VERMONT

Vermont Department of Environmental Conservation
Agency of Natural Resources
Watershed Management Division
1 National Life Drive, Davis 3
Montpelier, VT 05620-3522
[phone] 802-828-1535

July 26, 2022

Mr. Joseph Bishop
EPA Region 1
5 Post Office Square
Suite 100 (OEP 06-01)
Boston MA 02109 - 3912

Dear Joe:

I am pleased to transmit with this letter Vermont's final 2022 303(d) List of Impaired Waters, dated July 2020, for your approval. Also enclosed for your information are the final versions of the Vermont List of Priority Surface Waters (Parts B, D, E, & F). These documents underwent a public comment period and comments were received. A summary of these comments and VTDEC's responses is also included. Any changes stemming from these comments are noted in the responses. This list has been prepared in accordance with Section 303(d) of the Clean Water Act, associated regulations and current EPA listing guidance.

With the submittal of this final 2022 List of Impaired Waters complete, the Department looks forward to working with EPA in the shared goal of further improving the quality of Vermont's waters. Feel free to contact the Division with any questions or comments.

Sincerely,

John Beling

John Beling, Commissioner
Department of Environmental Conservation

Date: 8/19/22

Encs.

STATE OF VERMONT

2022

303(d) LIST OF IMPAIRED WATERS

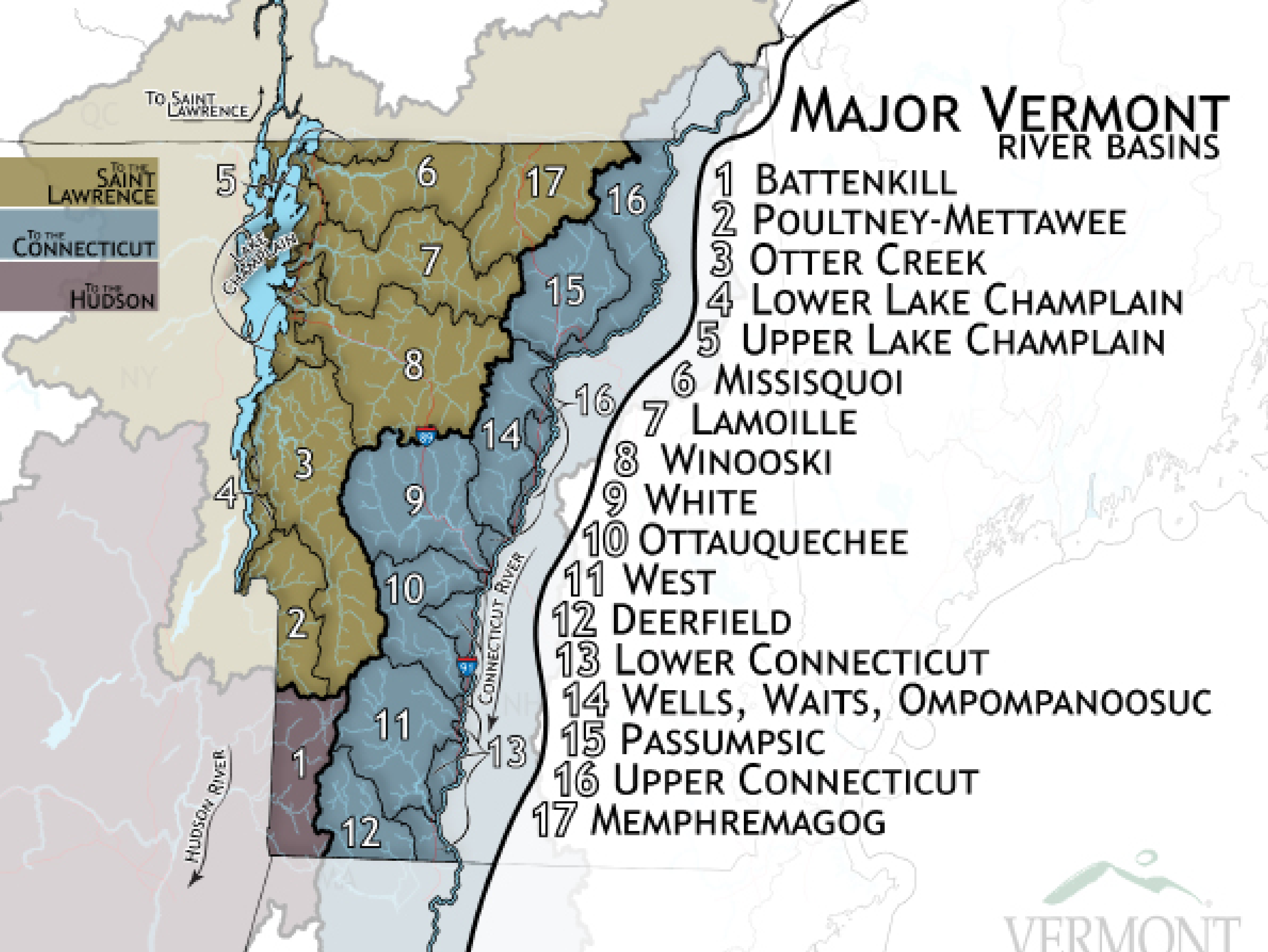
PART A. IMPAIRED SURFACE WATERS IN NEED OF TMDL

-final-

July 25, 2022

Vermont Department of Environmental Conservation
Watershed Management Division
One National Life Drive, Davis 3
Montpelier, VT 05620-3522

www.watershedmanagement.vt.gov


MAJOR VERMONT
RIVER BASINS
1 BATTENKILL
2 POULTNEY-METTAWEE
3 OTTER CREEK
4 LOWER LAKE CHAMPLAIN
5 UPPER LAKE CHAMPLAIN
6 MISSISQUOI
7 LAMOILLE
8 WINOOSKI
9 WHITE
10 OTTAUQUECHEE
11 WEST
12 DEERFIELD
13 LOWER CONNECTICUT
14 WELLS, WAITS, OMPOMPANOOSUC
15 PASSUMPSIC
16 UPPER CONNECTICUT
17 MEMPHREMAGOG
TO THE SAINT LAWRENCE
TO THE CONNECTICUT
TO THE HUDSON
TO SAINT LAWRENCE
LAKE CHAMPLAIN
CONNECTICUT RIVER
HUDSON RIVER
VERMONT

Part A of the 2022 List of Waters identifies impaired surface waters where a total maximum daily load (TMDL) is required. Part A of the List has been prepared in accordance with the Vermont Surface Water Assessment and Listing Methodology, current EPA Guidance and the Environmental Protection Regulations 40 CFR 130.7. A TMDL is deemed necessary for these waters (unless remediation will be completed prior to the scheduled TMDL) in order to establish the maximum limit of a pollutant that may be introduced into the water andstill ensure the Water Quality Standards are attained and maintained. ** Identify new listings. ++ Identify listings moved from Part B.

Waterbody ID - The two digits following VT identifies the **Major Vermont River Basin** illustrated above and the two digits following - identifies the sub basin or mainstem within the major basin.

Code - If the code contains an L the listing is a Lake within the sub basin and if the code is two digits the listing is a river reach within the sub basin or mainstem.

Altered Use(s) - (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions

TMDL Priority - An indication of priority as to when TMDLs will be completed (High = 1-3 years, Medium= 4-8 years, Low = 8+ years)

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
VT01-02	01	Hoosic River, Entire 7 Mile Length in Vermont	FC	PCBS IN FISH TISSUE	Elevated levels of toxic contaminant in Brown Trout	Low
	02	Ladd Brook, Mouth to rm 0.4	ALS	SEDIMENTATION/SILTATION	Indication of sediment stress; potential impacts from eroding gravel roads	Medium
VT01-03	01	Barney Brook, Mouth to rm 1.5	AES, ALS	IRON, SEDIMENTATION/ SILTATION	Downstream of landfill, hazardous site, and constructed wetlands; silt and iron precipitate impact fish/invertebrates	Medium
	08	**Walloomsac River from the New York State border to river river mile 9.2	ALS	NUTRIENTS	Bennington WWTF discharge	Low
	09	**Jewett Brook from its mouth upstream to Fuller Road	ALS	NUTRIENTS	Agricultural land uses as source of nutrient	Medium
VT01-05	01	Lye Brook, rm 2.5 to Headwaters (4.5 Miles)	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium
	03	Munson Brook	ALS	SEDIMENTATION/SILTATION	Runoff from developed lands, chloride stress biological community	Low
VT01-06	01	Branch Pond Brook (Pond to Roaring Branch)	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium
	02	Fayville Branch, rm 3.7 to Headwaters	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	L04	Lost (Sundld)	AH, ALS	pH	Atmospheric deposition: critically acidified; chronic acidification	Medium
VT02-02	01	Hubbardton River, Trib #7, Below WWTF Discharge	ALS	NUTRIENTS	Benson WWTF, agricultural runoff, elevated chloride possible sources	Medium
VT02-05	02	Unnamed Trib to Indian River	ALS	IRON, ZINC	Pawlet landfill leachate, monitoring to continue to better identify source location	Low
	04	Mettawee River, Flower Brook Confluence Downstream 4.3 Mi.	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
VT03-01	02	Lower Otter Creek, Mouth Upstream to Vergennes Dam (Approx 7.6 Miles)	CR	ESCHERICHIA COLI (E. coli)	Periodic & recurring overflows at pump stations within the collection system	Low
VT03-04	02	Pleasant Brook from Leicester-Whiting Rd Upstream to VT Route 73e (2.2 Miles)	ALS	NUTRIENTS	Runoff from agricultural lands	Medium
VT03-05	01	Otter Creek, Vicinity of Rutland City WWTF	AES, CR	ESCHERICHIA COLI (E. coli), ORGANIC ENRICHMENT (SEWAGE) BIOLOGICAL INDICATORS	Rutland City WWTF collection system passes CSOs	Low
VT03-06	01	Moon Brook, Mouth to 1.8	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
	02	Mussey Brook, Mouth to rm 0.1	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
	06	Mussey Brook, rm 0.1 to rm 0.5	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
VT03-07	07	**Little Otter Creek from rm 4.2 (Route 7) to rm 7.0 (Echo Rd)	ALS	SEDIMENTATION/SILTATION, PHOSPHORUS	Agricultural land uses as sources of nutrient and sediment, lack of riparian buffer as contributing stressor	Medium
VT03-09	L01	**Jerome Pond	AES	TOTAL PHOSPHORUS	Excessive phosphorus; reduced clarity	Low
VT03-12	02	Halnon Brook, Tributary #10	ALS	NUTRIENTS	Elevated nutrients affect aquatic biota	Medium
VT03-14	01	East Creek, Mouth to 0.2 Mi (Below CSO Discharge Pts #2, 3, 4, & 5)	AES, CR	ORGANIC ENRICHMENT (SEWAGE) BIOLOGICAL INDICATORS, ESCHERICHIA COLI (E. coli)	Rutland City collection system CSO	Low

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	04	Tenney Brook, Mouth to rm 1.0	ALS	CAUSE UNKNOWN	Failed biological criteria; stressors include elevated temperature, nutrients and developed land runoff	
VT04-01	L01	Otter Creek Section - Lake Champlain (Ferrisburg)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
	L02	Port Henry Section - Lake Champlain (Ferrisburg)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT04-02	L01	Southern Section - Lake Champlain (Bridport)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT05-01	01	Rock River, Mouth to VT/Quebec Border (3.6 Miles)	AES, AH	NUTRIENTS, SEDIMENTATION/ SILTATION	Algal growth; agricultural runoff	Medium
	02	Rock River, Upstream from Quebec/VT Border (Approx 13 Miles)	ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Nutrient enrichment; agricultural runoff	High
	03	Saxe Brook (Trib to Rock River) from Mouth Upstream 1 Mile	ALS	NUTRIENTS	Agricultural runoff	Medium
VT05-04	L01	Northeast Arm - Lake Champlain (Swanton)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
	L02	Isle Lamotte - Lake Champlain (Alburg)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT05-07	01	Rugg Brook, from Mouth to Approx 3.1 Miles Upstream	AES, ALS, CR	ESCHERICHIA COLI (E. coli), SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff	High
	03	Jewett Brook (3.5 Miles)	ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff	Medium
	04	Mill River, from St. Albans Bay to 1.8 Miles Upstream	ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff, streambank erosion	High
	05	Stevens Brook, Mouth Upstream 6.5 Miles	ALS, CR	NUTRIENTS, SEDIMENTATION/ SILTATION, ESCHERICHIA COLI (E. coli)	Agricultural runoff; morphological instability; St Albans CSO	High
	06	Stevens Brook, Lasalle St Downstream 0.5 Miles	ALS, CR	METALS	Sediment contamination from St Albans Gas and Light hazardous waste site	Low

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	L01	St. Albans Bay - Lake Champlain (St. Albans)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT05-09	L01	Malletts Bay - Lake Champlain (Colchester)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT05-10	01	Englesby Brook, Mouth to rm 1.3	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	L01	Burlington Bay - Lake Champlain (Burlington)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
	L02	Main Section - Lake Champlain (South Hero)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT05-11	03	Potash Brook, Mouth Upstream 1 Mile	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	06	Mccabes Brook, Mouth to rm 1.4	ALS	NUTRIENTS	Includes above and below WWTF; possible toxic impact below WWTF; unstable channel above	Medium
	07	Potash Brook, I189 River Upstream 4.2 Miles	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	12	Upper Potash Brook, Kennedy Drive to Above Route 89	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	L01	Shelburne Bay - Lake Champlain (Shelburne)	FC	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	Low
VT06-03	01	Morrow Brook from Its Mouth Upstream 2 Miles	ALS	NUTRIENTS	Runoff from agricultural lands	High
VT06-04	01	Berry Brook, Mouth Up to and Including N. Trib (Approx. 1 Mile)	AES, ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff, aquatic habitat impacts	High
	02	Godin Brook	AES, ALS	NUTRIENTS, SEDIMENTATION/SILTATION	Agricultural runoff, aquatic habitat impacts	High
	03	Samsonville Brook	AES, ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff, aquatic habitat impacts	Medium
	04	Trout Brook, Upstream from Mouth for 2.3 Miles	ALS	NUTRIENTS	Runoff from agricultural lands	High

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	06	Giddings Brook from Its Confluence with the Missisquoi Upstream 4 Miles	ALS	NUTRIENTS, POLLUTANTS IN URBAN STORMWATER	Runoff from agricultural and developed lands	High, Low
VT06-05	02	Wanzer Brook (Mouth to rm 4.0)	ALS	NUTRIENTS, SEDIMENTATION/ SILTATION	Agricultural runoff	High
VT06-08	03	Mud Creek, from Vt/ Que Border Up to rm 6.5 (Approx. 3.2 Miles)	AES, ALS	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff; nutrient enrichment impacts macroinvertebrates	High
	04	Coburn Brook (Mouth to rm 0.2)	ALS	NUTRIENTS	Agricultural activities and runoff	High
	05	Burgess Brook, rm 4.9 to 5.4	ALS, CR	ASBESTOS, SEDIMENTATION/ SILTATION	Asbestos mine tailings erosion; asbestos fibers	Low
	06	Burgess Brook Tributary# 11, Mouth to rm 0.5	ALS, CR	ASBESTOS, SEDIMENTATION/ SILTATION	Asbestos mine tailings erosion; asbestos fibers	Low
	09	Jay Branch Tributary # 7 (2.2 Mi.)	ALS	SEDIMENTATION/SILTATION	Erosion from parking areas and on-mountain activities	Medium
	10	Ace Brook, rm 0.7 to Headwaters 1 Miles	ALS	SEDIMENTATION/SILTATION	Sediment discharges and hydrologic change from logging activity	Low
VT07-01	03	Lamoille River Trib #4, rm 0.4 to rm 0.7	ALS	METALS	Old Milton landfill (Pb, Zn, Cu, Fe) impacts macroinvertebrates	Medium
VT07-03	01	Deer Brook, Mouth to 2.5 Miles Upstream	ALS	SEDIMENTATION/SILTATION	Erosion from stormwater discharges; corroding road culverts; BMPs implemented	Medium
	02	Stones Brook from 150 Feet Below Fairfax Road Upstream to the Confluence with Halfmoon Brook (1 Mile)	ALS	NUTRIENTS	Agricultural runoff, loss of riparian buffer	High
	L01	Halfmoon	AES	TOTAL PHOSPHORUS	Extremely elevated TP; agricultural influences	Low
VT07-08	01	Rodman Brook, Mouth to rm 0.6	AES, ALS	IRON	Impacts from landfill leachate; bio community improving; monitoring to continue	Medium
VT07-13	01	Trib #10 to Brewster River (1 Mile)	AES, ALS	IRON	Iron seeps on streambank, BMPs in place	Low
VT07-15	01	Hutchins Brook, rm 2.0 to 3.0	AES, ALS, CR	ASBESTOS, SEDIMENTATION/ SILTATION	Asbestos mine tailings erosion; asbestos fibers	Low

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	02	Hutchins Brook Tributary #4, Mouth to rm 0.3	AES, ALS, CR	SEDIMENTATION/SILTATION, ASBESTOS	Asbestos mine tailings erosion; asbestos fibers	Low
VT08-01	01	Winooski River, Mouth to Winooski Dam	CR	ESCHERICHIA COLI (E. coli)	Burlington CSOs	Low
VT08-02	03	Muddy Brook Tributary #4 and Trib to Trib #4	ALS	TOXICITY, CHLORIDE	Chloride criteria exceeded; impacts to macroinvertebrates	Low
	05	Centennial Brook, Mouth to rm 1.2	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	07	++Unnamed Trib to Winooski River	ALS	IRON, ARSENIC	South Burlington landfill leachate entering surface water.	Low
	08	Sunnyside Brook (Trib #8 to Sunderland Brook) (1.2 Mi.)	ALS	CHLORIDE	Elevated chloride levels due to road salt	High
	L01	Shelburne Pond	ALS, CR, RF	PHOSPHORUS	Excessive algae and native plant growth causes periodic low dissolved Oxygen and fish kills	Low
VT08-04	02	Goose Pond Brook	ALS	pH, LOW	Chronic acidification	Low
VT08-05	01	Winooski River Above Montpelier WWTF Discharge	CR	ESCHERICHIA COLI (E. coli)	Montpelier WWTF collection system passes CSOs	Low
VT08-07	01	Winooski River, Plainfield rm 70.7 to rm 71.4	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
	02	Winooski River, Marshfield, rm 72.8 Up to Confluence with Mollys Brook	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli, impairment continues upstream into VT08-09	Low
VT08-08	01	++Muddy Brook (0.1 Mile)	ALS	CADMIUM	CV landfill: leachate entering surface water	Low
	02	Blanchard Brook, Mouth to rm 0.4	ALS	CAUSE UNKNOWN, TEMPERATURE	Failed biocriteria; stressors include temperature, chloride, sediment, nutrients and developed land runoff	Medium
VT08-09	03	Winooski River, Cabot, Mollys Falls Brook Up to rm 83.8	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli; continuation of downstream impairment from VT08-07	Low
VT08-11	L02	Waterbury Reservoir (Waterbury)	AES, AH, ALS	SEDIMENTATION/SILTATION	Sedimentation, turbidity	Low

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
VT08-12	01	Inn Brook, rm 0.3 to 0.6	AES, ALS	IRON	Iron seeps originating from disturbed soils	Low
	10	**Little Spruce Brook	ALS	POLLUTANTS IN URBAN STORMWATER	The stressors to aquatic biota include chloride, sedimentation and erosion.	Low
VT08-13	01	Lower North Branch, Winooski River Mouth to Montpelier Rec Fields	CR	ESCHERICHIA COLI (E. coli)	Montpelier WWTF collection system passes CSOs	Low
VT08-16	01	Gunner Brook, Below Farwell St. Dump (Approx 0.5 Mile)	AES, ALS, CR	TOXICITY, SEDIMENTATION/ SILTATION	Farwell St. landfill leachate, surface runoff from developed area	Medium
	04	Stevens Branch, from Barre City Limits to Mouth, 5.8 Miles	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated e. coli, urban runoff	Low
VT08-17	01	Dog River, Riverton Canoe Access Downstream 0.5 Miles	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
	L01	Beaver (Roxbry)	AH, ALS	pH	Atmoshheric deposition; extremely sensitive to acidification; episodic acidification	Medium
VT08-20	01	Clay Brook, rm 1.8 to rm 2.3	AES, ALS	IRON, POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion from construction activities & gravel parking lot; increased peak stormwater flows	Low
VT09-04	01	First Branch White River, Mouth to rm 15.2	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
VT09-05	01	Second Branch White River, Mouth to rm 9.8	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
VT09-06	01	Smith Brook (Mouth to rm 0.3)	AES, ALS	IRON	Apparent leachate from adjacent old dump	Medium
	02	Third Branch White River, Mouth to rm 4.3	CR	ESCHERICHIA COLI (E. coli)	Consistently elevated E. coli	Low
VT10-04	01	Small Stream to Ottauquechee River (Bridgewater)	AES, ALS	IRON	Bridgewater landfill; leachate entering surface water	Medium
VT10-06	01	Roaring Brook, rm 3.5 to rm 4.2	AES, ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	Low
	02	E. Branch Roaring Brook, rm 0.1 to rm 0.6	AES, ALS	IRON, POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	Low
VT11-10	01	West River, Below Ball Mountain Dam to Townshend Dam (9 Miles)	RF	TEMPERATURE	Artificial flow regime at dam	Low

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
VT11-15	04	Bear Creek Brook, rm 0.7 to Headwaters	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium
	05	Kidder Brook, Confluence of Sun Bowl Brook to Headwaters	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium
VT12-03	01	East Branch Deerfield River, Below Somerset Dam	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification, low temperature dam release	Medium
VT12-04	01	Upper Deerfield River, Below Searsburg Dam	ALS	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	Medium
VT12-05	01	No. Branch Deerfield River, Tannery Brk Rd to Snow Lake	ALS	TEMPERATURE	High temperatures below Snow Lake impact aquatic biota	Low
	03	Iron Stream, Trib to Jacks Brook (0.3 Mile)	AES, ALS	IRON	Land development, source(s) need further assessment	Medium
	06	Ellis Brook, Mouth to rm 0.5	ALS	TEMPERATURE, NUTRIENTS	Possible impacts from NBFD WWTF, agricultural runoff and channel alterations, lack of riparian buffer; high algal cover	Medium
VT13-06	01	Neal Brook, Mouth to rm 0.4	ALS	METALS	Landfill drainage impacts macroinvertebrates	Medium
VT13-10	01	Commissary Brook Trib, Mouth to rm 0.2	AES, ALS	SEDIMENTATION/SILTATION	Bank failure and erosion due to past clay mining	Low
VT13-13	01	Crosby Brook, Mouth to rm 0.7	ALS	SEDIMENTATION/SILTATION	Habitat alterations due to sedimentation, channelization, and buffer loss	Medium
VT13-16	01	Newton Brook, Mouth to rm 2.0	ALS	SEDIMENTATION/SILTATION	Agricultural activity	Medium
VT14-02	02	Copperas Brook (1 Mile)	AES, ALS, CR, FC, RB	METALS	High metals in drainage from abandoned Elizabeth mine & tailings piles	Low
	04	Lords Brook, Headwater Tributary #2 and Trib 2-Trib 1	ALS	METALS	Abandoned mine drainage below South Cut and South Mine	Low
VT14-03	03	Schoolhouse Brook and Tributary	AES, ALS	METALS	High metal concentrations in drainage from abandoned Ely Mine	Medium
VT14-05	01	Pike Hill Brook, from Mouth to 4 Miles Upstream	AES, ALS	METALS	High metal concentrations in drainage from abandoned Pike Hill Mine & Tailings	Medium

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	TMDL Priority
	02	Tabor Branch Tributary #6, Mouth to rm 0.1	ALS	CAUSE UNKNOWN	Agricultural runoff	
VT14-06	01	Cookville Trib #4, rm 1.0 to 1.7	ALS	METALS	Acid mine drainage associated with Pike Hill mine	Low
VT15-01	01	Passumpsic River, Tremont Street Downstream 5 Miles Through St J.	CR	ESCHERICHIA COLI (E. coli)	St. Johnsbury WWTF collection system passes combined sewer overflows	Low
VT15-04	01	Lower Sleepers River in St. Johnsbury	CR	ESCHERICHIA COLI (E. coli)	St. Johnsbury WWTF collection system passes combined sewer overflows	Low
VT16-13	L04	Unknown (Ferdnd)	AH, ALS	pH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	Medium
VT17-02	01	Stearns Brook Tributary (Holland)	ALS	NUTRIENTS	Agricultural runoff	High
VT17-08	01	Roaring Brook, rm 2.4 to Lake Parker	ALS	NUTRIENTS	Agricultural runoff impacts macroinvertebrates	Low
VT17-09	L01	Walker (Covnty)	AES	TOTAL PHOSPHORUS	Extremely elevated TP concentrations; agricultural influences	Low
VT17-10	L02	Mud (Crafby)	AES	TOTAL PHOSPHORUS	Extremely elevated TP concentrations; agricultural influences	Low

STATE OF VERMONT

2022

LIST OF PRIORITY SURFACE WATERS

PART B. IMPAIRED WATERS - NO TOTAL MAXIMUM DAILY LOAD DETERMINATION REQUIRED

-final-

July 25, 2022

Vermont Department of Environmental Conservation
Watershed Management Division
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Montpelier, VT 05620-3522

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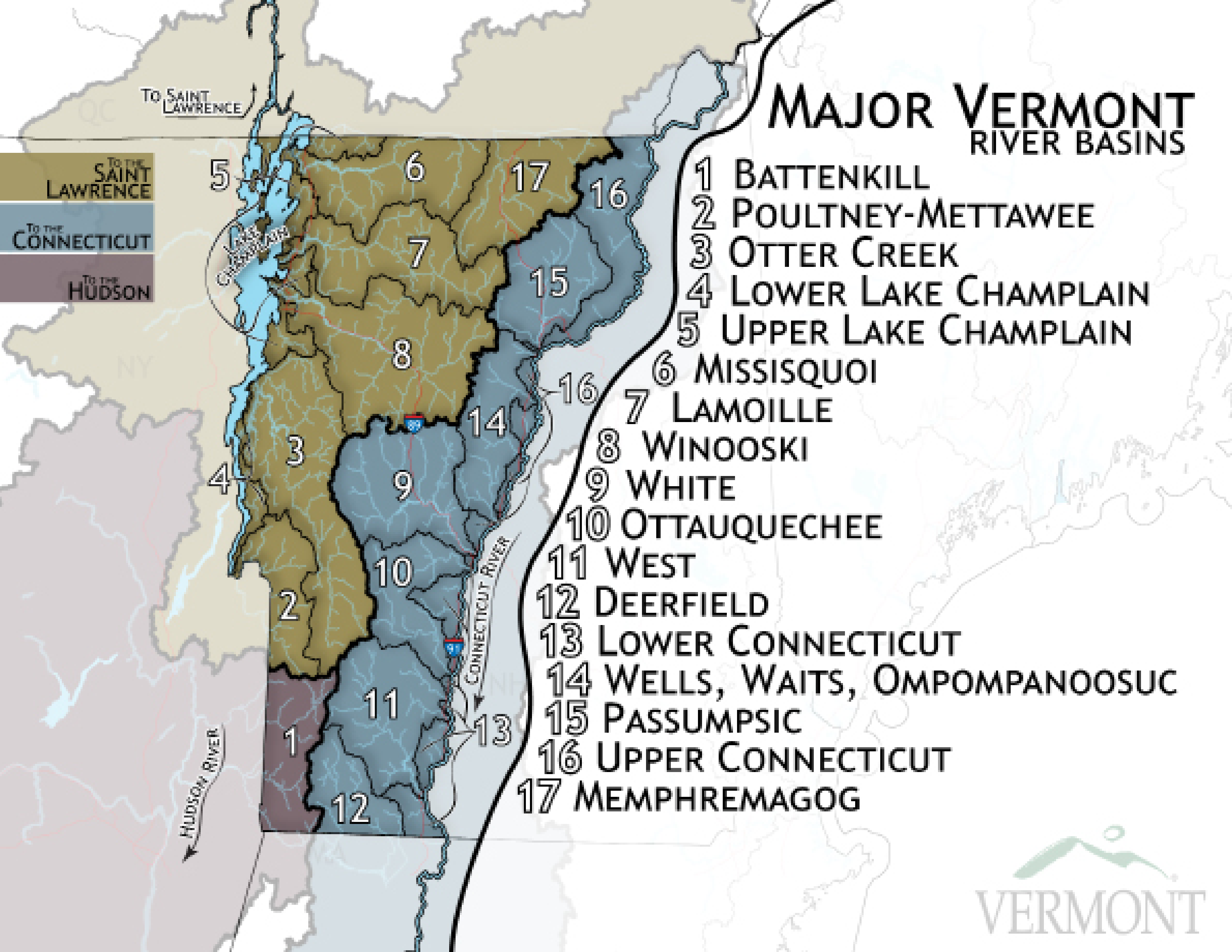
MAJOR VERMONT
RIVER BASINS
1 BATTENKILL
2 POULTNEY-METTAWEE
3 OTTER CREEK
4 LOWER LAKE CHAMPLAIN
5 UPPER LAKE CHAMPLAIN
6 MISSISQUOI
7 LAMOILLE
8 WINOOSKI
9 WHITE
10 OTTAUQUECHEE
11 WEST
12 DEERFIELD
13 LOWER CONNECTICUT
14 WELLS, WAITS, OMPOMPANOOSUC
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HUDSON RIVER
VERMONT

Waters appearing below have documentation and data indicating impairment and do not meet VT Water Quality Standards. However, according to US EPA Listing Guidance, these waters do not require a TMDL because other pollution control requirements by local, state, or federal authority are stringent enough to implement any water quality standard (WQS) applicable to such waters.

Waterbody ID - The two digits following VT identifies the MAJOR VERMONT RIVER BASIN illustrated above and the two digits following - identifies the sub basin or mainstem within the major basin.

Code - If the code contains an L the listing is a Lake within the sub basin and if the code is two digits the listing is a river reach within the sub basin or mainstem.

Altered Use(s) - (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem
VT05-10	L01	Burlington Bay Barge Canal - Lake Champlain (Burlington)	AH, ALS, CR, RB	TOLUENE, XYLENE	Contamination from coal tar in sediments of Pine Street Barge Canal (SITE #770042)

No TMDL is necessary for this impairment as authority and legal means are available and in place to address the source of impairment. The authority and legal means that are available to DEC and the US EPA are considered sufficient to attain Water Quality Standards in the future. DEC authority is under 10 VSA 6603 and 6610a. US EPA authority is CERCLA (42 USC section 9601 - 9675).

The Pine Street Barge Canal Coordinating Council (PSBC Council) is overseeing implementation of the May 1998 Cleanup Plan. Cleanup Plan was reviewed and approved by EPA. Personnel from DEC's Hazardous Materials Division participate with and serve on the Council.

This is an EPA Superfund site designated under CERCLA. There are legal requirements in place that apply to the source of the pollutants contributing to the impairment. The performance standards identified in the Statement of Work are sufficient to remediate the problem and are consistent with VT Water Quality Standards when implementation of the remediation/clean-up plan is complete.

The required “Five Year Review Report for the Pine Street Canal Superfund Site Burlington Vermont” (FYR) was produced and published by USEPA December 21, 2021 that describes the past and current conditions of various indicators of interest as related to this impairment listing. The FYR indicates: “EPA has determined, as part of the third five-year review, that the remedy at the Pine Street Canal Superfund Site is protective of human health and the environment. All construction activities specified in the 1998 ROD (Record of Decision), 2009 ESD (Explanation of Significant Differences) and 2011 ESD are complete and operating as intended. Ecological, human health and management of migration RAOs (Remedial Action Objectives) are being met. The Performing Defendants continue to perform compliance monitoring and O&M (Operation and Maintenance) and report the results to EPA and VTDEC twice a year.”

DEC considers this substantial progress towards WQS compliance. However, the Department needs more time for a complete assessment of water quality before any move to delist is initiated. Furthermore, to allow complete transparency for any listing action to occur, DEC prefers that a complete public notice and comment period occur prior to action.

VT06-08	07	South Mountain Branch, Tributary #3 (Mouth To Rm 0.5)	ALS	SEDIMENTATION/SILTATION	Erosion from parking areas and on-mountain activities.

No TMDL is necessary as DEC has the authority and legal means available to eliminate the sources causing this impairment. The authority and legal means that are available to DEC are sufficient to attain WQS and enable DEC to utilize enforcement authority as it exists under 10 VSA 1272.

The South Mountain Branch is a tributary Jay Branch and is located in the town of Jay. The streams within the watershed are managed as Class B waters, with cold water fishery. South Mountain Branch, Tributary #3 enters the South Mountain Branch at about RM 2.3, and drains the south side of Jay Peak mountain and portions of the Stateside lodge and parking area.

Based on biomonitoring conducted by Jay Peak Resort (JPR) and VTDEC that was initiated in 2011, Tributary #3 to South Mountain Branch shows noncompliance with VTWQS biocriteria. Indications from habitat assessments and water quality monitoring, impacts due to sediment appear to be the primary stressor. As reported in the 2012 update of the water quality remediation plan prepared for JPR, multiple problematic sediment sources have been identified as potential sites for remedial measures.

VTDEC issued a follow-up §1272 Order in 2014 to have JPR revisit the original WQRP and identify, prioritize and implement an additional suite of remedial actions to be completed in two years. Additionally, as a result of private party appeals of several stormwater permits in 2014, JPR entered into a settlement agreement that establishes WQS compliance dates with interim targets, a mechanism by which additional BMPs are implemented and a monitoring plan.

Watershed BMP implementation has continued in this watershed over the past several years, but the biomonitoring conducted in 2016-2019 failed to show compliance with the VTWQS. However, in 2020, results for all eight biocriteria metrics were within the established thresholds for meeting Class B(2) criteria, indicating the first year the station has reached attainment for all metrics since sampling began in 2012. Progressively larger BMPs have been installed in this watershed over the past several years, including a large sediment trap that collects sediment from a large dirt parking lot adjacent to the stream. Because this BMP was installed at the end of summer 2018, the sediment reduction that it provides would not have been significantly represented in the biomonitoring results for 2018 and 2019. However, the improved physical and biological conditions demonstrated in the downstream reach reflect the sediment reductions provided by this BMP over the two years since it was installed. Jay Peak Resort is also working collaboratively with VTrans in identifying additional sediment controlling BMPs along the Rt. 242 corridor. According to the WQRP, large-scale BMPs will be scheduled to be implemented in the watershed and biomonitoring will continue for the next several years to track the stream condition.

VT07-01	01	Lamoille River, Route 2 To Arrowhead Mountain Lake	ALS	DISSOLVED OXYGEN	Three dams (Clarks, Milton, Peterson) create dissolved oxygen problems downstream.

No TMDL is necessary for this impaired segment as DEC has the authority and legal means available to address the dissolved oxygen (D.O.) problem found below the Clarks Falls hydroelectric facility. The authority and legal means that are available to DEC are sufficient to attain Water Quality Standards in the near future.

A new federal license for the Lamoille River Hydroelectric Project was issued in June 2005. Articles 407 and 408 address post-licensing water quality monitoring and D.O. enhancement, respectively. The new license provides for conservation flows that may improve the D.O. regime sufficiently to obviate the need for specific mechanical enhancements, such as turbine aspiration. FERC approved the licensee's water quality monitoring and dissolved oxygen enhancement plan on December 5, 2006, although the licensee elected to initiate sampling in Summer 2006. Because of higher than normal flows in 2006, sampling continued in 2007. Conditions were again somewhat atypical in 2007 because the Milton Station was off line, resulting in highly reoxygenated flows entering Peterson impoundment. Consequently, the Department has asked CVPS to continue sampling in summer 2008 before it determines whether there is sufficient data to conclude that the post-licensing operational changes have achieved compliance with the Water Quality Standards. If the data indicates that standards are not being met, the licensee must propose and implement enhancement measures.

Dissolved oxygen data will be collected to determine if the aeration modification made at the dam is sufficient to comply with the appropriate water quality standards. Data and assessment listing decisions will be provided during the 2024 assessment cycle.

VT11-15	06	No. Branch, Ball Mtn Brook, Stratton Lake To Kidder Brook	AES	MANGANESE	Contributions/releases of reduced Managanese from reservoir sediment coats stream substrate.

Conditions created by the installed diversion around the pond have resulted in an elimination of the problematic Mn discharge. Staining of the substrate is no longer occurring. Historical staining from previous Mn discharge remains but no further remediation actions are necessary or planned. This site will be revisited and reassessed during the 2024 listing cycle. Since the impairment is no longer ongoing (the source of manganese has been addressed), delisting is likely in 2024.

STATE OF VERMONT

2022

LIST OF PRIORITY SURFACE WATERS

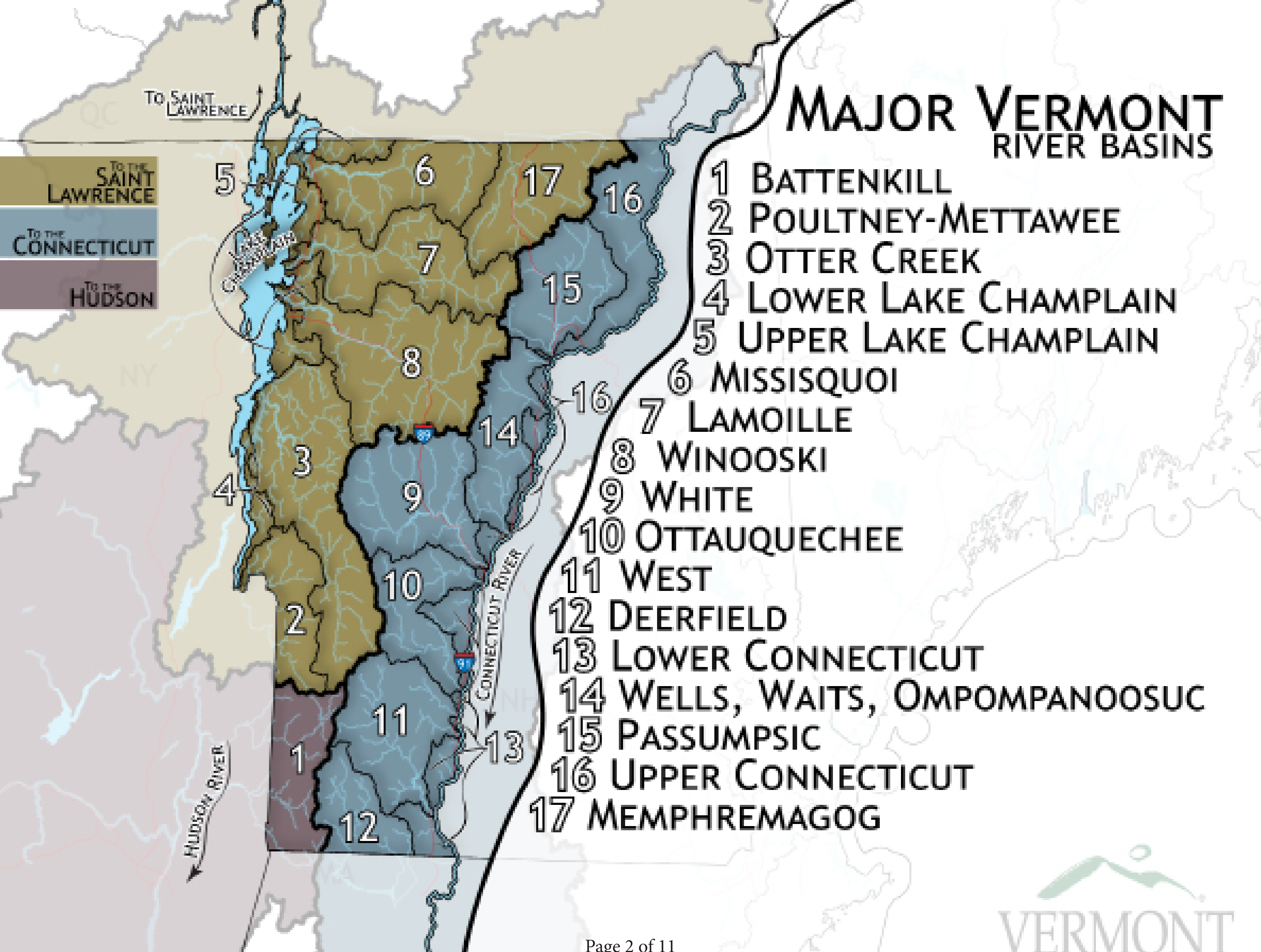
PART D. IMPAIRED SURFACE WATERS WITH A TMDL

-final-

July 6, 2022

Vermont Department of Environmental Conservation
Watershed Management Division
One National Life Drive, Davis 3
Montpelier, VT 05620-3522

www.watershedmanagement.vt.gov


MAJOR VERMONT
RIVER BASINS
1 BATTENKILL
2 POULTNEY-METTAWEE
3 OTTER CREEK
4 LOWER LAKE CHAMPLAIN
5 UPPER LAKE CHAMPLAIN
6 MISSISQUOI
7 LAMOILLE
8 WINOOSKI
9 WHITE
10 OTTAUQUECHEE
11 WEST
12 DEERFIELD
13 LOWER CONNECTICUT
14 WELLS, WAITS, OMPOMPANOOSUC
15 PASSUMPSIC
16 UPPER CONNECTICUT
17 MEMPHREMAGOG
TO THE SAINT LAWRENCE
TO THE CONNECTICUT
TO THE HUDSON
TO SAINT LAWRENCE
LAKE CHAMPLAIN
CONNECTICUT RIVER
HUDSON RIVER
VERMONT

All waters identified on Part D are assessed as impaired and have completed and approved TMDLs in place. If future assessments show the impairment has been eliminated, the water will no longer be tracked on Part D. These waters correspond to Category 4a of EPA's Consolidated Assessment Listing Methodology.

Waterbody ID - The two digits following VT identifies the MAJOR VERMONT RIVER BASIN illustrated above and the two digits following - identifies the sub basin or mainstem within the major basin.

Code - If the code contains an L the listing is a Lake within the sub basin and if the code is two digits the listing is a river reach within the sub basin or mainstem.

Altered Use(s) - (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
VT01-05	L01	Bourn Pond (Sunderland)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
	L10	Little Mud (Winhall)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 20, 2004
VT01-06	L01	Branch Pond (Sunderland)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
	L02	Beebe Pond (Sunderland)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 20, 2004
VT02-01	01	Poultney River, Mouth Upstream To Hubbardton River	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
	02	Poultney River, From Hubbardton River To Carvers Falls	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT02-05	03	Flower Brook, Mouth to rm 0.5	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* monitoring results	EPA approved TMDL September 30, 2011
VT03-01	01	Otter Creek, Mouth of Middlebury River to Pulp Mill Bridge (4.0 Mi)	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff, possible failed septic systems, Middlebury CSOs	EPA approved TMDL September 30, 2011
	02	Lower Otter Creek, Mouth Upstream to Vergennes Dam (Approx 7.6 Miles)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT03-06	01	Moon Brook, Mouth to 1.8	ALS	POLLUTANTS IN URBAN STORMWATER	Elevated instream temperatures; impoundments and lack of shading	thermal TMDL completed by VTDEC and approved by EPA region 1, May 2018

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
	02	Mussey Brook, Mouth to rm 0.1	ALS	POLLUTANTS IN URBAN STORMWATER	Elevated instream temperatures; trout avoidance of stream reaches	thermal TMDL completed by VTDEC and approved by EPA region 1, May 2018
	04	Moon Brook, rm 1.8 to rm 2.9	ALS	TEMPERATURE, POLLUTANTS IN URBAN STORMWATER	Elevated instream temperatures; impoundments and lack of shading	thermal TMDL completed by VTDEC and approved by EPA region 1, May 2018
	05	Mussey Brook, rm 0.5 to rm 1.2	ALS	TEMPERATURE, POLLUTANTS IN URBAN STORMWATER	Elevated instream temperatures; trout avoidance of stream reaches	thermal TMDL completed by VTDEC and approved by EPA region 1, May 2018
	06	Mussey Brook, rm 0.1 to rm 0.5	ALS	TEMPERATURE, POLLUTANTS IN URBAN STORMWATER	Elevated instream temperatures; trout avoidance of stream reaches	thermal TMDL completed by VTDEC and approved by EPA region 1, May 2018
VT03-07	01	Little Otter Creek, Mouth to rm 1.0	CR, FC	ESCHERICHIA COLI (*E. coli*), MERCURY IN FISH TISSUE	Elevated *E. coli* monitoring results; Elevated levels of Hg in walleye; fish present only seasonally; extremely low numbers	EPA approved TMDL September 30, 2011; EPA approved regional mercury TMDL on December 20, 2007
	02	Little Otter Creek, rm 15.4 to rm 16.4	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff	EPA approved TMDL September 30, 2011
	03	Little Otter Creek, rm 1.0 to rm 4.2	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* monitoring results	EPA approved TMDL September 30, 2011
VT03-08	01	Lewis Creek, Parsonage Bridge Rd (Lcr19.5) to Covered Bridge (Lcr7.3)	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff	EPA approved TMDL September 30, 2011
	02	Pond Brook, from Lewis Creek Confluence Upstream (1.5 Miles)	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff	EPA approved TMDL September 30, 2011
VT03-09	01	Lower Dead Creek, from Mouth Upstream (Approx 3 Miles)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT03-11	L01	North Pond (Bristol)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
	L02	Gilmore Pond (Bristol)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
VT03-12	01	Middlebury River, from Mouth Upstream 2 Miles	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff, livestock, possible failed septic systems	EPA approved TMDL September 30, 2011
VT03-14	L03	Chittenden Reservoir (Chittenden)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT03-18	L02	Griffith Lake (Peru)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
	L03	Big Mud Pond (Mt. Tabor)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
	L06	Long Hole (Mt. Tabor)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
	L07	Little Mud (Mt. Tabor)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT04-01	L01	Otter Creek Section - Lake Champlain (Ferrisburg)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016
	L02	Port Henry Section - Lake Champlain (Ferrisburg)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT04-02	L01	Southern Section - Lake Champlain (Bridport)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT04-04	L05	Southern Section (B) - Lake Champlain (Bridport)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016
VT05-01	L01	Missisquoi Bay - Lake Champlain (Alburg)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT05-02	L01	Lake Carmi (Franklin)	ALL USES	PHOSPHORUS	Algae blooms	EPA approved TMDL April 13, 2009
VT05-04	L01	Northeast Arm - Lake Champlain (Swanton)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
	L02	Isle Lamotte - Lake Champlain (Alburg)	AES, CR, FC	MERCURY IN FISH TISSUE, PHOSPHORUS	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
VT05-07	02	Rugg Brook, rm 3.1 to rm 5.3	AES, ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff	EPA approved TMDL February 19, 2009
	07	Stevens Brook, rm 6.5 (Pearl St) to rm 9.3	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion/ sedimentation, morphological instability	EPA approved TMDL February 19, 2009
	L01	St. Albans Bay - Lake Champlain (St. Albans)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016
VT05-09	01	Indian Brook, rm 5.8 (Suzie Wilson Rd) to rm 9.8	AES, ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	EPA approved TMDL August 21, 2008
	02	Direct Smaller Drainages to Inner Malletts Bay	CR	ESCHERICHIA COLI (*E. coli*)	Urban runoff, potential failed/failing septic systems; includes Smith Hollow Brook & Crooked Creek	EPA approved TMDL September 30, 2011
	L01	Malletts Bay - Lake Champlain (Colchester)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT05-10	01	Englesby Brook, Mouth to rm 1.3	AES, ALS, CR, RB	POLLUTANTS IN URBAN STORMWATER, ESCHERICHIA COLI (*E. coli*)	Stormwater runoff, blanchard beach closure	EPA approved TMDL September 30, 2007, PROBLEM: Elevated *E. coli* levels
	L01	Burlington Bay - Lake Champlain (Burlington)	AES, CR, FC	MERCURY IN FISH TISSUE, PHOSPHORUS	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016
	L02	Main Section - Lake Champlain (South Hero)	AES, CR, FC	MERCURY IN FISH TISSUE, PHOSPHORUS	Phosphorus enrichment	EPA approved Lake Champlain phosphorus TMDL June 2016
VT05-11	01	Munroe Brook, Mouth to rm 2.8 (Including North Trib.)	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion, land development	EPA approved TMDL August 21, 2008
	02	Bartlett Brook, Mouth to rm 0.7	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	EPA approved TMDL September 30, 2007
	03	Potash Brook, Mouth Upstream 1 Mile	ALS, CR	POLLUTANTS IN URBAN STORMWATER, ESCHERICHIA COLI (*E. coli*)	Stormwater runoff, land development, erosion	EPA approved TMDL December 19, 2006
	04	Laplatte River, at Mouth	CR, FC	MERCURY IN FISH TISSUE, ESCHERICHIA COLI (*E. coli*)	Agricultural runoff	EPA approved TMDL September 30, 2011
	05	Mud Hollow Brook, from Mouth to 3 Miles Upstream	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff, streambank erosion	EPA approved TMDL September 30, 2011

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
	07	Potash Brook, I189 River Upstream 4.2 Miles	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	EPA approved TMDL December 19, 2006
	08	Laplatte River from Hinesburg to rm 0.2	CR	ESCHERICHIA COLI (*E. coli*)	Agricultural runoff	EPA approved TMDL September 30, 2011
	L01	Shelburne Bay - Lake Champlain (Shelburne)	AES, CR, FC	PHOSPHORUS, MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT06-01	01	Missisquoi River, Mouth Upstrm to Swanton Dam (Approx 8 Miles)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT06-04	01	Berry Brook, Mouth Up to and Including N. Trib (Approx. 1 Mile)	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* levels	EPA approved TMDL September 30, 2011
	02	Godin Brook	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* levels	EPA approved TMDL September 30, 2011
	03	Samsonville Brook	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* levels	EPA approved TMDL September 30, 2011
VT06-06	L01	Kings Hill Pond (Bakersfield)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT07-01	01	Lamoille River, Route 2 to Arrowhead Mountain Lake	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
	02	Lamoille River, Mouth to Route 2	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT07-03	L03	Arrowhead Mountain Lake (Milton)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT07-13	L02	Lake-Of-The-Clouds (Cambridge)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
VT08-01	01	Winooski River, Mouth to Winooski Dam	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007
VT08-02	01	Allen Brook, rm 2.4 to rm 5.0 (Talcott Rd)	ALS, CR	POLLUTANTS IN URBAN STORMWATER, ESCHERICHIA COLI (*E. coli*)	Stormwater runoff, land development; erosion	EPA approved TMDL August 21, 2008
	04	Sunderland Brook, rm 3.5 (Rt. 7) to rm 5.3	AES, ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development; erosion	EPA approved TMDL August 21, 2008

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
	05	Centennial Brook, Mouth to rm 1.2	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development; erosion	EPA approved TMDL September 30, 2007
	06	Morehouse Brook, Mouth to rm 0.6	ALS	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion	EPA approved TMDL September 30, 2007
VT08-10	01	Huntington River, Vicinity of Bridge Street in Huntington	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* levels detected at several sampling stations	EPA approved TMDL September 30, 2011
VT08-18	01	Mad River, Mouth to Moretown (6.2 Miles)	CR	ESCHERICHIA COLI (*E. coli*)	Possible failing septic systems and other unknown sources; elevated *E. coli* levels	EPA approved TMDL September 30, 2011
VT09-07	L01	Skylight Pond (Ripton)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 20, 2004
VT11-08	L01	Sunset Lake (Marlboro)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT11-15	02	Styles Brook (2 Miles)	AES, ALS	SEDIMENT	Land development, hydrologic modification	EPA approved TMDL June21, 2002
	L01	Forester Pond (Jamaica)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
	L02	Little Pond (Winhall)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 20, 2004
VT11-16	L01	Stratton Pond (Stratton)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT11-17	01	West River, Approx 1 Mile Below to 0.5 Mile Above South Londonderry	CR	ESCHERICHIA COLI (*E. coli*)	Possible septic system discharges	EPA approved TMDL September 30, 2011
VT11-18	L06	Moses (Weston)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
VT12-01	L01	Harriman Reservoir (Whitingham)	FC	MERCURY IN FISH TISSUE	Elevated level of mercury in all fish except brown bullhead	EPA approved regional mercury TMDL on December 20, 2007
	L04	Sherman Reservoir (Whitingham)	FC	MERCURY IN FISH TISSUE	Elevated level of mercury in all fish except brown bullhead	EPA approved regional mercury TMDL on December 20, 2007
VT12-02	L02	Howe Pond (Readsboro)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
	L03	Stamford Pond (Stamford)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT12-03	01	East Branch Deerfield River, Below Somerset Dam	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	EPA approved regional mercury TMDL on December 20, 2007
	L01	Grout Pond (Stratton)	AH, ALS, FC	MERCURY IN FISH TISSUE, PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
	L02	Somerset Reservoir (Somerset)	AH, ALS, FC	PH, MERCURY IN FISH TISSUE	Elevated level of mercury in all fish except brown bullhead	EPA approved regional mercury TMDL on December 20, 2007
VT12-04	01	Upper Deerfield River, Below Searsburg Dam	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	EPA approved regional mercury TMDL on December 20, 2007
	L01	Adams Reservoir (Woodford)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
	L04	Little Pond (Woodford)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
	L05	Searsburg Reservoir (Searsburg)	FC	MERCURY IN FISH TISSUE	Elevated level of mercury in all fish except brown bullhead	EPA approved regional mercury TMDL on December 20, 2007
VT12-05	02	No. Branch, Deerfield River, Vicinity of West Dover	CR	ESCHERICHIA COLI (*E. coli*)	High *E. coli* levels; cause(s) & source(s) unknown; needs assessment	EPA approved TMDL September 30, 2011
	L01	Haystack Pond (Wilmington)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
VT12-07	L01	South Pond (Marlboro)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT13-14	01	Whetstone Brook, Bend Northwest of Living Memorial Park Downstream	CR	ESCHERICHIA COLI (*E. coli*)	Sources unknown, potentially faulty sewer line/septic system	EPA approved TMDL September 30, 2011
VT13-16	L01	Lily Pond (Vernon)	AH, ALS	PH, LOW	Atmospheric deposition; extremely sensitive to acidification; episodic acidification	TMDL EPA approved TMDL September 27, 2012
VT14-03	01	Ompompanoosuc River, Usacoe Beach Area to Brimstone Corner (9.8 Mi)	CR	ESCHERICHIA COLI (*E. coli*)	Elevated *E. coli* levels	EPA approved TMDL September 30, 2011

Waterbody ID	Code	Waterbody Name	Impaired Use(s)	Pollutant	Problem	Status
VT14-07	L01	Levi Pond (Groton)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 20, 2004
VT16-04	L01	Moore Reservoir (Waterford)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	EPA approved regional mercury TMDL on December 20, 2007
VT16-05	L01	Comerford Reservoir (Barnet)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	EPA approved regional mercury TMDL on December 20, 2007
VT16-11	L01	Unknown Pond (Averys Gore)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT17-01	L01	Lake Memphremagog	AES, CR	PHOSPHORUS	Excessive algae growth, nutrient enrichment	EPA approved TMDL September 28, 2017
VT17-02	L06	Duck Pond (Holland)	AH, ALS	PH	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	EPA approved TMDL September 30, 2003
VT17-03	L03	Halfway Pond (Norton)	AH, ALS	PH	Atmospheric deposition: critically acidified; chronic acidification	EPA approved TMDL September 30, 2003
VT17-04	L04	Lake Salem (Derby)	FC	MERCURY IN FISH TISSUE	Elevated levels of mercury in walleye	EPA approved regional mercury TMDL on December 20, 2007

STATE OF VERMONT

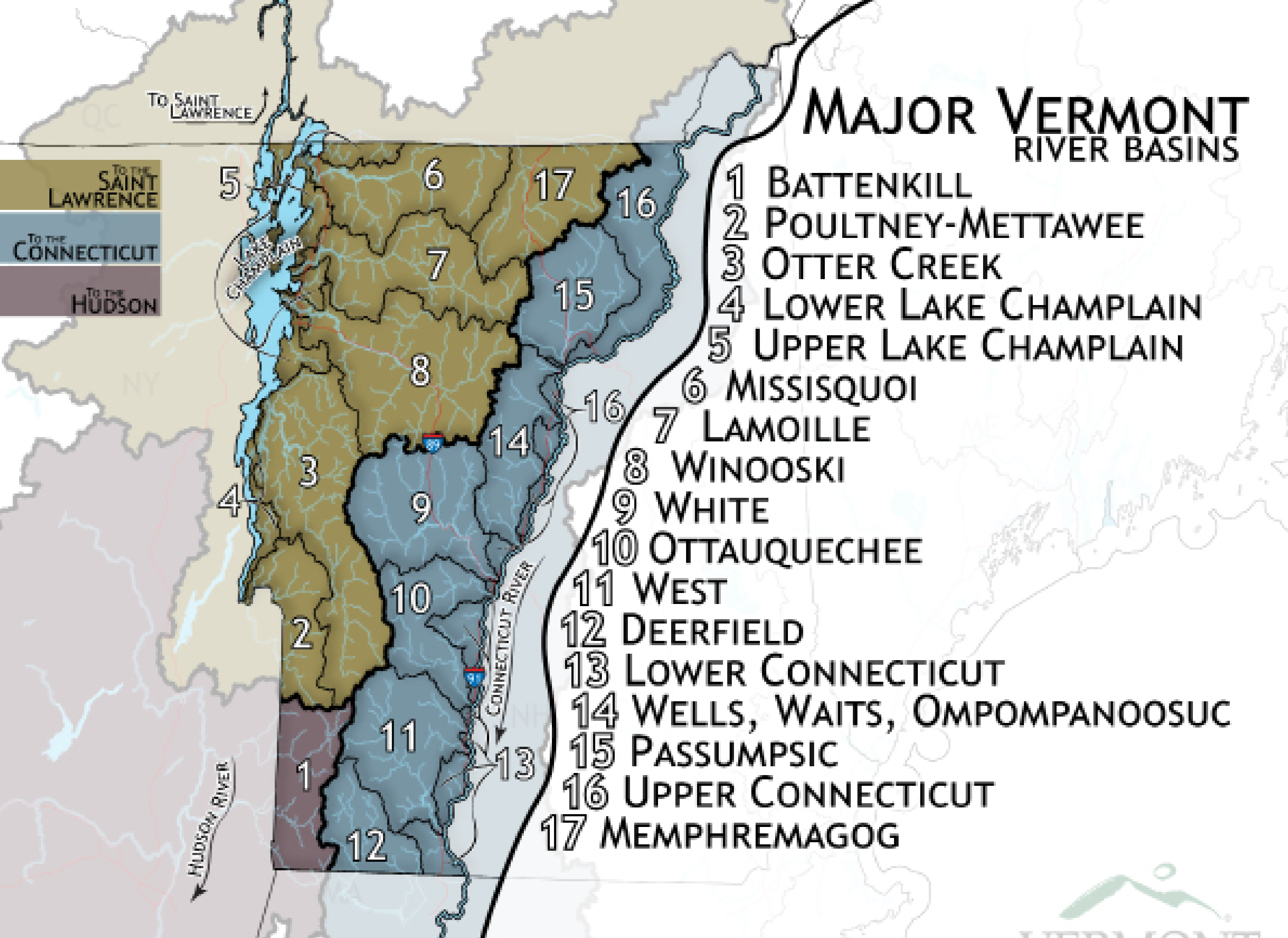
2022

LIST OF PRIORITY SURFACE WATERS

PART E. SURFACE WATERS ALTERED BY AQUATIC INVASIVE SPECIES

-final-

July 6, 2022


MAJOR VERMONT
RIVER BASINS
1 BATTENKILL
2 POULTNEY-METTAWEE
3 OTTER CREEK
4 LOWER LAKE CHAMPLAIN
5 UPPER LAKE CHAMPLAIN
6 MISSISQUOI
7 LAMOILLE
8 WINOOSKI
9 WHITE
10 OTTAUQUECHEE
11 WEST
12 DEERFIELD
13 LOWER CONNECTICUT
14 WELLS, WAITS, OMPOMPANOOSUC
15 PASSUMPSIC
16 UPPER CONNECTICUT
17 MEMPHREMAGOG
TO THE SAINT LAWRENCE
TO THE CONNECTICUT
TO THE HUDSON
TO SAINT LAWRENCE
LAKE CHAMPLAIN
CONNECTICUT RIVER
HUDSON RIVER
VERMONT

Waters appearing in Part E are assessed as “altered.” They represent situations to be given priority for management where aquatic habitat and/or other designated uses are not supported due to the presence of invasive aquatic species. These waters correspond to Category 4c of EPA’s Consolidated Assessment Listing Methodology. ** Identify new listings.

Waterbody ID - The two digits following VT identifies the **Major Vermont River Basin** illustrated above and the two digits following - identifies the sub basin or mainstem within the major basin.

Code - If the code contains an L the listing is a Lake within the sub basin and if the code is two digits the listing is a river reach within the sub basin or mainstem.

Altered Use(s) - (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions

Invasives -
WC - Water chestnut *Trapa natans*
VLM - Variable leaf milfoil *Myriophyllum heterophyllum*
SS - Starry stonewort *Nitellopsis obtusa*
EWM - Eurasian watermilfoil *Myriophyllum spicatum*
ZM - Zebra mussel *Dreissena polymorpha*

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status
VT01-03	L05	Paran	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT02-01	02	Poultney River, From Hubbardton River To Carvers Falls	AES, ALS, CR, RB	Locally abundant WC growth.	Active hand-pulling efforts for water chestnut.
	L01	Coggman	AES, ALS, CR, RB	Locally abundant EWM and WC growth.	Active hand-pulling efforts for water chestnut.
VT02-02	L02	**Sunrise	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
	L04	Burr (Sudbry)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
	L05	Hortonia	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
	L06	Black (Hubdtn)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT02-03	L01	Echo (Hubdtn)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
	L02	Beebe (Hubdtn)	AES, AH, ALS, CR, RB	Abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
	L05	Bomoseen	AES, AH, ALS, CR, RB	Locally abundant EWM growthZM and AC also present.	Ongoing management plan that includes mechanical harvesting efforts.

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status
VT02-05	L01	Lily (Poulty)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
	L02	Little (Wells)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes mechanical harvesting.
	L03	St. Catherine	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
VT03-04	L04	Fern	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes mechanical harvesting, DOSH, benthic barriers, and hand-pulling.
	L05	Lake Dunmore (Salisbury)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes mechanical harvesting, DOSH, benthic barriers, and hand-pulling.
VT03-06	L01	Beaver (Proctr)	AES, AH, ALS, CR, RB	Abundant EWM growth.	No active management.
VT03-07	L01	Vergennes Watershed	AES, AH, ALS, CR, RB	Abundant EWM growth.	No active management.
VT03-08	L02	Cedar	AES, AH, ALS, CR, RB	Abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT03-10	L01	Richville	AES, AH, ALS, CR, RB	Abundant EWM growth.	No active management.
VT03-15	L01	Chipman	AES, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT03-17	L01	Star	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT04-01	L01	Otter Creek Section - Lake Champlain (Ferrisburg)	AES, AH, ALS, CR, RB	EWMZMand WC infestation.	Active hand-pulling efforts for water chestnut, ZM are ubiquitous.
	L02	Port Henry Section - Lake Champlain (Ferrisburg)	ALL USES	EWM and ZM infestation.	No active management, ZM are ubiquitous.
VT04-02	01	Lower Whitney Creek	AES, ALS, CR, RB	Locally abundant EWM and WC growth.	Active hand-pulling efforts for water chestnut.
	L01	Southern Section - Lake Champlain (Bridport)	AH, ALS, CR	EWMZMand WC infestation.	Active mechanical harvesting and hand-pulling efforts for water chestnut, ZM are ubiquitous.
VT04-03	01	East Creek Segment, Orwell	AES, ALS, CR, RB	Locally abundant WC growth.	Active hand-pulling efforts for water chestnut.
	02	South Fork East Creek	AES, ALS, CR, RB	Locally abundant WC growth.	Active hand-pulling efforts for water chestnut.

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status
VT04-04	L05	Southern Section (B) - Lake Champlain (Bridport)	AH, ALS, CR		
VT05-01	L01	Missisquoi Bay - Lake Champlain (Alburg)	ALL USES	EWMVLMZMand WC infestation.	Active hand-pulling efforts for water chestnut, ZM are ubiquitous.
VT05-02	L01	Lake Carmi (Franklin)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes mechanical harvesting efforts.
VT05-04	L01	Northeast Arm - Lake Champlain (Swanton)	ALL USES	EWM and ZM infestation.	No active management, ZM are ubiquitous.
	L02	Isle Lamotte - Lake Champlain (Alburg)	ALL USES	EWM and ZM infestation.	Some mechanical harvesting of all nuisance vegetation, ZM are ubiquitous.
VT05-07	L01	St. Albans Bay - Lake Champlain (St. Albans)	AES, AH, ALS, CR, RB	EWM and ZM infestation.	Some mechanical harvesting of all nuisance vegetation, ZM are ubiquitous.
VT05-09	L01	Malletts Bay - Lake Champlain (Colchester)	ALL USES	EWM and ZM infestation.	No active management, ZM are ubiquitous.
	L02	Indian Brook (Essex)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Herbicides previously used to control EWM.
VT05-10	L01	Burlington Bay - Lake Champlain (Burlington)	ALL USES	EWM and ZM infestation.	No active management, ZM are ubiquitous.
	L02	Main Section - Lake Champlain (South Hero)	ALL USES	EWM and ZM infestation.	No active management, ZM are ubiquitous.
VT05-11	L01	Shelburne Bay - Lake Champlain (Shelburne)	ALL USES		
	L02	Iroquois	AES, AH, ALS, CR, RB	Abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
VT06-05	L01	Metcalf	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
	L02	Fairfield Swamp	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
	L03	Fairfield	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT07-03	L03	Arrowhead Mountain Lake (Milton)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Locally abundant growth, No active management.,
VT07-08	L02	Lake Elmore (Elmore)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT08-02	L01	Shelburne Pond	AES, AH, ALS, CR	Locally abundant EWM growth.	No active management.
VT10-01	L01	Deweys Mill	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes benthic barriers and hand-pulling.
VT10-02	L03	Pinneo	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH.

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status
VT12-01	L02	Sadawga	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT13-02		Upper Mid-Southern Connecticut River	AES, ALS	Locally abundant EWM growth.	No active management.
	01	Connecticut River Above Bellow Falls Dam in Springfield	AES, ALS	Locally abundant EWM growth.	No active management.
	03	CT River, Hoyts Landing	AES, ALS	Locally abundant EWM growth.	No active management.
VT13-08	L01	Mill (Windsr)	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT14-03	L01	Fairlee	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
VT16-07	01	Connecticut River, Above Wilder Dam	AES, ALS, CR, RB	Locally abundant EWM growth.	No active management.
VT16-20	L01	Morey	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes herbicides, DOSH, benthic barriers, and hand-pulling.
VT17-04	L05	Derby	AES, AH, ALS, CR, RB	Locally abundant EWM & SS growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT17-06	L02	Willoughby	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.
VT17-10	L01	Elligo	AES, AH, ALS, CR, RB	Locally abundant EWM growth.	Ongoing management plan that includes DOSH, benthic barriers, and hand-pulling.

STATE OF VERMONT

2022

LIST OF PRIORITY SURFACE WATERS

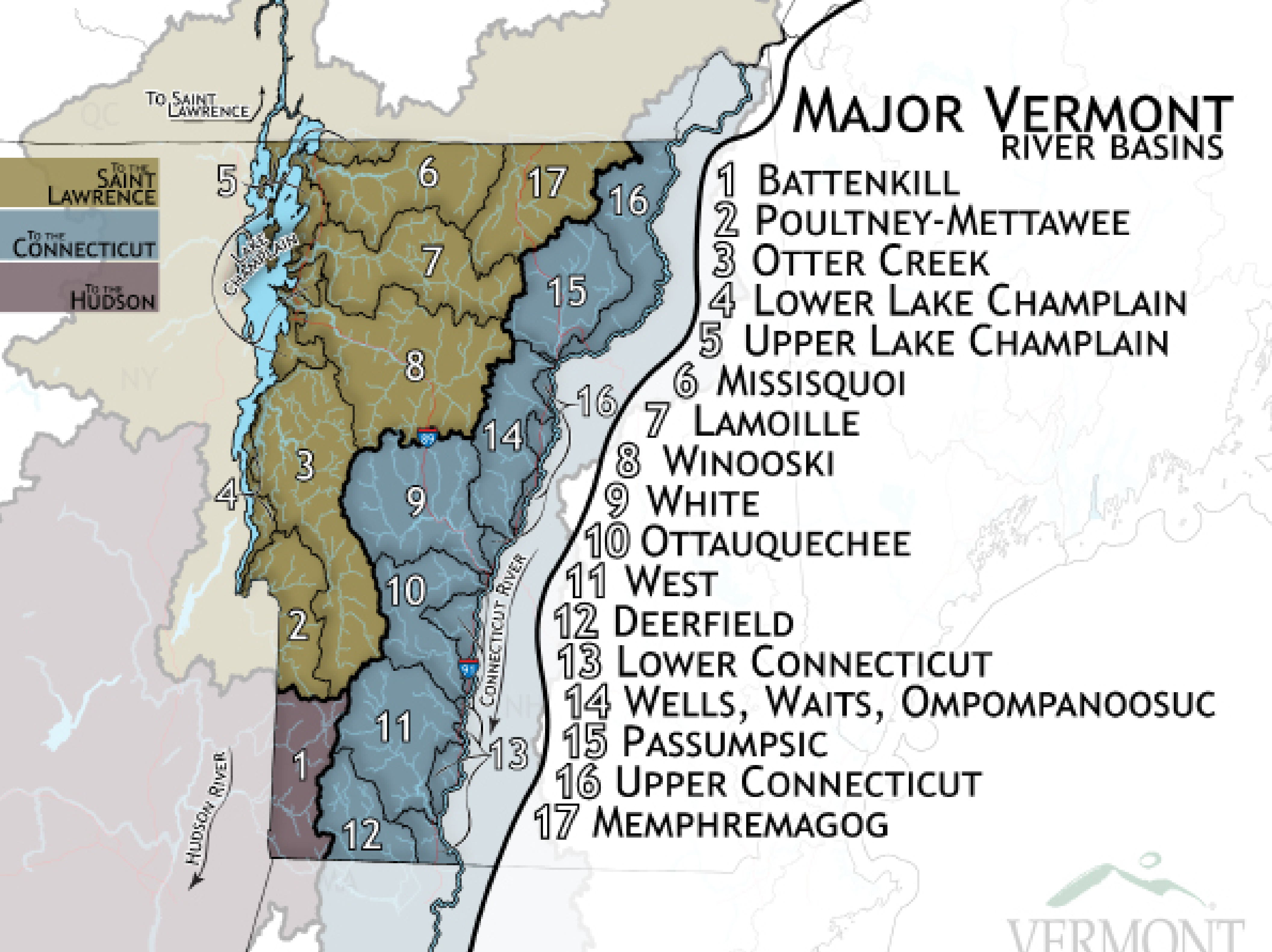
PART F. SURFACE WATERS ALTERED BY FLOW REGULATION

-final-

July 6, 2022

Vermont Department of Environmental Conservation
Watershed Management Division
One National Life Drive, Davis 3
Montpelier, VT 05620-3522

www.watershedmanagement.vt.gov


Major Vermont
River Basins
1 Battenkill
2 Poultney-Mettawee
3 Otter Creek
4 Lower Lake Champlain
5 Upper Lake Champlain
6 Missisquoi
7 Lamoille
8 Winooski
9 White
10 Ottauquechee
11 West
12 Deerfield
13 Lower Connecticut
14 Wells, Waits, Ompompanoosuc
15 Passumpsic
16 Upper Connecticut
17 Memphremagog
To the Saint Lawrence
To the Connecticut
To the Hudson
To Saint Lawrence
Lake Champlain
Connecticut River
Hudson River
Vermont

Waters appearing in Part F of the Vermont Priority Waters List are assessed as "altered." Alterations arise from flow fluctuation, obstructions, or other manipulations of water levels that originate from hydroelectric facilities, dam operations or water withdrawals for industrial or municipal water supply or snowmaking purposes. These waters correspond to Category 4c of EPA's Consolidated Assessment Listing Methodology. ** Identify new listings.

Waterbody ID - The two digits following VT identifies the **Major Vermont River Basin** illustrated above and the two digits following - identifies the sub basin or mainstem within the major basin.

Code - If the code contains an L the listing is a Lake within the sub basin and if the code is two digits the listing is a river reach within the sub basin or mainstem.

Altered Use(s) - (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT01-03	02	Basin Brook	ALS	Possible lack of minimum flow below water supply withdrawal point	WSID #5017 - North Bennington Water Department; serves as back up supply source to gravel well field, permit down to 3.0 mgd from 4.0 mgd	NA
	03	Bolles Brook/Roaring Branch, Intake to City Stream Confluence	ALS	Possible lack of minimum flow below water supply withdrawal point	WSID #5016 - Bennington Water Department; assessment of water withdrawal impact difficult given low productivity & low pH effect	NA
VT01-05	02	Hopper Brook	ALS	Artificial flow regime and condition by hydroelectric operations may alter aquatic habitat	Unlicensed hydroelectric project	2026
	L02	Lake Madeleine	AH, ALS	Water level fluctuation alters aquatic habitat	Unlicensed hydroelectric project	2026
VT02-03	02	Lake Bomoseen Outlet Stream (0.4 Mi)	ALS	Flow fluctuation and no minimum flow below the Lake Bomoseen dam used to manage water level	Engage DEC dam safety program on the management on downstream flows from the dam	NA
VT03-04	01	Leicester River, from Lake Dunmore Dam to 6 miles downstream, including Salisbury Dam	ALL USES	Artificial flow regulation & condition by hydroelectric dam	GMP needs 404 ACOE to complete work on the dam; DEC trigger section 401 to address flow and water level issue; Project currently delayed	2023

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
	L05	Lake Dunmore (Salisbury)	AH, ALS	Water level management by hydro alters aquatic biota	GMP needs 404 ACOE to complete work on the dam; DEC trigger section 401 to address flow and water level issue; Project currently delayed	2023
VT03-12	03	South Branch, Middlebury River (1.4 Miles)	ALS	Artificial flow condition, insufficient flow below Snow Bowl snowmaking water withdrawal	Partial support 1.4 mi (6.0 mi total length)	NA
VT03-14	02	East Creek Below Chittenden Reservoir	ALL USES	Artificial flow regulation & condition by dam; only local drainage below; possible fish passage problem at dam (threat)	Unlicensed facility	2026
	05	East Creek Below Glen Dam	ALL USES	Artificial flow regulation & condition by dam; only local drainage below; possible fish passage problem at dam (threat)	Unlicensed facility	2026
	06	East Creek Below Patch Dam	ALL USES	Artificial flow regulation & condition by hydro; possible downstream fish passage problem at dam (threat)	Unlicensed facility	2026
	07	Trib to East Creek	ALS	Low dissolved oxygen downstream of hydro facility	Unlicensed facility	2026
	L03	Chittenden Reservoir (Chittenden)	AH, ALS	Water level fluctuation by hydro alters biological community & wetlands	Unlicensed facility	2026
	L05	Patch Pond (Rutland)	AH, ALS, RB	Water level fluctuations alter biological community	Unlicensed facility	2026
VT06-01	01	Missisquoi River, Mouth Upstrm to Swanton Dam (Approx 8 Miles)	ALS, RB	Artificial flow fluctuating and condition by hydropower production	FERC license expires 2024	2024
	02	Missisquoi River Between Swanton Dam and Highgate Falls	ALS, RB	Artificial flow fluctuating and condition by hydropower production	FERC license expires 2024	2024

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
	03	Missisquoi River Between Sheldon Springs and Highgate Falls	ALS, RB	Artificial flow fluctuating and condition by hydropower production	FERC license expires 2024; Owner has proposed to operate in a run-of-river mode under a new license	2024
VT06-02	01	Missisquoi River, Below Enosburg Falls Dam (0.1 Mile)	ALS	Artificial flow fluctuating and condition by hydropower production	FERC license expires 2023; Owner has proposed to pass conservation flow equal to aquatic base flow under new license	2023
VT06-04	05	Stanhope Brook	ALS	Possible lack of minimum flow below water supply withdrawl point	Richford water supply	NA
VT06-08	08	Jay Branch (4.7 Miles)	ALS	Artificial & insufficient flow below Jay Peak snowmaking water withdrawal	Partial support 4.7 mi (8.7 mi total length); Jay Peak evaluating expansion/ alternatives	NA
VT07-04	01	Mid-Lamoille River, Immed. Below Cadys Falls Dam (0.3 Miles)	AES, ALS	Artificial dewatering of falls by hydroelectric facility	Environmental court reinstated ANRs 401 conditions; FERC license still pending	2022
VT07-07	01	Upper Lamoille River Below Morrisville Lake Dam	AES, ALS, RB	Below Morrisville dam: no flow in bypass impairs aesthetics, recreation, habitat	Environmental court reinstated ANRs 401 conditions; FERC license still pending	2022
	02	Upper Lamoille River Below Wolcott Dam	AES, ALS, RB	Wolcott Dam: artificial & poor flow regime downstream (threat)	Unlicensed facility	2026
	03	Upper Lamoille River Below Hardwick Lake Dam	AES, ALS, RB	Hardwick Lake Dam: artificial flow regime downriver	Supreme court remanded issues back to environmental court; FERC license still pending	2024
	L01	Lake Lamoille (Morristown)	AH, ALS	Water level fluctuation by hydroelectric facility may alter aquatic habitat	Environmental court reinstated ANRs 401 conditions; FERC license still pending	2022
VT07-08	02	Elmore Pond Brook-From Dam to 2.2 Miles Downstream	ALL USES	Artificial flow regulation & condition by dam	Environmental court reinstated ANRs 401 conditions; FERC license still pending	2022
	L02	Lake Elmore (Elmore)	AH, ALS	Water level fluctuation by hydroelectric facility may alter aquatic habitat	Environmental court reinstated ANRs 401 conditions; FERC license still pending	2022

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT07-13	02	Unnamed Brook, Trib to Brewster River (1 Mile)	ALS	Artificial flow regime, insufficient flow below Morse Reservoir, used for domestic water	Non-support 1.0 mi (2.7 mi total length); domestic water use	NA
VT07-18	01	Green River, Downstream from Reservoir 4.7 Miles	ALS	Artificial flow regime and condition by hydroelectric operations alters aquatic biota	Environmental court reinstated ANRs 401 conditions; MWL is exploring the option of decommissioning the project; FERC process still pending	2022
	L03	Green River Reservoir	AH, ALS	Water level fluctuation and winter drawdown alters aquatic habitat	Environmental court reinstated ANRs 401 conditions; MWL is exploring the option of decommissioning the project; FERC process still pending	2022
VT07-21	L05	Hardwick Lake (Hardwick)	AES, AH, ALS	Water level fluctuation by hydroelectric facility alters aquatic habitat & wetlands	No longer managed for hydroelectric production; lake drained during fall/winter for ice control	2024
VT08-01	02	Winooski River at Essex No. 19	AES, ALS	Artificial & inadequate flow in bypass reach	FERC licences expires in 2025	2025
	05	Winooski River, from No 19 Dam down 0.1 miles	AES, ALS			NA
VT08-04	01	Joiner Brook (2.9 Miles)	ALS	Artificial & insufficient flow below Bolton Valley snowmaking water withdrawal	Non-support 2.9 mi (5.7 mi total length)	NA
VT08-06	01	Tyler Brk (O.1 Mi) & Merriam Brk (0.1 Mi), Thatcher Brook Tribs	ALL USES	Artificial & inadequate flow condition below Waterbury Village public water supply withdrawal point	WSID #5284 - Waterbury Village Water	NA
VT08-11	01	Lower Little River Below Hydro Dam (2.6 Miles)	ALL USES	Artificial flow regime in the winter	New turbine runner and bypass flow valve will be operational in may 2018; winter drawdown will continue until tanner gates are replaced; DEC Dam Safety in consultation with USACE	2028

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
	L02	Waterbury Reservoir (Waterbury)	ALL USES	Winter drawdown alters all uses	New turbine runner and bypass flow valve will be operational in may 2018; winter drawdown will continue until tanner gates are replaced; DEC Dam Safety in consultation with USACE	2028
VT08-16	03	Benjamin Falls Brook (Pond Brook) from Berlin Pond to Mouth	AES, ALS	Artificial dewatering of brook by Montpelier & Berlin water supply withdrawals	WSID #5272	NA
VT08-20	02	Mill Brook (2.1 Miles)	ALS	Artificial & insufficient flow below Mad River Glen snowmaking water withdrawal	Partial support 2.1 mi (5.9 mi total length)	NA
	03	Slide Brook (0.8 Mile)	ALS	Artificial & insufficient flow below Mt. Ellen snowmaking water withdrawal	Non-support 0.8 mi (3.4 mi total length)	NA
VT10-01	01	Lower Ottauquechee River, Below No. Hartland Dam (0.9 Mile)	AES, ALS, RB	Artificial flow regulation & condition	USACE dam; no conservation flow based on any biological/ wq criteria; 401 WQC issued for operation of the hydroelectric project in Oct. 2021; FERC license still pending	NA
	02	Lower Ottauquechee River, Below Ottauquechee Woolen Mill Dam (0.1 Mi)	AES	Artificial flow condition, dewatering of falls by hydroelectric facility		2032
VT10-02	L01	North Hartland Reservoir (Hartland)	AH, ALS, RB	Annual water level fluctuations alter aquatic habitat	USACE dam; no conservation flow based on any biological/ wq criteria; 401 WQC issued for operation of the hydroelectric project in Oct. 2021; FERC license still pending	NA
VT10-13	01	Black River, Below North Springfield Reservoir (3.7 Miles)	ALS	Artificial flow regulation & condition by dam	USACE dam; no conservation flow based on any biological/wq criteria	NA
	L02	North Springfield Reservoir (Springfield)	AH, ALS	Water level fluctuation alters aquatic habitat	USACE dam; no conservation flow based on any biological/wq criteria	NA

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT10-16	L03	Stoughton Pond (Weathersfield)	AH, ALS	Water level fluctuation alters aquatic habitat	USACE dam; no conservation flow based on any biological/wq criteria	NA
VT11-07		West River, Mouth to Grassy Brook	AH, RB	Wide shallow channel, loss of riparian vegetation, USACOE dam operation	Wide shallow channel, loss of riparian vegetation, USACOE dam operation	NA
	01	Retreat Meadows	AH, RB	Unique habitat impacted by Vernon Dam water level fluctuations	Agreement on operation of Vernon Dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT11-08	01	Stickney Brook (2.5 Miles)	ALS, RB	Artificial flow condition, seasonally devoid of flow below diversion dam; dredging	WSID # 5290 - Brattleboro Water Department; water supply reservoir above dam	NA
VT11-10	01	West River, Below Ball Mountain Dam to Townshend Dam (9 Miles)	AH, ALS, CR	Artificial flow regime at dam	No minimum flow by USACE based on any biological/ wq criteria. structural study complete, no action planned	NA
	02	West River, Townshend Dam to Grassy Brook	AH, RF	USACOE dam operation, impounded waters release results in elevated temperatures downstream		NA
	L02	Townshend Reservoir (Townshend)	AH, ALS	Water level fluctuation alters aquatic habitat	USACE dam; no conservation flow based on any biological/wq criteria	NA
VT11-16	02	Mill Brook (1.6 Miles)	ALS	Artificial & insufficient flow below Bromley Snowmaking water wihdrawal	Partial support 1.6 mi (8 mi total length)	NA
	03	Trib to Mill Brook (2.2 Miles)	ALS	Artificial & insufficient flow below Bromley Snowmaking water wihdrawal	Non-support 0.7 mi, partial support 1.5 mi (2.5 mi total length).	NA
VT11-18	L01	Hapgood Pond (Peru)	AH, ALS	Annual drawdowns alter aquatic habitat		NA
VT12-01	01	Lower Deerfield River Below Harriman Reservoir (3.5 Miles)	ALS	Low temperature hypolimnetic water release from reservoir affect fishery	401 certification issued (1/95); FERC license issued (4/97); DFW evaluating the effects of release.	NA

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT12-05	07	Cold Brook (0.58 Miles)	ALS	Artificial & insufficient flow below Hermitage snowmaking withdrawal	Compliance schedule established as part of act 250 process to bring the withdrawal into compliance	NA
VT13-01		CT River, Wilder Dam to Ascutney Village	ALS	Artificial flow condition, fluctuating flows associated with hydropower production	Agreement on operation of Wilder dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT13-02		Upper Mid-Southern Connecticut River	AES, ALS			NA
	01	Connecticut River Above Bellow Falls Dam in Springfield	AES, ALS	Water level fluctuation at dam; dewatered shorelines/ wetlands; unstable/eroding streambanks	Agreement on operation of Bellows Falls dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
	02	Connecticut River Above Bellow Falls Dam to Hoyts Landing Area, Rockingham	ALS	Water level fluctuation at dam; dewatered shorelines/ wetlands	Agreement on operations of Bellows Falls dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
	03	CT River, Hoyts Landing	ALS	Water level fluctuation at dam; dewatered shorelines/ wetlands	Agreement on operation of Bellows Falls dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT13-03		CT River, Below Bellows Falls Dam	ALS	Artificial flow condition, fluctuating flows by hydropower production	Agreement on operation of Bellows Falls dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT13-04		Vernon Impoundment	ALS	Water level fluctuation at dam; dewatered shoreline/ wetlands	Agreement on operation of Vernon dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT13-05		Lower Connecticut River, Below Vernon Dam	ALS	Artificial flow condition, fluctuating flows by hydropower production	Agreement on operation of Vernon dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT13-10	02	Ellis Brook, Farr (?) Brook Below Minards Pond	ALS	Possible lack of minimum flow below water supply withdrawal point (threat)	WSID #5298 - Bellows Falls Water Department	NA
VT14-04	01	Waits River, Below Bradford Dam (0.3 Mile)	AES, ALS	Artificial flow condition, poor flow regime in dam's bypass segment	FERC exemption	2026
VT14-07	01	Wells River, Below Dam at Boltonville (0.4 Mi)	AES, ALS, RB	Artificial flow condition, poor flow and physical alterations in hydroelectric dam bypass segment	FERC exemption	2028
VT14-09	01	South Peacham Brook and Stevens River below Harveys Lake	ALS	Dam management alters aquatic biota	Town is working with NGO and consultants on feasibility anaysis of dam removal	NA
	L05	Harveys Lake (Barnet)	AH, ALS	Water level management may alter aquatic habitat	Town is working towards dam removal and placement of weir to stabilze water level	NA
VT16-07	01	Connecticut River, Above Wilder Dam	ALS	Reservoir water level fluctuation at dam; unstable/eroding streambanks upstream	Agreement on operations of Wilder dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
	02	Connecticut River, Above Wilder Dam to Bradford (Approx 30 Miles)	ALS	Reservoir water level fluctuation at dam; unstable/eroding streambanks upstream	Agreement on operation of Wilder dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	2023
VT17-01	L01	Lake Memphremagog	AH, ALS	Water level fluctuation by hydroelectric facility may alter aquatic habitat and dewater wetlands and shoreline	DEC is a party to regular meetings which includes international joint commission, Canadian environmental regulatory authorities and municipalities to discuss ways to improve the water quality of the lake	NA

Waterbody ID	Code	Waterbody Name	Altered Use(s)	Problem	Status	Compliance Year
VT17-03	01	Coaticook River Below Norton Pond Dam (3 Miles)	ALS	Artificial flow condition by hydroelectric facility creates poor flow regime	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
	02	Averill Creek Downstream from Dam on Great Averill Lake (5.4 Miles)	ALS	Artificial flow condition by hydroelectric facility creates poor flow regime	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
	03	Averill Creek Downstream from Dam on Little Averill Lake (1 Mile)	ALS	Artificial flow condition by hydroelectric facility creates poor flow regime	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
	L01	Little Averill Pond (Averill)	AH, ALS, RF	Water level fluctuation by hydroelectric facility alters fishery, recreation & endangered species	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
	L02	Great Averill Pond (Norton)	AH, ALS, RF	Water level fluctuation by hydroelectric facility alters aquatic habitat, recreation	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
	L04	Norton Pond (Norton)	AES, AH, ALS, RB	Water level fluctation by hydroelectric facility alters aquatic habitat, recreation, aesthetics	ANR, Coaticook, and other parties have reached a tentative settlement; Coaticook currently implementing conditions	2022
VT17-05	01	Unnamed Brooks, Tribs to Clyde River	ALS	Possible lack of minimum flow below water supply withdrawal point	WSID #5105; Brighton	NA
VT17-08	L03	Shadow Lake (Glover)	AES, AH, ALS	Water level fluctuation (seasonal drawdown) may alter aquatic habitat and aesthetics		2020

Responsiveness Summary to Comments Received on the draft 2022 Vermont List of Priority Waters, including the 303(d) List of Impaired Waters (Part A) and Other Priority Waters Lists (Parts B, D, E, and F)

The Vermont Department of Environmental Conservation (DEC) established and noticed a public comment period upon the release of the draft 2022 Vermont List of Priority Waters, including the 303(d) List of Impaired Waters (Part A) and Other Priority Waters Lists (Parts B, D, E, and F). The public comment period extended from April 18 through June 3, 2022. The public notice stated a person may request a public informational meeting regarding any draft decision during the public notice; no requests were received. DEC contacted and met with several parties directly impacted by the new listings on Part A to provide further detail on the proposed listing. At the close of the public comment period, DEC had received written comments from the following parties:

Commenter	Received
Stowe Mountain Resort & Spruce Peak Realty (SMR/SPR) via email from Bear Creek Environmental (BCE) and Downs Rachlin Martin PLLC (duplicate comments)	5-31-2022
US EPA Region 1	5-4-2022

Part A and Part B Comments

1. **Comment:** SMR/SPR

West Branch of Little River (RM 7.5 to RM 8.0)

Considerable field investigation was conducted in spring 2012 to develop and prioritize actions to improve water quality in the reach of the West Branch of Little River located in the vicinity of Stowe Mountain Resort. Best management practices were implemented during fall 2012 to upgrade the stormwater system, to protect and maintain riparian buffers, and to make modifications to snowplowing, snow piling, and sand operations.

In recent years, there has been a trend toward improved water quality at this station in both the water quality and the biological data. The water quality monitoring data for RM 8.0 and RM 7.5 for freshet events has reflected low turbidity values in recent years. The West Branch at river mile 8.0 met Class B(2) biocriteria in 2021 resulting in good to very good biological integrity. There have been two consecutive years (2020 and 2021), where the macroinvertebrate community at river mile 8.0 has met Class B(2) biocriteria. The West Branch station, RM 7.4, located just downstream of the listed impaired reach, has met the Class B(2) biocriteria annually starting in 2016, when it was first sampled.

In conclusion, we are requesting the West Branch of the Little River section from RM 7.5 to RM 8.0 not be included on the final 2022 303d list for the following reasons:

- Best management practices were implemented in 2012 to improve water quality;
- There has been a trend toward improved water quality in the reach within the resort;

- The draft 2022 303d list does not reflect biological data that was collected in 2021 at RM 8.0. The river has met Class B(2) biocriteria in the past two consecutive years within the listed impaired section and has met Class B(2) biocriteria immediately below the impaired listed segment in all six of the years monitored.

Response:

The 2021 biological data for West Branch Little River was not available for consideration at the time DEC staff reviewed sites for impairment delisting in late fall 2021. In response to this comment and follow-up conversations with SMR and BCE, DEC staff reviewed the biological data and supporting habitat and water chemistry data. DEC staff agrees that biological data from the impaired section of the West Branch of the Little River supports delisting based on the Vermont Surface Water Assessment and Listing Methodology. All macroinvertebrate data associated with the lower extent of the impairment listing has met B(2) biocriteria since 2017, and data from the upper extent of the impairment listing has met B(2) biocriteria for the two most recent years, 2020 and 2021.

Listing action: Remove West Branch Little River from Part B of the Priority Waters List.

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2. Comment: SMR/SPR

<u>Little Spruce Brook</u>

Water quality monitoring of streams in the vicinity of Stowe Mountain Resort has been taking place since 2000. Due to its small size, Little Spruce Brook has only been monitored for water chemistry parameters and not biological monitoring. This monitoring program has been approved by Department of Environmental Conservation (DEC) biologists over the years. In 2020 and 2021, the DEC reversed its position and sampled the biological community using a macroinvertebrate kick net technique. The kick net samples were processed and evaluated using the Small High Gradient (SHG) biocriteria. Based on DEC data, Little Spruce Brook resulted in “fair” biological integrity when evaluated using the SHG biocriteria in both 2020 and 2021. Little Spruce Brook has been listed on the draft 2022 303d list based on aquatic life support as an impaired use.

The SHG biocriteria were developed using Vermont reference streams with drainage areas that averaged 10.5 km2 and ranged from 0.6 km2 to 95 km2. Little Spruce Brook is so small that it doesn’t show up on the Vermont Hydrography Dataset (VHD stream layer). Based on a watershed delineation using a digital elevation model, the drainage area of Little Spruce Brook at the mouth is 0.45 km2, which is outside the range of drainage areas of streams included to develop the SHG biocriteria. For this reason alone, Little Spruce Brook should not be listed on the Part A 303d list.

The 2022 draft 303d list suggests the cause for the impairment is pollutants in urban stormwater with stressors to the aquatic biota including chloride, iron, sedimentation, and erosion. The listing of sedimentation and erosion as a stressor is unsubstantiated. Based on my recent site visit of April 26, 2022, Little Spruce Brook was noted to have a well vegetated riparian corridor with stable bed and banks. There is no evidence that erosion is causing sedimentation that is contributing to impairment of aquatic life. In addition, turbidity data collected during rain and snow melt events over the five years (*Bear Creek Environmental, LLC, 2021. Stowe Mountain Resort, SMR 2000 Community Plan, Water Quality*

Management Plan, 2020 Monitoring Report, May 28, 2021, 55 pp. plus appendices.) has resulted in low turbidity levels, providing additional support that sedimentation and erosion are not stressors.

Water Chemistry data collected by the Vermont DEC has shown that total iron concentrations collected at Little Spruce Brook at river mile 0.1 are less than 100 ug/L and are well below the chronic criteria for protection of aquatic life, which is listed in the 2017 Vermont Water Quality Standards (VWQS) as 1000 ug/L.

Monitoring data has shown elevated chloride values in Little Spruce Brook; however, only one sample has exceeded the Vermont Water Quality Standard of 230 mg/L listed as the chronic criteria for protection of Aquatic Life. In order to be placed on the 303d list of impaired waters, the stream needs to consistently not meet the Vermont Water Quality Standards, and in this instance, one sample does not meet this requirement. The elevated chloride concentrations are from the use of deicing agents. Spruce Peak Realty recognizes the chloride values are elevated and is working to develop and implement a snowplowing and snow storage plan, as well as train personnel regarding application of deicing agents.

In summary, there is not sufficient data to list Little Spruce on the 303d list. We are requesting Little Spruce Brook not be included on the final 2022 303 list for the following reasons:

- The SHG is not applicable to such a small watershed;
- Over the 20 years of monitoring of Little Spruce Brook, biomonitoring has not been required or conducted at this station until recent monitoring (2020 and 2021) by Vermont DEC;
- There is no evidence that sedimentation and erosion are stressors;
- Water chemistry monitoring has shown elevated concentrations of chloride, but only one sample exceeded the VWQS.
- Spruce Peak Realty is taking steps to reduce concentrations of chloride within the Little Spruce watershed by modifying plowing and snow storage that were previously in close proximity to Little Spruce Brook.

Response:

- The comments note that the range of streams used to create the original SHG biocriteria was 0.6-95 km^2.

  This was the range of reference streams available when the SHG biocriteria were developed, approximately 20 years ago. Since then, DEC biologists have collected thousands more samples statewide, including many from watersheds less than 0.6 km^2. DEC staff apply SHG criteria and assess perennial streams with watersheds smaller than 0.6 km^2. Very small streams may require changes to expected SHG thresholds based on best professional judgment. Little Spruce Brook (LSB) was sampled in 2020 and 2021, during abnormally dry and/or drought conditions in this region, and in late summer when baseflows are often near annual lows. In both 2020 and 2021, LSB had adequate flow and wetted width.

- The comments note that monitoring of LSB was not requested by DEC over the previous 20 years as part of approved monitoring programs.

  Historically, the primary focus of monitoring (including biological monitoring) in the greater Big

Spruce watershed was on iron and iron precipitate in the mainstem Big Spruce Brook. The absence of a request to monitor LSB for macroinvertebrates is not a reversal in position, nor does it preclude current and future monitoring of the stream.

- The comments note no evidence of sedimentation and erosion, as well as iron are stressors in Little Spruce Brook.

  Iron and sediment were not listed as the specific 'pollutants', but as possible stressors resulting from the pollutant of urban stormwater runoff. On further review of the data, DEC staff agree iron is likely not a biological stressor in LSB, and this listing should be amended. A very high relative abundance of Oligochaeta worms (19%) was observed in 2021, which is associated with sediment deposition or excessive iron precipitate on the substrate (iron precipitate was absent in this stream). The increase in Oligochaeta from 2020 (6%) to 2021 (19%) coincided with an increase in fine sediment and gravel in the pebble counts from a combined 15% in 2020 to 29% in 2021.

- The comments note that only one sample exceeded the Vermont Water Quality Standards (WQS) chronic criteria of 230 mg/l, and that this lack of consistency precludes the listing of the stream.

  The WQS chronic and acute chloride criteria for the protection of aquatic biota allow for streams to be listed solely based on chloride data without biological data. DEC proposes LSB be listed based on the failure of the macroinvertebrate community to meet B(2) SHG criteria. Chloride is acknowledged as a primary stressor; it is not the basis of the listing. Both DEC data and recent peer reviewed literature provide evidence that chloride concentrations much lower than 230 mg/l can adversely affect macroinvertebrate communities and suggest that loss of sensitive taxa can occur at concentrations as low as 50-90 mg/l. The average baseflow concentration in LSB was 183 mg/l. Sensitive Ephemeroptera (mayfly) taxa can be the first species affected by chloride (and correlated issues with impervious runoff). Typically an important part of SHG communities, mayflies were absent from LSB in 2020, and only two taxa were recorded at a relative abundance of 1.6% in 2021. DEC appreciates SPR's actions to remedy excess chloride loading to the stream through snow and ice management practices.

Listing action: Remove iron from Little Spruce Brook as a stressor but retain "Pollutant in urban stormwater" as the pollutant in Part A of the Priority Waters List.

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3. **Comment:** SMR/SPR

Big Spruce Brook

It is important to understand the history of the 303d listing of Big Spruce Brook to understand why Big Spruce Brook should not be included on the 2022 303d list. Big Spruce Brook was originally placed on the Part C of the 2008 Vermont List of Priority Waters by the Agency of Natural Resources (ANR) and was listed "as in need of further assessment" to determine compliance with the Vermont Water Quality Standards (VWQS). In 2010, Big Spruce Brook was moved to Part B of the Vermont Priority Water List, based on monitoring data from the previous four years. The Agency of Natural Resources issued a 1272 order on May 6, 2010 to serve as a water quality remediation plan to address sources of iron and sediment identified in Big Spruce Brook.

Following the issuance of the 1272 order in 2010, improvements were completed to remediate a local iron seep adjacent to the Club House and to improve stormwater management to reduce sediment impacts. Despite these remediation efforts, both Big Spruce monitoring stations have shown little improvement. In May 2015, extensive iron seeps were documented that are contributing to impairment of the macroinvertebrate community. These iron seeps do not appear to be related to construction activities at Spruce Peak, and have likely existed for many years. Bear Creek Environmental conducted a stream reconnaissance with Steve Fiske, Aquatic Biologist with the Vermont Department of Environmental Conservation (VDEC) during September 2015 and noted iron seeps are strong, extensive in length, and are in steep locations that are not accessible. Big Spruce Brook from river mile 0.2 to river mile 0.3 was listed as impaired on the 2016 Final Part B List of Priority Surface Waters due to sediment and iron. Big Spruce Brook from river miles 0.3 to 0.8 was listed on the Part A List of Priority Surface Waters due to multiple iron seeps from unknown causes. In 2018 the entire Big Spruce watershed was removed from the 303(d) list of impaired waters “due to reassessment of sediment cause parameter and the identification of a natural source of Iron” (State of Vermont, 20182).

> *Big Spruce Brook (Stowe) between river mile 0.2 and 0.8 does not fully support aquatic life and the enjoyment of aesthetic conditions. River mile 0.2 to 0.3 was on the TMDL alternative list of impaired waters due to the cause parameters sediment/siltation and Iron from land development at Stowe Mountain Resort. Several non TMDL remediation actions for both sediment and iron have been implemented but little improvement has been observed. Biological assessment in 2016 indicated sediment/siltation is not a cause parameter and reaffirmed the iron cause parameter. Iron pollution is feeding a bacterial mat that disrupts the trophic structure of the macroinvertebrate community. River mile 0.3 to 0.8 was on the 303 (d) list of impaired waters requiring a TMDL due to the cause parameter Iron. We are now aware that Big Spruce Brook lies upon the Hazens Notch Formation (HNF). The HNF is dominated by rusty weathering schist and gneiss that is leaching Iron and Sulfur to the streams above it. The entire Big Spruce Brook is now removed from the 303(d) list of impaired waters due to the reassessment of sediment cause parameter and the identification of a natural source for Iron. 43°41'09.3"N 73°18'42.0"W* (State of Vermont, Agency of Natural Resources, Department of Environmental Conservation, Watershed Management Division. 2018. State of Vermont 2018 Water Quality Integrated Assessment Report, Clean Water Act Section 303(b) Report. 52 pp. Available at: https://dec.vermont.gov/sites/dec/files/documents/WaterQualityAssessmentReport_305b_2018.pdf).

Biological monitoring of Big Spruce Brook was temporarily discontinued in 2016 due to extensive iron seeps that impact the biological community and are infeasible to remediate. The Vermont DEC conducted kick net sampling in 2020 and 2021 and found the stream was not meeting Class B(2) biocriteria, when evaluated using the SHG biocriteria. Big Spruce Brook is listed on the draft 303(d) Part A list from the confluence to river mile 0.3 as impaired for Aquatic Life Use; and chloride, iron, sedimentation and erosion are listed as stressors to the community.

Based on the data available, the most likely stressor to the Big Spruce Brook aquatic biota is iron. Chloride concentrations at Big Spruce River miles 0.3 and 0.2 are elevated above background, but are typically less than 100 mg/L and are well below the VWQS of 230 mg/L. While the DEC suggests in their memorandum (State of Vermont, Agency of Natural Resources, Watershed Management Division, Memorandum to 2022 Listing File, Assessment Status of Big Spruce Brook and Little Spruce Brook (Stowe)) dated April 6, 2022 that the high percentage of worms in kick net samples in 2020 and 2021 is "suggestive of sediment issues". The DEC's habitat data indicates the fine sediments were low and water quality data collected by Bear Creek Environmental reflects low turbidity values during freshet events. For this reason, sediment and erosion do not appear to be playing a significant role. We are in agreement with the DEC's conclusion in 2018 that iron pollution is disrupting the trophic structure of the macroinvertebrate community; however, the iron seeps are in areas that are in areas that are infeasible to remediate.

We are requesting the DEC remain consistent with their action in 2018 to leave Big Spruce Brook off the 303d list due to lack of evidence of sediment and siltation and the infeasibility to remediate the Brook for iron pollution.

Response:

- A primary argument proposed for not listing the impairment of Big Spruce Brook (BSB) from the mouth to the confluence with Little Spruce Brook (LSB) is that the source of impairment at RM 0.2 is due primarily to the downstream effects of upstream iron seeps in BSB (RM 0.3-RM 0.8), rather than the effects of 'pollutants in urban stormwater' sourced from impervious areas in LSB, which include chloride and sediment.

  DEC concurs that stressors related to iron in upstream reaches of BSB are also likely contributing to the biological degradation seen at RM 0.2. Iron seeps upstream are leading to high iron concentrations and excessive iron precipitate in those reaches. The iron precipitate at upstream locations has been shown to degrade substrate habitat to an extent where many sensitive taxa are lost, and the precipitate is colonized by a high relative abundance of Oligochaeta. Water quality degradation is likely continuing downstream; lack of sensitive taxa and excessive Oligochaeta in those reaches could be contributing factors for the degradation found at RM 0.2. DEC also believes that the chloride and stormwater associated with impervious surfaces in LSB may be contributing to the biological degradation at BSB RM 0.2. Chloride concentrations are diluted at this reach compared to LSB, with an average baseflow concentration of 73.4 mg/l. While this concentration is not high enough to be the sole stressor to the biological community, it is at a level that can adversely affect macroinvertebrates as mentioned above, and likely also contributes to the low EPT richness at RM 0.2. While sediment indicators in the habitat data were low at BSB 0.2, Oligochaeta were at high relative abundance in LSB, and increased significantly at both sites in 2021. These patterns create some difficulty with attributing the relative contributions of stressors from both LSB and upper reaches of BSB to the poor biological condition at RM 0.2; therefore, DEC will seek additional data to further refine the assessment.

- The second argument proposed is that the stream should not be listed as impaired because the upstream degradation caused by iron is infeasible to remediate, and/or may be caused by naturally occurring iron due to underlying geology.

  EPA requires the documentation of impairments regardless of whether they can be remediated.

Listing action: Big Spruce Brook from the confluence to Little Spruce Brook will not be listed in 2022.

4. Comment: USEPA R1

VT05-10, Burlington Bay Barge Canal, impairment for xylene and toluene

EPA requests that Vermont provide information about progress made in the restoration of these impairments.

Response:

The required "*Five Year Review Report for the Pine Street Canal Superfund Site Burlington Vermont*" (FYR) was produced and published by USEPA December 21, 2021 that describes the past and current conditions of various indicators of interest as related to this impairment listing. The FYR indicates:

> "EPA has determined, as part of the third five-year review, that the remedy at the Pine Street Canal Superfund Site is protective of human health and the environment. All construction activities specified in the 1998 ROD (Record of Decision), 2009 ESD (Explanation of Significant Differences) and 2011 ESD are complete and operating as intended. Ecological, human health and management of migration RAOs (Remedial Action Objectives) are being met. The Performing Defendants continue to perform compliance monitoring and O&M (Operation and Maintenance) and report the results to EPA and VTDEC twice a year."

DEC considers this substantial progress towards WQS compliance. However, the Department needs more time for a complete assessment of water quality before any move to delist is initiated. Furthermore, to allow complete transparency for any listing action to occur, DEC prefers that a complete public notice and comment period occur prior to action.

Listing action: Additional summary status information will be added to the listing

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5. Comment: USEPA R1

VT07-01, Lamoille River, Rt. 2 to Arrowhead Mountain Lake, impairment for dissolved oxygen

EPA notes that there is no indication that data has been collected to assess this waterbody's impairment since 2008, and no indication of the results of that sampling. EPA requests that Vermont provide information about progress made in the restoration of these impairments.

Response: Dissolved oxygen data will be collected to determine if the aeration modification made at the dam is sufficient to comply with the appropriate water quality standards. Data and assessment listing decisions will be provided during the 2024 assessment cycle.

Listing action: No changes.

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6. Comment: USEPA R1

VT08-02, Unnamed Trib to Winooski River, impairments for cadmium (sic) and iron.

EPA requests that Vermont provide information about progress made in the restoration of these impairments.

Response: Remediation efforts at the South Burlington landfill are complete with an ongoing requirement of biannual surface water monitoring. As late as 2021, concentrations of iron and arsenic continue to exceed WQS. Arsenic has never exceeded the Aquatic Biota criteria for either chronic or acute exposure (190 & 360 ug/L, respectively) but does routinely exceed the human health criteria of organism consumption (1.5 ug/L) and organisms and water (0.02 ug/L), though fish and drinking water consumption from this very small stream are unlikely.

Iron concentrations continue to routinely exceed the Aquatic Biota criterion of 1.0 mg/L, but concentrations remain in the low single digits. DEC will continue to track surface water monitoring results.

Subsequent to close of the public comment period, EPA Region 1 required moving this listing from Part B (EPA Category 4b) to Part A (EPA Category 5). EPA indicated that it had resided too long on Part B without complete remediation and compliance so that it should now reside on Part A.

Listing action: This listing will be moved to Part A.

7. Comment: USEPA R1

<u>VT08-08, Muddy Brook, impairments for cadmium and iron</u>.

EPA requests that Vermont provide information about progress made in the restoration of these impairments.

Response: Remediation efforts at the Central Vermont landfill are complete with an ongoing requirement of biannual surface water monitoring. Over time, pollutants that reach surface waters are expected to decrease. The current update as posted with the draft Part B List discusses the situation whereby the reporting limit is above the pollutant criteria for cadmium. Iron has not been detected in biannual monitoring at compliance site SS-11 above the WQS criterion since 2017; therefore, DEC proposes to remove iron from the pollutant list for this impaired segment.

Subsequent to close of the public comment period, EPA Region 1 required moving this listing from Part B (EPA Category 4b) to Part A (EPA Category 5). EPA indicated that it had resided too long on Part B without complete remediation and compliance so that it should now reside on Part A.

Listing action: Remove iron as a pollutant from this listing and move to Part A.

8. Comment: USEPA R1

<u>VT08-12, West Branch Little River, Rm 7.5 – 8.0. Impairment is cause unknown</u>.

EPA requests that Vermont provide information about progress made in the restoration of these impairments. Tables 9 and 10 are referred to in the justification but not provided. While the narrative justification seems reasonable, EPA would like to see more information about progress made to fully support this water's continued placement in Category 4B.

Response: See above response to Comment 1.

Listing action: See above listing action in response to Comment 1.

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9. Comment: USEPA R1

VT11-15. No. Branch Ball Mountain Brook, Stratton Lake to Kidder Brook. Impairment for manganese.

EPA notes that it is unclear whether this water body may be meeting its WQS criteria or not.

Response: This site will be revisited and reassessed during the 2024 listing cycle. Since the impairment is no longer ongoing (the source of manganese has been addressed), delisting is likely in 2024.

Listing action: Updated information will be added to the list entry regarding reassessment in 2024.

Vermont Surface Water Assessment and Listing Methodology

In accordance with

USEPA Guidance

Prepared by:

Vermont Department of Environmental Conservation

Watershed Management Division

One National Life Drive

Montpelier, VT 05620

https://dec.vermont.gov/watershed

Updated:

2022

Contents

Executive Summary

The federal Water Pollution Control Act, also known as the Clean Water Act, requires the States to develop and submit to the US Environmental Protection Agency two surface water quality-related documents. The documents, to be prepared every two years, arise out of two sections of the Act. Section 305(b) of the Act requires submittal of a report that describes the quality of the State's surface waters and contains an analysis of the extent to which its waters provide for the protection and propagation of a balanced population of fish, shellfish and wildlife. This analysis is also referred to as the extent to which Vermont's waters achieve the Act's fishable and swimmable goals. The biennial Vermont Water Quality Assessment Report is commonly known as the "305(b) Report."

The second document, developed in response to Section 303(d) of the Act, is a listing of surface waters that:

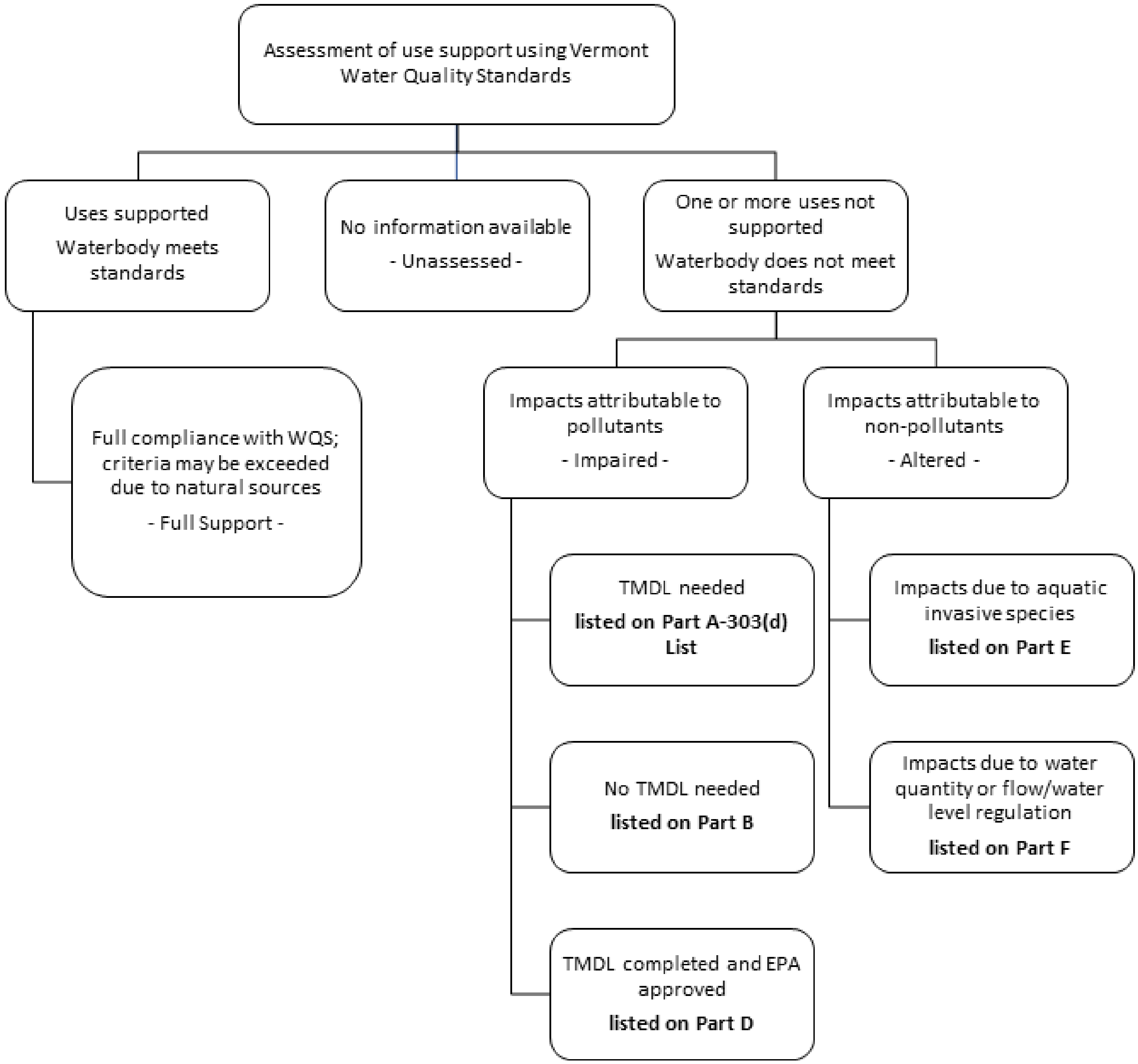
1. are impaired or threatened by one or more pollutants; and,
2. are not expected to meet Water Quality Standards within a reasonable time even after the application of best available technology standards for point sources of pollution or best management practices for nonpoint sources of pollution; and,
3. require development and implementation of a pollutant loading and reduction plan, called a Total Maximum Daily Load, which is designed to achieve Water Quality Standards.

The collection, analysis and evaluation of water quality monitoring data and other information represent the assessment of a water's condition. The assessment of a water is most accurate when judgements about the water's condition are made using chemical, physical, and/or biological data of known reliability collected through monitoring. While not as reliable as data collected though monitoring, an assessment of a water's condition can also consider professional opinion, direct observations, or other qualitative information.

The Vermont Water Quality Standards (VWQS) are promulgated by the Watershed Management Division for the Agency of Natural Resources, and are used in planning, management, and regulatory programs to protect Vermont's surface waters. The VWQS are used in determining the condition of surface waters including whether the water meets (attains) or does not meet (exceeds or violates) certain criteria. The assessment of a water's condition within the context of the VWQS requires consideration of the water's classification, a variety of designated or existing uses, and a series of criteria which can be numerical or narrative. The outcome of an assessment conducted by the Vermont Department of Environmental Conservation (VTDEC) is to categorize Vermont's surface waters as either "full support," "altered," "impaired", or "unassessed". Over time, the Department is gradually reducing the number of waters characterized as "unassessed."

This document describes the process used by the VTDEC when making water quality attainment decisions to fulfill 305(b) reporting and 303(d) listing requirements. The document contains an overview of the Water Quality Standards (Chapter 1); a description of water quality monitoring approaches that are utilized and their linkage to assessment efforts (Chapter 2); the four assessment categories and the factors and decision principles applied when evaluating data and other information to determine if a water meets the Standards (Chapter 3); and, the rationale when deciding where and how to list a particular water (Chapter 4). Figure 1 illustrates the major components of VTDEC's assessment and listing process.

Figure 1. Organization of Vermont's water quality assessment and listing categories



Chapter One. Introduction

The VTDEC is charged with implementing the Vermont Water Quality Standards. As part of this responsibility, the Department must characterize the quality of Vermont's surface waters and determine what factors or stressors may be bringing about observed changes. In Vermont and nationwide, significant emphasis is placed on how the condition of surface waters is determined and whether waters comply with the applicable water quality standards. The methods used for making these determinations are important because whether the waters meet or do not meet the water quality standards informs and directs water quality management strategies for each waterbody and may lead to significant regulatory consequences. It is essential that determinations are accurate and defensible.

The Vermont Water Quality Standards provide the specific criteria and policies for the management and protection of Vermont's surface waters. The classification of waters (rivers, streams, lakes and ponds) as Class A(1), Class B(1), Class A(2), or Class B(2) are attributed management goals to be attained and maintained. The classification also specifies the designated water uses for each class and establishes narrative and numeric criteria to support designated and existing uses. The following table serves to indicate applicable designated uses. Chapter Four of this Assessment Methodology describes VTDEC's approach towards assessing the level of support of these designated uses considering the criteria established in the Water Quality Standards.

Table 1. *Designated Uses for Water Classifications.*

Designated Uses	**Class A(1)**	**Class B(1)**	**Class A(2)**	**Class B(2)**
Aquatic Biota and Wildlife	✓	✓	✓	✓
Aquatic Habitat	✓	✓	✓	✓
Aesthetics	✓	✓	✓	✓
Recreation - Boating	✓	✓	✓	✓
Recreation - Fishing	✓	✓	✓	✓
Recreation – Swimming & Other Primary Contact Recreation	✓	✓	✓	✓
Public Water Supplies			✓	✓
Irrigation of Crops & Other Agricultural Uses				✓

Surface water assessment is part science and part careful observation of the causes of the measured conditions. Assessment begins with an examination of the water's chemical, physical and biological condition, and the causality of the conditions observed. Data is used to estimate the Water Quality Standards "attainment status" of waters. Selecting representative data with known and quantifiable precision is the first step in assessing standards attainment. If a waterbody is determined not to attain one or more criteria of the Vermont Water Quality Standards, it is necessary to determine whether the impact to the surface water is of natural or anthropogenic origin. Identifying the cause of impairment will have considerable bearing on decisions about what approach to initiate to restore the waterbody. The Department also seeks to provide avenues for Vermont's community to contribute in a meaningful way to the protection and improvement of waters.

This document explains how VTDEC carries out surface water quality monitoring and assessment activities and how it makes decisions on a regular basis regarding a water's condition based on the Vermont Water Quality Standards. It also describes how VTDEC considers certain factors and how VTDEC makes decisions when interpreting data and observations obtained through monitoring efforts, whether monitoring information is generated by VTDEC or by others. This document does not describe VTDEC's broad array of monitoring programs, which can be found in Appendix A of the Water Quality Monitoring Program Strategy.

Throughout the Assessment and Listing Methodology document, the terms "waters" and "water resources," are used generically and mean lakes and ponds, perennial streams and rivers, and wetlands. The Department does not conduct or carry out any systematic monitoring on many other types of waterbodies including vernal pools, lakes and ponds less than five acres, or ephemeral or intermittent streams. This Assessment and Listing Methodology document is evolving and reflects the ever-improving methods available for water quality monitoring and interpretation. Vermont's residents, federal and academic collaborators, and others are encouraged to view the Assessment and Listing Methodology with an eye towards where and how they can improve or add to the quality of data and other information used to understand, protect, and improve Vermont's water resources.

Chapter Two. Surface Waters Assessment Methodology

Overview and Data Sources

The assessment process involves identifying, compiling, and evaluating all existing and readily available water quality data and information as well as evident point and nonpoint source pollution impacts on designated and existing uses specific to the basins and waters being assessed in any given year. The data is maintained in EPA's ATTAINS or in databases specifically designed to allow the population of the ADB. Vermont relies on the following sources of reliable data and information when assessing use support:

1. VTDEC Watershed Management Division (monitoring data)
2. VTDEC Water Investment Division (stakeholder and community information)
3. VTDEC Wastewater Management Program (National Point Source Discharge Elimination System permit compliance, residuals management)
4. Drinking Water and Ground Water Protection Division (indirect discharge permit compliance)
5. VTDEC Waste Management and Prevention Division (residuals management, solid and hazardous waste sites monitoring data)
6. VTDEC Laboratory Services at the Vermont Agricultural and Environmental Laboratory (VAEL) (quality assurance, analytical services, pollutant data)
7. Vermont Agency of Natural Resources Enforcement Division (violations of water quality standards)
8. Vermont Department of Fish & Wildlife (data on game fish and temperature, habitat studies)
9. Vermont Department of Health (beach closure information, fish consumption risk assessments)
10. Vermont Department of Forests, Parks, and Recreation (bacteriological testing, beach closure information)
11. Vermont Agency of Agriculture, Food, and Markets (agricultural water quality violations, maintaining Noxious Weeds list)
12. US Department of Agriculture, Natural Resource Conservation Service (agricultural nonpoint sources, locations of pollution abatement projects)
13. Community and community associations (community monitoring data, location of sources, complaints)
14. US Geological Survey Water Resources Division (monitoring and research)
15. US Forest Service (fish habitat and water quality data and information)
16. US Environmental Protection Agency (monitoring and research)
17. US Army Corps of Engineers (environmental assessments of project waters)
18. University of Vermont, Vermont State Colleges System, and other colleges (monitoring and research)

The VTDEC Biomonitoring and Aquatic Studies Section and Rivers Program provide much of the data used in the assessment of monitored river miles. The VTDEC Lakes and Ponds Program provides much of the data used in the assessment of monitored lake acres. The other sources noted above provide fewer and less widespread, but nevertheless important, data.

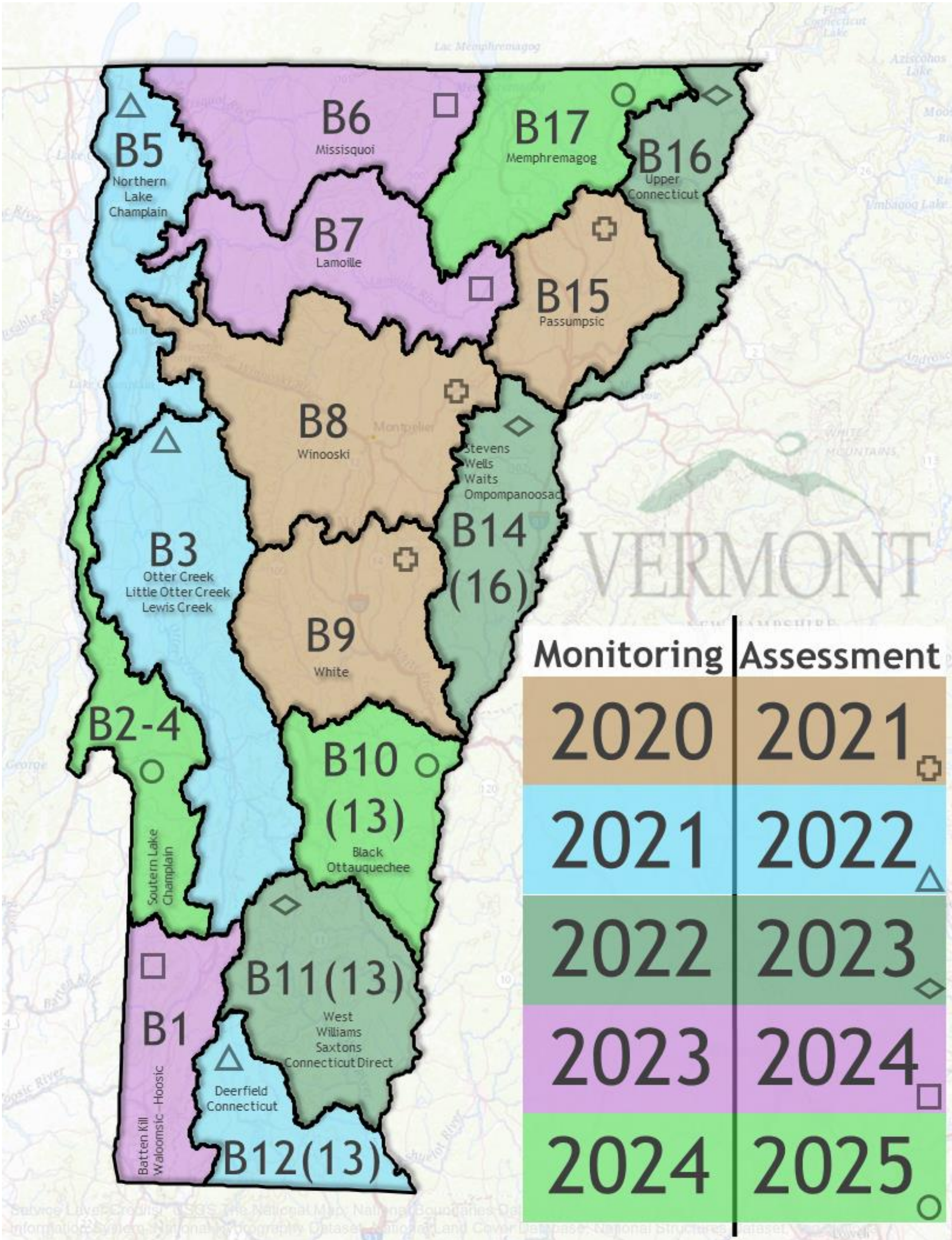
Monitoring to Collect Assessment Data

A full description of the Department's monitoring work is provided in the VTDEC [Water Quality Monitoring Strategy 2011 - 2020, May 2015]. The document contains goals, objectives, and recommendations as well as complete descriptions of the various monitoring and assessment programs in the VTDEC Watershed Management Division. The primary monitoring deigns utilized include targeted, probability-based, and special or TMDL related studies. These monitoring designs are conducted across all waterbody types including lakes, rivers and wetlands assessing the chemical, biological, and physical conditions

Rotational Watershed Assessment Approach

For the purposes of water quality management planning and implementation, which includes assessing and reporting water quality information, Vermont has been divided into fifteen planning basins. Each major basin has from four to twenty-two watersheds, subwatersheds and river mainstem segments. These sub-watersheds and mainstem river segments and the various lakes and ponds are known as “waterbodies.” There are a total of 208 river and stream waterbodies (37 as mainstem segments) and 574 lake and pond waterbodies designated throughout Vermont. The fifteen major river basins are in one of four large regional drainages: Lake Champlain, Connecticut River, Lake Memphremagog, or Hudson River. The fifteen basins are presented in Figure 2.

Figure 2. Rotational assessment schedule among Vermont's 15 planning basins



To more thoroughly assess the State's surface waters and to take advantage of all existing and readily available sources of water quality information, the VTDEC Watershed Management Division (WSMD) applies a five-year rotational watershed assessment process. By focusing evaluations on selected basins each year, more systematic, intensive, and integrated efforts can be made to collect and evaluate information related to the sources and causes of pollution. The scheduled assessment year for each basin is shown in Figure 2 above.

Under the rotational monitoring and assessment process, VTDEC staff compile and evaluate all water quality and biological data and information, determine impacts to designated and existing uses, and document very high quality waters for particular uses. Once the data and other information for each waterbody in a particular basin is assessed, a Basin Assessment and Management Plan (BAMP) is prepared. Each BAMP presents the latest conditions across waterbody types, any detectable trends, and targeted opportunities for future monitoring. The WSMD Programs then present priorities and management strategies to protect, enhance, maintain, and restore waters for each basin.

The information contained in each BAMP is also an early and vital piece of the tactical basin planning process conducted by the Watershed Planning Program within the Water Investment Division of VTDEC. One or more assessment reports have been prepared for all the basins and can be viewed on the Assessment and Listing page of the Watershed Management Division's webpage. The basin assessment process has evolved over time, so some of these earlier versions may have slightly differing content than more recent versions.

Biological Monitoring and Assessments

Assessment of biological integrity is conducted in the state's rivers and streams for the purpose of establishment of baseline biological condition, trend detection, classification, evaluation of permitted activities, and site-specific impact evaluation. Macroinvertebrate and/or fish populations of rivers and streams considered to be "wadeable" are assessed by comparing a series of biological metrics measuring community structure and function to numeric criteria that represent the biological expectation for the stream type being evaluated. These numeric criteria are used to directly interpret the narrative criteria for biota found in the Vermont Water Quality Standards (VTANR, WQS. 2017).

The Department implements biocriteria only when appropriate reference conditions have been described. The Department recognizes differences between biological expectations for different types of waterbodies including lakes, ponds, wetlands, streams, and rivers. Management decisions are made accordingly.

VTDEC uses monitoring of fish and macroinvertebrate communities for direct assessment of aquatic biota use attainment in wadeable streams and rivers. To date, biocriteria have not been developed for Vermont's nonwadeable, ephemeral or intermittent streams, or for wetlands or lakes, though indices for lakes are being evaluated utilizing aquatic macrophytes and lake bottom macroinvertebrates. A Vermont led regional lake biomonitoring workgroup continues to pursue the development of biocriteria for lakes.

The methods to determine individual site assessments are outlined in the "Application of Biocriteria for Fish and Macroinvertebrate communities in Vermont Wadeable Streams and Rivers" (WQS 2017, Appendix G). Using the biocriteria procedures, the integrity of the aquatic biota is attributed a rank of "Excellent" to "Poor". Rankings are indicative of aquatic biota use support status for each water quality classification and water management type.

Sampled streams include macroinvertebrate and fish community surveys where possible. Failure of either community to meet criteria indicates that the site/reach does not comply with applicable aquatic biota standards. While information from both assemblages is desirable, an overall biological assessment declaring support or non-support of aquatic biota uses can be made based on just one community alone. A determination of support or nonsupport is made only when data has been determined to be fully representative of the stream reach under consideration. Approximately 130 river sites are assessed each year in the late summer-early fall (September to October 15) on a five-year rotational watershed basis.

The biological potential for various sites has been established through statewide reference site monitoring. Information from long-term monitoring of reference sites also serves to refine existing biocriteria and detect trends in baseline biological integrity. The long-term goal of reference site monitoring is to gather information on a set of known reference sites every year or every other year. There are twelve of these long-term biological stream reference sites. Sites are stratified across stream ecotypes differing in drainage area size, elevation, and alkalinity, and include each of the stream types identified for biological criteria in the VWQS. Human activity in reference site drainages is minimal relative to other streams in the ecoregion, and most reference sites have significant portions of land with state and federal protection from future development.

Macroinvertebrate and/or fish populations may be sampled to assess a stream's site-specific condition. Where point-source impact assessments are conducted (including an evaluation of the appropriate chemical and physical data), potential pollution sources are spatially bracketed (i.e., above and below) with sample sites to determine effects on the aquatic biota attributable to the pollution source.

Lakes Monitoring and Assessments

Lakes and ponds in Vermont are monitored and assessed through a multitude of programs, too numerous to summarize here. Monitoring is conducted to identify current conditions and assess long-term water quality, habitat, climate, and other ecological trends. A full description of VTDEC lakes monitoring programs is provided on the Lakes Program website.

As with numerous monitoring programs, lake assessment is conducted for a variety of parameters through numerous assessment programs and methodologies. Through these multiple assessment processes, determinations of compliance with the VTWQS are documented. A full description of VTDEC lakes assessment programs is provided on the Lakes Program website.

Stream Geomorphic/Physical Habitat Assessment

Data collected during stream geomorphic assessments according to recognized procedures provide a better understanding of the physical processes and features shaping a watershed; help identify high quality habitat or habitat and aquatic communities that have been compromised; and contribute to understanding the effects of watershed land use activities on stream condition.

The Vermont Stream Geomorphic Assessment Protocols provide a method for assigning a geomorphic and physical habitat condition to stream reaches. The term "departure from reference" is used synonymously with stream geomorphic condition throughout the protocols. The degree of departure is captured by the following three terms:

A stream reach in *reference and good* condition:

- Is in dynamic equilibrium which involves minor to moderate localized change to its shape or location while maintaining the fluvial processes and functions of its watershed over time and within the range of natural variability; and
- Provides very high to high quality aquatic and riparian habitat with persistent bed features and channel forms that experience periodic disturbance because of erosion, deposition, and woody debris.
- Aquatic communities are likely assessed as “Excellent” to “Very Good” when sampled in a subset of the geomorphically assessed reach (absent other limiting factors on biological communities)
-

A stream reach in *fair* condition:

- Has experienced major changes in channel form and fluvial processes outside the expected range of natural variability; may be poised for additional adjustment with future flooding or changes in watershed inputs that would change the stream type; and
- Provides aquatic and riparian habitat that may lack certain bed features and channel forms due to increases or decreases in the rate of erosion and deposition-related processes.
- Aquatic communities are expected to be assessed in the “Good” to “Fair” range depending on whether the sample site reflects the erosional or depositional changes underway.
-

A stream reach in *poor* condition:

- Is experiencing severe adjustment outside the expected range of natural variability; is exhibiting a new stream type; is expected to continue to adjust, either evolving back to the historic reference stream type or to a new stream type consistent with watershed inputs; and
- Provides aquatic and riparian habitat that lacks certain bed features and channel forms due to substantial increases or decreases in the rate of erosion and deposition-related processes. Habitat features may be frequently disturbed beyond the range of many species’ adaptability.
- Aquatic communities are likely “Fair-Poor” or “Poor”. Aquatic biota sampling sites from previous years may not exist in the same location due to the stream type departure.

Phase 1 of the VTDEC protocols is the remote sensing phase and involves the collection of data from topographic maps and aerial photographs, from existing studies, and from very limited field studies. Geomorphic reaches and provisional reference stream types are established based on valley landforms and their geology. Predictions of channel condition (departure from reference), adjustment process, and reach sensitivity are based on evaluations of watershed and river corridor land use, and channel and floodplain modifications.

Phase 2 of the protocols is known as the rapid field assessment phase and involves the collection of field data from measurements and observations at the reach or sub-reach (segment) scale. Existing stream types are established based on channel and floodplain cross-section and stream substrate measurements. Stream geomorphic condition, physical habitat condition, adjustment processes, reach sensitivity, and stage of channel evolution are based on a qualitative field evaluation of erosion and depositional processes, changes in channel and floodplain geometry, and riparian land use/land cover. At least Phase 1 and Phase 2 stream geomorphic data will be used in determining altered waters due to physical problems.

Aquatic Invasive Nuisance Species Monitoring and Assessment

VTDEC monitors and assesses aquatic plant and animal threats and their nuisance level, whether a native or non-native aquatic species. Aquatic nuisance species can have significant impacts on the designated uses of surface waters biological, aesthetics, recreational, and as public resource. VTDEC assesses aquatic species to establish a reference of their growth, abundance of cover, evaluation of permitted activities, and site-specific impact evaluation and impacts of the non-target species present.

Aquatic Invasive (Non-Native) Species

In statute, aquatic (non-native) invasive plants or "Noxious Weeds" (listed by the Vermont Agency of Agriculture, Food and Markets) outcompete and displace plants in natural ecosystems and managed lands and have significant environmental, agricultural, and economic impacts. If a non-native species will likely cause social and/or ecological problems, control of the species may be recommended before it reaches nuisance densities. The Department understands the potential of invasive species to proliferate, spread rapidly, outcompete native species, and dominate an aquatic habitat.

Aquatic Nuisance Species

In statute, "aquatic nuisance" is defined as:

> *"Undesirable or excessive substances or populations that interfere with the recreational potential or aquatic habitat of a body of water. Aquatic nuisances include rooted aquatic plant, animal, and algal populations."*

Assessing Aquatic Invasive Nuisance impacts to Surface Waters involves many considerations, including:

- Complaints from members of the public about the extent of proliferation of nuisance species.
- Uses (swimming, fishing, boating, and aesthetics) may be affected, either positively or negatively by aquatic organisms. The effect of these aquatic organisms on different uses needs to be considered and balanced.
- The presence of certain aquatic plant species can be used as indicators of nutrient enrichment, e.g., certain species may be present in small numbers in many waters, but when growing in abundance, they may indicate an elevated nutrient level. These include *Elodea canadensis*, *Ceratophyllum demersum,* and *Zosterella dubia*.
- Nutrient enrichment. Generally, as nutrients increase due to eutrophication, nuisance aquatic plant or algae growth also increases. If a water is known to have elevated nutrient levels, it's possible the aquatic growth will be elevated above natural levels as well. An increase of nutrients might also occur when aquatic plant beds are reduced naturally or through management activities.
- Ecological stability. In some cases, a significant reduction of aquatic plant growth can stimulate excessive algae growth, simply trading one problem for another. Likewise, a significant reduction in the population of an animal species may alter food web dynamics. The risk of these occurrences or other sudden shifts in species composition needs to be considered.
- Expected natural growth of a waterbody. Generally, the smaller and shallower a waterbody, the more aquatic plant and algae growth is likely. It is difficult to cause a waterbody to support an amount of growth less than its natural state. A variety of waterbody types and associated growth is a positive attribute for both the ecological and recreational landscape.

Data Solicitation and Quality

In conjunction with each biennial assessment and reporting cycle, VTDEC solicits data to further enhance the quantity and spatial coverage of water quality data and other information that is used in assessing surface waters. The solicitation for water quality data is distributed to various watershed groups and is posted on the WSMD website. The solicitation seeks data and information to be submitted by mid-November in odd-numbered years to be considered for the even-year reporting cycle. Data and other information submitted after that date will be considered for the next reporting cycle.

Data used must be of known quality and be representative of the water's condition. All data generated by VTDEC in conjunction with WSMD monitoring programs are subject to quality assurance planning using USEPA quality assurance guidance. Moreover, all data generated in part or whole using funding from USEPA must be subject to a USEPA-approved quality assurance project plan (QAPP). All data generated in conjunction with any active and/or approved QAPP are considered readily available and reliable data (subject to data limitations identified in the quality assurance/quality control validation and verification process for each project) and are considered in determining use support. Data can be rejected from consideration if it does not meet data quality objectives established by individual QAPPs. VTDEC's Quality Management Plan and Water Quality Monitoring Strategy provide listings of project specific QAPPs. Guidance and assistance regarding quality assurance is also provided by the Vermont Agriculture and Environmental Laboratory.

For data provided by organizations other than VTDEC and WSMD such as consultants, colleges, universities, and community-based activities, data quality must be assured prior to considering it as the sole basis for use support. The number of samples, the length of the sampling period, the antecedent weather conditions, degree of compliance or violation, and other factors are all considered when evaluating data from other organizations. Where data of unknown or unquantifiable quality are at odds with companion data of quantified quality, the higher quality data will be accorded higher weight in determining use support. Where data of unknown or suspect quality are the only information available, the waterbody is scheduled for additional monitoring prior to determining use support.

Vermont Surface Water Assessment Categories

Vermont's rivers, streams, lakes, and ponds have been categorized into "waterbodies" which serve as the cataloging units for the overall statewide assessment. Waterbodies are typically entire lakes, subwatersheds of river drainages, or segments of major rivers. Using data that is quality assured along with other contextual information that is reliable, the Watershed Management Division determines whether each waterbody meets or does not meet Vermont Water Quality Standards, and then places waters into one of four assessment categories, considering the waterbody classification and water management type. The three categories used in Vermont's surface water assessment are **full support, altered,** and **impaired**. Waters that support designated and existing uses and meet Water Quality Standards are placed into the full support category. Waters that do not support uses and do not meet standards are placed into the altered or impaired category. Waters can also be put into an **unassessed** category. These assessment categories are described below.

Full Support Waters

This assessment category includes waters of high quality that meet all use support standards for the water's classification.

In Vermont, there are many waters, such as intermittent streams, that are a lower priority for sampling given resource constraints, lack of public access or interest, and competing needs within VTDEC's water quality monitoring program. VTDEC therefore makes preliminary assessments, where practical, by considering five factors that address the likelihood that significant stressors exist within the subject watershed. Waters that meet all these factors are then considered to support their uses. The factors VTDEC uses to develop preliminary, screening-level assessments for these waters are:

- no discharges or contaminated sites in proximity to the waterbody;
- low probability of habitat degradation as evaluated by "Phase One" geomorphic assessments or other remote sensing evaluations;
- nearby sites have biological assessment findings compliant with Vermont Water Quality Standards for similar class;
- no problems are uncovered during outreach efforts associated with the rotational assessment process and basin planning; and
- no known water level manipulations.

Altered Waters

These are waters where a lack of flow, water level or flow fluctuations, modified hydrology, physical channel alterations, documented channel degradation, or stream type change is occurring <u>and</u> arises from some human activity, OR where the occurrence of aquatic invasive species has had negative impacts on designated uses. These aquatic communities are altered from the expected ecological state.

This assessment category includes those waters where there is a documentation of water quality standards violations for flow and aquatic habitat, but EPA does not consider the problem(s) caused by a pollutant.

Impaired Waters

These are surface waters where there are chemical, physical, and/or biological data collected from quality assured and reliable monitoring efforts that reveal 1) an ongoing violation of one or more of the criteria in the Water Quality Standards and 2) a pollutant of human origin is the most probable cause of the violation.

Unassessed Waters

Waters for which VTDEC has limited monitoring data and available information to make an assessment decision.

Chapter Three. Assessment Use Support Determinations

The following pages provide specific criteria, principles for making decisions, and other information that VTDEC applies when assessing water quality conditions and determining whether individual designated uses are fully supported, altered, impaired, or unassessed. Information below is presented by each of the seven designated uses to show how relevant, representative, and reliable water quality monitoring data and other information relates directly to the degree of use support for assessment reporting purposes. If not otherwise specified, the decision-making criteria apply to both streams and lakes.

Consistent with Section 29A-301 of the Vermont Water Quality Standards, waters in which one or more applicable water quality criteria are not met due to natural influences are not considered to be in noncompliance with respect to such criteria. In such waters, activities may be specifically authorized by a permit, provided that those activities do not further reduce the quality of the receiving waters and would comply with all other applicable criteria.

Aquatic Biota and Wildlife and Aquatic Habitat Uses

In assessing Aquatic Biota and Wildlife and Aquatic Habitat Uses, the VTDEC Watershed Management Division uses several types of water quality and water quantity data and information to determine use support. The specific data types are biological monitoring, habitat assessment, conventional pollutants, toxicants, and invasive aquatic species. For lakes, additional assessment guidelines are used to assess directly or indirectly uses when considering conventional pollutants, nutrients, and information regarding water-level impacts. Where there is biological (aquatic community) data, use support is determined by the assessment of that data even if conventional pollutant measures or habitat indicators may be available. Specific decision-making criteria are as follows:

Aquatic Biota and Wildlife Assessment using Biological Monitoring

Streams

Full Support: Biological assessments for fish and/or macroinvertebrate communities demonstrate compliance with appropriate threshold criteria as described in DEC biocriteria implementation methodologies. In the absence of biological data or applicable biocriteria, all available information and data are used to make scientifically defensible weight-of-evidence findings that designated aquatic biota uses are fully supported. In most cases, biological condition ratings of *Excellent, Very Good,* and *Good* will indicate full support status for Class A(1), Classes B(1) and A(2), and B(2) respectively.

Altered: Biological assessments for fish and/or macroinvertebrate communities demonstrate non-compliance with appropriate threshold criteria as described in DEC biocriteria implementation methodologies and the cause is not a pollutant (e.g., flow regulation or aquatic invasive species). In the absence of biological data or applicable biocriteria, all available information and data are used to make scientifically defensible weight-of-evidence findings that designated aquatic biota uses are not fully supported. In most cases, biological condition ratings of *Very Good* or lower*, Good* or lower*,* and *Fair* or lower will indicate altered status for Class A(1), Class B(1), and Class A(2)/B(2) respectively. Generally, biological data indicating non-attainment from the previous two or more successive samples are necessary determine this condition.

Impaired: Biological assessments for fish and/or macroinvertebrate communities demonstrate non-compliance with appropriate threshold criteria as described in DEC biocriteria implementation methodologies if the cause is due to a pollutant of human origin. In the absence of biological data or applicable biocriteria, all available information and data are used to make scientifically defensible weight-of-evidence findings that designated aquatic biota uses are not fully supported. In most cases, biological condition ratings of *Very Good* or lower, *Good* or lower, and *Fair* or lower will indicate impaired status for Class A(1), Class B(1), and Classes A(2) and B(2) respectively. Generally, biological data indicating non-attainment from the previous two or more successive samples are necessary to determine this condition.

Aquatic Habitat Assessment

Full Support: Depending on the water's classification (A(1), B(1), A(2), B(2)), very high or high quality habitat with up to a moderate change from natural or reference condition exists "consistent with the full support of all aquatic biota and wildlife uses."

Altered: Changes to the habitat show a moderate change from reference depending on the water's classification. There is an undue adverse effect on the physical nature of the substrate. Aquatic habitat surveys show significant deviation from the reference condition due to human-caused changes and/or Reach Habitat Assessment indicated "fair" to "poor" conditions. All life cycle functions, including over-wintering and reproductive requirements, are not adequately maintained, and protected due to the physical habitat changes.

Impaired: A pollutant of human origin is shown to cause more than the allowable change to aquatic habitat as defined by Vermont Water Quality Standards.

Conventional Pollutants (temperature, pH, D.O., turbidity, phosphorus, nitrate-nitrogen.)

Streams and Lakes

Full Support: Waters that are not impaired due to conventional pollutants, assessed using the Vermont Water Quality Standards.

Altered: This assessment category is not used in this context.

Impaired: Temperature: Due to human activities, water temperatures are too high or too low to fully support aquatic biota, wildlife, and aquatic habitat uses according to the Vermont Water Quality Standards Section 29A-302(1).

Acidity: Reliable, representative monitoring indicates that pH values repeatedly fall below 6.5 standard units or exceed 8.5 standard units across a range of weather conditions, and values are not due to natural sources.

Dissolved oxygen: Reliable, representative monitoring indicates D.O. values (concentration or percent saturation) repeatedly fall below the standard for the water's classification except as noted below.

Turbidity: Reliable, representative monitoring shows that the mean turbidity values are above the standard for a water's classification as measured at or below dry weather base-flow conditions and values are not due to natural sources.

Nitrates: Reliable, representative monitoring shows that nitrate-nitrogen repeatedly and/or consistently exceeds the standard for the water's classification and elevation as noted in the Vermont Water Quality Standards Section 29A-302(3).

Phosphorus: Reliable, representative monitoring shows that mean phosphorus concentrations repeatedly and/or consistently exceed the criteria contained in the Vermont Water Quality Standards Sections 29A-302(2) and 29A-306 (Table 2).

Lakes Only – Alkalinity and Dissolved Oxygen

Full Support: Waters that are not impaired.

Altered: This assessment category is not used in this context.

Impaired: Reliable monitoring data indicates that alkalinity routinely drops below 2.5 mg/l (as acid neutralizing capacity) during the spring runoff period. Reliable monitoring data indicates that a lake's hypolimnetic dissolved oxygen concentration falls to (or near) 0 mg/l or 0% saturation for a period of greater than 50% of the summer stratification period. However, if in the best professional judgement of DEC scientists, the dissolved oxygen deficit is due to natural causes (e.g., morphometry and meromixis), aquatic biota uses will be considered instead as fully supported.

All Toxics but Chloride (addressed below)

<u>Streams and Lakes</u>

Full Support: Waters that are not impaired due to toxicants, as described below.

Altered: Toxicants are considered pollutants, therefore, the category "altered" is not applicable.

Impaired: In most cases, the following exposure presumptions are applicable to compliance determinations: for any one pollutant, an acute aquatic biota criterion is exceeded more than once within a 3-year period, for longer than one hour, above ten-year, seven-day flow minimum (7Q10) flows; or a chronic aquatic biota criterion is exceeded for more than four consecutive days in a three-year period, above 7Q10 flows.

(DEC recognizes that the literal interpretation of the exposure scenario cited would be difficult to replicate in a field situation. The language cited reflects the exposure conditions used to develop the numerical criterion that is the water quality standard. It is likely that available monitoring data would be collected under a variety of temporal and spatial formats. In evaluating data, DEC uses the exposure assumptions of the criterion development as guidelines in the interpretation of data and uses empirical and judgmental means to assess whether there is reasonable potential for those exposure assumptions to be violated. Given the variable nature of available information, evaluations will vary on a case-by-case basis. DEC takes into consideration guidance provided by EPA when evaluating toxicants in surface waters (see "Technical Support Document for Water Quality-based Toxics Control." EPA/505/2-90-001).

Chloride

<u>Streams and Lakes</u>

Full support: No exceedances of the acute (860 mg/L) or chronic (230 mg/L) criterion.

Impaired:

Chronic criterion:

<u>Grab Samples</u>: Given the duration and frequency terms of the chronic criteria, limited numbers of chloride grab samples will rarely be sufficient to document the four-day average over a three-year period. Surface

waters with multiple samples above the criterion will direct the need for follow-up monitoring, most likely developing a continuous dataset. However, if a sufficiently large chloride dataset exists to confidently calculate any unique 96-hour average exceeding the criterion, then the water will be assessed in non-support.

Continuous Monitoring Using Conductivity: Where continuous monitoring datasets indicate an average chloride concentration exceeding 230 mg/L for more than one 96-hour period in a three-year period, the waterbody will be assessed in non-support (See Appendix A).

Acute Criterion:

Grab Samples: A minimum of 2 samples, separated by one hour, that exceed 860 mg/L for any given 3-year period.

Continuous Monitoring Using Conductivity: Where continuous monitoring datasets indicate an average chloride concentration more than 860 mg/L for more than one hour in a three-year period, the waterbody will be assessed in non-support.

Aquatic Invasive Nuisance Species

Full Support: Aquatic Biota and Wildlife and Aquatic Habitat Uses are not altered by aquatic invasive species.

Altered: Moderate to heavy infestation of aquatic invasive species with substantial impact to native communities (for aquatic macrophytes, locally abundant growth in >50% of littoral zone to dense growth in >75% of littoral zone).

Fluctuated Reservoirs and Lakes

Reservoirs present special cases with regards to assessment of Aquatic Biota and Wildlife and Aquatic Habitat Uses. In the absence of direct biological measurements beyond routine aquatic plant survey data, assessment can be made using the following decision-making 'tree.' To use this decision tree, several pieces of information regarding the reservoir are useful. These include bathymetry, maximum and mean waterbody depth, the limnological shoreline development index, and the magnitude and timing of the drawdown. These data can be used collectively to estimate the proportion of the littoral zone likely to be affected by a drawdown regimen. Where available, biological data (in particular the presence and distribution of aquatic macrophytes within the littoral zone) are also useful.

1) Can the level of the waterbody be regulated by an artificial structure (e.g., dam, sluice, weir)?
   Answer is NO: no alteration due to water level fluctuation. ***Full Support.***

   Answer is YES: go to 2.

2) Is the artificial structure regulated (e.g., Section 401 Water Quality Certification, 10 V.S.A Chapter 43 Dam Order, Water Resources Board rules; Public Service Board Certificate of Public Good or 30 V.S.A Section 401,)?
   Answer is NO: an alteration could potentially exist but must be verified by direct assessment before the waterbody can be correctly assessed; go to 4.

   Answer is YES: go to 3.

3) Do the conditions of the regulation subject the waterbody to periodic water level fluctuations that are attributable to operations?

   Answer is NO: ***Full Support - no alteration due to water level fluctuation if operated in accordance with the regulatory conditions.***

   Answer is YES: Go to 4***.***

4) Is the waterbody in fact subject to periodic fluctuations that are attributable to operation or manipulation of the outflow structure?

   Answer is NO: ***Full support at time of assessment.*** There is potential for stress due to the ability of the outflow operators to fluctuate water levels if owner deems necessary, which can negatively impact littoral zone communities.

   Answer is YES: Go to 5.

5) Does there exist a sufficient area of littoral habitat below the drawdown zone to enable establishment of a viable and stable aquatic community, with all expected functional groups, while accommodating the drawdown regimen, **or** does available biological data suggest that such a community exists within the drawdown zone?

   Answer is NO: ***altered.*** These alterations create more than a moderate change to aquatic habitat. Littoral zone impacts of this magnitude will have cascading impacts throughout the trophic web, resulting in more than a moderate change in aquatic biota from the reference expectation. Aquatic macroinvertebrate and fish assemblages exhibit more than moderate changes in the relative proportions of tolerant, intolerant, taxonomic, and functional components. Accordingly, the entire acreage is assessed as altered.

   Answer is YES: ***full support.*** These stresses cause no more than a moderate change to aquatic habitat. Littoral zone impacts of this magnitude could have cascading effects within the trophic web of the waterbody, but these are presumed to create no more than a moderate change to aquatic biota from the reference expectation based on the relative proportions of tolerant, intolerant, taxonomic, and functional groups. Aquatic Habitat Use

Swimming/Contact Recreation Use

For assessment of Swimming/Contact Recreation Use, the DEC Watershed Management Division uses one or more types of data to determine whether this use is supported. The specific data types are bacterial monitoring, cyanobacteria reports, presence and density of aquatic nuisance species, and on rare occasion, the presence of chemical contaminants. Decision-making criteria are as follows:

Indicator Bacteria

To assess waters for support of swimming and contact recreation using *E. coli* monitoring data, a minimum number of data points are necessary, and supporting contextual data such as antecedent weather and flow conditions must be considered. DEC considers at least five (5) reliable and quality assured sample results over a swimming season and gathered across a range of weather/flow conditions to be the minimum practical number of samples necessary to document representative conditions and to assess attainment of contact recreational uses. In a practical sense, weekly or more frequent *E. coli* data across the swimming season is most useful to determine impairment and observe weather-related patterns in bacterial concentrations. If there are questions regarding the representativeness of the data, the water is identified as needing monitoring and is recommended for follow-up *E. coli* sampling in the next season.

In keeping with the epidemiological studies that are the basis of the USEPA's E. coli indicator bacteria standard (USEPA 2012), there should be sufficient evidence that the contamination is from a human source. If contamination sources are unclear, further source investigation may be necessary before an assessment can be made.

Vermont's standards for bacteria are like those recommended by EPA. In Class A waters, *E. coli* are not to exceed the geometric mean of 126 organisms/100 ml obtained over a representative period of 60 days and no more than 10% of samples may be above the statistical threshold value of 235 organisms/100ml, with none attributable to the discharge of wastes. The same criterion applies to Class B waters, except for the preclusion of treated waste, and with criteria in a shorter averaging period for waters receiving CSOs.

The following guidelines are applied during the assessment process:

Full Support: Waters are suitable for swimming with generally low *E. coli* values.

Altered: *E. coli* indicator bacteria are considered a pollutant. This assessment category is not applicable.

Impaired: For class B waters, the geometric mean of 126 *E. coli* /100 ml is exceeded in a given segment or area **and/or** more than 10% of the samples are above 235 organisms/100 ml. The contamination must be attributable to sources other than natural sources. DEC accepts a weight-of-evidence approach to confirm that *E. coli* values are or are not of natural origin. The WQS state that samples should be obtained "over a representative period of 60 days" and "in water receiving combined sewer overflows, the representative period shall be 30 days". However, at least five samples collected regularly over the representative period is recommended, and flow and antecedent precipitation are important in this determination.

For Class A(1) and A(2) waters, the geometric mean of 126 *E. coli* /100ml is exceeded over a representative period of 60 days **and/or** more than 10% of the samples are above 235 organisms/100ml. No elevated *E. coli* can be "attributable to the discharge of wastes". Generally, data from at least two swimming seasons are needed to assess waters as impaired for swimming.

Alternatively, waters with CSOs present that do not meet the current CSO control policy and discharge on a relatively frequent basis are considered impaired for swimming without the direct water *E. coli* sampling numbers (per the sampling parameters described above).

Aquatic Invasive Nuisance Species

Full Support: Swimming/Contact Recreation Use is not altered by aquatic invasive species.

Altered: Moderate to heavy infestation of aquatic invasive species with substantial impact to swimming (for aquatic macrophytes, this would be locally abundant growth in >50% of littoral zone to dense growth in >75% of littoral zone).

Impaired: Aquatic invasive species are not considered a pollutant; therefore this assessment category does not apply.

Chemical Contamination

Water quality criteria do not address incidental/accidental ingestion of water or dermal exposure to recreational users where there is chemical contamination present. Chemical contamination can enter surface waters or be deposited on beaches from both natural and anthropogenic sources. These may be point sources, such as municipal and industrial outfalls, or nonpoint sources such as runoff from land or leaching from old hazardous waste sites. In most cases there will be significant dilution or attenuation of contaminants.

Drinking water guidelines can provide a starting point for deriving values that could be used to make a screening level risk assessment. It has been suggested (WHO Guidelines for Safe Recreational Waters 2009) that water quality standards for chemicals in recreational waters should assume that recreational water makes only a minor contribution to intake.

It is assumed that contribution of swimming is equivalent of 10% of drinking-water consumption. Based on drinking water consumption value of 2.4 liters a day, this would result in an intake of 200ml per day from recreational contact with water. A simple screening approach therefore would be that a substance occurring in recreational water at a concentration of ten times the drinking water guidelines (VDOH Drinking Water Guidance) would need further assessment.

Organic contaminants can be present in surface waters from industrial and agricultural activity. EPA studies have shown that dermal contact and inhalation can contribute as much as water ingestion. Many of these are associated with sediments and particulate matter. Consideration should be given to the possibility of sediment being disturbed and ingested by infants and young children. EPA Regional Screening Levels (RSL) for Residential Soil can be used to screen sediment chemistry data from a site. If the screening value is exceeded, it suggests the need for specific evaluation of the contaminant taking local circumstances into consideration.

Full Support: No chemical contamination present in sediments or surface waters at level of concern.

Altered: This category is not used under these situations.

Impaired: A water is part of a Superfund site or other hazardous waste site where special health and safety training and precautions are required to access the site or the public is restricted access from all activities including swimming, fishing, and trespassing for health and safety reasons by an entity such as the Vermont Department of Health.

Fishing - Recreational Uses

For assessment of Fishing Use, the DEC Watershed Management Division uses information regarding water quantity, water quality, and other information regarding the game fishery and records of public feedback and complaints to determine levels of support.

General Conditions

Full Support: Water quantity and quality sufficient for fishing according to class.

Altered: Fishing is limited due to insufficient or diminished water, plant growth, or channel alterations.

Impaired: Fishing is limited due to water quality or aquatic habitat impairment(s) caused by pollutants from human sources. Reliable, representative monitoring shows that temperature repeatedly and/or consistently exceeds the standard for the water's classification and fish habitat designation as noted in the Vermont Water Quality Standards Section 29A-302(1).

Aquatic Invasive Nuisance Species

Full Support: Fishing Recreational Uses are not altered by aquatic invasive species.

Altered: Moderate to heavy infestation of aquatic invasive nuisance species with substantial impact to fishing (for aquatic macrophytes, this would be locally abundant growth in >50% of littoral zone to dense growth in >75% of littoral zone).

Fish Consumption Advisories

Vermont interprets the U.S. EPA guidance on fish consumption use attainment to indicate that no waters fully support fish consumption. This is due to well-documented contamination of varying levels of lakes by mercury in waters, sediments, and aquatic biota arising from atmospheric deposition. In the tissues of fish inhabiting Lake Champlain (and elsewhere), other contaminants including polychlorinated biphenyls, polyaromated hydrocarbons, and “DDT” derivatives, have been identified.

DEC does not, however, subscribe to the notion that fish tissue consumption is impaired on a statewide basis. This is because the Vermont Department of Health has determined that most fish species can be consumed from most Vermont waters, albeit at a reduced rate. Fish consumption use is considered impaired only if the fish species subject to the consumption advisory is documented to exist in the waterbody and contaminant data exist for that species from the waterbody. This approach is consistent with current EPA guidance.

Full Support: No fish non-consumption advisory in effect.

Altered: Tissue contaminants are derived from the deposition or release of pollutants into the aquatic environment. Accordingly, this assessment category is not relevant.

Impaired: Fish consumption use is considered impaired only if the fish species subject to the consumption advisory is documented to exist in the waterbody and contaminant data exist for the species from the waterbody. For a given fish species present in a waterbody, a ‘no-consumption’ advisory is in place for a designated sub-population (e.g., children or women of childbearing age) or for the general population.

Boating - Recreational Use

For assessment of Boating Use, the DEC Watershed Management Division uses information regarding water quantity and water quality.

General Conditions

Full Support: Water quantity and quality sufficient for boating according to class.

Altered: Boating is limited due to insufficient or diminished water, plant growth, or channel alterations. Boating is not feasible to the degree deemed achievable for the water’s class.

Impaired: Boating is limited due to water quality or aquatic habitat impairment(s) caused by pollutants from human sources.

Aquatic Invasive Nuisance Species

Full Support: Boating Recreational Uses are not altered by aquatic invasive species.

Altered: Moderate to heavy infestation of aquatic invasive nuisance species with substantial impact to boating (for aquatic macrophytes, this would be locally abundant growth in >50% of littoral zone to dense growth in >75% of littoral zone).

Public Water Source Use

Public water source use is assessed using data on toxicants and bacteria; information on water treatment plant operation and operating costs; and data describing cyanobacterial (blue-green algae) toxin concentrations.

Full Support: Water quality suitable as a source of public water with disinfection and filtration.

Altered: A well-established *Dreissenid* mussel infestation or frequent cyanobacteria blooms have increased cost or effort to produce water that is suitable for drinking.

***Impaired**:* Criteria established by the Federal Safe Drinking Water Act can be met only by employing treatment practices that operationally or financially supersede customary practices that include filtration and disinfection.

Aesthetics Use

For assessment of Aesthetic Use, the DEC Watershed Management Division uses water quality and water quantity information from field surveys for rivers and streams and public feedback and complaints as well as field surveys for lakes and ponds to determine levels of support.

General Conditions

Full Support: Water character, flows, water level, riparian, and channel characteristics exhibit good to excellent aesthetic value consistent with the waters classification. Water clarity and substrate condition is good. No floating solids, oil, grease, scum. Limited or no record of public concern.

Altered: Aesthetic quality is poor due to a diminished amount of water to no water in the channel or lake resulting from human activities. Streambanks are severely slumping, stream is braided, channel is highly straightened and rip-rapped, and channel bed material is severely jumbled and unsorted.

Impaired: Aesthetic quality of water is poor. Water is frequently and unnaturally turbid. Substrate is unnaturally silt-covered, mucky, or otherwise changed to adversely affect the aesthetics in an undue manner. Presence of solid waste, floating solids, scum, oil, or grease occurs frequently and persistently. Rocks are unnaturally and extensively colored by metal contamination.

Aquatic Invasive Nuisance Species

Full Support: Aesthetics Use is not altered by aquatic invasive species.

Altered: Moderate to heavy infestation of visible aquatic invasive species with substantial impact to aesthetics (for aquatic macrophytes, this corresponds to locally abundant growth in >50% of littoral zone to dense growth in >75% of littoral zone).

Combined Nutrient Criteria for Lakes, Ponds, and Reservoirs

Full Support: All available sampling data from within the last 10 years (with a minimum of five years of data over that period) show with 95% confidence based on a one tailed T-test that the mean of the total phosphorus annual means or all nutrient response annual means do not exceed the criteria contained in Table 3 of Section 29A-306 of the Vermont Water Quality Standards; or, for full support at the B(2) classification level only, sampling data from a minimum of two visits show expected total phosphorus concentrations (e.g. TP < 18 µg/l) or nutrient response conditions (e.g. chlorophyll-a < 7.0 µg/l, Secchi disk depth > 2.6 m) for the lake's characteristics based on best professional judgement and documentation of little or no impact from post-industrial land use changes and/or human disturbances (e.g. Vermont Lake Score Card Shoreland Score is "Good Condition" and Watershed Score is "Minimally Disturbed").

Impaired: All available sampling data from within the last 10 years (with a minimum of five years of data over that period) show with 95% confidence based on a one tailed T-test that the mean of the total phosphorus annual means ***or*** all nutrient response annual means exceed the criteria contained in Table 3 of Section 29A-306 of the Vermont Water Quality Standards; or sampling data from a minimum of two visits show extremely high total phosphorus concentrations (e.g. TP > 100 µg/l) [a] or extreme nutrient response conditions (e.g. chlorophyll-a > 25 µg/l, Secchi disk depth < 1.0 m) [c] exceeding expected values for the lake's characteristics based on best professional judgement and documentation of post-industrial land use changes and/or human disturbances (e.g. Vermont Lake Score Card Shoreland Score is "Poor Condition" and Watershed Score is "Highly Disturbed").

[a] Based-on Nurnberg 1996 characterization of hyper-eutrophic conditions in the summer epilimnetic zone

Agricultural Water Supply Use

There are no EPA definitions for agricultural water supply nor any state definitions and criteria. Consequently, this use is unassessed, and the three assessment categories are not used.

Chapter Four. Listing and De-Listing Methodology

For the purposes of identifying and tracking important water quality problems where the Vermont Water Quality Standards (VTWQS) are not met, VTDEC has developed the Vermont Priority Waters List. This list is composed of several parts, each identifying a group of waters with unique water quality concerns. Development of each part is guided by various regulations and/or management considerations including federal Clean Water Act (CWA) requirements, EPA guidance, or Vermont-specific management objectives. This list is produced biannually on even numbered years. Table 2 outlines the composition of the Priority Waters List while specific details of each list's composition are given below.

Table 2. Summary of Vermont Priority Waters List

List Section	Assessment status	Description
Part A (303(d) List)	Impaired	Also known as the CWA §303(d) Impaired Waters List. This federally mandated list identifies impaired waters scheduled for TMDL development
Part B	Impaired	Waters assessed as impaired for which TMDLs are not required
Part D	Impaired	Impaired waters that have completed and EPA approved TMDLs
Part E	Altered	Waters not in compliance with VTWQS due to the presence of invasive aquatic species
Part F	Altered	Waters not in compliance with VTWQS due to flow regulation

Impaired Waters

All waters determined to be impaired are placed on Part A (303(d) List), Part B, or Part D.

Part A - 303(d) List

Part A of the Priority Waters List identifies impaired surface waters that are scheduled for total maximum daily load (TMDL) development. Part A of the List is prepared in accordance with current EPA guidance and federal regulations 40CFR 130.7 ("Total maximum daily loads (TMDL) and individual water quality-based effluent limitations"). A TMDL is required for these waters to establish the maximum amount of a pollutant that may be introduced into the water after the application of required pollution controls and to ensure the VTWQS are attained and maintained.

In addition to identifying the waterbody, Part A identifies the pollutant(s) causing the impairment, the priority ranking for TMDL development, which water use(s) are impaired, and a brief description of the specific water quality problem if known.

Identification of Pollutant

The federal regulation governing 303(d) List development, 40CFR §130.7(b)(4), requires states to include the "pollutants causing or expected to cause violations of the applicable water quality standards". This pollutant then becomes the basis for TMDL loading allocations or for the control measures necessary to bring about compliance.

Where there is monitoring data that identifies a violation of numeric criteria, identification of the pollutant is evident. For example, long-term monitoring data may identify a segment of Lake Champlain as exceeding the numeric criterion for total phosphorus. Other numeric criteria are less indicative of the specific pollutant as in the instance of a dissolved oxygen criteria. The numeric criterion in this instance can be measured (low dissolved oxygen) but the pollutant causing that condition is not directly identified. Where there is monitoring data that identifies a violation of a narrative standard, the identification of the causal pollutant becomes more complex. An example is where biomonitoring data indicates a violation of the biocriteria for aquatic biota use support.

In the instance of a biocriteria violation, VTDEC attempts to be as accurate as possible in identifying the causal pollutant. Where appropriate, VTDEC subscribes to EPA's Stressor Identification Methodology (USEPA, 2000b) or similar process. These assess site specific stressors and indicators such as biological and habitat indicators, land use information, proximity of known pollutant sources, or other relevant information to identify by inference the most probable causal pollutants or stressors. This process can provide a defensible list of pollutant stressors or suite of stressors of common origin as in the case of runoff from impervious surfaces (i.e., stormwater).

At times, however, it may be necessary to identify a water as impaired without providing a specific causal pollutant. In these instances, the pollutant is identified as "undefined".

TMDL Scheduling

Priority ranking for TMDL development is done with consideration of many factors. These include but are not limited to: (1) health issues, (2) the nature, extent, and severity of the pollutant(s), (3) the use or uses that are impaired, (4) the availability of resources and methods to develop a TMDL, (5) the degree of public interest, and (6) the utility of TMDL development to the elimination of the impairment.

Public Comment Opportunity, Submittal to EPA, and EPA Approval

Upon compilation of the draft Part A-303(d) List, it is made available to the public for review and comment. Notification of availability is at a level sufficient to allow broad coverage of the general public and may include notices in newspapers, websites, and direct notification through email or mailing lists. In addition to notification, public meetings may be conducted to further the public's understanding. Following receipt of public comments, a response summary is developed that describes how the comments were addressed. Appropriate changes are made to the list and a final version of the Part A-303(d) List is then sent to the New England regional office of EPA for review and approval.

De-listing - Interim List

During development of new Part A-303(d) Lists, there may arise the need to propose for de-listing water(s) identified on previous lists. In this instance, waters proposed for de-listing are presented on the Interim List. This list is termed "interim" because it only exists during the period of Part A-303(d) List development to notify the public and EPA of de-listing proposals and to provide the rationale and justification for such proposals.

On the Interim List, each entry contains specific information for that waterbody as to why it is being proposed for de-listing. The waterbody-specific rationale is intended to provide "good cause" for de-listing and may be based on the following determinations:

- Assessment and interpretation of more recent or more accurate data demonstrate that the applicable WQS(s) is being met.

  The absence of impairment can be substantiated by data of a comparable quantity and quality as the data that was required to assess the water as impaired (for example, 2 years of biological or chemical data needed to establish impairment generally means 2 years of data needed to establish attainment).

- Flaws in the original analysis of data and information led to the segment being incorrectly listed.
- Documentation that a water included on a previous Part A-303(d) List was not required to be listed by EPA regulations, e.g., segments where there is no pollutant associated with the non-compliance.
- A determination pursuant to 40 CFR 130.7(b)(1)(iii) that there are other pollution control requirements required by state, local, or federal authority that will result in attainment of WQS(s) for a specific pollutant(s) within a reasonable time.

  To de-list these impaired waters from Part A, VTDEC must be convinced that other pollution control requirements, such as best management practices, will result in the attainment of Vermont Water Quality Standards. Specifically, DEC needs to show that (1) there are legal requirements in place (e.g., regulations, permits implementing regulations) that apply to the source(s) causing the water quality impairment and (2) that such legally required pollution control practices are specifically applicable to the impairment in question **and** are sufficient to cause the water to meet water quality standards within a reasonable time. These waters are then listed on Part B of the Vermont Priority Waters List.

- Approval or establishment by EPA of a TMDL since the last Part A-303(d) List.
  These waters are then listed in Part D of the Vermont Priority Waters List if they remain impaired.

- Other relevant information that supports the decision not to include the segment on the Part A-303(d) List.

Part B List

All waters listed in Part B are assessed as impaired and do not require development of a TMDL as described in 40 CFR 130.7. Impaired waters that do not need a TMDL are those where other pollution control requirements (such as best management practices) required by local, state, or federal authority are expected to address all water-pollutant combinations and the Water Quality Standards are expected to be attained in a reasonable period. DEC will provide information to show that (1) there are legal requirements in place (e.g., regulations or permits implementing regulations) that apply to the source(s) causing the water quality impairment and (2) that such legally required pollution control practices are specifically applicable to the impairment in question **and** are sufficient to cause the water to meet water quality standards within a reasonable time. Additional discussion of the Part B requirements is given in the EPA Integrated Report guidance document (USEPA 2005).

Part D List

All waters identified on Part D are assessed as impaired and have completed and approved TMDLs. If future assessments show the impairment has been eliminated, the waters will be removed from the Part D List. A comprehensive list of completed TMDLs is maintained on the Watershed Management Division’s website.

Altered Waters

All waters determined to be altered are placed on one of two lists that track altered waters. These lists include Part E List (water altered by invasive non-native species), and Part F (waters altered by flow regulation). The listing methodology for each list is given below.

Part E List

Waters appearing in Part E are assessed as “altered.” They represent situations to be given priority for management where aquatic habitat and/or other designated uses have been altered to the extent that one or more designated uses are not supported due to the presence of aquatic invasive species.

Waters will be removed from the Part E List when the population of the aquatic invasive species declines or is eliminated, and the water is assessed as in “full support” of the designated uses.

Part F List

Waters appearing in this part of the Vermont Priority Waters List are assessed as “altered.” They represent priority management situations where aquatic habitat and/or other designated uses have been altered by flow regulation to the extent that one or more designated uses are not supported. Alterations arise from flow fluctuation, obstructions, or other manipulations of water levels that originate from hydroelectric facilities, dam operations, or water withdrawals for industrial or municipal water supply or snowmaking purposes.

Waters will be removed from the Part F List as corrective actions are implemented.

Full Support Waters

Waters that fully support designated uses are not tracked on the Vermont Priority Waters List.

Stressed Waters

In previous iterations of this Assessment and Listing Methodology, an assessment category of “stressed waters” was included and waters listed as such. This category attempted to identify waters for which, 1) stressors were not at sufficient level to cause impairment but could be problematic, 2) more monitoring was needed to make a complete assessment decision, and 3) watershed features were observed that could be problematic for water quality in the future. The Stressed Waters List was eliminated as an assessment category in 2021 in a transition relying on purely data driven assessment decisions. In its place, the WSMD now identifies two data driven categories that contain certain aspects of the Stressed List. First, waters in need of further data are identified to make assessment determinations for certain uses. Second, where sufficient data exists, trends in water quality, either positive or negative, are identified to help target future monitoring or restorative implementation. These waters are now identified and mapped for inclusion in the Division’s Basin Assessment and Management Plans developed on a five-year rotation for all fifteen water quality planning basins across Vermont.

Comparison to EPA’s Listing Categories

In 2005, the USEPA issued guidance (USEPA 2005) to provide states a recommended reporting format and suggested content to develop a single document that integrates the reporting requirements of Clean Water Act section 303(d) and 305(b). Known as the “Integrated Report”, it is EPA’s strategy to report on water quality standards attainment of assessed waters, document availability of data and information for each segment, identify trends in water quality conditions and provide information to managers for priority setting. This comprehensive report is broken down into five parts into which all water segments within a state can be categorized. These categories are described in Table 1.

Table 3. USEPA Integrated Report listing categories

<table>
<tr><td>Category 1</td><td colspan="2">All designated uses are supported, no use is threatened</td></tr>
<tr><td>Category 2</td><td colspan="2">Available data and /or information indicate that some but not all the designated uses are supported</td></tr>
<tr><td>Category 3</td><td colspan="2">Insufficient available data and/or information to make a use support determination</td></tr>
<tr><td rowspan="4">Category 4</td><td colspan="2">Available data and/or information indicate that at least one designated use is not being supported or is threatened, but a TMDL is not needed. This category is further divided into subcategories a-c;</td></tr>
<tr><td>4a</td><td>Segments with completed TMDLs</td></tr>
<tr><td>4b</td><td>Segments for which control measures other than a TMDL are expected to bring about WQS compliance</td></tr>
<tr><td>4c</td><td>Segments demonstrating failure to meet WQS but not by a pollutant</td></tr>
<tr><td>Category 5</td><td colspan="2">Available data and/or information indicate that at least one designated use is not being supported and a TMDL is needed – 303(d) List</td></tr>
</table>

As guidance, Vermont is not required to follow the USEPA suggested listing format as outlined in the guidance document and has instead opted to present the state's Priority Waters List as described above. It should be noted however that VTDEC does submit Vermont's water quality status to EPA electronically which is compatible with the five-category format. Table 4 compares the parts of the Priority Waters List to EPA's five categories.

Table 4. EPA Categories compared to Vermont's Priority Waters Lists

EPA Category	Vermont listing component	Notes
Category 1	NA	Waters in full support are not tracked on the Priority Waters List[1]
Category 2	NA	Waters where some but not all the uses are supported are not tracked on the Priority Waters List
Category 3	NA	Unassessed waters are not tracked on the Priority Waters List[2]
Category 4a	Part D	The waters in Part D are assessed as impaired. Waters coming back into compliance after a TMDL is complete will be removed from Part D.
Category 4b	Part B	Requirements other than a TMDL are expected to bring an impaired water into compliance.

Category 4c	Parts E & F	A pollutant is not the cause of impairment, no TMDL required
Category 5	Part A	EPA approved 303(d) list as well as proposed delistings

1 Waterbodies or river miles in full support can be identified from Vermont's database through queries

2 Waterbodies or river miles that are not assessed can be identified from Vermont's database through queries

Chapter Five. References

USEPA. 2012. 2012 Recreational Water Quality Criteria. EPA-820-F-12-058. Washington, D.C.

USEPA. 2005. Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act

USEPA. 2000b. Stressor Identification Guidance Manual. EPA-822-B-00-025. Washington, D.C.

VTANR, WQS. 2017. Vermont Water Quality Standards Environmental Protection Rule Chapter 29A (effective January 15, 2017). Montpelier, Vermont.

Appendix A: Using Conductivity as a Surrogate for Chloride

Continuous Conductivity Datasets

Chloride is a unique parameter when it comes to measuring it in the aquatic environment. Not only can you measure it directly in the laboratory from grab samples, but specific conductivity has been shown to be a reliable surrogate for measuring it in the field. By using modern water quality probes and dataloggers, continuous estimates of chloride can be obtained for weeks or months at a time. Simple regression equations relate specific conductivity measurements to chloride concentrations and recent studies in the Chittenden County region of Vermont have successfully employed these techniques. The continuous datasets make it easier to make assessments relating the three aspects of the WQS: magnitude, duration, and frequency, and are particularly useful in assessing the 4-day duration aspects of the chronic criterion.

Where adequate continuous conductivity datasets exist, they will be assessed based on the duration of exposure and the frequency of exceedance criteria as described below:

Acute Criterion Dataset

A continuous dataset applicable for the acute criterion means specific conductivity samples taken at least every 15 minutes for a duration that equals or exceeds the duration of the acute criteria (i.e. 1 hour). The arithmetic average chloride concentrations estimated from specific conductivity measurements, taken over the 1 hour, shall be compared to the acute criterion to determine compliance or noncompliance.

Chronic Criteria Dataset

A continuous dataset applicable for the chronic criterion means specific conductivity samples taken at least every hour for a duration that equals or exceeds the duration of the chronic criteria (i.e., 96 hours). The arithmetic, moving average of chloride concentrations, estimated from specific conductivity measurements, taken over the 96-hour period shall be compared to the chronic criterion to determine compliance or noncompliance.

For a continuous dataset to be considered complete and comparable to the criteria, samples must have been collected over a time period that encompass the exposure period that the criteria is based on (i.e., 1 hour for acute and 96 hours for chronic criteria).

Rolling averages are calculated for all possible blocks of 1 hour (acute criteria) or 96 hours (chronic criteria). The time blocks overlap. For example, the 1 hour average value is calculated when four specific conductivity measurements were made within any given hour at 15 minute increments and the 96 hour average value is calculated if 384 specific conductivity measurements are made over any given four day period.

For comparison of continuous datasets to the frequency component of the standard, the average of either the acute or chronic exceedances shall not exceed the frequency of exceedance (i.e. an average of no more than 1 exceedance every 3 years).

Specific Conductivity as a Chloride Surrogate

Specific conductivity can be used as a surrogate for chloride samples. When specific conductivity is used as a surrogate for chloride, it is necessary to collect at least 2 chloride samples within each time period that the specific conductivity to chloride relationship is to be used. These samples will be used to confirm that the site fits the statewide specific conductivity to chloride relationship. If confirmation samples do not adequately fit the statewide relationship, a site-specific relationship can be developed (see discussion below).

Conductivity/Chloride Relationship

An ordinary least squared regression was fit to all chloride-specific conductivity data pairs collected in Vermont from 2003 to 2010, and again in 2013. A minimum chloride threshold of 30 mg/L was applied to these data. Chloride concentration observations below 30 mg/L are numerous, far below water quality criteria, and tend to bias the results of regression analyses; removing low chloride concentrations improves regression fit and model diagnostics. A total of 441 observations were used in the model.

The final regression equation has an adjusted r-squared value of 0.94 (Eqn. 1):

$$\boldsymbol{Chloride\ (mg/L) = -69.72 + 0.292 * Specific\ Conductivty\ (\mu S)} \qquad \text{Eqn. 1}$$

This r-squared value indicates that specific conductivity explains about 94% of the observed variation in chloride concentration.

The Division anticipates that this regression equation will be sufficient in most cases to accurately estimate chloride concentrations when site specific regressions are not available. However, where site specific data is sufficient, a site-specific regression may be preferred.

Criteria for Using the State-Wide Chloride Regression

Study Areas without a Site-Specific Chloride Regression

If the organization/researcher has not developed a site-specific chloride regression that is equal to or better than the WSMD state-wide chloride regression, the organization/researcher should use the WSMD state-wide chloride regression. The organization/researcher should follow the steps listed below to verify that the state-wide regression is acceptable for their study site.

1. The organization/researcher will collect at least 2 data pairs of chloride concentration and specific conductivity on water samples collected from the study area. If possible, the data pairs should be collected during different flow conditions and seasons.

2. If the data pairs consistently fall outside the 95th percentile prediction interval for the WSMD state-wide regression, then the organization/researcher should question whether the WSMD state-wide regression is appropriate for their study site. A figure depicting the WSMD state-wide regression line with 95% prediction intervals is provided below for reference.

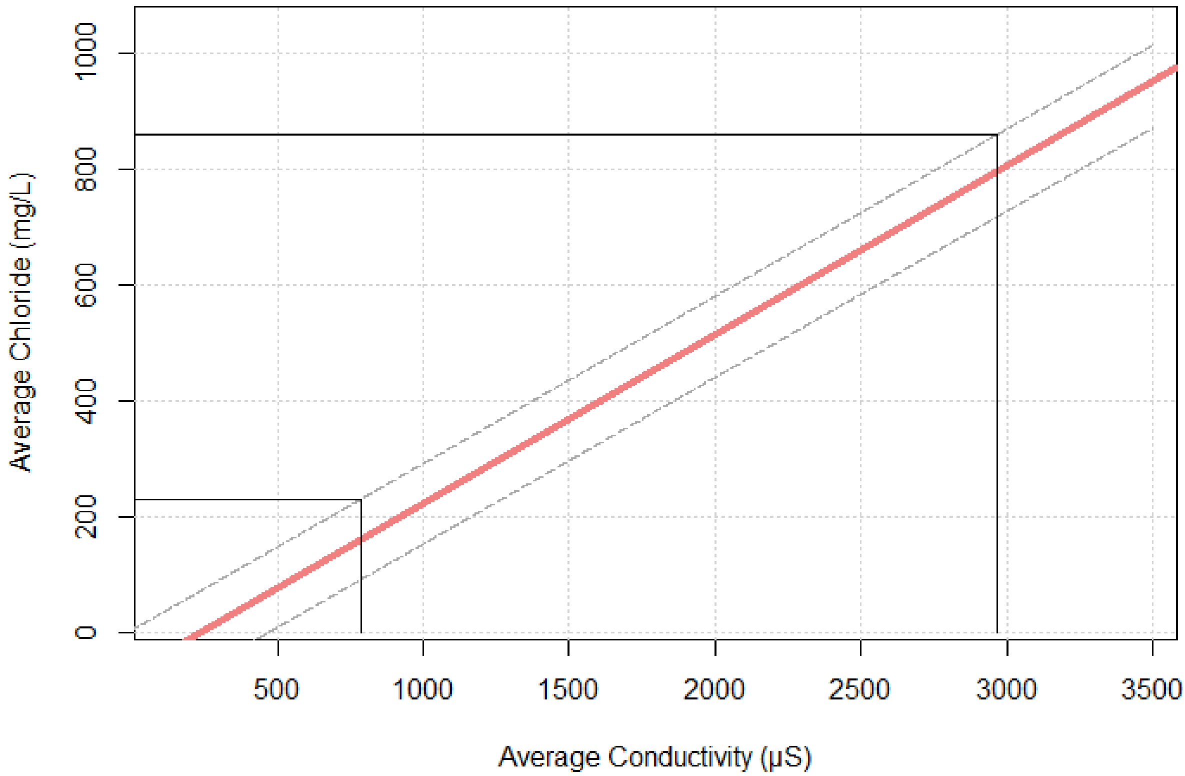


Figure A1. WSMD state-wide chloride-specific conductivity regression line with 95% confidence intervals. The points at which the 95% prediction interval exceeds the chronic (230 mg/L) and acute (860 mg/L) chloride concentrations are shown.

3. Because confidence and prediction intervals vary across the range of observed values, no single equation for these intervals can be provided. However, using the WSMD state-wide regression, the conductivity values associated with a 95% prediction interval above the relevant chloride criteria can be calculated; these values show the threshold at which an observed conductivity concentration is no longer 95% sure to be below the chloride criteria, based on the fitted model (see Table A1).

Table A1. Specific conductivity values whose 95% prediction interval exceed the chronic and acute chloride criteria, respectively. For instance, we cannot be 95% confident that a conductivity value of 784 (µS) is below the chronic standard.

Chloride (mg/L) Standard	Conductivity (µS)
Chronic, 230	784
Acute, 860	2966

Study areas with Site-Specific Chloride Regressions

If the organization/researcher has developed a site-specific chloride regression that is equal to or better than the WSMD state-wide chloride regression, the organization/researcher should use the site-specific regression. The following guidance should be used to determine if the site-specific regression is superior to the state-wide regression.

1. The chloride-specific conductivity data pairs should be representative of the study area in terms of seasons and flow conditions. In particular, the data pairs should have the following characteristics:

- If the organization/researcher collects specific conductivity data during the winter season (Nov-Mar), the data pairs should be collected during the winter season. If the organization collects specific conductivity data during the summer season (Jun-Sept), the data pairs should be collected during the summer season. If the organization collects specific conductivity data in both seasons, the data pairs should be collected from each season.

- Some of the data pairs should be collected during low flow conditions and some from high flow conditions in each season.

- Some of the data pairs should be for water samples with "high" conductivity readings relative to the maximum specific conductivity measured in the study area. The maximum conductivity in a calibration data pair should not be less than 75% of the maximum conductivity measured in the study area.

2. The site-specific regression should have a reasonable r-squared that will be evaluated by the WSMD on a case-by-case basis. As currently formulated, the state regression has an adjusted r-squared value of 0.94.

3. The site-specific regression should meet the four principal assumptions of linear and generalized linear regressions:

- The relationship between chloride and specific conductivity should be linear and additive.
- Model errors should be normally distributed.
- Model errors should exhibit statistical independence; for instance, error values should not be correlated by date, time, month, season, etc.
- Model errors should demonstrate constant variance (*homoscedasticity*) with regards to sample time and date, predicted chloride values, and specific conductivity values.

Agency of Natural Resources
Department of Environmental Conservation
Watershed Management Division
1 National Life Drive, Davis 3

MEMORANDUM

To: 2022 Listing File

From: Biomonitoring and Aquatic Studies Section

Cc: Tim Clear, Bethany Sargent, Heather Pembrook (Monitoring and Assessment Program)

Date: June 20, 2022

Subject: Delisting of aquatic biota impairment of the West Branch of the Little River (Stowe)

The West Branch of the Little River (Stowe) is on the State of Vermont List of Priority Surface Waters – Part B (impaired waters where no total maximum daily load determination is required). The impairment is for aquatic biota and the pollutant is unknown, though hydrologic modification, sediment, and low pH are suggested as likely stressors. The impairment listing is from river mile (RM) 7.5 to RM 8.0, a length of stream that includes a substantial amount of runoff from the Stowe Mountain Resort (Figure 1). This listing was based on the consistent failure of the macroinvertebrate community to meet the State of Vermont's biological criteria as outlined in the Vermont Water Quality Standards, Appendix G. Following the stream's listing in 2012, significant best management practices have been undertaken to upgrade the stormwater system, protect and maintain riparian buffers, and to modify practices around snow disposal and road sanding operations.

Biological monitoring of sites at the downstream (RM 7.4/7.5) and upstream (RM 8.0) extent of the impairment listing has occurred annually since the early 2000's, as well as at a site located further downstream at RM 6.5. In addition, two sites (RM 8.2 and RM 8.8) have been monitored upstream of the resort. Recent results show that all samples taken near the downstream extent of the listing since 2017 have passed the State of Vermont's B(2) biological criteria for small high gradient (SHG) macroinvertebrate communities (Table 1). The most recent two successive samples (2020 and 2021) at the upstream extent of the listing have also met the State's macroinvertebrate criteria. The upstream site at RM 8.0 (closer to the resort), has historically performed worse than the community at RM 7.4 for density and EPT richness metrics, which have been below B(2) thresholds in the past. EPT richness values in 2020 and both EPT richness and density metrics in 2021 were nearly identical at the two sites. Additionally, macroinvertebrate samples at RM 6.5 have met B(2) SHG macroinvertebrate criteria for the past four consecutive years, showing a consistent improvement in biological condition in downstream reaches.

While the sites within and downstream of the impaired segment of West Branch Little River have shown improvement in recent years, the two sites upstream of the resort have had notably lower biological condition (Table 1). The watersheds of these sites (3.2 – 3.7 km^2) are approximately half the size of the watershed at RM 8.0 (7.3 km^2) and exclude small tributaries to the west of the stream near the resort. Due to the smaller drainage areas, these communities may be more sensitive to acid deposition, which is a suspected secondary stressor in this stream. The fact that the upstream 'control' stations score worse for some key biocriteria metrics compared to sites within the impaired section supports the current attainment status of those downstream sites, though the difference in watershed size and water chemistry suggest that RM 8.2 and RM 8.8 aren't fully comparable to downstream sites as a bracketed control. Table 2 shows key habitat and water chemistry results for all sites discussed. This data suggests there have been no recent indicators of sediment deposition or erosion within or downstream of the resort, and chloride levels are below concentrations expected to adversely affect the macroinvertebrate community. Alkalinity and pH results are somewhat variable but suggest that acidification stress may decrease in a downstream direction, as elevation decreases and watershed size increases.

Based on the 2022 Vermont Surface Water Listing and Assessment Methodology , delisting a stream requires that the two most recent successive samples from sites associated with an impaired stream section meet the State's B(2) criteria for the biological community used in the original impairment listing. In this case, the macroinvertebrate community at RM 7.4 has met B(2) criteria for 5 consecutive years, while the community at RM 8.0 has met criteria for the past two years. Therefore, it is recommended the West Branch Little River segment from RM 7.5 to RM 8.0 be removed from Part B of the State's List of Priority Surface Waters. The remediation efforts appear to have improved stream quality and are allowing for a consistently healthy macroinvertebrate community. Given the extensive history of biomonitoring in this stream (over 20 years) compared to the relatively short length of this positive trend, follow-up monitoring is needed to ensure that B(2) criteria continue to be met.

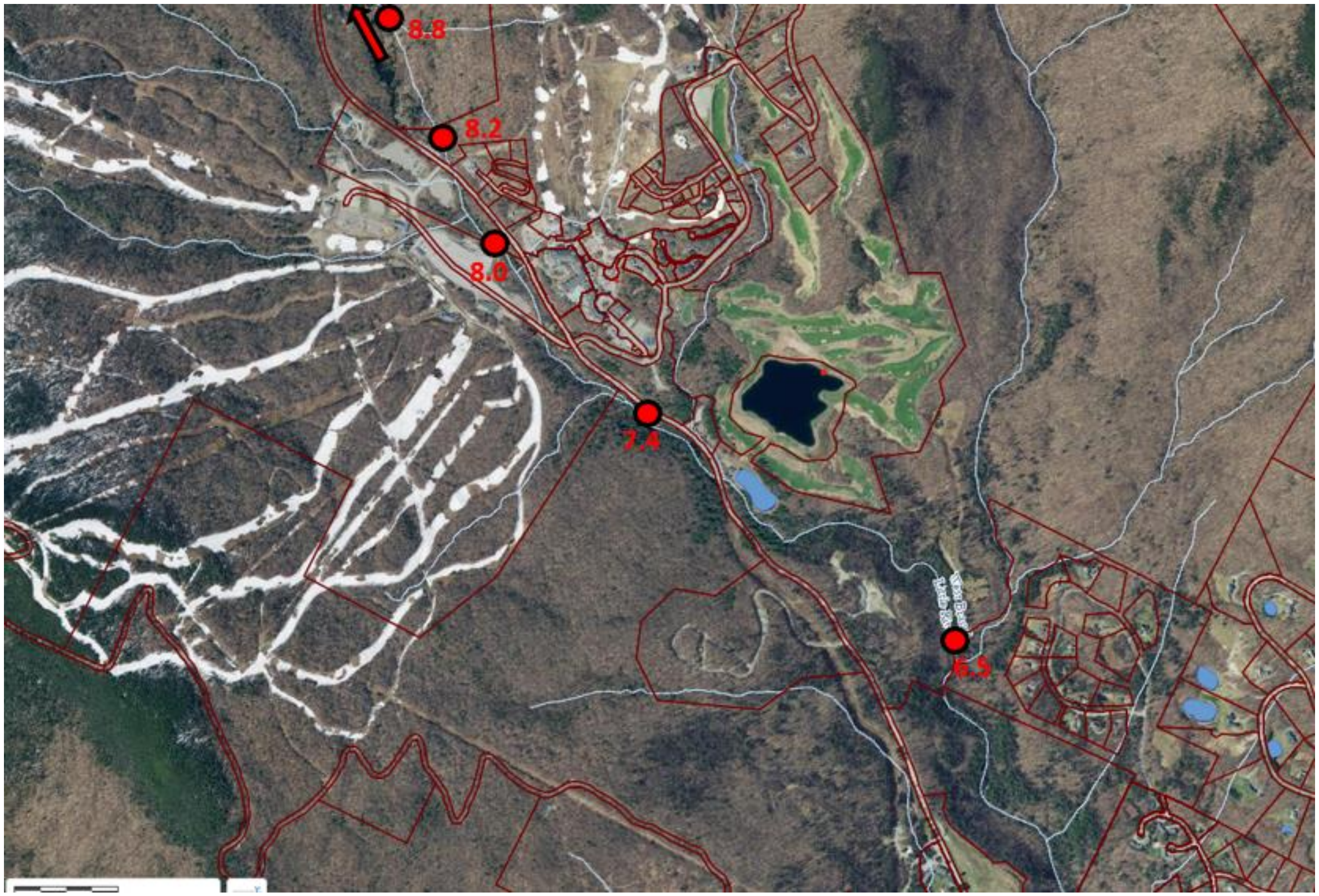


Figure 1: Map of biomonitoring sampling locations on the West Branch of the Little River near Stowe Mountain Resort. Numbers indicate river miles (RM). The impaired section of the stream is from RM 7.5 (just upstream of RM 7.4) to RM 8.0. The arrow indicates that the RM 8.8 site is located upstream of the map extent.

Table 1: Macroinvertebrate metric results and assessment scores for sites on the West Branch of the Little River near Stowe Mountain Resort since 2016. A red cell indicates failure to meet B(2) criteria, a yellow cell indicates an indeterminate value. A minimum assessment of 'Good' indicates attainment of B(2) aquatic biota standards. Results from river mile (RM) 7.4 and RM 8.0 are associated with the Part B impairment listing. Samples from RM 6.5 in 2018 were combined for a single assessment.

Date	RM	Lab ID	Density	Total Richness	EPT Richness	PMA-O	Biotic Index	% Oligo-chaeta	EPT/EPT + Chiro	PPCS-F	Community Assessment
9/23/2016	6.5	2016.554	368	36.5	24.0	80.1	1.92	2.33	0.92	0.60	Good/VG
	7.4	**2016.553**	**371**	**39.0**	**21.0**	**81.7**	**1.77**	**8.41**	**0.89**	**0.49**	**Good**
	8.8	2016.550	357	32.5	16.0	50.1	1.41	6.80	0.81	0.42	Good
9/28/2016	**8.0**	**2016.551**	**250**	**29.0**	**17.0**	**75.5**	**1.71**	**5.48**	**0.92**	**0.37**	**Fair/Good**
9/21/2017	6.5	2017.549	261	29.5	19.0	64.8	3.48	0.60	0.95	0.42	Fair/Good
	7.4	**2017.548**	**330**	**28.0**	**18.0**	**67.2**	**3.81**	**1.11**	**0.94**	**0.43**	**Good**
	8.0	**2017.547**	**150**	**26.5**	**13.5**	**70.3**	**2.61**	**8.76**	**0.79**	**0.44**	**Fair**
	8.2	2017.546	222	24.0	10.5	46.7	3.63	1.75	0.73	0.43	Fair
	8.8	2017.545	329	27.0	18.5	55.8	1.81	7.01	0.92	0.56	Good
9/18/2018*	6.5	2018.072	367	51.0	31.0	74.4	2.92	6.81	0.89	0.55	Good
	6.5	2018.544	240	30.0	19.5	71.1	1.70	5.02	0.96	0.61	
9/19/2018	**7.4**	**2018.545**	**366**	**30.5**	**20.5**	**71.2**	**2.73**	**2.90**	**0.94**	**0.44**	**Good/VG**
	8.0	**2018.546**	**318**	**29.0**	**17.0**	**64.7**	**1.56**	**10.88**	**0.93**	**0.48**	**Good**
	8.2	2018.547	230	27.0	15.0	47.2	1.01	9.57	0.90	0.28	Fair
	8.8	2018.548	432	29.0	16.0	45.3	0.84	2.86	0.93	0.43	Good
9/12/2019	6.5	2019.074	434	36.0	18.5	72.6	1.92	8.47	0.85	0.45	Good
	6.5	2019.500	687	38.5	19.0	79.2	1.88	4.46	0.88	0.43	Good/VG
	7.4	**2019.531**	**363**	**35.0**	**23.0**	**73.1**	**2.80**	**1.90**	**0.95**	**0.41**	**Good/VG**
	8.0	**2019.532**	**219**	**34.0**	**14.5**	**69.4**	**2.45**	**5.93**	**0.85**	**0.41**	**Fair**
	8.8	2019.533	337	29.0	16.0	48.6	1.24	14.99	0.94	0.44	Fair
9/9/2020	6.5	2020.533	679	29.0	19.0	74.6	1.29	0.49	0.96	0.47	Good
	7.4	**2020.534**	**501**	**31.0**	**18.0**	**64.8**	**2.35**	**0.38**	**0.97**	**0.42**	**Good/VG**
9/10/2020	**8.0**	**2020.535**	**378**	**29.0**	**18.5**	**64.7**	**3.06**	**2.36**	**0.96**	**0.48**	**Good**
	8.8	2020.536	345	22.5	12.0	52.5	1.17	2.78	0.90	0.39	Fair
9/8/2021	6.5	2021.537	1232	33.0	19.5	74.0	2.64	1.22	0.73	0.42	Good/VG
9/7/2021	**7.4**	**2021.538**	**708**	**39.0**	**21.5**	**76.6**	**3.50**	**1.34**	**0.86**	**0.55**	**Very Good**
	8.0	**2021.539**	**709**	**38.5**	**21.0**	**78.9**	**3.56**	**2.64**	**0.72**	**0.49**	**Good/VG**
	8.8	2021.540	444	30.0	15.0	62.9	1.73	7.79	0.77	0.51	Fair/Good
	Full Support		≥ 300	≥ 27	≥ 16	≥ 45	≤ 4.5	≤ 12	≥ 0.45	≥ 0.4	
	Indeterminate		≥ 250	≥ 26	≥ 15	≥ 40	≤ 4.65	≤ 14.5	≥ 0.43	≥ 0.35	
	Non-Support		< 250	< 26	< 15	< 40	> 4.65	> 14.5	< 0.43	< 0.35	

Table 2: Habitat and water chemistry data (since 2016) used to evaluate potential stress associated with stormwater runoff and deicing at Stowe Mountain Resort, and acid deposition within the West Branch of the Little River watershed. Results from river mile (RM) 7.4 and RM 8.0 are associated with the Part B impairment listing. Bold indicates the river mile stations which are candidates for delisting.

Year	River Mile	% Embedd-edness	Bank Stability Rating	% Fine Sediment	% Gravel	Alkalinity (mgCaCO3/l)	pH	Cl (mg/l)
2016	8.8	10	Very Good	4	20	7.9	7.2	< 2.5
	8.0	**15**	**Good**	**2**	**13**	**7.5**	**7.1**	**3.4**
	7.5	**15**	**Good**	**1**	**20**	**9.4**	**7.5**	**8.5**
	7.4	**20**	**Very Good**	**0**	**9**			
	6.5	10	Very Good	1	14	35	7.6	24
2017	8.8	10	Very Good			4.7	7.5	< 0.5
	8.0	**35**	**Very Good**			**4.3**	**7.1**	**3**
	7.4	**20**	**Very Good**			**5.7**	**7.4**	**7.3**
	6.5	15	Very Good			10	7.7	< 5.0
2018	8.8	10	Very Good	3	16	< 2.0	7.3	< 0.5
	8.0	**30**	**Very Good**	**0**	**15**	**2.9**	**7.2**	**3.4**
	7.4	**15**	**Very Good**	**0**	**8**	**< 2.0 / 13**	**7.6 / 7.3**	**9.2**
	6.5	15	Very Good	3	15	4.3	7.8	16
2019	8.8	15	Very Good	0	11	2.6	7.35	< 0.5
	8.2					4.6	7.3	< 0.5
	8.0	**35**	**Very Good**	**0**	**14**	**5.1**	**7.5**	**3**
	7.4	**20**	**Very Good**	**0**	**8**	**24**	**7.7**	**7.9**
	6.5	14	Very Good	0	7	11	7.9	21
2020	8.8	15	Good	7	21	2.3 / 4.7	6.82 / 7.3	0.76 / 0.8
	8.2					4.0 / 2.6	6.63 / 7.1	0.84 / 0/76
	8.0	**15**	**Very Good**	**2**	**14**	**3.1 / 3/1**	**6.77 / 7.4**	**2.9 / 4.2**
	7.4	**25**	**Very Good**	**3**	**13**	**6.8 / 7.6**	**7.13 / 7.7**	**7.0 / 11**
	6.5	15	Very Good	0	7	5.8 / 3.5	7.25 / 7.8	16 / 28
2021	8.8	10	Very Good	0	13	3.4 / 4.7	6.63 / 6.76	0.66 / 0.61
	8.2					2.7 / 2.0	6.62 / 7.02	0.65 / 0.57
	8.0	**15**	**Very Good**	**0**	**11**	**3.0 / 3.5**	**6.63 / 7.23**	**3.6 / 2.9**
	7.4	**20**	**Very Good**	**0**	**9**	**< 2.0 / 4.8**	**7.06 / 7.23**	**8.4 / 7.7**
	6.5	10	Very Good	0	9	2.6 / 3.7	7.12 / 7.08	17 / 16

MEMO

To: Tim Clear and Mark Mitchell
CC: Bethany Sargent and Oliver Pierson
From: Bruce Forsberg and Heather Pembrook
Date: 01/14/2022
Subject: Acid Lake Status for TMDL Listing

Summarized below are the most recent alkalinity results for lakes sampled under the Vermont Long-term Monitoring (LTM) or Vermont Spring Phosphorus Monitoring Program to determine acid impairment status. The restrictions imposed by the COVID-19 pandemic of 2020-2021 limited sampling efforts to mostly core VLTM lakes and did not include most TMDL lakes typically monitored every 5 years. Due to the limited monitoring results, the acid impairment status has not changed for any of the previously listed lakes. Monitoring in 2022 is planned for not only the core VLTM 12 acid lakes, but an additional 4-5 TMDL acid lakes.

A change in acid impairment status will be determined if the alkalinity routinely drops above or below 2.5 mg/L $CaCO_3$ during the springtime open lake epilimnion sampling. Typically, this means two or more springtime values above the 2.5 mg/L $CaCO_3$. More data is needed to determine if a change in status is warranted for the lakes noted below for these lakes:

1. Lily Pond in Vernon is a candidate for delisting, but we need more data before delisting. Three of the four most recent values are above criteria for impairment (2012, 2014, 2016, 2021) and overall, alkalinity is increasing over time. LTM will make this a priority for sampling prior to 2024.
2. Searsburg Reservoir was sampled in 2016, 2017 and 2018 with gran alkalinities of 1.75, 1.82 and 2.21 mg/L. LTM will make this a priority for sampling prior to 2024.
3. Beebe Pond's (Sunderland) 2021 alkalinity value was above criteria for impairment (3.00 mg/L). Additional sampling is required before it will be recommended for delisting. LTM will make this a priority for sampling in 2022.
4. Howe Pond's spring epilimnion alkalinity exceeded 2.5 mg/L for the first time in 2021. As a core LTM lake, this lake will be monitored in the spring of 2022 and 2023 to determine if it can be a candidate for delisting in the 2024 cycle.
5. Unknown Pond in Woodford was sampled for the first time in 2016 and may be a candidate for the acid impaired list with an alkalinity of 1.28 mg/L $CaCO_3$. Additional sampling is required before it can be recommended for listing. LTM will make this a priority for sampling prior to 2024.

Other items to note:

1. Lye Brook-N and Lye Brook-S beaver dams are no longer creating lentic conditions; these sites are no longer lakes. No alkalinity data has been collected for these sites and therefore they are not included in the summary below.
2. Lost Pond in Glastenbury is no longer a lake. The beaver dam creating the lake failed and this waterbody is now a wetland.
3. Most of our ponds show an increasing trend in alkalinity, although the rate of recovery is highly variable.

Table 1. Acid Lake Assessment categories based on alkalinity. Ponds classified as Critically acidified or extremely sensitive are considered acid impaired. Underlined ponds are part of the LTM core ponds, which are sampled annually.

Category	Criteria	Ponds
Critically Acidified	Gran Alk ≤ 0 mg/L $CaCO_3$	1. North Pond (Bristol) 2. Forester
Extremely Sensitive	0 mg/L $CaCO_3$ < Gran Alk ≤ 2.5 mg/L $CaCO_3$	3. Adams Reservoir 4. Beaver (Roxbury) 5. Beebe (Sunderland) 6. Big Mud (Mt. Tabor) 7. Bourn 8. Branch 9. Duck Pond 10. Gilmore 11. Griffith 12. Grout 13. Halfway 14. Haystack 15. Howe 16. Kings Hill 17. Lake-of-the-Clouds 18. Levi 19. Little (Winhall) 20. Little (Woodford) 21. Little Mud (Mt. Tabor) 22. Little Mud (Winhall) 23. Long Hole (Mt. Tabor) 24. Moses 25. Skylight 26. Searsburg Reservoir 27. Somerset Reservoir* 28. South (Marlboro) 29. Stamford 30. Stratton 31. Sunset (Marlboro) 32. Unknown Pond (Averys Gore) 33. Unknown (Ferdinand) 34. Unknown (Woodford)*
Stressed*	2.5 mg/L $CaCO_3$ < Gran Alk ≤ 12.5 mg/L $CaCO_3$	35. Beaver (Holland) 36. Lily (Vernon) 37. Line (Holland) 38. Hardwood 39. Harriman 40. Lily (Londonderry) [2] 41. Turtle [2]

* need more data before listing as acid impaired

Table 2. Most recent alkalinity results for acid sensitive ponds

Lake	Town	Location ID	Date Sampled	Alk (mg/L)
1. Adams Reservoir	Woodford	504365	5/4/2021	1.50
2. Beaver Pond	Roxbury	500601	4/28/2021	1.27
3. Beebe Pond	Sunderland	503008	4/28/2021	3.00
4. Big Mud Pond	Mt. Tabor	503191	5/10/2021	0.42
5. Bourn Pond	Sunderland	503009	5/10/2021	0.87
6. Branch Pond	Sunderland	503001	4/20/2021	0.15
7. Duck Pond	Holland	504822	5/8/2015	0.73
8. Forester Pond	Jamaica	504260	4/20/2021	-0.05
9. Gilmore Pond	Bristol	503187	5/18/2015	1.53
10. Griffith Lake	Peru	503190	4/13/2016	2.09
11. Grout	Stratton	500176	4/27/2021	2.40
12. Halfway Pond	Norton	500566	5/21/2019	0.48
13. Haystack Pond	Wilmington	504360	5/13/2021	0.23
14. Howe Pond[2]	(Readsboro	504361	4/13/2021	2.60
15. Kings Hill Pond	Bakersfield	503685	5/5/2016	2.24
16. Lake-Of-The-Clouds	Cambridge	503901	7/26/2017	0.02
17. Levi Pond	Groton	504545	5/16/2018	0.82
18. Lily Pond[2]	Vernon	500197	04/20/2021	2.70
19. Little Mud	Mt. Tabor	503189	4/13/2016	1.12
20. Little Mud	Winhall	500533	5/30/2018	0.62
21. Little Pond	Winhall	504621	5/20/2019	0.76
22. Little Pond	Woodford	504362	10/21/2021	0.75
23. Long Hole	Mt. Tabor	500565	5/9/2013	1.46
24. Lost Pond	Glastenbury	500634	5/14/2013	0.08
25. Moses	Weston	504258	4/22/2016	<1
26. North Pond	Bristol	500562	5/2/2016	-0.43
27. Searsburg Reservoir[1]	Searsburg	515493	5/29/2018	2.21
28. Skylight Pond	Ripton	500593	5/17/2019	0.79
29. Somerset Reservoir	Somerset	504363	4/19/2017	1.82
30. South Pond	Marlboro	504354	5/10/2018	2.39
31. Stamford Pond	Stamford	504364	5/4/2021	0.78
32. Stratton Pond	Stratton	504259	6/15/2017	1.41
33. Sunset Lake	Marlboro	504257	4/13/2021	2.00
34. Unknown Pond	Averys Gore	504713	5/12/2014	2.29
35. Unknown Pond	Ferdinand	500629	5/18/2018	1.93
36. Unknown Pond[1]	Woodford	515482	04/20/2016	1.28

1. Potential candidate for addition to the TMDL acid impaired list in 2024.
2. Potential candidate for removal from TMDL acid impaired list in 2024.

December 9, 2021

Mr. John Gay
CV Landfill, Inc.
Casella Waste Management, Inc.
1855 VT Route 100
Hyde Park, VT 05655

Re: October 2021 Water Quality Sampling; and
Analysis of Trends and Standards Exceedances
CV Landfill, Inc.
East Montpelier, Vermont

Dear Joe:

Enclosed please find the results of the October 2021 water quality sampling round conducted by Waite-Heindel Environmental Management (WHEM) at the closed unlined CV Landfill in East Montpelier, Vermont, in accordance with Conditions #10 through #14 of the *Stipulation and Consent Order (SCO,* dated April 3, 2001), not including paragraph 14 section (1)(f) which requests reporting of the quantity of leachate pumped, the date of shipment, and the receiving location for the previous 6 months. It is our understanding that personnel of CV Landfill, Inc. provide these records to the Vermont Agency of Natural Resources (VT ANR) Solid Waste Management Program (SWMP). This Stipulation and Consent order is being followed while a proposed Post Closure Plan and Solid Waste Certification is under review by the VTDEC SWMP. This report also includes the August and October 2021 Leachate Sampling Results.

WHEM Project Scientist Wendy Shellito, Staff Geologist Sam Cowan, and Staff Scientist Hannah Weiss sampled the leachate tank, eight (8) monitoring wells, and five (5) surface waters on October 21, 2021.

Method(s) of Reporting Trends in Water Quality Data: This report describes recent trends in the water quality results. Trends are estimated by visually comparing the values for this current round of sampling to the previous round of sampling [as agreed by K. Kathan, VTDEC Solid Waste Program, 3/03/2015).

DEC Comments on Water Quality Report Regarding Previous Sampling Round:

To date, no comment letter from the VTDEC SWMP regarding the report on the May 2021 sampling round has been received by WHEM.

I. GROUNDWATER QUALITY

All monitoring wells were successfully sampled in October 2021 via WHEM's low-flow sampling SOP (except G-4, the non-potable water supply well, which was grab-sampled as usual). As per the SOP, all monitoring wells were field-measured for depth to water; and temperature, specific conductance, dissolved oxygen (DO), pH, oxidation reduction potential (ORP) and turbidity readings were obtained until readings stabilized (or after one hour of data collection; whichever comes first), then samples were collected. See summary tables and individual lab reports in the Attachment. For a summary of recent trends, see the Attachment, page 3; for tables showing standards exceedances in the October 2021 sampling round, see the Attachment, page 4. Water quality tables are included in the Attachment, pages 7-46.

Groundwater samples were analyzed primarily by Endyne, Inc., of Williston, Vermont, or their sub-contracted certified laboratories if needed, for landfill indicator parameters, inorganic compounds, and volatile organic compounds (VOCs) by EPA Method 8260C. All PFAS samples were analyzed by Alpha Analytical.

Groundwater lab results are compared to the VT Groundwater Enforcement Standards (GES) and Preventive Action Levels (PALs) from Table 1, Groundwater Protection Rule & Strategy (GWPRS), 7/6/2019, and the Vermont Health Advisory Levels and Federal MCLs (primary and secondary) from 5/3/2019 Vermont Department of Health Drinking Water Guidance. Only GES exceedances are referenced in the following report.

Total Cadmium has a laboratory reporting limit of 2 ug/L which is less than the GES [5.0 ug/L], but greater than the PAL [1.0 ug/L]. Therefore, the non-detections of cadmium are considered as "technical exceedances" of the PAL, since the detection limit is greater than that value.

Upgradient of the Unlined Landfill

MW-3R is the only well in the monitoring program that is clearly upgradient (south) of the landfill. MW-8R and G-4 are east of the landfill, and may be upgradient or side-gradient of the Landfill. Refer to page 2 of the Attachment for the Monitoring Plan showing these locations.

<u>Trends in Upgradient Water Quality Results, October 2021</u>: Trends in the October 2021 groundwater water quality results were evaluated as explained above, and are summarized below:

<u>Inorganic compounds and Metals</u> showed *downward trends* in MW-3R and MW-8R and *mixed trends* in G-4.
<u>VOCs</u> were non-detected in MW-3R, and *downward trends* were noted in MW-8R. VOC analysis is not required in G-4.
<u>PFAS</u> analysis is not required in MW-3R, MW-8R or G-4.

<u>Summaries of WQ Results, from individual upgradient monitoring wells</u>:

MW-3R: After low-flow purging in October 2021, the sample collected for laboratory analysis had a very low turbidity value of 1.2 NTU. In general, inorganic compounds and metals trended down in October 2021, and VOCs were non-detected compared to the previous round. Notable:

- No metals exceeded their GES's, as sporadically occurs.
- All inorganic compounds and metals are within their historic ranges.
- VOCs were non-detected in this well, as is typical.
- PFAS analysis is not required.

MW-8R: After low-flow purging in October 2021 the sample collected for laboratory analysis had a low turbidity value of 18.7 NTU. In general, inorganic compounds, metals, and VOCs trended downward in October 2021 compared to the previous round. Notable:

- Three (3) metals exceeded their GESs, as has been typical over their historic ranges:
  - Manganese, Dissolved [2.4 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is steadily declining from is its highest concentration in June 2019;
  - Arsenic, Total [10.9 ug/L; GES = 10 ug/L]. The October 2021 concentration is within the historic range;
  - Manganese, Total [2.40 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is within the historic range.
- All other inorganic compounds and metals did not exceed GESs, and are within their historic ranges.
- VOCs detections did not exceed any GESs, as is typical over their historic ranges.
- Seven (7) VOCs were detected; all were within their historic ranges.
- PFAS analysis is not required.

G-4: In general, inorganic compounds and metals showed mixed trends in October 2021 compared to the previous round; VOC analysis is not required. Notable:

- No metals exceeded their GES's, as is typical.
- Sodium [10 mg/L; GES = none] continues to be tied at its highest concentration; it is routinely detected, and it has no GES.
- All other metals and inorganic compounds are within their historic ranges.
- VOC analysis is not required.
- PFAS analysis is not required.

Downgradient of the Unlined Landfill

Six monitoring wells (WE-1B, MW-5AR, MW-6R, MW-7, MW-9 and MW-10R) provide downgradient groundwater information at the landfill. Only MW-10R is almost directly on the down-gradient property line; the other wells are in the interior of the site. Refer to page 2 of the Attachment for the Monitoring Plan showing these locations.

Trends in Downgradient Water Quality Results, October 2021: Trends in the October 2021 groundwater water quality results were evaluated as explained above, and are summarized below.

Inorganic compounds and Metals showed *upward trends* in WE-1B, MW-5AR, and MW-7, and showed *downward trends* in MW-6R and MW-10R.
VOCs were non-detected in WE-1B and MW-5AR, downward *trends* were noted in MW-6R, and *upward trends* were noted in MW-10R; VOC analysis in MW-7 is not required.
PFAS was sampled in the following wells from this group: MW-5AR, MW-7 and MW-10R; see below for discussions within each well summary. PFAS showed *upward trends* in MW-10R and *downward trends* in MW-5AR and MW-7; all were above the GES for the five VT-regulated PFAS compounds.

Summaries of WQ Results, from individual downgradient monitoring wells:

WE-1B: In May 2021, the steel cover of this well was found to be broken, and the cap on the PVC well was not secure. The water level was extremely high, making it obvious that surface flow has infiltrated the well. Due to this, the laboratory data indicated anomalous results due to this surface infiltration, so all data for WE-1B were rejected in May 2021. The cap was secured onto the PVC well after the May 2021 sampling, to prevent surface flow infiltration, and this well was successfully sampling in October 2021.

After low-flow purging in October 2021, the sample collected for laboratory analysis had its highest turbidity value of 53.8 NTU. In general, inorganic compounds and metals trended up, and VOCs were non-detected in October 2021 compared to the previous round. Notable:

- Two metals exceeded their GES's, which has not occurred since October 2013:
  - Manganese, Dissolved [0.45 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is within the historic range;
  - Manganese, Total [0.41 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is within the historic range.
- One metal was detected at its highest concentration to date:
  - Total lead [4.6 ug/L; GES = 15 ug/L]. This is its first detection since February 2015, and it is below the GES.
- Two inorganic compounds were detected at their highest concentrations since February 2015; they have no GES and were verified by the laboratory as correct:
  - Chloride [1,200 mg/L; GES = none]; it is routinely detected;
  - Sodium [660 mg/L; GES = none]; it is routinely detected.
- All other metals and inorganic compounds are within their historic ranges.
- VOCs were non-detected in this well for the first time since May 2008.
- PFAS analysis is not required.

MW-5AR: After low-flow purging in October 2021, the sample collected for laboratory analysis had a low turbidity value of 12 NTU. In general, inorganic compounds and metals trended up, PFAS trended down, and VOCs were non-detected in October 2021 compared to the previous round. Notable:

- One (1) metal exceeded its GES, as has been typical over its historic range:
  - Arsenic, Total [15.8 ug/L; GES = 10 ug/L]. The October 2021 concentration is within the historic range.
- All other inorganic compounds and metals did not exceed GESs, and are within their historic ranges.
- VOCs were non-detected in this well, as is generally typical.
- PFAS: The sum of the five VT-regulated PFAS exceeded the GES [438.84 ng/L; GES = 20 ng/L], and trended down in October 2021 compared to May 2021; the overall trend has been up then recently down since PFAS analyses began in October 2018 (see graph on page 39 of the Attachment).

MW-6R: After low-flow purging in October 2021, the sample collected for laboratory analysis had a very low turbidity value of 0.0 NTU for the first time. In general, inorganic compounds, metals and VOCs trended down in October 2021 compared to the previous round. Notable:

- Two (2) metals exceeded their GESs, as has been typical over their historic ranges:

    - Arsenic, Total [55.5 ug/L; GES = 10 ug/L]. The October 2021 concentration is within the historic range;
    - Nickel, Total [110 ug/L; GES = 100 ug/L]. The October 2021 concentration is within the historic range;
- All other inorganic compounds and metals did not exceed GESs, and are within their historic ranges.
- Two (2) VOCs exceeded their GESs, as has been typical over their historic ranges:
    - Benzene [20.8 ug/L; GES = 5 ug/L]. The October 2021 concentration is within the historic range;
    - Naphthalene [1.1 ug/L; GES = 0.5 ug/L]. This is its sixth detection, all of which have exceeded its GES.
- Combined Trimethylbenzenes [2.5 ug/L; GES = 23 ug/L] decreased back within historic range after its highest concentration last round [14.9 ug/L]. These compounds are routinely detected and remain below the GES.
- All other VOCs are within their historic ranges, with no new detections.
- PFAS analysis is not required.

MW-7: After low-flow purging in October 2021, the sample collected for laboratory analysis had an extremely low turbidity value of 0.1 NTU for the first time. In general, inorganic compounds and metals tended up, and PFAS trended down in October 2021 compared to the previous round; VOC analysis is not required. Notable:

- Three(3) metals exceeded their GESs, as has been typical over their historic ranges:
    - Manganese, Dissolved [1.60 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is within the historic range;
    - Arsenic, Total [11.1 ug/L; GES = 10 ug/L]. The October 2021 concentration is within the historic range;
    - Manganese, Total [1.5 mg/L; GES = 0.300 mg/L]. The October 2021 concentration is within the historic range.
- All other inorganic compounds and metals did not exceed GESs, and are within their historic ranges.
- VOC analysis is not required.
- PFAS: The sum of the five VT-regulated PFAS exceeded the GES [73.44 ng/L; GES = 20 ng/L], and trended down in October 2021 compared to May 2020; the overall trend is down since PFAS analyses began in October 2018 (see graph on page 41 of the Attachment).

MW-10R: This well is the only groundwater monitoring well location that is at the down-gradient property line. After low-flow purging in October 2021, the sample collected for laboratory analysis had a very low turbidity value of 0.0 NTU for the first time. In general, inorganic compounds and metals trended down, and VOCs and PFAS trended up in October 2021 compared to the previous round. Notable:

- One (1) metal exceeded its GES, as has generally been typical over its historic ranges:
    - Arsenic, Total [25.2 ug/L; GES = 10 ug/L]. The October 2021 concentration is within the historic range. The 3-year trend since this well was replaced in 2018 is generally down (see graph on page 23 of the Attachment).
- All other inorganic compounds and metals did not exceed GESs, and are within their historic ranges.

- Two (2) VOCs exceeded their GES, as has been typical over its historic range:
  - Benzene [11.1 ug/L; GES = 5 ug/L]. The October 2021 concentration is within the historic range. The 3-year trend since this well was replaced in 2018 is generally down (see graph on page 35 of the Attachment);
  - Vinyl Chloride [4.5 ug/L; GES = 2 ug/L]. The October 2021 concentration is within the historic range. The 3-year trend since this well was replaced in 2018 is mixed (see graph on page 35 of the Attachment);
- All other VOCs are within their historic ranges, with no new detections.
- PFAS: The sum of the five VT-regulated PFAS exceeded the GES [421.1 ng/L; GES = 20 ng/L], and trended up in October 2021 compared to May 2021; the overall trend has been mixed since PFAS analyses began in October 2018 (see graph on page 43 of the Attachment).

II. STATISTICAL EXCEEDANCES OF GROUNDWATER STANDARDS

In an email dated April 8, 2011, Kimberly Crosby (Permits, Compliance and Engineering, Casella Waste Management Inc.), confirmed that the State of Vermont has indicated that statistical analysis of standards exceedances is no longer required for unlined landfill reports.

III. DRINKING WATER QUALITY

No drinking water well sources are located at the landfill. There is one drilled well that is included in the sampling plan. This well is labeled G-4 on the site map, and it is a drilled well located on the north side of the truck scale. The well is listed as a non-potable water source. It is our understanding that it is only used for lavatory flushing, and that drinking water for workers at the site is provided by bottled water. Well G-4 sampling results are discussed above in Section I.

IV. SURFACE WATER QUALITY

There are six surface water quality sampling locations listed in the Consent Order dated April 3, 2001. SS-10 was dropped from the sampling plan in late May 2004, as approved by David DiDomenico of the SWMP. PFAS analysis is not required from any surface water sampling location. Four of the five locations had sufficient water to sample in October 2021; SS-4 was dry as often occurs. See location map, summary tables and individual lab reports in the Appendices. For a summary of recent trends, see the Attachment, page 5. These current trends were visually estimated in comparison to the previous sampling event. For a table showing exceedances of surface water quality standards in the October 2021 sampling round, see the Attachment, page 6. Surface water quality tables are included in the Attachment, pages 47-61.

Surface water quality results are compared to the Vermont Water Quality Standards (VWQS; effective 1/15/17), Appendix C, for Protection of Human Health (Consumption of Organisms only), and Protection of Aquatic Biota, Average Acceptable Concentration (AAC) Chronic Criteria. If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is used or calculated using formulas provided in Appendix D and E of the VWQS. Dissolved concentrations of select metals (cadmium, chromium, copper, lead, nickel, and zinc) are estimated using laboratory reported total metals concentrations and conversion factors provided in Appendix D of the VWQS. Both total and dissolved concentrations are now included in the data tables. Some metals are non-detected; their detection limits are higher than their water quality standards, so the actual concentrations of these metals cannot be compared to standards.

In this October 2021 event, the calculated dissolved cadmium levels for SS-11, SS-12, SS-101 and SS-102 possibly exceeded the calculated hardness-dependent VWQS standard. This is because the laboratory's practical quantitation limit is higher than this round's hardness-dependent dissolved cadmium standard for the Protection of Aquatic Biota, Chronic Criteria.

Upstream Surface Water, Inorganics and Metals:

There are two upstream surface water sampling points at CV Landfill: SS-12 [a small stream south of the landfill], and SS-101 [Winooski River upstream].

Trends in Upstream Surface Water Quality Results, October 2021: Trends in the October 2021 surface water quality results were evaluated as explained on page 1, and are summarized below:

Inorganic compounds and Metals showed *upward trends* in SS-101 and SS-12.
VOCs were non-detected in both upstream surface water locations.

Summaries of Upstream Surface WQ Results, from individual locations:

SS-12 (small stream to south): In general, inorganic compounds and metals trended up in October 2021 compared to the previous round. Notable:

- No metals exceeded their VWQS's, as is typical.
- All metals and inorganic compounds are within historic ranges.
- VOCs were non-detected, as is typical.

SS-101 (Winooski River, upstream): The Upstream Winooski River values were very similar to the downstream Winooski River results (see SS-102 below). In general, inorganic compounds and metals trended up in October 2021 compared to the previous round. Notable:

- No metals exceeded their VWQS's, as is typical.
- All metals and inorganic compounds are within historic ranges.
- VOCs were non-detected, as is typical.

Downstream Surface Water, Inorganics and Metals

There are three upstream surface water sampling points at CV Landfill: SS-4 (small seasonal surface water flow at the inlet to a culvert under Route 2), SS-11 (small stream northeast of the landfill) and SS-102 (Winooski River, downstream).

Trends in Downstream Surface Water Quality Results, October 2021: Trends in the October 2021 surface water quality results were evaluated as explained on page 1, and are summarized below:

Inorganic compounds and Metals showed *upward trends* in SS-11, and *mixed trends* in SS-102. VOCs were non-detected in both downstream surface water locations.

Summaries of Downstream Surface WQ Results, from individual locations:

SS-4 (small seasonal surface water flow north of the landfill, at the inlet to a culvert under Route 2): This was dry this round, as often occurs.

SS-11 (small stream northeast of the landfill): In general, inorganic compounds and metals trended up in October 2021 compared to the previous round. Notable:

- No metals exceeded their VWQS's, as is typical.
- Two (2) inorganic compounds were detected at their highest concentrations to date:
  - Chloride [54 ug/L; VWQS = 230 ug/L]; it is routinely detected and always below the VWQS;
  - Sodium [32 ug/L; VWQS = none]; it is routinely detected.
- All other metals and inorganic compounds are within historic ranges.
- VOCs were non-detected, as is typical.

SS-102 (Winooski River, downstream): The downstream Winooski River values were very similar to the upstream Winooski River results (see SS-101 above). In general, inorganic compounds and metals were mixed in October 2021 compared to the previous round. Notable:

- No metals exceeded their VWQS's, as is typical.
- All metals and inorganic compounds are within historic ranges.
- VOCs were non-detected, as is typical.

V. LEACHATE

Samples for lab analysis of inorganic compounds and metals in leachate are collected on a quarterly basis in February, May, August, and October of each year. PFAS analysis is not required from leachate. The August and October 2021 leachate sampling results are included in this report. Samples for VOCs and SVOCs in leachate are collected annually in October of each year, and are discussed in this report. The laboratory analyses were conducted by Endyne, Inc., in Williston, Vermont. All leachate samples are kept in a cooler separate from all other environmental samples during sample collection and transport. See the Attachment, pages 62-67 for summary tables of results, and subsequent pages for lab reports.

Leachate quality is compared to the *Vermont Hazardous Waste Management Regulations*, Toxicity Characteristic (TC); Chapter 2, Table 1: Maximum Concentration of Contaminants for the Characteristic of Toxicity (December 16, 2016). The lab results for the October 2021 leachate samples indicate that CV Landfill leachate is not characterized as toxic, because none of the parameters tested exceed the Vermont Toxicity Characteristic (TC) concentrations.

In December 2018, a new underground storage tank (UST #4) was installed adjacent to the north edge of the access road, to collect the liquid from the groundwater collection system. The pipe to the former leachate tank was cut and capped, and groundwater/leachate is now piped to the new UST. A manway to the top of this new tank provides access for liquid removal and sampling. The former leachate tank and its components were removed after the new tank was installed.

August 2021 Leachate Results:
A sample was collected by bailer from the leachate tank on August 10, 2021, and was analyzed for inorganics and metals. Lab results for the August 2021 leachate sample showed that inorganics and metals concentrations generally increased when compared to the previous leachate sampling event in May 2021. All detected compounds were within their historic ranges, with no parameters exceeding TCs.

October 2021 Leachate Results:
A sample was collected by bailer from the leachate tank on October 21, 2021 and was analyzed for inorganics, metals, VOCs and SVOCs. Lab results for the October 2021 leachate sample showed that inorganics and metals concentrations generally increased, and VOCS decreased when compared to the previous leachate sampling event in October and December 2020. SVOCs were non-detected, as has occurred since October 2013. All detected compounds were within their historic ranges with no parameters exceeding TCs.

Field parameters for temperature, pH and specific conductance are collected during each quarterly event from the leachate tank; all were within historic ranges during each sampling event.

Leachate Quantities and Shipping:

Note that Item #14(f) of the Consent Order requires semi-annual reporting "of the quantity of leachate pumped, the quantity of leachate shipped, the date shipped, and the receiving location of each shipment of leachate for the previous six months..." It is our understanding that the personnel of CV Landfill, Inc. provide these records to the Vermont Agency of Natural Resources.

VI. QUALITY ASSURANCE/QUALITY CONTROL

A groundwater QA/QC Trip Blank was poured by WHEM from deionized water provided by Endyne, Inc. which was stored in the same cooler as the groundwater samples. Lab results indicated a low-level acetone concentration was detected in only the groundwater trip blank sample, and none of the groundwater samples; all other VOC compounds were non-detected in the groundwater trip blank. Due to the ambient ubiquity of acetone and its frequency as a laboratory contaminant, WHEM does not feel any further investigation is warranted, and believes acceptable sampling procedures have occurred.

A surface water QA/QC Trip Blank was poured by WHEM from deionized water provided by Endyne, Inc. which was stored in the same cooler as the surface water samples. Laboratory results showed no VOC detections in the surface water trip blank, indicating acceptable sampling procedures have occurred.

A leachate QA/QC Trip Blank was poured by WHEM from deionized water provided by Endyne, Inc. which was stored in the same cooler as the leachate sample. Laboratory results showed no VOC detections in the leachate trip blank, indicating acceptable sampling procedures have occurred.

An Equipment Blank sample was collected at the end of sampling from the Geotech Geosub rental pump used for low-flow sampling of some of the deep monitoring wells. Laboratory results showed no VOC detections, indicating acceptable sampling and laboratory procedures for groundwater samples in the October 2021 sampling round.

Monitoring well MW-8R served as the duplicate sampling location in October 2021. The lab results between MW-8R and the duplicate for most compounds were in close relation, indicating acceptable sampling and laboratory procedures for inorganics, metals, and VOC groundwater samples in the October 2021 sampling round. The results for total arsenic, total iron and t-Butanol were not in close relation between MW-8R and the duplicate. Upon inquiry to the laboratory, personnel stated the duplicate had a slightly different color tint than MW-8R and more precipitate present, which could contribute to the discrepancy. Lab personnel also stated the reporting limit for t-butanol is 20 ug/L, and at this low level there can be some interference in the chromatography, which likely contributes to this discrepancy. See the summary tables and individual lab reports in the Attachment for QA/QC results.

QA/QC samples for PFAS analysis were also collected [Trip Blank, Field Blank and Equipment Blank]. All three of these QA/QC samples were non-detected for PFAS compounds, indicating acceptable sampling and laboratory procedures for PFAS groundwater samples in the October 2021 sampling round.

VII. CONCLUSIONS AND RECOMMENDATIONS

1. WHEM sampled the monitoring wells, surface waters and leachate on October 21, 2021.
2. Upgradient of the Unlined Landfill (3 Wells):
   - Inorganic compounds and Metals showed *downward trends* in MW-3R and MW-8R and *mixed trends* in G-4.
   - VOCs were non-detected in MW-3R, and *downward trends* were noted in MW-8R. VOC analysis is not required in G-4.
   - PFAS analysis is not required in MW-3R, MW-8R or G-4.
   - Groundwater Exceedances:
     - Arsenic and total and dissolved manganese exceeded their GESs in MW-8R, as is typical.
3. Downgradient of the Unlined Landfill (6 Wells)
   - Inorganic compounds and Metals showed *upward trends* in WE-1B, MW-5AR, and MW-7, and showed *downward trends* in MW-6R and MW-10R.
   - VOCs were non-detected in WE-1B and MW-5AR, downward *trends* were noted in MW-6R, and *upward trends* were noted in MW-10R; VOC analysis in MW-7 is not required.
   - PFAS was sampled in the following wells from this group: MW-5AR, MW-7 and MW-10R; all were above the GES for the five VT-regulated PFAS compounds.
   - Groundwater Exceedances:
     - Arsenic exceeded the GES in MW-5AR, MW-6R, MW-7 and MW-10R, as is typical;
     - Total and dissolved manganese exceeded their GESs in WE-1B and MW-7, as is typical;

- Nickel exceeded the GES in MW-6R, as is typical;
- Benzene exceeded the GES in MW-6R and MW-10R, as is typical;
- Naphthalene exceeded the GES in MW-6R, as is typical;
- Vinyl Chloride exceeded the GES in MW-10R, as is typical.

4. Arsenic, iron, lead, and manganese levels continue to exceed the groundwater standards in many of the wells at CV Landfill, as they have for many years. These metals are common naturally-occurring constituents in groundwater in Vermont. However, downgradient concentrations are elevated at CV Landfill, so the groundwater standards exceedances generally reflect likely impacts from this landfill.
5. Four surface water locations had sufficient water to sample in October 2021; SS-4 was dry this round, as often occurs.
   - Surface water exceedances: No surface water stations exceeded VWQSs in October 2021, as is typical.
6. WHEM collected leachate samples from the leachate UST on August 10, 2021 and October 21, 2021.
   - Leachate TC exceedances: Leachate concentrations from August and October 2021 did not exceed the TCs, as is typical.

Recommendations: Based on the above conclusions, WHEM recommends the following:

1. WHEM recommends that monitoring be conducted in accordance with the Stipulation and Consent Order, except as modified per explanations provided in this report, until the re-certification of the Post-Closure Plan is finalized.

Sincerely,

Wendy Shellito (phone x103)
Project Scientist
wshellito@waiteenv.com

Craig Heindel, C.P.G. (phone x102)
Senior Hydrogeologist
cheindel@gmavt.net

Attachment

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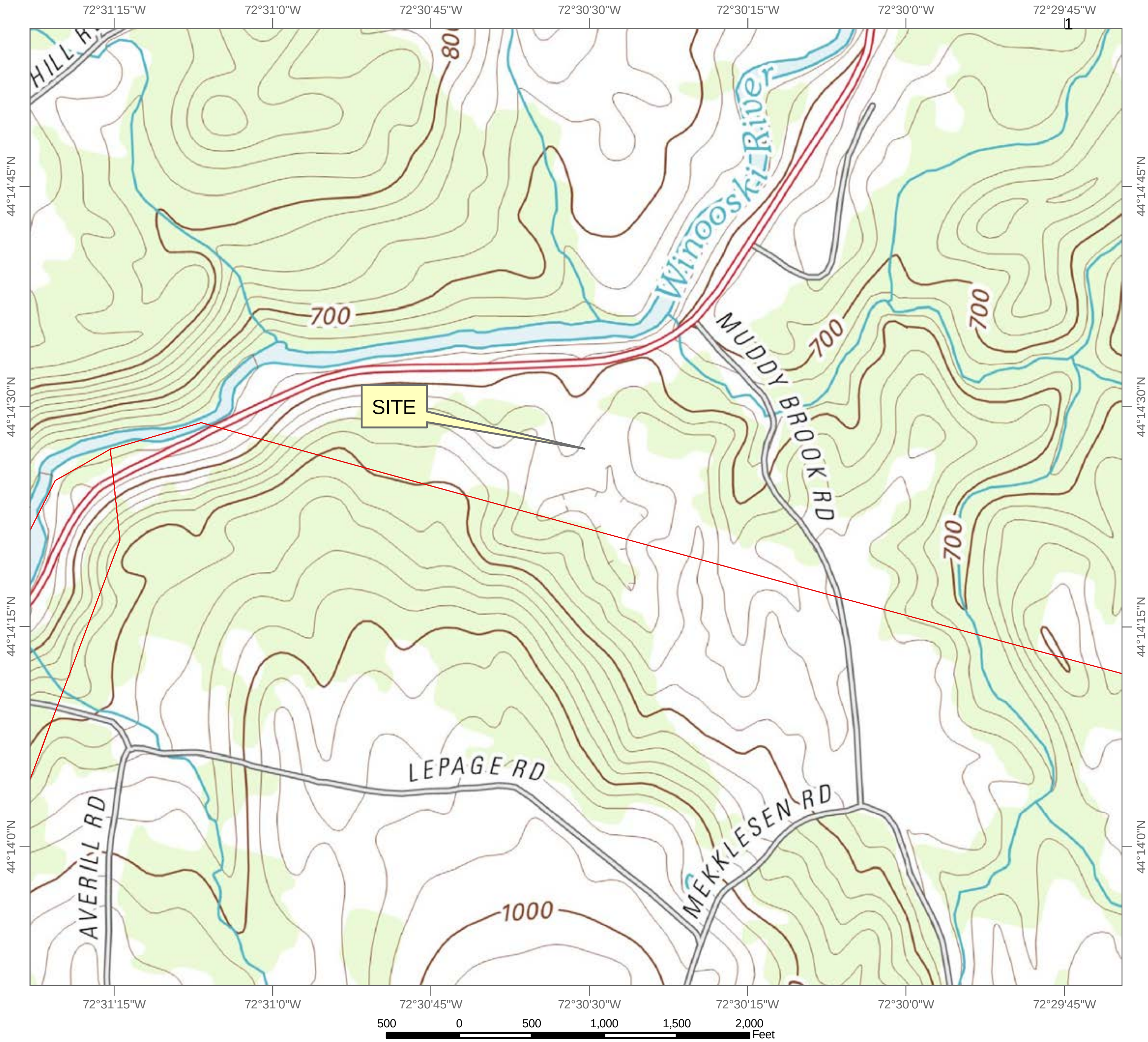
ATTACHMENT

CV LANDFILL

TABLE OF CONTENTS
OCTOBER 2021 Water Quality Sampling;
AUGUST and OCTOBER 2021 Leachate Sampling

Page



USGS Site Location Map

CV Landfill
East Montpelier, VT

July 12, 2021
Map produced by: wshellito
U:\PROJECTS - WHEM\CV Landfill\Site Plans, Maps\USGS

Site Coordinates:

VT State Plane Meters:

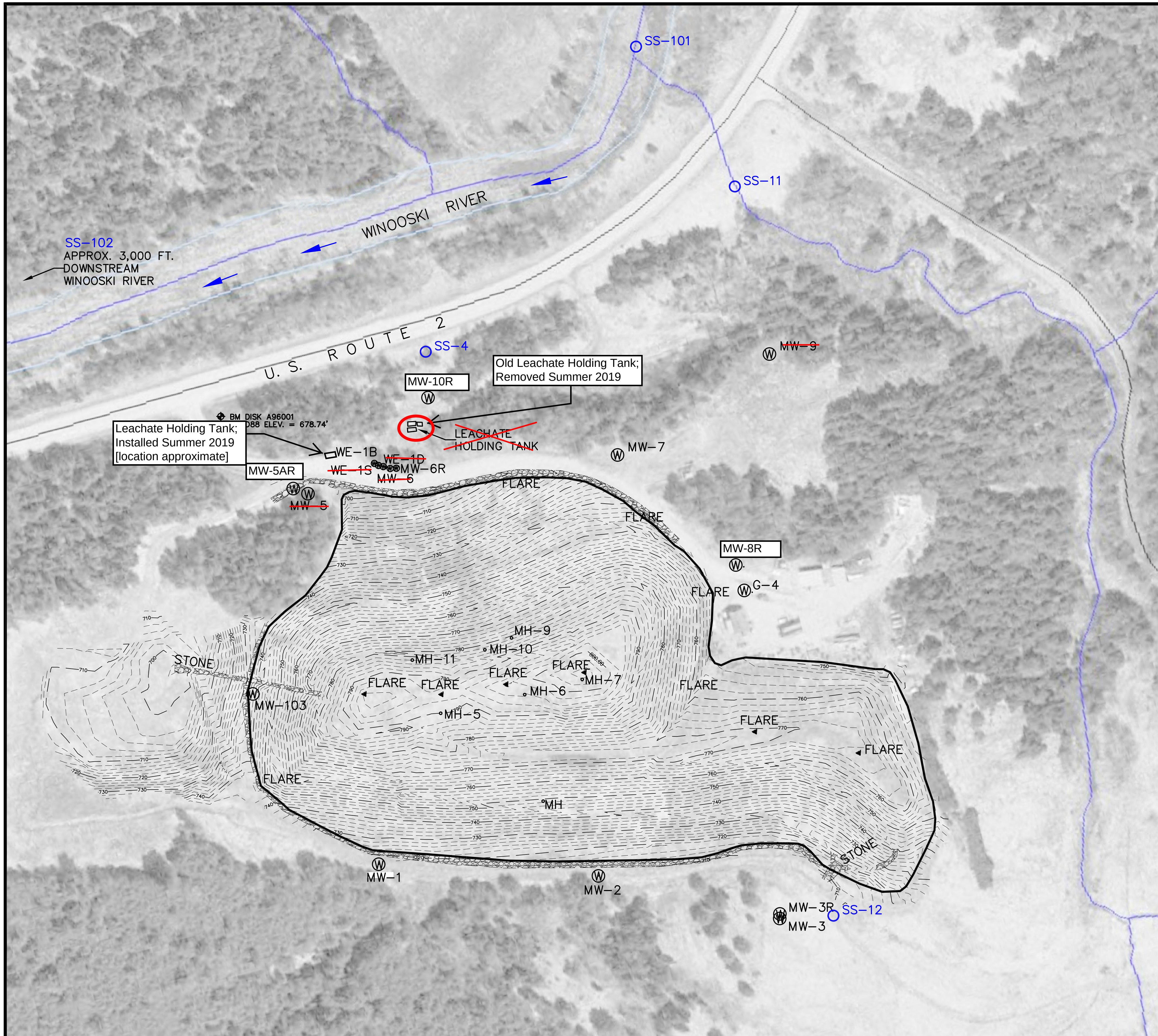
Northing: 193376
Easting: 498971

Town Boundary

WAITE HEINDEL
Environmental Management

References:

United States Geological Survey 2013 Barre West, Vermont Quadrangle. Computer file, USGS. Distributed 2014 through Vermont Center for Geographic Information,
Town boundary, best sources. Computer file, bndhash, Vermont Center for Geographic Information, Waterbury, VT. Distributed through Vermont Center for Geographic Information, Inc. 2007.



NOTES:

1. THE BASE PLAN WAS PROVIDED TO SANBORN, HEAD & ASSOCIATES, INC. (SHA) IN DIGITAL FORMAT BY VERMONT SURVEYING AND ENGINEERING, INC. (VSE) OF MONTPELIER, VERMONT. THE BASE PLAN REPRESENTS SITE CONDITIONS ON AUGUST 6, 2002. THE ORTHOPHOTO BASE (1996) WITH SURFACE WATER WAS ADDED TO THIS PLAN BY HEINDEL & NOYES ON 11/11/04.

2. MONITORING WELL LOCATIONS WERE DIGITIZED FROM A PLAN ENTITLED "CONSTRUCTION DRAWINGS, PRE–CLOSURE GRADING PLAN" PREPARED BY H&A AND CMA ENGINEERS, INC. (CMA) OF PORTSMOUTH, NEW HAMPSHIRE DATED JANUARY 2001.

3. THE LOCATION OF MONITORING WELL MW–9 IS BASED ONLY ON THE OBSERVATIONS OF SHA FIELD STAFF AND SHOULD BE CONSIDERED APPROXIMATE ONLY.

LEGEND:

710	EXISTING 10–FOOT CONTOUR
	EXISTING 2–FOOT CONTOUR
FLARE	PASSIVE GAS FLARE
MH–9	DECOMMISSIONED MANHOLE
WE–1B	APPROXIMATE GROUNDWATER MONITORING WELL LOCATION (TYP.)
SS	APPROXIMATE SURFACE WATER SAMPLING STATION
	ASSUMED APPROXIMATE LIMITS OF UNLINED LANDFILL
	Removed [9/2018 or earlier].

Waite - Heindel Environmental Management
• Hydrogeology • Environmental Services •
• Water and Wastewater Design •
Burlington, Vermont • (802) 860-9400

DATE: Last Rev. 08/22/2019
PROJECT NO. 03351
Last Rev.: CDH.
PROJ. MGR: W.K.
APPROVED:
DRAFT
FINAL

CV LANDFILL
EAST MONTPELIER, VERMONT
MONITORING PLAN

FILE: Z:\Projects\CV_Landfill\Monitoring Plan.dwg
SCALE: 1"=200'

CV LANDFILL East Montpelier, Vermont RECENT GROUNDWATER QUALITY TRENDS Through OCTOBER 2021			
	Recent Estimated Trends*		
Location	**Inorganics, Metals**	**Volatile Organics**	**sum of 5 VT PFAS**
UPGRADIENT OF THE UNLINED LANDFILL (1 LOCATION)			
MW-3R	D	ND	NA
UPGRADIENT OR SIDEGRADIENT OF THE UNLINED LANDFILL (2 LOCATIONS)			
MW-8R	D	D	NA
G-4	M	NA	NA
DOWNGRADIENT OR SIDEGRADIENT OF THE UNLINED LANDFILL (7 LOCATIONS)			
WE-1B	U	ND	NA
MW-5AR	U	ND	D
MW-6R	D	D	NA
MW-7	U	NA	D
MW-10R	D	U	U

Notes:

Recent Trends visually estimated from previous sampling event.

U = Concentrations generally up.

D = Concentrations generally down.

M = Mixed trend or no trend.

ND = Non-Detected for all parameters.

NS = Not Sampled.

NA = Not Analyzed.

CV Landfill
East Montpelier, Vermont
Water Quality Standards Exceedances
In OCTOBER 2021 Groundwater

Monitor Well	GES	PAL	HA	Primary MCL	Secondary MCL
UPGRADIENT OF THE UNLINED LANDFILL (1 LOCATION)					
MW-3R	--	--	--	--	Total Manganese
	--	--	--	--	Diss. Manganese
UPGRADIENT OR SIDEGRADIENT OF THE UNLINED LADNFIL (2 LOCATIONS)					
MW-8R	Total Manganese	Total Manganese	Total Manganese	--	Total Manganese
	Diss. Manganese	Diss. Manganese	Diss. Manganese	--	Diss. Manganese
	Total Arsenic	Total Arsenic	--	Total Arsenic	--
	--	Total Nickel	--	--	--
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
	--	Benzene	--	--	--
	--	MTBE	--	--	--
G-4	--	Total Arsenic	--	--	--
	--	--	--	--	Total Manganese
	--	--	--	--	Diss. Manganese
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
DOWNGRADIENT OR SIDEGRADIENT OF THE UNLINED LADNFILL (7 LOCATIONS)					
WE-1B	Total Manganese	Total Manganese	Total Manganese		Total Manganese
	Diss. Manganese	Diss. Manganese	Diss. Manganese	--	Diss. Manganese
	--	Total Arsenic		--	--
	--	Total Lead	Total Lead	--	--
	--	--	--	--	Chloride
	--	--	--	--	Total Iron
	--	--	--	--	Sodium
MW-5AR	--	Total Manganese	--	--	Total Manganese
	--	Diss. Manganese	--	--	Diss. Manganese
	Total Arsenic	Total Arsenic	--	Total Arsenic	--
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
	sum of 5 VT PFAS	sum of 5 VT PFAS	sum of 5 VT PFAS	--	--
MW-6R	--	--	--	--	Total Manganese
	--	--	--	--	Diss. Manganese
	Total Arsenic	Total Arsenic	--	Total Arsenic	--
	Total Nickel	Total Nickel	Total Nickel	--	--
	--	--	--	--	Chloride
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
	--	--	--	--	Sodium
	Benzene	Benzene	--	Benzene	--
	Naphthalene	Naphthalene	Naphthalene	--	--
	--	Trimethylbenzenes	--	--	--
MW-7	Total Manganese	Total Manganese	Total Manganese	--	Total Manganese
	Diss. Manganese	Diss. Manganese	Diss. Manganese	--	Diss. Manganese
	Total Arsenic	Total Arsenic	--	Total Arsenic	--
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
	--	--	--	--	Chloride
	sum of 5 VT PFAS	sum of 5 VT PFAS	sum of 5 VT PFAS	--	--
MW-10R	--	Total Manganese	--	--	Total Manganese
	--	Diss. Manganese	--	--	Diss. Manganese
	Total Arsenic	Total Arsenic	--	Total Arsenic	--
	--	--	--	--	Total Iron
	--	--	--	--	Diss. Iron
	sum of 5 VT PFAS	sum of 5 VT PFAS	sum of 5 VT PFAS	--	--
	Benzene	Benzene	--	Benzene	--
	--	1,2 Dichloroethane	--	--	--
	--	Trichloroethene	--	--	--
	Vinyl Chloride	Vinyl Chloride	--	Vinyl Chloride	--

Notes:

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels (PAL) from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels (HA) and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

-- = No exceedances of VGESs.

CV LANDFILL
East Montpelier, Vermont
SURFACE WATER QUALITY TRENDS
Through OCTOBER 2021

Location		Recent Estimated Trends	
Name	**Station Number**	**Inorganics, Metals**	**Volatile Organics**
Upstream			
SS-12	SS-12	U	ND
Winooski River	SS-101	U	ND
Downstream			
SS-4	SS-4	DRY	DRY
SS-11	SS-11	U	ND
Winooski River	SS-102	M	ND

Notes:

Trends are visually estimated from previous sampling event.

U = Concentrations generally up.

D = Concentrations generally down.

M = Mixed trend or no trend.

ND = Non-Detected for all parameters.

NS = Not sampled (dry stream).

CV LANDFILL East Montpelier, Vermont WATER QUALITY STANDARDS EXCEEDANCES* Through OCTOBER 2021		
Location		**Exceedances of Water Quality Standards, Appendix C [2]**
Name	**Station Number**	**Inorganics, Metals**
Upstream		
SS-12	SS-12	Diss. Cadmium [1]
Winooski River	SS-101	Diss. Cadmium [1]
Downstream		
SS-4	SS-4	DRY
SS-11	SS-11	Diss. Cadmium [1]
Winooski River	SS-102	Diss. Cadmium [1]

Notes:

* Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E: Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteria).

If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated.

NS = Not Sampled because the stream was dry.

[1] Some metals are non-detected, but their detection limits are higher than their water quality standards, so the actual concentraiton of these metals cannot be compared to standards.

MW-3R; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/26/1999	**MW-3R**	10	270		7.5		
10/19/1999		9	480		7.4		
5/22/2000		11	350		7.4		
10/10/2000		8	440		8.0		
5/17/2001		14.5	477		7.5		
10/22/2001		9.6	497		7.3		
5/2/2002		10.4	515		7.83		
10/30/2002		10	536		7.1		
5/15/2003		13.3	490		7.11		
10/8/2003		12.7	495		7.5		
5/18/2004		9.71	286*		7.79		
10/11/2004		8.58	317*		7.82		
10/11/2004	duplicate						
5/11/2005		11.7	435		6.98		
10/11/2005		12.32	708		7.65		
5/4/2006		10.80	424		7.31		
10/10/2006		9.15	429		7.61		
5/8/2007		11.34	423		7.42		
10/9/2007		9.90	434.2		8.0		
5/8/2008		11.81	446		7.7		
10/1/2008		12.60	411.9		7.5		
5/4/2009		12.14	430		8.0		
10/12/2009		9.40	423		7.3		
5/5/2010		10.30	303.4		8.1		
10/11/2010		9.30	385		8.3		
5/12/2011		10.20	353.8		8.1		
10/12/2011		10.00	273		8.4		
5/10/2012		9.80	421.9		8.3		
10/4/2012		10.20	418.3		7.4		
5/1/2013		10.70	206.2		7.6		
10/1/2013		12.10	298.8		*9.1*		
5/1/2014		10.40	284.9		7.1		
11/17/2014	MW redevelopment						
2/12/2015		6.89	323	0.68	7.5	19.0	288.0
10/28/2015		8.20	377.3	0.39	7.5	8.7	9.1
6/13/2016		9.90	387.9	0.32	7.62	-53.6	471.4
10/18/2016		10.00	420.3	0.69	7.72	9.3	6.3
5/17/2017		12.90	269.8	0.27	6.88	72.5	337.3
10/16/2017		8.52	380	0.93	7.18	-95.2	388.4
5/9/2018		14.40	175.6	1.39	6.60	-40.1	346.0
10/30/2018		7.90	401.8	0.62	7.38	-76.8	79.2
5/14/2019		9.10	166.5	0.31	6.77	68.2	699.5
10/24/2019		9.80	380.5	0.25	7.19	-83.6	133.2
5/14/2020		9.80	379.8	0.41	7.50	-83.1	271.3
5/14/2020	Duplicate						
10/29/2020		8.60	398.7	3.10	8.14	273.4	0.3
5/17/2021		10.50	387.9	0.74	7.48	1.7	36.7
10/21/2021		9.40	401.5	0.34	7.50	-1.5	1.2

MW-3R; INORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMONT

WAITE HEINDEL

		INORGANIC PARAMETERS			DISSOLVED METALS		TOTAL METALS									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/26/1999	**MW-3R**	1	105	14	*0.89*	***0.87***										
10/19/1999		2	< 20	13	0.30	***0.48***										
5/22/2000		2	< 20	20	0.15	*0.09*										
10/10/2000		1	< 20	15	*0.34*	0.03										
5/17/2001		1	62	20	*58*	***2.2***										
10/22/2001		2	< 20	17	0.26	*0.11*	***21***	***13***	49	0.06	*44*	***71***	***4.8***	< 2	< 50	0.1
5/2/2002		1	< 20	12	0.03	0.02	**< 2**	*<2*	10	0.03	*5.7*	***6***	***0.49***	< 2	< 50	0.02
10/30/2002		1	< 20	16	0.22	*0.08*	**4**	*<5*	19	0.05	*24*	***21***	***1.5***	< 2	< 50	0.12
5/15/2003		3	< 20	22	*1.8*	*0.07*	**4**	*<5*	12	0.08	*24*	***18***	***2.1***	< 2	< 50	0.12
10/8/2003		2	<20	13	0.1	0.02	**< 2**	*<5*	10	0.04	*5.1*	***7***	***0.55***	< 2	< 50	0.04
5/18/2004		*< 2.5*	<15	4.74	0.034	*0.052*	**6**	**< 3**	< 10	0.01	*7.06*	***4***	**0.189**	< 1	**54**	0.027
10/11/2004		*< 2.5*	< 15	15.2	0.022	0.013	**6**	**< 3**	< 10	0.011	*7.0*	***4***	*0.142*	< 1	< 20	0.037
10/11/2004	duplicate	*< 2.5*	< 15	16.1	0.047	0.017	**6**	**< 3**	< 10	0.014	*6.6*	***4***	**0.16**	< 1	< 20	0.041
5/11/2005		< 2.50	15	18.0	0.017	0.031	***11***	**< 3**	43	0.024	*28.3*	***8***	***0.571***	< 1	39	0.068
10/11/2005		< 2.50	< 15	12.4	0.061	0.021	**8**	**< 2**	23	< 0.010	*17.8*	***< 10***	***0.432***	< 1	< 20	0.050
5/4/2006		< 2.50	< 15	28.2	0.151	0.014	***49***	**3**	***141***	0.059	*135*	***24***	***3.39***	< 1	***173***	0.320
10/10/2006		< 2.50	< 15	17.8	0.178	< 0.020	***28***	**3**	**73**	0.049	*66.1*	***16***	***1.32***	< 1	**84**	0.145
5/8/2007		< 2.50	< 15	13.6	0.187	0.036	**4**	**< 2**	< 20	< 0.020	*6.24*	*2*	*0.148*	< 1	< 20	< 0.020
10/9/2007		< 2.50	< 10	12.1	0.075	< 0.020	**< 2**	**< 2**	< 20	< 0.020	*9.16*	< 1	**0.214**	< 1	< 20	0.024
5/8/2008		< 2.50	< 10	19.0	*0.31*	< 0.020	**6**	**< 2**	< 20	< 0.020	*13*	***5***	***0.31***	< 1	24	0.039
10/1/2008		< 2.50	< 10	11.0	0.049	< 0.020	**< 2**	**< 2**	< 20	< 0.020	*1.9*	< 1	*0.053*	< 1	< 20	< 0.020
5/4/2009		< 2.50	10	14.0	0.051	< 0.020	**2**	**< 2**	< 20	< 0.020	*3.6*	*2*	***0.93***	< 1	< 20	< 0.020
10/12/2009		< 2.50	16	12.0	0.083	< 0.020	**3**	**< 2**	< 20	< 0.020	*3.3*	< 1	*0.12*	< 1	< 20	< 0.020
5/5/2010		< 2.50	83	17.0	0.11	< 0.020	**8**	**< 2**	21	< 0.020	*17.0*	***8***	***0.39***	< 0.1	27	0.048
10/11/2010		< 2.50	30	11.0	*0.52*	< 0.020	**3**	**< 2**	7	< 0.020	*5.4*	*2*	*0.12*	< 0.2	7	0.015
5/12/2011		4.6	42	11.0	*1.0*	*0.110*	**9**	**< 2**	25	< 0.020	*15.0*	***7***	***0.34***	< 0.2	36	0.063
10/12/2011		< 2.50	32	12.0	0.091	< 0.020	**9**	**< 2**	35	0.028	*23.0*	***11***	**0.29**	< 0.2	39	0.075
5/10/2012		7.40	23	13.0	0.280	0.030	***12***	**< 2**	32	0.028	*23.0*	***9***	***0.31***	< 0.2	40	0.065
10/4/2012		5.40	39	11.0	0.095	< 0.020	**9**	**< 2**	21	< 0.020	*14.0*	***5***	**0.19**	< 0.2	20	0.030
5/1/2013		3.20	340	< 10	*1.000*	*0.074*	***70***	***< 20***	***200***	< 0.200	*200.0*	***76***	***2.3***	< 0.2	***330***	0.470
10/1/2013		11.00	41	9.8	0.150	0.045	**6**	**< 2**	11	< 0.020	*13.0*	***5***	**0.22**	< 0.2	21	0.032
5/1/2014		< 2.5	40	13.0	0.240	0.034	***20***	**< 2**	43	0.042	*35.0*	***14***	***0.45***	< 0.2	**60**	0.098
11/17/2014	MW redevelopment															
2/12/2015		< 2.5	20	13.0	< 0.020	< 0.020	**2**	**< 2**	14	< 0.020	*13.0*	*2*	**0.24**	< 0.2	15	0.027
10/28/2015		< 2.5	19	11.0	0.034	0.023	**2**	**< 2**	< 5	< 0.020	*2.0*	< 1	*0.092*	< 0.2	< 5.0	< 0.020
6/13/2016		< 2.5	160	12.0	*1.300*	***0.300***	**7**	**< 2**	21	0.046	*33.0*	***25***	***2.1***	< 0.2	**54**	0.084
10/18/2016		< 2.5	< 10	11.0	0.022	< 0.020	< 1	**< 2**	< 5	< 0.020	0.3	< 1	< 0.020	< 0.2	< 5.0	< 0.020
5/17/2017		2.7	55	10.0	*0.940*	***0.210***	***18***	**< 2**	**53**	0.054	*40.0*	***18.4***	***0.64***	< 0.2	**64**	0.097
10/16/2017		2.8	49	13.0	*12.000*	***2.600***	***16***	**< 2**	**57**	0.039	*47.0*	***18.6***	***2.8***	< 0.2	**81**	0.130
5/9/2018		6.4	130	7.2	0.220	*0.095*	***11.3***	**< 2**	31.9	0.027	*27.0*	***12.1***	***0.51***	< 0.2	37.2	0.054
10/30/2018		4.0	15	10.0	< 0.020	0.011	**2.6**	**< 2**	< 5	< 0.020	*2.0*	*1.2*	*0.065*	< 0.2	< 5.0	< 0.020
5/14/2019		18.0	66	7.0	*0.55*	***0.330***	***38.4***	**< 2**	***125***	0.079	*100.0*	***39.4***	***1.4***	< 0.2	***133***	0.170
10/24/2019		< 2.7	18	12.0	*1.80*	***0.630***	***11.1***	**< 2**	13	< 0.020	*11.0*	***3.5***	***0.87***	< 0.2	15.2	< 0.020
5/14/2020		< 2.7	21	14.0	*1.00*	***0.290***	***11.5***	**< 2**	23	< 0.020	*17.0*	***7.6***	***0.44***	< 0.2	25.8	0.037
5/14/2020	Duplicate	3.4	20	13.0	*0.95*	***0.280***	**9.2**	**< 2**	12.7	< 0.020	*9.4*	***4.0***	***0.42***	< 0.2	14.8	< 0.020
10/29/2020		< 2.7	< 10	12.0	0.079	< 0.010	**1.3**	**< 2**	< 5	< 0.020	*0.55*	< 1	0.014	< 0.2	< 5	< 0.020
5/17/2021		< 2.7	< 10	13.0	< 0.020	*0.073*	**2.4**	**< 2**	5.6	< 0.020	*3.60*	*1.8*	*0.15*	< 0.2	6.5	< 0.020
10/21/2021		< 2.7	< 10	11.0	< 0.020	*0.059*	< 1	**< 2**	< 5	< 0.020	0.17	< 1	*0.082*	< 0.2	< 5	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.

Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.

Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.

Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.

*In 2004, water was analyzed for conductivity, not specific conductance

< = non-detected, at the reported detection limit shown.

NS=Not Sampled

Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

MW-8 & MW-8R; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/26/99	**MW-8**	10	330		7.9		
10/19/1999		10	420		7.3		
5/23/2000		11	410		6.86		
10/11/2000		9	320		8.2		
5/22/2001		11.2	425		7.5		
10/22/2001		10.3	294		7.3		
5/2/2002		8.9	647		*6.42*		
10/29/2002		7.6	803		*6.04*		
5/14/2003		10.5	730		*6.00*		
10/7/2003		7.6	803		*6.3*		
5/18/2004		9.67	285*		7.41		
10/11/2004		8.8	291*		7.89		
5/11/2005		11.2	408		7.38		
10/11/2005		10.01	596.7		7.59		
5/4/2006		11.03	350		7.24		
10/10/2006		8.79	380		7.72		
5/3/2007		9.98	341		7.33		
10/9/2007		9.8	350.3		8.30		
5/8/2008		10.45	390		7.95		
10/1/2008		10.50	452		8.00		
5/4/2009		11.05	327		*8.57*		
10/12/2009		9.20	192.6		8.10		
10/12/2009	duplicate						
5/5/2010		9.90	276.6		7.40		
5/5/2010	duplicate						
10/11/2010		9.00	257.5		8.35		
5/12/2011		9.20	317.3		7.70		
10/12/2011		10.80	207.4		8.30		
5/10/2012		9.50	300.1		7.90		
10/4/2012		10.80	260.2		7.20		
5/1/2013		9.90	281.6		6.70		
10/1/2013		11.70	257.2		7.50		
5/1/2014		10.00	210.3		7.00		
11/17/2014	MW redevelopment						
2/11/2015		4.94	263.0	5.97	7.68	67.7	129.8
10/1/2015	MW redevelopment						
10/28/2015		9.10	333.4	10.74	7.96	84.4	>1,000
5/16/2016	MW redevelopment						
6/13/2016		9.80	325.5	0.47	7.59	-63.9	115.1
10/18/2016		12.20	434.7	1.18	7.77	-108.1	415.0
5/17/2017		12.50	386.1	0.74	7.36	-57.3	58.7
10/16/2017		8.90	482.4	1.87	7.54	-68.9	178.0
5/9/2018		11.30	386.6	1.44	7.41	-140.1	2.5
9/10/2018	MW-8 de-commissioned						
9/11/2018	MW-8R installed						
10/30/2018		11.40	546.9	0.52	7.70	-161.3	84.6
6/24/2019		12.40	2936	0.44	6.70	8.2	213.4
10/24/2019		11.50	2652	0.85	*6.48*	8.1	379.9
10/24/2019	duplicate						
5/14/2020		9.04	2493	1.78	6.61	8.2	113.6
10/29/2020		7.94	2332	7.60	7.14	-23.9	416.2
5/17/2021		9.09	2259	0.46	*6.48*	-61.3	67.1
5/17/2021	duplicate						
10/21/2021		11.40	1994	0.21	6.79	134.2	18.7
10/21/2021	duplicate						

MW-8 & MW-8R; INORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			DISSOLVED METALS		TOTAL METALS									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/26/99	**MW-8**	1	178	12	*1.5*	***0.44***										
10/19/1999		19	< 20	13	*0.74*	***0.75***										
5/23/2000		2	< 20	12	*2.2*	***0.98***										
10/11/2000		1	< 20	17	*0.48*	***0.4***										
5/22/2001		1	82	13	*0.39*	***0.34***										
10/22/2001		2	22	14	*0.32*	***0.22***	***42***	***17***	13	0.05	*73*	***55***	***18***	< 2	50	0.06
5/2/2002		6	< 20	14	*5.4*	***2.8***	***23***	***6***	24	0.03	*19*	***29***	***3.7***	< 2	< 50	0.05
10/29/2002		3	< 20	15	*4.9*	***2.6***	***42***	***< 5***	20	0.05	*27*	***22***	***4***	< 2	**70**	0.09
5/14/2003		2	< 20	14	*2.1*	***2.5***	***52***	***7***	25	0.11	*40*	***33***	***4.8***	< 2	**80**	0.12
10/7/2003		2	20	14	*9.5*	***2.6***	***73***	***< 5***	14	0.04	*18*	*15*	***3.3***	< 2	< 50	0.04
5/18/2004		< 2.5	< 15	12.9	*1.2*	***1.01***	**3**	**3**	< 10	< 0.01	*4.89*	*2*	***1.15***	< 1	< 50	0.018
10/11/2004		< 2.5	< 15	12.5	*0.432*	***0.744***	***30***	**< 3**	16	< 0.01	*9.22*	*4*	***1.01***	< 1	20	0.031
5/11/2005		< 2.50	< 15	13.2	0.196	***0.665***	***35***	**< 3**	39	0.041	*40.5*	*10*	***1.95***	< 1	**63**	0.098
10/11/2005		< 2.50	< 15	11.3	*0.605*	***0.647***	***25***	**< 2**	15	< 0.010	*11.7*	*< 10*	***0.917***	< 1	< 20	0.036
5/4/2006		< 2.50	< 15	14.9	*0.649*	***0.597***	***33***	**< 2**	< 10	< 0.010	*2.33*	*< 10*	***0.619***	< 1	< 20	0.034
10/10/2006		< 2.50	< 15	13.9	< 0.020	< 0.020	***35***	**4**	< 20	0.035	*14.3*	*6*	***0.774***	< 1	< 20	0.056
5/3/2007		< 2.50	< 15	14.4	*0.304*	***0.498***	***31***	**< 2**	< 20	< 0.020	*17.1*	*5*	***0.96***	< 1	27	0.042
10/9/2007		< 2.50	< 10	16.9	*0.404*	***0.545***	**< 2**	***9***	***217***	0.200	*237*	< 1	***14.7***	< 1	***301***	0.484
5/8/2008		< 2.50	< 10	17	*0.45*	***0.54***	***63***	***15***	**74**	0.170	*180*	***76***	***13***	< 1	26	0.37
10/1/2008		< 2.50	42	16	0.26	***0.46***	***35***	**< 2**	**94**	0.110	*110*	***46***	***3.8***	< 1	***180***	0.26
5/4/2009		< 2.50	23	13	0.29	***0.36***	***18***	**< 2**	< 20	< 0.020	*3.4*	*2*	***0.41***	< 1	< 20	< 0.020
10/12/2009		< 2.50	49	14	*0.34*	***0.31***	***25***	**< 2**	< 20	0.030	*7.1*	*2*	***0.55***	< 1	30	< 0.020
10/12/2009	duplicate	< 2.50	37	14	*0.41*	***0.34***	***22***	**< 2**	< 20	< 0.020	*11.0*	*4*	***0.63***	< 1	< 20	0.028
5/5/2010		< 2.50	45	13	0.24	***0.32***	***25***	***5***	8	< 0.020	*7.5*	*4*	***0.55***	< 0.1	11	0.032
5/5/2010	duplicate	14.00	220	12	*1.1*	***0.95***	***120.0***	1	**84**	0.097	*120.0*	***47***	***3.3***	< 0.1	***120***	0.22
10/11/2010		< 2.50	38	13	0.26	***0.29***	***21***	**< 2**	< 5	< 0.020	*3.8*	1	***0.37***	< 0.2	< 5	0.014
5/12/2011		< 2.50	35	12	*0.35*	***0.25***	***25***	**< 2**	6	< 0.020	*5.3*	1	***0.40***	< 0.2	8	0.026
10/12/2011		< 2.50	11	12	0.15	***0.24***	***31***	**< 2**	< 5	< 0.020	*3.0*	1	***0.30***	< 0.2	< 5	0.045
5/10/2012		< 2.50	< 10	12	0.14	***0.24***	***26***	**< 2**	< 5	< 0.020	*1.6*	< 1	***0.28***	< 0.2	< 5	< 0.020
10/4/2012		< 2.50	21	12	0.23	***0.28***	***22***	**< 2**	< 5	< 0.020	*1.2*	< 1	***0.31***	< 0.2	< 5	< 0.020
5/1/2013		< 2.50	20	13	*0.47*	***0.36***	***18***	**< 2**	< 5	< 0.020	*1.6*	1	***0.33***	< 0.2	< 5	< 0.020
10/1/2013		< 2.50	11	13	0.16	***0.23***	***30***	**< 2**	< 5	< 0.020	*1.8*	< 1	***0.30***	< 0.2	< 5	< 0.020
5/1/2014		3.20	17	14	0.19	***0.24***	***19***	**< 2**	< 5	< 0.020	*0.89*	1	***0.25***	< 0.2	< 5	< 0.020
11/17/2014	MW redevelopment															
2/11/2015		< 2.50	29	13	*0.48*	***0.35***	***21***	**< 2**	< 5	< 0.020	*3.10*	*3*	***0.38***	< 0.2	7	0.014
10/1/2015	MW redevelopment															
10/28/2015		< 2.50	140	13	0.15	***0.28***	***70***	**< 2**	***150***	0.13	*190.00*	***61***	***3.60***	< 0.2	***200***	0.340
5/16/2016	MW redevelopment															
6/13/2016		71	11	11	0.16	***0.24***	***13***	**< 2**	6.4	< 0.020	*4.40*	1	***0.35***	< 0.2	7	< 0.020
10/18/2016		< 2.50	28	15	0.14	***0.35***	***25***	**< 2**	6.1	< 0.020	*5.50*	*4.5*	***0.62***	< 0.2	15	< 0.020
5/17/2017		< 2.50	13	12	0.084	***0.41***	***14***	**< 2**	< 5	< 0.020	*0.86*	< 1	***0.43***	< 0.2	< 5	< 0.020
10/16/2017		3.10	23	14	*2.1*	***0.49***	***33.5***	**< 2**	17	< 0.020	*11.00*	*3.3*	***0.62***	< 0.2	21	0.028
5/9/2018		7.40	15	14	0.23	***0.31***	***23.2***	**< 2**	< 5	< 0.020	*0.55*	< 1	***0.36***	< 0.2	< 5	< 0.020
9/10/2018	MW-8 de-commissioned															
9/11/2018	MW-8R installed															
10/30/2018		34.00	114	24	0.029	***0.39***	***32.0***	**< 2**	***550***	0.064	*63.00*	***24.8***	***2.00***	0.2	***347***	< 0.020
6/24/2019		*390*	100	220	*1.9*	***3.1***	***15.4***	**< 2**	< 5	< 0.020	*21.00*	< 1	***3.00***	< 0.2	**86.8**	< 0.020
10/24/2019		*310*	130	190	*1.9*	***2.8***	***18.1***	**< 2**	< 5	< 0.020	*27.00*	*1.3*	***3.20***	< 0.2	**80.2**	< 0.020
10/24/2019	duplicate	*320*	130	200	*1.9*	***2.8***	***25.8***	**< 2**	6.2	< 0.020	*39.00*	*2.2*	***3.30***	< 0.2	**82.8**	< 0.020
5/14/2020		*270*	110	180	*1.9*	***2.4***	***32.7***	**< 2**	< 5	< 0.020	*30.00*	< 1	***2.50***	< 0.2	**67.5**	< 0.020
10/29/2020		240	91	170	*2.5*	***2.2***	***95.8***	**< 2**	< 5	< 0.020	*91.00*	< 1	***2.70***	< 0.2	**69.2**	< 0.020
5/17/2021		190	65	160	*5.1*	***2.4***	***26.0***	**< 2**	< 50	< 0.020	*26.00*	< 1	***2.70***	< 0.2	**65.2**	< 0.200
5/17/2021	duplicate	190	63	160	*4.9*	***2.4***	***23.6***	**< 2**	< 5	< 0.020	*26.00*	< 1	***2.50***	< 0.2	**66.7**	< 0.200
10/21/2021		200	76	160	*4.3*	***2.4***	***10.9***	**< 2**	< 5	< 0.020	*10.00*	< 1	***2.40***	< 0.2	**59.4**	< 0.020
10/21/2021	duplicate	200	67	160	*4.1*	***2.4***	***26.0***	**< 2**	< 5	< 0.020	*22.00*	< 1	***2.40***	< 0.2	**59.8**	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.
Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.
*In 2004, water was analyzed for conductivity, not specific conductance
< = non-detected, at the reported detection limit shown.
NS=Not Sampled
Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

WELL G-4; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/26/1999	**G-4**	11	260		7.7		
10/19/1999		11	260		7.6		
5/23/2000		10	230		7.96		
10/11/2000		14	240		8.2		
5/22/2001		12	289		7.4		
10/22/2001		13.3	286		7.3		
5/2/2002		10.4	239		7.88		
10/29/2002		10	317		7.15		
5/14/2003		10.8	300		6.94		
10/8/2003		9.3	357		7.0		
5/18/2004		10.55	202*		8.06		
10/11/2004		13.81	264*		8.05		
5/11/2005		10	290		7.20		
10/11/2005		13.59	445		8.19		
5/4/2006		10.13	280		7.10		
10/10/2006		13.03	277		7.72		
5/8/2007		8.38	295		7.92		
10/9/2007		10.1	289.4		7.90		
5/8/2008		10.6	267		7.54		
10/1/2008		16.1	285		7.81		
5/4/2009		10.8	253		8.13		
10/12/2009		13.1	289		7.60		
5/5/2010		10.2	280.3		8.10		
10/11/2010		NS	NS		8.21		
5/12/2011		9.8	296.5		8.20		
10/12/2011		13.4	219.2		7.90		
5/10/2012		10.6	210.3		7.90		
10/4/2012		14.1	299.3		7.60		
5/1/2013		10.2	293.2		8.16		
10/1/2013		16.0	243.3		7.70		
5/1/2014		8.6	198.0		7.50		
2/12/2015		6.65	235.1	4.84	7.99	63.5	
2/12/2015	duplicate						
10/28/2015		11.60	277.4	1.76	7.82	-119.0	
6/13/2016		12.10	283.5	1.62	7.95	-115.5	2.10
10/18/2016		13.90	283.5	2.93	8.14	-100.1	0.52
5/17/2017		NC	NC	NC	*NC*	NC	NC
10/16/2017		13.70	293.8	3.61	7.87	125.6	1.24
5/9/2018		10.70	293.2	4.02	7.85	-105.2	1.46
10/30/2018		11.40	294.1	2.24	8.13	-136.0	5.91
6/7/2019		16.90	291.5	2.43	7.72	50.1	3.64
10/24/2019		12.60	257.0	3.23	7.93	-70.2	2.09
5/14/2020		7.39	279.0	3.10	7.73	-73.7	16.77
10/29/2020		11.15	279.0	2.60	7.56	-133.5	0.00
5/17/2021		11.80	316.9	0.74	8.05	-139.6	2.32
10/21/2021		12.00	283.2	1.10	8.12	-131.1	0.88

WELL G-4; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			**DISSOLVED METALS**		**TOTAL METALS**									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/26/1999	**G-4**	1	< 20	8.7	*1.2*	*0.1*										
10/19/1999		1	< 20	9.6	*1.4*	*0.09*										
5/23/2000		1	< 20	9.1	*1.4*	*0.1*										
10/11/2000		< 1	< 20	10.0	*1.1*	*0.08*										
5/22/2001		< 1	< 20	8.9	*0.9*	*0.08*										
10/22/2001		1	< 20	9.8	*0.71*	*0.10*	**9**	**< 5**	< 2	< 0.03	*0.89*	***< 3***	*0.12*	< 2	< 5	< 0.01
5/2/2002		1	< 20	9.1	*0.94*	*0.12*	**9**	**< 2**	< 2	< 0.03	*0.91*	***< 3***	*0.12*	< 2	< 5	< 0.01
10/29/2002		1	< 20	12.0	*0.81*	*0.11*	**6**	**< 9**	< 2	< 0.03	*0.92*	***< 3***	*0.12*	< 2	< 5	< 0.01
5/14/2003		3	< 20	9.5	*5.2*	*0.1*	**8**	**< 5**	< 2	< 0.03	*0.58*	***< 3***	*0.11*	< 2	< 5	< 0.01
10/8/2003		2	< 20	9.4	*0.81*	*0.12*	**8**	**< 5**	< 2	< 0.03	*0.94*	***< 3***	*0.12*	< 2	< 5	< 0.01
5/18/2004		< 2.50	< 15	9.6	0.038	*0.099*	**8**	**< 3**	< 10	< 0.01	*0.834*	< 2	*0.104*	< 1	< 2	< 0.02
10/11/2004		< 2.50	< 15	9.0	0.179	*0.099*	**9**	**< 3**	< 10	0.227	*0.618*	***4***	*0.094*	< 1	< 2	< 0.02
5/11/2005		< 2.50	< 15	8.9	*0.496*	*0.104*	**10**	**< 3**	< 10	0.014	*0.549*	< 2	*0.106*	< 1	< 20	< 0.020
10/11/2005		< 2.50	< 15	7.7	0.171	*0.114*	**9**	**< 2**	< 10	< 0.010	*0.701*	***< 10***	*0.118*	< 1	< 20	< 0.020
5/4/2006		< 2.50	< 15	9.4	*4.20*	***1.12***	***22***	**< 2**	< 10	< 0.010	*0.444*	***< 10***	*0.105*	< 1	< 20	< 0.020
10/10/2006		< 2.50	< 15	8.9	*0.417*	*0.114*	**10**	**< 2**	< 20	< 0.020	*0.612*	< 1	*0.110*	< 1	< 20	< 0.020
5/8/2007		< 2.50	< 15	9.2	0.30	*0.107*	**8**	**< 2**	< 20	< 0.020	*0.459*	< 1	*0.105*	< 1	< 20	< 0.020
10/9/2007		< 2.50	< 10	9.4	0.209	*0.102*	**9**	**< 2**	< 20	< 0.020	0.200	< 1	*0.103*	< 1	< 20	< 0.020
5/8/2008		< 2.50	< 10	9.8	*0.59*	*0.11*	***11***	**< 2**	< 20	0.021	*0.640*	< 1	*0.11*	< 1	< 20	< 0.020
10/1/2008		5.2	< 10	9.3	*0.42*	*0.10*	**8**	**< 2**	< 20	0.020	*0.510*	< 1	*0.10*	< 1	< 20	< 0.020
5/4/2009		< 2.50	< 10	9.1	*0.52*	*0.11*	**8**	**< 2**	< 20	< 0.020	*0.790*	< 1	*0.099*	< 1	< 20	< 0.020
10/12/2009		< 2.50	< 10	10.0	*0.55*	*0.10*	**6**	**< 2**	< 20	< 0.020	*0.550*	< 1	*0.098*	< 1	35	< 0.020
5/5/2010		< 2.50	< 10	9.1	*0.58*	*0.11*	**8**	**< 2**	< 5	< 0.020	*0.710*	< 1	*0.100*	< 0.1	< 5	< 0.005
10/11/2010		< 2.50	< 10	10.0	*0.54*	*0.10*	**7**	**< 2**	< 5	< 0.020	*0.630*	< 1	*0.100*	< 0.2	< 5	< 0.005
5/12/2011		< 2.50	< 10	8.4	*0.42*	*0.10*	**7**	**< 2**	< 5	< 0.020	*0.430*	< 1	*0.099*	< 0.2	< 5	< 0.020
10/12/2011		< 2.50	< 10	9.2	*0.36*	*0.09*	**9**	**< 2**	< 5	0.020	*0.370*	< 1	*0.088*	< 0.2	< 5	< 0.020
5/10/2012		< 2.50	11	9.6	*0.50*	*0.10*	**7**	**< 2**	< 5	0.029	*0.620*	< 1	*0.100*	< 0.2	< 5	< 0.020
10/4/2012		< 2.50	13	9.7	*0.55*	*0.11*	**8**	**< 2**	< 5	< 0.020	*0.590*	< 1	*0.100*	< 0.2	< 5	< 0.020
5/1/2013		< 2.50	< 10	10.0	*0.47*	*0.12*	**8**	**< 2**	< 5	< 0.020	*0.490*	< 1	*0.110*	< 0.2	< 5	< 0.020
10/1/2013		< 2.50	< 10	10.0	*0.45*	*0.10*	**7**	**< 2**	< 5	< 0.020	*0.670*	< 1	*0.110*	< 0.2	< 5	< 0.020
5/1/2014		< 2.50	< 10	8.6	*0.45*	*0.11*	**6**	**< 2**	< 5	< 0.020	*0.460*	< 1	*0.110*	< 0.2	< 5	< 0.020
2/12/2015		< 2.50	22	10.0	*0.52*	*0.11*	**7**	**< 2**	< 5	0.029	*0.520*	< 1	*0.099*	< 0.2	< 5	< 0.020
2/12/2015	duplicate	< 2.50	< 10	10.0	*0.49*	*0.11*	**8**	**< 2**	< 5	< 0.020	*0.520*	< 1	*0.100*	< 0.2	< 5	< 0.020
10/28/2015		< 2.50	< 10	8.2	*0.42*	*0.10*	**7**	**< 2**	< 5	< 0.020	*0.530*	< 1	*0.100*	< 0.2	< 5	< 0.020
6/13/2016		< 2.50	< 10	9.0	*0.50*	*0.12*	**6**	**< 2**	< 5	< 0.020	*0.460*	< 1	*0.110*	< 0.2	< 5	< 0.020
10/18/2016		< 2.50	< 10	9.7	*0.31*	*0.11*	**9**	**< 2**	< 5	< 0.020	*0.370*	< 1	*0.110*	< 0.2	< 5	< 0.020
5/17/2017		3.1	15	8.8	*0.39*	*0.11*	**8**	**< 2**	< 5	< 0.020	*0.620*	< 1	*0.110*	< 0.2	< 5	< 0.020
10/16/2017		< 2.50	< 10	9.7	*0.52*	*0.11*	**7.4**	**< 2**	< 5	< 0.020	*0.590*	< 1	*0.110*	< 0.2	< 5	< 0.020
5/9/2018		2.7	34	9.5	0.26	*0.09*	**8.4**	**< 2**	< 5	< 0.020	*0.350*	< 1	*0.095*	< 0.2	< 5	< 0.020
10/30/2018		< 2.50	< 10	9.9	*0.41*	*0.089*	**6.9**	**< 2**	< 5	< 0.020	*0.570*	< 1	*0.095*	< 0.2	< 5	< 0.020
6/7/2019		< 2.50	< 10	9.5	*0.33*	*0.100*	**8.2**	**< 2**	< 5	< 0.020	*0.430*	< 1	*0.100*	< 0.2	< 5	< 0.020
10/24/2019		< 2.70	< 10	10.0	*0.57*	*0.100*	**7.2**	**< 2**	< 5	< 0.020	*0.780*	< 1	*0.100*	< 0.2	< 5	< 0.020
5/14/2020		< 2.70	< 10	9.1	*0.46*	*0.098*	**7.6**	**< 2**	< 5	< 0.020	*0.540*	< 1	*0.099*	< 0.2	< 5	< 0.020
10/29/2020		< 2.70	< 10	9.5	*0.43*	*0.100*	**7.9**	**< 2**	< 5	< 0.020	*0.490*	< 1	*0.097*	< 0.2	< 5	< 0.020
5/17/2021		< 2.70	< 10	10.0	0.25	*0.099*	**9.5**	**< 2**	< 5	< 0.020	0.270	< 1	*0.100*	< 0.2	< 5	< 0.200
10/21/2021		< 2.70	< 10	10.0	*0.69*	*0.099*	**6.7**	**< 2**	< 5	< 0.020	*0.850*	< 1	*0.100*	< 0.2	< 5	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.
Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.
*In 2004, water was analyzed for conductivity, not specific conductance
< = non-detected, at the reported detection limit shown.
NS=Not Sampled
Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.
NC= parameters not collected, inadvertent oversight

WE-1B; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/27/1999	**WE-1B**	10	1170		7.3		
10/19/1999		10			7.3		
5/23/2000		11	4000		6.60		
10/11/2000		10	540		8.1		
5/21/2001		15.9	222		6.9		
10/22/2001		12	490		7.3		
5/1/2002		9.6	388		7.71		
10/29/2002		9.1	362		7.12		
5/16/2003		11.2	493		6.78		
10/8/2003		15.5	380		7.6		
5/17/2004		10.76	1848*		7.36		
10/11/2004		9.36	670*		7.69		
5/11/2005	duplicate						
5/11/2005		11.3	3220		6.68		
10/11/2005		10.92	2891		7.86		
5/4/2006		10.05	3894		6.86		
10/10/2006		10.35	458		7.37		
5/3/2007		10.47	364		7.63		
10/9/2007		10.2	389		8.2		
5/8/2008		10.89	494		7.74		
10/1/2008		11	559		7.9		
5/4/2009		10.57	548		4.76		
5/4/2009	duplicate						
10/12/2009		9.4	653		8.2		
5/5/2010		10.1	648		8		
10/11/2010		9	615		7.81		
5/12/2011		10	523		8.2		
5/12/2011	duplicate						
10/12/2011		9.6	294.2		8.1		
5/10/2012		10.8	1656		7.3		
5/10/2012	duplicate						
10/4/2012		11.6	1075		7.3		
5/1/2013		10.2	669		7.1		
10/1/2013		11.8	467.9		7.3		
10/1/2013	duplicate						
5/1/2014		10.1	430.3		7.4		
11/13/2014	MW redevelopment						
2/12/2015		7.86	454	1.06	7.85	-94.1	11.00
10/28/2015		9.6	1195	0.39	7.09	-109.8	22.61
10/28/2015	duplicate						
6/13/2016		10.0	1331	1.04	7.31	-118.3	2.68
10/18/2016		11.5	1233	0.58	7.40	-115.9	14.50
5/17/2017		12.1	1293	0.26	7.33	-149	8.66
10/16/2017		10.8	1395	0.66	7.24	132.2	33.80
5/9/2018		11.6	1438	6.41	7.42	-155.4	21.80
10/30/2018		16.9	1459	0.21	7.42	-141.3	49.80
5/14/2019		18.9	1239	0.92	7.51	-172.5	38.10
10/24/2019		14.1	1080	0.35	7.15	-109.7	21.81
5/14/2020		10.0	1099	1.93	7.30	-109.5	34.83
10/29/2020		9.6	1055	1.42	7.47	-90.6	23.31
5/17/2021		Laboratory results indicated anomalous results due to surface infiltration from well integrity being compromised, and were rejected by WHEM					
10/21/2021		11.7	3252	0.14		-153.7	53.80

WE-1B; INORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			**DISSOLVED METALS**		**TOTAL METALS**									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/27/1999	**WE-1B**	230	< 20	130	*1.5*	***0.57***										
10/19/1999		150	< 20	100	*0.51*	***0.47***										
5/23/2000		*1200*	96	*690*	*52*	***4.3***										
10/11/2000		82	< 20	67	*1.8*	***0.45***										
5/21/2001		*470*	43	*320*	*13*	***2***										
10/22/2001		53	< 20	43	*0.34*	***0.35***	**< 5**	**< 5**	< 2	< 0.03	*1.3*	***< 3***	***0.42***	< 2	< 50	0.02
5/1/2002		33	< 20	31	*0.180*	***0.24***	**< 2**	**< 2**	< 2	< 0.03	*2.6*	***< 3***	***0.27***	< 2	< 50	< 0.01
10/29/2002		24	< 20	30	*0.38*	***0.25***	**< 2**	***8***	< 2	< 0.03	*2.2*	***< 3***	***0.26***	< 2	< 50	< 0.01
5/16/2003		39	34	34	*0.72*	***0.27***	**3**	**< 5**	7	0.04	*23*	***6***	***0.49***	< 2	< 50	0.03
10/8/2003		46	< 20	29	*3.5*	***0.28***	**< 2**	**< 5**	2	< 0.03	*5*	***< 3***	***0.3***	< 2	< 50	< 0.01
5/17/2004		*384*	< 15	*281*	*0.582*	***0.83***	**3**	**< 3**	**95**	0.119	*5.4*	*< 2*	***0.776***	< 1	**61**	0.093
10/11/2004		179	< 15	95.3	*0.180*	***0.338***	**< 2**	**< 3**	< 10	< 0.01	*0.480*	*< 2*	***0.338***	< 1	< 20	< 0.02
5/11/2005	duplicate	*758*	35	*436*	*3.38*	***1.87***	**3**	**< 3**	< 10	0.026	*4.640*	***3***	***1.91***	< 1	< 20	< 0.020
5/11/2005		*758*	45	*433*	*3.41*	***1.86***	**3**	**< 3**	< 10	< 0.010	*4.75*	*< 2*	***1.92***	< 1	< 20	< 0.020
10/11/2005		*330*	< 15	146	*0.184*	***0.523***	**2**	***< 2***	< 10	< 0.010	*2.27*	***< 10***	***0.608***	< 1	< 20	0.036
5/4/2006		*996*	< 15	*582*	*7.14*	***2.22***	***30***	**< 2**	< 10	0.013	*8.75*	***< 10***	***2.26***	< 1	< 20	0.020
10/10/2006		45.3	< 15	33.6	*0.64*	***0.269***	**3**	**< 2**	< 20	0.021	*3.84*	*2*	***0.300***	< 1	< 20	< 0.020
5/3/2007		25.8	< 15	26.9	*0.33*	***0.185***	**< 2**	**< 2**	< 20	< 0.020	*2.32*	< 1	***0.200***	< 1	< 20	< 0.020
10/9/2007		27	< 10	26.2	0.066	*0.142*	**3**	**< 2**	< 20	0.033	*18.9*	1	***0.368***	< 1	< 20	0.038
5/8/2008		77	< 10	34	0.11	*0.093*	**< 2**	**< 2**	< 20	< 0.020	*4.4*	< 1	***0.190***	< 1	< 20	0.026
10/1/2008		76	10	42	0.14	*0.14*	**< 2**	**< 2**	< 20	< 0.020	*3.3*	< 1	***0.170***	< 1	< 20	< 0.020
5/4/2009		150	35	81	0.29	*0.11*	**< 2**	**< 2**	< 20	< 0.020	*2.9*	< 1	*0.120*	< 1	< 20	< 0.020
5/4/2009	duplicate	150	30	77	*0.31*	*0.12*	**< 2**	**< 2**	< 20	< 0.020	*3.2*	< 1	*0.120*	< 1	< 20	< 0.020
10/12/2009		120	21	58	0.14	*0.12*	**< 2**	**< 2**	< 20	< 0.020	*1.2*	< 1	*0.120*	< 1	< 20	< 0.020
5/5/2010		120	43	57	0.17	*0.096*	< 1	**< 2**	< 5	< 0.020	*2.3*	*2*	*0.130*	< 0.1	6	0.017
10/11/2010		110	30	51	0.12	*0.1*	< 1	**< 2**	< 5	< 0.020	*1.7*	< 1	*0.130*	< 0.2	< 5	0.013
5/12/2011		94	28	39	0.25	*0.12*	**3**	**< 2**	< 5	< 0.020	*8.8*	< 1	***0.200***	< 0.2	7	0.024
5/12/2011	duplicate	92	35	38	0.23	*0.12*	**2**	**< 2**	< 5	< 0.020	*6.9*	< 1	***0.170***	< 0.2	6	0.018
10/12/2011		39	26	21	0.19	*0.13*	< 1	**< 2**	< 5	< 0.020	*3.4*	< 1	*0.140*	< 0.2	< 5	< 0.020
5/10/2012		*510*	78	*380*	*8.70*	***2.1***	**2**	**< 2**	< 5	< 0.020	*17.0*	< 1	***2.100***	< 0.2	< 5	< 0.020
5/10/2012	duplicate	*530*	73	*350*	*10.00*	***2.1***	**2**	**< 2**	< 5	< 0.020	*15.0*	< 1	***2.100***	< 0.2	< 5	< 0.020
10/4/2012		210	110	130	*1.30*	***0.91***	**2**	**< 2**	< 5	< 0.020	*7.3*	< 1	***0.920***	< 0.2	< 5	< 0.020
5/1/2013		86	19	53	*1.60*	***0.39***	< 1	**< 2**	< 5	< 0.020	*2.6*	< 1	***0.390***	< 0.2	< 5	< 0.020
10/1/2013		43	29	27	0.21	***0.23***	< 1	**< 2**	< 5	< 0.020	*1.5*	< 1	***0.210***	< 0.2	< 5	< 0.020
10/1/2013	duplicate	42	10	28	*0.47*	***0.68***	< 1	**< 2**	< 5	< 0.020	*1.2*	< 1	***0.220***	< 0.2	< 5	< 0.020
5/1/2014		30	27	19	0.12	***0.18***	< 1	**< 2**	< 5	< 0.020	*0.52*	< 1	***0.180***	< 0.2	< 5	< 0.020
11/13/2014	MW redevelopment															
2/12/2015		54	120	22	*0.97*	*0.12*	**2**	**< 2**	< 5	< 0.020	*0.90*	1	*0.100*	< 0.2	< 5	< 0.020
10/28/2015		220	240	92	*1.10*	***0.23***	1	**< 2**	< 5	< 0.020	*1.50*	< 1	***0.230***	< 0.2	< 5	< 0.020
10/28/2015	duplicate	210	230	91	*1.10*	***0.22***	1	**< 2**	< 5	< 0.020	*1.40*	< 1	***0.230***	< 0.2	< 5	< 0.020
6/13/2016		230	260	88	*3.80*	***0.20***	1	**< 2**	< 5	< 0.020	*3.70*	< 1	***0.190***	< 0.2	< 5	< 0.020
10/18/2016		210	200	81	*4.60*	***0.21***	**2**	**< 2**	< 5	< 0.020	*5.70*	< 1	***0.220***	< 0.2	< 5	< 0.020
5/17/2017		230	140	82	*7.90*	***0.17***	**2**	**< 2**	< 5	< 0.020	*8.60*	< 1	***0.170***	< 0.2	< 5	< 0.020
10/16/2017		250	88	78	*9.30*	***0.18***	**1.8**	**< 2**	< 5	< 0.020	*9.60*	< 1	***0.180***	< 0.2	< 5	< 0.020
5/9/2018		250	61	75	*9.50*	*0.14*	**1.9**	**< 2**	< 5	< 0.020	*11.00*	< 1	*0.150*	< 0.2	< 5	< 0.020
10/30/2018		250	49	70	*7.10*	*0.14*	**1.8**	**< 2**	< 5	< 0.020	*9.00*	< 1	*0.150*	< 0.2	< 5	< 0.020
5/14/2019		210	36	62	*6.80*	*0.14*	**1.9**	**< 2**	32.0	< 0.020	*11.00*	< 1	***0.160***	< 0.2	25.6	< 0.020
10/24/2019		180	35	52	*3.30*	*0.12*	**1.4**	**< 2**	< 5	< 0.020	*4.30*	< 1	*0.130*	< 0.2	< 5	< 0.020
5/14/2020		160	29	47	*5.90*	*0.14*	**1.5**	**< 2**	< 5	< 0.020	*8.50*	< 1	*0.150*	< 0.2	< 5	< 0.020
10/29/2020		170	33	56	*5.80*	*0.14*	**1.7**	**< 2**	< 5	< 0.020	*8.80*	< 1	***0.160***	< 0.2	< 5	< 0.020
5/17/2021					Laboratory results indicated anomalous results due to surface infiltration from well integrity being compromised, and were rejected by WHEM											
10/21/2021		*1200*	69	*660*	0.13	***0.45***	**2.7**	**< 2**	< 5	< 0.020	*8.00*	***4.6***	***0.410***	< 0.2	7.3	0.024

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.
Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.
*In 2004, water was analyzed for conductivity, not specific conductance
< = non-detected, at the reported detection limit shown.
NS=Not Sampled
Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

MW-5A and MW-5AR; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/28/1999	**MW-5A**	12	480		7.1		
10/18/1999		10	420		8.0		
5/23/2000		10	370		7.54		
10/12/2000		9	380		7.6		
5/17/2001		15	526		7.5		
10/22/2001		12.4	505		7.0		
5/3/2002		8.5	470		6.55		
10/29/2002		9.9	610		7.0		
5/15/2003		11.5	663		6.60		
10/8/2003		7.8	533		6.7		
5/18/2004		9.41	455*		7.34		
10/11/2004		8.63	460*		7.69		
5/11/2005		10.8	662		6.64		
10/11/2005		11.61	1247		*6.46*		
5/4/2006		9.33	724		7.19		
5/4/2006	duplicate						
10/10/2006		9.13	668		7.07		
5/8/2007		10.28	1239		7.36		
10/9/2007		9.1	758		7.7		
5/8/2008		10.31	627		7.6		
10/1/2008		10.77	657		8.06		
5/4/2009		11.13	854		7.92		
10/12/2009		8.1	490		8.2		
5/5/2010		9.5	503		7.7		
10/11/2010		8.9	477		8.29		
5/12/2011		9.2	655		7.2		
10/12/2011		9.6	390		7.5		
5/10/2012		9.3	663		7.7		
10/4/2012		9.8	474.5		7.4		
5/1/2013		9.3	656		7.4		
10/1/2013		10.3	565		6.5		
5/1/2014		9.7	444.7		*6.3*		
11/17/2014	MW redevelopment						
2/11/2015		6.7	545	0.59	7.08	-35.3	>1000
10/1/2015	MW redevelopment						
10/28/2015		8.4	656	3.38	6.94	-20.4	180.2
6/13/2016		8.5	632	7.15	6.70	-3.9	810.0
10/18/2016		8.8	581	0.59	*NM*	-97.7	572.8
5/17/2017		9.6	638	4.23	7.11	-37.8	340.1
10/16/2017		8.4	702	2.12	6.92	-54.4	203.9
5/9/2018		9.0	548	1.27	7.14	0.3	229.2
9/10/2011	MW-5A de-commissioned						
9/11/2018	MW-5AR installed						
10/30/2018		7.4	626	0.30	6.74	-76.7	>1000
5/14/2019		7.1	687	0.49	7.38	-92.2	
10/24/2019		8.2	629	0.94	7.19	-111.1	6.0
5/14/2020		9.2	665.8	0.41	7.32	-72.4	416.4
10/29/2020		8.6	654.5	0.25	7.55	-91.2	50.9
5/17/2021		9.2	702.8	0.39	7.47	-93.8	95.1
10/21/2021		9.2	658.8	0.27	7.54	-130.6	12.0

MW-5A and MW-5AR; INORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			DISSOLVED METALS		TOTAL METALS									
		Chloride	COD	Sodium	Iron	*Manganese*	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/28/1999	**MW-5A**	9	361	12	1.2	0.37										
10/18/1999		8	< 20	8.5	0.63	0.63										
5/23/2000		7	26	7.8	0.40	0.54										
10/12/2000		9	< 20	8.2	0.45	0.67										
5/17/2001		8	510	12	0.73	0.53										
10/22/2001		7	< 20	9.5	0.94	0.63	23	16	66	< 0.03	120	120	7.1	< 2	< 50	0.08
5/3/2002		6	< 20	8.1	1.4	0.55	< 2	2	< 2	< 0.03	0.81	< 3	4.6	< 2	< 50	< 0.01
10/29/2002		8	< 20	11	2.4	0.81	37	21	49	0.31	290	75	23	< 2	560	0.74
5/15/2003		7	< 20	11	4.2	0.61	17	6	16	0.15	58	21	4.4	< 2	120	0.19
10/8/2003		10	83	11	1.1	0.61	33	5	140	0.05	62	17	7.2	< 2	70	0.11
5/18/2004		14.3	< 30	11.7	0.266	0.575	53	< 7	153	0.068	170	< 2	4.15	< 1	217	0.373
10/11/2004		7.79	< 15	11.2	1.75	0.672	59	3	100	0.028	120	< 2	3.1	< 1	169	0.293
5/11/2005		19.4	21	15.4	1.41	1.85	97	8	301	0.218	333	6	13.5	< 1	386	0.694
10/11/2005		28.1	< 15	16.8	1.85	0.934	88	< 2	153	0.117	181	61	5.47	< 1	194	0.460
5/4/2006		19.9	< 15	21.9	0.871	0.987	84	6	211	0.105	283	72	13.5	< 1	337	0.612
5/4/2006	duplicate	20.0	< 15	19.7	0.793	1.02	76	7	126	0.073	157	36	12.8	< 1	171	0.349
10/10/2006		10.1	19	22.6	2.70	0.764	210	33	698	0.730	1280	327	34.5	< 1	1240	2.200
5/8/2007		13.8	96	12.8	3.53	0.893	34	15	132	0.213	202	87	7.15	< 1	291	0.409
10/9/2007		19	< 10	15.5	2.38	0.730	< 2	8	149	0.145	194	< 1	6.5	< 1	217	0.387
5/8/2008		13	< 10	12	2.6	0.820	5.9	9	31	0.079	66	29	3.1	< 1	79	0.140
10/1/2008		14	29	13	0.77	0.660	90.0	3	100	0.17	170	95	5.3	< 1	220	0.350
5/4/2009		11	150	11	1.2	0.830	170.0	7	58	0.067	120	40	2.9	< 1	92	0.170
10/12/2009		11	510	10	0.92	0.550	120.0	4	76	0.076	130	41	3.4	< 1	110	0.210
5/5/2010		14	320	12	1.4	0.880	140.0	2	89	0.11	130	56	3.9	< 0.1	130	0.240
10/11/2010		14	290	13	1.6	0.560	54.0	3	88	0.088	110.0	45	2.9	< 0.2	130	0.23
5/12/2011		15	230	9.7	1.3	0.590	141.0	3	79	0.049	92.0	35	3.3	< 0.2	120	0.23
10/12/2011		11	270	15	0.9	0.940	97.0	< 2	90	0.053	94.0	28	2.8	< 0.2	92	0.21
5/10/2012		20	110	11	1.2	0.930	110.0	< 2	92	0.048	110.0	25	2.9	< 0.2	100	0.21
10/4/2012		58	110	9.5	2.5	0.680	59.0	< 2	78	0.060	89.0	33	3.0	< 0.2	110	0.21
5/1/2013		16	210	11	< 0.20	0.980	88.0	< 20	100	< 0.200	110.0	29	3.4	< 0.2	970	< 0.20
10/1/2013		18	33	11	0.20	0.210	17.0	< 2	15	< 0.020	27.0	7	1.2	< 0.2	30	0.052
5/1/2014		15	190	11	1.6	0.910	30.0	< 2	31	0.033	38.0	14	1.9	< 0.2	48	0.110
11/17/2014	MW redevelopment															
2/11/2015		15	230	27	0.95	0.370	130.0	< 20	930	0.780	120.0	221	18.0	0.32	1200	2.200
10/1/2015	MW redevelopment															
10/28/2015		14	32	9.7	0.62	0.270	15.0	< 2	17	< 0.020	19.0	4	0.49	< 0.2	19	0.036
6/13/2016		26	66	12	6.60	0.610	43.0	< 2	14	< 0.020	40.0	7	1.00	< 0.2	17	0.033
10/18/2016		14	190	14	2.20	0.440	34.0	< 2	39	0.140	67.0	56.4	4.20	< 0.2	140	0.180
5/17/2017		16	81	12	0.51	0.230	99.0	< 2	24	< 0.020	7.6	76.0	2.20	< 0.2	29	0.061
10/16/2017		19	120	14	45.00	1.900	267.0	< 2	150	0.091	300.0	56.5	4.20	< 0.2	180	0.380
5/9/2018		16	66	12	0.10	0.100	7.4	< 2	16.9	< 0.020	18.0	4.6	0.62	< 0.2	18.8	0.033
9/10/2011	MW-5A de-commissioned															
9/11/2018	MW-5AR installed															
10/30/2018		22	210	15	1.50	0.540	34.9	< 2	139.0	0.091	130.0	46.2	3.20	< 0.2	146.0	0.280
5/14/2019		22	22	13	1.40	0.380	14.5	< 2	16.8	< 0.020	15.0	4.8	0.61	< 0.2	14.7	0.029
10/24/2019		23	< 10	13	2.20	0.300	13.4	< 2	< 5	< 0.020	2.7	< 1	0.34	< 0.2	< 5	< 0.020
5/14/2020		22	33	19	1.50	0.340	9.4	< 2	11.0	< 0.020	11.0	3.1	0.50	< 0.2	11.1	0.022
10/29/2020		22	38	16	2.50	0.230	9.4	< 2	< 5	< 0.020	4.1	< 1	0.25	< 0.2	< 5.0	< 0.020
5/17/2021		19	< 10	24	0.47	0.110	12.7	< 2	< 5	< 0.020	5.2	< 1	0.18	< 0.2	< 5.0	< 0.020
10/21/2021		20	< 10	13	2.30	0.250	15.8	< 2	< 5	< 0.020	3.4	< 1	0.26	< 0.2	< 5.0	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.

Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.

Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.

Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.

*In 2004, water was analyzed for conductivity, not specific conductance

< = non-detected, at the reported detection limit shown.

NS = Not Sampled.

Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

NM= not measured due to equipment malfunction

MW-6R; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/27/1999	**MW-6R**	12	3,700		6.5		
10/18/1999		10	5,200		*6.3*		
5/23/2000		11	3,700		6.85		
10/11/2000		11	8,100		7.0		
5/21/2001		16	7,510		6.6		
10/22/2001		12.1	7,960		6.5		
5/2/2002		8.8	5,780		6.72		
10/29/2002		10.3	7,180		6.5		
5/15/2003		13.8	4,390		*6.30*		
10/9/2003		13.1	6,970		6.8		
5/17/2004		11.18	3922*		6.99		
10/11/2004		10.1	4136*		6.89		
5/11/2005		11.5	6,490		6.74		
10/11/2005		12.49	10,557		7.09		
5/4/2006		11.18	6,018		6.82		
10/10/2006		12.67	5,783		6.69		
5/8/2007		11.53	5,668		6.73		
10/9/2007		12.3	6,730		6.9		
5/8/2008		11.95	5,564		*6.46*		
10/1/2008		10.96	6,402		7.77		
5/4/2009		10.68	5,353		7.41		
10/12/2009		9.5	3,344		7.2		
5/5/2010		10.2	4,710		7.1		
10/11/2010		10.3	5,100		8.28		
5/12/2011		10.5	7,100		7.0		
10/12/2011		11.2	5,170		8.3		
10/12/2011	Duplicate						
5/10/2012		10.5	7,580		7.2		
10/4/2012		10.2	7,050		7.2		
5/1/2013		10.4	7,610		7.2		
10/1/2013		11.5	6,430		*6.3*		
5/1/2014		10.4	5,330		*6.3*		
5/1/2014	Duplicate						
11/17/2014	MW redevelopment						
2/11/2015		9.37	4,987	0.51	7.09	-76.5	13.84
10/28/2015		10.3	6,790	0.26	7.10	-131.1	29.91
6/13/2016		10.28	6,744	2.25	6.74	-92.3	49.9
10/18/2016		10.63	5,858	0.49	*NM*	-106.1	46.88
10/18/2016	Duplicate						
5/17/2017		11.57	6,708	1.04	6.94	-111.2	5.11
10/16/2017		10.21	7,534	2.17	6.95	-114.8	10.46
10/16/2017	Duplicate						
5/9/2018		12.09	6,839	0.36	7.16	-127.4	3.73
10/30/2018		9.9	7,520	0.33	7.14	-88.6	21.49
5/14/2019		8.88	6,228	0.36	7.03	-105.2	4.05
5/14/2019	Duplicate						
10/24/2019		12.3	6,805	0.27	6.95	-100.8	8.13
5/14/2020		10.32	6,801	1.13	7.19	-101.1	16.2
10/29/2020		9.16	5,781	2.41	7.40	-123.8	6.29
5/17/2021		10.01	4,821	0.31	6.93	-113.2	50.96
10/21/2021		11.6	5,606	0.22	7.11	-122.2	0.00

MW-6R; INORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMON

WAITE HEINDEL

		INORGANIC PARAMETERS			DISSOLVED METALS		TOTAL METALS									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/27/1999	MW-6R	680	440	280	65	0.81										
10/18/1999		700	4,800	300	22	0.42										
5/23/2000		610	360	250	24	0.11										
10/11/2000		900	13,000	470	210	0.88										
5/21/2001		930	6,600	490	68	0.23										
10/22/2001		960	6,900	480	110	0.4	69	< 5	8	< 0.03	110	5	0.66	< 2	< 50	0.03
5/2/2002		800	4,700	570	0.41	0.28	16	< 2	7	< 0.03	22	< 3	0.29	< 2	< 50	< 0.01
10/29/2002		1,000	4,200	660	58	0.37	78	< 5	8	< 0.03	65	< 3	0.38	< 2	< 50	0.02
5/15/2003		760	320	320	52	0.67	93	< 5	6	0.03	50	< 3	0.84	< 2	50	0.02
10/9/2003		1,100	1,600	650	40	0.11	49	< 5	7	< 0.03	45	< 3	0.18	< 2	< 50	< 0.01
5/17/2004		716	336	404	14.9	0.474	87	< 3	< 10	0.039	54	3	0.423	< 1	70	0.03
10/11/2004		834	< 15	374	30.4	0.425	141	< 3	< 10	0.055	51.5	< 2	0.423	< 1	80	0.031
5/11/2005		853	410	476	12.8	0.107	93	< 3	< 15	0.01	31	2	0.18	< 1	53	0.02
10/11/2005		969	500	502	2.95	0.049	92	2	61	< 0.010	41.5	< 10	0.555	< 1	< 20	0.050
5/4/2006		748	332	419	43.5	0.342	122	< 2	20	< 0.010	59.5	< 10	0.397	< 1	92	< 0.020
10/10/2006		1,000	148	542	21.7	0.142	77	2	< 20	0.026	27.1	1	0.134	< 1	57	0.021
5/8/2007		952	2080	443	49.8	0.56	111	4	< 20	< 0.020	48.2	< 1	0.557	< 1	94	< 0.020
10/9/2007		1,100	490	735	17.1	0.053	67	< 2	< 20	< 0.020	18.1	< 1	0.06	< 1	62	< 0.020
5/8/2008		980	390	670	27	0.18	75	4	< 20	< 0.020	31.0	< 1	0.28	< 1	50	< 0.020
10/1/2008		890	450	560	24	0.44	128	< 2	< 20	< 0.020	27.0	< 1	0.43	< 1	11	< 0.020
5/4/2009		630	310	350	62	0.94	140	3	< 20	< 0.020	69.0	< 1	0.94	< 1	73	0.021
10/12/2009		900	390	470	39	0.54	150	< 2	< 100	< 0.100	35.0	< 1	0.57	< 1	130	< 0.100
5/5/2010		800	430	390	58	0.54	140	< 1	6	< 0.020	64.0	< 1	0.58	< 0.1	89	0.009
10/11/2010		1,300	610	950	22	0.13	131	< 2	5	< 0.020	29.0	< 1	0.24	< 0.2	83	0.006
5/12/2011		920	460	890	19	0.17	99	< 2	7	< 0.020	19.0	< 1	0.14	< 0.2	86	0.006
10/12/2011		1,300	570	950	18	0.092	100	< 2	7	< 0.020	19.0	< 1	0.11	< 0.2	90	< 0.020
10/12/2011	Duplicate	1,300	560	920	18	0.095	80	< 2	< 5	0.027	20.0	< 1	0.11	< 0.2	80	< 0.020
5/10/2012		1,100	430	710	39	0.31	110	< 2	10.0	< 0.020	27.0	< 1	0.20	< 0.2	110	< 0.020
10/4/2012		1,300	650	1,100	16	0.11	150	< 2	< 5	< 0.020	18.0	< 3	0.14	< 0.2	110	< 0.025
5/1/2013		1,600	560	840	13	< 0.20	170	< 2	< 5	< 0.020	13.0	< 2	0.15	< 0.2	170	< 0.025
10/1/2013		1,200	540	460	15	0.180	130	< 2	< 5	< 0.020	14.0	< 1	0.16	< 0.2	130	< 0.020
5/1/2014		660	360	360	1.9	0.510	70	< 2	< 5	< 0.020	26.0	< 1	0.52	< 0.2	110	< 0.020
5/1/2014	Duplicate	640	350	340	1.2	0.520	110	< 2	6	< 0.020	46.0	< 1	0.54	< 0.2	120	< 0.020
11/17/2014	MW redevelopmen															
2/11/2015		920	440	690	23	0.210	77	< 2	< 5	< 0.020	23.0	< 1	0.19	< 0.2	85	< 0.020
10/28/2015		1,200	560	820	2.9	0.120	64	< 2	12	< 0.020	30.0	1	0.42	< 0.2	120	0.029
6/13/2016		1,100	600	750	16	0.180	52	< 2	< 5	< 0.020	18.0	< 1	0.33	< 0.2	89	< 0.020
10/18/2016		1,000	540	690	21	0.210	77	< 2	28	< 0.020	39.0	3.7	0.28	< 0.2	120	0.040
10/18/2016	Duplicate	990	550	700	22	0.210	79	< 2	16	< 0.020	31.0	1.8	0.32	< 0.2	120	0.030
5/17/2017		1,100	500	670	21	0.200	69	< 2	< 5	< 0.020	21.0	< 1	0.18	< 0.2	110	< 0.020
10/16/2017		1,000	550	790	19	0.140	63	< 2	< 5	< 0.020	17.0	< 1	0.15	< 0.2	130	< 0.020
10/16/2017	Duplicate	1,000	790	760	18	0.130	64	< 2	5.2	< 0.020	15.0	< 1	0.13	< 0.2	130	< 0.020
5/9/2018		860	570	850	16	0.140	58.5	< 2	< 5	< 0.020	15.0	< 1	0.078	< 0.2	132	< 0.020
10/30/2018		1,100	600	860	10	0.086	48.8	< 2	< 5	< 0.020	11.0	< 1	0.068	< 0.2	160	< 0.020
5/14/2019		940	490	700	24	0.190	73.3	< 2	< 5	< 0.020	20.0	< 1	0.180	< 0.2	128	< 0.020
5/14/2019	Duplicate	960	480	700	24	0.190	72.2	< 2	< 5	< 0.020	22.0	< 1	0.140	< 0.2	124	< 0.020
10/24/2019		1,100	550	790	12	0.086	49.9	< 2	< 5	< 0.020	11.0	< 1	0.074	< 0.2	139	< 0.020
5/14/2020		890	580	730	14	0.110	55.0	< 2	< 5	< 0.020	13.0	< 1	0.078	< 0.2	139	< 0.020
10/29/2020		890	460	560	21	0.170	75.9	< 2	< 5	< 0.020	22.0	< 1	0.130	< 0.2	120	< 0.020
5/17/2021		630	340	420	36	0.290	97.6	< 2	< 5	< 0.020	35.0	< 2	0.270	< 0.2	103	< 0.020
10/21/2021		940	440	590	14	0.110	55.5	< 2	< 5	< 0.020	15.0	< 1	0.075	< 0.2	110	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.

Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.

Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.

Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.

*In 2004, water was analyzed for conductivity, not specific conductance

NS = Not Sampled.

Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

NM= not measured due to equipment malfunction

< = non-detected, at the reported detection limit shown.

MW-7; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/28/99	**MW-7**	12	1,100		8.5		
10/21/1999		10	820		7.4		
5/23/2000		11	2,600		7.41		
10/11/2000		12	630		7.8		
5/23/2001		10	1,208		7.7		
10/22/2001		9.4	918		7.2		
5/3/2002		9.1	1,351		7.26		
10/29/2002		7.3	996		*9.1*		
5/15/2003		11.5	2,000		6.75		
10/7/2003		13	1,286		7.3		
5/18/2004		9.58	1054*		7.57		
10/11/2004		8.85	700*		7.58		
5/11/2005		10.9	2,145		6.88		
10/11/2005		10.3	2,114		7.46		
5/4/2006		11.14	1,990		6.80		
10/10/2006		12.67	1,113		6.69		
5/8/2007		11.04	1,370		7.22		
5/8/2007	duplicate						
10/9/2007		9.8	1020		7.5		
5/8/2008		10.96	1313		7.53		
10/1/2008		10.8	934		7.4		
5/4/2009		15.3	283		6.97		
10/12/2009		9.4	640		7.9		
5/5/2010		10.2	857		7.6		
10/11/2010		10.3	549		8.43		
5/12/2011		9.4	994		7.6		
10/12/2011		10.4	721		8.4		
5/10/2012		10.4	960		7.5		
10/4/2012		11.6	687		7.2		
5/1/2013		10.7	1316		7.44		
10/1/2013		11.7	757		7.5		
5/1/2014		10.1	1323		6.8		
11/17/2014	MW redevelopment						
2/11/2015		7.28	1139	0.55	7.24	-46.5	11.72
10/28/2015		9.21	1423	1.25	7.21	-50.9	26.4
6/13/2016		9.64	1512	1.58	*6.11*	4.6	20.9
6/13/2016	duplicate						
10/18/2016		11.4	1030	0.82	7.28	-69.0	76.9
5/17/2017		11.46	3053	1.65	6.91	-23.8	24.91
5/17/2017	duplicate						
10/16/2017		9.32	1947	2.09	6.53	-50.9	22.81
5/8/2018		10.04	2684	0.44	6.86	-34.3	13.98
10/30/2018		7.98	1327	0.45	6.54	-44.4	9.71
5/14/2019		7.8	3204	0.86	6.88	59.2	16.94
10/24/2019		11.71	1575	1.24	6.95	-38.5	15.9
5/14/2020		9.6	2536	0.59	6.78	305.9	13.75
10/29/2020		9.5	1232	0.22	7.12	14.8	4.06
5/17/2021		9.8	1963	1.21	7.12	-58.4	2.06
10/21/2021		10.1	1442	0.41	7.12	-55.2	0.01

MW-7; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			DISSOLVED METALS		TOTAL METALS									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/28/99	**MW-7**	140	170	62	*0.5*	***0.850***										
10/21/1999		160	30	60	0.1	***0.670***										
5/23/2000		120	39	100	0.1	*0.110*										
10/11/2000		*77*	< 20	59	0.27	***0.430***										
5/23/2001		200	22	91	0.03	***0.500***										
10/22/2001		130	< 20	73	*0.45*	***1.400***	***78***	***77***	37	0.08	*66*	***390***	***44***	< 2	**100**	0.22
5/3/2002		220	< 20	120	0.3	0.040	***14***	***13***	27	0.08	*19*	***58***	***10***	< 2	< 50	0.07
10/29/2002		130	24	79	0.25	***0.880***	***15***	***19***	22	0.14	*40*	***50***	***14***	< 2	**90**	0.22
5/15/2003		*450*	< 20	170	0.17	***0.650***	**8**	**< 5**	6	0.04	*9.4*	***7***	***2.6***	< 2	< 50	0.04
10/7/2003		240	80	120	0.21	***0.610***	**6**	**< 5**	5	< 0.03	*3.1*	***4***	***1.1***	< 2	< 50	0.02
5/18/2004		*289*	21	146	0.081	***0.645***	**2**	**< 5**	10	< 0.03	*0.692*	*< 2*	***0.646***	< 1	< 50	< 0.02
10/11/2004		172	< 15	85.6	0.024	***0.441***	**3**	**< 3**	11	0.011	*1.16*	*< 2*	***0.464***	< 1	< 20	< 0.02
5/11/2005		*428*	22	188	*0.334*	***0.747***	***21***	**< 3**	< 10	< 0.010	*6.20*	***3***	***0.971***	< 1	< 20	< 0.020
10/11/2005		216	< 15	102	0.056	***0.403***	***29***	**< 2**	< 10	< 0.010	*7.09*	***< 10***	***0.676***	< 1	< 20	< 0.020
5/4/2006		*353*	26	195	*1.06*	***0.973***	***46***	**< 2**	< 10	< 0.010	*6.50*	***< 10***	***1.05***	< 1	< 20	0.030
10/10/2006		193	76	131	*0.77*	***0.557***	***535***	***20***	***394***	0.392	*674*	***276***	***11.6***	< 1	***656***	1.29
5/8/2007		*262*	28	145	0.21	***0.364***	***31***	**< 2**	< 20	< 0.020	*19.6*	***6***	***0.633***	< 1	26	0.040
5/8/2007	duplicate	*260*	30	135	0.24	***0.444***	**10**	**< 2**	< 20	< 0.020	*6.69*	*2*	***0.608***	< 1	< 20	< 0.020
10/9/2007		150	< 10	102	*0.383*	***0.459***	***12***	**4**	**68**	< 0.093	*69.4*	***19***	***1.69***	< 1	**91**	0.162
5/8/2008		180	51	110	0.27	***0.41***	***31***	**3**	< 20	0.039	*26.0*	***10***	***0.41***	< 1	42	0.063
10/1/2008		160	47	85	*0.61*	***0.49***	***43***	**< 2**	< 20	0.022	*21.0*	***6***	***0.79***	< 1	26	0.033
5/4/2009		220	350	130	0.22	***0.64***	***140***	***8***	**75**	0.110	*22.0*	***45***	***1.9***	< 1	11	0.190
10/12/2009		150	110	80	*1.10*	***0.61***	***15***	**< 2**	< 20	< 0.020	*14.0*	***5***	***0.68***	< 1	20	0.030
5/5/2010		170	54	110	*0.72*	***0.61***	***34***	1	23	0.028	*28.0*	***17***	***0.99***	< 0.1	12	0.053
10/11/2010		100	170	61	0.22	***0.53***	***51***	***61***	29	0.026	*37.0*	***13***	***1.1***	< 2.0	42	0.069
5/12/2011		130	72	87	*0.36*	***0.34***	***174***	***6***	38	0.021	*62.0*	***16***	***0.94***	< 0.2	38	0.082
10/12/2011		150	37	58	*2.10*	***0.64***	***49***	**< 2**	16	< 0.020	*19.0*	***6***	***0.74***	< 0.2	17	0.039
5/10/2012		200	73	110	*1.50*	***0.92***	***64***	**< 2**	13	< 0.020	*25.0*	***4***	***1.2***	< 0.2	34	0.029
10/4/2012		130	140	61	*0.76*	***0.81***	***54***	**2**	35	0.024	*40.0*	***15***	***1.4***	< 0.2	50	0.075
5/1/2013		240	27	92	0.20	***1.1***	***30***	**3**	< 5	< 0.020	*15.0*	***3***	***1.5***	< 0.2	13	< 0.020
10/1/2013		120	66	66	*2.30*	***0.86***	***46***	**< 2**	10	0.038	*35.0*	***11***	***1.4***	< 0.2	37	0.057
5/1/2014		*420*	49	160	0.052	***0.31***	***17***	**< 2**	< 5	< 0.020	*6.3*	< 1	***1.3***	< 0.2	9	< 0.020
11/17/2014	MW redevelopment															
2/11/2015		220	23	96	*2.20*	***1.00***	***23***	**< 2**	< 5	< 0.020	*4.0*	*2*	***0.97***	< 0.2	< 5.0	< 0.020
10/28/2015		190	26	100	*1.90*	***0.85***	***16***	**< 2**	< 5	< 0.020	*2.9*	< 1	***0.85***	< 0.2	5.4	< 0.020
6/13/2016		240	37	150	*0.55*	***0.71***	**7**	**< 2**	< 5	< 0.020	*2.1*	< 1	***0.71***	< 0.2	< 5.0	< 0.020
6/13/2016	duplicate	230	30	150	*0.55*	***0.71***	**6**	**< 2**	< 5	< 0.020	*2.0*	< 1	***0.72***	< 0.2	< 5.0	< 0.020
10/18/2016		140	30	86	*0.82*	***0.74***	***73***	**< 2**	< 5	< 0.020	*13.0*	< 1	***0.88***	< 0.2	< 5.0	< 0.020
5/17/2017		*780*	50	*450*	*0.69*	***0.68***	***12***	**< 2**	< 5	< 0.020	*3.9*	< 1	***0.71***	< 0.2	< 5.0	< 0.020
5/17/2017	duplicate	*780*	47	*450*	*0.68*	***0.68***	**8**	**< 2**	< 5	< 0.020	*2.3*	< 1	***0.67***	< 0.2	< 5.0	< 0.020
10/16/2017		*390*	34	220	*3.90*	***1.10***	***48***	**< 2**	< 5	< 0.020	*12.0*	< 1	***1.2***	< 0.2	6.9	< 0.020
5/8/2018		*680*	130	*370*	*0.59*	***0.99***	**7.7**	**< 2**	< 5	< 0.020	*2.0*	< 1	***0.93***	< 0.2	< 5.0	< 0.020
10/30/2018		*280*	24	160	*1.20*	***0.73***	***17.9***	**< 2**	< 5	< 0.020	*4.0*	< 1	***0.86***	< 0.2	< 5.0	< 0.020
5/14/2019		*870*	56	*480*	*0.67*	***1.80***	***10.8***	**< 2**	< 5	< 0.020	*2.9*	< 1	***1.8***	< 0.2	5.8	< 0.020
10/24/2019		*340*	32	190	*2.40*	***1.20***	***43.1***	**< 2**	< 5	< 0.020	*8.8*	< 1	***1.4***	< 0.2	5.1	< 0.020
5/14/2020		*520*	51	*270*	*0.62*	***3.20***	***15.9***	**< 2**	< 5	< 0.020	*3.7*	< 1	***3.0***	< 0.2	7.5	< 0.020
10/29/2020		220	22	130	*0.59*	***1.20***	**8.2**	**< 2**	< 5	< 0.020	*1.5*	< 1	***1.2***	< 0.2	< 5.0	< 0.020
5/17/2021		*360*	14	210	*0.89*	***0.78***	***22.6***	**< 2**	< 5	< 0.020	*5.9*	< 1	***1.1***	< 0.2	< 5.0	< 0.020
10/21/2021		*260*	24	150	*1.40*	***1.60***	***11.1***	**< 2**	< 5	< 0.020	*2.8*	< 1	***1.5***	< 0.2	< 5.0	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.
Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.
*In 2004, water was analyzed for conductivity, not specific conductance
< = non-detected, at the reported detection limit shown.
NS=Not Sampled
Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.

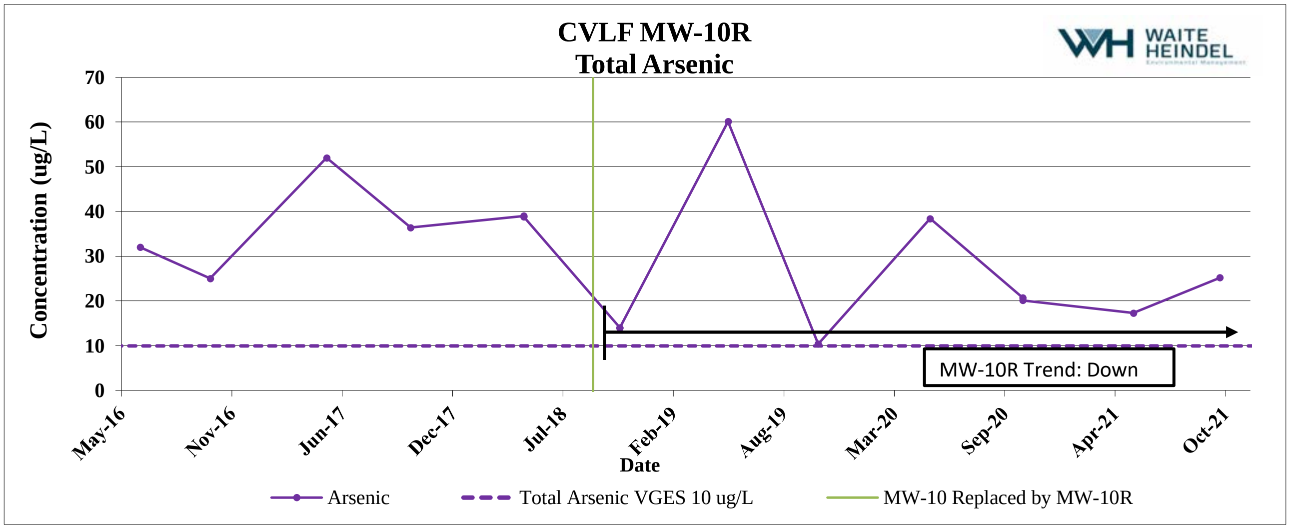
MW-10 and MW-10R; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

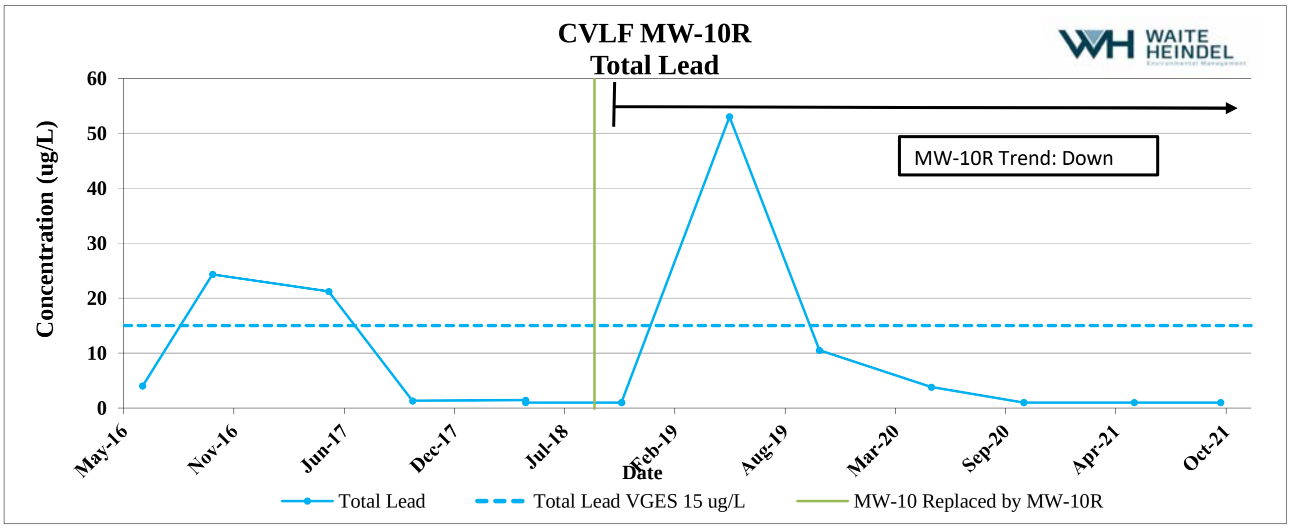
		FIELD PARAMETERS					
		Temperature	Specific Conductivity	Dissolved Oxygen	pH	Oxygen-Reduction Potential	Turbidity
VT GW Enforcement Standards [1]		None	None	None	None	None	None
VT Preventive Action Level [1]		None	None	None	None	None	None
VT Health Advisory [2]		None	None	None	None	None	None
Federal MCL (Primary) [2]		None	None	None	None	None	None
Federal MCL (Secondary) [2]		None	None	None	6.5-8.5	None	None
Units		C	us/cm	mg/L	S.U.	mV	NTU
SAMPLING DATE	LOCATION						
5/26/1999	**MW-10**	9	2,200		7.3		
10/19/1999		10	1,700		6.9		
5/22/2000		9	2,000		7.20		
10/12/2000		9	1,170		7.6		
5/21/2001		11.6	1,774		7.2		
10/22/2001		10.4	1,720		7.1		
5/1/2002		9.2	1,048		7.48		
10/29/2002		7.7	1,850		6.73		
5/14/2003		9.6	2,160		6.9		
10/7/2003		12.7	1,832		7.0		
5/18/2004		7.96	1413*		7.33		
10/11/2004		9.04	1517*		7.34		
5/11/2005		7.7	2,342		7.00		
10/11/2005		13.03	3,135		7.31		
5/4/2006		7.89	2,244		6.86		
10/10/2006		9.68	2,182		6.85		
10/10/2006	duplicate						
5/8/2007		8.83	1,922		7.14		
10/9/2007		10.1	1,920		7.20		
5/8/2008		10.98	2,019		7.10		
10/1/2008		10.5	2,504		8.06		
5/4/2009		9.85	2,016		8.00		
10/12/2009		9.1	1,490		7.30		
5/5/2010		8.5	1,445		7.40		
10/11/2010		10.7	1,401		8.35		
10/11/2010	duplicate						
5/12/2011		7.4	2,109		7.40		
10/12/2011		10.9	1,606		7.90		
5/10/2012		9.5	1,356		7.40		
10/4/2012		10.6	1,682		**		
5/1/2013		9.1	2,428		6.80		
5/1/2013	duplicate						
10/1/2013		11.3	1,815		6.70		
5/1/2014		8.5	1,549		6.70		
11/17/2014	MW redevelopment						
2/11/2015		6.75	2,001	0.53	6.94	-57.0	117.5
10/1/2015	MW redevelopment						
10/29/2015		11.91	2,455	1.05	6.95	-81.9	203.7
6/13/2016		7.98	2,011	1.84	*6.44*	-67.6	132
10/18/2016		10.05	2,035	0.60	*NM*	-55.1	280.9
5/17/2017		9.8	2,099	0.27	6.80	-70.4	308.6
10/16/2017		10.5	2,254	0.21	6.71	-87.8	70.3
5/9/2018		8.77	2,040	0.91	6.89	-106.1	41.06
5/9/2018	duplicate						
9/10/2018	MW-10 de-commissioned						
9/11/2018	MW-10R installed						
10/30/2018		8.91	1,970	0.39	*6.44*	-90.2	29.49
10/30/2018	duplicate						
5/14/2019		7.7	1,926	0.13	7.08	-127.6	68.89
10/24/2019		10.52	1,947	0.84	6.90	-133.8	<1000
5/14/2020		8.9	1,942	0.24	7.16	-111.2	315.6
10/29/2020		10.0	1,995	0.18	7.04	-78.6	19.4
10/29/2020	duplicate						
5/17/2021		9.4	1,964	0.07	7.15	-135.9	40
10/21/2021		11.3	1,978	0.22	6.86	-98.2	0.00

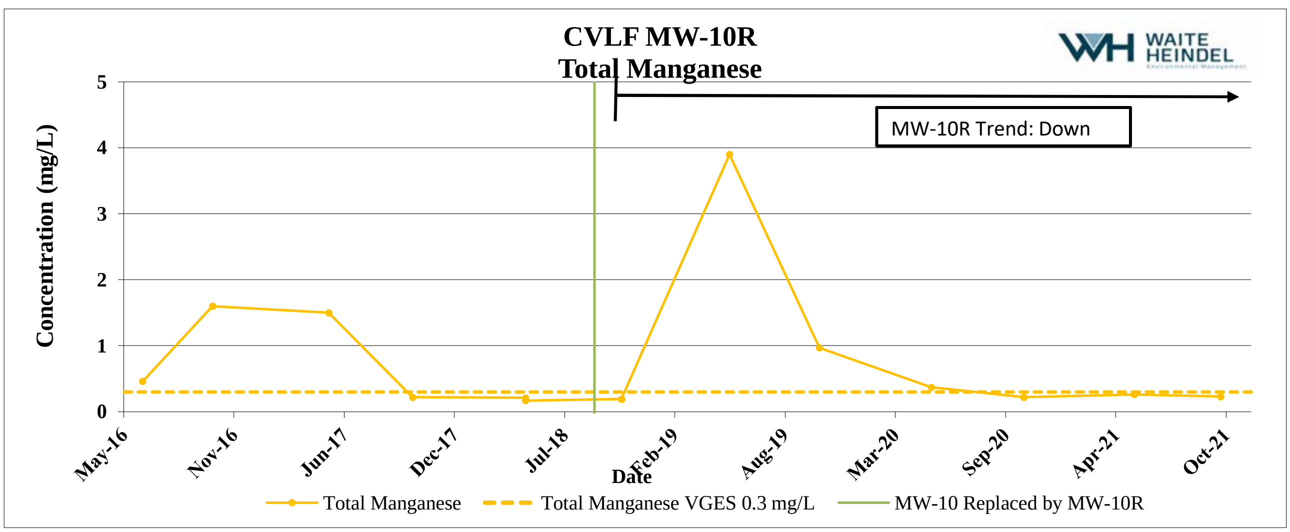
MW-10 and MW-10R; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		INORGANIC PARAMETERS			**DISSOLVED METALS**		**TOTAL METALS**									
		Chloride	COD	Sodium	Iron	Manganese	Arsenic	Cadmium	Chromium	Copper	Iron	Lead	Manganese	Mercury	Nickel	Zinc
VT GW Enforcement Standards [1]		None	None	None	None	0.300	10.0	5.0	100.0	1.300	None	15.0	0.300	2.0	100.0	None
VT Preventive Action Level [1]		None	None	None	None	0.150	1.0	1.0	50.0	0.650	None	2.0	0.150	0.5	50.0	None
VT Health Advisory [2]		None	None	None	None	0.300	None	None	None	1.300	None	1.0	0.300	None	100	None
Federal MCL (Primary) [2]		None	None	None	None	None	10.0	5.0	100.0	None	None	None	None	2.0	None	None
Federal MCL (Secondary) [2]		250.0	None	250	0.3	0.05	None	None	None	1.0	0.3	None	0.05	None	None	5
Units		mg/l	mg/l	mg/l	mg/l	mg/l	ug/L	ug/L	ug/L	mg/l	mg/l	ug/L	mg/l	ug/L	ug/L	mg/l
SAMPLING DATE	LOCATION															
5/26/1999	**MW-10**	250	1,800	81	*20*	***0.64***										
10/19/1999		210	144	51	*7.7*	***0.24***										
5/22/2000		*312*	550	65	*39*	***0.33***										
10/12/2000		110	26	45	*8.8*	***0.24***										
5/21/2001		*320*	92	90	*10*	***0.21***										
10/22/2001		*340*	56	79	*13*	*0.14*	***45***	**< 5**	38	< 0.03	*66*	***48***	***4.0***	< 2	< 50	0.06
5/1/2002		*310*	34	81	*9.9*	***0.18***	**10**	**< 2**	11	< 0.03	*32*	***13***	***0.85***	< 2	< 50	0.02
10/29/2002		*300*	41	91	*8.6*	*0.15*	***40***	***17***	47	0.16	*270*	***83***	***23***	< 2	***300***	0.45
5/14/2003		*420*	48	140	*21*	*0.12*	***33***	**< 5**	17	0.10	*63*	***28***	***3.1***	< 2	**70**	0.1
10/7/2003		*330*	73	100	*19*	*0.14*	***22***	**< 5**	**100**	0.07	*63*	***93***	***3.3***	< 2	**80**	0.09
5/18/2004		*424*	51	164	*1.3*	*0.121*	***11***	**3**	< 10	< 0.01	*16.4*	< 2	*0.149*	< 1	< 20	< 0.02
10/11/2004		*374*	< 15	120	*2.95*	*0.118*	***69***	**4**	***162***	< 0.01	*206*	***12***	***4.86***	< 1	***249***	0.488
5/11/2005		*418*	58	158	*12.9*	***0.187***	***53***	**< 3**	***178***	0.146	*235*	***14***	***5.65***	< 1	***234***	0.423
10/11/2005		*345*	25	103	*14.5*	***0.174***	***41***	**3**	**61**	0.012	*78.4*	***16***	***1.44***	< 1	40	0.147
5/4/2006		*448*	61	210	*14.2*	***0.211***	***46***	**< 2**	18	< 0.010	*42.5*	***< 10***	***0.422***	< 1	29	0.051
10/10/2006		*405*	54	187	*20.2*	*0.105*	***76***	***6***	***155***	0.136	*209*	***57***	***3.47***	< 1	***213***	0.374
10/10/2006	duplicate	*397*	52	195	*17.7*	*0.107*	***37***	**< 2**	< 20	0.024	*31.0*	***3***	***0.232***	< 1	< 20	0.023
5/8/2007		*466*	65	177	*14.4*	*0.09*	***68***	***6***	36	0.042	*74.3*	***18***	***1.28***	< 1	**60**	0.092
10/9/2007		*380*	26	136	*14.1*	*0.147*	***29***	**4**	**84**	0.075	*113*	***23***	***2.34***	< 1	***118***	0.020
5/8/2008		*460*	65	200	*13*	*0.13*	***50***	***20***	**100**	0.270	*270*	***121***	***7.2***	< 1	***300***	0.470
10/1/2008		*560*	150	210	*14*	*0.094*	***40***	**< 2**	***110***	0.190	*220*	***105***	***4.7***	< 1	***240***	0.370
5/4/2009		*500*	2000	210	*10*	*0.094*	***46***	***11***	14	0.240	*270*	***130***	***6.1***	< 1	***280***	0.420
10/12/2009		*490*	1100	210	*18*	*0.13*	***54***	**< 2**	***170***	0.190	*280*	***110***	***5.6***	< 1	***260***	0.042
5/5/2010		*540*	400	200	*14*	*0.13*	***61***	< 1	15	0.240	*270*	***140***	***6.1***	< 0.1	***260***	0.460
10/11/2010		*420*	350	130	*22*	***0.21***	***51***	**< 2**	***110***	0.120	*170*	***62***	***3.5***	< 0.2	***160***	0.290
10/11/2010	duplicate	*430*	340	130	*20*	***0.21***	***51***	0.6	***130***	0.160	*210*	***90***	***4.7***	< 0.2	***200***	0.350
5/12/2011		*550*	490	170	*16*	*0.13*	***56***	***7***	***150***	0.079	*220*	***59***	***8.4***	< 0.2	***290***	0.490
10/12/2011		*530*	470	150	*25*	***0.47***	***34***	**< 2**	***230***	0.140	*260*	***91***	***6.2***	< 0.2	***270***	0.520
5/10/2012		*580*	330	220	*19*	*0.10*	***13***	**< 2**	***220***	0.026	*300*	***49***	***6.8***	< 0.2	***200***	0.350
10/4/2012		*430*	120	100	*24*	***0.27***	***130***	**< 4**	***190***	0.150	*370*	***120***	***5.9***	< 0.2	***270***	0.450
5/1/2013		*590*	650	230	*18*	***< 0.20***	***70***	***< 20***	**95**	< 0.200	*160*	***71***	***4.1***	< 0.2	***140***	0.220
5/1/2013	duplicate	*570*	790	230	*20*	***< 0.20***	***61***	***< 20***	***110***	< 0.200	*140*	***92***	***3.8***	< 0.2	***130***	0.230
10/1/2013		*480*	85	200	*14*	***0.17***	***36***	**< 2**	10	< 0.020	*40*	***3***	***0.64***	< 0.2	28	0.029
5/1/2014		*480*	190	220	*20*	***0.16***	***47***	**< 2**	22	< 0.020	*53*	***11***	***1.0***	< 0.2	46	0.072
11/17/2014	MW redevelopment															
2/11/2015		*430*	96	*270*	*9.7*	***0.21***	***15***	**< 2**	5.1	< 0.020	*15*	***3***	***0.33***	< 0.2	15	0.014
10/1/2015	MW redevelopment															
10/29/2015		*410*	85	230	*24*	*0.15*	***42***	**< 2**	11	< 0.020	*37*	***3***	***0.37***	< 0.2	22	0.024
6/13/2016		*320*	98	210	*18*	*0.15*	***32***	**< 2**	19	< 0.020	*33*	***4***	***0.46***	< 0.2	20	0.033
10/18/2016		*440*	170	180	*18*	***0.34***	***25***	**< 2**	18	0.043	*46*	***24.3***	***1.60***	< 0.2	46	0.057
5/17/2017		*320*	210	240	*20*	***0.16***	***52***	**< 2**	**62**	0.048	*90*	***21.2***	***1.50***	< 0.2	**86**	0.150
10/16/2017		*360*	64	240	*20*	***0.17***	***36.4***	**< 2**	< 5	< 0.020	*23*	*1.3*	***0.22***	< 0.2	12	< 0.020
5/9/2018		*300*	81	240	*18*	*0.12*	***39***	**< 2**	< 5	< 0.020	*23*	*1.4*	***0.21***	< 0.2	14.7	< 0.020
5/9/2018	duplicate	*300*	80	240	*18*	*0.12*	***38.8***	**< 2**	< 5	< 0.020	*22*	< 1	***0.17***	< 0.2	12.7	< 0.020
9/10/2018	MW-10 de-commissioned															
9/11/2018	MW-10R installed															
10/30/2018		*370*	49	180	*17*	***0.16***	***14.0***	**< 2**	< 5	< 0.020	*18*	< 1	***0.19***	< 0.2	< 5	< 0.020
10/30/2018	duplicate	*340*	67	180	*17*	***0.16***	***14.0***	**< 2**	< 5	< 0.020	*17*	< 1	***0.19***	< 0.2	5.4	< 0.020
5/14/2019		*280*	160	230	*20*	***0.22***	***60.1***	**< 2**	***165***	< 0.200	*220*	***53.0***	***3.90***	< 0.2	***192.0***	0.360
10/24/2019		*300*	71	160	*21*	***0.33***	***10.4***	**< 2**	16.3	< 0.020	*43*	***10.5***	***0.97***	< 0.2	29.2	0.045
5/14/2020		*260*	74	220	*18*	***0.18***	***38.4***	**< 2**	10.8	< 0.020	*40*	***3.8***	***0.37***	< 0.2	18.5	0.023
10/29/2020		*270*	42	180	*20*	***0.22***	***20.7***	**< 2**	< 5	< 0.020	*22*	< 1	***0.22***	< 0.2	< 5	< 0.020
10/29/2020	duplicate	*260*	51	180	*20*	***0.23***	***20.1***	**< 2**	< 5	< 0.020	*22*	< 1	***0.22***	< 0.2	< 5	< 0.020
5/17/2021		210	38	200	*22*	***0.24***	***17.3***	**< 2**	< 5	< 0.020	*26*	< 1	***0.26***	< 0.2	6.5	< 0.200
10/21/2021		230	40	190	*21*	***0.21***	***25.2***	**< 2**	< 5	< 0.020	*23*	< 1	***0.23***	< 0.2	6.5	< 0.020

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.
Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
Per the March 2001 Consent Order, groundwater samples must be analyzed as total metals with the exception of Iron and Manganese, which will also be analyzed as dissolved metals.
*In 2004, water was analyzed for conductivity, not specific conductance
** pH meter error in October 2012 sampling
< = non-detected, at the reported detection limit shown.
NS=Not Sampled
Blank cells indicate no analysis; Temp, Spec. Cond., Dissolved Oxygen, pH, Oxygen-Reduction Potential and Turbidity may be available upon request.
NM= not measured due to equipment malfunction







VGES = VT Groundwater Enforcement Standards from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

MW-3R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

SAMPLING DATE	Location	Lab Method	Result	Unidentified Peaks
	UNITS			
	VT Groundwater Enforcement Standards [1]			
	VT Preventive Action Level [1]			
	VT Health Advisory [2]			
	Federal MCL (Primary) [2]			
	Federal MCL (Secondary) [2]			
5/26/1999	**MW-3R**	8260	ND	
10/19/1999		8260	ND	
5/22/2000		8260	ND	
10/10/2000		8260	ND	
5/17/2001		8260	ND	
10/22/2001		8260	ND	
5/2/2002		8260	ND	
10/30/2002		8260	ND	
5/15/2003		8260	ND	
10/8/2003		8260	ND	
5/18/2004		8260	ND	
10/11/2004		8260	ND	0
10/11/2004 duplicate		8260	ND	0
5/11/2005		8260	ND	0
10/11/2005		8260	ND	0
5/4/2006		8260	ND	0
10/10/2006		8260	ND	0
5/3/2007		8260	ND	0
10/9/2007		8260	ND	0
5/2/2008		8260	ND	0
10/1/2008		8260B	ND	0
5/4/2009		8260B	ND	0
10/12/2009		8260B	ND	0
5/5/2010		8260B	ND	0
10/11/2010		8260B	ND	0
5/12/2011		8260B	ND	0
10/12/2011		8260B	ND	0
5/10/2012		8260B	ND	0
10/4/2012		8260B	ND	0
5/1/2013		8260B	ND	0
10/1/2013		8260B	ND	0
5/1/2014		8260B	ND	0
11/17/2014	MW redevelopment	8260C		
2/12/2015		8260C	ND	0
10/28/2015		8260C	ND	0
6/13/2016		8260C	ND	0
10/18/2016		8260C	ND	0
5/17/2017		8260C	ND	0
10/16/2017		8260C	ND	1
5/9/2018		8260C	ND	0
10/30/2018		8260C	ND	0
5/14/2019		8260C	ND	0
10/24/2019		8260C	ND	0
5/14/2020		8260C	ND	0
5/14/2020	Duplicate	8260C	ND	0
10/29/2020		8260C	ND	0
5/17/2021		8260C	ND	0
10/21/2021		8260C	ND	0

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

ND = Non-detected, no organic compounds detected.

Bolded values exceed Vermont Preventive Action Level as set by GWPRS; 7/6/2019.

Shaded values exceed Vermont Groundwater Enforcement Standard, as set by GWPRS; 7/6/2019.

Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.

MW-8 and MW-8R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL

SAMPLING DATE	Location	Lab Method	ACETONE	BENZENE	t-BUTANOL	CHLORO-FORM	1,1-DICHLORO-ETHANE	1,2-DICHLORO-ETHANE	cis 1,2-DICHLORO-ETHENE	1,2-DICHLORO-PROPANE	DIETHYL ETHER	MTBE	TETRA-HYDRO-FURAN	TRICHLOR-OETHENE (TCE)	VINYL CHLORIDE	Result	Unidentified Peaks
	UNITS		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
	VT Groundwater Enforcement Standards [1]		950	5.0	-----	-----	70	5	70	5	----	11	----	5	2		
	VT Preventive Action Level [1]		475	0.5	-----	-----	35	0.5	35	0.5	----	5	----	0.5	0.5		
	VT Health Advisory [2]		949.8	-----	-----	-----	70	-----	-----	----	----	11.3	----	-----	----		
	Federal MCL (Primary) [2]		-----	5.0	-----	-----	-----	5	70	5	----	-----	-----	5	2		
	Federal MCL (Secondary) [2]		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	----	----	----		
5/26/1999	**MW-8**	8260	13														
10/19/1999		8260	12														
5/23/2000		8260	10														
10/11/2000		8260														ND	
5/22/2001		8260														ND	
10/22/01		8260														ND	
5/2/2002		8260													**1.5**		
10/29/2002		8260													**1.2**		
5/14/2003		8260													**1**		
10/7/2003		8260													**1**		
5/17/2004		8260														ND	
10/11/2004		8260														ND	0
5/11/2005		8260														ND	0
10/11/2005		8260														ND	0
5/4/2006		8260														ND	0
10/10/2006		8260														ND	0
5/3/2007		8260														ND	0
10/9/2007		8260														ND	0
5/9/2008		8260														ND	0
10/1/2008		8260B														ND	0
5/4/2009		8260B														ND	0
10/12/2009		8260B														ND	0
10/12/09 Dup		8260B														ND	0
5/5/2010		8260B														ND	0
10/11/2010		8260B														ND	0
5/12/2011		8260B														ND	0
10/12/2011		8260B														ND	0
5/10/2012		8260B														ND	0
10/4/2012		8260B														ND	0
5/1/2013		8260B														ND	0
10/1/2013		8260B														ND	0
5/1/2014		8260B														ND	0
11/17/2014	MW redevelopment	8260C															
2/11/2015		8260C														ND	0
10/1/2015	MW redevelopment	8260C															
10/28/2015		8260C														ND	0
5/16/2016	MW redevelopment	8260C															
6/13/2016		8260C														ND	0
10/19/2016		8260C													**0.6**		0
5/17/2017		8260C														ND	0
10/16/2017		8260C														ND	0
5/9/2018		8260C														ND	0
9/10/2018	MW-8 de-commissioned	8260C															
9/11/2018	MW-8R installed	8260C															
10/30/2018		8260C				4.0							15.5				0
6/24/2019		8260C			150		4.9	**0.6**	3.3	**0.8**	98.8	**8.8**	246		**2.0**		2
10/24/2019		8260C			245		3.9		3.1		81.0	**7.2**	213				3
10/24/2019	duplicate	8260C			240		4.1	**0.7**	3.2	0.5	87.2	**7.5**	213				0
5/14/2020		8260C		***0.7***	93.6		3.8		3.9	0.5	92.8	**8.4**	222		**1.8**		0
10/29/2020		8260C		***0.9***	105		3.3	0.5	4.1		68.0	**6.8**	157	**1.4**	**0.8**		1
5/17/2021		8260C		***1.0***	80.3		3.2		3.2	0.5	77.7	**6.6**	140		**0.9**		1
5/17/2021	duplicate	8260C		***1.0***	77.7		3.2		3.1	0.5	78.4	**6.6**	137		**0.9**		1
10/21/2021		8260C		***0.6***	32.3		2.9		2.6		56.6	**5.2**	49.2				0
10/21/2021	duplicate	8260C		***0.6***	23.5		2.9		2.6		56.4	**5.1**	43.6				0

[1] VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bold values exceed Vermont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
ND = Non-detected, no organic compounds detected.

G-4; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

		Results
SAMPLING DATE	**Location**	
5/26/1999	**G-4**	ND
10/19/1999		ND
5/23/2000		ND
10/11/2000		ND
5/22/2001		ND
*		

Note:
ND = Non-detected above laboratory detection limits
* MW-G-4 is not required to be sampled for VOCs, per Partial Consent Order dated 4/3/2001

WE-1B; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

SAMPLING DATE	Location	Lab Method	ACETONE	BENZENE	2-BUTANONE (MEK)	t-BUTANOL	CARBON-DISULFIDE	1,4-DICHLORO-BENZENE (para)	cis 1,2-DICHLORO-ETHENE	1,2-DICHLORO-PROPANE	DIETHYL-ETHER	ETHYL-BENZENE
		UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	VT Groundwater Enforcement Standards [1]		950	5.0	511	--	--	75	70	5	--	700
	VT Preventive Action Level [1]		475	0.5	255	--	--	38	35	0.5	--	350
	VT Health Advisory [2]		949.8	--	510.6	--	--	--	--	--	--	--
	Federal MCL (Primary) [2]		--	0.5	--	--	--	75.0	70	5.0	--	700
	Federal MCL (Secondary) [2]		--	--	--	--	--	--	--	--	--	--
5/27/1999	**WE-1B**	8260						< 1	< 1	< 1		
10/19/1999		8260						< 1	< 1	< 1		
5/23/2000		8260	***3800***	***29***	45			< 2	< 1	< 1		14
10/11/2000		8260					7	< 1	< 1	< 1		
5/21/2001		8260	15	***2.3***				< 1	< 1	< 1		
10/22/2001		8260						< 1	< 1	< 1		
5/1/2002		8260						< 1	< 1	< 1		
10/29/2002		8260						< 1	< 1	< 1		
5/16/2003		8260						< 0.5	< 0.5	< 0.5		
10/8/2003		8260						< 0.5	< 0.5	< 0.5		
5/17/2004		8260						1.0 ND	1.0 ND	1.0 ND		
10/11/2004		8260						< 1	< 1	< 1		
5/11/2005		8260						< 1	< 1	< 1		
5/11/2005	duplicate	8260						< 1	< 1	< 1		
10/11/2005		8260						< 1	< 1	< 1		
5/4/2006		8260						< 1	< 1	< 1		
10/10/2006		8260						< 1	< 1	< 1		
5/3/2007		8260										
10/9/2007		8260										
5/9/2008		8260										
10/1/2008		8260B			14.7							
5/4/2009		8260B			17							
5/4/2009	duplicate	8260B	23.6		26						5.5	
10/12/2009		8260B	20.2		15.4						5.6	
5/5/2010		8260B									6.1	
10/11/2010		8260B	28.9								6.6	
5/12/2011		8260B	22.4		38.7						6.5	
5/12/2011	duplicate	8260B	26.9		42.6						6.8	
10/12/2011		8260B	30.7		42.7							
5/10/2012		8260B	48.7	***3.5***	55.3			1.2			8.4	1.5
5/10/2012	duplicate	8260B	52.2	***3.2***	64.4			1.1			8.2	1.3
10/4/2012		8260B	70.7	***1.5***	98.2						6.5	
5/1/2013		8260B		***1.0***							5.5	
10/1/2013		8260B	***[3]***						1.1		5.6	
10/1/2013	duplicate	8260B	***[3]***						1.1		5.2	
5/1/2014		8260B	30.4		44.9				1.3		5.6	
11/13/2014	MW redevelopment	8260C										
2/12/2015		8260C	200	***1.6***	**396**				2.6		7.6	
10/28/2015		8260C	313	***2.3***	**508**				4.5		15.5	
10/28/2015	duplicate	8260C	327	***2.4***	***538***				4.8		15.3	
6/13/2016		8260C	**510**	***3.7***	***834***				8.1	0.5	25.9	
10/18/2016		8260C	**417**	***3.3***	***642***				8.4		23.3	
5/17/2017		8260C	**380**	***3.4***	***560***				8.5		26.7	
10/16/2017		8260C	244	***3.6***	**395**				8.4		38.0	
5/9/2018		8260C	49	***2.5***	95.4				5.0		30.6	
10/30/2018		8260C	14.5	***2.4***	21.7	22.7					29.5	
5/14/2019		8260C	10.5	***1.6***		20.6			2.3		21.2	
10/24/2019		8260C		***1.5***					1.9		19.9	
5/14/2020		8260C		***1.4***							20.8	
10/29/2020		8260C		***1.7***		25.4					18.8	
5/17/2021		8260C	Laboratory results indicated anomalous results due to surface infiltration from well integrity being compromised, and were rejected by WHEM									
10/21/2021		8260C										

WE-1B; ORGANICS
C.V. LANDFILL
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SAMPLING DATE	Location	Lab Method	4-METHYL-2-PENTANONE (MIBK)	TOLUENE	t-BUTYL-BENZENE	1,2,3-TRIMETHYL-BENZENE	1,2,4-TRIMETHYL-BENZENE	1,3,5-TRIMETHYL-BENZENE	NAPH-THALENE	TETRA-HYDRO-FURAN	VINYL CHLORIDE	Result	Unidentified Peaks
		UNITS	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L		
	VT Groundwater Enforcement Standards [1]		--	1000	--		23		0.5	--	2		
	VT Preventive Action Level [1]		--	500	--		2		0.5	--	0.5		
	VT Health Advisory [2]		--	--	--		23.2		0.5	--	--		
	Federal MCL (Primary) [2]		--	1000	--	--	--	--	--	--	2		
	Federal MCL (Secondary) [2]		--	--	--	--	--	--	--	--	--		
5/27/1999	**WE-1B**	8260	< 10	< 1									
10/19/1999		8260	< 10	< 1									
5/23/2000		8260	< 10	1									
10/11/2000		8260	< 10	< 1									
5/21/2001		8260	< 10	< 1									
10/22/2001		8260	< 10	< 1									
5/1/2002		8260	< 10	< 1									
10/29/2002		8260	< 10	< 1									
5/16/2003		8260	< 5	< 0.5									
10/8/2003		8260	< 5	< 0.5									
5/17/2004		8260		< 1									
10/11/2004		8260		< 1									0
5/11/2005		8260		< 1									1
5/11/2005	duplicate	8260		< 1									1
10/11/2005		8260		< 1									0
5/4/2006		8260		< 1									1
10/10/2006		8260		< 1									0
5/3/2007		8260										ND	0
10/9/2007		8260										ND	0
5/9/2008		8260										ND	0
10/1/2008		8260B											0
5/4/2009		8260B											0
5/4/2009	duplicate	8260B											0
10/12/2009		8260B											3
5/5/2010		8260B											0
10/11/2010		8260B											0
5/12/2011		8260B											1
5/12/2011	duplicate	8260B											0
10/12/2011		8260B											0
5/10/2012		8260B			1.8		**21.7**		***8.6***				7
5/10/2012	duplicate	8260B			1.8		**19.7**		***8.7***				7
10/4/2012		8260B					**3.4**		***2.2***				2
5/1/2013		8260B											0
10/1/2013		8260B											0
10/1/2013	duplicate	8260B											0
5/1/2014		8260B											0
11/13/2014	MW redevelopment	8260C											
2/12/2015		8260C											4
10/28/2015		8260C											4
10/28/2015	duplicate	8260C											4
6/13/2016		8260C	24.6	1.1						33.9			5
10/18/2016		8260C	22.2							28.6	**1.1**		5
5/17/2017		8260C	26.4							35.6	**1.3**		6
10/16/2017		8260C	31.7	1.4						45.8	***3.7***		2
5/9/2018		8260C	22.7							49.9	***3.1***		5
10/30/2018		8260C	11.8	1						52.4	***3.7***		4
5/14/2019		8260C								42.1	***2.3***		3
10/24/2019		8260C								43.0	***2.4***		0
5/14/2020		8260C								44.3	***4.0***		0
10/29/2020		8260C								50.2	***3.9***		0
5/17/2021		8260C	Laboratory results indicated anomalous results due to surface infiltration from well integrity being compromised, and were rejected by WHEM										
10/21/2021		8260C										ND	0

[1] VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance;
applies only to drinking water supplies.
Bold values exceed Vermont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
[3]: Acetone values rejected by WHEM because it was also detected in both QA/QC trip blanks.
< = non-detected, at the reported detection limit shown; ND = Non-detected for all analyzed compounds.

MW-5A and MW-5AR; ORGANICS

C.V. LANDFILL

EAST MONTPELIER, VERMONT

			ACETONE	BENZENE	CARBON DISULFIDE	CHLORO-FORM	1,1-DICHLORO-ETHANE	cis 1,2-DICHLORO-ETHENE	TETRA-CHLORO-ETHENE (PCE)	VINYL CHLORIDE	Result	Unidentified Peaks
UNITS			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l		
VT Groundwater Enforcement Standards [1]			950	5	---	---	70	70	5	2		
VT Preventive Action Level [1]			475	0.5	---	---	35	35	0.5	0.5		
VT Health Advisory [2]			949.8	---	---	---	70	---	---	---		
Federal MCL (Primary) [2]			---	5	---	---	---	70	5	2		
Federal MCL (Secondary) [2]			---	---	---	---	---	---	---	---		
SAMPLING DATE	**Location**	**Lab Method**										
5/28/1999	**MW-5A**	8260				< 1.0				**1.1**		
10/18/1999		8260				< 1.0				**2.2**		
5/23/2000		8260				< 1.0					ND	
10/12/2000		8260	71		7.2	< 1.0						
5/17/2001		8260				< 1.0					ND	
10/22/2001		8260				< 1.0				**1.9**		
5/3/2002		8260		**1.7**		< 1.0		1.2		**5.2**		
10/29/2002		8260		**4.2**		< 1.0	1.4	4.4	**0.7**	**4**		
5/15/2003		8260		**2**		< 0.5	0.6	2		**1**		
10/8/2003		8260		**1**		< 0.5		1		**2**		
5/18/2004		8260		**1.2**		< 1.0		1.4				
10/11/2004		8260		**4.5**		< 1.0		4.3		**3.6**		0
5/11/2005		8260				< 1.0					ND	0
10/11/2005		8260		**2.2**		< 1.0		2.3		**4.3**		0
5/4/2006		8260				< 1.0					ND	0
5/4/2006	duplicate	8260				< 1.0					ND	0
10/10/2006		8260				< 1.0					ND	0
5/3/2007		8260									ND	0
10/9/2007		8260									ND	0
5/9/2008		8260	75.9									0
10/1/2008		8260B									ND	0
5/4/2009		8260B									ND	0
10/12/2009		8260B									ND	0
5/5/2010		8260B									ND	0
5/5/2010	duplicate	8260B									ND	0
10/11/2010		8260B									ND	0
5/12/2011		8260B									ND	0
10/12/2011		8260B									ND	0
5/10/2012		8260B									ND	0
10/4/2012		8260B									ND	0
5/1/2013		8260B									ND	0
10/1/2013		8260B									ND	0
5/1/2014		8260B									ND	0
11/17/2015	MW redevelopment	8260C										
2/11/2015		8260C									ND	0
10/1/2015	MW redevelopment	8260C										
10/28/2015		8260C									ND	0
6/13/2016		8260C									ND	0
10/18/2016		8260C								**0.7**		0
5/17/2017		8260C									ND	0
10/16/2017		8260C									ND	0
5/9/2018		8260C									ND	0
9/10/2011	MW-5A de-commissioned	8260C										
9/11/2018	MW-5AR installed	8260C										
10/30/2018		8260C				2.3						0
5/14/2019		8260C									ND	0
10/24/2019		8260C									ND	0
5/14/2020		8260C									ND	0
10/29/2020		8260C									ND	0
5/17/2021		8260C									ND	0
10/21/2021		8260C									ND	0

[1] VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.

Bold values exceed Vermont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.

Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.

Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.

ND = Non-detected, no organic compounds detected.

MW-6R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

			ACETONE	tert-AMYL-METHYL-ETHER (TAME)	BENZENE	2-BUTANONE (MEK)	t-BUTANOL	CHLORO-BENZENE	CHLORO-ETHANE	CHLORO-METHANE	1,4-DICHLORO-BENZENE (para)	cis 1,2-DICHLORO-ETHENE	trans 1,2-DICHLORO-ETHENE	DIETHYL ETHER	ETHYL BENZENE	ETHYL-t-BUTYL-ETHER
UNITS			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
VT Groundwater Enforcement Standards [1]			950	-----	5.0	511	-----	100	-----	-----	75	70	100	----	700	----
VT Preventive Action Level [1]			475	-----	0.5	255	-----	50	-----	-----	38	35	50	----	350	----
VT Health Advisory [2]			949.8	-----	-----	510.6	-----	-----	-----	-----	-----	-----	-----	----	-----	----
Federal MCL (Primary) [2]			-----	-----	5.0	-----	-----	100	-----	-----	75	70	100	----	700	----
Federal MCL (Secondary) [2]			-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
SAMPLING DATE	**Location**	**Lab Method**														
5/27/1999	**MW-6R**	8260	330		***80***	**1,100**		2.6			0.9	1.9			9.6	9.6
10/18/1999		8260	**830**		***121***	**2,930**					0.9	1.9			20	20
5/23/2000		8260			***150***			8.0							29	29
10/11/2000		8260	**4,600**		***105***	20			190	155					60	60
5/21/2001		8260	**9,500**		***75***	30										
10/22/2001		8260	**5,000**		***120***	13		6.9			5.1	11			26	26
5/2/2002		8260	**3,700**		***120***	13			13	86					27	27
10/29/2002		8260	**5,500**		***170***	16				34					32	32
5/15/2003		8260	**5,400**	< 50.0	***73***	13										
10/9/2003		8260	**10,000**	< 100.0		14										
5/17/2004		8260			***66.5***			3.1			5.4				16.1	16.1
10/11/2004		8260			***109.0***			3.6			3.3		1.5		17.9	17.9
5/11/2005		8260			***58.2***			1.2			2.7				8.6	8.6
10/11/2005		8260			***66.8***						1.8	2.1			4.2	4.2
5/4/2006		8260			***68.2***			1.8			2.8				8.1	8.1
10/10/2006		8260			***43.8***						1.2	2.2			3.8	3.8
5/3/2007		8260			***49.5***						1.2				6.6	6.6
10/9/2007		8260			***34.5***							1			1.6	1.6
5/9/2008		8260	15.1		***24.3***		< 72	1.1			1.9			72	6.8	6.8
10/1/2008		8260B			***54.2***		99.1							158	6.7	6.7
5/4/2009		8260B			***39.5***			1.4			3.3			94.3	9.5	9.5
10/12/2009		8260B			***39.9***		122				1.1			168	4	4
5/5/2010		8260B			***54.8***		82.3				2.1		1.2	128	6.4	6.4
10/11/2010		8260B	25.6		***33.9***	31.6	330					1.1		180	2.3	2.3
5/12/2011		8260B	42.2		***26.2***	78.3	284							149		
10/12/2011		8260B	14.7		***29.3***		340							156	1.1	1.1
10/12/2011	Duplicate	8260B	26.0		***25.5***		291							144	1.1	1.1
5/10/2012		8260B	11.0		***19.8***		227					1.6		122	1.2	1.2
10/4/2012		8260B	30.1		***20.5***	42.5	348					1.9		162		
5/1/2013		8260B			***13.0***		184							98.5		
10/1/2013		8260B			***29.2***		243							198		
5/1/2014		8260B			***41.6***		148							139		
5/1/2014	Duplicate	8260C	15.4		***41.4***		144							141		
11/17/2015	MW redevelopment	8260C														
2/11/2015		8260C			***31.2***		247							134		
10/28/2015		8260C			***20.6***		275							148		
6/13/2016		8260C			***25.0***		283							136		
10/18/2016		8260C			***42.0***		241							134		
10/18/2016	Duplicate	8260C			***41.3***		243							137		
5/17/2017		8260C	29.9		***28.4***		189							136		
10/16/2017		8260C	11.3		***19.3***		274							154	1.5	2.8
10/16/2017	Duplicate	8260C			***21.6***		233							166	1.5	1.7
5/9/2018		8260C	10.8		***23.1***		268							144		
10/30/2018		8260C			***51.6***		322	1.9						117		
5/14/2019		8260C			***34.8***		267							117		
5/14/2019	Duplicate	8260C			***34.9***		275							122		
10/24/2019		8260C			***17.7***		272							124		
5/14/2020		8260C			***19.3***		382							144		
10/29/2020		8260C			***26.3***		426							114		
5/17/2021		8260C			***64.7***		190	2.7			2.0			124		
10/21/2021		8260C			***20.8***		74.9*							101		

MW-6R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

SAMPLING DATE	Location	Lab Method	2-HEXANONE	ISOPROPYL-BENZENE	4-ISOPROPYL-TOLUENE	METHYLENE CHLORIDE	MTBE	4-METHYL-2-PENTA-NONE (MIBK)	NAPH-THALENE	N-PROPYL-BENZENE	TETRA HYDRO FURAN	TOLUENE	TRI-CHLORO-ETHENE (TCE)	1,2,3-TRIMETHYL-BENZENE	1,2,4-TRIMETHYL-BENZENE	1,3,5-TRIMETHYL-BENZENE	VINYL CHLORIDE	XYLENES - m,p	Unidentified Peaks
	UNITS		ug/l	ug/L	ug/L	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/L	ug/L	ug/L	ug/l	ug/l	
	VT Groundwater Enforcement Standards [1]		-----	-----	-----	5	11	-----	0.5	--	----	1000	5		23		2	10000	
	VT Preventive Action Level [1]		-----	-----	-----	0.5	5	-----	0.5	--	----	500	0.5		2		0.5	5000	
	VT Health Advisory [2]		-----	-----	-----	-----	11.3	-----	0.5	--	----	-----	-----		23.2		----	-----	
	Federal MCL (Primary) [2]		-----	-----	-----	5	-----	-----	-----	--	----	1000	5		-----		2	10000	
	Federal MCL (Secondary) [2]		-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----		-----		-----	-----	-----
5/27/1999	**MW-6R**	8260				**1.7**		36				43						17	
10/18/1999		8260						110				1280						31	
5/23/2000		8260																46	
10/11/2000		8260						940				290							
5/21/2001		8260						740				240							
10/22/2001		8260	40					330				160					**7.2**	52	
5/2/2002		8260						280				210						29	
10/29/2002		8260						360				160						42	
5/15/2003		8260						610				240							
10/9/2003		8260										270							
5/17/2004		8260																31.5	
10/11/2004		8260		2.0			2.3			1.0		1.4			**7.4**	**3.0**		31.7	9
5/11/2005		8260		1.3								11.1			**7.6**	**2.3**		18.6	> 10
10/11/2005		8260										28.5	**1.2**		**3.7**			9.9	> 10
5/4/2006		8260		1.4											**1.4**	**2.6**		10.0	> 10
10/10/2006		8260		1.1			2.2					6.9			**2.0**	**1.0**		10.4	> 10
5/3/2007		8260		1.5			2.2					1.3			**2.1**			13.5	> 10
10/9/2007		8260					2.6					6.3						4.2	> 10
5/9/2008		8260		1.9							93.9	1.2			**4.4**			8.4	> 10
10/1/2008		8260B									225							10.8	0
5/4/2009		8260B		3.0					**3.0**	1.0	128				**10.1**			9.8	0
10/12/2009		8260B		2.9			2.7				348	2.3			**3.1**			11.6	> 10
5/5/2010		8260B		4.2							209				**5.6**	**2.4**		22.7	> 10
10/11/2010		8260B		2.6			4.3	27.8			719	7.0			**2.1**			6.2	> 10
5/12/2011		8260B		1.6			3.4				618	4.2						3.0	> 10
10/12/2011		8260B		2.1	1.6		4.2	12.0			627	5.8						4.0	4
10/12/2011	Duplicate	8260B		2.1	1.3		3.8	11.4			709	5.1						3.8	4
5/10/2012		8260B		2.4			3.0				556	2.5						4.9	3
10/4/2012		8260B		1.2			4.2	24.2			733	6.4							9
5/1/2013		8260B									450	2.4							2
10/1/2013		8260B		2.5	2.2		3.7				796	4.4							0
5/1/2014		8260B		4.4							282				**4.1**			9.6	2
5/1/2014	Duplicate	8260C		4.5			2.5		**3.2**		290	1.3			**4.3**	**1.9**		10.7	2
11/17/2015	MW redevelopment	8260C																	
2/11/2015		8260C									499	7.8							2
10/28/2015		8260C									692	11.1			**5.6**				2
6/13/2016		8260C									586								4
10/18/2016		8260C		7.2							539								3
10/18/2016	Duplicate	8260C		7.3							563								3
5/17/2017		8260C		3.3			2.9				567			**1.4**	**1.8**			8.4	> 10
10/16/2017		8260C		3.6			**5.4**				756	3.4			1.1			7.7	4
10/16/2017	Duplicate	8260C		3.7			3.6				768	2.4			1.0			8.1	4
5/9/2018		8260C		3.0			3.5				724	1.2		**1.4**	**2.0**			7.0	> 10
10/30/2018		8260C		3.9			2.4				650			**3.0**	**5.2**	**1.4**		9.2	> 10
5/14/2019		8260C									496								3
5/14/2019	Duplicate	8260C									522								3
10/24/2019		8260C		2.1			3.0				652	1.5						3.7	> 10
5/14/2020		8260C		1.9			3.3		**0.8**		737			**1.0**	**1.4**			3.4	> 10
10/29/2020		8260C		1.8			3.0		**1.3**		631	1.0		**1.4**	**1.8**			2.6	4
5/17/2021		8260C		4.6			2.4		**5.0**		461			**5.4**	**9.5**			3.7	4
10/21/2021		8260C		1.8			2.5		**1.1**		461			**1.0**	**1.5**				3

[1] VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bold values exceed Vermont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
ND = Non-detected, no organic compounds detected.
* The QA/QC associated with this analysis did not meet laboratory acceptance limits indicating the results may be biased low.

MW-7; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL
Environmental Management

			Result	Unidentified Peaks
	UNITS		ug/l	
SAMPLING DATE	Location			
5/28/99	**MW-7**		ND	
10/21/1999			ND	
5/23/2000			ND	
10/11/2000			ND	
5/23/2001			ND	
*				

Notes:
ND = Non-detected above laboratory detection limits
* MW-7 is not required to be sampled for VOCs, per Partial Consent Order dated 4/3/2001

MW-10 and MW-10R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

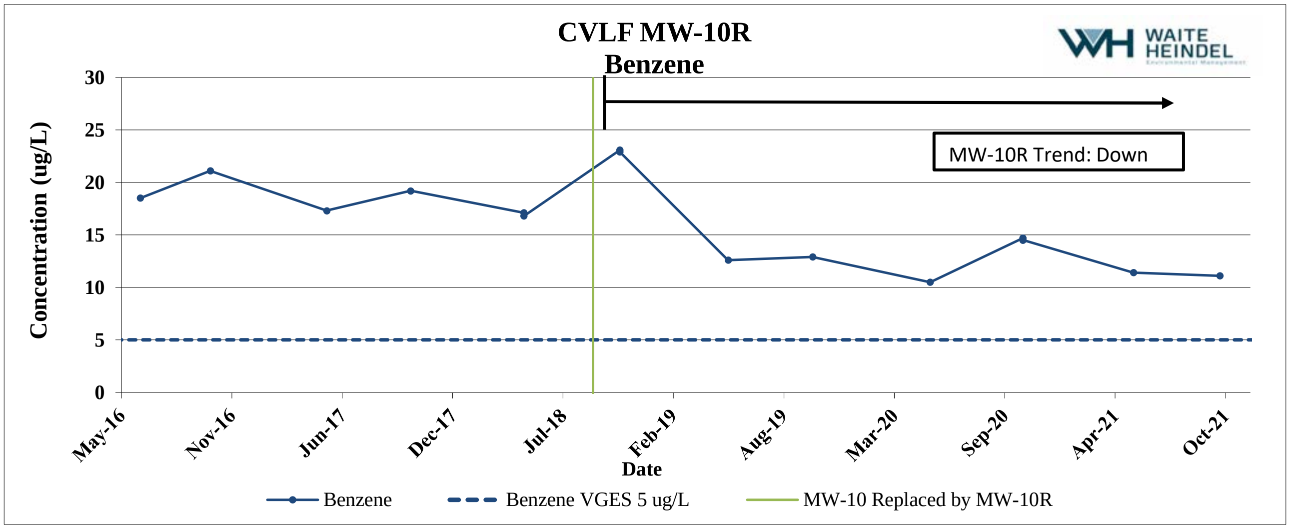
SAMPLING DATE	Location	Lab Method	ACETONE	BENZENE	BROMO-METHANE	t-BUTANOL	t-BUTYL-BENZENE	2-BUTANONE (MEK)	CHLORO-ETHANE	CHLORO-METHANE	1,4-DICHLORO-BENZENE (para)	DICHLORO-DIFLUORO-METHANE	1,1-DICHLORO-ETHANE	1,2-DICHLORO-ETHANE	cis 1,2-DICHLORO-ETHENE	trans 1,2-DICHLORO-ETHENE	1,2-DICHLORO-PROPANE
UNITS			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
VT Groundwater Enforcement Standards [1]			950	5.0	5	----	----	511	-----	-----	75	-----	70	5	70	100	5
VT Preventive Action Level [1]			475	0.5	0.5	----	----	255	-----	-----	38	-----	35	0.5	35	50	0.5
VT Health Advisory [2]			949.8	----	4.8	----	----	510.6	-----	----	-----	-----	70	----	-----	-----	-----
Federal MCL (Primary) [2]			-----	5	-----	-----	-----	-----	-----	-----	75	-----	-----	5	70	100	5
Federal MCL (Secondary) [2]			-----	-----	-----	----	----	-----	-----	-----	-----	----	-----	-----	-----	-----	-----
5/26/1999	**MW-10**	8260	***985***	***170***				***1,940***	7.4				6.4	***6.4***	***154***	2.7	***11***
10/19/1999		8260	150	***81***				**290**							**64**		
5/22/2000		8260	**560**	***160***	**1.4**			***800***	8.8	2.3			3.1	**3.1**	6.2	2.4	**2.3**
10/12/2000		8260		***44***									< 5				
5/21/2001		8260	11	***120***	**1.9**				5				3.9	**3.9**	1.1	3.7	
10/22/2001		8260	15	***86***				9.9	4.5				3.1	**3.1**	1.6	2.6	
5/1/2002		8260	32	***75***				18	9.8				4.2	**4.2**	5.8	2.5	**2.1**
10/29/2002		8260		***46***					2.7	1.7			5.3	***5.3***		1.6	
5/16/2003		8260		***55***					2				3	**3**		5	
10/7/2003		8260							4				4	**4**		1	
5/18/2004		8260		***68.5***							5.1		< 1				
10/11/2004		8260		***61.9***									5.2	**1.3**	6.2	3.5	**1.6**
5/11/2005		8260		***51***					5			9.5	4.8	**2.3**	**67.8**	3	***6.8***
10/11/2005		8260		***54.6***						3.4			4.8		22.8	2.8	
5/4/2006		8260		***46.3***								7.6	3.0	**2.0**	11.8	3.7	**3.4**
10/10/2006		8260		***34.4***									1.8			3.0	**1.0**
10/10/2006	duplicate	8260		***33.3***								10.5	2.0	**1.5**	30.3	2.2	**4.1**
5/3/2007		8260		***34.2***								11.7	2.1		13.1	2.8	**2.5**
10/9/2007		8260		***48.6***									3.3			2.0	
5/9/2008		8260		***23.1***		29.1									1.7	2.5	
10/1/2008		8260B		***27.6***		32.6	1.5						1			3.7	
5/4/2009		8260B		***26.1***									1.5		2.1	3.5	
10/12/2009		8260B		***28.2***		28.5							1.6			3.5	
5/5/2010		8260B		***28.6***		34.8	1.0						1.3			2.8	
10/11/2010		8260B		***37.9***									2.3		11.0	1.5	
10/11/2010	duplicate	8260B		***39.6***									2.3		11.3	1.6	
5/12/2011		8260B		***32.1***		47.4							1.4		1.6	2.5	
10/12/2011		8260B		***26.0***		42.8							1.6		2.3	1.1	
5/10/2012		8260B		***23.5***		51.3	1.2									2.8	
10/4/2012		8260B		***25.0***		21.4							1.7		19.6	1.4	
5/1/2013		8260B		***14.2***		44.3	1.3									2.2	
5/1/2013	duplicate	8260B		***17.6***		40.6	1.4									2.9	
10/1/2013		8260B		***24.5***		31.5	1.6						1.3			2.9	
5/1/2014		8260B		***19.1***		34.0	1.3									3.1	
11/17/2014	MW redevelopment	8260C															
2/11/2015		8260C		***5.8***		28.2	1.1									2.4	
10/1/2015	MW redevelopment	8260C															
10/29/2015		8260C		***16.6***													
5/16/2016	MW redevelopment	8260C															
6/13/2016		8260C		***18.5***			1.9									4.1	
10/18/2016		8260C		***21.1***		23.7	1.2						1.4	**1.0**	6.3	2.3	
5/17/2017		8260C		***17.3***			2.5									4.5	
10/16/2017		8260C		***19.2***			1.7									4.0	
5/9/2018		8260C		***17.1***		35.8	1.7									3.3	
5/9/2018	duplicate	8260C		***16.8***		36.0	1.7									3.3	
9/10/2018	MW-10 de-commissioned	8260C															
9/11/2018	MW-10R installed	8260C															
10/30/2018		8260C		***23.1***		28.7								**1.4**	30.7	1.5	**0.9**
10/30/2018	duplicate	8260C		***22.9***		23.5								**1.4**	30.4	1.5	**0.9**
5/14/2019		8260C		***12.6***										**0.7**	4.1	2.0	**1.0**
10/14/2019		8260C		***12.9***										**0.6**	6.5	1.9	**1.2**
5/14/2020		8260C		***10.5***											2.3	1.8	**0.6**
10/29/2020		8260C		***14.7***										**0.7**	11.1	1.9	
10/29/2020	duplicate	8260C		***14.5***										**0.6**	11.1	1.9	
5/17/2021		8260C		***11.4***											2.8	2.0	
10/21/2021		8260C		***11.1***										**0.6**	13.3	1.8	

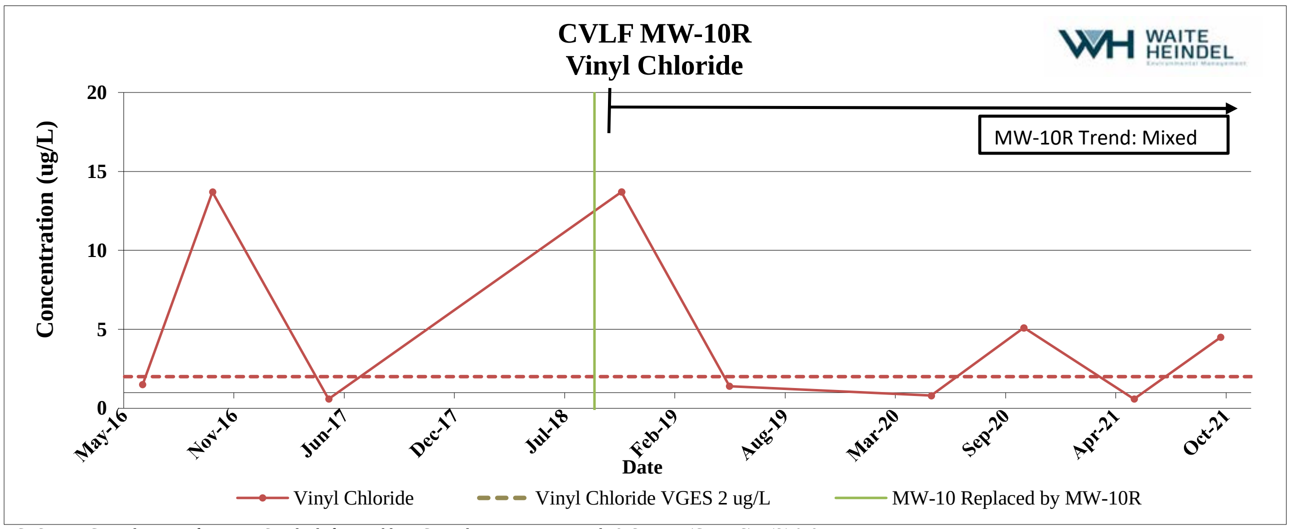
MW-10 and MW-10R; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL

SAMPLING DATE	Location	Lab Method	DIETHYL-ETHER	ETHYL-BENZENE	2-HEXANONE	ISOPROPYL-BENZENE	METHYLENE-CHLORIDE	4-METHYL-2-PENTANONE (MIBK)	TETRA-HYDRO-FURAN	TOLUENE	TRICHLORO-ETHENE (TCE)	VINYL-CHLORIDE	XYLENES - m,p	Unidentified Peaks
	UNITS		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	
	VT Groundwater Enforcement Standards [1]		----	700	-----	----	5	----	----	1000	5	2	10000	
	VT Preventive Action Level [1]		----	350	-----	----	0.5	----	----	500	0.5	0.5	5000	
	VT Health Advisory [2]		----	-----	-----	----	-----	----	----	-----	-----	-----	-----	
	Federal MCL (Primary) [2]		-----	700	-----	-----	-----	----	-----	1000	5	2	1000	
	Federal MCL (Secondary) [2]		----	-----	-----	----	5	-----	-----	-----	-----	-----	-----	
5/26/1999	**MW-10**	8260		12	102		**1.8**	127		148	**1.6**	***18***	3.7	
10/19/1999		8260								27	**< 1**	***12***		
5/22/2000		8260		11	76		**1.7**	93		79	**< 1**	***3.9***	3.8	
10/12/2000		8260								4.2	**< 5**			
5/21/2001		8260		7.7						2.3	**< 1**	**1.5**	3.6	
10/22/2001		8260		5.3						2.2	**< 1**		2.6	
5/1/2002		8260		2.8						3.0	**< 1**	***4.1***	1.9	
10/29/2002		8260		1.8						0.9	**< 1**	**0.9**		
5/16/2003		8260		5							< 0.5		4	
10/7/2003		8260									< 0.5			
5/18/2004		8260		15.8							**< 1**		30.6	
10/11/2004		8260		2.6						2.7	**< 1**	***12.6***	4.0	7
5/11/2005		8260		1.4						5.8	**< 3**	***13.7***	2	5
10/11/2005		8260		1.2						2.4	**< 1**	***12.7***		5
5/4/2006		8260		3.5						4.7	**< 1**	***4.1***	5.4	> 10
10/10/2006		8260		4.3		1.3					**< 1**		6.0	> 10
10/10/2006	duplicate	8260		1.8						3.6	**1.8**	***4.1***	3.0	> 10
5/3/2007		8260		1.8						3.3		***2.5***	2.0	> 10
10/9/2007		8260		1.6										> 10
5/9/2008		8260	93.4	3.2		1.1			20.4	3.5			2.9	> 10
10/1/2008		8260B	140	5.0		2.2			39.5				9.2	0
5/4/2009		8260B	145	3.2					33.5	1.0			4.7	0
10/12/2009		8260B	159	2.7		1.1			37.8				2.8	0
5/5/2010		8260B	152	4.0		1.5			36.3	1.9			5.9	0
10/11/2010		8260B	90.1	1.1					23.9			***15.8***		
10/11/2010	duplicate	8260B	91.9	1.2					23.3			***17.8***		
5/12/2011		8260B	129	3.3		1.1			45.4				5.7	2
10/12/2011		8260B	97.9	1.4					46.0					0
5/10/2012		8260B	113	4.3		1.6			57.9				8.1	0
10/4/2012		8260B	89.9						26.3			***17.5***		1
5/1/2013		8260B	97.1	3.0		1.4			57.9				4.7	0
5/1/2013	duplicate	8260B	101	3.7		1.7			54.9				5.3	0
10/1/2013		8260B	108	2.1		1.5			48.6					0
5/1/2014		8260B	122	3.5		1.5			66.0				4.1	0
11/17/2014	MW redevelopment	8260C												
2/11/2015		8260C	85.9	1.5					54.9					0
10/1/2015	MW redevelopment	8260C												
10/29/2015		8260C	110						59.1					0
5/16/2016	MW redevelopment	8260C												
6/13/2016		8260C	86.9	3.0		1.8			62.6		**0.9**	**1.5**		0
10/18/2016		8260C	81.6	1.3		1.3			35.0			***13.7***		0
5/17/2017		8260C	85.1	3.3		2.3			60.1		**1.2**	**0.6**		1
10/16/2017		8260C	74.1	1.2		1.8			44.9					0
5/9/2018		8260C	92.7	1.4		1.6			100.0		0.5			0
5/9/2018	duplicate	8260C	92.8	1.4		1.6			105.0		0.5			0
9/10/2018	MW-10 de-commissioned	8260C												
9/11/2018	MW-10R installed	8260C												
10/30/2018		8260C	83.1	2.0					45.4	2.4	**0.9**	***13.7***	2.5	5
10/30/2018	duplicate	8260C	82.3	2.0					45.3	2.4	**0.9**	***13.7***	2.4	5
5/14/2019		8260C	56.5	1.8					52.0		**1.6**	**1.4**		2
10/14/2019		8260C	48.5						33.8		**1.6**			0
5/14/2020		8260C	66.9	1.1					83.9		**1.3**	**0.8**		0
10/29/2020		8260C	60.2	1.6					50.2		**0.7**	***5.1***		0
10/29/2020	duplicate	8260C	58.5	1.7					48.0		**0.8**	***5.1***		0
5/17/2021		8260C	66.2	1.2					55.6		**0.8**	**0.6**		0
10/21/2021		8260C	46.8	1.4					28.6		**1.5**	***4.5***		1

[1] VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.
Bold values exceed Vermont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.
Italicized values exceed the VT Health Advisory, which include primary or secondary MCLs, as set by GWPRS; 7/6/2019.
< = non-detected, at the reported detection limit shown.





VGES = VT Groundwater Enforcement Standards from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

TRIP BLANK DATA
C.V. LANDFILL
EAST MONTPELIER, VT

Location	Date	Sampled by	Lab	Lab Method	Tetra-hydro-furan	Toluene	Xylenes	Acetone	Non-detect	Unidentified Peaks
Trip Blank										
GW & SW	5/18/2004	H&N	EN	8260					ND	0
GW & SW	10/11/2004	H&N	EN	8260					ND	0
GW & SW	5/11/2005	H&N	EN	8260					ND	0
GW & SW	10/11/2005	H&N	EN	8260					ND	0
GW & SW	5/4/2006	H&N	EN	8260					ND	0
GW & SW	10/10/2006	H&N	EN	8260					ND	0
GW & SW	5/3/2007	H&N	EN	8260		3.3	2.2			0
GW & SW	10/8/2007	H&N	EN	8260					ND	0
GW & SW	5/8/2008	H&N	EN	8260					ND	0
GW & SW	10/1/2008	H&N	EN	8260B	48.5	2.3				0
GW & SW	5/4/2009	H&N	EN	8260B					ND	0
Leachate	5/4/2009	H&N	EN	8260B					ND	0
GW & SW	10/12/2009	H&N	EN	8260B					ND	0
Leachate	10/12/2009	H&N	EN	8260B					ND	0
GW & SW	5/5/2010	H&N	EN	8260B					ND	0
Leachate	5/5/2010	H&N	EN	8260B					ND	0
GW & SW	10/11/2010	H&N	EN	8260B					ND	0
Leachate	10/8/2010	H&N	EN	8260B					ND	0
GW & SW	5/12/2011	H&N	EN	8260B					ND	0
Leachate	5/12/2011	H&N	EN	8260B					ND	0
GW & SW	10/12/2011	H&N	EN	8260B					ND	0
Leachate	10/11/2011	H&N	EN	8260B					ND	0
GW & SW	5/9/2012	H&N	EN	8260B					ND	0
Leachate	5/9/2012	H&N	EN	8260B					ND	0
GW & SW	10/4/2012	H&N	EN	8260B					ND	0
Leachate	10/4/2012	H&N	EN	8260B					ND	0
GW & SW	5/1/2013	WHEM	EN	8260B					ND	0
Leachate	6/16/2013	WHEM	EN	8260B					ND	0
GW & SW	10/1/2013	WHEM	EN	8260B				44.8		0
Leachate	10/1/2013	WHEM	EN	8260B				50		0
GW & SW	5/1/2014	WHEM	EN	8260B					ND	0
GW & SW	2/11/2015	WHEM	EN	8260C					ND	0
GW & SW	10/28/2015	WHEM	EN	8260C					ND	0
GW & SW	10/29/2015	WHEM	EN	8260C					ND	0
Leachate	10/29/2015	WHEM	EN	8260B					ND	0
GW & SW	6/13/2016	Endyne	EN	8260C					ND	0
GW & SW	10/10/2016	Endyne	EN	8260C					ND	0
Leachate	10/10/2016	Endyne	EN	8260C					ND	0
GW & SW	5/16/2017	Endyne	EN	8260C					ND	0
GW & SW	10/6/2017	Endyne	EN	8260C					ND	0
Leachate	10/6/2017	Endyne	EN	8260C					ND	0
GW & SW	4/26/2018	Endyne	EN	8260C					ND	0
Leachate	10/8/2018	Endyne	EN	8260C					ND	0
GW & SW	10/30/2018	Endyne	EN	8260C					ND	0
GW	5/14/2019	Endyne	EN	8260C					ND	0
SW	6/7/2019	Endyne	EN	8260C					ND	0
GW & SW	10/9/2019	Endyne	EN	8260C					ND	0
Leachate	10/9/2019	Endyne	EN	8260C					ND	0
GW & SW	4/16/2020	Endyne	EN	8260C					ND	0
GW	10/29/2020	Endyne	EN	8260C				25.9		0
GW/SW	5/17/2021	Endyne	EN	8260C						0
SW	10/21/2021	Endyne	EN	8260C						0
Leachate	10/21/2021	Endyne	EN	8260C						0
GW	10/21/2021	Endyne	EN	8260C				36.9		0

Notes:
Only positive results are recorded in the main body of the table.
If the entire analysis was non-detect, there will be an "ND" in the column labeled "Non-detect."
Sampled by: H&N = Heindel & Noyes, WHEM=Waite-Heindel Environmental Management.
Lab: EN = Endyne.
All parameters listed in ug/l (ppb).
GW & SW = Trip blank located in Groundwater and Surface Water Sample cooler.
Leachate = Trip blank located in leachate sample cooler.

EQUIPMENT BLANK DATA
C.V. LANDFILL
EAST MONTPELIER, VT

Well	Date	Sampled by	Lab	Lab Method	Non-detect	Unidentified Peaks
Equipment Blank	10/18/2016	WHEM	EN	8260C	ND	0
Equipment Blank	5/17/2017	WHEM	EN	8260C	ND	0
Equipment Blank	10/16/2017	WHEM	EN	8260C	ND	0
Equipment Blank	5/9/2018	no sample collected due to pump malfunction at the end of sampling				
Equipment Blank	10/30/2018	WHEM	EN	8260C	ND	0
Equipment Blank	5/14/19 & 6/24/19	no sample collected due to pump malfunction at the end of sampling				
Equipment Blank	10/24/2019	WHEM	EN	8260C	ND	0
Equipment Blank	5/14/2020	no sample collected due to pump malfunction at the end of sampling				
Equipment Blank	10/29/2020	no sample collected; badder pump used with new bladder at each well				
Equipment Blank	5/17/2021	WHEM	EN	8260C	ND	0
Equipment Blank	10/21/2021	WHEM	EN	8260C	ND	0

Notes:
Only positive results are recorded in the main body of the table.
If the entire analysis was non-detect, there will be an "ND" in the column labeled "Non-detect."
Sampled by: WHEM = Waite-Heindel Environmental Management.
Lab: EN = Endyne.
All parameters listed in ug/l (ppb).

C.V. LANDFILL
EAST MONTPELIER, VERMONT
Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

				PFAS compounds with VTGES, PAL, HA & MCL Standards												
				Perfluoro-octanoic acid (PFOA)	Perfluoro-octane sulfonic acid (PFOS)	Perfluoro-hexane sulfonic acid (PFHxS)	Perlfuoro heptanoic acid (PFHpA)	Perfluoro-nonanoic acid (PFNA)	Sum of 5 PFAS Compounds with VT Standards [1],[2]	Perfluoro-butane sulfonic acid (PFBS)	Perfluoro-hexanoic acid (PFHxA)	Perfluoro-undecanoic acid (PFUnA)	Perfluoro-decanoic acid (PFDA)	Perfluoro-dodecanoic acid (PFDoA)	Perfluoro-tridecanoic acid (PFTrDA)	Perfluoro-tetradecanoic acid (PFTA)
				(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)	(ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Monitoring Well	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
MW-5AR	10/30/2018	TA	537 (mod)	310	26	4.2	76	4.2	**420.4**	ND / < 1.8	88	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8
	5/14/2019	TA	537 (mod)	250	130	3.6	*65*	13	**461.6**	*2.7*	86	ND / < 1.7	ND / < 1.7	ND / < 1.7	ND / < 1.7	ND / < 1.7
	10/24/2019	AA	537 (mod)	345	101	4.82	72.7	14.0	**537.52**	ND / < 1.84	94.6	ND / < 1.84	ND / < 1.84	ND / < 1.84	ND / < 1.84	ND / < 1.84
	5/14/2020	AA	537 (mod)	360	169	4.68	80.4	20.2	**634.28**	ND / < 1.97	91.2	ND / < 1.97	2.44	ND / < 1.97	ND / < 1.97	ND / < 1.97
	10/29/2020	AA	537 (mod)	399 F	119 F	5.38	80.3	19.0	**622.68**	1.94	102	ND / < 1.87	ND / < 1.87	ND / < 1.87	ND / < 1.87	ND / < 1.87
	5/17/2021	AA	537 (mod)	310	146	4.06	63.7	20.4	**544.16**	ND / < 1.86	74.7	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86
	10/21/2021	AA	537 (mod)	278	84.8	3.84	58.3	13.9	**438.84**	ND / < 1.86	71.5	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019; VGES & PAL standards are for any combination of FPOA, PFOS, PFHxS, PFHpz and PFNA.

[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.HA standard is for any combination of FPOA, PFOS, PFHxS, PFHpz and PFNA.

* Bold values exceed Vemont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.

** Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.

TA = TestAmerica Laboratories, South Burlington, VT; AA = Alpha Analytical, Mansfield, MA.

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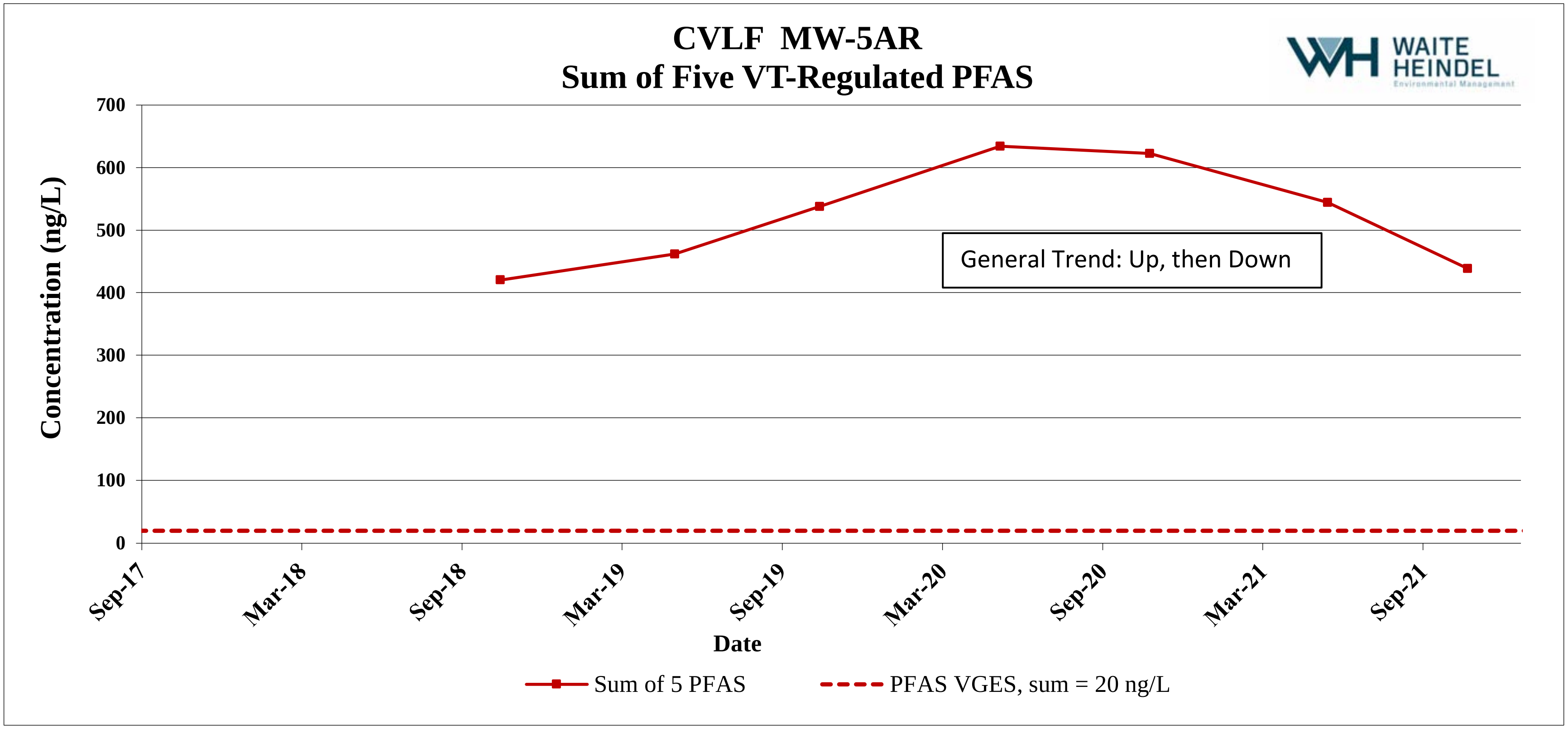

VGES = VT Groundwater Enforcement Standards from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

				PFAS compounds with VTGES, PAL, HA & MCL Standards												
				Perfluoro-octanoic acid (PFOA) (ng/L)	Perfluoro-octane sulfonic acid (PFOS) (ng/L)	Perfluoro-hexane sulfonic acid (PFHxS) (ng/L)	Perlfuoro heptanoic acid (PFHpA) (ng/L)	Perfluoro-nonanoic acid (PFNA) (ng/L)	Sum of 5 PFAS Compounds with VT Standards [1],[2] (ng/L)	Perfluoro-butane sulfonic acid (PFBS) (ng/L)	Perfluoro-hexanoic acid (PFHxA) (ng/L)	Perfluoro-undecanoic acid (PFUnA) (ng/L)	Perfluoro-decanoic acid (PFDA) (ng/L)	Perfluoro-dodecanoic acid (PFDoA) (ng/L)	Perfluoro-tridecanoic acid (PFTrDA) (ng/L)	Perfluoro-tetradecanoic acid (PFTA) (ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Monitoring Well	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
MW-7	10/30/2018	TA	537 (mod)	59	6.5	3	25	ND / < 1.9	**93.5**	3.9	41	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9
	5/14/2019	TA	537 (mod)	160	24	11	*47*	5.4	**247.4**	*17*	84	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8
	10/24/2019	AA	537 (mod)	64.4	6.07	6.58	30.7	ND / < 1.89	**107.75**	4.04	62.8	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89
	5/14/2020	AA	537 (mod)	153	10.5	7.48	44.9	ND / < 1.93	**215.88**	5.18	77.7	ND / < 1.93	ND / < 1.93	ND / < 1.93	ND / < 1.93	ND / < 1.93
	10/29/2020	AA	537 (mod)	58.1 F	4.98 F	5.70	24.0	ND / < 1.88	**92.78**	3.11	42.8	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88
	5/17/2021	AA	537 (mod)	90.7	5.29	6.73	31.4	ND / < 1.88	**134.12**	5.14	59.0	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88
	10/21/2021	AA	537 (mod)	43.0	5.26	4.18	21.0	ND / < 1.84	**73.44**	2.78	40.7	ND / < 1.84	ND / < 1.84	ND / < 1.84	ND / < 1.84	ND / < 1.84

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* Bold values exceed Vemont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
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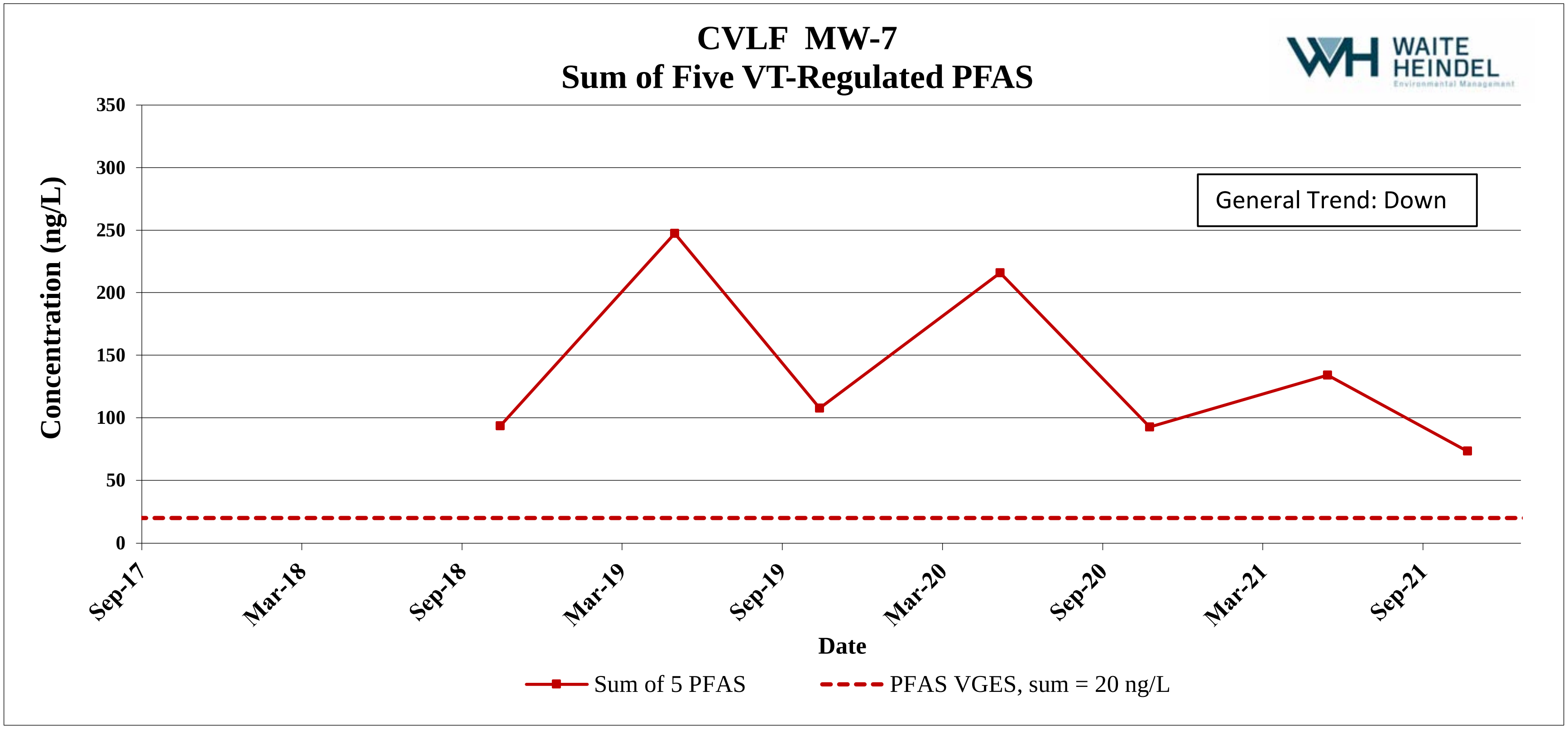

VGES = VT Groundwater Enforcement Standards from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

WAITE HEINDEL

				PFAS compounds with VTGES, PAL, HA & MCL Standards												
				Perfluoro-octanoic acid (PFOA) (ng/L)	Perfluoro-octane sulfonic acid (PFOS) (ng/L)	Perfluoro-hexane sulfonic acid (PFHxS) (ng/L)	Perlfuoro heptanoic acid (PFHpA) (ng/L)	Perfluoro-nonanoic acid (PFNA) (ng/L)	Sum of 5 PFAS Compounds with VT Standards [1],[2] (ng/L)	Perfluoro-butane sulfonic acid (PFBS) (ng/L)	Perfluoro-hexanoic acid (PFHxA) (ng/L)	Perfluoro-undecanoic acid (PFUnA) (ng/L)	Perfluoro-decanoic acid (PFDA) (ng/L)	Perfluoro-dodecanoic acid (PFDoA) (ng/L)	Perfluoro-tridecanoic acid (PFTrDA) (ng/L)	Perfluoro-tetradecanoic acid (PFTA) (ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Monitoring Well	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
MW-10^	8/14/2018	TA	537 (mod)	200	5.8	26	88	ND / < 1.8	**320**	15	180	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8
MW-10R	10/30/2018	TA	537 (mod)	170	8.2	19	94	ND / < 1.8	**291.2**	9.2	160	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8
	5/14/2019	TA	537 (mod)	160	*ND / < 8.8*	10	60	ND / < 8.8	**230.0**	ND / < 8.8	150	ND / < 8.8	ND / < 8.8	ND / < 8.8	ND / < 8.8	ND / < 8.8
	10/24/2019	AA	537 (mod)	50.2	ND / < 1.95	8.29	24.8	ND / < 1.95	**83.3**	5.40	108	ND / < 1.95	ND / < 1.95	ND / < 1.95	ND / < 1.95	ND / < 1.95
	5/14/2020	AA	537 (mod)	78.9	ND / < 1.90	6.61	54.0	ND / < 1.90	**139.5**	6.11	146	ND / < 1.90	ND / < 1.90	ND / < 1.90	ND / < 1.90	ND / < 1.90
	10/29/2020	AA	537 (mod)	329 F	15.3 F	25.4 F	84.6	ND / < 1.88	**454.3**	6.24	147	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88
	5/17/2021	AA	537 (mod)	152	4.89 F	12.6	71.8	ND / < 1.87	**241.3**	5.25	139	ND / < 1.87	ND / < 1.87	ND / < 1.87	ND / < 1.87	ND / < 1.87
	10/21/2021	AA	537 (mod)	270	55.1	16.8	77.0	2.24	**421.1**	3.90	126	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019; VGES & PAL standards
are for any combination of FPOA, PFOS, PFHxS, PFHpz and PFNA.
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* Bold values exceed Vemont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
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^ MW-10 was decommissioned on 9/10/18, and replaced with MW-10R; MW-10R is located approximately 5' from former MW-10.
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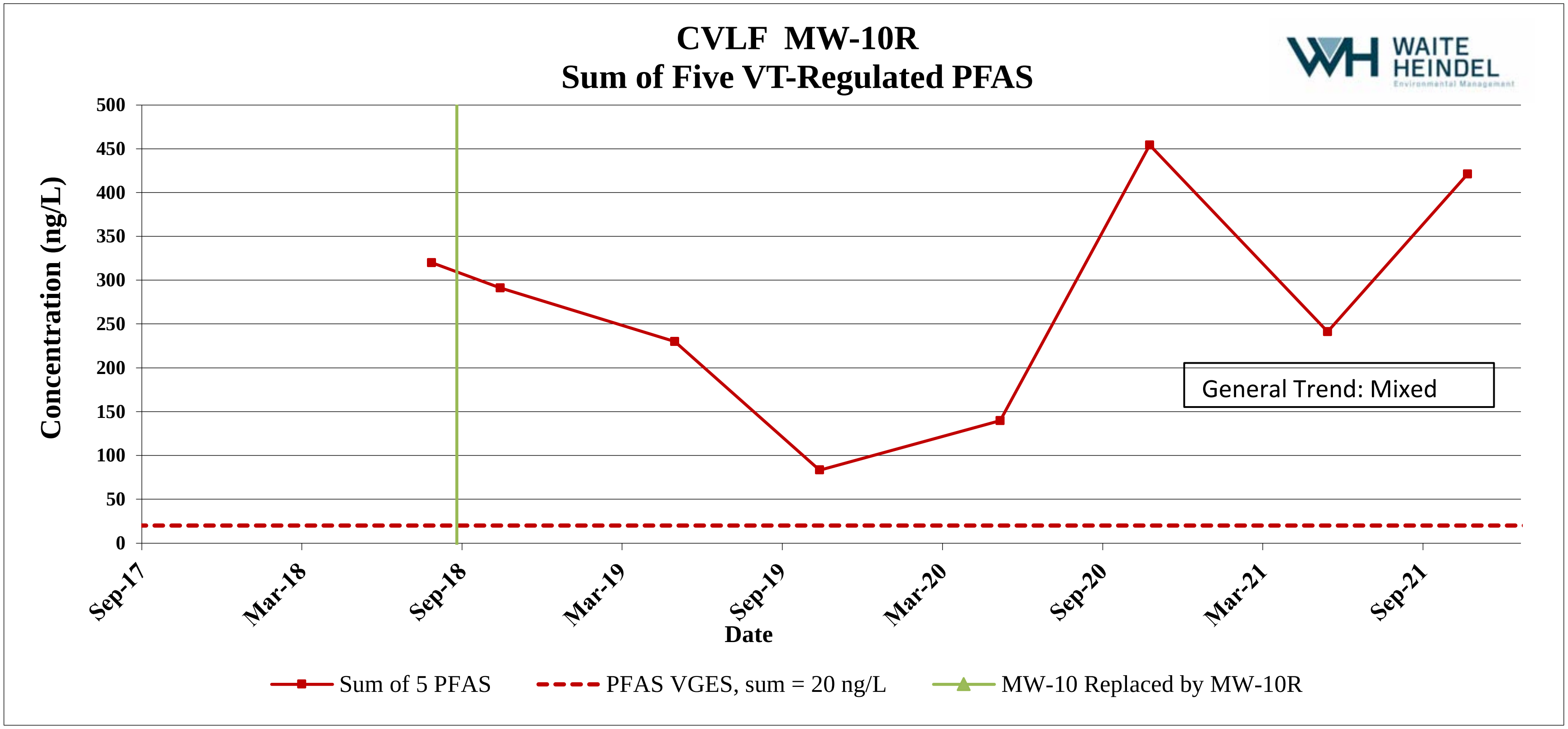

VGES = VT Groundwater Enforcement Standards from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

				PFAS compounds with VTGES, PAL, HA & MCL Standards												
				Perfluoro-octanoic acid (PFOA) (ng/L)	Perfluoro-octane sulfonic acid (PFOS) (ng/L)	Perfluoro-hexane sulfonic acid (PFHxS) (ng/L)	Perlfuoro heptanoic acid (PFHpA) (ng/L)	Perfluoro-nonanoic acid (PFNA) (ng/L)	Sum of 5 PFAS Compounds with VT Standards [1],[2] (ng/L)	Perfluoro-butane sulfonic acid (PFBS) (ng/L)	Perfluoro-hexanoic acid (PFHxA) (ng/L)	Perfluoro-undecanoic acid (PFUnA) (ng/L)	Perfluoro-decanoic acid (PFDA) (ng/L)	Perfluoro-dodecanoic acid (PFDoA) (ng/L)	Perfluoro-tridecanoic acid (PFTrDA) (ng/L)	Perfluoro-tetradecanoic acid (PFTA) (ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Location	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Trip Blank	8/14/2018	TA	537 (mod)	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	**Non Detected**	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9
	10/30/2018	TA	537 (mod)	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	**Non Detected**	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9
	5/14/2019	TA	537 (mod)	ND / < 1.8 H	ND / < 1.8 H	*ND / < 1.8 H*	*ND / < 1.8 H*	ND / < 1.8 H	**Non-Detected**	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H
	10/24/2019	AA	537 (mod)	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94	**Non-Detected**	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94	ND / < 1.94
	5/14/2020	AA	537 (mod)	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77	**Non-Detected**	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77	ND / < 1.77
	10/29/2020	AA	537 (mod)	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	**Non-Detected**	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81
	5/17/2021	AA	537 (mod)	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99	**Non-Detected**	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99	ND / < 1.99
	10/21/2021	AA	537 (mod)	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74	**Non-Detected**	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74	ND / < 1.74

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EAST MONTPELIER, VERMONT
Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

				PFAS compounds with VTGES, PAL, HA & MCL Standards												
				Perfluoro- octanoic acid (PFOA) (ng/L)	Perfluoro- octane sulfonic acid (PFOS) (ng/L)	Perfluoro- hexane sulfonic acid (PFHxS) (ng/L)	Perlfuoro heptanoic acid (PFHpA) (ng/L)	Perfluoro- nonanoic acid (PFNA) (ng/L)	Sum of 5 PFAS Compounds with VT Standards [1],[2] (ng/L)	Perfluoro- butane sulfonic acid (PFBS) (ng/L)	Perfluoro- hexanoic acid (PFHxA) (ng/L)	Perfluoro- undecanoic acid (PFUnA) (ng/L)	Perfluoro- decanoic acid (PFDA) (ng/L)	Perfluoro- dodecanoic acid (PFDoA) (ng/L)	Perfluoro- tridecanoic acid (PFTrDA) (ng/L)	Perfluoro- tetradecanoic acid (PFTA) (ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Location	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Field Blank	8/14/2018	TA	537 (mod)	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0	**Non-Detected**	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0	ND / < 2.0
	9/13/2018	TA	537 (mod)	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	**Non-Detected**	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8
	5/14/2019	TA	537 (mod)	ND / < 1.8 H	ND / < 1.8 H	*ND / < 1.8 H*	ND / < 1.8 H	ND / < 1.8 H	**Non-Detected**	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H	ND / < 1.8 H
	10/24/2019	AA	537 (mod)	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	**Non-Detected**	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86	ND / < 1.86
	5/14/2020	AA	537 (mod)	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	**Non-Detected**	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78
	10/29/2020	AA	537 (mod)	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82	**Non-Detected**	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82	ND / < 1.82
	5/17/2021	AA	537 (mod)	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	**Non-Detected**	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80
	10/21/2021	AA	537 (mod)	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	**Non-Detected**	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78

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Groundwater Analyses
Perfluoroalkyl Substances (PFAS)

WAITE HEINDEL

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				Perfluoro-octanoic acid (PFOA) (ng/L)	Perfluoro-octane sulfonic acid (PFOS) (ng/L)	Perfluoro-hexane sulfonic acid (PFHxS) (ng/L)	Perlfuoro heptanoic acid (PFHpA) (ng/L)	Perfluoro-nonanoic acid (PFNA) (ng/L)	Sum of 5 PFAS Compounds with VT Standards [1],[2] (ng/L)	Perfluoro-butane sulfonic acid (PFBS) (ng/L)	Perfluoro-hexanoic acid (PFHxA) (ng/L)	Perfluoro-undecanoic acid (PFUnA) (ng/L)	Perfluoro-decanoic acid (PFDA) (ng/L)	Perfluoro-dodecanoic acid (PFDoA) (ng/L)	Perfluoro-tridecanoic acid (PFTrDA) (ng/L)	Perfluoro-tetradecanoic acid (PFTA) (ng/L)
	VT Groundwater Enforcement Standards**[1]			20					20	none	none	none	none	none	none	none
	VT Preventive Action Level*[1]			2					2	none	none	none	none	none	none	none
	VT Health Advisory [2]			20					20	none	none	none	none	none	none	none
	Federal MCL (Primary) [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
	Federal MCL (Secondary [2]			none	none	none	none	none	none	none	none	none	none	none	none	none
Location	Sampling Date	Lab	Method	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
Equipment Blank	8/14/2018	TA	537 (mod)	ND / < 1.9 H	ND / < 1.9 H	ND / < 1.9 H	ND / < 1.9 H	ND / < 1.9 H	**Non Detected**	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9
	10/30/2018	TA	537 (mod)	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	ND / < 1.8	**Non Detected**	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9	ND / < 1.9
	5/14/2019	TA	537 (mod)	ND / < 1.6 H	ND / < 1.6 H	*ND / < 1.8 H*	ND / < 1.6 H	ND / < 1.6 H	**Non Detected**	ND / < 1.6 H	ND / < 1.6 H	ND / < 1.6 H	ND / < 1.6 H	ND / < 1.6 H	ND / < 1.6 H	ND / < 1.6 H
	10/24/2019	AA	537 (mod)	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	**Non-Detected**	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81	ND / < 1.81
	5/14/2020	AA	537 (mod)	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	**Non-Detected**	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78	ND / < 1.78
	10/29/2020	AA	537 (mod)	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	**Non-Detected**	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89	ND / < 1.89
	5/17/2021	AA	537 (mod)	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	**Non-Detected**	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80	ND / < 1.80
	10/21/2021	AA	537 (mod)	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	**Non-Detected**	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88	ND / < 1.88

[1] VT GES = VT Groundwater Enforcement Standards and Preventive Action Levels from Table 1, Groundwater Protection Rule & Strategy (GWPRS); 7/6/2019; VGES & PAL standards are for any combination of FPOA, PFOS, PFHxS, PFHpz and PFNA.
[2] Vermont Health Advisory Levels and Federal MCLs from 05/03/2019 Vermont Department of Health Drinking Water Guidance; applies only to drinking water supplies.HA standard is for any combination of FPOA, PFOS, PFHxS, PFHpz and PFNA.
* Bold values exceed Vemont GES Vermont Preventive Action Levels, as set by Vermont GWPRS; 7/6/2019.
** Shaded values exceed Vermont GES, as set by Vermont GWPRS; 7/6/2019.
TA = TestAmerica Laboratories, South Burlington, VT; AA = Alpha Analytical, Mansfield, MA.
Results listed here as "< - - - " are shown on lab reports as "TBQ: Trace, below quantitation limit." The < values listed here are the reported detection limit.
[H] Non-detected at the laboratory detection limit shown with an 'H' qualifier. This 'H' qualifier is defined by the laboratory on page 3 of the analytical Report as: Sample was prepped or analyzed beyond the specified holding time.
itlalics: Results qualified by lab for the following: Isotope dilution analyte is outside acceptance limits; LCS or LCSD is outside acceptance limits; RPD of the LCS & LCSD exceeds the contol limits.

WAITE HEINDEL Environmental Management

SS-12 (Upstream)		FIELD PARAMETERS			INORGANIC PARAMETERS				
		Specific Conductivity (us/cm)	pH (S.U.)	Temperature (C)	BOD5 (mg/L)	Chloride (mg/L)	COD (mg/L)	Hardness (mg/L)	Sodium (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		none	none	none	none	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		none	none	none	none	230	none	none	none
SAMPLING DATE	LAB								
5/26/99	Endyne	340	7.7	13		14	81	180	13.0
10/19/1999	Endyne	500	7.6	7		20	< 20	200	14.0
5/22/2000	Endyne	250	7.4	16		9	< 20	160	6.5
10/10/2000	Endyne	490	8.0	8		22	< 20	260	16.0
5/17/2001	Endyne	334	6.3	12.4		6	< 20	160	3.9
10/23/2001	Endyne	3,740	7.3	7.4	> 20	**340**	13,000	750	250.0
5/1/2002	Endyne	232	7.5	10.4	< 2.5	10	< 20	150	5.0
10/30/2002	Endyne	1228	7.4	6.3	7	78	49	350	68.0
5/14/2003	Endyne	309	6.95	10.8	< 2.5	16	< 20	140	8.3
10/9/2003	Endyne	1315	7.7	12.3	20	110	62	260	75.0
5/18/2004	Endyne	287**	8.01	18.9	< 2.5	8.94	< 15	152	6.0
10/11/2004	Endyne	1076**	7.5	9.37	5.2^	129	80	261	90.4
5/11/2005	Endyne	405	6.96	16.7	< 2.0	21.4	18	150	14.0
10/11/2005	Endyne	671.4	8.0	14.14	< 2.0	20.5	< 15	164	10.8
5/4/2006	Endyne	333	7.93	19.84	< 2.0	13.5	< 15	139	12.1
10/10/2006	Endyne	517	7.75	8.90	2.9	26.2	< 15	195	20.0
5/8/2007	Endyne	297	7.81	13.86	< 2.0	25.0	< 15	131	9.0
10/9/2007	Endyne	341.6	8.10	12.8	< 2.0	28	15	154	16.5
5/8/2008	Endyne	270	7.90	15.04	< 2.0	11	< 10	130	8.5
10/1/2008	Endyne	391	7.55	13.64	8.2	18	12	183	9.4
5/4/2009	Endyne	249	8.56	15.83	< 2.0	11	24	128	8.3
10/12/2009	Endyne	256.6	8.1	7.1	12	12	17	196	9.0
5/5/2010	Endyne	299.7	7.9	13.4	< 2.0	10	13	138	7.2
10/11/2010	Endyne	296.1	8.2	8.8	< 2.0	12	< 10	219	9.5
5/12/2011	Endyne	302.4	8.2	14.4	< 2.0	8.5	13	128	8.0
10/12/2011	Endyne	284.2	8.6	11.6	< 3.0	12	13	177	9.1
5/10/2012	Endyne	192	7.6	11.9	< 2.5	7.0	69	226	6.8
10/4/2012	Endyne	464.1	7.5	13.9	< 2.5	9.3	34	281	7.8
5/1/2013	Endyne	328	8.13	18.5	< 2.0	9.7	15	162	6.9
10/1/2013	Endyne	336.7	8.10	15.0	< 2.5	8.7	17	179	6.8
5/1/2014	Endyne	134.5	7.10	6.1	< 2.5	23.0	230	386	5.2
10/29/2015	Endyne	303	8.14	8.4	< 2.0	11.0	24	136	4.8
6/13/2016	Endyne	350	7.61	13.03	< 2.5	4.5	< 10	180	5.1
10/19/2016	DRY								
5/17/2017	Endyne	341	7.84	20.95	< 2.0	8.3	10	150	5.2
10/16/2017	Endyne	370.2	7.70	10.80	< 3.0	8.2	< 10	193	4.3
5/9/2018	Endyne	280	7.87	14.89	< 2.4	8.1	23	138	5.2
10/30/2018	Endyne	456	7.56	4.18		10.0	10	229	5.7
11/8/2018^	Endyne	378		4.95	< 4.0				
6/7/2019	Endyne	276.9	6.77	11.60	< 2.0	6.4	< 10	148	4.7
10/24/2019	Endyne	315	7.02	5.19	13	10	24	164	5.9
5/14/2020	Endyne	289	7.45	11.04	< 4.0	7.6	14	138	4.6
10/29/2020	Endyne	414	7.57	3.81	< 4.0	6.5	27	235	4.0
5/17/2021	Endyne	330	7.74	14.84	< 4.0	7.0	< 10	163	5.7
10/21/2021	Endyne	416	6.28	7.53	< 4.0	9.1	10	249	6.1

WAITE HEINDEL Environmental Management

SS-12 (Upstream)		TOTAL METALS															
		Total Arsenic (ug/L)	Total Cadmium (ug/L)	Diss. Cadmium (ug/L)	Total Chromium (ug/L)*	Diss. Chromium (ug/L)*	Total Copper (mg/L)	Diss. Copper (mg/L)	Total Iron (mg/L)	Total Lead (ug/L)	Diss. Lead (ug/L)	Total Manganese (mg/L)	Total Mercury (ug/L)	Total Nickel (ug/L)	Diss. Nickel (ug/L)	Total Zinc (mg/L)	Diss. Zinc (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		1.5	none	none	none	none	none	none	none	none	none	none	0.2 [3]	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		150	none	[C - 1]	none	[C - 2]	none	[C - 3]	1.0	none	[C - 4]	none	0.2 [3]	none	[C - 5]	none	[C - 6]
SAMPLING DATE	LAB																
5/26/99	Endyne																
10/19/1999	Endyne																
5/22/2000	Endyne																
10/10/2000	Endyne																
5/17/2001	Endyne																
10/23/2001	Endyne	**12**	< 0.5	< 0.41	< 2	< 2	< 0.03	< 0.03	**21**	< 3	< 1	4.4	< 0.2	98	97.7	0.31	0.306
5/1/2002	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.28	< 3	< 2	0.09	< 0.2	< 2	< 2	< 0.01	< 0.01
10/30/2002	Endyne	**< 2**	< 0.5	< 0.43	< 2	< 2	< 0.03	< 0.03	0.71	< 3	< 2	0.42	< 0.2	17	16.9	0.03	0.030
5/14/2003	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.71	< 3	< 2	0.15	< 0.2	< 2	< 2	0.02	0.020
10/9/2003	Endyne	**< 2**	< 0.5	< 0.43	< 2	< 2	< 0.03	< 0.03	**1.1**	< 3	< 2	0.58	< 0.2	19	18.9	0.04	0.039
5/18/2004	Endyne	**< 2**	< 3	**< 2.67**	< 10	< 9	< 0.01	< 0.01	0.651	< 2	< 1	0.277	**< 1**	< 20	< 20	< 0.02	< 0.02
10/11/2004	Endyne	**6**	< 3	**< 2.61**	< 10	< 9	< 0.01	< 0.01	**3.59**	< 2	< 1	0.627	**< 1**	29	28.9	0.035	0.0345
5/11/2005	Endyne	**6**	< 3	**< 2.68**	< 10	< 9	< 0.01	< 0.01	**8.87**	< 2	< 1	0.43	**< 1**	< 20	< 20	< 0.02	< 0.02
10/11/2005	Endyne	**< 2**	< 2	**< 1.78**	< 10	< 9	< 0.010	< 0.010	0.620	< 10	**< 7**	0.251	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2006	Endyne	**2**	< 2	**< 1.79**	< 10	< 9	< 0.010	< 0.010	**2.19**	< 10	**< 7**	0.217	**< 1**	< 20	< 20	< 0.020	< 0.020
10/10/2006	Endyne	**< 2**	< 2	**< 1.76**	< 20	< 17	< 0.020	< 0.019	0.689	< 1	< 1	0.154	**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2007	Endyne	**< 2**	< 2	**< 1.80**	< 20	< 17	< 0.020	< 0.019	**4.75**	< 1	< 1	0.234	**< 1**	< 20	< 20	< 0.020	< 0.020
10/9/2007	Endyne	**< 2**	< 2	**< 1.78**	< 20	< 17	< 0.020	< 0.019	**2.65**	< 1	< 1		**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2008	Endyne	**< 2**	< 2	**< 1.80**	< 20	< 17	< 0.020	< 0.019	**1.40**	< 1	< 1	0.140	**< 1**	< 20	< 20	< 0.020	< 0.020
10/1/2008	Endyne	**< 2**	< 2	**< 1.77**	< 20	< 17	< 0.020	< 0.019	**2.40**	< 1	< 1	0.58	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2009	Endyne	**< 2**	< 2	**< 1.80**	< 20	< 17	< 0.020	< 0.019	**1.60**	< 1	< 1	0.37	**< 1**	< 20	< 20	< 0.020	< 0.020
10/12/2009	Endyne	**< 2**	< 2	**< 1.76**	< 20	< 17	< 0.020	< 0.019	0.49	< 1	< 1	0.15	**< 1**	< 20	< 20	< 0.020	< 0.020
5/5/2010	Endyne	< 1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	0.86	< 1	< 1	0.25	< 0.1	< 5	< 5	< 0.005	< 0.005
10/11/2010	Endyne	< 1	< 2	**< 1.75**	< 5	< 4	< 0.020	< 0.019	0.21	< 1	< 1	0.28	< 0.2	< 5	< 5	< 0.005	< 0.005
5/12/2011	Endyne	< 1	< 2	**< 1.80**	< 5	< 4	< 0.020	< 0.019	0.93	< 1	< 1	0.94	< 0.2	< 5	< 5	< 0.020	< 0.020
10/12/2011	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.86	< 1	< 1	1.10	< 0.2	< 5	< 5	< 0.020	< 0.020
5/10/2012	Endyne	**16**	< 2	**< 1.75**	65	56	0.032	0.031	**54**	16	**11**	1.30	< 0.2	77	76.8	0.130	0.128
10/4/2012	Endyne	< 1	< 2	**< 1.73**	< 5	< 4	< 0.020	< 0.019	0.52	< 1	< 1	0.15	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2013	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	**2**	< 1	< 1	0.34	< 0.2	< 5	< 5	< 0.020	< 0.020
10/1/2013	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	**1.20**	< 1	< 1	0.21	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2014	Endyne	**47**	< 2	**< 1.70**	150	129	0.11	0.106	**200**	44	**26**	3.60	< 0.2	22	21.9	0.360	0.355
10/29/2015	Endyne	< 1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	**2.60**	< 1	< 1	0.24	< 0.2	5.1	5.08	< 0.020	< 0.020
6/13/2016	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.58	< 1	< 1	0.34	< 0.2	< 5	< 5	< 0.020	< 0.020
10/19/2016	DRY																
5/17/2017	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.48	< 1	< 1	0.22	< 0.2	< 5	< 5	< 0.020	< 0.020
10/16/2017	Endyne	< 1	< 2	**< 1.76**	< 5	< 4	< 0.020	< 0.019	0.52	< 1	< 1	0.34	< 0.2	< 5	< 5	< 0.020	< 0.020
5/9/2018	Endyne	**1.9**	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	**3.3**	< 1	< 1	0.34	< 0.2	5.3	5.28	< 0.020	< 0.020
10/30/2018	Endyne	< 1	< 2	**< 1.75**	< 5	< 4	< 0.020	< 0.019	0.55	< 1	< 1	0.18	< 0.2	< 5	< 5	0.023	0.023
11/8/2018^	Endyne																
6/7/2019	Endyne	< 1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	0.83	< 1	< 1	0.25	< 0.2	< 5	< 5	< 0.020	< 0.020
10/24/2019	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.40	< 1	< 1	0.29	< 0.2	< 5	< 5	< 0.020	< 0.020
5/14/2020	Endyne	< 1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	0.54	< 1	< 1	0.23	< 0.2	< 5	< 5	< 0.020	< 0.020
10/29/2020	Endyne	< 1	< 2	**< 1.75**	< 5	< 4	< 0.020	< 0.019	0.14	< 1	< 1	0.077	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2021	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.25	< 1	< 1	0.200	< 0.2	< 5	< 5	< 0.020	< 0.020
10/21/2021	Endyne	< 1	< 2	**< 1.74**	< 5	< 4	< 0.020	< 0.019	0.41	< 1	< 1	0.150	< 0.2	< 5	< 5	< 0.020	< 0.020

Compound	**10/21/2021**		**WQ Stnd.**
Cadmium (ug/L)	[C-1] =	exp(0.7977*ln(hardness)-3.909)*(1.101672-[(ln hardness)(0.041838)]	**1.42**
Chromium III (ug/L	[C-2] =	exp(0.8190*ln(hardness)+0.6848)*0.860	**156**
Copper (mg/L)	[C-3] =	exp(0.8545*ln(hardness)-1.702)*(0.96)	**20**
Lead (ug/L)	[C-4] =	exp(1.273*ln(hardness)-4.705)*(1.46203-ln(hardness)*0.145712)	**7**
Nickel (ug/L)	[C-5] =	exp(0.846*ln(hardness)+0.0584)*0.997	**113**
Zinc (mg/L)	[C-6] =	exp(0.8473*ln(hardness)+0.884)*0.986	**256**

Hardness 10/21/21 = 249

NOTES:

The < values listed here are the reported detection limit

Shading bold indicates exceedance of Water Quality Standards

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E

Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteri

If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated in table abov

[2] Dissolved (Diss.) values are calculated from Total concentrations using formulas and conversion factors provided in Appendix D of the above mentioned standard

[3] Mercury std. of 0.2 ppb are the ANR Laboratory's Practical Quantitation Limits, for the specific purposes of SWMD; per telecon S. Bushman, SWMD, 9/7/9

*Endyne reports total chromium concentration, so chromium III WQS used, as it is the lowest concentration when compared to the chromium VI WQ

**In 2004, water was analyzed for conductivity, not specific conductanc

^pH meter malfunction, not recorde

^ Indicates sample was reanalyzed past EPA method specified holding time.

SS-101 (Winooski River, Upstream)		FIELD PARAMETERS			INORGANIC PARAMETERS				
		Specific Conductivity (us/cm)	pH (S.U.)	Temperature (C)	BOD5 (mg/L)	Chloride (mg/L)	COD (mg/L)	Hardness (mg/L)	Sodium (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		none	none	none	none	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		none	none	none	none	230	none	none	none
SAMPLING DATE	LAB								
5/26/1999	Endyne	170	8.1	13		8	< 20	84	4.9
10/18/1999	Endyne	190	7.8	10		12	< 20	100	6.5
5/22/2000	Endyne	120	7.7	12		7	< 20	84	4.0
10/10/2000	Endyne	140	8.4	10		9	< 20	84	5.1
5/17/2001	Endyne	217	7	13.4		11	< 20	110	5.8
10/23/2001	Endyne	306	7.7	7.8	< 2.5	21	< 20	130	11
5/1/2002	Endyne	185	8.12	9	< 2.5	8	< 20	72	4.2
10/30/2002	Endyne	244	6.74	5.1	< 2.5	13	< 20	96	9.3
5/14/2003	Endyne	199	6.83	11.6	< 2.5	9	< 20	75	5.4
10/9/2003	Endyne	287	6.8	14.3	< 2.5	15	< 20	110	8.4
5/18/2004**	Endyne	159	8.01	17.29	< 2.5	9.01	< 15	75.6	5.63
10/11/2004**	Endyne	309	8.24	10.34	< 2.0	17.1	< 15	103	8.76
5/11/2005	Endyne	185	8.37	17.3	< 2.0	8.85	< 15	68.5	5.16
10/11/2005	Endyne	250.2	8.13	14.45	< 2.0	7.38	< 15	64.3	4.00
5/4/2006	Endyne	167	7.66	15.09	< 2.0	5.93	< 15	76.1	4.91
10/10/2006	Endyne	226	7.98	10.94	< 2.0	10.6	< 15	108	6.98
5/8/2007	Endyne	140	7.47	7.55		< 25	< 15	61.4	3.91
10/9/2007	Endyne	247.1	8.2	14.3	< 2.0	11	< 10	99.5	7.5
5/8/2008	Endyne	169	8.06	14.35	< 2.0	8.8	< 10	84	6.4
10/1/2008	Endyne	273	8.1	14.75	< 2.0	16.0	< 10	117	10
5/4/2009	Endyne	140	8.65	13.49	< 2.0	6.3	< 10	74	4.6
10/12/2009	Endyne	134.5	8.3	8.8	< 2.0	7.7	10	83	6.1
5/5/2010	Endyne	126.8	7.9	12.1	< 2.0	5.6	< 10	74	4.2
10/11/2010	Endyne	118.4	8.11	10	< 2.0	6.7	14	79	5.3
5/12/2011	Endyne	189.8	8.3	13.5	< 2.0	6.4	15	70	5.2
10/12/2011	Endyne	158.64	8.2	13.2	< 2.5	7.6	18	89	5.7
5/10/2012	Endyne	128.1	7.9	12.9	< 2.5	6.5	11	79	4.7
10/4/2012	Endyne	240.9	7.5	14.4	< 2.5	11.0	51	99	6.2
5/1/2013	Endyne	177.2	8.2	14.6	< 2.0	9.6	35	86	5.1
10/1/2013	Endyne	214.8	7.3	16.8	< 2.5	16.0	12	104	8.0
5/1/2014	Endyne	107.5	7.2	7.6	< 2.5	9.1	52	88	4.7
10/29/2015	Endyne	195	8.36	7.86	3.0	8.5	10	85	4.2
6/13/2016	Endyne	228.6	8.06	13.2	< 2.5	9.1	< 10	99	6.6
10/19/2016	Endyne	263	8.25	12.51	< 2.5	17.0	< 10	120	10.0
5/17/2017	Endyne	187	8.1	16.65	< 2.0	20.0	< 10	72	4.6
10/16/2017	Endyne	261.8	7.6	15.2	< 3.0	17.0	< 10	133	9.8
5/9/2018	Endyne	149	7.87	13.08	< 2.4	7.8	25	66	4.7
10/30/2018	Endyne	183.4	8.14	5.6		12.0	13	72	5.1
11/8/2018^	Endyne	180		5.62	5.8				
6/7/2019	Endyne	154.8	7.78	14.4	< 2.0	6.8	17	66	4.4
10/24/2019	Endyne	192	7.86	8.0	< 4.0	9.3	20	86	5.8
5/14/2020	Endyne	153	7.33	10.24	< 4.0	7.5	11	66	4.5
10/29/2020	Endyne	219	7.98	4.24	< 4.0	12	18	101	7.1
5/17/2021	Endyne	239.7	7.62	17	< 4.0	8.9	< 10	110	6.7
10/21/2021	Endyne	203	7.56	9.2	< 4.0	11.0	14	97	7.1

SS-101
(Winooski River, Upstream)

TOTAL METALS

SAMPLING DATE	LAB	Total Arsenic (ug/L)	Total Cadmium (ug/L)	Diss. Cadmium (ug/L)	Total Chromium (ug/L)*	Diss. Chromium (ug/L)*	Total Copper (mg/L)	Diss. Copper (mg/L)	Total Iron (mg/L)	Total Lead (ug/L)	Diss. Lead (ug/L)	Total Manganese (mg/L)	Total Mercury (ug/L)	Total Nickel (ug/L)	Diss. Nickel (ug/L)	Total Zinc (mg/L)	Diss. Zinc (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		1.5	none	none	none	none	none	none	none	none	none	none	0.2 [3]	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		150	none	[C - 1]	none	[C - 2]	none	[C - 3]	1.0	none	[C - 4]	none	0.2 [3]	none	[C - 5]	none	[C - 6]
5/26/1999	Endyne																
10/18/1999	Endyne																
5/22/2000	Endyne																
10/10/2000	Endyne																
5/17/2001	Endyne																
10/23/2001	Endyne	**< 5**	< 5	**< 4**	< 2	< 2	< 0.03	< 0.03	0.14	< 3	< 2	0.03	**< 2**	< 5	< 5	0.01	0.010
5/1/2002	Endyne	**< 2**	< 5	**< 5**	< 2	< 2	< 0.03	< 0.03	0.24	< 3	**< 3**	0.03	**< 2**	< 2	< 2	< 0.01	< 0.01
10/30/2002	Endyne	**< 2**	< 5	**< 5**	< 2	< 2	< 0.03	< 0.03	0.23	< 3	< 2	0.03	**< 2**	< 5	< 5	< 0.01	< 0.01
5/14/2003	Endyne	**< 2**	< 5	**< 5**	< 2	< 2	< 0.03	< 0.03	0.46	< 3	**< 2**	0.04	**< 2**	< 2	< 2	< 0.01	< 0.01
10/9/2003	Endyne	**< 2**	< 5	**< 5**	< 2	< 2	< 0.03	< 0.03	0.15	< 3	< 2	0.05	**< 2**	< 5	< 5	< 0.01	< 0.01
5/18/2004**	Endyne	**< 2**	3	**3**	< 10	< 9	< 0.01	< 0.01	0.153	< 2	< 2	0.029	**< 1**	< 20	< 20	< 0.02	< 0.02
10/11/2004**	Endyne	**< 2**	< 3	**< 3**	< 10	< 9	< 0.01	< 0.01	0.132	< 2	< 2	0.034	**< 1**	< 20	< 20	< 0.02	< 0.02
5/11/2005	Endyne	**< 2**	< 3	**< 3**	< 10	< 9	< 0.01	< 0.01	0.355	4	**3**	0.036	**< 1**	< 20	< 20	< 0.02	< 0.02
10/11/2005	Endyne	**< 2**	< 2	**< 1.85**	< 10	< 9	< 0.010	< 0.010	0.783	< 10	**< 9**	0.064	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2006	Endyne	**< 2**	< 2	**< 1.84**	< 10	< 9	< 0.010	< 0.010	0.32	< 10	**< 8**	0.035	**< 1**	< 20	< 20	< 0.020	< 0.020
10/10/2006	Endyne	**< 2**	< 2	**< 1.81**	< 20	< 17	< 0.020	< 0.019	0.256	< 1	< 1	0.04	**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2007	Endyne	**< 2**	< 2	**< 1.86**	< 20	< 17	< 0.020	< 0.019	0.78	< 1	< 1	0.045	**< 1**	< 20	< 20	< 0.020	< 0.020
10/9/2007	Endyne	**< 2**	< 2	**< 1.82**	< 20	< 17	< 0.020	< 0.019	0.716	< 1	< 1	0.075	**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2008	Endyne	**< 2**	< 2	**< 1.83**	< 20	< 17	< 0.020	< 0.019	1.0	< 1	< 1	0.064	**< 1**	< 20	< 20	< 0.020	< 0.020
10/1/2008	Endyne	**< 2**	< 2	**< 1.80**	< 20	< 17	< 0.020	< 0.019	0.91	< 1	< 1	0.068	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2009	Endyne	**< 2**	< 2	**< 1.84**	< 20	< 17	< 0.020	< 0.019	0.24	< 1	< 1	0.027	**< 1**	< 20	< 20	< 0.020	< 0.020
10/12/2009	Endyne	**< 2**	< 2	**< 1.83**	< 20	< 17	< 0.020	< 0.019	0.21	< 1	< 1	0.035	**< 1**	< 20	< 20	< 0.020	< 0.020
5/5/2010	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.40	< 1	< 1	0.033	< 0.1	< 5	< 5	< 0.005	< 0.005
10/11/2010	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.36	< 1	< 1	0.054	< 0.2	< 5	< 5	< 0.005	< 0.005
5/12/2011	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.32	< 1	< 1	0.032	< 0.2	< 5	< 5	< 0.005	< 0.005
10/12/2011	Endyne	< 1	< 2	**< 1.83**	< 5	< 4	< 0.020	< 0.019	0.29	< 1	< 1	0.037	< 0.2	< 5	< 5	< 0.020	< 0.020
5/10/2012	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	**1.70**	< 1	< 1	0.068	< 0.2	< 5	< 5	< 0.020	< 0.020
10/4/2012	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.28	< 1	< 1	0.048	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2013	Endyne	< 1	< 2	**< 1.83**	< 5	< 4	< 0.020	< 0.019	0.52	< 1	< 1	0.052	< 0.2	< 5	< 5	< 0.020	< 0.020
10/1/2013	Endyne	< 1	< 2	**< 1.81**	< 5	< 4	< 0.020	< 0.019	0.28	< 1	< 1	0.058	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2014	Endyne	**4**	< 2	**< 1.83**	15	13	< 0.020	< 0.019	**12.00**	5	**4**	0.370	< 0.2	21	20.9	0.033	0.0325
10/29/2015	Endyne	1	< 2	**< 1.83**	6	5	< 0.020	< 0.019	**4.40**	2	1.6	0.220	< 0.2	7.4	7.38	< 0.020	< 0.020
6/13/2016	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.31	< 1	< 1	0.041	< 0.2	< 5	< 5	< 0.020	< 0.020
10/19/2016	Endyne	< 1	< 2	**< 1.80**	< 5	< 4	0.064	0.061	0.14	< 1	< 1	0.063	< 0.2	< 5	< 5	0.032	0.0316
5/17/2017	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.36	< 1	< 1	0.036	< 0.2	< 5	< 5	< 0.020	< 0.020
10/16/2017	Endyne	1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	0.26	< 1	< 1	0.063	< 0.2	< 5	< 5	< 0.020	< 0.020
5/9/2018	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	**1.10**	< 1	< 1	0.054	< 0.2	< 5	< 5	< 0.020	< 0.020
10/30/2018	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.32	< 1	< 1	0.043	< 0.2	< 5	< 5	< 0.020	< 0.020
11/8/2018^	Endyne																
6/7/2019	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.50	< 1	< 1	0.045	< 0.2	< 5	< 5	< 0.020	< 0.020
10/24/2019	Endyne	< 1	< 2	**< 1.83**	< 5	< 4	< 0.020	< 0.019	0.46	< 1	< 1	0.042	< 0.2	< 5	< 5	< 0.020	< 0.020
5/14/2020	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.31	< 1	< 1	0.029	< 0.2	< 5	< 5	< 0.020	< 0.020
10/29/2020	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.20	< 1	< 1	0.042	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2021	Endyne	< 1	< 2	**< 1.81**	< 5	< 4	< 0.020	< 0.019	0.19	< 1	< 1	0.038	< 0.2	< 5	< 5	< 0.020	< 0.020
10/21/2021	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.22	< 1	< 1	0.039	< 0.2	< 5	< 5	< 0.020	< 0.020

Compound	10/21/2021		WQ Stnd.
Cadmium (ug/L)	[C-1] =	exp(0.7977*ln(hardness)-3.909)*(1.101672-[(ln hardness)(0.041838)]	**0.70**
Chromium III (ug/L)	[C-2] =	exp(0.8190*ln(hardness)+0.6848)*0.860	**72**
Copper (mg/L)	[C-3] =	exp(0.8545*ln(hardness)-1.702)*(0.96)	**9**
Lead (ug/L)	[C-4] =	exp(1.273*ln(hardness)-4.705)*(1.46203-ln(hardness)*0.145712)	**2**
Nickel (ug/L)	[C-5] =	exp(0.846*ln(hardness)+0.0584)*0.997	**51**
Zinc (mg/L)	[C-6] =	exp(0.8473*ln(hardness)+0.884)*0.986	**115**

Hardness 10/21/21 = 97

NOTES:

The < values listed here are the reported detection limit.

Shading bold indicates exceedance of Water Quality Standards.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E:

Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteria).

If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated in table above.

[2] Dissolved (Diss.) values are calculated from Total concentrations using formulas and conversion factors provided in Appendix D of the above mentioned standards.

[3] Mercury std. of 0.2 ppb are the ANR Laboratory's Practical Quantitation Limits, for the specific purposes of SWMD; per telecon S. Bushman, SWMD, 9/7/93.

*Endyne reports total chromium concentration, so chromium III WQS used, as it is the lowest concentration when compared to the chromium VI WQS.

**In 2004, water was analyzed for conductivity, not specific conductance

^pH meter malfunction, not recorded

WAITE HEINDEL

SS-4 (Downstream)		FIELD PARAMETERS			INORGANIC PARAMETERS				
		Specific Conductivity (us/cm)	pH (S.U.)	Temperature (C)	BOD5 (mg/L)	Chloride (mg/L)	COD (mg/L)	Hardness (mg/L)	Sodium (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		none	none	none	none	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		none	none	none	none	230	none	none	none
SAMPLING DATE	LAB								
5/26/99	Endyne	170	8.1	13		**290**	577	530	140
10/18/1999	Endyne	1580	6.8	9		220	< 30	670	110
5/22/2000	Endyne	1230	7.1	13		200	< 41	450	120
5/17/2001	Endyne	4640	7.1	14.5		**560**	< 3300	1300	340
5/1/2002	Endyne	1320	7.55	10.3	10	190	< 47	500	100
10/30/2002	Endyne	1412	6.35	6.8	6	130	130	550	84
5/14/2003	Endyne	1200	7.1	9.9	10	130	< 34	460	760
10/9/2003	Endyne	1390	6.35	15.8	9	180	910	510	110
5/18/2004	DRY								
10/11/2004	DRY								
5/11/2005	Endyne	1420	7.29	14.6	2.4	181	36	460	95.5
10/11/2005	Endyne	1882	7.24	13.45	< 2.0	125	26	386	52.2
5/4/2006	Endyne	1400	7.47	14.20	3.0	184	60	585	100
10/10/2006	Endyne	1286	7.10	10.07	< 2	129	< 15	585	76.9
5/8/2007	Endyne	1230	7.31	7.69	2.7	157	16	462	98.0
10/9/2007	Endyne	1235	8.2	12.80	< 2.0	190	15	446	91.6
5/8/2008	DRY								
10/1/2008	DRY								
5/4/2009	DRY								
10/12/2009	DRY								
5/5/2010	Endyne	776	8.1	11.50	< 2.0	120	27	395	71.0
10/11/2010	DRY								
5/12/2011	Endyne	1086	7.6	11.80	< 2.0	97	35	341	62.0
10/12/2011	Endyne	647	7.7	12.20	5.3	85	25	415	60.0
5/10/2012	Endyne	598	7.8	12.00	< 2.5	100	24	378	61.0
10/4/2012	DRY								
5/1/2013	DRY								
10/1/2013	DRY								
5/1/2014	Endyne	658	7.2	9.00	< 2.5	24	47	62	12.0
10/29/2015	Endyne	734	7.51	9.60	2.7	87	82	234	44.0
6/13/2016	DRY								
10/19/2016	DRY								
5/17/2017	DRY								
10/16/2017	DRY								
5/9/2018	Endyne	1154	7.63	14.01	5.7	140	39	395	81.0
10/30/2018	DRY								
11/8/2018	DRY								
6/7/2019	Endyne	1237	7.4	11.40	< 2.0	150	32	399	100.0
10/24/2019	Endyne	977	7.14	6.91	< 4.0	120	33	386	76.0
5/14/2020	Endyne	1122	7.51	10.30	< 4.0	150	14	382	90.0
10/29/2020	DRY								
5/17/2021	DRY								
10/21/2021	DRY								

SS-4 (Downstream)

TOTAL METALS

SAMPLING DATE	LAB	Total Arsenic (ug/L)	Total Cadmium (ug/L)	Diss. Cadmium (ug/L)	Total Chromium (ug/L)*	Diss. Chromium (ug/L)*	Total Copper (mg/L)	Diss. Copper (mg/L)	Total Iron (mg/L)	Total Lead (ug/L)	Diss. Lead (ug/L)	Total Manganese (mg/L)	Total Mercury (ug/L)	Total Nickel (ug/L)	Diss. Nickel (ug/L)	Total Zinc (mg/L)	Diss. Zinc (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		1.5	None	None	None	None	None	None	None	None	None	None	0.2 [3]	None	None	None	None
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		150	None	[C - 1]	None	[C - 2]	None	[C - 3]	1.0	None	[C - 4]	None	0.2 [3]	None	[C - 5]	None	[C - 6]
5/26/99	Endyne																
10/18/1999	Endyne																
5/22/2000	Endyne																
5/17/2001	Endyne																
5/1/2002	Endyne	**3**	ND	**ND**	ND	**ND**	ND	**ND**	**3.5**	ND	**ND**	1.5	ND	20	19.9	ND	**ND**
10/30/2002	Endyne	**24**	29	**24.29**	25	21.5	0.06	0.058	**90**	48	**26**	5.7	ND	76	75.8	0.51	0.503
5/14/2003	Endyne	**5**	ND		4	3.4	0.04	0.038	**11**	11	6	1.1	ND	25	24.9	0.08	0.079
10/9/2003	Endyne	**19**	ND		3	2.6	0.14	0.134	**120**	47	**26**	17	ND	480	**478.6**	0.91	0.897
5/18/2004	DRY																
10/11/2004	DRY																
5/11/2005	Endyne	**5**	3	**2.54**	10	8.6	< 0.010	< 0.010	**4.7**	2	1	0.531	**< 1**	< 20	< 20	< 0.020	< 0.020
10/11/2005	Endyne	**6**	< 2	< 1.70	< 10	< 9	< 0.010	< 0.010	**5.24**	< 10	< 6	0.487	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2006	Endyne	**21**	< 2	< 1.67	42	36.1	0.050	0.048	**50.6**	21	**11**	7.00	**< 1**	73	72.8	0.178	0.176
10/10/2006	Endyne	**96**	3	**2.51**	38	32.7	0.048	0.046	**147**	10	5	7.63	**< 1**	54	53.8	< 0.020	< 0.020
5/8/2007	Endyne	**17**	< 2	< 1.69	< 20	< 17	< 0.020	< 0.019	**23.5**	3	2	2.68	**< 1**	< 20	< 20	0.039	0.0385
10/9/2007	Endyne	**4**	< 2	< 1.69	< 20	< 17	< 0.020	< 0.019	**18.4**	8	5	3.28	**< 1**	29	28.9	0.067	0.0661
5/8/2008	DRY																
10/1/2008	DRY																
5/4/2009	DRY																
10/12/2009	DRY																
5/5/2010	Endyne	1	< 2	< 1.70	< 5	< 4	< 0.020	< 0.019	**1.6**	2	1	0.28	< 0.1	< 5	< 5	0.005	0.0049
10/11/2010	DRY																
5/12/2011	Endyne	**5**	< 2	< 1.72	< 5	< 4	< 0.020	< 0.019	**4.7**	< 1	< 1	0.77	< 0.2	8	8.0	0.013	0.0128
10/12/2011	Endyne	**13**	< 2	< 1.70	6	5.2	0.040	0.038	**20**	6	4	2.20	< 0.2	16	16.0	0.039	0.0385
5/10/2012	Endyne	**3**	< 2	< 1.71	6	5.2	< 0.020	< 0.019	**5.3**	5	3	0.76	< 0.2	12	12.0	0.020	0.0197
10/4/2012	DRY																
5/1/2013	DRY																
10/1/2013	DRY																
5/1/2014	Endyne	**2**	< 2	< 1.86	8	6.9	< 0.020	< 0.019	**6.7**	3	3	0.14	< 0.2	12	12.0	0.021	0.0207
10/29/2015	Endyne	**4**	< 2	< 1.75	12	10.3	< 0.020	< 0.019	**11**	6	4	0.92	< 0.2	22	21.9	0.045	0.0444
6/13/2016	DRY																
10/19/2016	DRY																
5/17/2017	DRY																
10/16/2017	DRY																
5/9/2018	Endyne	< 1	< 2	< 1.70	< 5	< 4	< 0.020	< 0.019	0.62	< 1	< 1	0.10	< 0.2	7.4	7.38	< 0.020	< 0.020
10/30/2018	DRY																
11/8/2018	DRY																
6/7/2019	Endyne	1.2	< 2	< 1.70	< 5	< 4	< 0.020	< 0.019	0.5	< 1	< 1	1.00	< 0.2	6.1	6.08	< 0.020	< 0.020
10/24/2019	Endyne	1.5	< 2	< 1.70	< 5	< 4	< 0.020	< 0.019	**2.6**	1.6	1.0	0.68	< 0.2	9.1	9.07	< 0.020	< 0.020
5/14/2020	Endyne	**1.7**	< 2	< 1.71	< 5	< 4	< 0.020	< 0.019	**2.0**	< 1	< 1	0.41	< 0.2	6.8	6.78	< 0.020	< 0.020
10/29/2020	DRY																
5/17/2021	DRY																
10/21/2021	DRY																

Compound	5/14/2020		WQ Stnd.
Cadmium (ug/L)	[C-1] =	exp(0.7977*ln(hardness)-3.909)*(1.101672-[(ln hardness)(0.041838)]	**1.96**
Chromium III (ug/L)	[C-2] =	exp(0.8190*ln(hardness)+0.6848)*0.860	**222**
Copper (mg/L)	[C-3] =	exp(0.8545*ln(hardness)-1.702)*(0.96)	**28**
Lead (ug/L)	[C-4] =	exp(1.273*ln(hardness)-4.705)*(1.46203-ln(hardness)*0.145712)	**10**
Nickel (ug/L)	[C-5] =	exp(0.846*ln(hardness)+0.0584)*0.997	**162**
Zinc (mg/L)	[C-6] =	exp(0.8473*ln(hardness)+0.884)*0.986	**368**

Hardness 5/14/20 = 382

NOTES:

The < values listed here are the reported detection limit.

Shading bold indicates exceedance of Water Quality Standards.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E:

Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteria).

If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated in table above.

[2] Dissolved (Diss.) values are calculated from Total concentrations using formulas and conversion factors provided in Appendix D of the above mentioned standards.

[3] Mercury std. of 0.2 ppb are the ANR Laboratory's Practical Quantitation Limits, for the specific purposes of SWMD; per telecon S. Bushman, SWMD, 9/7/93.

*Endyne reports total chromium concentration, so chromium III WQS used, as it is the lowest concentration when compared to the chromium VI WQS.

WAITE HEINDEL

SS-11 (Downstream)		FIELD PARAMETERS			INORGANIC PARAMETERS				
		Specific Conductivity (us/cm)	pH (S.U.)	Temperature (C)	BOD5 (mg/L)	Chloride (mg/L)	COD (mg/L)	Hardness (mg/L)	Sodium (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		none	none	none	none	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		none	none	none	none	230	none	none	none
SAMPLING DATE	LAB								
5/26/1999	Endyne	330	8.1	12		30	< 20	170	16
10/18/1999	Endyne	400	7.3	7		31	< 20	180	17
5/22/2000	Endyne	310	7.4	11		29	< 20	170	14
10/10/2000	Endyne	340	8.4	12		29	< 20	180	16
5/17/2001	Endyne	418	7.2	16.9		39	< 20	230	18
10/23/2001	Endyne	428	7.8	7.1	< 2.5	32	< 20	180	14
5/1/2002	Endyne	309	7.97	8.1	< 2.5	26	< 20	140	11
10/30/2002	Endyne	488	7.18	4.7	< 2.5	39	< 20	190	22
5/14/2003	Endyne	353	7.03	10.5	< 2.5	26	< 20	140	14
10/9/2003	Endyne	525	7.3	12.1	< 2.5	44	< 20	190	22
5/18/2004	Endyne	333	8.14	16.05	< 2.0	41.5	< 15	164	20
10/11/2004	Endyne	330**	8.15	9.53	< 2.0	40.5	< 15	156	19
5/11/2005	Endyne	397**	8.1	14.9	< 2.0	33.1	< 15	146	16.5
10/11/2005	Endyne	603.5	8.04	13.64	< 2.0	26.3	< 15	151	12
5/4/2006	Endyne	356	7.69	14.15	< 2.0	24.6	< 15	151	17.1
10/10/2006	Endyne	417	7.80	8.84	< 2.0	29.0	< 15	180	16.9
5/3/2007	Endyne	367	8.06	4.96		26.0	15	154	15.4
10/9/2007	Endyne	358.2	7.90	12.6	< 2.0	28	15	132	16.5
5/8/2008	Endyne	340	8.19	12.63	< 2.0	29	< 10	151	18
10/1/2008	Endyne	194	7.75	13.47	2.3	29	14	158	17
5/4/2009	Endyne	340	8.57	13.14	< 2.0	32	< 10	163	19
10/12/2009	Endyne	267.6	8.2	6.8	< 2.0	31	12	175	18
5/5/2010	Endyne	242.5	8.20	11.2	< 2.0	21	14	150	13
10/11/2010	Endyne	285.7	8.09	8.5	< 2.0	29	15	187	19
5/12/2011	Endyne	395.9	8.40	12.3	< 2.0	29	19	137	15
10/12/2011	Endyne	287.1	8.20	11.6	< 3.0	31	10	178	20
5/10/2012	Endyne	232.2	7.90	12.0	< 2.5	19	32	162	12
10/4/2012	Endyne	465.0	7.60	13.4	< 2.5	39	21	182	21
5/1/2013	Endyne	406.5	8.44	15.5	< 2.0	43	11	175	20
10/1/2013	Endyne	388.2	7.60	13.8	< 2.5	44	20	179	25
5/1/2014	Endyne	198.2	7.10	7.8	< 2.5	23	59	238	12
10/29/2015	Endyne	362	8.41	9.1	< 2.0	25	26	138	11
6/13/2016	Endyne	401	7.77	11.87	< 2.5	36	< 10	180	20
10/19/2016	Endyne	408	7.74	11.26	< 2.5	53	10	180	22
5/17/2017	Endyne	448	8.27	19.46	< 2.0	37	10	170	19
10/16/2017	Endyne	356	7.80	12.90	< 3.0	42	30	191	24
5/9/2018	Endyne	397	8.40	15.21	< 2.4	37	17	158	19
10/30/2018	Endyne	460	8.25	5.30		39	10	175	21
11/8/2018^	Endyne	399		4.92	< 4.0				
6/7/2019	Endyne	387	7.87	11.50	< 2.0	39	11	155	19
10/24/2019	Endyne	395	6.95	6.60	< 4.0	31	16	171	19
5/14/2020	Endyne	418	7.67	12.40	< 4.0	35	15	157	19
10/29/2020	Endyne	453	7.90	3.65	< 4.0	42	17	196	23
5/17/2021	Endyne	426	8.39	14.26	< 4.0	36	< 10	171	23
10/21/2021	Endyne	499	6.79	7.40	< 4.0	54	10	221	32

WAITE HEINDEL

SS-11 (Downstream)		TOTAL METALS															
		Total Arsenic (ug/L)	Total Cadmium (ug/L)	Diss. Cadmium (ug/L)	Total Chromium (ug/L)*	Diss. Chromium (ug/L)*	Total Copper (mg/L)	Diss. Copper (mg/L)	Total Iron (mg/L)	Total Lead (ug/L)	Diss. Lead (ug/L)	Total Manganese (mg/L)	Total Mercury (ug/L)	Total Nickel (ug/L)	Diss. Nickel (ug/L)	Total Zinc (mg/L)	Diss. Zinc (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		1.5	none	none	none	none	none	none	none	none	none	none	0.2 [3]	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3]		150	none	[C - 1]	none	[C - 2]	none	[C - 3]	1.0	none	[C - 4]	none	0.2 [3]	none	[C - 5]	none	[C - 6]
SAMPLING DATE	LAB																
5/26/1999	Endyne																
10/18/1999	Endyne																
5/22/2000	Endyne																
10/10/2000	Endyne																
5/17/2001	Endyne																
10/23/2001	Endyne	**< 5**	< 0.5	< 0.44	< 2	< 2	< 0.03	< 0.03	0.33	< 3	< 2	0.15	< 0.2	< 0.005	< 0.005	< 0.01	< 0.01
5/1/2002	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.27	< 3	< 2	0.05	< 0.2	< 0.002	< 0.002	< 0.01	< 0.01
10/30/2002	Endyne	**< 2**	< 0.5	< 0.44	< 2	< 2	< 0.03	< 0.03	0.47	< 3	< 2	0.16	< 0.2	< 0.005	< 0.005	< 0.01	< 0.01
5/14/2003	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.93	< 3	< 2	0.08	< 0.2	0.002	0.0020	0.02	0.020
10/9/2003	Endyne	**< 2**	< 0.5	< 0.44	< 2	< 2	< 0.03	< 0.03	0.55	< 3	< 2	0.15	< 0.2	< 0.005	< 0.005	< 0.01	< 0.01
5/18/2004	Endyne	**< 2**	< 3	**< 2.66**	< 10	< 9	< 0.01	< 0.01	0.334	< 2	< 1	0.075	**< 1**	< 0.020	< 0.020	< 0.02	< 0.02
10/11/2004	Endyne	**< 2**	< 3	**< 2.67**	< 10	< 9	< 0.01	< 0.01	0.389	< 2	< 1	0.108	**< 1**	< 0.020	< 0.020	< 0.02	< 0.02
5/11/2005	Endyne	**< 2**	< 3	**< 2.68**	< 10	< 9	< 0.01	< 0.01	**3.53**	< 2	< 1	0.212	**< 1**	< 0.020	< 0.020	< 0.02	< 0.02
10/11/2005	Endyne	**< 2**	< 2	**< 1.78**	< 10	< 9	< 0.010	< 0.010	0.819	< 10	**< 7**	0.161	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
5/4/2006	Endyne	**< 2**	< 2	**< 1.78**	< 10	< 9	< 0.010	< 0.010	**1.09**	< 10	**< 7**	0.110	**< 1**	0.021	0.0209	< 0.020	< 0.020
10/10/2006	Endyne	**2**	< 2	**< 1.77**	< 20	< 17	< 0.020	< 0.019	0.709	< 1	< 1	0.222	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
5/3/2007	Endyne	**< 2**	< 2	**< 1.78**	< 20	< 17	< 0.020	< 0.019	**1.46**	< 1	< 1	0.124	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
10/9/2007	Endyne	**< 2**	< 2	**< 1.79**	< 20	< 17	< 0.020	< 0.019	**2.65**	< 1	< 1	0.257	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
5/8/2008	Endyne	**< 2**	< 2	**< 1.78**	< 20	< 17	< 0.020	< 0.019	0.49	< 1	< 1	0.075	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
10/1/2008	Endyne	**< 2**	< 2	**< 1.78**	< 20	< 17	< 0.020	< 0.019	**3.1**	< 1	< 1	0.310	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
5/4/2009	Endyne	**< 2**	< 2	**< 1.78**	< 20	< 17	< 0.020	< 0.019	0.39	< 1	< 1	0.10	**< 1**	< 0.020	< 0.020	< 0.020	< 0.020
10/12/2009	Endyne	**< 2**	< 2	**< 1.77**	< 20	< 17	< 0.020	< 0.019	0.50	< 1	< 1	0.17	**< 1**	< 20	< 20	< 0.020	< 0.020
5/5/2010	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.44	< 1	< 1	0.075	< 0.1	< 5	< 5	< 0.005	< 0.005
10/11/2010	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	**1.1**	< 1	< 1	0.240	< 0.2	< 5	< 5	< 0.005	< 0.005
5/12/2011	Endyne	< 1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	0.74	< 1	< 1	0.097	< 0.2	< 5	< 5	< 0.005	< 0.005
10/12/2011	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.62	< 1	< 1	0.220	< 0.2	< 5	< 5	< 0.005	< 0.005
5/10/2012	Endyne	**4**	< 2	**< 1.78**	14	12	< 0.020	< 0.019	**11**	4	3	0.340	< 0.2	16	15.95	0.032	0.0316
10/4/2012	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.69	< 1	< 1	0.220	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2013	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.50	< 1	< 1	0.120	< 0.2	< 5	< 5	< 0.020	< 0.020
10/1/2013	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.80	< 1	< 1	0.180	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2014	Endyne	**17**	< 2	**< 1.75**	63	54	0.046	0.044	**56**	20	**13**	1.600	< 0.2	92	91.72	0.150	0.148
10/29/2015	Endyne	1	< 2	**< 1.79**	< 5	< 4	< 0.020	< 0.019	**3**	< 1	< 1	0.180	< 0.2	5.4	5.38	< 0.020	< 0.020
6/13/2016	Endyne	< 1	< 2	**< 1.77**	8.1	7.0	< 0.020	< 0.019	0.46	< 1	< 1	0.170	< 0.2	< 5	< 5	< 0.020	< 0.020
10/19/2016	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.25	< 1	< 1	0.073	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2017	Endyne	1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	**1.30**	1.4	1.0	0.110	< 0.2	< 5	< 5	0.099	0.098
10/16/2017	Endyne	1	< 2	**< 1.76**	< 5	< 4	< 0.020	< 0.019	0.39	< 1	< 0.7	0.130	< 0.2	< 5	< 5	< 0.020	< 0.020
5/9/2018	Endyne	1.4	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.95	< 1	< 0.7	0.070	< 0.2	< 5	< 5	< 0.020	< 0.020
10/30/2018	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.49	< 1	< 0.7	0.170	< 0.2	< 5	< 5	< 0.020	< 0.020
11/8/2018^	Endyne																
6/7/2019	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.74	< 1	< 0.7	0.064	< 0.2	< 5	< 5	< 0.020	< 0.020
10/24/2019	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.46	< 1	< 0.7	0.078	< 0.2	< 5	< 5	< 0.020	< 0.020
5/14/2020	Endyne	< 1	< 2	**< 1.78**	< 5	< 4	< 0.020	< 0.019	0.38	< 1	< 0.7	0.056	< 0.2	< 5	< 5	< 0.020	< 0.020
10/29/2020	Endyne	< 1	< 2	**< 1.76**	< 5	< 4	< 0.020	< 0.019	0.38	< 1	< 0.7	0.200	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2021	Endyne	< 1	< 2	**< 1.77**	< 5	< 4	< 0.020	< 0.019	0.20	< 1	< 0.7	0.051	< 0.2	< 5	< 5	< 0.020	< 0.020
10/21/2021	Endyne	< 1	< 2	**< 1.75**	< 5	< 4	< 0.020	< 0.019	0.38	< 1	< 0.7	0.120	< 0.2	< 5	< 5	< 0.020	< 0.020

Compound	10/21/2021		WQ Stnd.
Cadmium (ug/L)	[C-1] =	exp(0.7977*ln(hardness)-3.909)*(1.101672-[(ln hardness)(0.041838)]	**1.30**
Chromium III (ug/L)	[C-2] =	exp(0.8190*ln(hardness)+0.6848)*0.860	**142**
Copper (mg/L)	[C-3] =	exp(0.8545*ln(hardness)-1.702)*(0.96)	**18**
Lead (ug/L)	[C-4] =	exp(1.273*ln(hardness)-4.705)*(1.46203-ln(hardness)*0.145712)	**6**
Nickel (ug/L)	[C-5] =	exp(0.846*ln(hardness)+0.0584)*0.997	**102**
Zinc (mg/L)	[C-6] =	exp(0.8473*ln(hardness)+0.884)*0.986	**231**

Hardness 10/21/21 = 221

NOTES:
The < values listed here are the reported detection limit.
Shading bold indicates exceedance of Water Quality Standards.
[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E:
Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteria).
If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated in table above.
[2] Dissolved (Diss.) values are calculated from Total concentrations using formulas and conversion factors provided in Appendix D of the above mentioned standards.
[3] Mercury std. of 0.2 ppb are the ANR Laboratory's Practical Quantitation Limits, for the specific purposes of SWMD; per telecon S. Bushman, SWMD, 9/7/93.
*Endyne reports total chromium concentration, so chromium III WQS used, as it is the lowest concentration when compared to the chromium VI WQS.
**In 2004, water was analyzed for conductivity, not specific conductance
^pH meter malfunction, not recorded

WAITE HEINDEL Environmental Management

SS-102 (Winooski River Downstream)		FIELD PARAMETERS			INORGANIC PARAMETERS				
		Specific Conductivity (us/cm)	pH (S.U.)	Temperature (C)	BOD5 (mg/L)	Chloride (mg/L)	COD (mg/L)	Hardness (mg/L)	Sodium (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		none	none	none	none	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3		none	none	none	none	230	none	none	none
SAMPLING DATE	LAB								
5/26/99	Endyne	160	7.9	15		8	< 20	110	4.8
10/18/1999	Endyne	210	7.8	9		12	< 20	100	6.8
5/22/2000	Endyne	110	7.7	12		6	< 20	80	4.0
10/10/2000	Endyne	140	8.3	8		9	< 20	92	5.3
5/17/2001	Endyne	228	6.6	13.8		7	< 20	160	5.7
10/23/2001	Endyne	311	7.8	7.6	< 2.5	21	< 20	130	11
5/1/2002	Endyne	195	7.03	9.5	< 2.5	8	< 20	72	4.2
10/30/2002	Endyne	244	6.88	5.5	< 2.5	13	< 20	100	8.6
5/14/2003	Endyne	192	6.79	11.4	< 2.5	8	< 20	72	5.1
10/9/2003	Endyne	397	6.7	12.9	< 2.5	15	< 20	120	8.7
5/18/2004	Endyne	158*	8.08	10.34	< 2.0	9.54	< 15	76.3	5.88
10/11/2004	Endyne	231*	8.27	10.65	< 2.0	17.3	< 15	111	9.41
5/18/2004	Endyne	158*	8.08	10.34	< 2.0	9.54	< 15	76.3	5.88
10/11/2005	Endyne	254	8.12	14.43	< 2.0	7.29	< 15	63.8	4.00
5/4/2006	Endyne	171	7.11	15.03	< 2.0	6.09	< 15	79.2	4.97
10/10/2006	Endyne	227	7.99	10.23	NA	10.8	< 15	107	7.24
5/8/2007	Endyne	140	7.83	12.15	< 2.0	< 25	< 15	63.8	4.02
10/9/2007	Endyne	244.3	8.1	14.2	< 2.0	11	< 10	95.3	7.53
5/8/2008	Endyne	171	8.06	14.53	< 2.0	8.4	< 10	84	6.10
10/1/2008	Endyne	263	7.88	14.89	< 2.0	14.0	< 10	116	9.10
5/4/2009	Endyne	153	9.14	13.88	< 2.0	6.5	< 10	77	4.90
10/12/2009	Endyne	134.1	8.2	8.9	< 2.0	7.9	< 10	81	5.90
5/5/2010	Endyne	127.5	7.9	13.0	< 2.0	5.6	12	77	4.20
10/11/2010	Endyne	128.6	7.99	10.1	< 2.0	6.5	11	81	5.20
5/12/2011	Endyne	198.2	8.4	13.9	< 2.0	6.3	10	73	5.30
10/12/2011	Endyne	205	8.2	13.5	< 3.0	7.5	12	92	5.90
5/10/2012	Endyne	129.9	7.9	13.0	< 2.5	6.1	13	81	4.60
10/4/2012	Endyne	243.7	7.7	14.7	< 2.5	10.0	20	94	6.00
5/1/2013	Endyne	179.7	8.27	14.8	< 2.0	8.7	16	85	4.80
10/1/2013	Endyne	215.1	7.6	16.8	< 2.5	13.0	17	101	7.50
5/1/2014	Endyne	111.4	7.1	8.1	< 2.5	9.4	48	94	5.20
10/29/2015	Endyne	203	8.31	8.1	3.0	9.3	30	91	4.40
6/13/2016	Endyne	239	8.12	13.4	< 2.5	9.6	< 10	99	6.10
10/19/2016	Endyne	267	8.49	12.9	< 2.5	17.0	< 10	130	10.00
5/17/2017	Endyne	190	7.95	17.9	< 2.0	8.1	11	75	4.70
10/16/2017	Endyne	227.8	8.0	14.6	< 3.0	16.0	< 10	127	9.40
5/9/2018	Endyne	145	7.9	13.4	< 2.4	7.8	19	66	4.70
10/30/2018	Endyne	185.4	8.0	5.7		9.4	13	78	5.70
11/8/2018^	Endyne	187		5.8	< 6.0				
6/7/2019	Endyne	160.9	7.8	14.9	< 2.0	7.5	11	69	4.70
10/24/2019	Endyne	193	7.8	8.2	< 4.0	9.7	24	84	5.90
5/14/2020	Endyne	244	7.5	10.2	< 4.0	8.1	33	66	4.60
10/29/2020	Endyne	221	8.0	4.4	< 4.0	13	10	104	7.60
5/17/2021	Endyne	220.4	8.2	17.1	< 4.0	9.2	< 10	113	7.20
10/21/2021	Endyne	194	7.7	9.4	< 4.0	10	15	97	6.80

SS-102; INORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL
Environmental Management

SS-102
(Winooski River Downstream)

TOTAL METALS

		Total Arsenic (ug/L)	Total Cadmium (ug/L)	Diss. Cadmium (ug/L)	Total Chromium (ug/L)*	Diss. Chromium (ug/L)*	Total Copper (mg/L)	Diss. Copper (mg/L)	Total Iron (mg/L)	Total Lead (ug/L)	Diss. Lead (ug/L)	Total Manganese (mg/L)	Total Mercury (ug/L)	Total Nickel (ug/L)	Diss. Nickel (ug/L)	Total Zinc (mg/L)	Diss. Zinc (mg/L)
Water Quality Standards (Prot. Human Health): [1] [2] [3]		1.5	none	none	none	none	none	none	none	none	none	none	0.2 [3]	none	none	none	none
Water Quality Standards (Prot. Aq. Biota): [1] [2] [3		150	none	[C - 1]	noen	[C - 2]	none	[C - 3]	1.0	none	[C - 4]	none	0.2 [3]	none	[C - 5]	none	[C - 6]
SAMPLING DATE	LAB																
5/26/99	Endyne																
10/18/1999	Endyne																
5/22/2000	Endyne																
10/10/2000	Endyne																
5/17/2001	Endyne																
10/23/2001	Endyne	**< 5**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.15	< 3	< 2	0.03	**< 2**	< 5	< 5	0.04	0.03944
5/1/2002	Endyne	**< 2**	< 0.5	< 0.46	< 2	< 2	< 0.03	< 0.03	0.24	< 3	**< 3**	0.04	**< 2**	< 2	< 2	< 0.01	< 0.01
10/30/2002	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.2	< 3	< 2	0.03	**< 2**	< 5	< 5	< 0.01	< 0.01
5/14/2003	Endyne	**< 2**	< 0.5	< 0.46	< 2	< 2	< 0.03	< 0.03	0.51	5	**4.2**	0.04	**< 2**	< 2	< 2	0.01	0.00986
10/9/2003	Endyne	**< 2**	< 0.5	< 0.45	< 2	< 2	< 0.03	< 0.03	0.22	< 3	< 2	0.06	**< 2**	< 5	< 5	< 0.01	< 0.01
5/18/2004	Endyne	**< 2**	< 3	**< 2.76**	< 10	< 9	< 0.01	< 0.01	0.161	< 2	< 2	0.027	**< 10**	< 20	< 20	< 0.02	< 0.02
10/11/2004	Endyne	**< 2**	< 3	**< 2.71**	< 10	< 9	< 0.01	< 0.01	0.146	< 2	< 2	0.031	**< 10**	< 20	< 20	< 0.02	< 0.02
5/18/2004	Endyne	**< 2**	< 3	**< 2.76**	< 10	< 9	< 0.01	< 0.01	0.161	< 2	< 2	0.027	**< 10**	< 20	< 20	< 0.02	< 0.02
10/11/2005	Endyne	**< 2**	< 2	**< 1.86**	< 10	< 9	< 0.010	< 0.010	0.623	< 10	**< 9**	0.059	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2006	Endyne	**< 2**	< 2	**< 1.84**	< 10	< 9	< 0.010	< 0.010	0.460	< 10	**< 8**	0.048	**< 1**	< 20	< 20	< 0.020	< 0.020
10/10/2006	Endyne	**< 2**	< 2	**< 1.81**	< 20	< 17	< 0.020	< 0.019	0.256	< 1	< 1	0.042	**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2007	Endyne	**< 2**	< 2	**< 1.86**	< 20	< 17	< 0.020	< 0.019	0.918	< 1	< 1	0.057	**< 1**	< 20	< 20	< 0.020	< 0.020
10/9/2007	Endyne	**< 2**	< 2	**< 1.82**	< 20	< 17	< 0.020	< 0.019	0.809	< 1	< 1	3.28	**< 1**	< 20	< 20	< 0.020	< 0.020
5/8/2008	Endyne	**< 2**	< 2	**< 1.83**	< 20	< 17	< 0.020	< 0.019	**1.100**	< 2	< 2	0.062	**< 1**	< 20	< 20	< 0.020	< 0.020
10/1/2008	Endyne	**< 2**	< 2	**< 1.81**	< 20	< 17	< 0.020	< 0.019	0.380	< 1	< 1	0.047	**< 1**	< 20	< 20	< 0.020	< 0.020
5/4/2009	Endyne	**< 2**	< 2	**< 1.84**	< 20	< 17	< 0.020	< 0.019	0.260	< 1	< 1	0.028	**< 1**	< 20	< 20	< 0.020	< 0.020
10/12/2009	Endyne	**< 2**	< 2	**< 1.84**	< 20	< 17	< 0.020	< 0.019	0.20	< 1	< 1	0.033	**< 1**	< 20	< 20	< 0.020	< 0.020
5/5/2010	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.44	< 1	< 1	0.037	< 0.1	< 5	< 5	0.016	0.0158
10/11/2010	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.45	< 1	< 1	0.054	< 0.2	< 5	< 5	0.005	0.0049
5/12/2011	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.27	< 1	< 1	0.029	< 0.2	< 5	< 5	0.006	0.0059
10/12/2011	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.31	< 1	< 1	0.040	< 0.2	< 5	< 5	< 0.020	< 0.020
5/10/2012	Endyne	1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	**1.70**	< 1	< 1	0.066	< 0.2	< 5	< 5	< 0.020	< 0.020
10/4/2012	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.28	< 1	< 1	0.045	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2013	Endyne	< 1	< 2	**< 1.83**	< 5	< 4	< 0.020	< 0.019	0.35	< 1	< 1	0.037	< 0.2	< 5	< 5	< 0.020	< 0.020
10/1/2013	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.40	< 1	< 1	0.043	< 0.2	< 5	< 5	< 0.020	< 0.020
5/1/2014	Endyne	**3**	< 2	**< 1.82**	14	12	< 0.020	< 0.019	**12.00**	5	**4.0**	0.340	< 0.2	20	19.9	0.032	0.0316
10/29/2015	Endyne	1	< 2	**< 1.83**	7	6	< 0.020	< 0.019	**5.00**	2	1.6	0.240	< 0.2	8.3	8.28	< 0.020	< 0.020
6/13/2016	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.30	< 1	< 1	0.039	< 0.2	< 5	< 5	< 0.020	< 0.020
10/19/2016	Endyne	< 1	< 2	**< 1.80**	< 5	< 4	0.026	0.025	0.17	< 1	< 1	0.054	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2017	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.38	< 1	< 1	0.036	< 0.2	< 5	< 5	< 0.020	< 0.020
10/16/2017	Endyne	< 1	< 2	**< 1.80**	< 5	< 4	< 0.020	< 0.019	0.20	< 1	< 1	0.045	< 0.2	< 5	< 5	< 0.020	< 0.020
5/9/2018	Endyne	1.4	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.74	< 1	< 1	0.044	< 0.2	< 5	< 5	< 0.020	< 0.020
10/30/2018	Endyne	< 1	< 2	**< 1.84**	< 5	< 4	< 0.020	< 0.019	0.33	< 1	< 1	0.045	< 0.2	< 5	< 5	< 0.020	< 0.020
11/8/2018^	Endyne																
6/7/2019	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.33	< 1	< 1	0.037	< 0.2	< 5	< 5	< 0.020	< 0.020
10/24/2019	Endyne	< 1	< 2	**< 1.83**	< 5	< 4	< 0.020	< 0.019	0.43	< 1	< 1	0.043	< 0.2	< 5	< 5	< 0.020	< 0.020
5/14/2020	Endyne	< 1	< 2	**< 1.85**	< 5	< 4	< 0.020	< 0.019	0.26	< 1	< 1	0.026	< 0.2	< 5	< 5	< 0.020	< 0.020
10/29/2020	Endyne	< 1	< 2	**< 1.81**	< 5	< 4	< 0.020	< 0.019	0.21	< 1	< 1	0.042	< 0.2	< 5	< 5	< 0.020	< 0.020
5/17/2021	Endyne	< 1	< 2	**< 1.81**	< 5	< 4	< 0.020	< 0.019	0.20	< 1	< 1	0.040	< 0.2	< 5	< 5	< 0.020	< 0.020
10/21/2021	Endyne	< 1	< 2	**< 1.82**	< 5	< 4	< 0.020	< 0.019	0.22	< 1	< 1	0.038	< 0.2	< 5	< 5	< 0.020	< 0.020

Compound		10/21/2021	WQ Stnd.
Cadmium (ug/L)	[C-1] =	exp(0.7977*ln(hardness)-3.909)*(1.101672-[(ln hardness)(0.041838)]	**0.70**
Chromium III (ug/L)	[C-2] =	exp(0.8190*ln(hardness)+0.6848)*0.860	**72**
Copper (mg/L)	[C-3] =	exp(0.8545*ln(hardness)-1.702)*(0.96)	**9**
Lead (ug/L)	[C-4] =	exp(1.273*ln(hardness)-4.705)*(1.46203-ln(hardness)*0.145712)	**2**
Nickel (ug/L)	[C-5] =	exp(0.846*ln(hardness)+0.0584)*0.997	**51**
Zinc (mg/L)	[C-6] =	exp(0.8473*ln(hardness)+0.884)*0.986	**115**

Hardness 10/21/21 = 97

NOTES:
The < values listed here are the reported detection limit.
Shading bold indicates exceedance of Water Quality Standards.
[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C, D & E:
Protection of Human Health (consumption of organisms only), Protection of Aquatic Biota, Average Acceptable Concentration (AAC Chronic Criteria).
If no Human Health standard is shown, the standard for Protection of Aquatic Biota, Chronic Criteria is calculated in table above.
[2] Dissolved (Diss.) values are calculated from Total concentrations using formulas and conversion factors provided in Appendix D of the above mentioned standards.
[3] Mercury std. of 0.2 ppb are the ANR Laboratory's Practical Quantitation Limits, for the specific purposes of SWMD; per telecon S. Bushman, SWMD, 9/7/93.
*Endyne reports total chromium concentration, so chromium III WQS used, as it is the lowest concentration when compared to the chromium VI WQS.
**In 2004, water was analyzed for conductivity, not specific conductance
^pH meter malfunction, not recorded

WAITE HEINDEL Environmental Management

SS-12 (Upstream)			ACETONE	2-BUTANONE (MEK)	CHLORO METHANE	TOLUENE	Result	Unidentified Peaks
Water Quality Standards: Appendix C [1]			none	none	none	520		
Units			ug/L	ug/L	ug/L	ug/L		
SAMPLING DATE	**LAB**	**Lab Method**						
5/26/1999	Endyne	8260	26	20				
10/19/1999	Endyne	8260	9.1					
5/22/2000	Endyne	8260	15	12				
10/10/2000	Endyne	8260					ND	
5/17/2001	Endyne	8260					ND	
10/23/2001	Endyne	8260	1,700	2300	10	16		
5/1/2002	Endyne	8260					ND	
10/30/2002	Endyne	8260				4.4		
5/14/2003	Endyne	8260					ND	
10/9/2003	Endyne	8260					ND	
5/18/2004	Endyne	8260					ND	
10/11/2004	Endyne	8260					ND	0
5/11/2005	Endyne	8260					ND	0
10/11/2005	Endyne	8260					ND	0
5/4/2006	Endyne	8260					ND	0
10/10/2006	Endyne	8260					ND	0
5/3/2007	Endyne	8260					ND	0
10/9/2007	Endyne	8260					ND	0
5/8/2008	Endyne	8260					ND	0
10/1/2008	Endyne	8260B					ND	0
5/4/2009	Endyne	8260B					ND	0
10/12/2009	Endyne	8260B					ND	0
5/5/2010	Endyne	8260B					ND	0
10/11/2010	Endyne	8260B					ND	0
5/12/2011	Endyne	8260B					ND	0
10/12/2011	Endyne	8260B					ND	0
5/10/2012	Endyne	8260B					ND	0
10/4/2012	Endyne	8260B					ND	0
5/1/2013	Endyne	8260B					ND	0
10/1/2013	Endyne	8260B					ND	0
5/1/2014	Endyne	8260B					ND	0
10/29/2015	Endyne	8260C					ND	0
6/13/2016	Endyne	8260C					ND	0
10/19/2016	DRY	8260C						
5/17/2017	Endyne	8260C					ND	0
10/16/2017	Endyne	8260C					ND	0
5/9/2018	Endyne	8260C					ND	0
10/30/2018	Endyne	8260C					ND	0
6/7/2019	Endyne	8260C					ND	0
10/24/2019	Endyne	8260C					ND	0
5/14/2020	Endyne	8260C					ND	0
10/29/2020	Endyne	8260C					ND	0
5/17/2021	Endyne	8260C					ND	0
10/21/2021	Endyne	8260C					ND	0

NOTES:

Shading indicates exceedence of Vermont Surface Water Standard.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C: consumption of organisms only.

WAITE HEINDEL
Environmental Management

SS-101
(Winooski River, upstream)

			Result	Unidentified Peaks
Water Quality Standards: Appendix C [1]				
		Units		
SAMPLING DATE	**LAB**	**Lab Method**		
5/22/2000	Endyne	8260	ND	
10/10/2000	Endyne	8260	ND	
5/17/2001	Endyne	8260	ND	
10/23/2001	Endyne	8260	ND	
5/1/2002	Endyne	8260	ND	
10/30/2002	Endyne	8260	ND	
5/14/2003	Endyne	8260	ND	
10/9/2003	Endyne	8260	ND	
5/18/2004	Endyne	8260	ND	
10/11/2004	Endyne	8260	ND	0
5/11/2005	Endyne	8260	ND	0
10/11/2005	Endyne	8260	ND	0
5/4/2006	Endyne	8260	ND	0
10/10/2006	Endyne	8260	ND	0
5/3/2007	Endyne	8260	ND	0
10/9/2007	Endyne	8260	ND	0
5/8/2008	Endyne	8260	ND	0
10/1/2008	Endyne	8260B	ND	0
5/4/2009	Endyne	8260B	ND	0
10/12/2009	Endyne	8260B	ND	0
5/5/2010	Endyne	8260B	ND	0
10/11/2010	Endyne	8260B	ND	0
5/12/2011	Endyne	8260B	ND	0
10/12/2011	Endyne	8260B	ND	0
5/10/2012	Endyne	8260B	ND	0
10/4/2012	Endyne	8260B	ND	0
5/1/2013	Endyne	8260B	ND	0
10/1/2013	Endyne	8260B	ND	0
5/1/2014	Endyne	8260B	ND	0
10/29/2015	Endyne	8260C	ND	0
6/13/2016	Endyne	8260C	ND	0
10/19/2016	Endyne	8260C	ND	0
5/17/2017	Endyne	8260C	ND	0
10/16/2017	Endyne	8260C	ND	0
5/9/2018	Endyne	8260C	ND	0
10/30/2018	Endyne	8260C	ND	0
6/7/2019	Endyne	8260C	ND	0
10/24/2019	Endyne	8260C	ND	0
5/14/2020	Endyne	8260C	ND	0
10/29/2020	Endyne	8260C	ND	0
5/17/2021	Endyne	8260C	ND	0
10/21/2021	Endyne	8260C	ND	0

NOTES:

Shading indicates exceedence of Vermont Surface Water Standard.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C: consumption of organisms only.

WAITE HEINDEL

SS-4 (Downstream)			ACETONE	BENZENE	2-BUTANONE (MEK)	CHLORO ETHANE	CHLORO METHANE	TOLUENE	Result	Unidentified Peaks
Water Quality Standards: Appendix C [1]			none	58	none	none	none	520		
Units			ug/l	ug/l	ug/l	ug/l	ug/l	ug/l		
SAMPLING DATE	**LAB**	**Lab Method**								
5/26/1999	Endyne	8260							ND	
10/18/1999	Endyne	8260							ND	
5/22/2000	Endyne	8260							ND	
5/17/2001	Endyne	8260	780	8.5	880	110	48	10		
5/1/2002	Endyne	8260	29		9.9					
10/30/2002	Endyne	8260							ND	
5/14/2003	Endyne	8260	17							
10/9/2003	Endyne	8260							ND	
5/18/2004	DRY	8260								
10/11/2004	DRY	8260								
5/11/2005	Endyne	8260							ND	0
10/11/2005	Endyne	8260							ND	0
5/4/2006	Endyne	8260							ND	0
10/10/2006	Endyne	8260							ND	0
5/3/2007	Endyne	8260							ND	0
10/9/2007	Endyne	8260							ND	0
5/8/2008	DRY	8260								
10/1/2008	DRY	8260B								
5/4/2009	DRY	8260B								
10/12/2009	DRY	8260B								
5/5/2010	Endyne	8260B							ND	0
10/11/2010**	Endyne	8260B								
5/12/2011	Endyne	8260B							ND	0
10/12/2011	Endyne	8260B							ND	0
5/10/2012	Endyne	8260B							ND	0
10/4/2012	DRY	8260B								
5/1/2013	DRY	8260B								
10/1/2013	DRY	8260B								
5/1/2014	Endyne	8260B							ND	0
10/29/2015	Endyne	8260C							ND	0
6/13/2016	DRY	8260C								
10/19/2016	DRY	8260C								
5/17/2017	DRY	8260C								
10/16/2017	DRY	8260C								
5/9/2018	Endyne	8260C							ND	0
10/30/2018	DRY	8260C								
11/8/2018	DRY	8260C								
6/7/2019	Endyne	8260C							ND	0
10/24/2019	Endyne	8260C							ND	0
5/14/2020	Endyne	8260C							ND	0
10/29/2020	DRY	8260C								
5/17/2021	DRY	8260C								
10/21/2021	DRY	8260C								

NOTES:

Shading indicates exceedence of Vermont Surface Water Standard.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C: consumption of organisms only.

SS-11; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

WAITE HEINDEL Environmental Management

SS-11 (Downstream)			Result	Unidentified Peaks
		Water Quality Standards: Appendix C [1]		
		Units		
SAMPLING DATE	**LAB**	**Lab Method**		
5/22/2000	Endyne	8260	ND	
10/10/2000	Endyne	8260	ND	
5/17/2001	Endyne	8260	ND	
10/23/2001	Endyne	8260	ND	
5/1/2002	Endyne	8260	ND	
10/30/2002	Endyne	8260	ND	
5/14/2003	Endyne	8260	ND	
10/9/2003	Endyne	8260	ND	
5/18/2004	Endyne	8260	ND	
10/11/2004	Endyne	8260	ND	0
5/11/2005	Endyne	8260	ND	0
10/11/2005	Endyne	8260	ND	0
5/4/2006	Endyne	8260	ND	0
10/10/2006	Endyne	8260	ND	0
5/3/2007	Endyne	8260	ND	0
10/9/2007	Endyne	8260	ND	0
5/8/2008	Endyne	8260	ND	0
10/1/2008	Endyne	8260B	ND	0
5/4/2009	Endyne	8260B	ND	0
10/12/2009	Endyne	8260B	ND	0
5/5/2010	Endyne	8260B	ND	0
10/11/2010	Endyne	8260B	ND	0
5/12/2011	Endyne	8260B	ND	0
10/12/2011	Endyne	8260B	ND	0
5/10/2012	Endyne	8260B	ND	0
10/4/2012	Endyne	8260B	ND	0
5/1/2013	Endyne	8260B	ND	0
10/1/2013	Endyne	8260B	[2]	0
5/1/2014	Endyne	8260B	ND	0
10/29/2015	Endyne	8260C	ND	0
6/13/2016	Endyne	8260C	ND	0
10/19/2016	Endyne	8260C	ND	0
5/17/2017	Endyne	8260C	ND	0
10/16/2017	Endyne	8260C	ND	0
5/9/2018	Endyne	8260C	ND	0
10/30/2018	Endyne	8260C	ND	0
6/7/2019	Endyne	8260C	ND	0
10/24/2019	Endyne	8260C	ND	0
5/14/2020	Endyne	8260C	ND	0
10/29/2020	Endyne	8260C	ND	0
5/17/2021	Endyne	8260C	ND	0
10/21/2021	Endyne	8260C	ND	0

NOTES:

Shading indicates exceedence of Vermont Surface Water Standard.
[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C: consumption of organisms only.
[2]: Acetone value was rejected by WHEM because it was also detected in both QA/QC trip blanks.

SS-102; ORGANICS
C.V. LANDFILL
EAST MONTPELIER, VERMONT

SS-102 (Winooski River downstream)			Result	Unidentified Peaks
		Water Quality Standards: Appendix C [1]		
		Units		
SAMPLING DATE	**LAB**	**Lab Method**		
5/22/2000	Endyne	8260	ND	
10/10/2000	Endyne	8260	ND	
5/17/2001	Endyne	8260	ND	
10/23/2001	Endyne	8260	ND	
5/1/2002	Endyne	8260	ND	
10/30/2002	Endyne	8260	ND	
5/14/2003	Endyne	8260	ND	
10/9/2003	Endyne	8260	ND	
5/18/2004	Endyne	8260	ND	
10/11/2004	Endyne	8260	ND	0
5/11/2005	Endyne	8260	ND	0
10/11/2005	Endyne	8260	ND	0
5/4/2006	Endyne	8260	ND	0
10/10/2006	Endyne	8260	ND	0
5/3/2007	Endyne	8260	ND	0
10/9/2007	Endyne	8260	ND	0
5/8/2008	Endyne	8260	ND	0
10/1/2008	Endyne	8260B	ND	0
5/4/2009	Endyne	8260B	ND	0
10/12/2009	Endyne	8260B	ND	0
5/5/2010	Endyne	8260B	ND	0
10/11/2010	Endyne	8260B	ND	0
5/12/2011	Endyne	8260B	ND	0
10/12/2011	Endyne	8260B	ND	0
5/10/2012	Endyne	8260B	ND	0
10/4/2012	Endyne	8260B	ND	0
5/1/2013	Endyne	8260B	ND	0
10/1/2013	Endyne	8260B	ND	0
5/1/2014	Endyne	8260B	ND	0
10/29/2015	Endyne	8260C	ND	0
6/13/2016	Endyne	8260C	ND	0
10/19/2016	Endyne	8260C	ND	0
5/17/2017	Endyne	8260C	ND	0
10/16/2017	Endyne	8260C	ND	0
5/9/2018	Endyne	8260C	ND	0
10/30/2018	Endyne	8260C	ND	0
6/7/2019	Endyne	8260C	ND	0
10/24/2019	Endyne	8260C	ND	0
5/14/2020	Endyne	8260C	ND	0
10/29/2020	Endyne	8260C	ND	0
5/17/2021	Endyne	8260C	ND	0
10/21/2021	Endyne	8260C	ND	0

NOTES:

Shading indicates exceedence of Vermont Surface Water Standard.

[1] Water Quality Standards from Vermont Water Quality Standards, effective date 1/15/17, Appendix C: consumption of organisms only.

Leachate Sampling Summary Sheet

Project Name:	CV Landfill
Location:	E. Montpelier, Vermont
Project Number:	03351
Date of Sampling:	8/10/2021
Staff Scientists:	Wendy Shellito
Weather:	sunny
Air Temperature:	80's ^{o}F
Equipment	
pH Meter:	Oakton pH Meter
Temp./S. Conduct:	YSI Conductivity Metetr

Field Measurements:

Leachate Sampling Location		Tank #4 (Underground Storage Tank)
	Units	
pH:	S. U.	6.30
Specific Conductance:	uS/cm	2,326
Temperature:	^{o}C	16.1
Sample Time:		12:10 PM
Collection Method:		grab sampling, using a hand bailer (see below)
CV Personnel:		None

<u>Sampling Notes:</u> Using a hand bailer, a grab sample was collected from the underground leachate storage tank, directly down through the manway at the top of the tank. Field measurements were taken on-site after sample collection on 8/10/2021. Samples from the tank were submitted to Endyne for analysis the day sampling occurred.

uS/cm = microSiemens per centimeter.
^{0}C = degrees Celsius.

Laboratory Sample Delivery Information:

Samples were delivered to Endyne on 8/10/2021, the day sampling occurred, by Wendy Shellito of WHEM.
Endyne Chain of Custody Number: W-70338QRT CVLF Feb/May/Aug Leachate.

Leachate Sampling Summary Sheet

Project Name:	CV Landfill
Location:	E. Montpelier, Vermont
Project Number:	03351
Date of Sampling:	10/21/2021
Staff Scientists:	Sam Cowan & Hannah Weiss
Weather:	clouds
Air Temperature:	60's^{o}F
Equipment	
pH Meter:	YSI 556
Temp./S. Conduct:	YSI 556

Field Measurements:

Leachate Sampling Location		Tank #4 (Underground Storage Tank)
	Units	
pH:	S. U.	6.83
Specific Conductance:	uS/cm	2,250
Temperature:	^{o}C	12.3
Sample Time:		11:40 AM
Collection Method:		grab sampling, using a hand bailer (see below)
CV Personnel:		None

Sampling Notes: Using a hand bailer, a grab sample was collected from the underground leachate storage tank, directly down through the manway at the top of the tank. Field measurements were taken on-site after sample collection on 10/21/2021. Samples from the tank were submitted to Endyne for analysis the day sampling occurred.

uS/cm = microSiemens per centimeter.
^{0}C = degrees Celsius.

Laboratory Sample Delivery Information:

Samples were delivered to Endyne on 10/21/2021, the day sampling occurred, by Hannah Weiss of WHEM.
Endyne Chain of Custody Number: W-70338CLS CVLF Leachate.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
LEACHATE - INORGANICS

SAMPLING DATE		Toxicity	2/14/2018	5/9/2018	8/14/2018	10/11/2018	2/14/2019	5/14/2019	8/15/2019	10/24/2019
LOCATION ID	UNITS	Characteristic [1]	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
FIELD PARAMETERS										
SPECIFIC CONDUCTANCE	uS/cm	none	**1,262**	**1,534**	**1,932**	**2,872**	**811**	**1,532**	**1,820**	**1,553**
PH	s.u.	none	**6.7**	**7.0**	**7.03**	**7.83**	**6.63**	**6.65**	**6.45**	**6.70**
TEMPERATURE	deg. C	none	**4.60**	**7.32**	**15.80**	**13.30**	**3.30**	**6.25**	**17.80**	**11.05**
CONVENTIONAL PARAMETERS										
BOD5 (Biochemical Oxygen Demand)	mg/l	none	**8.9**	8.6 ND	**14**	**57**	**12**	6 ND	**8.5**	8 ND
CHLORIDE	mg/l	none	**350**	**170**	***284***	**370**	**140**	**150**	**200**	**130**
COD (Chemical Oxygen Demand)	mg/l	none	**320**	**81**	**140**	**290**	**71**	**55**	**94**	**82**
T.K.N. (Total Kjeldahl Nitrogen)	mg/l	none	**83**	**32**	**8.8**	**110**	**43**	**31**	**36**	**41**
TOTAL METALS										
ARSENIC	mg/l	5	**0.0030**	**0.0023**	**0.0030**	**0.098**	**0.0071**	**0.0055**	**0.0047**	**0.0080**
CADMIUM	mg/l	1	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND
CHROMIUM	mg/l	5	0.005 ND	0.005 ND	0.005 ND	**0.012**	0.005 ND	0.005 ND	0.005 ND	0.005 ND
COPPER	mg/l	none	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND
IRON	mg/l	none	**12**	**7.4**	**16**	**310**	**12**	**11**	**16**	**24**
LEAD	mg/l	5	0.001 ND	0.001 ND	0.001 ND	0.020 ND	0.001 ND	0.001 ND	0.001 ND	0.001 ND
MANGANESE	mg/l	none	**0.67**	**0.45**	**0.67**	**0.85**	**1.10**	**1.40**	**0.96**	**0.79**
MERCURY	mg/l	0.2	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND
MOLYBDENUM	mg/l	none	0.02 ND	0.01 ND	0.01 ND	0.02 ND	0.01 ND	0.01 ND	0.01 ND	0.01 ND
NICKEL	mg/l	none	**0.039**	**0.0193**	**0.0334**	**0.054**	**0.0215**	**0.0144**	**0.0220**	**0.0167**
SELENIUM	mg/l	1	0.002 ND	0.002 ND	0.002 ND	0.020 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND
ZINC	mg/l	none	**0.020**	0.020 ND	0.020 ND	**0.460**	0.020 ND	0.020 ND	0.020 ND	0.020 ND

C.V. LANDFILL
EAST MONTPELIER, VERMONT
LEACHATE - INORGANICS

SAMPLING DATE		Toxicity	2/14/2020	5/14/2020	8/6/2020	10/29/2020	2/9/2021	5/17/2021	8/10/2021	10/21/2021
LOCATION ID	UNITS	Characteristic [1]	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
FIELD PARAMETERS										
SPECIFIC CONDUCTANCE	uS/cm	none	**780**	**1,474**	**2,537**	**1,783**	**1,615**	**1,924**	**2,326**	**2,250**
PH	s.u.	none	**6.21**	**6.49**	**6.53**	**6.93**	**6.61**	**6.29**	**6.30**	**6.83**
TEMPERATURE	deg. C	none	**4.70**	**7.38**	**15.10**	**10.66**	**5.20**	**14.80**	**16.10**	**12.29**
CONVENTIONAL PARAMETERS										
BOD5 (Biochemical Oxygen Demand)	mg/l	none	**12**	8 ND	**8.2**	**7.0**	**12**	**14**	**11**	**8.2**
CHLORIDE	mg/l	none	**110**	**100**	**300**	**170**	**160**	**190**	**280**	**290**
COD (Chemical Oxygen Demand)	mg/l	none	**77**	**65**	**160**	**98**	**90**	**68**	**150**	**200**
T.K.N. (Total Kjeldahl Nitrogen)	mg/l	none	**38**	**28**	**89**	**57**	**52**	**39**	**66**	**76**
TOTAL METALS										
ARSENIC	mg/l	5	**0.0039**	**0.0082**	**0.0070**	**0.0054**	**0.0043**	**0.0033**	**0.0070**	**0.0213**
CADMIUM	mg/l	1	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.020 ND
CHROMIUM	mg/l	5	0.005 ND	0.005 ND	0.005 ND	0.005 ND	0.005 ND	0.005 ND	0.005 ND	0.050 ND
COPPER	mg/l	none	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.200 ND
IRON	mg/l	none	**19**	**42**	**25**	**16**	**29**	**38**	**35**	**160**
LEAD	mg/l	5	0.001 ND	0.001 ND	0.001 ND	0.001 ND	0.001 ND	0.001 ND	0.001 ND	0.010 ND
MANGANESE	mg/l	none	**1.50**	**1.20**	**0.81**	**0.85**	**1.00**	**1.30**	**0.88**	**0.24**
MERCURY	mg/l	0.2	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0002 ND	0.0020 ND
MOLYBDENUM	mg/l	none	0.01 ND	0.01 ND	0.01 ND	0.01 ND	0.01 ND	0.01 ND	0.01 ND	0.10 ND
NICKEL	mg/l	none	**0.0201**	**0.0165**	**0.0387**	**0.0223**	**0.0205**	**0.0215**	**0.0317**	< 0.050
SELENIUM	mg/l	1	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.002 ND	0.020 ND
ZINC	mg/l	none	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.020 ND	0.200 ND

Notes:

Data prior to Feb. 2004 were provided by Sanborn, Head & Assocs.

ND - Not Detected to the detection limit indicated.

Blank cell - Not analyzed on that date.

- TKN sample was collected on 11/2/07.

bold = laboratory detected concentration.

italics = qualified data, see Endyne report.

[1] Toxicity Characteristic = Taken from Vermont Hazardous Waste Management Regulations 12/31/2016;
Chapter 2, Table 1, Maximum Concentration of Contaminants for the Characteristic of Toxicity.

Data prior to 2/14/2018 is hidden to conserve space & is available upon request.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
LEACHATE
VOLATILE ORGANIC COMPOUNDS BY EPA METHOD 8260B/C

SAMPLING DATE [1]		Toxicity	10/29/2015	10/19/2016	10/16/2017	10/11/2018	10/24/2019	12/9/2020	10/21/2021
LOCATION ID	UNITS	Characteristic [1]	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate	Leachate
VOLATILE ORGANICS									
(EPA Method 8260)									
ACETONE	ug/l	none	50 ND	10 ND	50 ND	50 ND	50 ND	50 ND	50 ND
tert-AMYL METHYL ETHER (TAME)	ug/l	none	10 ND	2 ND	10 ND	10 ND	10 ND	10 ND	10 ND
BENZENE	ug/l	**500**	5 ND	**5.2**	2.5 ND	2.5 ND	**4.9**	2.5 ND	2.5 ND
BROMODICHLOROMETHANE	ug/l	none	2.5 ND	0.5 ND	2.5 ND	2.5 ND	4.0 ND	2.5 ND	2.5 ND
BROMOFORM	ug/l	none	10 ND	2 ND	10 ND	10 ND	10 ND	10 ND	10 ND
BROMOMETHANE	ug/l	none	25 ND	*0.5 ND*	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
2-BUTANONE (MEK)	ug/l	none	50 ND	10 ND	50 ND	50 ND	50 ND	50 ND	50 ND
t-BUTANOL	ug/l	none	**208**	**234**	***158***	**196**	*150 ND*	*150 ND*	100 ND
n-BUTYLBENZENE	ug/L	none	10 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
CARBON DISULFIDE	ug/l	none	25 ND	5 ND	25 ND	25 ND	25 ND	25 ND	25 ND
CARBON TETRACHLORIDE	ug/l	**500**	5 ND	0.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
CHLOROBENZENE	ug/l	**100,000**	5 ND	**8**	5 ND	5 ND	5 ND	5 ND	5 ND
CHLOROETHANE	ug/l	none	25 ND	5 ND	25 ND	25 ND	25 ND	25 ND	25 ND
2-CHLOROETHYLVINYL ETHER	ug/l	none							
CHLOROFORM	ug/l	6000	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
CHLOROMETHANE	ug/l	none	15 ND	3 ND	15 ND	15 ND	15 ND	15 ND	15 ND
DIBROMOCHLOROMETHANE	ug/l	none	10 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
DIETHYL ETHER	ug/l	none	25 ND	**21.3**	25 ND	25 ND	25 ND	**25.5**	25 ND
1,2-DICHLOROBENZENE (ortho)	ug/l	none	5 ND	**1.8**	5 ND	5 ND	5 ND	5 ND	5 ND
1,3-DICHLOROBENZENE (meta)	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
1,4-DICHLOROBENZENE (para)	ug/l	**7500**	**6.6**	**10.9**	**12.4**	**5.4**	**12.1**	**14.6**	**9.1**
1,1-DICHLOROETHANE	ug/l	none	5 ND	1 ND	3.5 ND	5 ND	5 ND	5 ND	5 ND
cis 1,2-DICHLOROETHENE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
trans 1,2-DICHLOROETHENE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
1,2-DICHLOROPROPANE	ug/l	none	10 ND	1 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
cis 1,3-DICHLOROPROPENE	ug/l	none	10 ND	0.5 ND	5.0 ND	5 ND	5 ND	5 ND	5 ND
trans 1,3-DICHLOROPROPENE	ug/l	none	10 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
DI-ISOPROPYL ETHER (DIPE)	ug/l	none	10 ND	2 ND	10 ND	10 ND	10 ND	10 ND	10 ND
ETHYLBENZENE	ug/l	none	5 ND	**11.2**	5 ND	5 ND	5 ND	5 ND	5 ND
2-HEXANONE	ug/l	none	50 ND	10 ND	50 ND	50 ND	50 ND	50 ND	50 ND
ISOPROPYLBENZENE	ug/l	none	5 ND	**2.1**	5 ND	5 ND	5 ND	5 ND	5 ND
p-ISOPROPYLTOLUENE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
METHYLENE CHLORIDE	ug/l	none	25 ND	5 ND	25 ND	25 ND	25 ND	25 ND	25 ND
4-METHYL-2-PENTANONE (MIBK)	ug/l	none	50 ND	10 ND	50 ND	50 ND	50 ND	50 ND	50 ND
NAPHTHALENE	ug/l	none	10 ND	**8.3**	10 ND	10 ND	**14.1**	2.5 ND	2.5 ND
n-PROPYLBENZENE	ug/l	none	5 ND	**1.4**	5 ND	5 ND	5 ND	5 ND	5 ND
STYRENE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
1,1,1,2-TETRACHLOROETHANE	ug/l	none	10 ND	2 ND	10 ND	10 ND	10 ND	10 ND	10 ND
TETRACHLOROETHENE (PCE)	ug/l	**700**	5 ND	0.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
TETRAHYDROFURAN (THF)	ug/l	none	**207**	**341**	**214**	**204**	**106**	**120**	**164**
TOLUENE	ug/l	none	5 ND	**1.2**	5 ND	5 ND	5 ND	5 ND	5 ND
1,1,1-TRICHLOROETHANE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
1,1,2-TRICHLOROETHANE	ug/l	none	5 ND	1 ND	5 ND	5 ND	5 ND	5 ND	5 ND
TRICHLOROETHENE (TCE)	ug/l	**500**	5 ND	0.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
TRICHLOROFLUOROMETHANE	ug/l	none	10 ND	2 ND	10 ND	10 ND	10 ND	10 ND	10 ND
1,2,4-TRIMETHYLBENZENE	ug/l	none	5 ND	**11.6**	5 ND	5 ND	5 ND	5 ND	5 ND
1,3,5-TRIMETHYLBENZENE	ug/l	none	5 ND	**4.6**	5 ND	5 ND	5 ND	5 ND	5 ND
1,2,3-TRIMETHYLBENZENE	ug/l	none		**4.1**	5 ND	5 ND	5 ND	5 ND	5 ND
VINYL CHLORIDE	ug/l	**200**	10 ND	0.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND	2.5 ND
XYLENES - m,p	ug/l	none	10 ND	**23.8**	10 ND	10 ND	**14**	10 ND	10 ND

Notes:
Data prior to Feb. 2004 were provided by Sanborn, Head & Assocs.
ND - Not Detected to the detection limit indicated.
Blank cell - Not analyzed on that date.
bold = laboratory detected concentration.
italics = qualified data, see Endyne report.
[1] Toxicity Characteristic = Taken from Vermont Hazardous Waste Management Regulations
12/31/2016; Chapter 2, Table 1, Maximum Concentration of Contaminants for the Characteristic of Toxicity.
Data prior to 10/29/2015 is hidden to conserve space & is available upon request.

C.V. LANDFILL
EAST MONTPELIER, VERMONT
LEACHATE - SEMIVOLATILES
EPA Method 8270

SAMPLING DATE [1] LOCATION ID	UNITS	Toxicity Characteristic [1]	10/29/2015 Leachate	10/19/2016 Leachate	10/16/2017 Leachate	10/11/2018 Leachate	10/24/2019 Leachate	10/29/2020 Leachate	10/21/2021 Leachate
SEMI-VOLATILE ORGANICS (EPA Method 8270)									
Non-Detected	ug/L		ND	ND	ND	ND	ND	ND	ND
Acenaphthylene	ug/L	none							
Dibenzofuran	ug/L	none							
1,4 Dichlorobenzene	ug/L	**7500**							
Diethyl phthalate	ug/L	none							
Fluorene	ug/L	none							
Naphthalene	ug/L	none							
3&4 Methylphenol	ug/L	none							
Phenanthrene	ug/L	none							
Phenol	ug/L	none							
2-Methylnaphthalene	ug/L	none							
1-Methylnaphthalene	ug/L	none							
Bis(2-ethylhexyl)phthalate	ug/L	none							
UIP's	#	none	1	0	0	1	0	0	0

Notes:

Data prior to Feb. 2004 were provided by Sanborn, Head & Assocs.
Only detected compounds are shown. All other 8270 compounds are non-detect.
Data prior to 10/29/2015 is hidden to conserve space & is available upon request.
Blank cell = non-detected.
UIP's = Unidentified Peaks.
italics = qualified data, see Endyne report.
[1] Toxicity Characteristic = Taken from Vermont Hazardous Waste Management Regulations 12/31/2016;
Chapter 2, Table 1, Maximum Concentration of Contaminants for the Characteristic of Toxicity.
ND = Non-detected above laboratory detetion limits on laboratory report.

ENDYNE Inc.
Environmental Laboratories

Laboratory Report

WaiteHeindel Environmental	070338
7 Kilburn Street	
Suite 301	
Burlington, VT 05406-4709	
Atten: Craig Heindel	

PROJECT: CV LF GWSW
WORK ORDER: **2110-31728**
DATE RECEIVED: October 21, 2021
DATE REPORTED: November 04, 2021
SAMPLER: SC HW

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and “N” the Plattsburgh, NY lab under certification ELAP 11892. “Sub” indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. “A” indicates the referenced laboratory is NELAC accredited for the parameter reported. “N” indicates the laboratory is not accredited. “U” indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an “A” meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31728**
DATE RECEIVED: 10/21/2021

010 Site: SS-101 Date Sampled: 10/21/21 Time: 10:16

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
BOD-5day	< 4.0	mg/L	SM 5210B(11)	10/22/21	11:48	W	JSS	A	
Chloride	11	mg/L	SM 4500-Cl-E-2011	10/29/21		N	MAP	A	
COD	14	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Hardness, Total as CaCO3	97	mg/L	EPA 200.7	11/1/21		W	FAA	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Calcium, Total	34	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Iron, Total	0.22	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Magnesium, Total	3.0	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Manganese, Total	0.039	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	
Sodium, Total	7.1	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:47	W	SJM	A	

011 Site: SS-102 Date Sampled: 10/21/21 Time: 10:38

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
BOD-5day	< 4.0	mg/L	SM 5210B(11)	10/22/21	11:49	W	JSS	A	
Chloride	10	mg/L	SM 4500-Cl-E-2011	10/29/21		N	MAP	A	
COD	15	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Hardness, Total as CaCO3	97	mg/L	EPA 200.7	11/1/21		W	FAA	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Calcium, Total	34	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Iron, Total	0.22	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Magnesium, Total	3.0	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Manganese, Total	0.038	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	
Sodium, Total	6.8	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:52	W	SJM	A	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31728**
DATE RECEIVED: 10/21/2021

013 Site: SS-11 Date Sampled: 10/21/21 Time: 9:46

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
BOD-5day	< 4.0	mg/L	SM 5210B(11)	10/22/21	11:52	W	JSS	A	
Chloride	54	mg/L	SM 4500-Cl-E-2011	10/29/21		N	MAP	A	
COD	10	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Hardness, Total as CaCO3	221	mg/L	EPA 200.7	11/1/21		W	FAA	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Calcium, Total	72	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Iron, Total	0.38	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Magnesium, Total	10	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Manganese, Total	0.12	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	
Sodium, Total	32	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:56	W	SJM	A	

014 Site: SS-12 Date Sampled: 10/21/21 Time: 9:12

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
BOD-5day	< 4.0	mg/L	SM 5210B(11)	10/22/21	11:56	W	JSS	A	
Chloride	9.1	mg/L	SM 4500-Cl-E-2011	10/29/21		N	MAP	A	
COD	10	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Hardness, Total as CaCO3	249	mg/L	EPA 200.7	11/1/21		W	FAA	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Calcium, Total	87	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Iron, Total	0.41	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Magnesium, Total	7.6	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Manganese, Total	0.15	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	
Sodium, Total	6.1	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:00	W	SJM	A	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31728**
DATE RECEIVED: 10/21/2021

TEST METHOD: EPA 8260C

010 Site: SS-101 Sampled: 10/21/21 10:16 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31728**
DATE RECEIVED: 10/21/2021

TEST METHOD: EPA 8260C

011 Site: SS-102 Sampled: 10/21/21 10:38 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31728**
DATE RECEIVED: 10/21/2021

TEST METHOD: EPA 8260C

013 Site: SS-11 Sampled: 10/21/21 9:46 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	95	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31728**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/21/2021
REPORT DATE: 11/4/2021

TEST METHOD: EPA 8260C

014 Site: SS-12 Sampled: 10/21/21 9:12 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental WORK ORDER: **2110-31728**
PROJECT: CV LF GWSW DATE RECEIVED: 10/21/2021
REPORT DATE: 11/4/2021

TEST METHOD: EPA 8260C

015 Site: Trip Blank Sampled: 10/21/21 9:00 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	97	%	A	
Surr. 3 (4-Bromofluorobenzene)	97	%	A		Unidentified Peaks	0		U	

CV LF GWSW

Endyne Inc. COC

Prepared: 4/20/21

2110-31728

2110-31728

WaiteHeindel Environmental
CV LF GWSW

Bill to:	Report to:	
Mr. Joe Gay	Craig Heindel	Customer # 070:
Casella Waste Management Inc.	WaiteHeindel Environmental	
220 Avenue B	7 Kilburn Street	CVLANDFILLGW:
Williston VT 05495	Burlington VT 05406-470:	
Ph: (802)-651-5454	cheindel@gmavt.net;john.gay@cas	W-70338C

WE-1B   Sampled Date/Time: ___/___/___@_____   Sampler: ________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-3R   Sampled Date/Time: ___/___/___@_____   Sampler: ________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-5AR Sampled Date/Time: ___/___/___@______ Sampler: ____________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-6R Sampled Date/Time: ___/___/___@______ Sampler: ____________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-7 Sampled Date/Time: ___/___/___@______ Sampler: ____________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____

MW-8R Sampled Date/Time: ___/___/___@______ Sampler: __________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
~~Iron, Dissolved~~ ~~Manganese, Dissolved~~	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
~~Arsenic, Total~~ ~~Cadmium, Total~~ ~~Chromium, Total~~ ~~Copper, Total~~ ~~Iron, Total~~ ~~Lead, Total~~ ~~Manganese, Total~~ ~~Mercury, Total~~ Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-10R Sampled Date/Time: ___/___/___@______ Sampler: __________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
Iron, Dissolved ~~Manganese, Dissolved~~	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
~~Arsenic, Total~~ ~~Cadmium, Total~~ ~~Chromium, Total~~ ~~Copper, Total~~ ~~Iron, Total~~ ~~Lead, Total~~ ~~Manganese, Total~~ ~~Mercury, Total~~ Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

G-4 Sampled Date/Time: ___/___/___@______ Sampler: __________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4__________
~~Iron, Dissolved~~ ~~Manganese, Dissolved~~	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
~~Arsenic, Total~~ ~~Cadmium, Total~~ ~~Chromium, Total~~ ~~Copper, Total~~ ~~Iron, Total~~ ~~Lead, Total~~ ~~Manganese, Total~~ ~~Mercury, Total~~ ~~Molybdenum, Total~~ Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____

Duplicate — Sampled Date/Time: 10/21/21 @_____ — Sampler: __________

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4________
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3
~~Arsenic, Total~~ ~~Cadmium, Total~~ ~~Chromium, Total~~ ~~Copper, Total~~ ~~Iron, Total~~ ~~Lead, Total~~ ~~Manganese, Total~~ ~~Mercury, Total~~ ~~Molybdenum, Total~~ ~~Nickel, Total~~ ~~Selenium, Total~~ Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-101 — Sampled Date/Time: 10/21/21 @ 1016 — Sampler: SC / HW

BOD-5day Chloride	1 - 1/2 gal Plastic 1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4________
Hardness, Total Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-102 — Sampled Date/Time: 10/21/21 @ 1038 — Sampler: SC / HW

BOD-5day Chloride	1 - 1/2 gal Plastic 1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4________
Hardness, Total Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-4 Sampled Date/Time: __/__/__ @____ Sampler: ________

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4______
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-11 Sampled Date/Time: 10 / 21 / 21 @0946 Sampler: SC / HW

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4______
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-12 Sampled Date/Time: 10 / 21 / 21 @0912 Sampler: SC / HW

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4______
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

Trip Blank	Sampled Date/Time:	10/21/21 @ 900	Sampler: SC /HW	
	VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl	
Equipment Blank	Sampled Date/Time:	___/___/___ @____	Sampler: ______	
	VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl	

Relinquished by: [signature] 10/21/21 1317 Date Time

Accepted by: __________ Date Time

Relinquished by: __________ Date Time

Received by: [signature] 10-21-21 12:16 Date Time

Sites/Parameters correct as listed. Client Initials ______

Client Authorization to use Subcontract lab Client Initials ______

Sample origin: VT ☐ NH ☐ NY ☐ Other ☐

Special reporting instructions: (PO#) __________

Requested Turnaround Time: Routine: Rush Due Date __________

Delv: Client
Temp C: 1.8
Comment:

Tmpl Ck
Log by

Lab use Only

ENDYNE Inc. www.endynelabs.com

160 James Brown Dr.
Williston, VT 05495
Ph 802-879-4333
Fax 802-879-7103

56 Etna Road
Lebanon, NH 03766
Ph 603-678-4891
Fax 603-678-4893

315 New York Rd.
Plattsburgh, NY 12903
Ph 518-563-1720
Fax 518-563-0052

ENDYNE Inc.
Environmental Laboratories

Laboratory Report

WaiteHeindel Environmental	070338
7 Kilburn Street	
Suite 301	
Burlington, VT 05406-4709	
Atten: Craig Heindel	

PROJECT: CV LF GWSW
WORK ORDER: **2110-31767**
DATE RECEIVED: October 22, 2021
DATE REPORTED: November 10, 2021
SAMPLER: WS/SC

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and “N” the Plattsburgh, NY lab under certification ELAP 11892. “Sub” indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. “A” indicates the referenced laboratory is NELAC accredited for the parameter reported. “N” indicates the laboratory is not accredited. “U” indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an “A” meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

001 Site: WE-1B Date Sampled: 10/21/21 Time: 13:22

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	1200	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	69	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0027	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Iron, Dissolved	0.13	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	8.0	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	0.0046	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Manganese, Dissolved	0.45	mg/L	EPA 200.8	10/27/21	17:34	W	SJM	A	
Manganese, Total	0.41	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Nickel, Total	0.0073	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	
Sodium, Total	660	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	0.024	mg/L	EPA 6020B	11/3/21	12:17	W	SJM	A	

002 Site: MW-3R Date Sampled: 10/21/21 Time: 14:44

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	< 2.7	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	< 10	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Iron, Dissolved	< 0.020	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	0.17	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Manganese, Dissolved	0.059	mg/L	EPA 200.8	10/27/21	17:37	W	SJM	A	
Manganese, Total	0.082	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	
Sodium, Total	11	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:30	W	SJM	A	

003 Site: MW-5AR Date Sampled: 10/21/21 Time: 10:49

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	20	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

003 | Site: MW-5AR | Date Sampled: 10/21/21 | Time: 10:49

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
COD	< 10	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0158	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Iron, Dissolved	2.3	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	3.4	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Manganese, Dissolved	0.25	mg/L	EPA 200.8	10/27/21	17:52	W	SJM	A	
Manganese, Total	0.26	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	
Sodium, Total	13	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:34	W	SJM	A	

004 | Site: MW-6R | Date Sampled: 10/21/21 | Time: 15:30

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	940	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	440	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0555	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Iron, Dissolved	14	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	15	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Manganese, Dissolved	0.11	mg/L	EPA 200.8	10/29/21	14:04	W	SJM	A	
Manganese, Total	0.075	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Nickel, Total	0.110	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	
Sodium, Total	590	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:38	W	SJM	A	

005 | Site: MW-7 | Date Sampled: 10/21/21 | Time: 9:37

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	260	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	24	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

005 Site: MW-7 Date Sampled: 10/21/21 Time: 9:37

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0111	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Iron, Dissolved	1.4	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	2.8	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Manganese, Dissolved	1.6	mg/L	EPA 200.8	10/27/21	18:03	W	SJM	A	
Manganese, Total	1.5	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	
Sodium, Total	150	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:42	W	SJM	A	

006 Site: MW-8R Date Sampled: 10/21/21 Time: 10:47

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	200	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	76	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0109	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Iron, Dissolved	4.3	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	10	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Manganese, Dissolved	2.4	mg/L	EPA 200.8	10/27/21	18:07	W	SJM	A	
Manganese, Total	2.4	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Nickel, Total	0.0594	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	
Sodium, Total	160	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:47	W	SJM	A	

007 Site: MW-10R Date Sampled: 10/21/21 Time: 13:02

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	230	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	40	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	

Laboratory Report

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

007 | Site: MW-10R | Date Sampled: 10/21/21 | Time: 13:02

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Arsenic, Total	0.0252	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Iron, Dissolved	21	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	23	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Manganese, Dissolved	0.21	mg/L	EPA 200.8	10/27/21	18:10	W	SJM	A	
Manganese, Total	0.23	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	
Sodium, Total	190	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:51	W	SJM	A	

008 | Site: G-4 | Date Sampled: 10/21/21 | Time: 14:09

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	< 2.7	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	< 10	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0067	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Iron, Dissolved	0.69	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	0.85	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Manganese, Dissolved	0.099	mg/L	EPA 200.8	10/27/21	18:14	W	SJM	A	
Manganese, Total	0.10	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Nickel, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	
Sodium, Total	10	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:55	W	SJM	A	

009 | Site: Duplicate (MW-8R) | Date Sampled: 10/21/21 | Time:

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Chloride	200	mg/L	SM 4500-Cl-E-2011	11/5/21	13:06	N	LKL	A	
COD	67	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0260	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

009 Site: Duplicate (MW-8R) Date Sampled: 10/21/21 Time:

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Iron, Dissolved	4.1	mg/L	EPA 200.7	11/3/21		W	FAA	A	
Iron, Total	22	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Manganese, Dissolved	2.4	mg/L	EPA 200.8	10/27/21	18:18	W	SJM	A	
Manganese, Total	2.4	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Nickel, Total	0.0598	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	
Sodium, Total	160	mg/L	EPA 6010C	11/4/21		W	FAA	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	11/3/21	12:59	W	SJM	A	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

001 Site: WE-1B Sampled: 10/21/21 13:22 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	99	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	99	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

002 Site: MW-3R Sampled: 10/21/21 14:44 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	99	%	A	
Surr. 3 (4-Bromofluorobenzene)	97	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

003 Site: MW-5AR | Sampled: 10/21/21 10:49 | Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

004 Site: MW-6R | Sampled: 10/21/21 15:30 | Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	101	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	74.9	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	2.5	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	461	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	20.8	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 3.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	1.8	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	1.5	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	1.1	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	97	%	A	
Surr. 3 (4-Bromofluorobenzene)	99	%	A		Unidentified Peaks	3		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

006 Site: MW-8R Sampled: 10/21/21 10:47 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	56.6	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	32.3	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	5.2	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	2.9	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	2.6	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	49.2	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	0.6	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	95	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

007 Site: MW-10R Sampled: 10/21/21 13:02 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	4.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	46.8	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	1.8	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	13.3	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	28.6	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	11.1	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	0.6	ug/L	A		Trichloroethene	1.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	1.4	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	1		U	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF GWSW
REPORT DATE: 11/10/2021

WORK ORDER: **2110-31767**
DATE RECEIVED: 10/22/2021

TEST METHOD: EPA 8260C

009 Site: Duplicate (MW-8R) Sampled: 10/21/21 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	56.4	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	23.5	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	5.1	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	2.9	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	2.6	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	43.6	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	0.6	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	96	%	A		Surr. 2 (Toluene d8)	99	%	A	
Surr. 3 (4-Bromofluorobenzene)	95	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

015 Site: Trip Blank | Sampled: 10/21/21 9:10 | Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	36.9	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	99	%	A	
Surr. 3 (4-Bromofluorobenzene)	97	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31767**
PROJECT: CV LF GWSW | DATE RECEIVED: 10/22/2021
REPORT DATE: 11/10/2021

TEST METHOD: EPA 8260C

016 Site: Equipment Blank | Sampled: 10/21/21 13:36 | Test Date: 10/29/21 | W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	QA-
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	98	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	99	%	A		Unidentified Peaks	0		U	

Report Summary of Qualifiers and Notes

QA-: QA/QC associated with this analysis did not meet laboratory acceptance limits indicating the results may be biased low.

CV LF GWSW

Endyne Inc. COC

Prepared: 4/20/21

2110-31767

2110-31767

WaiteHeindel Environmental
CV LF GWSW

Bill to:	Report to:	
Mr. Joe Gay	Craig Heindel	Customer # C
Casella Waste Management Inc.	WaiteHeindel Environmental	
220 Avenue B	7 Kilburn Street	CVLANDFILLC
Williston VT 05495	Burlington VT 05406-4709	
Ph: (802)-651-5454	cheindel@gmavt.net;john.gay@case	W-703

WE-1B Sampled Date/Time: 10/21/21 @ 1322 Sampler: WS

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals ✓FF	Filter then preserve w HNO3
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-3R Sampled Date/Time: 10/21/21 @ 1444 Sampler: WS/SC

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-5AR Sampled Date/Time: 10/21/21 @ 1049 Sampler: HW

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-6R Sampled Date/Time: 10/21/21 @ 1530 Sampler: SC/WS

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-7 Sampled Date/Time: 10/21/21 @ 0937 Sampler: HW

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____

MW-8R Sampled Date/Time: 10 / 21 / 21 @ 1047 Sampler: WS

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

MW-10R Sampled Date/Time: 10 / 21 / 21 @ 1302 Sampler: SC

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

G-4 Sampled Date/Time: 10 / 21 / 21 @ 1409 Sampler: WS/SC

Chloride	1 - 2oz Plastic	<6C
COD	1 - 40ml Vial	<6C, H2SO4 ✓
Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 ✓FF
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____

Duplicate (MW-8R)		Sampled Date/Time: 10/21/21 @ —	Sampler: WS
	Chloride	1 - 2oz Plastic	<6C
	COD	1 - 40ml Vial	<6C, H2SO4 ✓
	Iron, Dissolved Manganese, Dissolved	1 - 4oz Plastic diss Metals	Filter then preserve w HNO3 FF
	Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
	VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

~~SS-101~~		Sampled Date/Time: ___/___/___@____	Sampler: ________
	BOD-5day Chloride	1 - 1/2 gal Plastic 1 - 2oz Plastic	<6C
	COD	1 - 40ml Vial	<6C, H2SO4________
	Hardness, Total Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
	VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

~~SS-102~~		Sampled Date/Time: ___/___/___@____	Sampler: ________
	BOD-5day Chloride	1 - 1/2 gal Plastic 1 - 2oz Plastic	<6C
	COD	1 - 40ml Vial	<6C, H2SO4________
	Hardness, Total Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Sodium, Total Zinc, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 ____
	VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-4 Sampled Date/Time: ___/___/___@______ Sampler: ____________

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4_________
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-11 Sampled Date/Time: ___/___/___@______ Sampler: ____________

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4_________
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

SS-12 Sampled Date/Time: ___/___/___@______ Sampler: ____________

BOD-5day	1 - 1/2 gal Plastic	<6C
Chloride	1 - 2oz Plastic	
COD	1 - 40ml Vial	<6C, H2SO4_________
Hardness, Total	1 - 16oz Plastic Total Metals	HNO3 pH< 2 _____
Arsenic, Total		
Cadmium, Total		
Chromium, Total		
Copper, Total		
Iron, Total		
Lead, Total		
Manganese, Total		
Mercury, Total		
Molybdenum, Total		
Nickel, Total		
Selenium, Total		
Sodium, Total		
Zinc, Total		
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

Trip Blank	Sampled Date/Time:	10/21/21 @ 0910	Sampler: WS
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl	
Equipment Blank	Sampled Date/Time:	10/21/21 @ 1336	Sampler: WS
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl	

Relinquished by: Wendy Shellito 10/22/21 0820 Date Time

Accepted by: Date Time

Relinquished by: Date Time

Received by: 10/22/21 8:20 Date Time

Sites/Parameters correct as listed. Client Initials WS

Client Authorization to use Subcontract lab Client Initials WS

Sample origin: VT [X] NH [ ] NY [ ] Other [ ]

Special reporting instructions: (PO#)

Requested Turnaround Time: Routine: Rush Due Date

Delv: Client
Temp C: ~4.2
Comment:

Tmpl Ck
Log by

Lab use Only

ENDYNE Inc.
Environmental Laboratories

WaiteHeindel Environmental	PROJECT: CV LF AUG Leachate
7 Kilburn Street 070338	WORK ORDER: **2108-23410**
Suite 301	DATE RECEIVED: August 10, 2021
Burlington, VT 05406-4709	DATE REPORTED: August 18, 2021
Atten: Craig Heindel	SAMPLER: WS

Laboratory Report

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields. The Williston, VT facility is also ISO/IEC 17025:2017 accredited for Total Coliform and E coli by SM9223B.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

Laboratory Report DATE REPORTED: 08/18/2021

CLIENT: WaiteHeindel Environmental WORK ORDER: **2108-23410**
PROJECT: CV LF AUG Leachate DATE RECEIVED: 08/10/2021

001 Site: Leachate Date Sampled: 8/10/21 Time: 12:10

Parameter	Result	Units	Method	Analysis Date/Time		Lab/Tech	NELAC	Qual.
BOD-5day	11	mg/L	SM 5210B(11)	8/11/21	11:01	W JSS	A	
Chloride	280	mg/L	EPA 300.0	8/14/21	3:15	W TEL	A	
COD	150	mg/L	Hach8000/EPA410.4	8/13/21	11:19	N LKL	A	
TKN	66	mg/L	EPA 351.2, R.2(1993)	8/17/21		N MAP	A	
Metals Digestion	Digested		EPA 3015A	8/16/21		W FAA	A	
Arsenic, Total	0.0070	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Cadmium, Total	< 0.0020	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Chromium, Total	< 0.0050	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Copper, Total	< 0.020	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Iron, Total	35	mg/L	EPA 6010C	8/16/21		W FAA	A	
Lead, Total	< 0.0010	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Manganese, Total	0.88	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Mercury, Total	< 0.0002	mg/L	EPA 6020B	8/16/21	16:56	W SJM	N	
Molybdenum, Total	< 0.010	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Nickel, Total	0.0317	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Selenium, Total	< 0.0020	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	
Zinc, Total	< 0.020	mg/L	EPA 6020B	8/16/21	16:56	W SJM	A	

CV LF FEB/MAY/AUG Leachate

Endyne Inc. COC

Prepared: 2/11/20

2108-23410

2108-23410

WaiteHeindel Environmental
CV LF AUG Leachate

Bill to:	Report to:	
Mr. Joe Gay	Craig Heindel	Cust # 07(
Casella Waste Management Inc.	WaiteHeindel Environmental	
220 Avenue B	7 Kilburn Street	CVQUARTLE,
Williston VT 05495	Burlington VT 05406-470(	
Ph: (802)-651-5454	cheindel@gmavt.net;john.gay@cas(	W-70338(

Page 1 of 1

Leachate

Sampled Date/Time: 8 10 21 @ 1210 Sampler: WS

BOD-5day Chloride	1 - 8 oz Plastic	<6C
TKN	1 - 8 oz Plastic	<6C, NY Phos, H2SO4 ✓
COD	1 - 40ml Vial :	<6C, H2SO4 ✓
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Zinc, Total	1 - 8 oz Plastic Total Metals	HNO3 pH< 2 ____

One or more sample bottles in this project must be kept refrigerated or on ice until delivery at the laboratory.

Your initials will allow Endyne to proceed with analysis if the temperature preservation requirement is not satisfied. WS ______ [redacted]

Relinquished by: Wendy Shelto 8/10/21 1329 Date Time Accepted by: ______

Relinquished by: ______ Date Time Received by: [signature] 8/10/21 13:29 Date Time

Sites/Parameters correct as listed. Client Initials WS

Client Authorization to use Subcontract lab Client Initials WS

Sample origin: VT ☒ NH ☐ NY ☐ Other ☐

Special reporting instructions: (PO#) ______

Requested Turnaround Time: Routine: Rush Due Date ______

Delv: Client
Temp C: 3.7
Comment:

Tmpl Ck
Log by

Lab use Only

ENDYNE Inc. www.endynelabs.com

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Williston, VT 05495
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ENDYNE Inc.
Environmental Laboratories

Laboratory Report

WaiteHeindel Environmental	070338
7 Kilburn Street	
Suite 301	
Burlington, VT 05406-4709	
Atten: Craig Heindel	

PROJECT: CV LF Leachate
WORK ORDER: **2110-31727**
DATE RECEIVED: October 21, 2021
DATE REPORTED: November 04, 2021
SAMPLER: SC HW

Enclosed please find the results of the analyses performed for the samples referenced on the attached chain of custody. All required method quality control elements including instrument calibration were performed in accordance with method requirements and determined to be acceptable unless otherwise noted.

The column labeled Lab/Tech in the accompanying report denotes the laboratory facility where the testing was performed and the technician who conducted the assay. A "W" designates the Williston, VT lab under NELAC certification ELAP 11263; "R" designates the Lebanon, NH facility under certification NH 2037 and "N" the Plattsburgh, NY lab under certification ELAP 11892. "Sub" indicates the testing was performed by a subcontracted laboratory. The accreditation status of the subcontracted lab is referenced in the corresponding NELAC and Qual fields.

The NELAC column also denotes the accreditation status of each laboratory for each reported parameter. "A" indicates the referenced laboratory is NELAC accredited for the parameter reported. "N" indicates the laboratory is not accredited. "U" indicates that NELAC does not offer accreditation for that parameter in that specific matrix. Test results denoted with an "A" meet all National Environmental Laboratory Accreditation Program requirements except where denoted by pertinent data qualifiers. Test results are representative of the samples as they were received at the laboratory

Endyne, Inc. warrants, to the best of its knowledge and belief, the accuracy of the analytical test results contained in this report, but makes no other warranty, expressed or implied, especially no warranties of merchantability or fitness for a particular purpose.

Reviewed by:

Harry B. Locker, Ph.D.
Laboratory Director

Laboratory Report

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF Leachate
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31727**
DATE RECEIVED: 10/21/2021

001 Site: Leachate Date Sampled: 10/21/21 Time: 11:40

Parameter	Result	Units	Method	Analysis Date		Lab/Tech		NELAC	Qual.
BOD-5day	8.2	mg/L	SM 5210B(11)	10/22/21	11:45	W	JSS	A	
Chloride	290	mg/L	SM 4500-Cl-E-2011	10/29/21		N	MAP	A	
COD	200	mg/L	EPA 410.4	10/26/21	12:45	N	LKL	A	
TKN	76	mg/L	EPA 351.2, R.2(1993)	11/2/21		N	MAP	A	
Metals Digestion	Digested		EPA 3015A	11/3/21	16:40	W	VRL	A	
Arsenic, Total	0.0213	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Cadmium, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Chromium, Total	< 0.050	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Copper, Total	< 0.20	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Iron, Total	160	mg/L	EPA 6010C	11/1/21		W	FAA	A	
Lead, Total	< 0.010	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Manganese, Total	0.24	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Mercury, Total	< 0.0020	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	N	
Molybdenum, Total	< 0.10	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Nickel, Total	< 0.050	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Selenium, Total	< 0.020	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	
Zinc, Total	< 0.20	mg/L	EPA 6020B	11/3/21	11:43	W	SJM	A	

CLIENT: WaiteHeindel Environmental | WORK ORDER: **2110-31727**
PROJECT: CV LF Leachate | DATE RECEIVED: 10/21/2021
REPORT DATE: 11/4/2021

TEST METHOD: EPA 8270D

001 Site: Leachate | Sampled: 10/21/21 11:40 | Test Date: 10/28/21 W CLD

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Extraction EPA 3510C	Extracted		A		N-Nitrosodimethylamine	< 50.0	ug/L	A	
Pyridine	< 100	ug/L	A		Aniline	< 100	ug/L	N	
Bis(2-chloroethyl)ether	< 50.0	ug/L	A		1,2-Dichlorobenzene	< 20.0	ug/L	A	
1,3-Dichlorobenzene	< 20.0	ug/L	A		1,4-Dichlorobenzene	< 20.0	ug/L	A	
Benzyl alcohol	< 200	ug/L	N		2,2'-Oxybis(1-chloropropane)	< 50.0	ug/L	A	
N-Nitrosodi-n-propylamine	< 100	ug/L	A		Hexachloroethane	< 20.0	ug/L	A	
Nitrobenzene	< 50.0	ug/L	A		N-Nitrosopiperidine	< 100	ug/L	N	
Isophorone	< 20.0	ug/L	A		Bis(2-chloroethoxy)methane	< 50.0	ug/L	A	
1,2,4-Trichlorobenzene	< 20.0	ug/L	A		Naphthalene	< 5.0	ug/L	A	
4-Chloroaniline	< 50.0	ug/L	N		Hexachlorobutadiene	< 20.0	ug/L	A	
N-Nitrosodi-n-butylamine	< 50.0	ug/L	N		2-Methylnaphthalene	< 5.0	ug/L	A	
1-Methylnaphthalene	< 5.0	ug/L	U		Hexachlorocyclopentadiene	< 200	ug/L	A	
2-Chloronaphthalene	< 20.0	ug/L	A		1-Chloronaphthalene	< 20.0	ug/L	N	
2-Nitroaniline	< 200	ug/L	N		Dimethyl phthalate	< 20.0	ug/L	A	
2,6-Dinitrotoluene	< 50.0	ug/L	A		Acenaphthylene	< 5.0	ug/L	A	
3-Nitroaniline	< 50.0	ug/L	N		Acenaphthene	< 5.0	ug/L	A	
Dibenzofuran	< 20.0	ug/L	N		2,4-Dinitrotoluene	< 50.0	ug/L	A	
1-Naphthylamine	< 100	ug/L	N		2-Naphthylamine	< 100	ug/L	N	
Fluorene	< 5.0	ug/L	A		Diethyl phthalate	< 50.0	ug/L	A	
4-Chlorophenyl phenyl ether	< 20.0	ug/L	A		4-Nitroaniline	< 200	ug/L	N	
N-Nitrosodiphenylamine	< 50.0	ug/L	A		Azobenzene/1,2-Diphenylhydrazine	< 50.0	ug/L	U	
4-Bromophenyl phenyl ether	< 20.0	ug/L	A		Hexachlorobenzene	< 10.0	ug/L	A	
Phenanthrene	< 5.0	ug/L	A		Anthracene	< 5.0	ug/L	A	
Carbazole	< 50.0	ug/L	N		Di-n-butylphthalate	< 50.0	ug/L	A	
Fluoranthene	< 5.0	ug/L	A		Benzidine	< 200	ug/L	A	
Pyrene	< 5.0	ug/L	A		Butyl benzyl phthalate	< 50.0	ug/L	A	
Benzo(a)anthracene	< 5.0	ug/L	A		Chrysene	< 5.0	ug/L	A	
3,3'-Dichlorobenzidine	< 50.0	ug/L	A		Bis(2-ethylhexyl)phthalate	< 50.0	ug/L	A	
Di-n-octylphthalate	< 50.0	ug/L	A		Benzo(b)fluoranthene	< 5.0	ug/L	A	
Benzo(k)fluoranthene	< 5.0	ug/L	A		Benzo(a)pyrene	< 5.0	ug/L	A	
Indeno(1,2,3-cd)pyrene	< 5.0	ug/L	A		Dibenzo(a,h)anthracene	< 5.0	ug/L	A	
Benzo(g,h,i)perylene	< 5.0	ug/L	A		Phenol	< 20.0	ug/L	A	
2-Chlorophenol	< 50.0	ug/L	A		2-Methylphenol (o-cresol)	< 50.0	ug/L	A	
3&4-Methylphenol (m&p-cresol)	< 50.0	ug/L	A		Cresols, Total	< 100	ug/L	A	
2-Nitrophenol	< 100	ug/L	A		2,4-Dimethylphenol	< 50.0	ug/L	A	
2,4-Dichlorophenol	< 50.0	ug/L	A		2,6-Dichlorophenol	< 50.0	ug/L	N	
4-Chloro-3-methylphenol	< 50.0	ug/L	A		2,4,5-Trichlorophenol	< 50.0	ug/L	A	
2,4,6-Trichlorophenol	< 50.0	ug/L	A		2,4-Dinitrophenol	< 200	ug/L	A	
4-Nitrophenol	< 50.0	ug/L	A		4,6-Dinitro-2-methylphenol	< 200	ug/L	A	
Pentachlorophenol	< 100	ug/L	A		BaP Toxic Equiv. Quotient	< 11.6	ug/L	U	
B/N Surr.1 Nitrobenzene-d5	57	%	A		B/N Surr.2 2-Fluorobiphenyl	59	%	A	
B/N Surr.3 Terphenyl-d14	93	%	A		Acid Surr.1 2-Fluorophenol	24	%	A	
Acid Surr.2 Phenol-d5	22	%	A		Acid Surr.3 Tribromophenol	89	%	A	
Unidentified Peaks	0		U						

Laboratory Report

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF Leachate
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31727**
DATE RECEIVED: 10/21/2021

TEST METHOD: EPA 8260C

001 Site: Leachate — Sampled: 10/21/21 11:40 — Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 25.0	ug/L	A		Chloromethane	< 15.0	ug/L	A	
Vinyl chloride	< 2.5	ug/L	A		Bromomethane	< 2.5	ug/L	A	
Chloroethane	< 25.0	ug/L	A		Trichlorofluoromethane	< 10.0	ug/L	A	
Diethyl ether	< 25.0	ug/L	N		1,1-Dichloroethene	< 3.5	ug/L	A	
Acetone	< 50.0	ug/L	A		Carbon disulfide	< 25.0	ug/L	A	
Methylene chloride	< 25.0	ug/L	A		t-Butanol	< 100	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 10.0	ug/L	A		trans-1,2-Dichloroethene	< 5.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 10.0	ug/L	N		1,1-Dichloroethane	< 5.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 10.0	ug/L	N		2-Butanone	< 50.0	ug/L	A	
2,2-Dichloropropane	< 5.0	ug/L	N		cis-1,2-Dichloroethene	< 5.0	ug/L	A	
Bromochloromethane	< 4.0	ug/L	A		Chloroform	< 5.0	ug/L	A	
Tetrahydrofuran	164	ug/L	N		1,1,1-Trichloroethane	< 5.0	ug/L	A	
Carbon tetrachloride	< 2.5	ug/L	A		1,1-Dichloropropene	< 5.0	ug/L	N	
Benzene	< 2.5	ug/L	A		t-Amylmethyl ether (TAME)	< 10.0	ug/L	N	
1,2-Dichloroethane	< 2.5	ug/L	A		Trichloroethene	< 2.5	ug/L	A	
1,2-Dichloropropane	< 2.5	ug/L	A		Dibromomethane	< 10.0	ug/L	A	
Bromodichloromethane	< 2.5	ug/L	A		cis-1,3-Dichloropropene	< 5.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 50.0	ug/L	A		Toluene	< 5.0	ug/L	A	
trans-1,3-Dichloropropene	< 5.0	ug/L	A		1,1,2-Trichloroethane	< 5.0	ug/L	A	
Tetrachloroethene	< 2.5	ug/L	A		1,3-Dichloropropane	< 5.0	ug/L	N	
2-Hexanone	< 50.0	ug/L	A		Dibromochloromethane	< 5.0	ug/L	A	
1,2-Dibromoethane	< 10.0	ug/L	A		Chlorobenzene	< 5.0	ug/L	A	
Ethylbenzene	< 5.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 10.0	ug/L	A	
Xylenes, Total	< 10.0	ug/L	A		Styrene	< 5.0	ug/L	A	
Bromoform	< 10.0	ug/L	A		Isopropylbenzene	< 5.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 10.0	ug/L	A		Bromobenzene	< 5.0	ug/L	A	
n-Propylbenzene	< 5.0	ug/L	A		1,2,3-Trichloropropane	< 10.0	ug/L	A	
2-Chlorotoluene	< 5.0	ug/L	A		1,3,5-Trimethylbenzene	< 5.0	ug/L	A	
4-Chlorotoluene	< 5.0	ug/L	A		t-Butylbenzene	< 5.0	ug/L	A	
1,2,4-Trimethylbenzene	< 5.0	ug/L	A		s-Butylbenzene	< 5.0	ug/L	A	
4-Isopropyltoluene	< 5.0	ug/L	A		1,3-Dichlorobenzene	< 5.0	ug/L	A	
1,4-Dichlorobenzene	9.1	ug/L	A		1,2,3-Trimethylbenzene	< 5.0	ug/L	U	
n-Butylbenzene	< 5.0	ug/L	A		1,2-Dichlorobenzene	< 5.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 10.0	ug/L	A		1,2,4-Trichlorobenzene	< 10.0	ug/L	A	
1,3,5-Trichlorobenzene	< 10.0	ug/L	N		Hexachlorobutadiene	< 2.5	ug/L	A	
Naphthalene	< 2.5	ug/L	A		1,2,3-Trichlorobenzene	< 2.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	97	%	A		Surr. 2 (Toluene d8)	98	%	A	
Surr. 3 (4-Bromofluorobenzene)	97	%	A		Unidentified Peaks	0		U	

CLIENT: WaiteHeindel Environmental
PROJECT: CV LF Leachate
REPORT DATE: 11/4/2021

WORK ORDER: **2110-31727**
DATE RECEIVED: 10/21/2021

TEST METHOD: EPA 8260C

002 Site: Trip Blank Sampled: 10/21/21 11:30 Test Date: 10/28/21 W TRP

Parameter	Result	Unit	Nelac	Qual	Parameter	Result	Unit	Nelac	Qual
Dichlorodifluoromethane	< 5.0	ug/L	A		Chloromethane	< 3.0	ug/L	A	
Vinyl chloride	< 0.5	ug/L	A		Bromomethane	< 0.5	ug/L	A	
Chloroethane	< 5.0	ug/L	A		Trichlorofluoromethane	< 2.0	ug/L	A	
Diethyl ether	< 5.0	ug/L	N		1,1-Dichloroethene	< 0.7	ug/L	A	
Acetone	< 10.0	ug/L	A		Carbon disulfide	< 5.0	ug/L	A	
Methylene chloride	< 5.0	ug/L	A		t-Butanol	< 20.0	ug/L	N	
Methyl-t-butyl ether (MTBE)	< 2.0	ug/L	A		trans-1,2-Dichloroethene	< 1.0	ug/L	A	
Di-isopropyl ether (DIPE)	< 2.0	ug/L	N		1,1-Dichloroethane	< 1.0	ug/L	A	
Ethyl-t-butyl ether (ETBE)	< 2.0	ug/L	N		2-Butanone	< 10.0	ug/L	A	
2,2-Dichloropropane	< 1.0	ug/L	N		cis-1,2-Dichloroethene	< 1.0	ug/L	A	
Bromochloromethane	< 0.8	ug/L	A		Chloroform	< 1.0	ug/L	A	
Tetrahydrofuran	< 10.0	ug/L	N		1,1,1-Trichloroethane	< 1.0	ug/L	A	
Carbon tetrachloride	< 0.5	ug/L	A		1,1-Dichloropropene	< 1.0	ug/L	N	
Benzene	< 0.5	ug/L	A		t-Amylmethyl ether (TAME)	< 2.0	ug/L	N	
1,2-Dichloroethane	< 0.5	ug/L	A		Trichloroethene	< 0.5	ug/L	A	
1,2-Dichloropropane	< 0.5	ug/L	A		Dibromomethane	< 2.0	ug/L	A	
Bromodichloromethane	< 0.5	ug/L	A		cis-1,3-Dichloropropene	< 1.0	ug/L	A	
4-Methyl-2-pentanone (MIBK)	< 10.0	ug/L	A		Toluene	< 1.0	ug/L	A	
trans-1,3-Dichloropropene	< 1.0	ug/L	A		1,1,2-Trichloroethane	< 1.0	ug/L	A	
Tetrachloroethene	< 0.5	ug/L	A		1,3-Dichloropropane	< 1.0	ug/L	N	
2-Hexanone	< 10.0	ug/L	A		Dibromochloromethane	< 1.0	ug/L	A	
1,2-Dibromoethane	< 2.0	ug/L	A		Chlorobenzene	< 1.0	ug/L	A	
Ethylbenzene	< 1.0	ug/L	A		1,1,1,2-Tetrachloroethane	< 2.0	ug/L	A	
Xylenes, Total	< 2.0	ug/L	A		Styrene	< 1.0	ug/L	A	
Bromoform	< 2.0	ug/L	A		Isopropylbenzene	< 1.0	ug/L	A	
1,1,2,2-Tetrachloroethane	< 2.0	ug/L	A		Bromobenzene	< 1.0	ug/L	A	
n-Propylbenzene	< 1.0	ug/L	A		1,2,3-Trichloropropane	< 2.0	ug/L	A	
2-Chlorotoluene	< 1.0	ug/L	A		1,3,5-Trimethylbenzene	< 1.0	ug/L	A	
4-Chlorotoluene	< 1.0	ug/L	A		t-Butylbenzene	< 1.0	ug/L	A	
1,2,4-Trimethylbenzene	< 1.0	ug/L	A		s-Butylbenzene	< 1.0	ug/L	A	
4-Isopropyltoluene	< 1.0	ug/L	A		1,3-Dichlorobenzene	< 1.0	ug/L	A	
1,4-Dichlorobenzene	< 1.0	ug/L	A		1,2,3-Trimethylbenzene	< 1.0	ug/L	U	
n-Butylbenzene	< 1.0	ug/L	A		1,2-Dichlorobenzene	< 1.0	ug/L	A	
1,2-Dibromo-3-Chloropropane	< 2.0	ug/L	A		1,2,4-Trichlorobenzene	< 2.0	ug/L	A	
1,3,5-Trichlorobenzene	< 2.0	ug/L	N		Hexachlorobutadiene	< 0.5	ug/L	A	
Naphthalene	< 0.5	ug/L	A		1,2,3-Trichlorobenzene	< 0.5	ug/L	A	
Surr. 1 (Dibromofluoromethane)	95	%	A		Surr. 2 (Toluene d8)	97	%	A	
Surr. 3 (4-Bromofluorobenzene)	98	%	A		Unidentified Peaks	0		U	

CV LF Leachate

Endyne Inc. COC

Prepared: 9/8/21

2110-31727

2110-31727
WaiteHeindel Environmental
CV LF Leachate

Bill to:	Report to:	
Mr. Joe Gay	Craig Heindel	Cust # 07(
Casella Waste Management Inc.	WaiteHeindel Environmental	
220 Avenue B	7 Kilburn Street	CVQUARTLE/
Williston VT 05495	Burlington VT 05406-470!	
Ph: (802)-651-5454	cheindel@gmavt.net;john.gay@cas(	W-70338(

Leachate

Sampled Date/Time: 10/21/21 @ 1140 Sampler: SC/HW

SVOC BNAs	2 - 8 oz Amber Glass	<6C, pH 5-9____
BOD-5day	1 - 8 oz Plastic	<6C
Chloride	1 - 2 oz Plastic	<6C
TKN	1 - 8 oz Plastic	<6C, NY Phos, H2SO4____
COD	Taken from TKN bottle	<6C, H2SO4____
Arsenic, Total Cadmium, Total Chromium, Total Copper, Total Iron, Total Lead, Total Manganese, Total Mercury, Total Molybdenum, Total Nickel, Total Selenium, Total Zinc, Total	1 - 8 oz Plastic Total Metals	HNO3 pH< 2 ____
VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

Trip Blank

Sampled Date/Time: 10/21/21 @ 1130 Sampler: SC/HW

VOC w/ Oxygenates, Water	2 - 40ml vials	<6C, HCl

Relinquished by: Hannah Weiss [signature] 10-21-21 1316 Date Time Accepted by: ____ Date Time

Relinquished by: ____ Date Time Received by: [signature] 10-21-21 1316 Date Time

Sites/Parameters correct as listed. Client Initials ____

Client Authorization to use Subcontract lab Client Initials ____

Sample origin: VT ☐ NH ☐ NY ☐ Other ☐

Special reporting instructions: (PO#) ____

Requested Turnaround Time: Routine: Rush Due Date ____

Delv: Client
Temp C: 2.9
Comment:
Tmpl Ck
Log by
Lab use Only

Aqueous samples requiring metals testing require acid preservation for a 24 hr period prior to analysis.

ANALYTICAL REPORT

Lab Number:	L2158657
Client:	Waite-Heindel Environmental Management 7 Kilburn Street Suite 301 Burlington, VT 05401
ATTN:	Wendy Shellito
Phone:	(802) 860-9400
Project Name:	CVLF
Project Number:	03351
Report Date:	11/21/21

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2158657-01	TRIP BLANK	WATER	E. MONTPELLIER, VT	10/21/21 15:10	10/26/21
L2158657-02	EQUIPMENT BLANK	WATER	E. MONTPELLIER, VT	10/21/21 15:10	10/26/21
L2158657-03	FIELD BLANK	WATER	E. MONTPELLIER, VT	10/21/21 09:15	10/26/21
L2158657-04	MW-5AR	WATER	E. MONTPELLIER, VT	10/21/21 10:49	10/26/21
L2158657-05	MW-7	WATER	E. MONTPELLIER, VT	10/21/21 09:37	10/26/21
L2158657-06	MW-10R	WATER	E. MONTPELLIER, VT	10/21/21 13:02	10/26/21

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Case Narrative (continued)

Perfluorinated Alkyl Acids by Isotope Dilution

L2158657-04, -05, and -06: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

L2158657-04, -05, and -06: The sample was centrifuged and decanted prior to extraction due to sample matrix.

WG1565045-4: The sample was centrifuged and decanted prior to extraction due to sample matrix.

WG1565045-4: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative Date: 11/21/21

ORGANICS

SEMIVOLATILES

Project Name: CVLF **Lab Number:** L2158657 118

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-01	Date Collected:	10/21/21 15:10
Client ID:	TRIP BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	11/02/21 18:40
Analytical Date:	11/03/21 21:53		
Analyst:	MP		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.74	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	1.74	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	1.74	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.74	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/l	1.74	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.74	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.74	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.74	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.74	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.74	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.74	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.74	--	1

Project Name:	CVLF	**Lab Number:**	L2158657 119
Project Number:	03351	**Report Date:**	11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-01	Date Collected:	10/21/21 15:10
Client ID:	TRIP BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	100		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	112		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	114		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	103		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	106		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	105		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	104		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	112		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	107		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	101		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	98		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	119		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	52		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	95		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	35		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	75		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68		22-136

Project Name: CVLF **Lab Number:** L2158657[120]

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-02	Date Collected:	10/21/21 15:10
Client ID:	EQUIPMENT BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	10/29/21 18:25
Analytical Date:	10/30/21 23:39		
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.88	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	1.88	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	1.88	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.88	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/l	1.88	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.88	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.88	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.88	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.88	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.88	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.88	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.88	--	1

Project Name: CVLF **Lab Number:** L2158657 121

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-02	Date Collected:	10/21/21 15:10
Client ID:	EQUIPMENT BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	89		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	106		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	95		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	80		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	89		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	87		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	90		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	80		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	97		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	95		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	88		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	83		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	99		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	41		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	94		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	87		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	80		22-136

Project Name: CVLF **Lab Number:** L2158657122

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-03	Date Collected:	10/21/21 09:15
Client ID:	FIELD BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	10/29/21 18:25
Analytical Date:	10/31/21 00:12		
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.78	--	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	1.78	--	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	1.78	--	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.78	--	1
Perfluorooctanoic Acid (PFOA)	ND		ng/l	1.78	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.78	--	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.78	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.78	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.78	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.78	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.78	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.78	--	1

Project Name: CVLF **Lab Number:** L2158657 123

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-03	Date Collected:	10/21/21 09:15
Client ID:	FIELD BLANK	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	88		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	106		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	98		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	79		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	88		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	86		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	88		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	79		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	94		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	90		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	89		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	87		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	96		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	47		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	86		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	85		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	81		22-136

Project Name: CVLF **Lab Number:** L2158657

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-04	Date Collected:	10/21/21 10:49
Client ID:	MW-5AR	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	10/29/21 18:25
Analytical Date:	10/31/21 00:28		
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.86	--	1
Perfluorohexanoic Acid (PFHxA)	71.5		ng/l	1.86	--	1
Perfluoroheptanoic Acid (PFHpA)	58.3		ng/l	1.86	--	1
Perfluorohexanesulfonic Acid (PFHxS)	3.84		ng/l	1.86	--	1
Perfluorooctanoic Acid (PFOA)	278		ng/l	1.86	--	1
Perfluorononanoic Acid (PFNA)	13.9		ng/l	1.86	--	1
Perfluorooctanesulfonic Acid (PFOS)	84.8		ng/l	1.86	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.86	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.86	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.86	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.86	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.86	--	1

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-04	Date Collected:	10/21/21 10:49
Client ID:	MW-5AR	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	87		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	97		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	96		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**193**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	92		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	95		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	99		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	87		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	122		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	103		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	89		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	96		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	75		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	92		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	18		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	85		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	86		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	78		22-136

Project Name: CVLF **Lab Number:** L2158657126

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-05	Date Collected:	10/21/21 09:37
Client ID:	MW-7	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	10/29/21 18:25
Analytical Date:	10/31/21 00:45		
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	2.78		ng/l	1.84	--	1
Perfluorohexanoic Acid (PFHxA)	40.7		ng/l	1.84	--	1
Perfluoroheptanoic Acid (PFHpA)	21.0		ng/l	1.84	--	1
Perfluorohexanesulfonic Acid (PFHxS)	4.18		ng/l	1.84	--	1
Perfluorooctanoic Acid (PFOA)	43.0		ng/l	1.84	--	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.84	--	1
Perfluorooctanesulfonic Acid (PFOS)	5.26		ng/l	1.84	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.84	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.84	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.84	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.84	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.84	--	1

Project Name:	CVLF	**Lab Number:**	L2158657 127
Project Number:	03351	**Report Date:**	11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-05	Date Collected:	10/21/21 09:37
Client ID:	MW-7	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	85		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	92		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**207**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	75		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	80		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	87		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**172**	Q	14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	92		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	91		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	88		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	109		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	77		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	90		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	26		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	75		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	76		22-136

Project Name: CVLF **Lab Number:** L2158657[128]

Project Number: 03351 **Report Date:** 11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-06	Date Collected:	10/21/21 13:02
Client ID:	MW-10R	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Water	Extraction Method:	ALPHA 23528
Analytical Method:	134,LCMSMS-ID	Extraction Date:	10/29/21 18:25
Analytical Date:	10/31/21 01:18		
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanesulfonic Acid (PFBS)	3.90		ng/l	1.88	--	1
Perfluorohexanoic Acid (PFHxA)	126		ng/l	1.88	--	1
Perfluoroheptanoic Acid (PFHpA)	77.0		ng/l	1.88	--	1
Perfluorohexanesulfonic Acid (PFHxS)	16.8		ng/l	1.88	--	1
Perfluorooctanoic Acid (PFOA)	270		ng/l	1.88	--	1
Perfluorononanoic Acid (PFNA)	2.24		ng/l	1.88	--	1
Perfluorooctanesulfonic Acid (PFOS)	55.1		ng/l	1.88	--	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.88	--	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.88	--	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.88	--	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.88	--	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.88	--	1

Project Name:	CVLF	**Lab Number:**	L2158657[129]
Project Number:	03351	**Report Date:**	11/21/21

SAMPLE RESULTS

Lab ID:	L2158657-06	Date Collected:	10/21/21 13:02
Client ID:	MW-10R	Date Received:	10/26/21
Sample Location:	E. MONTPELLIER, VT	Field Prep:	Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	89		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	85		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	90		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**225**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	68		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	81		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	101		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	88		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**250**	Q	14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	99		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	86		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	79		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	144		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	80		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	75		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	28		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	73		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	69		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	67		22-136

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

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Method Blank Analysis
Batch Quality Control

Analytical Method:	134,LCMSMS-ID	Extraction Method:	ALPHA 23528
Analytical Date:	10/30/21 18:57	Extraction Date:	10/29/21 18:25
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02-06 Batch: WG1565045-1					
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	--
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	--
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	--
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	--

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

Method Blank Analysis
Batch Quality Control

Analytical Method:	134,LCMSMS-ID	Extraction Method:	ALPHA 23528
Analytical Date:	10/30/21 18:57	Extraction Date:	10/29/21 18:25
Analyst:	SG		

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 02-06 Batch: WG1565045-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	81		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	100		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	86		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	67		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	78		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	79		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	88		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	81		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	68		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	88		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	85		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	85		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	79		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	85		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	91		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	45		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	87		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	83		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	75		22-136

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657 132
Report Date: 11/21/21

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 11/03/21 16:39
Analyst: MP

Extraction Method: ALPHA 23528
Extraction Date: 11/02/21 18:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1566236-1					
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	--
Perfluorohexanoic Acid (PFHxA)	ND		ng/l	2.00	--
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	--
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	--
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	--
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	--
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	--
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	--
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	--
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	--
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	--
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	--

Project Name:	CVLF	**Lab Number:**	L2158657
Project Number:	03351	**Report Date:**	11/21/21

Method Blank Analysis
Batch Quality Control

Analytical Method:	134,LCMSMS-ID	Extraction Method:	ALPHA 23528
Analytical Date:	11/03/21 16:39	Extraction Date:	11/02/21 18:40
Analyst:	MP		

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01 Batch: WG1566236-1					

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	93		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	102		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	108		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	104		12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	101		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	99		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	104		62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	109		14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	112		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	100		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	95		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	119		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	57		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	93		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	37		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	56		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	74		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	69		22-136
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	96		10-165
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	61		10-206
1H,1H,2H,2H-Perfluorododecane Sulfonate (M2D4-10:2FTS)	111		50-150

Lab Control Sample Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657
Report Date: 11/21/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 Batch: WG1565045-2								
Perfluorobutanesulfonic Acid (PFBS)	102		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	104		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	100		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	101		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	101		-		63-159	-		30
Perfluorononanoic Acid (PFNA)	96		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	96		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	96		-		63-171	-		30
Perfluoroundecanoic Acid (PFUnA)	99		-		60-153	-		30
Perfluorododecanoic Acid (PFDoA)	104		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	105		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	106		-		59-182	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657
Report Date: 11/21/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 Batch: WG1565045-2								

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	85				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	102				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	91				70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	76				12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	83				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	81				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	91				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	86				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	82				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	92				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	90				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	92				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	92				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	89				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	93				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	44				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	89				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	90				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	81				22-136

Lab Control Sample Analysis

Batch Quality Control

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657
Report Date: 11/21/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1566236-2								
Perfluorobutanesulfonic Acid (PFBS)	97		-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	91		-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	92		-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	92		-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	88		-		63-159	-		30
Perfluorononanoic Acid (PFNA)	85		-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	90		-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	84		-		63-171	-		30
Perfluoroundecanoic Acid (PFUnA)	85		-		60-153	-		30
Perfluorododecanoic Acid (PFDoA)	90		-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	95		-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	89		-		59-182	-		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657
Report Date: 11/21/21

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 Batch: WG1566236-2								

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	88				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	95				62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102				70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	105				12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	95				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	93				60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	93				71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	98				62-129
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	108				14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	103				59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	94				69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	89				62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	123				10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	58				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	90				55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	33				10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	58				27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	72				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	68				22-136
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA)	92				10-165
Perfluoro[13C2]Hexadecanoic Acid (M2PFHxDA)	60				10-206
1H,1H,2H,2H-Perfluorododecane Sulfonate (M2D4-10:2FTS)	103				50-150

Matrix Spike Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351
Lab Number: L2158657
Report Date: 11/21/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 QC Batch ID: WG1565045-3 QC Sample: L2158657-02 Client ID: EQUIPMENT BLANK												
Perfluorobutanesulfonic Acid (PFBS)	ND	35.3	35.3	100		-	-		65-157	-		30
Perfluorohexanoic Acid (PFHxA)	ND	39.7	41.2	104		-	-		69-168	-		30
Perfluoroheptanoic Acid (PFHpA)	ND	39.7	39.7	100		-	-		58-159	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	36.3	36.2	100		-	-		69-177	-		30
Perfluorooctanoic Acid (PFOA)	ND	39.7	40.4	102		-	-		63-159	-		30
Perfluorononanoic Acid (PFNA)	ND	39.7	38.4	97		-	-		68-171	-		30
Perfluorooctanesulfonic Acid (PFOS)	ND	36.8	35.4	96		-	-		52-151	-		30
Perfluorodecanoic Acid (PFDA)	ND	39.7	38.1	96		-	-		63-171	-		30
Perfluoroundecanoic Acid (PFUnA)	ND	39.7	38.8	98		-	-		60-153	-		30
Perfluorododecanoic Acid (PFDoA)	ND	39.7	40.7	102		-	-		67-153	-		30
Perfluorotridecanoic Acid (PFTrDA)	ND	39.7	42.6	107		-	-		48-158	-		30
Perfluorotetradecanoic Acid (PFTA)	ND	39.7	42.2	106		-	-		59-182	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	95				10-162
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	89				12-142
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	93				14-147
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91				27-126
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	83				24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	99				55-137
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	96				62-124
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	91				57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	89				60-129

Matrix Spike Analysis
Batch Quality Control

Project Name: CVLF **Lab Number:** L2158657
Project Number: 03351 **Report Date:** 11/21/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 QC Batch ID: WG1565045-3 QC Sample: L2158657-02 Client ID: EQUIPMENT BLANK

Surrogate (Extracted Internal Standard)	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	102				71-134
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	94				48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	88				22-136
Perfluoro[13C4]Butanoic Acid (MPFBA)	92				58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	110				62-163
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	49				10-112
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	99				69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	93				62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	100				59-139
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	104				70-131

Matrix Spike Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351
Lab Number: L2158657
Report Date: 11/21/21

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01 QC Batch ID: WG1566236-3 WG1566236-4 QC Sample: L2158062-04 Client ID: MS Sample												
Perfluorooctanoic Acid (PFOA)	250	40.1	288	95		276	72		63-159	4		30
Perfluorononanoic Acid (PFNA)	96.7	40.1	132	88		125	79		68-171	5		30
Perfluorooctanesulfonic Acid (PFOS)	6.74	37.2	41.3	93		37.2	92		52-151	10		30

Surrogate	MS % Recovery	MS Qualifier	MSD % Recovery	MSD Qualifier	Acceptance Criteria
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81		94		69-131
Perfluoro[13C8]Octanoic Acid (M8PFOA)	90		98		62-129
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		107		59-139

Lab Duplicate Analysis
Batch Quality Control

Project Name: CVLF
Project Number: 03351
Lab Number: L2158657
Report Date: 11/21/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 QC Batch ID: WG1565045-4 QC Sample: L2158657-05 Client ID: MW-7						
Perfluorobutanesulfonic Acid (PFBS)	2.78	2.69	ng/l	3		30
Perfluorohexanoic Acid (PFHxA)	40.7	40.9	ng/l	0		30
Perfluoroheptanoic Acid (PFHpA)	21.0	20.4	ng/l	3		30
Perfluorohexanesulfonic Acid (PFHxS)	4.18	4.36	ng/l	4		30
Perfluorooctanoic Acid (PFOA)	43.0	43.4	ng/l	1		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonic Acid (PFOS)	5.26	4.85	ng/l	8		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	85		85		58-132
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89		89		62-163
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	92		93		70-131
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	**207**	Q	**207**	Q	12-142
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	75		74		57-129
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	80		81		60-129
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	97		97		71-134
Perfluoro[13C8]Octanoic Acid (M8PFOA)	87		86		62-129

Lab Duplicate Analysis

Batch Quality Control

Project Name: CVLF
Project Number: 03351

Lab Number: L2158657
Report Date: 11/21/21

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits

Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 02-06 QC Batch ID: WG1565045-4 QC Sample: L2158657-05 Client ID: MW-7

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	**172**	Q	**167**	Q	14-147
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	92		95		59-139
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	91		93		69-131
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	88		90		62-124
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	109		117		10-162
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	77		82		24-116
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	90		92		55-137
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	26		27		10-112
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	91		78		27-126
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	75		84		48-131
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	76		75		22-136

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	*Custody Seal*
A	Absent

Container Information

Container ID	*Container Type*	*Cooler*	*Initial pH*	*Final pH*	*Temp deg C*	*Pres*	*Seal*	*Frozen Date/Time*	*Analysis(*)*
L2158657-01A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-02A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-02B	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-03A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-04A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-04B	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-05A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-05B	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-06A	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)
L2158657-06B	Plastic 250ml unpreserved	A	NA		4.3	Y	Absent		A2-537-ISOTOPE(14)

*Values in parentheses indicate holding time in days

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.) Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
NR	- No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Report Format: *Data Usability Report*

Footnotes

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenz(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA,this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

F - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the reporting limit (RL) for the sample.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where

Data Qualifiers

the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

V - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

Z - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

REFERENCES

134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 625/625.1: alpha-Terpineol
EPA 8260C/8260D: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D/8270E: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522, EPA 537.1.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF CUSTODY

PAGE 1 OF 1

ALPHA ANALYTICAL World Class Chemistry

Westborough, MA TEL: 508-898-9220 FAX: 508-898-9193
Mansfield, MA TEL: 508-822-9300 FAX: 508-822-3288

Date Rec'd in Lab: 10/27/21

ALPHA Job #: L2158657

Project Information

Project Name: CVLF

Project Location: E. Montpelier, VT

Project #: 03351

Project Manager: Wendy Shellito

ALPHA Quote #: 9263

Client Information

Client: Waite-Heindel Environmental Mngt

Address: 7 Kilburn Street, Suite 301

Burlington, VT 05401

Phone: 802-860-9400

Fax: 802-860-9440

Email: wshellito@waiteenv.com

☒ These samples have been Previously analyzed by Alpha

Report Information Data Deliverables

☐ FAX ☒ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info

PO #: CVLF 03351

Regulatory Requirements/Report Limits

State/Fed Program

Criteria

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Other Project Specific Requirements/Comments/Detection Limits:

**ONLY ANALYZE THE TRIP BLANK, FIELD BLANKS & EQUIPMENT BLANK IF DETECTIONS IN THE SAMPLES

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☒ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	PFAS EPA 537M Iso dil 12compound	Sample Specific Comments	TOTAL # BOTTLES
58657-01	Trip Blank			water	Alpha	☒	** lab provided	2
-02	Equipment Blank	10/21/21	1510	water	WS	☒	**	2
-03	Field Blank	10/21/21	0915	water	WS	☒	**	1
-04	MW-5AR	10/21/21	1049	water	HW	☒		2
-05	MW-7	10/21/21	0937	water	HW	☒		2
-06	MW-10R	10/21/21	1302	water	SC	☒		2
	temperature blank			water	Alpha	☐		1

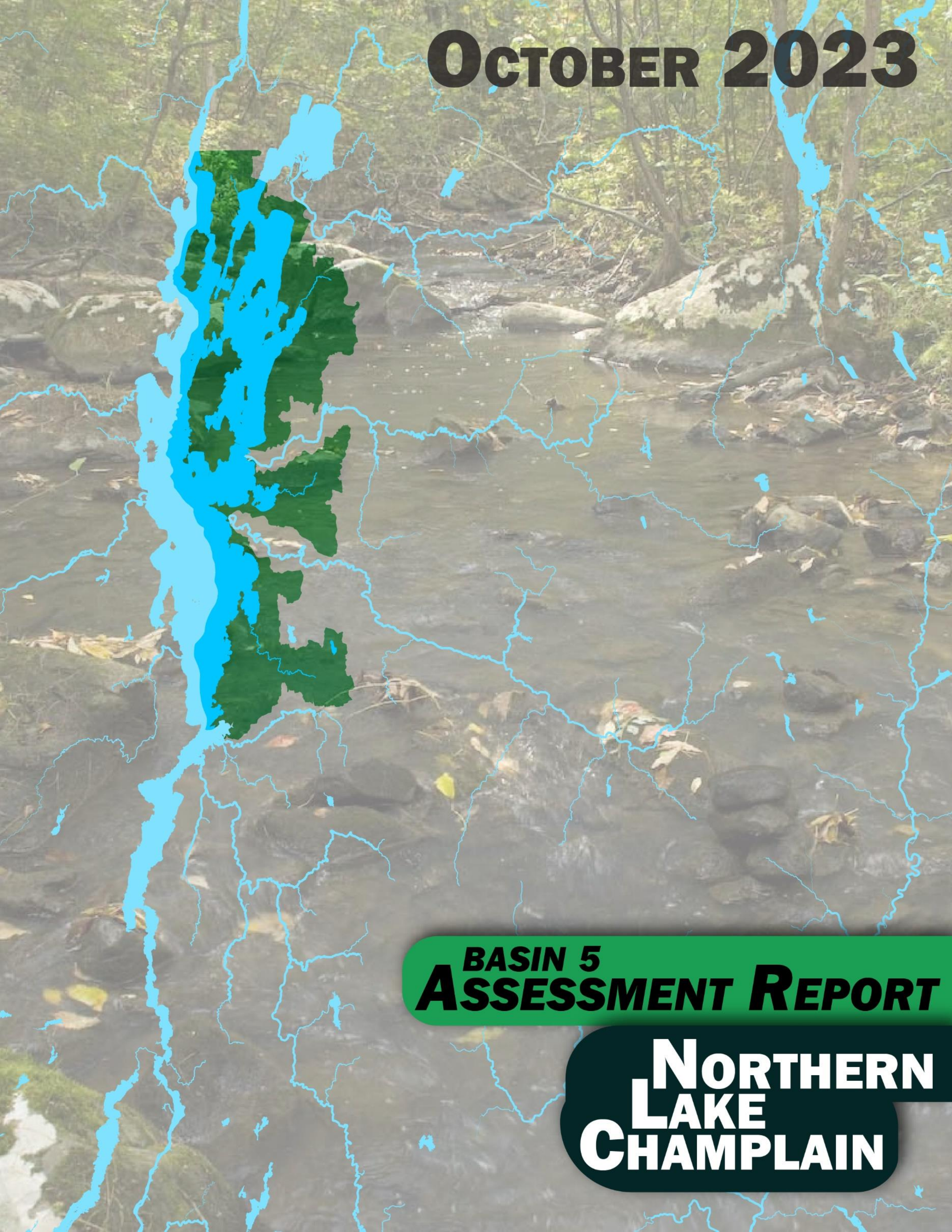
Container Type: P

Preservative: A

Relinquished By:	Date/Time	Received By:	Date/Time
Wendy Shellito	10/26/21 319	B. Arm AA	10/26/21 13:47
B. Arm	10/26/21 18:35	[illegible]	10/26/21 01:70
[illegible]	10/27/21 4100	[illegible]	10/27/21 0420
[illegible]	10/27/21 0520	MC — AA	10/27/21 0521

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

FORM NO: 01-01(I-NJ) (rev. 5-JAN-12)



October 2023

Basin 5 Assessment Report

Northern Lake Champlain

Contents

Basin overview

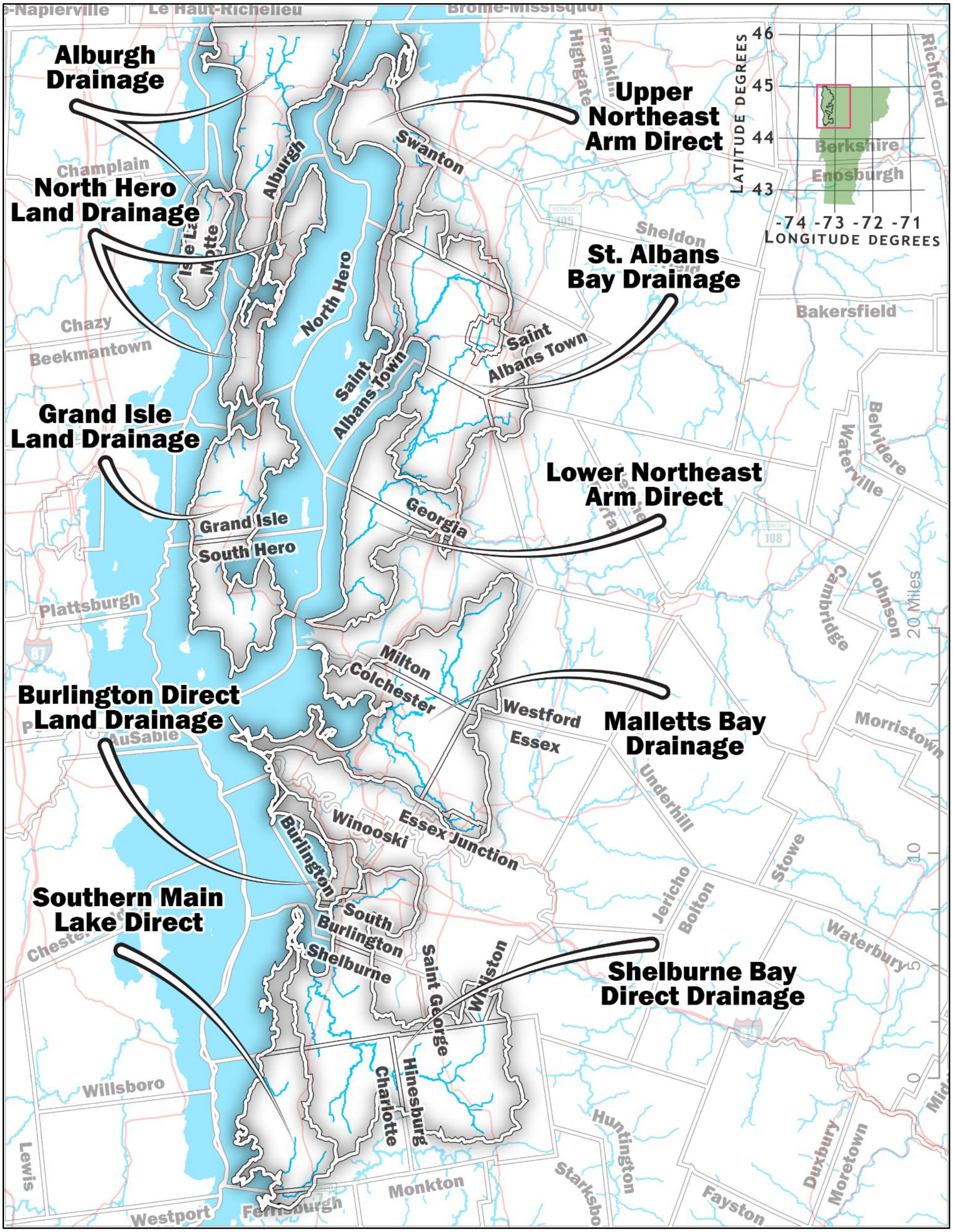


Figure 1 The 543 square mile Northern Lake Champlain basin encompasses waters of western Chittenden and Franklin counties.

Table 1 Distribution of Strahler stream orders by miles across Basin 5. This data is from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

1	2	3	4	5	6
530	236	136	50	29	2

Table 2 Distribution of lake surface area (acres) across Basin 5. Data from the High-Resolution National Hydrography Dataset Plus (NHDPlus).Not including the 313,000 acre Lake Champlain.

Lake area (acres)			
<10	*>10<100*	*>100<500*	*>500*
21	16	5	0

Table 3 Distribution of wetland area (acres) across Basin 5. Data from the Vermont State Wetland Inventory (VSWI). Contiguous wetlands were combined to account for wetlands complexes containing multiple classes.

<5	*>5<50*	*>50<500*	*>500*
2754	530	93	8

Table 4 Summation of town level human population over time that intersects with Basin 5.

Basin-wide human population by year				
1980	*1990*	*2000*	*2010*	*2020*
69404	78789	88018	93628	99901

Table 5 . Major waters of Basin 5.

Largest River	La Platte River (19 miles)
Largest Lake or Reservoir (not Lake Champlain)	Lake Iroquois (247.0 acres)
Deepest Lake or Reservoir (not Lake Champlain)	Colchester Pond (42 feet)
Largest Wetland Complex	Missisquoi National Wildlife Refuge (2643 acres)

Land cover

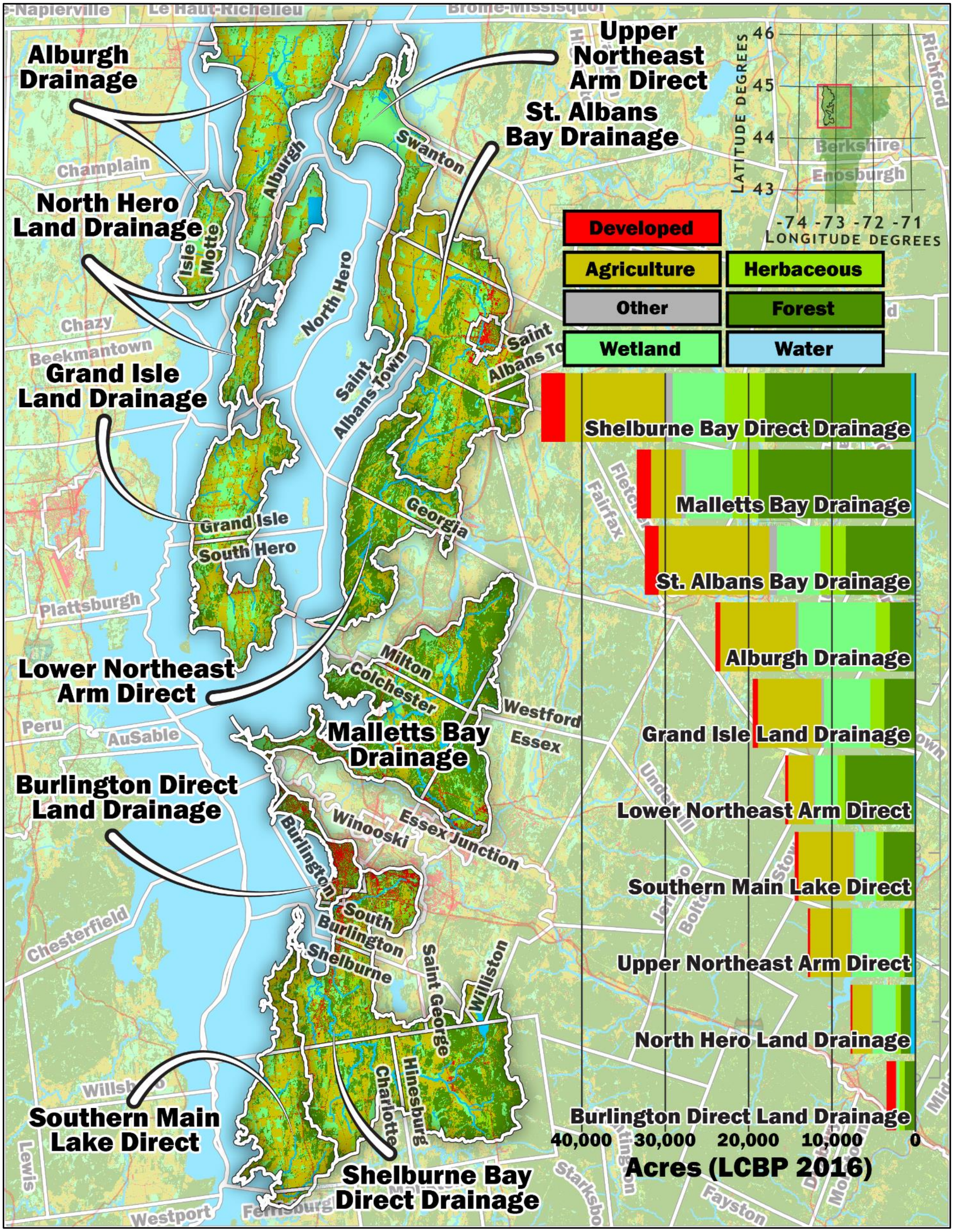


Figure 2. Landcover based on the 1-meter Lake Champlain land cover dataset produced by the University of Vermont spatial analysis laboratory and the Lake Champlain Basin program. The bar graph is a summary based on the Vermont WBID subwaterheds of the tactical basin.

Table 6 The percentage of major land cover types across the Vermont WBID subwatersheds of Basin 5. 1-meter Lake Champlain land cover dataset produced by the University of Vermont spatial analysis laboratory and the Lake Champlain Basin program. Common land cover types were combined, for example deciduous, coniferous, and mixed forests are categorized as forest. The other category includes shrubs and barren land. Wetlands are found throughout other cover types.

Name	acres	Developed	Agriculture	Other	Wetland	Herbaceous	Forest	Water
Shelburne Bay Direct Drainage	44900	6.4	26.8	1.9	13.8	10.7	39.1	1.3
Malletts Bay Drainage	33463	5.1	11.0	1.5	16.7	9.2	54.9	1.6
St. Albans Bay Drainage	32488	5.1	40.8	2.8	15.9	9.4	25.2	0.7
Alburg Drainage	24049	2.3	37.7	1.3	38.4	7.1	11.9	1.2
Grand Isle Land Drainage	19572	3.2	38.9	1.6	28.2	8.6	19.1	0.4
Lower Northeast Arm Direct	15688	2.4	19.2	1.4	17.0	5.9	52.3	1.8
Southern Main Lake Direct	14537	3.1	45.4	1.2	17.3	6.2	26.0	0.8
Upper Northeast Arm Direct	12961	2.0	37.6	1.5	43.8	4.4	7.5	3.3
North Hero Land Drainage	7850	2.7	29.6	1.5	34.5	7.9	15.2	8.5
Burlington Direct Land Drainage	3537	31.8	0.6	2.8	8.4	18.2	37.6	0.7

Lakes and Ponds

Conditions and trends

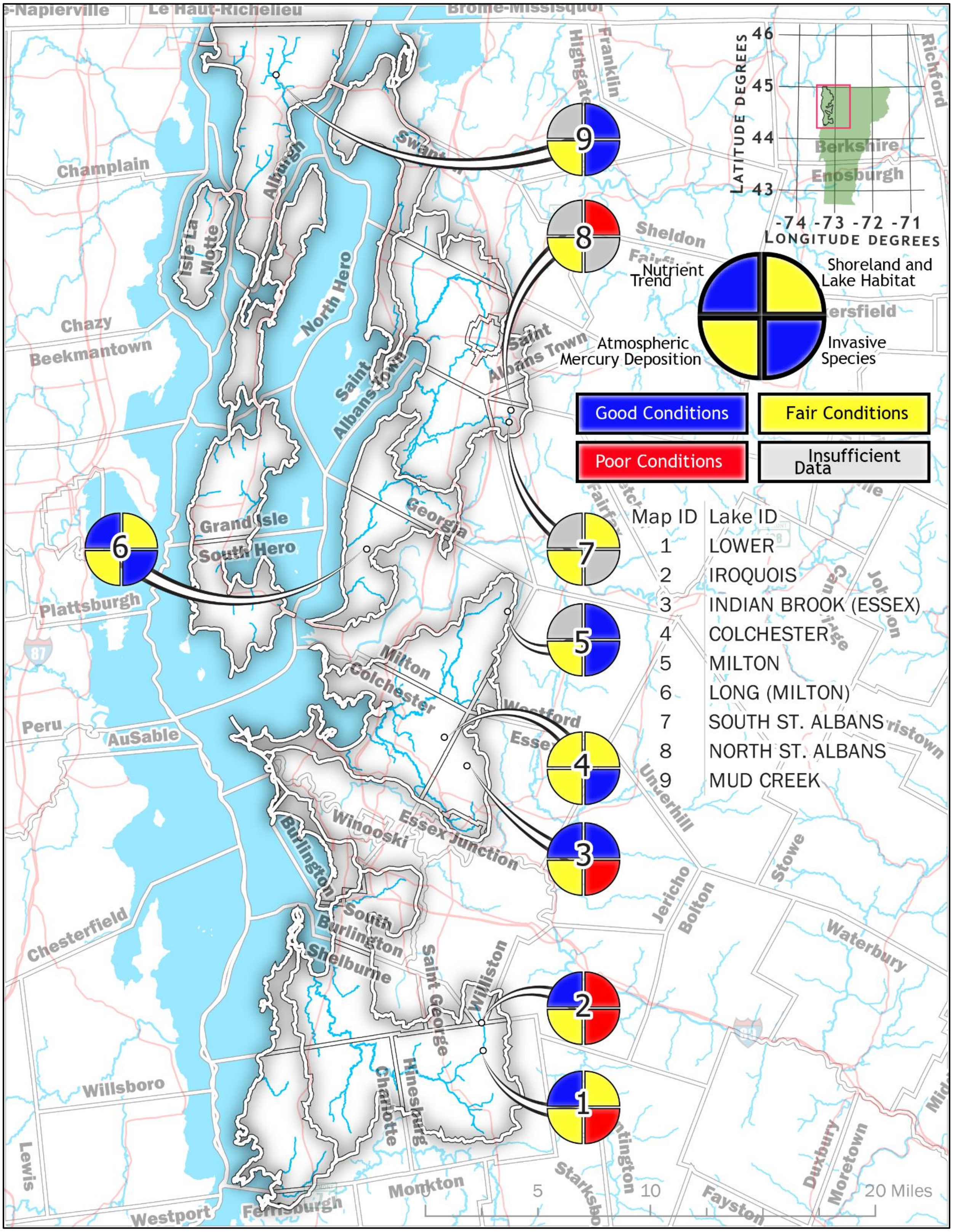


Figure 3. Lake scorecards for Basin 5. Only lakes greater than 10 acres are included. Lake IDs and additional information is provided in the table below.

The Lakes and Ponds Management and Protection Program (VLMPP) reports lake condition with the Vermont Inland Lake Score Card. Lake condition includes these key aspects: nutrients status and trends, aquatic invasive species, shoreland and lake habitat, and mercury pollution. For a more detailed overview, see the *score card webpage*. For more technical information, see *how lakes are scored*, and for lake specific information, navigate to the Score Card tab in this *Lake Score Card* links using the Lake IDs reported below.

VLMPP provides score cards for nine lakes in Basin 5. The colors are a ranked representation of condition: blue is better than yellow, yellow is better than red, and grey is insufficient data. The Map ID numbers correspond with the following table. Use the ID to navigate the *report viewer* to find more information.

The score for a lake's nutrient trend is derived primarily from data obtained through two lake monitoring programs within the Lakes and Ponds Program - the Spring Phosphorus Program and the Lay Monitoring Program; both data sets are used for analysis when available. The final nutrient trend score, which determines the color of the nutrient quadrant on the Score Card, combines the individual scores from the spring TP (total phosphorus), summer TP, summer Chlorophyll-a and summer Secchi depth. See *how lakes are scored* for more information.

Shoreland habitat is assessed using the Lakeshore Disturbance Index (LDI). A value of 0.2 or less is considered in good condition; an LDI value between 0.2 and 0.75 is considered in fair condition and an LDI value of greater than 0.75 is considered in poor condition. The Lake Wise Program offers technical assistance to shoreland property owners who want to protect or restore their shoreland habitat. Take advantage of free technical assistance through the Lake Wise Program and have your shoreland property assessed for controlling runoff and preventing erosion. The Lake Wise Program offers solutions - Best Management Practices - for managing shoreland property and making it lake-friendly for all.

The Aquatic Invasive Species (AIS) score is based on the presence of one or more invasive animal or plant species. A good score indicates there are no known invasive species present while a poor score indicates that there is at least one invasive species present, regardless of its abundance or 'nuisance' level (a fair score is not used for this criteria).

The Mercury Fish Tissue Contamination Score reflects the most recent data that VLMPP has regarding the presence of mercury (Hg) in the food web of Vermont lakes. A good score indicates low probability of Hg accumulation in fish tissue; a fair score indicates that Hg accumulation in fish tissue is likely; a poor score indicates that Hg in fish tissue exceeds EPA guidelines.

Table 7 Vermont Inland Lake Score Card table: lake-specific information with area in acres and depth in feet. Only lakes greater than 10 acres are included. AIS: Aquatic invasive species score. Mercury: mercury fish tissue contamination. Shoreland: shoreland disturbance (USEPA National Lake Assessment). Nutrient Trend: an index of trends in annual means of spring TP, summer TP, Secchi, and chlorophyl-a.

Map ID	Lake ID	Area (ac)	Max Depth (ft)	Nutrient Trend	Shoreland	AIS	Mercury
1	LOWER	44.94	10	Good	Fair	Poor	Fair
2	IROQUOIS	246.97	37	Good	Poor	Poor	Fair
3	INDIAN BROOK (ESSEX)	57.541	22	Good	Good	Poor	Fair
4	COLCHESTER	191.43	42	Fair	Fair	Good	Fair
5	MILTON	29.791	13	Insufficient data	Good	Good	Fair
6	LONG (MILTON)	81.158	36	Good	Fair	Good	Fair
7	SOUTH ST. ALBANS	24.804	23	Insufficient data	Fair	Insufficient data	Fair
8	NORTH ST. ALBANS	37.225	28	Insufficient data	Poor	Insufficient data	Fair
9	MUD CREEK	30.786	3	Insufficient data	Good	Good	Fair

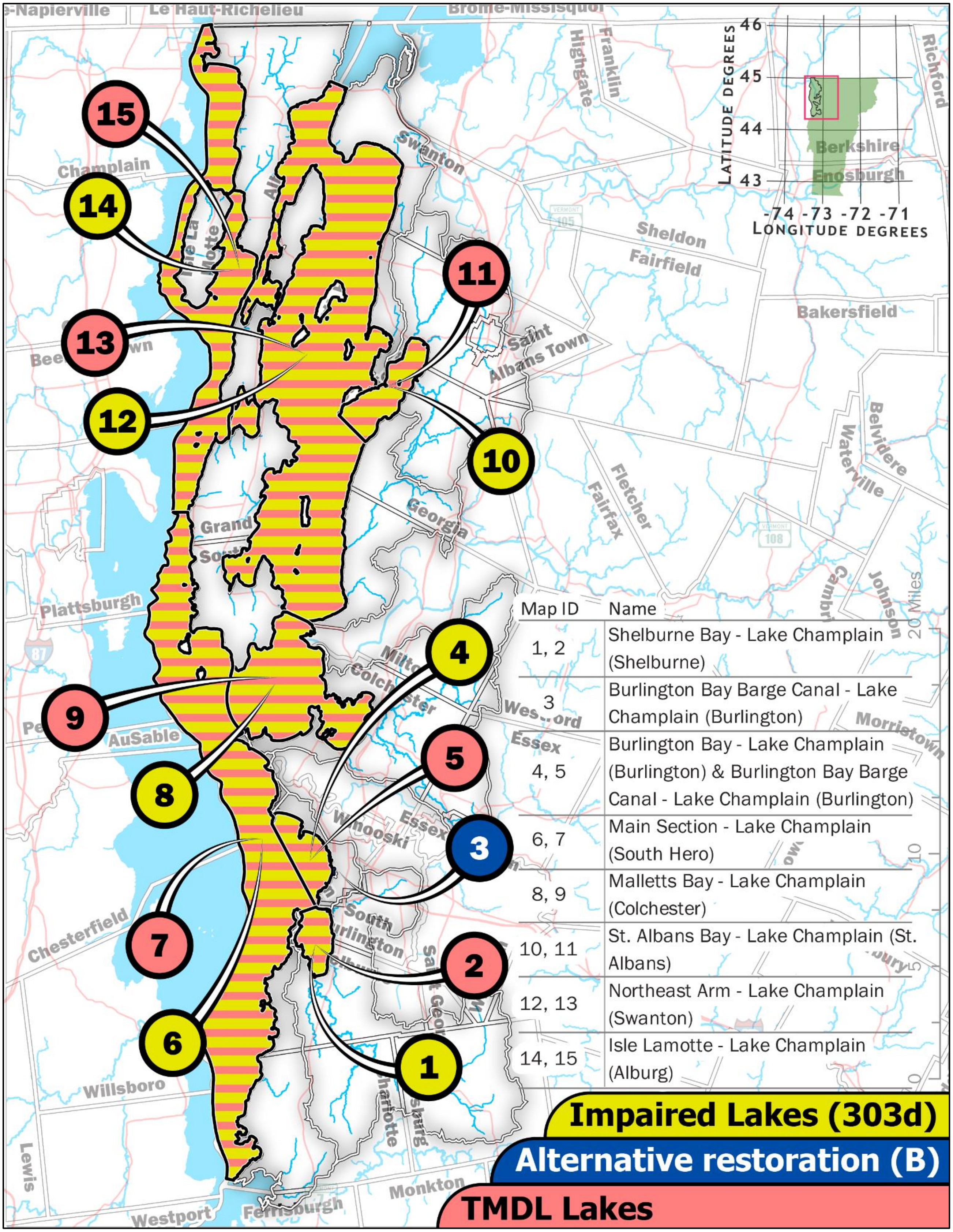
Lake Reclassification

To protect the waters of the State of Vermont, the Watershed Management Division (WSMD) can initiate rulemaking to reclassify surface waters to maintain a higher standard. The public may also petition the Division to request the initiation of rulemaking. The major implication of reclassification is the application of the most recent *Water Quality Standards*.

Most lakes in the state have a classification of B(2) for aesthetics uses, requiring that the lake maintains a total phosphorus criteria of below 18 ug/l. Reclassification to B(1) for aesthetics uses would lower the criteria to 17 ug/l, and a reclassification to A(1) for aesthetics uses would lower the criteria to 12 ug/l.

There are no lake reclassification candidates in Basin 5.

Impaired Lakes



Map ID	Name
1, 2	Shelburne Bay - Lake Champlain (Shelburne)
3	Burlington Bay Barge Canal - Lake Champlain (Burlington)
4, 5	Burlington Bay - Lake Champlain (Burlington) & Burlington Bay Barge Canal - Lake Champlain (Burlington)
6, 7	Main Section - Lake Champlain (South Hero)
8, 9	Malletts Bay - Lake Champlain (Colchester)
10, 11	St. Albans Bay - Lake Champlain (St. Albans)
12, 13	Northeast Arm - Lake Champlain (Swanton)
14, 15	Isle Lamotte - Lake Champlain (Alburg)

Figure 4 Map of impaired lakes across Basin 5 through 2022. Salmon color represent lakes that are on Part D of the Priority Waters List and have an approved Total Maximum Daily Load (TMDL) And blue lakes have an alternative restoration plan, in this case, the Barge Canal is a Superfund site.

Restoring waters is one of the priorities of the [Watershed Management Division's Strategic Management Plan](). WSMD begins the process of restoring Vermont surface waters by listing waters not in compliance with the water quality standards on a biennial basis. Waters are added and removed based on whether they meet [water quality standards]() through a process defined in the Vermont [Surface Water Assessment and Listing Methodology]()[1]. Adding waters to these lists prioritizes them for fund allocation, remediation, and monitoring. Fifteen sections of Lake Champlain are impaired and listed in Table 8, .

Table 8 List of impaired lakes across Basin 5. Map IDs correspond to the map above. Part A= impaired and needs a TMDL, Part B=impaired with alternative restoration plan in place, and Part D=impaired with an EPA approved TMDL.

MAP ID	NAME	PROBLEM	POLLUTANT	PART
1	Shelburne Bay - Lake Champlain (Shelburne)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
2	Shelburne Bay - Lake Champlain (Shelburne)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
3	Burlington Bay Barge Canal - Lake Champlain (Burlington)	XYLENE, TOLUENE	Contamination from coal tar in sediments of Pine Street Barge Canal (SITE #770042)	B
4	Burlington Bay - Lake Champlain (Burlington) & Burlington Bay Barge Canal - Lake Champlain (Burlington)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
5	Burlington Bay - Lake Champlain (Burlington) & Burlington Bay Barge Canal - Lake Champlain (Burlington)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
6	Main Section - Lake Champlain (South Hero)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
7	Main Section - Lake Champlain (South Hero)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
8	Malletts Bay - Lake Champlain (Colchester)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A

MAP ID	NAME	PROBLEM	POLLUTANT	PART
9	Malletts Bay - Lake Champlain (Colchester)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
10	St. Albans Bay - Lake Champlain (St. Albans)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
11	St. Albans Bay - Lake Champlain (St. Albans)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
12	Northeast Arm - Lake Champlain (Swanton)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
13	Northeast Arm - Lake Champlain (Swanton)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D
14	Isle La Motte - Lake Champlain (Alburg)	PCBS IN FISH TISSUE	Elevated levels of PCBs in lake trout	A
15	Isle La Motte - Lake Champlain (Alburg)	MERCURY IN FISH TISSUE, PHOSPHORUS	Elevated levels of mercury in walleye, Phosphorus enrichment	D

Altered Lakes

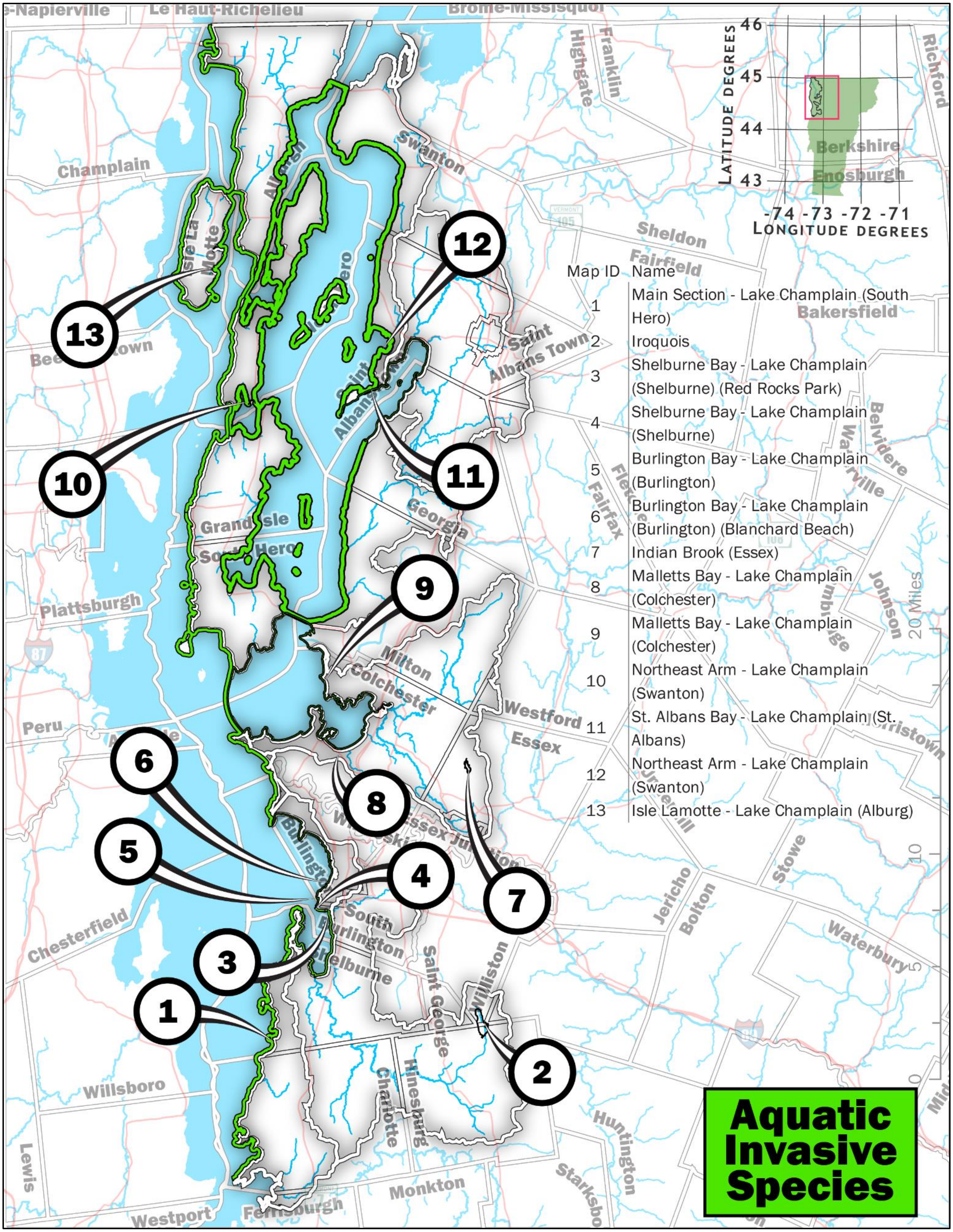


Figure 5 Map of altered lakes for Basin 5. Lakes in green are those altered by aquatic invasive species.

Lakes are assessed as Altered when aquatic habitat and/or other designated uses are not supported due to the extent of invasive aquatic species, or hydrologic factors such as a lack of flow, water level or flow fluctuations, or some other modified hydrologic condition. These waters are listed on the Priority Waters List in Parts E (invasive species) and F (flow) respectively. For Parts E, Eurasian water milfoil (EWM), zebra mussels (ZM) are indicated in Table 9.

Table 9 Altered lakes in Basin 5.

MAP ID	NAME	PROBLEM	PART
1	Main Section - Lake Champlain (South Hero)	EWM and ZM infestation.	E
2	Iroquois	Abundant EWM growth.	E
3	Shelburne Bay - Lake Champlain (Shelburne) (Red Rocks Park)	ZM, EWM	E
4	Shelburne Bay - Lake Champlain (Shelburne)	ZM, EWM	E
5	Burlington Bay - Lake Champlain (Burlington)	EWM and ZM infestation.	E
6	Burlington Bay - Lake Champlain (Burlington) (Blanchard Beach)	EWM and ZM infestation.	E
7	Indian Brook (Essex)	Locally abundant EWM growth.	E
8	Malletts Bay - Lake Champlain (Colchester)	EWM and ZM infestation.	E
9	Malletts Bay - Lake Champlain (Colchester)	EWM and ZM infestation.	E
10	Northeast Arm - Lake Champlain (Swanton)	EWM and ZM infestation.	E
11	St. Albans Bay - Lake Champlain (St. Albans)	EWM and ZM infestation.	E
12	Northeast Arm - Lake Champlain (Swanton)	EWM and ZM infestation.	E
13	Isle La Motte - Lake Champlain (Alburg)	EWM and ZM infestation.	E

Phosphorus Trends in Lakes

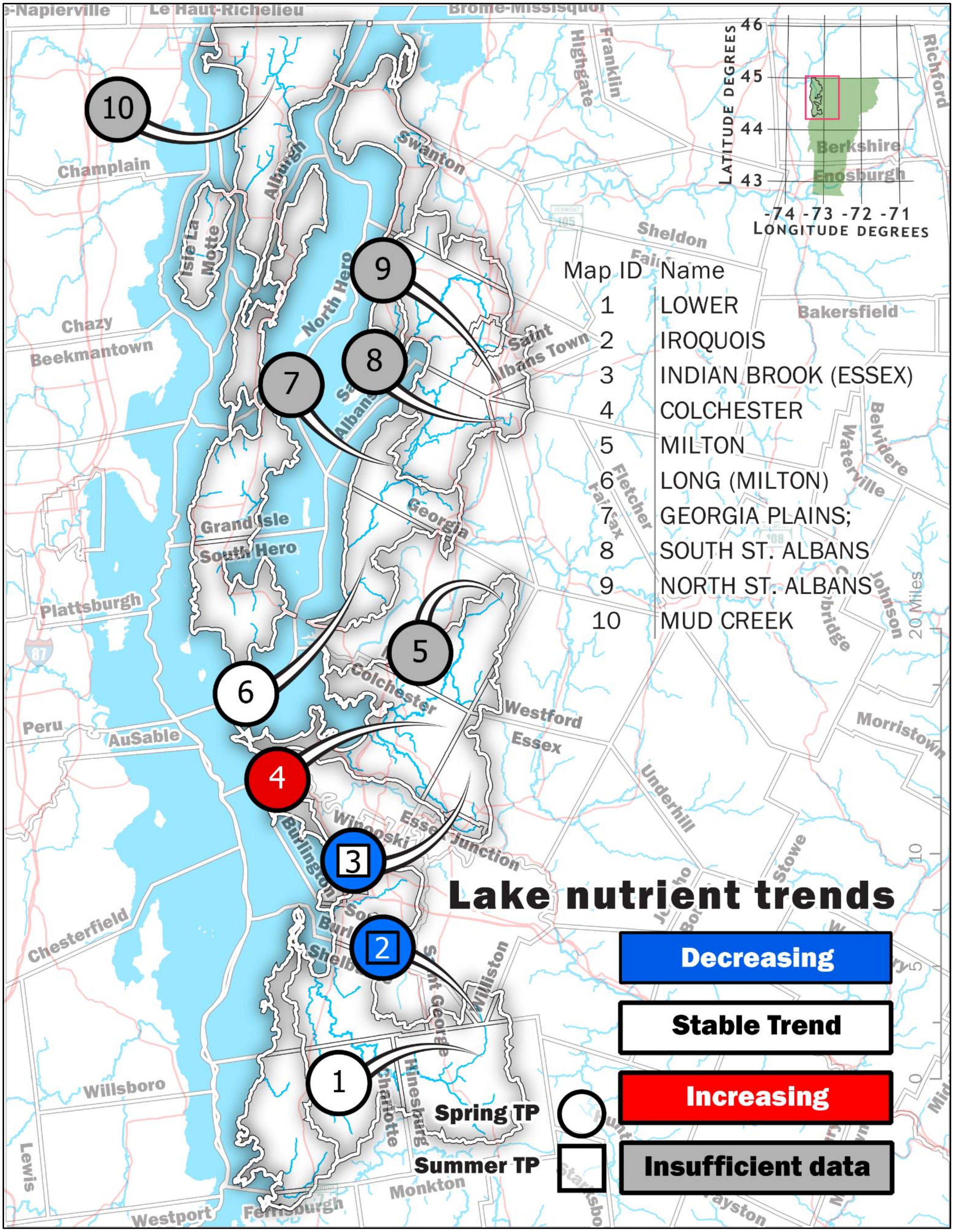


Figure 6 Total phosphorus trends for lakes in Basin 5. Note that trends can be for either spring or summer data or for both.

The WSMD conducts long-term monitoring of surface waters to identify increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont Water Quality Standards. Modeling water quality trends before a surface water becomes impaired or altered can lead to more effective and efficient actions to reduce stressors to these waters. For more information on how trends in lakes are identified, see the nutrient trend section of the *Lake Score Card Document*.

While the Lake Score Card identifies trends for multiple parameters of lake health, Lakes with sufficient data to identify a trend in total phosphorus concentrations are shown on the above map. Trends are categorized into three groups: Increasing (models with p-values <0.05 and positive coefficients), stable (models with p-values > 0.05) and decreasing (models with p-values <0.05 and negative coefficients). Use the Lake ID in Table 10 to find more information in the *report viewer*.

Table 10 List of lakes with enough data to model trends in summer or spring total phosphorus. Map IDs correspond with the map above. (+) increasing TP trends, (=) stable TP trends, and (-) negative TP trends. Insufficient data are lakes with data but require more to model a trend.

Map ID	Lake ID	Summer	Spring
1	LOWER	Insufficient data	=
2	IROQUOIS	-	-
3	INDIAN BROOK (ESSEX)	=	-
4	COLCHESTER	Insufficient data	+
5	MILTON	No data	Insufficient data
6	LONG (MILTON)	No data	=
7	GEORGIA PLAINS;	No data	Insufficient data
8	SOUTH ST. ALBANS	No data	Insufficient data
9	NORTH ST. ALBANS	No data	Insufficient data
10	MUD CREEK	No data	Insufficient data

Lakes in need of further assessment

In the Lake Score Card section above, there are numerous lakes that have insufficient data. For these lakes, impervious cover and agricultural land uses information is shown below to help watershed evaluation because these land cover / use types tend to export more pollutants than other land cover/use types. Use the Lake ID in the table below to find more information in the report viewer. The Watershed Disturbance Score is derived from a landscape development intensity index (LDI) developed by Brown and Vivas (2005)[1]. The LDI is a measure of human-induced alterations to the biological, chemical, and physical processes of a watershed's lands that impact the receiving water, in this case a lake.

Table 11. Landcover of watersheds of lakes with insufficient data to determine water quality status.

	Watershed disturbance	Impervious surface		Agricultural land	
Lake ID		Percent	Acres	Percent	Acres
DUCK (SHELBN)	Poor	73.6	95.9	1.1	1.4
INDIAN BROOK;	Poor	3.7	239.1	2.1	137.6
EAGLE	Insufficient data	0.0	0.0	0.0	0.0
GEORGIA PLAINS;	Insufficient data	43.7	419.5	0.5	4.5
MALLETT;	Poor	4.1	116.2	0.2	4.4
DUCK (SHELBN)	Insufficient data	73.6	95.9	1.1	1.4

[1] Brown, M. T., & Vivas, M. B. (2005). Landscape development intensity index. Environmental monitoring and assessment, 101, 289-309.

Rivers

Conditions and trends

Physical condition

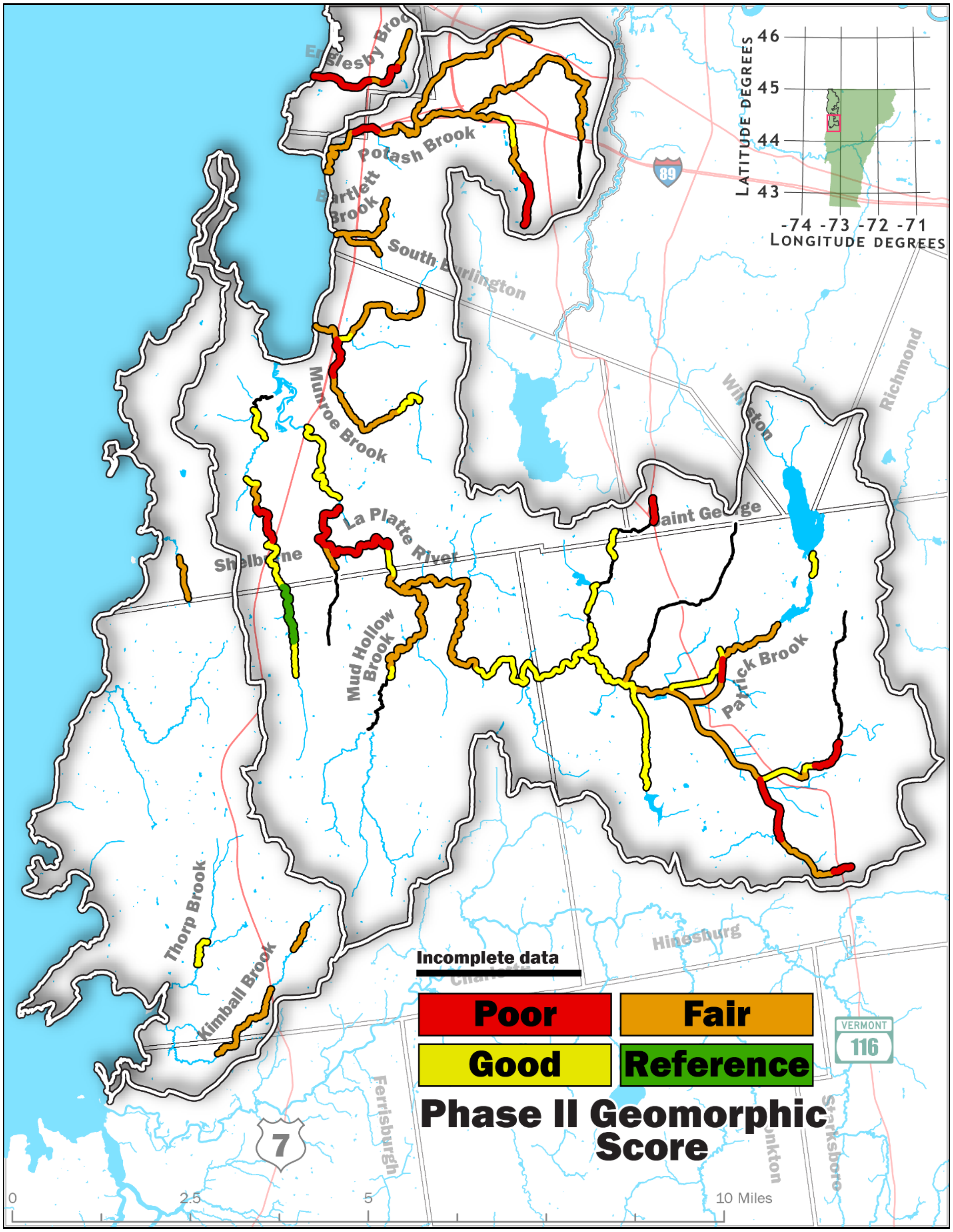


Figure 7 Map of rivers in Basin 5, southern section, with Phase II geomorphic condition scores through 2023. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

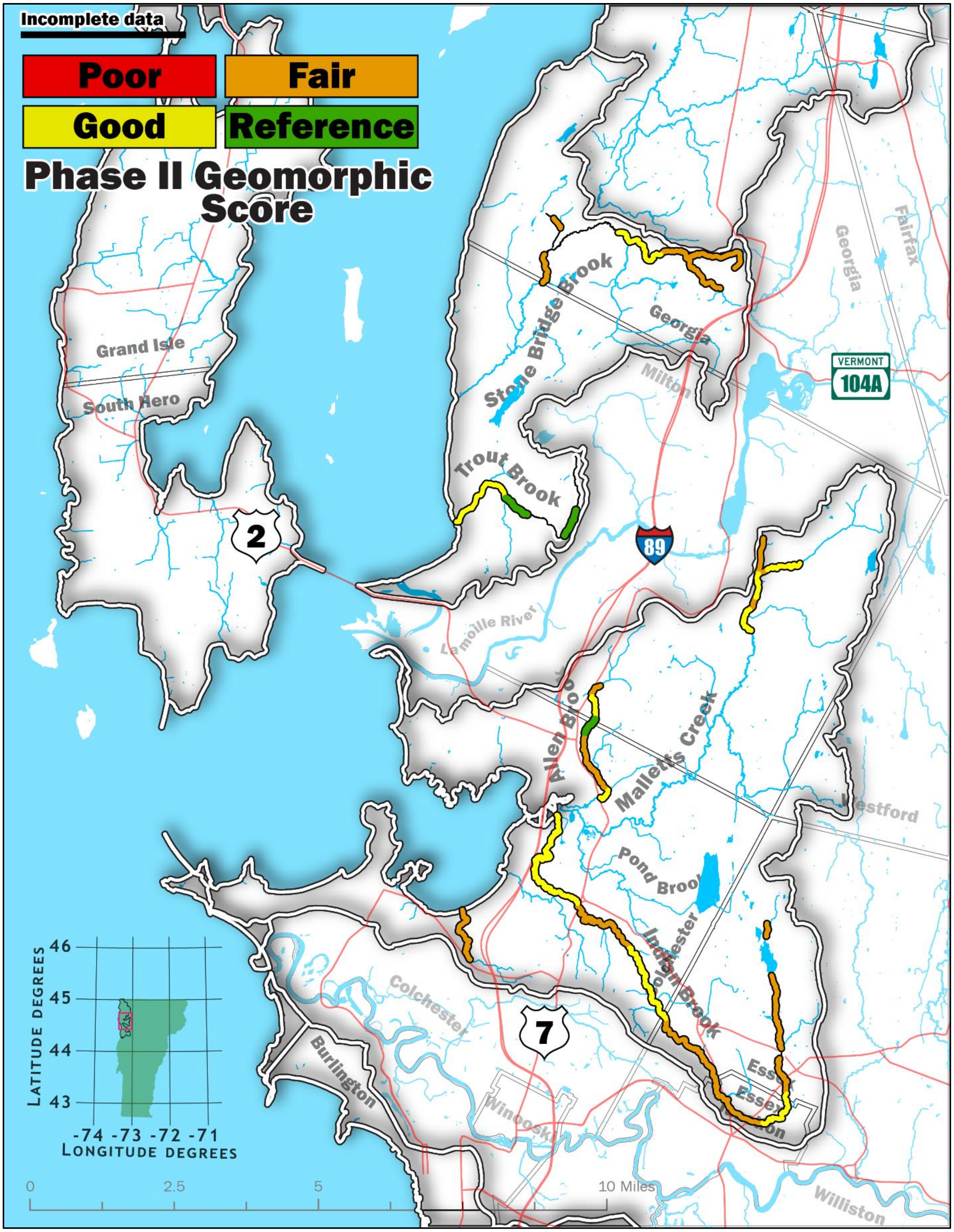


Figure 8 Map of rivers in Basin 5, middle section, with Phase II geomorphic condition scores through 2023. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

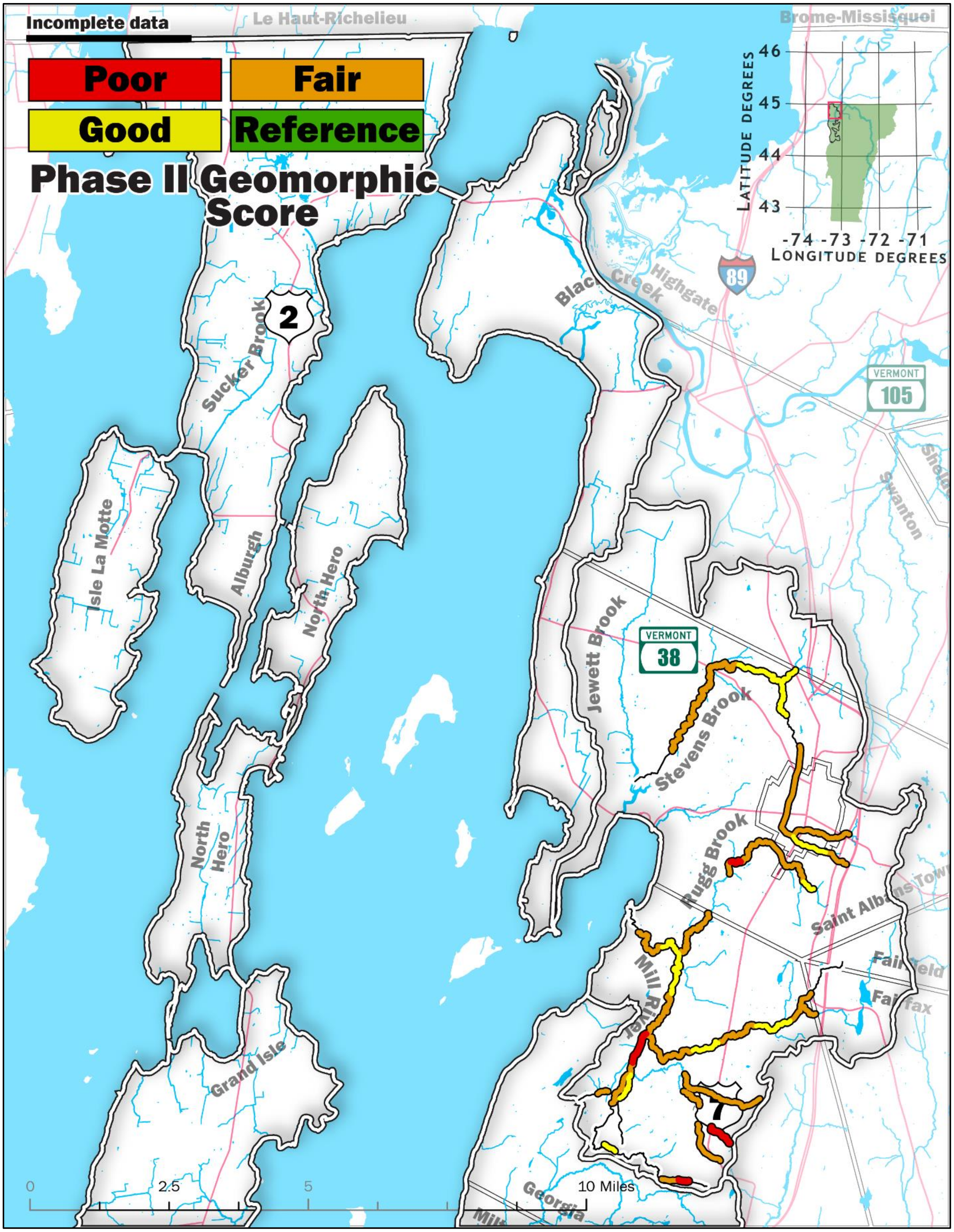


Figure 9 Map of rivers in Basin 5, north section, with Phase II geomorphic condition scores through 2023. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

Within the WSMD Rivers Program, two sections conduct assessments of Vermont's rivers and streams. The Biomonitoring Section collects data and assesses the biological and chemical condition of rivers, and the Stream Geomorphic Assessment Section collects data and assesses the physical condition of rivers.

Fluvial geomorphology is a subdiscipline of geomorphology that investigates how flowing water shapes and modifies Earth's surface through erosional and depositional processes. The Rivers Program conducts a three-phase approach to assess the physical condition of rivers in the State of Vermont. Phase 1 is a watershed assessment. Phase 2 is a rapid field stream assessment, and Phase 3 is a survey assessment. Figures 7- 9 give the overall Phase 2 geomorphic condition score of rivers in Basin 5. Figures displayed here are based on Phase 2 data.

The Stream Geomorphic Assessment (SGA) can be used to problem solve and set priorities for river corridor conservation and restoration strategies at a watershed scale because it allows you to ascertain how one reach may be affecting the condition of another. In Phase 2 SGA direct observations are used to evaluate stream geomorphic condition and different channel adjustment processes in each reach. In the Phase 2 SGA, the geomorphic stream condition is largely a function of the type and degree to which the stream has departed from its reference condition and the type and magnitude of channel adjustments that are happening in response to the channel and floodplain modifications that have been documented at assessed reaches in the watershed.

For more information on these type of assessments see the River's Assessment *webpage*. To learn more about the rivers and streams with Phase 1 and Phase 2 assessments in Basin 5, final reports for each project can be found at: *https://anrweb.vt.gov/DEC/SGA/finalReports.aspx*.

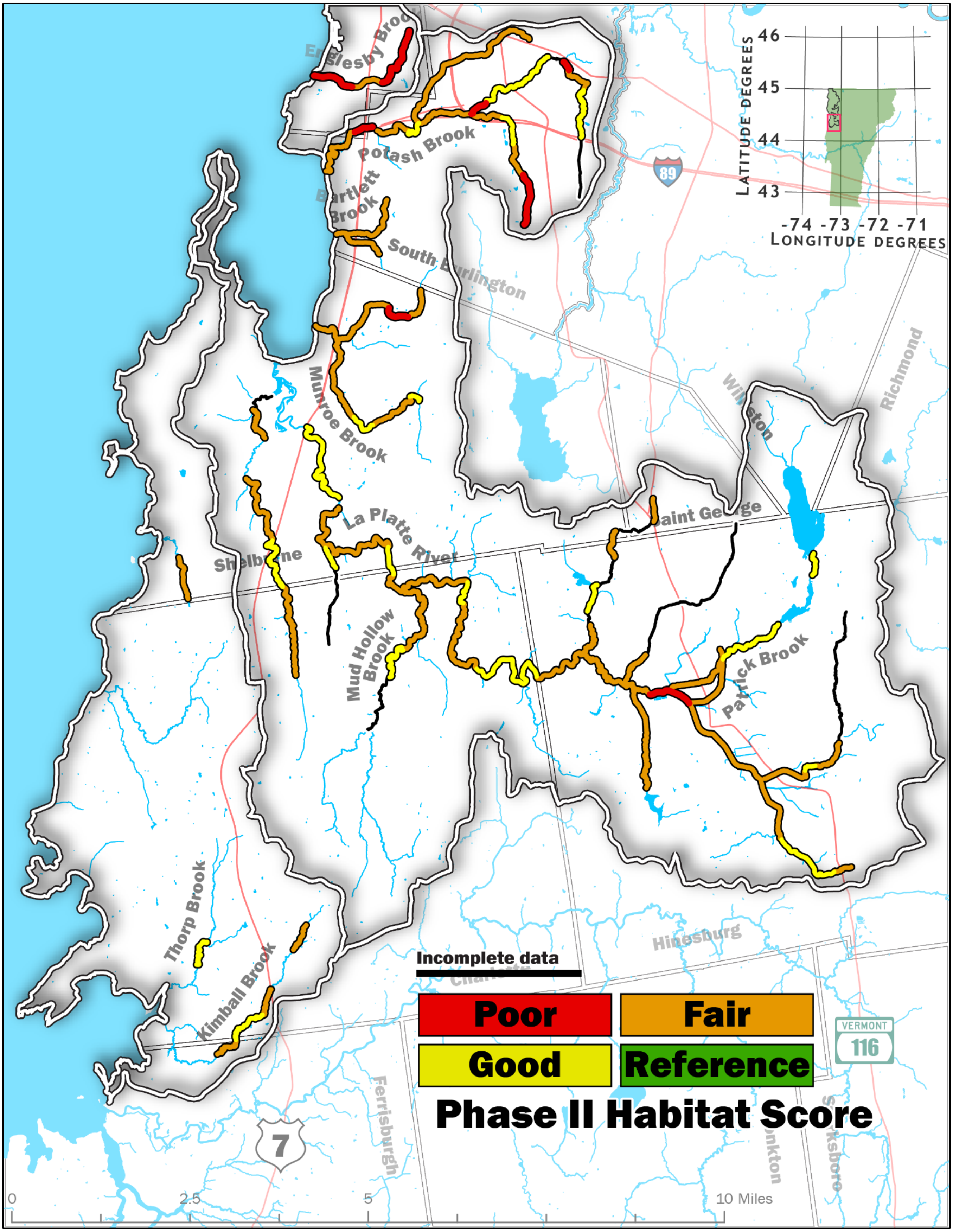


Figure 10 Map of rivers in Basin 5, south section, with Phase II habitat condition ratings through 2023. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

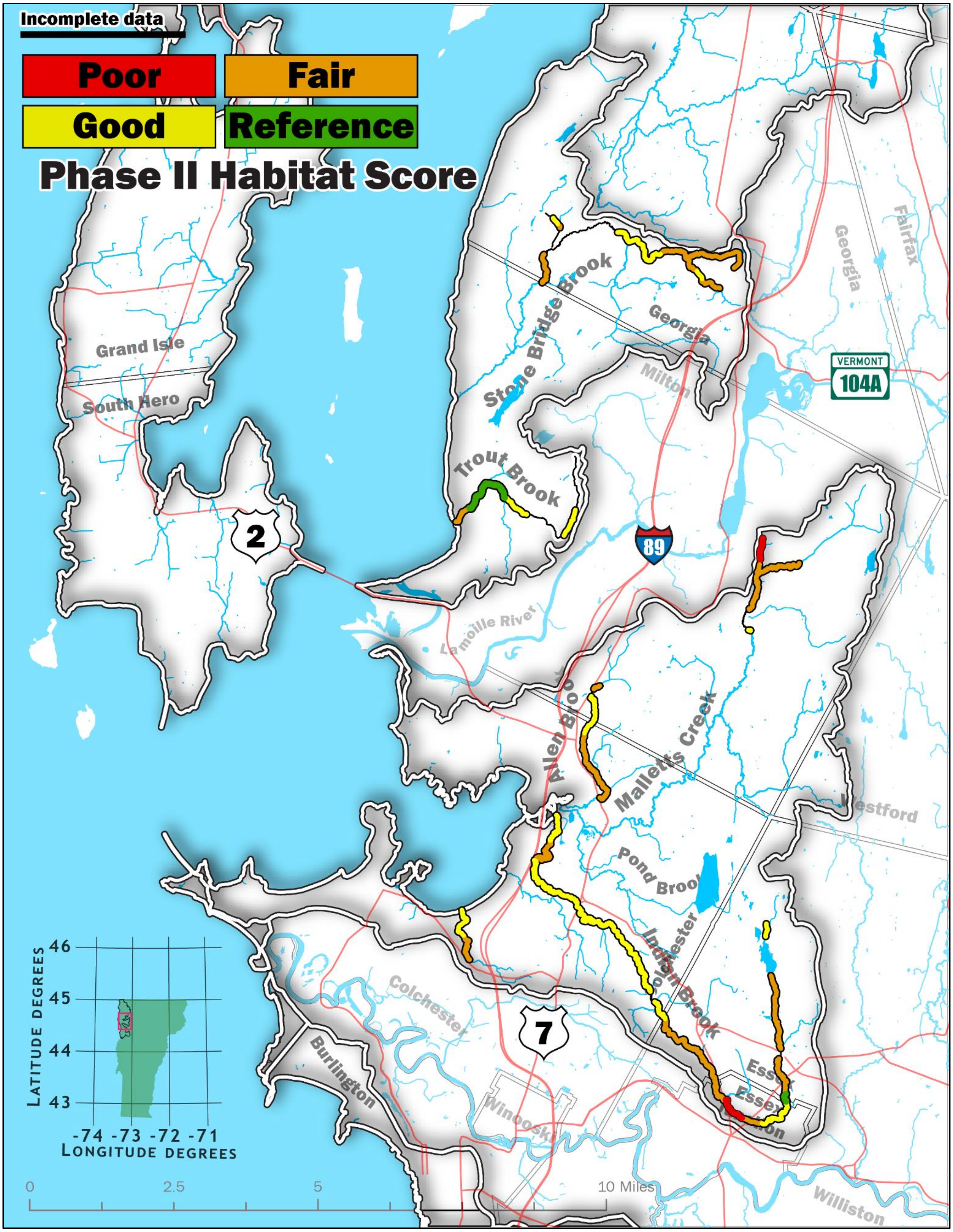


Figure 11 Map of rivers in Basin 5, middle section, with Phase II habitat condition ratings through 2023. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

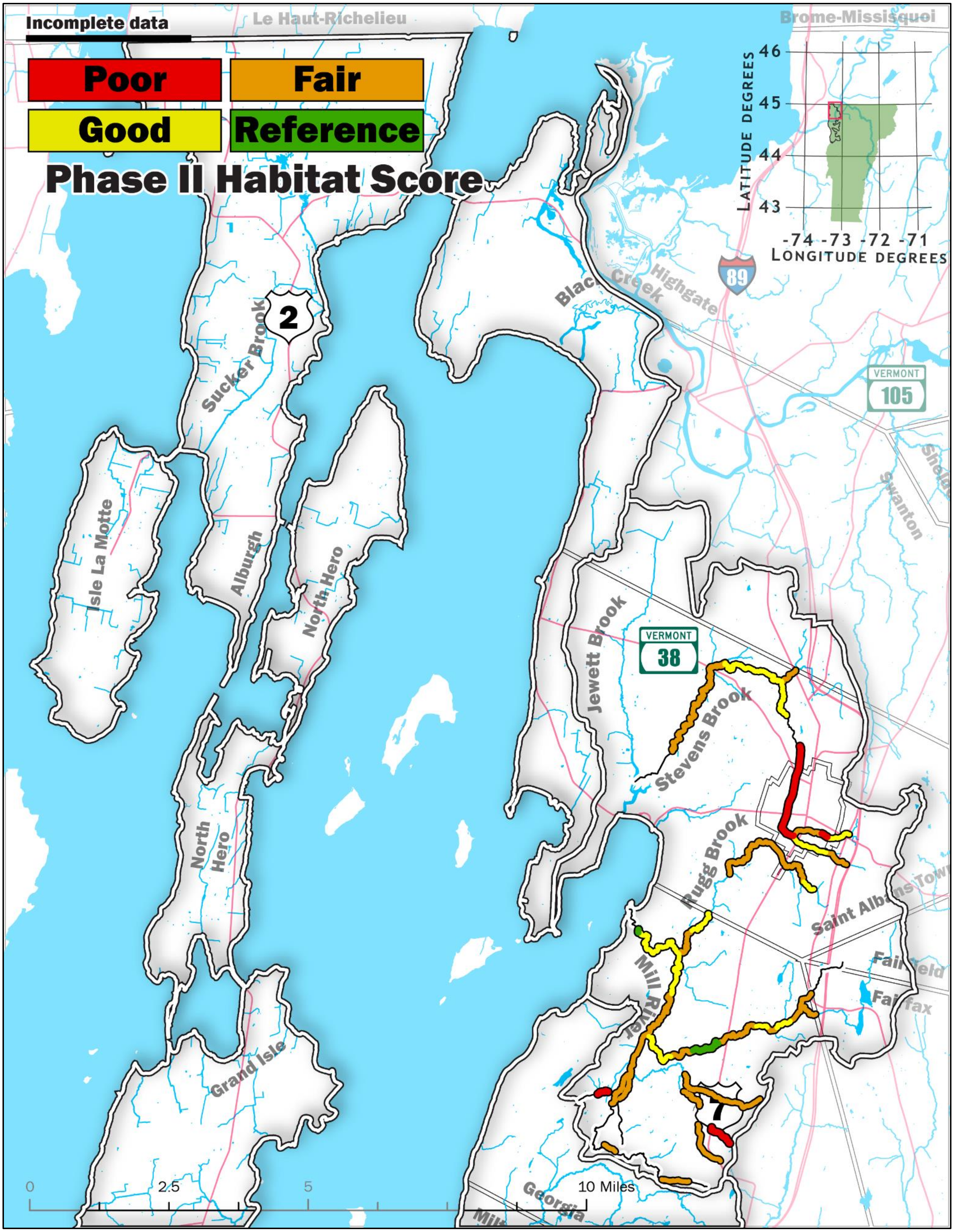


Figure 12 Map of rivers in Basin 5, north section, with Phase II habitat condition ratings through 2023. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

The Rapid Habitat Assessment evaluates the physical components of a channel bed, banks, and riparian vegetation and how they may affect aquatic life. The Habitat condition ratings can be used to identify high quality habitat and to red-flag areas of degraded physical habitat. It is also useful to examine habitat condition ratings at a watershed scale and compare these ratings with Phase 1 and Phase 2 impact rating data to determine potential reasons for habitat degradation, and to understand habitat quality and availability throughout the watershed. Looking closely at the physical processes and the resulting physical conditions that determine aquatic habitat, and thus the biota that inhabit it, and by comparing healthy systems to unhealthy systems, a better understanding of how fluvial processes impact aquatic habitat and biota can be determined. For information on habitat assessments, see the rapid habit assessment section in the SGA handbook:
https://dec.vermont.gov/sites/dec/files/wsm/rivers/docs/rv_SGA_Phase2_Protocol.pdf#page=69.

Physical condition - protection

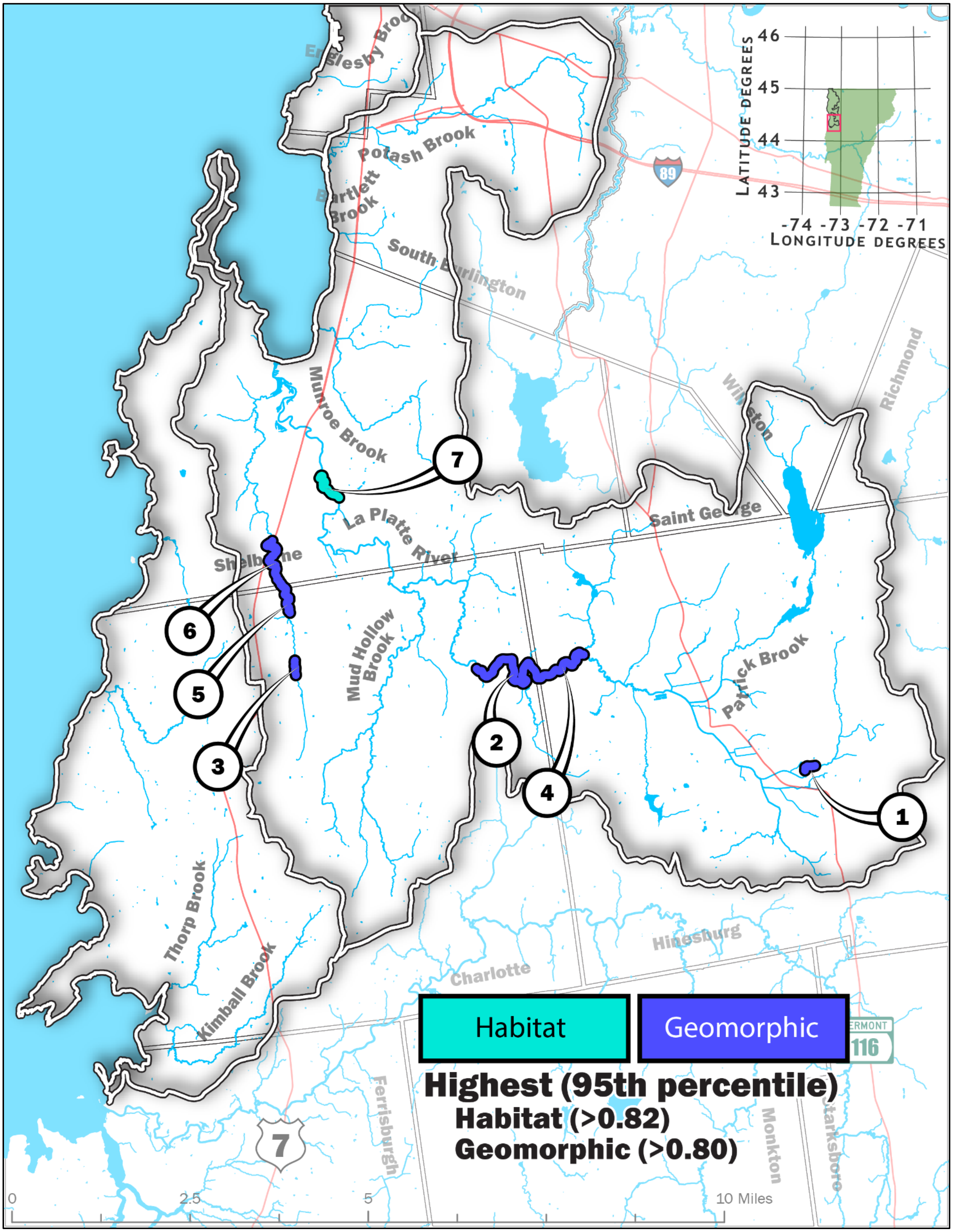


Figure 13. Map of the 95th percentile (highest) habitat and geomorphic condition scores (Basin 5 south section). Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

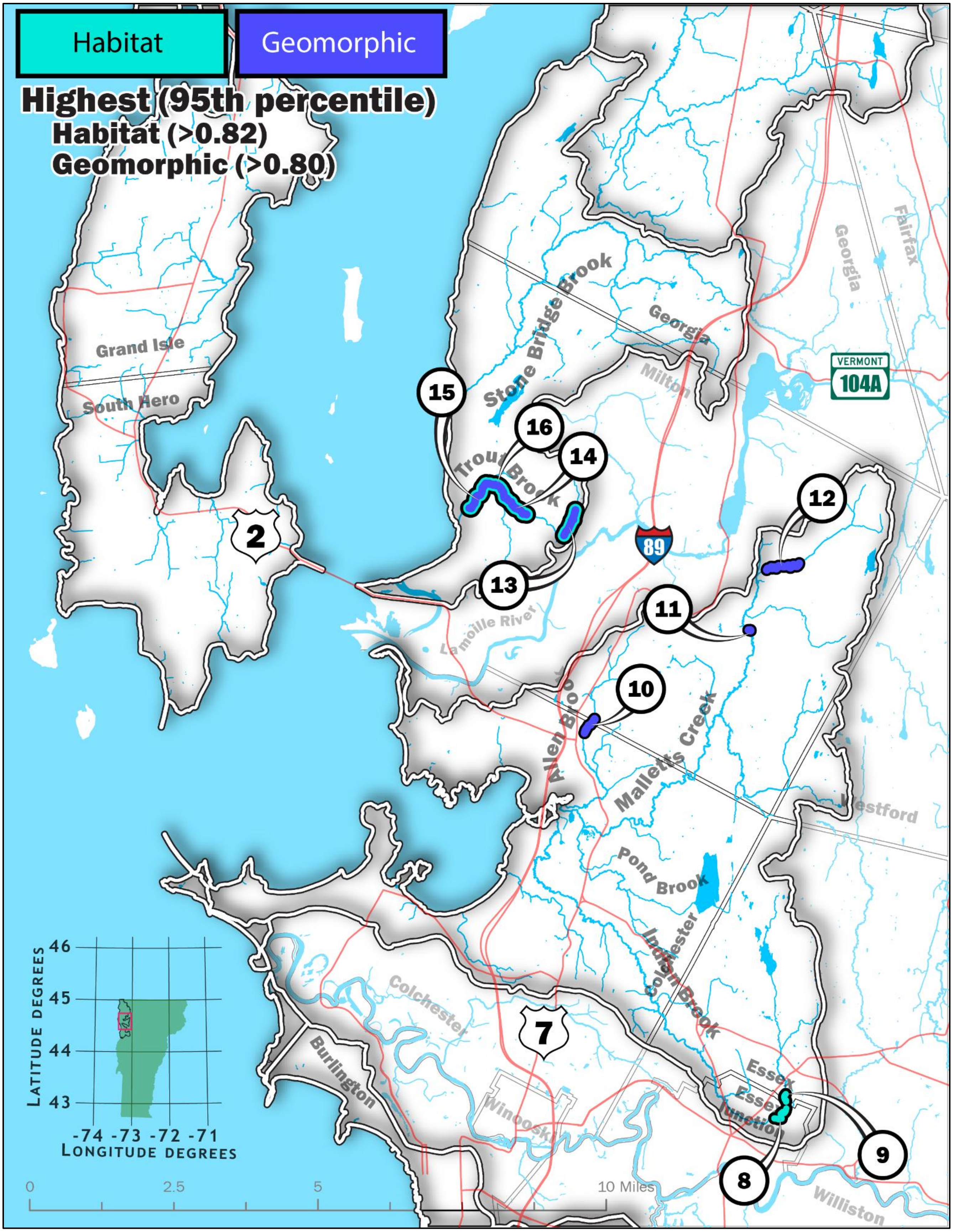


Figure 14 Map of the 95th percentile (highest) habitat and geomorphic condition scores (Basin 5 middle section). Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

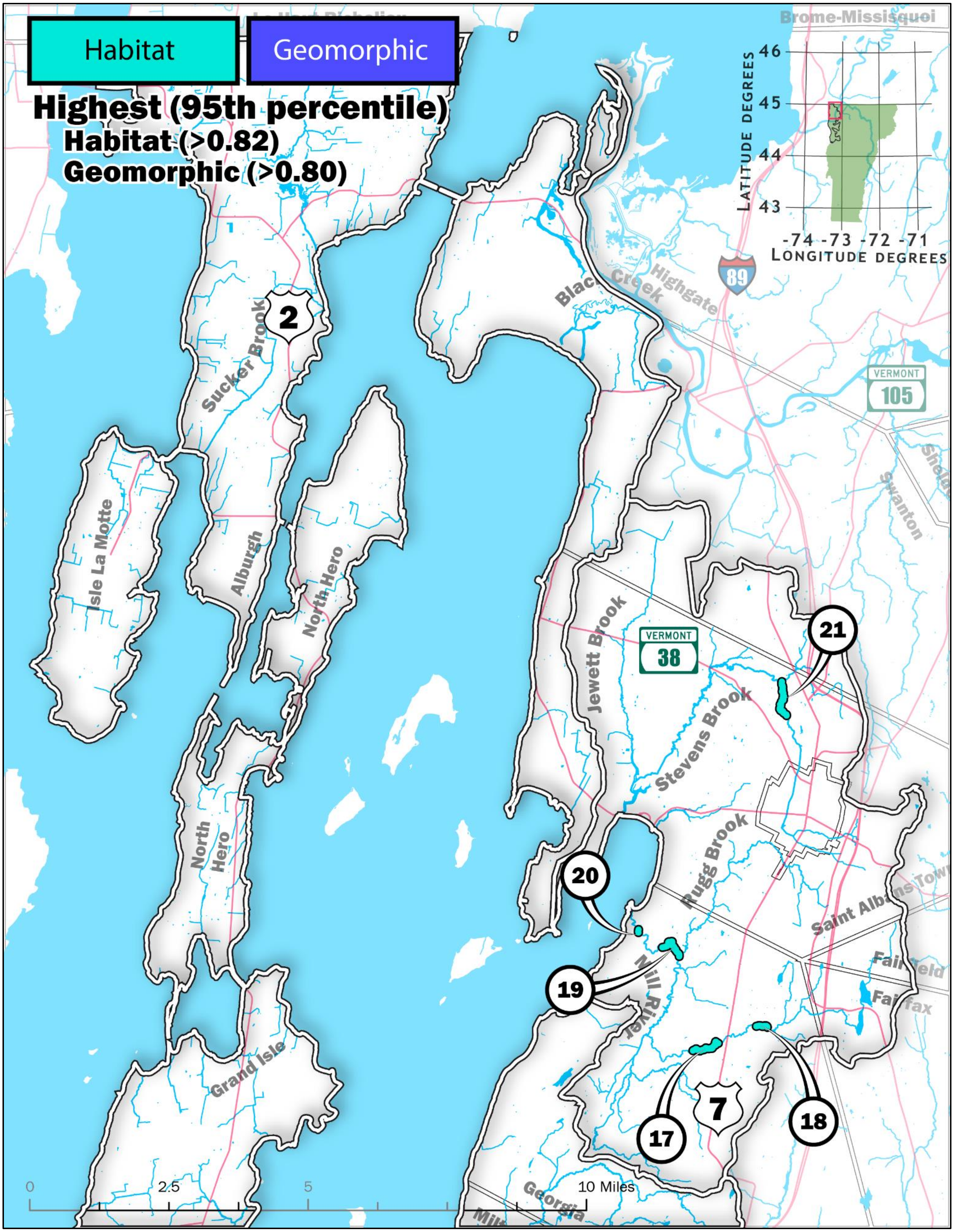


Figure 15 Map of the 95th percentile (highest) habitat and geomorphic condition scores (Basin 5 north section). Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

Table 12 The highest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Assessment	Longitude	Latitude
1	75_T5.01C	Beecher Hill Brook			Link	-73.082	44.319
2	75_M11-	La Platte River			Link	-73.166	44.338
3	75_T1.07B	McCabes Brook			Link	-73.228	44.338
4	75_M12-	La Platte River			Link	-73.152	44.339
5	75_T1.05C	McCabes Brook			Link	-73.230	44.352
6	75_T1.05B	McCabes Brook			Link	-73.234	44.359
7	75_M04B	LaPlatte River			Link	-73.220	44.374
8	44_M12-	Indian Brook			Link	-73.094	44.496
9	44_M13B	Indian Brook			Link	-73.092	44.500
10	171_T1.05-	Allen Brook			Link	-73.162	44.593
11	171_M14A	Malletts Creek			Link	-73.106	44.617
12	171_M17B	Malletts Creek			Link	-73.094	44.633
13	76_M07-	Trout Brook			Link	-73.169	44.644
14	76_M04-	Trout Brook			Link	-73.188	44.648
15	76_M02-	Trout Brook			Link	-73.201	44.651
16	76_M03-	Trout Brook			Link	-73.194	44.653
17	109_M04B	Mill River			Link	-73.120	44.750
18	109_M06A	Mill River			Link	-73.099	44.756
19	109_M01E	Mill River			Link	-73.132	44.776
20	109_M01B	Mill River			Link	-73.145	44.780
21	7_M04-	Stevens Brook			Link	-73.093	44.841

Physical condition - restoration

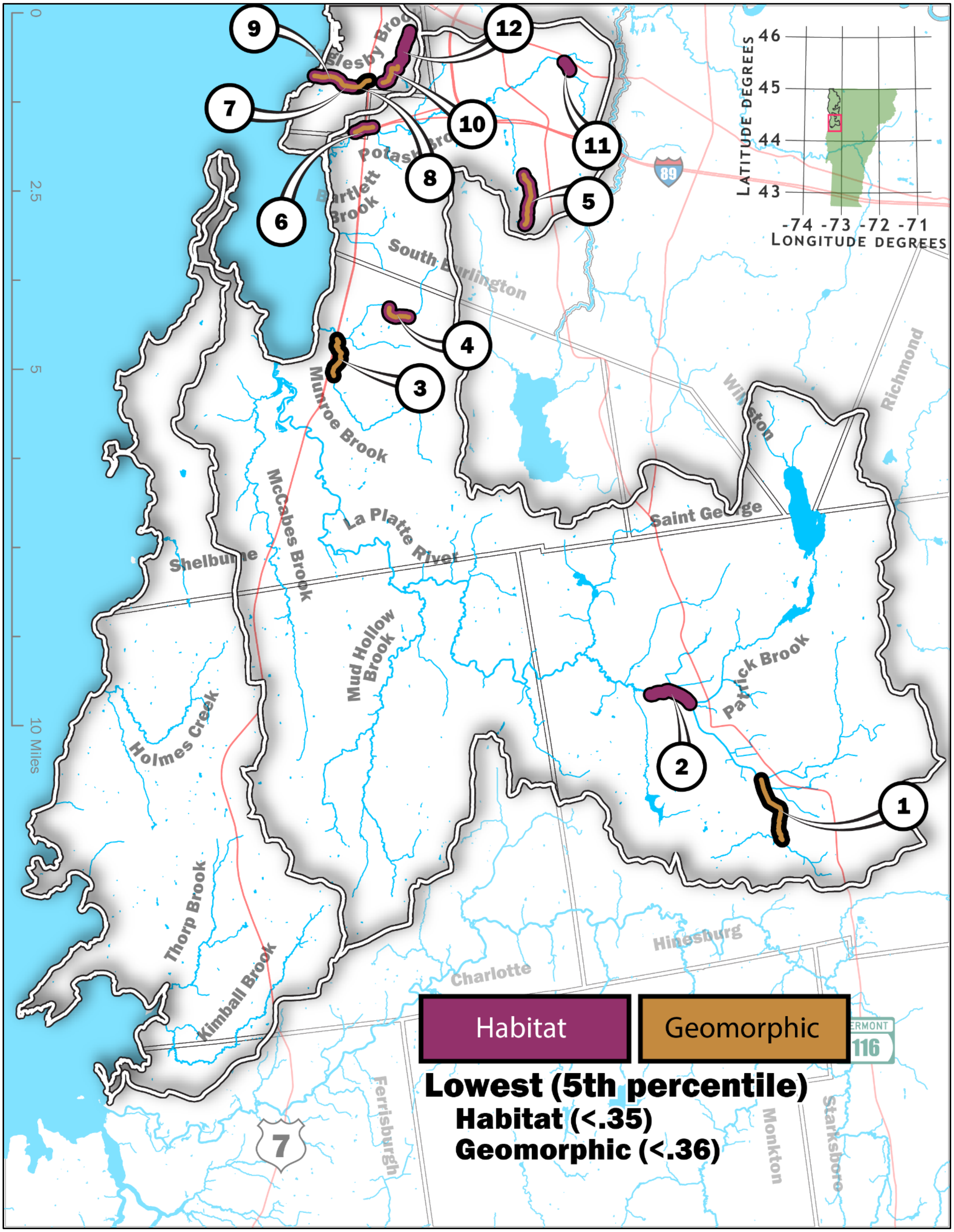


Figure 16 Map of the lowest 5th percentile habitat and geomorphic condition scores (Basin 5 south section). Map IDs correspond to the table below.

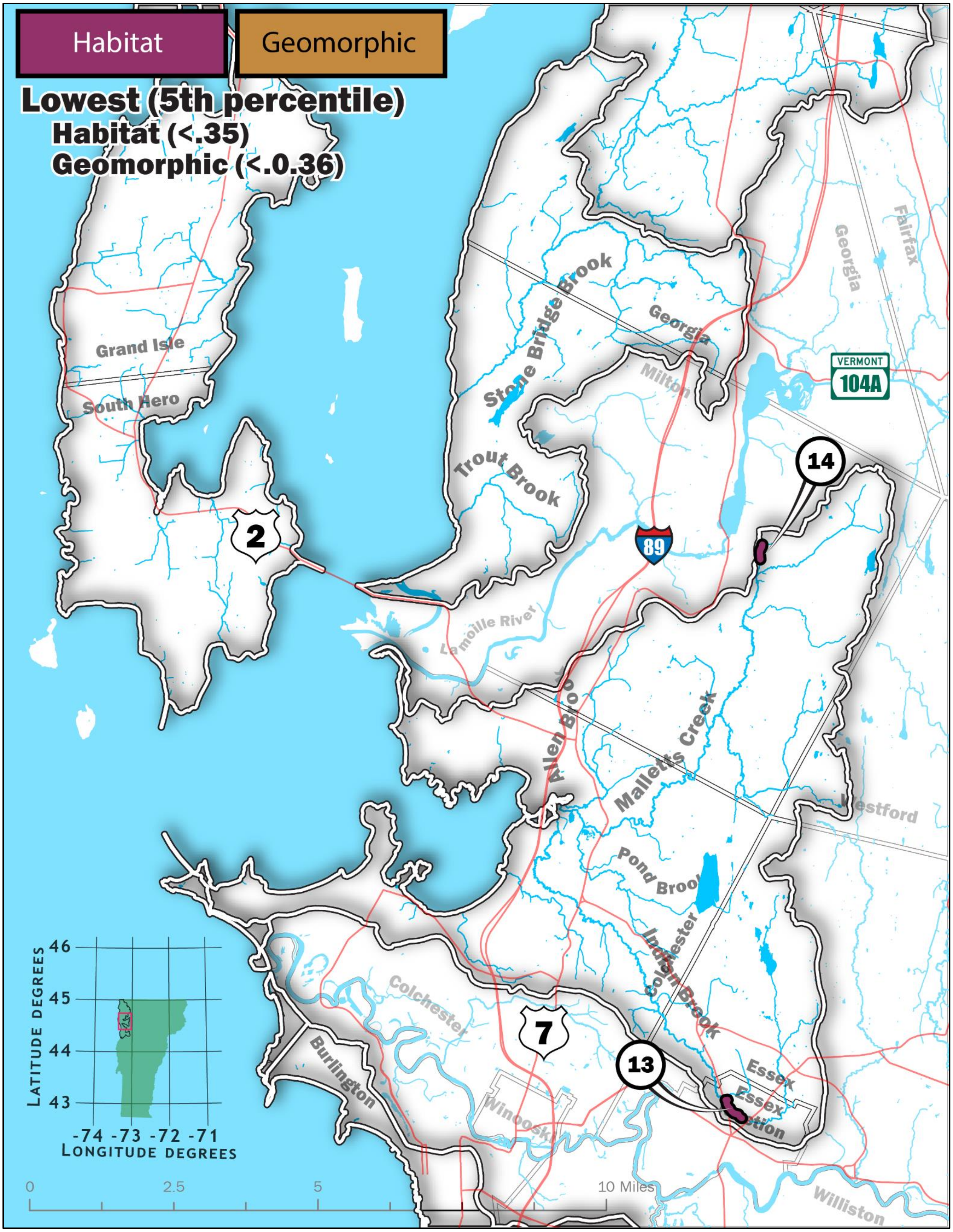


Figure 17 Map of the lowest 5th percentile habitat and geomorphic condition scores (Basin 5 middle section). Map IDs correspond to the table below.

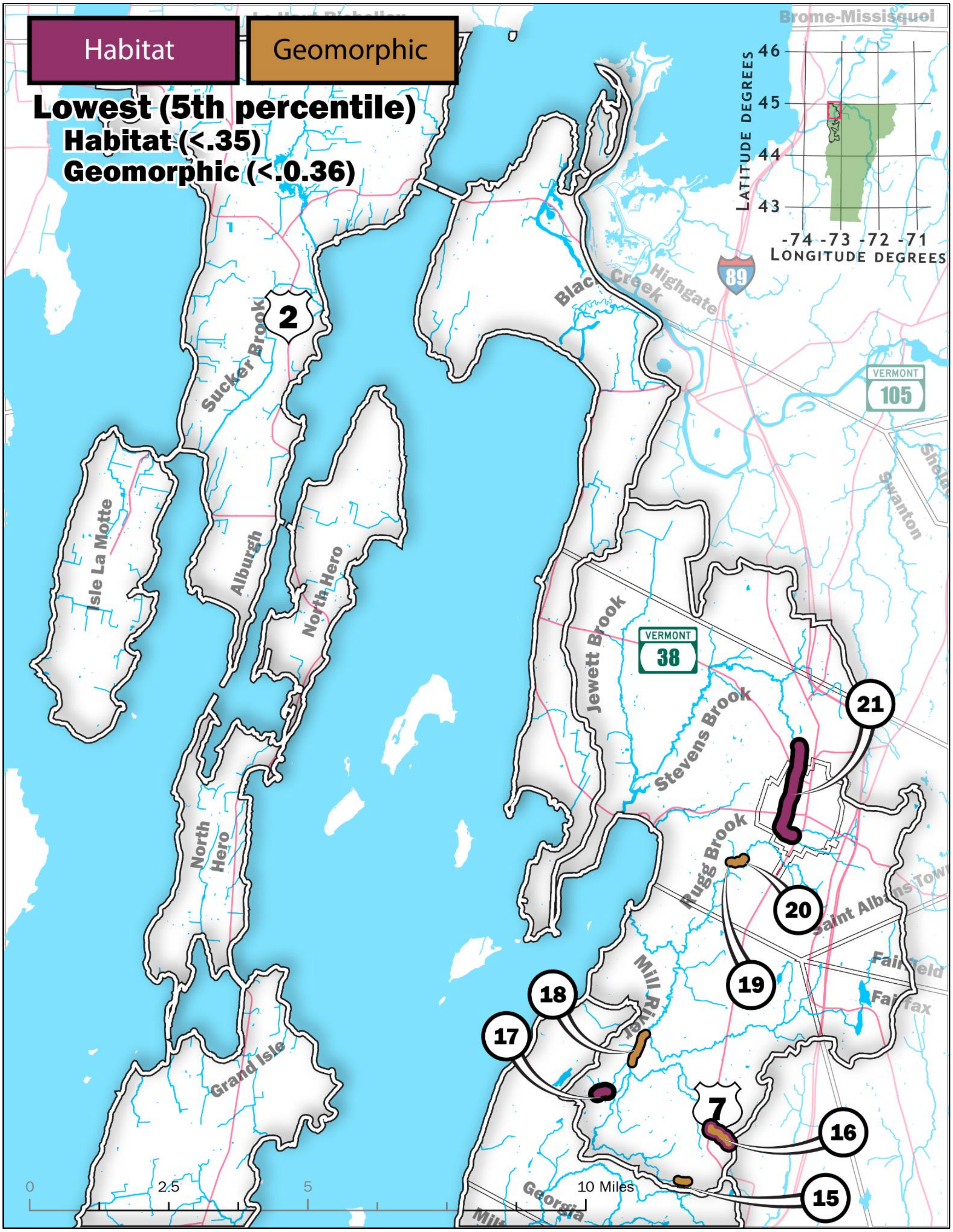


Figure 18 Map of the lowest 5th percentile habitat and geomorphic condition scores (Basin 5 south section). Map IDs correspond to the table below.

Table 13. The lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Assessment	Longitude	Latitude
1	75_M17-	La Platte River			Link	-73.091	44.311
2	75_M15B	La Platte River			Link	-73.121	44.334
3	40_M02A	Munroe Brook			Link	-73.216	44.401
4	40_T1.03-	Munroe Brook, northern trib			Link	-73.200	44.409
5	47_T3.04B	Potash Brook Trib 3			Link	-73.163	44.433
6	47_M03-	Potash Brook			Link	-73.210	44.448
7	45_M01B	Englesby Brook			Link	-73.215	44.456
8	45_M01C	Englesby Brook			Link	-73.211	44.456
9	45_M01A	Englesby Brook			Link	-73.219	44.458
10	45_M02-	Englesby Brook			Link	-73.202	44.459
11	47_M13-	Potash Brook			Link	-73.152	44.460
12	45_M03-	Englesby Brook			Link	-73.199	44.464
13	44_M11A	Indian Brook			Link	-73.111	44.497
14	171_T6.01C	Mallets Creek			Link	-73.102	44.637
15	109_M2T2.06C	Unnamed Trib to M02			Link	-73.127	44.715
16	109_M2T2.2S1.3S3.01B	Unnamed Trib to M02			Link	-73.114	44.727
17	109_M2T2.1S1.1S1.01A	Unnamed Trib to M02			Link	-73.157	44.738
18	109_M2T2.01-	Unnamed Trib to M02			Link	-73.144	44.750
19	8_M05B	Rugg Brook			Link	-73.109	44.798
20	8_M06A	Rugg Brook			Link	-73.107	44.799
21	7_M05B	Stevens Brook			Link	-73.089	44.816

Biological condition

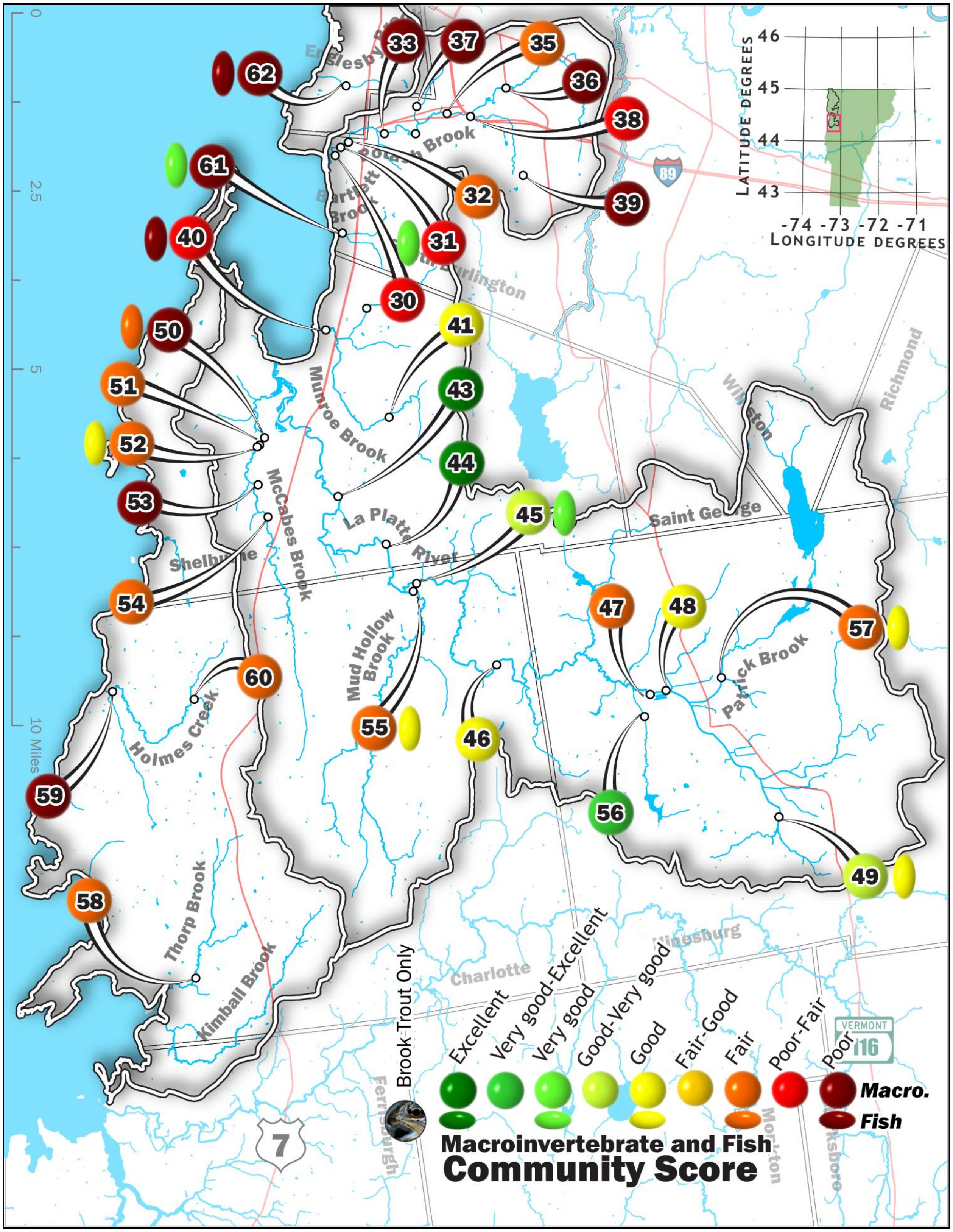


Figure 19. Map of the most recent Macroinvertebrate Community assessments over last 12 years for sites in Basin 5, south section (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

The Biomonitoring Section conducts biological assessments of wadeable rivers and streams. For more information on these assessments see the WSMD Biomonitoring Section *webpage*[1]. The assessments include sampling of macroinvertebrate and fish communities to determine Aquatic Biota use support, as well as the collection of water quality and habitat data to better understand the condition of the biological communities. Aquatic biota health in streams is one of the primary areas of study by the WSMD with data used to determine a river's ability to fully support aquatic biota. Brook Trout (BKT) only streams are defined as streams that contain only Brook Trout, which cannot be assessed using the VDEC Fish Index of Biological Integrity (IBI), which requires two or more native species to score.

Table 14 Macroinvertebrate (bug) and fish community assessment matrix for the streams of Basin 5, south section. Blank = no data,

Unable to sample or assess	Poor (P)	Poor-fair (PF)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Potash Brook, 0.4	30	Bug	PF	PF									
Potash Brook, 0.7	31	Bug	PF	P			PF				PF		
Potash Brook, 0.7	31	Fish									Vg		
Potash Brook, 1.0	32	Bug	PF				F						
Potash Brook, 1.0	32	Fish											
Potash Brook, 1.8	33	Bug	P				P						
Potash Brook, 1.8	33	Fish											
Potash Brook, 2.1	34	Bug	F										
Potash Brook, 2.1	34	Fish											
Potash Brook, 3.0	35	Bug	PF				F						
Potash Brook, 4.3	36	Bug	P				P						
Potash Brook Trib 3, 0.3	37	Bug					P						
Potash Brook Trib 7, 0.1	38	Bug					PF						
Potash Brook Trib 7, 1.7	39	Bug					P						
Munroe Brook, 0.3	40	Bug	F				F			U	PF		
Munroe Brook, 0.3	40	Fish	P										
Munroe Brook, 2.8	41	Bug	G							U			
Munroe Brook, 2.8	41	Fish											
Munroe Brook North Trib, 0.8	42	Bug	F							U	U		
Laplatte River, 3.4	43	Bug						E					

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
LaPlatte River, 5.2	44	Bug										E	
LaPlatte River, 5.8	45	Bug	Vg					E				GVg	
LaPlatte River, 5.8	45	Fish										Vg	
LaPlatte River, 8.6	46	Bug						G					
Laplatte River, 12.0	47	Bug						F					
Laplatte River, 12.0	47	Fish											
Laplatte River, 12.5	48	Bug						G					
Laplatte River, 12.5	48	Fish											
Laplatte River, 14.9	49	Bug						GVg					
Laplatte River, 14.9	49	Fish	F					G					
McCabes Brook, 1.2	50	Bug	P	P			P	P	P			P	
McCabes Brook, 1.2	50	Fish	G	P			F						
McCabes Brook, 1.3	51	Bug					F						
McCabes Brook, 1.4	52	Bug	PF				F	F	F			F	
McCabes Brook, 1.4	52	Fish	G				U						
McCabes Brook, 2.1	53	Bug							F	U		P	
McCabes Brook, 2.7	54	Bug					F						
Mud Hollow Brook, 0.1	55	Bug										F	
Mud Hollow Brook, 0.1	55	Fish										G	
LaPlatte River Trib #7, 0.5	56	Bug				VgE							
LaPlatte River Trib #7, 0.5	56	Fish				U							
Patrick Brook, 0.7	57	Bug										F	
Patrick Brook, 0.7	57	Fish										G	
Thorpe Brook, 0.5	58	Bug	F					F				U	
Holmes Creek, 0.1	59	Bug										P	
Holmes Creek, 2.7	60	Bug	F										
Holmes Creek, 2.7	60	Fish	U										
Bartlett Brook, 0.2	61	Bug	P	PF						P			

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Bartlett Brook, 0.2	61	Fish		G								Vg	

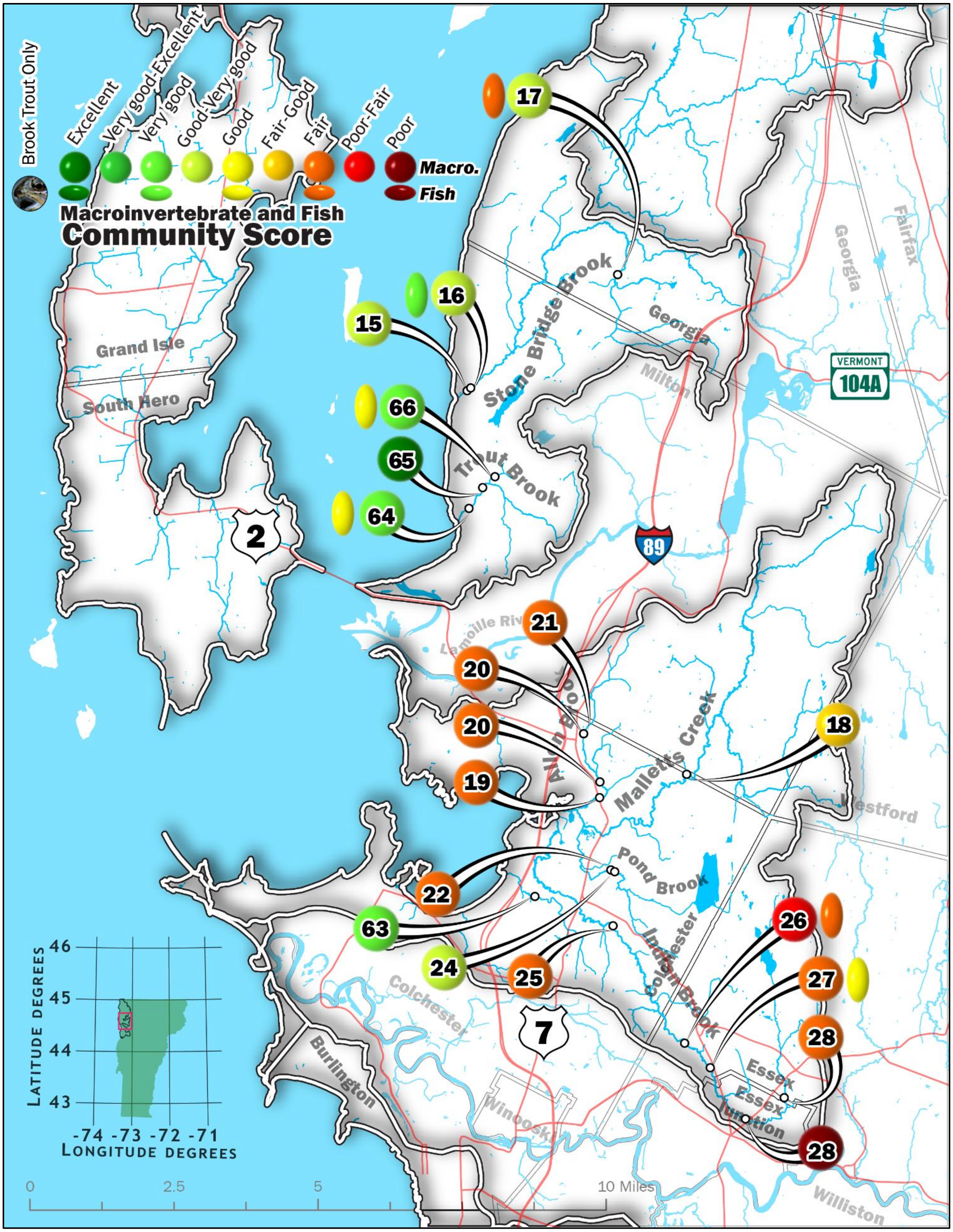


Figure 20 Map of the Macroinvertebrate Community assessment for Basin 5, middle section, (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

Table 15 Macroinvertebrate (bug) and fish community matrix for the watersheds of Basin 5, middle section. Blank = no data, bkt = streams with a robust brook trout community

Unable to sample or assess	Poor (P)	Poor-fair (PF)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Stone Bridge Brook, 0.2	15	Bug	GVg										
Stone Bridge Brook, 0.2	15	Fish											
Stone Bridge Brook, 0.3	16	Bug										GVg	
Stone Bridge Brook, 0.3	16	Fish										Vg	
Stone Bridge Brook, 5.5	17	Bug						GVg					
Stone Bridge Brook, 5.5	17	Fish						F					
Malletts Creek, 3.5	18	Bug										FG	
Malletts Creek, 3.5	18	Fish										U	
Allen Brook, 0.9	19	Bug						F					
Allen Brook, 1.3	20	Bug						F					
Allen Brook, 2.2	21	Bug	Vg					F					
Allen Brook, 2.2	21	Fish											
Allen Brook, 2.3	22	Bug										F	
Pond Brook, 1.5	23	Bug										F	
Pond Brook, 1.5	23	Fish										U	
Pond Brook, 1.6	24	Bug	GVg										

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Indian Brook, 3.1	25	Bug										F	
Indian Brook, 3.1	25	Fish											
Indian Brook, 5.8	26	Bug	F				PF					PF	
Indian Brook, 5.8	26	Fish	F									F	
Indian Brook, 7.0	27	Bug	F				F						
Indian Brook, 7.0	27	Fish					G						
Indian Brook, 8.5	28	Bug	PF					P					
Indian Brook, 8.5	28	Fish											
Indian Brook, 9.5	29	Bug	F										
Indian Brook, 9.5	29	Fish											
Englesby Brook, 0.6	62	Bug		P							U	P	
Englesby Brook, 0.6	62	Fish		P								P	
Crooked Creek, 1.0	63	Bug	Vg									U	
Trout Brook, 0.3	64	Bug			E			Vg					
Trout Brook, 0.3	64	Fish			Vg			G					
Trout Brook, 0.7	65	Bug										E	
Trout Brook, 0.7	65	Fish										U	
Trout Brook, 0.8	66	Bug	Vg										

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Trout Brook, 0.8	66	Fish	G										

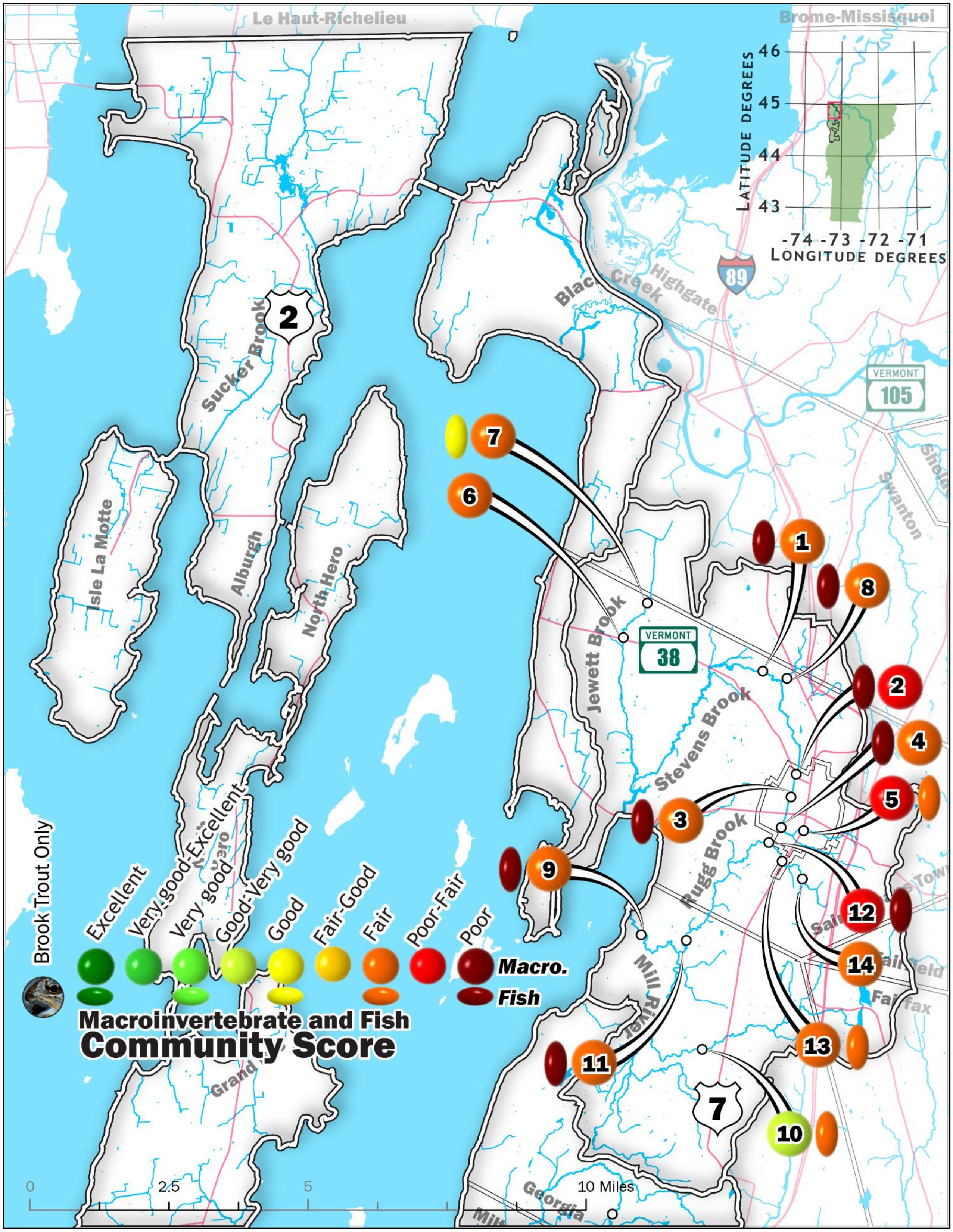


Figure 21 Map of the Macroinvertebrate Community assessment for Basin 5, north section, (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

Table 16 Macroinvertebrate (bug) and fish community matrix for the watersheds of Basin 5, north section. Blank = no data, bkt = streams with a robust brook trout community

Unable to sample or assess	Poor (P)	Poor-fair (PF)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Stevens Brook, 4.2	1	Bug	F					F				F	
Stevens Brook, 4.2	1	Fish	P					F				P	
Stevens Brook, 6.5	2	Bug	PF										
Stevens Brook, 6.5	2	Fish	P										
Stevens Brook, 6.8	3	Bug						F					
Stevens Brook, 6.8	3	Fish						P					
Stevens Brook, 7.5	4	Bug	F										
Stevens Brook, 7.5	4	Fish	P										
Stevens Brook, 8.2	5	Bug				G		F				PF	
Stevens Brook, 8.2	5	Fish				F							
Jewett Brook, 3.2	6	Bug						F				U	U
Jewett Brook, 4.1	7	Bug						F					
Jewett Brook, 4.1	7	Fish						G					
Stevens Brook Trib 7, 0.2	8	Bug										F	
Stevens Brook Trib 7, 0.2	8	Fish										P	
Mill River, 0.7	9	Bug						F					
Mill River, 0.7	9	Fish						P					
Mill River, 5.2	10	Bug											GVg
Mill River, 5.2	10	Fish											F
Rugg Brook, 0.5	11	Bug		FG								F	
Rugg Brook, 0.5	11	Fish		F								P	
Rugg Brook, 4.3	12	Bug	F									PF	
Rugg Brook, 4.3	12	Fish	F									P	
Rugg Brook, 4.8	13	Bug				F							
Rugg Brook, 4.8	13	Fish				F							

Rugg Brook, 5.3	14	Bug	G	F

Chemical condition

Chemical water quality monitoring occurs across the state in rivers and streams in a variety of ways: targeted, probability-based, and special studies. Examples of targeted monitoring include the LaRosa Partnership Program (LPP) and water quality samples collected by the Ambient Biomonitoring Network (ABN). All chemical data can be accessed through the Vermont Integrated Watershed Information System (VIWIS) and generally there is too much data that requires special contextual information to effectively display in graphics and tables in the format of this report. LPP monitoring stations are normally sampled eight times during the spring and summer season, and may be monitored from one to several years, depending on the monitoring purpose. LPP data can provide enough information to make assessment determinations (i.e., impaired or full support). Chemical monitoring associated with the ABN is used to help interpret the biological data, which is relied upon more heavily for assessment and regulatory purposes.

Special chemical studies are usually only conducted in response to compelling data and information obtained from fixed-station and probability-based projects. The number and nature of special studies is commonly dictated by the nature of issues that need further monitoring or that arise as interest or funding permits. These types of studies include detailed sampling to assess use support or standards violations, stressor identification, diagnostic-feasibility studies, effectiveness evaluations of pollution control measures, and watershed-based surveys and evaluations. These evaluations are usually resource intensive and are reserved for issues of particular interest. Additionally, data from these investigations are usually organized and presented in a summary report format and would not be used separately for assessments.

River reclassification candidates (Aquatic biota)

To protect aquatic biota in rivers in the State of Vermont, the Watershed Management Division can initiate reclassification for Aquatic Biota use in rivers that meet a high-quality standard. The major implication of reclassification is the application of new *Water Quality Standards*. Most rivers in the State of Vermont are classified B(2) for Aquatic Biota use and must maintain biological assessments of Good or better for both macroinvertebrate and fish communities. Rivers reclassified to B(1) must maintain biological assessments of Very Good or better, and Rivers reclassified to A(1) must maintain biological assessments of Excellent. The rivers shown here have maintained biological condition expected of either A(1) or B(1) waters and therefore, are candidates for reclassification. For more information, visit the *stream reclassification webpage*.

There are no reclassification candidates in Basin 5.

Impaired rivers

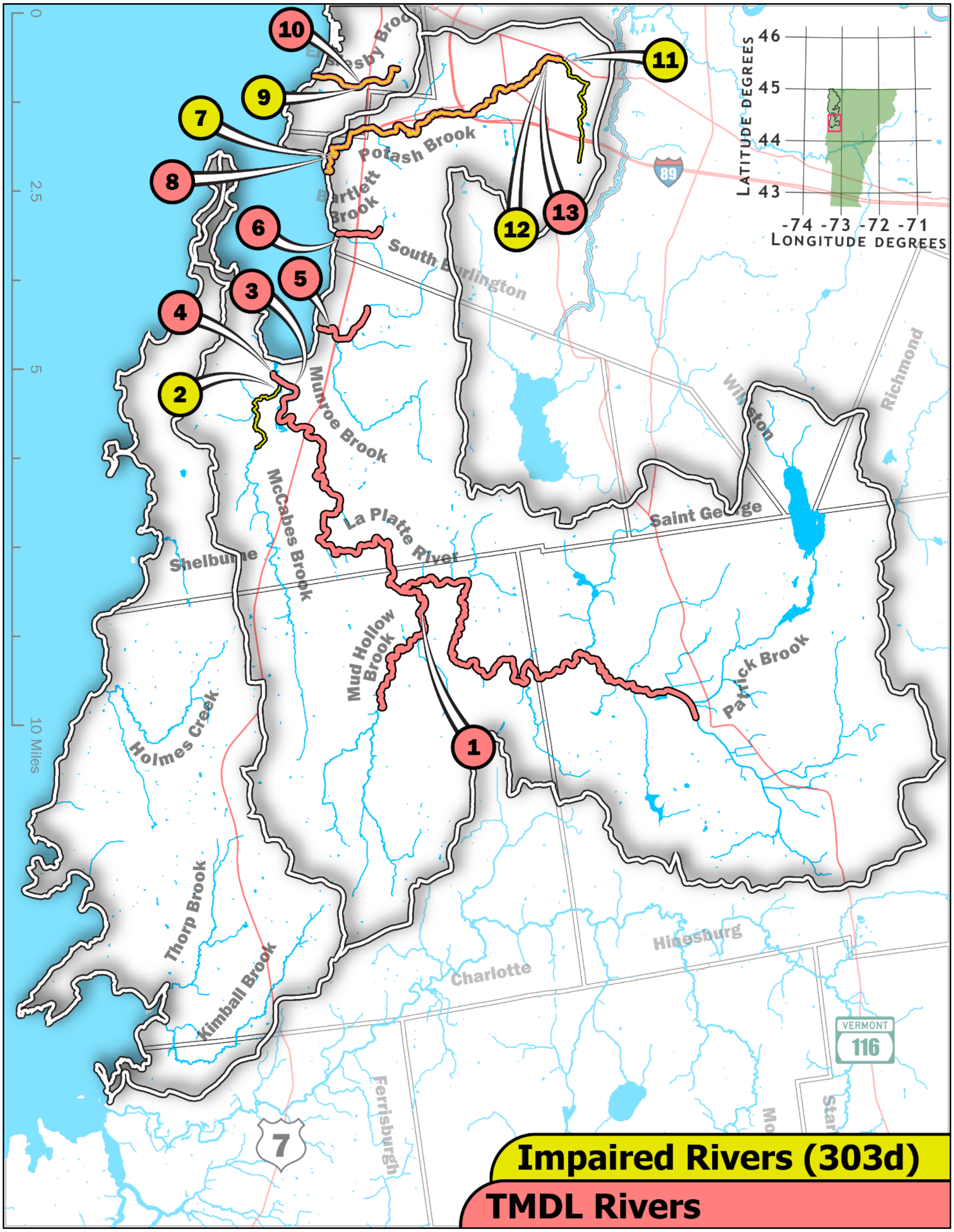


Figure 22. Map of impaired rivers in Basin 05. Yellow represents rivers that are on the 2022 303(d) list (Part A-Priority Waters List). Salmon represents rivers that have an approved TMDL but remain impaired (Part D-Priority Waters List). Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

Table 17 Table of impaired rivers in Basin 5. Map IDs are associated with the map above. (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of wate6rs for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
1	Mud Hollow Brook, from Mouth to 3 Miles Upstream	VT05-11.05	ESCHERICHIA COLI (E. COLI)	Agricultural runoff, streambank erosion	CR	D
2	McCabe's Brook, Mouth to rm 1.4	VT05-11.06	NUTRIENTS	Includes above and below WWTF; possible toxic impact below WWTF; unstable channel above	ALS	A
3	Laplatte River from Hinesburg to rm 0.2	VT05-11.08	ESCHERICHIA COLI (E. COLI)	Agricultural runoff	CR	D
4	Laplatte River, at Mouth	VT05-11.04	MERCURY IN FISH TISSUE, ESCHERICHIA COLI (E. COLI)	Agricultural runoff	FC, CR	D
5	Munroe Brook, Mouth to rm 2.8 (Including North Trib.)	VT05-11.01	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion, land development	ALS	D
6	Bartlett Brook, Mouth to rm 0.7	VT05-11.02	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	ALS	D

7	Potash Brook, Mouth Upstream 1 Mile	VT05-11.03	CHLORIDE	Elevated chloride levels due to road salt	ALS	A
8	Potash Brook, Mouth Upstream 1 Mile	VT05-11.03	POLLUTANTS IN URBAN STORMWATER, ESCHERICHIA COLI (E. COLI)	Stormwater runoff, land development, erosion	ALS, CR	D
9	Englesby Brook, Mouth to rm 1.3	VT05-10.01	CHLORIDE	Elevated chloride levels due to road salt	ALS	A
10	Englesby Brook, Mouth to rm 1.3	VT05-10.01	POLLUTANTS IN URBAN STORMWATER, ESCHERICHIA COLI (E. COLI)	Stormwater runoff, Blanchard beach closure	ALS, RB, CR, AES	D
11	Upper Potash Brook, Kennedy Drive to Above Route 89	VT05-11.12	CHLORIDE	Elevated chloride levels due to road salt	ALS	A
12	Potash Brook, I189 River Upstream 4.2 Miles	VT05-11.07	CHLORIDE	Elevated chloride levels due to road salt	ALS	A
13	Potash Brook, I189 River Upstream 4.2 Miles	VT05-11.07	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	ALS	D

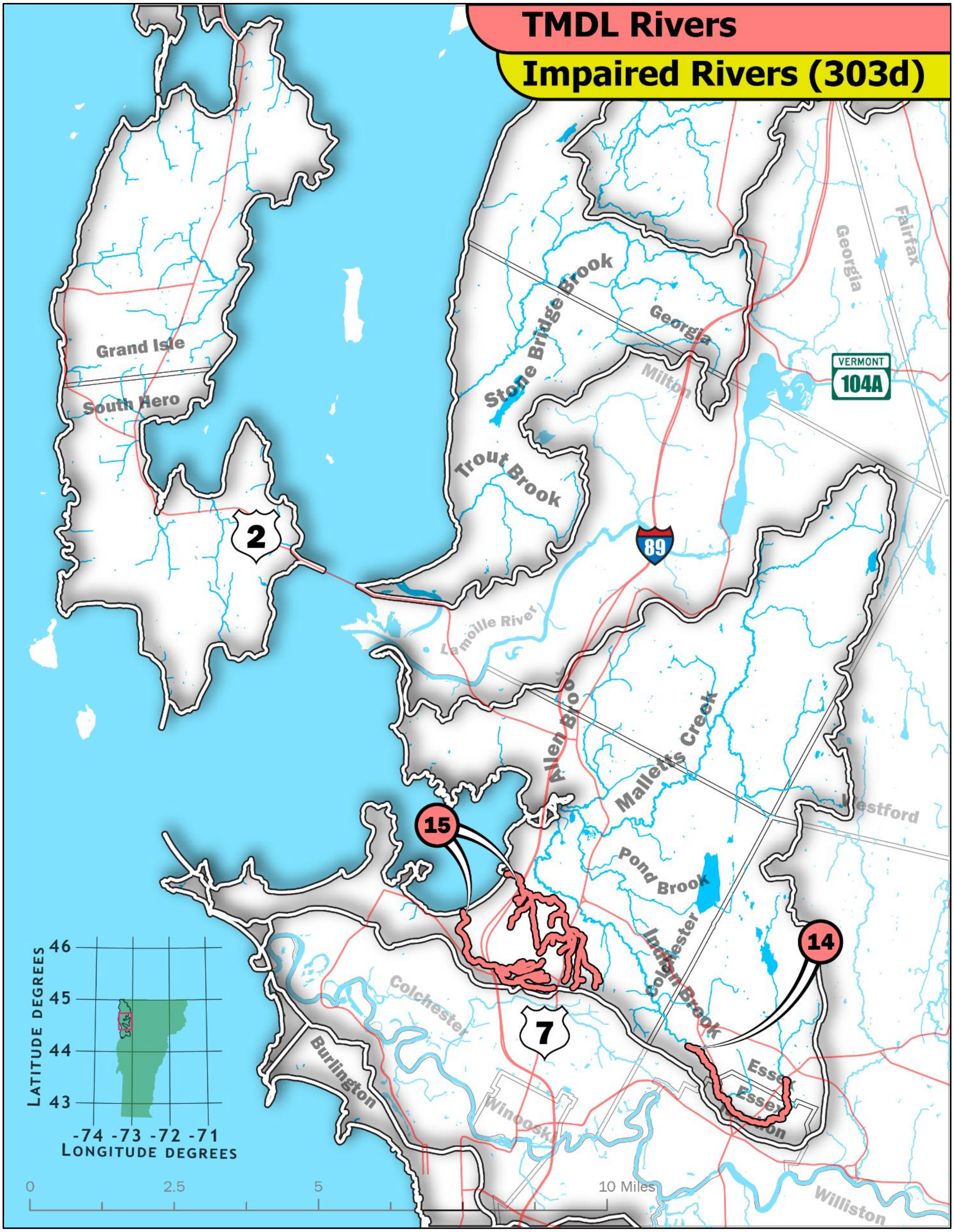


Figure 23 Map of impaired rivers in Basin 05 (middle section). Yellow represents rivers that are on the 2022 303(d) list (Part A-Priority Waters List). Salmon represents rivers that have an approved TMDL (Part D-Priority Waters List) but remain impaired. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

Table 18 Table of impaired rivers in Basin 5 (middle section). Map IDs are associated with the map above. (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
14	Indian Brook, rm 5.8 (Suzie Wilson Rd) to rm 9.8	VT05-09.01	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, land development, erosion	ALS, AES	D
15	Direct Smaller Drainages to Inner Malletts Bay	VT05-09.02	ESCHERICHIA COLI (E. COLI)	Urban runoff, potential failed/failing septic systems; includes Smith Hollow Brook & Crooked Creek	CR	D

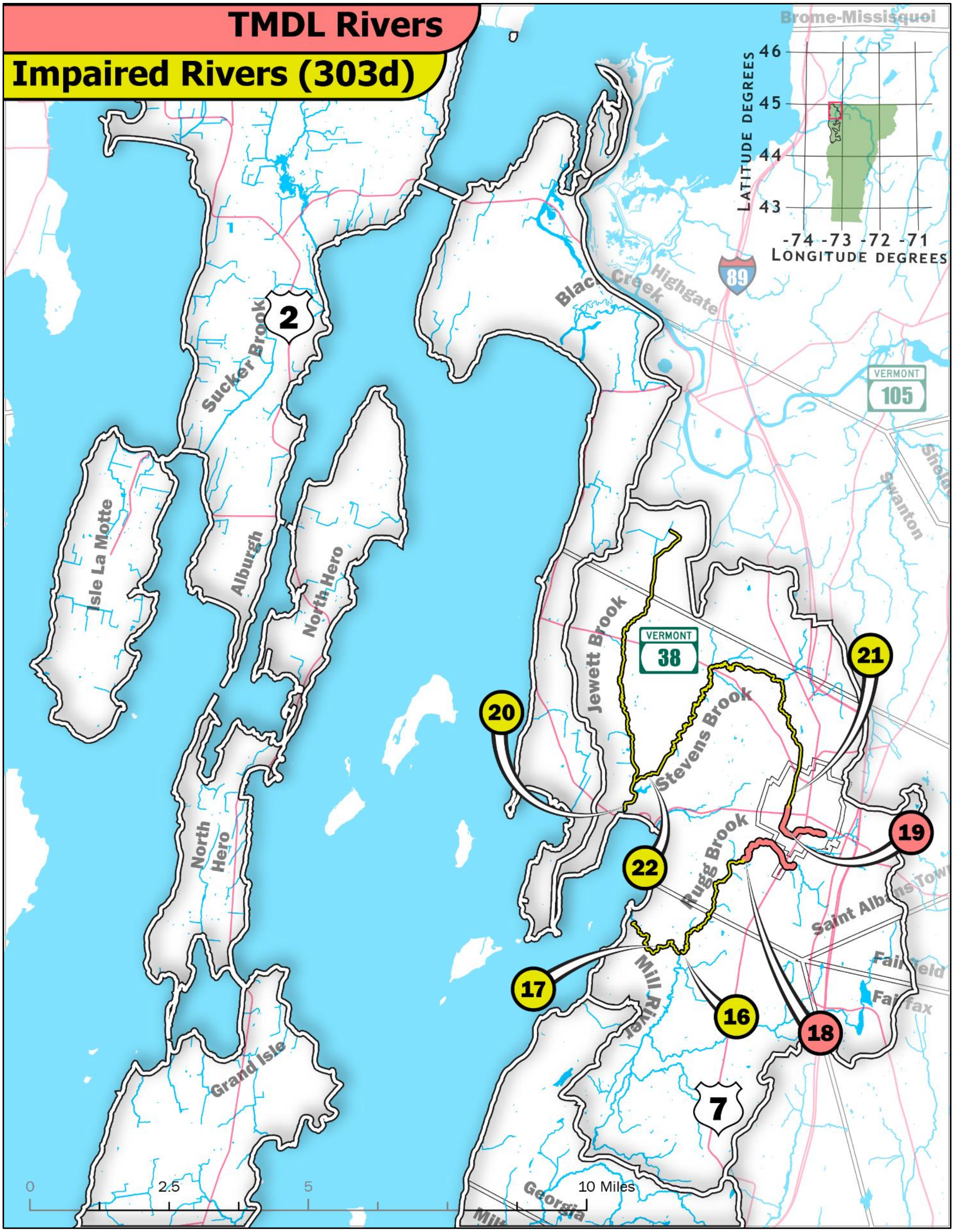


Figure 24 Map of impaired rivers in Basin 05 (north section). Yellow represents rivers that are on the 2022 303(d) list (Part A-Priority Waters List). Salmon represents rivers that have an approved TMDL (Part D-Priority Waters List) but remain impaired. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

Table 19 Table of impaired rivers in Basin 5 (north section). Map IDs are associated with the map above. (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
16	Rugg Brook, from Mouth to Approx 3.1 Miles Upstream	VT05-07.01	NUTRIENTS, SEDIMENTATION/SILTATION, ESCHERICHIA COLI (E. COLI)	Agricultural runoff	ALS, CR, AES	A
17	Mill River, from St. Albans Bay to 1.8 Miles Upstream	VT05-07.04	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff, streambank erosion	ALS	A
18	Rugg Brook, rm 3.1 to rm 5.3	VT05-07.02	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff	ALS, AES	D
19	Stevens Brook, rm 6.5 (Pearl St) to rm 9.3	VT05-07.07	POLLUTANTS IN URBAN STORMWATER	Stormwater runoff, erosion/sedimentation, morphological instability	ALS	D
20	Jewett Brook (3.5 Miles)	VT05-07.03	SEDIMENTATION/SILTATION, NUTRIENTS	Agricultural runoff	ALS	A
21	Stevens Brook, Lasalle St Downstream 0.5 Miles	VT05-07.06	METALS	Sediment contamination from St Albans Gas and Light hazardous waste site	ALS, CR	A
22	Stevens Brook, Mouth Upstream 6.5 Miles	VT05-07.05	SEDIMENTATION/SILTATION, NUTRIENTS, ESCHERICHIA COLI (E. COLI)	Agricultural runoff; morphological instability; St Albans CSO	ALS, CR	A

Altered Rivers

Altered waters are waters where a lack of flow, water level or flow fluctuations, modified hydrology, physical channel alterations, documented channel degradation, or stream type change is occurring and arises from some human activity, or where the occurrence of aquatic invasive species has had negative impacts on designated uses. This assessment category includes those waters where there is documentation of water quality standards violations for flow and aquatic habitat, but EPA does not consider the problem(s) caused by a pollutant.

There are no altered rivers in Basin 5.

Trending rivers

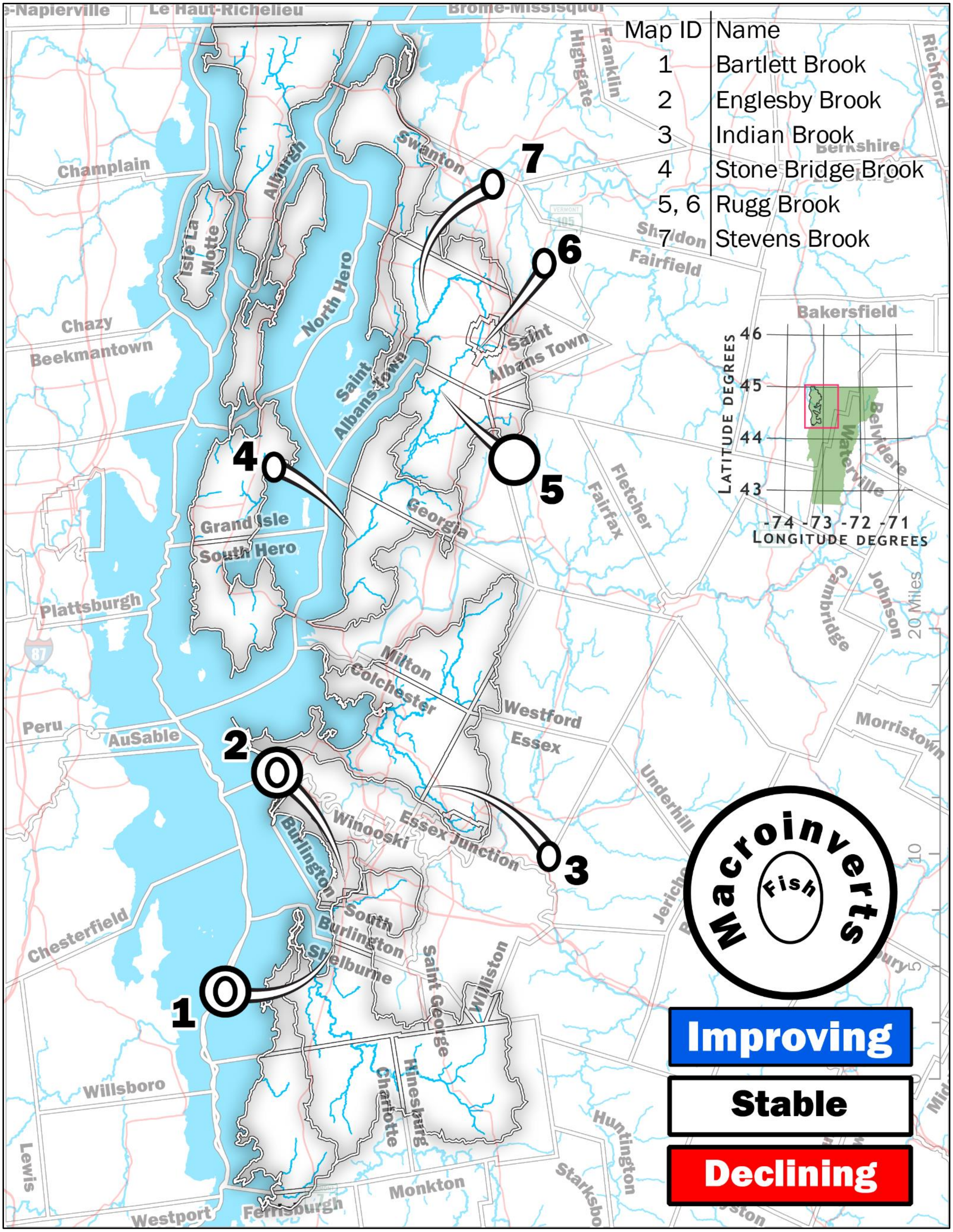


Figure 25 Map of rivers with enough biological data to model a water quality trend.

To maintain waters in their current state, WSMD conducts long term monitoring on surface waters and identifies increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont Water Quality Standards. Modeling trends can act as an early warning system for declining water quality, and it may be cost effective to reduce stressors to these waters before they become impaired or altered. Likewise, increasing trends can show areas of effective remediation. For each biological monitoring site, two linear regression models are used with year of sampling as the independent variable. The response variables include the community assessment ratings for macroinvertebrates and/or fish (Poor to Excellent; coded as 1 to 9). Sites with more than three data points were included. Data from sites is pooled by coincident NHD+ reach code (multiple sites on the same reach) unless the sites are bracketing. Trends are categorized into three groups: Improving (models with p-values <0.1 and positive coefficients), stable (models with p-values > 0.1) and declining (models with p-values <0.1 and negative coefficients.

Table 20 Trends in biological condition of macroinvertebrate (bug) and fish communities in Basin 5. + Improving, - declining, = stable/no trend. B = Bug community, F = Fish community. Community: B = macroinvertebrate, F = fish.

Unable to sample or assess	Poor (2)	Poor-fair (3)	Fair (4)	Fair-good (5)	Good (6)	Good-Very good (7)	Very good (8)	Very good-excellent	Excellent (10)

Name, river mile	Map ID	Trend	Community	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2003	2004	2005	2006	2008	2009	2011	2012	2014	2016	2018	2020	2021
Bartlett Brook, 0.2	1	=	B	0	0	0	P	0	0	0	0	0	0	0	0	P	P	P	0	0	0	P	0	0	0	P	0	0
Bartlett Brook, 0.2	1	=	F	0	0	0	G	U	U	0	Vg	0	0	0	F	P	G	0	0	G	0	0	G	0	0	0	0	Vg
Englesby Brook, 0.6	2	=	B	0	0	0	0	P	P	P	P	0	0	0	0	0	0	0	P	0	P	0	P	0	0	0	U	P
Englesby Brook, 0.6	2	=	F	0	0	0	0	P	0	0	0	P	0	0	0	0	0	0	P	0	0	0	P	0	0	0	0	P
Indian Brook, 5.8	3	=	F	0	0	F	G	F	0	0	0	0	G	0	0	F	0	0	0	F	0	F	0	0	0	0	0	F
Rugg Brook, 0.5	6	=	B	0	0	0	0	0	0	0	0	0	F	0	0	0	F	0	0	0	0	0	0	0	0	0	0	F
Rugg Brook, 4.3	6	=	F	0	0	0	0	0	0	0	0	0	P	P	0	0	P	0	0	0	P	F	0	0	0	0	0	P
Stevens Brook, 4.2	7	+	F	P	P	P	0	0	0	0	0	0	U	0	0	0	0	0	0	0	F	P	0	0	F	0	0	P
Stevens Brook, 6.5	7	+	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P	P	0	0	0	0	0	0
Stevens Brook, 6.8	7	+	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P	0	0	0
Stevens Brook, 7.5	7	+	F	0	0	0	0	0	0	0	0	0	0	0	0	0	P	0	0	0	0	P	0	0	0	0	0	0
Stevens Brook, 8.2	7	+	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0
Stone Bridge Brook, 0.2	4	=	F	0	0	0	0	0	0	0	G	0	0	0	0	0	Vg	0	0	0	0	0	0	0	0	0	0	0
Stone Bridge Brook, 0.3	4	=	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Vg

Rivers in need of assessment

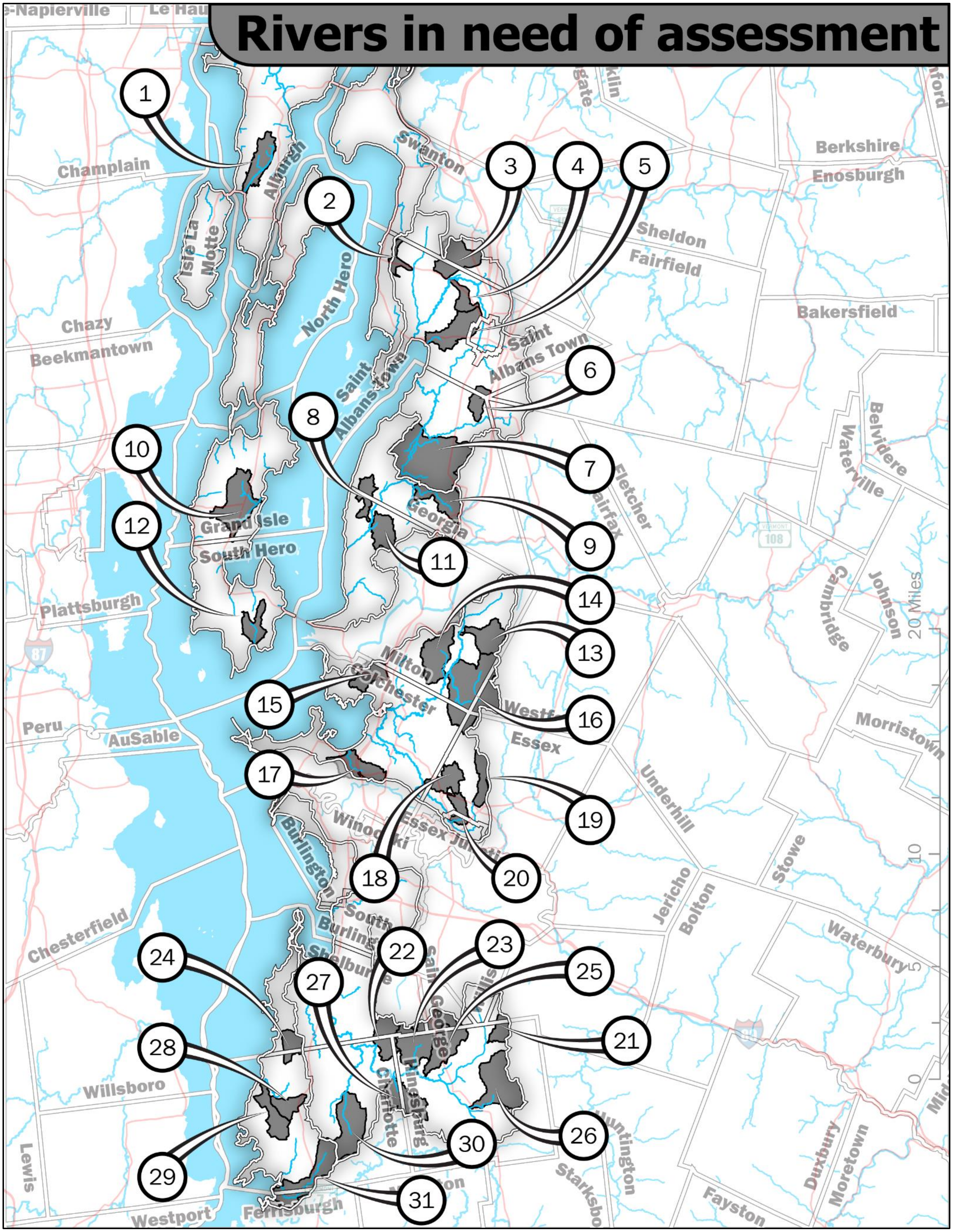


Figure 26 Map of rivers with unassessed aquatic biota use in Basin 5.

Aquatic biota health in streams is one of the primary areas of assessment by the WSMD. In the sections above, areas with sufficient data were used to determine a river's ability to fully support aquatic biota. This section highlights the 32 streams within this basin that lack data needed to determine the support status of aquatic biota. Streams larger than 2 square kilometers and have no biological data between 2000 and 2022 were removed. Because all these streams cannot be monitored at the same time, land use/cover data are provided in the figure below to aid site prioritization. Many of these streams are unnamed, therefore, names were added based on their source location (hill names) or adjacent road names and are identified by an asterisk.

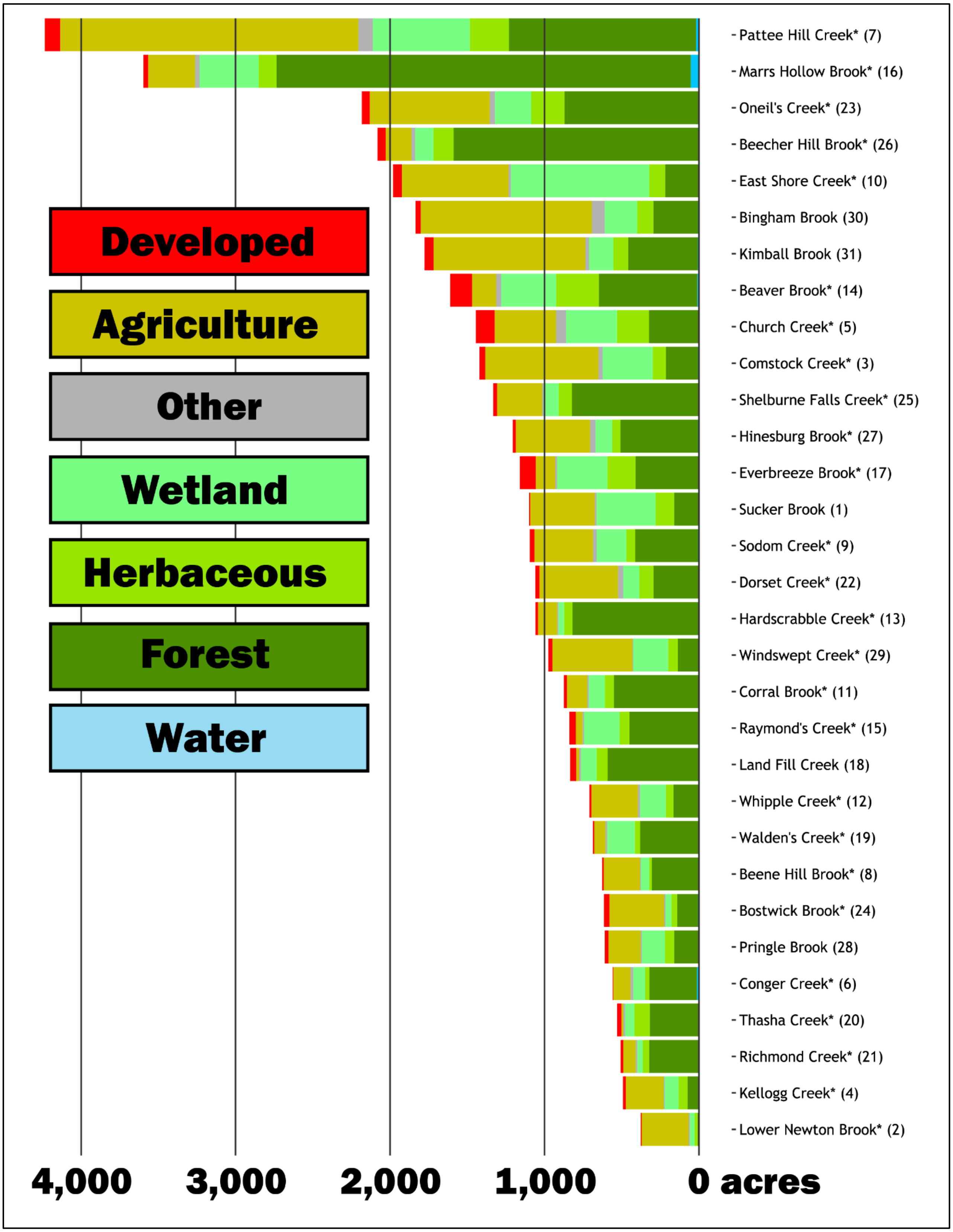


Figure 27 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University of Vermont Spatial Analysis Laboratory.

Table 21. Rivers with unassessed aquatic biota use, values are in percent land cover. The Map IDs correspond to the map above. Latitude and longitudes designate the pour point of the watershed. Asterisks are officially unnamed streams.

Name, Map ID	Latitude	Longitude	Developed	Agriculture	Forest	Wetland	Other	Water
Beaver Brook* (14)	44.595	-73.121	8.75	9.80	39.69	22.09	17.14	1.92
Beecher Hill Brook* (26)	44.317	-73.092	2.52	8.04	76.34	5.69	6.23	1.14
Beene Hill Brook* (8)	44.696	-73.192	1.55	37.67	48.49	8.66	2.78	0.83
Bingham Brook (30)	44.324	-73.206	1.80	60.42	15.81	11.42	5.75	4.52
Bostwick Brook* (24)	44.364	-73.263	5.69	57.78	22.10	6.22	6.05	1.35
Church Creek* (5)	44.810	-73.134	8.40	27.52	22.31	22.87	14.30	4.49
Comstock Creek* (3)	44.850	-73.119	2.70	51.54	14.75	22.77	5.99	1.92
Conger Creek* (6)	44.765	-73.089	0.61	20.05	55.01	13.61	5.26	3.15
Corral Brook* (11)	44.689	-73.185	2.09	15.14	62.64	11.81	6.73	1.20
Dorset Creek* (22)	44.356	-73.179	2.42	48.19	27.48	9.80	8.58	3.16
East Shore Creek* (10)	44.704	-73.289	2.86	34.91	10.95	45.16	5.23	0.79
Everbreeze Brook* (17)	44.543	-73.206	8.85	10.96	35.33	27.99	15.72	1.04
Hardscrabble Creek* (13)	44.623	-73.096	1.58	11.84	77.39	3.55	4.93	0.67
Hinesburg Brook* (27)	44.335	-73.163	1.61	40.00	41.73	8.98	4.38	2.87
Kellogg Creek* (4)	44.847	-73.118	3.73	49.68	15.01	18.23	11.62	1.57
Kimball Brook (31)	44.264	-73.262	3.33	55.28	25.40	8.90	5.36	1.33
Land Fill Creek (18)	44.526	-73.134	4.52	2.53	70.75	12.08	8.54	1.37
Lower Newton Brook* (2)	44.856	-73.155	1.67	80.85	2.42	8.12	4.97	1.99
Marrs Hollow Brook* (16)	44.595	-73.115	0.83	8.47	74.60	10.66	3.18	0.79
Oneil's Creek* (23)	44.344	-73.144	2.28	35.69	39.71	10.76	9.91	1.50
Pattee Hill Creek* (7)	44.753	-73.143	2.31	45.62	28.64	14.83	5.97	2.21
Pringle Brook (28)	44.319	-73.270	3.88	34.26	25.68	24.44	9.79	1.44
Raymond's Creek* (15)	44.587	-73.193	4.89	5.23	53.34	27.38	7.51	1.27
Richmond Creek* (21)	44.365	-73.072	3.40	16.06	63.45	6.86	8.18	1.99
Shelburne Falls Creek* (25)	44.342	-73.128	1.87	21.86	61.63	7.36	6.42	0.76
Sodom Creek* (9)	44.715	-73.147	2.69	34.67	37.20	17.51	5.26	2.22
Sucker Brook (1)	44.904	-73.304	0.63	38.08	14.38	34.74	10.94	1.10
Thasha Creek* (20)	44.501	-73.110	5.03	2.56	60.03	11.39	18.80	2.13
Walden's Creek* (19)	44.519	-73.087	1.26	10.67	55.05	25.92	5.18	1.56
Whipple Creek* (12)	44.614	-73.291	1.76	42.49	23.14	23.46	6.84	2.10
Windswept Creek* (29)	44.328	-73.278	2.77	53.10	13.66	23.30	6.42	0.43

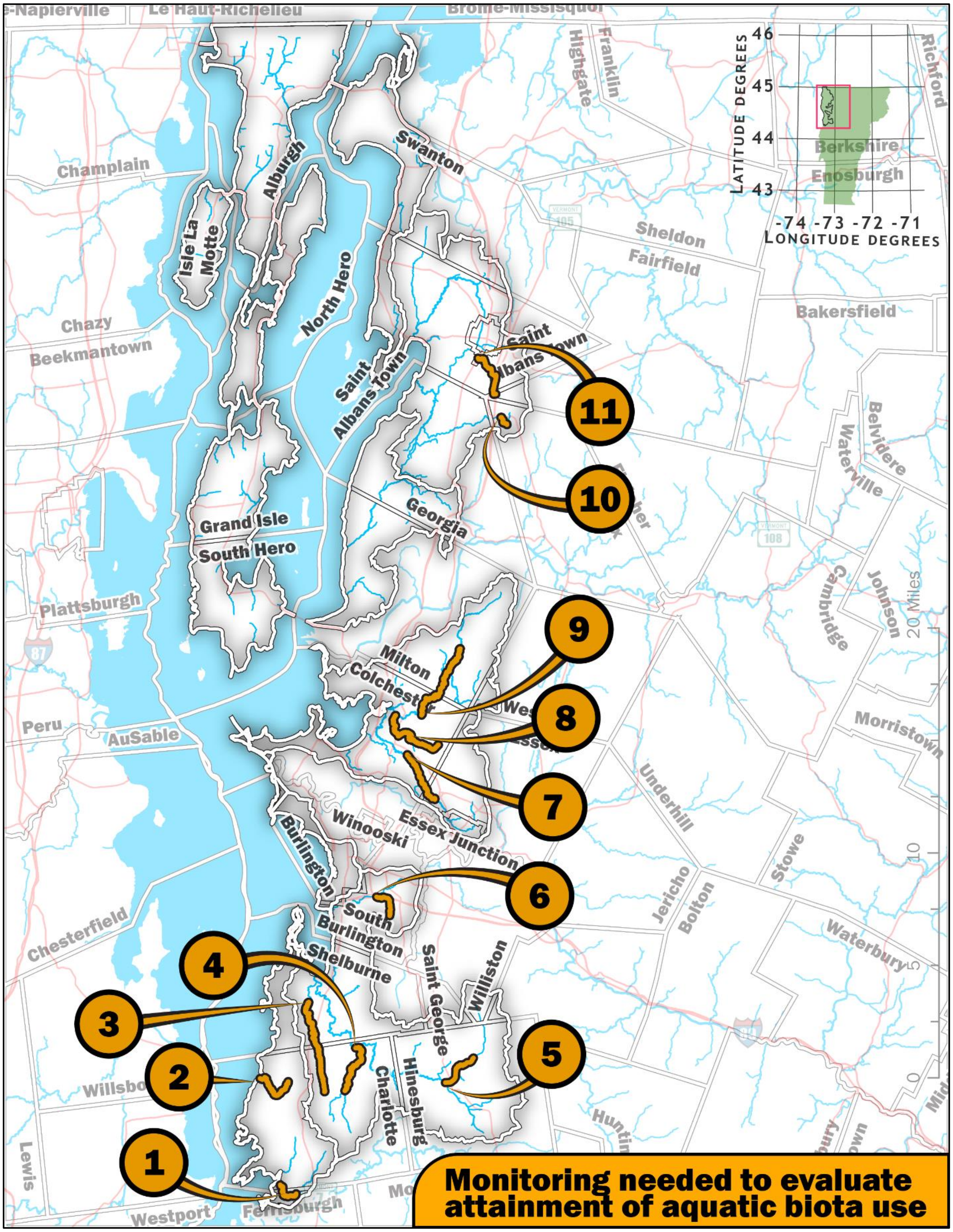


Figure 28 Map of rivers that require more monitoring to evaluate attainment of Aquatic Biota use. Unlike the streams mentioned above with no biological monitoring data, the streams here have limited biomonitoring data that indicates fair or poor condition, however, there is either not enough data to fully evaluate the attainment of Aquatic Biota use or monitoring results show volatile condition year to year.

Table 22 Table of rivers that require more monitoring to evaluate attainment of aquatic biota use. Map IDs correspond to the map above.

Map ID	Assessment unit name	Pollutant	Problem
1	Kimball Brook, from Town Farm Bay Up 1.1 Miles	NUTRIENTS, TURBIDITY	Pasture, barnyard, lack of riparian vegetation
2	Holmes Creek, mouth upstream to Greenbush Road	PHOSPHORUS, SEDIMENT	Agricultural runoff
3	McCabes Brook, rm 1.4 upstream	NUTRIENTS, CHLORIDE, POTENTIAL LOW FLOW	Agricultural runoff, road salt
4	Mud Hollow Brook, Mouth upstream 2.5 miles	NUTRIENTS, TEMPERATURE	Agricultural runoff, lack of riparian cover, elevated turbidity and aluminum
5	Patrick Brook, from Laplatte River Up to Lower Pond	SEDIMENT, HABITAT ALTERATIONS	Land development, channelization
6	Potash Brook Trib 7	CHLORIDE	Elevated chloride levels due to road salt
7	Indian Brook, Mouth to rm 5.4	SEDIMENT, METALS, TOXICITY	potential impacts from landfill leachate, developed areas, hazardous waste site
8	Pond Brook	NUTRIENTS, CHLORIDE, TURBIDITY	Agricultural runoff, road salt
9	Malletts Creek, Middle Road upstream to Duffy Road (4 miles)	Unknown	Requires low gradient sampling
10	Mill River, 3.5 Miles in Upper Reaches	NUTRIENTS, ORGANIC ENRICHMENT, SEDIMENT, ESCHERICHIA COLI (E. COLI)	Agricultural & urban runoff, streambank erosion
11	Rugg Brook, Upstream from Route 7	HABITAT ALTERATIONS, FLOW REGIME MODIFICATION	Land development, suburban runoff

River reclassification candidates (Aquatic biota)

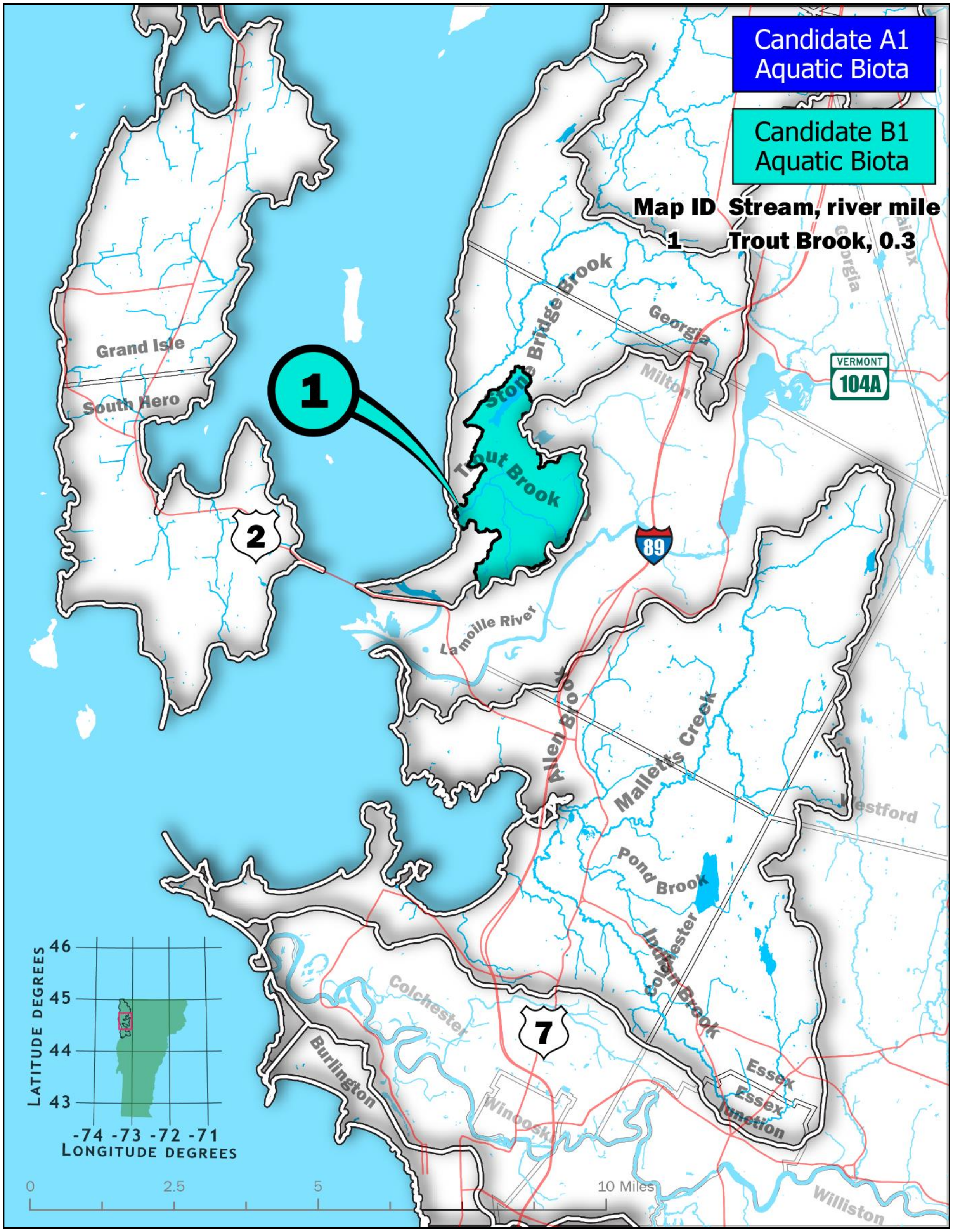


Figure 29 Map of A(1) and B(1) reclassification candidates. Map IDs correspond to the table below.

To protect aquatic biota in rivers in the State of Vermont, the Watershed Management Division can initiate reclassification for Aquatic Biota use in rivers that meet a high-quality standard. The major implication of reclassification is the application of new [Water Quality Standards](). Most rivers in the State of Vermont are classified B(2) for Aquatic Biota use and must maintain biological assessments of Good or better for both macroinvertebrate and fish communities. Rivers reclassified to B(1) must maintain biological assessments of Very Good or better, and Rivers reclassified to A(1) must maintain biological assessments of Excellent. The rivers shown here have maintained biological condition expected of either A(1) or B(1) waters and therefore, are candidates for reclassification. Candidacy is based on the propensity of data over the last ten years and the nearness of data—data must be within six years of each other. Data from both communities, macroinvertebrates and fish, is required unless land cover is overwhelmingly natural. For more information, visit the *stream reclassification webpage*.

Table 23 Table of A(1) and B(1) reclassification candidates. Map IDs correspond to the map above. The community column identifies the community assessed.

Unable to sample or assess	Poor (P)	Poor-fair (PF)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2020	2021	2022
Trout Brook, 0.3	64	Fish			Vg			G					
Trout Brook, 0.7	65	Bug										E	
Trout Brook, 0.7	65	Fish										U	

Wetlands

The purpose of the Wetland Bioassessment and Monitoring Program ("Program") is to build a pertinent and practical program to assess the biological integrity and ecological condition of Vermont's wetlands. The Program has adopted the EPA's wetland monitoring methodology and is organized into three levels. Level 1 assessments are performed through desktop review and rely on coarse landscape-scale inventory information. Level 2 surveys are a "rapid assessment" at the specific wetland scale and use simple and quick protocols to collect data. Level 2 protocols are calibrated and validated by more intensive assessments known as Level 3, which are rigorous biological assessments that derive multi-metric indices. The Program conducts vegetation surveys to calculate biological metrics with a strong focus on the Coefficient of Conservatism score, which is a numeric scale from 0-10 assigned to each plant species which measures its tolerance and sensitivity to disturbance (Link to latest Bioassessment Report). There have been 19 level 3 plots conducted in basin 5.

Vermont Rapid Assessment Method (VRAM)

The Level 2 assessment is conducted using the Vermont Rapid Assessment Method (VRAM), which is composed of 6 qualitative metrics used to collect data on the wetland's function, value, and condition. These metrics include wetland area, buffers, hydrology, habitat, special wetland status, and plant communities. It generates a quality score on a scale of 0-100, where the higher the score equates to better wetland quality. From the VRAM information, condition indexes can be calculated that offer additional information to help evaluate human stressor impacts on the wetland and surrounding landscape or evaluate wetland restoration success.

Total VRAM scores (function and condition) are less comparable between wetlands due to the unique characteristics of a given wetland, such as the presence of a rare or threatened plant species or its size. Smaller wetlands generally receive less points than larger wetlands. Therefore, a lower total VRAM score may still demonstrate that a particular wetland is in reference or excellent condition with significant functions present. Function scores between wetlands are also not directly comparable as these scores do not relate specifically to wetland condition nor reflect whether one wetland is exemplary for one or more functions. Condition scores do provide relative comparison of wetland health between wetlands. However, it should be noted that sampling locations are not randomized and conclusions on area-wide wetland health, based on condition scores or total VRAM scores within the basin, cannot be determined at this time.

Additionally, the Program is currently unable to report on basin-wide wetland conditions and trends, impairments, or altered wetlands. The following information provides an overview of the various monitoring, assessment, and mapping objectives the Program is focused on.

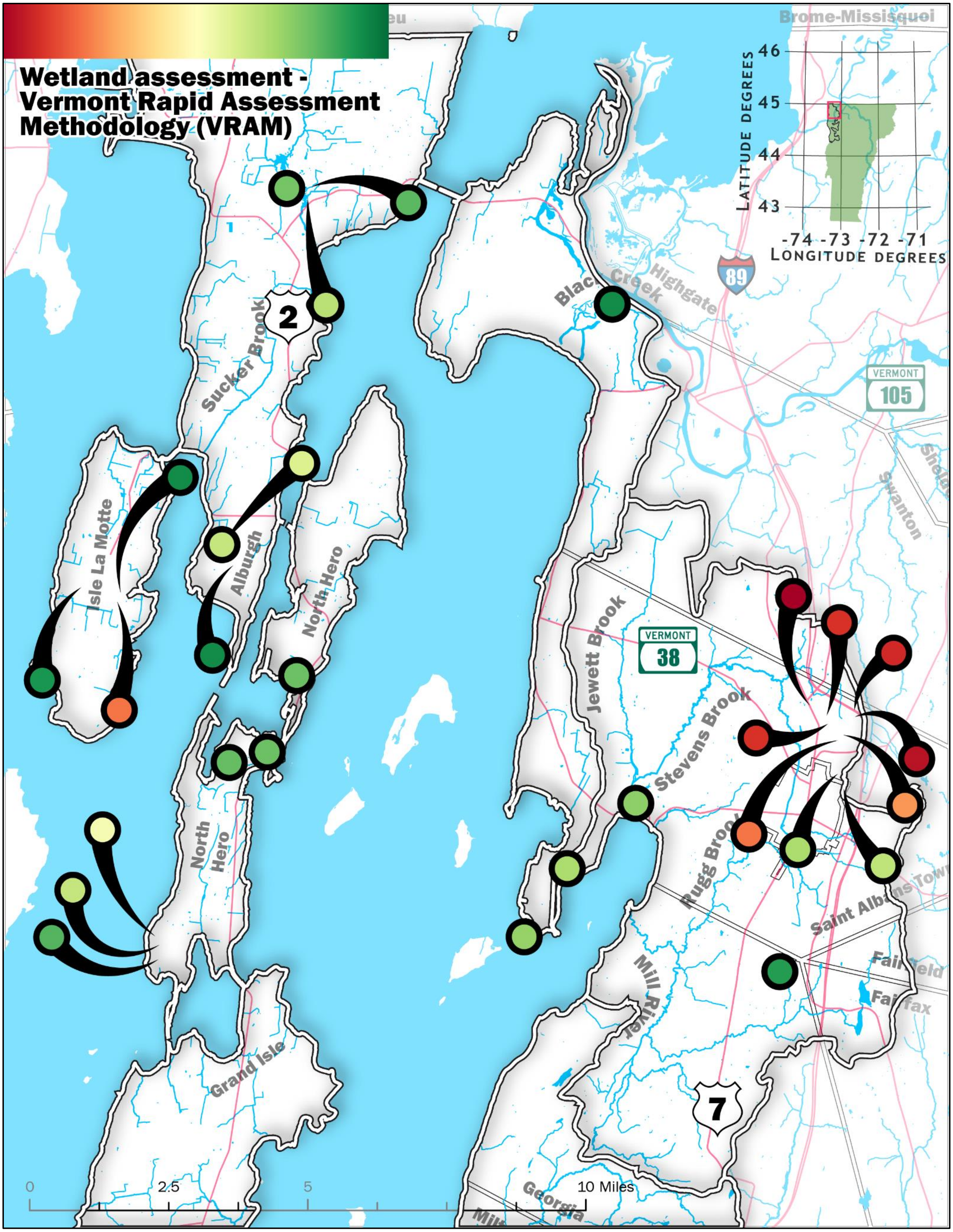


Figure 30. VRAM scores Basin 5 (North). The red to green symbology illustrates the relative wetland condition amongst VRAMs.

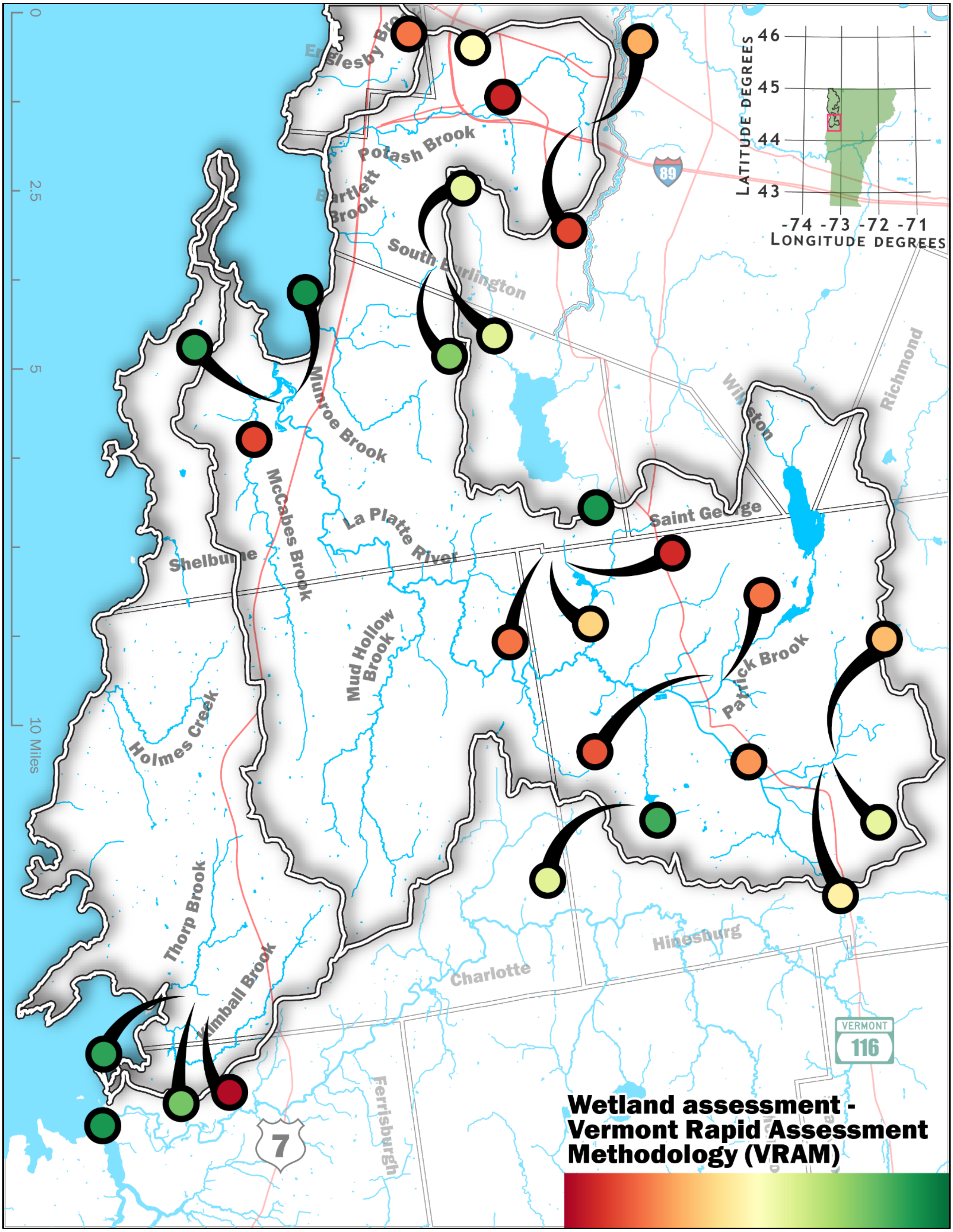


Figure 31 VRAM scores Basin 5 (South). The red to green symbology illustrates the relative wetland condition amongst VRAMs.

Table 24 Number of VRAMs conducted in Basin 5, summarized by HUC12 sub-basins. Sub basin size in acres included for reference.

Name	Sub basin acres	VRAM Count
Alburg Drainage	24050	10
Burlington Direct Land Drainage	3537.9	1
Grand Isle Land Drainage	19572.5	13
Lower Northeast Arm Direct	15688.9	2
Malletts Bay Drainage	33463.9	25
North Hero Land Drainage	7850.6	6
Shelburne Bay Direct Drainage	44900.7	24
Southern Main Lake Direct	14537.8	5
St. Albans Bay Drainage	32488.1	12
Upper Northeast Arm Direct	12961.8	4

Wetland restoration monitoring

In 2017, the Program initiated a pilot project of monitoring restoration sites and associated reference sites. The project focused on sites with (1) recent restoration work; and (2) pre-restoration sites, with the intent to return to the sites as restoration progresses. Monitoring includes Level III assessments, Level II assessments using the VRAM, and tracking wetland restoration success using a metric called the Restoration Indicators of Success (RIS). This metric generates a numeric score calculated by summing the VRAM scores of metrics specifically relevant to and affected by restoration success, such as habitat development and alteration, presence of high-value habitat features, and intactness of hydrologic regime. To learn more about the RIS, and preliminary findings of the restoration monitoring project, click here: (link to RIS and Restoration Report).

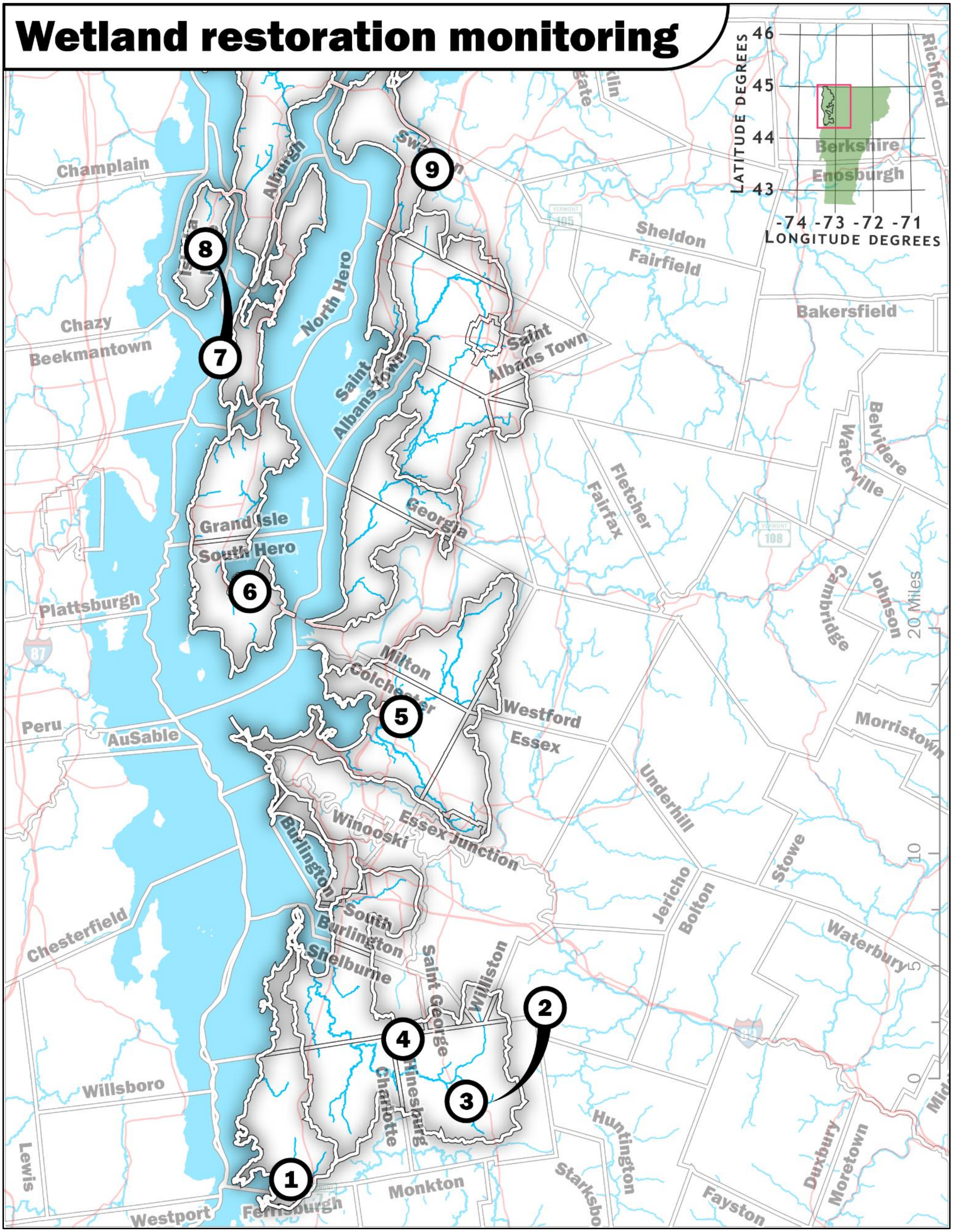


Figure 32 Distribution of wetland restoration sites in Basin 5.

Table 25 Wetland restoration monitoring sites in Basin 5.

MAP ID	LATITUDE	LONGITUDE	NAME
1	44.269	-73.254	Williams Woods Farm Field
2	44.320	-73.076	Hinesburg Garage Cattail Marsh
3	44.320	-73.097	Hinesburg Restoration Site N
4	44.360	-73.155	Lomas Scirpus Marsh
5	44.567	-73.159	MUFL01 (Munson Flats)
6	44.647	-73.296	2016-283 Swale
7	44.865	-73.335	Potvin Restoration Site
8	44.867	-73.339	Isle La Motte Marsh East
9	44.919	-73.134	Middle Road Swanton Restoration Site

Class 1 wetlands

Class I wetlands are exceptional or irreplaceable in their contribution to Vermont's natural heritage. They provide unmatched environmental functions and values and therefore merit the highest level of protection. Wetlands meeting Class I criteria and sub-criteria can be petitioned for reclassification from Class II to Class I by the public. These criteria evaluate the wetland's size, location, surrounding landscape, condition, and contribution to the functions and values identified by the State of Vermont.

There are three class 1 wetlands in Basin 5: the LaPlatte River Marsh Complex, North Shore Wetland, and the Sandbar Wetland Complex.

Class I candidate wetlands are those where enough data has been collected to support a petition for reclassification. An important note is there are likely to be multiple additional wetlands in the basin that meet Class I criteria and have not been proposed or have had a complete Class I assessment conducted. For more information on this process see this webpage: https://dec.vermont.gov/watershed/wetlands/class1wetlands

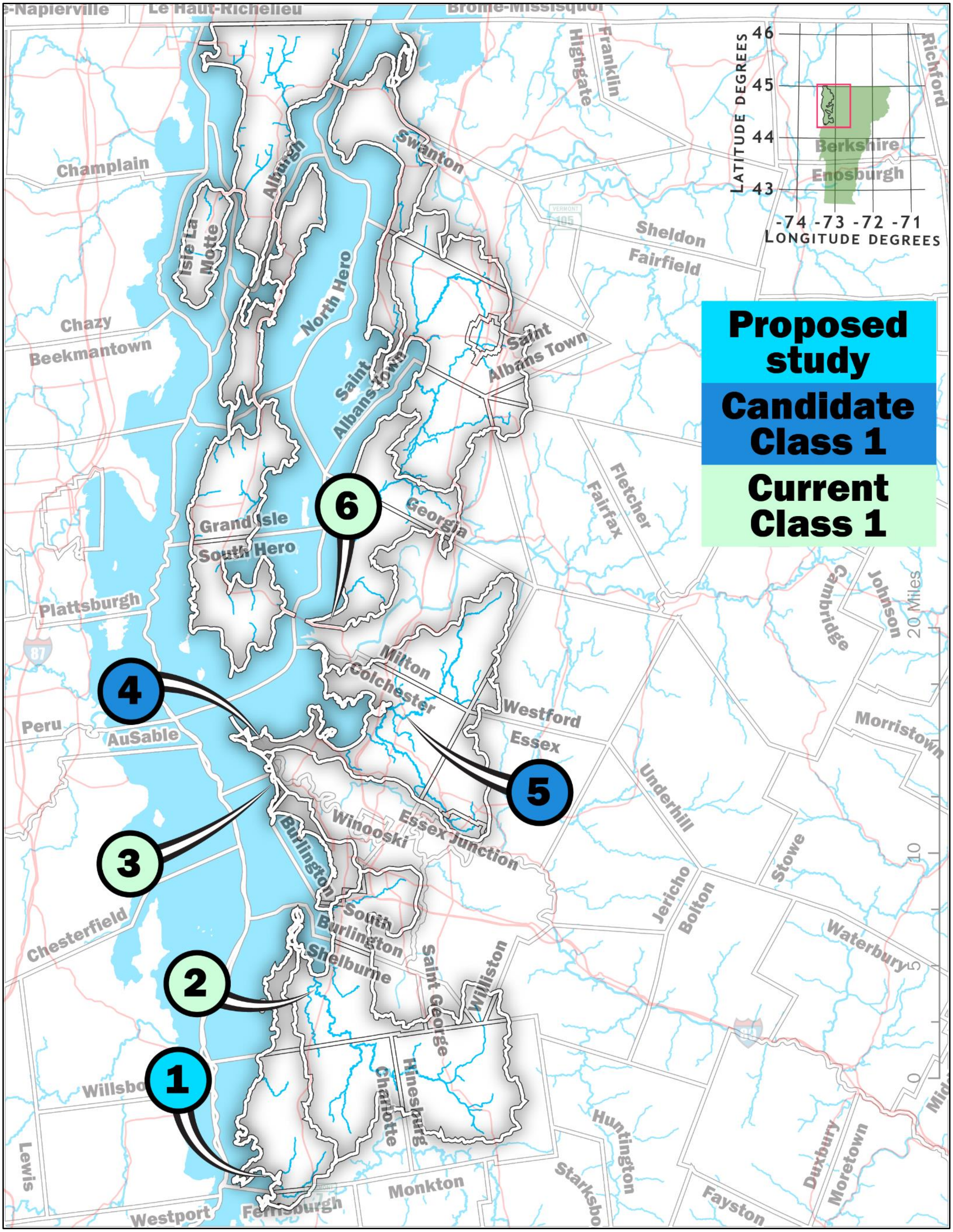


Figure 33 Class 1 wetland candidates.

Table 26 Class 1 wetland candidates.

Map ID	*Latitude*	*Longitude*	*Wetland name*	*Category*	*Towns*
1	44.272	-73.266	Thorp Brook	Proposed for Study	Charlotte
2	44.392	-73.235	LaPlatte River Marsh Complex	Current Class 1	Shelburne
3	44.524	-73.271	North Shore Wetland	Current Class 1	Burlington, South Burlington
4	44.549	-73.287	Colchester Bog	Candidate Class 1	Colchester
5	44.571	-73.158	Munson Flats	Candidate Class 1	Milton
6	44.621	-73.230	Sandbar Wetland Complex	Current Class 1	Milton, Colchester

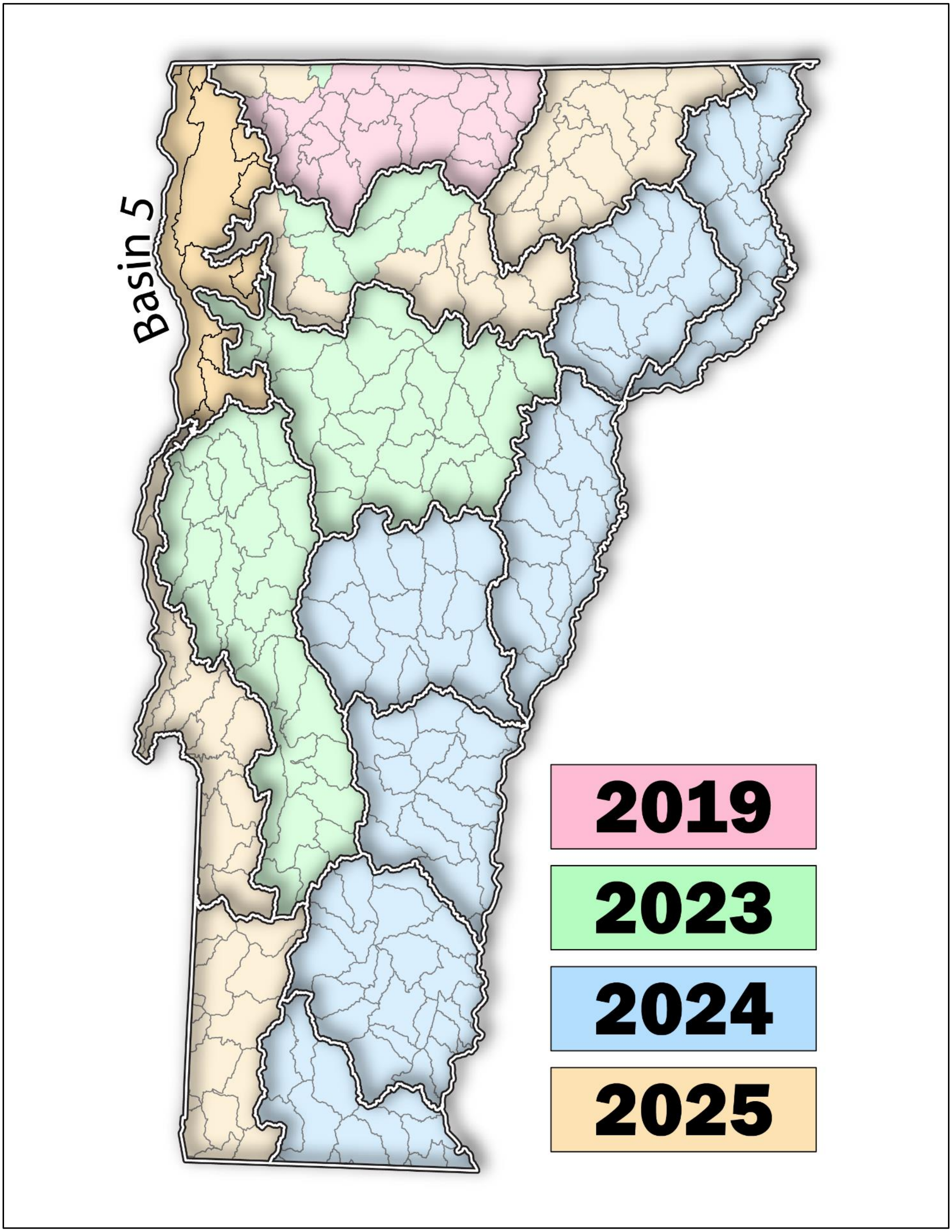


Figure 34. Wetland mapping schedule for Vermont Tactical Basins. Mapping is scheduled for 2024 in Basin 5.

The Vermont Wetlands program is currently in the process of working with contractors and federal agencies to update wetland mapping across the state. This will provide essential data as much of the current mapping is out of date and significantly under maps some types of wetlands such as seepage forests and softwood swamps. New mapping will gradually be made available in the Vermont Significant Wetlands Inventory layer over the next few years, with some basins updated sooner than others. This process has already started with updated mapping currently being added to VSWI for the Missisquoi basin.

Basin 12 Assessment Report

Deerfield River & Connecticut Direct

Vermont Department of Environmental Conservation
Watershed Management Division

June 2023

Contents

Basin overview

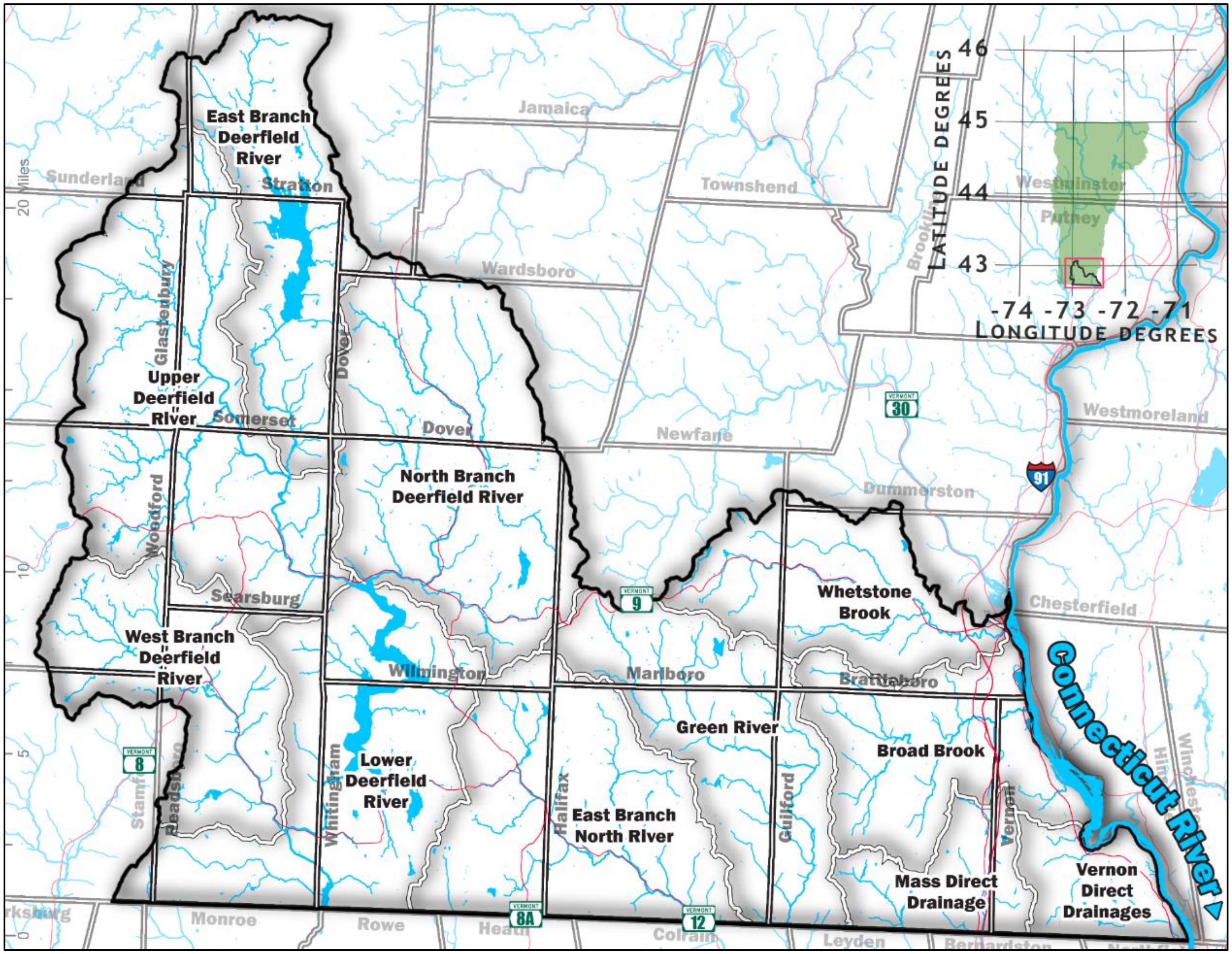


Figure 1 The 400 square mile Deerfield River-Connecticut River Direct basin encompasses waters of southern Windham County and southeastern Bennington County draining to the Connecticut River.

Table 1 Distribution of Strahler stream orders by miles across Basin 12. This data is from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

Stream order (miles)						
1	2	3	4	5	6	8
526	219	131	59	22	13	13

Table 2 Distribution of lake surface area (acres) across Basin 12. Data from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

Lake area (acres)			
<10	*>10<100*	*>100<500*	*>500*
23	15	12	6

Table 3 Distribution of wetland area (acres) across Basin 12. Data from the Vermont State Wetland Inventory (VSWI). Contiguous wetlands were dissolved to larger features to account for wetlands complexes containing multiple classes.

Wetland sizes (acres)				
<5	*>5<15*	*>15<70*	*>70<150*	*>=150*
3475	908	66	6	4

Table 4 Summation of town level human population over time that intersects with Basin 12.

Basin-wide human population by year				
1980	*1990*	*2000*	*2010*	*2020*
16940	19174	20375	20074	21408

Table 5 . Major waters of Basin 12.

Largest River	Deerfield River (23 miles)
Largest Lake or Reservoir	Harriman Reservoir (1949 acres)
Deepest Lake or Reservoir	Harriman Reservoir (160 feet)
Largest Wetland Complex	Glastenbury Wetlands (428 acres)

Land cover

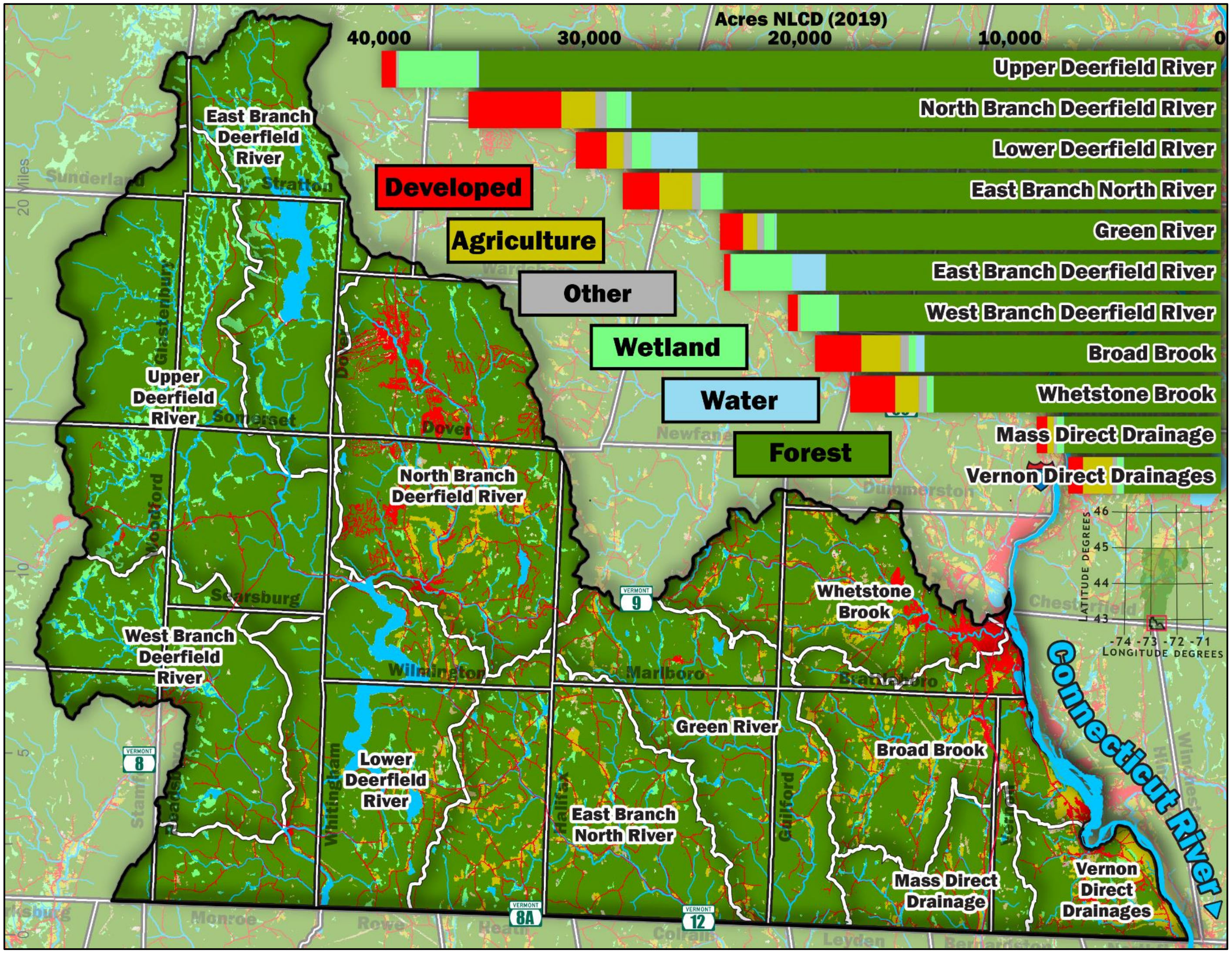


Figure 2. There are two land cover datasets available for the 255,000-acre Basin 12. The first is the 30-meter National Land Cover Database (NLCD) for 2019 (and several previous years) and the second is the 0.5-meter statewide land cover dataset produced by the University of Vermont spatial analysis laboratory. To summarize the large-scale distribution of different land covers across the Vermont WBID subwatersheds of the tactical basin, the 30-meter NLCD for 2019 was used.

Table 6 The proportion of major land cover types across the HUC12s of Basin 12. Land cover is the National Land Cover Database (NLCD) for 2019. Common land cover types were combined, for example deciduous, coniferous, and mixed forests are categorized as forest. Wetlands are found throughout other cover types.

Name	*acres*	*Developed*	*Agriculture*	*Other*	*Wetland*	*Water*	*Forest*
Vernon Direct Drainages	7261	9.66	19.53	2.92	3.9	0.52	63.48
Massachusetts Direct Drainage	8758	5.77	3.49	1.71	3.52	0.4	85.1
Whetstone Brook	17629	12.13	6.44	2.13	1.64	0.2	77.47
Broad Brook	19296	11.35	9.67	2.06	1.74	2.17	73.01
West Branch Deerfield River	20586	2.22	0.19	0.52	8.31	0.49	88.27
East Branch Deerfield River	23626	1.24	0.02	0.23	12.21	6.78	79.53
Green River	23822	4.6	2.83	1.4	2.08	0.39	88.7
East Branch North River	28444	6.09	5.51	1.43	3.62	0.11	83.25
Lower Deerfield River	30677	4.76	2.64	1.26	2.97	7.23	81.13
North Branch Deerfield River	35785	12.33	4.56	1.48	2.55	0.73	78.35
Upper Deerfield River	39916	1.69	0.07	0.31	9.24	0.28	88.41

Lakes and Ponds

Conditions and trends

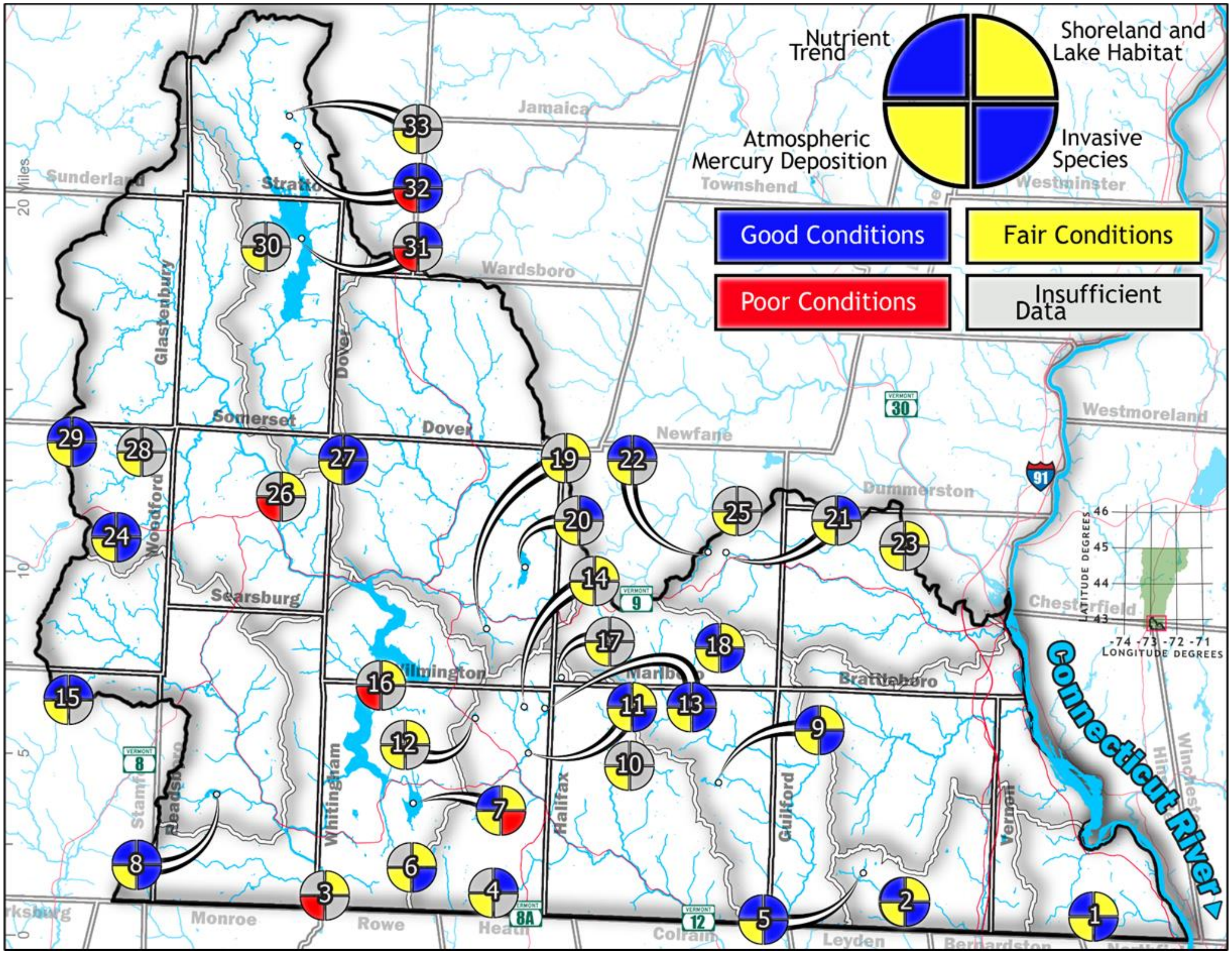


Figure 3. Lake scorecards for Basin 12. Lake IDs and additional information is provided in the table below.

The Lakes and Ponds Management and Protection Program (VLMPP) reports lake condition with the Vermont Inland Lake Score Card. Lake condition includes these key aspects: nutrients status and trends, aquatic invasive species, shoreland and lake habitat, and mercury pollution. For a more detailed overview, see the *score card webpage*. For more technical information, see *how lakes are scored*, and for lake specific information, navigate to this *Lake Score Card* links using the Lake IDs reported below.

VLMPP provides score cards for thirty-five lakes in Basin 12. The colors are a ranked representation of condition: blue is better than yellow, yellow is better than red, and grey is insufficient data. The Map ID numbers correspond with the following table. Use the ID to navigate the *report viewer* to find more information.

The score for a lake's nutrient trend is derived primarily from data obtained through two lake monitoring programs within the Lakes and Ponds Program - the Spring Phosphorus Program and the Lay Monitoring Program; both data sets are used for analysis when available. The final nutrient trend score, which determines the color of the nutrient quadrant on the Score Card, combines the individual scores from the spring TP (total phosphorus), summer TP, summer Chlorophyll-a and summer Secchi depth. See *how lakes are scored* for more information.

Shoreland habitat is assessed using the Lakeshore Disturbance Index (LDI). A value of 0.2 or less is considered in good condition; an LDI value between 0.2 and 0.75 is considered in fair condition and an LDI value of greater than 0.75 is considered in poor condition.

The Aquatic Invasive Species (AIS) score is based on the presence of one or more invasive animal or plant species. A good score indicates there are no known invasive species present while a poor score indicates that there is at least one invasive species present, regardless of its abundance or 'nuisance' level (a fair score is not used for this criteria).

The Mercury Fish Tissue Contamination Score reflects the most recent data that VLPP has regarding the presence of mercury (Hg) in the food web of Vermont lakes. A good score indicates low probability of Hg accumulation in fish tissue; a fair score indicates that Hg accumulation in fish tissue is likely; a poor score indicates that Hg in fish tissue exceeds EPA guidelines.

Table 7 Vermont Inland Lake Score Card table: lake-specific information with area in acres and depth in feet. AIS: Aquatic invasive species score. Mercury: mercury fish tissue contamination. WQ Status: Water quality standards status. Shoreland: shoreland disturbance (USEPA National Lake Assessment). Nutrient Trend: an index of trends in annual means of spring TP, summer TP, Secchi, and chlorophyl-a.

Map ID	Lake ID	Area (ac)	Max Depth (ft)	Nutrient Trend	Shoreland	AIS	Mercury
1	LILY (VERNON)	40.3	13	Good	Fair	Good	Fair
2	WEATHERHEAD HOLLOW	30.8	10	Good	Fair	Good	Fair
3	SHERMAN	88.2	57	Insufficient data	Fair	Insufficient data	Poor
4	SHIPPEE	23.9	6	Insufficient data	Good	Insufficient data	Fair
5	SWEET	16.0	11	Good	Good	Good	Fair
6	NORTH (WHITHM)	26.0	10	Insufficient data	Fair	Good	Fair
7	SADAWGA	191.3	10	Good	Fair	Poor	Fair
8	HOWE	53.3	33	Good	Good	Good	Fair
9	DEER PARK	18.7	9	Good	Fair	Good	Fair
10	BLUE;	11.0		Insufficient data	Insufficient data	Insufficient data	Fair
11	JACKSONVILLE	16.3	8	Good	Fair	Good	Fair
12	RYDER	13.8	12	Insufficient data	Fair	Insufficient data	Fair
13	GATES	30.2	7	Good	Good	Good	Fair
14	LAUREL	16.7	17	Insufficient data	Fair	Insufficient data	Fair
15	STAMFORD	10.6	14	Good	Good	Insufficient data	Fair

Map ID	Lake ID	Area (ac)	Max Depth (ft)	Nutrient Trend	Shoreland	AIS	Mercury
16	HARRIMAN (WHITHM)	1949.4	160	Insufficient data	Fair	Insufficient data	Poor
17	GATES-NE;	11.2		Insufficient data	Insufficient data	Insufficient data	Fair
18	SOUTH (MARLBR)	68.5	35	Good	Fair	Good	Fair
19	SPRUCE (WILMTN)	14.0	4	Insufficient data	Fair	Insufficient data	Fair
20	RAPONDA	123.8	12	Good	Fair	Good	Fair
21	MARLBORO-431;	11.4	2	Insufficient data	Good	Insufficient data	Fair
22	HIDDEN	19.6	6	Good	Good	Insufficient data	Fair
23	PLEASANT VALLEY	21.8	38	Insufficient data	Fair	Insufficient data	Fair
24	ADAMS (WOODFD)	33.6	15	Good	Good	Good	Fair
25	HALLADAY;	10.5		Insufficient data	Insufficient data	Insufficient data	Fair
26	SEARSBURG	15.5	14	Insufficient data	Fair	Insufficient data	Poor
27	HAYSTACK	28.1	30	Good	Good	Good	Fair
28	MILL (WOODFD)	10.5	0	Insufficient data	Insufficient data	Insufficient data	Fair
29	LITTLE (WOODFD)	22.0	8	Good	Good	Good	Fair
30	SOMERSET-W;	10.5		Insufficient data	Insufficient data	Insufficient data	Fair
31	SOMERSET	1525.3	85	Insufficient data	Good	Insufficient data	Poor
32	GROUT	86.1	33	Good	Good	Good	Poor

Map ID	Lake ID	Area (ac)	Max Depth (ft)	Nutrient Trend	Shoreland	AIS	Mercury
33	GROUT-N;	16.9		Insufficient data	Insufficient data	Insufficient data	Fair

Lake Reclassification

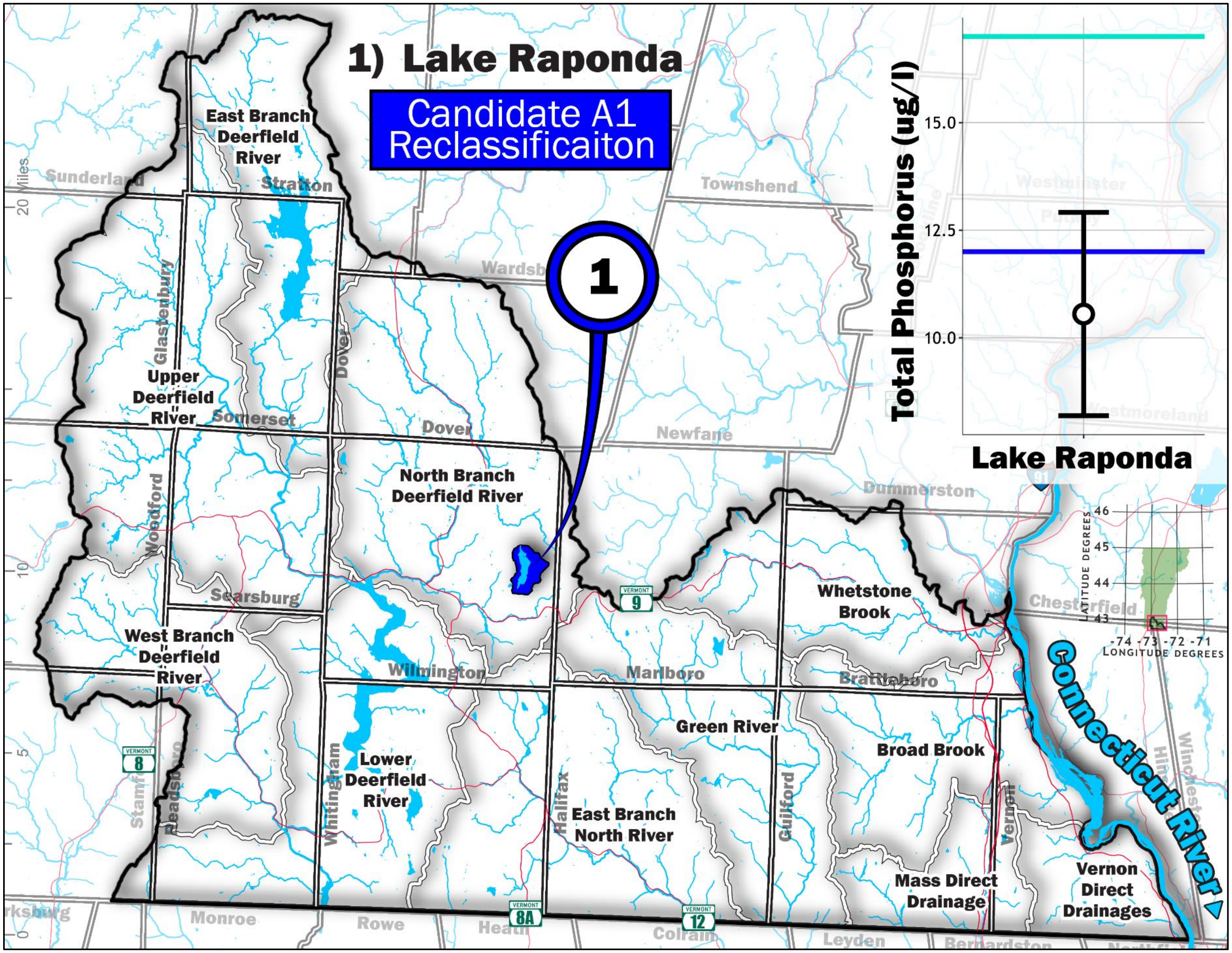


Figure 4 Lake reclassification candidates for Aesthetics and their corresponding watersheds.

To protect the waters of the State of Vermont, the Watershed Management Division (WSMD) can initiate rulemaking to reclassify surface waters to maintain a higher standard. The public may also petition the Division to request the initiation of rulemaking. The major implication of reclassification is the application of 2022 Vermont Water Quality Standards.

Most lakes in the state have a classification of B(2) for aesthetics uses, requiring that the lake maintains a total phosphorus criteria of below 18 ug/l. Reclassification to B(1) for aesthetics uses would lower the criteria to 17 ug/l, and a reclassification to A(1) for aesthetics uses would lower the criteria to 12 ug/l. Lakes with a mean annual total phosphorus concentration less than the standards for B(1) criteria are presented in Figure 5, although there are currently no lakes eligible for reclassification to A(1) based on available data. To access data for the lakes below, navigate the *report viewer* using the Lake ID.

The Lakes and Ponds Management and Protection Program has prioritized the following site for additional summer monitoring to determine if the water body is eligible for A(1) status :

- A(1): Lake Raponda (this site has a lay monitor collecting water samples for total phosphorus and chlorophyll-a in addition to Secchi depth).

Impaired Lakes

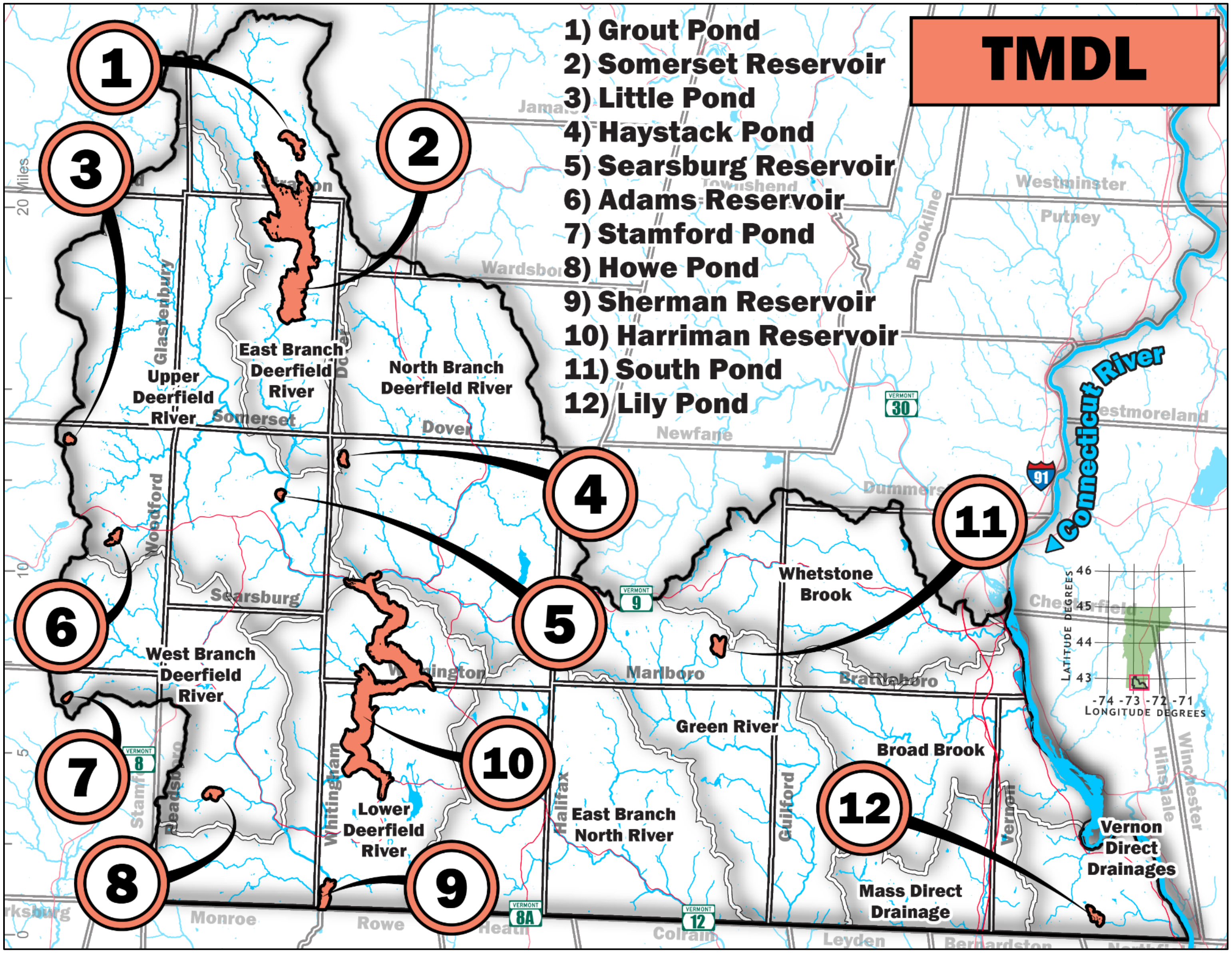


Figure 5 Map of impaired lakes across Basin 12 through 2022. Salmon color represent lakes that are on Part D of the Priority Waters List and have an approved Total Maximum Daily Load (TMDL).

Restoring waters is one of the priorities of the *Watershed Management Division's Strategic Management Plan*. WSMD begins the process of restoring Vermont surface waters by listing waters not in compliance with the water quality standards on a biennial basis. Waters are added and removed based on whether they meet *water quality standards* through a process defined in the Vermont *Surface Water Assessment and Listing Methodology*[1]. Adding waters to these lists prioritizes them for fund allocation, remediation, and monitoring. Figure 6 presents the location of the lakes impaired by pollutants. Table 8 further describes the impairment or alteration. Use the Lake ID to find more information in the *report viewer*.

Table 8 List of impaired lakes across Basin 12. Map IDs correspond to the map above.. Part D=impaired with an EPA approved TMDL.

MAP ID	NAME	PROBLEM	POLLUTANT	PART
1	Grout Pond (Stratton)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	MERCURY IN FISH TISSUE, PH	D
2	Somerset Reservoir (Somerset)	Elevated level of mercury in all fish except brown bullhead	PH, MERCURY IN FISH TISSUE	D
3	Little Pond (Woodford)	Atmospheric deposition: critically acidified; chronic acidification	PH	D
4	Haystack Pond (Wilmington)	Atmospheric deposition: critically acidified; chronic acidification	PH	D
5	Searsburg Reservoir (Searsburg)	Elevated level of mercury in all fish except brown bullhead	MERCURY IN FISH TISSUE	D
6	Adams Reservoir (Woodford)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	PH	D
7	Stamford Pond (Stamford)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	PH	D
8	Howe Pond (Readsboro)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	PH	D
9	Sherman Reservoir (Whitingham)	Elevated level of mercury in all fish except brown bullhead	MERCURY IN FISH TISSUE	D
10	Harriman Reservoir (Whitingham)	Elevated level of mercury in all fish except brown bullhead	MERCURY IN FISH TISSUE	D
11	South Pond (Marlboro)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	PH	D
12	Lily Pond (Vernon)	Atmospheric deposition; extremely sensitive to acidification; episodic acidification	PH, LOW	D

Altered Lakes

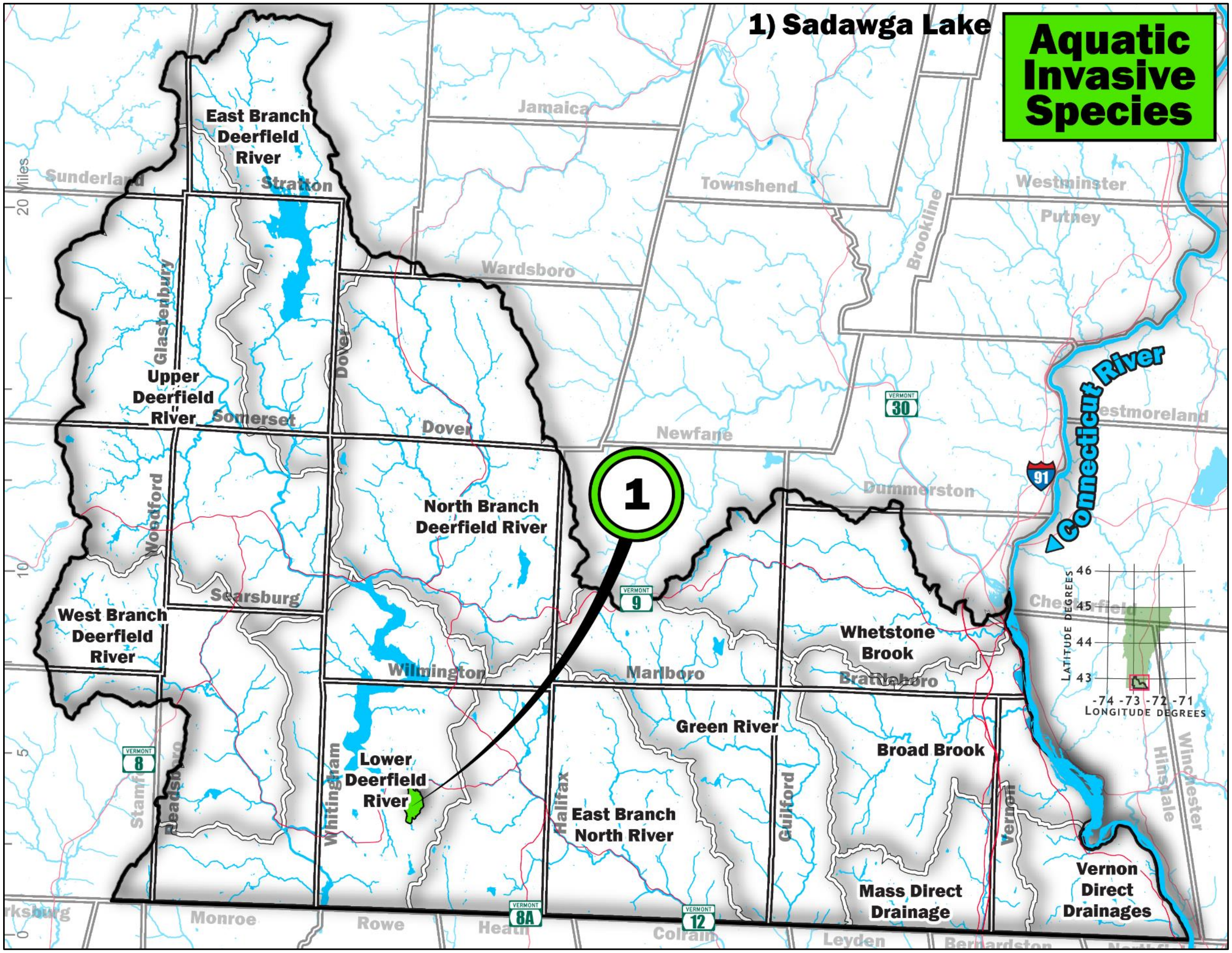


Figure 6 Map of altered lakes for Basin 12. Lakes in green are those altered by aquatic invasive species.

Lakes are assessed as Altered when aquatic habitat and/or other designated uses are not supported due to the extent of invasive aquatic species, or hydrologic factors such as a lack of flow, water level or flow fluctuations, or some other modified hydrologic condition. These waters are listed on the Priority Waters List in Parts E and F respectively.

Table 9. Altered lakes in Basin 12.

MAP ID	NAME	PROBLEM	PART
1	Sadawga	Locally abundant EWM growth.	E

Phosphorus Trends in Lakes

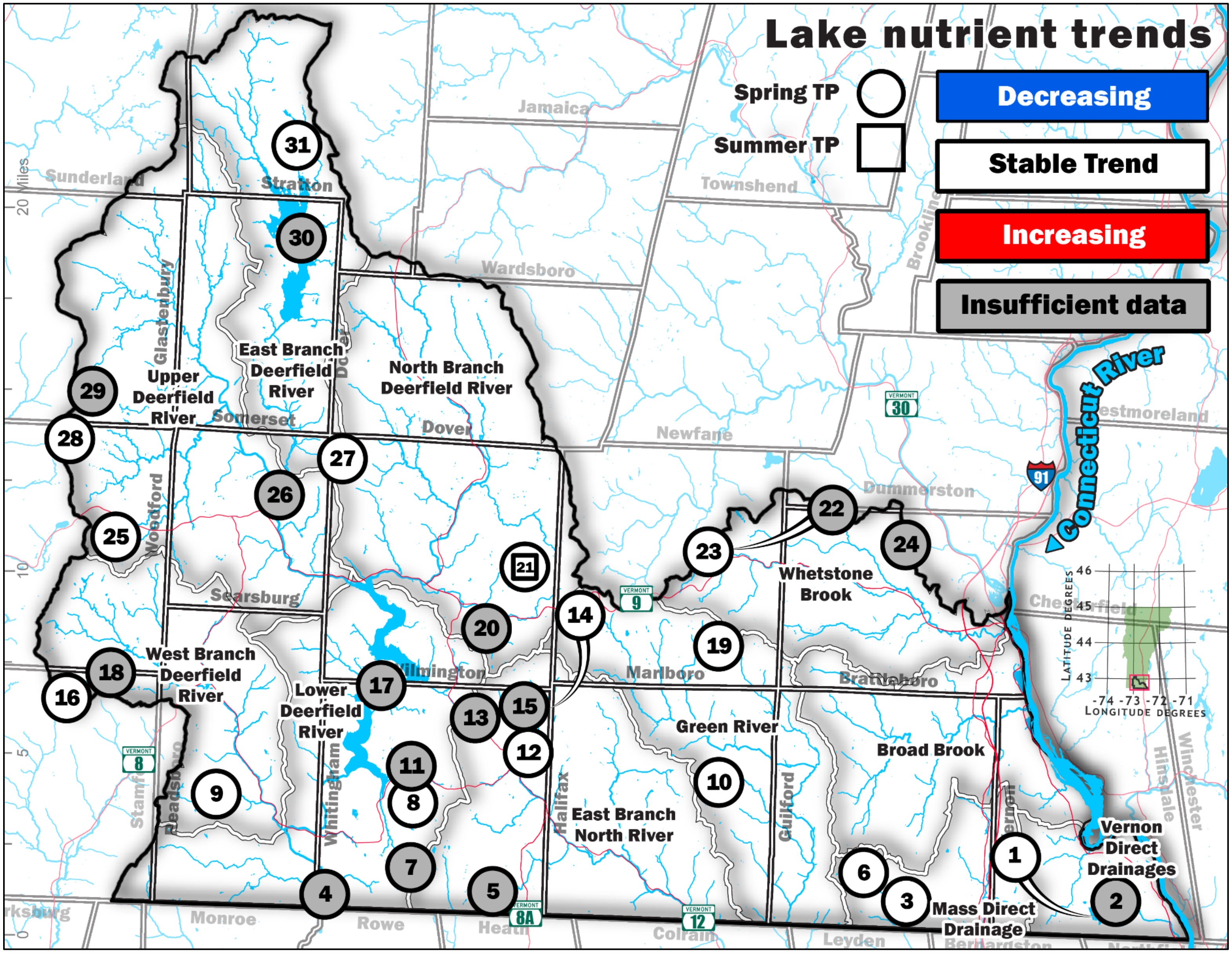


Figure 7 Total phosphorus trends for lakes in Basin 12. Note that trends can be for either spring or summer data or for both.

The WSMD conducts long-term monitoring of surface waters to identify increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont [Water Quality Standards](). Modeling water quality trends before a surface water becomes impaired or altered can lead to more effective and efficient actions to reduce stressors to these waters. For more information on how trends in lakes are identified, see the nutrient trend section of the *Lake Score Card Document*.

While the Lake Score Card identifies trends for multiple parameters of lake health, lakes with sufficient data to identify a trend in total phosphorus concentrations are shown on the above map. Trends are categorized into three groups: Increasing (models with p-values <0.05 and positive coefficients), stable (models with p-values > 0.05) and decreasing (models with p-values <0.05 and negative coefficients). Use the Lake ID in Table 10 to find more information in the *report viewer* and the interactive Vermont lake data application.

Table 10 List of lakes with enough data to model trends in summer or spring total phosphorus. Map IDs correspond with the map above. (+) increasing TP trends, (=) stable TP trends, and (-) negative TP trends. While (?) represents lakes with data available for modeling but lack sufficient data for fitting a model.

Map ID	Lake ID	Summer	Spring
1	LILY (VERNON)		=
2	VERNON HATCHERY;		?
3	WEATHERHEAD HOLLOW		=
4	SHERMAN		?
5	SHIPPEE		?
6	SWEET		=
7	NORTH (WHITHM)		?
8	SADAWGA		=
9	HOWE		=
10	DEER PARK		=
11	CLARA		?
12	JACKSONVILLE		=

Map ID	Lake ID	Summer	Spring
13	RYDER		?
14	GATES		=
15	LAUREL		?
16	STAMFORD		=
17	HARRIMAN (WHITHM)		?
18	MUD (WOODFD)		?
19	SOUTH (MARLBR)		=
20	SPRUCE (WILMTN)		?
21	RAPONDA	=	=
22	MARLBORO-431;		?
23	HIDDEN		=
24	PLEASANT VALLEY		?
25	ADAMS (WOODFD)		=
26	SEARSBURG		?
27	HAYSTACK		=
28	LITTLE (WOODFD)		=
29	LOST (GLASBY)		?
30	SOMERSET		?

Map ID	Lake ID	Summer	Spring
31	GROUT		=

Lakes in need of further assessment

In the Lake Score Card section above, there are numerous lakes that have insufficient data. For these lakes, impervious cover and agricultural land uses information is shown below to help watershed evaluation because these land cover / use types tend to export more pollutants than other land cover/use types. Use the Lake ID in the table below to find more information in the report viewer.

Table 11. Landcover of watersheds of lakes with insufficient data to determine water quality status. These lakes are less than 10 acres and are not included in the above score card maps.

	Impervious surface		Agricultural land	
Lake ID	**Percent**	**Acres**	**Percent**	**Acres**
CRYSTAL (WILMTN)	0	0	0	0
DEER PARK-WEST;	<0.1	0.06	0	0
YAW	0.1	1.70	0	0.01

Rivers

Conditions and trends

Physical condition

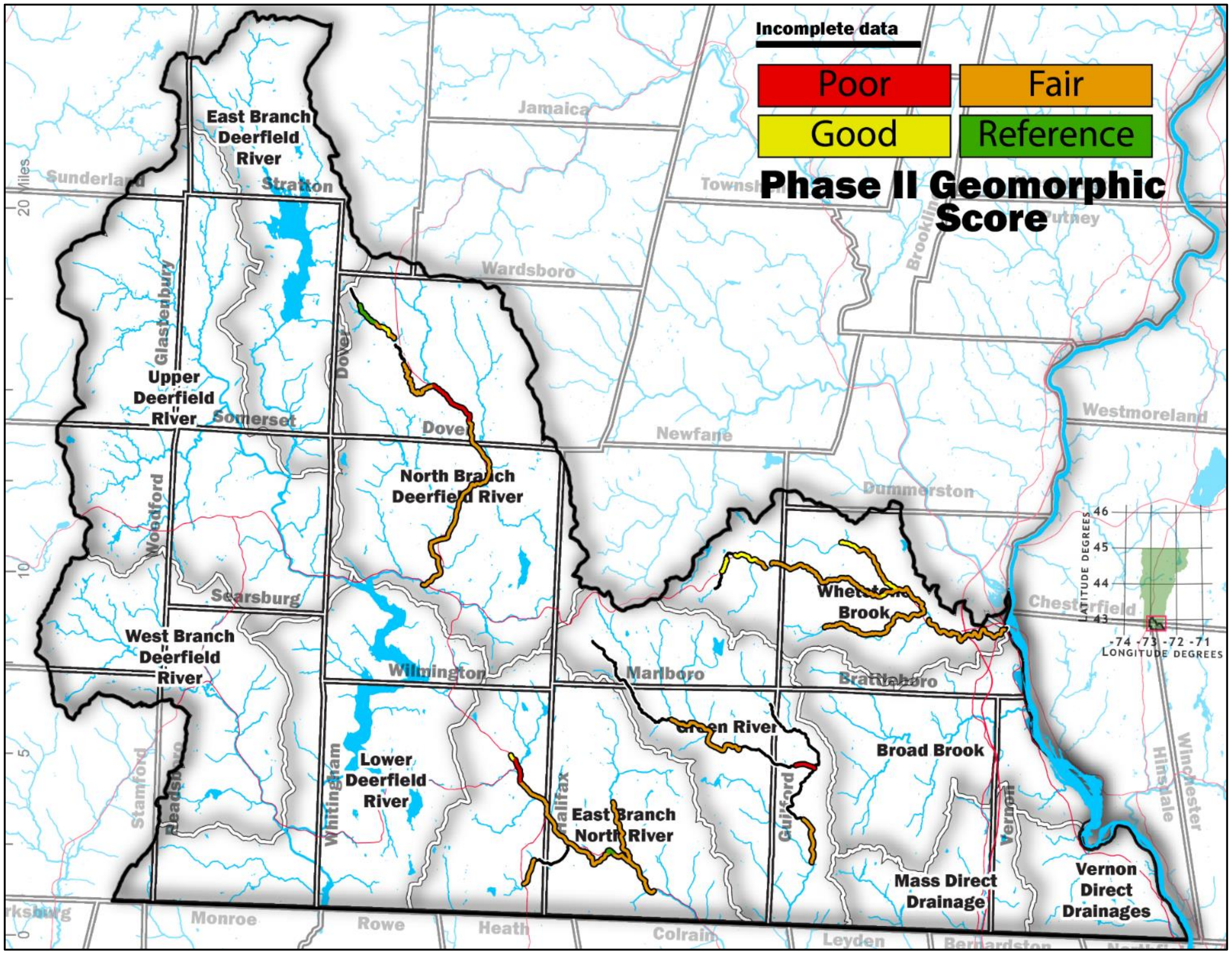


Figure 8 Map of rivers in Basin 12 with Phase II geomorphic condition scores through the present. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

Within the WSMD rivers program, two sections conduct assessments of Vermont's rivers and streams. The Biomonitoring Section collects data and assesses the biological and chemical condition of rivers, and the River Science Section collects data and assesses the physical condition of rivers.

Fluvial geomorphology is a subdiscipline of geomorphology that investigates how flowing water shapes and modifies Earth's surface through erosional and depositional processes. The Rivers Program conducts a three-phase approach to assess the physical condition of rivers in the State of Vermont. Phase 1 is a watershed assessment. Phase 2 is a rapid field stream assessment, and Phase 3 is a survey assessment. Figure 9 gives the overall Phase 2 geomorphic condition score of rivers in Basin 12. Figures displayed here are based on Phase 2 data.

The Stream Geomorphic Assessment can be used to problem solve and set priorities for river corridor conservation at a watershed scale because it allows you to ascertain how one reach may be affecting the condition of another. In the Phase 2 Rapid Field Assessment you use direct observations to evaluate stream geomorphic condition and different channel adjustment processes in each reach. In the Phase 2 Rapid Stream Assessment, the geomorphic stream condition is largely a function of the type and degree to which the stream has departed from its reference condition and the type and magnitude of channel adjustments that are happening in response to the channel and floodplain modifications you have documented at assessed reaches in the watershed.

For more information on these type of assessments see the River's Assessment *webpage*[1]. To learn more about the rivers and streams with Phase 1 and Phase 2 assessments in Basin 12, final reports for each project can be found at: *https://anrweb.vt.gov/DEC/SGA/finalReports.aspx*

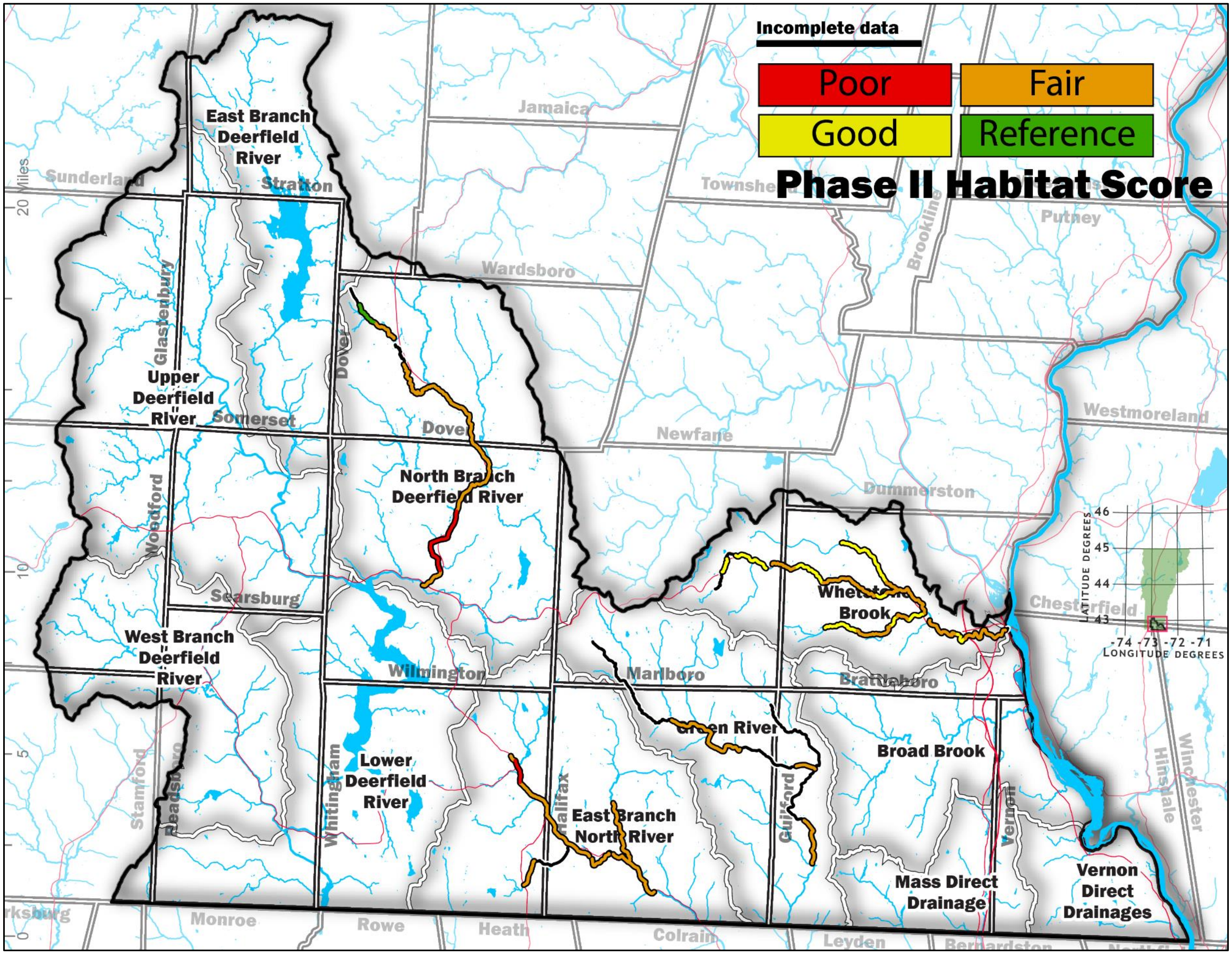


Figure 9 Map of rivers in Basin 12 with Phase II habitat condition ratings through 2020. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

The Rapid Habitat Assessment evaluates the physical components of a channel bed, banks, and riparian vegetation and how they affect aquatic life. The Habitat condition ratings can be used to identify high quality habitat and to “red-flag” areas of degraded habitat. It is also useful to examine habitat condition ratings at a watershed scale and compare these ratings with Phase 1 and Phase 2 impact rating data to determine potential reasons for habitat degradation, and to understand habitat quality and availability throughout the watershed, which is important when evaluating habitat for species that move and/or migrate within a stream system to meet different needs.

Physical condition – protection

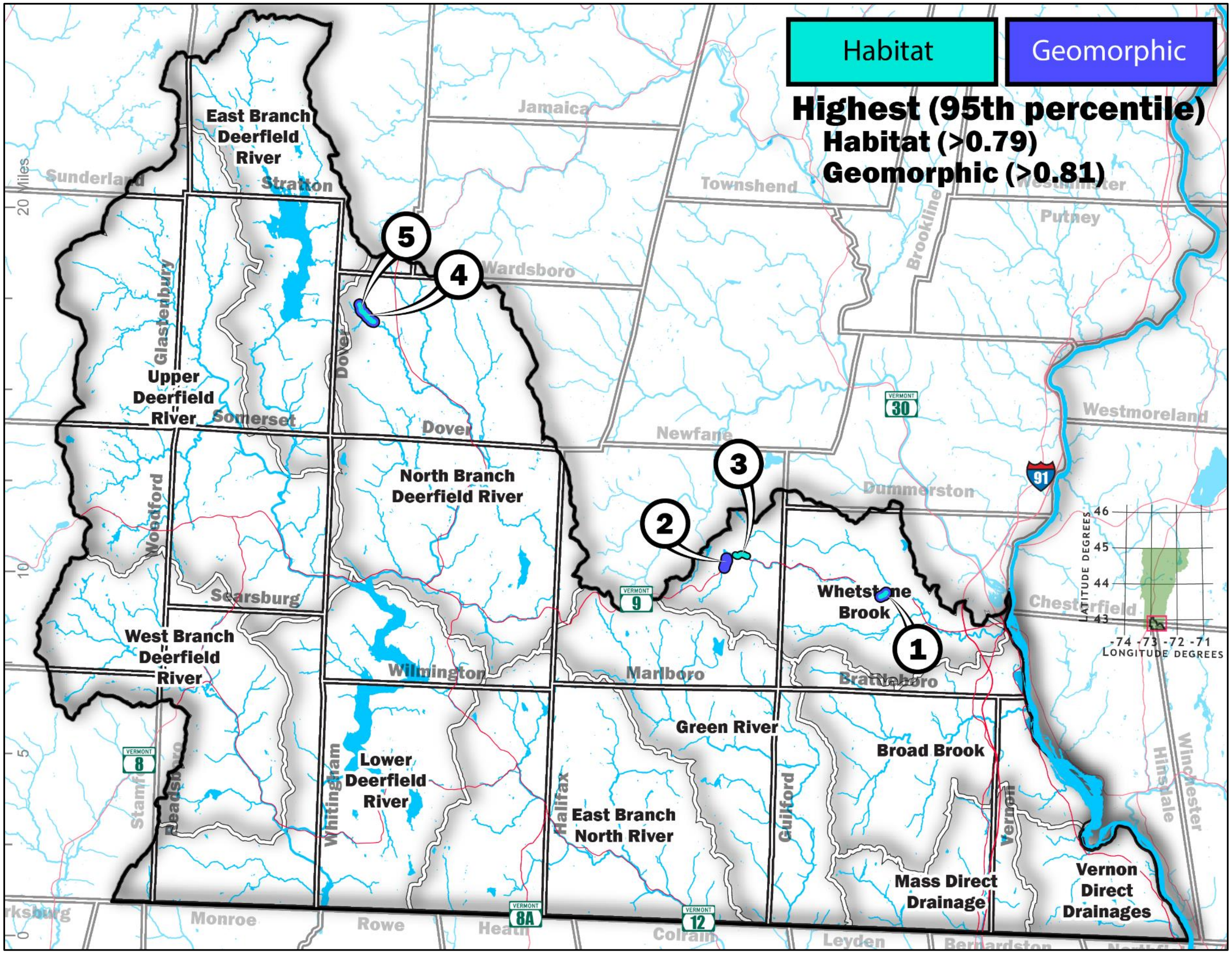


Figure 10. Map of the 95th percentile (highest) habitat and geomorphic condition scores. Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

Table 12 The highest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Longitude	Latitude	Assessment
1	143_M08A	Whetstone Brook			-72.624	42.865	Link
2	143_M12B	Whetstone Brook			-72.709	42.877	Link
3	143_M11D	Whetstone Brook			-72.701	42.881	Link
4	63_T2.14B	North Branch Deerfield River			-72.904	42.975	Link
5	63_T2.14C	North Branch Deerfield River			-72.908	42.979	Link

Physical condition – restoration

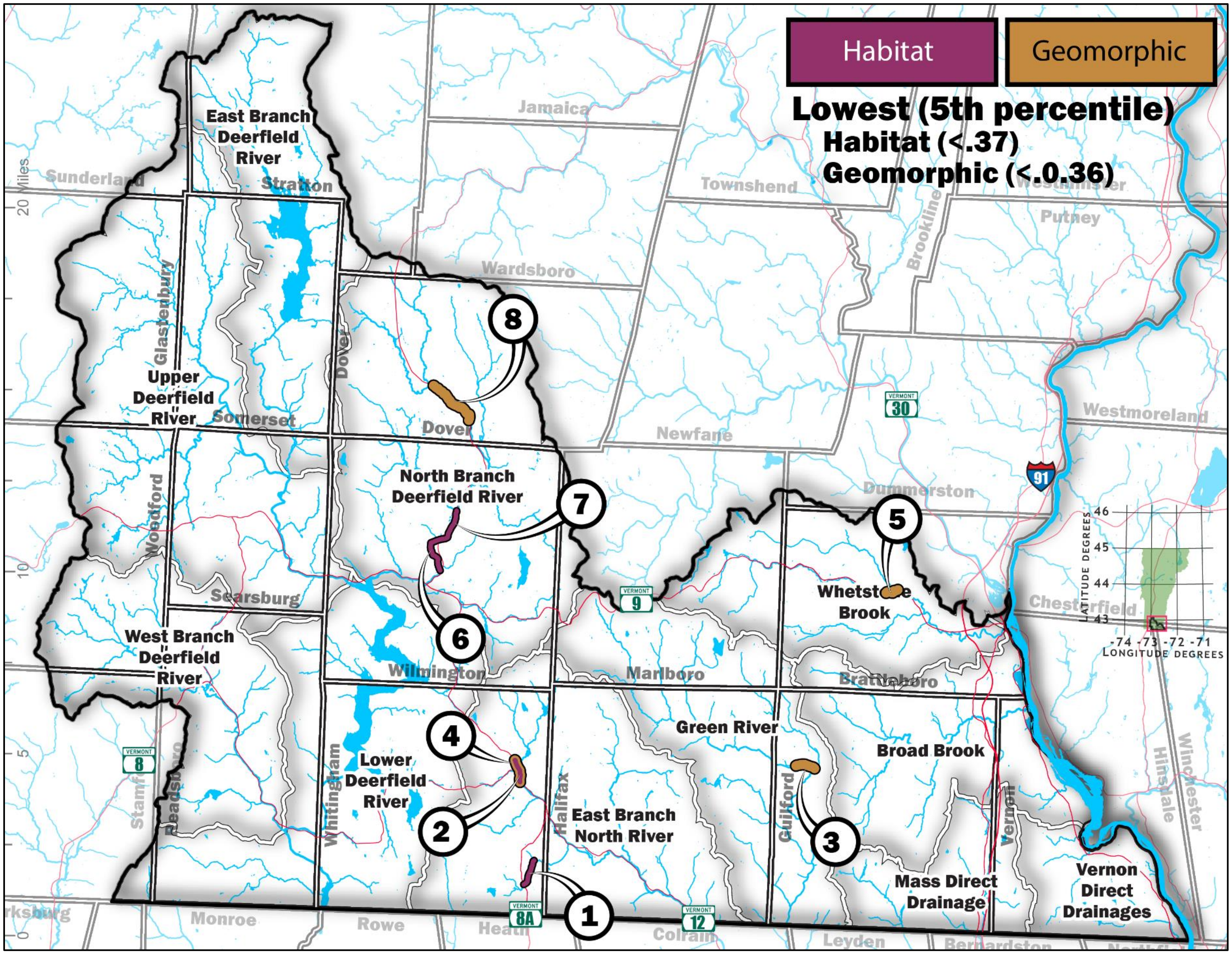


Figure 11 Map of the lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the table below.

Table 13. The lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Longitude	Latitude	Assessment
1	63_T2.02-	Hager Brook			-72.815	42.754	Link
2	191_M06B	East Branch North River			-72.820	42.793	Link
3	188_M07-	Green River			-72.665	42.797	Link
4	191_M07A	East Branch North River			-72.822	42.798	Link
5	143_M07-	Whetstone Brook			-72.619	42.866	Link
6	63_T2.04A	North Branch Deerfield River			-72.868	42.882	Link
7	63_T2.04B	North Branch Deerfield River			-72.856	42.893	Link
8	63_T2.10-	North Branch Deerfield River			-72.857	42.940	Link

Biological condition

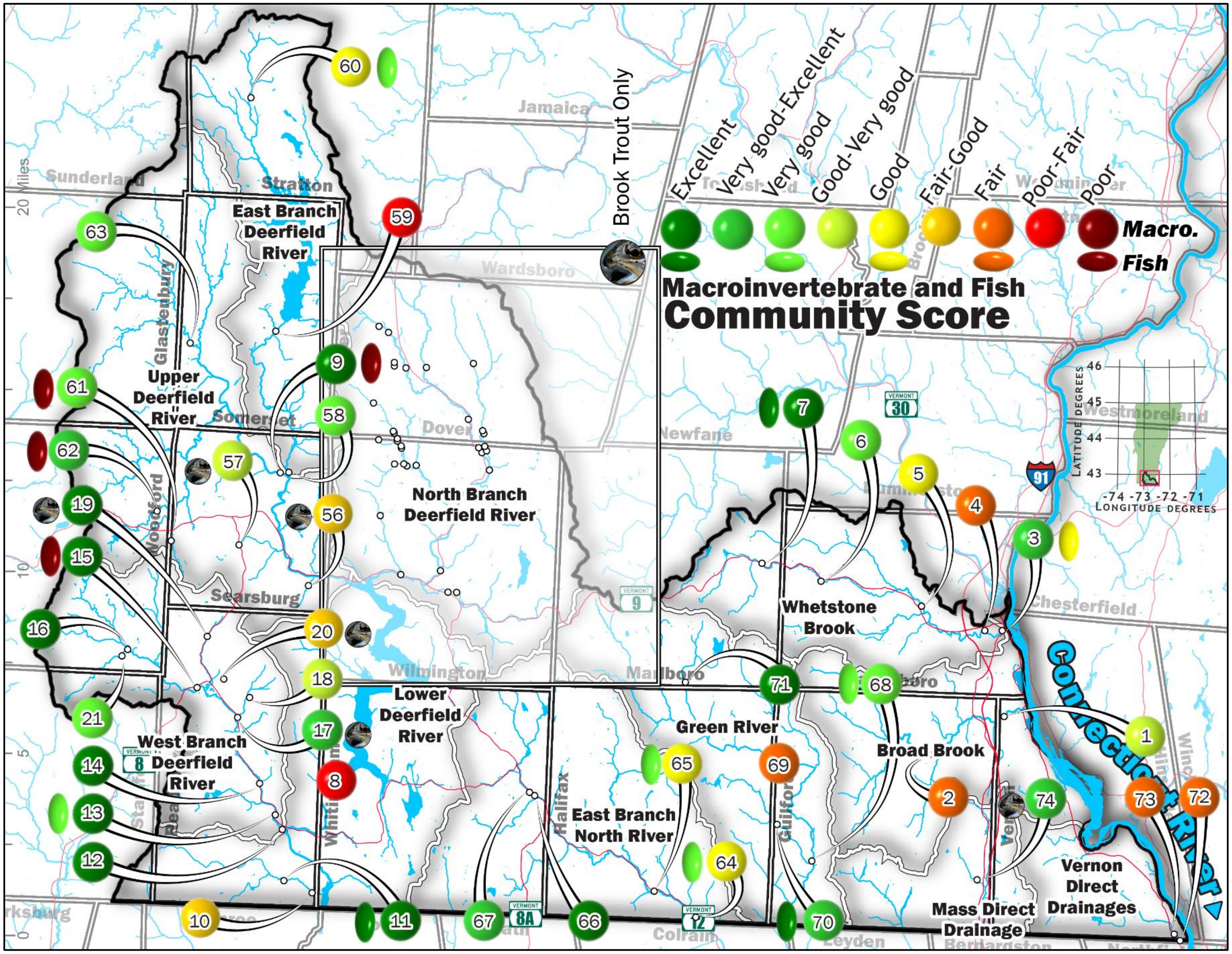


Figure 12. Map of the most recent Macroinvertebrate and Fish Community assessments for Basin 12, excluding North Branch (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

The Monitoring section conducts biological assessments of wadeable rivers and streams. For more information on these assessments see the WSMD Biomonitoring Section [webpage][1]. The assessments include sampling of macroinvertebrate and fish communities to determine Aquatic Biota use support, as well as the collection of water quality and habitat data to better understand the condition of the biological communities. Aquatic biota health in streams is one of the primary areas of study by the WSMD with data used to determine a river's ability to fully support aquatic biota. Brook Trout (BKT) only streams are defined by reaches where the only fish species found are Brook Trout, which cannot be assessed using the VDEC Fish Index of Biological Integrity (IBI), which requires two or more native species to score.

Table 14 Macroinvertebrate (bug) and fish community assessment matrix over the last decade for the watersheds of Basin 12 excluding North Branch Deerfield River. Blank = no data, bkt = streams with a robust brook trout community

Unable to sample or assess or BKT	Poor (P)	Poor-fair (Pf)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Broad Brook, 0.9	1	Bug										GVg	
Broad Brook, 4.1	2	Bug										F	F
Whetstone Brook, 0.2	3	Bug	FG	VgE									
Whetstone Brook, 0.2	3	Fish		G									
Whetstone Brook, 1.0	4	Bug										FG	F
Whetstone Brook, 2.9	5	Bug										G	
Whetstone Brook, 8.6	6	Bug	Vg										
Whetstone Brook, 10.7	7	Bug							E				
Whetstone Brook, 10.7	7	Fish							E				
Deerfield River, 52.4	8	Bug										PF	
Deerfield River, 67.5	9	Bug	VgE				Vg						
Deerfield River, 67.5	9	Fish					P						
South Branch Deerfield River, 0.3	10	Bug										FG	
South Branch Deerfield River, 1.3	11	Bug		E			E						
South Branch Deerfield River, 1.3	11	Fish		Vg			E						
West Branch Deerfield River, 0.1	12	Bug	E										
West Branch Deerfield River, 0.6	13	Bug											E
West Branch Deerfield River, 0.6	13	Fish											Vg
West Branch Deerfield River, 1.8	14	Bug		E									
West Branch Deerfield River, 5.9	15	Bug					E						
West Branch Deerfield River, 5.9	15	Fish					P						
West Branch Deerfield River, 8.5	16	Bug			Vg		E						
Lamb Brook, 0.1	17	Bug					Vg	E	GVg	VgE	VgE		
Lamb Brook, 0.1	17	Bug					BKT		BKT	BKT	BKT		

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Lamb Brook, 0.7	18	Bug	GVg										
West Branch Deerfield River Trib 7, 1.8	19	Bug					VgE	E	GVg	VgE	E		
West Branch Deerfield River Trib 7, 1.8	19	Fish					E		U	BKT	BKT		
West Branch Deerfield River Trib 7 Trib 1, 0.7	20	Bug					F	G	F	GVg	FG		
West Branch Deerfield River Trib 7 Trib 1, 0.7	20	Fish					BKT		U	U	BKT		
Reservoir Brook, 0.4	21	Bug										Vg	
Reservoir Brook, 0.4	21	Fish										U	
Medbury Brook, 0.4	56	Bug					F	G	F	FG	FG		
Medbury Brook, 0.4	56	Fish					BKT		U	BKT	BKT		
Bond Brook, 1.7	57	Bug					GVg	E	GVg	GVg	GVg		
Bond Brook, 1.7	57	Fish					BKT	BKT	BKT	BKT			
East Branch Deerfield River, 0.1	58	Bug	FG				E						
East Branch Deerfield River, 5.3	59	Bug					PF						
East Branch Deerfield River, 12.6	60	Bug										G	
East Branch Deerfield River, 12.6	60	Fish											Vg
Rake Branch, 1.0	61	Bug					FG	Vg	G	GVg	Vg		
Rake Branch, 1.0	61	Fish					P	P	P	P	P		
Red Mill Brook, 0.7	62	Bug					VgE						
Red Mill Brook, 0.7	62	Fish					P						
Glastenbury River, 0.4	63	Bug					Vg						
East Branch North River, 10.3	64	Bug					G						
East Branch North River, 10.3	64	Fish					Vg						
East Branch North River, 11.7	65	Bug	E	E		E		E				FG	G
East Branch North River, 11.7	65	Fish						Vg					
East Branch North River, 17.6	66	Bug					E					E	
East Branch North River, 17.8	67	Bug										VgE	
Green River, 16.6	68	Bug	E	F	E	E	VgE	VgE	GVg	GVg	GVg	FG	Vg
Green River, 16.6	68	Fish	Vg	E	Vg					G			Vg
Green River, 19.9	69	Bug										F	
Green River Trib 6, 1.7	70	Bug										VgE	
Green River Trib 6, 1.7	70	Fish										E	
Pond Brook, 1.3	71	Bug			E								
Newton Brook, 0.2	72	Bug	F									F	
Newton Brook, 0.6	73	Bug	F										

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Fall River, 15.2	74	Bug		E				VgE					
Fall River, 15.2	74	Fish		BKT									

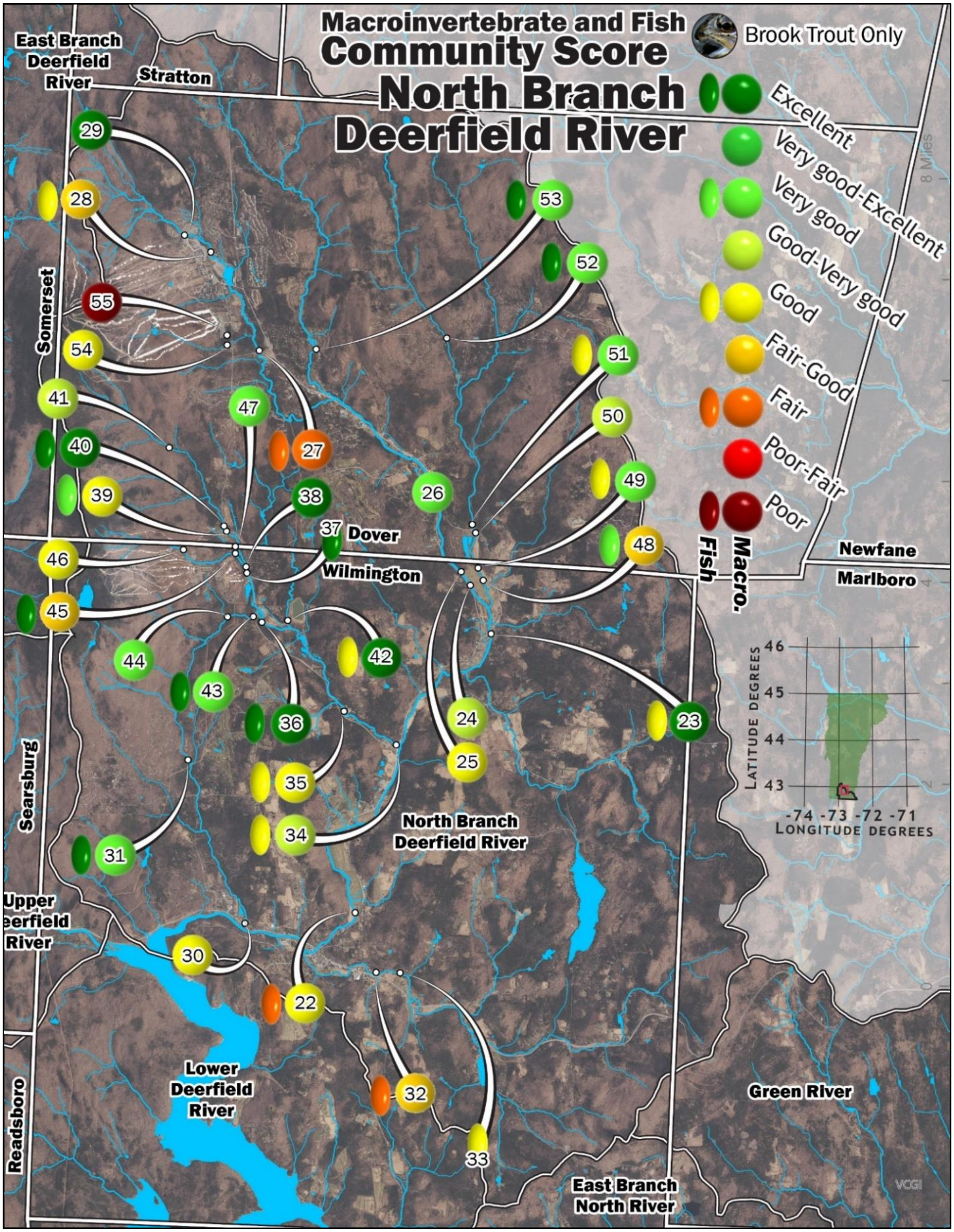


Figure 13. Map of the most recent macroinvertebrate and fish community assessments for North Branch Deerfield River. Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

Table 15 Macroinvertebrate (bug) and fish community matrix for the North Branch of the Deerfield River. Blank = no data, bkt = stream reaches with only brook trout present and are not assessable using Vermont's fish IBI which requires a minimum of two native species to calculate.

Unable to sample or assess or BKT	Poor (P)	Poor-fair (Pf)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
North Branch Deerfield River, 2.0	22	Bug									G		
North Branch Deerfield River, 2.0	22	Fish									F		
North Branch Deerfield River, 5.8	23	Bug					E						
North Branch Deerfield River, 5.8	23	Fish					G						
North Branch Deerfield River, 6.3	24	Bug				G					GVg		
North Branch Deerfield River, 6.5	25	Bug				GVg					G		
North Branch Deerfield River, 7.6	26	Bug				G					Vg		
North Branch Deerfield River, 11.0	27	Bug				G	FG				F		
North Branch Deerfield River, 11.0	27	Fish				P					F		
North Branch Deerfield River, 12.1	28	Bug				Vg	Vg					FG	
North Branch Deerfield River, 12.1	28	Fish										G	
North Branch Deerfield River, 12.6	29	Bug					E						
Binney Brook, 0.1	30	Bug		G									
Rose Brook, 0.9	31	Bug	Vg				G	GVg				Vg	
Rose Brook, 0.9	31	Fish					F	E					
Beaver Brook, 1.0	32	Bug		E								FG	
Beaver Brook, 1.0	32	Fish		F									
Beaver Brook, 1.2	33	Fish					G						
Cold Brook, 0.1	34	Bug	Vg			Vg	GVg						
Cold Brook, 0.1	34	Fish				G							
Cold Brook, 0.7	35	Bug					G						
Cold Brook, 0.7	35	Fish					G						
Cold Brook, 2.2	36	Bug					GVg					E	E
Cold Brook, 2.2	36	Fish										E	
Cold Brook, 3.0	37	Fish				E						E	

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Cold Brook, 3.1	38	Bug				G	E					VgE	E
Cold Brook, 3.3	39	Bug				G							
Cold Brook, 3.3	39	Fish				Vg							
Cold Brook, 3.4	40	Bug					E					Vg	E
Cold Brook, 3.4	40	Fish										E	
Cold Brook, 4.3	41	Bug					GVg						
Airport Trib, 0.1	42	Bug				E							
Airport Trib, 0.1	42	Fish				G							
Haystack Brook, .1	43	Bug				E	Vg					E	Vg
Haystack Brook, .1	43	Fish				Vg						E	
Haystack Brook, 0.3	44	Bug				Vg							
Oak Brook, 0.1	45	Bug				E						GVg	FG
Oak Brook, 0.1	45	Fish										E	
Oak Brook, 0.7	46	Bug				G							
Oak Brook, 0.7	46	Fish				BKT							
Cold Brook Trib 6, 0.1	47	Bug				Vg							
Cold Brook Trib 6, 0.1	47	Fish				U							
Ellis Brook, 0.3	48	Bug					FG					FG	
Ellis Brook, 0.3	48	Fish					Vg						
Ellis Brook, 0.5	49	Bug			F	F				Vg			
Ellis Brook, 0.5	49	Fish				G							
Ellis Brook, 0.9	50	Bug									GVg		
Ellis Brook, 1.0	51	Bug			E	VgE	Vg						
Ellis Brook, 1.0	51	Fish				G							
Ellis Brook, 2.9	52	Bug										Vg	
Ellis Brook, 2.9	52	Fish										E	
Blue Brook, 0.7	53	Bug					VgE					Vg	
Blue Brook, 0.7	53	Fish					E					E	

Stream name, river mile	Map ID	Community	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Jacks Brook, 0.3	54	Bug								GVg	GVg	FG	G
Iron Stream, 0.2	55	Bug								P	P	P	P

Chemical condition

Chemical water quality monitoring occurs across the state in rivers and streams in a variety of ways: targeted, probability-based, and special studies. Examples of targeted monitoring include the LaRosa Partnership Program (LPP) and water quality samples collected by the Ambient Biomonitoring Network (ABN). All chemical data can be accessed through the Vermont Integrated Watershed Information System (VIWIS) and generally there is too much data that requires special contextual information to effectively display in graphics and tables in the format of this report. LPP monitoring stations are normally sampled eight times during the spring and summer season, and may be monitored from one to several years, depending on the monitoring purpose. LPP data can provide enough information to make assessment determinations (i.e., impaired or full support) of select chemical parameters. Chemical monitoring associated with the ABN is used to help interpret the biological data, which is heavily relied upon for assessment and regulatory purposes.

Special chemical studies are usually only conducted in response to compelling data and information obtained from fixed-station and probability-based projects. The number and nature of special studies is commonly dictated by the nature of issues that need further monitoring or that arise as interest or funding permits. These types of studies include detailed sampling to assess use support or standards violations, stressor identification, diagnostic-feasibility studies, effectiveness evaluations of pollution control measures, and watershed-based surveys and evaluations. These evaluations are usually resource intensive and are reserved for issues of particular interest. Additionally, data from these investigations are usually organized and presented in a summary report format and would not be used separately for assessments.

River reclassification candidates (Aquatic biota)

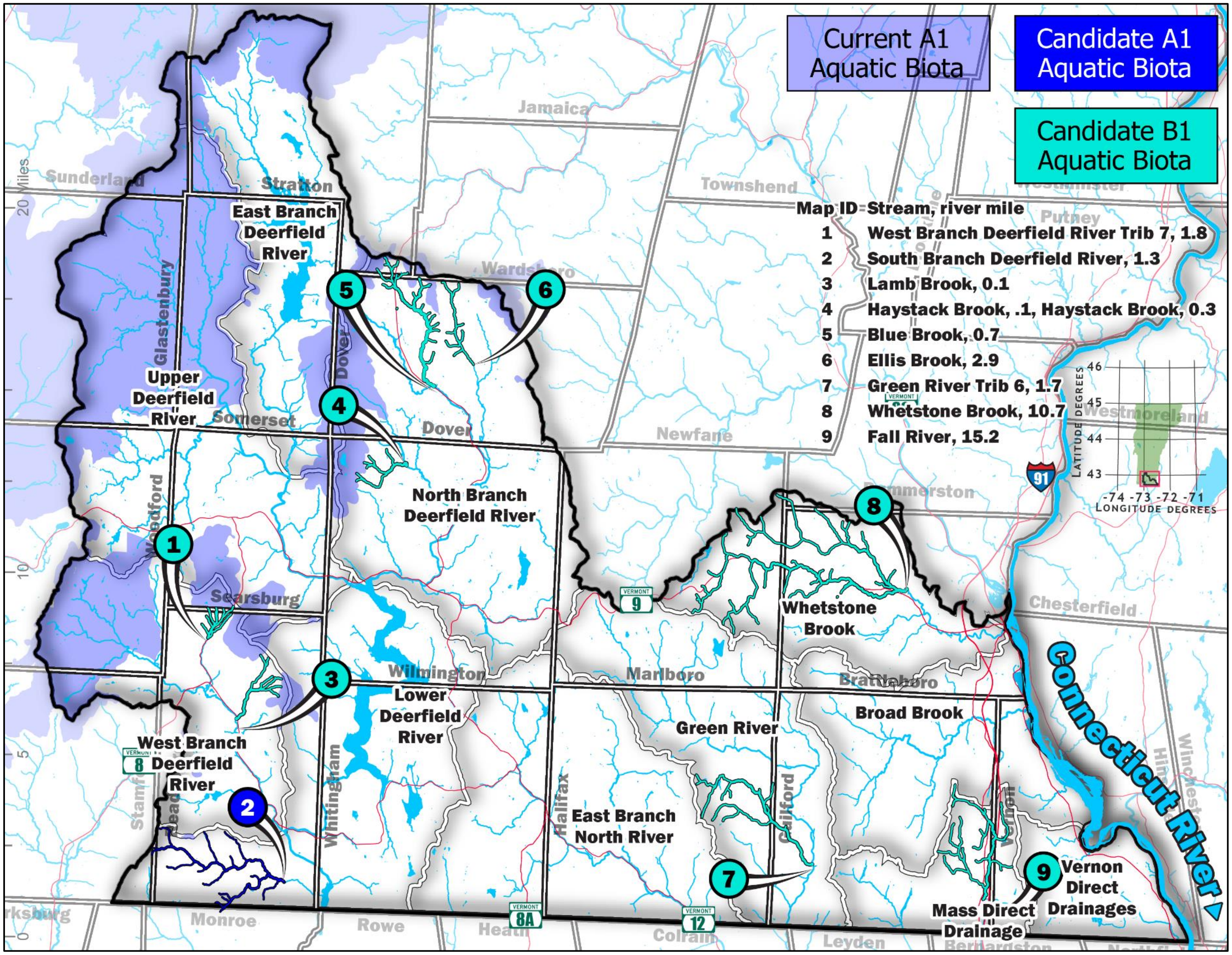


Figure 14 Map of A(1) and B(1) reclassification candidates. Map IDs correspond to the table below.

To protect aquatic biota in rivers in the State of Vermont, the Watershed Management Division can initiate reclassification for Aquatic Biota use in rivers that meet a high-quality standard. The major implication of reclassification is the application of new *Water Quality Standards*. Most rivers in the State of Vermont are classified B(2) for Aquatic Biota use and must maintain biological assessments of Good or better for both macroinvertebrate and fish communities. Rivers reclassified to B(1) must maintain biological assessments of Very Good or better, and Rivers reclassified to A(1) must maintain biological assessments of Excellent. The rivers shown here have maintained biological condition expected of either A(1) or B(1) waters and therefore, are candidates for reclassification. Candidacy is based on the propensity of data over the last ten years and the nearness of data—data must be within six years of each other. Data from both communities, macroinvertebrates and fish, is required unless land cover is overwhelmingly natural. For more information, visit the *stream reclassification webpage*.

Table 16 Table of A(1) and B(1) reclassification candidates. Map IDs correspond to the map above. The community column identifies the community assessed.

Unable to sample or assess or BKT only	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Reclassification candidate	Map ID	Reclass	Community	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
West Branch Deerfield River Trib 7, 1.8	1	B1	Bug				VgE	E	GVg	VgE	E		
West Branch Deerfield River Trib 7, 1.8	1	B1	Fish				E		U	BKT	BKT		
South Branch Deerfield River, 1.3	2	A1	Bug	E			E						
South Branch Deerfield River, 1.3	2	A1	Fish	Vg			E						
Lamb Brook, 0.1	3	B1	Bug				Vg	E	GVg	VgE	VgE		
Haystack Brook, .1	4	B1	Bug			E	Vg					E	Vg
Haystack Brook, .1	4	B1	Fish			Vg						E	
Haystack Brook, 0.3	4	B1	Bug			Vg							
Blue Brook, 0.7	5	B1	Bug				VgE					Vg	
Blue Brook, 0.7	5	B1	Fish				E					E	
Ellis Brook, 2.9	6	B1	Bug									Vg	
Ellis Brook, 2.9	6	B1	Fish									E	
Green River Trib 6, 1.7	7	B1	Bug									VgE	
Green River Trib 6, 1.7	7	B1	Fish									E	
Whetstone Brook, 10.7	8	B1	Bug						E				
Whetstone Brook, 10.7	8	B1	Fish						E				
Fall River, 15.2	9	B1	Bug	E				VgE					
Fall River, 15.2	9	B1	Fish	BKT									

Impaired rivers

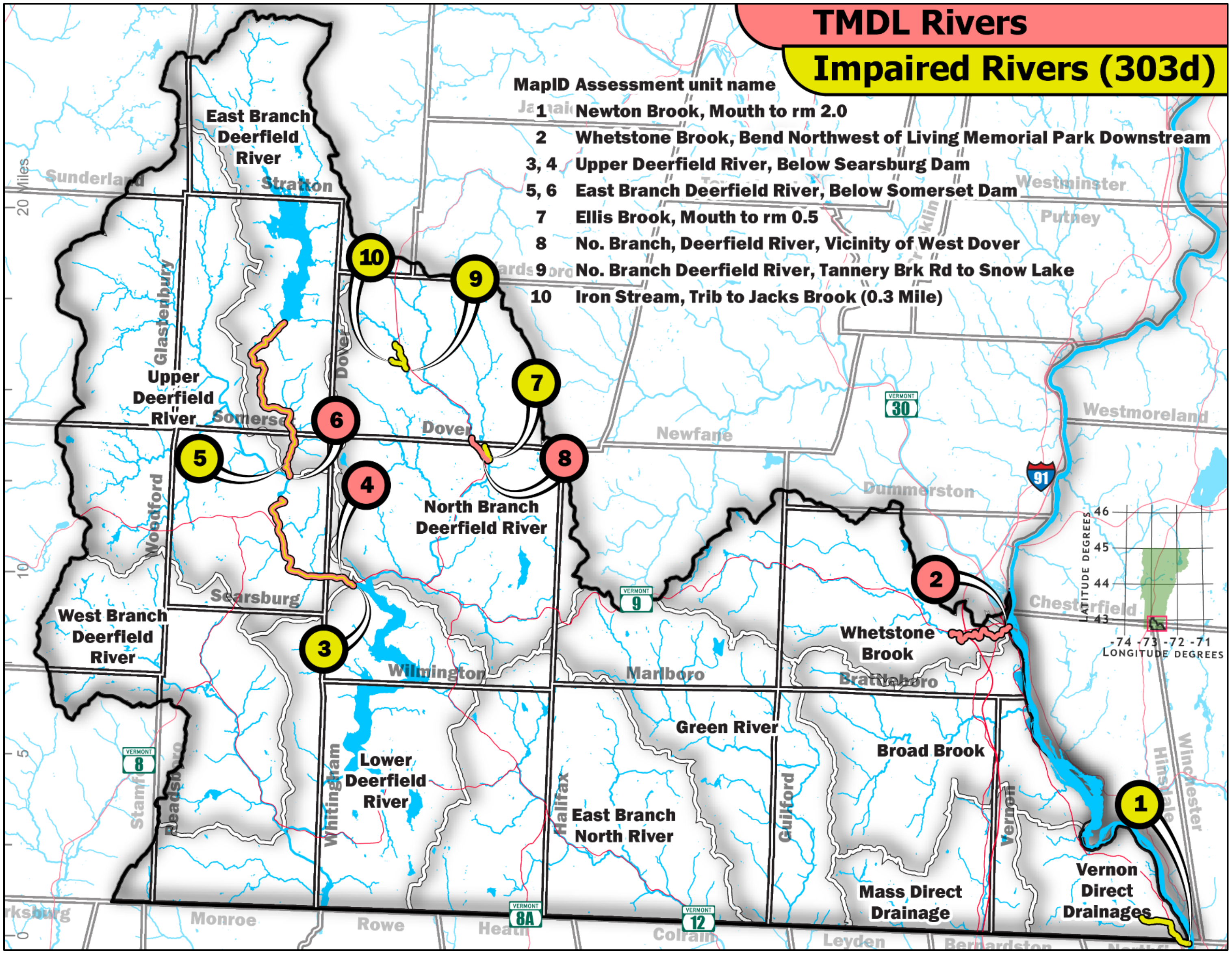


Figure 15. Map of impaired rivers in Basin 12. Yellow represents rivers that are on the 2022 303(d) list. Salmon represents rivers that have an approved TMDL but remain impaired. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this [report viewer](#).

Table 17 Table of impaired rivers in Basin 12. Map IDs are associated with the map above. (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
1	Newton Brook, Mouth to rm 2.0	VT13-16.01	SEDIMENTATION/SILTATION	Agricultural activity	ALS	A
2	Whetstone Brook, Bend Northwest of Living Memorial Park Downstream	VT13-14.01	ESCHERICHIA COLI (E. COLI)	Sources unknown, potentially faulty sewer line/septic system	CR	D
3	Upper Deerfield River, Below Searsburg Dam	VT12-04.01	PH, LOW	Atmospheric deposition: critically acidified; chronic acidification	ALS	A
4	Upper Deerfield River, Below Searsburg Dam	VT12-04.01	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	FC	D
5	East Branch Deerfield River, Below Somerset Dam	VT12-03.01	PH, LOW	Atmospheric deposition: critically acidified; chronic acidification, low temperature dam release	ALS	A
6	East Branch Deerfield River, Below Somerset Dam	VT12-03.01	MERCURY IN FISH TISSUE	Elevated levels of mercury in all fish	FC	D
7	Ellis Brook, Mouth to rm 0.5	VT12-05.06	TEMPERATURE, NUTRIENTS	Possible impacts from NBFD WWTF, agricultural runoff and channel alterations, lack of riparian buffer; high algal cover	ALS	A
8	No. Branch, Deerfield River, Vicinity of West Dover	VT12-05.02	ESCHERICHIA COLI (E. COLI)	High E. coli levels; cause(s) & source(s) unknown; needs assessment	CR	D
9	No. Branch Deerfield River, Tannery Brk Rd to Snow Lake	VT12-05.01	TEMPERATURE	High temperatures below Snow Lake impact aquatic biota	ALS	A

MAP ID	*NAME*	*ASSESSMENT UNIT ID*	*POLLUTANT*	*PROBLEM*	*IMPAIRED USE*	*PART*
10	Iron Stream, Trib to Jacks Brook (0.3 Mile)	VT12-05.03	IRON	Land development, source(s) need further assessment	ALS, AES	A

Altered Rivers

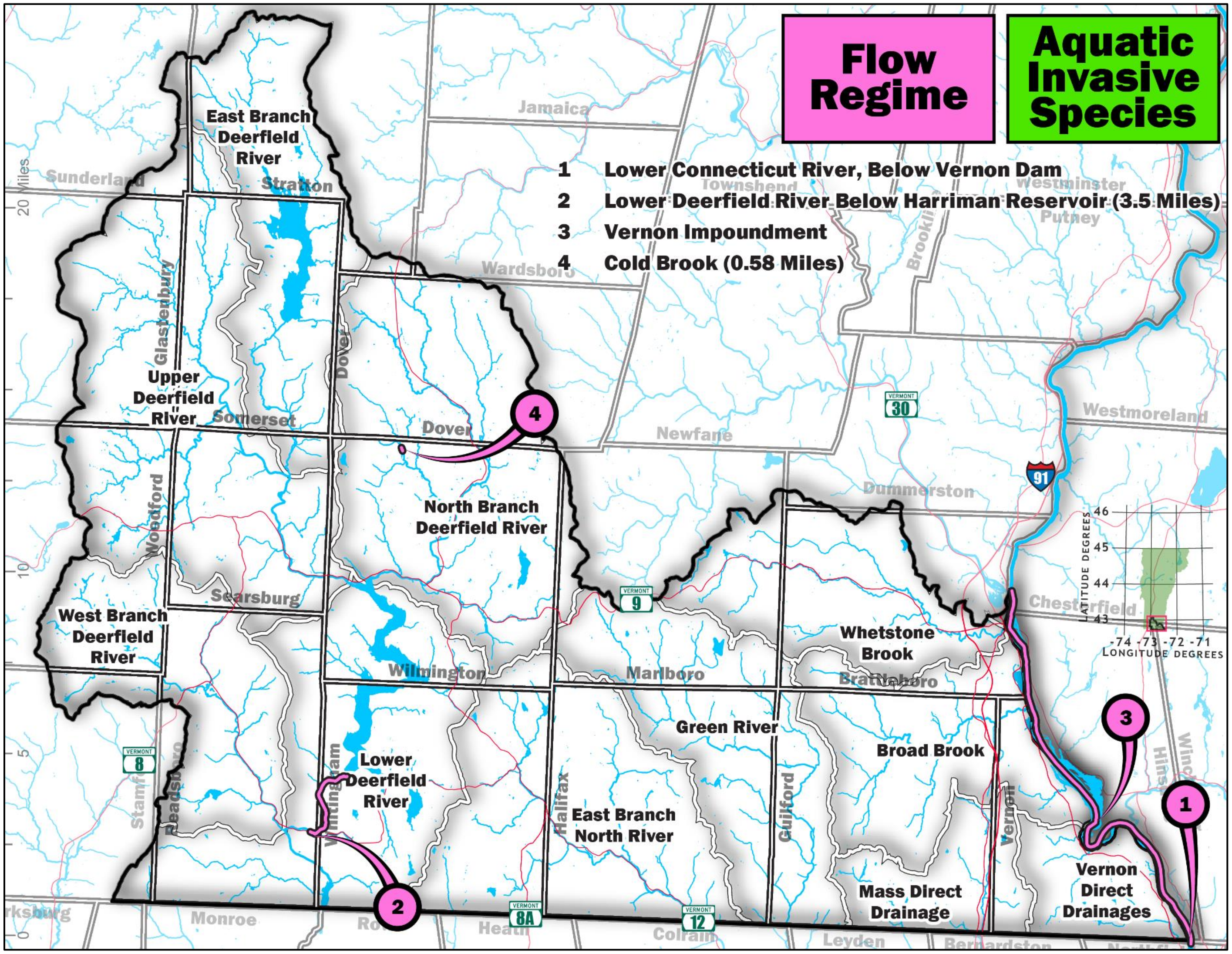


Figure 16. Map of altered rivers in Basin 12. Pink are rivers altered by flow modification. There are no altered rivers for aquatic invasive species. These are rivers that are caused to not meet the water quality standards by non-pollutants such as flow modification or aquatic invasive species. Associated with the map is a table further describing the alteration. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in the [report viewer](#)

Table 18. Altered rivers for Basin 12 as of 2022. All are flow modifications.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
1	Lower Connecticut River, Below Vernon Dam	VT13-05	Artificial flow condition, fluctuating flows by hydropower production	Agreement on operation of Vernon dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	ALS	F
2	Lower Deerfield River Below Harriman Reservoir (3.5 Miles)	VT12-01.01	Low temperature hypolimnetic water release from reservoir affect fishery	401 certification issued (1/95); FERC license issued (4/97); DFW evaluating the effects of release.	ALS	F
3	Vernon Impoundment	VT13-04	Water level fluctuation at dam; dewatered shoreline/wetlands	Agreement on operation of Vernon dam was reached in 2020 that will meet VWQS; FERC license and 401 WQC still pending	ALS	F
4	Cold Brook (0.58 Miles)	VT12-05.07	Artificial & insufficient flow below Hermitage snowmaking withdrawal	Compliance schedule established as part of act 250 process to bring the withdrawal into compliance	ALS	F

Trending rivers

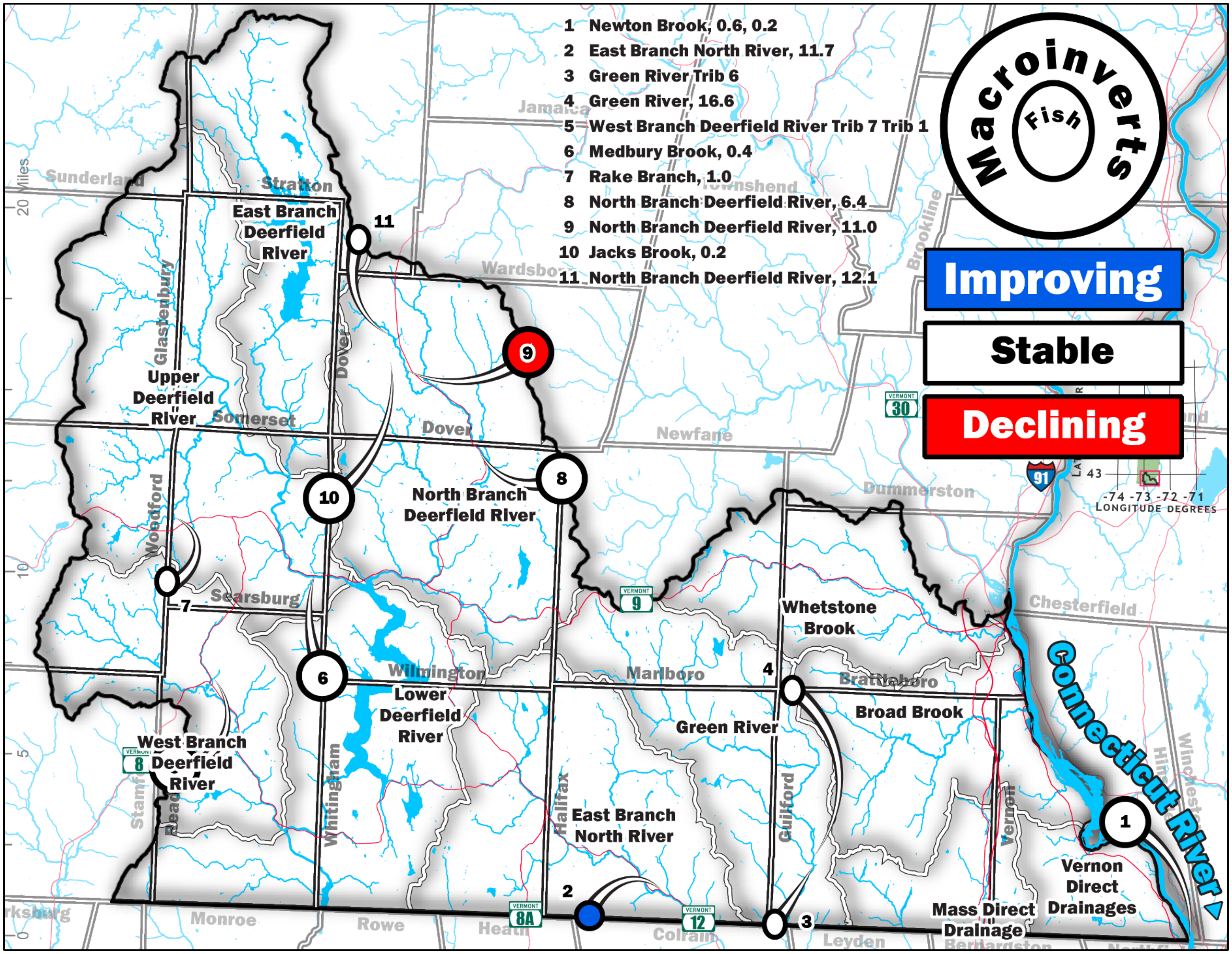


Figure 17 Map of rivers with enough biological data to model a water quality trend.

To maintain waters in their current state, WSMD conducts long term monitoring on surface waters and identifies increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont Water Quality Standards. Modeling trends can act as an early warning system for declining water quality, and it may be cost effective to reduce stressors to these waters before they become impaired or altered. Likewise, increasing trends can show areas of effective remediation. For each biological monitoring site, two linear regression models are used with year of sampling as the independent variable. The response variables include the community assessment ratings for macroinvertebrates and/or fish (Poor to Excellent), sites coded with a 0 were not sampled. Sites with more than three data points were included. Data from sites is pooled by coincident NHD+ reach code (multiple sites on the same reach) unless the sites are bracketing. Trends are categorized into three groups: Improving (models with p-values <0.1 and positive coefficients), stable (models with p-values > 0.1) and declining (models with p-values <0.1 and negative coefficients.

Table 19 Trends in biological condition of macroinvertebrate (bug) and fish communities in Basin 12. + Improving, - declining, = stable/no trend. B = Bug community, F = Fish community.

Unable to sample or assess	Poor (P)	Poor-fair (Pf)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name, river mile	Map ID	Trend	Set	1994	1995	1996	1998	2002	2003	2004	2005	2008	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Newton Brook, 0.2	1	=	B	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	F	0
Newton Brook, 0.6	1	=	B	0	0	0	F	0	0	0	0	0	0	0	F	0	0	0	0	0	0	0	0	0	0
East Branch North River, 11.7	2	+	F	G	G	0	0	0	0	0	0	Vg	0	0	0	0	0	0	0	Vg	0	0	0	0	0
Green River Trib 6, 1.7	3	=	F	0	0	0	0	0	E	0	0	Vg	0	0	0	0	0	0	0	0	0	0	0	E	0
Green River, 16.6	4	=	F	0	0	0	0	0	0	0	0	0	0	U	Vg	E	Vg	0	0	0	0	G	0	0	0
West Branch Deerfield River Trib 7 Trib 1, 0.7	5	=	B	0	0	0	0	0	0	0	0	0	G	0	0	0	0	0	F	G	F	0	0	0	0
Medbury Brook, 0.4	6	=	B	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0	F	G	F	0	0	0	0
Rake Branch, 1.0	7	=	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	P	P	P	P	P	0	0
North Branch Deerfield River, 6.5	8	=	B	0	0	0	0	0	0	0	G	Vg	F	0	0	0	0	0	0	0	0	0	G	0	0
North Branch Deerfield River, 11.0	9	-	B	0	0	0	G	G	G	G	0	0	0	0	0	0	0	G	0	0	0	0	F	0	0
Iron Stream, 0.2	10	=	B	0	0	P	0	0	0	P	0	0	0	0	0	0	0	0	0	0	0	P	P	P	P
North Branch Deerfield River, 12.1	11	=	F	0	0	0	0	0	Vg	0	0	E	0	0	0	0	0	0	0	0	0	0	0	G	0

Rivers in need of assessment

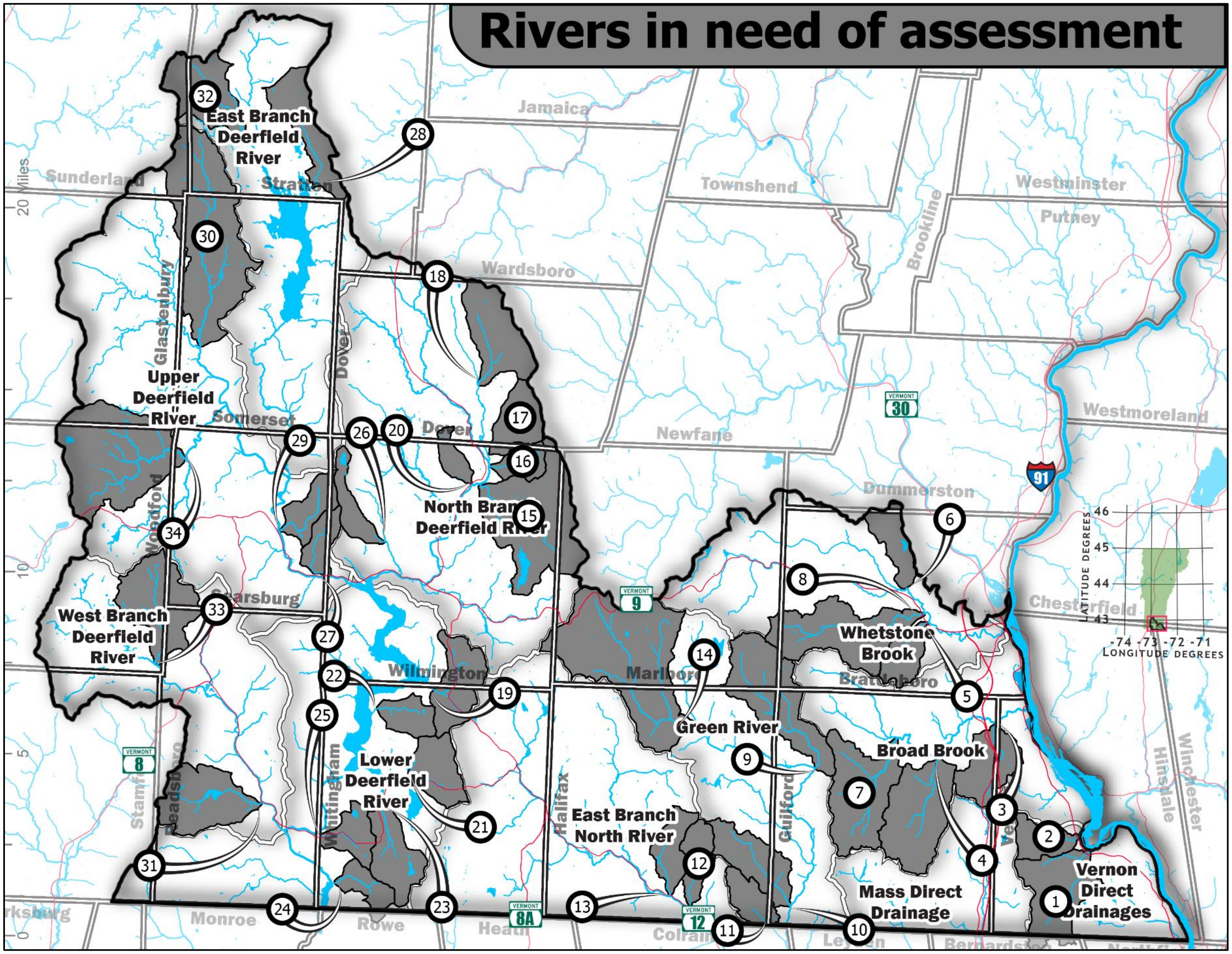


Figure 18 Map of rivers with unassessed aquatic biota use in Basin 12.

Aquatic biota health in streams is one of the primary areas of study by the WSMD. In the sections above, areas with sufficient data were used to determine a river's ability to fully support aquatic biota. This section highlights the 32 streams within this basin that lack data needed to determine the support status of aquatic biota. This includes streams larger than 2 square kilometers that lack biological data between 2000 and 2022. Because all these streams cannot be monitored at the same time, land use/cover data are provided in the figure below to aid site prioritization. Many of these streams are unnamed, therefore, names were added based on their source location (hill names) or adjacent road names and are identified by an asterisk.

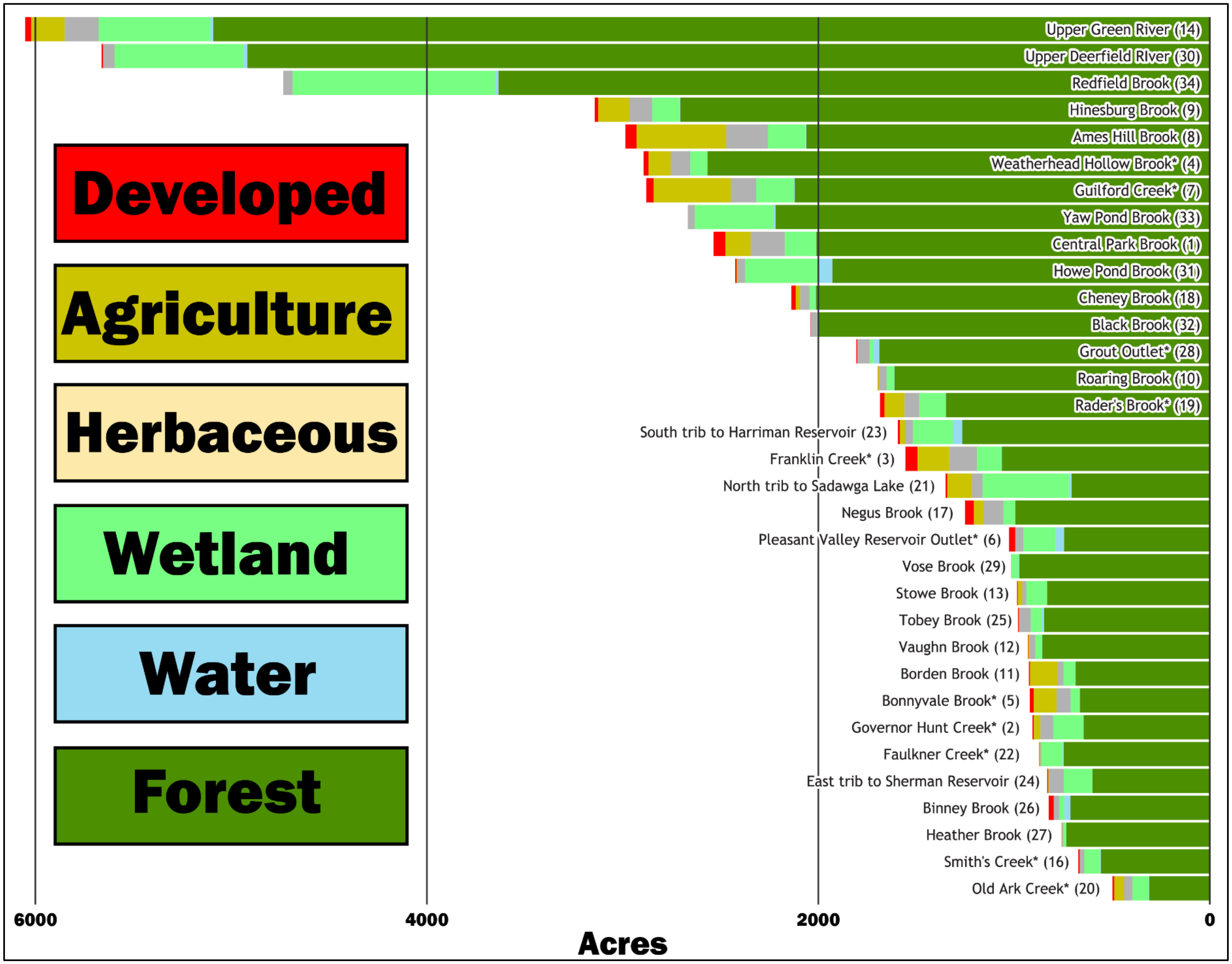


Figure 19 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University of Vermont Spatial Analysis Laboratory.

Table 20. Rivers with unassessed aquatic biota use, values are in percent land cover. The Map IDs correspond to the map above. Latitude and longitudes designate the pour point of the watershed. Asterisks are officially unnamed streams.

Name, Map ID	Latitude	Longitude	Developed	Agriculture	Forest	Wetland	Other	Water
Central Park Brook (1)	42.763	-72.513	2.39	5.10	79.28	6.33	6.87	0.04
Governor Hunt Creek* (2)	42.768	-72.517	0.78	3.83	71.21	17.08	7.10	0.01
Franklin Creek* (3)	42.810	-72.564	3.96	10.41	68.29	8.22	9.02	0.10
Weatherhead Hollow Brook* (4)	42.796	-72.596	0.86	3.90	88.73	3.00	3.45	0.06
Bonnyvale Brook* (5)	42.853	-72.603	2.27	12.75	72.19	5.10	7.62	0.08
Pleasant Valley Reservoir Outlet* (6)	42.875	-72.613	3.02	0.13	72.63	16.15	3.96	4.13
Guilford Creek* (7)	42.804	-72.619	1.31	13.69	73.67	6.72	4.48	0.15
Ames Hill Brook (8)	42.856	-72.612	1.93	15.34	69.03	6.43	7.13	0.14
Hinesburg Brook (9)	42.796	-72.660	0.57	5.05	86.09	4.49	3.69	0.11
Roaring Brook (10)	42.745	-72.677	0.10	0.32	94.96	2.33	2.24	0.05
Borden Brook (11)	42.734	-72.683	0.59	15.21	74.19	6.52	3.28	0.22
Vaughn Brook (12)	42.742	-72.728	0.35	0.61	92.06	3.68	3.15	0.16
Stowe Brook (13)	42.748	-72.741	0.36	2.29	84.40	10.83	2.09	0.04
Upper Green River (14)	42.813	-72.728	0.51	2.83	84.10	9.43	2.86	0.25
Smith's Creek* (16)	42.915	-72.832	1.02	0.07	82.81	12.17	3.35	0.58
Negus Brook (17)	42.932	-72.827	3.61	4.06	79.52	4.81	7.98	0.04
Cheney Brook (18)	42.951	-72.840	1.09	1.06	94.14	1.39	2.17	0.16
Rader's Brook* (19)	42.826	-72.865	1.34	6.13	80.04	8.05	4.39	0.06
Old Ark Creek* (20)	42.913	-72.852	1.91	10.12	62.34	17.03	8.47	0.13
North trib to Sadawga Lake (21)	42.787	-72.876	0.64	9.39	52.34	32.85	3.92	0.86
Faulkner Creek* (22)	42.819	-72.894	0.10	0.55	85.58	12.53	0.61	0.63
South trib to Harriman Reservoir (23)	42.773	-72.893	0.64	1.68	79.37	12.93	2.46	2.90
East trib to Sherman Reservoir (24)	42.749	-72.921	0.56	0.24	72.22	17.63	9.29	0.07
Tobey Brook (25)	42.769	-72.921	0.44	0.22	86.41	5.67	5.93	1.33
Binney Brook (26)	42.886	-72.897	3.10	0.00	86.50	3.17	3.39	3.84
Heather Brook (27)	42.879	-72.932	0.19	0.12	96.90	2.02	0.75	0.01
Grout Outlet* (28)	43.027	-72.933	0.26	0.00	93.50	1.14	3.47	1.65
Vose Brook (29)	42.891	-72.948	0.00	0.00	95.87	3.74	0.16	0.22
Upper Deerfield RIver (30)	42.966	-72.995	0.14	0.00	86.85	11.63	1.02	0.36
Howe Pond Brook (31)	42.781	-72.960	0.26	0.28	79.54	15.58	1.47	2.87
Black Brook (32)	43.049	-72.972	0.08	0.00	97.95	0.12	1.63	0.23
Yaw Pond Brook (33)	42.836	-73.016	0.02	0.00	83.22	15.11	1.26	0.39
Redfield Brook (34)	42.921	-73.007	0.00	0.00	76.78	21.88	1.00	0.33

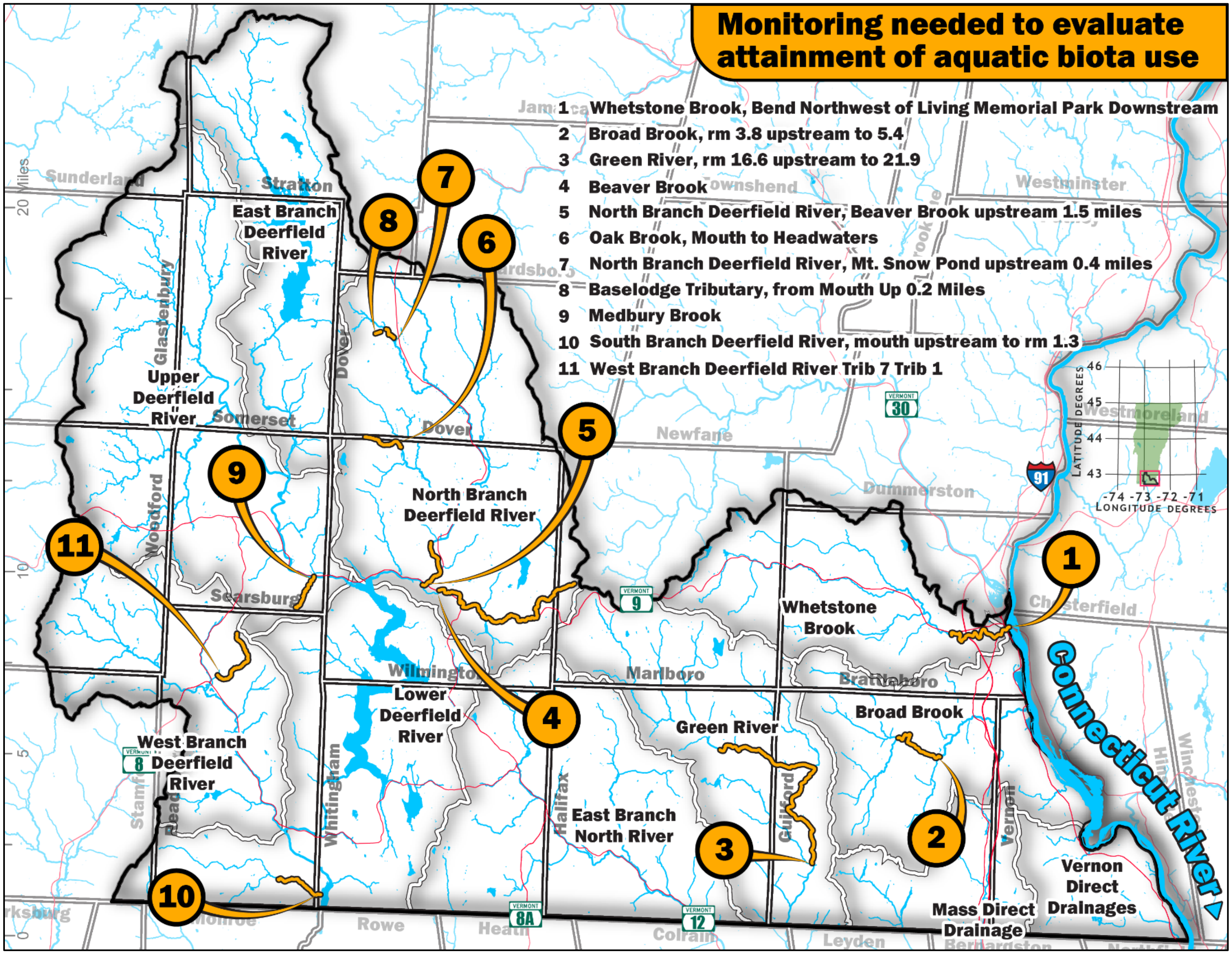


Figure 20 Map of rivers that require more monitoring to evaluate attainment of Aquatic Biota use.

Unlike the streams mentioned above with no biological monitoring data, the streams here have limited biomonitoring data that indicates indeterminate or failing (fair or poor) condition, however, there is either not enough data to fully evaluate the attainment of Aquatic Biota use or monitoring results show volatile condition year to year.

Table 21 Table of rivers that require more monitoring to evaluate attainment of aquatic biota use. Map IDs correspond to the map above.

MAP ID	NAME	POLLUTANT/PARAMETER	PROBLEM
1	Whetstone Brook, Bend Northwest of Living Memorial Park Downstream	Low flow, Sedimentation/siltation	Streambank erosion, developed land runoff, channelization, altered hydrology, regional dry conditions
2	Broad Brook, rm 3.8 upstream to 5.4	Unknown	Fair macroinvertebrate community, potential sedimentation from Guilford Center Road and surrounding network. Regional dry conditions.
3	Green River, rm 16.6 upstream to 21.9	Unknown	Fair macroinvertebrate community, potential sedimentation from Green River Road, fish community potentially impacted by the timber crib dam at Green River Covered Bridge
4	Beaver Brook	Sedimentation/siltation, habitat alterations	Channel relocation, straightening
5	North Branch Deerfield River, Beaver Brook upstream 1.5 miles	Unknown	Fair fish community, potential habitat alterations
6	Oak Brook, Mouth to Headwaters	pH, low	Acid deposition, low pH
7	North Branch Deerfield River, Mt. Snow Pond upstream 0.4 miles	Habitat alterations	Ski area development
8	Baselodge Tributary, from Mouth Up 0.2 Miles	Sedimentation/siltation	Ski area development
9	Medbury Brook	pH, low, Habitat alterations	Acid deposition, scour (potentially natural due to gradient)
10	South Branch Deerfield River, mouth upstream to rm 1.3	Unknown	Low densities of macroinvertebrates, potential scour
11	West Branch Deerfield River Trib 7 Trib 1	Unknown	Macroinvertebrate community fluctuating around full support, potential low pH

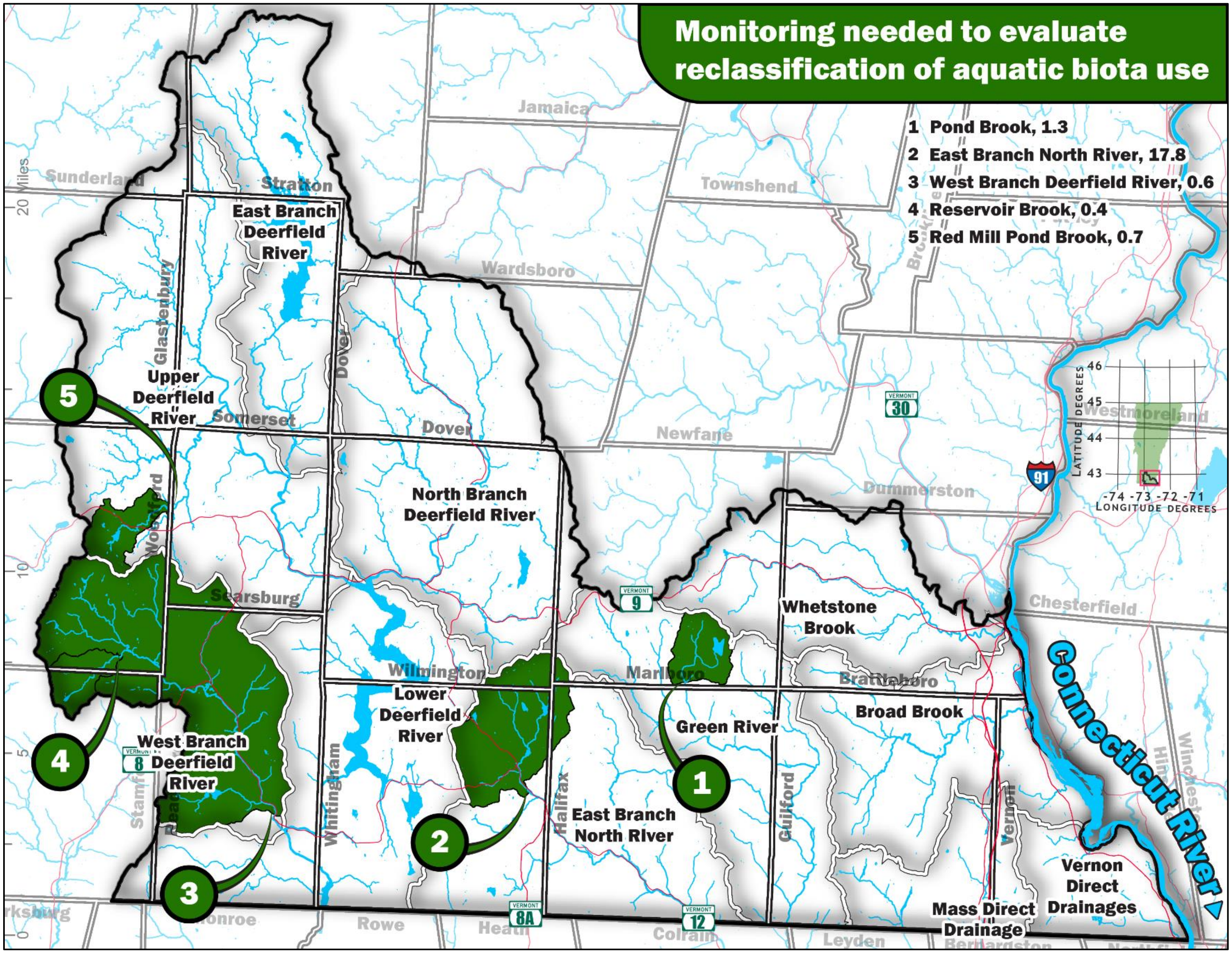


Figure 21 Map of rivers that require more monitoring to assess condition relative to A(1) or B(1) criteria for Aquatic Biota use.

The streams have biological monitoring data between 2012-2022 which suggests Very Good or Excellent. Additional data may be necessary to assess if it meets A(1) or B(1) criteria for Aquatic Biota use.

Table 22 Table of rivers that require more monitoring to evaluate reclassification candidacy. Map IDs correspond with the map above and the years associated with each community field represent additional data requirements for reclassification candidacy verification.

Map ID	Name	Macroinvertebrate	Fish
1	Pond Brook, 1.3**	2023, 2024	2023, 2024
2	East Branch North River, 17.8	2025	2024, 2025
3	West Branch Deerfield River, 0.6	2026	2026
4	Reservoir Brook, 0.4	2026	
5	Red Mill Pond Brook, 0.7	2023, 2024	2023, 2024*

*Poor fish community, may be due to wetland influence.

**All data is from 2014, would require new set of data.

Wetlands

The purpose of the Wetland Bioassessment and Monitoring Program ("Program") is to build a pertinent and practical program to assess the biological integrity and ecological condition of Vermont's wetlands. The Program has adopted the EPA's wetland monitoring methodology and is organized into three levels. Level 1 assessments are performed through desktop review and rely on coarse landscape-scale inventory information. Level 2 surveys are a "rapid assessment" at the specific wetland scale and use simple and quick protocols to collect data. Level 2 protocols are calibrated and validated by more intensive assessments known as Level 3, which are rigorous biological assessments that derive multi-metric indices. The Program conducts vegetation surveys to calculate biological metrics with a strong focus on the Coefficient of Conservatism score, which is a numeric scale from 0-10 assigned to each plant species which measures its tolerance and sensitivity to disturbance (Bioassessment Report).

Table23. Number and type of level 3 wetland assessments conducted across Basin 12. NWCA (National Wetland Condition Assessment). Heritage (Natural Heritage Inventory).

Heritage	Transect
3	3

Vermont Rapid Assessment Method (VRAM)

The Level 2 assessment is conducted using the Vermont Rapid Assessment Method (VRAM), which is composed of 6 qualitative metrics used to collect data on the wetland's function, value, and condition. These metrics include wetland area, buffers, hydrology, habitat, special wetland status, and plant communities. It generates a quality score on a scale of 0-100, where the higher the score equates to better wetland quality. From the VRAM information, condition indexes can be calculated that offer additional information to help evaluate human stressor impacts on the wetland and surrounding landscape or evaluate wetland restoration success.

Total VRAM scores (function and condition) are less comparable between wetlands due to the unique characteristics of a given wetland, such as the presence of a rare or threatened plant species or its size. Smaller wetlands generally receive less points than larger wetlands. Therefore, a lower total VRAM score may still demonstrate that a particular wetland is in reference or excellent condition with significant functions present. Function scores between wetlands are also not directly comparable as these scores do not relate specifically to wetland condition nor reflect whether one wetland is exemplary for one or more functions. Condition scores do provide relative comparison of wetland health between wetlands. However, it should be noted that sampling locations are not randomized and conclusions on area-wide wetland health, based on condition scores or total VRAM scores within the basin, cannot be determined at this time.

Additionally, the Program is currently unable to report on basin-wide wetland conditions and trends, impairments, or altered wetlands. The following information provides an overview of the various monitoring, assessment, and mapping objectives the Program is focused on.

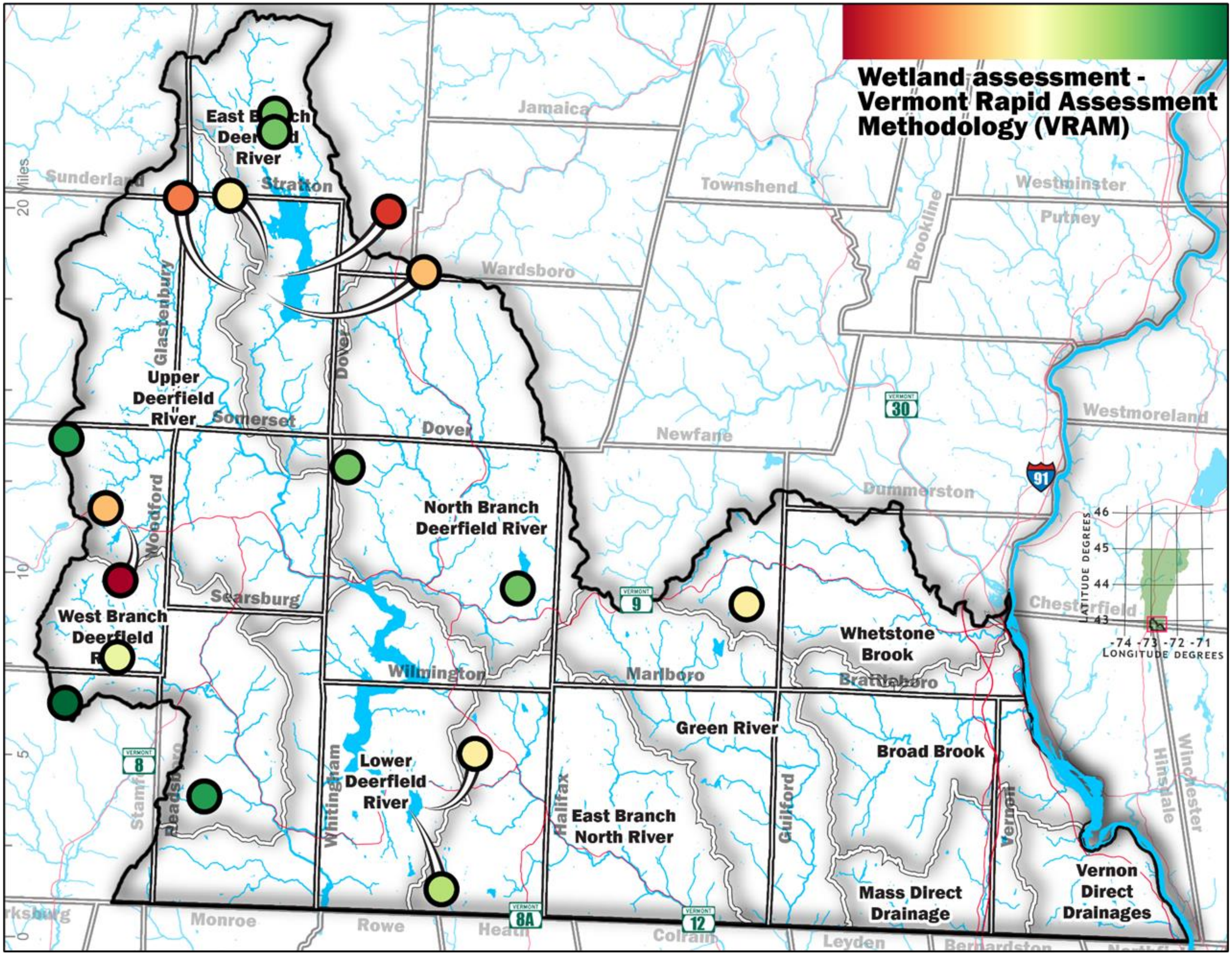


Figure 22. VRAM scores Basin 12.

Table 23 Number of VRAMs conducted in Basin 12, summarized by HUC12 sub-basins. Sub basin size in acres included for reference.

Name	Sub basin acres	VRAM Count
Broad Brook	692	0
East Branch Deerfield River	2611	6
East Branch North River	1111	0
Green River	544	0
Lower Deerfield River	953	2
Mass Direct Drainage	445	0
North Branch Deerfield River	1220	2
Upper Deerfield River	3538	4
Vernon Direct Drainages	463	0
West Branch Deerfield River	1768	3
Whetstone Brook	474	1

Wetland restoration monitoring

In 2017, the Wetlands Program initiated a pilot project of monitoring restoration sites and associated reference sites. The project focused on sites with (1) recent restoration work; and (2) pre-restoration sites, with the intent to return to the sites as restoration progresses. Monitoring includes Level III assessments, Level II assessments using the VRAM, and tracking wetland restoration success using a metric called the Restoration Indicators of Success (RIS). This metric generates a numeric score calculated by summing the VRAM scores of metrics specifically relevant to and affected by restoration success, such as habitat development and alteration, presence of high-value habitat features, and intactness of hydrologic regime. To learn more about the RIS, and preliminary findings of the restoration monitoring project, click here: (link to RIS and Restoration Report).

There are no restoration sites in Basin 12.

Class I wetlands

Class I wetlands are exceptional or irreplaceable in their contribution to Vermont's natural heritage. They provide unmatched environmental functions and values and therefore merit the highest level of protection. Wetlands meeting Class I criteria and sub-criteria can be petitioned for reclassification from Class II to Class I by the public. These criteria evaluate the wetland's size, location, surrounding landscape, condition, and contribution to the functions and values identified by the State of Vermont.

There are no Class I wetlands in Basin 12.

Class I candidate wetlands are those where enough data has been collected to support a petition for reclassification. An important note is there are likely to be multiple additional wetlands in the basin that meet Class I criteria and have not been proposed or have had a complete Class I assessment conducted. For more information on this process see this webpage: https://dec.vermont.gov/watershed/wetlands/class1wetlands

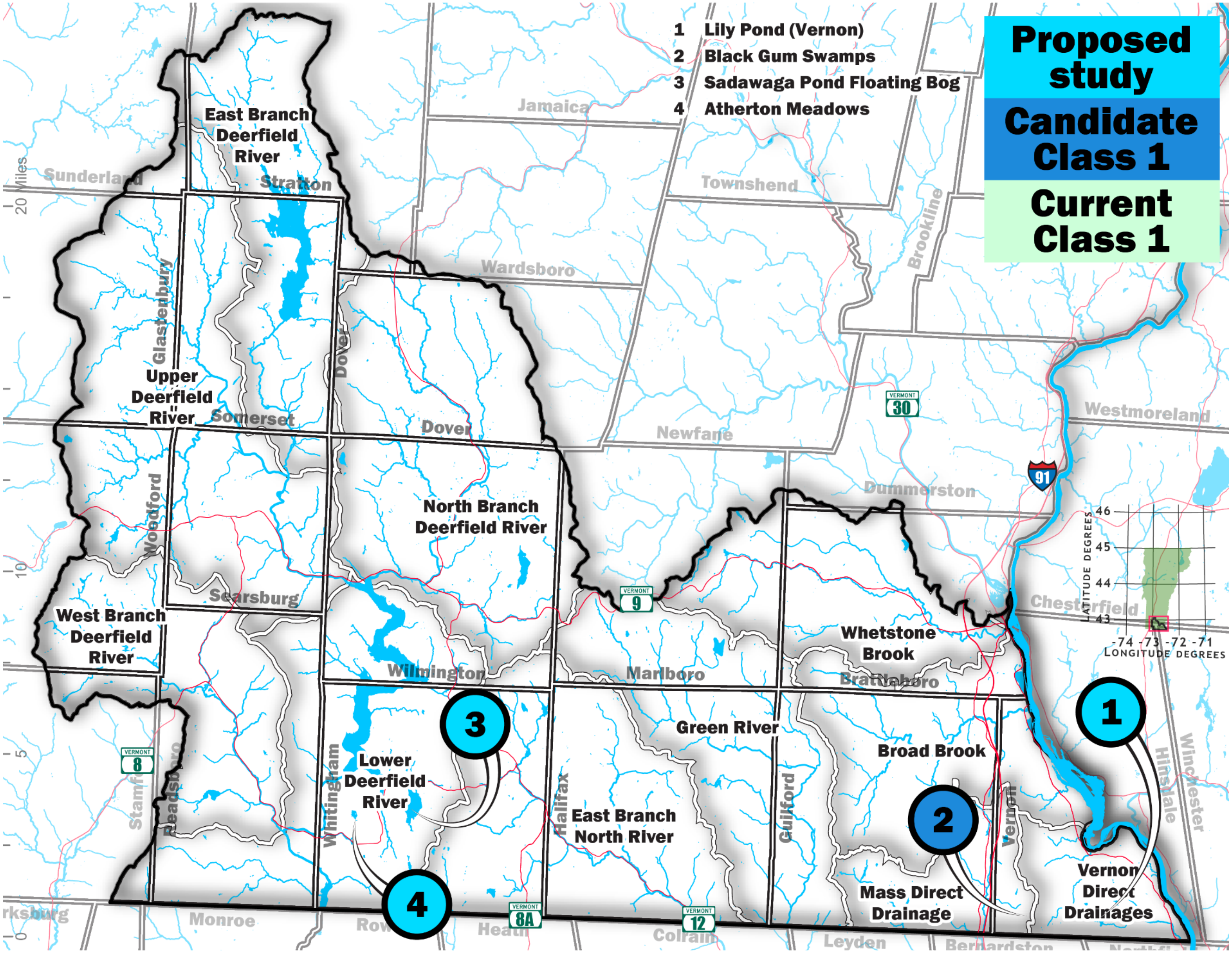


Figure 23.Class 1 wetland candidates.

Table 24. Candidate Class 1 wetlands in Basin 12

Map ID	*Wetland name*	*Category*	*Towns*
1	Lily Pond	Proposed for Study	Vernon
2	Black Gum Swamps	Candidate	Vernon
3	Sadawaga Pond Floating Bog	Proposed for Study	Whitingham
4	Atherton Meadows	Proposed for Study	Whitingham

Wetland mapping and inventory

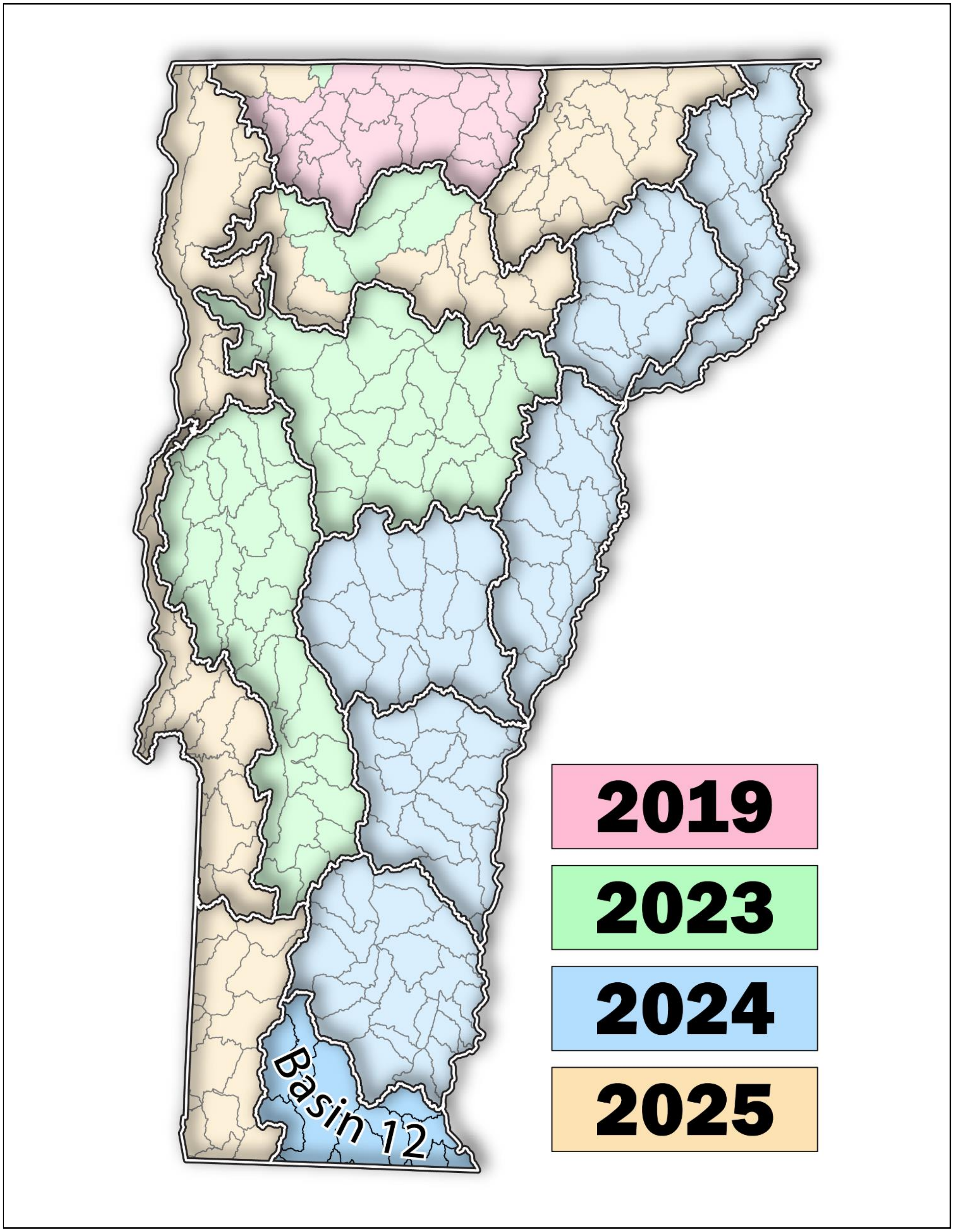
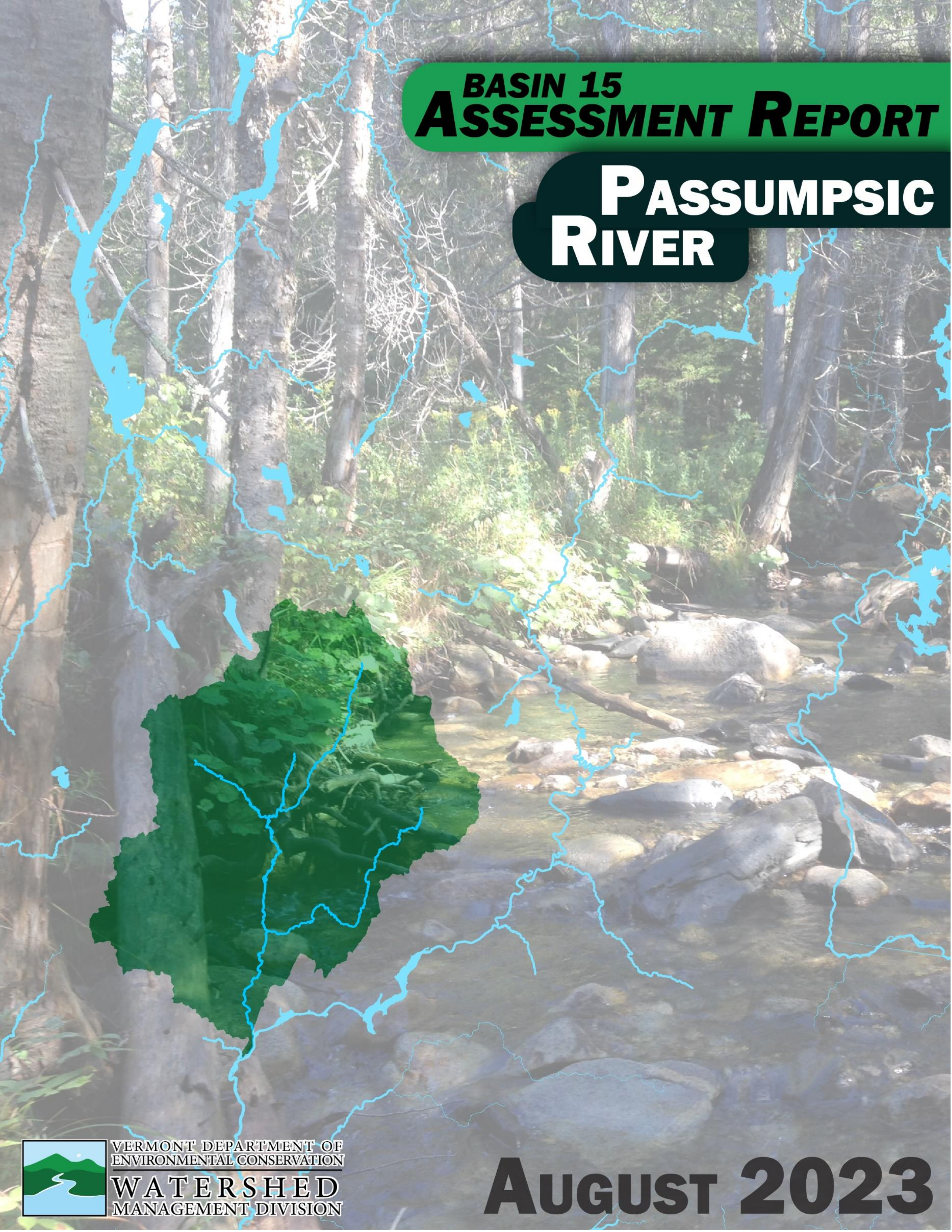


Figure 24. Wetland mapping schedule for Vermont Tactical Basins. Mapping is scheduled for 2024 in Basin 12.

The Vermont Wetlands program is currently in the process of working with contractors and federal agencies to update wetland mapping across the state. This will provide essential data as much of the current mapping is out of date and significantly under maps some types of wetlands such as seepage forests and softwood swamps. New mapping will gradually be made available in the Vermont Significant Wetlands Inventory layer over the next few years, with some basins updated sooner than others. This process has already started with updated mapping currently being added to VSWI for the Missisquoi basin.



BASIN 15 ASSESSMENT REPORT

PASSUMPSIC RIVER

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION

AUGUST 2023

Contents

Basin overview

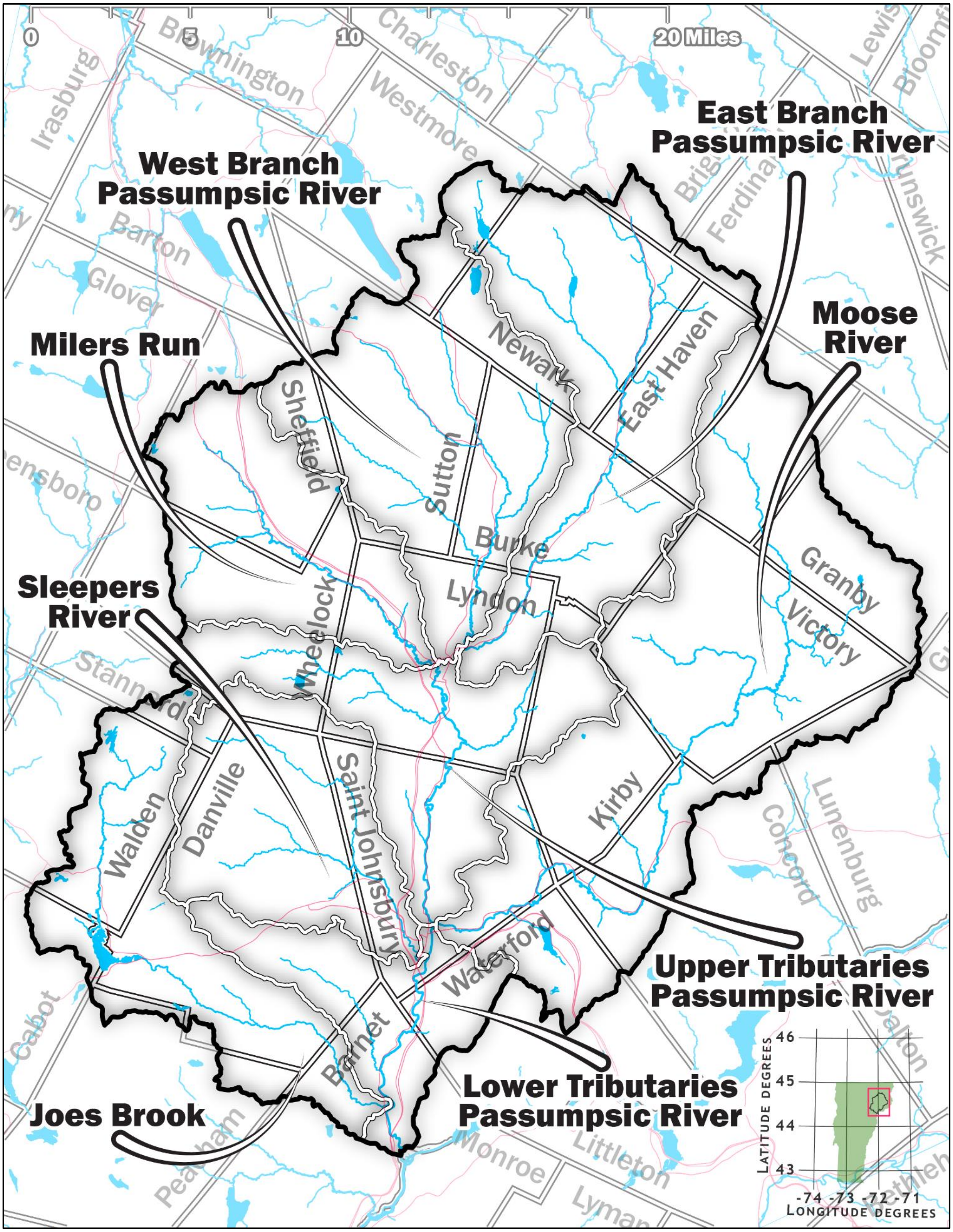


Figure 1 The 325,276 acre Passumpsic River basin encompasses waters of eastern Caledonia County and southern Essex County and drains to the Connecticut River.

Table 1 Distribution of Strahler stream orders by miles across Basin 15. This data is from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

1	2	3	4	5	6
610	283	118	76	56	23

Table 2 Distribution of lake surface area (acres) across Basin 15. Data from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

Lake area (acres)			
<10	*>10<100*	*>100<500*	*>500*
21	16	5	0

Table 3 Distribution of the number of wetlands across size classes in Basin 15. Data from the Vermont State Wetland Inventory (VSWI). Contiguous wetlands were dissolved to larger features to account for wetlands complexes containing multiple classes.

Distribution of wetlands by size (acres)			
<5	*>5<50*	*>50<500*	*>500*
1101	449	37	1

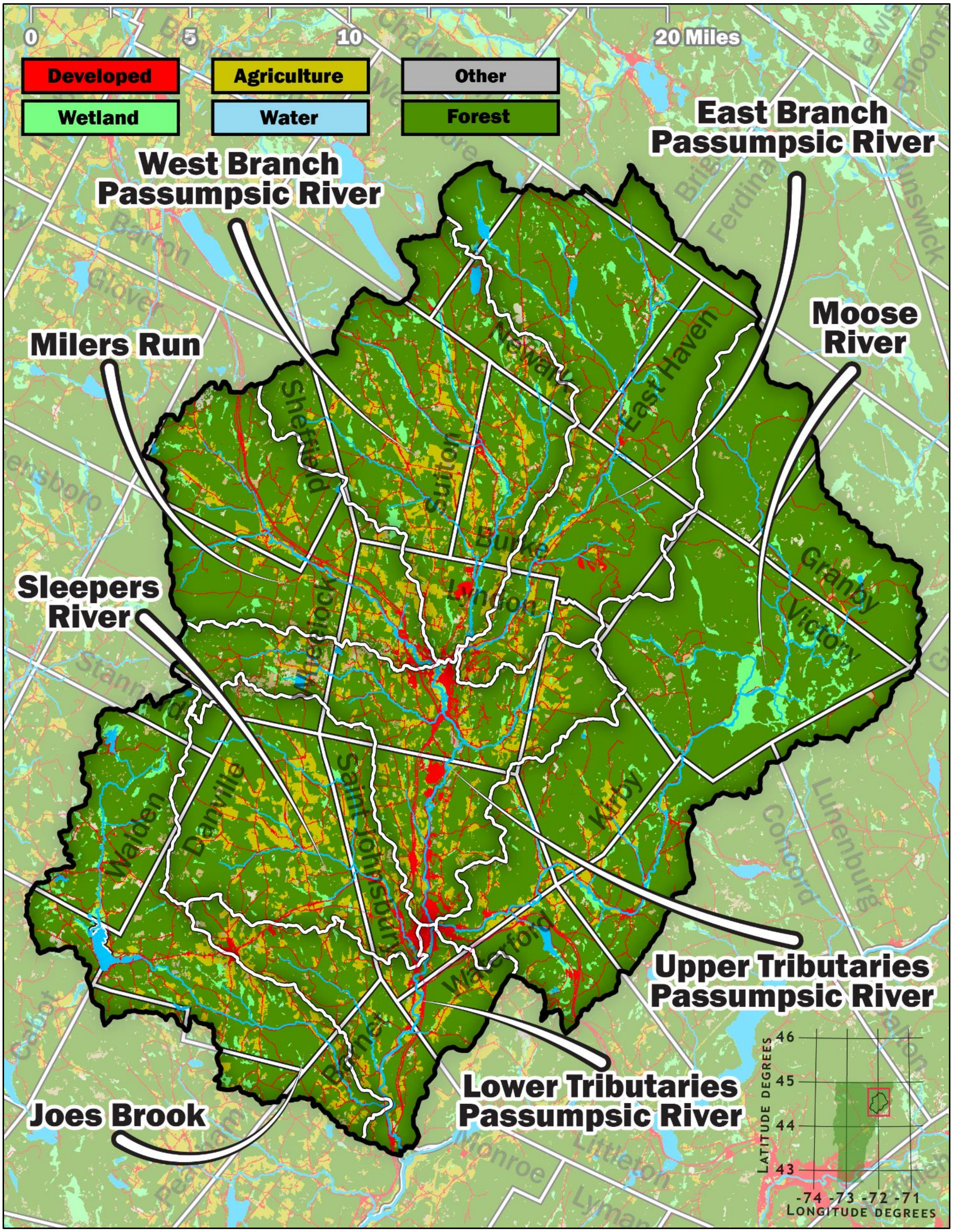
Table 4 Summation of town level human population over time for all towns that intersect Basin 15.

Basin-wide human population by year				
1980	*1990*	*2000*	*2010*	*2020*
12058	13378	14752	15913	15331

Table 5 . Major waters of Basin 15.

Largest River	Moose River (31 miles)
Largest Lake or Reservoir	Joe’s Pond (408 acres)
Deepest Lake or Reservoir	Joe’s Pond (78 feet)
Largest Wetland Complex	Victory Basin Wetlands (1834 acres)

Land cover


0
5
10
20 Miles
Developed
Agriculture
Other
Wetland
Water
Forest
East Branch Passumpsic River
West Branch Passumpsic River
Moose River
Milers Run
Sleepers River
Upper Tributaries Passumpsic River
Lower Tributaries Passumpsic River
Joes Brook
Newark
East Haven
Sheffield
Sutton
Burke
Lyndon
Wheelock
Granby
Victory
Danville
Walden
Saint Johnsbury
Kirby
Waterford
Barnet
Concord
Lunenburg
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Lyman
Cabot
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-74 -73 -72 -71
Longitude Degrees

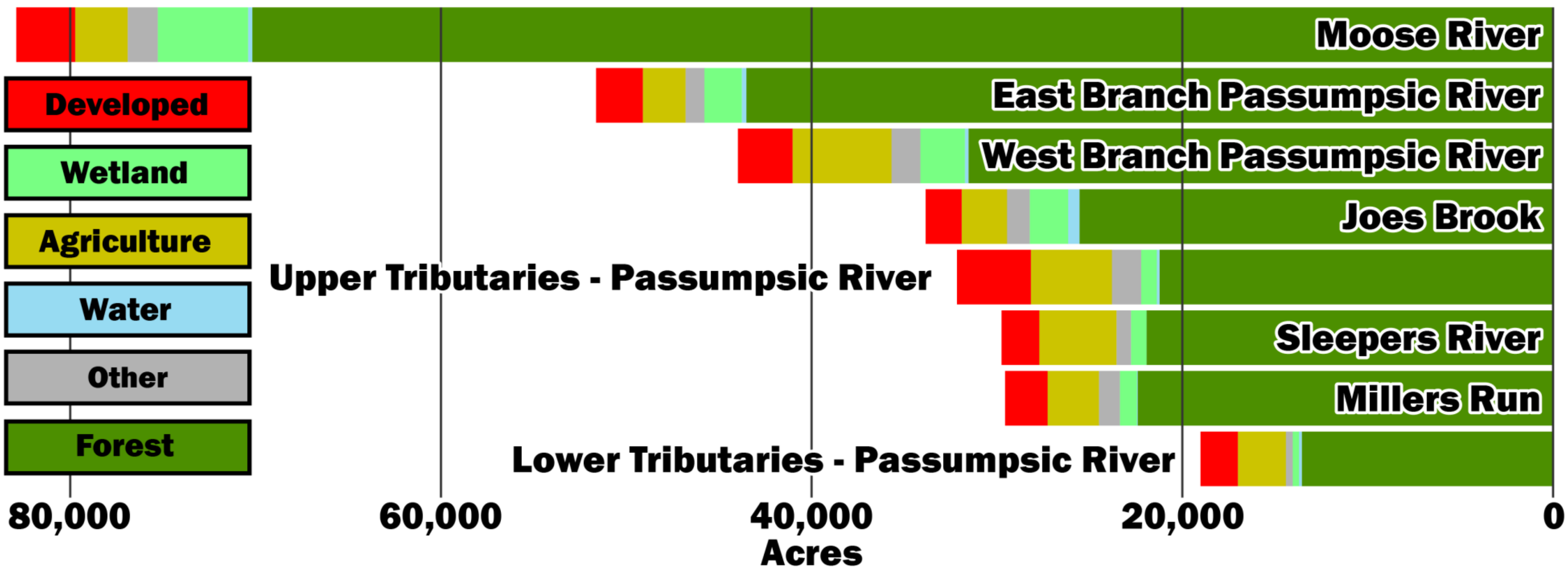


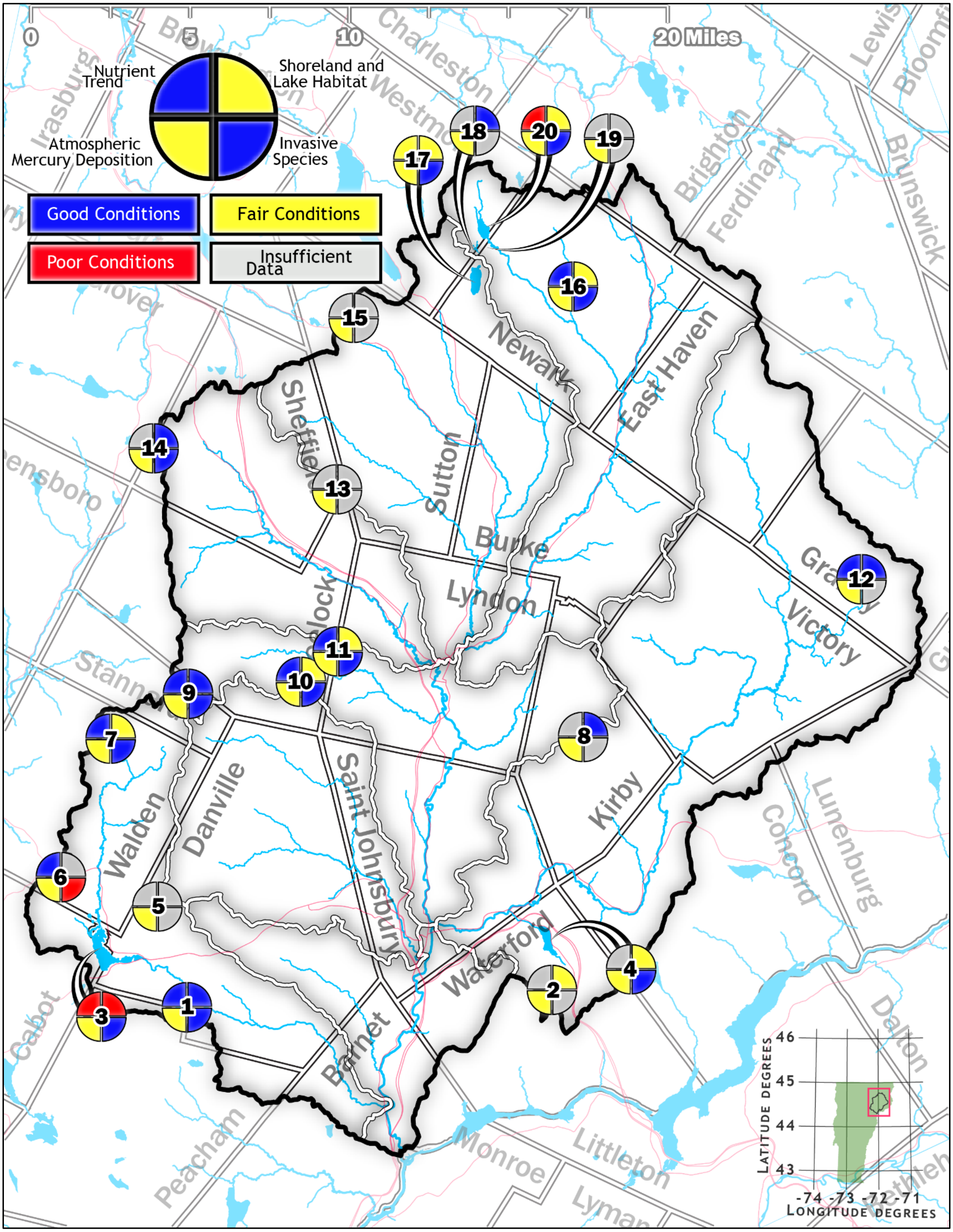
Figure 2 Acres of land cover based on NLCD 2019.

Table 6 The percent of major land cover types across the HUC12s of Basin 15. Land cover is the National Land Cover Database (NLCD) for 2019. Common land cover types were combined, for example deciduous, coniferous, and mixed forests are categorized as forest. Wetlands are also found throughout other cover types.

Name	acres	Developed	Agriculture	Other	Wetland	Water	Forest
East Branch Passumpsic River	51627	4.88	4.48	1.97	3.89	0.49	84.30
Joes Brook	33845	5.72	7.25	3.63	6.10	1.82	75.48
Lower Tributaries - Passumpsic River	19016	10.58	13.65	1.95	1.75	0.80	71.27
Millers Run	29562	7.73	9.41	3.81	3.07	0.17	75.80
Moose River	82909	3.83	3.43	1.96	5.86	0.28	84.64
Sleepers River	29751	6.83	14.02	2.64	2.77	0.03	73.71
Upper Tributaries - Passumpsic River	32157	12.38	13.62	4.90	2.63	0.45	66.02
West Branch Passumpsic River	43973	6.69	12.15	3.54	5.46	0.44	71.72

Lakes and Ponds

Conditions and trends



The Lakes and Ponds Management and Protection Program (VLMPP) reports lake condition with the Vermont Inland Lake Score Card. Lake condition includes these key aspects: nutrients status and trends, aquatic invasive species, shoreland and lake habitat, and mercury pollution. For a more detailed overview, see the *score card webpage*. For more technical information, see *how lakes are scored*, and for lake specific information, navigate to this *Lake Score Card* links using the Lake IDs reported below.

VLMPP provides score cards for seventy-five lakes in Basin 15. The colors are a ranked representation of condition: blue is better than yellow, yellow is better than red, and grey is insufficient data. The Map ID numbers correspond with the following table. Use the ID to navigate the *report viewer* to find more information.

The score for a lake's nutrient trend is derived primarily from data obtained through two lake monitoring programs within the Lakes and Ponds Program - the Spring Phosphorus Program and the Lay Monitoring Program; both data sets are used for analysis when available. The final nutrient trend score, which determines the color of the nutrient quadrant on the Score Card, combines the individual scores from the spring TP (total phosphorus), summer TP, summer Chlorophyll-a and summer Secchi depth. See *how lakes are scored* for more information.

Shoreland habitat is assessed using the Lakeshore Disturbance Index (LDI). A value of 0.2 or less is considered in good condition; an LDI value between 0.2 and 0.75 is considered in fair condition and an LDI value of greater than 0.75 is considered in poor condition.

The Aquatic Invasive Species (AIS) score is based on the presence of one or more invasive animal or plant species. A good score indicates there are no known invasive species present while a poor score indicates that there is at least one invasive species present, regardless of its abundance or 'nuisance' level (a fair score is not used for this criteria).

The Mercury Fish Tissue Contamination Score reflects the most recent data that VLPP has regarding the presence of mercury (Hg) in the food web of Vermont lakes. A good score indicates low probability of Hg accumulation in fish tissue; a fair score indicates that Hg accumulation in fish tissue is likely; a poor score indicates that Hg in fish tissue exceeds EPA guidelines.

Table 7 Vermont Inland Lake Score Card table: lake-specific information with area in acres and depth in feet. AIS: Aquatic invasive species score. Mercury: mercury fish tissue contamination. WQ Status: Water quality standards status. Shoreland: shoreland disturbance (USEPA National Lake Assessment). Nutrient Trend: an index of trends in annual means of spring TP, summer TP, Secchi, and chlorophyl-a.

Map ID	Lake ID	Area (ac)	Max Depth (ft)	Nutrient Trend	Shoreland	AIS	Mercury
1	KEISER	34.6	20	Good	Good	Good	Fair
2	DUCK (WATRFD)	20.1	2	Insufficient data	Fair	Insufficient data	Fair
3	JOES (DANVLL)	405.0	78	Poor	Poor	Good	Fair
4	STILES	154.8	33	Insufficient data	Fair	Good	Fair
5	UPPER DANVILLE;	10.4		Insufficient data	Insufficient data	Insufficient data	Fair
6	LYFORD	36.2	22	Good	Insufficient data	Poor	Fair
7	COLES	106.8	21	Good	Fair	Good	Fair
8	KIRBY	10.7	2	Insufficient data	Good	Insufficient data	Fair
9	STANNARD	23.8	11	Good	Good	Good	Fair
10	CHANDLER	66.8	6	Good	Fair	Good	Fair
11	BEAN (LYNDON)	26.1	15	Good	Fair	Good	Fair
12	MUD (GRANBY)	23.4	2	Good	Good	Insufficient data	Fair
13	MATHEWSON;	14.0		Insufficient data	Insufficient data	Insufficient data	Fair
14	BRUCE	27.1	13	Insufficient data	Good	Good	Fair
15	MARL	10.2		Insufficient data	Insufficient data	Insufficient data	Fair
16	CENTER	81.3	72	Good	Fair	Good	Fair
17	NEWARK	158.2	31	Fair	Fair	Good	Fair
18	BROWN	15.8	2	Insufficient data	Good	Insufficient data	Fair
19	SAWDUST	14.7		Insufficient data	Insufficient data	Insufficient data	Fair
20	BALD HILL	108.6	42	Poor	Fair	Good	Fair

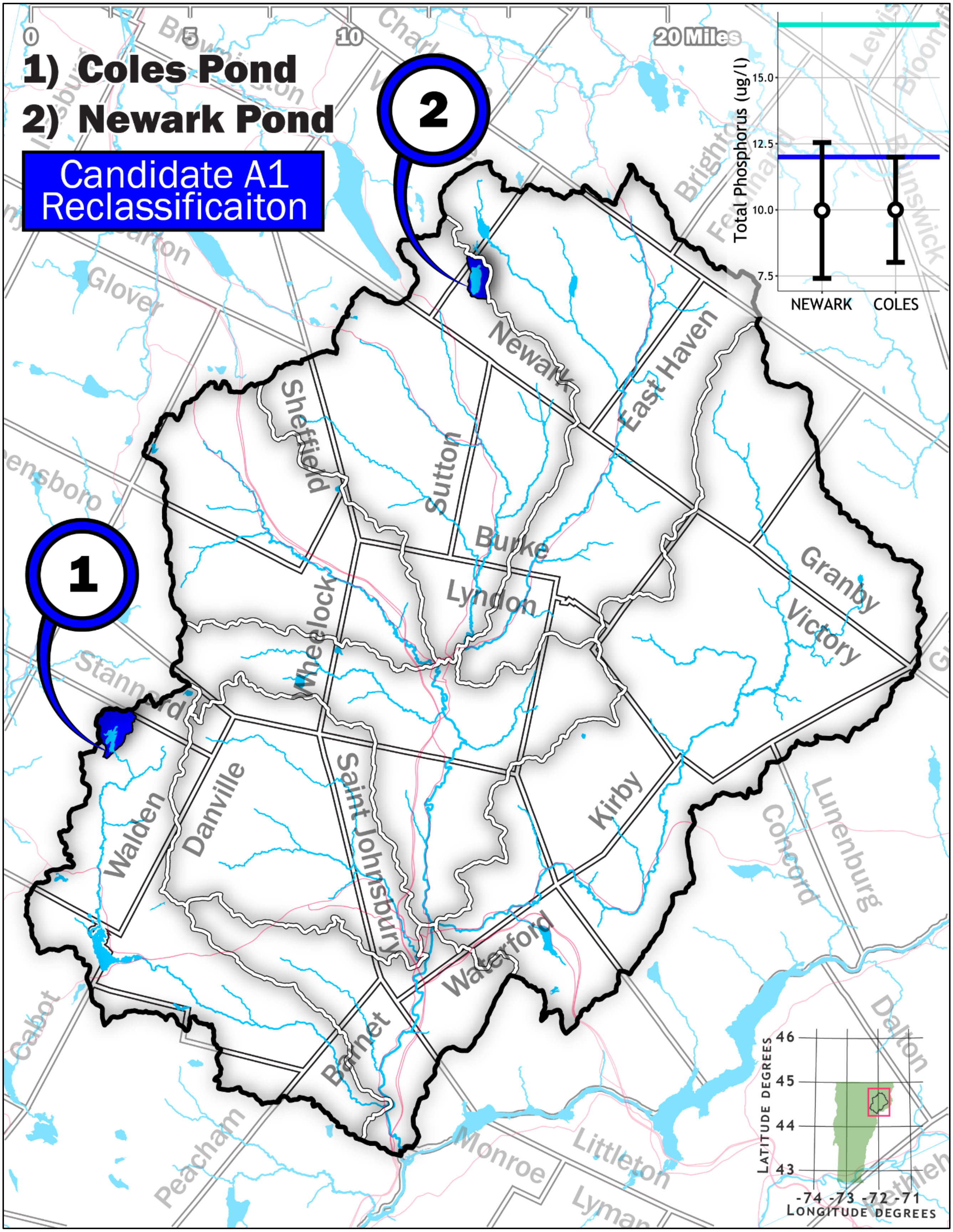


Figure 3 Lake reclassification candidates and their corresponding watersheds.

To protect the waters of the State of Vermont, the Watershed Management Division (WSMD) can initiate rulemaking to reclassify surface waters to maintain a higher standard. The public may also petition the Division to request the initiation of rulemaking. The major implication of reclassification is the application of new *Water Quality Standards*[1].

Most lakes in the state have a classification of B(2) for aesthetics uses, requiring that the lake maintains a total phosphorus criteria of below 18 ug/l. Reclassification to B(1) for aesthetics uses would lower the criteria to 17 ug/l, and a reclassification to A(1) for aesthetics uses would lower the criteria to 12 ug/l. To access data for the lakes below, navigate the *report viewer* using the Lake ID.

- A(1): Coles Pond (all of these sites have lay monitors collecting water samples for total phosphorus and chlorophyll-a in addition to Secchi depth).
- A(1): Newark Pond (all of these sites have lay monitors collecting water samples for total phosphorus and chlorophyll-a in addition to Secchi depth).

Water chemistry from four lakes have demonstrated their ability to maintain Total Phosphorus concentrations below 12 ug/l but do not have enough years of data to meet the reclassification criteria. More monitoring should be done to validate their candidacy for reclassification.

- A(1): Center Pond
- A(1): Bald Hill Pond
- A(1): Keiser Pond
- A(1): Marl Pond

Impaired Lakes

Restoring waters is one of the priorities of the *Watershed Management Division's Strategic Management Plan*. WSMD begins the process of restoring Vermont surface waters by listing waters not in compliance with the water quality standards on a biennial basis. Waters are added and removed based on whether they meet *water quality standards* through a process defined in the Vermont *Surface Water Assessment and Listing Methodology*[1]. Adding waters to these lists prioritizes them for fund allocation, remediation, and monitoring. There are no impaired lakes in basin 15.

Altered Lakes

Lakes are assessed as Altered when aquatic habitat and/or other designated uses are not supported due to the extent of invasive aquatic species. These waters are listed on the Priority Waters List in Part E. There are no altered lakes in basin 15.

Phosphorus Trends in Lakes

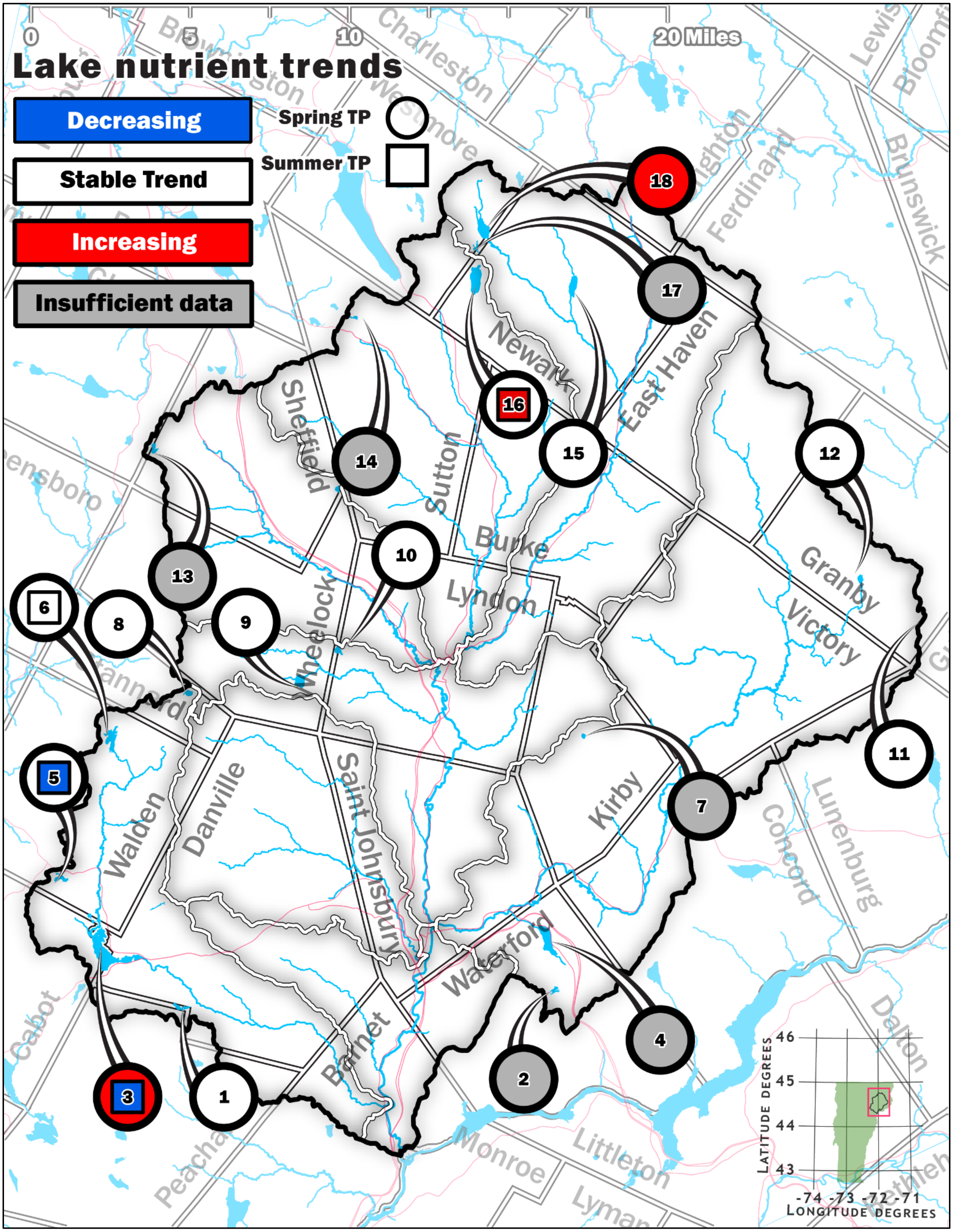


Figure 4 Total phosphorus trends for lakes in Basin 15. Note that trends can be for either spring or summer data or for both.

The WSMD conducts long-term monitoring of surface waters to identify increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont Water Quality Standards. Modeling water quality trends before a surface water becomes impaired or altered can lead to more effective and efficient actions to reduce stressors to these waters. For more information on how trends in lakes are identified, see the nutrient trend section of the *Lake Score Card Document*.

While the Lake Score Card identifies trends for multiple parameters of lake health, Lakes with sufficient data to identify a trend in total phosphorus concentrations are shown on the above map. Trends are categorized into three groups: Increasing (models with p-values <0.05 and positive coefficients), stable (models with p-values > 0.05) and decreasing (models with p-values <0.05 and negative coefficients). Use the Lake ID in Table 10 to find more information in the *report viewer*.

Table 8 List of lakes with enough data to model trends in summer or spring total phosphorus. Map IDs correspond with the map above. (+) increasing TP trends, (=) stable TP trends, and (-) negative TP trends. Insufficient data are lakes with some data but requires more to model a trend.

Map ID	Lake ID	Summer	Spring
1	KEISER		=
2	DUCK (WATRFD)		Insufficient data
3	JOES (DANVLL)	-	+
4	STILES		Insufficient data
5	LYFORD	-	=
6	COLES	=	=
7	KIRBY		Insufficient data
8	STANNARD		=
9	CHANDLER		=
10	BEAN (LYNDON)		=
11	COW MOUNTAIN		=
12	MUD (GRANBY)		=
13	BRUCE		Insufficient data
14	MARL		Insufficient data
15	CENTER		=
16	NEWARK	+	=
17	BROWN		Insufficient data
18	BALD HILL		+

Lakes in need of further assessment

In the Lake Score Card section above, there are numerous lakes that have insufficient data. For these lakes, impervious cover and agricultural land uses information is shown below to help watershed evaluation because these land cover / use types tend to export more pollutants than other land cover/use types. Use the Lake ID in the table below to find more information in the report viewer.

Table 9. Landcover of watersheds of lakes with insufficient data to determine water quality status.

	Impervious surface		Agricultural land	
Lake ID	**Percent**	**Acres**	**Percent**	**Acres**
DUCK (WATRFD)	4.2	28.2	2.2	15.0
GOSLANTS MILL;	0.4	34.0	1.4	110.3
DUCK (BURKE)	0.0	0.0	0.0	0.0

Rivers

Conditions and trends

Physical condition

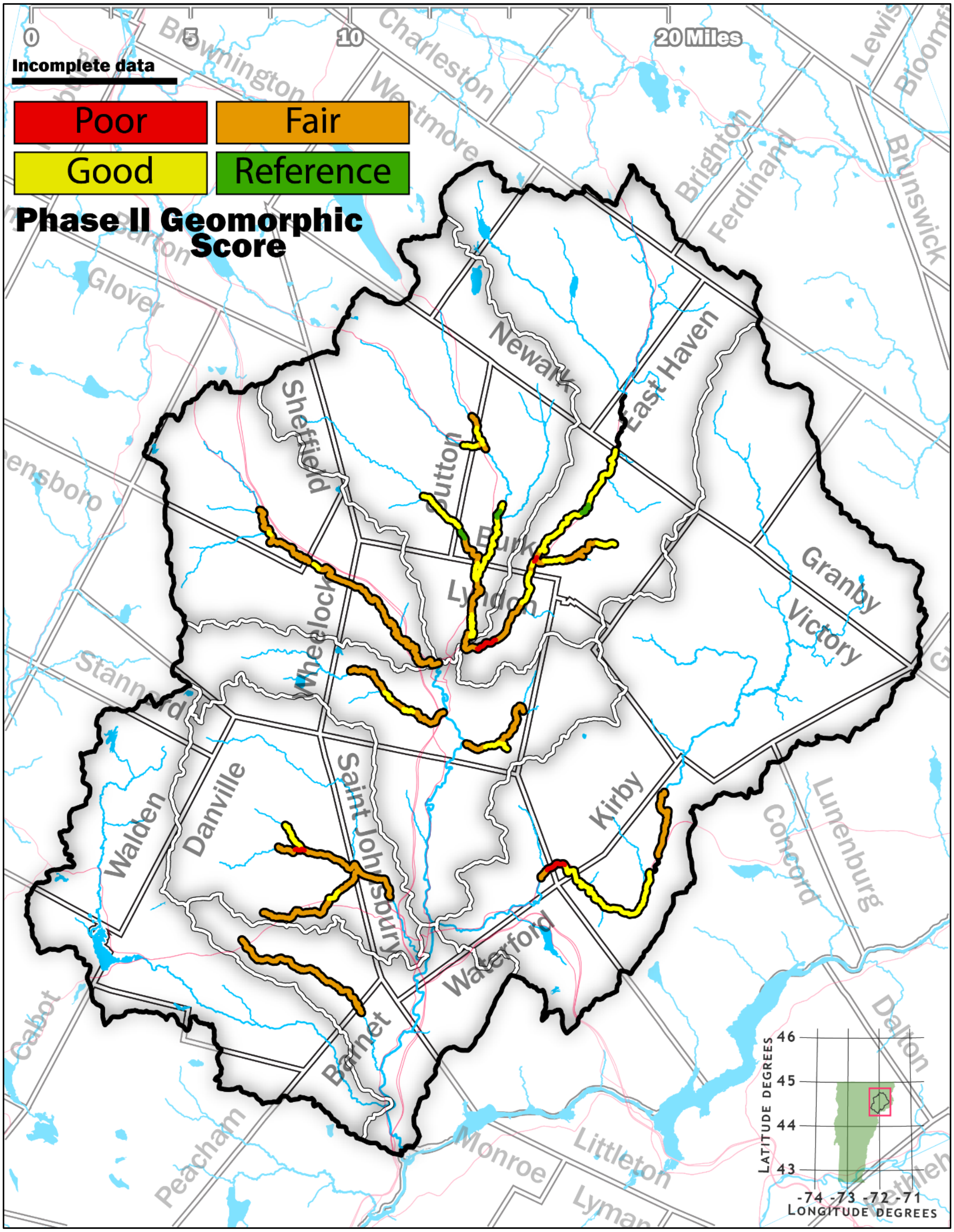


Figure 5 Map of rivers in Basin 15 with Phase II geomorphic condition scores through the present. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

Within the WSMD, two programs conduct assessments of Vermont's rivers and streams. The *Monitoring and Assessment*[1] Program collects data and assesses the biological and chemical condition of rivers, and the *Rivers*[1] Program collects data and assesses the physical condition of rivers.

Fluvial geomorphology is a subdiscipline of geomorphology that investigates how flowing water shapes and modifies Earth's surface through erosional and depositional processes. The Rivers Program conducts a three-phase approach to assess the physical condition of rivers in the State of Vermont. Phase 1 is a watershed assessment. Phase 2 is a rapid field stream assessment, and Phase 3 is a survey assessment. Figure 7 gives the overall Phase 2 geomorphic condition score of rivers in Basin 15. Figures displayed here are based on Phase 2 data.

The Stream Geomorphic Assessment can be used to problem solve and set priorities for river corridor conservation at a watershed scale because it allows you to ascertain how one reach may be affecting the condition of another. In the Phase 2 Rapid Field Assessment you use direct observations to evaluate stream geomorphic condition and different channel adjustment processes in each reach. In the Phase 2 Rapid Stream Assessment, the geomorphic stream condition is largely a function of the type and degree to which the stream has departed from its reference condition and the type and magnitude of channel adjustments that are happening in response to the channel and floodplain modifications you have documented at assessed reaches in the watershed.

For more information on these type of assessments see the River's Assessment *webpage*[1]. To learn more about the rivers and streams with Phase 1 and Phase 2 assessments in Basin 15, final reports for each project can be found at: *https://anrweb.vt.gov/DEC/SGA/finalReports.aspx*

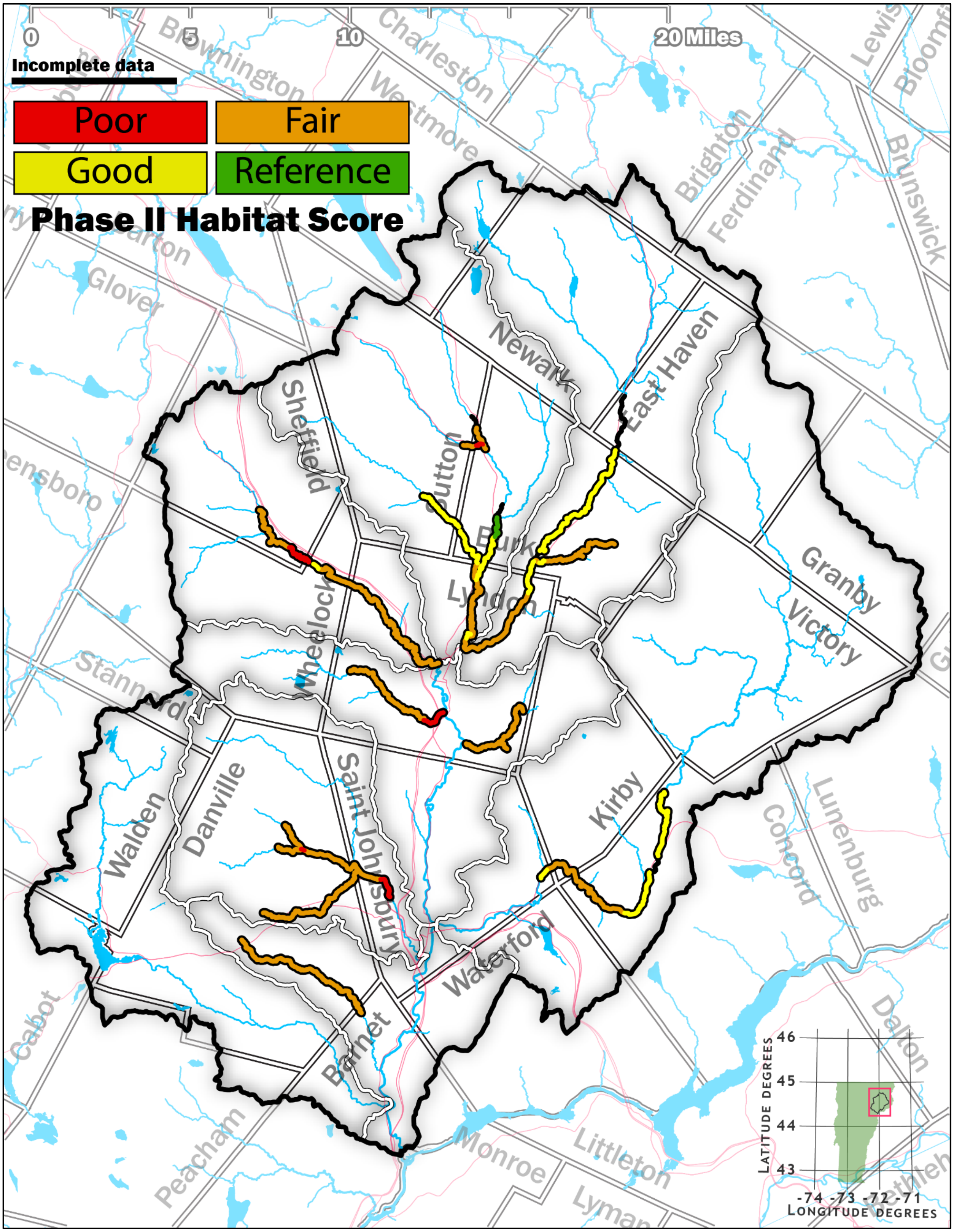


Figure 6 Map of rivers in Basin 15 with Phase II habitat condition ratings through 2020. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

The Rapid Habitat Assessment evaluates the physical components of a channel bed, banks, and riparian vegetation and how they affect aquatic life. The Habitat condition ratings can be used to identify high quality habitat and to “red-flag” areas of degraded habitat. It is also useful to examine habitat condition ratings at a watershed scale and compare these ratings with Phase 1 and Phase 2 impact rating data to determine potential reasons for habitat degradation, and to understand habitat quality and availability throughout the watershed, which is important when evaluating habitat for species that move and/or migrate within a stream system to meet different needs.

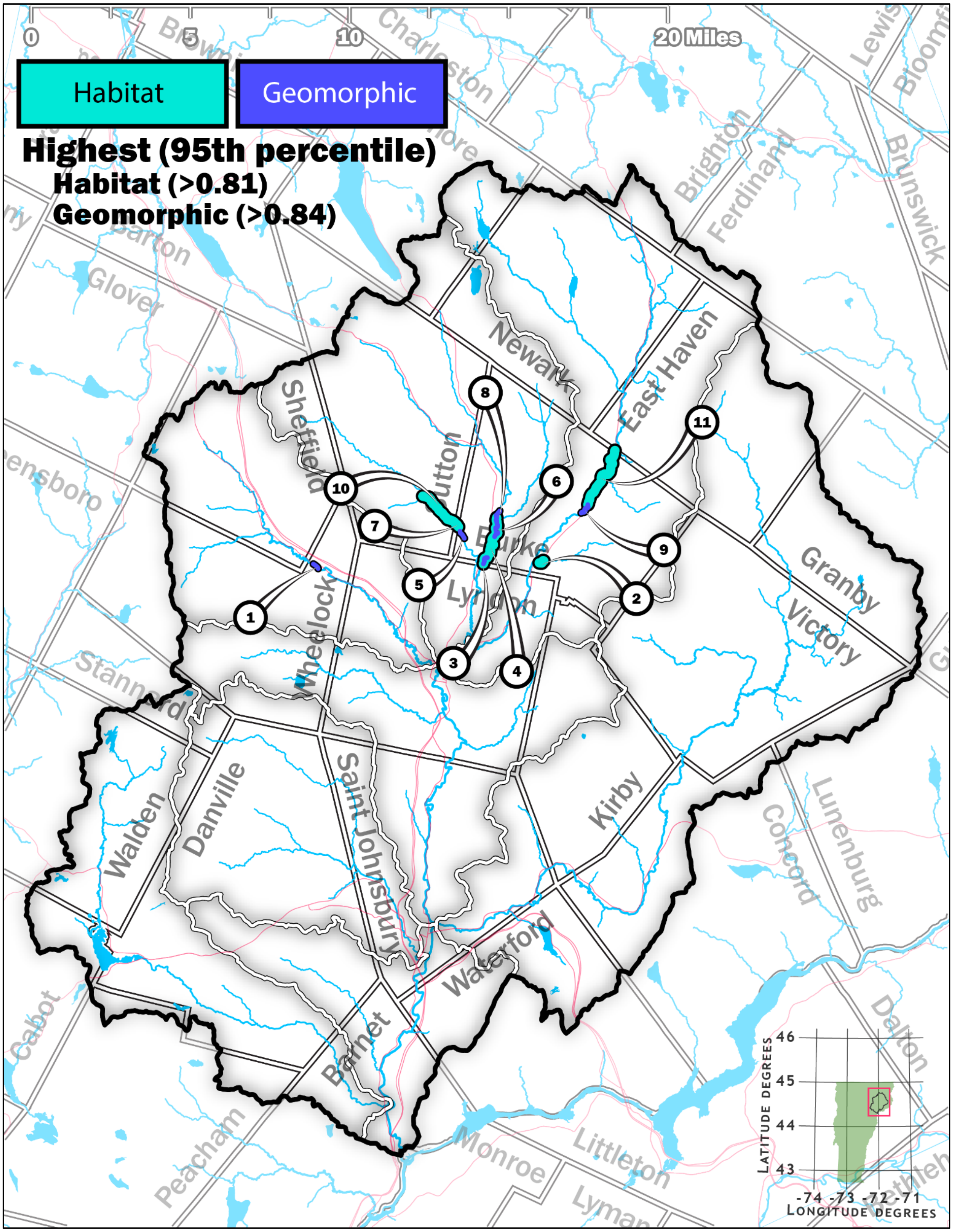


Figure 7. Map of the 95th percentile (highest) habitat and geomorphic condition scores. Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

Table 10 The highest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Longitude	Latitude	Assessment
1	51_T204D	Miller Run			44.587	-72.085	Link
2	140_M101B	Dish Mill Brook			44.588	-71.941	Link
3	141_T3.04B	West Branch Passumpsic River			44.589	-71.978	Link
4	141_T3.05-	West Branch Passumpsic River			44.595	-71.974	Link
5	141_T3.S1.03-	Calendar Brook			44.601	-71.992	Link
6	141_T3.06-	West Branch Passumpsic River			44.604	-71.970	Link
7	141_T3.S1.04B	Calendar Brook			44.606	-71.997	Link
8	141_T3.07A	West Branch Passumpsic River			44.610	-71.970	Link
9	35_T107A	East Branch Passumpsic River			44.612	-71.914	Link
10	141_T3.S1.05-	Calendar Brook			44.613	-72.008	Link
11	35_T107B	East Branch Passumpsic River			44.627	-71.903	Link

Physical condition - restoration

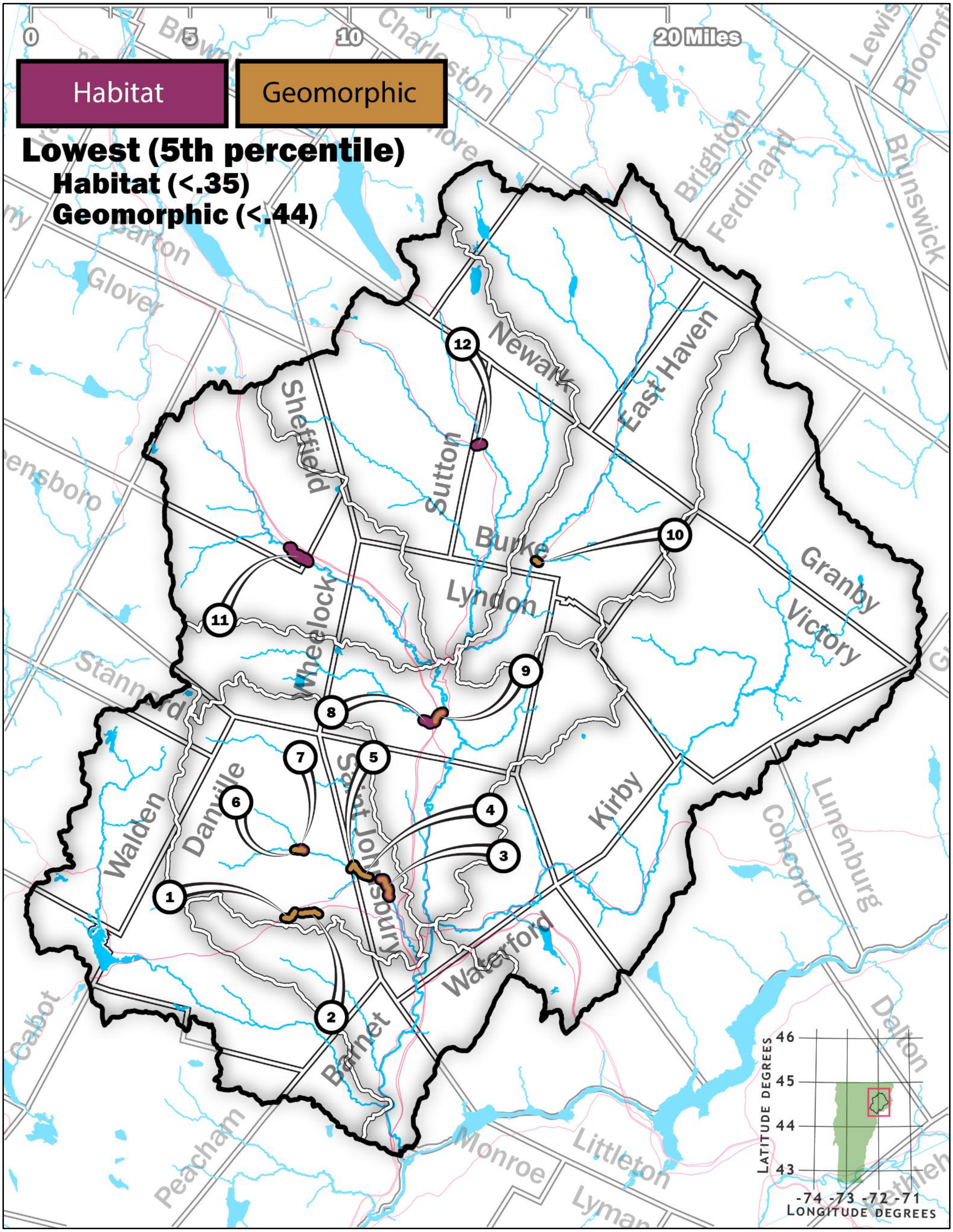


Figure 8 Map of the lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the table below.

Table 11. The lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the map above and the Assessment link hyperlinks to more information on the reach.

Map ID	SGAT_ID	Name	Geomorphic	Habitat	Longitude	Latitude	Assessment
1	176_T3.7S1.06B	Whiteman Brook			44.427	-72.102	Link
2	176_T3.7S1.05-	Whiteman Brook			44.429	-72.090	Link
3	176_T3.04-	Sleepers River			44.441	-72.041	Link
4	176_T3.06-	Sleepers River			44.446	-72.055	Link
5	176_T3.07-	Sleepers River			44.449	-72.061	Link
6	176_T3.10S1.01-	Morrill Brook			44.458	-72.098	Link
7	176_T3.10-	Sleepers River			44.458	-72.095	Link
8	176_T5.02-	South Wheelock Branch			44.515	-72.014	Link
9	176_T5.01-	South Wheelock Branch			44.519	-72.008	Link
10	140_M101A	Dish Mill Brook			44.588	-71.944	Link
11	51_T206A	Miller Run			44.592	-72.096	Link
12	141_T3.S3.01A	Sutton River			44.642	-71.981	Link

Biological condition

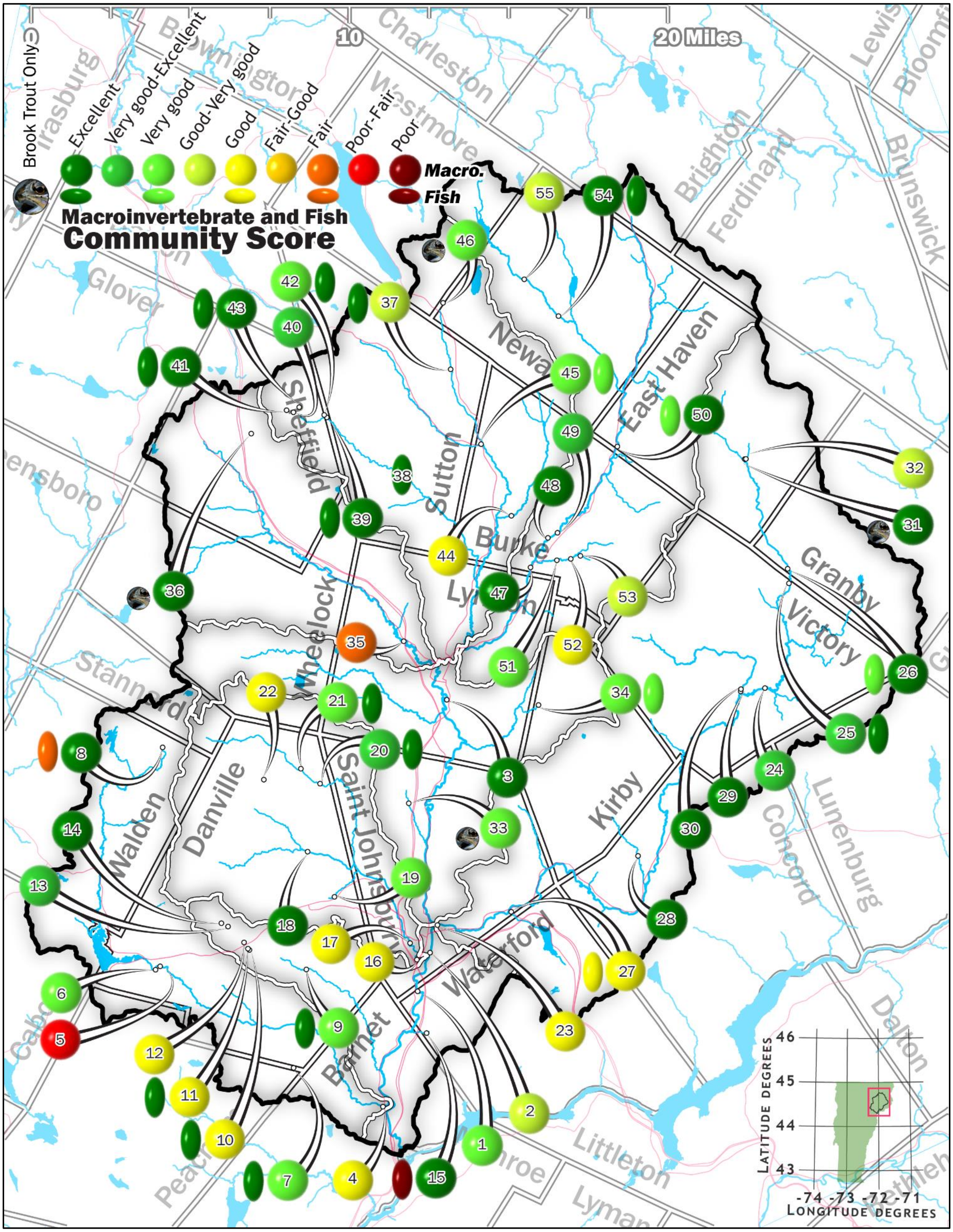


Figure 9. Map of the Macroinvertebrate Community assessment for Basin 15. Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook trout are the only observed taxa). Map IDs correspond with the table below.

The Monitoring and Assessment Program conducts biological assessments of wadeable rivers and streams. For more information on these assessments see the WSMD Biomonitoring Section webpage[1]. The assessments include sampling of macroinvertebrate and fish communities to determine Aquatic Biota use support, as well as the collection of water quality and habitat data to better understand the condition of the biological communities. Aquatic biota health in streams is one of the primary areas of study by the WSMD with data used to determine a river's ability to fully support aquatic biota. Brook Trout (BKT) only streams are defined as streams that contain only Brook Trout, which cannot be assessed using the VDEC Fish Index of Biological Integrity (IBI), which requires two or more native species to score.

Table 12 Macroinvertebrate (bug) and fish community matrix for the watersheds of Basin 15. Blank = no data, bkt = streams with a robust brook trout community

Unable to sample or assess or BKT	Poor (P)	Poor-fair (Pf)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Stream name, river mile	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Passumpsic River, 6.7	1	Bug		VgE			Vg					G	Vg	Vg
Passumpsic River, 8.6	2	Bug		VgE			G					GVg		
Passumpsic River, 18.3	3	Bug					Vg					E		
Joes Brook, 0.5	4	Bug										G		
Joes Brook, 10.5	5	Bug		PF										
Joes Brook, 10.8	6	Bug		Vg										
Rake Factory Brook, 2.3	7	Bug												Vg
Rake Factory Brook, 2.3	7	Fish												E
Steam Mill Brook, 5.5	8	Bug					E							
Steam Mill Brook, 5.5	8	Fish					F							
Water Andric, 4.3	9	Bug							FG			Vg		
Water Andric, 4.3	9	Fish										E		
Water Andric, 6.5	10	Bug		G			F		G			G		
Water Andric, 6.5	10	Fish		E										
Water Andric, 6.6	11	Bug		Vg			G		G			G		
Water Andric, 6.6	11	Fish		E										
Water Andric, 6.9	12	Bug							G					
Water Andric, 7.6	13	Bug							VgE					
Water Andric, 7.8	14	Bug					E							
Water Andric, 7.8	14	Fish					U							
Simpson Brook, 0.5	15	Bug										E		
Simpson Brook, 0.5	15	Fish										P		
Sleepers River, 0.4	16	Bug					G							

Stream name, river mile	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Sleepers River, 1.3	17	Bug					G							
Sleepers River, 1.3	17	Fish					Vg							
Sleepers River, 6.8	18	Bug										E		
Roy Brook, 1.3	19	Bug		Vg										
Houghton Brook, 0.8	20	Bug						FG				VgE		
Houghton Brook, 0.8	20	Fish										E		
Houghton Brook, 1.6	21	Bug					Vg							
Houghton Brook, 1.6	21	Fish					E							
North Brook, 2.6	22	Bug					G							
North Brook, 2.6	22	Fish					U							
Moose River, 0.1	23	Bug										FG	G	G
Moose River, 20.6	24	Bug										VgE		
Moose River, 20.6	24	Fish										U		
Moose River, 25.7	25	Bug			E	VgE	Vg	VgE	E	GVg	U	U	U	VgE
Moose River, 25.7	25	Fish			G		Vg		Vg				E	
Moose River, 26.8	26	Bug		E			E							
Moose River, 26.8	26	Fish		Vg										
Stiles Brook, 0.1	27	Bug										P	G	
Stiles Brook, 0.1	27	Fish										G	U	
Kirby Brook, 1.1	28	Bug											E	
Kirby Brook, 1.1	28	Fish											U	
Bog Brook, 0.1	29	Bug					E							
Bog Brook, 0.2	30	Bug						E	E	Vg	E	Vg	VgE	E
Bog Brook, 0.2	30	Fish							U					
West Branch Moose River, 0.1	31	Bug									E			E
West Branch Moose River, 0.1	31	Fish									BKT			
East Branch Moose River, 0.1	32	Bug									E			GVg
East Branch Moose River, 0.1	32	Fish									U			
Stark Brook, 1.5	33	Bug					GVg							
Stark Brook, 1.5	33	Fish					BKT							
Barnes Brook, 0.1	34	Bug					Vg							

Stream name, river mile	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Barnes Brook, 0.1	34	Fish					Vg							
Millers Run, 2.6	35	Bug										F		
Nation Brook Trib 3, 0.8	36	Bug	E	E	E									
Nation Brook Trib 3, 0.8	36	Fish	E	Vg	BKT									
West Branch Passumpsic River, 17.6	37	Bug									GVg			
West Branch Passumpsic River, 17.6	37	Fish									E			
Calendar Brook, 5.3	38	Fish						E						
Calendar Brook, 9.8	39	Bug										E		
Calendar Brook, 9.8	39	Fish										E		
Calendar Brook, 11.2	40	Bug	VgE	VgE										
Calendar Brook, 11.4	41	Bug			E									
Calendar Brook, 11.4	41	Fish							E					
Clark Brook, 0.2	42	Bug	VgE	VgE	Vg									
Clark Brook, 0.2	42	Fish	Vg	E	E									
Calendar Brook Trib 22, 0.4	43	Bug	E	E	E									
Calendar Brook Trib 22, 0.4	43	Fish	E	E	E									
Roundy Brook, 0.5	44	Bug										G		
Sutton River, 0.1	45	Bug										Vg		
Sutton River, 0.1	45	Fish										Vg		
Arcadia Brook, 0.3	46	Bug					Vg							
Arcadia Brook, 0.3	46	Fish					BKT							
East Branch Passumpsic River, 3.8	47	Bug					E							
East Branch Passumpsic River, 5.3	48	Bug		E					G					E
East Branch Passumpsic River, 5.7	49	Bug		G					Vg					VgE
East Branch Passumpsic River, 8.9	50	Bug					E							
East Branch Passumpsic River, 8.9	50	Fish					Vg							
Dish Mill Brook, 0.8	51	Bug										Vg		
Dish Mill Brook, 0.8	51	Fish										E		
Dish Mill Brook, 1.3	52	Bug					G							
Dish Mill Brook, 1.3	52	Fish					E							
Dish Mill Brook Trib 2, 0.2	53	Bug					GVg							

Stream name, river mile	Map ID		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Dish Mill Brook Trib 2, 0.2	53	Fish					E							
Bean Brook, 3.1	54	Bug										E		
Bean Brook, 3.1	54	Fish										E		
Bean Brook, 4.8	55	Bug										GVg		

Chemical condition

Chemical water quality monitoring occurs across the state in rivers and streams in a variety of ways: targeted, probability-based, and special studies. Examples of targeted monitoring include the LaRosa Partnership Program (LPP) and water quality samples collected by the Ambient Biomonitoring Network (ABN). All chemical data can be accessed through the Vermont Integrated Watershed Information System (VIWIS) and generally there is too much data that requires special contextual information to effectively display in graphics and tables in the format of this report. LPP monitoring stations are normally sampled eight times during the spring and summer season, and may be monitored from one to several years, depending on the monitoring purpose. LPP data can provide enough information to make assessment determinations (i.e., impaired or full support). Chemical monitoring associated with the ABN is used to help interpret the biological data, which is relied upon more heavily for assessment and regulatory purposes.

Special chemical studies are usually only conducted in response to compelling data and information obtained from fixed-station and probability-based projects. The number and nature of special studies is commonly dictated by the nature of issues that need further monitoring or that arise as interest or funding permits. These types of studies include detailed sampling to assess use support or standards violations, stressor identification, diagnostic-feasibility studies, effectiveness evaluations of pollution control measures, and watershed-based surveys and evaluations. These evaluations are usually resource intensive and are reserved for issues of particular interest. Additionally, data from these investigations are usually organized and presented in a summary report format and would not be used separately for assessments.

River reclassification candidates (Aquatic biota)

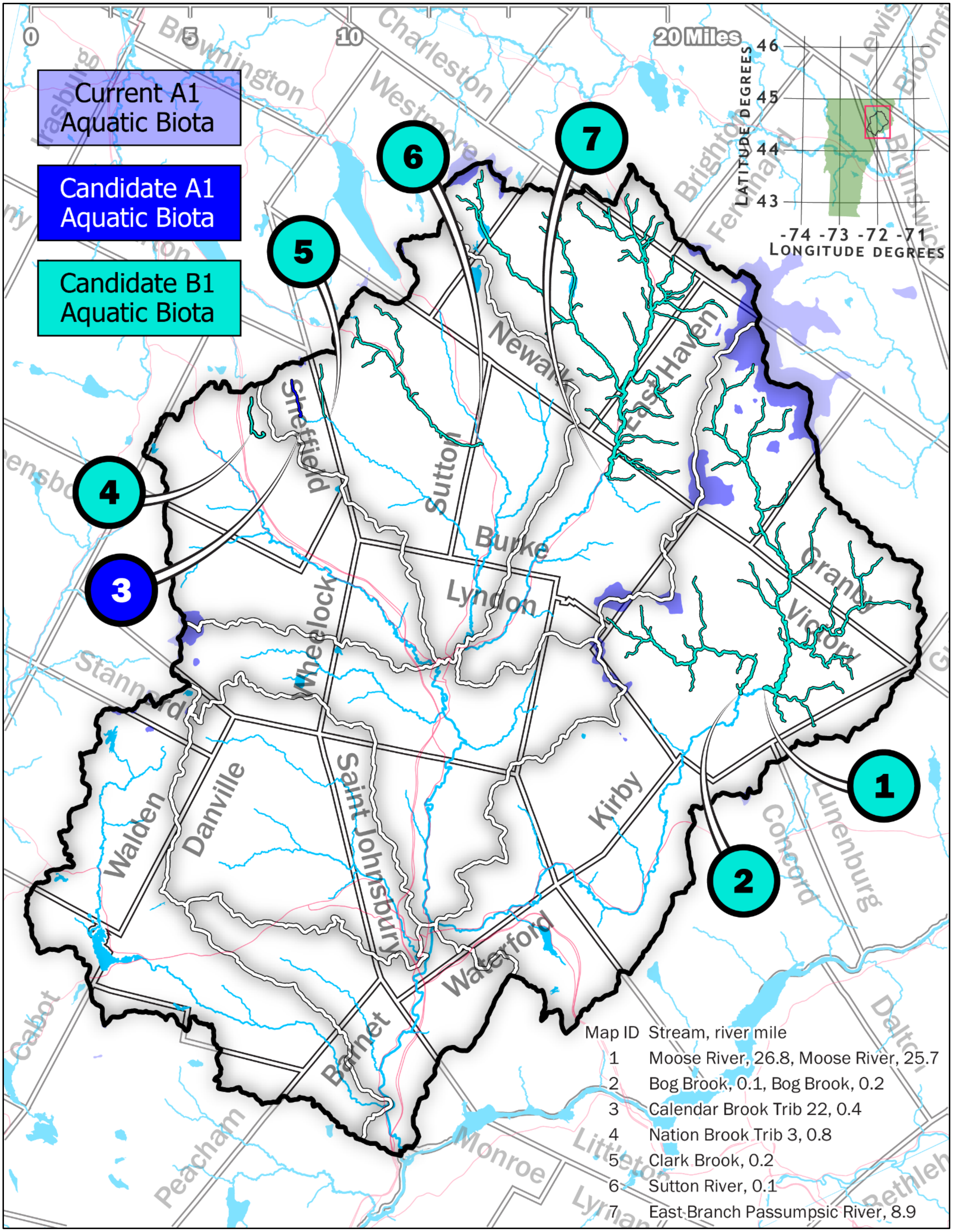


Figure 10 Map of A(1) and B(1) reclassification candidates. Map IDs correspond to the table below.

To protect aquatic biota in rivers in the State of Vermont, the Watershed Management Division can initiate reclassification for Aquatic Biota use in rivers that meet a high-quality standard. The major implication of reclassification is the application of new [Water Quality Standards](). Most rivers in the State of Vermont are classified B(2) for Aquatic Biota use and must maintain biological assessments of Good or better for both macroinvertebrate and fish communities. Rivers reclassified to B(1) must maintain biological assessments of Very Good or better, and Rivers reclassified to A(1) must maintain biological assessments of Excellent. The rivers shown here have maintained biological condition expected of either A(1) or B(1) waters and therefore, are candidates for reclassification. For more information, visit the [stream reclassification webpage]().

Table 13 Table of A(1) and B(1) reclassification candidates. Map IDs correspond to the map above. The community column identifies the community assessed.

Unable to sample or assess or BKT only	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent €

Reclassification candidate	Map ID	Reclass	Community	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Moose River, 25.7	1	B1	Bug	E	VgE	Vg	VgE	E	GVg	U	U	U	VgE
Moose River, 25.7	1	B1	Fish	G		Vg		Vg				E	
Moose River, 26.8	1	B1	Bug			E							
Moose River, 26.8	1	B1	Fish										
Bog Brook, 0.1	2	B1	Bug			E							
Bog Brook, 0.2	2	B1	Bug				E	E	Vg	E	Vg	VgE	E
Bog Brook, 0.2	2	B1	Fish					U					
Calendar Brook Trib 22, 0.4	3	A1	Bug	E									
Calendar Brook Trib 22, 0.4	3	A1	Fish	E									
Nation Brook Trib 3, 0.8	4	B1	Bug	E									
Nation Brook Trib 3, 0.8	4	B1	Fish	BKT									
Clark Brook, 0.2	5	B1	Bug	Vg									
Clark Brook, 0.2	5	B1	Fish	E									
Sutton River, 0.1	6	B1	Bug								Vg		
Sutton River, 0.1	6	B1	Fish								Vg		
East Branch Passumpsic River, 8.9	7	B1	Bug			E							
East Branch Passumpsic River, 8.9	7	B1	Fish			Vg							

Impaired rivers

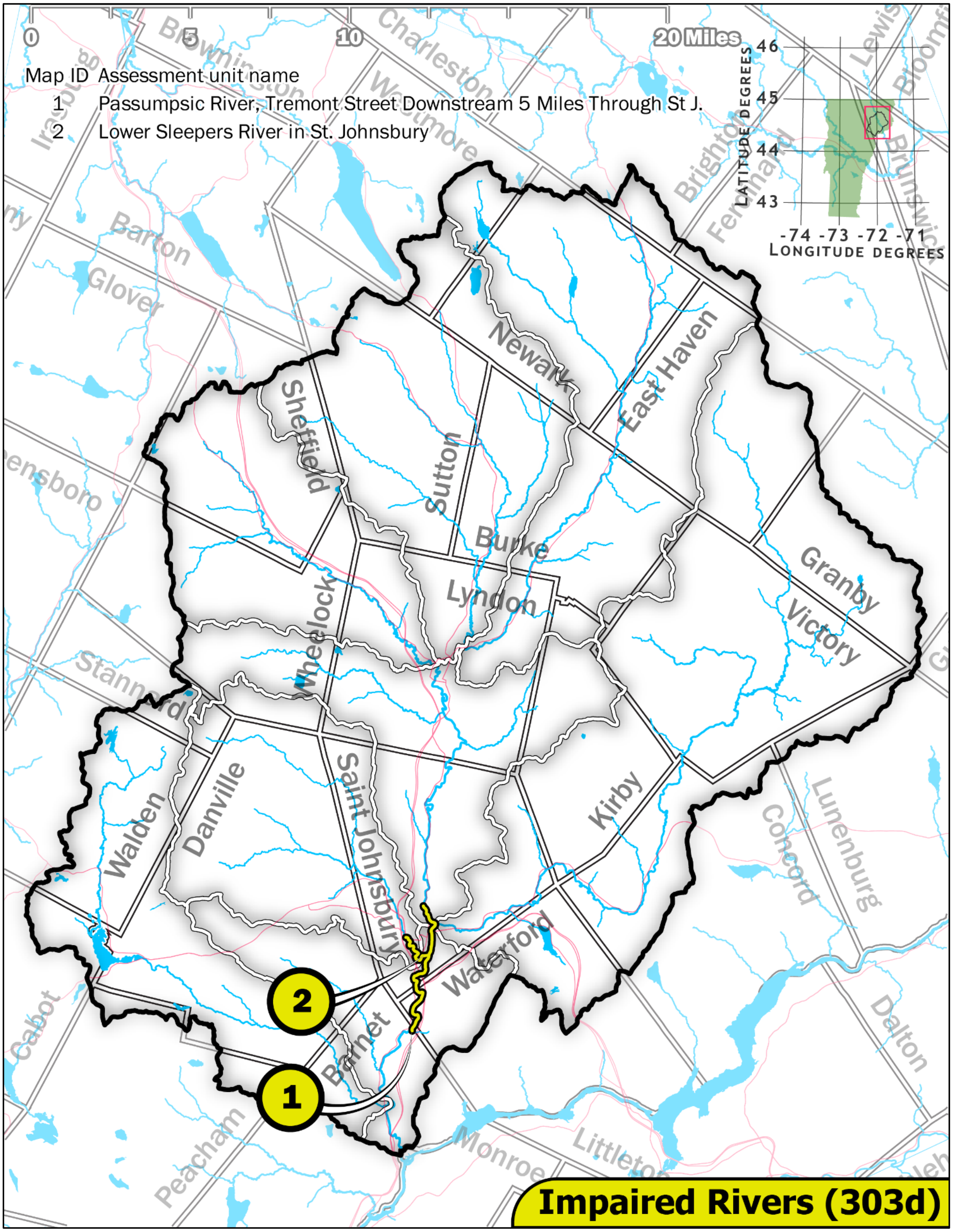


Figure 11. Map of impaired rivers in Basin 15. Yellow represents rivers that are on the 2022 303(d) list. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

Table 14 Table of impaired rivers in Basin 15. Map IDs are associated with the map above. (ALS) Aquatic biota and wildlife that may utilize or are present in the waters; (AH) Aquatic habitat to support aquatic biota, wildlife, or plant life; (CR) The use of waters for swimming and other primary contact recreation; (RF) The use of waters for fishing and related recreational uses; (RB) The use of waters for boating and related recreational uses; (AES) The use of waters for the enjoyment of aesthetic conditions.

MAP ID	NAME	ASSESSMENT UNIT ID	POLLUTANT	PROBLEM	IMPAIRED USE	PART
1	Passumpsic River, Tremont Street Downstream 5 Miles Through St J.	VT15-01.01	ESCHERICHIA COLI (E. COLI)	St. Johnsbury WWTF collection system passes combined sewer overflows	CR	A
2	Lower Sleepers River in St. Johnsbury	VT15-04.01	ESCHERICHIA COLI (E. COLI)	St. Johnsbury WWTF collection system passes combined sewer overflows	CR	A

Altered Rivers

There are no altered rivers in basin 15.

Trending rivers

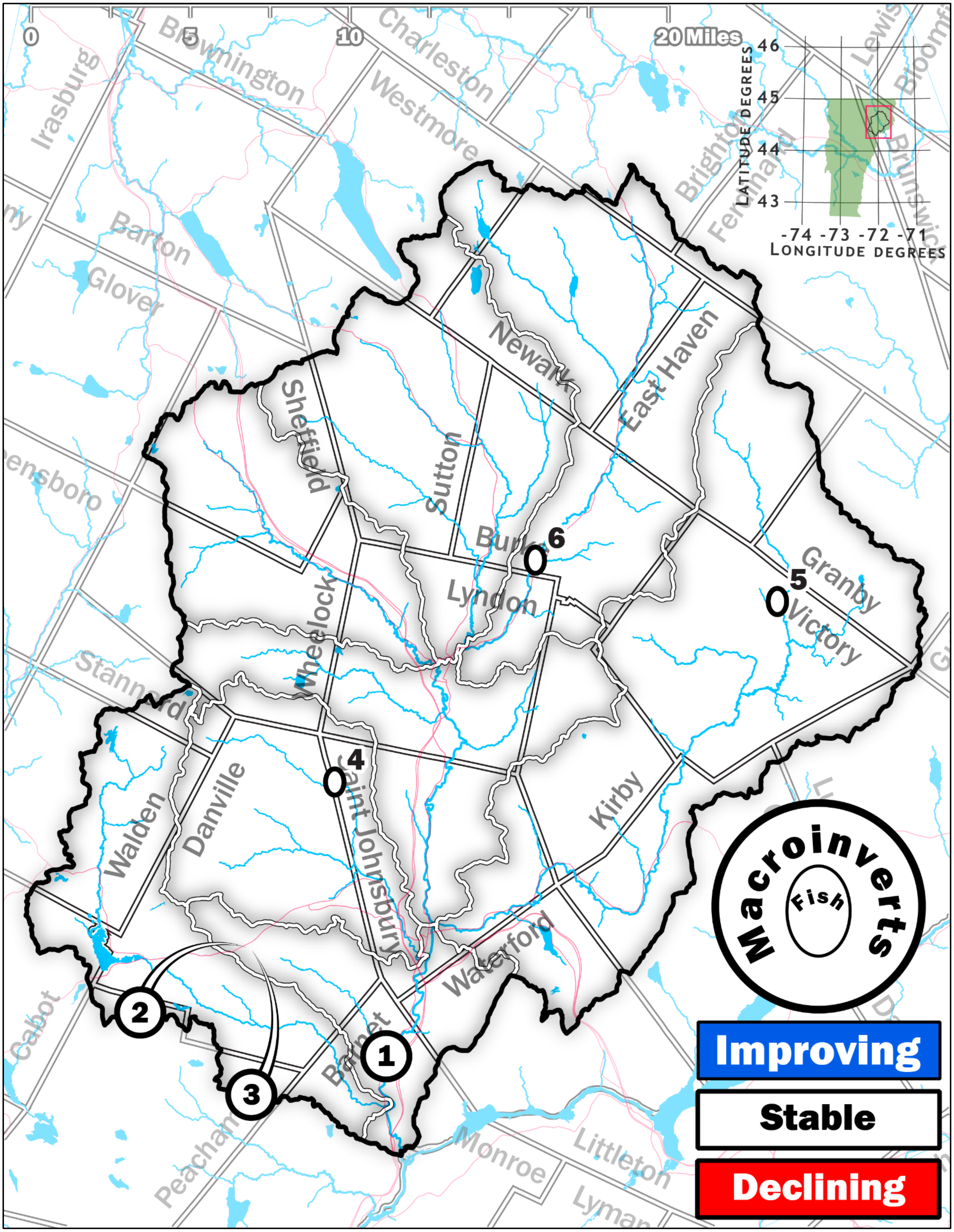


Figure 12 Map of rivers with enough biological data to model a water quality trend.

To maintain waters in their current state, WSMD conducts long term monitoring on surface waters and identifies increasing, stable, and decreasing trends of the most relevant water quality parameters in the Vermont [Water Quality Standards](). Modeling trends can act as an early warning system for declining water quality, and it may be cost effective to reduce stressors to these waters before they become impaired or altered. Likewise, increasing trends can show areas of effective remediation. For each biological monitoring site, two linear regression models are used with year of sampling as the independent variable. The response variables include the community assessment ratings for macroinvertebrates and/or fish (Poor to Excellent; coded as 1 to 9). Sites with more than three data points were included. Data from sites is pooled by coincident NHD+ reach code (multiple sites on the same reach) unless the sites are bracketing. Trends are categorized into three groups: Improving (models with p-values <0.1 and positive coefficients), stable (models with p-values > 0.1) and declining (models with p-values <0.1 and negative coefficients.

Table 15 Trends in biological condition of macroinvertebrate (bug) and fish communities in Basin 15. + Improving, - declining, = stable/no trend. B = Bug community, F = Fish community.

Unable to sample or assess	Poor (P)	Poor-fair (Pf)	Fair (F)	Fair-good (Fg)	Good (G)	Good-Very good (GVg)	Very good (Vg)	Very good-excellent (VgE)	Excellent (E)

Name, river mile	Map ID	Trend	Community	1990	1991	1992	2000	2005	2010	2012	2013	2015	2017	2020	2021	2022
Passumpsic River, 6.7	1	=	Bug	F	0	Vg	E	Vg	0	0	0	Vg	0	G	Vg	Vg
Water Andric, 6.5	2	=	Bug	0	0	0	0	0	G	G	0	F	G	G	0	0
Water Andric, 6.6	3	=	Bug	0	0	0	0	0	0	Vg	0	G	G	G	0	0
Houghton Brook, 0.8	4	=	Fish	0	0	0	0	E	0	0	0	0	0	E	0	0
Houghton Brook, 1.6	4	=	Fish	0	0	0	0	0	E	0	0	E	0	0	0	0
Moose River, 25.7	5	=	Fish	0	0	0	0	0	0	0	G	Vg	Vg	0	E	0
Moose River, 26.8	5	=	Fish	0	0	0	0	0	0	Vg	0	0	0	0	0	0
Dish Mill Brook, 0.8	6	=	Fish	0	0	0	0	0	0	0	0	0	0	E	0	0
Dish Mill Brook, 1.3	6	=	Fish	0	0	E	0	0	E	0	0	E	0	0	0	0

Rivers in need of assessment

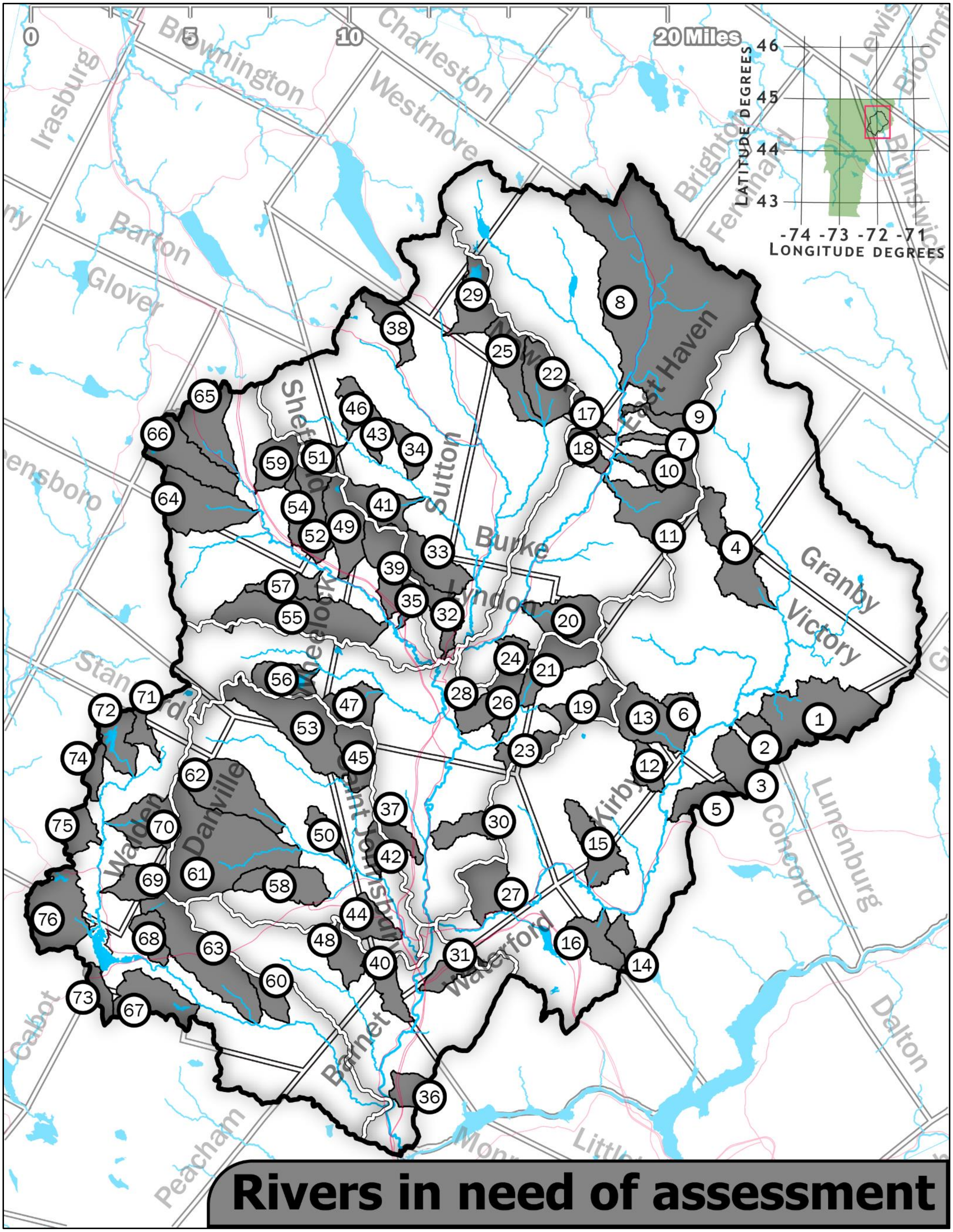


Figure 13 Map of rivers with unassessed aquatic biota use in Basin 15.

Aquatic biota health in streams is one of the primary areas of study by the WSMD. In the sections above, areas with sufficient data were used to determine a river's ability to fully support aquatic biota. This section highlights the 76 streams within this basin that lack data needed to determine the support status of aquatic biota. Streams larger than 2 square kilometers and have no biological data between 2000 and 2022 were identifed as in need of assessment. Because all these streams cannot be monitored at the same time, land use/cover data are provided in the figure below to aid site prioritization. Many of these streams are unnamed, therefore, names were added based on their source location (hill names) or adjacent road names and are identified by an asterisk.

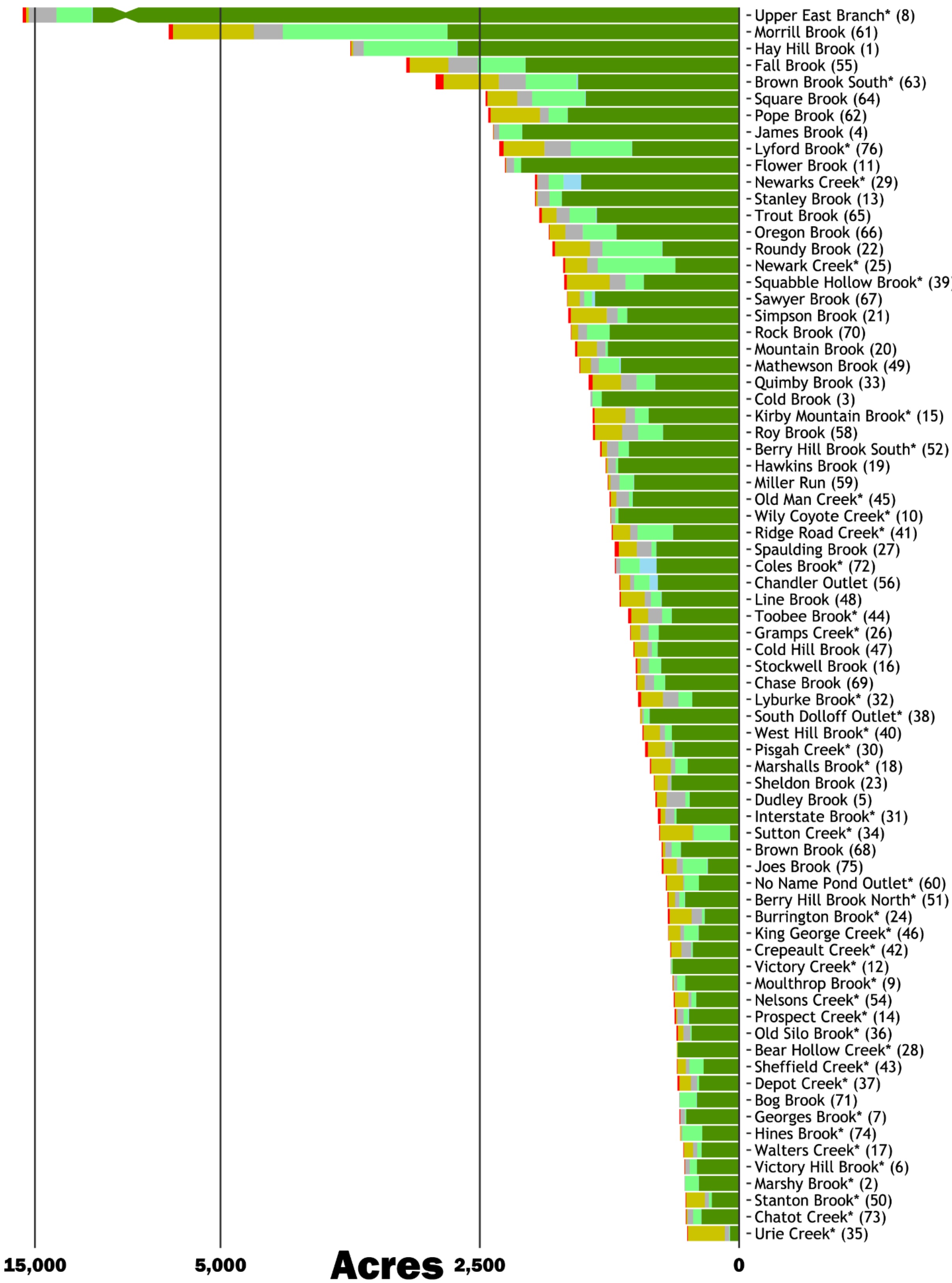


Figure 14 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University of Vermont Spatial Analysis Laboratory.

Table 16. Rivers with unassessed aquatic biota use, values are in percent land cover. The Map IDs correspond to the map above. Latitude and longitudes designate the pour point of the watershed. Asterisks are officially unnamed streams.

Name, Map ID	*Latitude*	*Longitude*	*Watershed Area (km²)*	*Developed*	*Agriculture*	*Forest*	*Wetland*	*Other*	*Water*
Bear Hollow Creek (28)*	44.512	-71.995	2.4	0.00	1.35	98.65	0.00	0.00	0.00
Berry Hill Brook North (51)*	44.641	-72.067	2.8	1.46	9.09	75.70	7.56	6.01	0.18
Berry Hill Brook South (52)*	44.588	-72.085	5.4	1.00	4.08	79.32	7.47	8.04	0.09
Bog Brook (71)	44.505	-72.189	2.3	0.09	0.00	70.69	27.97	0.72	0.54
Brown Brook (68)	44.407	-72.184	3.0	1.39	3.38	75.37	11.72	8.02	0.11
Brown Brook South (63)*	44.385	-72.129	11.8	2.66	18.21	53.09	16.78	8.79	0.46
Burrington Brook (24)*	44.553	-71.967	2.8	2.71	30.62	48.48	3.67	14.46	0.05
Chandler Outlet (56)	44.538	-72.087	4.7	0.84	8.07	67.81	13.17	3.24	6.84
Chase Brook (69)	44.440	-72.216	4.0	0.80	7.47	71.89	10.68	9.04	0.12
Chatot Creek (73)*	44.399	-72.228	2.1	1.48	2.20	70.75	15.59	9.79	0.19
Cold Brook (3)	44.512	-71.822	5.8	0.00	0.00	92.46	6.20	1.33	0.01
Cold Hill Brook (47)	44.529	-72.049	4.1	0.97	12.38	77.28	5.23	4.01	0.13
Coles Brook (72)*	44.496	-72.205	4.8	0.90	0.00	66.56	15.85	3.26	13.42
Crepeault Creek (42)*	44.447	-72.045	2.7	1.08	15.28	67.55	2.11	13.88	0.11
Depot Creek (37)*	44.459	-72.023	2.4	3.29	18.39	64.75	3.61	9.93	0.04
Dudley Brook (5)	44.471	-71.862	3.3	1.81	11.45	59.03	5.12	22.49	0.11
Fall Brook (55)	44.561	-72.040	13.0	0.99	11.66	64.16	14.34	8.79	0.05
Flower Brook (11)	44.628	-71.900	9.1	0.36	0.24	93.18	2.98	3.21	0.01
Georges Brook (7)*	44.644	-71.874	2.3	1.41	0.05	88.80	2.23	7.45	0.07
Gramps Creek (26)*	44.511	-71.968	4.2	0.72	8.81	73.83	9.30	7.30	0.04
Hawkins Brook (19)	44.520	-71.938	5.2	0.43	1.43	90.74	1.60	5.81	0.00
Hay Hill Brook (1)	44.528	-71.794	15.2	0.17	0.50	72.44	23.99	2.72	0.19
Hines Brook (74)*	44.483	-72.225	2.3	0.25	1.45	62.44	34.10	1.71	0.06
Interstate Brook (31)*	44.401	-72.009	3.2	3.33	5.86	76.98	2.75	10.98	0.11
James Brook (4)	44.569	-71.799	9.6	0.16	0.18	88.14	9.35	2.07	0.10
Joes Brook (75)	44.462	-72.224	3.0	2.25	17.30	40.57	31.71	7.54	0.64
King George Creek (46)*	44.649	-72.064	2.8	0.44	16.50	57.12	20.31	5.19	0.42
Kirby Mountain Brook (15)*	44.443	-71.910	5.7	1.26	21.22	61.83	9.37	6.29	0.04
Line Brook (48)	44.398	-72.066	4.7	0.92	20.04	64.87	8.64	5.04	0.49
Lyburke Brook (32)*	44.546	-72.003	3.9	3.18	21.60	46.36	13.74	15.02	0.10
Lyford Brook (76)*	44.422	-72.231	9.4	1.85	17.02	44.60	25.49	10.95	0.11
Marshalls Brook (18)*	44.629	-71.901	3.5	1.41	22.21	57.61	14.13	4.63	0.01
Marshy Brook (2)*	44.515	-71.815	2.1	0.00	0.00	74.19	25.25	0.33	0.23
Mathewson Brook (49)	44.589	-72.067	6.2	0.46	6.67	74.10	12.94	4.92	0.91

Name, Map ID	Latitude	Longitude	Watershed Area (km^2)	Developed	Agriculture	Forest	Wetland	Other	Water
Miller Run (59)	44.623	-72.121	5.1	0.27	1.78	80.04	10.95	6.68	0.28
Morrill Brook (61)	44.458	-72.098	22.3	0.75	14.17	51.10	28.89	5.06	0.03
Moulthrop Brook* (9)	44.654	-71.889	2.6	0.60	1.25	81.31	12.32	4.47	0.05
Mountain Brook (20)	44.566	-71.952	6.4	1.35	12.01	80.00	1.51	5.05	0.08
Nelsons Creek* (54)	44.602	-72.100	2.5	1.62	21.10	65.57	7.49	4.13	0.07
Newark Creek* (25)	44.656	-71.950	6.9	1.13	12.55	36.16	44.24	5.88	0.04
Newarks Creek* (29)	44.692	-72.004	8.0	1.08	0.26	77.32	7.37	5.33	8.62
No Name Pond Outlet* (60)	44.381	-72.105	2.9	1.08	22.38	55.10	19.80	1.63	0.00
Old Man Creek* (45)	44.491	-72.061	5.1	1.11	4.28	82.09	2.73	9.59	0.21
Old Silo Brook* (36)	44.346	-72.039	2.4	2.58	8.68	75.92	1.78	10.98	0.05
Oregon Brook (66)	44.626	-72.136	7.4	0.18	8.44	64.45	17.77	9.13	0.04
Pisgah Creek* (30)	44.464	-72.009	3.7	2.97	18.39	68.85	2.06	7.69	0.05
Pope Brook (62)	44.473	-72.115	9.8	0.92	19.72	68.37	7.57	3.35	0.09
Prospect Creek* (14)	44.427	-71.893	2.5	2.18	1.77	77.98	7.15	9.72	1.19
Quimby Brook (33)	44.579	-71.993	5.9	2.73	18.87	55.66	12.38	10.24	0.13
Ridge Road Creek* (41)	44.615	-72.024	5.0	0.77	13.66	51.93	27.85	5.71	0.07
Rock Brook (70)	44.470	-72.213	6.6	0.43	3.86	76.92	13.55	5.19	0.06
Roundy Brook (22)	44.651	-71.939	7.3	1.41	18.68	41.17	32.10	6.56	0.07
Roy Brook (58)	44.437	-72.082	5.7	1.38	18.48	52.13	17.01	10.99	0.02
Sawyer Brook (67)	44.387	-72.163	6.7	0.29	7.10	83.75	4.58	2.58	1.71
Sheffield Creek* (43)	44.636	-72.046	2.4	1.00	13.67	57.14	22.83	5.37	0.00
Sheldon Brook (23)	44.506	-71.969	3.3	0.72	15.40	79.32	0.60	3.89	0.05
Simpson Brook (21)	44.524	-71.955	6.7	1.56	21.05	65.49	5.47	6.29	0.13
South Dolloff Outlet* (38)	44.683	-72.030	3.9	0.31	1.60	90.60	5.46	1.52	0.49
Spaulding Brook (27)	44.425	-71.980	4.9	3.35	14.48	66.67	3.76	11.67	0.09
Squabble Hollow Brook* (39)	44.565	-72.039	6.8	1.61	24.48	54.49	10.50	8.89	0.03
Square Brook (64)	44.612	-72.129	9.9	0.73	11.76	60.54	20.99	5.83	0.15
Stanley Brook (13)	44.504	-71.858	8.0	0.37	0.87	86.98	6.09	5.66	0.03
Stanton Brook* (50)	44.460	-72.075	2.1	1.02	34.98	51.10	5.25	7.52	0.13
Stockwell Brook (16)	44.428	-71.905	4.0	1.45	3.41	75.48	11.40	7.98	0.26
Sutton Creek* (34)	44.631	-72.024	3.1	1.20	40.83	11.54	45.10	1.20	0.13
Toobee Brook* (44)	44.424	-72.041	4.3	2.87	15.30	60.64	8.45	12.49	0.25
Trout Brook (65)	44.632	-72.138	7.8	1.26	7.38	71.20	13.31	6.49	0.36
Upper East Branch* (8)	44.670	-71.887	61.8	0.52	0.37	89.80	5.15	4.02	0.13
Urie Creek* (35)	44.563	-72.031	2.0	1.80	71.02	17.58	1.28	8.03	0.30
Victory Creek* (12)	44.485	-71.866	2.7	0.27	0.00	97.13	1.84	0.62	0.15
Victory Hill Brook* (6)	44.516	-71.847	2.1	0.74	0.53	77.39	13.15	8.18	0.01
Walters Creek* (17)	44.646	-71.893	2.2	1.22	15.85	67.57	7.55	7.64	0.17

Name, Map ID	Latitude	Longitude	Watershed Area (km^2)	Developed	Agriculture	Forest	Wetland	Other	Water
West Hill Brook (40)*	44.384	-72.029	3.8	1.19	16.93	69.61	7.27	4.97	0.03
Wily Coyote Creek (10)*	44.636	-71.890	5.0	0.35	0.22	93.70	2.41	3.28	0.04

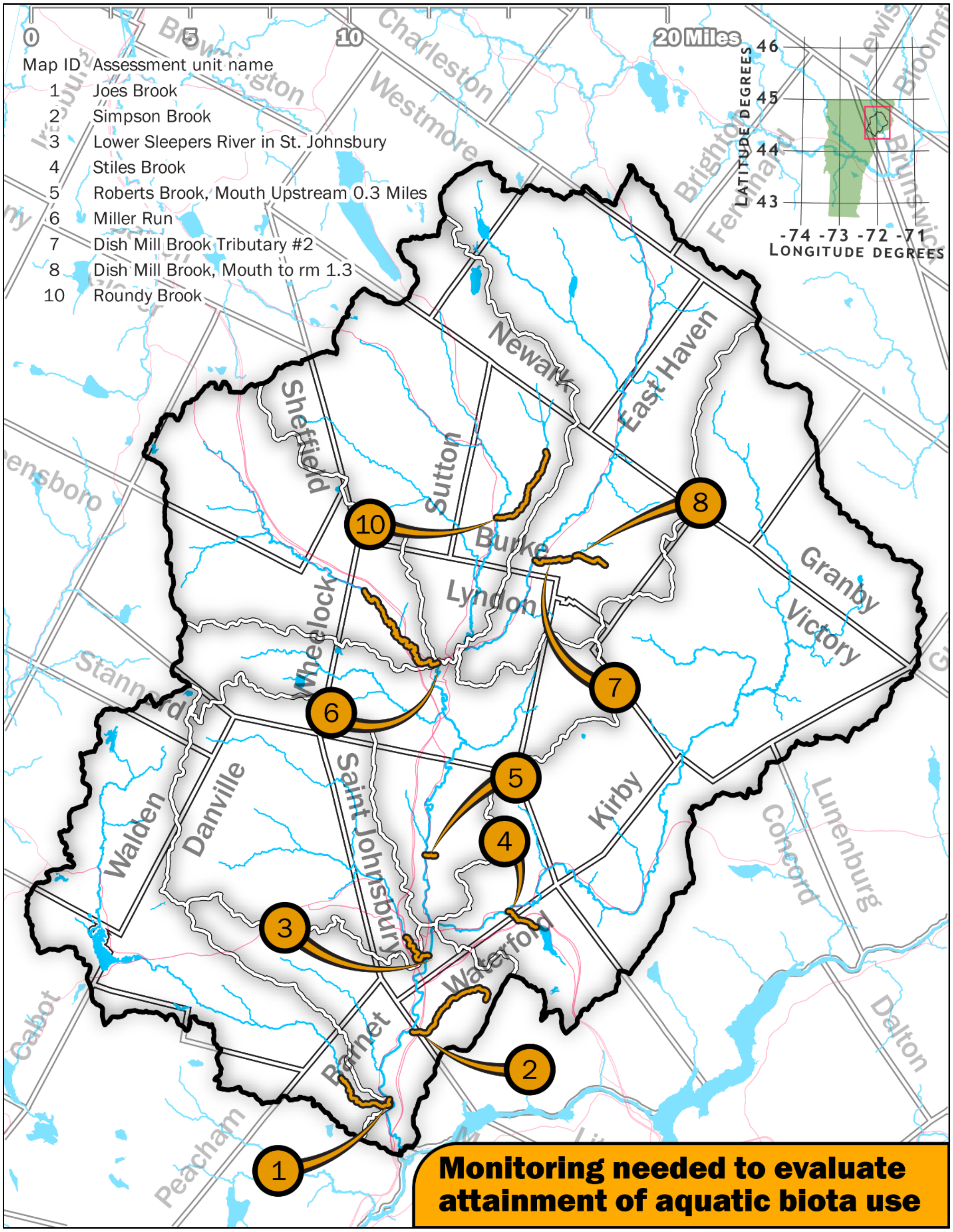


Figure 15 Map of rivers that require more monitoring to evaluate attainment of Aquatic Biota use.

Unlike the streams mentioned above with no biological monitoring data, the streams here have limited biomonitoring data that indicates fair or poor condition, however, there is either not enough data to fully evaluate the attainment of Aquatic Biota use or monitoring results show volatile condition year to year.

Table 17 Table of rivers that require more monitoring to evaluate attainment of aquatic biota use. Map IDs correspond to the map above.

Map ID	Assessment unit name	Pollutant	Problem
1	Joes Brook	TEMPERATURE	Lack of riparian buffer upstream
2	Simpson Brook	CAUSE UNKNOWN	Impacts to fish community, undetermined sources
3	Lower Sleepers River in St. Johnsbury	METALS, OIL	Fairbanks-Morse foundry site: oil spills, other possible contaminants; parker landfill received hazardous waste; groundwater & stream sediments contain elevated metal concentrations
4	Stiles Brook	SEDIMENTATION, CHLORIDE	Impacts from agriculture, Duck Pond, and I89
5	Roberts Brook, Mouth Upstream 0.3 Miles	SEDIMENTATION/SILTATION, POLLUTANTS IN URBAN STORMWATER	Runoff from developed lands
6	Miller Run	SEDIMENT, TEMPERATURE	High embeddedness, riparian agriculture, and development
7	Dish Mill Brook Tributary #2	SEDIMENT	High embeddedness, erosion from parking areas
8	Dish Mill Brook, Mouth to rm 1.3	SEDIMENT, FLOW REGIME MODIFICATION	Scour events from increased peak flows, periodic sedimentation issues
10	Roundy Brook	SEDIMENT	Elevated embeddedness, potential road impacts

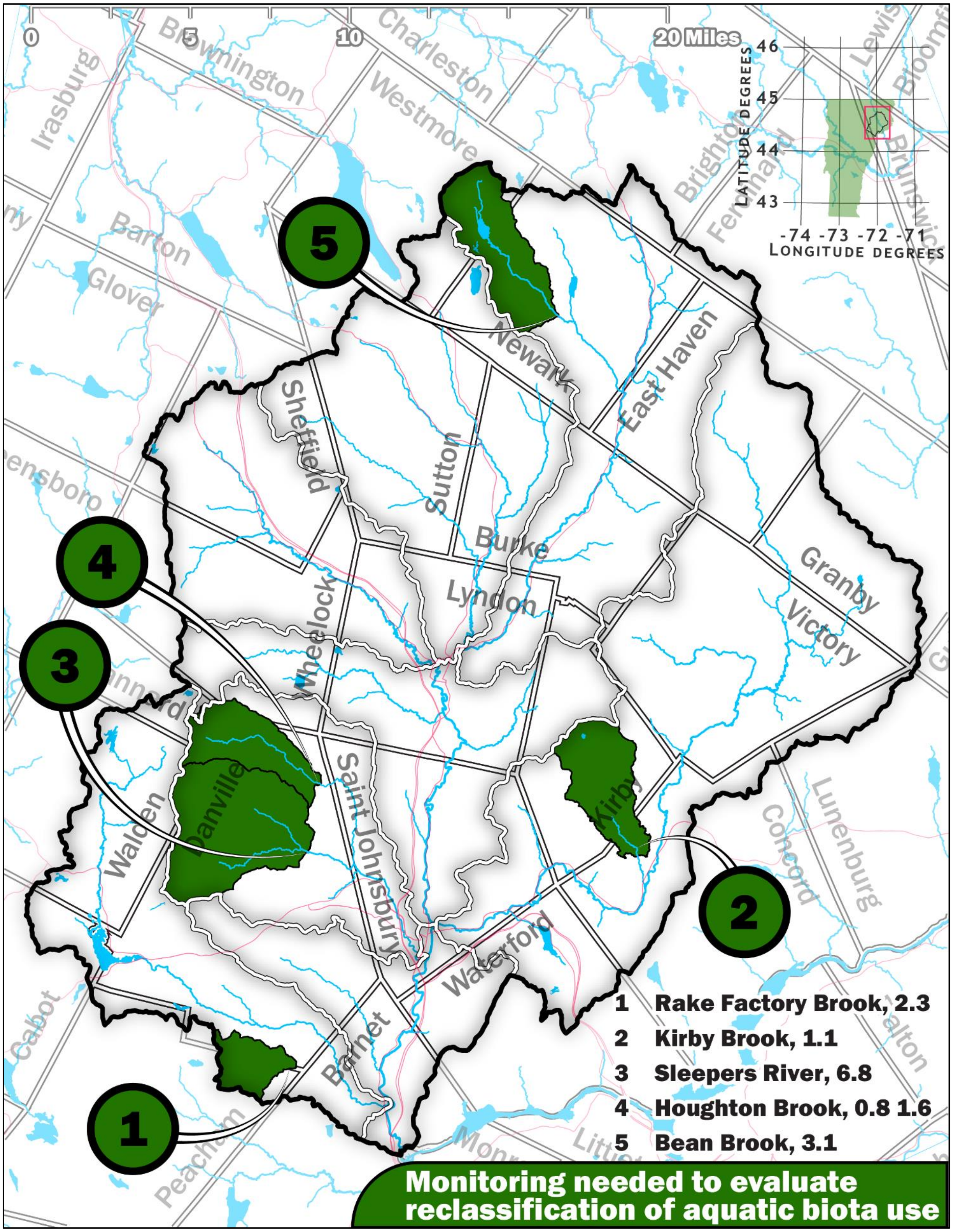


Figure 16 Map of rivers that require more monitoring to assess condition relative to A(1) or B(1) criteria for Aquatic Biota use.

The streams have biological monitoring data between 2012-2022 which suggests Very Good or Excellent. Additional data may be necessary to assess if it meets A(1) or B(1) criteria for Aquatic Biota use.

Table 18 Table of rivers that require more monitoring to evaluate reclassification candidacy. Map IDs correspond with the map above and the years associated with each community field represent additional data requirements for reclassification candidacy verification.

Map ID	Name	Macroinvertebrate	Fish
1	Rake Factory Brook, 2.3	2025	2025
2	Kirby Brook, 1.1	2025	2023, 2026
3	Sleepers River, 6.8	2025	2025
4	Houghton Brook, 0.8 & 1.6	2025	2025
5	Bean Brook, 3.1	2025	2025

Wetlands

The purpose of the Wetland Bioassessment and Monitoring Program ("Program") is to build a pertinent and practical program to assess the biological integrity and ecological condition of Vermont's wetlands. The Program has adopted the EPA's wetland monitoring methodology and is organized into three levels. Level 1 assessments are performed through desktop review and rely on coarse landscape-scale inventory information. Level 2 surveys are a "rapid assessment" at the specific wetland scale and use simple and quick protocols to collect data. Level 2 protocols are calibrated and validated by more intensive assessments known as Level 3, which are rigorous biological assessments that derive multi-metric indices. The Program conducts vegetation surveys to calculate biological metrics with a strong focus on the Coefficient of Conservatism score, which is a numeric scale from 0-10 assigned to each plant species which measures its tolerance and sensitivity to disturbance (Link to latest Bioassessment Report).

Table 23. Number and type of level 3 wetland assessments conducted across Basin 15. NWCA (National Wetland Condition Assessment). Heritage (Natural Heritage Inventory).

Heritage	Transect
15	31

Vermont Rapid Assessment Method (VRAM)

The Level 2 assessment is conducted using the Vermont Rapid Assessment Method (VRAM), which is composed of 6 qualitative metrics used to collect data on the wetland's function, value, and condition. These metrics include wetland area, buffers, hydrology, habitat, special wetland status, and plant communities. It generates a quality score on a scale of 0-100, where the higher the score equates to better wetland quality. From the VRAM information, condition indexes can be calculated that offer additional information to help evaluate human stressor impacts on the wetland and surrounding landscape or evaluate wetland restoration success.

Total VRAM scores (function and condition) are less comparable between wetlands due to the unique characteristics of a given wetland, such as the presence of a rare or threatened plant species or its size. Smaller wetlands generally receive less points than larger wetlands. Therefore, a lower total VRAM score may still demonstrate that a particular wetland is in reference or excellent condition with significant functions present. Function scores between wetlands are also not directly comparable as these scores do not relate specifically to wetland condition nor reflect whether one wetland is exemplary for one or more functions. Condition scores do provide relative comparison of wetland health between wetlands. However, it should be noted that sampling locations are not randomized and conclusions on area-wide wetland health, based on condition scores or total VRAM scores within the basin, cannot be determined at this time.

Additionally, the Program is currently unable to report on basin-wide wetland conditions and trends, impairments, or altered wetlands. The following information provides an overview of the various monitoring, assessment, and mapping objectives the Program is focused on.

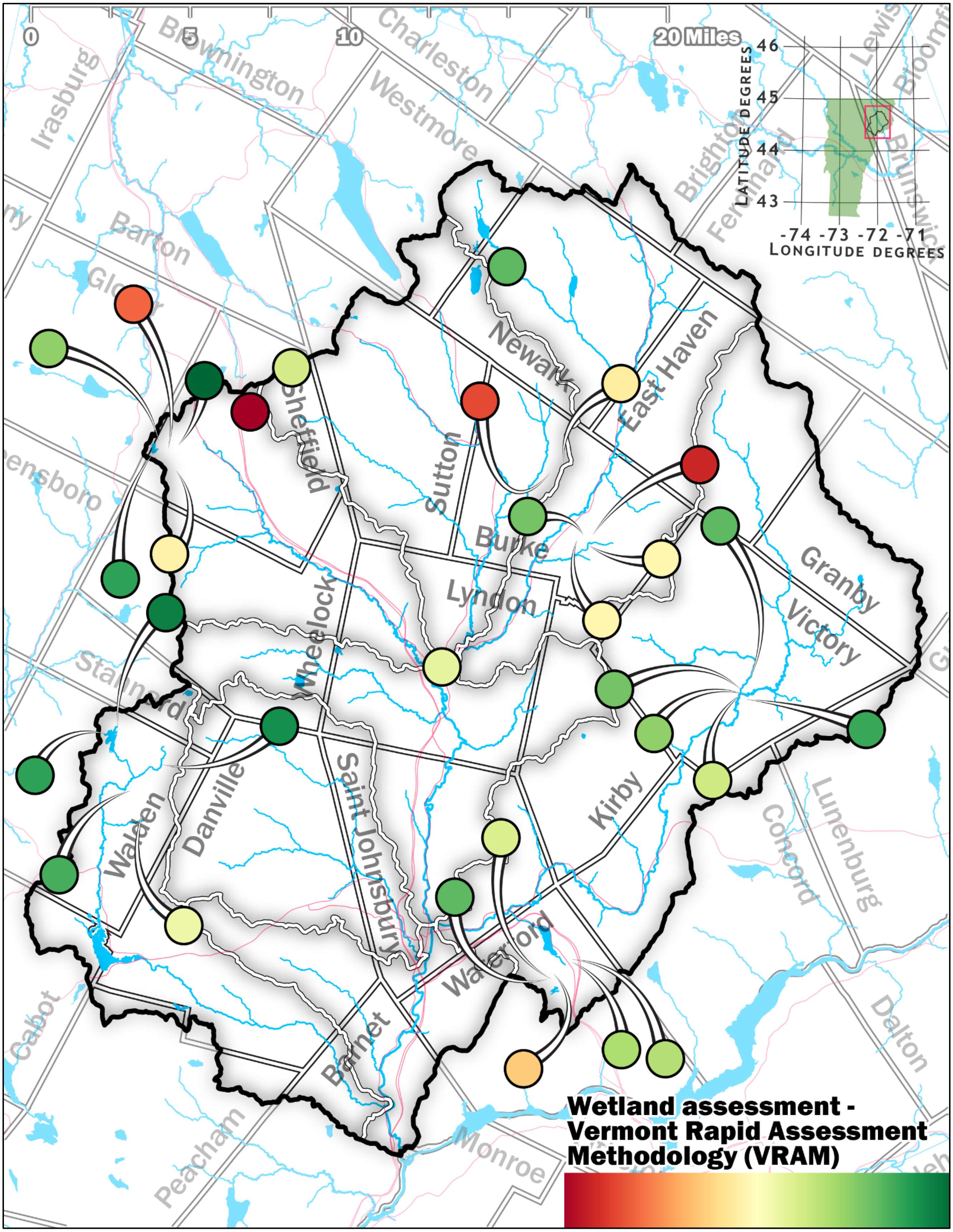


Figure 17. VRAM scores Basin 15.

Table 19 Number of VRAMs conducted in Basin 15, summarized by HUC12 sub-basins. Sub basin size in acres included for reference.

Name	*Sub basin acres*	*VRAM Count*
East Branch Passumpsic River	2114	5
Joes Brook	1794.1	5
Lower Tributaries - Passumpsic River	308.2	0
Millers Run	894.2	6
Moose River	5411.7	10
Sleepers River	557.4	0
Upper Tributaries - Passumpsic River	735.7	1
West Branch Passumpsic River	2173.8	3

Wetland restoration monitoring

In 2017, the Program initiated a pilot project of monitoring restoration sites and associated reference sites. The project focused on sites with (1) recent restoration work; and (2) pre-restoration sites, with the intent to return to the sites as restoration progresses. Monitoring includes Level III assessments, Level II assessments using the VRAM, and tracking wetland restoration success using a metric called the Restoration Indicators of Success (RIS). This metric generates a numeric score calculated by summing the VRAM scores of metrics specifically relevant to and affected by restoration success, such as habitat development and alteration, presence of high-value habitat features, and intactness of hydrologic regime. To learn more about the RIS, and preliminary findings of the restoration monitoring project, click here: (link to RIS and Restoration Report).

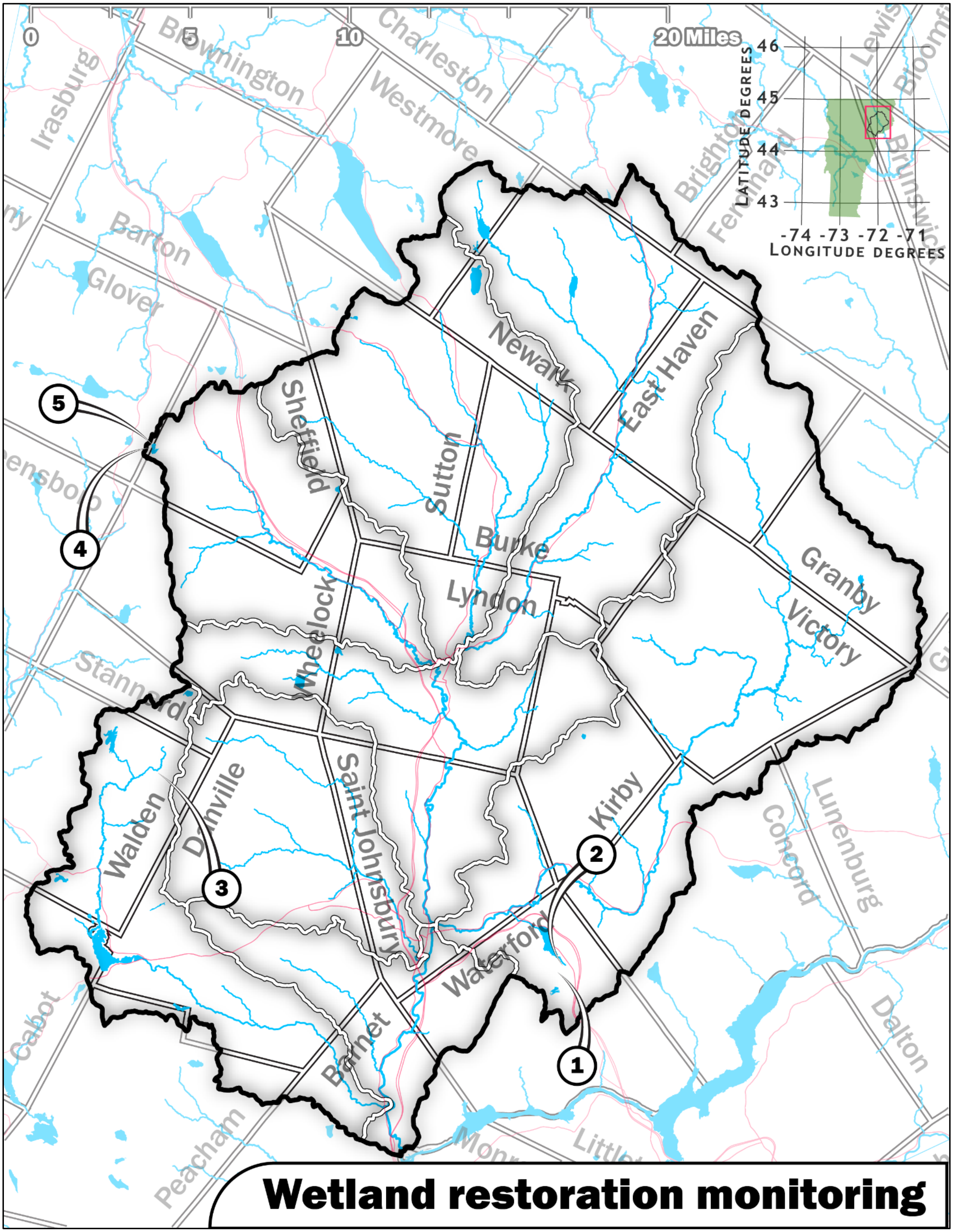


Figure 18 Distribution of wetland restoration sites in basin 15.

Table 20 Wetland restoration monitoring sites in basin 15.

MAP ID	LATITUDE	LONGITUDE	NAME	COMMUNITY	MONITORING DATE
1	44.402	-71.934	Stiles Pond Poor Fen	Poor Fen	8/3/2020
2	44.405	-71.929	Stiles Pond Beaver Meadow	Circumneutral Beaver Meadow	8/3/2020
3	44.494	-72.187	Steam Mill Softwood Swamp	exex	7/27/2020
4	44.638	-72.189	Bruce Pond Cedar Swamp	Northern White Cedar Swamp	7/1/2020
5	44.639	-72.190	Bruce Pond Bog	Dwarf Shrub Bog	7/1/2020

Class 1 wetlands

Class I wetlands are exceptional or irreplaceable in their contribution to Vermont's natural heritage. They provide unmatched environmental functions and values and therefore merit the highest level of protection. Wetlands meeting Class I criteria and sub-criteria can be petitioned for reclassification from Class II to Class I by the public. These criteria evaluate the wetland's size, location, surrounding landscape, condition, and contribution to the functions and values identified by the State of Vermont.

There are no class 1 wetlands in Basin 15 but one candidate wetland, Victory Bog Wetland.

Class I candidate wetlands are those where enough data has been collected to support a petition for reclassification. An important note is there are likely to be multiple additional wetlands in the basin that meet Class I criteria and have not been proposed or have had a complete Class I assessment conducted. For more information on this process see this webpage: https://dec.vermont.gov/watershed/wetlands/class1wetlands

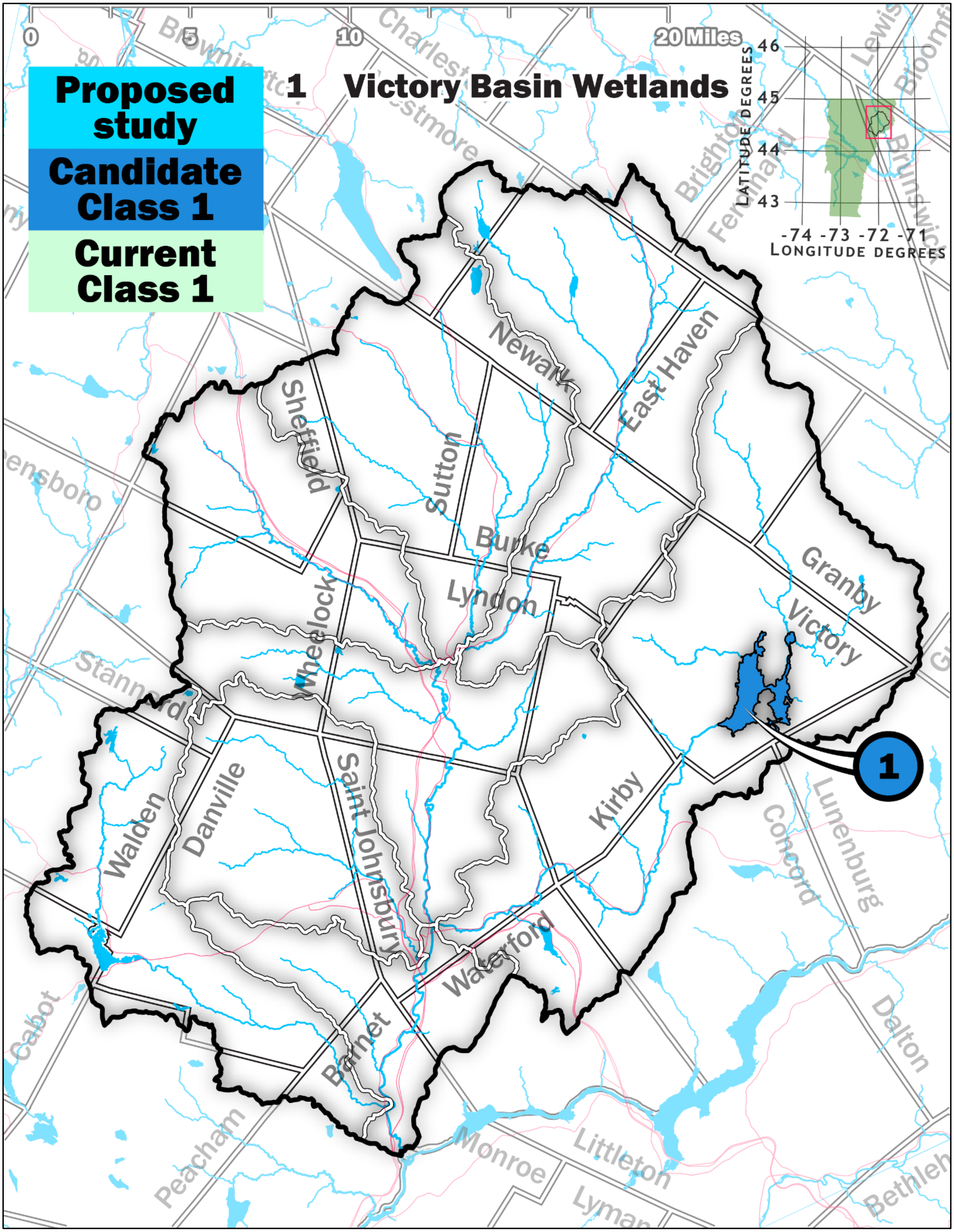


Figure 19 Class 1 wetland candidates.

Table 21 Class 1 wetland candidates.

Map ID	*Latitude*	*Longitude*	*Wetland name*	*Category*	*Towns*
1	44.52015	-71.8142	Victory Basin Wetlands	Candidate Class 1	Victory

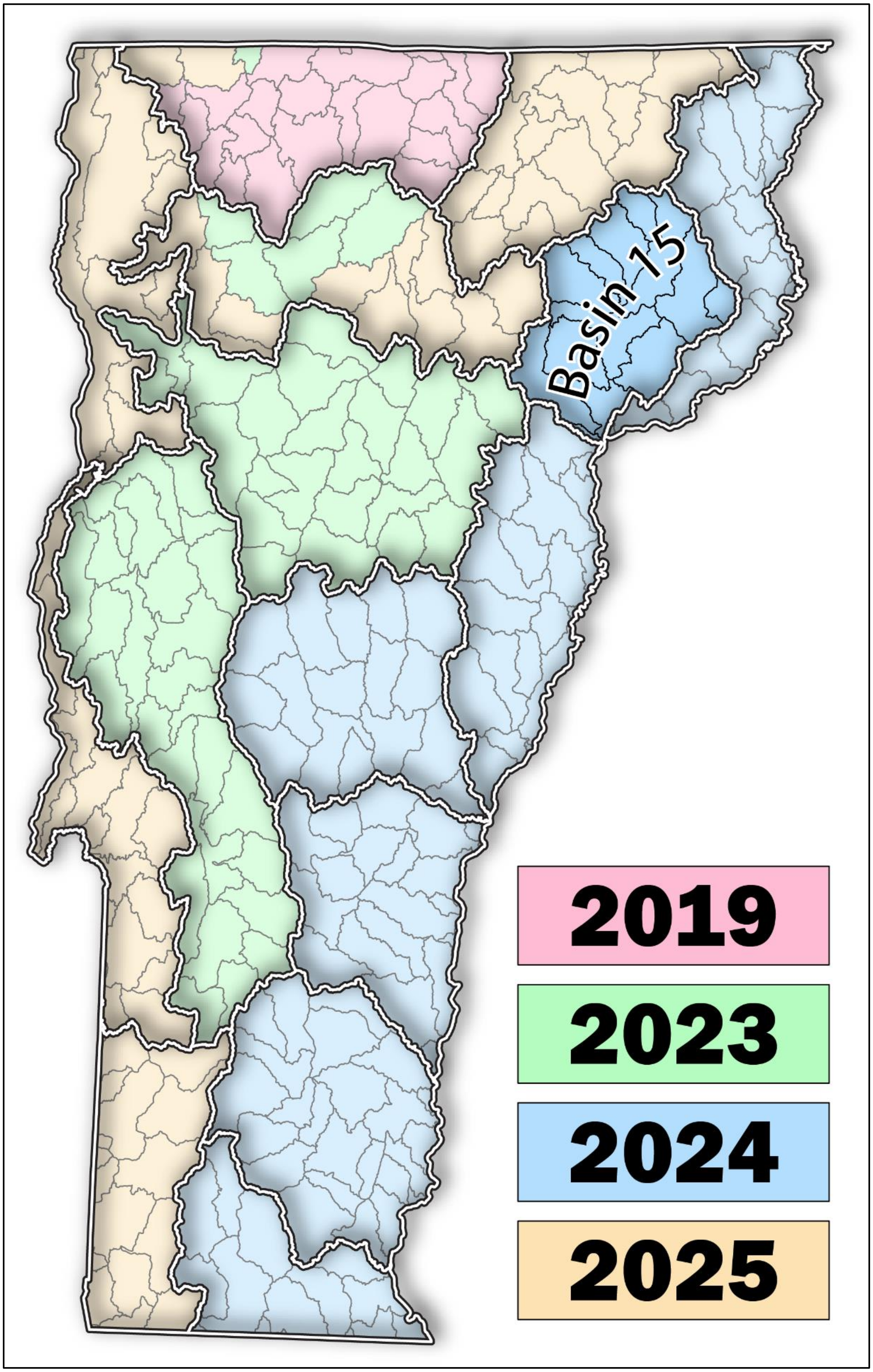


Figure 20. Wetland mapping schedule for Vermont Tactical Basins. Mapping is scheduled for 2024 in Basin 15.

The Vermont Wetlands program is currently in the process of working with contractors and federal agencies to update wetland mapping across the state. This will provide essential data as much of the current mapping is out of date and significantly under maps some types of wetlands such as seepage forests and softwood swamps. New mapping will gradually be made available in the Vermont Significant Wetlands Inventory layer over the next few years, with some basins updated sooner than others. This process has already started with updated mapping currently being added to VSWI for the Missisquoi basin.