Neely Henry Reservoir Report 2016 & 2019

Rivers and Reservoirs Monitoring Program

Alabama Department of Environmental Management

Field Operations Division
Rivers and Reservoirs Unit
April 2022

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LIST OF ACRONYMS

A&I	Agricultural and Industrial Water Supply
ADEM	Alabama Department of Environmental Management
AGPT	Algal Growth Potential Test
APCo	Alabama Power Company
CHL *a*	Chlorophyll *a*
DO	Dissolved Oxygen
F&W	Fish and Wildlife
MAX	Maximum
MDL	Method Detection Limit
MIN	Minimum
MSC	Mean Standing Crop
NTU	Nephelometric Turbidity Units
OAW	Outstanding Alabama Waters
ONRW	Outstanding National Resource Water
PWS	Public Water Supply
QAPP	Quality Assurance Project Plan
RRMP	Rivers and Reservoirs Monitoring Program
S	Swimming and Other Whole Body Water-Contact Sports
SD	Standard Deviation
SOP	Standard Operating Procedures
TEMP	Temperature
TN	Total Nitrogen
TMDL	Total Maximum Daily Load
TP	Total Phosphorus
TSI	Trophic State Index
TSS	Total Suspended Solids
USACE	United States Army Corp of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

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INTRODUCTION

Neely Henry Reservoir is located in northeast Alabama on the Coosa River near the city of Gadsden. It was one of the original dams built as a part of an Alabama Power Company construction program in the late 1950s and 1960s. The 11,235 acre reservoir borders Etowah, St. Clair, and Calhoun counties.

The Alabama Department of Environmental Management (ADEM) monitored Neely Henry Reservoir as part of the 2016 and 2019 assessments of the Coosa River basin under the Rivers and Reservoirs Monitoring Program (RRMP). ADEM began monitoring lake water quality statewide in 1985, followed by a second statewide survey in 1989. In 1990, the Reservoir Water Quality Monitoring Program (now known as RRMP) was initiated by the Field Operations Division of the ADEM. The current objectives of this program are to provide data that can be used to assess current water quality conditions, to identify trends in water quality conditions, and to develop Total Maximum Daily Loads (TMDLs) and water quality criteria. Descriptions of all RRMP monitoring activities are available in ADEM's 2017 Monitoring Strategy (ADEM 2017).

Neely Henry Reservoir was placed on Alabama's 1996 Clean Water Act (CWA) §303(d) list of impaired waters for not meeting its Public Water Supply (PWS)/Swimming (S)/Fish & Wildlife (F&W) water use classifications. The reservoir was listed for impairments caused by priority organics (PCBs), nutrients, pH, and organic enrichment/dissolved oxygen (OE/DO). A TMDL for nutrients, OE/DO, and pH was approved in 2008 (ADEM 2008). Based on new Fish Tissue Monitoring Program (FTMP) data collected in 2015, the Alabama Department of Public Health (ADPH) lifted all fish consumption advisories in Neely Henry Reservoir, resulting in the removal of the segments listed for PCBs from the 2016 §303(d) list. In 2018, the Big Wills Creek and Black Creek embayments were added to the §303(d) list for impairments caused by nutrients from agricultural, industrial, and municipal sources, as well as urban run-off/storm sewers.

In 2010, the ADEM implemented specific water quality criteria for nutrient management at the dam forebay and mid stations of Neely Henry Reservoir (ADEM Admin. Code R. 335-6-10-.11). These criteria represent a growing season mean (April-October) chlorophyll *a* (chl *a*)

concentration that is protective of the reservoir's PWS/S/F&W use classifications. These criteria are denoted in Table 1.

The purpose of this report is to summarize data collected at nine stations in Neely Henry Reservoir during the 2016 and 2019 growing seasons and to evaluate trends in mean lake trophic status and nutrient concentrations using ADEM's historic dataset. Monthly and/or mean concentrations of nutrients [total nitrogen (TN); total phosphorus (TP)], algal biomass/productivity [chl *a*; algal growth potential testing (AGPT)], sediment [total suspended solids (TSS)], and trophic state [Carlson's trophic state index (TSI)] were compared to ADEM's historical data and established criteria.

METHODS

Sampling stations were selected using historical data and previous assessments (Figure 1). Specific location information can be found in Table 1. Neely Henry Reservoir was sampled in the dam forebay, mid, and upper reservoir along with six tributary stations: Ballplay, Big Wills, Black, Big Canoe, Greens, and Beaver Creeks.

Water quality sampling was conducted at monthly intervals, April-October. All samples were collected, preserved, stored, and transported according to procedures in the ADEM Field Operations Division Standard Operating Procedures (ADEM 2019), Surface Water Quality Assurance Project Plan (ADEM 2018a), and Quality Management Plan (ADEM 2018b).

Mean growing season TN, TP, chl *a*, and TSS were calculated to evaluate water quality conditions at each site. Monthly concentrations of these parameters were graphed with the closest available Alabama Power Company's (APCo) dam discharge data and ADEM's previously collected data to help interpret the 2016 and 2019 results.

Figure 1. Neely Henry Reservoir with sampling locations. A description of each sampling location is provided in Table 1.

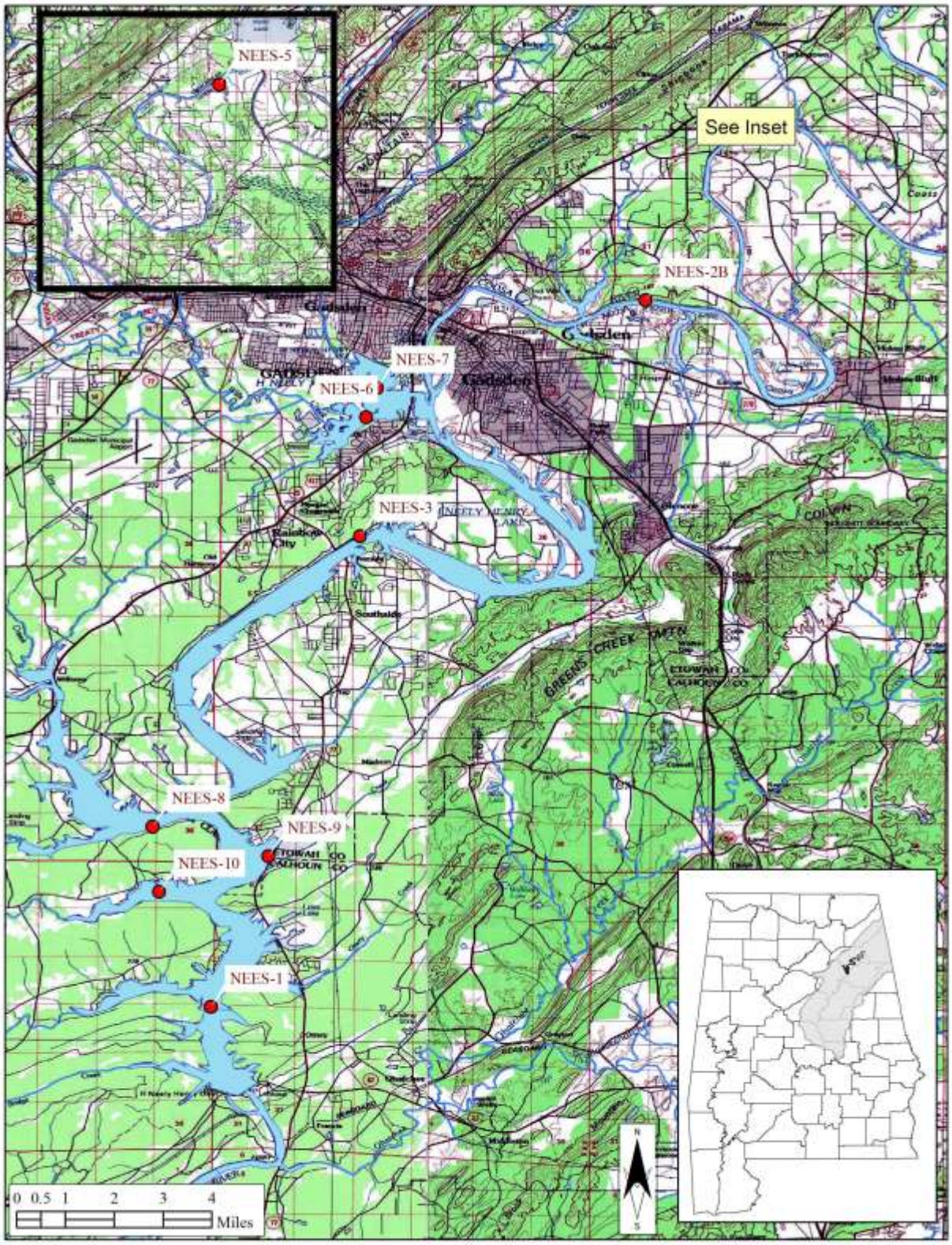


Table 1. Descriptions of the 2016 and 2019 monitoring stations in Neely Henry Reservoir.

HUC	County	Station Number	Report Designation	Waterbody Name	Station Description	Chl *a* Criteria	Latitude	Longitude
031501060309	Calhoun	NEES-1*	Lower	Coosa R	Deepest point, main river channel, dam forebay.	18 µg/L	33.80662	-86.06447
031501060204	Etowah	NEES-2B	Upper	Coosa R	Deepest point, main river channel, reservoir mile 28.0, above Gadsden.		34.01744	-85.93572
031501060309	Etowah	NEES-3*	Mid	Coosa R	Mid reservoir. Deepest point, main river channel, immediately upstream of Alabama Hwy 77 bridge. Reservoir mile 16.0.	18 µg/L	33.94763	-86.02021
031501060201	Etowah	NEES-5	Ballplay Cr	Ballplay Cr	Deepest point, main creek channel, Ballplay Creek embayment, approximately 0.5 miles upstream of Coosa River confluence.		34.11786	-85.81752
031501060108	Etowah	NEES-6	Big Wills Cr	Big Wills Cr	Deepest point, main creek channel, Big Wills Creek embayment, approximately 1.0 mi upstream of US Hwy. 411 bridge.		33.98290	-86.01840
031501060107	Etowah	NEES-7	Black Cr	Black Cr	Deepest point, main creek channel, Black Creek embayment, immediately upstream of Interstate 759 bridge.		33.99157	-86.01532
031501060306	Etowah	NEES-8	Big Canoe Cr	Big Canoe Cr	Deepest point, main creek channel, Big Canoe Creek embayment, downstream of Canoe Creek Campground.		33.86174	-86.08170
031501060309	Etowah	NEES-9	Greens Cr	Greens Cr	Deepest point, main creek channel, Greens Creek embayment, immediately upstream of AL Hwy. 77 bridge.		33.85293	-86.04744
031501060307	St Clair	NEES-10	Beaver Cr	Beaver Cr	Deepest point, main creek channel, Beaver Creek embayment, upstream of Greensport Marina.		33.84250	-86.07972

*Growing season mean chl *a* criteria implemented at this station in 2010.

RESULTS

Growing season mean graphs for TN, TP, chl *a*, and TSS are provided in this section (Figures 2-5). Monthly graphs for TN, TP, chl *a*, TSS, DO, and TSI are also provided (Figures 6-11, and 16-17). Mean monthly discharge is included in monthly graphs for TN, TP, chl *a*, TSS, and TSI as an indicator of flow and retention time in the months sampled. AGPT results appear in Table 2. Depth profile graphs of temperature, DO, and conductivity appear in Figures 12-15. Summary statistics of all data collected during 2016 and 2019 are presented in Appendix Table 1 and Appendix Table 2. The tables contain the minimum, maximum, median, mean, and standard deviation of each parameter analyzed.

Stations with the highest concentrations of nutrients, chlorophyll *a*, and TSS are noted in the paragraphs to follow. Though stations with lowest concentrations may not always be mentioned, review of the graphs that follow will indicate these stations that may be potential candidates for reference waterbodies and watersheds.

The mid reservoir station had highest mean growing season TN value calculated among mainstem stations in both 2016 and 2019 (Figure 2). The highest mean growing season TN values calculated among embayment stations in 2016 and 2019 were Black Creek and Big Wills Creek, respectively. Black, Big Wills, Big Canoe, and Beaver Creeks appeared to show a decrease in TN concentrations since 2010. In 2019, mean TN concentrations at the mainstem stations were the lowest measured in the reservoir since 1997. In 2016, monthly TN concentrations were highest in October at the upper station, in April at the mid station, and in July at the lower station (Figure 6). In 2019, monthly TN concentrations were highest in April at the upper and mid stations and in September at the lower station. Historic high monthly concentrations were recorded at the upper station in October and in the mid station in April in 2016. In 2019, a historic high was recorded at the upper station in April.

In both 2016 and 2019, the highest mean growing season TP value calculated among mainstem stations was in the mid reservoir station; however, mean TP values among the three mainstem stations were very similar in both 2016 and 2019 (Figure 3). Big Wills Creek had the highest mean growing season TP value calculated among embayment stations in both 2016 and 2019. In general, all mainstem stations appeared to decrease over time since 1997. In general,

embayment stations, except Ballplay Creek, appeared to decrease 2010-2019. Ballplay Creek decreased 2005-2016, but then saw the highest recorded mean TP calculated for the station in 2019. Monthly TP concentrations for mainstem stations were at or below historic means in all months sampled for both the 2016 and 2019 growing season (Figure 7).

The highest mean growing season chl *a* value among mainstem stations was calculated for the mid station in 2016 and the upper station in 2019 (Figure 4). In 2016, the mid station had the highest recorded mean observed in the reservoir at 42.17 mg/L. Black Creek had the highest mean growing season chl *a* value calculated for embayment stations in both years. In 2019, mean chl *a* concentrations in the mainstem stations appeared to decrease with movement downstream. With the exception of Ballplay Creek, mean chl *a* concentrations in the embayment stations appeared to decrease 2010-2019. Ballplay Creek had higher concentrations in 2016 compared to 2010. The growing season mean chl *a* value calculated in both the lower and mid stations exceeded the established criteria limits in both 2016 and 2019. In general, monthly chl *a* concentrations were higher in 2016 than in 2019 at all stations for most months (Figure 8). In 2016, historic highs were observed in April-August at the upper station, in August at the mid station, and in June at the lower station. In 2019, monthly concentrations were at or below historic means for all months sampled, except in September at the upper station, which was a historic high.

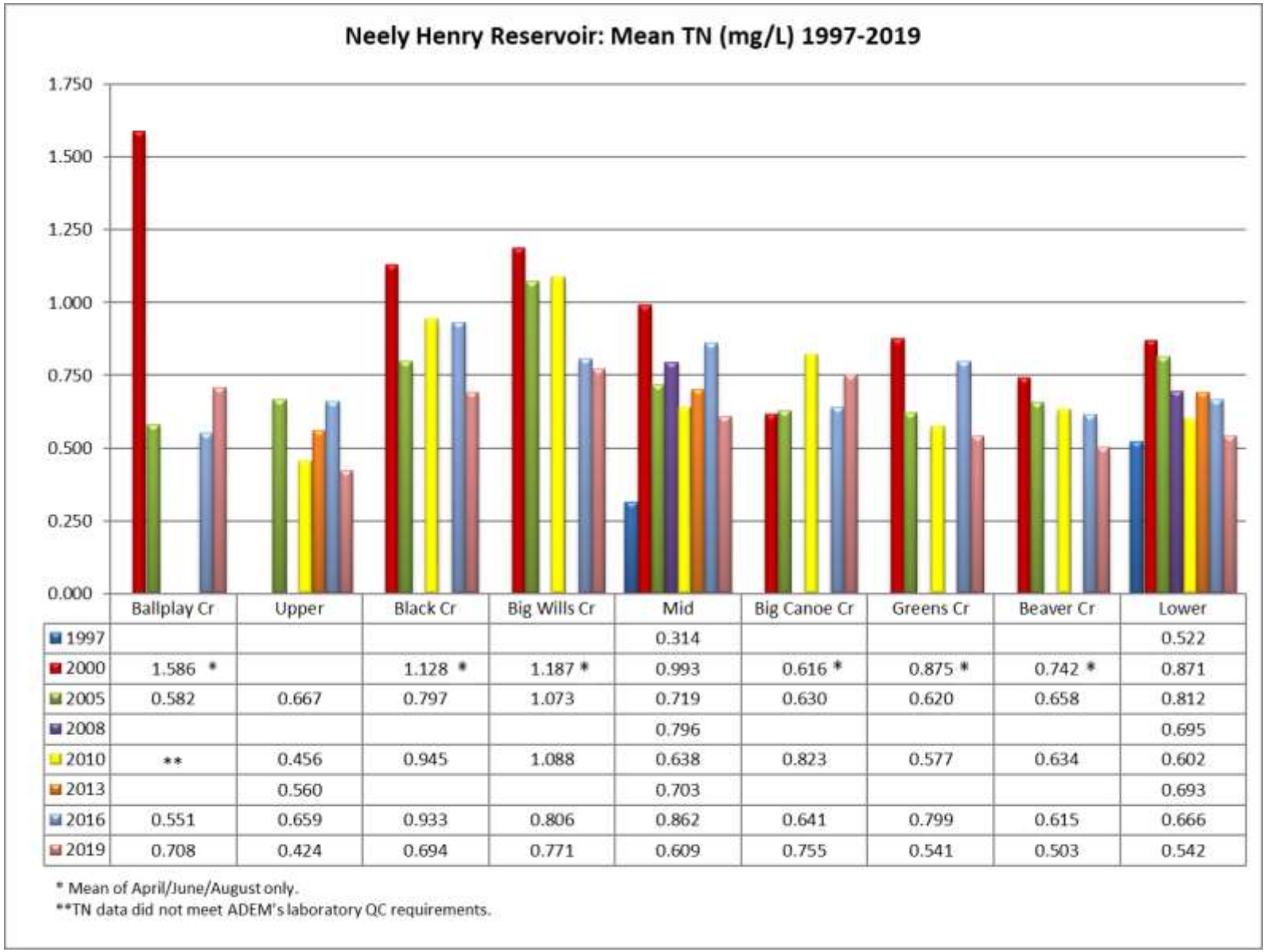
In both 2016 and 2019, the highest mean growing season TSS value among mainstem stations was calculated for the mid station (Figure 5). Black Creek had the highest mean growing season TSS value calculated among embayment stations for both years. All mainstem stations decreased since the early years of sampling and appeared to stabilize. The embayment stations appeared to decrease 2000-2019, with Ballplay Creek and Big Wills Creek having the lowest mean TSS concentrations on record in 2019. In 2016, the highest monthly TSS concentrations were measured in July at the upper station, in May at the mid station, and in September at the lower station (Figure 9). In 2019, the highest monthly TSS concentrations were measured in May and July at the upper station, in June at the mid station, and in July at the lower station. Historic highs were measured at the upper station in July and September of 2019.

All AGPT samples collected in August 2016 and August 2019 indicated nitrogen-limited conditions (Table 2). Due to resource constraints, AGPT samples were not collected at the mid and lower stations in 2016. Raschke and Schultz (1987) defined a mean standing crop (MSC) value of 5.0 mg/L as protective of reservoir and lake systems. All locations sampled in 2016 and 2019 had MSC values near 5.0 mg/L, except the mid station in 2019, which was 8.66 mg/L.

In 2016, DO concentrations in the lower reservoir station were below the ADEM criteria limit of 5.0 mg/L at 5.0 ft (1.5 m) in August (ADEM Admin. Code R. 335-6-10-.09) (Figure 10). All measurements of DO concentrations in Neely Henry Reservoir were at or above the criteria limit in 2019 (Figure 11). In 2016, the lower station was stratified April-October with a majority of the water column having DO concentrations near or below 5.0 mg/L (Figure 12). The mid station was stratified May-October (Figure 13). Highest water temperatures were measured in July at both stations. In 2019, the lower and mid stations were stratified in May, August, and September (Figures 14 & 15). There was also a slight thermocline and chemocline observed at the mid station in May. Highest water temperatures measured in 2019 were in August at both stations.

Monthly TSI values were calculated using chl *a* concentrations and Carlson's Trophic State Index (Figures 16 and 17). In 2016, all mainstem and embayment reservoir stations were eutrophic throughout the growing season, except for the mid station in August, which increased to hypereutrophic, and Big Wills Creek in April, which was mesotrophic. In 2019, the mid station remained eutrophic in all months sampled. The lower station was oligotrophic in April, increasing to eutrophic the remainder of the growing season. The upper station was eutrophic all months, except May, when the station was mesotrophic, and September, when the station was hypereutrophic. All embayment stations remained eutrophic throughout the 2019 growing season, except Big Wills Creek, which was only eutrophic July-October, and Big Canoe Creek, which was oligotrophic in May and mesotrophic in September, but eutrophic all other months.

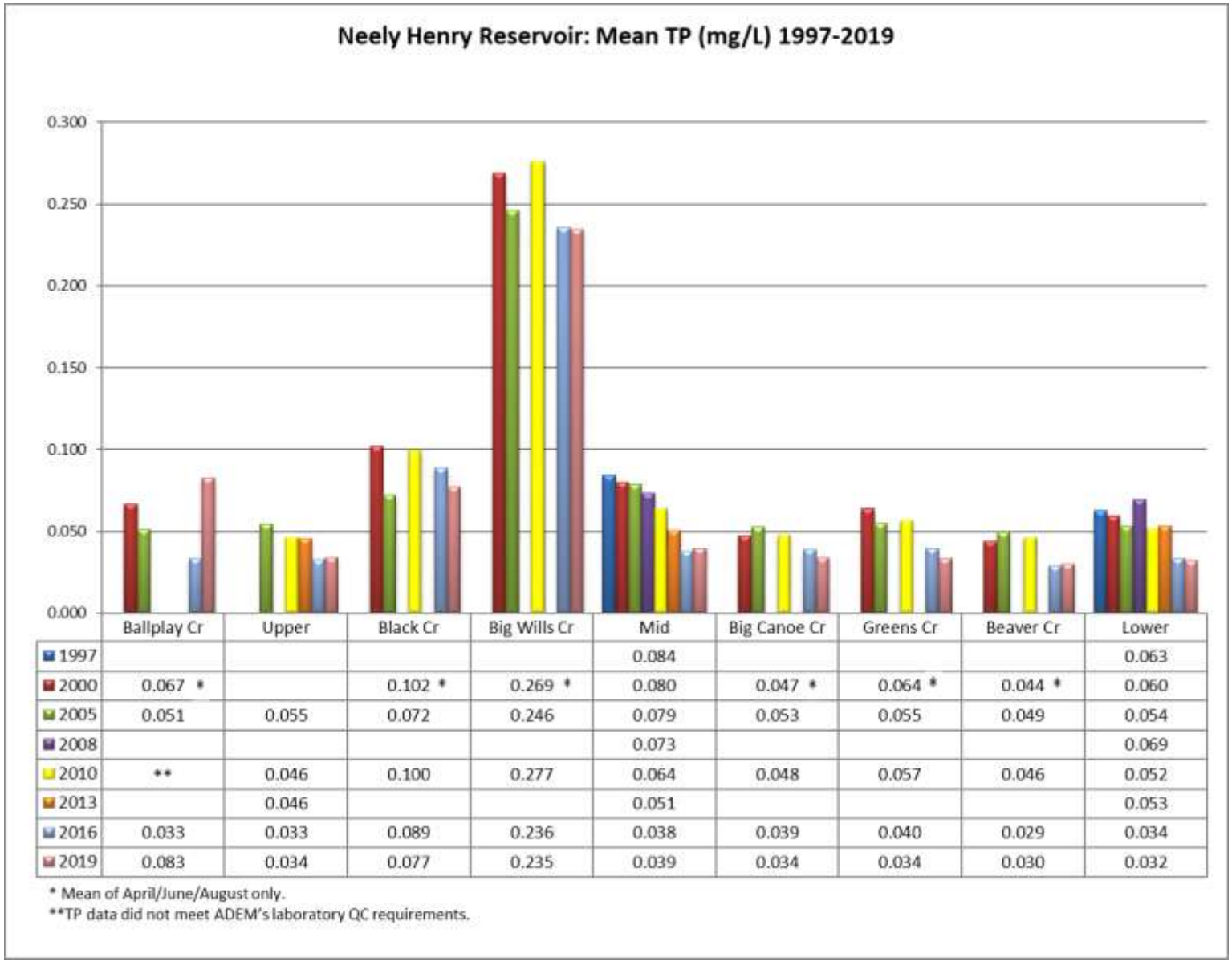
Figure 2. Mean growing season TN measured in Neely Henry Reservoir, April-October, 1997-2019. Bar graphs consist of multiple stations, illustrated from upstream to downstream as the graph is read from left to right.



	Ballplay Cr	Upper	Black Cr	Big Wills Cr	Mid	Big Canoe Cr	Greens Cr	Beaver Cr	Lower
1997					0.314				0.522
2000	1.586 *		1.128 *	1.187 *	0.993	0.616 *	0.875 *	0.742 *	0.871
2005	0.582	0.667	0.797	1.073	0.719	0.630	0.620	0.658	0.812
2008					0.796				0.695
2010	**	0.456	0.945	1.088	0.638	0.823	0.577	0.634	0.602
2013		0.560			0.703				0.693
2016	0.551	0.659	0.933	0.806	0.862	0.641	0.799	0.615	0.666
2019	0.708	0.424	0.694	0.771	0.609	0.755	0.541	0.503	0.542

* Mean of April/June/August only.
**TN data did not meet ADEM's laboratory QC requirements.

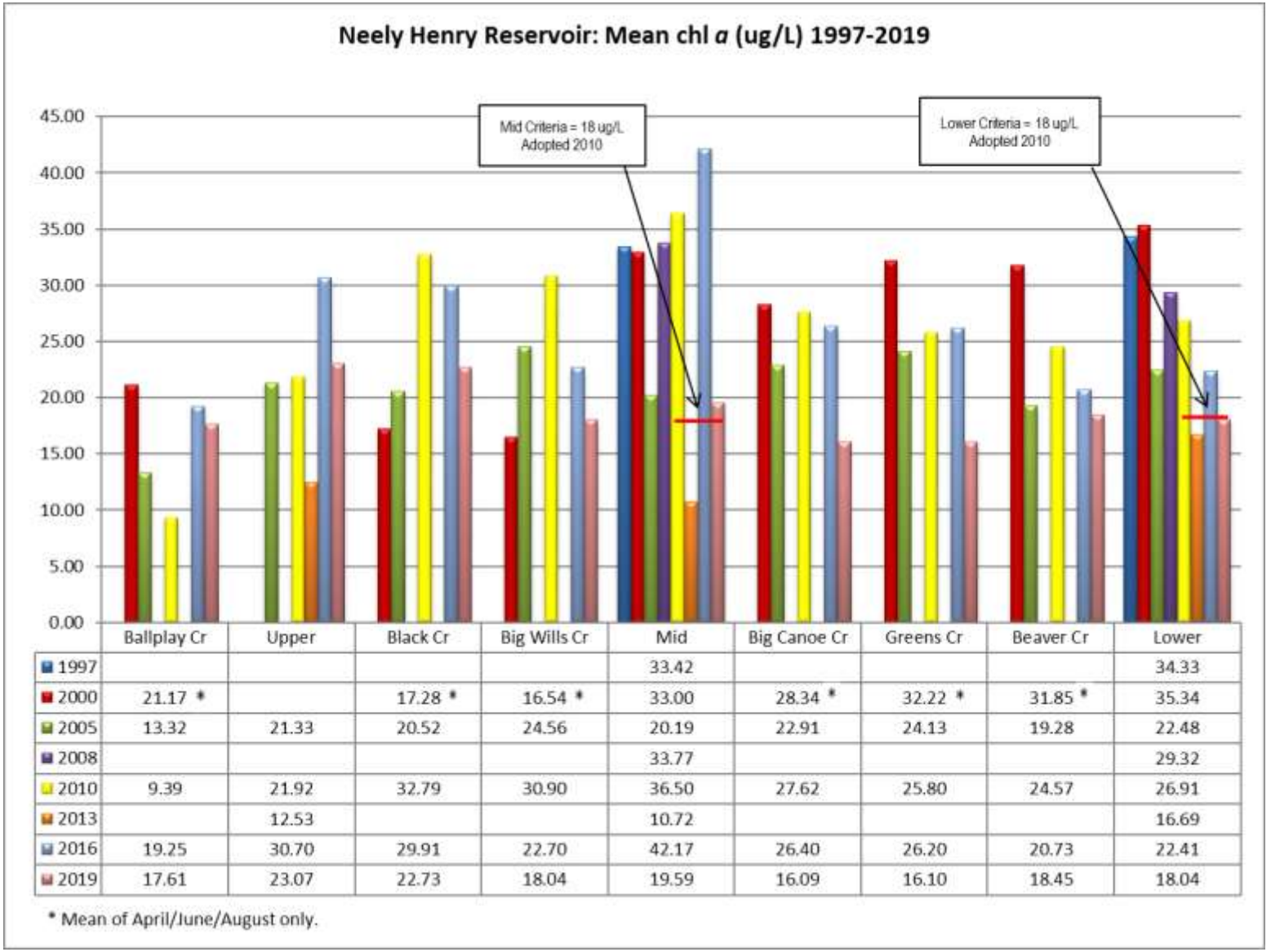
Figure 3. Mean growing season TP measured in Neely Henry Reservoir, April-October, 1997-2019. Bar graphs consist of multiple stations, illustrated from upstream to downstream as the graph is read from left to right.



	Ballplay Cr	Upper	Black Cr	Big Wills Cr	Mid	Big Canoe Cr	Greens Cr	Beaver Cr	Lower
1997					0.084				0.063
2000	0.067 *		0.102 *	0.269 *	0.080	0.047 *	0.064 *	0.044 *	0.060
2005	0.051	0.055	0.072	0.246	0.079	0.053	0.055	0.049	0.054
2008					0.073				0.069
2010	**	0.046	0.100	0.277	0.064	0.048	0.057	0.046	0.052
2013		0.046			0.051				0.053
2016	0.033	0.033	0.089	0.236	0.038	0.039	0.040	0.029	0.034
2019	0.083	0.034	0.077	0.235	0.039	0.034	0.034	0.030	0.032

* Mean of April/June/August only.
**TP data did not meet ADEM's laboratory QC requirements.

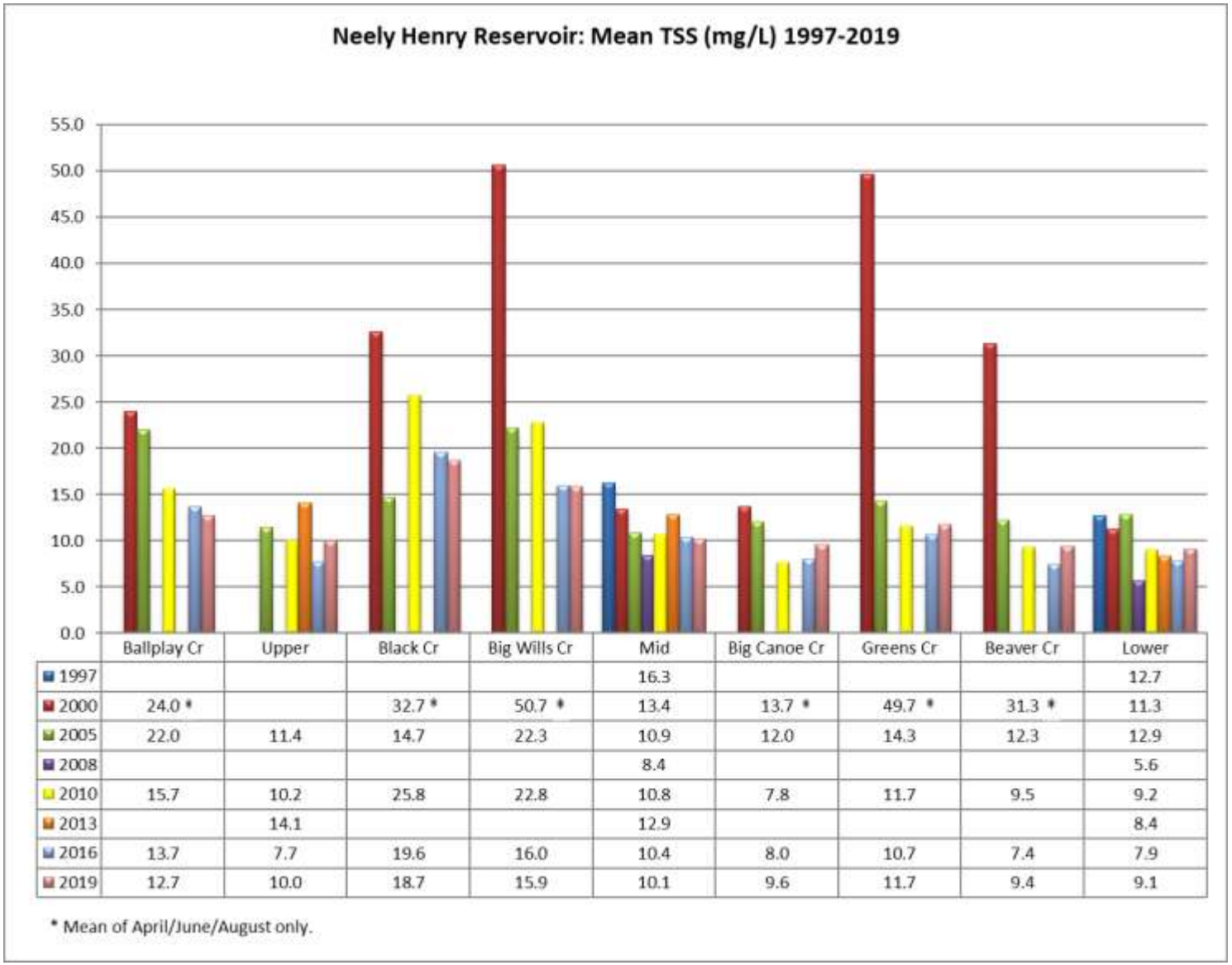
Figure 4. Mean growing season chl *a* measured in Neely Henry Reservoir, April-October, 1997-2019. Bar graphs consist of multiple stations, illustrated from upstream to downstream as the graph is read from left to right. Chl *a* criteria applies to the growing season mean of the mid and lower stations only.



	Ballplay Cr	Upper	Black Cr	Big Wills Cr	Mid	Big Canoe Cr	Greens Cr	Beaver Cr	Lower
1997					33.42				34.33
2000	21.17 *		17.28 *	16.54 *	33.00	28.34 *	32.22 *	31.85 *	35.34
2005	13.32	21.33	20.52	24.56	20.19	22.91	24.13	19.28	22.48
2008					33.77				29.32
2010	9.39	21.92	32.79	30.90	36.50	27.62	25.80	24.57	26.91
2013		12.53			10.72				16.69
2016	19.25	30.70	29.91	22.70	42.17	26.40	26.20	20.73	22.41
2019	17.61	23.07	22.73	18.04	19.59	16.09	16.10	18.45	18.04

* Mean of April/June/August only.

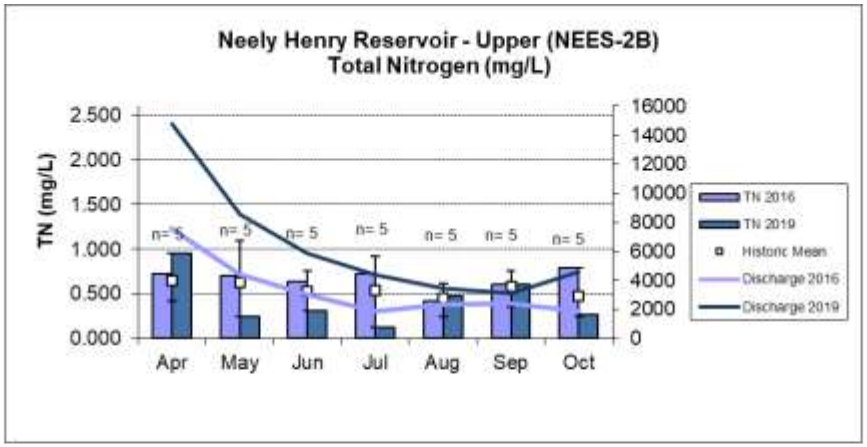
Figure 5. Mean growing season TSS measured in Neely Henry Reservoir, April-October, 1997-2019. Bar graphs consist of multiple stations, illustrated from upstream to downstream as the graph is read from left to right.

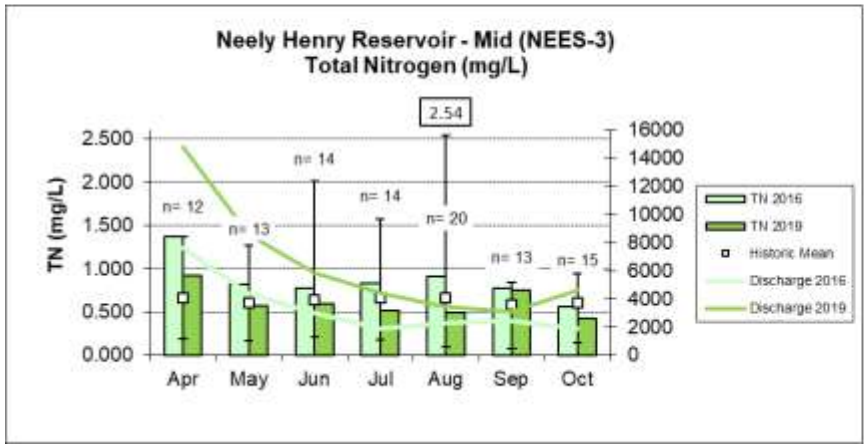


	Ballplay Cr	Upper	Black Cr	Big Wills Cr	Mid	Big Canoe Cr	Greens Cr	Beaver Cr	Lower
1997					16.3				12.7
2000	24.0 *		32.7 *	50.7 *	13.4	13.7 *	49.7 *	31.3 *	11.3
2005	22.0	11.4	14.7	22.3	10.9	12.0	14.3	12.3	12.9
2008					8.4				5.6
2010	15.7	10.2	25.8	22.8	10.8	7.8	11.7	9.5	9.2
2013		14.1			12.9				8.4
2016	13.7	7.7	19.6	16.0	10.4	8.0	10.7	7.4	7.9
2019	12.7	10.0	18.7	15.9	10.1	9.6	11.7	9.4	9.1

* Mean of April/June/August only.

Figure 6. Monthly TN concentrations measured in Neely Henry Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Monthly discharge acquired from APCo at Neely Henry Dam. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max ranges (for months with 3 or more values) are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.





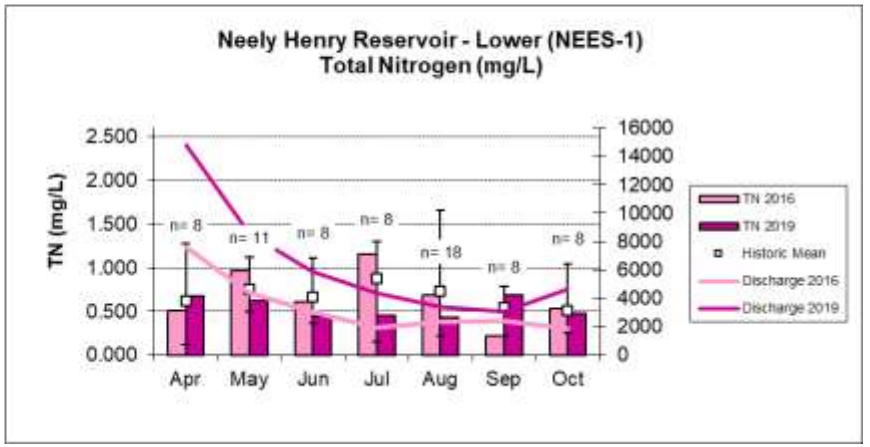


Figure 7. Monthly TP concentrations measured in Neely Henry Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Monthly discharge acquired from APCo at Neely Henry Dam. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max ranges (for months with 3 or more values) are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.

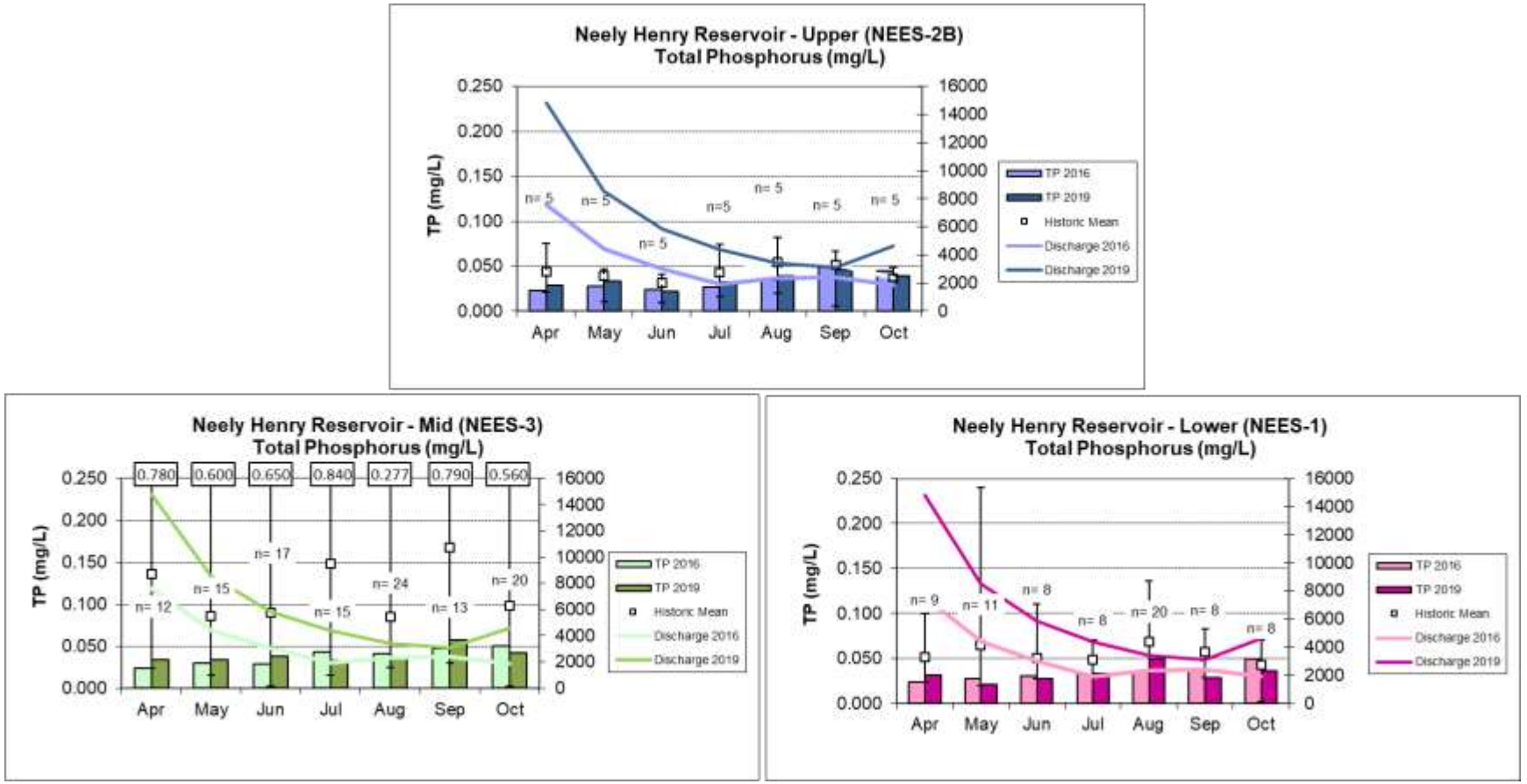
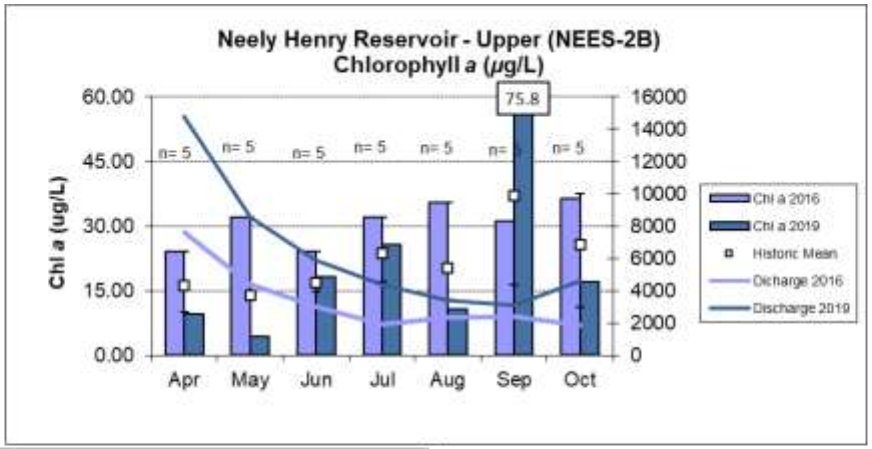
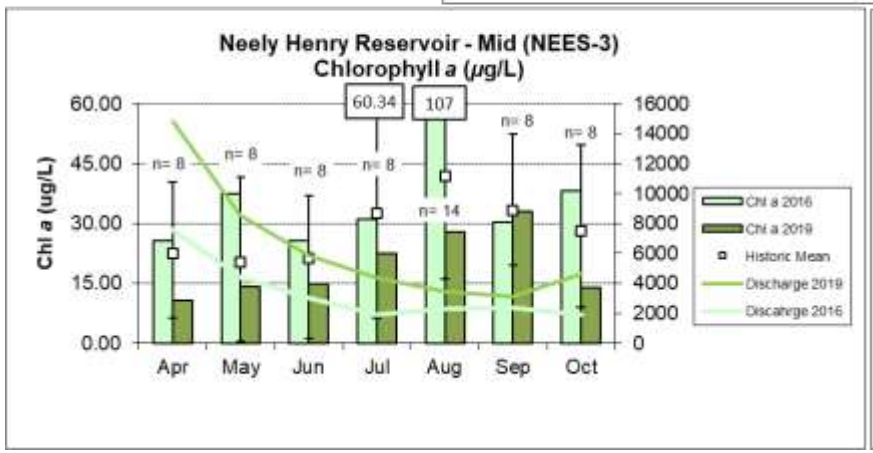


Figure 8. Monthly chl *a* concentrations measured in Neely Henry Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Monthly discharge acquired from APCo at Neely Henry Dam. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max ranges (for months with 3 or more values) are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.





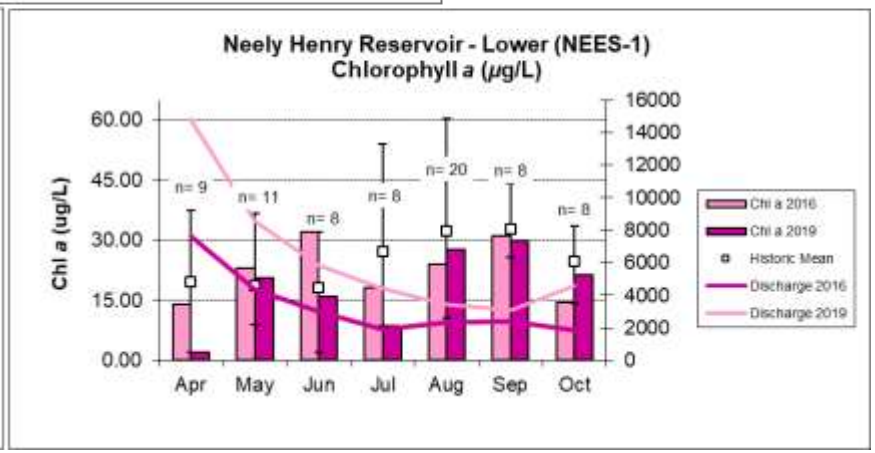
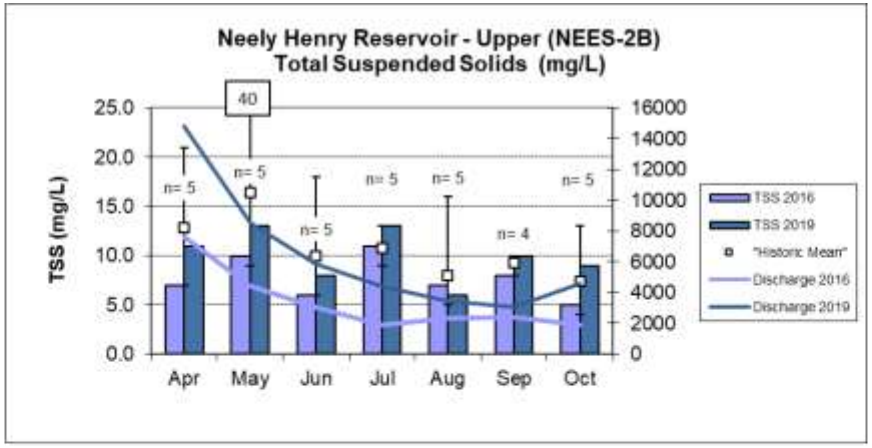
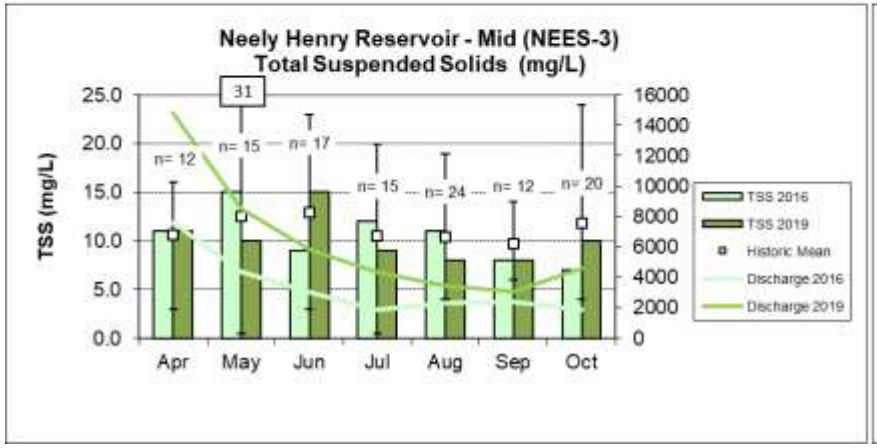


Figure 9. Monthly TSS concentrations measured in Neely Henry Reservoir, April-October 2016 and 2019 vs. average monthly discharge. Monthly discharge acquired from APCo at Neely Henry Dam. Each bar graph depicts monthly changes in each station. The historic mean (1990-2019) and min/max ranges (for months with 3 or more values) are also displayed for comparison. The "n" value equals the number of datapoints included in the monthly historic calculations.





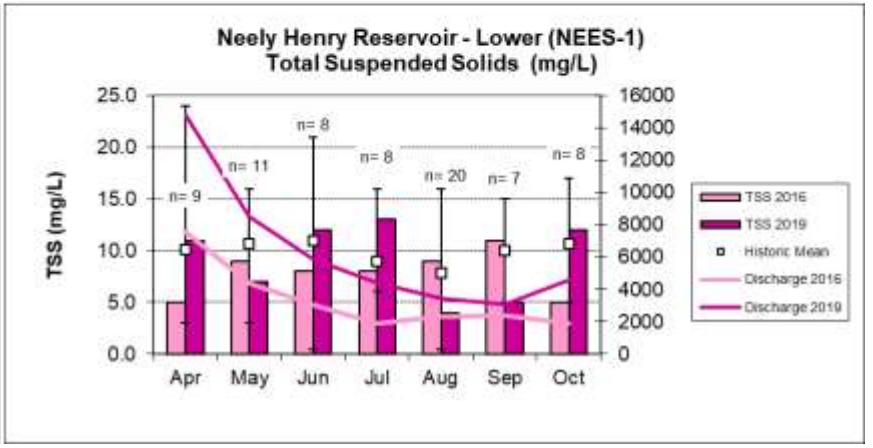


Table 2. Algal growth potential test results, Neely Henry Reservoir, 1999-2019 (expressed as mean Maximum Standing Crop (MSC) dry weights of *Selenastrum capricornutum* in mg/L) and limiting nutrient status. MSC values below 5 mg/L are considered to be protective in reservoirs and lakes; values below 20 mg/L MSC are considered protective of flowing streams and rivers. (Raschke and Schultz 1987).

Station	**Upper (NEES-2B)**		**Mid (NEES-3)**		**Lower (NEES-1)**	
	Control mean MSC	**Limiting Nutrient**	**Control mean MSC**	**Limiting Nutrient**	**Control mean MSC**	**Limiting Nutrient**
8/1997	---	---	3.4	NITROGEN	3.4	NITROGEN
8/2000	---	---	8.1	NITROGEN	4.35	NONE
8/2005	---	---	5.56	NONE	7.07	NITROGEN
8/2010	10.13	NITROGEN	---	---	---	---
8/2016	5.63	NITROGEN	---	---	---	---
8/2019	4.64	NITROGEN	8.66	NITROGEN	4.83	NITROGEN

Figure 10. Monthly DO concentrations at 1.5 m (5 ft) for Neely Henry Reservoir stations collected April-October 2016. ADEM Water Quality Criteria pertaining to reservoir waters require a minimum DO concentration of 5.0 mg/L at this depth (ADEM Admin. Code R. 335-6-10-.09).

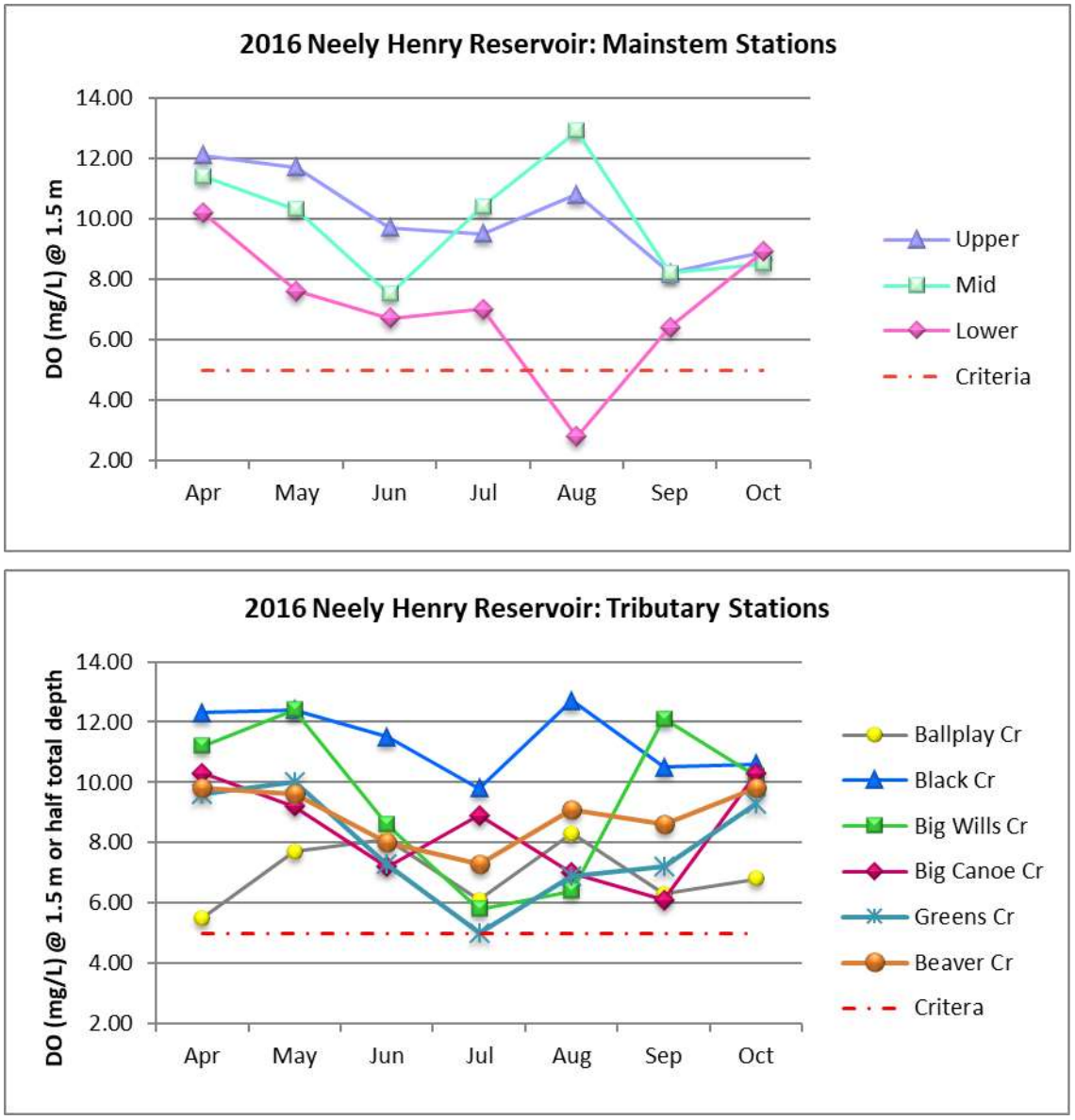


Figure 11. Monthly DO concentrations at 1.5 m (5 ft) for Neely Henry Reservoir stations collected April-October 2019. ADEM Water Quality Criteria pertaining to reservoir waters require a minimum DO concentration of 5.0 mg/L at this depth (ADEM Admin. Code R. 335-6-10-.09).

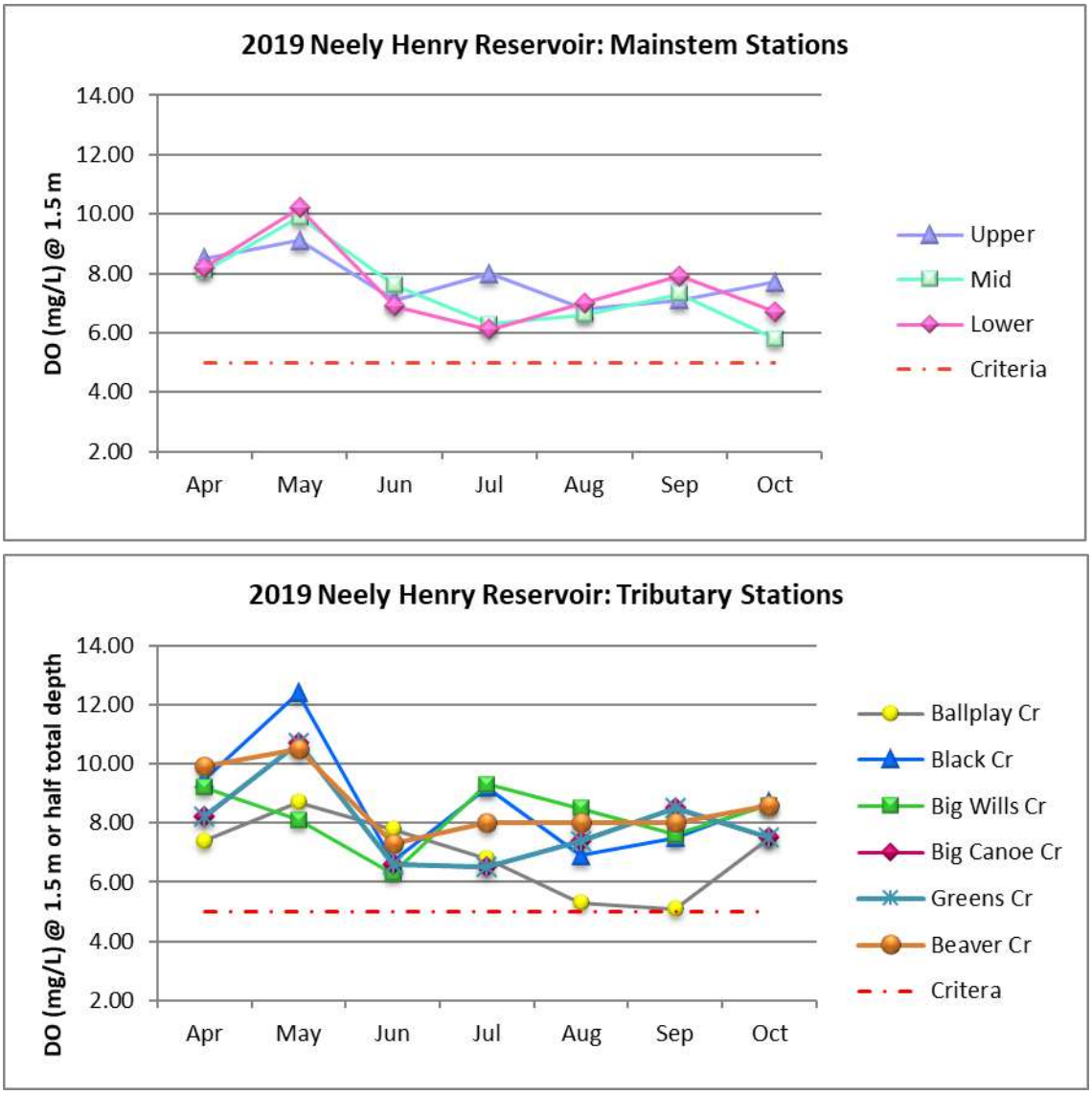


Figure 12. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Neely Henry Reservoir station, April-October 2016.

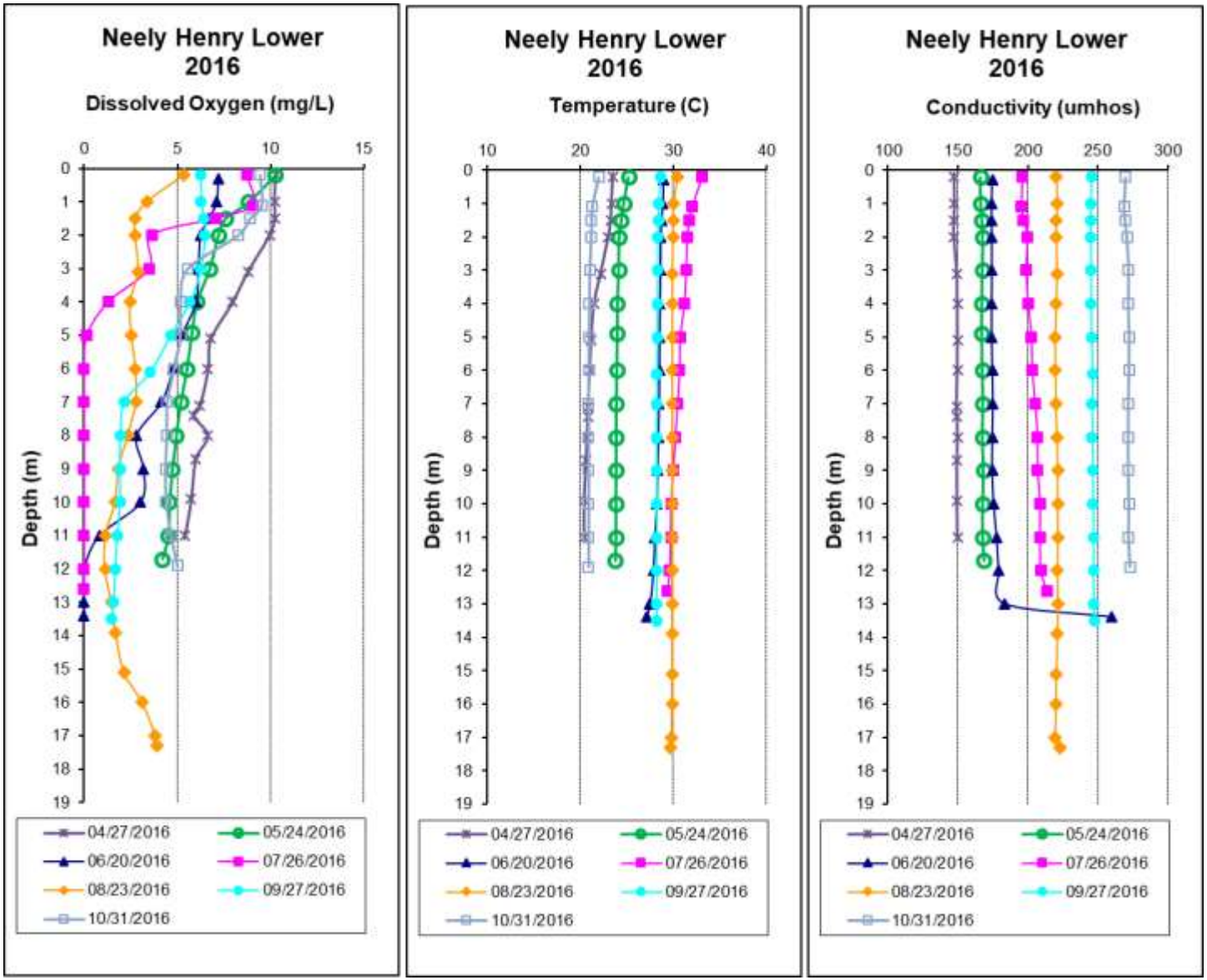


Figure 13. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the mid Neely Henry Reservoir station, April-October 2016.

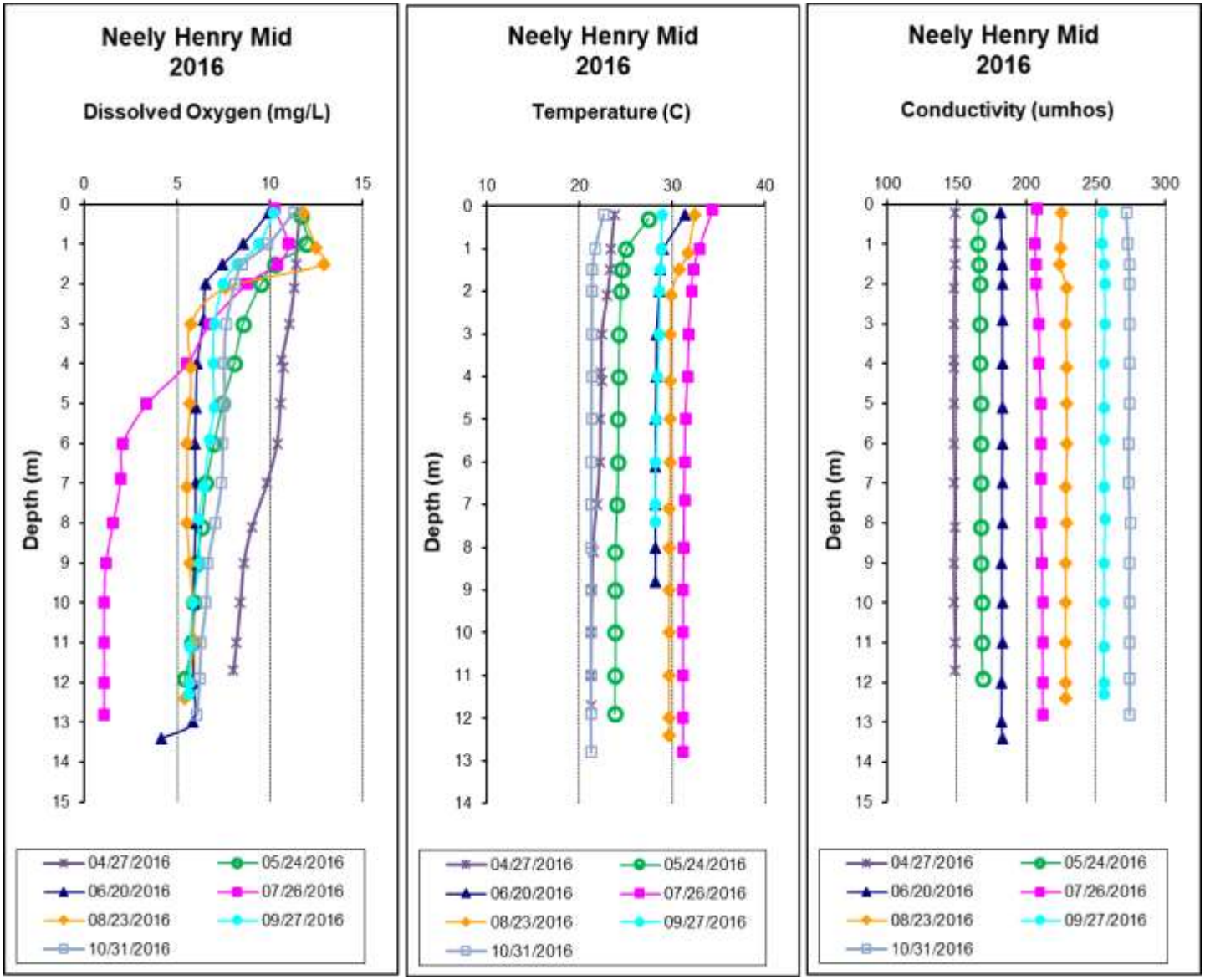


Figure 14. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the lower Neely Henry Reservoir station, April-October 2019.

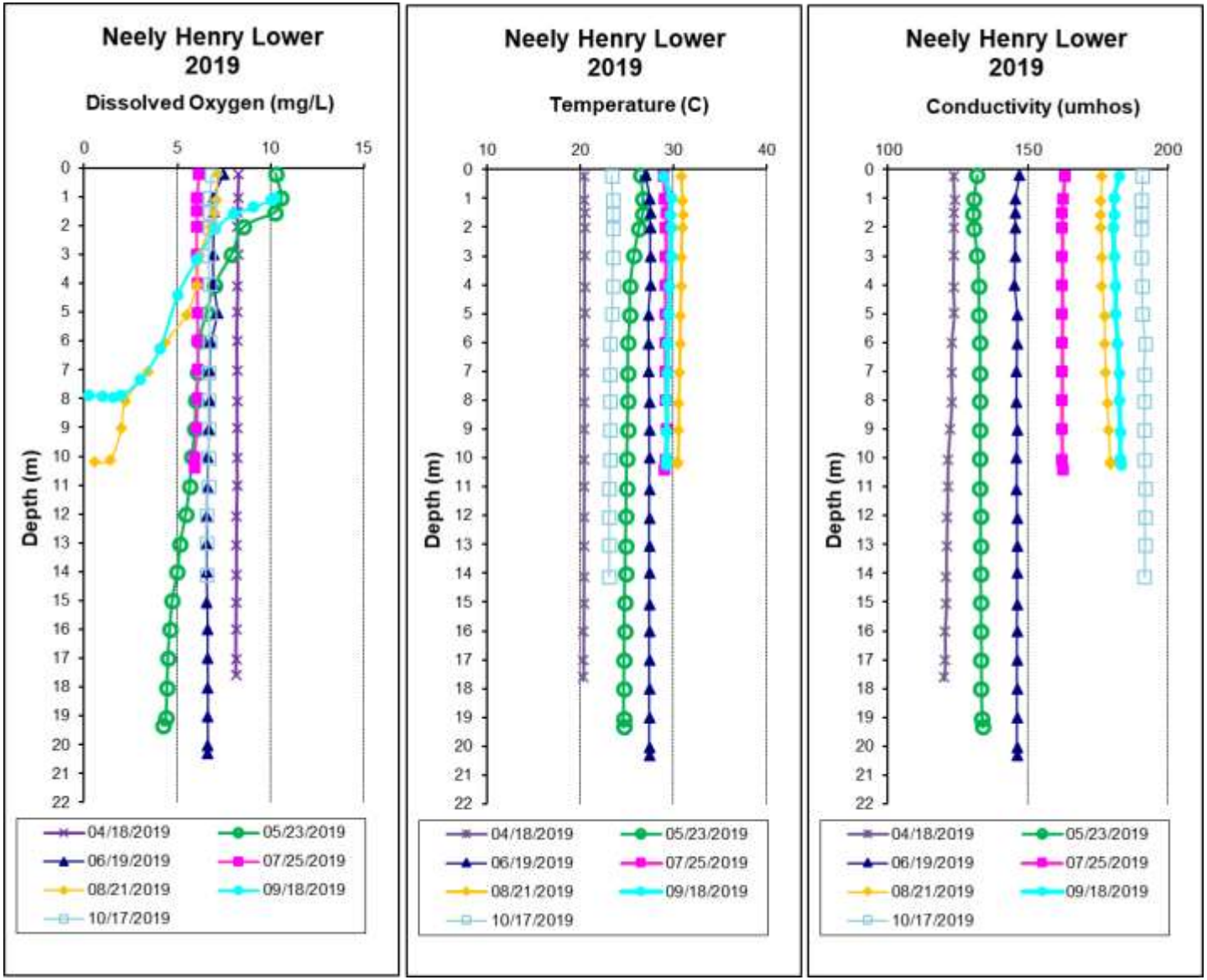


Figure 15. Monthly depth profiles of dissolved oxygen (mg/L), temperature (C), and conductivity (umhos) in the mid Neely Henry Reservoir station, April-October 2019.

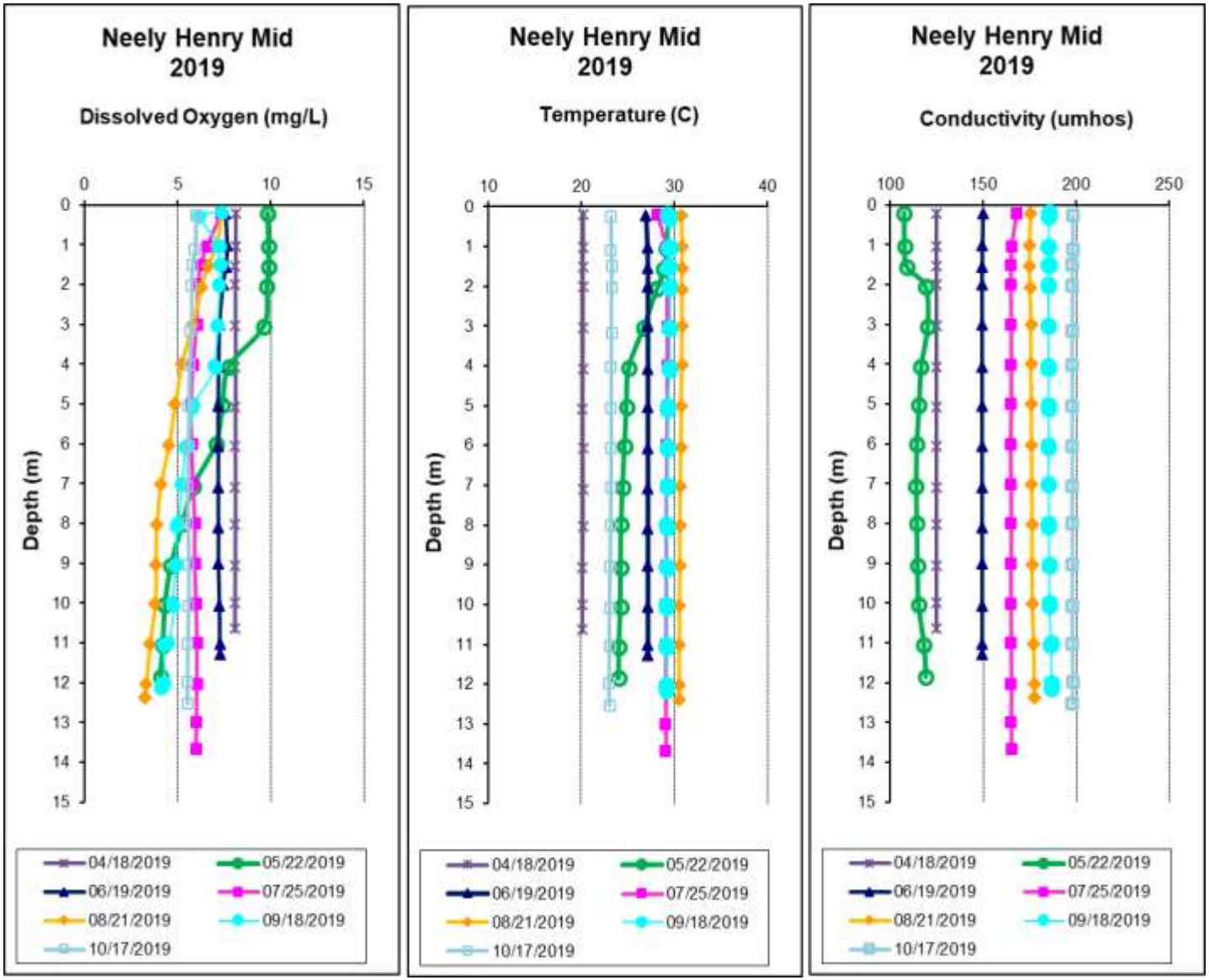
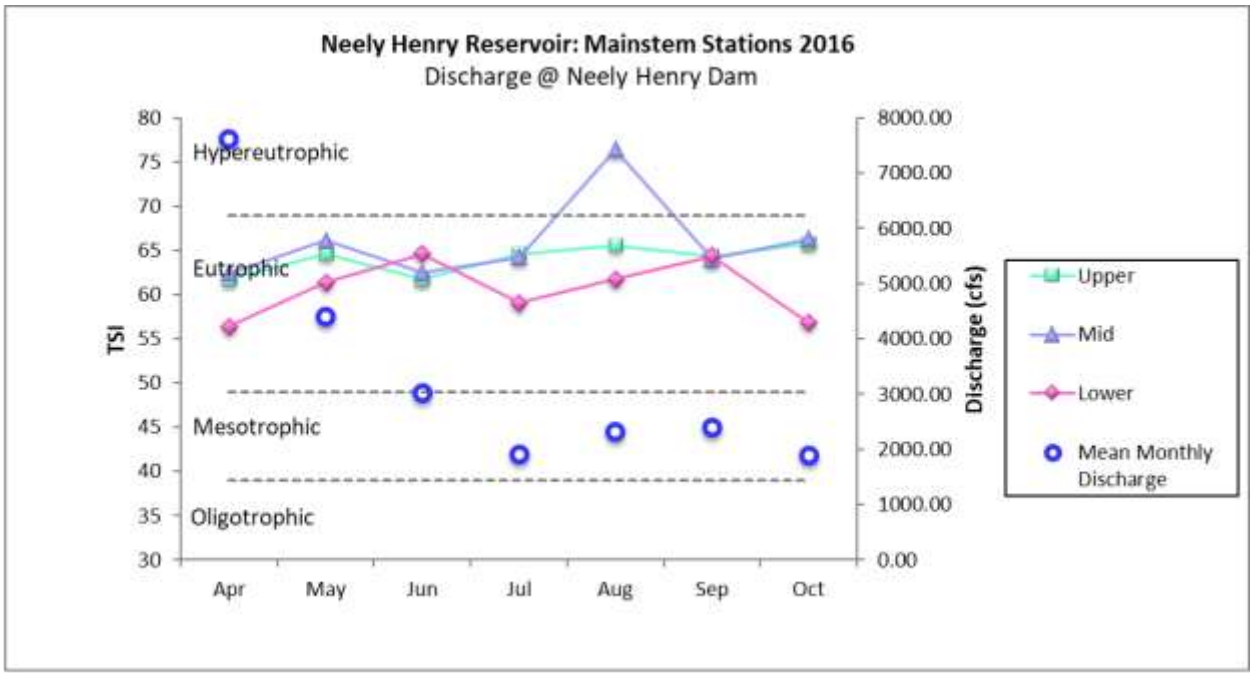


Figure 16. Monthly TSI values calculated for mainstem and tributary Neely Henry Reservoir stations in 2016 using chl *a* concentrations and Carlson's Trophic State Index calculation (Carlson 1977). Monthly discharge acquired from APCo at Neely Henry Dam.



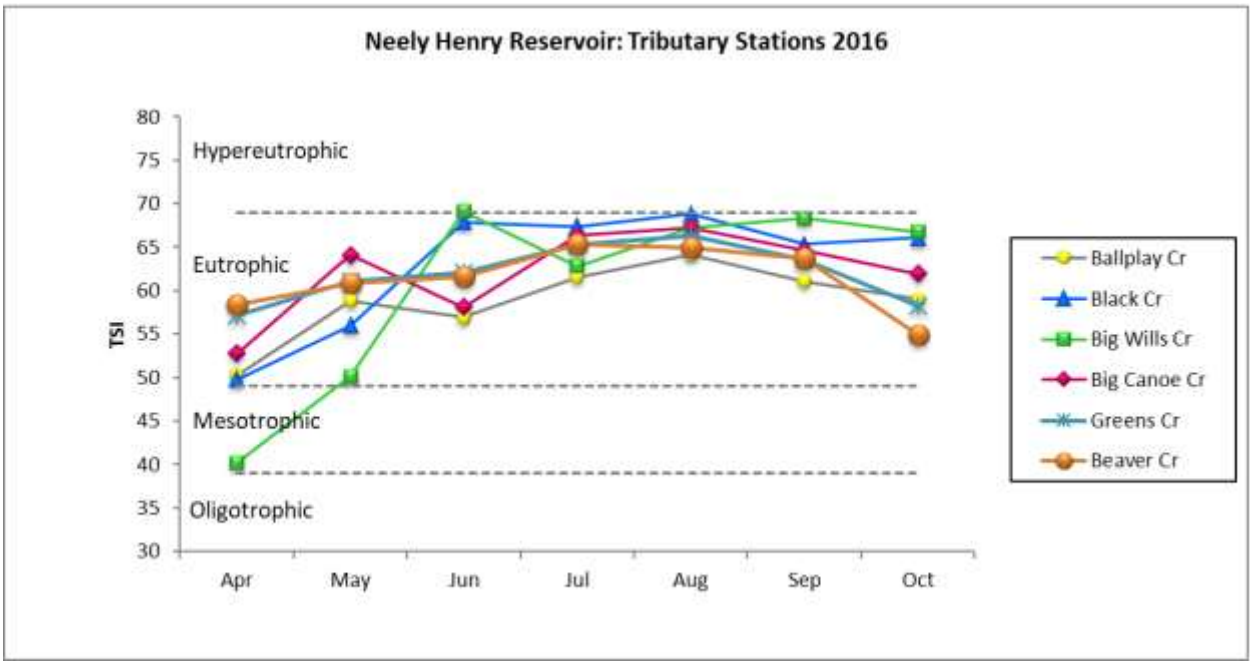
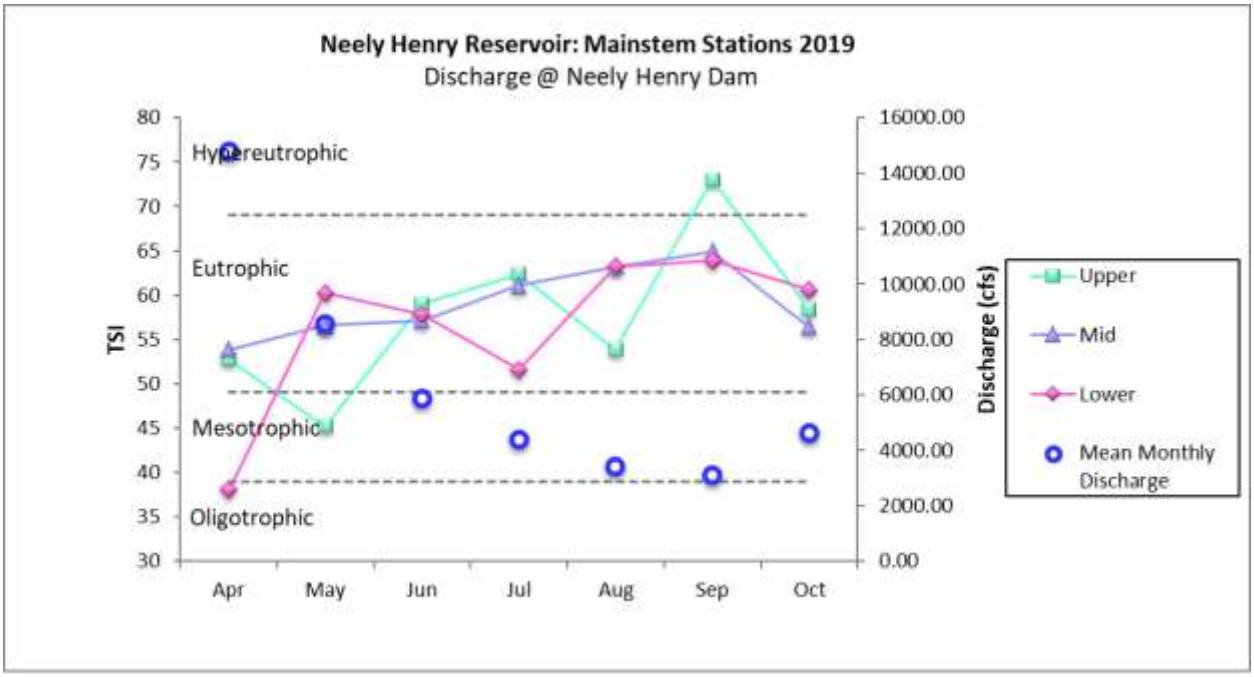
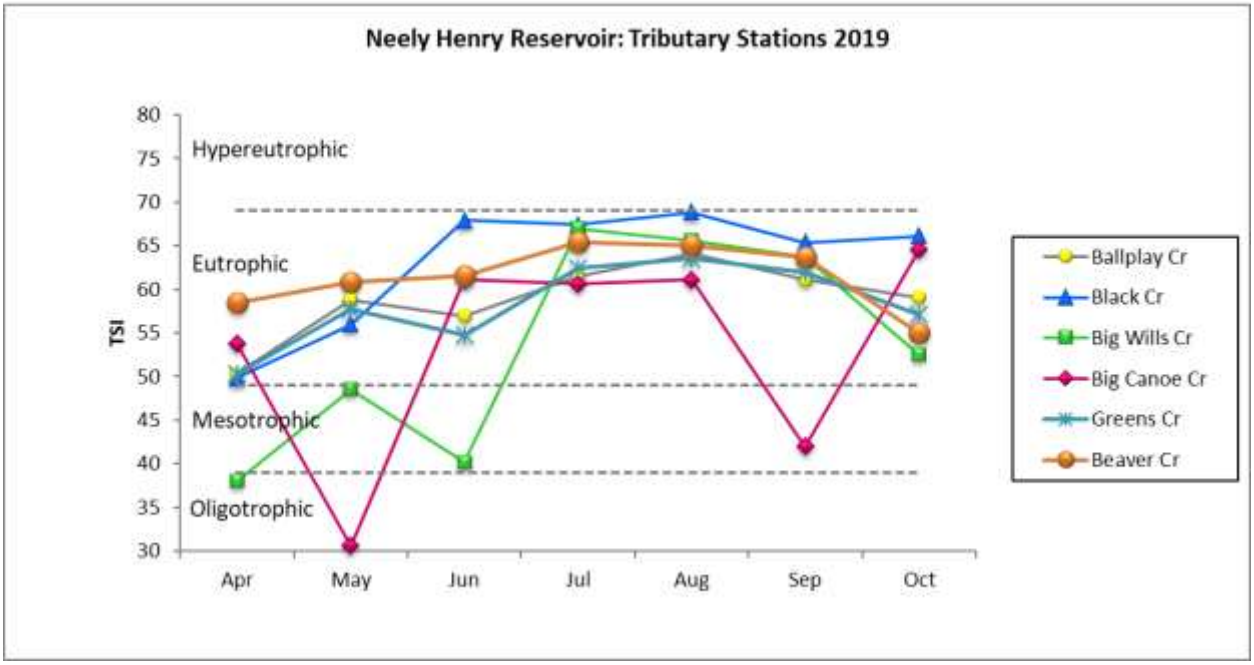


Figure 17. Monthly TSI values calculated for mainstem and tributary Neely Henry Reservoir stations in 2019 using chl *a* concentrations and Carlson's Trophic State Index calculation (Carlson 1977). Monthly discharge acquired from APCo at Neely Henry Dam.





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APPENDIX

Appendix Table 1. Summary of Neely Henry Reservoir water quality data collected April-October, 2016. Minimum (min) and maximum (max) values calculated using minimum detection limits when results were less than this value. Median (med), mean, and standard deviation (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Station	Parameter	N	Min	Max	Med	Avg	SD
NEES-1	**Physical**						
	Turbidity (NTU)	7	6.5	11.0	8.6	8.9	1.9
	Total Dissolved Solids (mg/L)	7	81.0	157.0	97.0	107.3	25.1
	Total Suspended Solids (mg/L)[J]	7	5.0	11.0	8.0	7.9	2.2
	Hardness (mg/L)	4	67.8	86.1	78.4	77.7	8.1
	Alkalinity (mg/L)	7	65.2	95.6	81.9	80.8	11.2
	Photic Zone (m)	7	2.18	4.01	2.77	2.97	0.69
	Secchi (m)	7	0.71	1.15	0.90	0.89	0.16
	Bottom Depth (m)	7	11.0	17.3	12.6	13.1	2.1
	Chemical						
	Ammonia Nitrogen (mg/L)	7	< 0.007	0.030	0.004	0.007	0.005
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	< 0.002	0.027	0.002	0.008	0.010
	Total Kjeldahl Nitrogen (mg/L)	7	0.215	1.150	0.590	0.657	0.310
	Total Nitrogen (mg/L)[J]	7	< 0.651	3.456	0.608	0.666	0.309
	Dis Reactive Phosphorus (mg/L)[J]	7	0.003	0.005	0.003	0.004	0.001
	Total Phosphorus (mg/L)	7	0.024	0.049	0.032	0.034	0.008
	CBOD-5 (mg/L)	7	< 2.0	3.0	2.1	2.0	0.8
	Chlorides (mg/L)	7	4.0	17.1	8.3	9.2	4.8
	Biological						
	Chlorophyll a (mg/m³)	7	13.90	32.00	23.10	22.41	7.36
	E. coli (MPN/DL)[J]	4	1	1	1	1	0
NEES-2B	**Physical**						
	Turbidity (NTU)	7	7.4	11.4	8.4	8.7	1.4
	Total Dissolved Solids (mg/L)	7	75.0	155.0	111.0	114.4	26.7
	Total Suspended Solids (mg/L)	7	5.0	11.0	7.0	7.7	2.1
	Hardness (mg/L)	4	68.0	87.3	78.7	78.2	8.0
	Alkalinity (mg/L)	7	66.6	90.3	82.2	79.1	9.7
	Photic Zone (m)	7	2.42	3.46	2.80	2.89	0.32
	Secchi (m)	7	0.65	1.24	0.78	0.85	0.20
	Bottom Depth (m)	7	7.4	9.6	9.0	8.8	0.8
	Chemical						
	Ammonia Nitrogen (mg/L)[J]	7	< 0.007	0.030	0.004	0.009	0.007
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	< 0.002	0.010	0.003	0.004	0.003
	Total Kjeldahl Nitrogen (mg/L)	7	0.421	0.784	0.700	0.655	0.119
	Total Nitrogen (mg/L)[J]	7	< 1.272	2.364	0.702	0.659	0.119
	Dis Reactive Phosphorus (mg/L)[J]	7	< 0.002	0.006	0.004	0.004	0.002
	Total Phosphorus (mg/L)	7	0.023	0.049	0.028	0.033	0.010
	CBOD-5 (mg/L)	7	2.0	4.1	2.7	2.8	0.7
	Chlorides (mg/L)	7	3.8	19.0	9.5	10.3	5.5
	Biological						
	Chlorophyll a (mg/m³)	7	24.00	36.30	32.00	30.70	4.95
	E. coli (MPN/DL)[J]	4	1	5	1	2	2

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-3	**Physical**							
	Turbidity (NTU)	7		7.2	13.6	9.2	9.5	2.2
	Total Dissolved Solids (mg/L)	7		72.0	165.0	123.0	114.7	33.8
	Total Suspended Solids (mg/L)	7		7.0	15.0	11.0	10.4	2.7
	Hardness (mg/L)	4		68.5	88.4	79.8	79.2	8.3
	Alkalinity (mg/L)	7		64.8	94.3	84.0	80.7	11.4
	Photic Zone (m)	7		1.94	243.00	2.89	37.00	90.84
	Secchi (m)	7		0.57	1.04	0.83	0.80	0.15
	Bottom Depth (m)	7		11.7	13.4	12.4	12.5	0.6
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.007	0.050	0.015	0.017	0.017
	Nitrate+Nitrite Nitrogen (mg/L)	7	<	0.002	0.077	0.002	0.022	0.029
	Total Kjeldahl Nitrogen (mg/L)	7		0.517	1.370	0.810	0.839	0.265
	Total Nitrogen (mg/L)	7	<	1.671	4.116	0.812	0.862	0.250
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.002	0.004	0.003	0.003	0.001
	Total Phosphorus (mg/L)	7		0.024	0.050	0.041	0.038	0.010
	CBOD-5 (mg/L)	7		2.0	4.8	2.6	2.9	1.0
	Chlorides (mg/L)	7		4.4	18.5	9.4	10.3	5.2
	Biological							
	Chlorophyll a (mg/m³)	7		25.60	107.00	31.00	42.17	29.01
	E. coli (MPN/DL)[J]	4		1	1	1	1	0
NEES-5	**Physical**							
	Turbidity (NTU)	7		11.6	17.9	13.2	13.9	2.3
	Total Dissolved Solids (mg/L)	7		56.0	147.0	118.0	111.4	32.1
	Total Suspended Solids (mg/L)	7		9.0	21.0	13.0	13.7	4.9
	Hardness (mg/L)	4		74.4	88.8	83.2	82.4	6.0
	Alkalinity (mg/L)	7		65.9	90.4	88.6	84.1	8.9
	Photic Zone (m)	7		0.70	1.90	0.90	1.14	0.46
	Secchi (m)	7		0.51	1.22	0.65	0.72	0.24
	Bottom Depth (m)	7		0.7	1.9	0.9	1.1	0.5
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.030	0.004	0.007	0.005
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.106	0.007	0.021	0.038
	Total Kjeldahl Nitrogen (mg/L)	7		0.190	1.050	0.411	0.530	0.282
	Total Nitrogen (mg/L)[J]	7	<	0.618	3.171	0.517	0.551	0.276
	Dis Reactive Phosphorus (mg/L)[J]	7		0.002	0.005	0.004	0.004	0.001
	Total Phosphorus (mg/L)	7		0.023	0.050	0.030	0.033	0.009
	CBOD-5 (mg/L)	7	<	2.0	2.5	1.0	1.4	0.7
	Chlorides (mg/L)	7		2.3	17.8	8.1	9.4	5.7
	Biological							
	Chlorophyll a (mg/m³)	7		7.48	30.70	18.20	19.25	7.32
	E. coli (MPN/DL)[J]	4		6	35	26	23	12

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-6	**Physical**							
	Turbidity (NTU)	7		8.6	34.7	23.5	20.7	9.8
	Total Dissolved Solids (mg/L)	7		131.0	164.0	143.0	147.7	13.8
	Total Suspended Solids (mg/L)	7		7.0	24.0	18.0	16.0	6.4
	Hardness (mg/L)	4		101.0	133.0	118.5	117.8	13.8
	Alkalinity (mg/L)[J]	7		110.0	143.0	131.0	129.7	11.4
	Photic Zone (m)	7		1.00	1.60	1.50	1.46	0.22
	Secchi (m)	7		0.31	1.00	0.51	0.54	0.26
	Bottom Depth (m)	7		1.0	1.6	1.5	1.5	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.030	0.004	0.007	0.005
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.782	0.040	0.247	0.316
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.050	1.540	0.500	0.559	0.476
	Total Nitrogen (mg/L)[J]	7	<	1.014	4.740	0.635	0.806	0.482
	Dis Reactive Phosphorus (mg/L)	7		0.102	0.281	0.182	0.180	0.076
	Total Phosphorus (mg/L)	7		0.136	0.362	0.228	0.236	0.086
	CBOD-5 (mg/L)	7	<	2.0	5.6	2.1	2.4	1.7
	Chlorides (mg/L)	7		5.1	15.6	7.9	8.8	3.8
	Biological							
	Chlorophyll a (mg/m³)	7		2.67	41.80	17.40	22.70	14.48
	E. coli (MPN/DL)[J]	4		5	32	15	17	13
NEES-7	**Physical**							
	Turbidity (NTU)	7		11.6	28.0	18.9	20.8	6.7
	Total Dissolved Solids (mg/L)[J]	7		76.0	164.0	128.0	123.4	27.7
	Total Suspended Solids (mg/L)	7		9.0	31.0	19.0	19.6	6.6
	Hardness (mg/L)	4		75.3	110.0	92.4	92.5	15.8
	Alkalinity (mg/L)[J]	7		67.4	121.0	110.0	100.2	20.2
	Photic Zone (m)	7		0.70	1.00	0.90	0.91	0.11
	Secchi (m)	7		0.32	0.60	0.41	0.43	0.10
	Bottom Depth (m)	7		0.7	1.0	0.9	0.9	0.1
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.047	0.004	0.013	0.016
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.004	0.002	0.002	0.001
	Total Kjeldahl Nitrogen (mg/L)	7		0.606	1.420	0.780	0.931	0.319
	Total Nitrogen (mg/L)[J]	7	<	1.821	4.263	0.782	0.933	0.320
	Dis Reactive Phosphorus (mg/L)[J]	7		0.004	0.101	0.008	0.034	0.045
	Total Phosphorus (mg/L)	7		0.044	0.188	0.058	0.089	0.060
	CBOD-5 (mg/L)	7		2.2	4.5	4.1	3.7	0.8
	Chlorides (mg/L)	7		3.2	16.0	6.6	8.1	4.4
	Biological							
	Chlorophyll a (mg/m³)	7		10.70	41.40	34.70	29.91	11.70
	E. coli (MPN/DL)[J]	4		1	40	3	12	19

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-8	**Physical**							
	Turbidity (NTU)	7		5.1	13.2	9.8	9.6	3.0
	Total Dissolved Solids (mg/L)	7		68.0	158.0	103.0	109.1	31.2
	Total Suspended Solids (mg/L)	7		3.0	11.0	7.0	8.0	2.9
	Hardness (mg/L)	4		74.6	89.2	80.4	81.2	6.1
	Alkalinity (mg/L)	7		72.0	97.6	86.6	85.9	8.6
	Photic Zone (m)	7		2.17	3.82	2.87	2.86	0.58
	Secchi (m)	7		0.52	1.27	0.79	0.80	0.26
	Bottom Depth (m)	7		5.2	6.5	6.3	6.2	0.5
	Chemical							
	Ammonia Nitrogen (mg/L)[J]	7	<	0.007	0.040	0.015	0.014	0.013
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.004	0.002	0.002	0.000
	Total Kjeldahl Nitrogen (mg/L)	7		0.320	0.863	0.670	0.639	0.220
	Total Nitrogen (mg/L)[J]	7	<	0.966	2.592	0.672	0.641	0.220
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.003	0.005	0.003	0.003	0.001
	Total Phosphorus (mg/L)	7		0.030	0.064	0.036	0.039	0.011
	CBOD-5 (mg/L)	7	<	2.0	2.7	2.2	2.1	0.6
	Chlorides (mg/L)	7		2.9	16.9	6.7	7.9	4.9
	Biological							
	Chlorophyll a (mg/m³)	7		11.20	40.60	29.00	26.40	10.17
	E. coli (MPN/DL)[J]	4		1	1	1	1	0
NEES-9	**Physical**							
	Turbidity (NTU)	7		9.1	19.4	10.3	12.0	3.7
	Total Dissolved Solids (mg/L)	7		81.0	142.0	112.0	110.3	25.1
	Total Suspended Solids (mg/L)	7		6.0	16.0	11.0	10.7	3.4
	Hardness (mg/L)	4		68.2	87.9	74.8	76.4	8.3
	Alkalinity (mg/L)	7		67.0	97.4	79.6	80.3	10.7
	Photic Zone (m)	7		1.69	2.94	2.38	2.36	0.40
	Secchi (m)	7		0.53	0.92	0.73	0.72	0.15
	Bottom Depth (m)	7		3.5	4.0	3.8	3.8	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.030	0.004	0.007	0.005
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.002	0.016	0.001	0.003	0.006
	Total Kjeldahl Nitrogen (mg/L)	7		0.312	1.190	0.848	0.796	0.324
	Total Nitrogen (mg/L)[J]	7	<	0.942	3.573	0.849	0.799	0.322
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.002	0.005	0.003	0.003	0.001
	Total Phosphorus (mg/L)	7		0.022	0.058	0.038	0.040	0.013
	CBOD-5 (mg/L)	7	<	2.0	2.7	2.0	1.7	0.7
	Chlorides (mg/L)	7		4.1	17.3	8.2	9.1	4.8
	Biological							
	Chlorophyll a (mg/m³)	7		20.30	36.30	22.40	26.20	6.70
	E. coli (MPN/DL)[J]	4		1	1	1	1	0

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-10	**Physical**							
	Turbidity (NTU)	7		5.9	10.1	8.2	8.2	1.4
	Total Dissolved Solids (mg/L)	7		41.0	150.0	119.0	106.1	35.2
	Total Suspended Solids (mg/L)	7		6.0	10.0	7.0	7.4	1.5
	Hardness (mg/L)	4		76.2	88.9	81.2	81.8	5.4
	Alkalinity (mg/L)	7		77.3	100.0	86.1	87.7	7.9
	Photic Zone (m)	7		2.23	3.80	2.71	2.84	0.53
	Secchi (m)	7		0.60	1.18	0.71	0.85	0.23
	Bottom Depth (m)	7		3.5	3.8	3.7	3.7	0.1
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.007	0.030	0.004	0.007	0.005
	Nitrate+Nitrite Nitrogen (mg/L)	7	<	0.002	0.004	0.001	0.001	0.000
	Total Kjeldahl Nitrogen (mg/L)	7		0.310	0.883	0.530	0.614	0.239
	Total Nitrogen (mg/L)	7	<	0.936	2.652	0.532	0.615	0.239
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.002	0.004	0.002	0.002	0.001
	Total Phosphorus (mg/L)	7		0.022	0.038	0.025	0.029	0.007
	CBOD-5 (mg/L)	7	<	2.0	2.8	2.2	1.8	0.8
	Chlorides (mg/L)	7		3.7	16.1	7.4	8.4	4.6
	Biological							
	Chlorophyll a (mg/m³)	7		12.80	32.00	19.20	20.73	6.38
	E. coli (MPN/DL)[J]	4		1	1	1	1	0

J=one or more of the values provided are estimated; < = Actual value is less than the detection limit.

Appendix Table 2. Summary of Neely Henry Reservoir water quality data collected April-October, 2019. Minimum (min) and maximum (max) values calculated using minimum detection limits when results were less than this value. Median (med), mean, and standard deviation (SD) values were calculated by multiplying the MDL by 0.5 when results were less than this value.

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-1	**Physical**							
	Turbidity (NTU)	7		6.1	14.0	11.0	10.2	3.3
	Total Dissolved Solids (mg/L)[J]	7	<	1.0	103.0	94.0	76.9	36.7
	Total Suspended Solids (mg/L)	7		4.0	13.0	11.0	9.1	3.7
	Hardness (mg/L)	4		61.7	71.6	70.0	68.3	4.6
	Alkalinity (mg/L)	7		51.8	71.5	64.4	62.4	7.7
	Photic Zone (m)	7		1.92	3.43	2.46	2.59	0.64
	Secchi (m)	7		0.71	1.17	0.93	0.91	0.17
	Bottom Depth (m)	7		10.2	20.3	14.1	14.6	4.5
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	0.252	0.020	0.059	0.089
	Total Kjeldahl Nitrogen (mg/L)	7		0.401	0.685	0.426	0.483	0.113
	Total Nitrogen (mg/L)[J]	7	<	1.282	2.067	0.481	0.542	0.115
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.006	0.002	0.003	0.001
	Total Phosphorus (mg/L)	7		0.021	0.049	0.031	0.032	0.009
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.7	9.0	6.3	6.2	2.1
	Biological							
	Chlorophyll a (mg/m³)	7		2.14	29.90	20.50	18.04	10.00
	E. coli (MPN/DL)[J]	4	<	1	13	1	4	6
NEES-2B	**Physical**							
	Turbidity (NTU)	6		7.9	12.7	8.8	9.6	1.8
	Total Dissolved Solids (mg/L)	7		46.0	106.0	78.0	73.4	20.5
	Total Suspended Solids (mg/L)	7		6.0	13.0	10.0	10.0	2.6
	Hardness (mg/L)	4		61.8	68.6	67.6	66.4	3.2
	Alkalinity (mg/L)	7		48.0	65.9	60.7	57.9	7.3
	Photic Zone (m)	6		2.37	2.96	2.75	2.69	0.25
	Secchi (m)	6		0.64	0.93	0.88	0.85	0.11
	Bottom Depth (m)	6		7.8	9.8	8.8	8.8	0.7
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7		0.015	0.252	0.057	0.090	0.089
	Total Kjeldahl Nitrogen (mg/L)[J]	7	<	0.139	0.697	0.255	0.334	0.247
	Total Nitrogen (mg/L)[J]	7	<	0.360	2.847	0.312	0.424	0.281
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.008	0.002	0.004	0.002
	Total Phosphorus (mg/L)	7		0.022	0.046	0.033	0.034	0.008
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.6	9.8	7.1	6.5	2.2
	Biological							
	Chlorophyll a (mg/m³)	7		4.45	75.80	17.10	23.07	24.25
	E. coli (MPN/DL)[J]	4	<	1	6	4	4	2

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-3	**Physical**							
	Turbidity (NTU)	6		2.6	15.1	10.4	10.4	4.4
	Total Dissolved Solids (mg/L)	7		51.0	102.0	78.0	79.0	19.8
	Total Suspended Solids (mg/L)	7		8.0	15.0	10.0	10.1	2.4
	Hardness (mg/L)	4		63.0	72.0	69.9	68.7	4.0
	Alkalinity (mg/L)	7		54.4	72.6	62.9	62.4	6.8
	Photic Zone (m)	6		2.03	2.82	2.50	2.44	0.30
	Secchi (m)	6		0.65	0.97	0.84	0.83	0.11
	Bottom Depth (m)	6		10.6	13.7	12.3	12.1	1.1
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.039	0.008	0.010	0.013
	Nitrate+Nitrite Nitrogen (mg/L)	7		0.040	0.283	0.096	0.132	0.094
	Total Kjeldahl Nitrogen (mg/L)	7		0.178	0.650	0.479	0.477	0.160
	Total Nitrogen (mg/L)	7		1.275	2.763	0.575	0.609	0.171
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.009	0.002	0.004	0.003
	Total Phosphorus (mg/L)	7		0.033	0.057	0.038	0.039	0.008
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.8	9.8	7.0	6.6	2.2
	Biological							
	Chlorophyll a (mg/m³)	7		10.70	33.10	15.00	19.59	8.36
	E. coli (MPN/DL)	4		1	6	3	3	2
NEES-5	**Physical**							
	Turbidity (NTU)	7		7.1	19.6	12.7	13.0	3.9
	Total Dissolved Solids (mg/L)	7		80.0	128.0	92.0	96.4	15.5
	Total Suspended Solids (mg/L)	7		9.0	27.0	10.0	12.7	6.4
	Hardness (mg/L)	4		61.8	67.4	67.0	65.8	2.7
	Alkalinity (mg/L)	7		50.6	62.6	60.0	58.4	4.7
	Photic Zone (m)	7		0.84	1.66	1.28	1.25	0.28
	Secchi (m)	7		0.64	1.07	0.88	0.86	0.14
	Bottom Depth (m)	7		0.8	3.2	1.3	1.5	0.8
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.060	0.044	0.032	0.027
	Nitrate+Nitrite Nitrogen (mg/L)	7	<	0.008	0.207	0.014	0.050	0.073
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	1.540	0.736	0.657	0.486
	Total Nitrogen (mg/L)	7	<	0.124	4.659	0.822	0.708	0.495
	Dis Reactive Phosphorus (mg/L)	7	<	0.006	0.018	0.003	0.006	0.006
	Total Phosphorus (mg/L)	7		0.025	0.370	0.037	0.083	0.127
	CBOD-5 (mg/L)	7	<	2.0	3.9	1.0	1.4	1.1
	Chlorides (mg/L)	7		2.2	9.8	4.9	5.3	2.4
	Biological							
	Chlorophyll a (mg/m³)	7		9.08	45.40	12.80	17.61	12.67
	E. coli (MPN/DL)	4		11	64	37	38	24

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-6	**Physical**							
	Turbidity (NTU)	6		15.0	19.9	19.6	18.3	2.2
	Total Dissolved Solids (mg/L)[J]	7		50.0	167.0	127.0	120.1	39.3
	Total Suspended Solids (mg/L)[J]	7		11.0	18.0	17.0	15.9	3.0
	Hardness (mg/L)	4		119.0	143.0	130.5	130.8	9.9
	Alkalinity (mg/L)	7		105.0	138.0	123.0	121.7	11.9
	Photic Zone (m)	6		1.20	1.74	1.50	1.48	0.21
	Secchi (m)	6		0.37	0.72	0.58	0.56	0.12
	Bottom Depth (m)	6		1.2	1.7	1.5	1.5	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)	7	<	0.003	0.622	0.401	0.334	0.203
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	0.646	0.514	0.437	0.211
	Total Nitrogen (mg/L)	7	<	1.322	3.198	0.863	0.771	0.275
	Dis Reactive Phosphorus (mg/L)	7		0.050	0.362	0.204	0.185	0.120
	Total Phosphorus (mg/L)	7		0.081	0.408	0.261	0.235	0.129
	CBOD-5 (mg/L)[J]	7	<	2.0	3.1	1.0	1.5	0.8
	Chlorides (mg/L)	7		3.2	12.3	6.6	7.0	3.4
	Biological							
	Chlorophyll a (mg/m³)	7		2.14	40.90	9.34	18.04	16.65
	E. coli (MPN/DL)	4		2	91	9	28	42
NEES-7	**Physical**							
	Turbidity (NTU)	6		9.2	27.1	18.2	19.2	7.0
	Total Dissolved Solids (mg/L)	7		21.0	146.0	109.0	94.9	44.0
	Total Suspended Solids (mg/L)[J]	7		5.0	27.0	19.0	18.7	7.1
	Hardness (mg/L)	4		94.9	113.0	101.0	102.5	8.2
	Alkalinity (mg/L)	7		23.6	106.0	92.0	84.9	27.9
	Photic Zone (m)	6		0.69	1.48	1.25	1.12	0.32
	Secchi (m)	6		0.46	1.00	0.54	0.60	0.20
	Bottom Depth (m)	6		0.7	1.5	1.3	1.2	0.3
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	0.112	0.002	0.022	0.040
	Total Kjeldahl Nitrogen (mg/L)	7	<	0.075	1.070	0.783	0.672	0.380
	Total Nitrogen (mg/L)[J]	7	<	0.158	3.214	0.784	0.694	0.371
	Dis Reactive Phosphorus (mg/L)	7	<	0.005	0.063	0.023	0.024	0.025
	Total Phosphorus (mg/L)	7		0.024	0.128	0.075	0.077	0.040
	CBOD-5 (mg/L)[J]	7	<	2.0	2.7	2.2	2.1	0.6
	Chlorides (mg/L)	7		2.4	9.6	4.9	5.7	2.7
	Biological							
	Chlorophyll a (mg/m³)	7		1.78	42.70	34.70	22.73	18.73
	E. coli (MPN/DL)	4		2	38	4	12	18

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-8	**Physical**							
	Turbidity (NTU)	6		6.5	14.5	12.2	11.3	3.1
	Total Dissolved Solids (mg/L)	7		29.0	105.0	94.0	82.1	27.8
	Total Suspended Solids (mg/L)	7		7.0	14.0	8.0	9.6	2.6
	Hardness (mg/L)	4		73.7	75.5	74.2	74.4	0.8
	Alkalinity (mg/L)[J]	7		53.6	77.6	70.3	67.6	7.8
	Photic Zone (m)	6		1.87	3.07	2.42	2.42	0.43
	Secchi (m)	6		0.51	0.91	0.76	0.76	0.14
	Bottom Depth (m)	6		5.9	6.4	6.1	6.1	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	0.079	0.004	0.017	0.028
	Total Kjeldahl Nitrogen (mg/L)	7		0.283	1.840	0.618	0.738	0.520
	Total Nitrogen (mg/L)[J]	7	<	0.861	5.757	0.622	0.755	0.547
	Dis Reactive Phosphorus (mg/L)[J]	7	<	0.005	0.008	0.002	0.003	0.002
	Total Phosphorus (mg/L)	7		0.023	0.049	0.032	0.034	0.009
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.2	0.4
	Chlorides (mg/L)	7		2.0	8.2	5.4	5.3	2.4
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	32.00	21.40	16.09	11.54
	E. coli (MPN/DL)[J]	4	<	1	33	1	9	16
NEES-9	**Physical**							
	Turbidity (NTU)	7		10.5	18.3	13.1	13.8	2.7
	Total Dissolved Solids (mg/L)	7		47.0	109.0	90.0	80.7	21.1
	Total Suspended Solids (mg/L)	7		8.0	17.0	11.0	11.7	3.4
	Hardness (mg/L)	4		63.1	71.6	69.8	68.6	3.8
	Alkalinity (mg/L)[J]	7		55.7	73.5	64.0	63.8	6.0
	Photic Zone (m)	7		1.81	2.59	2.04	2.18	0.32
	Secchi (m)	7		0.61	1.10	0.76	0.80	0.15
	Bottom Depth (m)	7		3.0	3.9	3.7	3.6	0.3
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	0.127	0.008	0.033	0.049
	Total Kjeldahl Nitrogen (mg/L)	7		0.211	0.757	0.497	0.507	0.182
	Total Nitrogen (mg/L)[J]	7	<	0.861	2.276	0.498	0.541	0.175
	Dis Reactive Phosphorus (mg/L)	7	<	0.005	0.005	0.002	0.002	0.000
	Total Phosphorus (mg/L)	7		0.025	0.045	0.033	0.034	0.007
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.2	0.4
	Chlorides (mg/L)	7		3.2	9.3	6.2	6.1	2.3
	Biological							
	Chlorophyll a (mg/m³)	7	<	1.00	33.10	9.61	16.10	12.23
	E. coli (MPN/DL)	4	<	1	41	2	11	20

Station	Parameter	N		Min	Max	Med	Avg	SD
NEES-10	**Physical**							
	Turbidity (NTU)	6		7.4	12.5	9.3	9.4	1.9
	Total Dissolved Solids (mg/L)[J]	7		36.0	111.0	95.0	85.9	25.4
	Total Suspended Solids (mg/L)[J]	7		7.0	13.0	9.0	9.4	2.0
	Hardness (mg/L)	4		72.0	77.7	76.8	75.8	2.6
	Alkalinity (mg/L)	7		61.5	76.3	73.6	71.9	5.1
	Photic Zone (m)	6		2.16	3.04	2.56	2.55	0.32
	Secchi (m)	6		0.69	1.00	0.92	0.88	0.12
	Bottom Depth (m)	6		3.4	3.8	3.6	3.6	0.2
	Chemical							
	Ammonia Nitrogen (mg/L)	7	<	0.004	0.016	0.008	0.005	0.003
	Nitrate+Nitrite Nitrogen (mg/L)[J]	7	<	0.003	0.141	0.003	0.023	0.052
	Total Kjeldahl Nitrogen (mg/L)[J]	7		0.222	0.685	0.461	0.481	0.159
	Total Nitrogen (mg/L)[J]	7	<	0.670	2.076	0.528	0.503	0.166
	Dis Reactive Phosphorus (mg/L)	7	<	0.005	0.005	0.002	0.002	0.000
	Total Phosphorus (mg/L)	7		0.022	0.041	0.030	0.030	0.006
	CBOD-5 (mg/L)[J]	7	<	2.0	2.0	1.0	1.0	0.0
	Chlorides (mg/L)	7		3.1	8.7	5.7	5.6	2.2
	Biological							
	Chlorophyll a (mg/m³)	7		7.48	28.80	16.00	18.45	7.96
	E. coli (MPN/DL)[J]	4	<	1	54	2	15	26

J=one or more of the values provided are estimated; < = Actual value is less than the detection limit.