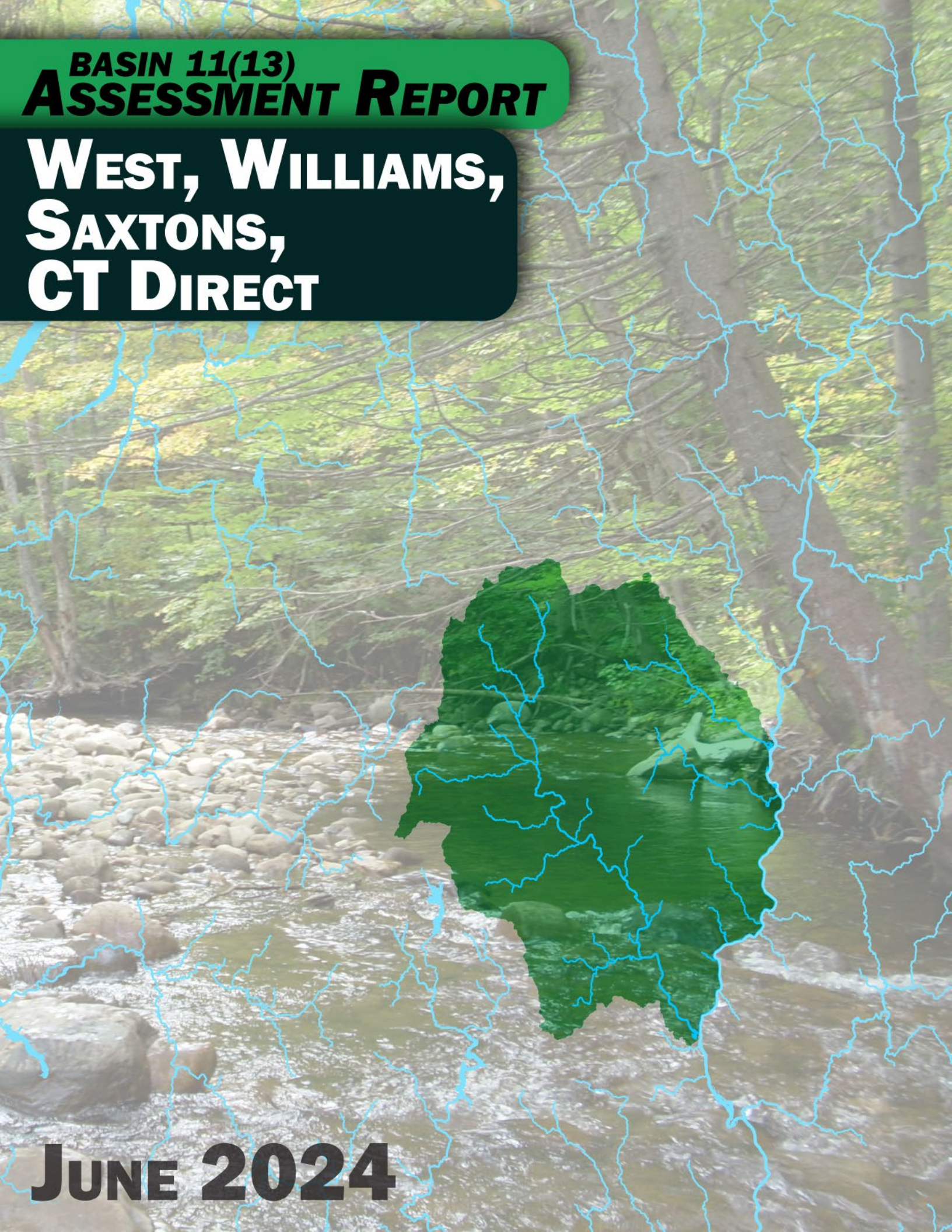
BASIN 11(13)

ASSESSMENT REPORT

WEST, WILLIAMS, SAXTONS, CT DIRECT



JUNE 2024

Contents

Basin overview

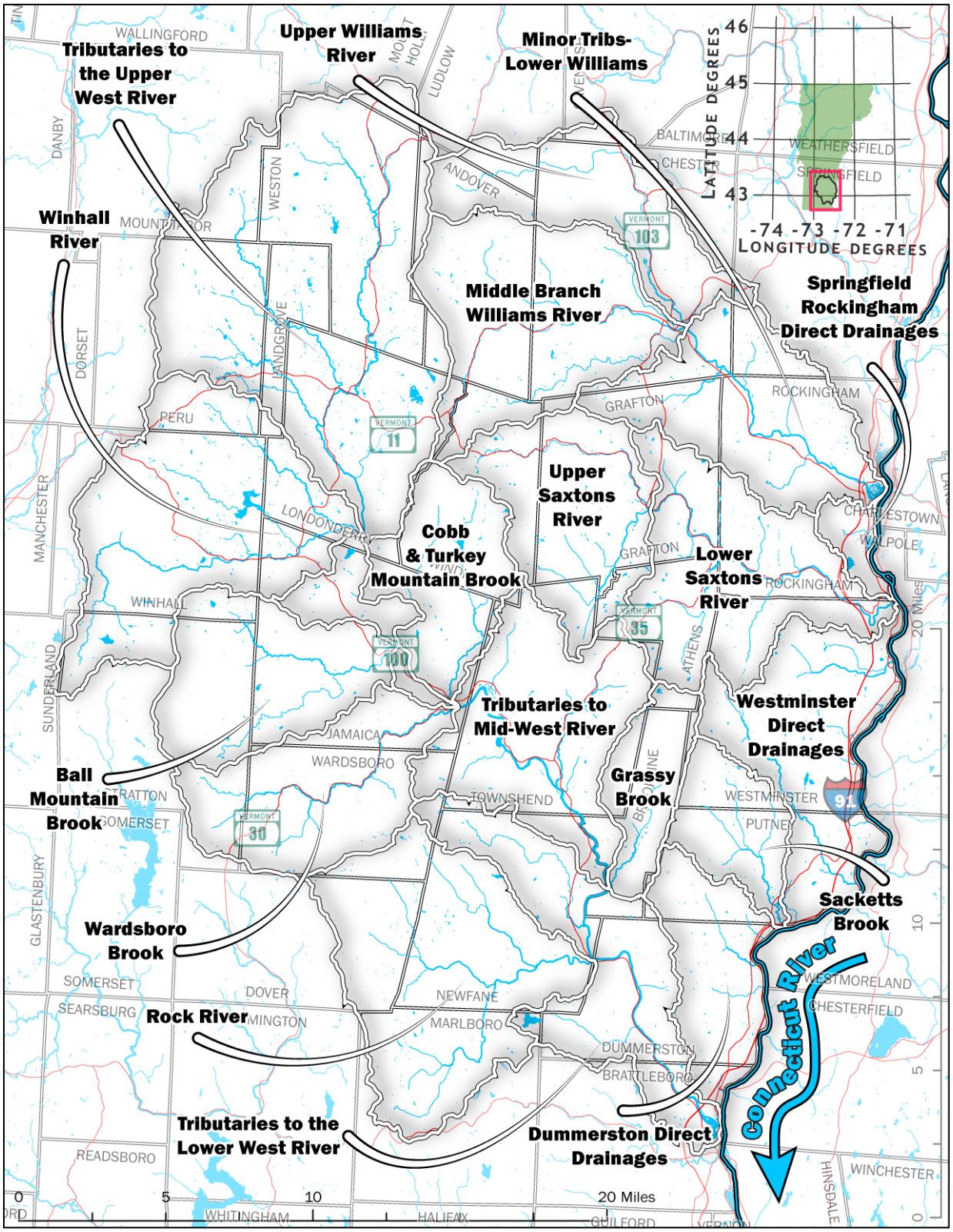


Figure 1 The 454 square mile West, Williams, Saxtons, and CT Direct basin encompasses the northeastern waters of Windham County, far southwestern waters of Windsor County, and the far northeastern waters of Bennington County.

Table 1 Distribution of Strahler stream orders by miles across Basin 11(13). This data is from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

1	2	3	4	5	8
1006	443	237	81	1	28

Table 2 Distribution of lake surface area (acres) across Basin 11(13). Data from the High-Resolution National Hydrography Dataset Plus (NHDPlus).

Lake area (acres)			
<10	*>10<100*	*>100<500*	*>500*
30	24	1	0

Table 3 Distribution of wetland area (acres) across Basin 11(13). Data from the Vermont State Wetland Inventory (VSWI). Contiguous wetlands were combined to account for wetlands complexes containing multiple classes.

<13	*>13<56*	*>56<123*	*>235*
2574	205	11	1

Table 4 Summation of town level human population over time that intersects with Basin 11(13).

Basin-wide human population by year				
1980	*1990*	*2000*	*2010*	*2020*
25762	29324	30529	31139	31659

Table 5 . Major waters of Basin 11(13).

Largest River	West River (54.4 miles)
Largest Lake or Reservoir	Gale Meadows Pond (195 acres)
Deepest Lake or Reservoir	Minards Pond (46 feet)
Largest Wetland Complex	Stratton Wetland Complex (235 acres; 43.038, -72.932)

Land cover

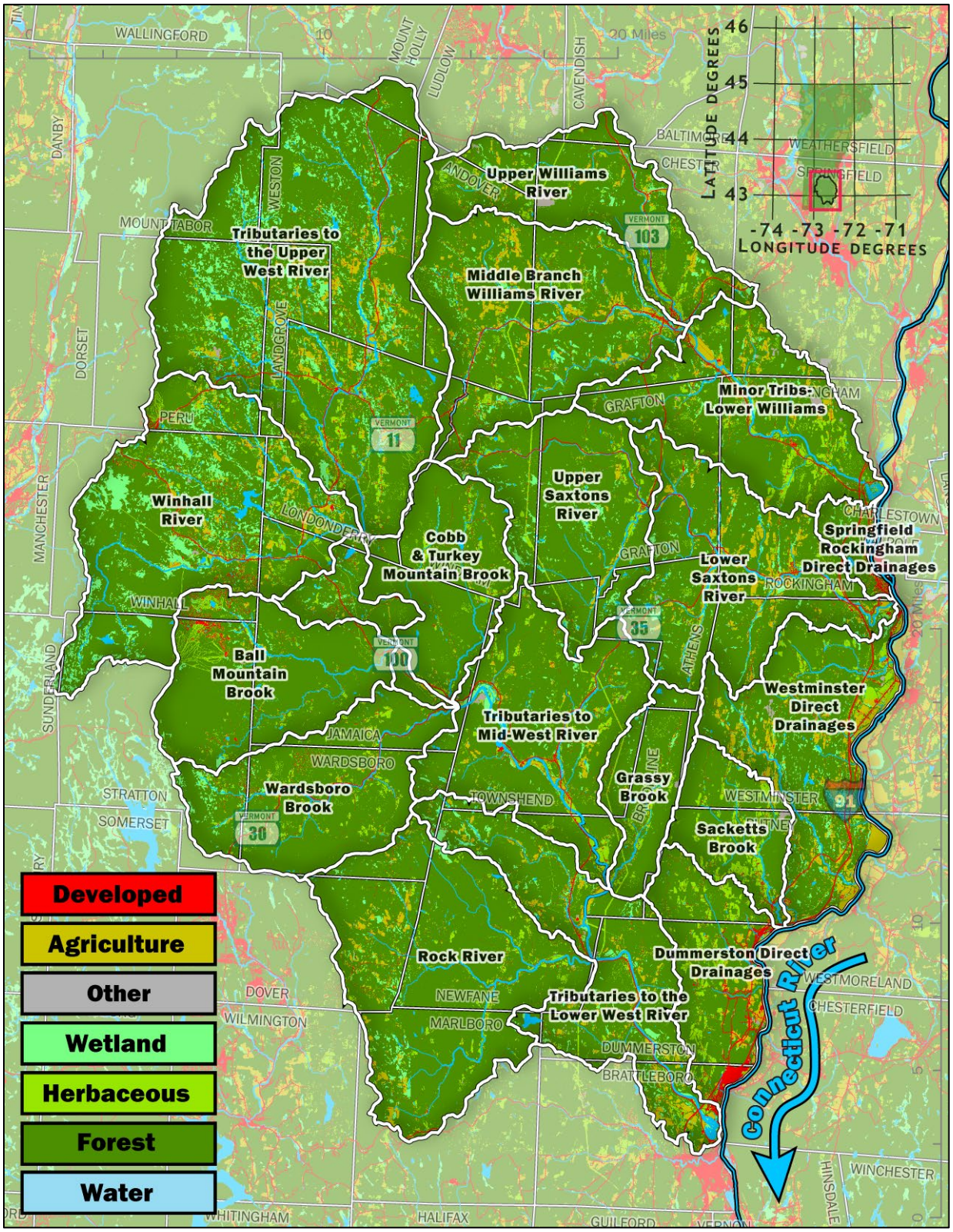


Figure 2. Landcover based on the 1-meter Lake Champlain land cover dataset produced by the University of Vermont spatial analysis laboratory and the Lake Champlain Basin program.

Table 6 The percentage of major land cover types across the Vermont WBID subwatersheds of Basin 11(13). Based on the 0.5-meter Vermont 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 and coniferous are categorized as forest. The "other" category includes shrubs and barren land. Wetlands are also found throughout other cover types.

Name	Acres	Developed %	Agriculture %	Other %	Wetlands %	Herbaceous %	Forest %	Water %
Ball Mountain Brook	21523	2.4	0.6	0.4	6.5	5.3	84.4	0.4
Cobb & Turkey Mountain Brooks	16262	1.1	2.5	0.5	4.6	2.6	87.7	1.0
Dummerston Direct Drainages	14530	4.8	13.3	0.9	4.6	5.9	70.4	0.2
Grassy Brook	9437	1.1	2.7	1.8	4.5	3.8	85.8	0.3
Lower Saxtons River	27969	2.0	6.1	0.4	5.3	4.0	81.5	0.6
Middle Branch - Williams River	30707	1.8	5.6	0.8	5.1	5.1	81.3	0.3
Minor Tribs - Lower Williams	24417	2.0	7.7	1.5	6.8	4.4	76.7	0.9
Rock River	36862	1.2	3.5	0.4	4.9	2.9	86.7	0.4
Sacketts Brook	10181	2.1	12.4	1.1	6.1	3.1	75.1	0.1
Springfield-Rockingham Direct Drainages	2987	9.7	1.1	0.5	6.0	7.3	71.1	4.2
Tributaries to Mid-West River	33584	1.6	3.4	1.0	5.0	3.7	83.9	1.3
Tributaries to the Lower West River	25169	2.3	5.0	1.0	5.9	5.0	78.7	2.1
Tributaries to the Upper West River	64601	1.6	3.8	0.5	11.3	4.0	77.9	0.9
Upper Saxtons River	21941	0.9	2.8	1.1	5.8	2.8	86.1	0.4
Upper Williams River	19687	1.7	5.0	2.0	5.2	4.9	81.0	0.2
Wardsboro Brook	22536	1.7	2.4	0.4	5.3	3.5	86.3	0.4
Westminster Direct Drainages	24862	3.1	13.2	0.9	7.5	4.8	70.1	0.3
Winhall River	38181	1.8	2.9	0.8	14.1	4.4	74.8	1.2

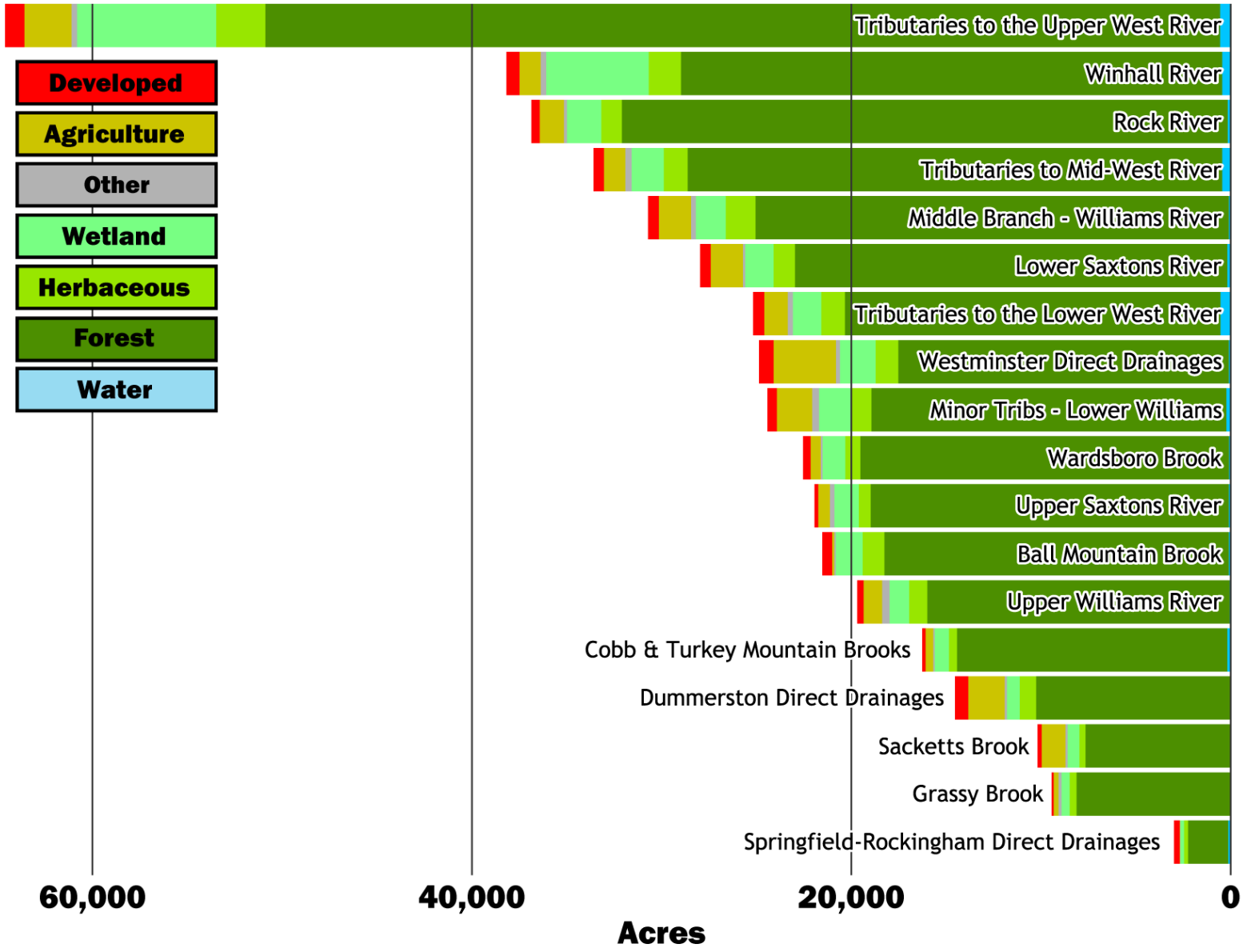


Figure 3 Land cover acreage across WBIDs.

Lakes and Ponds

Conditions and trends

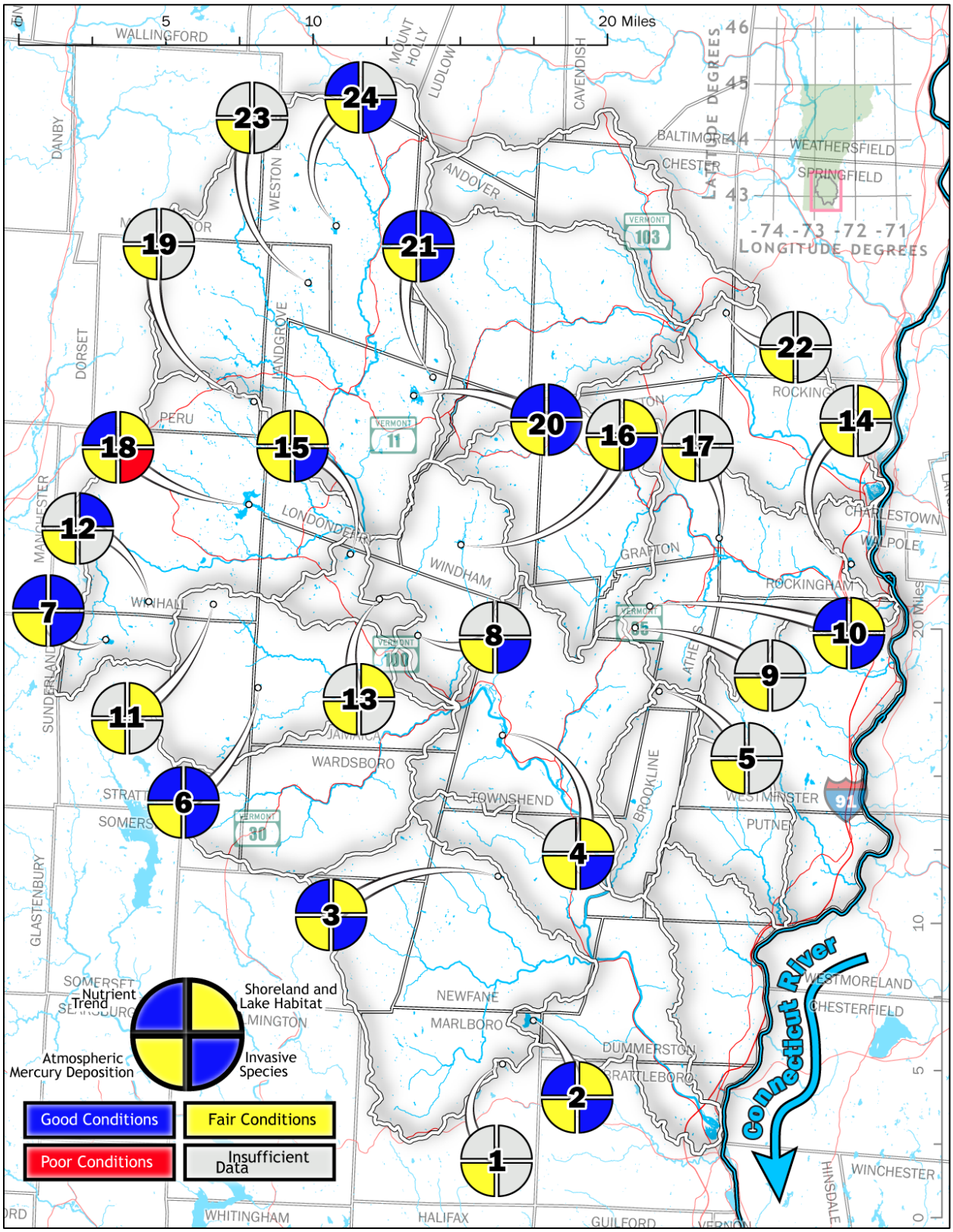


Figure 4. Lake scorecards for Basin 11(13). Only lakes greater than 10 acres are included. Lake IDs and additional information is provided in the table below.

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 twenty-four lakes in Basin 11(13). 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	HALLADAY;	10.5		Insufficient data	Insufficient data	Insufficient data	Fair
2	SUNSET (MARLBR)	97.6	35	Good	Good	Good	Fair
3	KENNY	20.2	11	Good	Fair	Good	Fair
4	TOWNSHEND	71.5	3	Insufficient data	Fair	Good	Fair
5	LILY (ATHENS)	12.5		Insufficient data	Insufficient data	Insufficient data	Fair
6	FORESTER	13.5	5	Good	Good	Good	Fair
7	STRATTON	48.0	18	Good	Good	Good	Fair
8	ADAM	10.4		Insufficient data	Insufficient data	Good	Fair
9	WESTMINSTER-W;	10.9		Insufficient data	Insufficient data	Insufficient data	Fair
10	ATHENS	20.6	12	Good	Fair	Good	Fair
11	STRATTON SKI AREA;	16.9	13	Insufficient data	Fair	Insufficient data	Fair
12	LITTLE (WINHLL)	17.1	2	Insufficient data	Good	Insufficient data	Fair
13	BALL MOUNTAIN	20.3	37	Insufficient data	Fair	Insufficient data	Fair
14	MINARDS	46.7	46	Insufficient data	Fair	Insufficient data	Fair
15	COLE	41.4	13	Fair	Fair	Good	Fair
16	BURBEE	32.2	5	Insufficient data	Fair	Good	Fair
17	CAMBRIDGEPORT;	30.9		Insufficient data	Insufficient data	Insufficient data	Fair
18	GALE MEADOWS	195.4	20	Good	Fair	Poor	Fair
19	MUD (PERU)	13.2		Insufficient data	Insufficient data	Insufficient data	Fair
20	LOWELL	93.4	22	Good	Good	Good	Fair
21	LILY (LONDRY)	26.7	8	Good	Good	Good	Fair
22	TELEPHONE;	19.2	2	Insufficient data	Insufficient data	Insufficient data	Fair
23	LANDGROVE;	15.2		Insufficient data	Insufficient data	Insufficient data	Fair
24	WANTASTIQUET	45.6	14	Good	Insufficient data	Good	Fair

Lake Reclassification

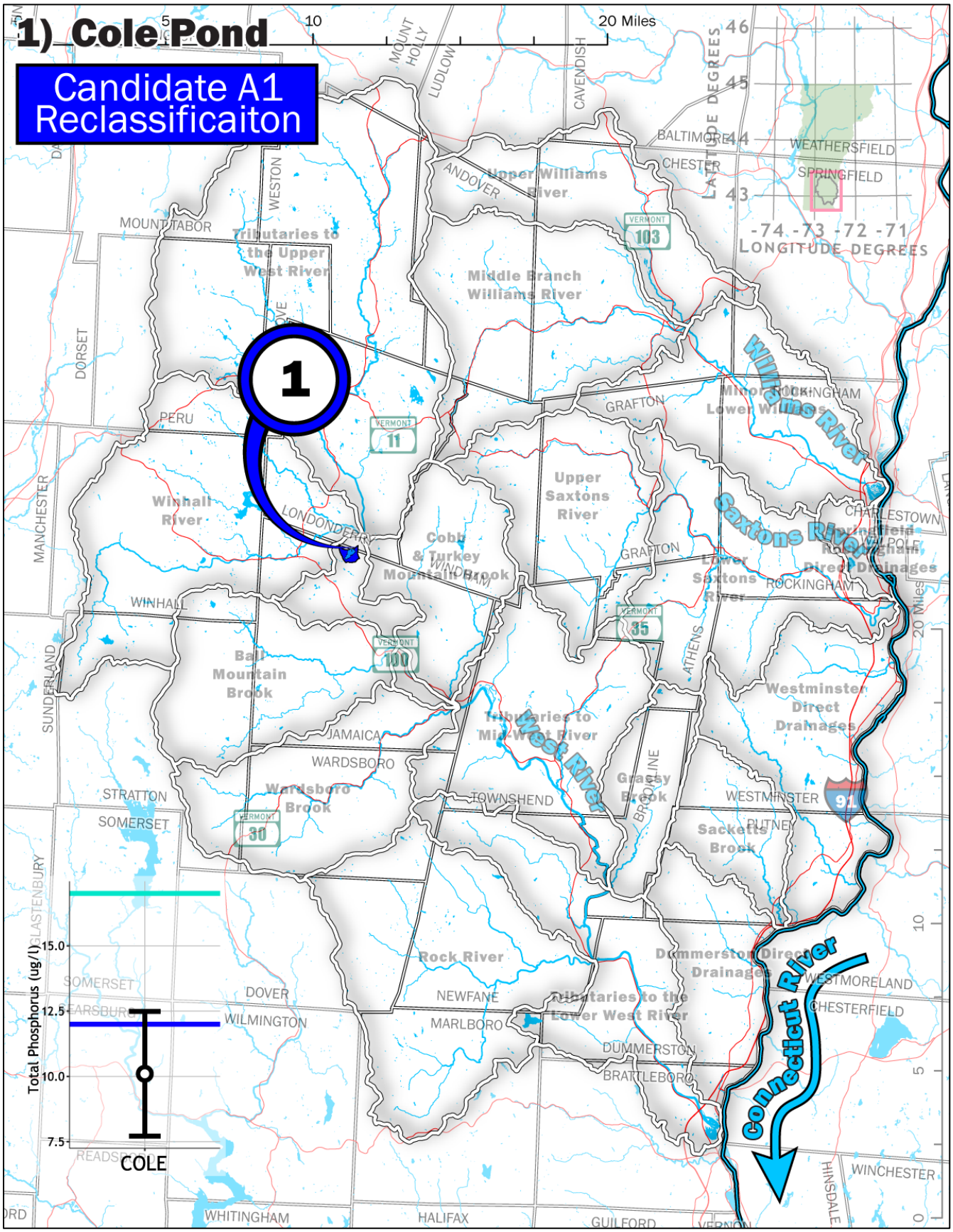


Figure 5 Lake reclassification candidates and their corresponding watersheds.

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): Cole Pond (all of these sites have lay monitors collecting water samples for total phosphorus and chlorophyll-a in addition to Secchi depth).

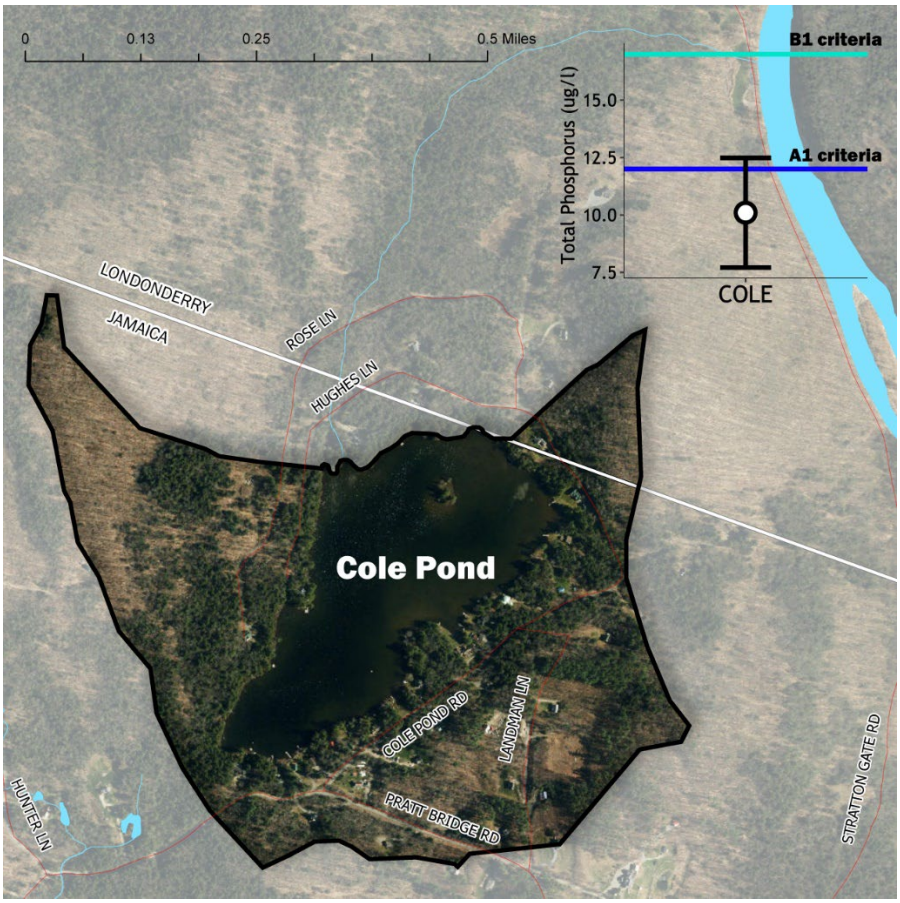


Figure 6 Cole Pond Watershed map

Impaired Lakes

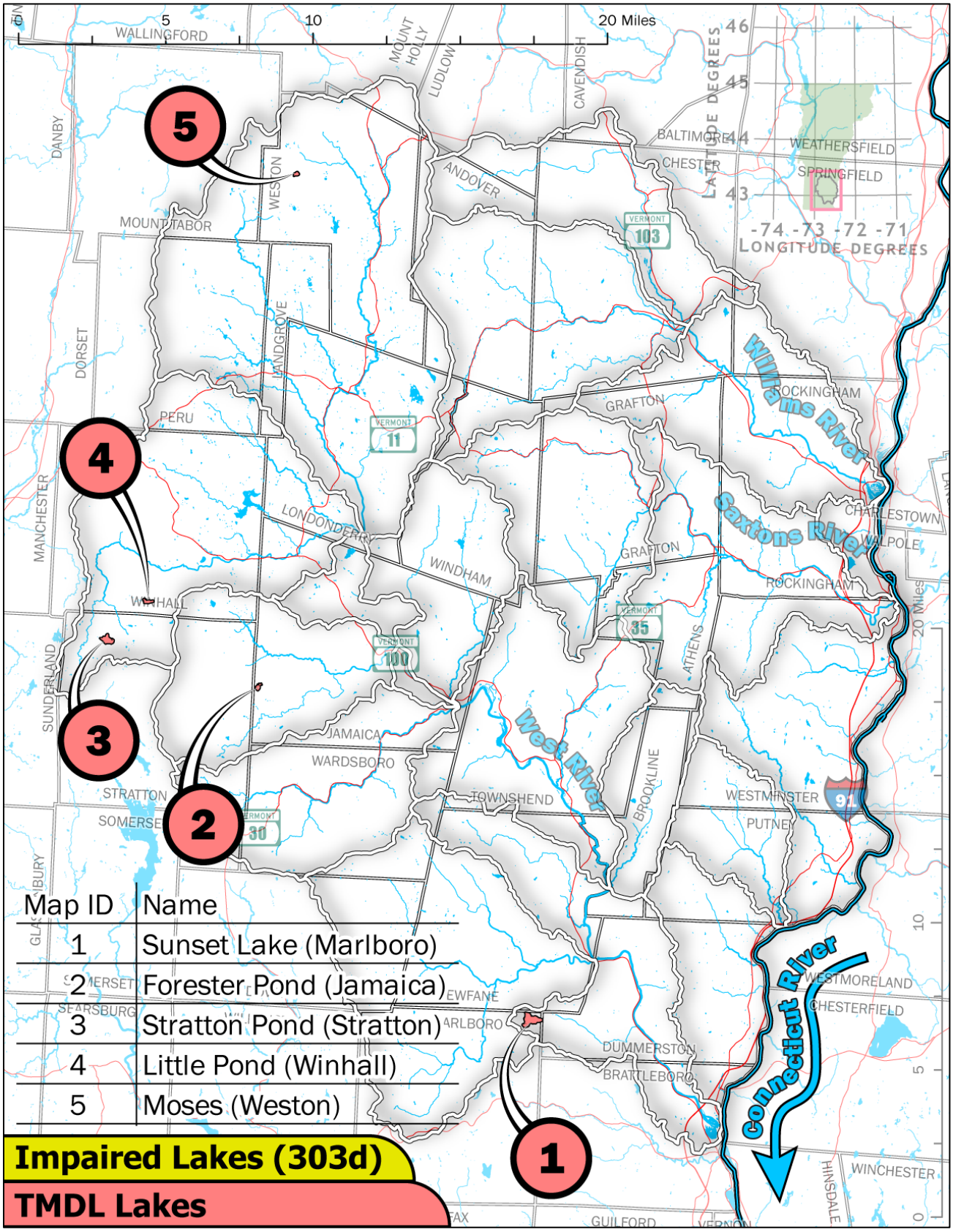


Figure 7 Map of impaired lakes across Basin 11(13) through 2024. Salmon color represent lakes that are on Part D of the Priority Waters List and have an approved Total Maximum Daily Load (TMDL).

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. Fifteen sections of Lake Champlain are impaired and listed in Table 8, .

Table 8 List of impaired lakes across Basin 11(13). 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	Sunset Lake (Marlboro)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	pH	D
2	Forester Pond (Jamaica)	Observed Al always exceeds Acute criteria	ALUMINUM, TOTAL, pH	D
3	Stratton Pond (Stratton)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	pH	D
4	Little Pond (Winhall)	Atmospheric deposition: extremely sensitive to acidification; episodic acidification	pH	D
5	Moses (Weston)	Atmospheric deposition: critically acidified; chronic acidification	pH	D

Altered Lakes

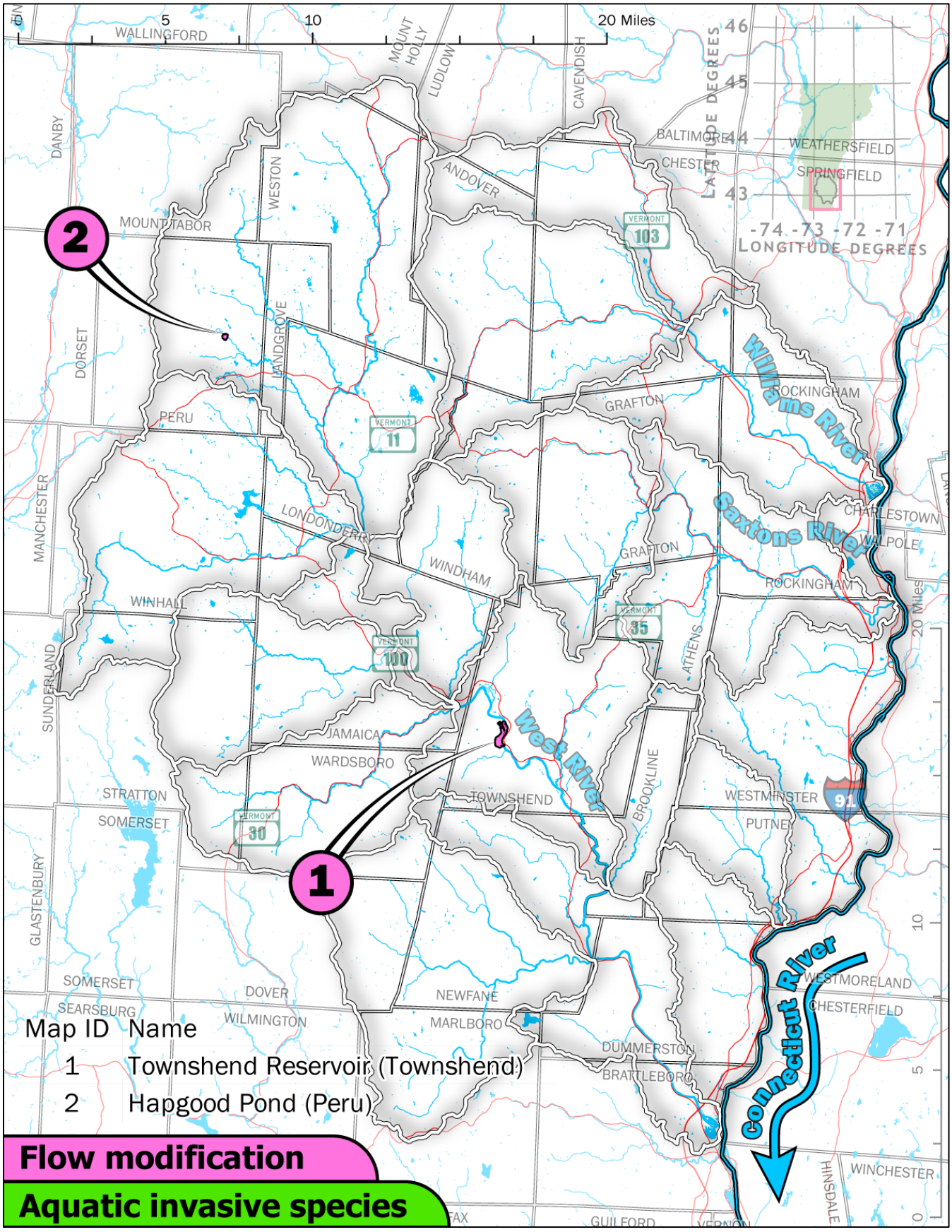


Figure 8 Map of altered lakes for Basin 11(13). Lakes in green are those altered by aquatic invasive species.

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 11(13).

MAP ID	NAME	PROBLEM	PART
1	Townshend Reservoir (Townshend)	Water level fluctuation alters aquatic habitat, USACE dam; no conservation flow based on any biological/wq criteria	F
2	Hapgood Pond (Peru)	Annual drawdowns alter aquatic habitat	F

Phosphorus Trends in Lakes

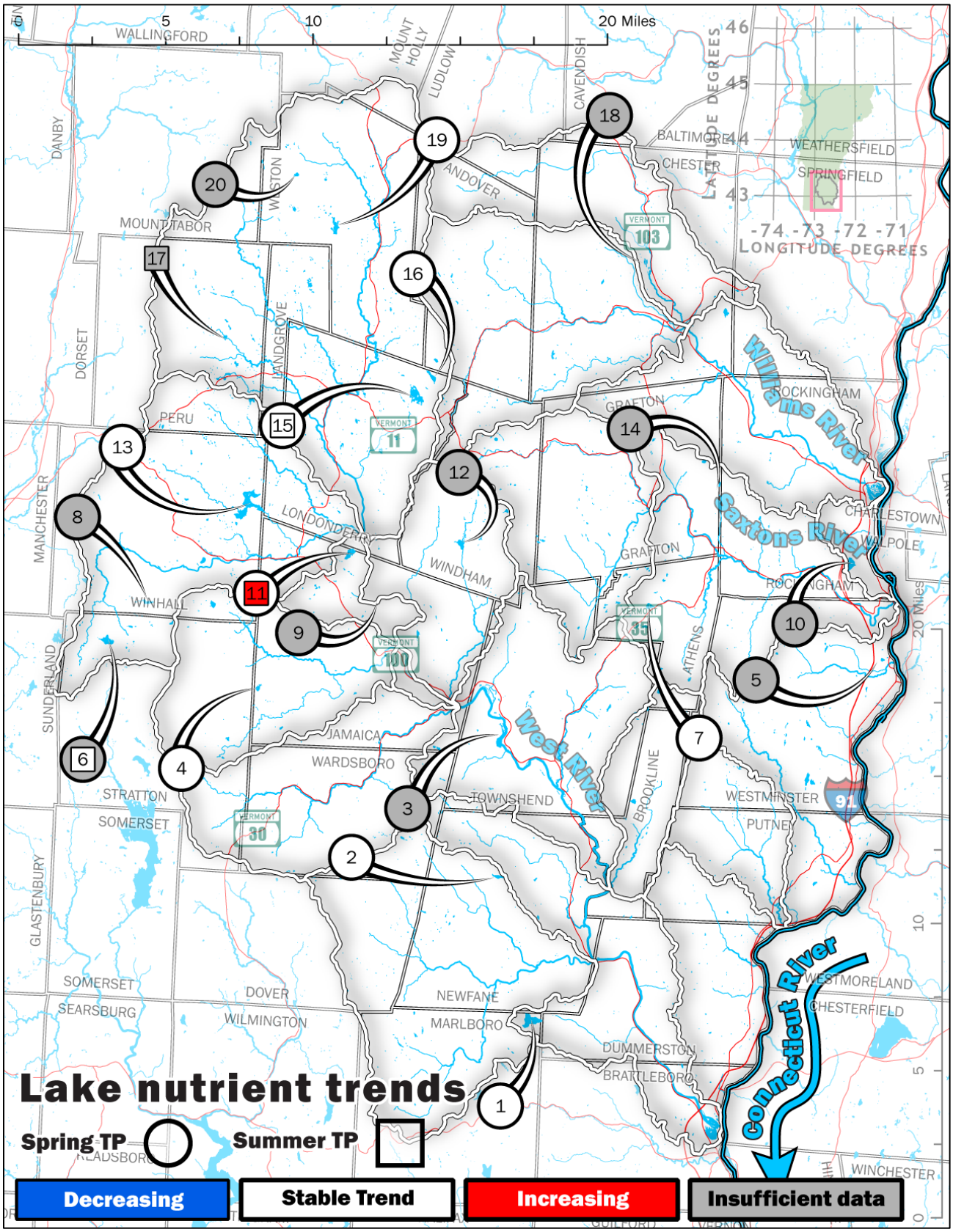


Figure 9 Total phosphorus trends for lakes in Basin 11(13). Note that trends can be for either spring or summer data or for both.

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	SUNSET (MARLBR)	No data	Stable
2	KENNY	No data	Stable
3	TOWNSHEND	No data	Insufficient data
4	FORESTER	No data	Stable
5	WESTMINSTER-E;	No data	Insufficient data
6	STRATTON	Stable	Insufficient data
7	ATHENS	No data	Stable
8	LITTLE (WINHLL)	No data	Insufficient data
9	BALL MOUNTAIN	No data	Insufficient data
10	MINARDS	No data	Insufficient data
11	COLE	+	Stable
12	BURBEE	No data	Insufficient data
13	GALE MEADOWS	No data	Stable
14	WEAVER;	No data	Insufficient data
15	LOWELL	Stable	Stable
16	LILY (LONDRY)	No data	Stable
17	HAPGOOD	Insufficient data	No data
18	BAILEYS MILLS;	No data	Insufficient data
19	WANTASTIQUET	No data	Stable
20	MOSES	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.

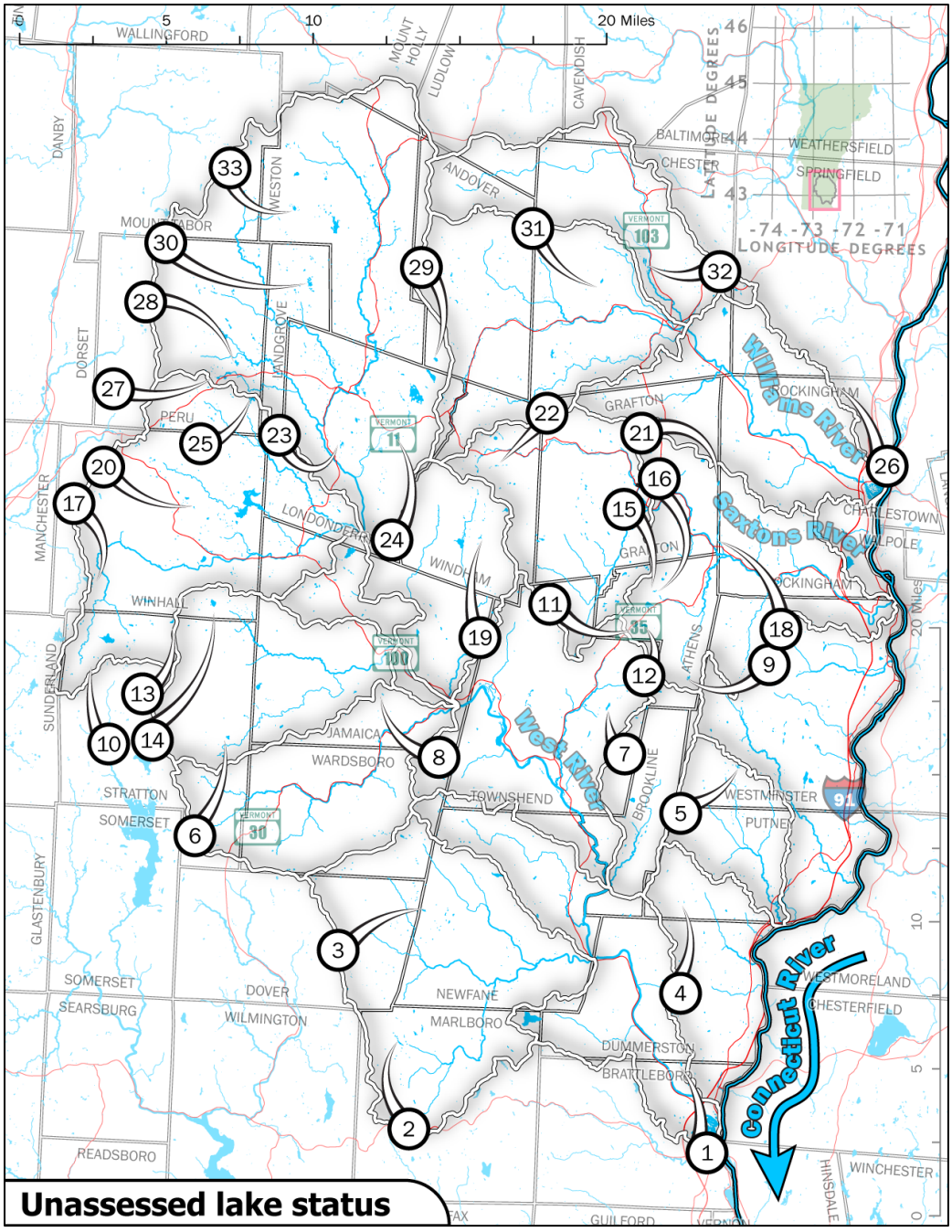


Figure 10 Lakes with insufficient data to assess water quality status.

[1] Brown, M. T., & Vivas, M. B. (2005). Landscape development intensity index. Environmental monitoring and assessment, 101, 289-309.

Table 11. Landcover of watersheds of lakes with insufficient data to determine water quality status.

			Acres		Percent						
Map ID	Lake ID	Watershed Disturbance	Lake	Watershed	Developed	Agriculture	Other	Wetlands	Herbaceous	Forest	Water
1	KIPLING;	Insufficient data	4.2	22.3	1.6	11.0	0.0	2.9	2.2	69.3	13.0
2	WORDEN;	Insufficient data	4.1	475.4	0.2	2.6	0.1	13.7	0.9	81.6	0.9
3	ELWIN MEADOW	Insufficient data	4.4	235.7	1.1	0.3	0.0	8.0	2.8	85.8	1.9
4	SALMON;	Fair	0.4	519.0	0.7	7.3	2.4	7.2	1.6	80.0	0.7
5	HICKORY;	Insufficient data	3.7	104.7	1.5	6.5	0.5	15.2	6.9	67.2	2.2
6	KIDDER;	Insufficient data	6.0	49.6	4.6	0.0	0.3	5.0	9.4	69.6	11.0
7	SIMPSONVILLE;	Insufficient data	8.8	384.6	1.1	4.6	0.5	8.0	6.4	77.6	1.9
8	KINGSTON;	Insufficient data	1.2	150.4	0.5	2.4	0.0	14.6	0.3	82.2	0.0
9	HEDGEHOG GULF;	Insufficient data	5.5	267.1	0.7	0.0	1.3	4.3	3.3	88.0	2.5
10	WINHALL;	Insufficient data	0.7	168.4	0.0	0.0	0.1	22.7	0.1	76.6	0.6
11	WESTMINSTER-W;	Insufficient data	10.9	1120.9	1.5	11.2	0.0	4.6	2.6	79.9	0.2
12	ATHENS-357;	Insufficient data	8.0	477.9	1.5	1.8	0.0	11.1	5.0	78.2	2.4
13	WINDHAM;	Insufficient data	5.6	44.9	5.7	0.0	0.0	0.1	6.4	75.4	12.4
14	STRATTON SKI AREA;	Poor	16.9	1405.6	12.0	0.0	0.2	0.8	23.8	61.7	1.5
15	EAST TWIN	Insufficient data	0.9	277.6	2.1	0.0	0.2	5.5	6.4	85.3	0.5
16	WEST TWIN	Insufficient data	0.5	108.9	1.4	0.0	0.3	2.5	6.2	89.5	0.1
17	LYE;	Insufficient data	0.7	103.1	0.0	0.0	0.7	46.4	0.3	51.7	0.8
18	CAMBRIDGEPORT;	Insufficient data	30.9	2121.9	1.3	6.0	0.3	5.9	2.1	84.1	0.2
19	BLAKE;	Insufficient data	2.7	40.7	0.0	0.0	0.0	32.3	0.9	61.2	5.6
20	RED;	Insufficient data	0.9	549.6	2.9	4.9	0.9	11.8	5.7	72.7	1.3
21	WEAVER;	Insufficient data	4.5	313.7	0.7	3.6	0.0	3.5	0.7	90.2	1.4
22	TIMBER RIDGE;	Insufficient data	1.5	115.7	0.0	0.0	0.2	9.4	0.5	88.4	1.6
23	SOUTH LONDONDERRY;	Insufficient data	5.3	97.9	2.0	16.4	0.0	8.2	6.2	62.9	4.3
24	THOMPSONBURG;	Insufficient data	2.2	494.2	3.6	0.0	0.4	2.1	18.8	74.5	0.6
25	MUD (PERU)	Good	13.2	377.1	0.9	0.0	2.1	14.2	3.4	76.0	3.4
27	PERU;	Insufficient data	3.9	308.7	4.4	3.5	0.1	9.5	15.9	64.2	2.5
28	FLOOD;	Poor	8.3	84.3	3.3	13.3	0.2	8.9	9.0	56.3	9.1
30	LANDGROVE;	Fair	15.2	373.0	1.8	7.7	0.3	15.9	4.7	65.6	4.0
31	CHESTER	Insufficient data	5.2	413.0	0.9	2.1	0.2	9.0	0.6	86.1	1.1
32	BAILEYS MILLS;	Insufficient data	5.3	74.1	1.6	2.9	0.0	3.0	8.8	79.0	4.7
33	PEABODY;	Insufficient data	7.3	181.6	0.4	0.0	0.0	14.0	0.6	84.8	0.2

Rivers

Conditions and trends

Physical condition

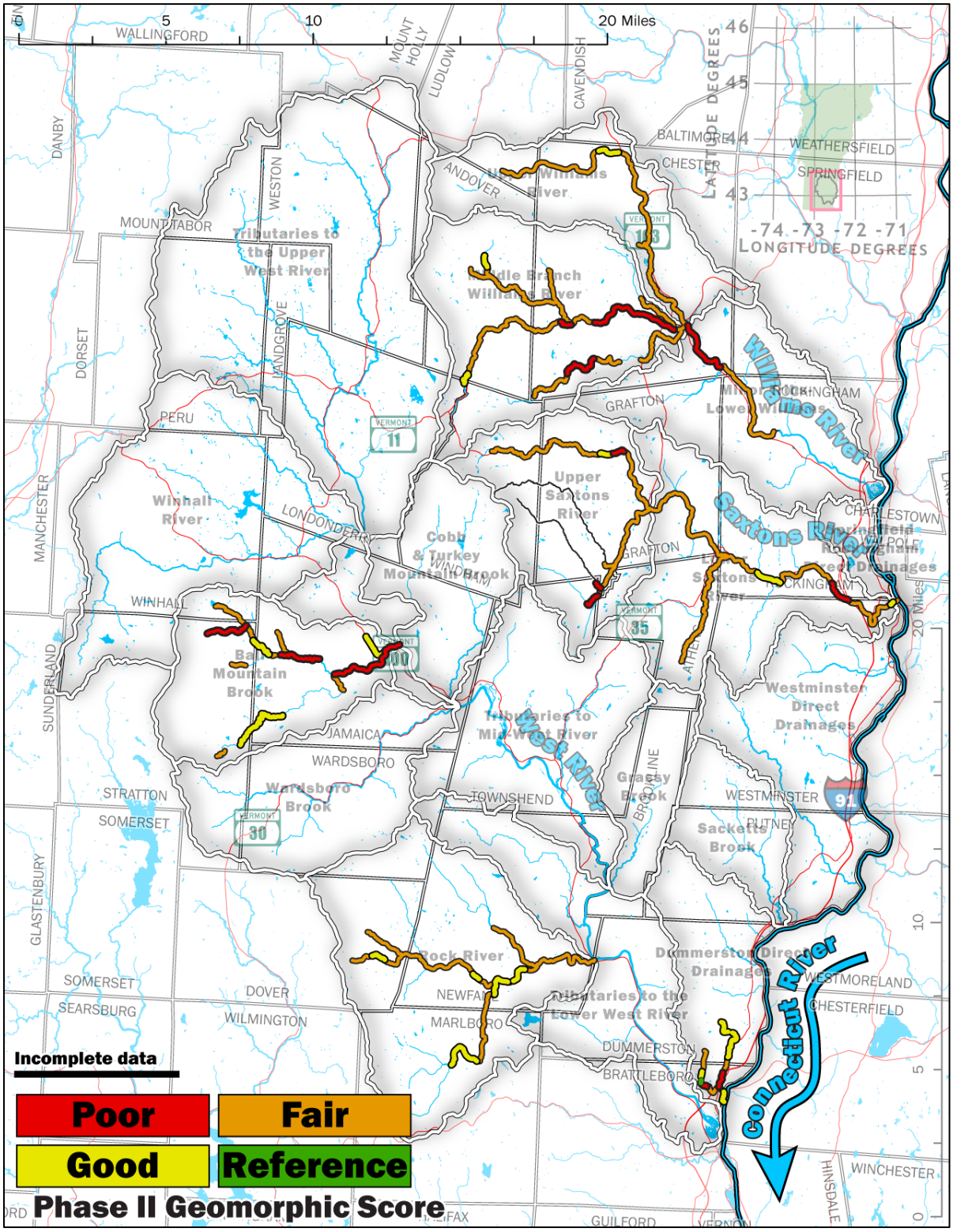


Figure 11 Map of rivers in Basin 11(13), with Phase II geomorphic condition scores through 2023. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

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 11(13). 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 11(13), final reports for each project can be found at: *https://anrweb.vt.gov/DEC/SGA/finalReports.aspx*.

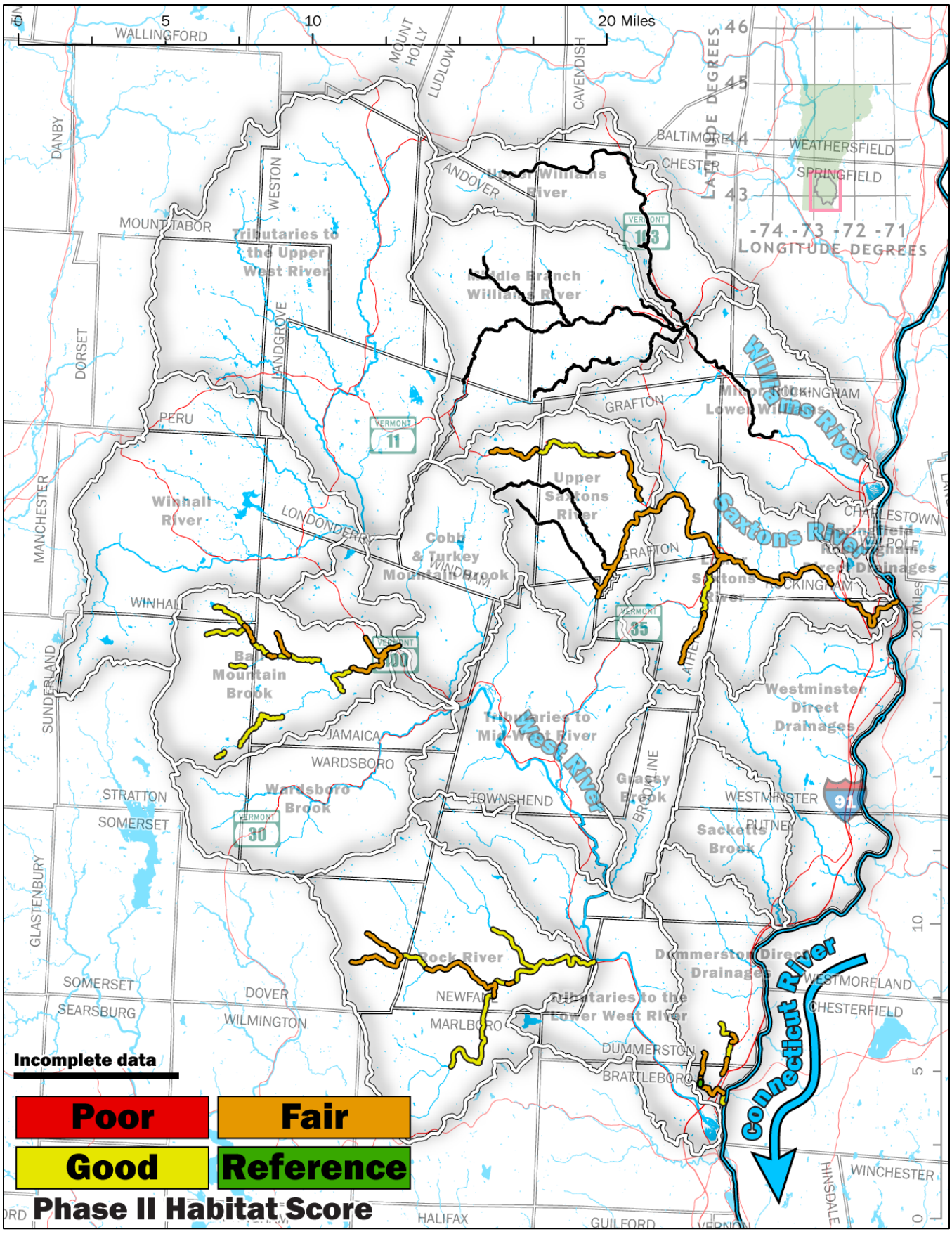


Figure 12 Map of rivers in Basin 11(13) Phase II habitat condition ratings through 2023. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

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.

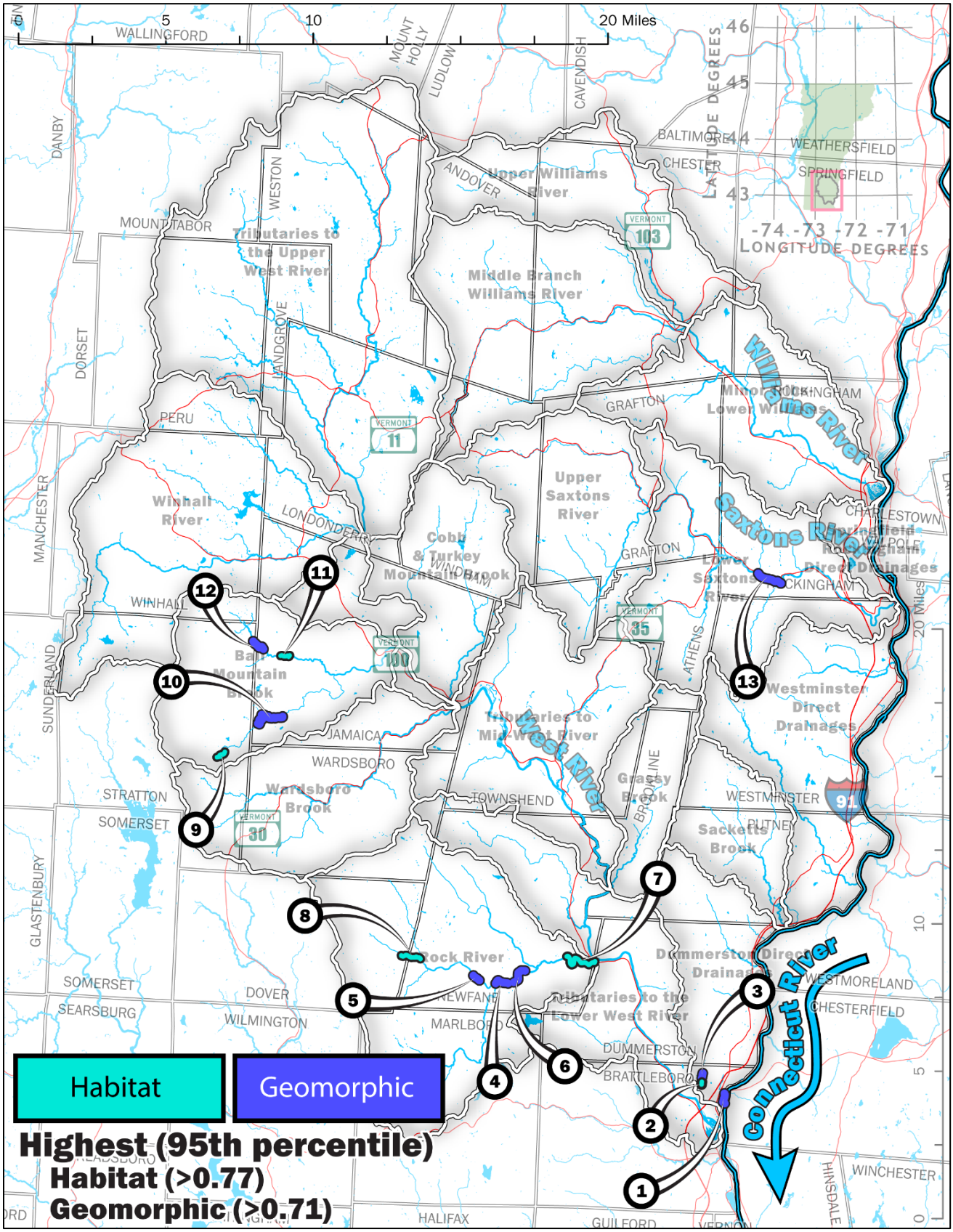


Figure 13. Map of the 95th percentile (highest) habitat and geomorphic condition scores (Basin 11(13) south section). Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap does occur.

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	147_M01A	Crosby Brook			link	42.880	-72.555
2	147_T1.02C	Crosby Brook South Branch			link	42.888	-72.570
3	147_T1.02E	Crosby Brook South Branch			link	42.892	-72.569
4	89_T02.05C	Rock River			link	42.937	-72.704
5	89_T02.06B	Rock River			link	42.939	-72.721
6	89_T02.05A	Rock River			link	42.941	-72.693
7	89_T02.01-	Rock River			link	42.948	-72.651
8	89_T02.11-	Rock River			link	42.950	-72.765
9	22_T0812-	Ball Mountain Brook			link	43.049	-72.892
10	22_T0809-	Ball Mountain Brook			link	43.067	-72.860
11	22_T08.04-S1.05-	North Branch Ball Mountain Brook			link	43.097	-72.849
12	22_T08.04-S1.09-	North Branch Ball Mountain Brook			link	43.102	-72.868
13	122_M07-	Saxtons River			link	43.136	-72.525

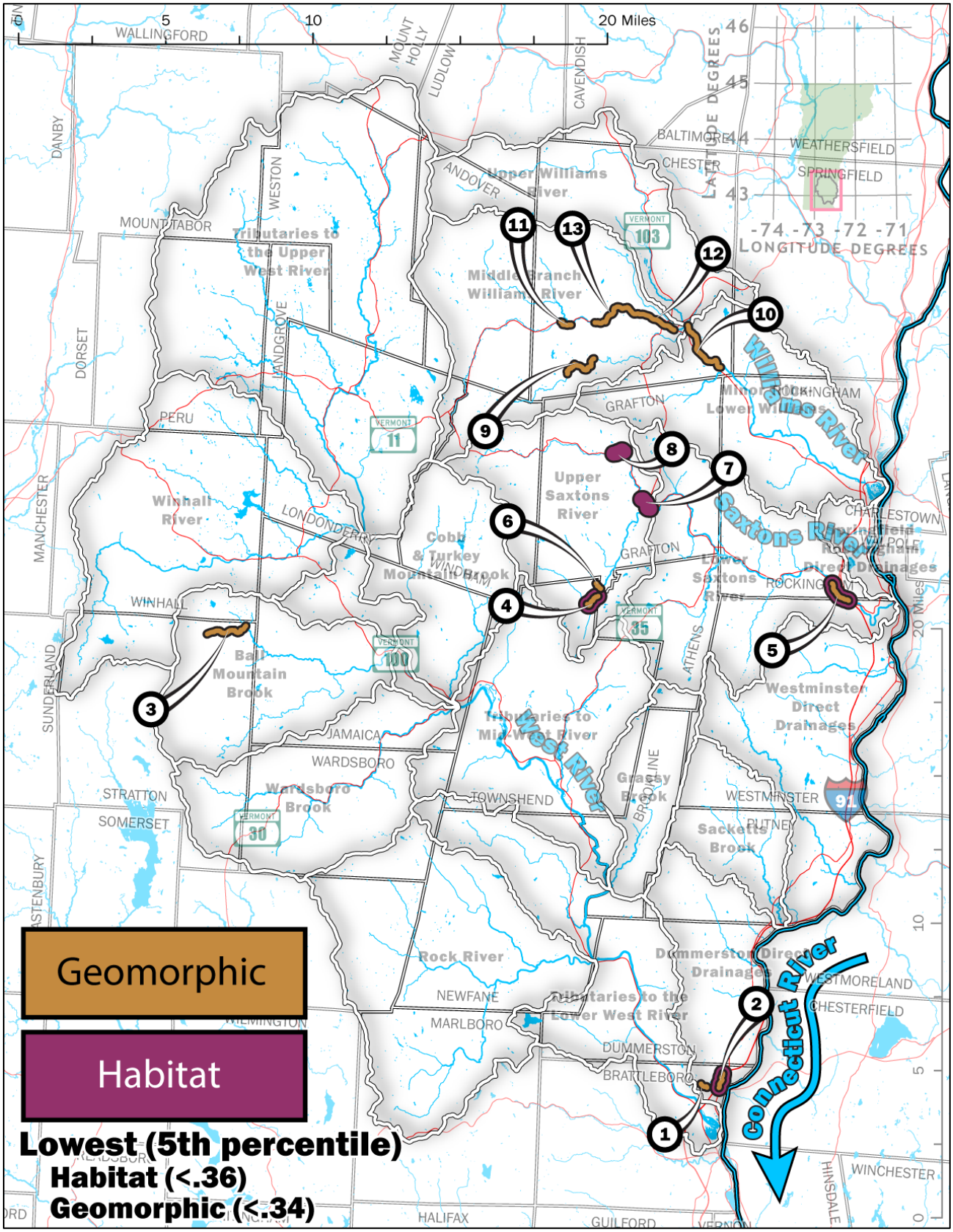


Figure 14 Map of the lowest 5th percentile habitat and geomorphic condition scores (Basin 11(13) south section). Map IDs correspond to the table below.

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	147_T1.02B	Crosby Brook South Branch			Link	-72.568	42.886
2	147_M02-	Crosby Brook			Link	-72.556	42.889
3	22_T08.04-S1.10-S1.01-	Styles Brook			Link	-72.888	43.109
4	122_T6.04B	Stiles Brook			Link	-72.643	43.125
5	122_M04-	Saxtons River			Link	-72.478	43.128
6	122_T6.S2.01A	Willie Brook			Link	-72.639	43.132
7	122_M14-	Saxtons River			Link	-72.607	43.172
8	122_M17-	Saxtons River			Link	-72.625	43.198
9	182_T5.S1.07-	South Branch Williams River			Link	-72.651	43.240
10	182_M11-	Williams River			Link	-72.572	43.247
11	182_T5.05A	Middle Branch Williams River			Link	-72.662	43.260
12	182_T5.02-	Middle Branch Williams River			Link	-72.602	43.263
13	182_T5.03-	Middle Branch Williams River			Link	-72.630	43.266

Biological condition

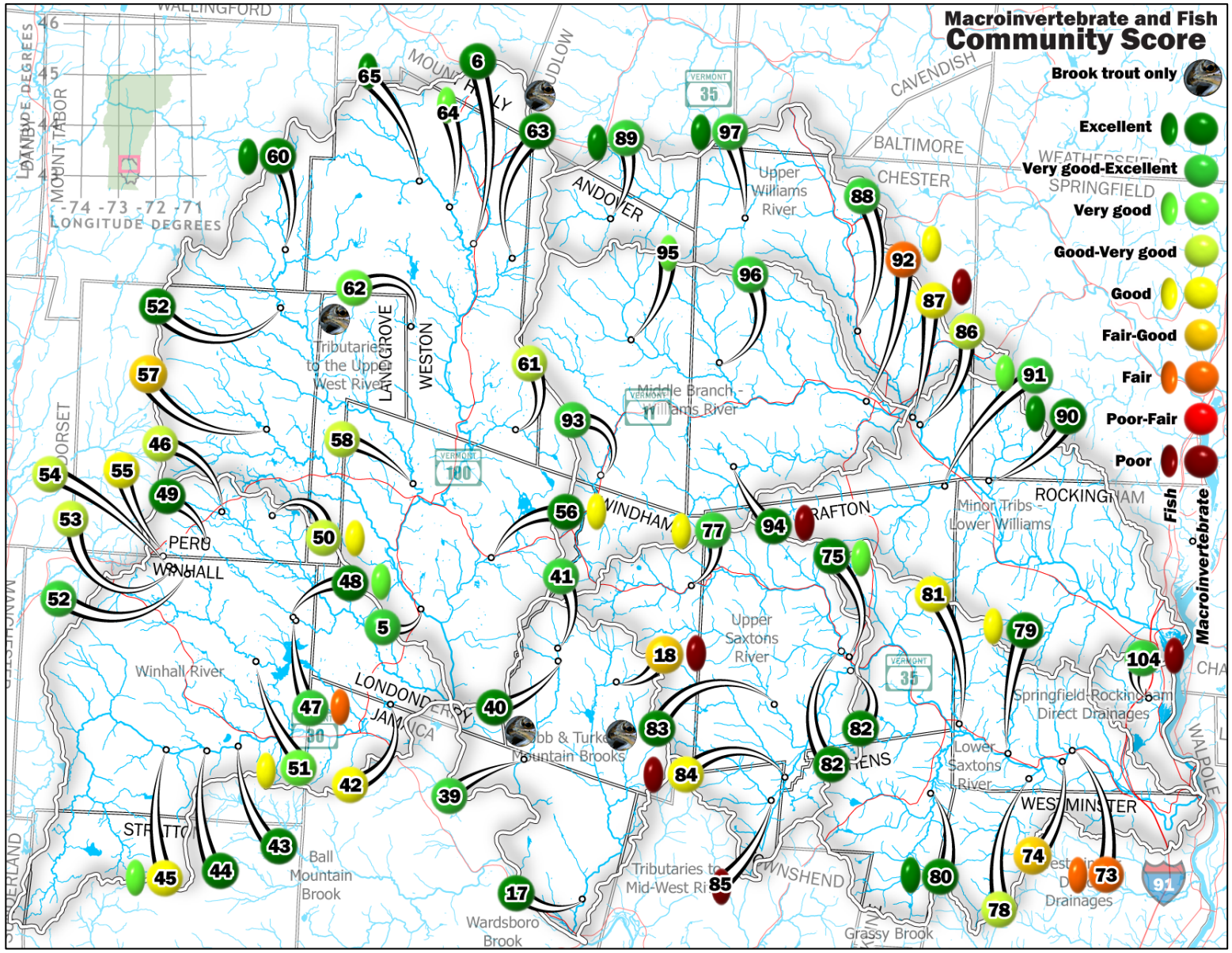


Figure 15. Map of the most recent fish and macroinvertebrate community assessments over last 12 years (2012 - 2023) for sites in Basin 11(13), North section (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from 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.

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 Indices of Biological Integrity (IBI), which require two or more native species to score.

Table 14 Macroinvertebrate (bug) and fish community assessment matrix for the streams of Basin 11(13), south section. Blank = no data, BKT = streams with a robust only Brook Trout recorded 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	MapID		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
West River, 35.2	5	Bug											VgE	
West River, 47.3	6	Bug						E						
Turkey Mountain Brook, 1.0	17	Bug											E	
Turkey Mountain Brook Trib 7, 0.7	18	Bug								FG				
Turkey Mountain Brook Trib 7, 0.7	18	Fish								P				
Cobb Brook, 0.9	39	Bug	VgE											
Cobb Brook, 3.9	40	Bug								Vg	E			
Cobb Brook, 3.9	40	Fish								BKT				
Cobb Brook, 4.3	41	Bug									GVg	Vg	VgE	Vg
Winhall River, 1.8	42	Bug											G	
Winhall River, 6.4	43	Bug	E	VgE	VgE	GVg	Vg	GVg	GVg	E	GVg		E	
Winhall River, 7.1	44	Bug	E	E	E	E	E	Vg	G	E	E		E	
Winhall River, 8.1	45	Bug	E	VgE	E	E	E	Vg	GVg	E	E	U	E	G
Winhall River, 8.1	45	Fish	Vg	Vg	Vg			G		Vg				Vg
Cook Brook, 8.1	46	Bug	GVg											
Eddy Brook, 1.8	47	Bug									VgE			
Eddy Brook, 1.8	47	Fish									F			
Eddy Brook, 1.9	48	Bug					E							
Eddy Brook, 1.9	48	Fish					Vg							
Eddy Brook, 5.3	49	Bug			E									
Cook Brook Trib #9, 2.4	50	Bug												GVg
Cook Brook Trib #9, 2.4	50	Fish												G
Mill Brook, 3.6	51	Bug											Vg	

Name	MapID		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Mill Brook, 3.6	51	Fish											G	
Bromley Mt Brook (Mill Brook Trib #6), 1.6	52	Bug						VgE						
Bromley Mt Brook (Mill Brook Trib #6), 1.9	53	Bug	G	G			G		FG		G		GVg	
Bromley Mt Brook (Mill Brook Trib #6), 2.0	54	Bug						GVg						
Bromley Mt Brook (Mill Brook Trib #6), 2.2	55	Bug		G										
Thompsonburg Brook, 2.4	56	Bug						E						
Thompsonburg Brook, 2.4	56	Fish						F					G	
Flood Brook, 6.1	57	Bug						FG						
Utley Brook, 0.7	58	Bug											GVg	
Utley Brook, 8.9	59	Bug						E						
Mount Tabor Brook, 1.4	60	Bug									E			
Mount Tabor Brook, 1.4	60	Fish									E			
Piper Hill Brook, 1.5	61	Bug						GVg						
Piper Hill Brook, 1.5	61	Fish						U						
Holden Hill Brook, 1.4	62	Bug						Vg						
Holden Hill Brook, 1.4	62	Fish						BKT						
Burton Brook, 1.8	63	Bug						E						
Burton Brook, 1.8	63	Fish						BKT						
Greendale Brook, 1.2	64	Fish						Vg						
Jenny Coolidge Brook, 0.4	65	Fish						E						
Saxtons River, 4.5	73	Bug	G					Vg					F	
Saxtons River, 4.5	73	Fish	F											
Saxtons River, 5.0	74	Bug											FG	
Saxtons River, 14.1	75	Bug							E					
Saxtons River, 14.1	75	Fish							Vg					
Saxtons River, 14.4	76	Bug						E						
Saxtons River, 20.5	77	Bug											VgE	
Saxtons River, 20.5	77	Fish											G	
Barnes Brook, 0.3	78	Bug						GVg						
Leach Brook, 0.1	79	Bug						E						
Leach Brook, 0.1	79	Fish						G						
Bull Creek, 2.0	80	Bug						E					E	
Bull Creek, 2.0	80	Fish						E						

Name	MapID		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Weaver Brook, 0.2	81	Bug									G			
Weaver Brook, 0.2	81	Fish									U			
South Branch Saxtons River, 0.2	82	Bug						E						
Howe Brook, 1.6	83	Bug						E					E	
Howe Brook, 1.6	83	Fish						BKT						
Willie Brook, 0.1	84	Bug						G						
Willie Brook, 0.1	84	Fish						P						
Stiles Brook, 0.4	85	Bug						E						
Stiles Brook, 0.4	85	Fish						P						
Williams River, 11.8	86	Bug	G					GVg				GVg		
Williams River, 11.8	86	Fish	P											
Williams River, 12.2	87	Bug										G		
Williams River, 14.9	88	Bug											VgE	
Williams River, 26.8	89	Bug											VgE	
Williams River, 26.8	89	Fish											E	
Skunk Hollow Brook, 0.4	90	Bug					Vg	E						
Skunk Hollow Brook, 0.4	90	Fish					E	E						
Hall Brook, 0.7	91	Bug						VgE						
Hall Brook, 0.7	91	Fish						Vg						
Middle Branch Williams River, 1.2	92	Bug											F	
Middle Branch Williams River, 1.2	92	Fish											G	
Middle Branch Williams River, 10.0	93	Bug						VgE						
South Branch Williams River Trib #7, 0.4	94	Bug						E						
South Branch Williams River Trib #7, 0.4	94	Fish						P						
Andover Branch, 4.4	95	Bug						E						
Andover Branch, 4.4	95	Fish						Vg						
Potash Brook, 0.4	96	Bug						VgE						
Chase Brook, 0.7	97	Bug								VgE				
Chase Brook, 0.7	97	Fish								E				
Ellis Brook, 0.6	104	Bug						VgE						
Ellis Brook, 0.6	104	Fish						P						
Little Commissary Brook, 0.1	105	Bug						FG						
Little Commissary Brook, 0.1	105	Fish						G						

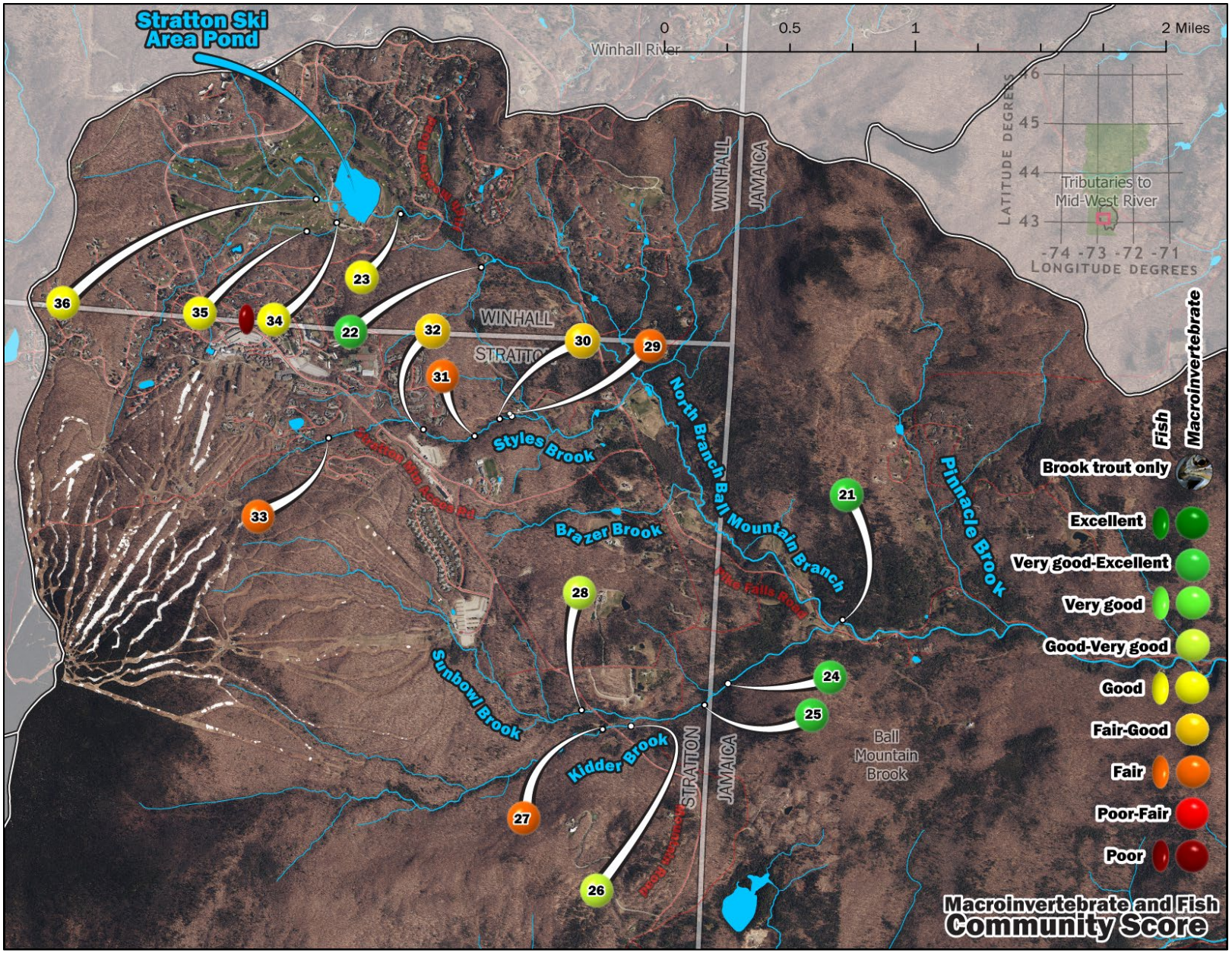


Figure 16 Map of the Macroinvertebrate Community assessment for Basin 11(13) Stratton Mountain. Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout 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 11(13), middle section. Blank = no data, BKT = streams with only Brook Trout recorded.

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		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
North Branch Ball Mountain Brook, 2.2	21	Bug						E	VgE					
North Branch Ball Mountain Brook, 4.3	22	Bug	GVg	Vg	FG	G	G	G	FG	FG	G		VgE	
North Branch Ball Mountain Brook, 4.7	23	Bug		Vg	FG	FG	G	G	GVg	FG	G		G	
Kidder Brook, 0.5	24	Bug	VgE											
Kidder Brook, 0.6	25	Bug							VgE					
Kidder Brook, 0.8	26	Bug	GVg											
Kidder Brook, 0.9	27	Bug	GVg	VgE				E	G				G	F
Kidder Brook, 0.9	27	Fish	U	U										
Sunbowl Brook, 0.3	28	Bug	GVg						GVg					
Styles Brook, 0.7	29	Bug									G	F	G	F
Styles Brook, 0.8	30	Bug	G	FG	FG	F	FG	G	F	GVg	FG			
Styles Brook, 1.0	31	Bug							F					
Styles Brook, 1.2	32	Bug							F	FG				
Styles Brook, 1.6	33	Bug											G	F
Stratton Pond Trib 1, 0.1	34	Bug	Vg			FG	G	Vg					G	
Stratton Pond Trib 1, 0.1	34	Fish											P	
Stratton Pond Trib 1, 0.4	35	Bug	G											
Stratton Pond Trib 2, 0.1	36	Bug	GVg	Vg	GVg	Vg	E	Vg	GVg	Vg	GVg	G	G	G

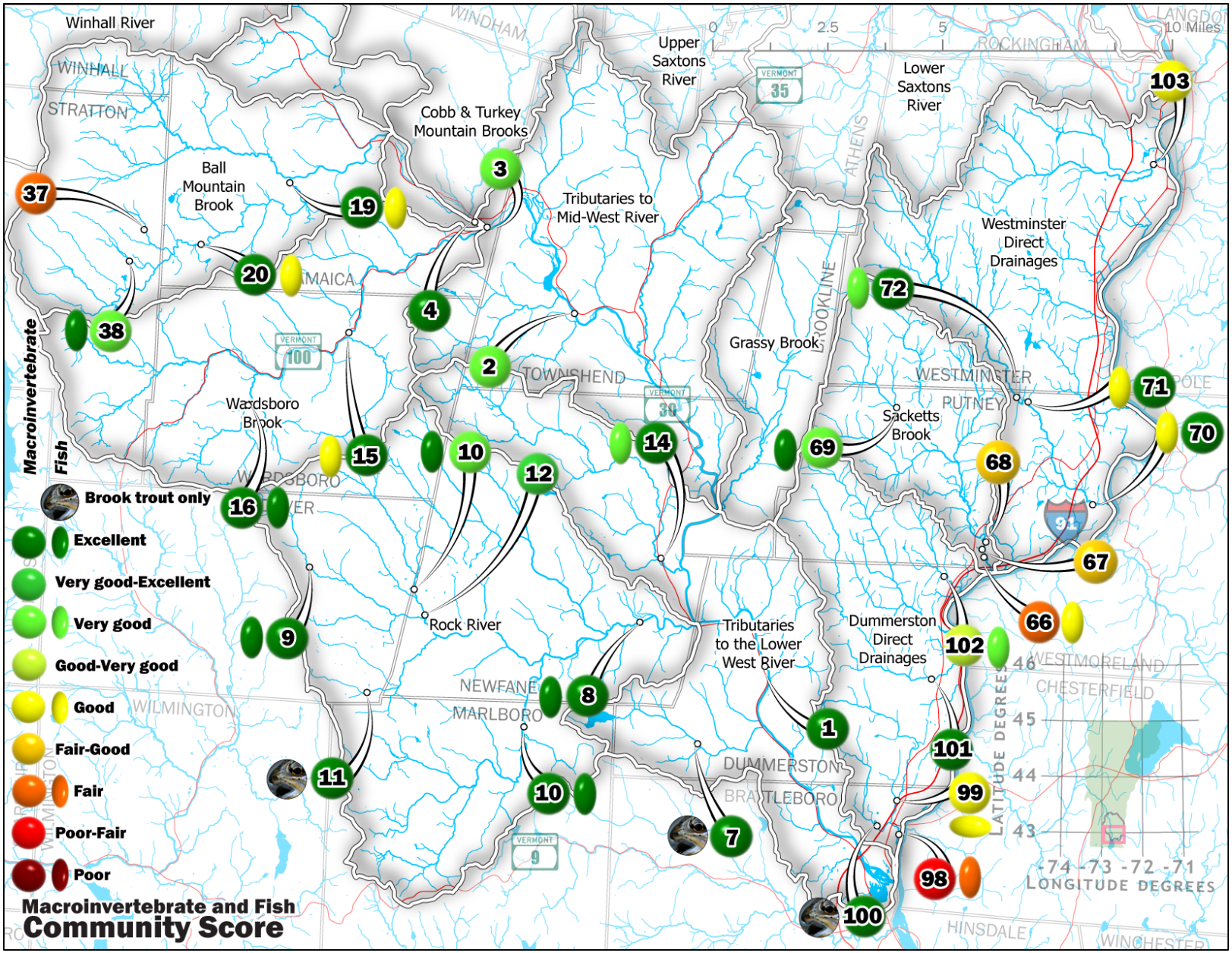


Figure 17 Map of the fish and macroinvertebrate community assessments for Basin 11(13), (see below). Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout 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 11(13), 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		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
West River, 6.1	1	Bug	G					Vg					E	
West River, 19.1	2	Bug						Vg						
West River, 22.4	3	Bug												U
West River, 22.6	4	Bug						E						
Stickney Brook, 2.3	7	Bug						E						
Stickney Brook, 2.3	7	Fish						BKT						
Rock River, 1.5	8	Bug						E					E	
Rock River, 1.5	8	Fish											E	
Rock River, 10.8	9	Bug						E						
Rock River, 10.8	9	Fish						E						
Marlboro Branch, 1.9	10	Bug											E	
Marlboro Branch, 1.9	10	Fish											E	
Hunter Brook, 2.4	11	Bug								E				
Hunter Brook, 2.4	11	Fish								BKT				
Adams Brook, 0.2	12	Bug	VgE											
Adams Brook, 0.8	13	Bug	Vg					VgE						
Adams Brook, 0.8	13	Fish						E						
Smith Brook, 0.7	14	Bug											E	
Smith Brook, 0.7	14	Fish											Vg	
Wardsboro Brook, 5.0	15	Bug						E						
Wardsboro Brook, 5.0	15	Fish						G						
Waite Brook, 0.8	16	Bug						E						
Waite Brook, 0.8	16	Fish						E						
Ball Mountain Brook, 3.1	19	Bug								E				
Ball Mountain Brook, 3.1	19	Fish								G				
Ball Mountain Brook, 7.3	20	Bug							E					
Ball Mountain Brook, 7.3	20	Fish							G					
Brehmi Brook, 0.8	37	Bug											F	
Bear Creek, 0.7	38	Bug							Vg	Vg				
Bear Creek, 0.7	38	Fish							E					

Name	Map ID		2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Sacketts Brook, 0.5	66	Bug	G								F		F	
Sacketts Brook, 0.5	66	Fish	G											
Sacketts Brook, 0.7	67	Bug									F		F	FG
Sacketts Brook, 0.9	68	Bug	GVg										FG	
Sacketts Brook, 4.8	69	Bug						Vg						
Sacketts Brook, 4.8	69	Fish						E						
East Putney Brook, 0.3	70	Bug	E											
East Putney Brook, 0.3	70	Fish	G											
East Putney Brook, 3.4	71	Bug						E						
East Putney Brook, 3.4	71	Fish						G						
East Putney Brook, 3.8	72	Bug								E				
East Putney Brook, 3.8	72	Fish								Vg				
Crosby Brook, 0.3	98	Bug	PF					FG					PF	
Crosby Brook, 0.3	98	Fish						F						
Crosby Brook, 1.3	99	Bug	F					G						
Crosby Brook, 1.3	99	Fish						G						
Crosby Brook South Branch, 0.5	100	Bug	VgE					E						
Crosby Brook South Branch, 0.5	100	Fish						BKT						
Salmon Brook, 0.8	101	Bug	E											
Mill Brook, 0.7	102	Bug											GVg	
Mill Brook, 0.7	102	Fish											Vg	
Cobb Brook, 0.4	103	Bug	G											

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*.

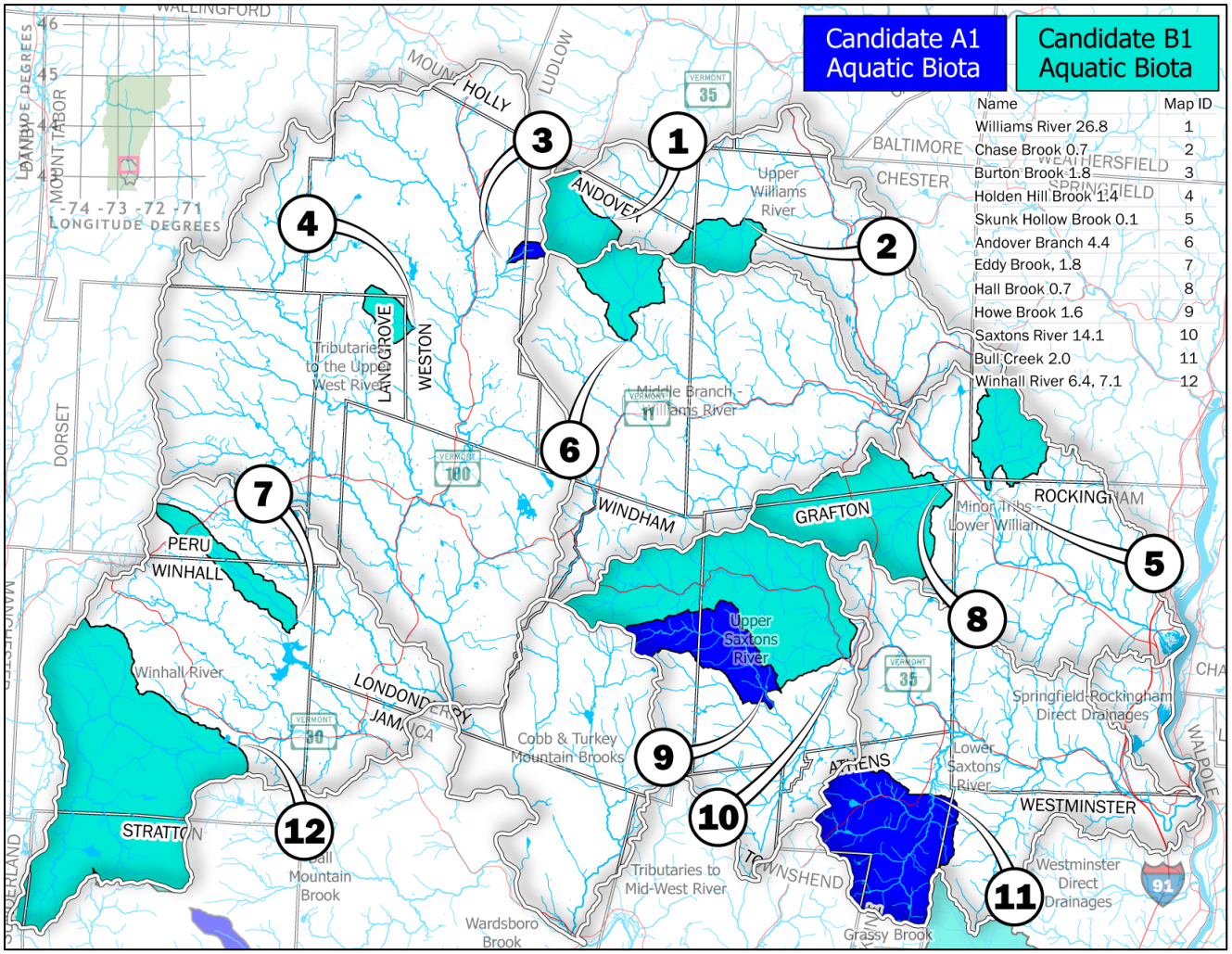


Figure 18 Map of A(1) and B(1) reclassification candidates, Basin 11(13) north. Map IDs correspond to the table below.

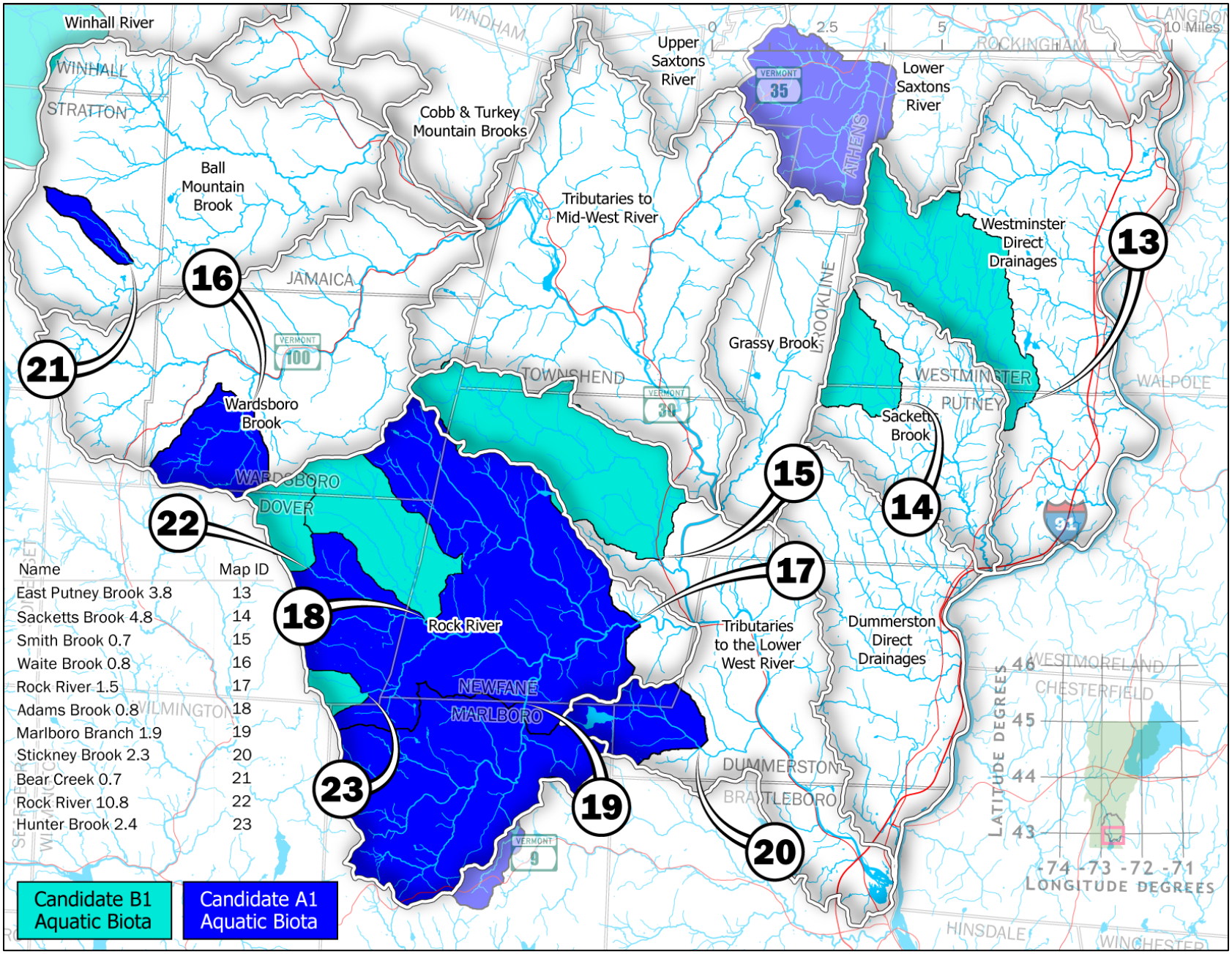


Figure 19 Map of A(1) and B(1) reclassification candidates, Basin 11(13) south. Map IDs correspond to the table below.

Table 17 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)	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		Latitude	Longitude	Candidate	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Adams Brook 0.8	18	Bugs	42.958	-72.7625	B1					VgE						
		Fish								E						
Andover Branch 4.4	6	Bugs	43.284	-72.712	B1					Vg						
Bear Creek 0.7	21		43.062	-72.885	A1						Vg	Vg				
											E					
Bull Creek 2.0	11	Bugs	43.126	-72.568	A1										E	
		Fish								E						
Burton Brook 1.8	3	Bugs	43.312	-72.769	A1					E						
		Fish								BKT						
Chase Brook 0.7	2	Bugs	43.327	-72.658	B1							VgE				
		Fish										E				
East Putney Brook 3.8	13	Bugs	43.019	-72.504	B1							E				
		Fish										Vg				
East Putney Brook, 3.4		Bugs								E						
		Fish								G						
Hall Brook 0.7	8	Bugs	43.233	-72.562	B1					Vg						
Holden Hill Brook 1.4	4	Bugs			A1					Vg						
		Fish								BKT						
Howe Brook 1.6	9	Bugs	43.157	-72.643	A1										E	
		Fish								BKT						
Hunter Brook 2.4	23	Bugs	42.926	-72.782	B1							E				
		Fish										BKT				
Marlboro Branch 1.9	19	Bugs	42.915	-72.715	A1										E	

Name	Map ID		Latitude	Longitude	Candidate	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		Fish													E	
Rock River 1.5	17	Bugs	42.948	-72.666	A1										E	
		Fish													E	
Rock River 10.8	22	Bugs	42.965	-72.807	B1					E						
		Fish								E						
Sacketts Brook 4.8	14	Bugs	43.016	-72.555	B1					Vg						
		Fish								E						
Saxtons River 14.1	10	Bugs	43.173	-72.607	B1						E					
		Fish									Vg					
Skunk Hollow Brook 0.1	5	Bugs	43.235	-72.541	B1					E						
		Fish								E						
Smith Brook 0.7	15	Bugs	42.968	-72.657	B1										E	
		Fish													Vg	
Stickney Brook 2.3	20	Bugs	42.910	-72.641	A1					E						
		Fish								BKT						
Waite Brook 0.8	16	Bugs	43.016	-72.834	A1					E						
		Fish								E						
Williams River 26.8	1	Bugs	43.327	-72.722	B1										VgE	
		Fish													E	
Winhall River 6.4	12	Bugs	43.141	-72.899	B1			GVg	Vg	GVg	GVg	E			E	
Winhall River 7.1		Bugs						E	E	Vg	G	E			E	
Eddy Brook, 1.8	7	Bugs	43.186	-72.872	B1								VgE			
Eddy Brook, 1.8		Fish											F			
Eddy Brook, 1.9		Bugs							E							
Eddy Brook, 1.9		Fish							Vg							

Impaired rivers

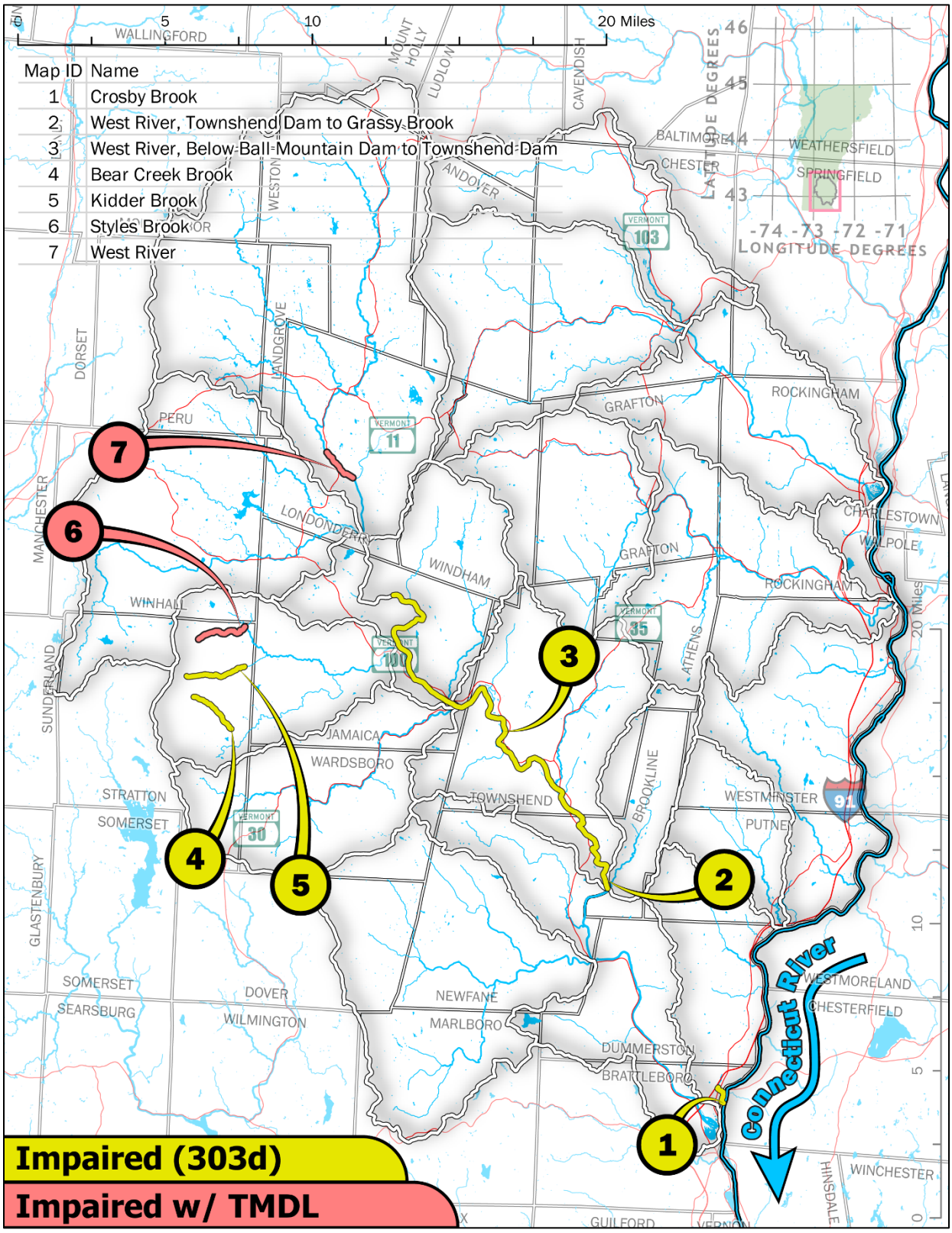


Figure 20. Map of impaired rivers in Basin 11(13). Yellow represents rivers that are on the 2024 303(d) list (Part A-Priority Waters List). Salmon represents rivers that have an approved TMDL but remain impaired (Part D-Priority Waters List). Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

Table 18 Table of impaired rivers in Basin 11(13). Map IDs are associated with the map above. (AB) 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	Crosby Brook, Mouth to rm 0.7	VT13-13.01	SEDIMENTATION/ SILTATION	Habitat alterations due to sedimentation, channelization, and buffer loss	AB	A
2	West River, Townshend Dam to Grassy Brook	VT11-10.02	TEMPERATURE	USACOE dam operation, impounded waters release results in elevated temperatures downstream	AH, RF	A
3	West River, Below Ball Mountain Dam to Townshend Dam (9 Miles)	VT11-10.01	TEMPERATURE	Artificial flow regime at dam	RF	A
4	Bear Creek Brook, rm 0.7 to Headwaters	VT11-15.04	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	AB	A
5	Kidder Brook, Confluence of Sun Bowl Brook to Headwaters	VT11-15.05	pH, LOW	Atmospheric deposition: critically acidified; chronic acidification	AB	A
6	Styles Brook (2 Miles)	VT11-15.02	SEDIMENT	Land development, hydrologic modification	AB, AES	D
7	West River, Approx 1 Mile Below to 0.5 Mile Above South Londonderry	VT11-17.01	ESCHERICHIA COLI (E. COLI)	Possible septic system discharges	CR	D

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.

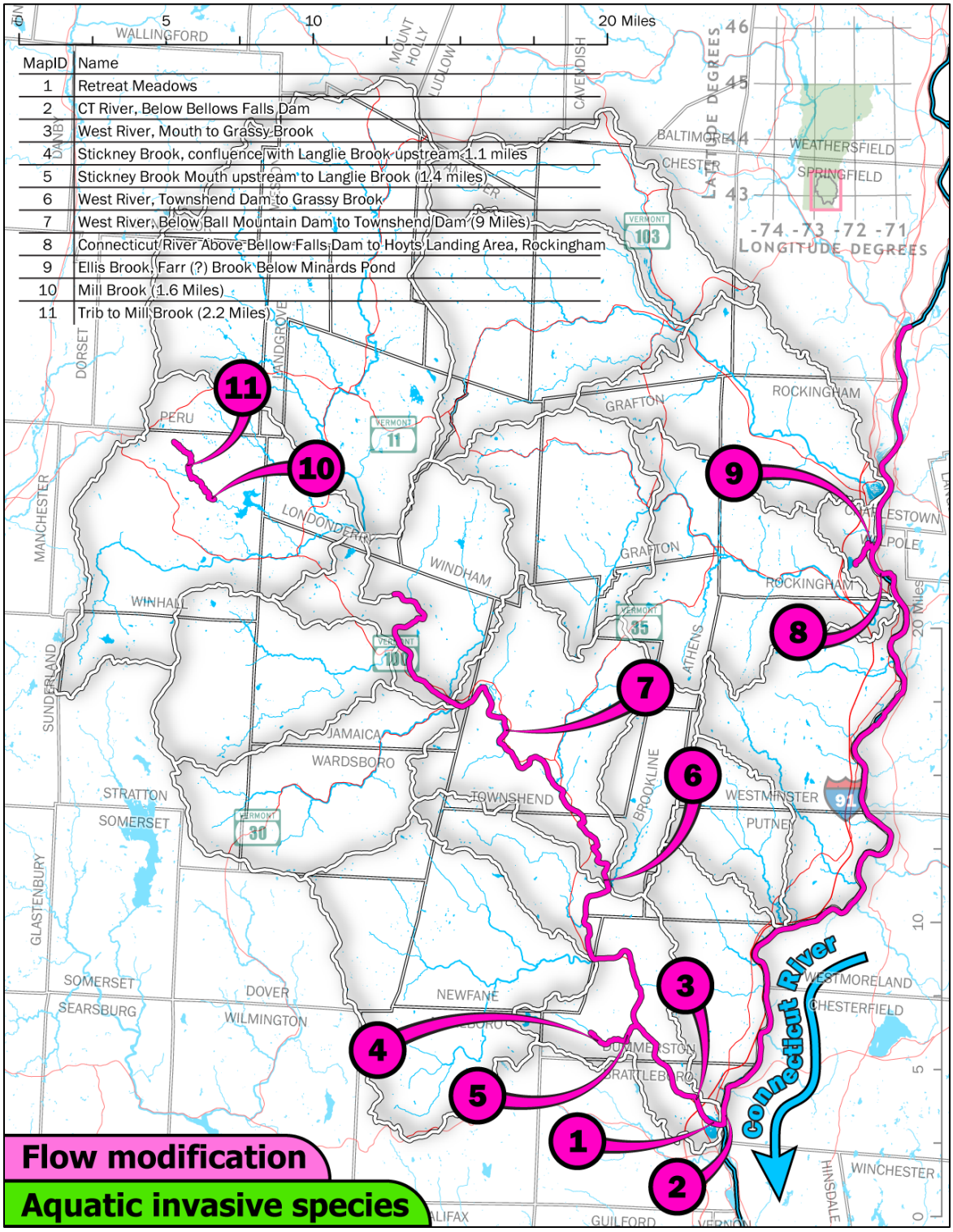


Figure 21 Map of altered rivers for Basin 11(13). Rivers in green are those altered by aquatic invasive species.

Table 19 Table of altered rivers in Basin 11(13). 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	PROBLEM	USES	PART
1	Retreat Meadows	Unique habitat impacted by Vernon Dam water level fluctuations	AH, RB	F
2	CT River, Below Bellows Falls Dam	Artificial flow condition, fluctuating flows by hydropower production	AB	F
3	West River, Mouth to Grassy Brook	Wide shallow channel, loss of riparian vegetation, USACOE dam operation	AH, RB	F
4	Stickney Brook, confluence with Langlie Brook upstream 1.1 miles	Artificial flow condition, seasonally devoid of flow below diversion dam; dredging	AB, RB	F
5	Stickney Brook Mouth upstream to Langlie Brook (1.4 miles)	Artificial flow condition, seasonally devoid of flow below diversion dam; dredging	AB, RB	F
6	West River, Townshend Dam to Grassy Brook	USACOE dam operation, impounded waters release results in elevated temperatures downstream	AH, RF	F
7	West River, Below Ball Mountain Dam to Townshend Dam (9 Miles)	Artificial flow regime at dam	AB, AH, CR	F
8	Connecticut River Above Bellow Falls Dam to Hoyts Landing Area, Rockingham	Water level fluctuation at dam; dewatered shorelines/wetlands	AB	F
9	Ellis Brook, Farr (?) Brook Below Minards Pond	Possible lack of minimum flow below water supply withdrawal point (threat)	AB	F
10	Mill Brook (1.6 Miles)	Artificial & insufficient flow below Bromley Snowmaking water wihdrawal	AB	F
11	Trib to Mill Brook (2.2 Miles)	Artificial & insufficient flow below Bromley Snowmaking water wihdrawal	AB	F

Trending rivers

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.

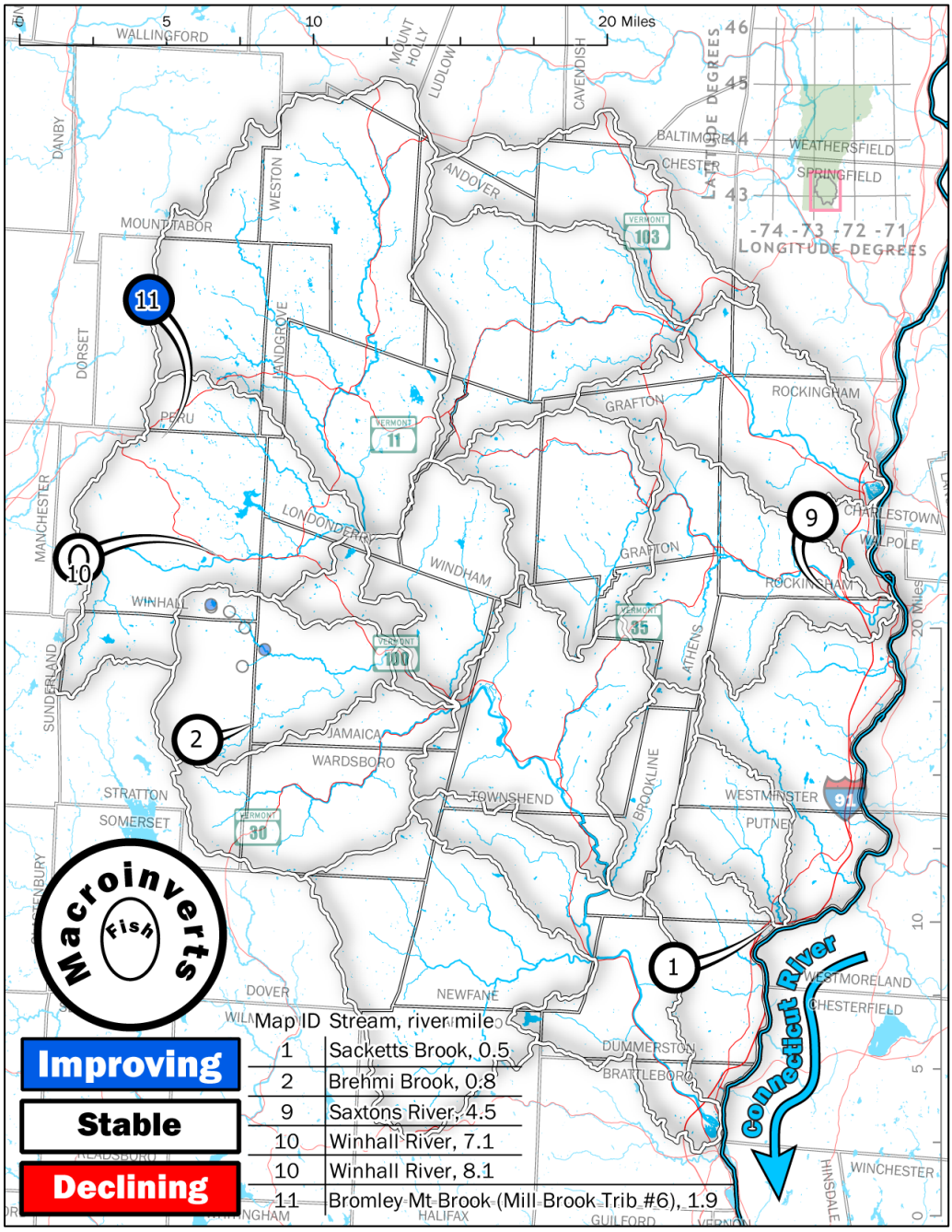


Figure 22 Map of rivers with enough biological data to model a water quality trend.

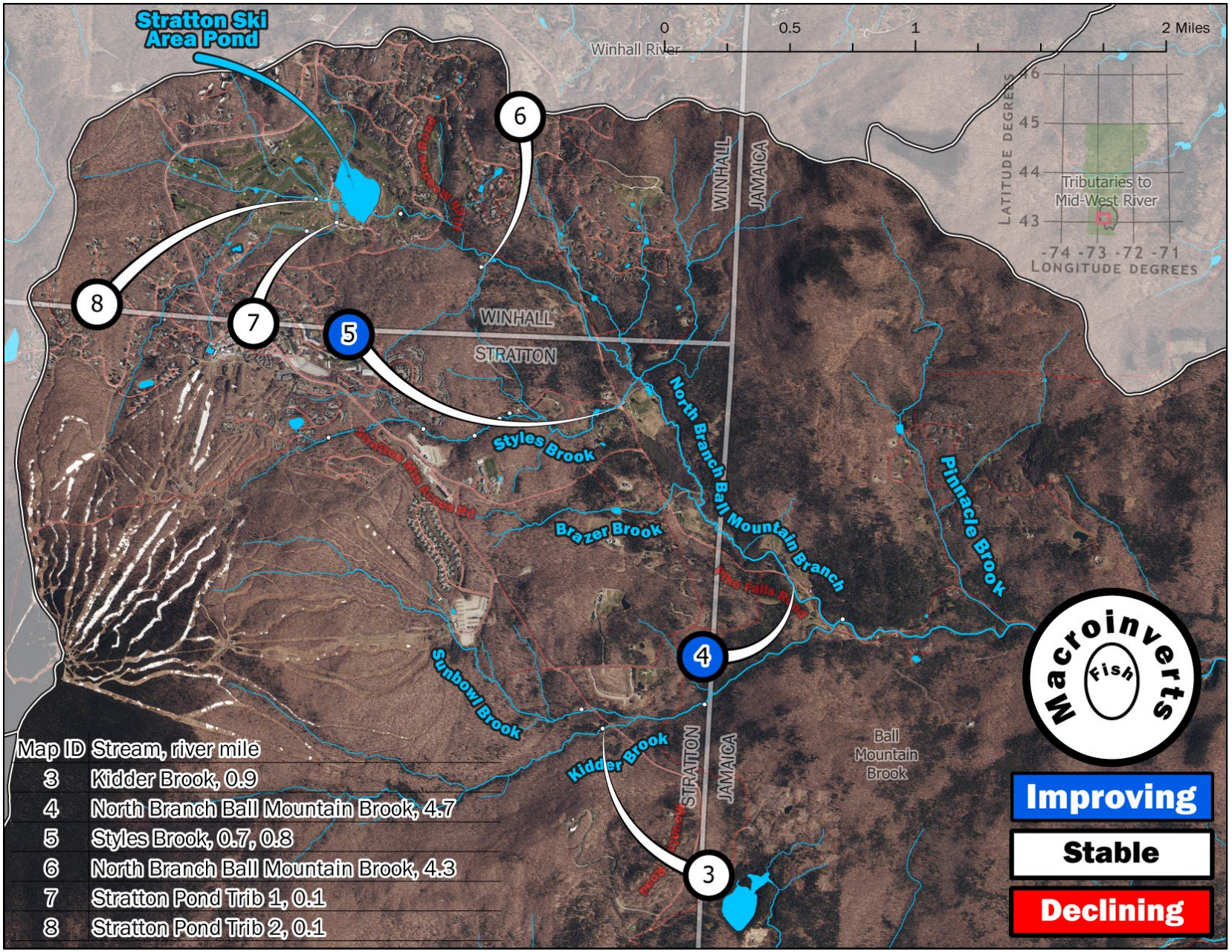


Figure 23 Map of rivers with enough biological data to model a water quality trend (Stratton area).

Table 20 Trends in biological condition of macroinvertebrate (bug) and fish communities in Basin 11(13). + 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)

Stream, river mile	Map ID	Trend	Set	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Brehmi Brook, 0.8	2	=	Bug	F	F	F	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0
Bromley Mt Brook (Mill Brook Trib #6), 1.9	11	+	Bug	0	F	0	0	0	0	F	0	F	F	0	0	G	G	0	0	G	0	0	0	G	0	0	0
Kidder Brook, 0.9	3	=	Bug	0	F	0	0	0	0	0	0	Vg	G	G	0	0	0	0	0	0	E	G	0	0	0	G	F
North Branch Ball Mountain Brook, 4.3	6	+	Bug	0	G	0	0	E	F	F	P	0	G	G	0	0	Vg	0	G	G	G	0	0	G	0	0	0
North Branch Ball Mountain Brook, 4.7	4	+	Bug	Vg	0	F	0	Vg	F	F	0	0	0	G	0	0	Vg	0	0	G	G	0	0	G	0	G	0
Sacketts Brook, 0.5	1	=	Bug	0	0	0	0	0	0	0	0	0	0	0	0	G	0	0	0	0	0	0	0	F	0	F	0
Saxtons River, 4.5	9	=	Bug	0	0	0	0	0	0	0	0	G	0	0	0	G	0	0	0	0	Vg	0	0	0	0	F	0
Stratton Pond Trib 1, 0.1	7	=	Bug	0	0	0	G	Vg	F	F	F	F	0	G	0	Vg	0	0	0	G	Vg	0	0	0	0	G	0
Stratton Pond Trib 2, 0.1	8	=	Bug	F	0	0	G	G	0	G	0	G	G	Vg	0	0	Vg	0	Vg	E	Vg	0	Vg	0	G	G	G
Styles Brook, 0.7	5	=	Bug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	G	F	G	F
Styles Brook, 0.8	5	=	Bug	F	F	F	0	F	0	F	F	F	0	F	0	G	0	0	F	0	G	F	0	0	0	0	0
Styles Brook, 1.0	5	=	Bug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0
Styles Brook, 1.2	5	=	Bug	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	F	0	0	0	0	0
Winhall River, 7.1	10	=	Bug	0	E	0	G	E	0	E	E	E	0	0	0	E	E	E	E	E	Vg	G	E	E	0	E	0
Winhall River, 8.1	10	=	Bug	0	0	0	0	E	0	0	0	E	E	E	F	E	0	E	E	E	Vg	0	U	U	U	E	G
Winhall River, 8.1	10	=	Fish	0	0	0	0	0	0	0	0	E	0	0	Vg	Vg	Vg	Vg	0	0	G	0	Vg	0	0	0	Vg

Rivers in need of assessment

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 110 streams within this basin that lack data needed to determine the support status of aquatic biota. Streams larger than 2 square kilometers and having no biological data between 2000 and 2024 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.

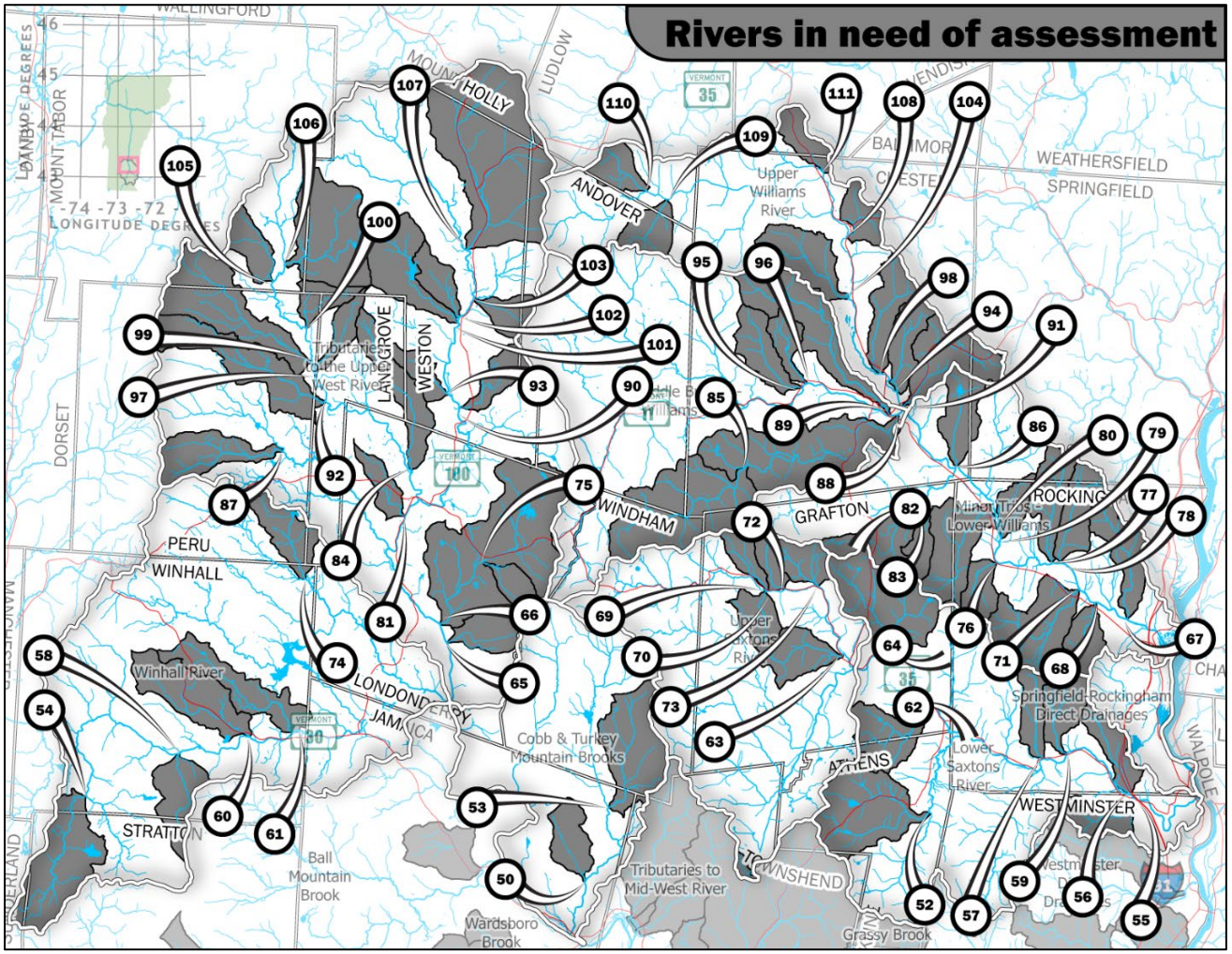


Figure 24 Waters in need of assessment for aquatic biota us in basins 11(13) north.

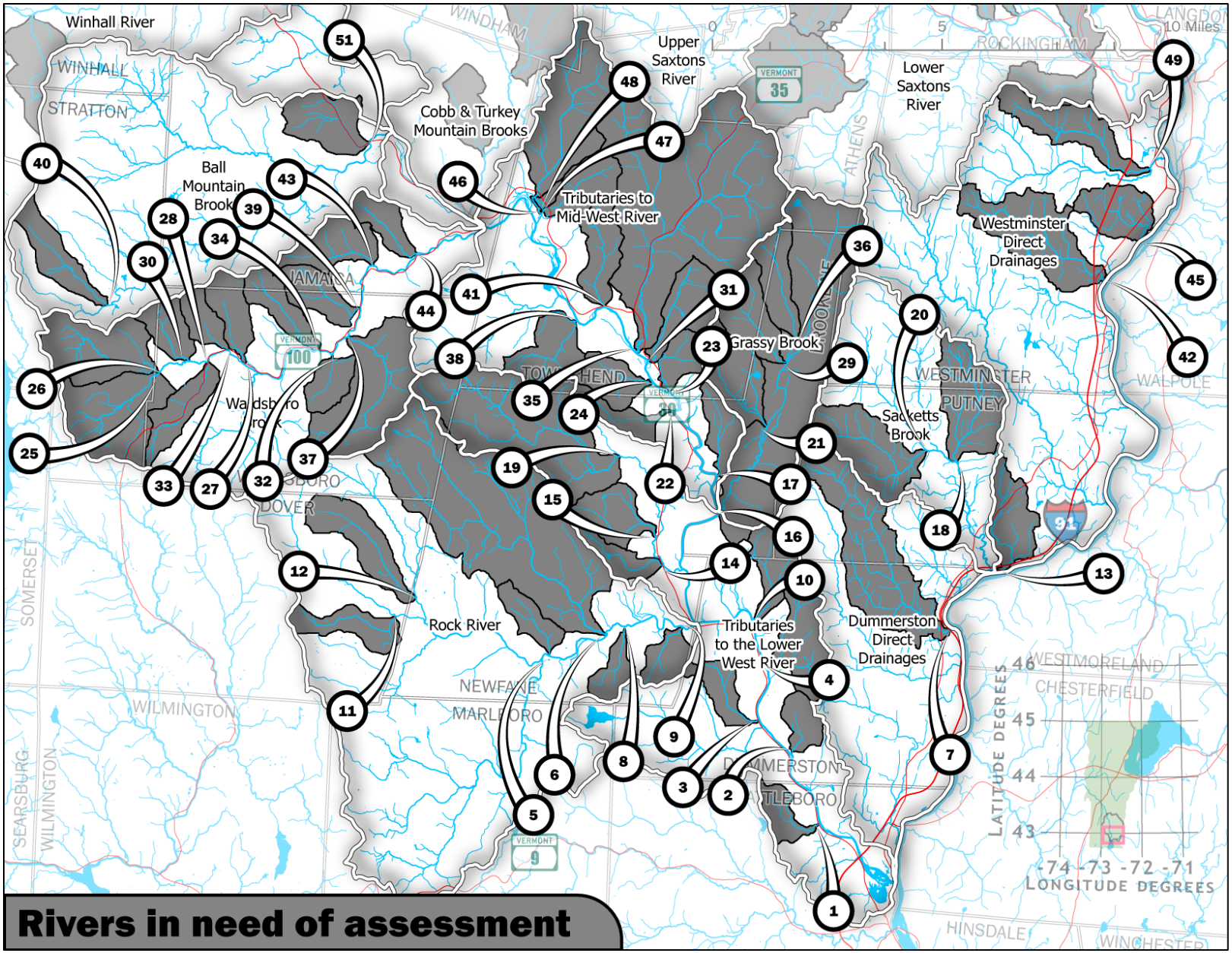


Figure 25 Waters in need of assessment for aquatic biota us in basins 11(13) south.

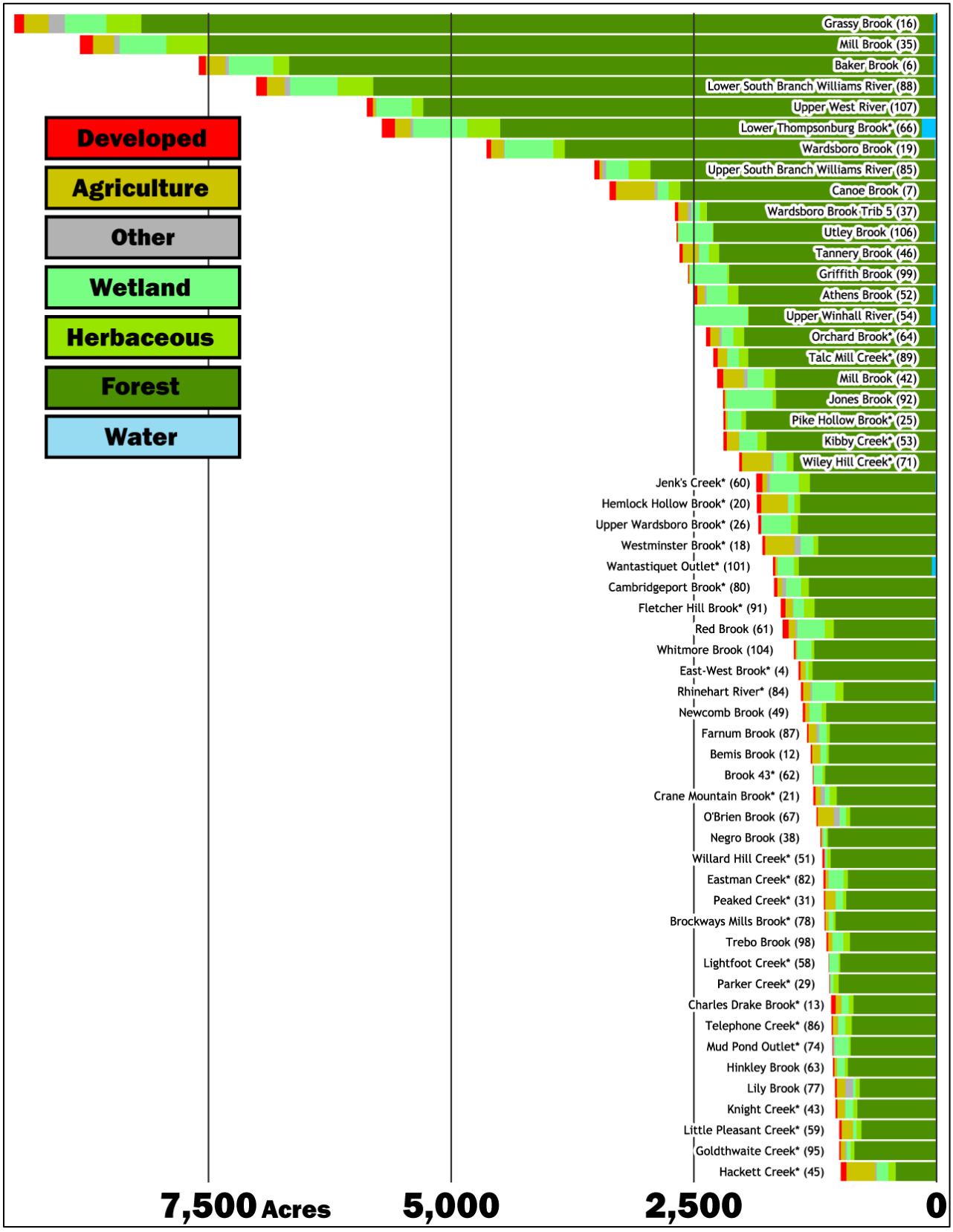


Figure 26 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University of Vermont Spatial Analysis Laboratory.

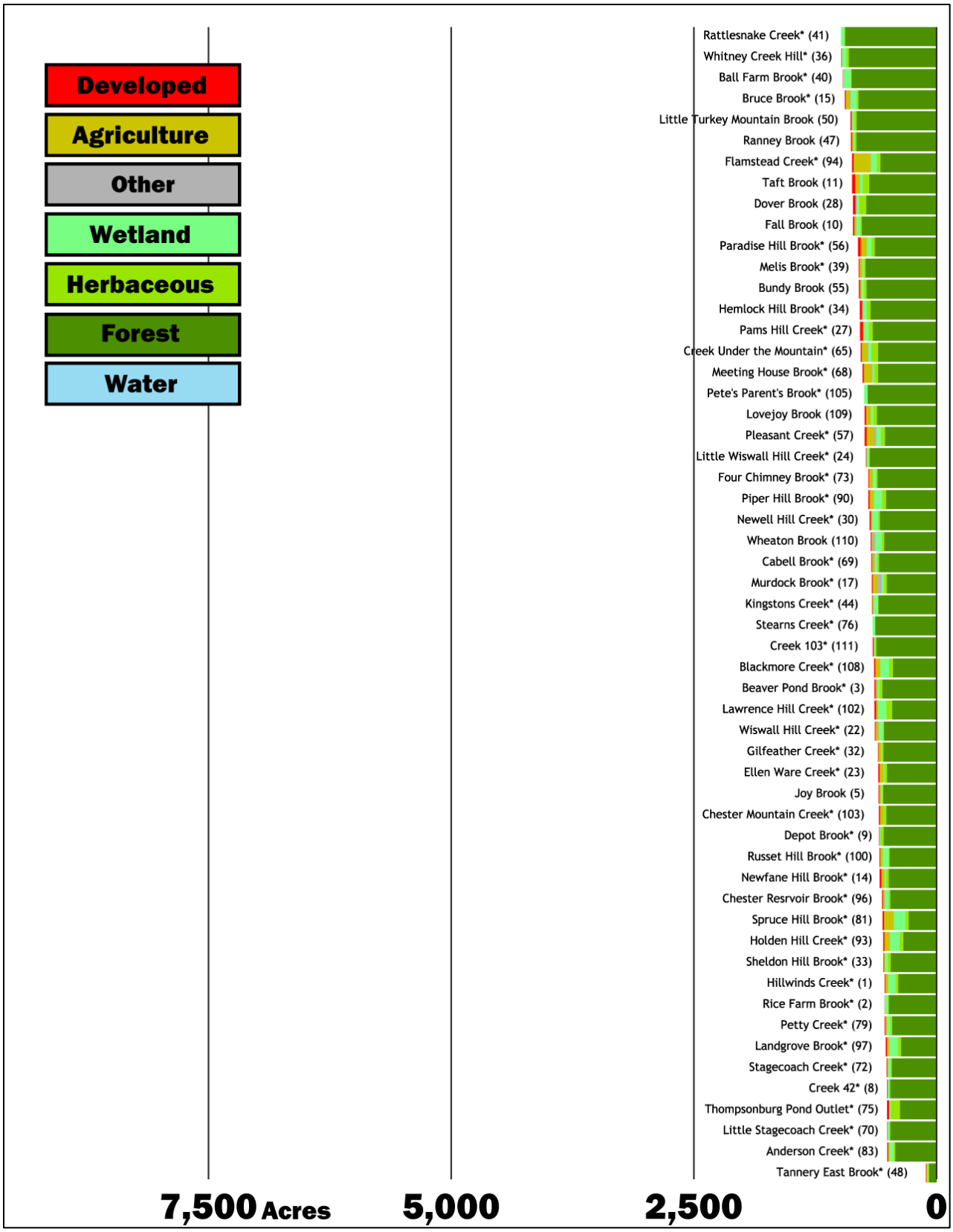


Figure 27 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University of Vermont Spatial Analysis Laboratory.

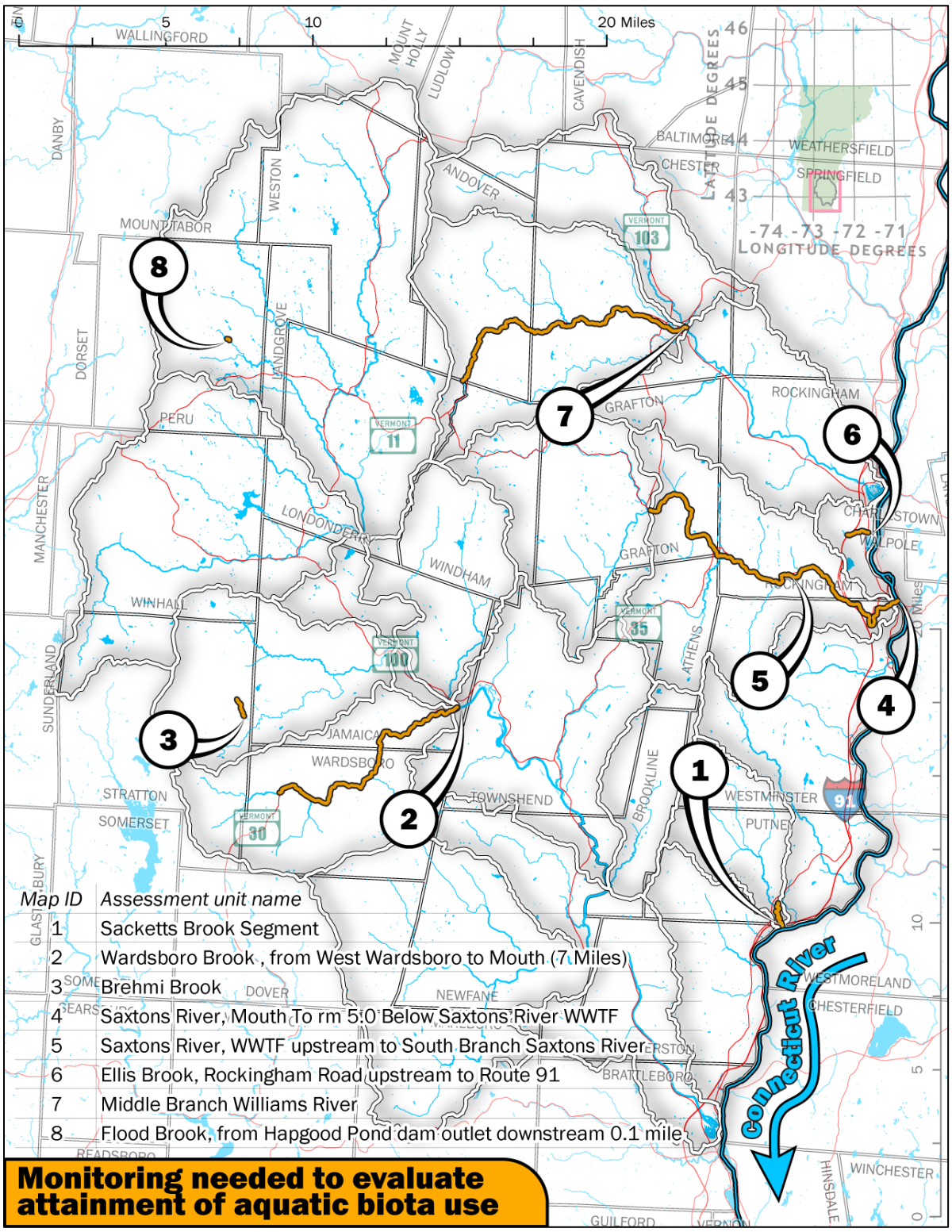
Table 21. Rivers with unassessed aquatic biota use, values are in percent land cover. The Map IDs correspond to the map above. Latitude and longitudes designate the pour point of the watershed. Asterisks are officially unnamed streams.

Name, Map ID	Latitude	Longitude	Acres	Developed	Agriculture	Other	Wetlands	Herbaceous	Forest	Water
Hillwinds Creek (1)*	42.885	-72.589	534.5	1.4	5.6	0	13.9	5.2	73.9	0
Rice Farm Brook (2)*	42.907	-72.600	533.4	0.1	0.1	0	6.2	1.3	92.1	0.1
Beaver Pond Brook (3)*	42.917	-72.615	639	1.6	2.7	0.9	2.7	4.8	87.1	0.2
East-West Brook (4)*	42.935	-72.611	1420.5	1.4	3.9	0.1	1.6	3.1	89.9	0.1
Joy Brook (5)	42.938	-72.704	595.9	0.8	3.1	0.1	2.1	1.8	92.1	0.1
Baker Brook (6)	42.945	-72.680	7598.3	0.9	2.7	0.5	6	2.2	87.4	0.4
Canoe Brook (7)	42.946	-72.532	3366.7	1.9	11.8	1	3.3	3.6	78.3	0.1
Creek 42 (8)*	42.946	-72.672	508.9	0.9	0.4	0	2.8	2.1	93.7	0
Depot Brook (9)*	42.947	-72.647	590.6	0.5	0	0.8	1.1	5.2	92.4	0
Fall Brook (10)	42.949	-72.616	859.2	1.2	2.6	0.1	4.8	1.6	89.4	0.2
Taft Brook (11)	42.950	-72.771	868.5	3.3	5.6	0.4	3.2	7.6	79.6	0.3
Bemis Brook (12)	42.956	-72.762	1294.4	0.9	6.7	0.2	4.6	1.8	85.7	0.1
Charles Drake Brook (13)*	42.964	-72.510	1085.1	4.3	5.5	0.3	6.5	4.6	78.7	0.1
Newfane Hill Brook (14)*	42.966	-72.656	584.7	2.4	5.8	0.2	2.5	5.1	83.8	0.1
Bruce Brook (15)*	42.975	-72.659	943.2	0.8	4.8	0.8	6.2	2	85	0.4
Grassy Brook (16)	42.983	-72.631	9499	1	2.7	1.8	4.5	3.8	85.9	0.3
Murdock Brook (17)*	42.995	-72.632	665.8	1.3	7.3	6.7	3.5	4.3	76.8	0.1
Westminster Brook (18)*	42.999	-72.529	1793	1.5	16.9	3.7	7.2	2.8	67.8	0.1
Wardsboro Brook (19)	43.000	-72.674	4634.3	1	2.9	0.2	10.8	2.6	82.3	0.4
Hemlock Hollow Brook (20)*	43.002	-72.542	1850.6	2.3	14.9	0.2	3.4	3.2	75.8	0.1
Crane Mountain Brook (21)*	43.010	-72.611	1269.1	1.7	4.4	3.4	3.9	5.7	80.9	0.1
Wiswall Hill Creek (22)*	43.015	-72.651	634.7	0.9	4.9	0.7	6.3	1.9	85.3	0
Ellen Ware Creek (23)*	43.021	-72.653	598.7	2.1	6.5	0.4	1.3	4.5	85	0.2
Little Wiswall Hill Creek (24)*	43.023	-72.661	725.3	0.4	0.7	0.1	2.8	1.2	94.9	0
Pike Hollow Brook (25)*	43.027	-72.872	2194.7	0.9	1	0.1	6.3	2.2	89.3	0.1
Upper Wardsboro Brook (26)*	43.027	-72.872	1835.6	1.6	0	0.4	16.2	4	77.6	0.2
Pams Hill Creek (27)*	43.029	-72.836	788.2	3.7	1.7	0.2	5.9	5	83.4	0.1

Name, Map ID	Latitude	Longitude	Acres	Developed	Agriculture	Other	Wetlands	Herbaceous	Forest	Water
Dover Brook (28)	43.030	-72.852	859.5	2.9	0.6	0.7	3	8.4	83.9	0.3
Newell Hill Creek (30)*	43.030	-72.860	688.1	1.6	2.2	0.2	8.8	2.5	84.7	0.1
Parker Creek (29)*	43.030	-72.603	1103.8	0.5	0	0.4	2.9	4.9	91.3	0.1
Peaked Creek (31)*	43.031	-72.662	1160.1	1	9.4	0.1	6.3	2.9	79.7	0.6
Gilfeather Creek (32)*	43.032	-72.798	602.9	0.8	4.7	0	1.3	2.3	90.8	0.1
Hemlock Hill Brook (34)*	43.034	-72.804	790.1	2.8	0.9	1	4.5	4.7	86.1	0.1
Mill Brook (35)	43.034	-72.667	8823.9	1.5	2.5	0.7	5.4	4.9	84.8	0.2
Sheldon Hill Brook (33)*	43.034	-72.842	546.8	0.6	2.7	0	4.6	5.7	86.3	0.1
Whitney Creek Hill (36)*	43.036	-72.597	982.3	0.3	0.4	0.2	4.6	2.5	91.4	0.6
Wardsboro Brook Trib 5 (37)	43.038	-72.791	2693.7	1.2	3.8	1.3	3.2	2.7	87.6	0.2
Negro Brook (38)	43.043	-72.693	1195.9	0.7	1.1	0.6	2.6	1.4	93.3	0.3
Melis Brook (39)*	43.047	-72.786	800.4	0.7	3.9	0	1.8	2.1	91.5	0.1
Ball Farm Brook (40)*	43.048	-72.895	962.4	0.4	0	0.1	7.8	0.9	90.9	0
Rattlesnake Creek (41)*	43.048	-72.681	983.9	0	0	0	3.5	0.8	95.2	0.5
Mill Brook (42)	43.056	-72.466	2257.9	2.7	9.6	1.6	7.4	5.3	73.1	0.5
Knight Creek (43)*	43.061	-72.780	1039.3	1.7	7.6	0.4	7.6	4.1	78.4	0.2
Kingstons Creek (44)*	43.064	-72.762	662.5	0.4	1.6	0	7	0.6	90.4	0
Hackett Creek (45)*	43.069	-72.450	985.9	5.7	30.3	1.8	11.8	7.8	42.4	0.2
Tannery Brook (46)	43.077	-72.708	2646.6	1.2	6.1	0.4	3.7	3.9	84.5	0.1
Ranney Brook (47)	43.078	-72.707	880.3	0.9	1.9	0.2	1.2	2	93.7	0.1
Tannery East Brook (48)*	43.078	-72.708	108.6	3.9	8	0	8.2	9.2	70.7	0
Newcomb Brook (49)	43.091	-72.446	1376.1	1.6	3.3	0.2	8.9	3.4	82.1	0.5
Little Turkey Mountain Brook (50)	43.095	-72.733	884.5	1.1	0.5	0.3	2.2	2.7	92.8	0.4
Willard Hill Creek (51)*	43.099	-72.783	1174	1.6	0.1	0.8	1.5	3.1	92.8	0.1
Athens Brook (52)	43.119	-72.569	2503.8	1.6	3	0.8	8.6	4.4	80.2	1.4
Kibby Creek (53)*	43.121	-72.721	2193.9	1.5	5.8	0.2	8.5	4.2	79.6	0.2
Bundy Brook (55)	43.124	-72.471	799.6	1.4	1.8	0.2	3.3	3.2	90.1	0
Upper Winhall River (54)	43.124	-72.972	2495.5	0	0	0.1	22	0.4	75.3	2.2
Paradise Hill Brook (56)*	43.126	-72.472	808.5	3.2	8.1	0	5.5	4.2	78.8	0.1
Pleasant Creek (57)*	43.138	-72.513	738.9	2.6	11	2.4	6.2	5.8	71.5	0.4
Lightfoot Creek (58)*	43.139	-72.927	1112.6	0.4	0	0.1	8.6	1.5	88.7	0.6

Name, Map ID	Latitude	Longitude	Acres	Developed	Agriculture	Other	Wetlands	Herbaceous	Forest	Water
Little Pleasant Creek (59)*	43.140	-72.503	1001.7	2.4	11.8	0.3	3.1	5.2	77.1	0.1
Jenk's Creek (60)*	43.145	-72.893	1856.8	3.3	2.7	1.6	16.1	6.1	69.6	0.7
Red Brook (61)	43.147	-72.870	1584.5	3.8	4.6	1.3	17.6	6	65.9	0.9
Brook 43 (62)*	43.156	-72.576	1274.3	0.6	0	0.1	7	2.1	89.9	0.1
Hinkley Brook (63)	43.175	-72.610	1066.6	1.3	2.5	0.2	7.5	2.9	85.3	0.3
Creek Under the Mountain (65)*	43.178	-72.799	780.6	1.4	7.9	0.7	3.9	8.8	76.9	0.4
Orchard Brook (64)*	43.178	-72.586	2372.7	1.8	4	0.9	5.1	4.6	82.9	0.6
Lower Thompsonburg Brook (66)*	43.185	-72.802	5712.5	2.3	2.9	0.5	9.7	5.9	76.1	2.6
O'Brien Brook (67)	43.187	-72.474	1236.4	1	13.6	4.8	5	3.6	71.8	0.1
Meeting House Brook (68)*	43.193	-72.489	761.2	1.5	11.2	1	2.2	5.1	79	0
Cabell Brook (69)*	43.196	-72.646	670.3	0.8	3.3	1.5	3.3	2.7	87.5	0.9
Little Stagecoach Creek (70)*	43.197	-72.645	507.6	0.4	0.9	0.1	3.4	1.5	93.6	0.1
Wiley Hill Creek (71)*	43.197	-72.497	2032.2	1.4	15	1.2	6.4	3.5	72.3	0.2
Four Chimney Brook (73)*	43.198	-72.621	702.2	0.9	5.7	0	4.7	2.2	85.9	0.6
Stagecoach Creek (72)*	43.198	-72.638	513.3	1.1	1.6	0	5.8	1.7	89.5	0.3
Mud Pond Outlet (74)*	43.200	-72.867	1071.8	0.5	0.4	1.4	13.3	1.9	81.5	0.9
Thompsonburg Pond Outlet (75)*	43.206	-72.782	508	3.6	0.3	0.4	2.6	19	73.4	0.7
Brockways Mills Brook (78)*	43.207	-72.510	1151	0.6	3	0	3.8	2.1	90.4	0
Lily Brook (77)	43.207	-72.505	1045.1	1.6	8.7	7.6	2.4	4.1	75.5	0.2
Stearns Creek (76)*	43.207	-72.537	657.8	0.1	0	0	3.6	0.4	95.9	0
Petty Creek (79)*	43.215	-72.534	532.8	0.8	3.2	0.4	6.1	3.8	85.7	0.1
Cambridgeport Brook (80)*	43.219	-72.536	1672	1.9	3.1	2.5	9.1	4.8	78.6	0.1
Spruce Hill Brook (81)*	43.222	-72.820	555.4	2.4	17.5	1.2	21.3	5.9	51.4	0.3
Anderson Creek (83)*	43.226	-72.573	506.2	1.3	2.8	0.1	8	3.3	84.5	0
Eastman Creek (82)*	43.226	-72.577	1163.3	1.6	2.5	0.4	13.2	3.8	78	0.4
Rhinehart River (84)*	43.239	-72.817	1396.4	1.6	5.4	1.2	17.1	6.1	67.1	1.5
Upper South Branch Williams River (85)	43.240	-72.656	3523.1	1.4	0.9	1.1	6.5	6.4	83.4	0.2
Telephone Creek (86)*	43.241	-72.555	1080	1.1	5	0.4	6.6	6	80.8	0.1
Farnum Brook (87)	43.245	-72.878	1332.2	0.9	6.4	2	6	2.3	82.5	0
Lower South Branch Williams River (88)	43.258	-72.584	7007.3	1.5	2.7	0.8	6.9	5.3	82.4	0.4
Talc Mill Creek (89)*	43.258	-72.587	2299.2	2	4.3	0.1	5.1	4.2	84.2	0.2

Name, Map ID	Latitude	Longitude	Acres	Developed	Agriculture	Other	Wetlands	Herbaceous	Forest	Water
Piper Hill Brook (90)*	43.261	-72.793	700.8	1.7	6.5	0	11.5	6.1	73.4	0.9
Fletcher Hill Brook (91)*	43.262	-72.581	1604.6	3	4.8	0.4	6.8	6.7	78	0.4
Jones Brook (92)	43.263	-72.858	2197	0.6	0.8	0	21.6	1.7	74.8	0.5
Holden Hill Creek (93)*	43.265	-72.799	547.9	2	10.3	0	18	7.2	62	0.4
Flamstead Creek (94)*	43.266	-72.584	868.6	1.6	20.5	0.2	6.7	4.4	66.4	0.1
Goldthwaite Creek (95)*	43.268	-72.629	1000.7	1.3	5	1.5	3.8	3.7	84.5	0.1
Chester Reservoir Brook (96)*	43.269	-72.627	559.5	1.3	3.1	0.8	7	2.9	84.1	0.9
Landgrove Brook (97)*	43.273	-72.863	522.8	2.2	4.3	0	17.4	6.3	69.1	0.6
Trebo Brook (98)	43.273	-72.591	1131.8	1.3	4	0	9.7	6	78.9	0
Griffith Brook (99)	43.276	-72.865	2557.8	0.3	0.5	0	15	0.7	83.4	0.1
Russet Hill Brook (100)*	43.288	-72.867	586.7	0.9	4.6	0	10.5	1.4	81.8	0.8
Wantastiquet Outlet (101)*	43.290	-72.795	1685.2	1.4	1.4	0.1	10	2.9	81.4	2.8
Lawrence Hill Creek (102)*	43.293	-72.794	637.9	2.4	3.3	0.3	12.9	9.4	70.8	0.8
Chester Mountain Creek (103)*	43.299	-72.787	593.3	1.8	6.6	0.4	0.6	3.7	86.8	0.1
Whitmore Brook (104)	43.299	-72.608	1468.7	1	1.1	0.2	9.8	2	85.8	0
Pete's Parent's Brook (105)*	43.305	-72.884	745.5	0	0	0	4.7	0.1	95.2	0
Utley Brook (106)	43.310	-72.878	2675.9	0.4	0.3	0	13.2	0.3	85.1	0.8
Upper West River (107)	43.316	-72.790	5867.7	1.1	0.5	0.1	6.2	2	90	0.1
Blackmore Creek (108)*	43.321	-72.608	642.9	1.9	7.8	0.5	13.5	6.3	69.6	0.2
Lovejoy Brook (109)	43.334	-72.695	740.4	1.8	6.7	0.3	3.2	5.2	82.6	0.2
Wheaton Brook (110)	43.337	-72.704	676.2	0.8	2.1	3.9	9.5	3.9	79.8	0.1
Creek 103 (111)*	43.343	-72.619	655.8	1.1	1.3	0	1.1	2.1	94.2	0.2



Map ID	Assessment unit name
1	Sacketts Brook Segment
2	Wardsboro Brook , from West Wardsboro to Mouth (7 Miles)
3	Brehmi Brook
4	Saxtons River, Mouth To rm 5.0 Below Saxtons River WWTF
5	Saxtons River, WWTF upstream to South Branch Saxtons River
6	Ellis Brook, Rockingham Road upstream to Route 91
7	Middle Branch Williams River
8	Flood Brook, from Hapgood Pond dam outlet downstream 0.1 mile

Monitoring needed to evaluate attainment of aquatic biota use

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	Lower Sacketts Brook Segment	UNKNOWN	Macroinvertebrate community is not in attainment mainly due to dense white fungal periphyton caused by a leaking discharge pipe carrying effluent from the paper mill at river mile 0.8
2	Wardsboro Brook, from West Wardsboro to Mouth (7 Miles)	SEDIMENTATION/SILTATION, TEMPERATURE	Streambank erosion, land development, road runoff, channel widening, loss of riparian vegetation
3	Brehmi Brook	PH, LOW	Acid deposition
4	Saxtons River, Mouth To rm 5.0 Below Saxtons River WWTF	PHOSPHORUS	Phosphorus enrichment, incomplete stream canopy
5	Saxtons River, WWTF upstream to South Branch Saxtons River	SEDIMENT, TEMPERATURE	Poor riparian condition, channel modification, needs fish community assessment
6	Ellis Brook, Rockingham Road upstream to Route 91	UNKNOWN	Poor fish community
7	Middle Branch Williams River	HABITAT ALTERATIONS	Dredging, berming, channelization
8	Flood Brook, from Hapgood Pond dam outlet downstream 0.1 mile	TEMPERATURE	Fair biological data, USFS to monitor temperature and dissolved oxygen

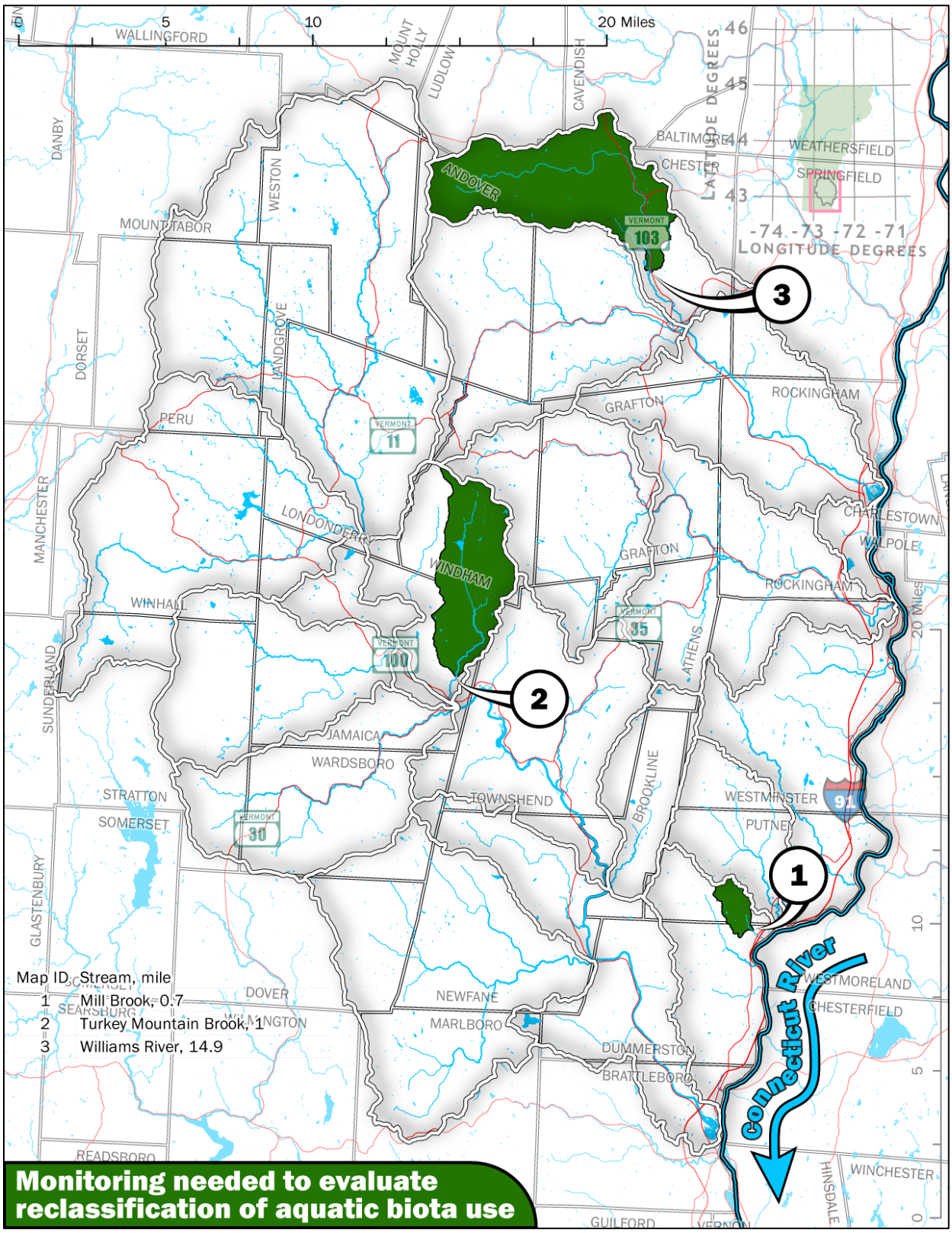


Figure 29 Map of rivers that require more monitoring to assess condition relative to A(1) or B(1) criteria for Aquatic Biota use. The streams have biological monitoring data between 2012-2022 which suggests Very Good or Excellent. Additional data may be necessary to assess if it meets A(1) or B(1) criteria for Aquatic Biota use.

Table 23 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	Mill Brook, 0.7	2027	2027
2	Turkey Mountain Brook, 1	2027	2027
3	Williams River, 14.9	2027	2027

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 11(13). NWCA (National Wetland Condition Assessment). Heritage (Natural Heritage methodology).

Boundless Plot	NWCA	Species List	Heritage	Wetlands Transect
4	2	9	23	7

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 a higher 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.

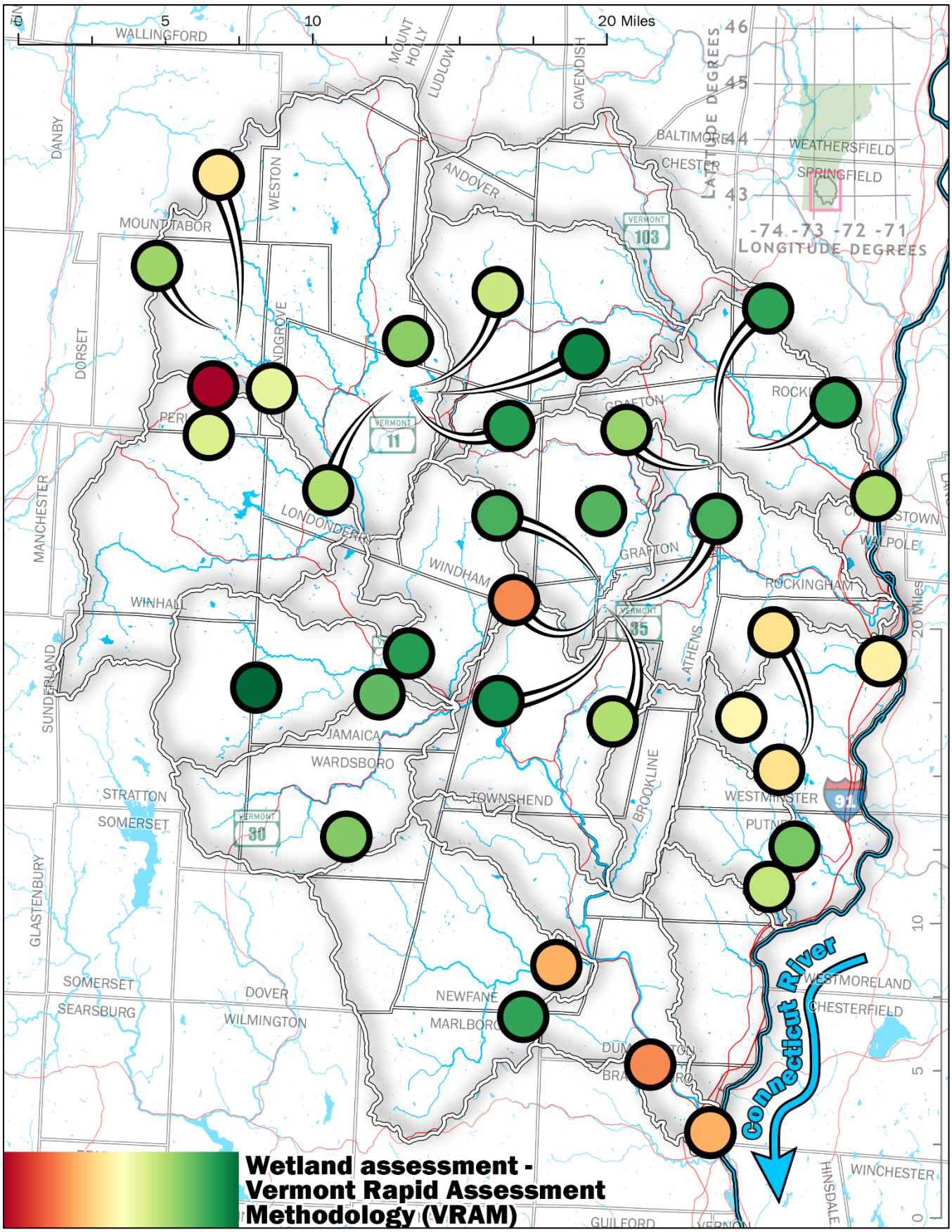


Figure 30. VRAM scores Basin 11(13) (North). The red to green symbology illustrates the relative wetland condition amongst VRAMs.

Table 24 Number of VRAMs conducted in Basin 11(13), summarized by HUC12 sub-basins. Sub basin size in acres included for reference.

Name	*Sub basin acres*	*VRAM Count*
Ball Mountain Brook	21523.6	1
Minor Tribs - Lower Williams	24417.4	4
Rock River	36862.2	1
Sacketts Brook	10181.2	1
Tributaries to Mid-West River	33583.9	1
Tributaries to the Lower West River	25169.2	5
Tributaries to the Upper West River	64601.2	10
Upper Saxtons River	21941.3	6
Wardsboro Brook	22536.5	2
Westminster Direct Drainages	24866	5
Winhall River	38180.6	1

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).

There are no restoration monitoring sites in this basin.

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 11(13).

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 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

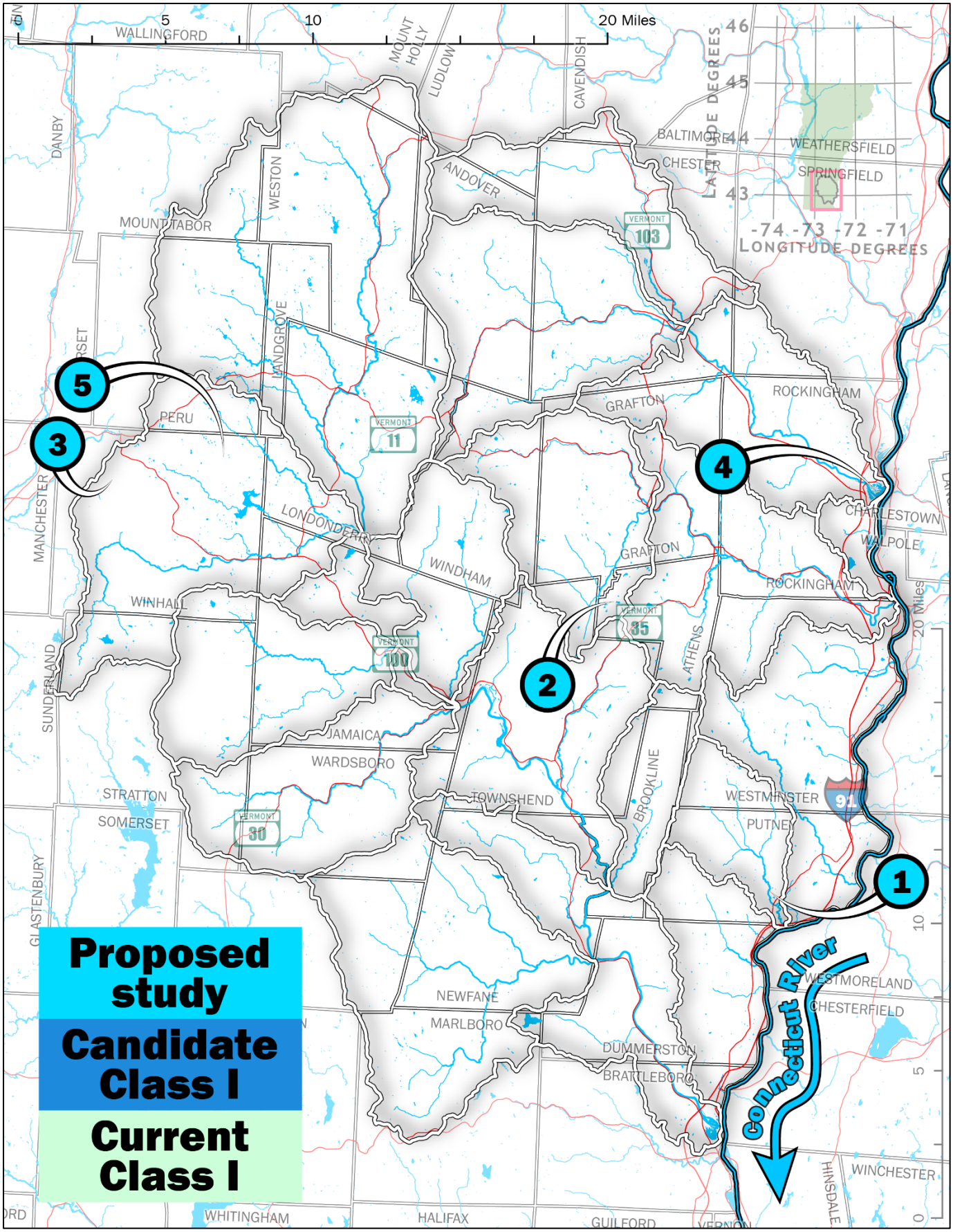


Figure 31 Class I wetland candidates.

Table 25 Class I wetland candidates.

Map ID	Latitude	Longitude	Wetland name	Category	Towns
1	42.9793	-72.5206	Putney's Sand Hill Road Complex	Proposed for Study	Putney
2	43.1237	-72.6269	Athens Dome Wetland Complex	Proposed for Study	Athens, Grafton
3	43.1116	-72.9467	Winhall River Headwaters Wetlands	Proposed for Study	Winhall
4	43.1789	-72.4514	Herrick's Cover, Rockingham	Proposed for Study	Rockingham
5	43.1825	-72.8622	Eddy Brook Wetlands	Proposed for Study	Peru, Winhall

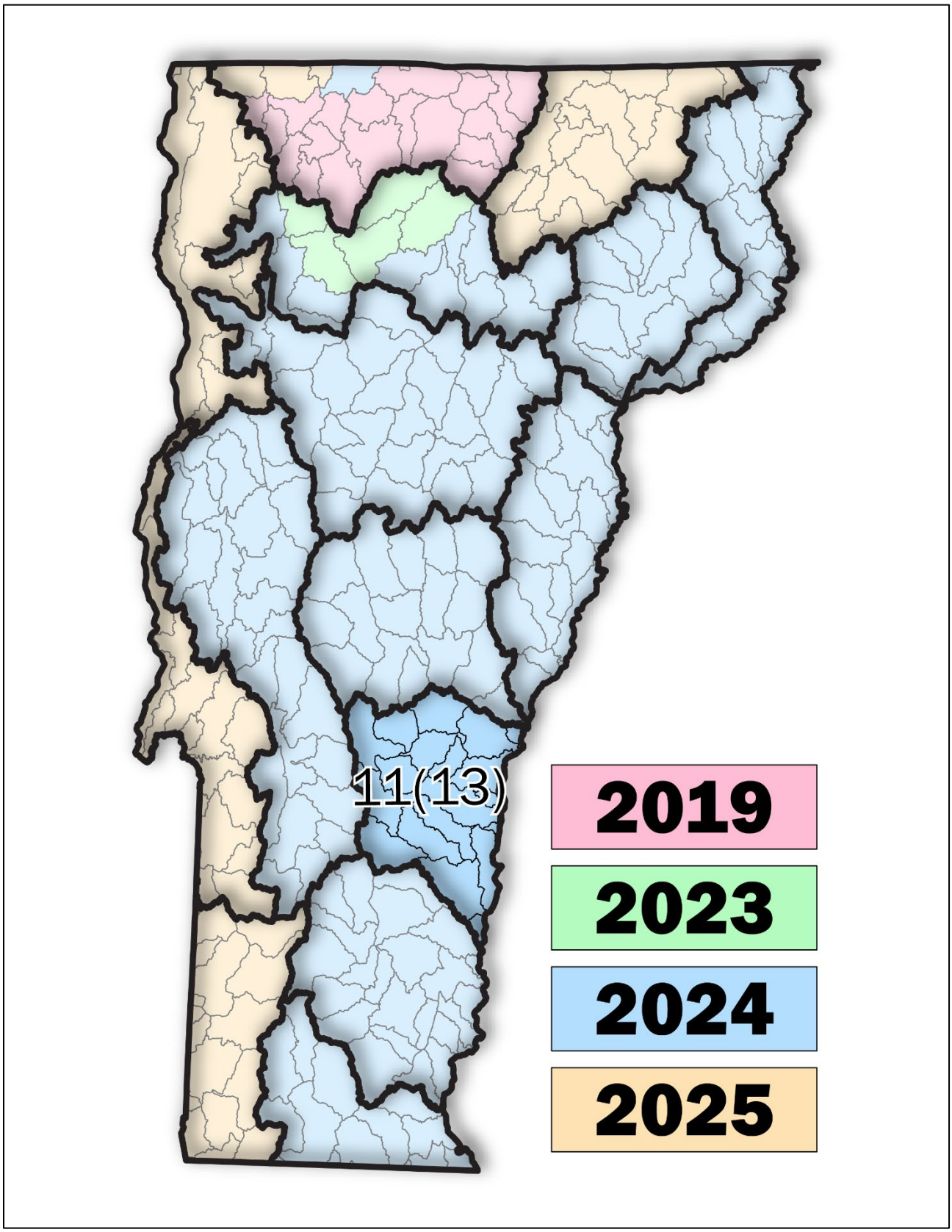


Figure 32. Wetland mapping schedule for Vermont Tactical Basins. Mapping is scheduled for 2024 in Basin 11(13).

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.