River Monitoring Network Condition Report

Tully Brook, Richmond, NH

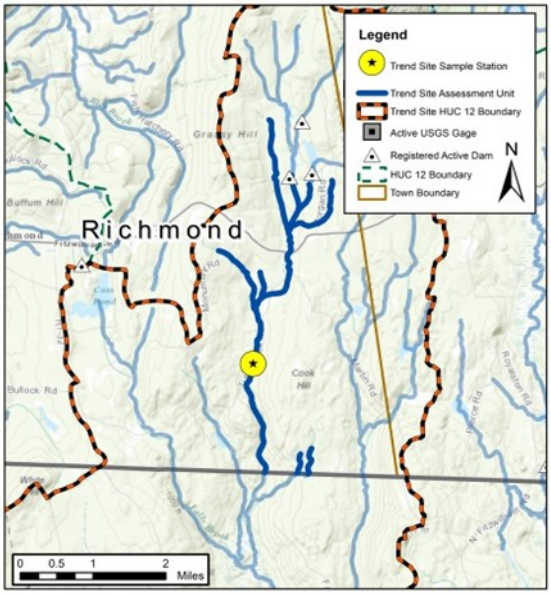
NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

RM-019

Station: **01-TYB** Current reporting period: **2012-2016** Start year: **2013**

Water Quality Summary (Data from May - September)			
Parameter	Trend	Current Condition	Overall Rating
Specific Conductance	⊗	Intermediate	⊗
Total Phosphorus	⊗	Intermediate	⊗
Total Nitrogen	⊗	Intermediate	⊗
pH	⊗	Low	⊗
Invertebrates	⊗	Good	⊗
Temperature	⊗	⊗	⊗

⊗ - no or limited data. For Current Condition: High>75th percentile, Intermediate=25th-75th percentile, Low <25th percentile of statewide conditions. Overall rating requires trend analysis and current condition. Shaded cells indicate that conditions are not as good as expected.



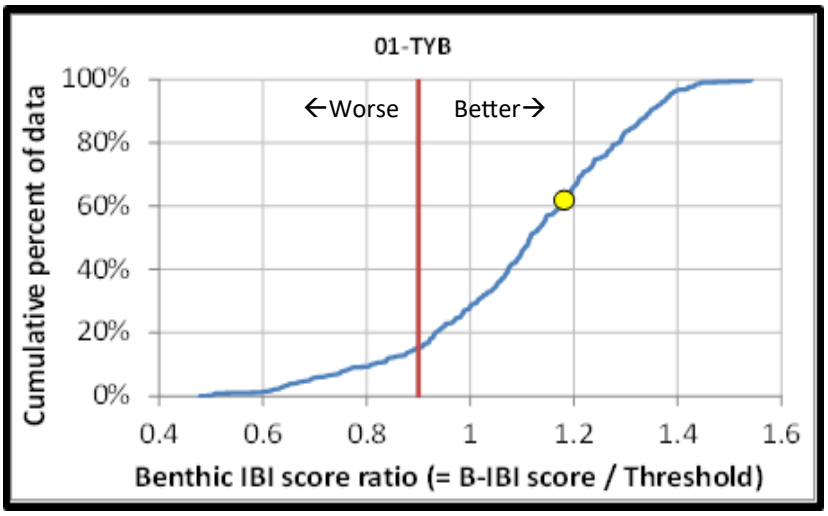
Sample station characteristics

Assessment unit	NHRIV802020203-05
Latitude	42.7365
Longitude	-72.2322
Drainage area (Sq. Mi.)	5
Elevation (FT)	940
Development category	Moderate
Drainage area size category	Small
Coldwater fish probability	51%
Fish community type	TRANSITIONAL
8 digit hydrologic unit code	01080202

Station Highlights: Tully Brook is a small stream in the Connecticut River drainage of New Hampshire with a moderate percentage of developed land in its watershed. It has intermediate nutrient concentrations, specific conductance levels, and low pH levels.

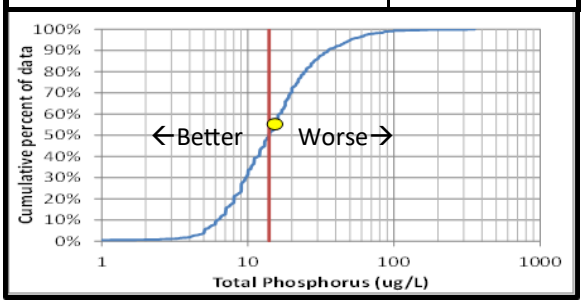
Biological indicators - For 01-TYB benthic macroinvertebrates were used as the primary biological indicator. Samples were collected from 2013-2016. The results, based on B-IBI scores that exceeded the applicable threshold, indicate that the benthic invertebrate community is in good condition (plot at right). Relative the statewide data, the median B-IBI score ratio at 01-TYB was greater than 62% of the B-IBI score ratios statewide (plot at right).

For plot at the right: Yellow dot=median score ratio; curved blue line=statewide score ratio distribution; red vertical line=water quality threshold.

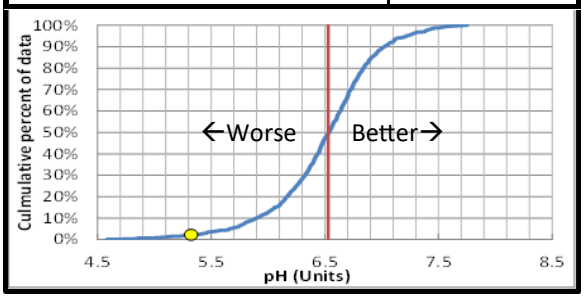


Statewide Comparison - The median value of the sampling station for the reporting period (yellow dot) was plotted with respect to water quality data collected from 1990-present as a percentile of the statewide distribution (curved blue line) and the statewide median (vertical red line). The position of the sampling station median on the plot provides an indication of the trend site's water quality compared to that collected around the state. For total phosphorus, total nitrogen, and specific conductance higher percentiles indicate lower water quality. Conversely, a lower percentile for pH indicates lower water quality. Over time, changes in the percentile can be used to track whether water quality is improving or declining at the sampling station with respect to data from around the state.

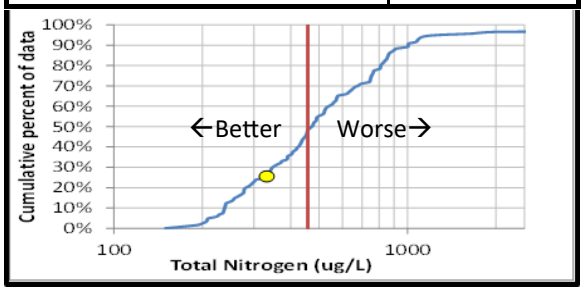
Total Phosphorus (ug/L)	
Statewide median	14.0
Station median	15.3
Station percentile of statewide data	55.2%



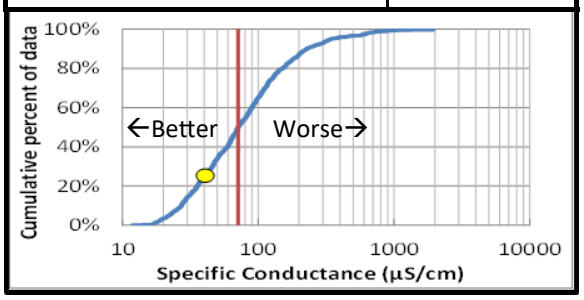
pH (standard units)	
Statewide median	6.53
Station median	5.33
Station percentile of statewide data	2.2%



Total Nitrogen (ug/L)	
Statewide median	457.8
Station median	331.5
Station percentile of statewide data	25.5%



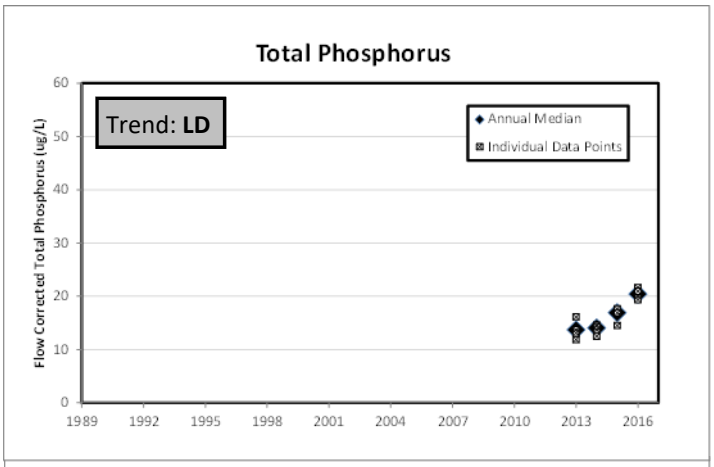
Specific Conductance (us/cm)	
Statewide median	71.1
Station median	40.8
Station percentile of statewide data	25.3%

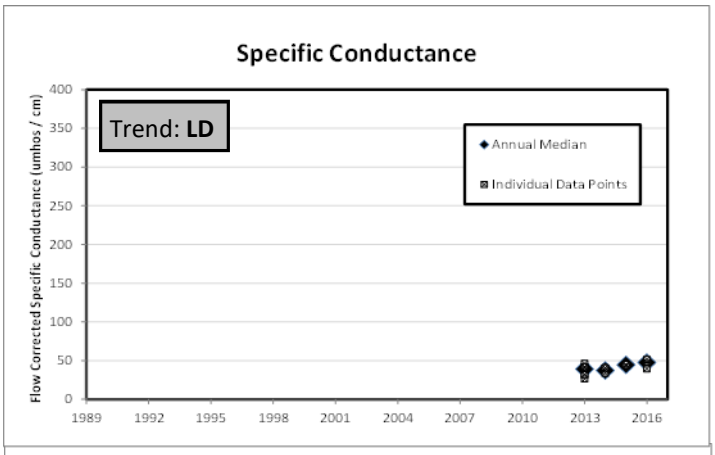


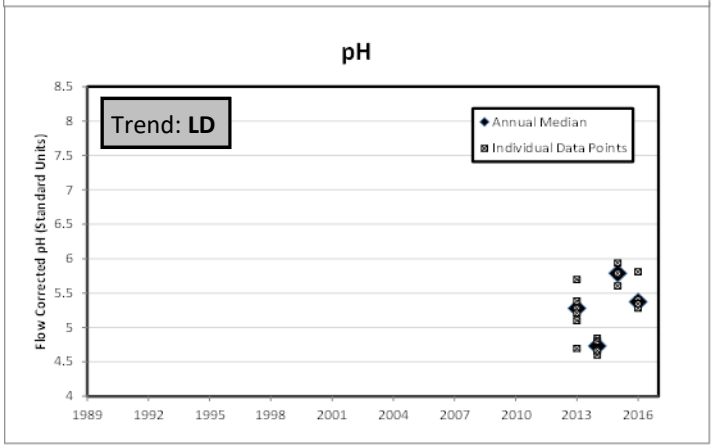
Current vs. previous water quality conditions– Data included in the current reporting period was compared to that from the previous reporting period. A Kruskal-Wallis test (p=0.05) was used to compare data collected in the respective reporting periods for each parameter. Differences between reporting periods provide a indication of whether short term water quality changes have occurred at the site. For table below, "Different (Y/N)" column indicates if significant change has occurred (Y=yes, N=no, Insufficient data=fewer than five samples contained in either of the reporting periods). "Change" column indicates the direction of change (Increase=water quality indicator higher in current period than previous period, Decrease= water quality indicator lower in current period than previous period, Blank=no change or insufficient data for comparison).

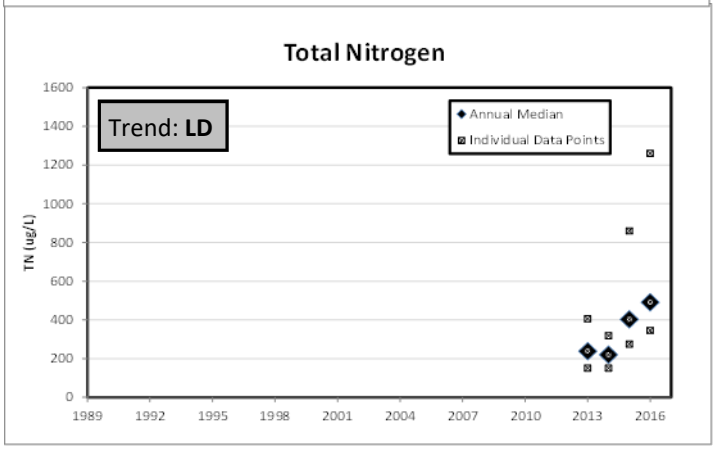
Parameter	Period	Years	Mean C	Range C	Period	Years	Mean P	Range P	Different (Y/N)	Change
Total Phosphorus	Current	2012-2016	16.1	9.2	Previous	2008-2011			Insufficient data	
Total Nitrogen			426.0	1110.0					Insufficient data	
Specific Conductance			40.3	25.0					Insufficient data	
pH			5.3	1.3					Insufficient data	

Trend analyses - Sites with 10 or more years of data were analyzed for trends. Trends analyses were completed on annual medians using the Mann-Kendall test (p=0.05). For 01-TYB, water quality data only exists from 2013—2016. The limited amount of data did not allow for trend analyses for this site. Trend outcomes included in plots below (**NT**=no trend; **(+)**=increasing; **(-)**=decreasing; **LD**=limited data; trend analysis not completed). Significant increasing or decreasing trends include a LOESS trend line for the period of analysis.

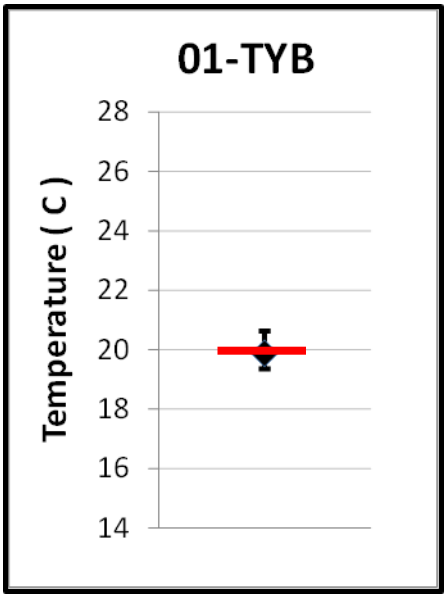








Summary of 7-day maximum water temperature



Water temperature – Water temperature is an important physical characteristic that influences water chemistry and biological community composition. For trend sites where continuous temperature data loggers are deployed, the maximum 7-day rolling mean was used as the primary metric for summarizing the thermal regime at individual sampling stations. The plot (left) summarizes the average (diamond), minimum (lower whisker), and maximum (upper whisker) 7-day maximum water temperature in the current reporting period. The table (below) provides the total number and percent of consecutive days that the 7-day running mean water temperature exceeded temperature benchmarks associated with the expected fish community type. For 01-TYB, the expected fish community type is transitional water and the respective temperature benchmark is 20°C.

Number and percent of consecutive days when the running 7-day mean water temperature exceeded the benchmark

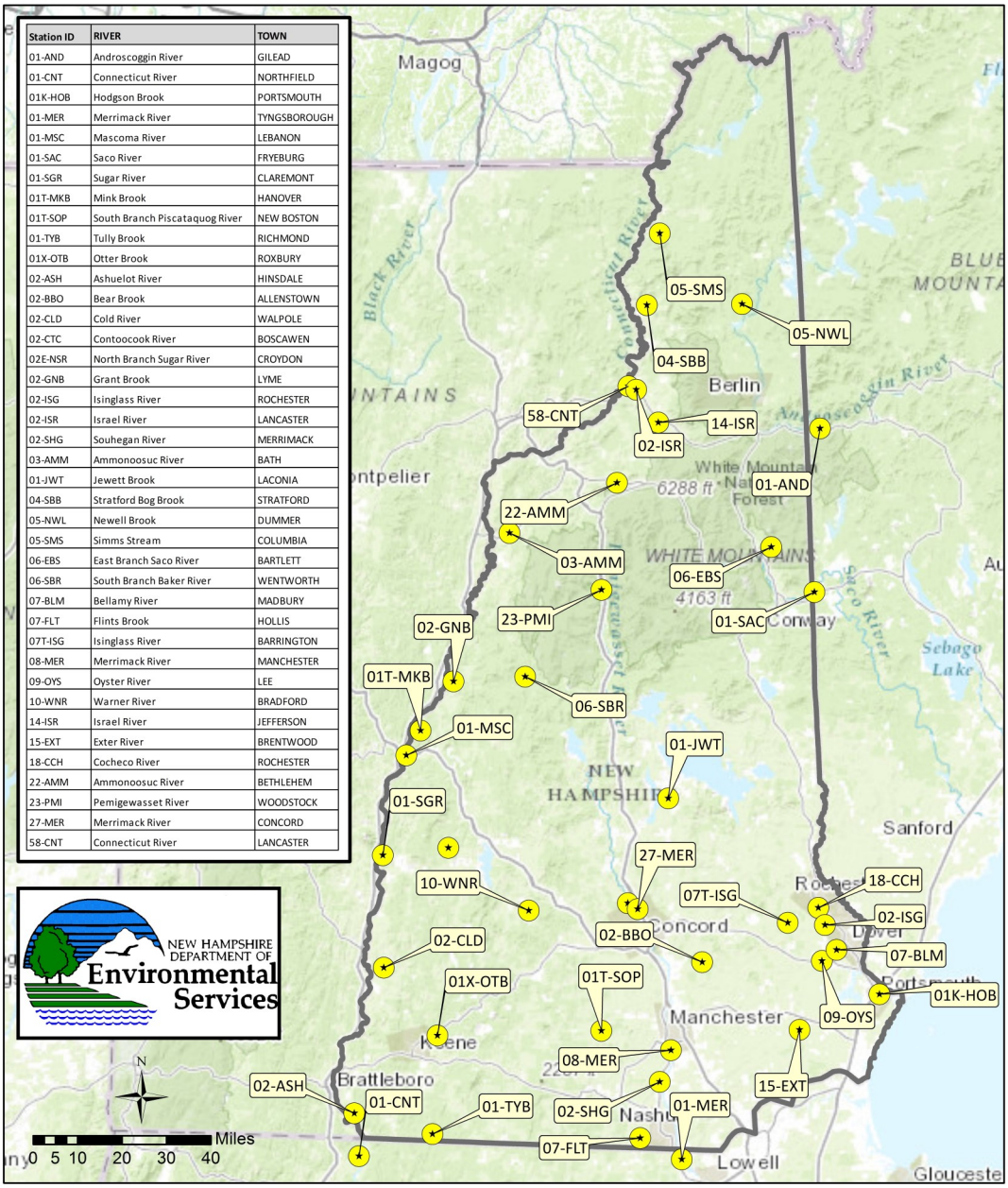
Year	2012	2013	2014	2015	2016	Total
Number of days			5	0		5
Percent of days	no data	no data	4.6%	0.0%	no data	1.59%

NH DES River and Stream Trend Monitoring Network

40 stations, sampled 3x from June through August and 1x during fall, winter, or spring

Last Updated: April 2016

Station ID	RIVER	TOWN
01-AND	Androscoggin River	GILEAD
01-CNT	Connecticut River	NORTHFIELD
01K-HOB	Hodgson Brook	PORTSMOUTH
01-MER	Merrimack River	TYNGSBOROUGH
01-MSC	Mascoma River	LEBANON
01-SAC	Saco River	FRYEBURG
01-SGR	Sugar River	CLAREMONT
01T-MKB	Mink Brook	HANOVER
01T-SOP	South Branch Piscataquog River	NEW BOSTON
01-TYB	Tully Brook	RICHMOND
01X-OTB	Otter Brook	ROXBURY
02-ASH	Ashuelot River	HINSDALE
02-BBO	Bear Brook	ALLENSTOWN
02-CLD	Cold River	WALPOLE
02-CTC	Contoocook River	BOSCAWEN
02E-NSR	North Branch Sugar River	CROYDON
02-GNB	Grant Brook	LYME
02-ISG	Isinglass River	ROCHESTER
02-ISR	Israel River	LANCASTER
02-SHG	Souhegan River	MERRIMACK
03-AMM	Ammonoosuc River	BATH
01-JWT	Jewett Brook	LACONIA
04-SBB	Stratford Bog Brook	STRATFORD
05-NWL	Newell Brook	DUMMER
05-SMS	Simms Stream	COLUMBIA
06-EBS	East Branch Saco River	BARTLETT
06-SBR	South Branch Baker River	WENTWORTH
07-BLM	Bellamy River	MADBURY
07-FLT	Flints Brook	HOLLIS
07T-ISG	Isinglass River	BARRINGTON
08-MER	Merrimack River	MANCHESTER
09-OYS	Oyster River	LEE
10-WNR	Warner River	BRADFORD
14-ISR	Israel River	JEFFERSON
15-EXT	Exter River	BRENTWOOD
18-CCH	Cocheco River	ROCHESTER
22-AMM	Ammonoosuc River	BETHLEHEM
23-PMI	Pemigewasset River	WOODSTOCK
27-MER	Merrimack River	CONCORD
58-CNT	Connecticut River	LANCASTER



NHDES River Monitoring Network– NHDES' river monitoring network includes 40 sampling stations located on rivers across New Hampshire. Stations are sited on small, medium, and large rivers in low to highly developed watersheds. The purpose of the network is to track changes in river water quality over time and document current conditions within a distinct five-year timeframe. Individual station reports provide a summary of water quality conditions at that site and are based on data analysis of monthly samples collected from May-September. Additional samples are collected seasonally every third year for fall, winter, and spring. For some stations, data exists back to 1990. Other stations were new in 2012 or 2013. The analyses completed on the river monitoring network sites are detailed in NHDES' Water Monitoring Strategy. The river monitoring network is one of several monitoring efforts detailed in the Water Monitoring Strategy and undertaken by NHDES Watershed Management Bureau to track surface water quality conditions across the state. For more information visit: https://www.des.nh.gov/organization/divisions/water/wmb/index.htm or call (603) 271-3503.