%	Yes	No	AE, B, CP, F, GS, LMB, RBS, WS, YB,
5125	08/12/14	BP	TP		11	195	0%	2	6%	0%	6	13%	No	No	AE, B, BC, F, LMB, P, RB, RBS, WS, YB, YP,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0696	01/19/11	11/16/11	5	7.9	11.8	0	0	0
W0696	02/22/12	10/24/12	5	8.2	10.4	0	0	0
W0696	01/28/13	09/25/13	5	8.1	11	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0696	01/19/11	11/16/11	6	1	25.6	11.9	1	1	0	0
W0696	02/22/12	10/24/12	5	2	22.6	14.4	2	1	0	0
W0696	01/28/13	09/25/13	5	1	21.7	11.6	1	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W0696	01/19/11	11/16/11	6	6.8	7.2	0	0
W0696	02/22/12	10/24/12	5	7.2	7.3	0	0
W0696	01/28/13	09/25/13	5	7	7.3	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0696	2011	3	0.024	0.027	0.026	--	--	110.8	7.2	6	0
W0696	2012	2	0.019	0.028	0.024	--	--	106.1	7.3	4	0
W0696	2013	2	0.013	0.021	0.017	--	--	102.8	7.3	5	2

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

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0696	2011	6	0.020	0.070	0.042	0	0
W0696	2012	5	0.020	0.050	0.030	0	0
W0696	2013	4	0.020	0.060	0.030	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W0696	2011	6	97	170	121	0	0
W0696	2012	5	98	120	110	0	0
W0696	2013	4	120	200	158	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W0696	01/19/11	11/16/11	6	381	684	0	0	0	0	0	0
W0696	02/22/12	10/24/12	5	387	473	0	0	0	0	0	0
W0696	01/28/13	09/25/13	5	508	698	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in this Sudbury River AU (MA82A-03), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for the Sudbury River (from Ashland to its confluence with the Assabet and Concord Rivers) recommends that "no one should consume any fish" from the Sudbury River because of mercury contamination (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP staff surveyed one station W0696 (Danforth Street bridge, Framingham) along this Sudbury River AU (MA82A-03) in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). There were generally no noted objectionable conditions (odors, growths, or turbidity) but moderate amounts of trash were noted on most visits.</p> <p>The Aesthetics use for this Sudbury River AU (MA82A-03) is assessed as Fully Supporting based on the general lack of objectionable conditions, but an Alert is being identified because of moderate amounts of trash noted on most site visits.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0696	MassDEP	Water Quality	Sudbury River	[Danforth Street bridge, Framingham]	42.325435	-71.397364

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W0696	Sudbury River	2011	6	The Aesthetics use for the Sudbury River is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W0696 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). However, the use is identified with an Alert status due to observations of objectionable deposits (moderate amounts of trash) observed on most visits.
W0696	Sudbury River	2012	5	The Aesthetics use for the Sudbury River is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W0696 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). However, the use is identified with an Alert status due to observations of objectionable deposits (moderate amounts of trash) observed on most visits.
W0696	Sudbury River	2013	5	The Aesthetics use for the Sudbury River is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W0696 in summer 2011 (n=6), 2012 (n=5), and 2013 (n=5). However, the use is identified with an Alert status due to observations of objectionable deposits (moderate amounts of trash) observed on most visits.

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W0696	2011	6	6	0
W0696	2012	5	4	0

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W0696	2013	5	5	2

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W0696	Sudbury River	2011	Color	Brownish	1	6
W0696	Sudbury River	2011	Color	Light Yellow/Tan	3	6
W0696	Sudbury River	2011	Color	None	1	6
W0696	Sudbury River	2011	Color	Reddish	1	6
W0696	Sudbury River	2011	Objectionable Deposits	Yes	6	6
W0696	Sudbury River	2011	Odor	Musty (Basement)	2	6
W0696	Sudbury River	2011	Odor	None	4	6
W0696	Sudbury River	2011	Scum	No	4	6
W0696	Sudbury River	2011	Scum	Yes	2	6
W0696	Sudbury River	2011	Turbidity	Moderately Turbid	1	6
W0696	Sudbury River	2011	Turbidity	None	4	6
W0696	Sudbury River	2011	Turbidity	Slightly Turbid	1	6
W0696	Sudbury River	2012	Color	Light Yellow/Tan	3	5
W0696	Sudbury River	2012	Color	None	2	5
W0696	Sudbury River	2012	Objectionable Deposits	Unobservable	1	5
W0696	Sudbury River	2012	Objectionable Deposits	Yes	4	5
W0696	Sudbury River	2012	Odor	Musty (Basement)	1	5
W0696	Sudbury River	2012	Odor	None	4	5
W0696	Sudbury River	2012	Scum	No	4	5
W0696	Sudbury River	2012	Scum	Yes	1	5
W0696	Sudbury River	2012	Turbidity	None	3	5
W0696	Sudbury River	2012	Turbidity	Slightly Turbid	1	5
W0696	Sudbury River	2012	Turbidity	Unobservable	1	5
W0696	Sudbury River	2013	Color	None	5	5
W0696	Sudbury River	2013	Objectionable Deposits	Yes	5	5
W0696	Sudbury River	2013	Odor	None	5	5
W0696	Sudbury River	2013	Scum	No	5	5
W0696	Sudbury River	2013	Turbidity	None	5	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

MassDEP staff conducted field surveys in this Sudbury River AU (MA82A-03) at station W0696 (Danforth Street bridge, Framingham) in 2011 (previously reported on; n=6), 2012 (n=5), and 2013 (n=5) as part of the SMART monitoring program. There were generally no observations of odors, growths, or turbidity during these surveys, but objectionable deposits (moderate amounts of trash) were observed on most visits. *E. coli* bacteria samples were collected during the summer field surveys, however, sample numbers/frequencies were insufficient (n= 3/4/3 in 2011/2012/2013, respectively) to allow the calculation of GMs during any 90-day intervals. There were no exceedances of the 410 cfu/100mL STV.

The Primary Contact Recreational Use for this Sudbury River AU (MA82A-03) will continue to be assessed as Not Supporting for Escherichia Coli (*E. Coli*) since the data collected between 2011 and 2013 were too limited to reevaluate using the current use attainment methodology. An Alert is being identified for objectionable deposits (trash).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0696	MassDEP	Water Quality	Sudbury River	[Danforth Street bridge, Framingham]	42.325435	-71.397364

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

[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
W0696	MassDEP	<i>E. coli</i>	05/17/11	09/21/11	3	54	365	158
W0696	MassDEP	<i>E. coli</i>	04/11/12	10/24/12	4	4	45	14
W0696	MassDEP	<i>E. coli</i>	05/20/13	09/25/13	3	20	72	34

W0696 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

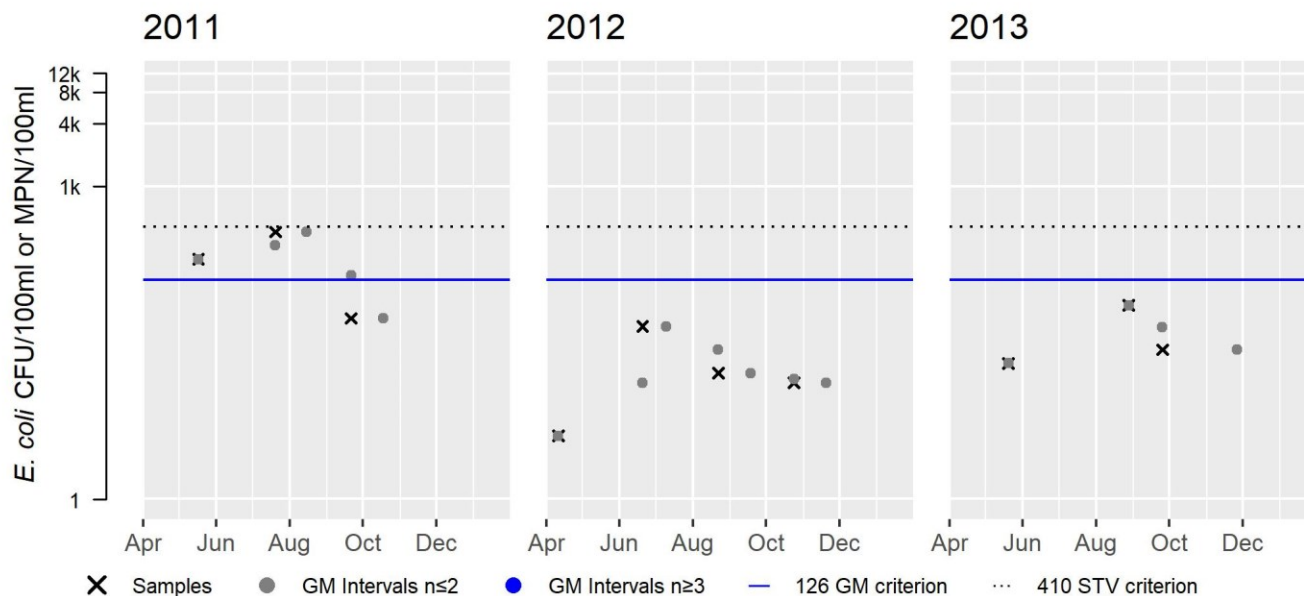
Var	Res
Samples	3
SeasGM	158
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	4
SeasGM	14
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	3
SeasGM	34
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0



Secondary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
<p>MassDEP staff conducted field surveys in this Sudbury River AU (MA82A-03) at station W0696 (Danforth Street bridge, Framingham) in 2011 (previously reported on; n=6), 2012 (n=5), and 2013 (n=5) as part of the SMART monitoring program. There were generally no observations of odors, growths, or turbidity during these surveys, but objectionable deposits (moderate amounts of trash) were observed on most visits. <i>E. coli</i> bacteria samples were collected during all the field surveys, but sample numbers/frequencies were insufficient to allow the calculation of GMs during any 90-day intervals. There were no exceedances of the 1260 cfu/100mL STV.</p> <p>There is Insufficient Information to assess the Secondary Contact Recreational Use for this Sudbury River AU (MA82A-03) since bacteria data were too limited to evaluate using the current use attainment methodology. An Alert is being identified for objectionable deposits (trash).</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W0696	MassDEP	Water Quality	Sudbury River	[Danforth Street bridge, Framingham]	42.325435	-71.397364

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)**

[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)
W0696	MassDEP	E. coli	01/19/11	11/16/11	6	29	365	86
W0696	MassDEP	E. coli	02/22/12	10/24/12	5	4	45	11
W0696	MassDEP	E. coli	01/28/13	09/25/13	5	20	72	32

W0696 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

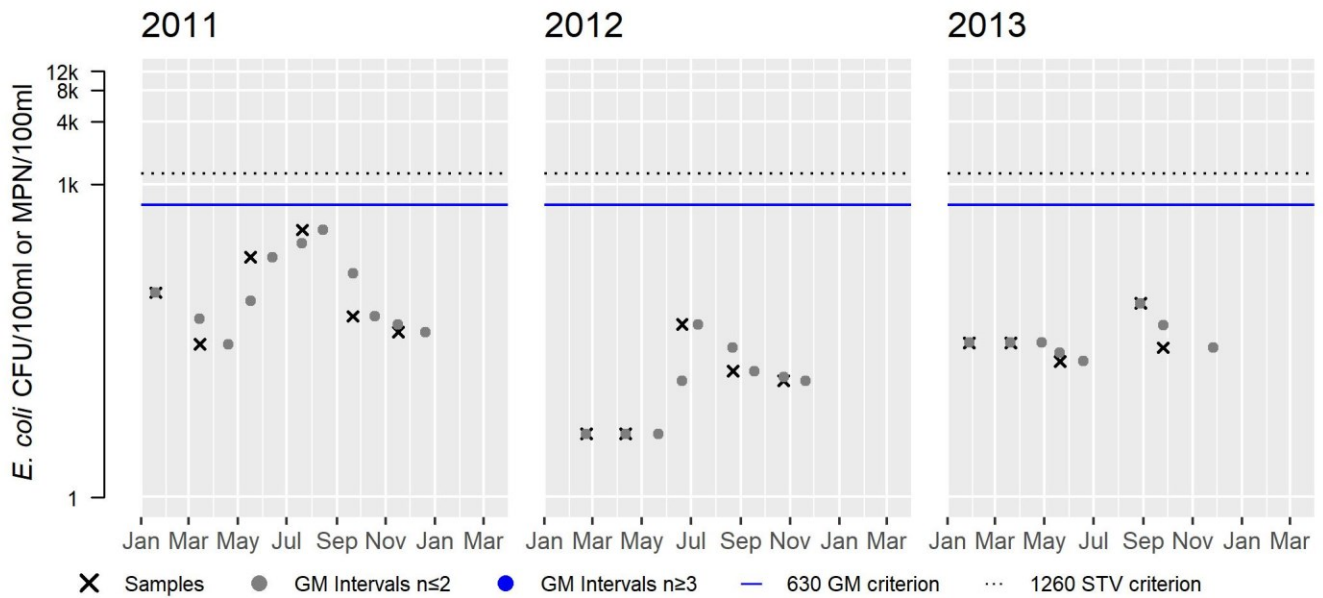
Var	Res
Samples	6
SeasGM	86
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	11
#GMI	0
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	5
SeasGM	32
#GMI	0
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

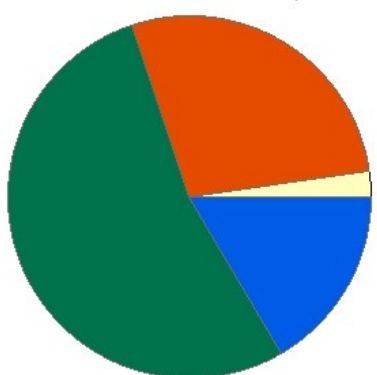


Sudbury River (MA82A-04)

Location:	Confluence with Hop Brook (the lower portion of Hop Brook was identified as Wash Brook on USGS topographic quadrangles prior to 1987), Wayland to confluence with Assabet River (forming headwaters Concord River), Concord.
AU Type:	RIVER
AU Size:	11.7 MILES
Classification/Qualifier:	B: AQL

Sudbury River - MA82A-04

Watershed Area: 162.49 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	162.49	7.85	47.14	2.01
Agriculture	2.3%	7.7%	2.1%	7.8%
Developed	27.9%	18.3%	19.8%	9%
Natural	53.3%	58.5%	46.7%	44.1%
Wetland	16.5%	15.5%	31.4%	39%
Impervious Cover	14.5%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Water Chestnut*)		Unchanged
5	5	Dissolved Oxygen		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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>As part of the public comment process on the draft 2022 IR, the OARS watershed association commented that this Sudbury River MA82A-04 AU should be assessed as impaired for Dissolved Oxygen (DO). OARS staff/volunteers collected DO data from 2018 through 2020 at four stations in this AU from upstream to downstream as follows: OARS-SUD-096 (Rt 20, Wayland; n= 5/yr), OARS-SUD-086 (River Rd, Wayland; n= 4-5/yr), OARS-SUD-064 (Sherman Br Rd, Wayland; n= 4-5/yr), and OARS-SUD-005 (Rt 62 Boat House, Concord; n= 7/yr). Since this AU is qualified as an Aquatic Life segment (AQL) in the SWQS, data evaluation included whether any DO measurements were <3.0 mg/L (the minimum SWQS Class C DO criteria that applies to AQL segments). OARS' data documented DO measurements <3.0 mg/L at all four sites at least once during the three years sampled (range 0 to 3 times per year at each site) while concentrations were often less than 4.0 mg/L (2 to 4 times per year in most sample-years for the three upstream stations with slightly higher overall concentrations documented at the most downstream sampling site). While the proximal stream buffer is composed of 39% wetlands (and 83.1% combined natural/wetlands land cover) and the wetland corridor is more extensive in the upper part of this subwatershed, with 14.5% impervious cover in the subwatershed, the natural conditions screening is not met. Additionally, when compared to OARS' 2009-2017 DO dataset for these stations (summarized in the 2018/2020 IR (MassDEP 2021)) in which there typically was not more than one measurement per year lower than 4.0 mg/L, the 2018-2020 data are concerning.</p> <p>The Aquatic Life Use of this Sudbury River AU (MA82A-04) is being assessed as Not Supporting, with the prior Water Chestnut impairment being carried forward and an impairment will be added for Dissolved Oxygen (based on OARS' 2018-2020 data documenting DO concentrations <3.0 mg/L at four locations). Additionally, all prior Alerts (potential infestations by the non-native aquatic macrophytes, <i>Potamogeton crispus</i>, <i>Cabomba caroliniana</i>, <i>Marsilea quadrifolia</i>, and <i>Myriophyllum spicatum</i>, as well as for some evidence of nutrient enrichment, elevated chlorophyll a, in the lower reaches of this AU) from the 2018/2020 IR cycle (MassDEP 2021) are being carried forward, except the DO Alert will be removed.</p>	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>No recent fish toxics sampling has been conducted in this Sudbury River AU (MA82A-04), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for the Sudbury River (from Ashland to its confluence with the Assabet and Concord Rivers) recommends that "no one should consume any fish" from the Sudbury River because of mercury contamination (MassDPH 2021).</p>	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available, so the Aesthetics Use of this Sudbury River AU (MA82A-04) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	

OARS staff/volunteers collected *E. coli* bacteria samples in this Sudbury River AU (MA82A-04) at Rt 20 in Wayland during the summers of 2019 and 2020 (n= 15/yr). Analysis of these high frequency datasets indicated that none of the intervals had GMs exceeding 126 cfu/100mL in 2019 but 30% of the 2020 intervals had GMs over the threshold. Cumulatively, 15% of all the intervals had GMs >126 cfu/100mL. The percentage of samples exceeding the 410 cfu/100mL STV was <10% in both years.

The Primary Contact Recreational Use of this Sudbury River AU (MA82A-04) is assessed as Fully Supporting since the concentrations of *E. coli* in samples collected by OARS during the summers of 2019 and 2020 did not exceed the use attainment impairment thresholds.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-SUD-096	OARS	Water Quality	Sudbury River	Rte 20, Wayland	42.363441	-71.374828

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (30-day Interval Analysis) (OARS 2021)
(MassDEP Undated 2)

[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
OARS_OARS-SUD-096	OARS	E. coli	06/17/19	09/23/19	15	8	264	51
OARS_OARS-SUD-096	OARS	E. coli	06/08/20	09/14/20	15	20	960	113

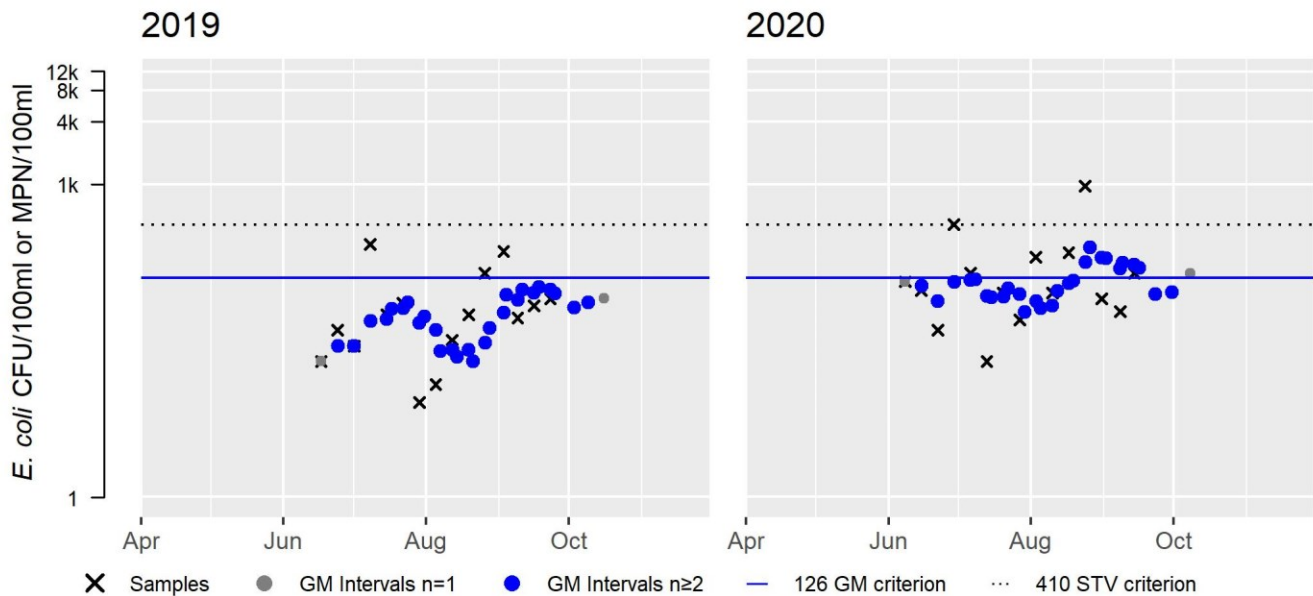
OARS_OARS-SUD-096 *E. coli* (30-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	51
#GMI	27
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	113
#GMI	27
#GMI Ex	8
%GMI Ex	30
n>STV	1
%n>STV	7

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

Variable	Cumulative %GMI Ex (all years)
Result	15



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
OARS staff/volunteers collected <i>E. coli</i> bacteria samples in this Sudbury River AU (MA82A-04) at Rt 20 in Wayland during the summers of 2019 and 2020 (n= 15/yr). Analysis of these high frequency datasets indicated that none of the intervals had GMs exceeding 630 cfu/100mL in either year, and none of the samples exceeded the 1260 cfu/100mL STV. The Secondary Contact Recreational Use of this Sudbury River AU (MA82A-04) is assessed as Fully Supporting since the concentrations of <i>E. coli</i> in samples collected by OARS during the summers of 2019 and 2020 did not exceed the use attainment impairment thresholds.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-SUD-096	OARS	Water Quality	Sudbury River	Rte 20, Wayland	42.363441	-71.374828

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (OARS 2021)

(MassDEP Undated 2)

[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)
OARS_OARS-SUD-096	OARS	E. coli	06/17/19	09/23/19	15	8	264	51
OARS_OARS-SUD-096	OARS	E. coli	06/08/20	09/14/20	15	20	960	113

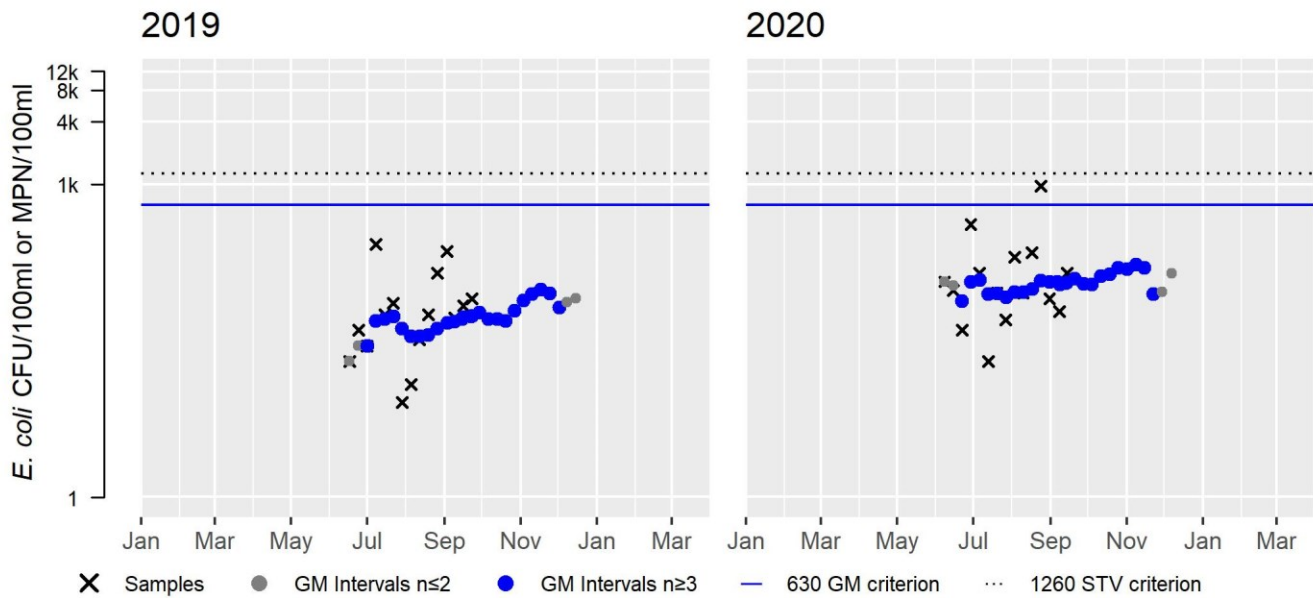
OARS_OARS-SUD-096 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	51
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	0
%n>STV	0

Var	Res
Samples	15
SeasGM	113
#GMI	25
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

Variable	Cumulative %GMI Ex (all years)
Result	0

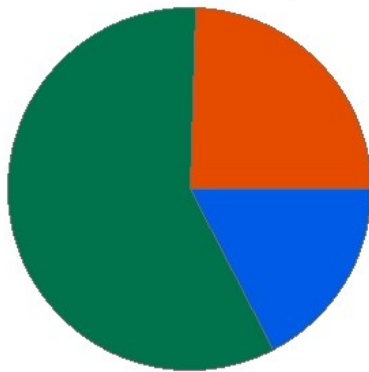


Sudbury River (MA82A-25)

Location:	From the Fruit Street bridge Hopkinton/Westborough to the inlet of Framingham Reservoir #2, Ashland (formerly part of 2004 segment: Sudbury River MA82A-02).
AU Type:	RIVER
AU Size:	6.3 MILES
Classification/Qualifier:	B: WWF, HQW

Sudbury River - MA82A-25

Watershed Area: 43.34 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	43.34	10.57	15.14	3.36
Agriculture	0.8%	0.6%	0.7%	0.4%
Developed	24.3%	26.1%	19.7%	21.3%
Natural	57.8%	60.6%	50%	54.1%
Wetland	17.2%	12.7%	29.6%	24.2%
Impervious Cover	11.7%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Water Chestnut*)		Unchanged
5	5	Escherichia Coli (E. Coli)		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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
No recent data are available, so the Aquatic Life Use of this Sudbury River AU (MA82A-25) will continue to be assessed as Not Supporting with the prior Water Chestnut impairment being carried forward. The prior Alerts for mercury in the sediments (due to the Nyanza Superfund site) and elevated water temperature downstream from the mill pond impoundment in Ashland (MassDEP 2021) are also being carried forward.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
No recent fish toxics sampling has been conducted in this Sudbury River AU (MA82A-25), so the Fish Consumption Use will continue to be assessed as Not Supporting with the prior Mercury in Fish Tissue impairment being carried forward. MassDPH's fish consumption advisory for the Sudbury River (from Ashland to its confluence with the Assabet and Concord Rivers) recommends that " <i>no one should consume any fish</i> " because of mercury contamination in the Sudbury River (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No recent data are available, so the Aesthetics Use of this Sudbury River AU (MA82A-25) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
OARS staff/volunteers collected <i>E. coli</i> bacteria samples at two stations near the downstream end of this Sudbury River AU (MA82A-25). During summer 2019, 15 samples were collected at Rt 135 in Ashland (OARS_OARS-SUD-237) and in summer 2020, 15 samples were collected a short way downstream at Chestnut St in Ashland (OARS_OARS-SUD-236). Analyses of these high frequency datasets indicated that 84% and 100% of intervals had GMs >126 cfu/100mL, respectively. Additionally, 7% of samples exceeded the 410 cfu/100mL STV for the upstream station and 33% of samples exceeded the STV for the downstream station. The Primary Contact Recreational Use of this Sudbury River AU (MA82A-25) will continue to be assessed as Not Supporting with the prior Escherichia Coli (E. Coli) impairment being carried forward since the OARS 2019 and 2020 <i>E. coli</i> data exceeded the use attainment impairment thresholds.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-SUD-236	OARS	Water Quality	Sudbury River	Chestnut St., Ashland	42.257609	-71.454952
OARS_OARS-SUD-237	OARS	Water Quality	Sudbury River	Rt 135, Ashland	42.2584984	-71.455472

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (OARS 2021) (MassDEP Undated 2)

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

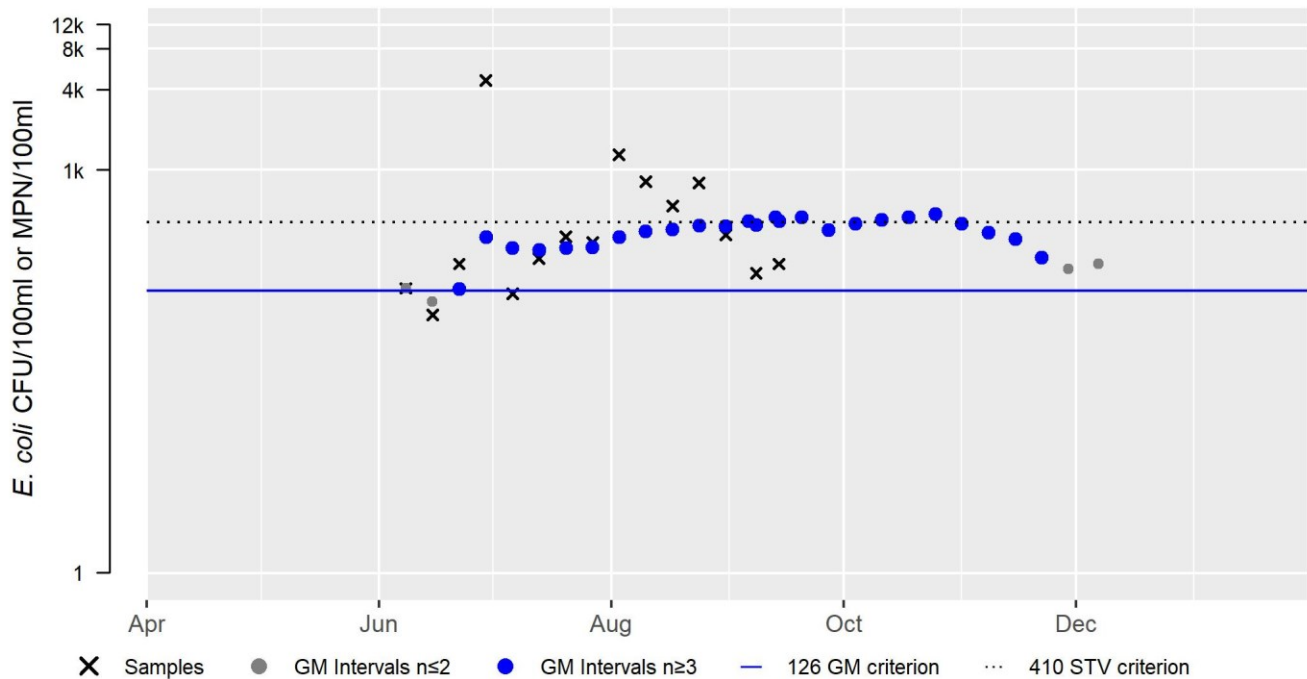
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
OARS_OARS-SUD-236	OARS	E. coli	06/08/20	09/14/20	15	84	4640	348
OARS_OARS-SUD-237	OARS	E. coli	06/17/19	09/23/19	15	64	532	151

OARS_OARS-SUD-236 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	348
#GMI	25
#GMI Ex	25
%GMI Ex	100
n>STV	5
%n>STV	33

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

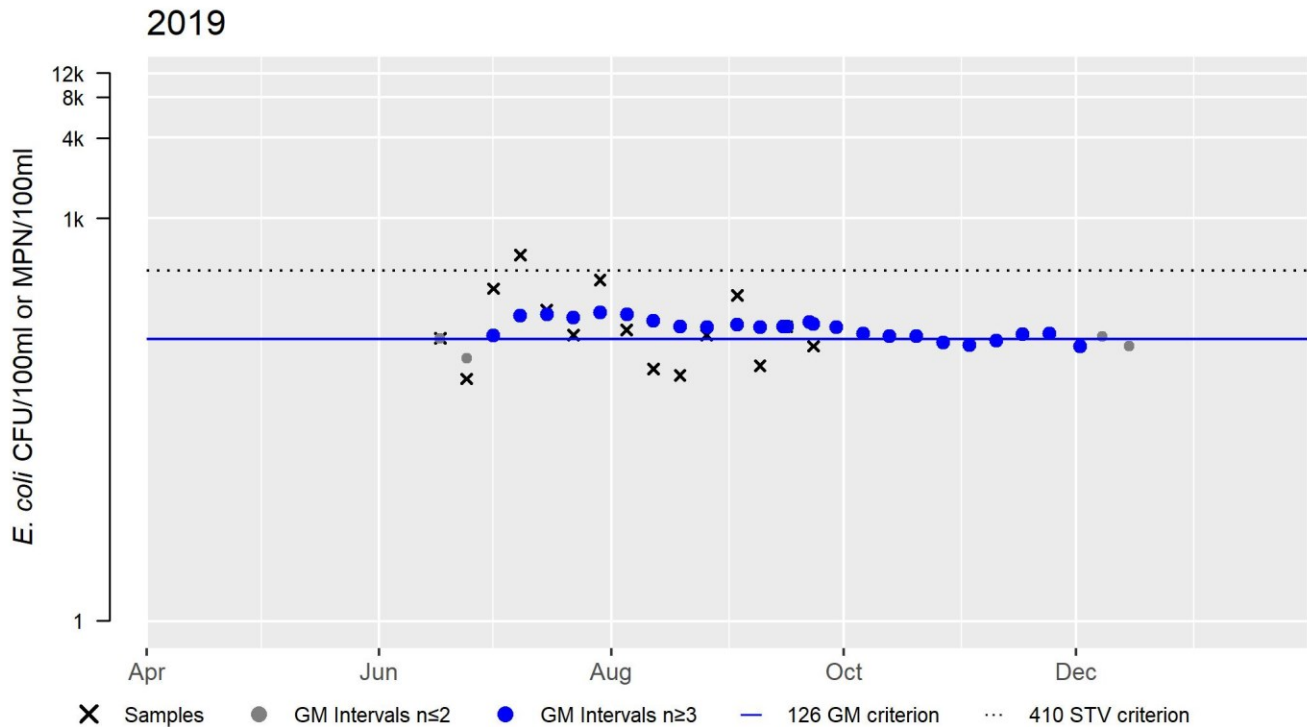
2020



OARS_OARS-SUD-237 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	151
#GMI	25
#GMI Ex	21
%GMI Ex	84
n>STV	1
%n>STV	7

Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; 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	
OARS staff/volunteers collected <i>E. coli</i> bacteria samples at two stations near the downstream end of this Sudbury River AU (MA82A-25). During summer 2019, 15 samples were collected at Rt 135 in Ashland (OARS_OARS-SUD-237) and in summer 2020, 15 samples were collected a short way downstream at Chestnut St in Ashland (OARS_OARS-SUD-236). Analyses of these high frequency datasets indicated that none of the intervals had GMs >630 cfu/100mL. None of the samples exceeded the 1260 cfu/100mL STV for the upstream station while 13% of samples exceeded the STV for the downstream station.	
The Secondary Contact Recreational Use of this Sudbury River AU (MA82A-25) is assessed as Fully Supporting since the OARS 2019 and 2020 <i>E. coli</i> data did not exceed the use attainment impairment thresholds.	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
OARS_OARS-SUD-236	OARS	Water Quality	Sudbury River	Chestnut St., Ashland	42.257609	-71.454952
OARS_OARS-SUD-237	OARS	Water Quality	Sudbury River	Rt 135, Ashland	42.2584984	-71.455472

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (OARS 2021)**

(MassDEP Undated 2)

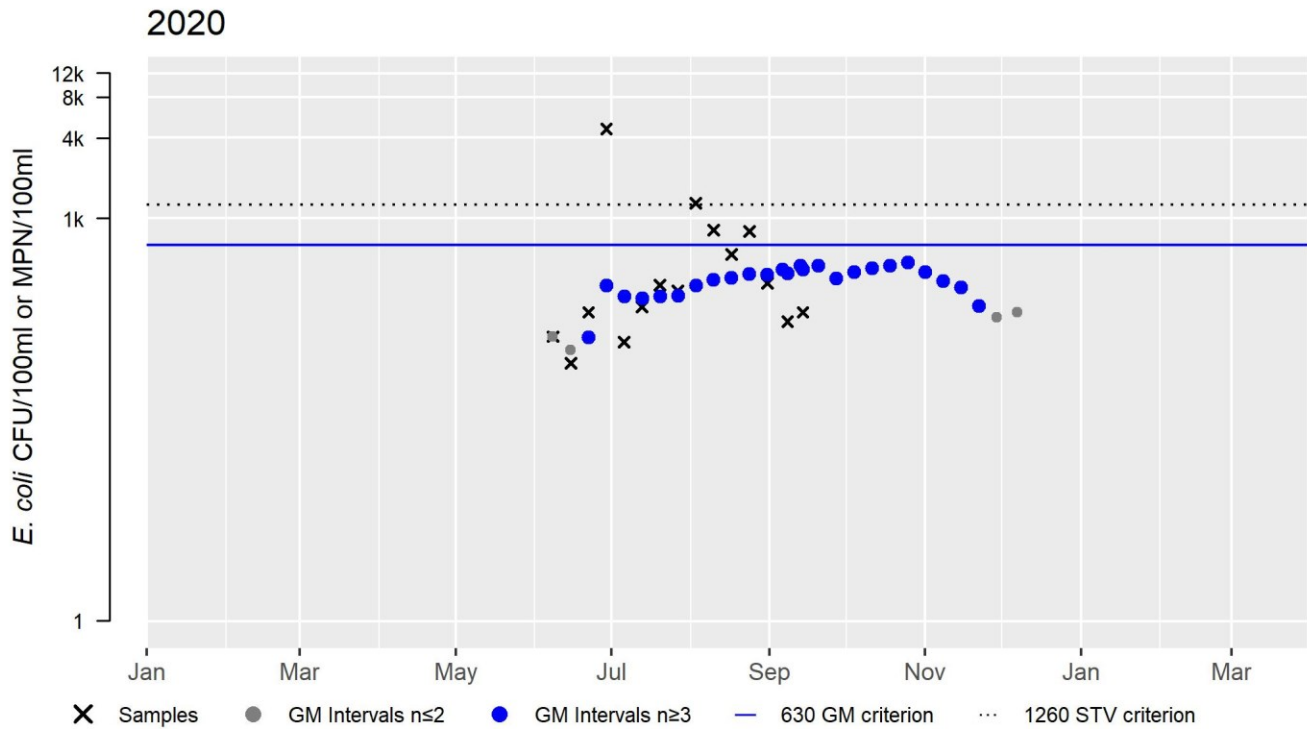
[Result units are CFU/100ml or MPN/100ml]

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)
OARS_OARS-SUD-236	OARS	E. coli	06/08/20	09/14/20	15	84	4640	348
OARS_OARS-SUD-237	OARS	E. coli	06/17/19	09/23/19	15	64	532	151

OARS_OARS-SUD-236 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	348
#GMI	25
#GMI Ex	0
%GMI Ex	0
n>STV	2
%n>STV	13

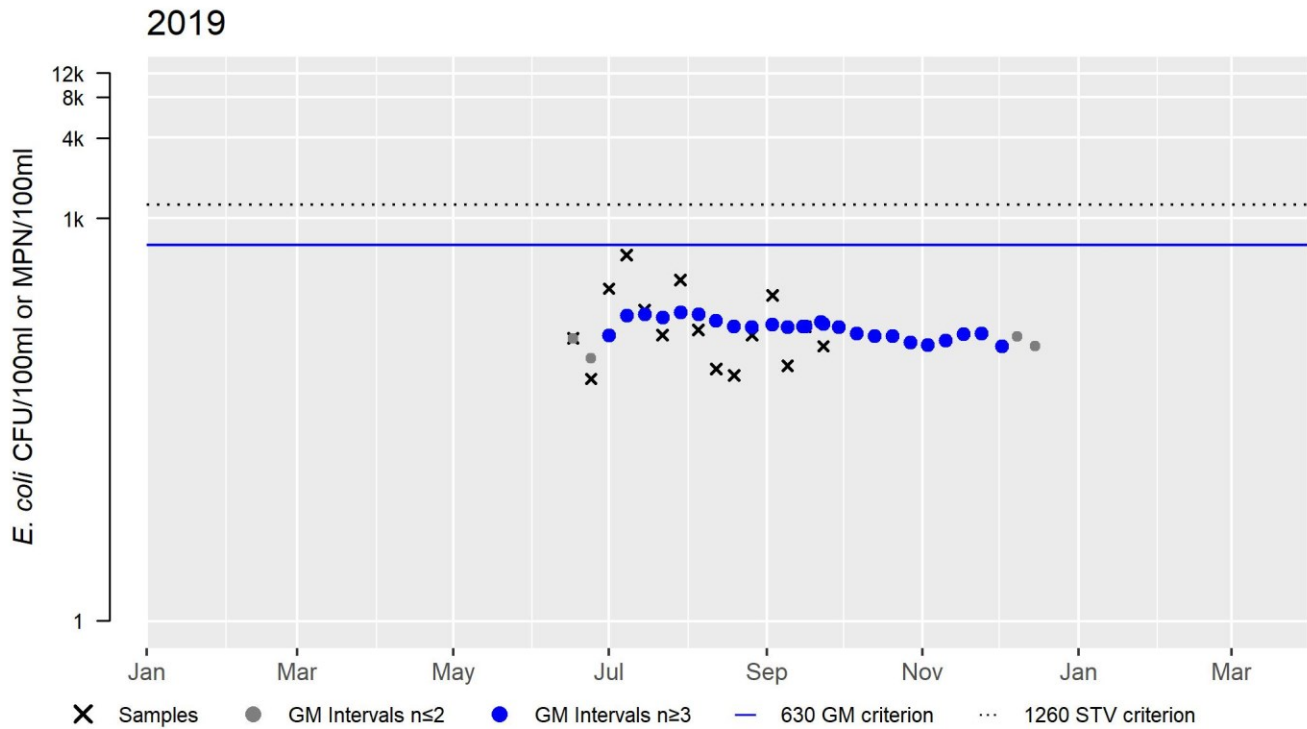
Abbreviations: Samples = #samples; SeasGM = Seasonal Geometric Mean (GM); #GMI = number GM Intervals; #GMI Ex = number GMI Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



OARS_OARS-SUD-237 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	15
SeasGM	151
#GMI	25
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV



Sudbury River (MA82A-26)

Location:	Outlet Framingham Reservoir #1, Framingham to inlet of Saxonville Pond, Framingham (formerly part of 2004 segment: Sudbury River MA82A-02).
AU Type:	RIVER
AU Size:	2.8 MILES
Classification/Qualifier:	B: WWF, HQW

No usable data were available for Sudbury River (MA82A-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	(Water Chestnut*)		Unchanged
5	5	Benthic Macroinvertebrates		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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Benthic Macroinvertebrates	Source Unknown (N)	X				
Mercury in Fish Tissue	CERCLA NPL (Superfund) Sites (Y)		X			

Taylor Brook (MA82B-08)

Location:	Headwaters, outlet Puffer Pond, Maynard to mouth at confluence with the Assabet River, Maynard.
AU Type:	RIVER
AU Size:	1.8 MILES
Classification/Qualifier:	B

No usable data were available for Taylor Brook (MA82B-08) 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

Tripp Pond (MA82107)

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

No usable data were available for Tripp Pond (MA82107) 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 (MA82A-15)

Location:	Headwaters, northeast of Indian Head Hill (near Route 20), Marlborough to mouth at inlet of Hager Pond, Marlborough (formerly part of 1996 segment: Hop Brook MA82A-05).
AU Type:	RIVER
AU Size:	1.1 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82A-15) 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	Ambient Bioassays - Chronic Aquatic Toxicity		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Phosphorus, Total		Unchanged
5	5	Total Suspended Solids (TSS)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Municipal Point Source Discharges (Y)			X	X	X
Algae	Source Unknown (N)			X	X	X
Ambient Bioassays - Chronic Aquatic Toxicity	Source Unknown (N)	X				
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Total Suspended Solids (TSS)	Municipal Point Source Discharges (Y)	X				

Unnamed Tributary (MA82A-16)

Location:	Headwaters, outlet Hager Pond, Marlborough to mouth at inlet of Grist Mill Pond, Marlborough (formerly part of 1996 segment: Hop Brook MA82A-05).
AU Type:	RIVER
AU Size:	0.2 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82A-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
5	5	Algae		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	pH, High		Unchanged
5	5	Phosphorus, Total		Unchanged
5	5	Total Suspended Solids (TSS)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Dam or Impoundment (Y)			X	X	X
Algae	Municipal Point Source Discharges (Y)			X	X	X
Algae	Source Unknown (N)			X	X	X
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen Supersaturation	Dam or Impoundment (Y)	X				
pH, High	Municipal Point Source Discharges (Y)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Total Suspended Solids (TSS)	Municipal Point Source Discharges (Y)	X				

Unnamed Tributary (MA82A-17)

Location:	Headwaters, outlet Grist Mill Pond, Sudbury to mouth at inlet of Carding Mill Pond, Sudbury (formerly part of 1996 segment: Hop Brook MA82A-05).
AU Type:	RIVER
AU Size:	0.5 MILES
Classification/Qualifier:	B

For the 2022 Integrated Reporting cycle, the category, use attainments, impairments, associated actions, and sources remain unchanged for this Unnamed Tributary (MA82A-17) from the previous IR reporting cycle.

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	Algae		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Dissolved Oxygen Supersaturation		Unchanged
5	5	Phosphorus, Total		Unchanged
5	5	Total Suspended Solids (TSS)		Unchanged

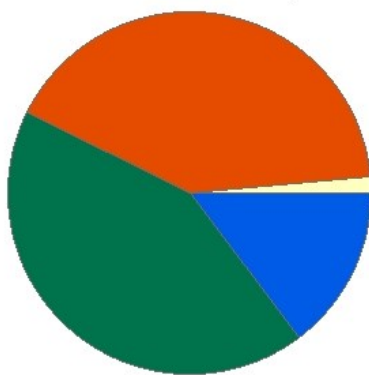
Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Algae	Dam or Impoundment (Y)			X	X	X
Algae	Municipal Point Source Discharges (Y)			X	X	X
Algae	Source Unknown (N)			X	X	X
Dissolved Oxygen	Municipal Point Source Discharges (Y)	X				
Dissolved Oxygen Supersaturation	Dam or Impoundment (Y)	X				
Phosphorus, Total	Municipal Point Source Discharges (Y)	X				
Total Suspended Solids (TSS)	Municipal Point Source Discharges (Y)	X				

Unnamed Tributary (MA82A-22)

Location:	Unnamed tributary to the Sudbury River locally known as Cochituate Brook, headwaters, outlet north basin of Lake Cochituate, Framingham to mouth at confluence with Sudbury River, Framingham.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA82A-22

Watershed Area: 20.35 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	20.35	9.62	4.66	2.3
Agriculture	1.4%	0%	1.9%	0%
Developed	41.2%	49.7%	30.2%	34.7%
Natural	42.7%	41.9%	39.4%	43.2%
Wetland	14.6%	8.4%	28.5%	22.1%
Impervious Cover	26%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
5	5	(Curly-leaf Pondweed*)		Unchanged
5	5	(Debris*)		Unchanged
5	5	Benthic Macroinvertebrates		Unchanged
5	5	Escherichia Coli (E. Coli)		Unchanged
5	5	Nutrient/Eutrophication Biological Indicators		Unchanged
5	5	Trash		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Curly-leaf Pondweed*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Debris*)	Source Unknown (N)			X	X	X
Benthic Macroinvertebrates	Dam or Impoundment (Y)	X				
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
Nutrient/Eutrophication Biological Indicators	Dam or Impoundment (Y)	X				
Trash	Source Unknown (N)			X	X	X

Recommendations

2022 Recommendations
<p>ALU: As first noted in the 2018/2020 IR (MassDEP 2021), chloride samples and continuous specific conductance data should be collected from this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) to better evaluate the potential for chloride toxicity. OTHER: Given the regional trend of increasing chloride, previous elevated chloride data recorded from this brook (in 2010), and 26% impervious cover in the subwatershed, the use of de-icing products containing chloride should be minimized by all parties (i.e., highways/roads, municipalities, businesses, residences) in the Cochituate Brook subwatershed.</p>

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	

MassDEP staff conducted fish (Sample ID 6366), benthic (Station B0935), and water quality (WQ) (W2536/MAP2-715) surveys of this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) ~800 ft upstream of School St / Rt 126, Framingham during summer 2015. The fish community sample, collected the middle of August, was not large (n=18) but included 11% fluvial taxa (fallfish, white sucker), as well as 28% moderately tolerant macrohabitat generalists (largemouth bass, pumpkinseed, yellow perch). However, the July benthic sample had an IBI score of 36, indicating that conditions were severely degraded for a low gradient location. A probe was deployed to measure dissolved oxygen (DO) for 91 days from early July through early October. None of the 7DADMin's for the DO measurements were <5.0 and only one daily minimum was <4.0 mg/L (minimum DO 3.3 mg/L). Continuous temperature measurements were recorded over 75 days in the summer index period; none of the 7DADMs were >27.7 °C (maximum 7DADM 27.7 °C) and the maximum 24-hr rolling average temperature was 27.2 °C. Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 7.4-7.7 S.U. (n=3), there was little evidence of nutrient enrichment (total phosphorus seasonal average was 0.045 mg/L with n=5, maximum DO saturation was 105.8%, no observations of excessive filamentous algae; however, the maximum DO diel shift was 7.5 mg/L), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), and the maximum Total Ammonia Nitrogen was 0.053 mg/L (n=5). As previously reported in the 2018/2020 IR (MassDEP 2021), none of the five chloride samples had concentrations greater than 230 mg/L (the criterion for chronic toxicity) and the maximum concentration was 220 mg/L. Similarly, none of the three specific conductance measurements were >994 µs/cm (the estimated chloride chronic criterion plus a 10% margin of error) and the maximum was 895 µs/cm.

The Aquatic Life Use of this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) will continue to be assessed as Not Supporting, with all prior impairments (Benthic Macroinvertebrates, Curly-leaf Pondweed, Nutrient/Eutrophication Biological Indicators) being carried forward. Additionally, although the most recent chloride data (collected in 2015) did not indicate impairment, the prior Alert for chloride will be carried forward based on the regional trend of increasing chloride, the 26% impervious cover in this subwatershed, and elevated chloride data collected in 2010 (MassDEP 2021).

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6366	MassDEP	Fish Community	Cochituate Brook	UNT to Sudbury River locally known as 'Cochituate Brook', approx 800 ft US of school street (Rt 126), Framingham	42.31932	-71.39558
B0935	MassDEP	Benthic	Unnamed And/Or Undefined Saris/	[unnamed tributary to Sudbury River locally known as 'Cochituate Brook', approximately 245 meters upstream of School Street (Route 126), Framingham, MA]	42.319324	-71.395583
W2536	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Sudbury River locally known as 'Cochituate Brook', approximately 800 feet upstream of School Street (Route 126), Framingham]	42.319324	-71.395583

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0935	07/13/15	RBP multihab	Statewide_Low_Gradient	323	36	SD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: B = Bluegill, F = Fallfish, LMB = Largemouth Bass, P = Pumpkinseed, 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
6366	08/18/15	BP	TP		7	18	0%	2	11%	0%	3	28%	Yes	No	B, F, LMB, P, WS, YB, YP,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	07/03/15	10/05/15	91	66	60	3.3	5.6	6.7	7.5	21	1	0	0	0	1	60	0

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	08/06/15	10/06/15	3	8.4	8.8	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2536	07/03/15	09/15/15	75	72	27.2	28.4	27.7	26.5	72	46	68	38	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2536	07/02/15	09/15/15	75	10717	27.2	6518	5392	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	08/06/15	10/06/15	3	2	25.7	22.3	2	2	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2536	08/06/15	10/06/15	3	7.4	7.7	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	2015	5	0.012	0.100	0.045	7.5	2.2	105.8	7.7	5	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2536	2015	5	0.040	0.053	0.045	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2536	2015	5	54	220	127	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2536	08/06/15	10/06/15	3	703	895	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	

Fish toxics sampling has not been conducted in this Unnamed Tributary, AU MA82A-22 (locally known as Cochituate Brook), so the Fish Consumption Use is Not Assessed.

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff observed aesthetic conditions during five field surveys in this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) ~800 ft upstream of School St / Rt 126, Framingham (Station W2536/MAP2-715) in summer 2015. Field crews generally did not note any odors, growths, or turbidity; however, objectionable deposits were observed on all site visits (i.e., trash, described once as “Lots of trash. Just under impairable levels” (MassDEP Undated 6)).</p> <p>The Aesthetics Use of this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) will continue to be assessed as Not Supporting, with the prior Debris and Trash impairments being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2536	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Sudbury River locally known as 'Cochituate Brook', approximately 800 feet upstream of School Street (Route 126), Framingham]	42.319324	-71.395583

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2536	Unnamed Tributary	2015	5	The Aesthetics use for this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) is assessed as Fully Supporting based on observations (generally no odors, growths, or turbidity) by MassDEP staff during field surveys at station W2536/MAP2-715 in summer 2015 (n=5). However, the use is identified with an Alert status due to observations of objectionable deposits on all site visits (i.e., trash, described once as “Lots of trash. Just under impairable levels”).

Observations of Filamentous/Film Algae at MassDEP Stations (2011-2018) (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2536	2015	5	5	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2536	Unnamed Tributary	2015	Color	Light Yellow/Tan	5	5

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2536	Unnamed Tributary	2015	Objectionable Deposits	Yes	5	5
W2536	Unnamed Tributary	2015	Odor	None	5	5
W2536	Unnamed Tributary	2015	Scum	No	4	5
W2536	Unnamed Tributary	2015	Scum	Yes	1	5
W2536	Unnamed Tributary	2015	Turbidity	None	4	5
W2536	Unnamed Tributary	2015	Turbidity	Slightly Turbid	1	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff collected <i>E. coli</i> bacteria samples in this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) ~800 ft upstream of School St / Rt 126, Framingham (Station W2536/MAP2-715) during summer 2015. Analysis of these low frequency data (n=5) indicated that 80% of intervals had GMs >126 cfu/100mL and one sample exceeded the 410 cfu/100mL STV. The seasonal GM was 163 cfu/100mL. MassDEP field crews also observed aesthetic conditions during these field surveys and generally did not note any odors, growths, or turbidity. However, objectionable deposits were observed on all site visits (i.e., trash, described once as “Lots of trash. Just under impairable levels” (MassDEP Undated 6)).</p> <p>The Primary Contact Recreational Use of this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) will continue to be assessed as Not Supporting, with the prior Debris, Escherichia Coli (<i>E. Coli</i>), and Trash impairments being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2536	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Sudbury River locally known as 'Cochituate Brook', approximately 800 feet upstream of School Street (Route 126), Framingham]	42.319324	-71.395583

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

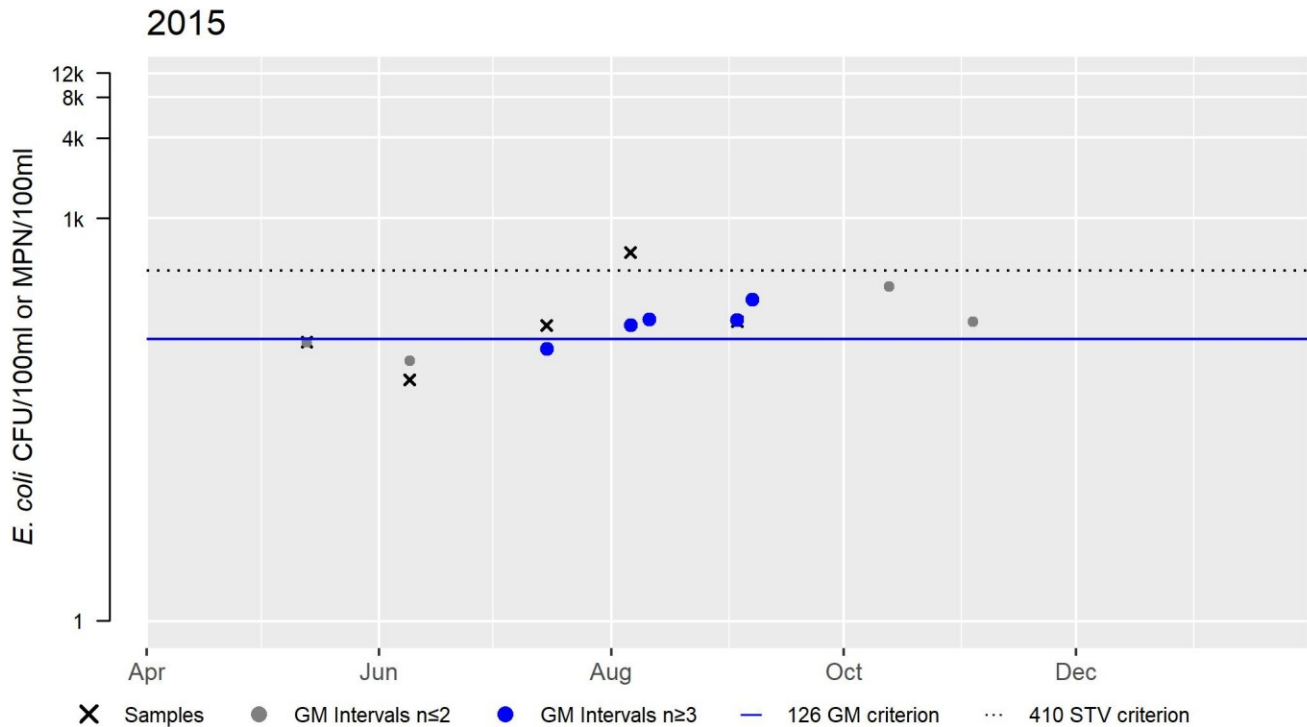
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2536	MassDEP	E. coli	05/13/15	09/03/15	5	63	560	163

W2536 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	163
#GMI	5
#GMI Ex	4
%GMI Ex	80
n>STV	1
%n>STV	20

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



Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff collected <i>E. coli</i> bacteria samples in this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) ~800 ft upstream of School St / Rt 126, Framingham (Station W2536/MAP2-715) during summer 2015. Analysis of these low frequency data (n=5) indicated that none of the intervals had GMs >630 cfu/100mL and none of the samples exceeded the 1260 cfu/100mL STV. The overall GM was 163 cfu/100mL. MassDEP field crews also observed aesthetic conditions during these field surveys and generally did not note any odors, growths, or turbidity. However, objectionable deposits were observed on all site visits (i.e., trash, described once as “Lots of trash. Just under impairable levels” (MassDEP Undated 6)).</p> <p>The Secondary Contact Recreational Use of this Unnamed Tributary (MA82A-22, locally known as Cochituate Brook) will continue to be assessed as Not Supporting, with the prior Debris and Trash impairments being carried forward. The <i>E. coli</i> bacteria concentrations in summer 2015 did not exceed the use attainment impairment thresholds.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2536	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Sudbury River locally known as 'Cochituate Brook', approximately 800 feet upstream of School Street (Route 126), Framingham]	42.319324	-71.395583

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

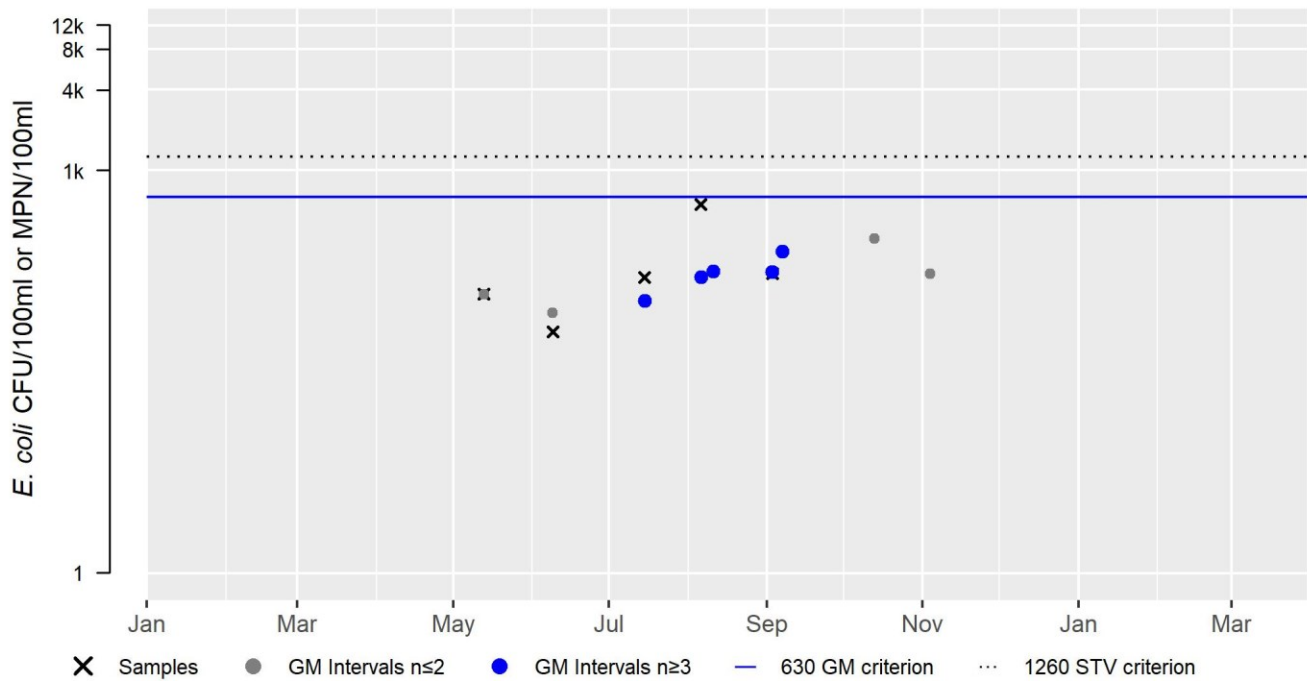
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2536	MassDEP	E. coli	05/13/15	09/03/15	5	63	560	163

W2536 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	163
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015

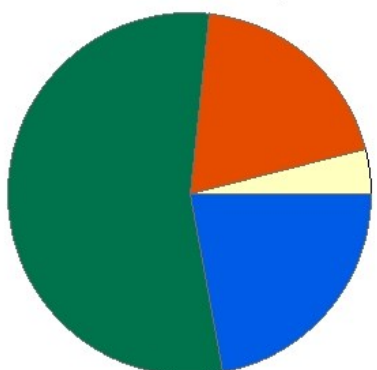


Unnamed Tributary (MA82A-31)

Location:	Unnamed tributary to River Meadow Brook, outlet Elm Street Pond, Carlisle to mouth at confluence with River Meadow Brook, Chelmsford (through former 2014 segment: Russell Millpond MA82096 and excluding approximately 0.4 mile through existing segment: Meadow Pond MA82129) (formerly part of 2014 segment: Unnamed Tributary MA82A-21).
AU Type:	RIVER
AU Size:	3.7 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA82A-31

Watershed Area: 10 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	10	6.32	2.49	1.54
Agriculture	4%	4.3%	5.7%	6.2%
Developed	19.3%	17.5%	12.9%	11.7%
Natural	54.6%	57.5%	46.1%	50.3%
Wetland	22.1%	20.7%	35.3%	31.8%
Impervious Cover	8.7%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
4c	4c	(Flow Regime Modification*)		Unchanged
4c	4c	(Water Chestnut*)		Unchanged

Impairment	Source (Confirmed Y/N)	Fish, other Aquatic Life and Wildlife	Fish Consumption	Aesthetic	Primary Contact Recreation	Secondary Contact Recreation
(Flow Regime Modification*)	Source Unknown (N)	X				
(Water Chestnut*)	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	
<p>As part of a chloride study, MassDEP staff conducted water quality monitoring in this Unnamed Tributary (MA82A-31) in 2015 and 2016 ~100 feet upstream from the inlet of Russell Millpond, Chelmsford (W2547). The discrete dissolved oxygen (DO) data minima were 10.5 mg/L (n=3) and 7.9 mg/L (n=4) in 2015 and 2016, respectively. The maximum DO saturation was 99%. A probe was deployed to measure continuous temperature data over 96 days in the 2016 summer index period with a maximum of 23.4 °C. pH measurements ranged from 6.8-7.1 S.U. (n= 3 & 4/yr). The maximum chloride concentration was 94 mg/L and the maximum specific conductance was 410 µs/cm (n= 3 & 6/yr). There were no observations of excessive filamentous algae either year.</p> <p>The Aquatic Life Use of this Unnamed Tributary (MA82A-31) will remain assessed as Not Supporting with the prior Flow Regime Modification and Water Chestnut impairments being carried forward, although the limited water quality data collected upstream from the inlet of Russell Millpond in the summers of 2015 and 2016 were indicative of good conditions.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2547	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Russell Millpond, approximately 100 feet upstream from inlet of Russell Millpond, Chelmsford]	42.562315	-71.336306

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2547	10/06/15	12/03/15	3	10.5	10.9	0	0	0
W2547	01/21/16	09/07/16	4	7.9	9.1	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2547	06/01/16	09/06/16	96	81	22.3	23.4	22.6	21.7	44	0	6	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2547	06/01/16	09/07/16	98	4626	22.6	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2547	10/06/15	12/03/15	3	0	9.6	7.8	0	0	0	0
W2547	01/21/16	09/07/16	6	3	17.6	9.6	0	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2547	10/06/15	12/03/15	3	7	7.1	0	0
W2547	01/21/16	09/07/16	4	6.8	6.9	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)

MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2547	2015	--	--	--	--	--	--	93.5	7.1	3	0
W2547	2016	--	--	--	--	--	--	99.0	6.9	6	0

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

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2547	2015	3	83	94	88	0	0
W2547	2016	6	4	90	50	0	0

MassDEP Long-term Continuous Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria.

(MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Start Date	End Date	SpCond Min (µs/cm)	SpCond Max (µs/cm)	SpCond Avg (µs/cm)	Max 4day Avg (µs/cm)	Max 1hr Avg (µs/cm)	4Day Count	1hr Count	Count 4day Avg >904	Count 1hr Avg >3193
W2547	10/06/15	12/31/15	192	455	392	439	455	3959	4149	0	0
W2547	01/01/16	09/07/16	48	501	251	477	501	12006	12006	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6)

(MassDEP Undated 4)

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
W2547	10/06/15	12/03/15	3	361	410	0	0	0	0	0	0
W2547	01/21/16	09/07/16	6	66	358	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in this Unnamed Tributary (MA82A-31), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys of this Unnamed Tributary (MA82A-31) in 2015 and 2016 ~100 feet upstream from the inlet of Russell Millpond, Chelmsford (W2547). There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded in either 2015 (n=3) or 2016 (n=6).</p> <p>The Aesthetics Use of this Unnamed Tributary (MA82A-31) is assessed as Fully Supporting based on the general lack of objectionable conditions noted by MassDEP staff during the summers of 2015 and 2016.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2547	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Russell Millpond, approximately 100 feet upstream from inlet of Russell Millpond, Chelmsford]	42.562315	-71.336306

*Aesthetic Observations***Aesthetics Summary Statements for MassDEP Stations (2011-2018)** (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2547	Unnamed Tributary	2015	3	MassDEP aesthetics observations for station W2547 on Unnamed Tributary 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.
W2547	Unnamed Tributary	2016	6	MassDEP aesthetics observations for station W2547 on Unnamed Tributary 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2547	2015	3	3	0
W2547	2016	6	6	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2547	Unnamed Tributary	2015	Color	None	3	3
W2547	Unnamed Tributary	2015	Objectionable Deposits	No	3	3
W2547	Unnamed Tributary	2015	Odor	None	3	3
W2547	Unnamed Tributary	2015	Scum	No	3	3
W2547	Unnamed Tributary	2015	Turbidity	None	3	3
W2547	Unnamed Tributary	2016	Color	Light Yellow/Tan	1	6
W2547	Unnamed Tributary	2016	Color	None	5	6
W2547	Unnamed Tributary	2016	Objectionable Deposits	No	6	6
W2547	Unnamed Tributary	2016	Odor	None	6	6
W2547	Unnamed Tributary	2016	Scum	No	6	6

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2547	Unnamed Tributary	2016	Turbidity	None	6	6

Primary Contact Recreation

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
There are no bacteria data available, so the Primary Contact Recreational Use of this Unnamed Tributary AU (MA82A-31) 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 Recreational Use of this Unnamed Tributary AU (MA82A-31) is Not Assessed.	

Unnamed Tributary (MA82A-35)

Location:	Unnamed tributary to Hop Brook, headwaters south of Graham Path, Marlborough to mouth at confluence with Hop Brook, Sudbury.
AU Type:	RIVER
AU Size:	1.9 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82A-35) 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

Unnamed Tributary (MA82A-36)

Location:	Unnamed tributary to Hop Brook, headwaters outlet unnamed pond west of Vega Road, Marlborough to mouth at confluence with Hop Brook, Sudbury.
AU Type:	RIVER
AU Size:	2.8 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82A-36) 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

Unnamed Tributary (MA82B-16)

Location:	Unnamed tributary to Assabet River (locally considered part of Spencer Brook), outlet Angiers Pond, Concord to mouth at confluence with the Assabet River, Concord.
AU Type:	RIVER
AU Size:	0.5 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82B-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

Unnamed Tributary (MA82B-23)

Location:	Unnamed tributary to the Assabet River; headwaters, outlet small pond south of Athens Street, Stow to mouth at confluence with Assabet River (backwater area), Stow.
AU Type:	RIVER
AU Size:	1.1 MILES
Classification/Qualifier:	B: CWF

No usable data were available for Unnamed Tributary (MA82B-23) 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

Unnamed Tributary (MA82B-24)

Location:	Unnamed tributary to Nashoba Brook, headwaters outlet unnamed pond east of Pope Road, Acton to mouth at confluence with Nashoba Brook, Acton.
AU Type:	RIVER
AU Size:	1.4 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82B-24) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

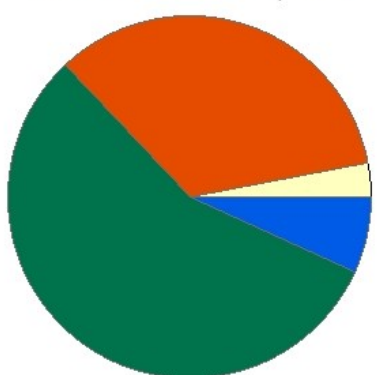
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	2	None		Unchanged

Unnamed Tributary (MA82B-27)

Location:	Unnamed tributary to Assabet River Reservoir, headwaters, perennial portion south of Route 30 (Nourse Street), Westborough to mouth at inlet of Assabet River Reservoir, Westborough.
AU Type:	RIVER
AU Size:	0.7 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA82B-27

Watershed Area: 1.3 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.3	1.3	0.36	0.36
Agriculture	3%	3%	0.1%	0.1%
Developed	34.1%	34.1%	28.8%	28.8%
Natural	56.1%	56.1%	58.8%	58.8%
Wetland	6.8%	6.8%	12.2%	12.2%
Impervious Cover	14.7%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
2	3	None		Unchanged

Recommendations

2022 Recommendations

ALU: Additional fish sampling is needed in Unnamed Tributary AU MA82B-27 (called Nourse Brook by DFG) downstream of Old Nourse Rd, Westborough to determine whether or not the Existing Use Tier 1 Cold Water Fishery has disappeared.

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	

MassDFG biologists conducted backpack electrofishing in this Unnamed Tributary AU (MA82B-27) (called Nourse Brook by DFG) downstream of Old Nourse Rd, Westborough (Sample ID 5410) in September 2014. The sample (n=38) was comprised entirely of the warmwater fluvial species, white sucker. In contrast, multiple age classes of the coldwater species, Eastern brook trout, were previously captured in the vicinity of this sampling station in 2001 (Sample ID 488) and in July 2013 (Sample ID 4954) (MassDEP 2021). Sampling notes indicated minimum water conditions in the September 2014 sample.

The lack of any cold water fish in the most recent sampling effort in this Tier 1 Existing Use Cold Water stream is of concern but an impairment decision is not being made at this time. The Aquatic Life Use of this Unnamed Tributary AU (MA82B-27) is assessed as having Insufficient Information but an Alert is being added for the Lack of a Coldwater Assemblage.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
5410	MassDFG	Fish Community	Nourse Brook	Old Nourse Rd crossing DS, East of Brook Way, Westborough	42.25677	-71.63380

Biological Monitoring Information

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: 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
5410	09/10/14	BP	TP	L	1	38	0%	1	100%	0%	0	0%	No	Yes	WS,

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in this Unnamed Tributary (MA82B-27), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No data are available, so the Aesthetics Use of this Unnamed Tributary (MA82B-27) 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 Recreational Use of this Unnamed Tributary (MA82B-27) 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 Recreational Use of this Unnamed Tributary (MA82B-27) is Not Assessed.		

Unnamed Tributary (MA82B-28)

Location:	Unnamed tributary to Assabet River Reservoir, headwaters, perennial portion north of Nourse Street (Route 30), Westborough to mouth at inlet of Assabet River Reservoir, Westborough.
AU Type:	RIVER
AU Size:	0.3 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82B-28) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

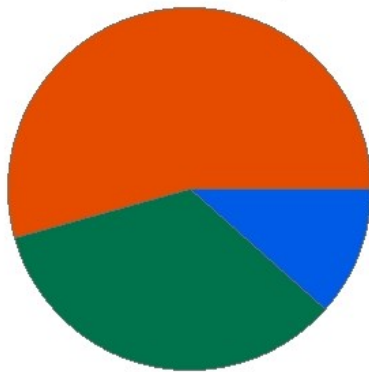
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Unnamed Tributary (MA82B-31)

Location:	Unnamed tributary to Hop Brook, headwaters west of Tennis Drive, Shrewsbury to inlet Eaton Pond, Shrewsbury.
AU Type:	RIVER
AU Size:	1 MILES
Classification/Qualifier:	B

Unnamed Tributary - MA82B-31

Watershed Area: 1.23 square miles including areas outside Massachusetts



■ Percent Agriculture ■ Percent Natural
■ Percent Developed ■ Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	1.23	1.23	0.36	0.36
Agriculture	0%	0%	0%	0%
Developed	54.3%	54.3%	37.9%	37.9%
Natural	34.1%	34.1%	33%	33%
Wetland	11.5%	11.5%	29.1%	29.1%
Impervious Cover	27.1%			

2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	5	Benthic Macroinvertebrates		Added
3	5	Chloride		Added
3	5	Dissolved Oxygen		Added
3	5	Escherichia Coli (E. Coli)		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				
Chloride	Highway/Road/Bridge Runoff (Non-construction Related) (Y)	X				
Chloride	Impervious Surface/Parking Lot Runoff (Y)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Escherichia Coli (E. Coli)	Discharges from Municipal Separate Storm Sewer Systems (MS4) (N)				X	
Escherichia Coli (E. Coli)	Source Unknown (N)				X	

Recommendations

2022 Recommendations
ALU: Given the new chloride impairment being applied in this 2022 IR cycle and 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 the sub-watershed of this Unnamed Tributary (MA82B-31).

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP staff conducted fish (Sample ID 6360), benthic (Station B0927), and water quality (Station W2528/MAP2-696) surveys of this Unnamed Tributary (MA82B-31) roughly 875 ft downstream/north of Main Boulevard, Shrewsbury (upstream of Hop Brook) during summer 2015. The small fish community sample (n=9), collected the end of June, was comprised of 56% fluvial individuals (white sucker) and an additional 22% intolerant/moderately tolerant macrohabitat generalists. The July benthic sample had an IBI score of 43, indicating that conditions were moderately degraded for a low gradient location. A probe was deployed to measure dissolved oxygen (DO) for 85 days from July through September. Roughly 46% of the 79 7DADMin for the DO measurements were <5.0 mg/L (minimum 7DADMin 1.3 mg/L) and the daily minima were <4.0 mg/L on 26 dates. Continuous temperature measurements were recorded over 70 days in the summer index period with a maximum of 25.0 °C (good for a WWF). Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.8-7.3 S.U. (n=3), there was little indication of nutrient enrichment (total phosphorus seasonal average was 0.030 mg/L with n=5, maximum DO saturation was 91.9%, no observations of excessive filamentous algae with n=4; however, the maximum DO diel shift was 7.9 mg/L), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), and the maximum Total Ammonia Nitrogen was 0.090 mg/L (n=5). Among five chloride samples (range 230-410 mg/L), four had concentrations greater than 230 mg/L, the chronic toxicity criterion. Similarly, two of three specific conductance measurements were >994 µs/cm (the estimated chloride chronic criterion plus a 10% margin of error), with a maximum of 1394 µs/cm.</p> <p>The Aquatic Life Use of this Unnamed Tributary (MA82B-31) is assessed as Not Supporting with impairments being added for Benthic Macroinvertebrates, Chloride, and Dissolved Oxygen based on the MassDEP survey data collected during the summer of 2015.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
6360	MassDEP	Fish Community	UNT to Hop Brook (1, 1)	, Shrewsbury	42.29107	-71.68853
B0927	MassDEP	Benthic	Unnamed And/Or Undefined Saris/	[unnamed tributary to Hop Brook, approximately 270 meters downstream/north of Main Boulevard, Shrewsbury, MA]	42.291074	-71.688531
W2528	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Hop Brook, approximately 875 feet downstream/north of Main Boulevard, Shrewsbury]	42.291074	-71.688531

Biological Monitoring Information

Benthic Macroinvertebrate Data

MassDEP Benthic Macroinvertebrate Data (2011-2017). (MassDEP Undated 3)

[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
B0927	07/29/15	RBP multihab	Statewide_Low_Gradient	317	43	MD

Fish Community Data and DELTS

Fish Community Data (2012-2019) Provided by MassDFG. (MassDFG 2020) (MassDEP Undated 1)

[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: GS = Golden Shiner, P = Pumpkinseed, RP = Redfin Pickerel, 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
6360	06/25/15	NS	TP		4	9	0%	1	56%	0%	2	22%	No	No	GS, P, RP, WS,

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	07/08/15	09/30/15	85	79	56	0.6	1.3	3.7	7.9	43	37	12	9	36	26	56	12

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	08/11/15	10/01/15	3	8.1	8.4	0	0	0

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2528	07/08/15	09/15/15	70	67	22.1	25.0	22.6	20.9	61	0	0	0	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2528	07/07/15	09/15/15	71	3343	22.1	0	0	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	08/11/15	10/01/15	3	2	20.3	18.2	1	0	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2528	08/11/15	10/01/15	3	6.8	7.3	0	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)
MassDEP Nutrient Enrichment Indicator Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	2015	5	0.018	0.046	0.030	7.9	2.3	91.9	7.3	4	0

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

MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2528	2015	5	0.040	0.090	0.060	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2528	2015	5	230	410	332	4	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2528	08/11/15	10/01/15	3	533	1394	2	2	0	0	1	1

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics monitoring has not been conducted in this Unnamed Tributary (MA82B-31), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys in this Unnamed Tributary (MA82B-31) ~875 feet downstream/north of Main Boulevard, Shrewsbury during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded during the five site visits.</p> <p>The Aesthetics Use of this Unnamed Tributary (MA82B-31) is assessed as Fully Supporting based on the general lack of any objectionable conditions noted by MassDEP staff during the summer of 2015.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2528	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Hop Brook, approximately 875 feet downstream/north of Main Boulevard, Shrewsbury]	42.291074	-71.688531

Aesthetic Observations

Aesthetics Summary Statements for MassDEP Stations (2011-2018) (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2528	Unnamed Tributary	2015	5	MassDEP aesthetics observations for station W2528/MAP2-696 on Unnamed Tributary 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2528	2015	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2528	Unnamed Tributary	2015	Color	Light Yellow/Tan	2	5

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2528	Unnamed Tributary	2015	Color	None	3	5
W2528	Unnamed Tributary	2015	Objectionable Deposits	No	5	5
W2528	Unnamed Tributary	2015	Odor	None	5	5
W2528	Unnamed Tributary	2015	Scum	No	5	5
W2528	Unnamed Tributary	2015	Turbidity	None	5	5

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys in this Unnamed Tributary (MA82B-31) ~875 feet downstream/north of Main Boulevard, Shrewsbury during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded during the five site visits. <i>E. coli</i> bacteria data were also collected during the site visits. Analysis of these low frequency data (n=5) indicated that all intervals had GMs >126 cfu/100mL (the seasonal GM was 258 cfu/100mL) and one sample exceeded the 410 cfu/100mL STV.</p> <p>The Primary Contact Recreational Use of this Unnamed Tributary (MA82B-31) is assessed as Not Supporting since <i>E. coli</i> concentrations exceeded the use attainment impairment thresholds for a single year limited frequency dataset.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2528	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Hop Brook, approximately 875 feet downstream/north of Main Boulevard, Shrewsbury]	42.291074	-71.688531

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

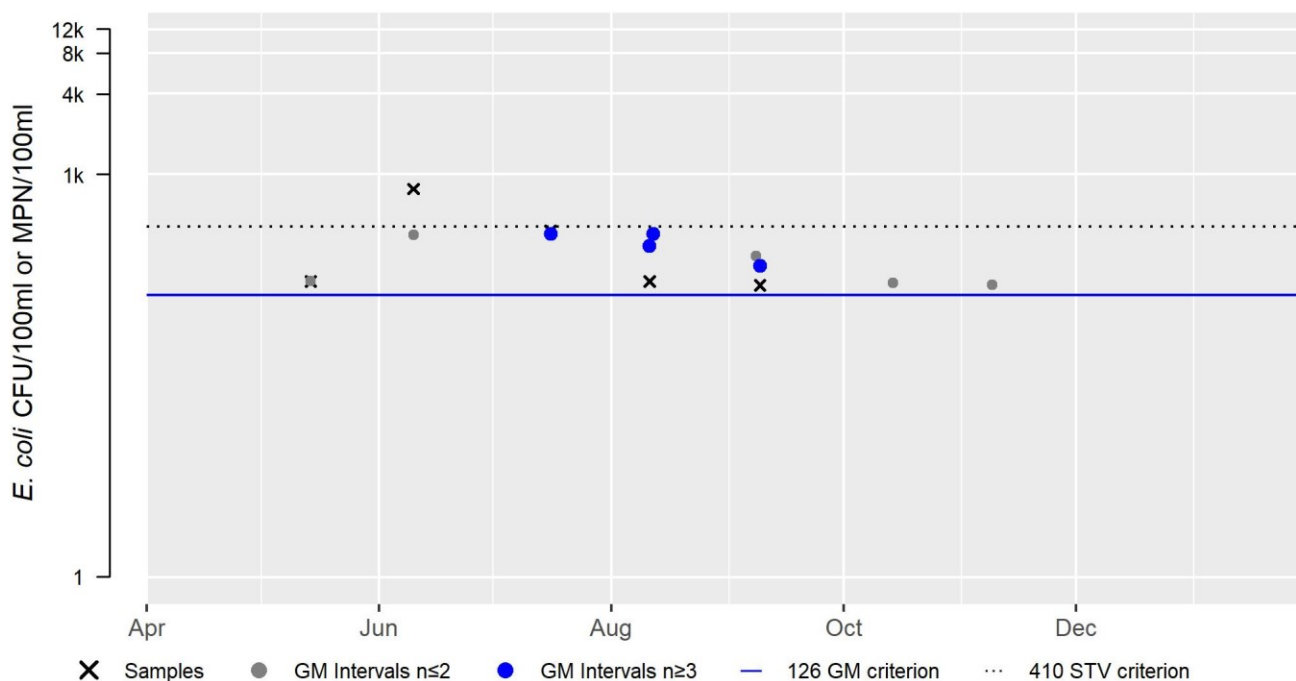
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2528	MassDEP	E. coli	05/14/15	09/09/15	5	150	780	258

W2528 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	258
#GMI	4
#GMI Ex	4
%GMI Ex	100
n>STV	1
%n>STV	20

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

2015



Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
<p>MassDEP field crews conducted surveys in this Unnamed Tributary (MA82B-31) ~875 feet downstream/north of Main Boulevard, Shrewsbury during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity) recorded during the five site visits. <i>E. coli</i> bacteria data were also collected during the site visits. Analysis of these low frequency data (n=5) indicated that none of the intervals had GMs >630 cfu/100mL and none of the samples exceeded the 1260 cfu/100mL STV.</p> <p>The Secondary Contact Recreational Use of this Unnamed Tributary (MA82B-31) is assessed as Fully Supporting based on MassDEP's 2015 <i>E. coli</i> and aesthetic observational data.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2528	MassDEP	Water Quality	Unnamed Tributary	[unnamed tributary to Hop Brook, approximately 875 feet downstream/north of Main Boulevard, Shrewsbury]	42.291074	-71.688531

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

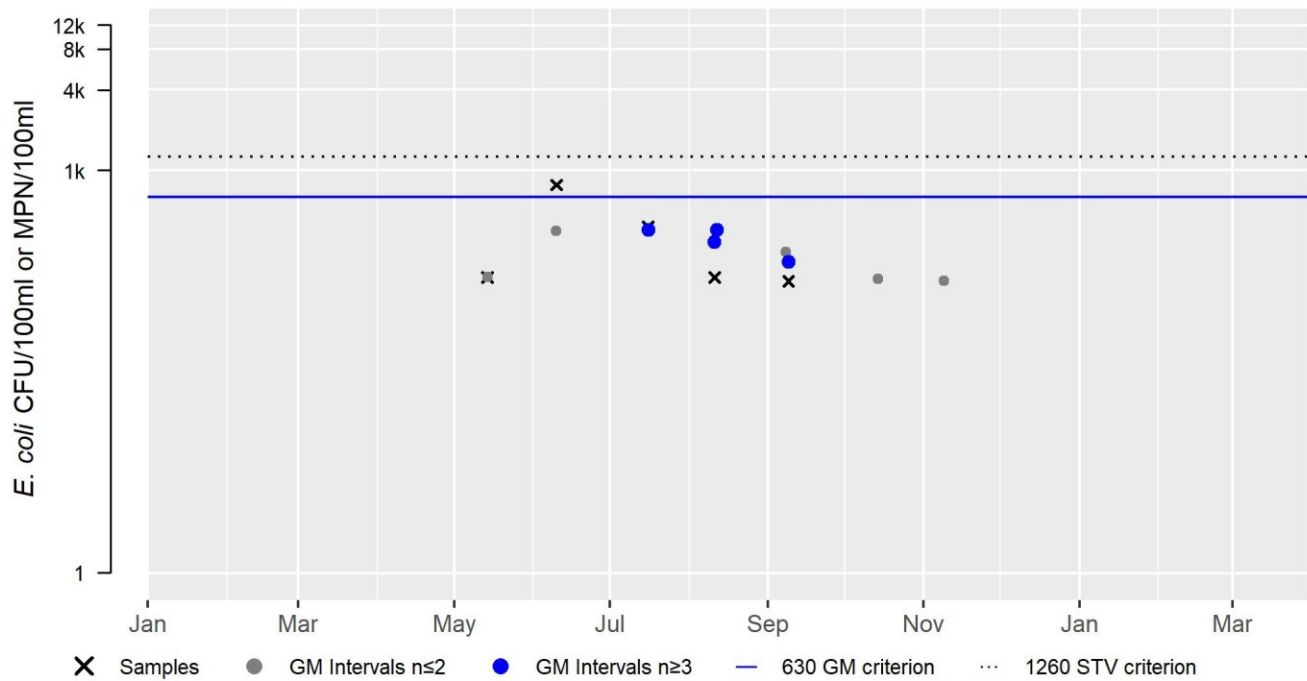
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2528	MassDEP	E. coli	05/14/15	09/09/15	5	150	780	258

W2528 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	258
#GMI	4
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Unnamed Tributary (MA82B-32)

Location:	Unnamed tributary to Assabet River, headwaters outlet Warner Pond, Concord to mouth at confluence with Assabet River, Concord.
AU Type:	RIVER
AU Size:	0.2 MILES
Classification/Qualifier:	B

No usable data were available for Unnamed Tributary (MA82B-32) 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

Walden Pond (MA82109)

Location:	Concord.
AU Type:	FRESHWATER LAKE
AU Size:	63 ACRES
Classification/Qualifier:	B

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			

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Assessed	YES
2022 Use Attainment Summary	
No recent data are available, so the Aquatic Life Use of Walden Pond (MA82109) is Not Assessed. The prior Alert for organic enrichment/low DO is being carried forward.	

Fish Consumption

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
Recent fish toxics sampling has not been conducted in Walden Pond (MA82109), so the Fish Consumption Use will remain assessed as Not Supporting with the historical Mercury in Fish Tissue impairment being carried forward. The MassDPH fish advisory for Walden Pond recommends that <i>“Children younger than 12 years of age, pregnant women, women of childbearing age who may become pregnant, and nursing mothers should not eat any of the affected fish species (largemouth bass, smallmouth bass) from this water body.”</i> Additionally, the <i>“general public should limit consumption of affected fish species (largemouth bass, smallmouth bass) to two meals per month”</i> (MassDPH 2021).	

Aesthetic

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
No data are available, so the Aesthetics Use of Walden Pond (MA82109) is Not Assessed.	

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
The Primary Contact Recreational Use of Walden Pond (MA82109) is assessed as Fully Supporting since there were few if any swimming advisory postings at the main beach and Red Cross beach between 2014 and 2019 (closures generally ranged from 0-6% of the season and 10% in one year at the Red Cross beach).	

Beach Postings

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

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%
4604	Walden Pond - Main (DCR)/Concord	42.43993	-71.33470	42.43887	-71.33440	0%	4%	6%	4%	2%	2%	0
4605	Walden Pond - Red Cross (DCR)/Concord	42.44045	-71.33660	42.44019	-71.33520	0%	10%	2%	2%	2%	4%	0

Secondary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	NO
2022 Use Attainment Summary	
The Secondary Contact Recreational Use of Walden Pond (MA82109) is assessed as Fully Supporting since there were few if any swimming advisory postings at the main beach and Red Cross beach between 2014 and 2019 (closures generally ranged from 0-6% of the season and 10% in one year at the Red Cross beach).	

Warners Pond (MA82110)

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

No usable data were available for Warners Pond (MA82110) 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	(Water Chestnut*)		Unchanged
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
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			

Waushakum Pond (MA82112)

Location:	Framingham/Ashland.
AU Type:	FRESHWATER LAKE
AU Size:	87 ACRES
Classification/Qualifier:	B

No usable data were available for Waushakum Pond (MA82112) 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	(Non-Native Aquatic Plants*)		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
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
Chlorophyll-a	Source Unknown (N)	X				
Dissolved Oxygen	Source Unknown (N)	X				
Phosphorus, Total	Source Unknown (N)	X				
Turbidity	Source Unknown (N)	X		X	X	X

West Pond (MA82115)

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

No usable data were available for West Pond (MA82115) 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

Westborough Reservoir (MA82114)

Location:	Westborough.
AU Type:	FRESHWATER LAKE
AU Size:	41 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Westborough Reservoir (MA82114) 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

White Pond (MA82118)

Location:	Concord.
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	Dissolved Oxygen		Unchanged
5	5	Harmful Algal Blooms		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				
Harmful Algal Blooms	Discharges from Municipal Separate Storm Sewer Systems (MS4) (N)	X		X	X	X
Harmful Algal Blooms	On-site Treatment Systems (Septic Systems and Similar Decentralized Systems) (N)	X		X	X	X
Harmful Algal Blooms	Source Unknown (N)	X		X	X	X

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
<p>C-HAB postings for White Pond (MA82118) were reported to MassDPH for 35 days in 2015 (the advisory was issued based on sample analysis), and another 30 days in 2015 (the 30-day advisory was not issued or confirmed by sampling results). Additionally, blooms were reported for 70 days in 2016, 5 days in 2017, and 11 days in 2019 (none of these were issued or confirmed by sampling results).</p> <p>The Aquatic Life Use of White Pond in Concord (MA82118) will continue to be assessed as Not Supporting, with the prior Dissolved Oxygen and Harmful Algal Blooms impairments being carried forward.</p>	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	

Fish toxics sampling was performed by MassDEP WPP biologists at White Pond in Concord (MA82118) in September 2019 at the recommendation of the Inter-agency Fish Toxics Committee. Edible fillets were analyzed for the presence of mercury, arsenic, cadmium, and selenium. No site-specific fish consumption advisory was issued by MassDPH. The Fish Consumption Use of White Pond in Concord (MA82118) is Not Assessed since no site-specific advisory was issued for this waterbody.

MassDEP fish toxics sampling information (2018-2020) and MassDPH Fish Consumption Advisory information (2019-2021) (MassDEP 2019) (MassDEP Undated 6)

Fish toxics sampling was performed by MassDEP WPP biologists at White Pond in Concord (MA82118) in September 2019 at the recommendation of the Inter-agency Fish Toxics Committee. Edible fillets were analyzed for the presence of mercury, arsenic, cadmium, and selenium. No site-specific fish consumption advisory was issued by MassDPH.

Aesthetic

2022 Use Attainment	Alert
Not Supporting	NO
2022 Use Attainment Summary	
C-HAB postings for White Pond (MA82118) were reported to MassDPH for a total of 65 days in 2015 (a 35-day advisory issued based on sample analysis and a 30-day advisory which was not issued or confirmed by sampling results), 70 days in 2016, 5 days in 2017, and 11 days in 2019 (none of these last three were issued or confirmed by sampling results). A recent study prepared for the Town of Concord noted a “dramatic increase” in the number of C-HABs in recent years and identified possible sources/confounding issues including septic systems from surrounding residences, fertilizers, stormwater runoff, human and dog waste, erosion, rainbow trout stocking, and variable water levels (possibly due to ground water pumping from Town Well #7) (White Pond Advisory Committee 2021). The Aesthetics Use of White Pond in Concord (MA82118) is assessed as Not Supporting since extended C-HAB blooms (>20 days duration) were reported in multiple recent years. A Harmful Algal Blooms impairment is being added.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement
C-HAB postings for White Pond (MA82118) were reported to MassDPH for 35 days in 2015 (the advisory was issued based on sample analysis), and another 30 days in 2015 (the 30-day advisory was not issued or confirmed by sampling results). Additionally, blooms were reported for 70 days in 2016, 5 days in 2017, and 11 days in 2019 (none of these were issued or confirmed by sampling results). Since extended blooms (>20 days duration) were reported in multiple years, the Primary/Secondary Contact Recreational Uses and Aesthetics Use are assessed as Not Supporting.

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
White Pond	Advisory issued based on sample analysis	35					1	yes
White Pond	Not issued or confirmed by sampling	30	70	5		11	2	yes

Primary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>C-HAB postings for White Pond (MA82118) were reported to MassDPH for a total of 65 days in 2015 (a 35-day advisory issued based on sample analysis and a 30-day advisory which was not issued or confirmed by sampling results), 70 days in 2016, 5 days in 2017, and 11 days in 2019 (none of these last three were issued or confirmed by sampling results). A recent study prepared for the Town of Concord noted a “dramatic increase” in the number of C-HABs in recent years and identified possible sources/confounding issues including septic systems from surrounding residences, fertilizers, stormwater runoff, human and dog waste, erosion, rainbow trout stocking, and variable water levels (possibly due to ground water pumping from Town Well #7) (White Pond Advisory Committee 2021).</p> <p>Since extended blooms (>20 days duration) were reported in multiple years, the Primary Contact Recreational Use of White Pond in Concord (MA82118) is assessed as Not Supporting for Harmful Algal Blooms. The prior Alert for old and failing septic systems (MassDEP Undated 5) is being carried forward.</p>	

Secondary Contact Recreation

2022 Use Attainment	Alert
Not Supporting	YES
2022 Use Attainment Summary	
<p>C-HAB postings for White Pond (MA82118) were reported to MassDPH for a total of 65 days in 2015 (a 35-day advisory issued based on sample analysis and a 30-day advisory which was not issued or confirmed by sampling results), 70 days in 2016, 5 days in 2017, and 11 days in 2019 (none of these last three were issued or confirmed by sampling results). A recent study prepared for the Town of Concord noted a “dramatic increase” in the number of C-HABs in recent years and identified possible sources/confounding issues including septic systems from surrounding residences, fertilizers, stormwater runoff, human and dog waste, erosion, rainbow trout stocking, and variable water levels (possibly due to ground water pumping from Town Well #7) (White Pond Advisory Committee 2021).</p> <p>Since extended blooms (>20 days duration) were reported in multiple years, the Secondary Contact Recreational Use of White Pond in Concord (MA82118) is assessed as Not Supporting for Harmful Algal Blooms. The prior Alert for old and failing septic systems (MassDEP Undated 5) is being carried forward.</p>	

White Pond (MA82119)

Location:	Hudson/Stow.
AU Type:	FRESHWATER LAKE
AU Size:	49 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for White Pond (MA82119) for the 2022 Integrated Reporting cycle, therefore its category, use attainments, impairments, associated actions, and sources remain unchanged from the previous cycle.

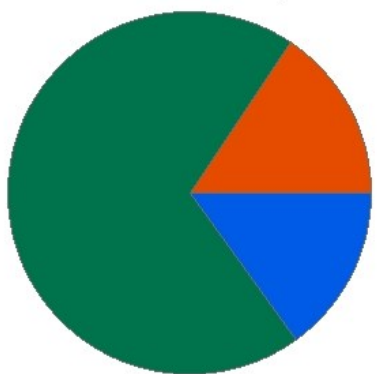
2018/20 AU Category	2022 AU Category	Impairment	ATTAINS Action ID	Impairment Change Summary
3	3	None		Unchanged

Whitehall Brook (MA82A-11)

Location:	Headwaters, outlet Whitehall Reservoir, Hopkinton to mouth at confluence with the Sudbury River, Westborough.
AU Type:	RIVER
AU Size:	3.5 MILES
Classification/Qualifier:	B: ORW

Whitehall Brook - MA82A-11

Watershed Area: 7.6 square miles including areas outside Massachusetts



Percent Agriculture
 Percent Natural
 Percent Developed
 Percent Wetland

Landuse Type	Entire Basin	5km Radius Proximal Subbasin	100m Stream Buffer	Proximal Stream Buffer
Land Use Area (square miles)	7.6	5.59	2.7	2.15
Agriculture	1%	1.4%	1.3%	1.6%
Developed	15.4%	16.5%	13.5%	13.7%
Natural	68.8%	66.8%	57%	56.2%
Wetland	14.8%	15.4%	28.2%	28.5%
Impervious Cover	5.9%			

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

MassDEP staff conducted benthic (B0912) and water quality surveys (W2513) of Whitehall Brook roughly 3500 ft upstream/east of Fruit Street, Hopkinton during summer 2015. The July benthic sample had an IBI score of 42, indicating that conditions were moderately degraded for a low gradient location. A probe was deployed to measure dissolved oxygen (DO) for 95 days from early July through early October. The 7DADMin for the DO measurements were <5.0 mg/L 89 times and the 1-day minima were <4.0 mg/L on 95 days (it is noted that all DO probe data were qualified "I"). Continuous temperature measurements were recorded over 75 days in the summer index period with a maximum of 27.0 °C (good for a WWF). Other water quality indicators are summarized as follows and were generally indicative of good conditions: pH ranged from 6.0-6.2 S.U, there was little indication of a nutrient enrichment problem (total phosphorus seasonal average concentration was 0.032 mg/L with n=5 and there were no observations of excessive filamentous algae; however, the maximum DO diel shift was 4.7 mg/L and the maximum DO saturation was 30.2%, likely reflective of the high amount of wetlands cover in the proximal stream buffer), there were no exceedances among three clean metals samples or three aluminum samples (because dissolved Al data were compared to the total recoverable Al criteria, exceedances cannot be ruled out, however), the maximum Total Ammonia Nitrogen was 0.090 mg/L, the maximum chloride was 210 mg/L, and the maximum specific conductance was 354 µs/cm (n was 3 for most lab/discrete measurements).

The Aquatic Life Use of Whitehall Brook (MA82A-11) is assessed as Not Supporting. Impairments are being added for Benthic Macroinvertebrates and Dissolved Oxygen (although low DO concentrations are likely affected by natural conditions- 83.6% natural/wetlands landcover in the subwatershed and 28.5% wetlands in the proximal stream buffer- the impervious cover is fairly high at 5.9% so the DO impairment is being added). The prior Alert, identified in the 2001 Water Quality Assessment Report (O'Brien-Clayton 2005), was given for sub-optimal fish and water quality data. This Alert will be removed since the fish community data from those surveys would be considered adequate under current CALM guidance (MassDEP 2022), and the main water quality parameter of concern at that time was DO, which is now identified as an impairment.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
B0912	MassDEP	Benthic	Whitehall Brook/	[approximately 1070 meters upstream/east of Fruit Street, Hopkinton, MA]	42.253214	-71.567270
W2513	MassDEP	Water Quality	Whitehall Brook	[approximately 3500 feet upstream/east of Fruit Street, Hopkinton]	42.253214	-71.567270

*Biological Monitoring Information**Benthic Macroinvertebrate Data***MassDEP Benthic Macroinvertebrate Data (2011-2017).** (MassDEP Undated 3)

[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
B0912	07/29/15	RBP multihab	Statewide_Low_Gradient	328	42	MD

Physico-chemical Water Quality Information

DO, pH, Temperature

MassDEP Long-term Continuous Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	07/03/15	10/05/15	95	89	66	0.2	0.2	0.2	4.7	89	95	26	29	89	95	66	66

MassDEP Discrete Dissolved Oxygen Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	08/06/15	10/06/15	3	0.6	1.8	3	3	3

MassDEP Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2513	07/03/15	09/15/15	75	72	24.8	27.0	25.1	23.8	72	11	54	6	0	0

24-hour Rolling Average Calculations for MassDEP Short- and Long-term Continuous Temperature Data (Summer Index 2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[Summer Index is June 1 – Sept 15; CW= Coldwater, WW= Warmwater; NOTE: In the case of more than one row of data in the same year for a site, different types of temperature probes were deployed.]

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
W2513	07/02/15	09/15/15	75	10709	25.0	1646	967	0

MassDEP Discrete Temperature Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	08/06/15	10/06/15	3	2	22.1	17.9	2	1	0	0

MassDEP Discrete pH Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

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
W2513	08/06/15	10/06/15	3	6	6.2	3	0

Nutrients (Primary Producer Screening, Physico-chemical Screening)**MassDEP Nutrient Enrichment Indicator Data (2011-2018).** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	2015	5	0.013	0.067	0.032	4.7	1.4	30.2	6.2	4	0

Toxics and other pollutants (metals, ammonia, chloride, chlorine)**MassDEP Clean Metals Water Column Data (2011-2018), Acute Criteria Violations.** (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	2015	3	0	0	0	0	0	0	0	0

MassDEP Clean Metals Water Column Data (2011-2018), Chronic Criteria Violations. (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	2015	3	0	0	0	0	0	0	0	0

MassDEP Dissolved Aluminum Water Column Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	2015	3	0.051	0.051	0.051	0.1	0.1	0	0

MassDEP Total Ammonia Nitrogen (TAN) Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

[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
W2513	2015	5	0.038	0.090	0.058	0	0

MassDEP Chloride Data (2011-2018). (MassDEP Undated 6) (MassDEP Undated 4)

Station Code	Data Year	Chloride Count	Chloride Min (mg/L)	Chloride Max (mg/L)	Chloride Avg (mg/L)	Count Chloride >230	Count Chloride >860
W2513	2015	5	53	210	149	0	0

MassDEP Discrete Specific Conductance Data (2011-2018) Compared to Estimated Chloride Criteria. (MassDEP Undated 6) (MassDEP Undated 4)

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
W2513	08/06/15	10/06/15	3	257	354	0	0	0	0	0	0

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Whitehall Brook (MA82A-11), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP field crews recorded field observations during five site visits to Whitehall Brook (Station W2513, approximately 3500 feet upstream/east of Fruit Street, Hopkinton) during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity).</p> <p>The Aesthetics Use of Whitehall Brook (MA82A-11) is assessed as Fully Supporting based on the general lack of any objectionable conditions noted during the summer of 2015. A prior Alert, first identified in 2001 (O'Brien-Clayton 2005), for "mucky" sediments is being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2513	MassDEP	Water Quality	Whitehall Brook	[approximately 3500 feet upstream/east of Fruit Street, Hopkinton]	42.253214	-71.567270

*Aesthetic Observations***Aesthetics Summary Statements for MassDEP Stations (2011-2018)** (MassDEP Undated 4)

Station Code	Waterbody	Data Year	Field Sheet Count	Aesthetics Summary Statement
W2513	Whitehall Brook	2015	5	MassDEP aesthetics observations for station W2513/MAP2-660 on Whitehall 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 6) (MassDEP Undated 4)

Station Code	Data Year	Field Sheet Count	Field Sheet Count w/ Film & Filamentous Algae Observations	Dense/ Very Dense Film/ Filamentous Algae
W2513	2015	5	4	0

MassDEP Aesthetics Observations (2011-2018) (MassDEP Undated 6)

Station Code	Waterbody	Data Year	Parameter	Result	Result Count	Total Field Sheet Count
W2513	Whitehall Brook	2015	Color	Greyish	1	5
W2513	Whitehall Brook	2015	Color	Light Yellow/Tan	3	5
W2513	Whitehall Brook	2015	Color	Reddish	1	5
W2513	Whitehall Brook	2015	Objectionable Deposits	No	5	5
W2513	Whitehall Brook	2015	Odor	None	5	5
W2513	Whitehall Brook	2015	Scum	No	3	5
W2513	Whitehall Brook	2015	Scum	Yes	2	5
W2513	Whitehall Brook	2015	Turbidity	Highly Turbid	1	5
W2513	Whitehall Brook	2015	Turbidity	None	2	5
W2513	Whitehall Brook	2015	Turbidity	Slightly Turbid	2	5

Primary Contact Recreation

2022 Use Attainment	Alert
Fully Supporting	YES
2022 Use Attainment Summary	
<p>MassDEP field crews collected <i>E. coli</i> bacteria samples and recorded field observations during five site visits to Whitehall Brook (Station W2513, approximately 3500 feet upstream/east of Fruit Street, Hopkinton) during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity). Analysis of the limited frequency bacteria dataset indicated that none of the intervals had GMs exceeding 126 cfu/100mL, none of the samples exceeded the 410 cfu/100mL STV, and that the seasonal GM was 62 cfu/100mL.</p> <p>The Primary Contact Recreational Use of Whitehall Brook (MA82A-11) is assessed as Fully Supporting based on the low <i>E. coli</i> concentration data and lack of aesthetically objectionable conditions. A prior Alert, first identified in 2001 (O'Brien-Clayton 2005), for "mucky" sediments is being carried forward.</p>	

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2513	MassDEP	Water Quality	Whitehall Brook	[approximately 3500 feet upstream/east of Fruit Street, Hopkinton]	42.253214	-71.567270

*Bacteria Data***Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis)** (MassDEP Undated 6) (MassDEP Undated 4)

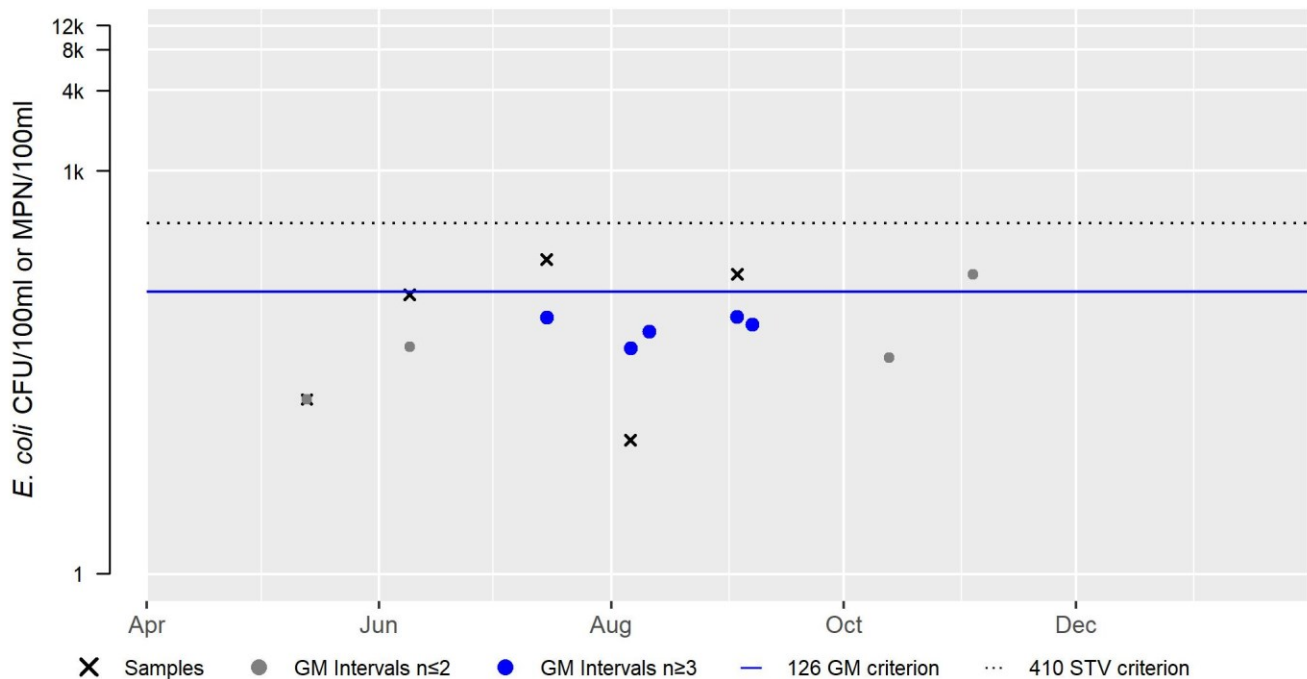
[Result units are CFU/100ml or MPN/100ml]

Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result	Maximum Sample Result	Seasonal Geometric Mean
W2513	MassDEP	E. coli	05/13/15	09/03/15	5	10	220	62

W2513 *E. coli* (90-day Interval), Primary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	62
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015**Secondary Contact Recreation**

2022 Use Attainment	Alert
Fully Supporting	YES

2022 Use Attainment Summary

MassDEP field crews collected *E. coli* bacteria samples and recorded field observations during five site visits to Whitehall Brook (Station W2513, approximately 3500 feet upstream/east of Fruit Street, Hopkinton) during summer 2015. There were generally no noted objectionable conditions (odors, deposits, growths, or turbidity). Analysis of the limited frequency bacteria dataset indicated that none of the intervals had GMs exceeding 630 cfu/100mL, none of the samples exceeded the 1260 cfu/100mL STV, and that the overall GM was 62 cfu/100mL.

The Secondary Contact Recreational Use of Whitehall Brook (MA82A-11) is assessed as Fully Supporting based on the low *E. coli* concentration data and lack of aesthetically objectionable conditions. A prior Alert, first identified in 2001 (O'Brien-Clayton 2005), for “mucky” sediments is being carried forward.

Monitoring Stations

Station Code	Organization	Type	Water Body	Station Description	Latitude	Longitude
W2513	MassDEP	Water Quality	Whitehall Brook	[approximately 3500 feet upstream/east of Fruit Street, Hopkinton]	42.253214	-71.567270

Bacteria Data

Bacteria Data Collected by MassDEP and External Data Providers 2011-2020 (90-day Interval Analysis) (MassDEP Undated 6) (MassDEP Undated 4)

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

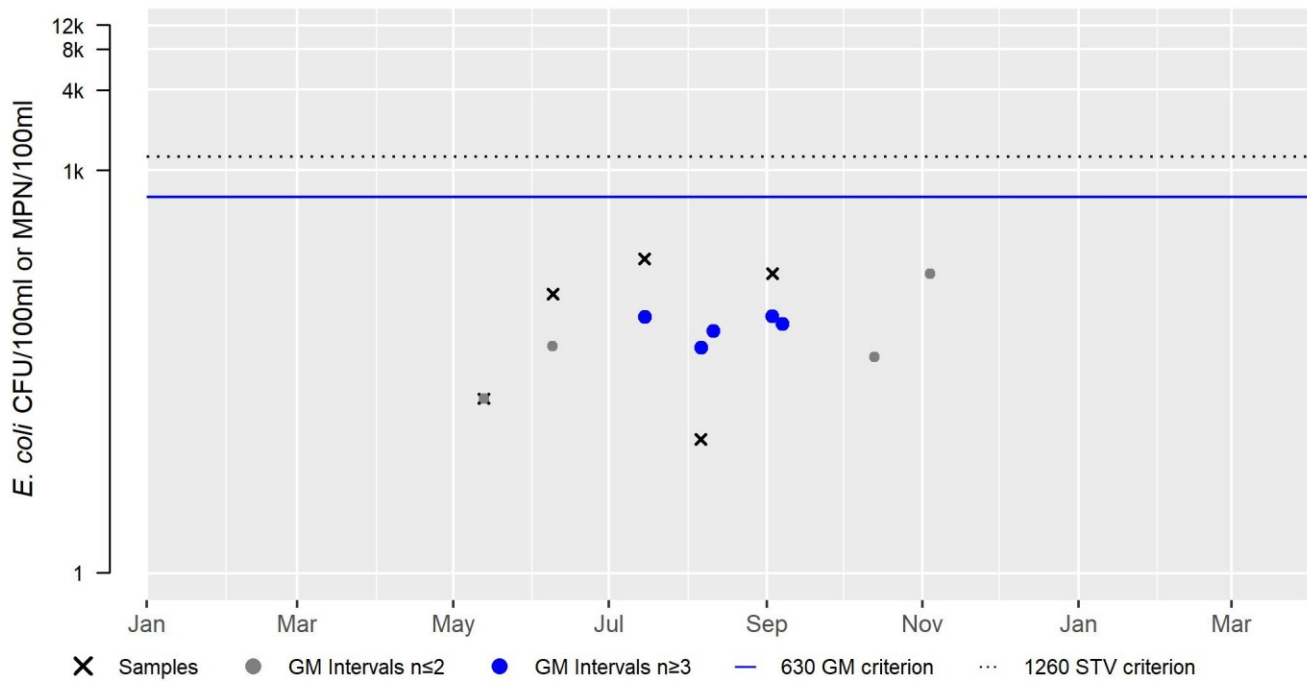
Station Code	Organization	Indicator	Start Date	End Date	Sample Count	Minimum Sample Result (CFU/100ml or MPN/100ml)	Maximum Sample Result (CFU/100ml or MPN/100ml)	Seasonal Geometric Mean (CFU/100ml or MPN/100ml)
W2513	MassDEP	E. coli	05/13/15	09/03/15	5	10	220	62

W2513 *E. coli* (90-day Interval), Secondary Contact Recreational Use Season

Var	Res
Samples	5
SeasGM	62
#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 Exceedances; %GMI Ex = percent GMI Exceedances; n>STV = #samples>Statistical Threshold Value (STV); %n>STV = percent samples>STV

2015



Whitehall Reservoir (MA82120)

Location:	Hopkinton.
AU Type:	FRESHWATER LAKE
AU Size:	560 ACRES
Classification/Qualifier:	B

No usable data were available for Whitehall Reservoir (MA82120) 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	(Fanwort*)		Unchanged
5	5	(Non-Native Aquatic Plants*)		Unchanged
5	5	Dissolved Oxygen		Unchanged
5	5	Mercury in Fish Tissue	33880	Unchanged
5	5	Phosphorus, Total		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		X	X	X
Dissolved Oxygen	Source Unknown (N)	X				
Mercury in Fish Tissue	Atmospheric Deposition - Toxics (Y)		X			
Mercury in Fish Tissue	Source Unknown (N)		X			
Phosphorus, Total	Source Unknown (N)	X				

Williams Lake (MA82121)

Location:	Marlborough.
AU Type:	FRESHWATER LAKE
AU Size:	69 ACRES
Classification/Qualifier:	A: PWS, ORW

No usable data were available for Williams Lake (MA82121) 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

Willis Pond (MA82122)

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

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

Designated Use Attainment Decisions

Fish, other Aquatic Life and Wildlife

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Willis Pond (MA82122) were reported to MassDPH for 21 days in July and August 2015 based on sample analysis (previously noted in the 2018/2020 IR (MassDEP 2021)), and another 31 days later that year (not issued or confirmed by sampling). Since no other data are available for this reporting cycle, there is Insufficient Information to assess the Aquatic Life Use of Willis Pond (MA82122). However, the prior Alert for Harmful Algal Blooms is being carried forward.	

Fish Consumption

2022 Use Attainment	Alert
Not Assessed	NO
2022 Use Attainment Summary	
Fish toxics sampling has not been conducted in Willis Pond (MA82122), so the Fish Consumption Use is Not Assessed.	

Aesthetic

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Willis Pond (MA82122) were reported to MassDPH for 21 days in July and August 2015 based on sample analysis, and another 31 days later that year (not issued or confirmed by sampling). Since blooms were not reported in recent years, a use impairment decision should not be made at this time. There is Insufficient Information to assess the Aesthetics Use of Willis Pond (MA82122), however, an Alert is being identified for Harmful Algal Blooms.	

Algal Bloom Information

Cyanobacteria Harmful Algal Bloom (C-HAB) Summary Statements for 2015-2019 MassDPH Data (Bailey, Logan April 15, 2021) (MassDEP Undated 2)

C-HAB Summary Statement

C-HAB postings for Willis Pond (MA82122) were reported to MassDPH for 21 days in 2015 based on sample analysis and another 31 days later that year (not issued or confirmed by sampling). Since blooms were not 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
Willis Pond	Advisory issued based on sample analysis	21					1	yes
Willis Pond	Not issued or confirmed by sampling	31					1	yes

Primary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Willis Pond (MA82122) were reported to MassDPH for 21 days in July and August 2015 based on sample analysis, and another 31 days later that year (not issued or confirmed by sampling). Since blooms were not reported in recent years, a use impairment decision should not be made at this time. There is Insufficient Information to assess the Primary Contact Recreational Use of Willis Pond (MA82122), however, an Alert is being identified for Harmful Algal Blooms.	

Secondary Contact Recreation

2022 Use Attainment	Alert
Insufficient Information	YES
2022 Use Attainment Summary	
C-HAB postings for Willis Pond (MA82122) were reported to MassDPH for 21 days in July and August 2015 based on sample analysis, and another 31 days later that year (not issued or confirmed by sampling). Since blooms were not reported in recent years, a use impairment decision should not be made at this time. There is Insufficient Information to assess the Secondary Contact Recreational Use of Willis Pond (MA82122), however, an Alert is being identified for Harmful Algal Blooms.	

Winning Pond (MA82123)

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

No usable data were available for Winning Pond (MA82123) 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	(Eurasian Water Milfoil, Myriophyllum Spicatum*)		Unchanged
4c	4c	(Non-Native Aquatic Plants*)		Unchanged
4c	4c	(Water Chestnut*)		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				
(Non-Native Aquatic Plants*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				
(Water Chestnut*)	Introduction of Non-native Organisms (Accidental or Intentional) (Y)	X				

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- 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 3.
- MassDEP. "Open file analysis of MassDEP WPP water quality data collected between 2011 and 2018 using 2022 CALM guidance." Division of Watershed Management, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 4.
- MassDEP. "Open files of repository documents for the 2016 Integrated Report cycle." Division of Watershed Management, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 5.
- MassDEP. "Open files of unpublished, validated water quality monitoring data, field sheet data, and GIS datalayers in development." Division of Watershed Management, Massachusetts Department of Environmental Protection, Worcester, MA, Undated 6.
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