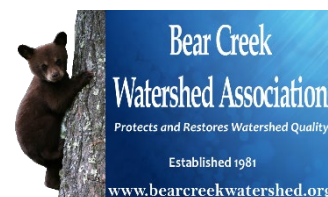


Technical Memorandum BCWA



Date: February 5, 2020
To: Bear Creek Watershed Association
From: Russell N. Clayshulte, Manager
Re: BCWA TM 2019.04 BCR 2019 Summary

Table 1	BCR Summary Statistics.....	1
Table 2	2019 Summary Compared to Long-Term Trends.....	2
Figure 1	Total Nitrogen BCR.....	3
Figure 2	Total Phosphorus BCR.....	3
Figure 3	Total Phosphorus Distribution within Water Column	3
Figure 4	BCR Temperature	4
Figure 5	BCR Specific Conductance.....	4
Figure 6	BCR pH.....	4
Figure 7	BCR Dissolved Oxygen.....	5
Figure 8	BCR Temperature Compliance.....	5
Figure 9	BCR Dissolved Oxygen Compliance.....	5
Figure 10	BCR Total Phosphorus.....	6
Figure 11	BCR Total Nitrogen	6
Figure 12	BCR Chlorophyll-a.....	6
Figure 13	BCR Secchi Depth.....	7
Figure 14	BCR Walker TSI	7
Figure 15	BCR Total Phosphorus Pounds	7
Figure 16	BCR Total Nitrogen Load	8
Figure 17	BCR Estimated Inflow	8

Table 1 BCR Summary Statistics

Bear Creek Reservoir 2019 - Summary Statistics *Reservoir Growing Season July to September*

Reservoir Monitoring Parameters	Reservoir
Chlorophyll (Site 40)	
Average Growing Season Chlorophyll-a [ug/l (-1m)]	13.9
Average Annual Chlorophyll-a [ug/l (-1m)]	14.8
Peak Chlorophyll-a [ug/l]	31.0
Total Phosphorus	
Average Annual Total Phosphorus [ug/l]: Water Column	65.1
Average Annual Total Phosphorus [ug/l] -1m	38.7
Average Annual Total Phosphorus [ug/l] -10m	91.5
Growing Season Total Phosphorus [ug/l]: Water Column	89.6
Growing Season Total Phosphorus [ug/l]: -1m	33.8
Growing Season Total Phosphorus [ug/l]: -10m	145.3
Peak Annual Total Phosphorus [ug/l] Water Column	543.0
Total Nitrogen	
Average Annual Total Nitrogen [ug/l]: Water Column	726
Average Total Nitrogen [ug/l]: -1m	733

Average Total Nitrogen [ug/l]: -10m	719
Growing Season Total Nitrogen [ug/l]: Water Column	467
Growing Season Total Nitrogen [ug/l]: -1m	507
Growing Season Total Nitrogen [ug/l]: -10m	428
Clarity (All Profiles)	
Average Annual Secchi Depth (meters)	1.44
Growing Season Average Secchi Depth (meters)	1.37
Dissolved Oxygen (site 40 Profile)	
Annual Average at -1/2m - 2m [mg/l]	10.65
Seasonal Average at -1/2 - 2m [mg/l]	7.78
Seasonal Minimum at -1/2 - 2m [mg/l]	6.67
pH	
Annual Average at -1/2m - 2m [mg/l]	8.26
Seasonal Average at -1/2 - 2m [mg/l]	8.73
Seasonal Maximum at -1/2 - 2m [mg/l]	8.47
Specific Conductance	
Annual Average at -1/2m - 2m [uS/cm]	884.5
Seasonal Average at -1/2 - 2m [us/cm]	887.5
Seasonal Minimum at -1/2 - 2m [us/cm]	230.1
Phytoplankton Species	
Phytoplankton Species with >100,000 Biovolume um³/mL - Site 40 (July- October 2019)	Anabaena flos-aquae
	Aphanizomenon flos-aquae
	Microcystis aeruginosa
	Cryptomonas erosa
	Achnanthes deflexa
	Asterionella formosa
	Cymbella mexicana
	Fragilaria crotonensis
	Melosira ambigua
	Melosira granulata
	Synedra ulna
	Trachelomonas scabra
Peak Phytoplankton	
Microcystis aeruginosa	Density cells/ml = 38,843
Fragilaria crotonensis	Peak Biovolume (um ³ /mL) = 2,280,056
Loading - Annual Pounds	
Total Nitrogen -Total Load In to BCR	32,236
Total Nitrogen -Total Load From BCR	26,728
Total Nitrogen -Total Deposition into BCR	5,508
Total Phosphorus -Total Load In to BCR	2,052
Total Phosphorus -Total Load From BCR	1,262
Total Phosphorus -Total Deposition into BCR	789

Table 2 2019 Summary Compared to Long-Term Trends

Parameter		2019	91-2019 Mean	91-2019 Median
Chlorophyll-a (ug/L)	Top	15	14	13
Total Nitrogen ug/l	Top	902	760	753
	Bottom	841	769	762
	Water Column	872	739	761
Total Phosphorus (ug/L)	Top	39	57	39

	Bottom	92	83	60
	Water Column	65	68	50
Secchi Depth (m)	Top	1.4	2.1	2.1

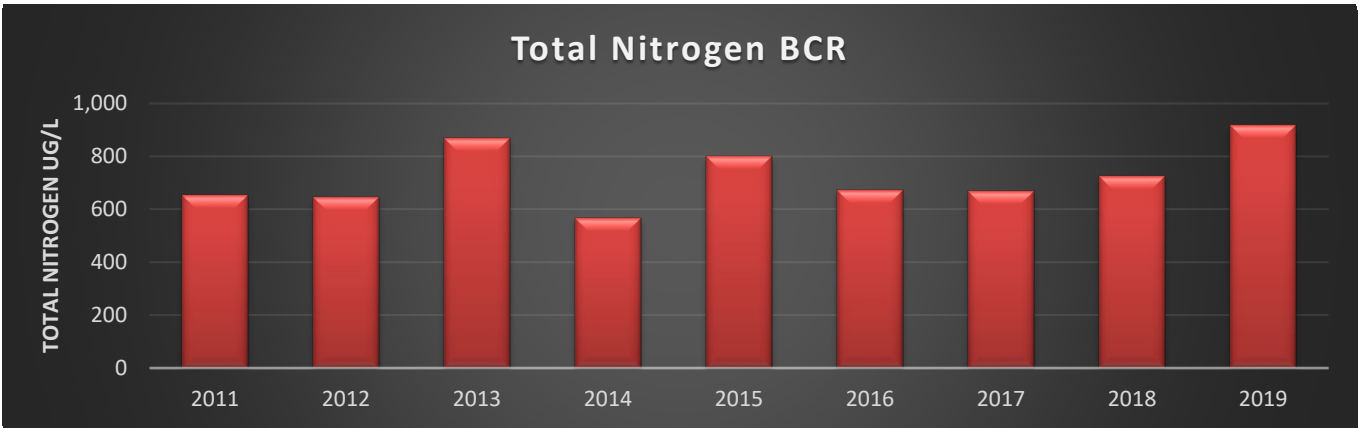


Figure 1 Total Nitrogen BCR

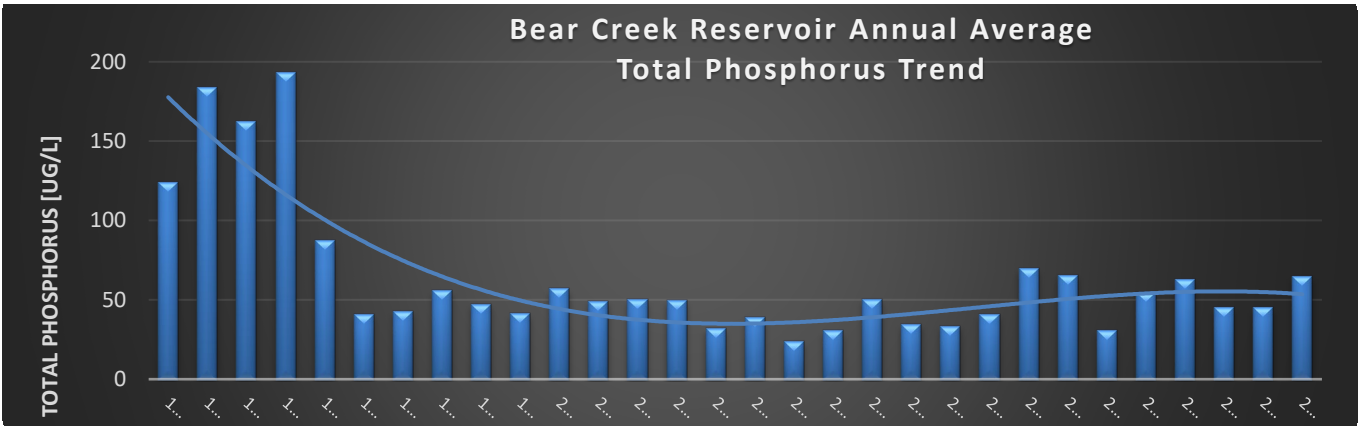


Figure 2 Total Phosphorus BCR

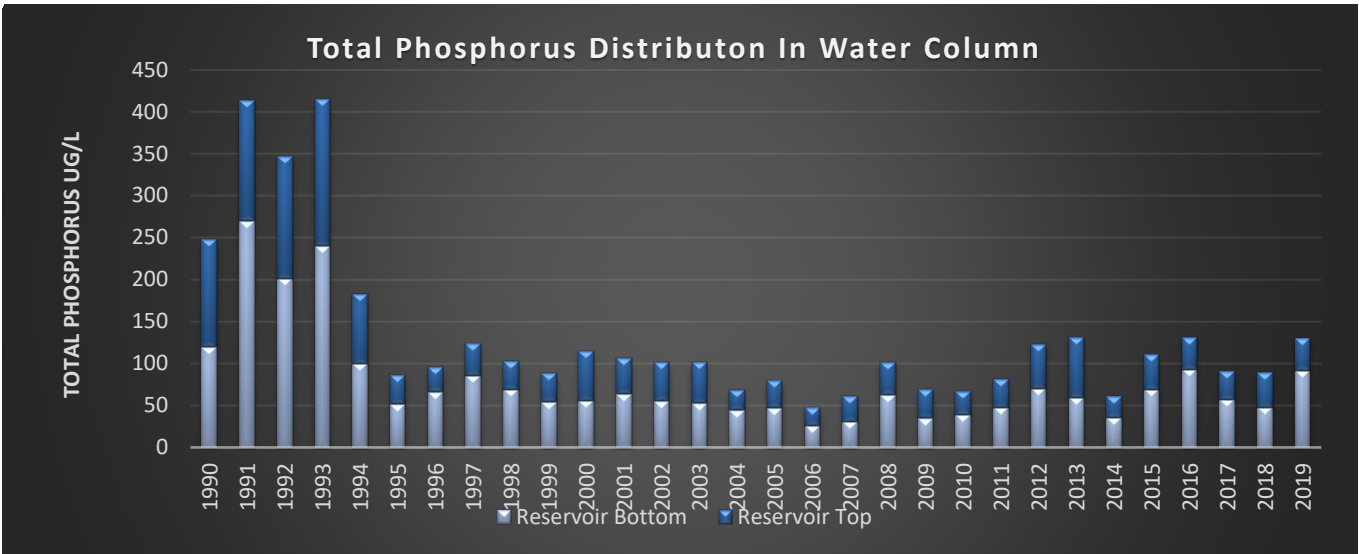


Figure 3 Total Phosphorus Distribution within Water Column

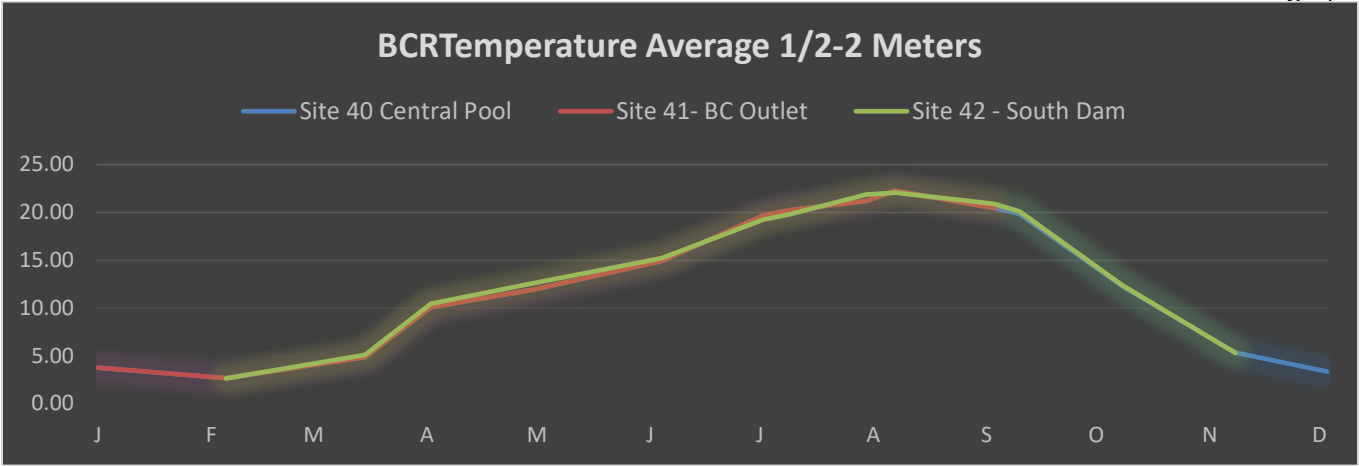


Figure 4 BCR Temperature

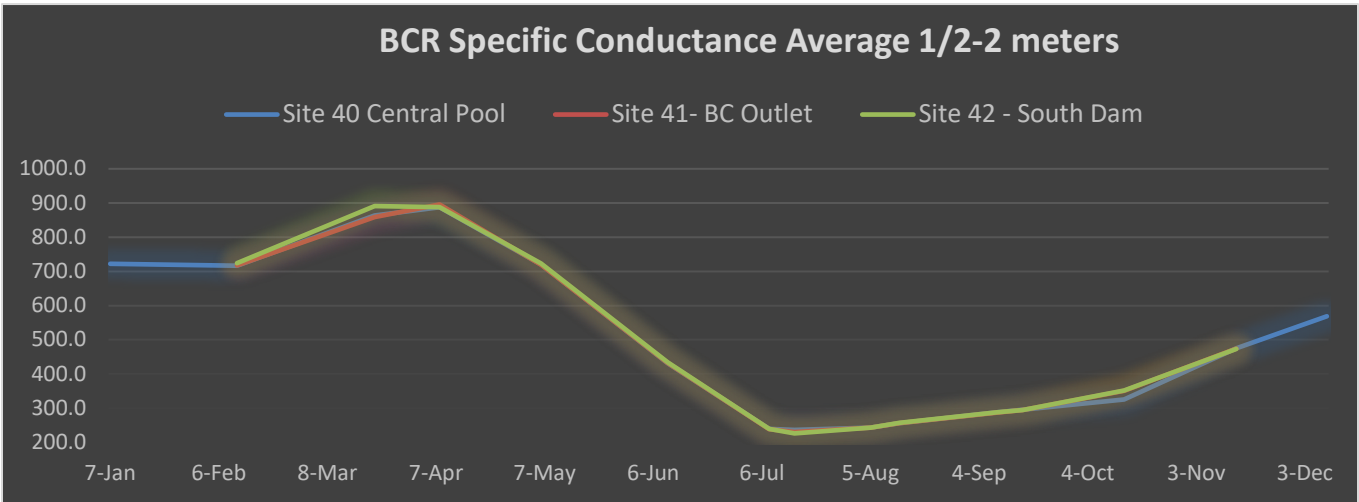


Figure 5 BCR Specific Conductance

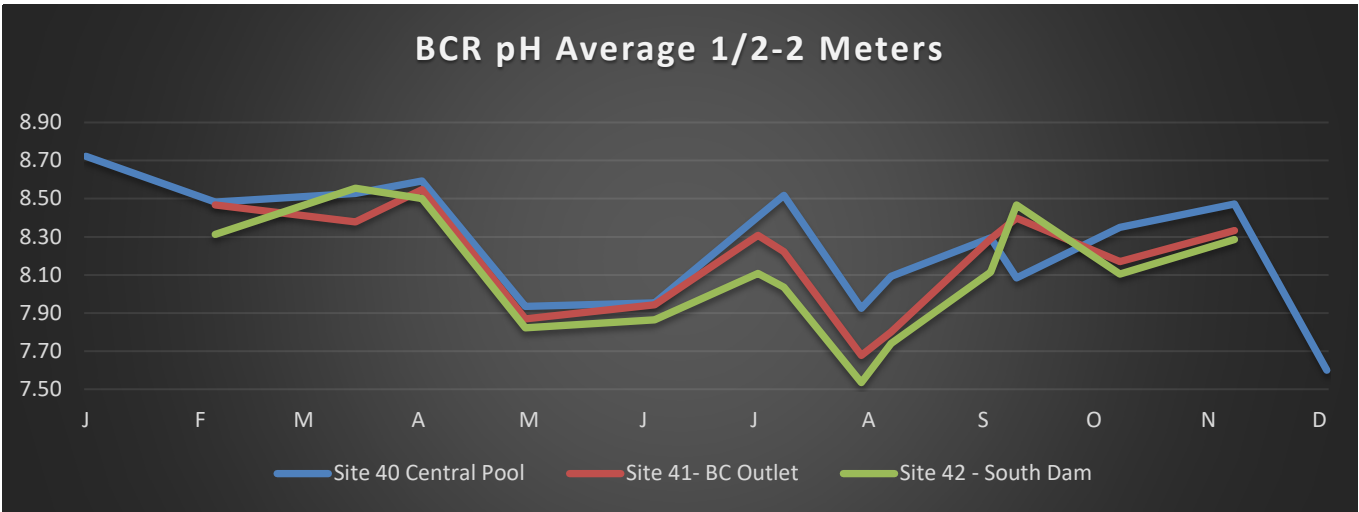


Figure 6 BCR pH

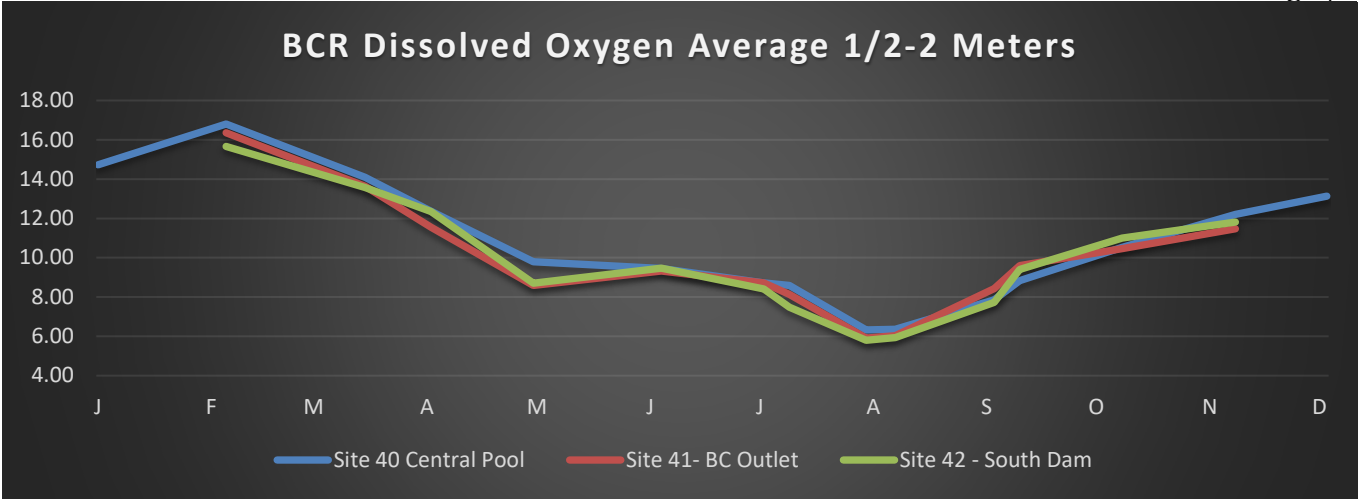


Figure 7 BCR Dissolved Oxygen

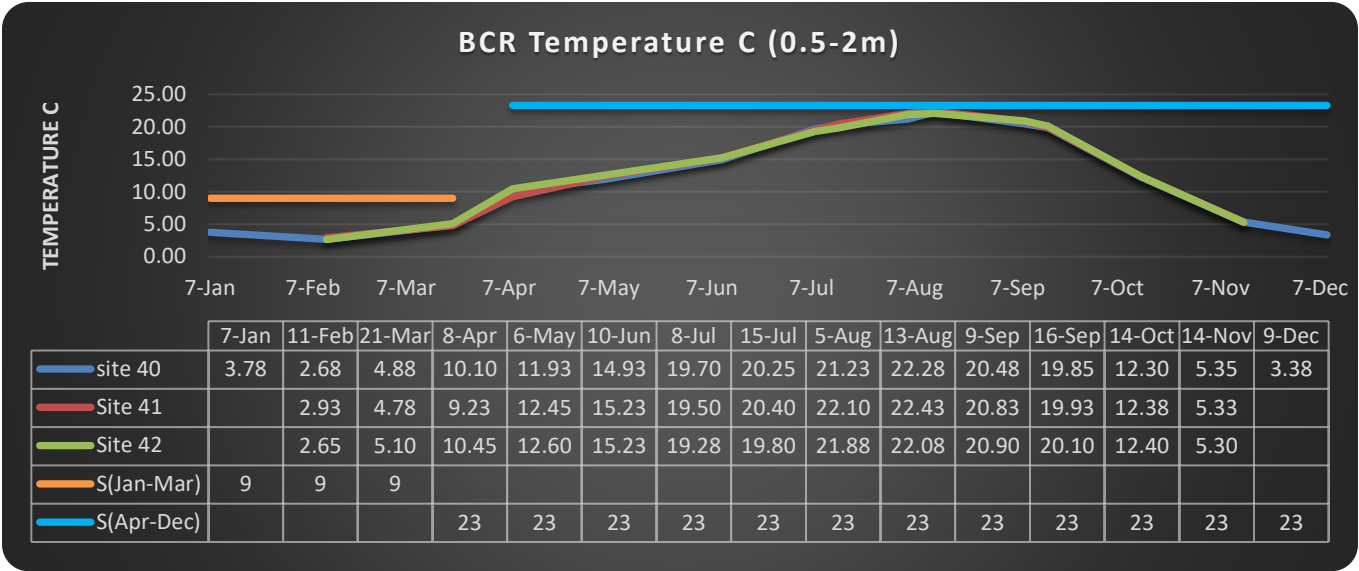


Figure 8 BCR Temperature Compliance

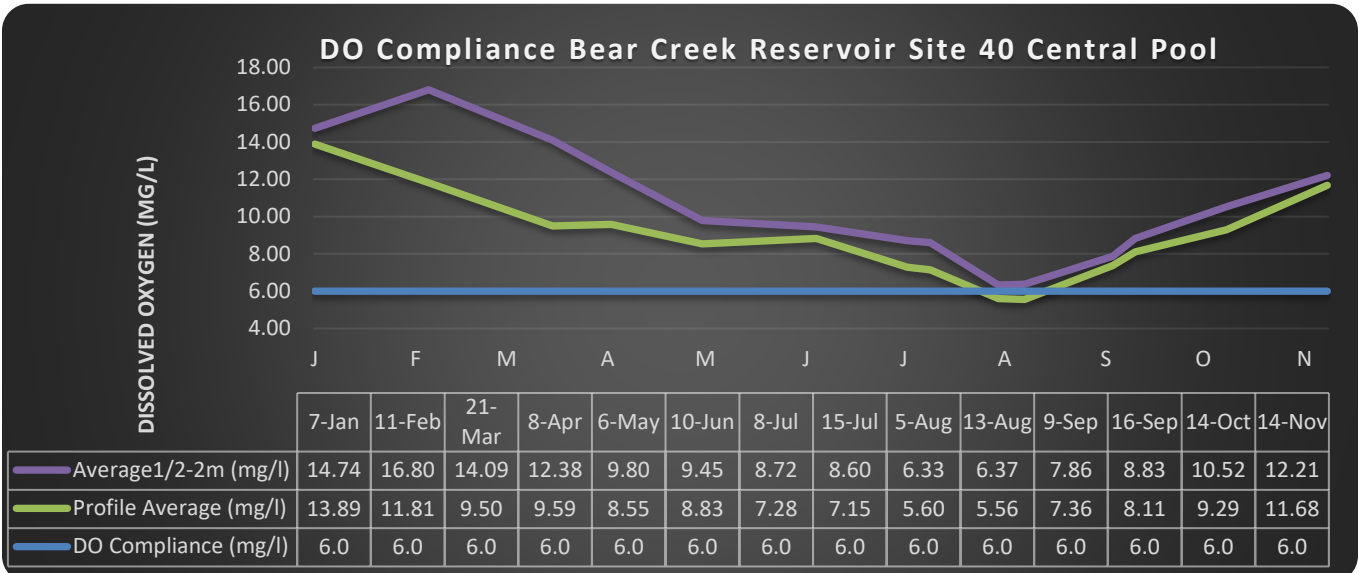


Figure 9 BCR Dissolved Oxygen Compliance

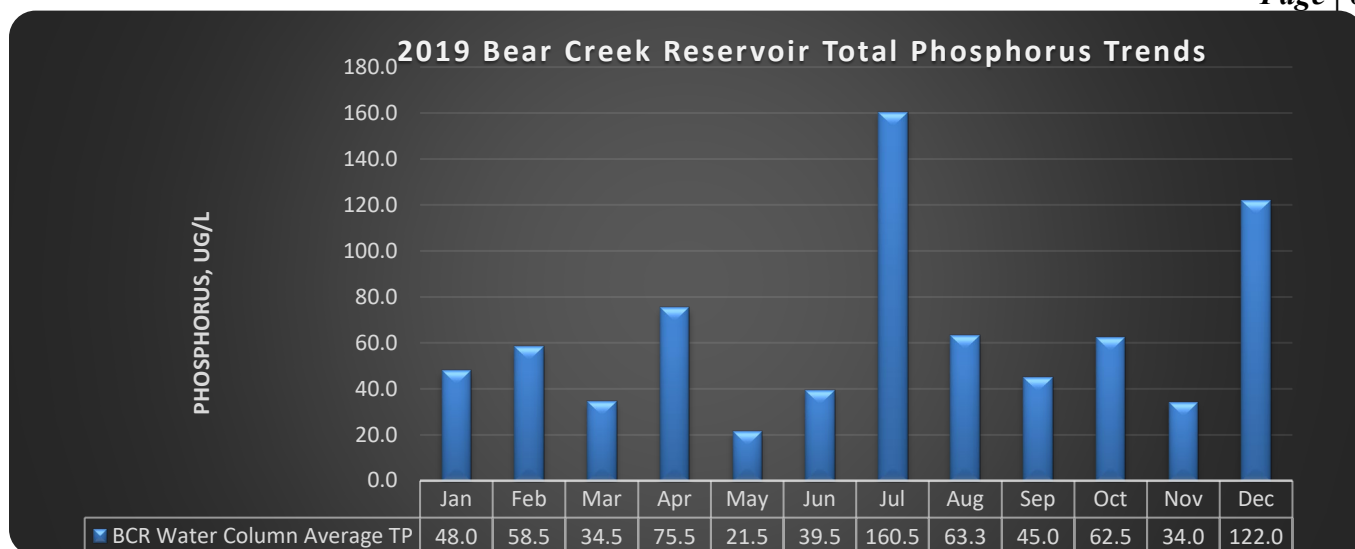


Figure 10 BCR Total Phosphorus

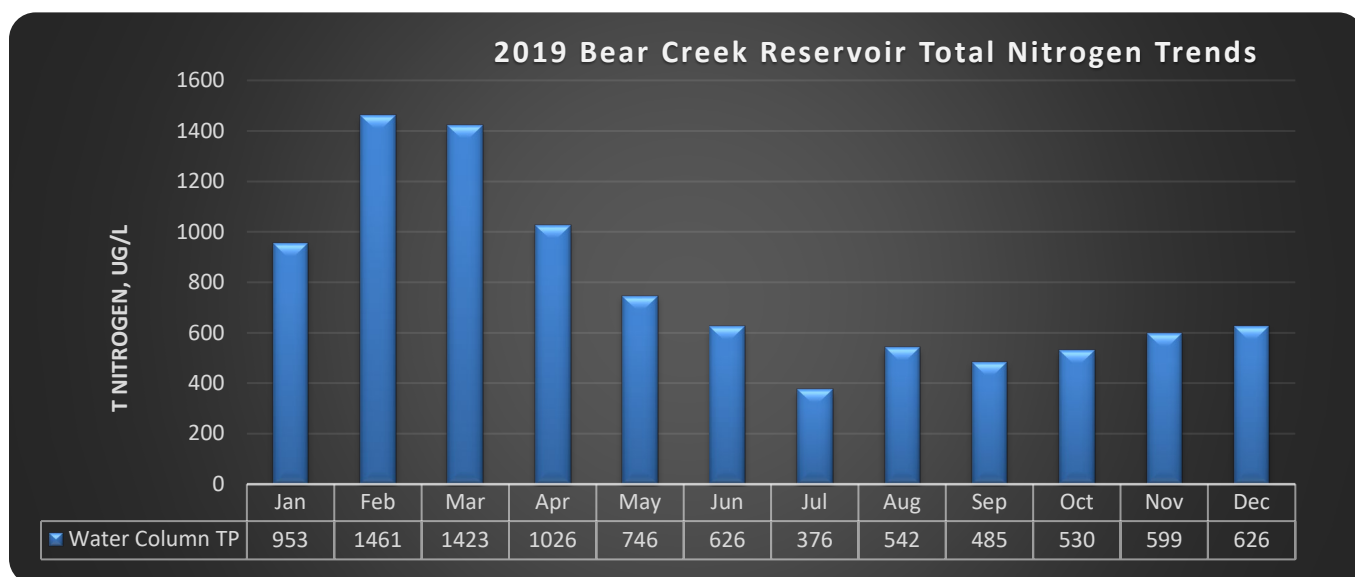


Figure 11 BCR Total Nitrogen

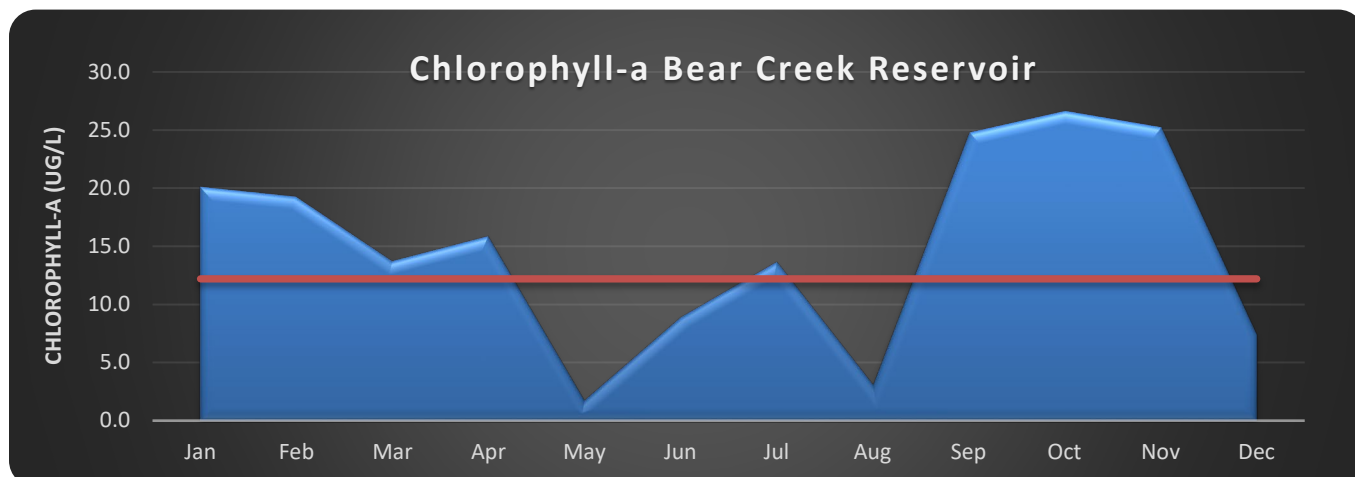


Figure 12 BCR Chlorophyll-a

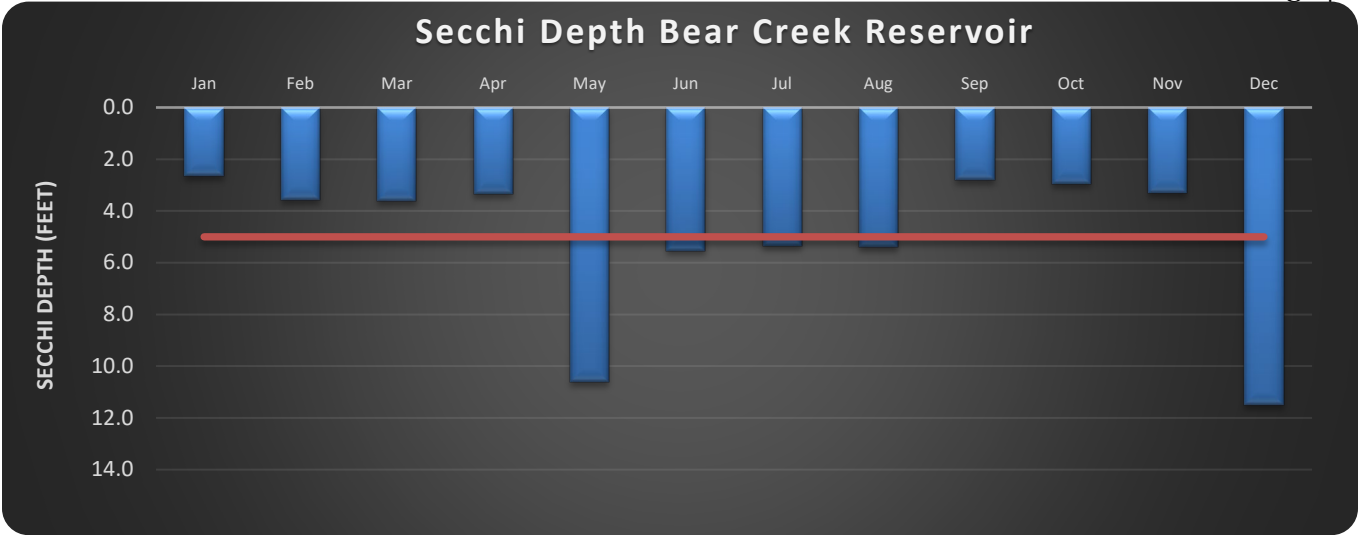


Figure 13 BCR Secchi Depth

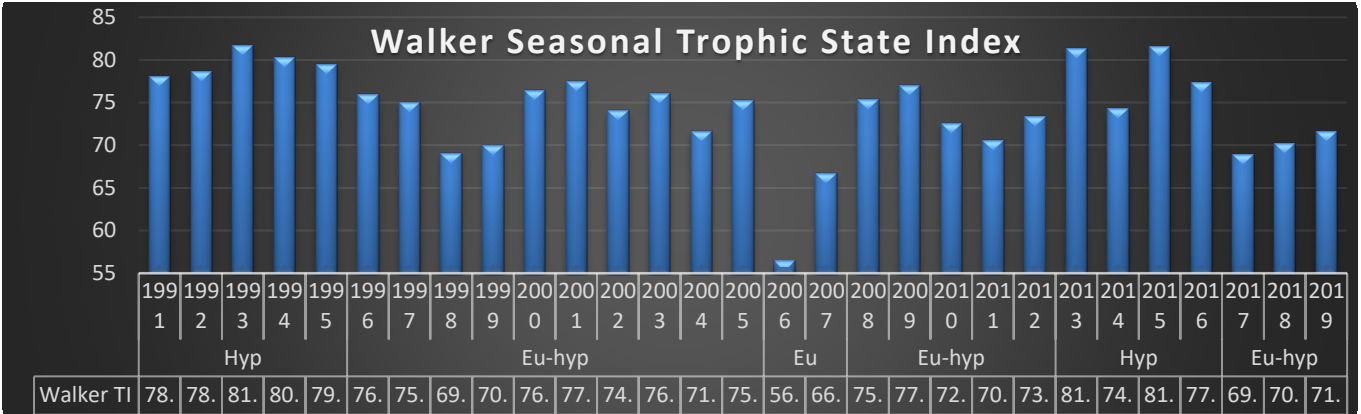


Figure 14 BCR Walker TSI

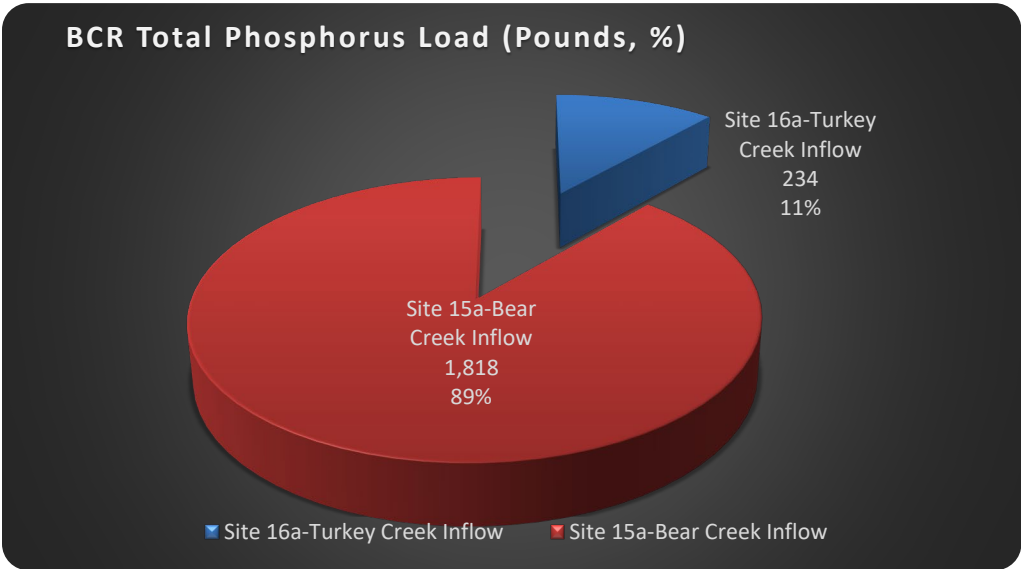


Figure 15 BCR Total Phosphorus Pounds

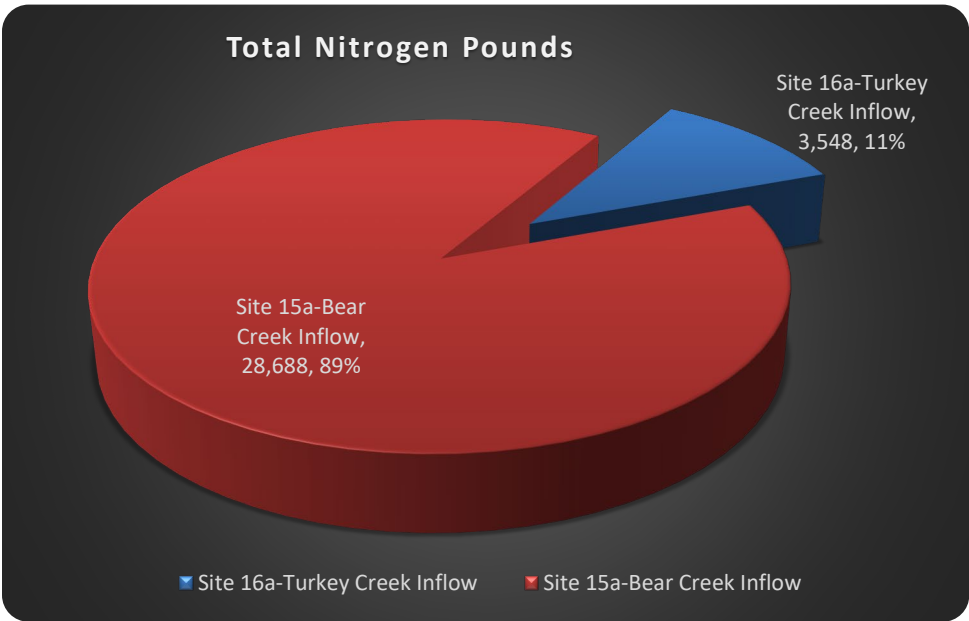


Figure 16 **BCR Total Nitrogen Load**

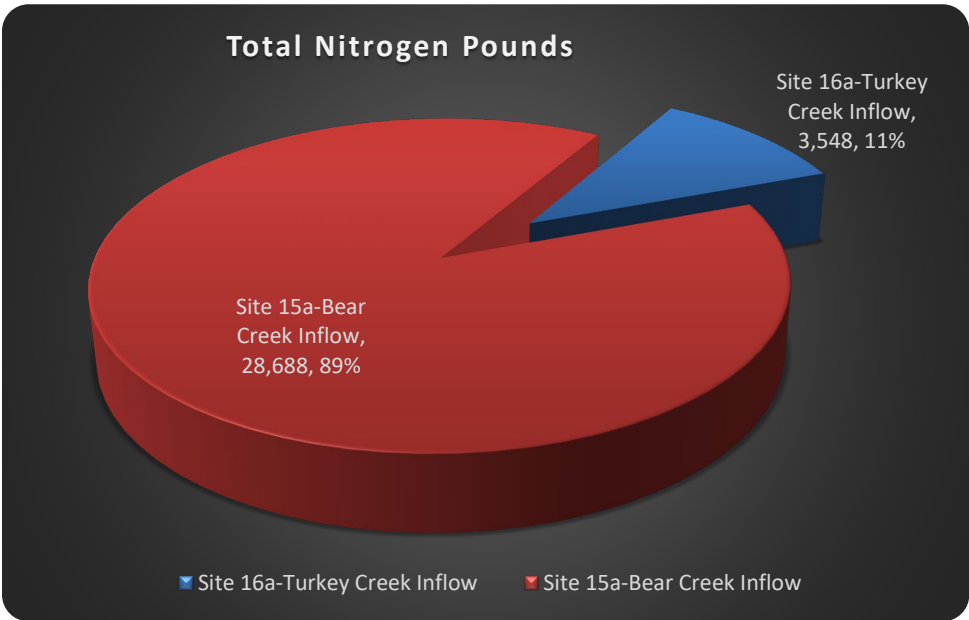


Figure 17 **BCR Estimated Inflow**