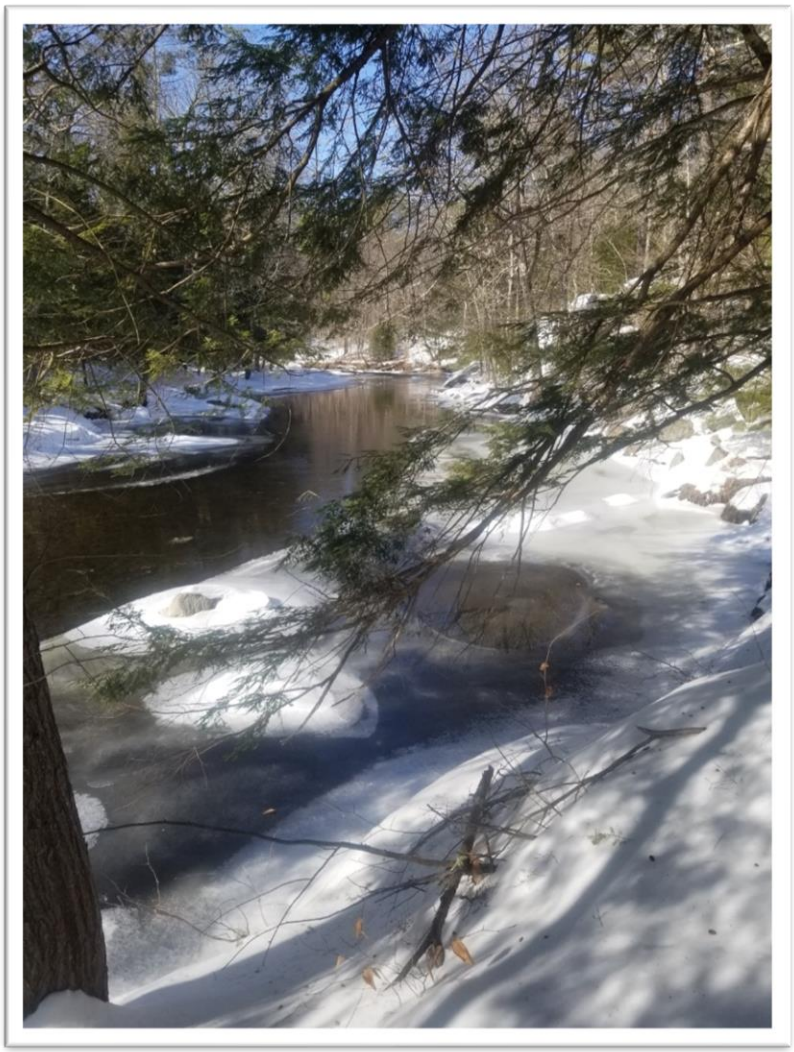
| Version Date 12-16-20, CNHRPC |

Warner River Corridor Management Plan

March 2020

Appendix D. Volunteer River Assessment Program (VRAP) Reports 2017-2020



Winter comes to the Warner River, near Morse Loop in Warner.
Photo Credit: Ken Milender of Warner

New Hampshire Rivers Management and Protection Program
Department of Environmental Services
Watershed Management Bureau

R-WD-20-25

Warner River Corridor Management Plan

Prepared by

Warner River Local Advisory Committee (WRLAC)
with assistance from the Central New Hampshire Regional Planning Commission (CNHRPC)

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Appendix D. Volunteer River Assessment Program (VRAP) Reports 2017-2020

2017 WARNER RIVER VRAP DATA

Measurements not meeting New Hampshire surface water quality standards

Measurements not meeting NHDES quality assurance/quality control standards

[A] Specific conductance > 835 µS/cm indicate exceedance of chronic chloride standard of 230 mg/L

[B] Chronic water quality standard

[C] Calculated using 1/2 of the 0.25 mg/L detectin limit of Total Kjeldahl Nitrogen (0.125 mg/L) and/or 1/2 of the 0.050 mg/L detection limit of Nitrate+Nitrite (0.025 mg/L)

TODNBYO, Andrew Brook, Todd Lake Outlet, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
06/21/2017	10:58	6.09	67.8	6.40	1.85	39.2	20.6		
07/14/2017	10:38	8.02	92.7	6.42	0.49	48.7	22.2	6	
08/26/2017	11:17	7.37	90.3	6.47	0.23	56.7	22.2	11	<0.005
09/23/2017	10:40	8.55	95.4	6.49	0.12	60.3	20.7		
10/11/2017	13:01	8.73	93.5	5.94	0.09	63.1	18.60		

01-WBW, West Branch Warner River, Water Street, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
06/21/2017	11:16	7.43	76.6	6.78	0.72	34.7	17.1		
07/14/2017	10:51	9.76	99.2	6.21	0.52	46.9	16.1	4	
08/26/2017	11:39	10.22	101.1	6.63	0.00	69.5	14.8	11	0.008
09/23/2017	10:50	10.14	101.5	6.98	0.25	72.3	15.5		
10/11/2017	13:13	10.17	101.6	6.04	0.04	69.2	15.0		

01-HOY, Hoyt Brook, Jones Street Bridge, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
06/21/2017	10:35	6.19	67.0	6.76	0.67	30.0	19.0		
07/14/2017	10:19	9.20	96.0	6.41	0.91	47.0	17.1	4	
08/26/2017	10:50	10.41	102.0	6.53	0.11	55.1	14.2	7	0.013
09/23/2017	10:15	9.81	96.8	6.88	0.18	70.4	15.6		
10/11/2017	12:30	9.92	98.7	5.75	0.20	65.3	15.0		

11F-WNR, Warner River, Breezy Hill Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
06/21/2017	10:10	5.12	56.4	6.35	1.28	40.1	20.0		
07/14/2017	9:58	7.56	81.1	5.84	0.69	56.6	18.7	7	
08/26/2017	10:40	8.04	84.0	6.10	0.23	78.1	17.7	15	0.009
09/23/2017	9:52	6.89	72.7	6.41	0.67	90.8	18.6		
10/11/2017	12:05	8.12	86.0	6.07	0.31	67.5	17.2		

10-WNR, Warner River, Melvin Mills Road, Bradford - NHDES Trend Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	*E. coli* (CTS/100mL)	*E.coli* Geometric Mean
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**	**230[B]**	**<406**	**<126**
02/06/2017	13:10	13.5	93.5	6.36	0.57	68.4	0.6	9		
06/21/2017	13:05	7.81	86.0	6.37	1.40	41.4	20.1	6	230	
07/20/2017	12:10	7.44	87.4	6.44	0.75	68.9	23.4	10	100	
08/17/2017	12:45	8.03	87.9	6.40	0.58	86.5	19.8	27	60	111

Date	Time of Sample	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrite (NO2) + Nitrate (NO3) (mg/L)	Total Nitrogen (mg/L)
Standard	**NA**	**NA**	**NA**	**NA**	**NA**
02/06/2017	13:10	0.009	<0.25	0.09	0.22[C]
06/21/2017	13:05	0.023	0.30	<0.05	0.33[C]
07/20/2017	12:10	0.014	0.29	0.08	0.37
08/17/2017	12:45	0.010	<0.25	0.08	0.21[C]

02-LNE, Lane River, Roby Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**NA**	**NA**	**<230 mg/L[B]**	**Narrative**
06/21/2017	9:35	7.48	81.9	6.84	0.61	99.1	19.6		
07/14/2017	9:33	8.15	85.9	6.57	0.94	123.2	18.1	22	
08/26/2017	9:52	9.79	98.7	6.62	0.06	117.2	15.6	39	0.009
09/23/2017	9:30	9.74	96.8	6.80	0.12	158.4	15.3		
10/11/2017	11:40	9.79	98.4	6.29	3.47	177.4	15.8		

03-WNR, Warner River, Dustin Road/Route 127 Bridge, Davisville

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**NA**	**NA**	**<230 mg/L[B]**	**Narrative**
06/21/2017	8:49	~~4.50~~	~~49.0~~	6.25	0.87	56.3	19.8		
07/14/2017	7:57	7.27	77.1	6.12	0.68	106.8	18.1	19	
08/26/2017	9:14	7.42	77.2	5.73	0.68	127.0	17.2	30	0.016
09/23/2017	9:00	7.17	73.8	6.44	0.65	161.5	16.9		
10/11/2017	11:13	6.20	62.4	6.07	0.60	150.1	15.9		

01-WNR, Warner River, Deer Path Road, Hopkinton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above backgrd**	**NA**	**NA**	**<230 mg/L[B]**	**Narrative**
06/21/2017	8:15	~~5.30~~	~~57.9~~	6.49	1.12	55.1	19.9		
07/14/2017	9:01	8.72	92.6	6.33	0.70	108.5	18.2	20	
08/26/2017	8:41	8.49	87.2	5.62	0.50	131.2	17.0	31	0.012
09/23/2017	8:40	8.40	86.0	6.70	0.36	162.9	16.6		
10/11/2017	10:45	8.85	89.4	6.43	0.33	170.0	15.7		

Warner River VRAP

Untitled layer

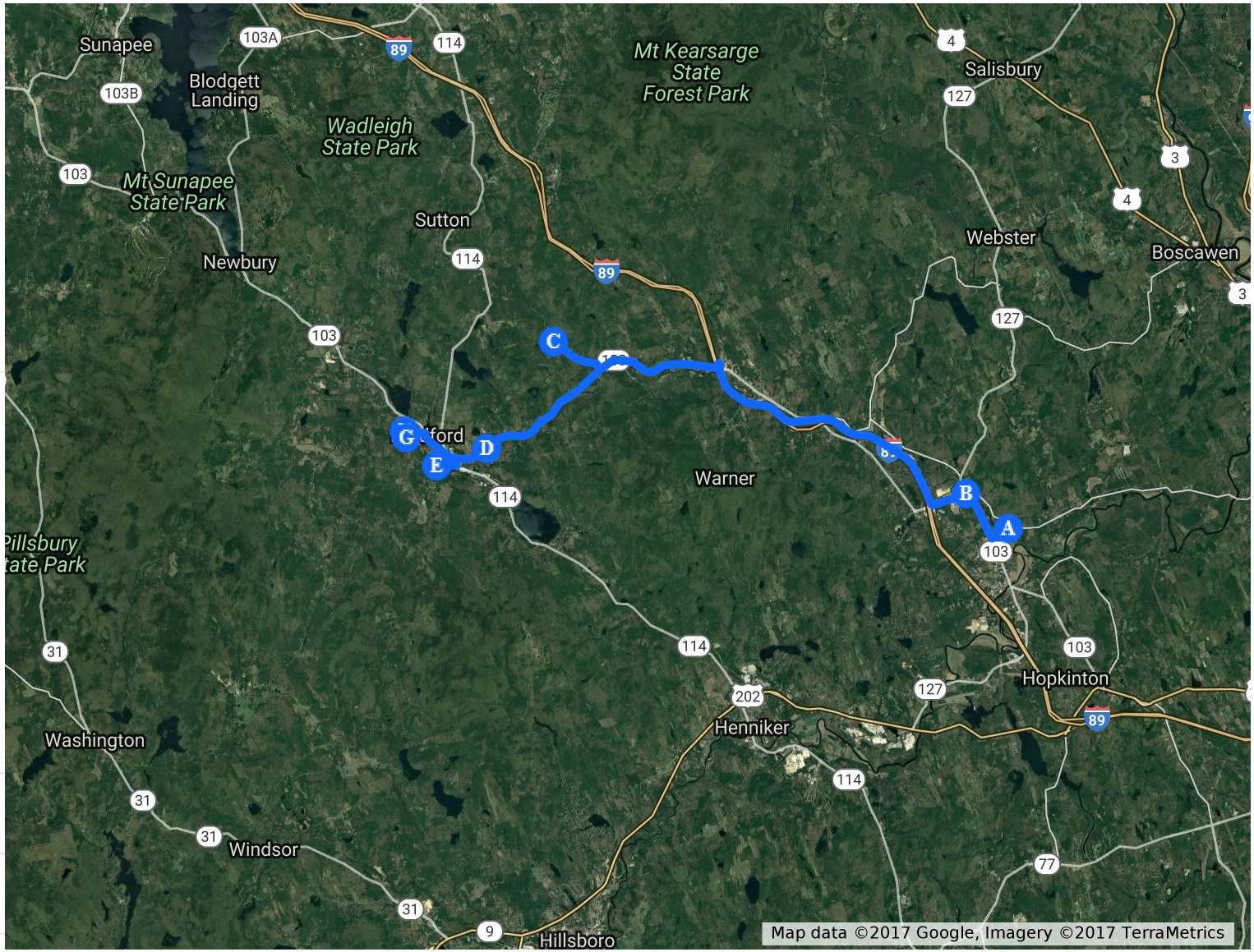
- 1. 01-WNR
- 2. 03-WNR
- 3. 02-LNE
- 4. 11F-WNR
- 5. 01-HOY
- 6. TODNBYO
- 7. 01-WBW

Directions from 1. 01-WNR to 7. 01-WBW

- A 1. 01-WNR
- B 2. 03-WNR
- C 3. 02-LNE
- D 4. 11F-WNR
- E 5. 01-HOY
- F 6. TODNBYO
- G 7. 01-WBW

Untitled layer

Untitled layer



2018 WARNER RIVER VRAP DATA

Measurements not meeting New Hampshire surface water quality standards

Measurements not meeting NHDES quality assurance/quality control standards

[A] Specific conductance > 835 µS/cm indicate exceedance of chronic chloride standard of 230 mg/L

[B] Chronic water quality standard

[C] Calculated using 1/2 of the 0.25 mg/L detectin limit of Total Kjeldahl Nitrogen (0.125 mg/L) and/or 1/2 of the 0.050 mg/L detection limit of Nitrate+Nitrite (0.025 mg/L)

15-ADW, Andrew Brook, Mountain Road, Newbury

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	11:25					14.3	1.2	< 3	
06/12/2018	9:11	8.62	85.7	6.47	0.75	1.5	14.9		
07/16/2018	11:30	7.13	81.0	5.16	1.44	36.7	20.8		0.015
08/24/2018	14:08	9.79	104.1	5.45	0.38	16.4	18.7		
09/22/2018	12:00	8.02	80.0	6.12	0.52	14.0	15.3		

04-ADW, Andrew Brook, Sutton Road, Newbury

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	11:40					42.3	1.5	7	
06/12/2018	10:04	7.88	77.6	6.41	0.08	93.7	14.5		
07/16/2018	11:54	5.10	61.3	5.66	1.59	116.8	23.2		0.0164
08/24/2018	14:28	9.25	104.1	5.88	0.89	46.4	19.5		
09/22/2018	12:25	6.39	65.3	6.40	1.02	41.5	16.3		

TODNBYO, Andrew Brook, Todd Lake Outlet, Bradford - NHDES VLAP Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	11:00					41.2	3.7	8	
06/24/2018	00:00			6.84	0.67	61.7			0.010
06/29/2018	10:37	6.44	78.0	6.69	1.83	66.2	23.0		
07/16/2018	10:57	5.83	72.1	5.68	0.71	59.4	25.5		0.014
08/05/2018	00:00			7.04	0.92	65.3			0.011
08/24/2018	13:08	8.36	96.5	5.12	0.94	56.2	22.8		
09/09/2018	00:00			6.81	0.71	62.7			0.011
09/22/2018	11:30	7.31	79.8	6.69	0.44	51.3	19.6		

01-WBW, West Branch Warner River, Water Street, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	11:10					25.6	1.1	3	
06/29/2018	10:48	8.02	86.0	6.73	0.91	60.6	17.6		
07/16/2018	11:08	8.41	91.6	5.84	0.59	47.7	19.8		0.013
08/24/2018	13:29	11.01	113.8	5.73	0.83	42.2	17.1		
09/22/2018	11:35	8.86	90.0	6.89	0.48	38.7	15.7		

01-HOY, Hoyt Brook, Jones Street Bridge, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	10:45					27.5	0.8	3	
06/29/2018	10:20	7.85	86.6	7.05	0.72	66.9	17.9		
07/16/2018	10:44	7.72	83.6	5.55	0.88	73.7	18.8		0.014
08/24/2018	12:42	~~10.40~~	~~109.5~~	5.78	3.01	35.3	17.7		
09/22/2018	11:05	7.74	79.0	6.76	0.63	30.5	16.3		

11F-WNR, Warner River, Breezy Hill Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	10:35					42.7	2.4	6	
06/29/2018	10:05	6.30	71.2	6.29	0.48	82.6	19.9		
07/16/2018	10:32	6.21	73.8	5.03	1.37	91.7	23.7		0.017
08/24/2018	12:06	9.02	99.8	5.75	0.74	55.7	20.7		
09/22/2018	10:45	5.97	62.8	6.32	0.91	54.9	17.6		

10-WNR, Warner River, Melvin Mills Road, Bradford - NHDES Trend Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	*E. coli* (CTS/100mL)	*E.coli* Geometric Mean
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835 µS/cm[A]	NA	230[B]	<406	<126
04/04/2018	12:00	12.80	97.0	6.59	0.70	51.2	3.8	9		
06/20/2018	12:15	7.42	82.4	6.80	0.60	89.3	20.5	15	80	
07/18/2018	13:45	6.82	78.7	6.52	0.69	106.5	22.4	21	140	
08/14/2018	11:45	7.61	86.4	6.54	0.62	58.9	21.6	10	300	150

Date	Time of Sample	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrite (NO2) + Nitrate (NO3) (mg/L)	Total Nitrogen (mg/L)
Standard	NA	NA	NA	NA	NA
04/04/2018	12:00	0.008	ND	0.06	0.19 [C]
06/20/2018	12:15	0.018	0.25	0.12	0.37
07/18/2018	13:45	0.014	0.25	0.08	0.33
08/14/2018	11:45	0.016	0.31	ND	0.34 [C]

02-TSL, Thistle Brook, Main Street, Sutton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	12:10					112.8	1.8	23	
06/12/2018	10:45	8.79	83.2	6.64	1.12	234.0	12.8		
07/11/2018	11:15					315.0		76	0.0102
07/16/2018	12:13	~~46.2~~	47.9	5.35	4.24	119.0	18.5		0.0474
08/24/2018	15:03	~~7.41~~	~~81.7~~	6.00	0.67	160.5	17.0		
09/22/2018	12:50	7.20	71.8	6.67	0.48	132.1	15.2		

02-LNE, Lane River, Roby Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
06/12/2018	10:20					100.4	1.2	19	
07/11/2018	09:45	7.90	88.6	7.01	1.17	135.1	18.9		
07/16/2018	10:14	8.71	96.6	6.65	1.55	138.3	20.1		0.020
08/24/2018	11:40	10.96	118.0	5.86	0.69	112.0	18.6		
09/22/2018	10:20	7.48	77.2	6.97	0.57	92.9	16.8		

26-STV, Stevens Brook, Culvert on North Road, Sutton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA
08/24/2018	15:29	~~3.01~~	~~35.7~~	6.04	1.63	243.3	23.5

01-XS4, Unnamed Stream, Kearsarge Regional High School, Sutton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	12:25					20.2	1.1	< 3	
06/12/2018	11:12	8.31	79.3	6.69	0.03	38.1	13.3		
07/16/2018	12:30	8.99	93.7	5.49	0.26	41.1	18.8		0.012
09/22/2018	13:10	8.47	83.4	6.84	0.09	29.2	14.5		

10-STV, Stevens Brook, North Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	12:45					78.8	1.9	17	
06/12/2018	11:39	8.00	81.1	6.30	0.34	32.4	15.8		
07/16/2018	13:01	9.44	108.0	6.15	0.96	191.0	22.7		0.014
08/24/2018	16:07	8.35	89.5	6.58	1.03	102.3	18.6		
09/22/2018	13:30	7.58	77.1	6.77	1.25	101.4	16.0		

02-STV, Stevens Brook, Route 103, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	13:00					99.0	2.4	22	
06/12/2018	12:21	7.82	80.5	6.69	0.18	~~18.6~~	16.6		
07/16/2018	13:20	7.95	93.0	6.32	0.19	224.0	24.7		0.006
08/24/2018	16:41	7.92	88.2	6.52	1.24	133.4	19.7		
09/22/2018	13:45	7.39	76.2	6.67	0.70	117.9	16.5		

05-WNR, Warner River, Joppa Road Bridge, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	10:00					46.3	1.8	10	
06/29/2018	08:56	7.70	84.7	6.54	1.18	94.8	18.9		
07/16/2018	09:50	7.04	75.5	6.07	0.55	139.0	23.3		0.010
08/24/2018	11:15	8.52	95.5	6.06	1.03	81.7	18.5		
09/22/2018	09:45	7.45	77.7	6.63	0.62	72.0	17.2		

03-WNR, Warner River, Dustin Road/Route 127 Bridge, Davisville

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	13:35					59.3	3.6	13	
06/29/2018	08:33	6.61	76.5	6.42	1.02	120.3	19.3		
07/16/2018	09:44	6.20	68.0	6.44	0.93	159.0	23.2		0.018
08/24/2018	10:19	6.84	71.5	6.15	0.90	80.6	18.5		
09/22/2018	09:18	6.06	62.7	6.12	0.72	81.2	16.9		

01-WNR, Warner River, Deer Path Road, Hopkinton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphous
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above backgrd	NA	NA	<230 mg/L[B]	Narrative
04/05/2018	13:25					69.6	3.3	12	
06/29/2018	08:11	7.44	80.8	6.59	1.06	135.2	18.9		
07/16/2018	09:26	5.30	62.0	6.05	0.80	163.6	22.5		0.015
08/24/2018	09:04	7.82	82.6	~~5.97~~	1.07	75.7	19.7		
09/22/2018	09:07	8.23	85.2	6.32	0.68	80.1	16.9		

Figure 1. Dissolved Oxygen Concentration Statistics for the Warner River
June 12 - September 22, 2018, NHDES VRAP

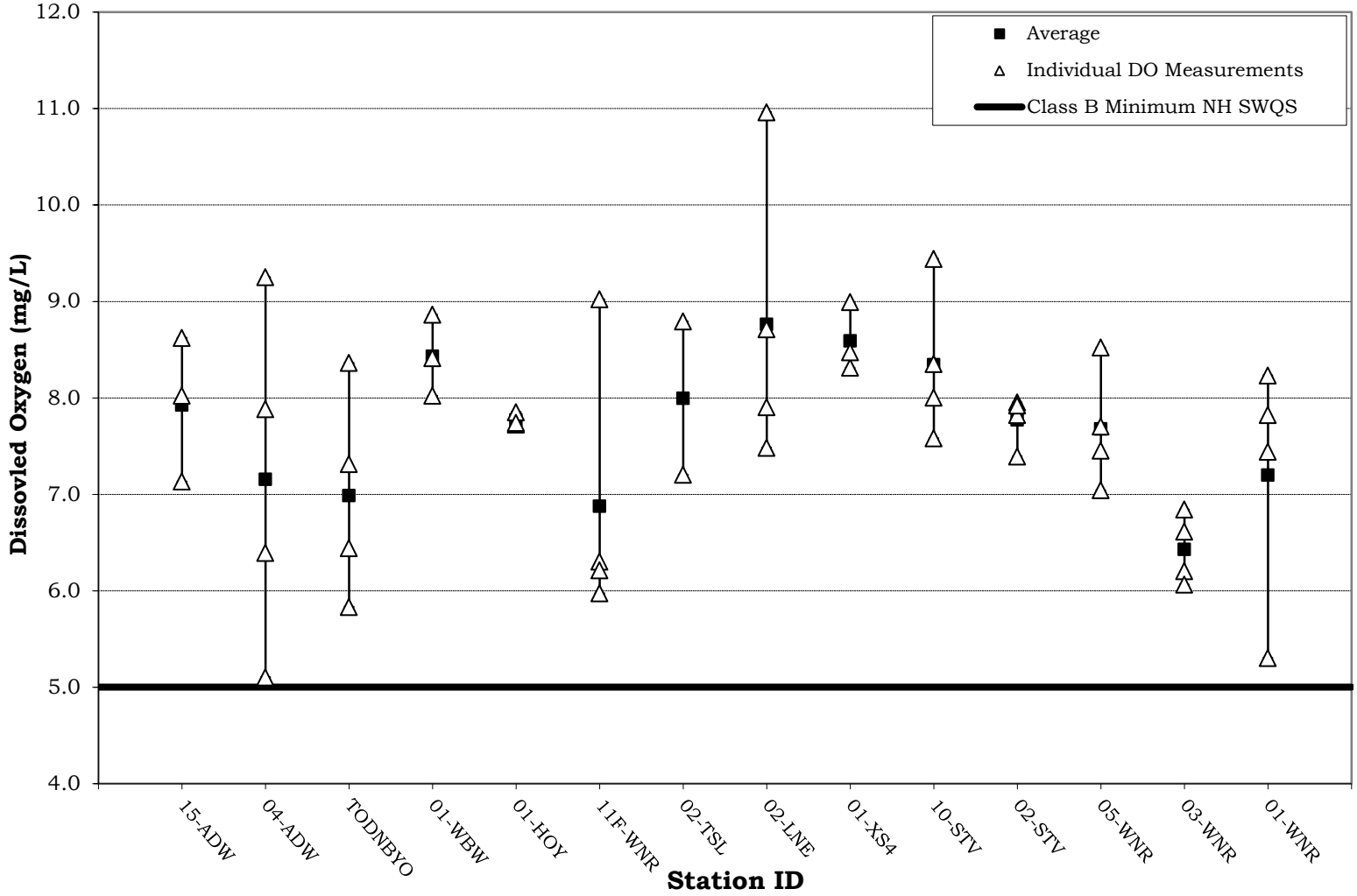


Figure 2. pH Statistics for the Warner River
June 12 - September 22, 2018, NHDES VRAP

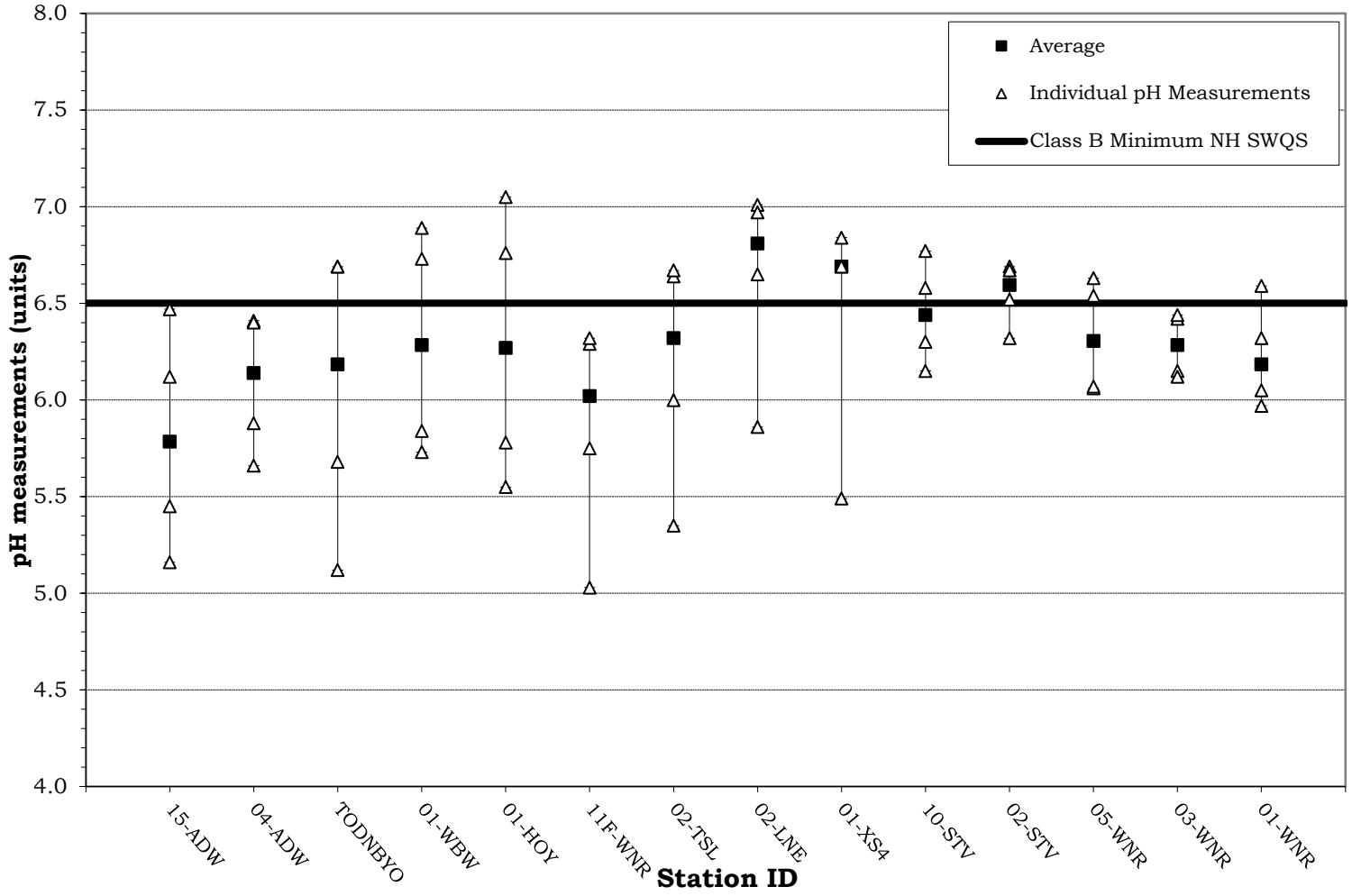


Figure 3. Turbidity Statistics for the Warner River
June 12 - September 22, 2018, NHDES VRAP

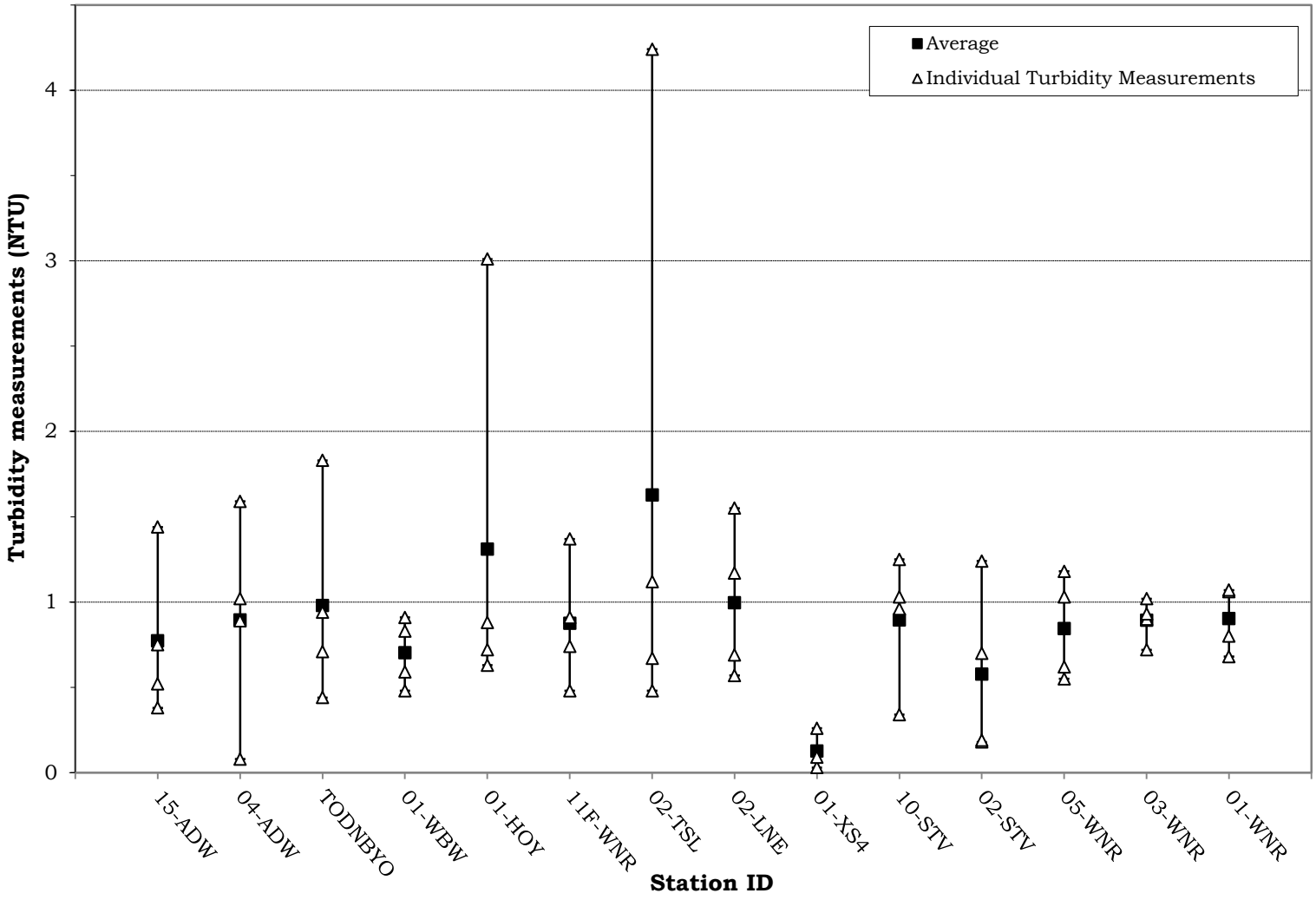


Figure 4. Specific Conductance Statistics for the Warner River
June 12 - September 22, 2018, NHDES VRAP

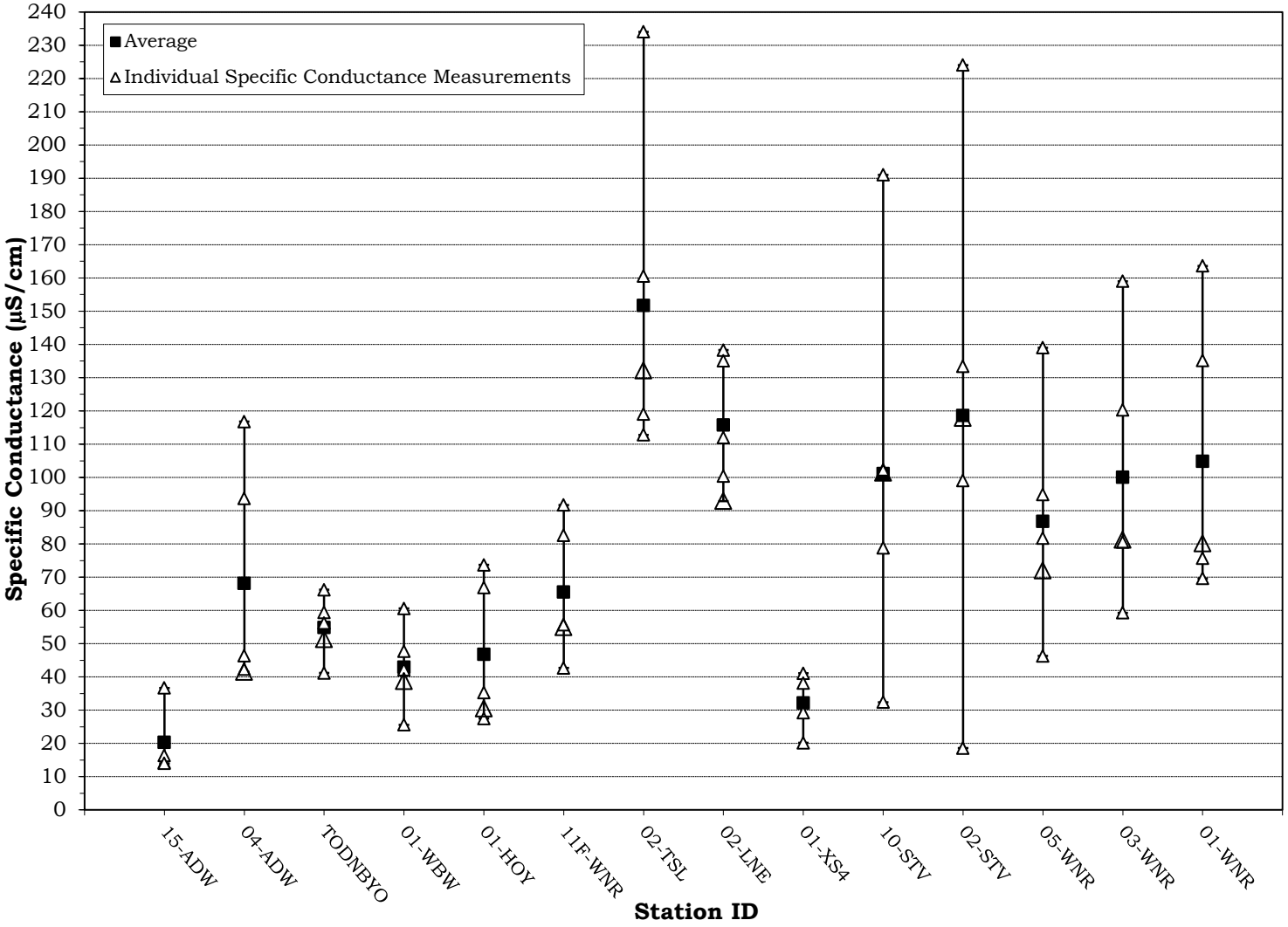
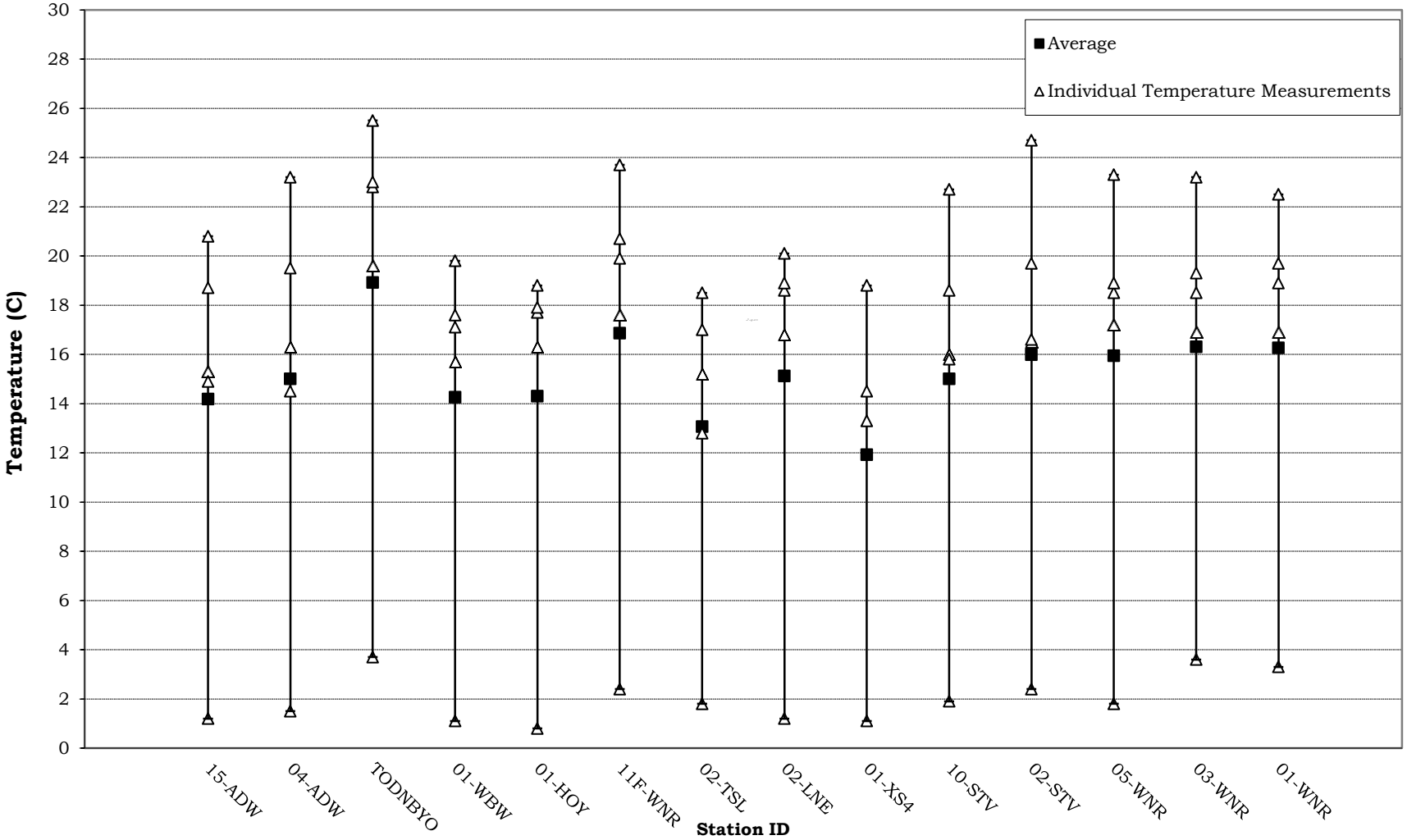
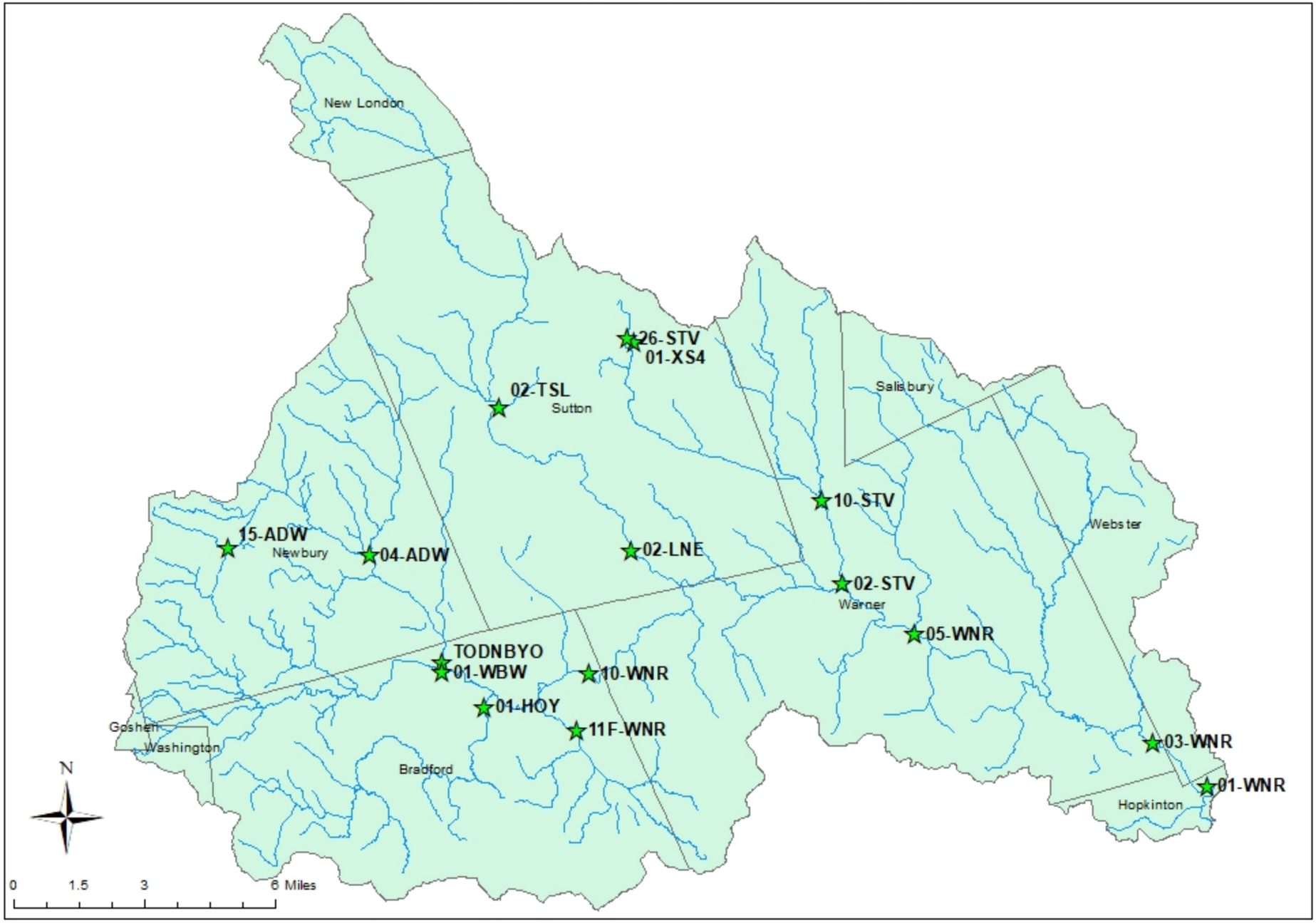


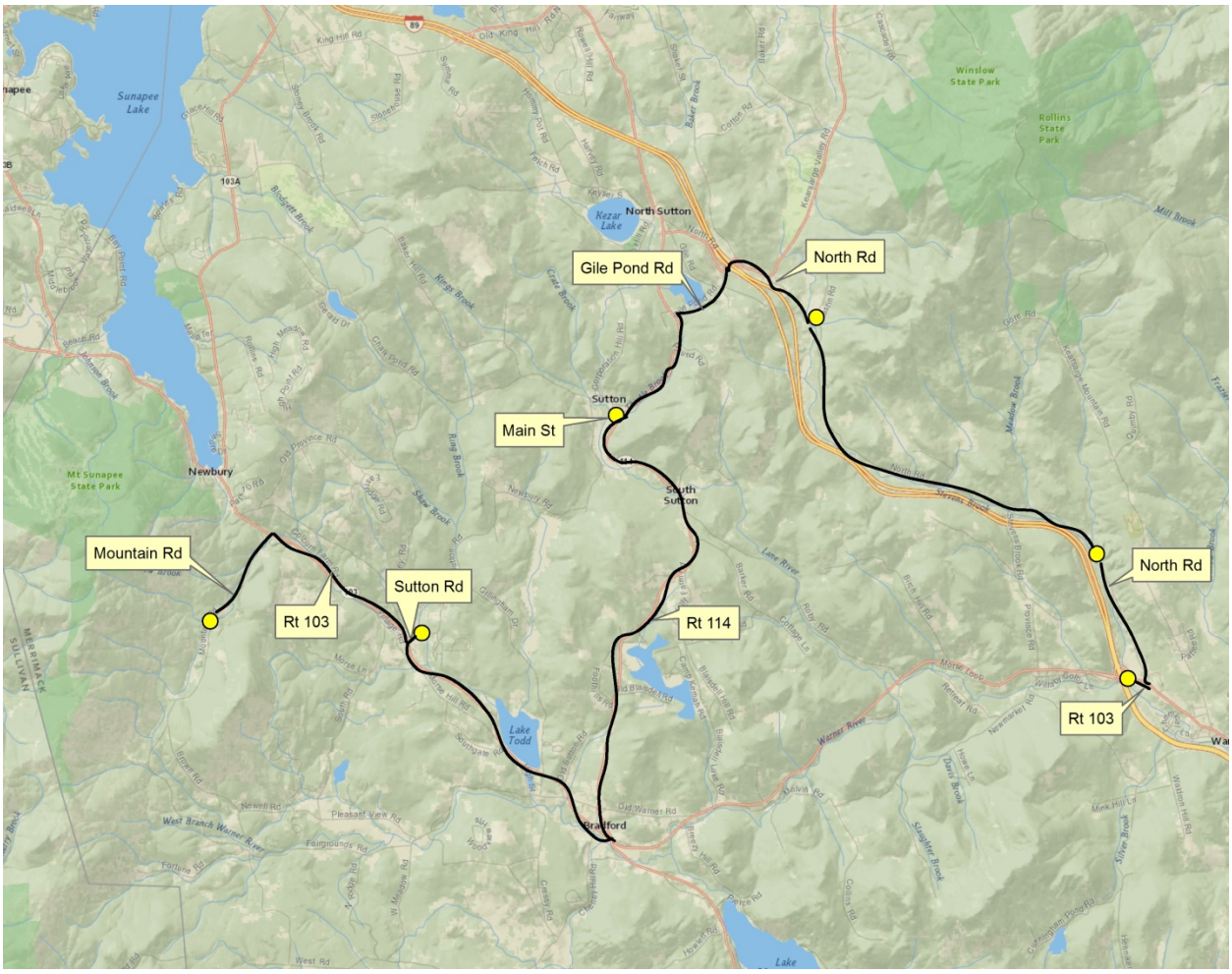
Figure 5. Water Temperature Statistics for the Warner River
June 12 - September 22, 2018, NHDES VRAP



Warner River Watershed VRAP Stations



2018 New VRAP Monitoring Locations



Stream	Site	Road	Town	Lat	Long
Andrew Brook	upper site	Mountain Rd	Newbury	43.29779	-72.03819
Andrew Brook	lower site	Sutton Rd	Newbury	43.296	-71.99141
Thistle Brook		Main St	Sutton	43.33128	-71.94854
Unnamed Stream		Mastin Rd	Sutton	43.34713	-71.90422
Stevens Brook	upper site	North Rd	Warner	43.30909	-71.84194
Stevens Brook	lower site	Rt 103	Warner	43.28903	-71.83509

New Hampshire Volunteer River Assessment Program

2019 Warner River Watershed Data

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

Measurements not meeting New Hampshire surface water quality standards

Measurements not meeting NHDES quality assurance/quality control standards

[A] Specific conductance > 835 µS/cm indicate exceedance of chronic chloride standard of 230 mg/L

[B] Chronic water quality standard

[C] Calculated using 1/2 of the 0.25 mg/L detectin limit of Total Kjeldahl Nitrogen (0.125 mg/L) and/or 1/2 of the 0.050 mg/L detection limit of Nitrate+Nitrite (0.025 mg/L) and/or 1/2 of the 0.050 mg/L detection limit of Nitrate+Nitrite (0.025 mg/L)

15-ADW, Andrew Brook, Mountain Road, Newbury

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	11:05	8.80	91.8	5.70	1.05	27.4	18.0
08/18/2019	12:00	7.04	78.5	6.71	2.61	36.7	20.5
09/29/2019	12:30	7.62	75.2	6.41	0.60	45.1	15.0
10/20/2019	12:05	9.52	79.9	5.41	0.40	19.4	7.6

04-ADW, Andrew Brook, Sutton Road, Newbury

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	11:21	8.26	86.6	6.10	0.67	75.4	18.0
08/18/2019	12:20	5.44	62.9	6.35	1.74	94.6	22.6
09/29/2019	12:50	5.64	57.8	6.19	1.59	105.4	16.5
10/20/2019	12:25	9.72	81.9	6.06	0.39	62.1	7.9

TODNBYO, Andrew Brook, Todd Lake Outlet, Bradford, NHDES VLAP Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	Chloride (mg/L)	Total Phosphorus (mg/L)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA	<230 mg/L[B]	Narrative
06/23/2019	00:00			6.93	1.19	51.5		11	0.012
07/25/2019	10:35	7.40	91.2	6.53	0.47	57.8	25.2		
07/28/2019	10:00			6.97	0.53			54	0.010
08/18/2019	11:25	6.65	80.1	6.89	0.57	60.2	24.9		
08/25/2019	00:00			6.93	0.97	62.0		10	0.011
09/29/2019	11:55	7.22	76.4	6.58	0.40	30.1	18.4		
10/20/2019	11:30	9.11	82.3	6.49	0.75	65.8	10.7		

01-WBW, West Branch Warner River, Water Street, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835µS/cm[A]**	**NA**
7/25/2019	10:46	9.43	98.5	6.64	1.10	56.9	17.5
8/18/2019	11:40	7.47	83.7	7.05	0.85	78.4	20.2
9/29/2019	12:10	8.90	87.1	6.78	0.38	76.4	14.4
10/20/2019	11:45	10.80	90.1	6.40	0.71	51.7	7.4

01-HOY, Hoyt Brook, Jones Street Bridge, Bradford

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835µS/cm[A]**	**NA**
7/25/2019	10:14	9.63	103.8	6.67	1.25	44.9	19.0
8/18/2019	11:10	7.88	86.1	7.03	0.77	90.8	19.6
9/29/2019	11:35	8.48	82.8	6.79	0.31	81.7	14.7
10/20/2019	11:05	10.23	85.1	5.90	1.16	52.9	7.4

11F-WNR, Warner River, Breezy Hill Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835µS/cm[A]**	**NA**
7/25/2019	09:57	7.50	83.3	6.12	0.95	65.1	20.9
8/18/2019	10:55	5.14	59.5	6.05	1.01	82.4	22.3
9/29/2019	11:20	4.94	50.9	6.00	0.84	98.9	16.7
10/20/2019	10:50	8.55	73.4	5.94	0.59	64.5	8.4

10-WNR, Warner River, Melvin Mills Road, Bradford, NHDES Trend Station

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)	*E. coli* (CTS/100mL)	*E.coli* Geometric Mean	Chloride (mg/L)
Standard	**NA**	**>5.0**	**>75% Daily Average**	**6.5-8.0**	**<10 NTU above background**	**835 µS/cm[A]**	**NA**	**<406**	**<126**	**230[B]**
06/20/2019	13:15	7.43	81.7	6.62	0.69	62.6	20.0	86		10
07/18/2019	11:45	8.09	92.8	6.49	0.95	90.2	22.1	75		18
08/15/2019	11:30	8.17	91.0	6.55	0.75	99.6	20.7	20	51	18
10/22/2019	11:40	9.76	88.8	6.06	0.54	71.3	10.8			12

Date	Time of Sample	Total Phosphorus (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Nitrite (NO2) + Nitrate (NO3) (mg/L)	Total Nitrogen (mg/L)
Standard	**NA**	**NA**	**NA**	**NA**	**NA**
06/20/2019	13:15	0.019	ND	ND	
07/18/2019	11:45	0.015	ND	0.08	0.21[C]
08/15/2019	11:30	0.022	0.26	ND	0.29[C]
10/22/2019	11:40	0.013	0.26	ND	0.29[C]

02-TSL, Thistle Brook, Main Street, Sutton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	11:47			6.20	0.82	257.0	16.0
08/18/2019	12:45	6.32	68.2	6.59	0.73	~~190.3~~	19.2
09/29/2019	13:15	5.38	53.4	6.11	0.99	436.4	15.0
10/20/2019	12:45	9.56	80.7	6.29	1.50	246.2	8.1

02-LNE, Lane River, Roby Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
7/25/2019	09:42	9.15	99.1	6.85	1.25	136.1	19.5
8/18/2019	10:35	7.12	79.0	6.79	0.80	162.8	20.4
9/29/2019	10:55	8.94	88.3	6.99	0.06	87.2	14.9
10/20/2019	10:25	10.36	86.0	6.30	0.72	169.3	7.2

01-XS4, Unnamed Stream, Kearsarge Regional High School, Sutton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	12:04	9.74	99.7	6.56	0.38	41.6	16.6
08/18/2019	13:10	7.15	78.3	6.83	1.49	46.6	19.2
09/29/2019	13:35	7.95	78.6	~~6.61~~	0.36	49.2	14.8
10/20/2019	13:05	9.93	84.6	6.49	0.16	41.5	8.2

10-STV, Stevens Brook, North Road, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	12:26	9.29	101.4	6.70	4.49	199.2	19.8
08/18/2019	01:30	7.43	83.7	6.87	2.27	152.8	21.0
09/29/2019	14:00	9.20	90.8	6.68	0.60	133.3	15.0
10/20/2019	13:25	10.61	90.2	6.31	0.87	170.7	8.1

02-STV, Stevens Brook, Route 103, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	12:42	9.20	100.1	6.65	2.15	180.9	19.7
08/18/2019	01:45	7.68	90.4	6.67	0.45	18.9	23.3
09/29/2019	14:15	8.37	88.1	6.61	0.14	190.4	17.3
10/20/2019	13:40	10.35	89.3	6.31	0.65	186.9	8.6

05-WNR, Warner River, Joppa Road Bridge, Warner

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
07/25/2019	09:23	8.74	95.2	6.63	1.01	109.8	19.7
08/18/2019	10:10	6.74	75.5	6.53	0.96	133.7	21.1
09/29/2019	10:25	~~7.01~~	~~71.7~~	6.53	0.45	167.8	16.5
10/20/2019	10:53	9.46	79.2	6.21	0.58	92.8	7.6

03-WNR, Warner River, Dustin Road/Route 127 Bridge, Davisville

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
7/25/2019	08:15	7.20	80.3	6.42	0.85	111.0	20.5
8/18/2019	09:45	6.07	66.6	6.31	1.72	202.2	20.8
9/29/2019	09:55	5.93	59.6	6.29	1.02	200.6	15.6
10/20/2019	09:45	8.86	74.7	6.12	0.70	91.8	7.9

01-WNR, Warner River, Deer Path Road, Hopkinton

Date	Time of Sample	DO (mg/L)	DO (% sat.)	pH	Turbidity (NTUs)	Specific Conductance (uS/cm)	Water Temp. (°C)
Standard	NA	>5.0	>75% Daily Average	6.5-8.0	<10 NTU above background	835µS/cm[A]	NA
7/25/2019	08:57	8.08	89.9	6.65	0.83	106.2	20.5
8/18/2019	09:30	5.04	56.6	6.73	0.94	184.2	20.9
9/29/2019	09:35	6.41	64.5	6.22	0.71	196.3	15.6
10/20/2019	09:35	10.08	85.4	6.24	0.68	92.4	8.0

Description of River Water Quality Parameters

Below are brief descriptions of common water quality parameters monitored in rivers by DES and a description of what certain levels may mean in terms of river quality. Please note the categories are provided only as general guidance. Also, the text is based on DES protocols and may not be completely applicable to data submitted by other agencies.

PARAMETER: CHLOROPHYLL *a* (abbreviated as Chlor *a*)

Unit of Measurement: micrograms/liter (abbreviated as µg/l)
Description: An estimate of the biomass of planktonic algae in the river. The technical term "biomass" is used to represent "amount by weight". Chlorophyll *a* can be strongly influenced by phosphorus, which is derived by natural and human activities.
Visual observation: Green, suspended particles
Class A NH surface water quality standard: No numeric standard
Class B NH surface water quality standard: No numeric standard

Categories	
< 3	Excellent
3 - 7	Good
7 - 15	Less than desirable
> 15	Nuisance

PARAMETER: COLOR (no abbreviation)

Unit of Measurement: units (no abbreviation)
Description: A visual measure of the color of the water. Color is generally caused by decaying organic matter and by naturally occurring metals, such as iron and manganese, in the soils. A highly colored river generally may have extensive wetlands along the shore or within the watershed.
Visual observation: See Categories below
Class A NH surface water quality standard: No numeric standard; As naturally occurs
Class B NH surface water quality standard: No numeric standard; No color in such concentrations that would impair any existing or designated use, unless naturally occurring.

Categories	
0 – 25	clear
25 – 40	light tea-color
40 – 80	tea color
> 80	dark tea color

Description of River Water Quality Parameters (continued)

PARAMETER: CONDUCTIVITY or SPECIFIC CONDUCTANCE (abbreviated as Cond or SpCond)

Unit of Measurement: micromhos per centimeter or microsiemens per centimeter (abbreviated as µmhos/cm or µS/cm, respectively)
Description: Conductivity is a numerical expression of the ability of water to carry an electric current at 25°C. The difference between conductivity and specific conductance is specific conductance accounts for the actual water temperature rather than 25°C. Conductivity and specific conductance levels are influenced by human sources, such as stormwater runoff, or natural sources, such as bedrock. Conductivity and specific conductance can indicate the presence of chloride, nitrate, sulfate, phosphate, or other ions. Mountain streams typically have low conductivity and freshwater coastal streams typically have high conductivity.
Visual observation: None
Class A NH surface water quality standard: No numeric standard
Class B NH surface water quality standard: No numeric standard

Categories (excluding regional natural variations)	
0 - 100	Normal
101 - 200	Low impact
201 - 500	Moderate impact
> 501	High impact

PARAMETER: DISSOLVED OXYGEN (abbreviated as DO)

Unit of Measurement: concentration (milligrams per liter) and saturation (percent); (abbreviated as mg/L and %, respectively)
Description: A measure of the amount of oxygen in the water: concentration is a measure of the amount of oxygen in a volume of water; saturation is a measure of the amount of oxygen in the water compared to the amount of oxygen the water can actually hold at full saturation. Oxygen is introduced into the water from the atmosphere through turbulence from wind and wave action or from rocky, steep, or uneven stream beds. Aquatic plants and algae produce oxygen in the water during the day, but consume oxygen during the night. Dead and decaying organic matter in the water consumes oxygen, day or night.
Visual observation: None
Class A NH surface water quality standard: Unless naturally occurring, 75% minimum daily average; 6 mg/L at any place or time
Class B NH surface water quality standard*: Unless naturally occurring, 75% minimum daily average; 5 mg/L instantaneous minimum
*Contact DES or refer to NH Code of Administrative Rules Env-Ws 1703.07 for standards relative to lakes, ponds, and impoundments and coldwater fisheries

Description of River Water Quality Parameters (continued)

PARAMETER: *ESCHERICHIA COLIFORM* (abbreviated as *E. coli*)

Unit of Measurement: counts per 100 ml (abbreviated as cts/100 ml)
Description: An indicator of the potential for the presence of pathogens in fresh water. *E. coli* is almost always found in the intestinal tracts of humans and warm-blooded animals, and can be excreted in their fecal material.
Visual observation: Typically none
Class A NH surface water quality standard: Unless naturally occurring, shall contain not more than either a geometric mean of 47 *E. coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 153 *E. coli* cts/100 mL in any one sample
Class B NH surface water quality standard: Unless naturally occurring, shall contain not more than either a geometric mean of 126 *E. coli* cts/100 mL based on at least three samples obtained over a sixty-day period, or greater than 406 *E. coli* cts/100 mL in any one sample
*Contact DES for criteria that applies at designated beaches.

PARAMETER: pH (no abbreviation)

Unit of Measurement: units (no abbreviation)
Description: A measure of the hydrogen ion activity in the water or, in general terms, the acidity of the water. pH is measured on a logarithmic scale of 0 to 14, with 7 being neutral. A high pH is indicative of an alkaline or basic environment, and a low pH is indicative of an acidic environment. pH is influenced by geology and soils, organic acids (decaying leaves and other matter), and human-induced acids from acid rain.
Visual observation: Some clear rivers can be highly acidic
Class A NH surface water quality standard: No numeric standard; As naturally occurs
Class B NH surface water quality standard: Between 6.5 and 8, unless naturally occurring

Categories	
< 5.0	High impact
5.0 - 5.9	Moderate to high impact
6.0 – 6.4	Normal; Low impact
6.5 – 8.0	Normal; Within NH water quality standards
8.0 – 9.0	Low to moderate impact

Description of River Water Quality Parameters (continued)

PARAMETER: SECCHI DISK TRANSPARENCY

Unit of Measurement: feet
Description: A naked-eye measure of water clarity generally correlated with the amount of planktonic algae in the river, but can also relate to the turbidity from suspended soil particles.
Visual observation: Clear, green, brown
Class A NH surface water quality standard: No numeric standard
Class B NH surface water quality standard: No numeric standard

Categories	
< 4	Poor
4 - 15	Good
> 15	Excellent

PARAMETER: TOTAL KJELDAHL NITROGEN (abbreviated TKN)

Unit of Measurement: milligrams per liter (abbreviated mg/L)
Description: A measure of the amount of ammonia and organic nitrogen in the water,. High nitrogen can increase the amount of algae and chlorophyll *a* levels in the river, but is generally of less concern in fresh water when compared to phosphorus. Nitrogen can indicate the presence of sewage, animal waste, fertilizer, erosion, or other types of pollution.
Visual observation: None
Class A NH surface water quality standard: No numeric standard; As naturally occurs
Class B NH surface water quality standard: No numeric standard; Unless naturally occurring, shall contain no nitrogen in such concentrations that would impair any existing or designated uses

Categories	
< 0.25	Ideal
0.26 - 0.40	Average
0.41 - 0.50	More than desirable
> 0.51	Excessive (potential nuisance concentration)

Description of River Water Quality Parameters (continued)

PARAMETER: TOTAL PHOSPHORUS (abbreviated as TP)

Unit of Measurement: micrograms/liter (abbreviated as µg/l)
Description: A measure of all forms of phosphorus in the water, including inorganic and organic forms. Phosphorus is generally the plant nutrient that is limiting in New Hampshire's rivers. In other words, the amount of phosphorus present in the water column determines the amount of planktonic algae that will grow in the river. High phosphorus can increase the amount of algae and chlorophyll *a* levels in the river. Phosphorus can indicate the presence of sewage, animal waste, fertilizer, erosion, or other types of pollution.
Visual observation: None
Class A NH surface water quality standard: No numeric standard; As naturally occurs
Class B NH surface water quality standard: No numeric standard; Unless naturally occurring, shall contain no phosphorus in such concentrations that would impair any existing or designated uses

Categories	
< 0.010	Ideal
0.011 - 0.025	Average
0.026 - 0.050	More than desirable
> 0.051	Excessive (potential nuisance concentration)

PARAMETER: TURBIDITY

Unit of Measurement: Nephelometric turbidity units (abbreviated as NTU)
Description: An indicator of the amount of suspended material in the water, such as clay, silt, algae, suspended sediment, and decaying plant material. A high degree of turbidity can scatter the passage of light through the water and inhibit light from reaching important areas. Rain events often contribute turbidity to surface waters by flushing sediment, organic matter, and other materials from the surrounding landscape into surface waters. Turbidity is usually very high during springtime snowmelt.
Visual observation: Brown, green, grey suspended particles
Class A NH surface water quality standard: As naturally occurs
Class B NH surface water quality standard: Shall not exceed naturally occurring conditions by more than 10 NTU

Categories	
0 - 5	Desirable and typical for most NH rivers
6 - 10	Low impact
11 - 50	Moderate impact; potentially observable with the naked eye
51 - 100	Moderate-high impact; observable with the naked eye
> 101	High impact; easily observable with the naked eye

2020 VRAP Reports to be inserted when available