BASIN 15 ASSESSMENT REPORT

PASSUMPSIC RIVER

VERMONT DEPARTMENT OF ENVIRONMENTAL CONSERVATION
WATERSHED MANAGEMENT DIVISION

AUGUST 2023

Contents

Basin overview

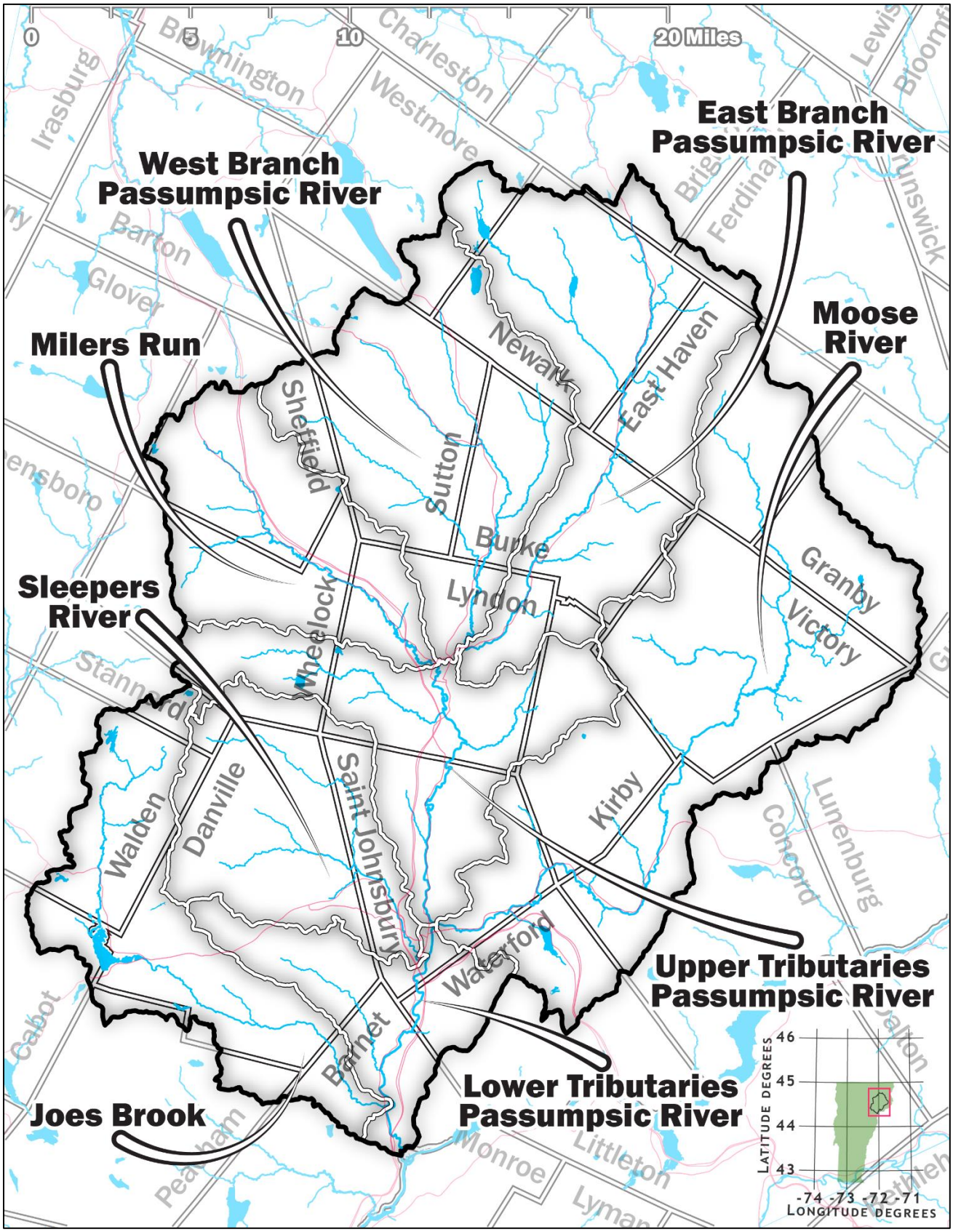


Figure 1 The 325,276 acre Passumpsic River basin encompasses waters of eastern Caledonia County and southern Essex County and drains to the Connecticut River.

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

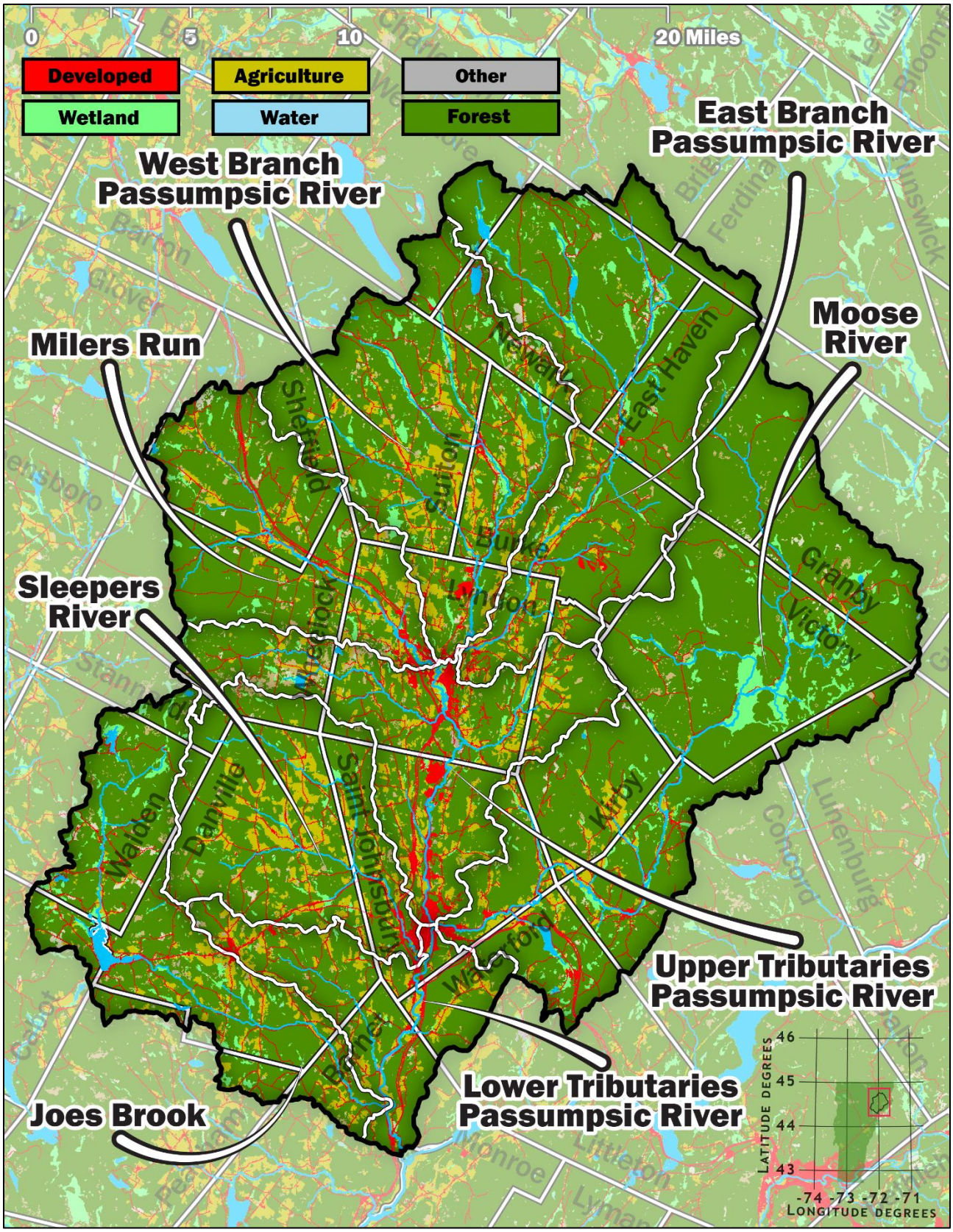
Table 4 Summation of town level human population over time for all towns that intersect Basin 15.

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
West Branch
Passumpsic River
East Branch
Passumpsic River
Milers Run
Moose
River
Sleepers
River
Upper Tributaries
Passumpsic River
Lower Tributaries
Passumpsic River
Joes Brook
Sheffield
Newark
East Haven
Lyndon
Granby
Victory
Kirby
Danville
Walden
Saint Johnsbury
Waterford
Concord
Lunenburg
Littleton
Monroe
Lyman
LATITUDE DEGREES
46
45
44
43
-74 -73 -72 -71
LONGITUDE DEGREES

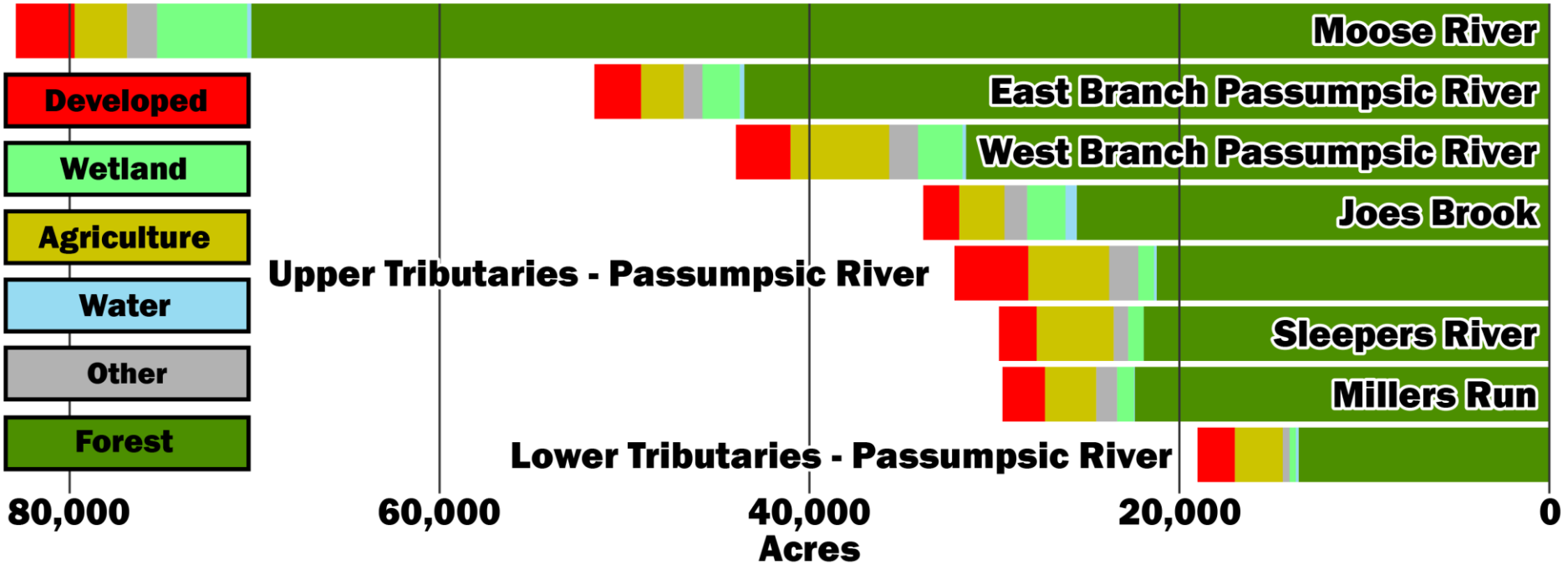


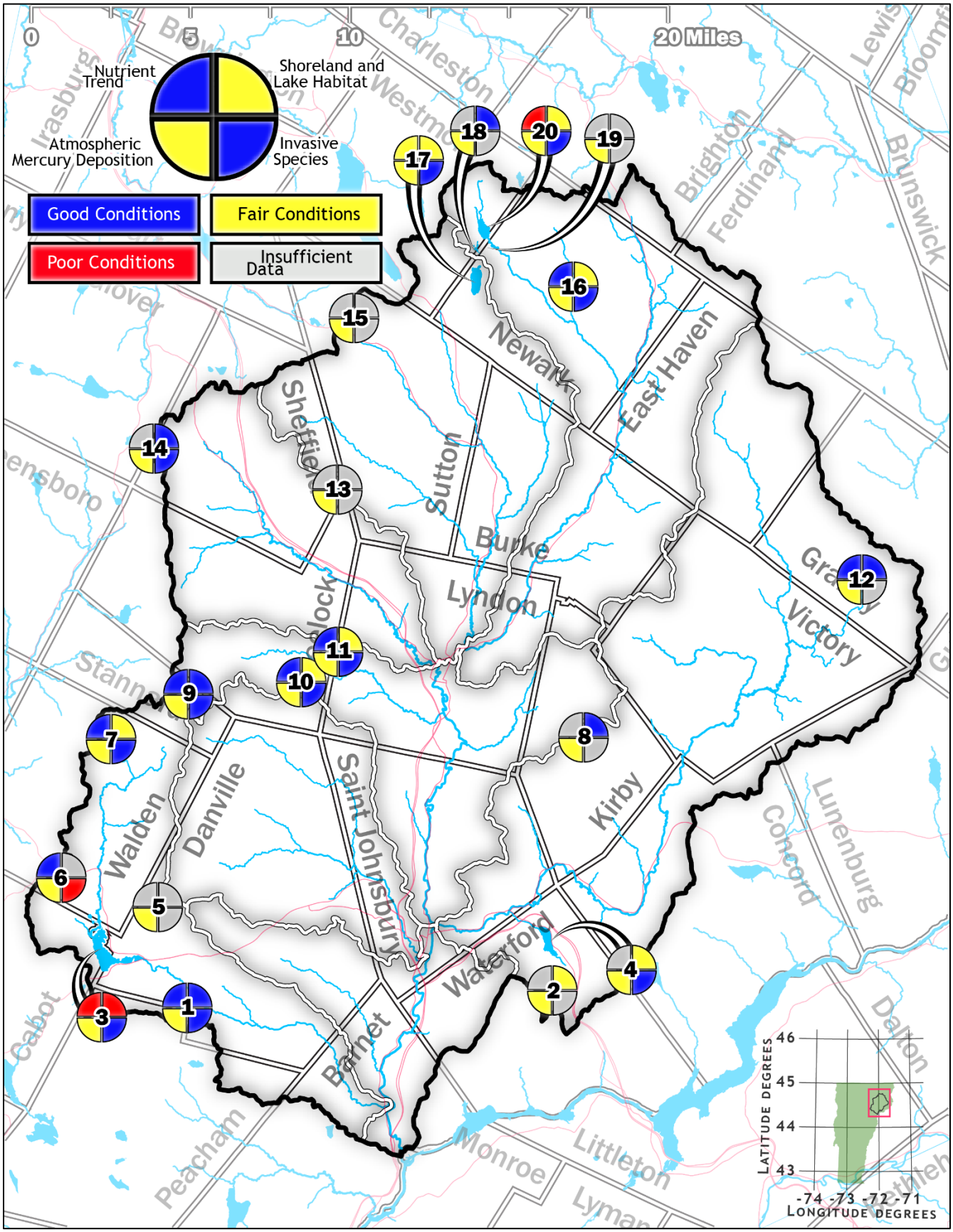
Figure 2 Acres of land cover based on NLCD 2019.

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

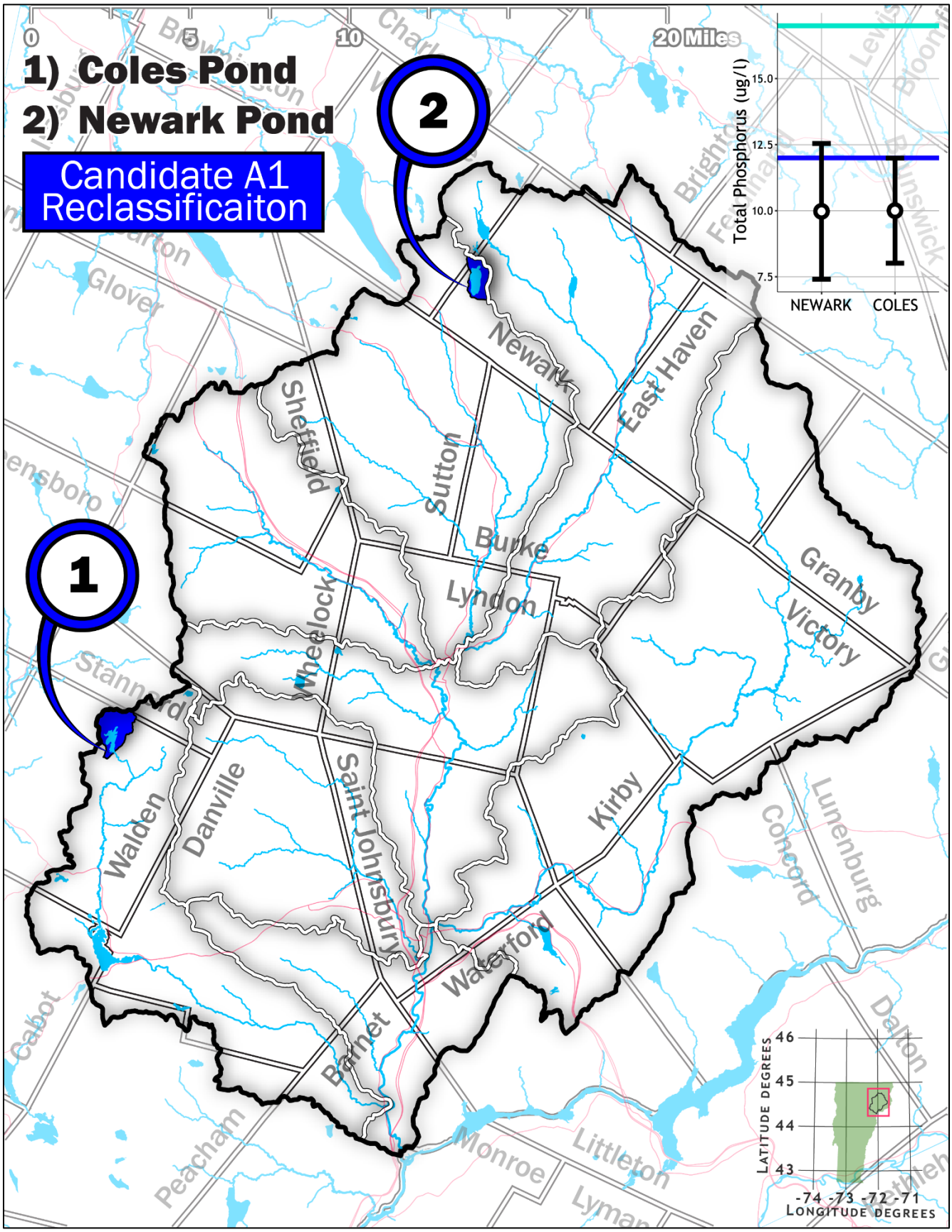


Figure 3 Lake reclassification candidates and their corresponding watersheds.

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

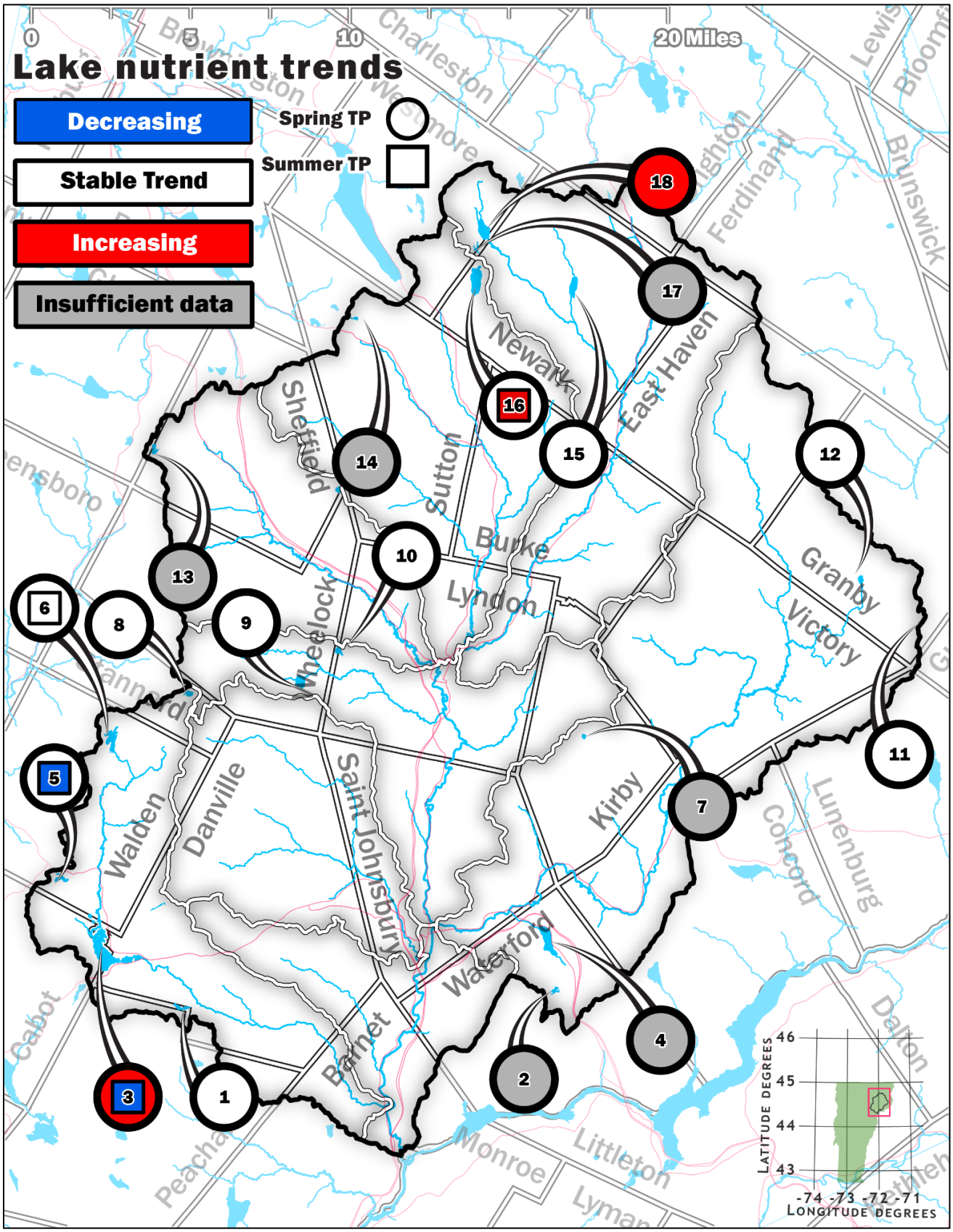


Figure 4 Total phosphorus trends for lakes in Basin 15. Note that trends can be for either spring or summer data or for both.

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

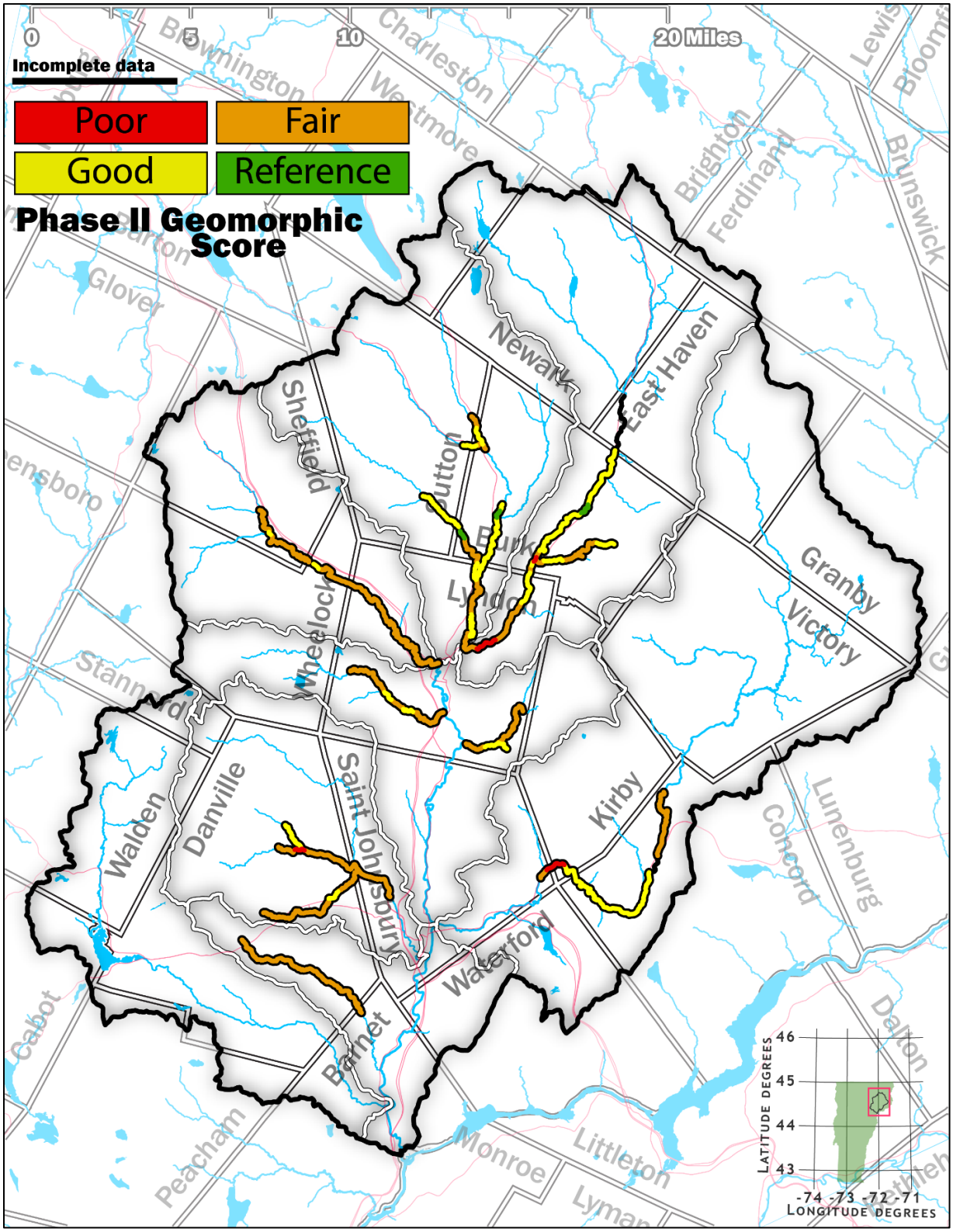


Figure 5 Map of rivers in Basin 15 with Phase II geomorphic condition scores through the present. Poor rivers have extreme departure from reference condition, fair rivers have major departure, and good rivers have minor departure. Reference rivers have no departure.

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*

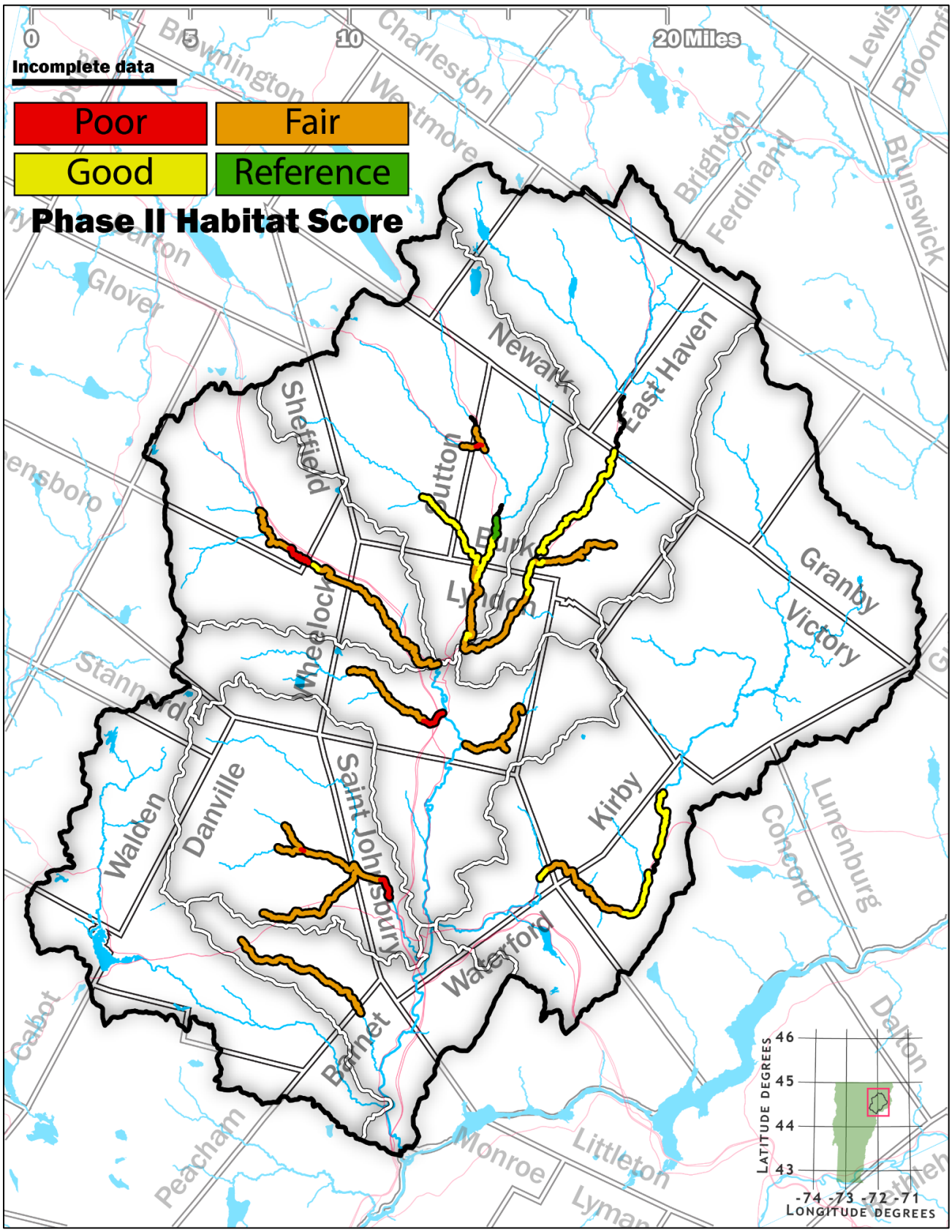


Figure 6 Map of rivers in Basin 15 with Phase II habitat condition ratings through 2020. Low number ratings have extreme departure from reference conditions. High number ratings have non-significant departure from reference conditions.

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.

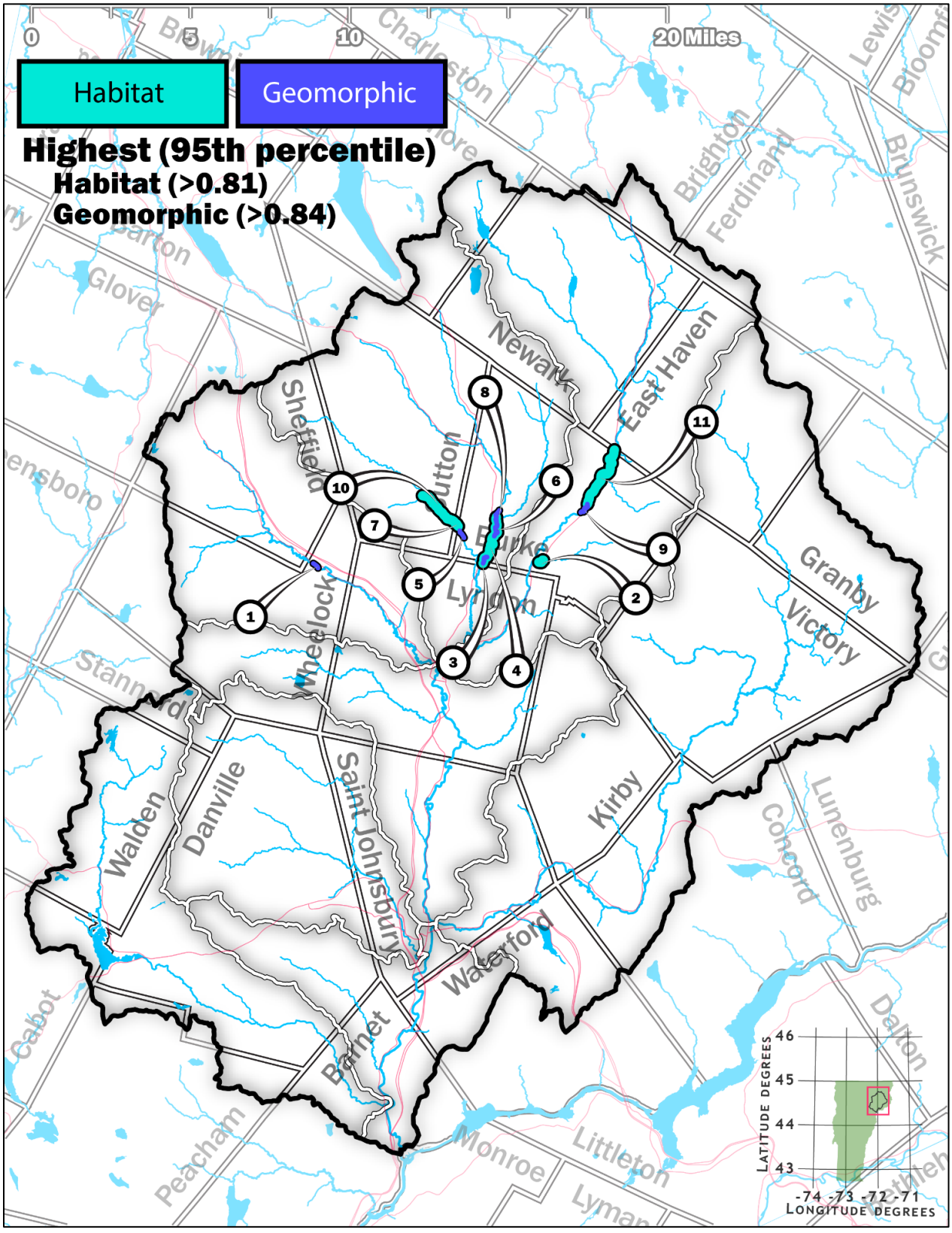


Figure 7. Map of the 95th percentile (highest) habitat and geomorphic condition scores. Map IDs correspond to the table below. Using this percentile approach identifies the reaches with the best geomorphic and habitat condition relative to conditions across the basin. Each is scored separately but overlap 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

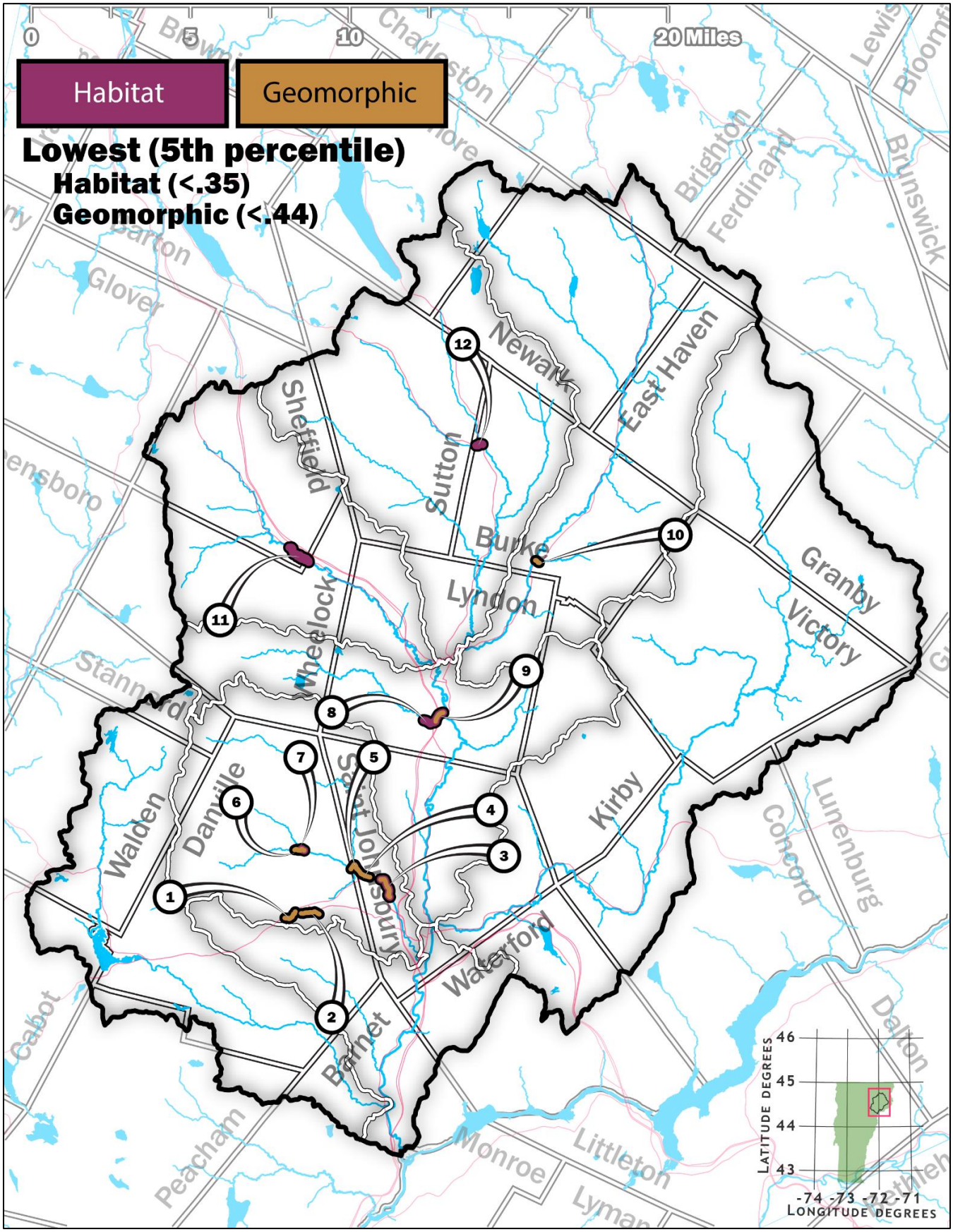


Figure 8 Map of the lowest 5th percentile habitat and geomorphic condition scores. Map IDs correspond to the table below.

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

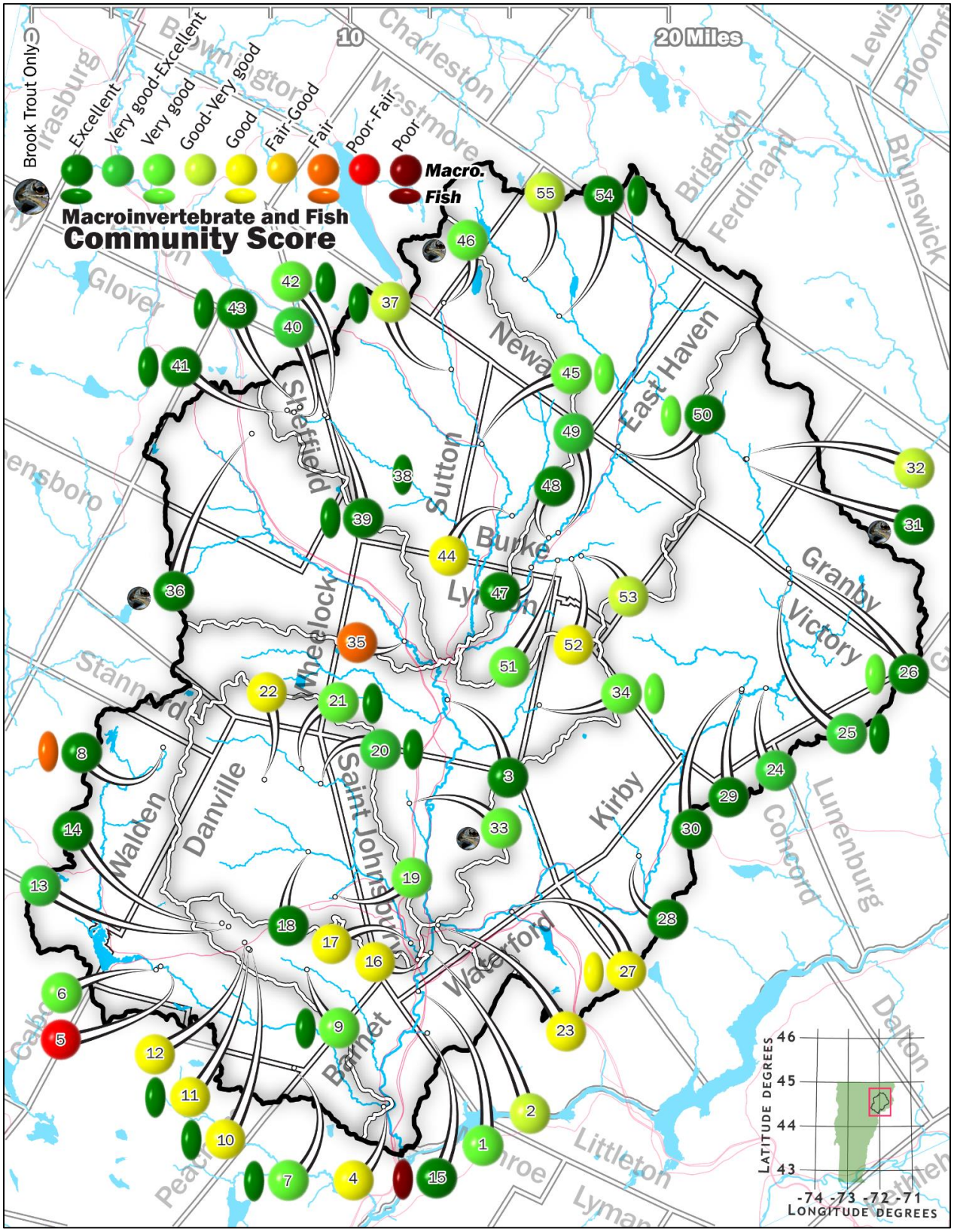


Figure 9. Map of the Macroinvertebrate Community assessment for Basin 15. Poor scores represent the greatest deviation from reference conditions and Excellent scores represent non-significant deviation from reference conditions. We do not have criteria for assessing Brook Trout Only streams (where brook 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)

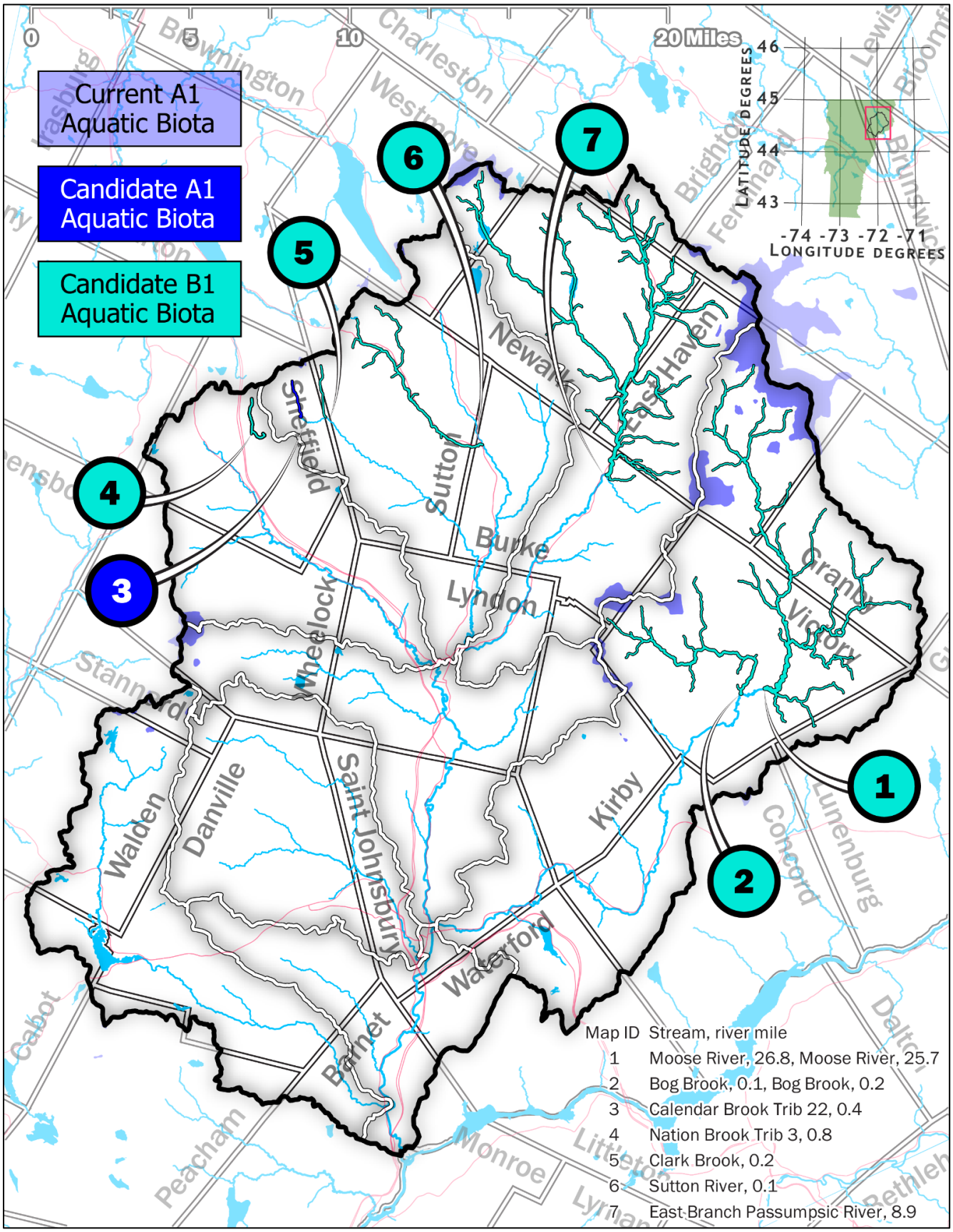


Figure 10 Map of A(1) and B(1) reclassification candidates. Map IDs correspond to the table below.

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

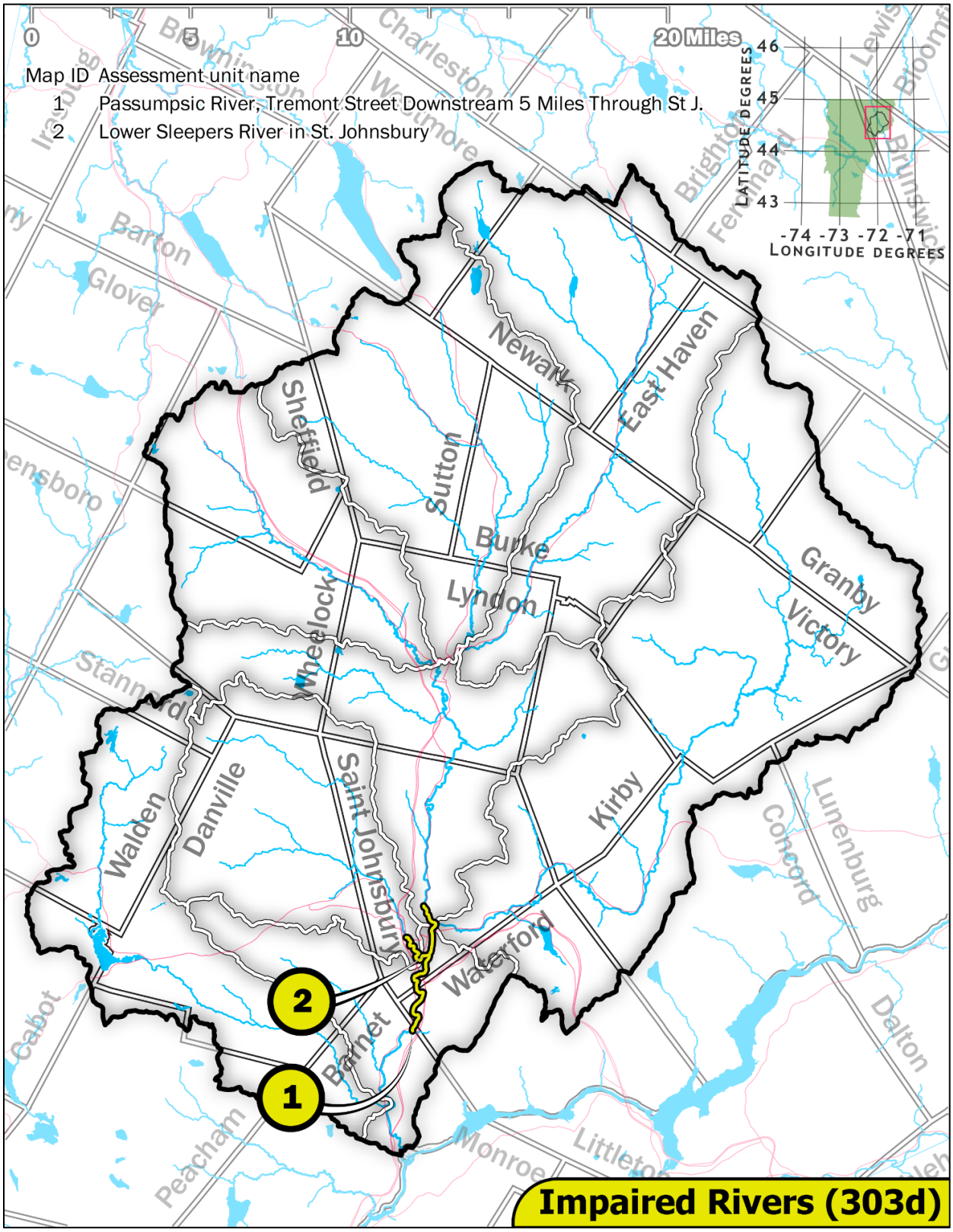


Figure 11. Map of impaired rivers in Basin 15. Yellow represents rivers that are on the 2022 303(d) list. Use the stream name and the first seven characters of the Assessment Unit ID to find monitoring data from the reach in this report viewer.

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

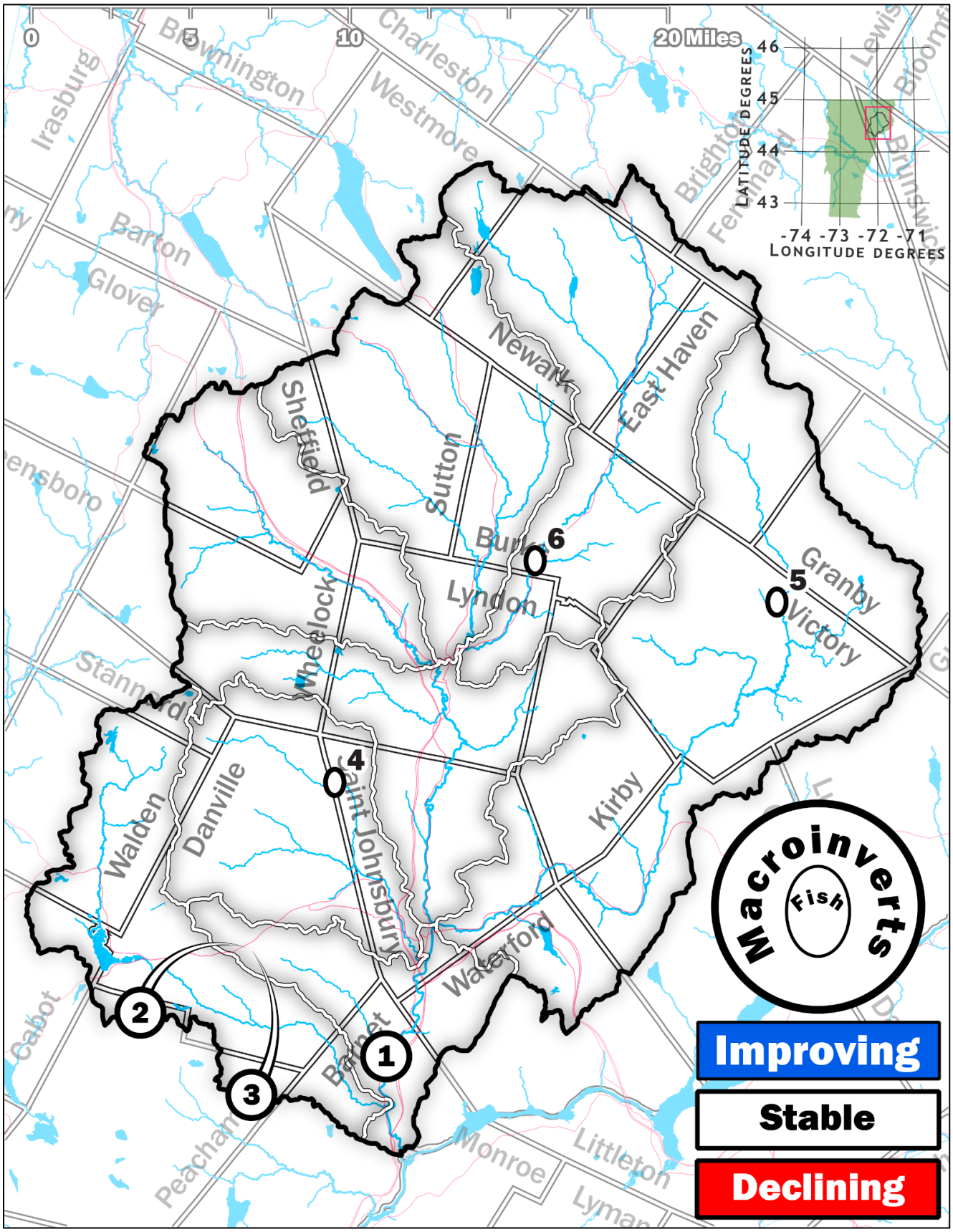


Figure 12 Map of rivers with enough biological data to model a water quality trend.

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

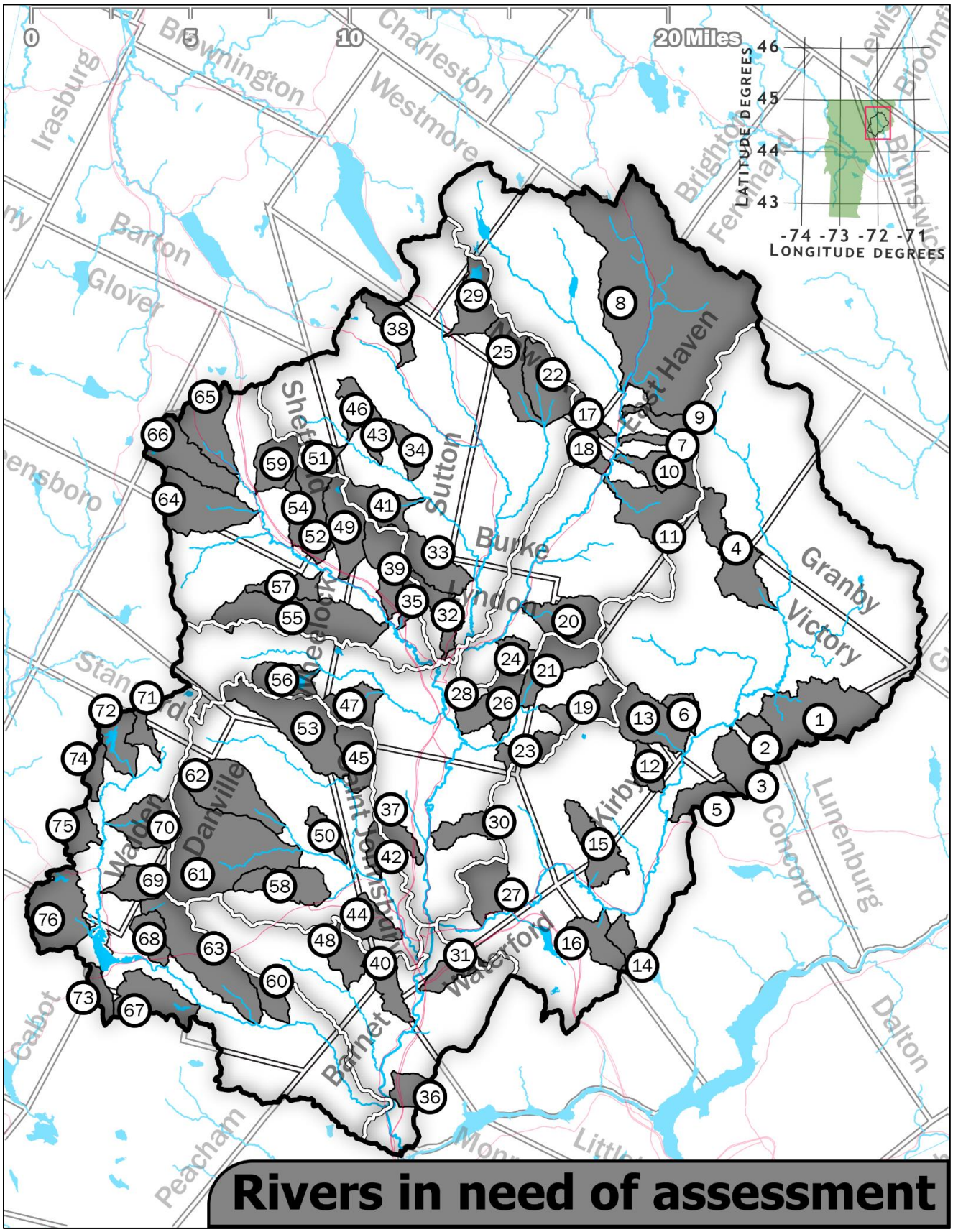


Figure 13 Map of rivers with unassessed aquatic biota use in Basin 15.

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.

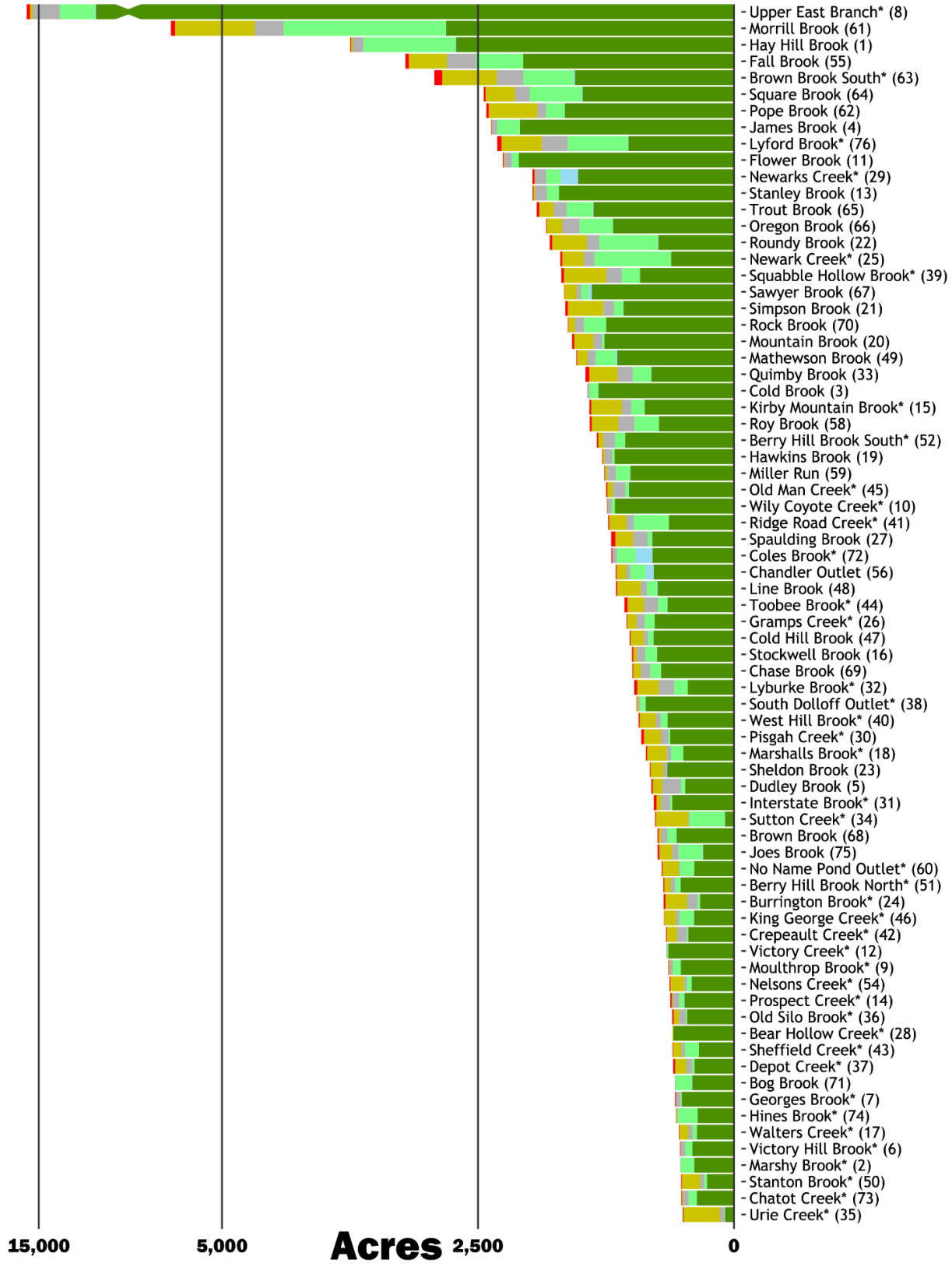


Figure 14 Land cover of unassessed waters ranked by watershed size. (#)'s associated with the stream name correspond to the map above. Asterisks are officially unnamed streams in the National Hydrography Dataset. Landcover is based on the Vermont High Resolution Land Cover dataset produced by the University 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 (km^2)	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 (km²)*	*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

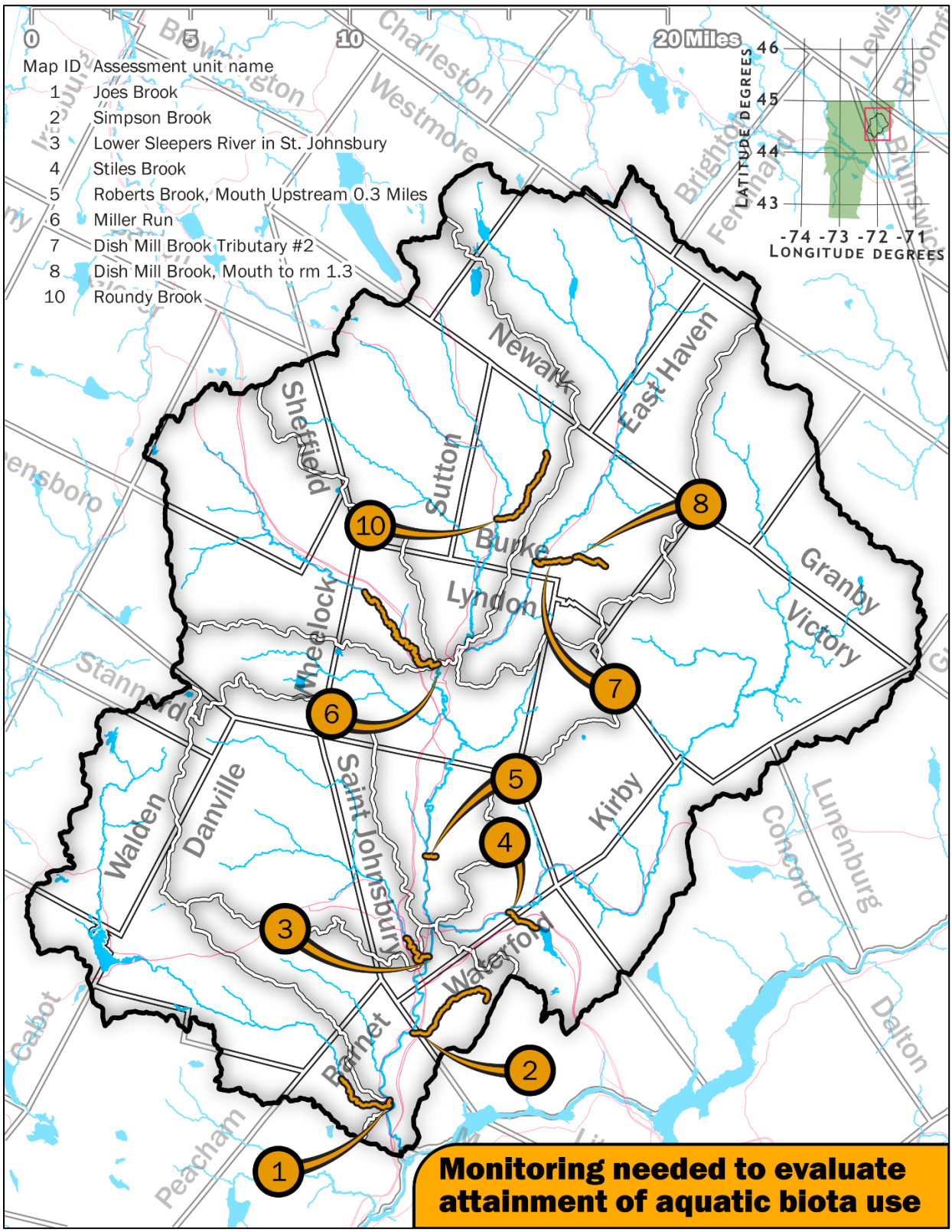


Figure 15 Map of rivers that require more monitoring to evaluate attainment of Aquatic Biota use.

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

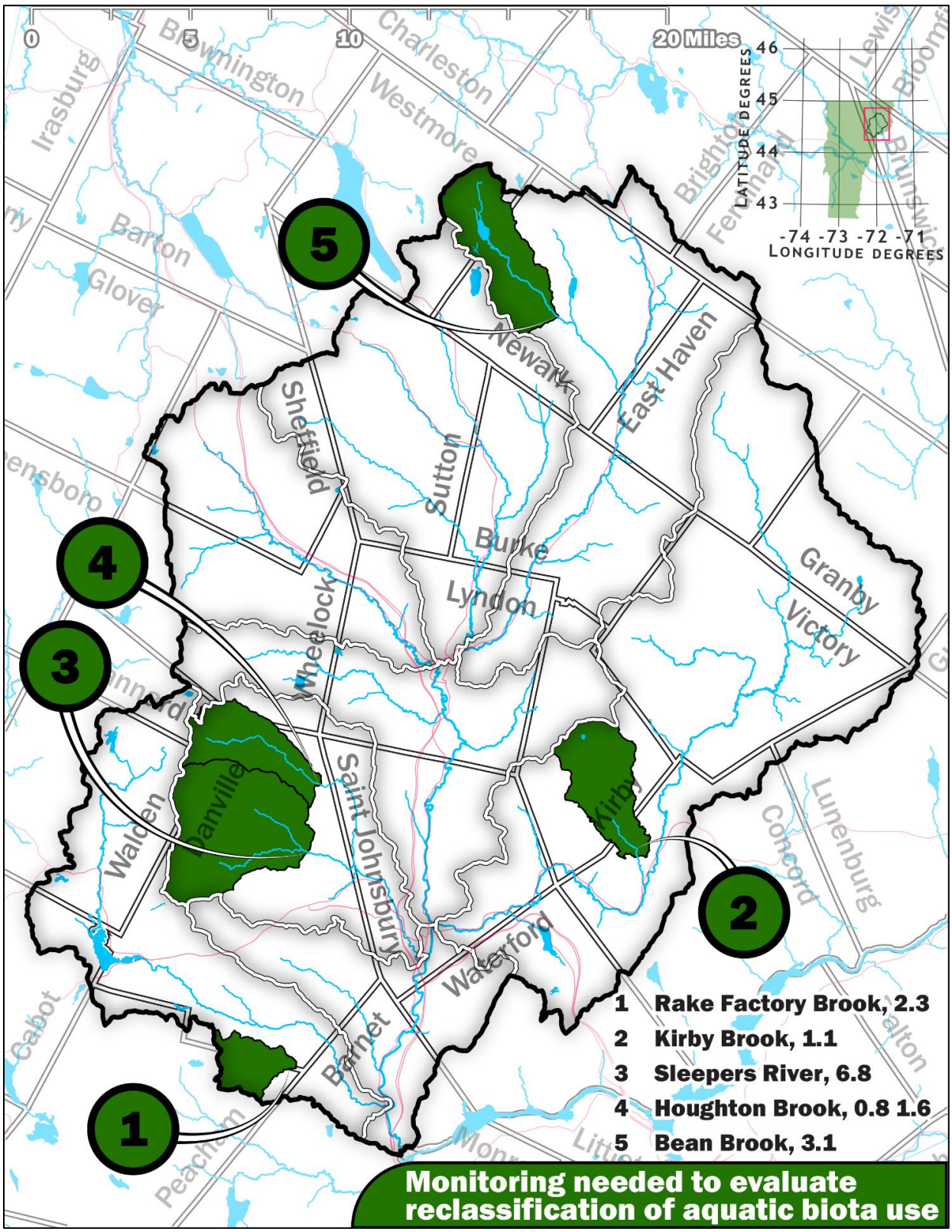


Figure 16 Map of rivers that require more monitoring to assess condition relative to A(1) or B(1) criteria for Aquatic Biota use.

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.

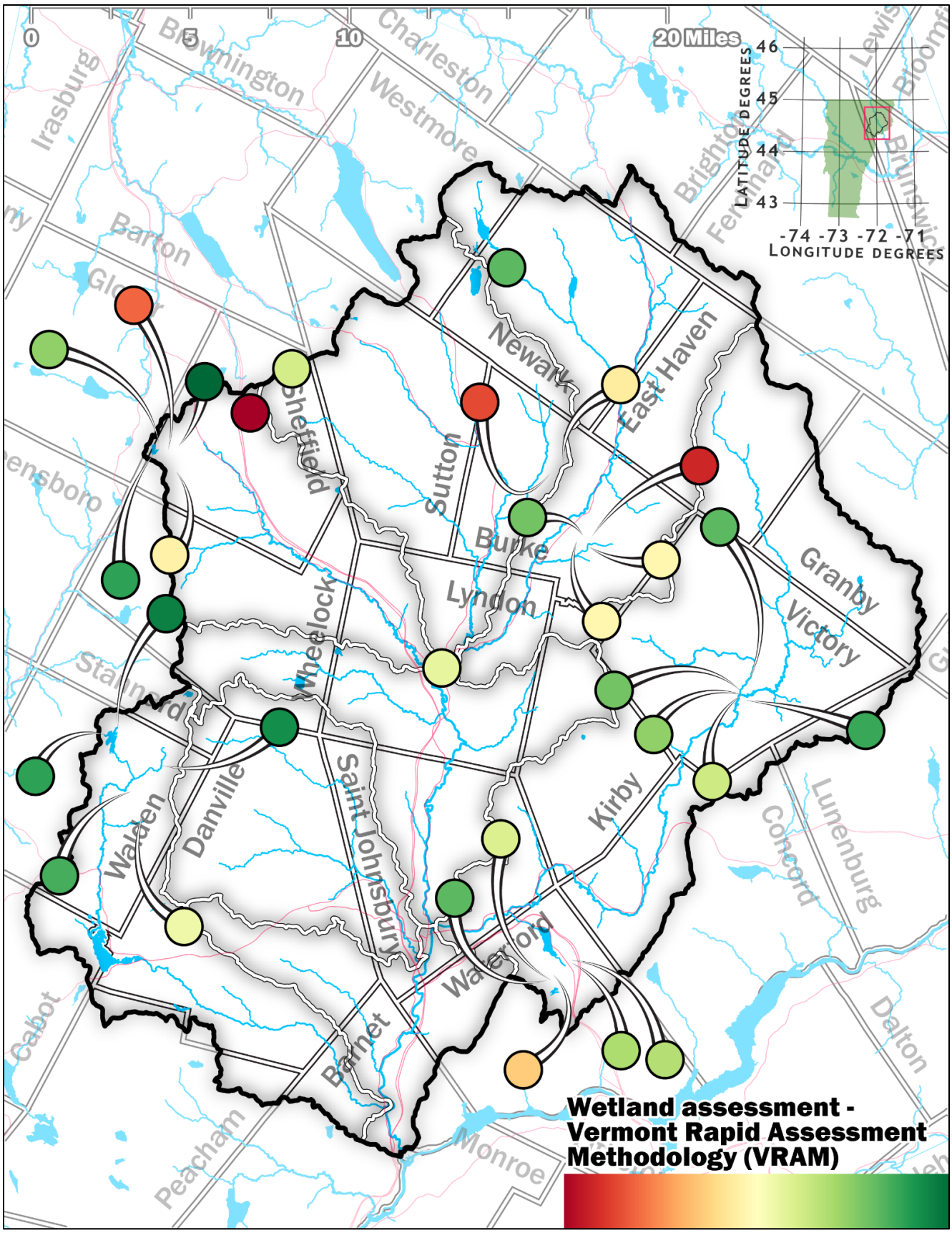


Figure 17. VRAM scores Basin 15.

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).

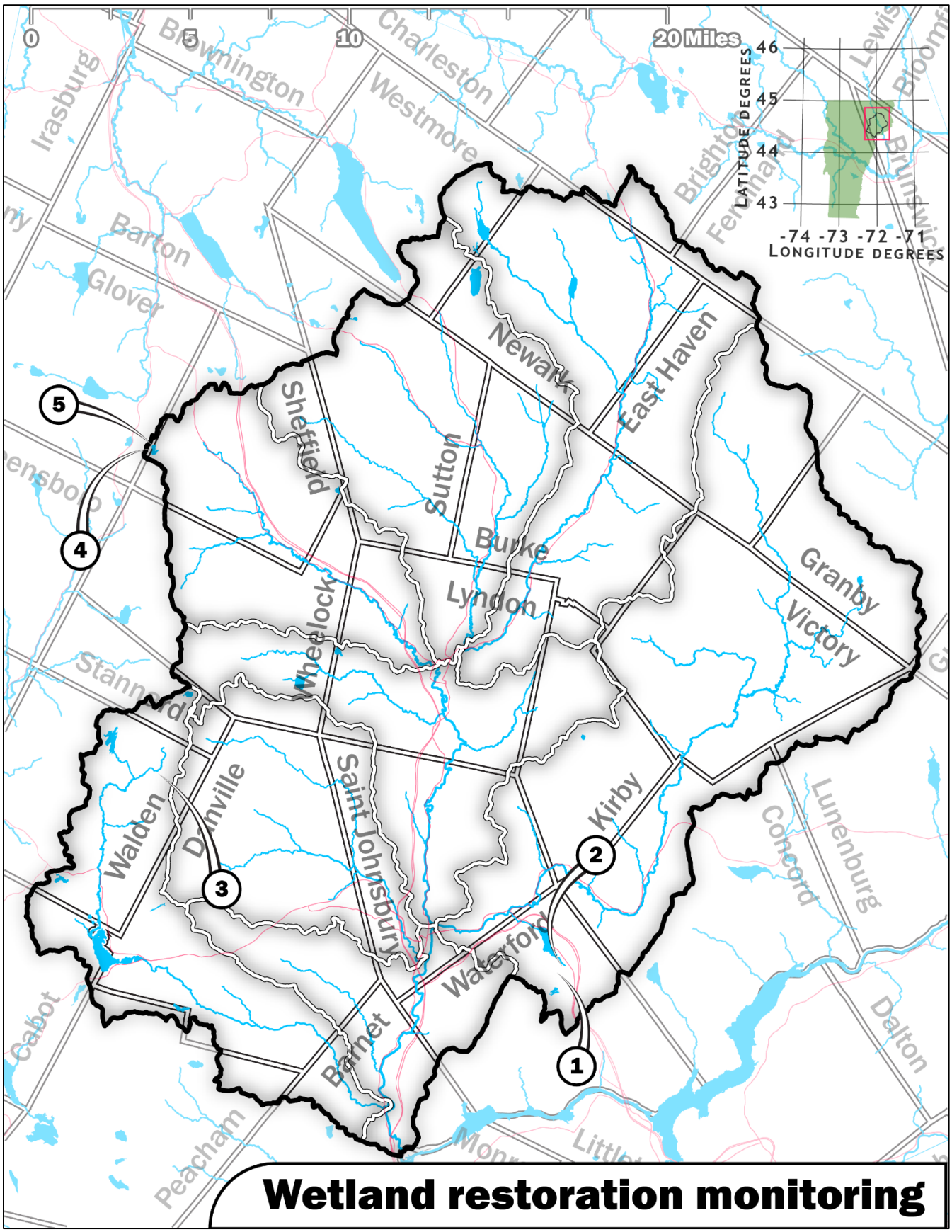


Figure 18 Distribution of wetland restoration sites in basin 15.

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

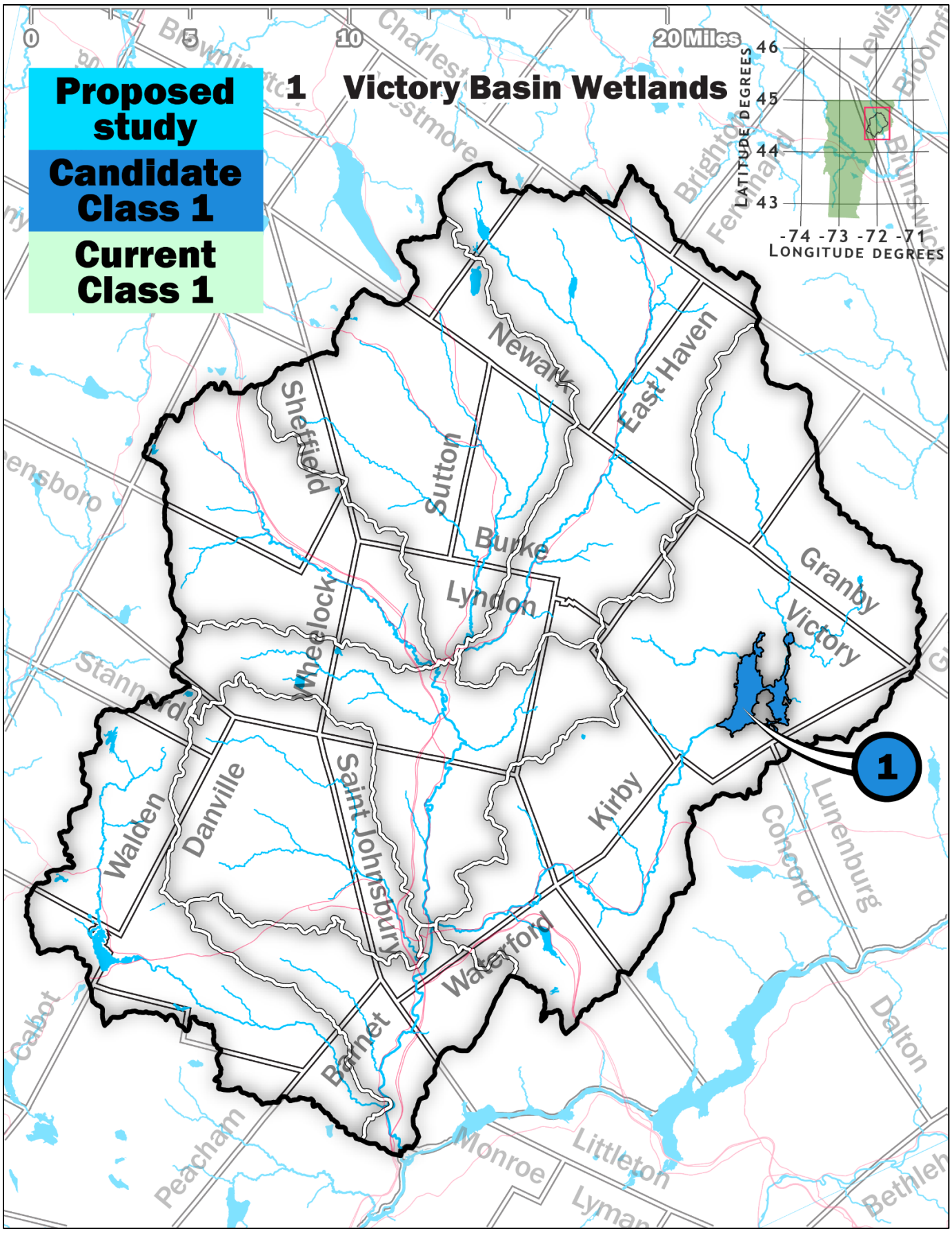


Figure 19 Class 1 wetland candidates.

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

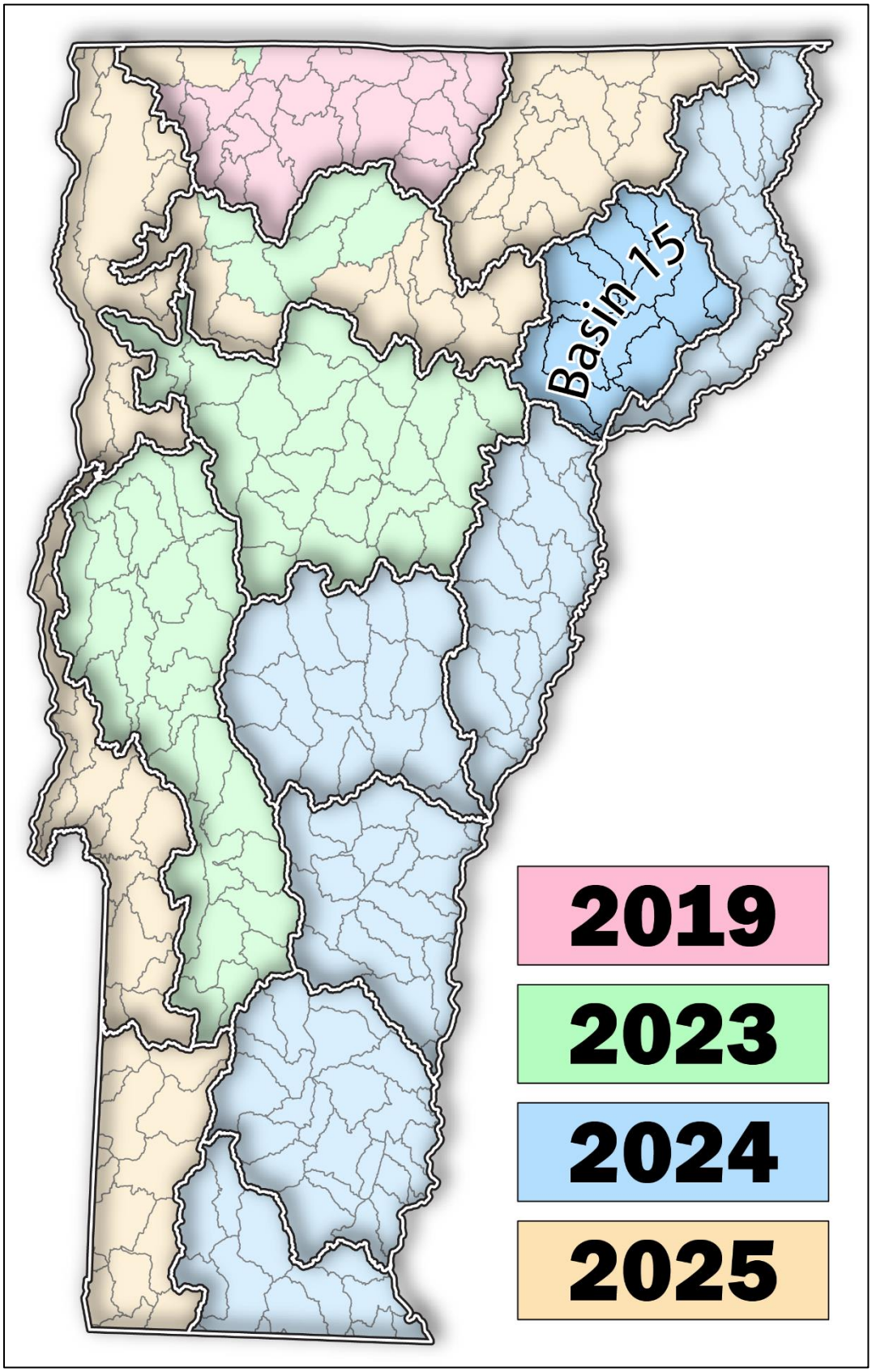


Figure 20. Wetland mapping schedule for Vermont Tactical Basins. Mapping is scheduled for 2024 in Basin 15.

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.