

# Technical Memorandum BCWA

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**Date:** February 8, 2017  
**To:** Bear Creek Watershed Association  
**From:** Russell N. Clayshulte, Manager  
**Re:** BCWA TM 2016.09 BCR Phytoplankton Summary

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Phytoplankton samples are taken at the Site 40 buoy in BCR for the July, August, September and October sample periods. The samples are 1-liter composites taken at -1 meter. A sample are taken for the laboratory analyses. This resulted in 9 sample sets. The replicate data from the same date is averaged, and then a monthly average is calculated that includes all counted species. There can be considerable variation among duplicate samples and for any given month. As such, the phytoplankton summary data provides general species composition, average biodensity and average total density. The *BCWA MSD17 Phytoplankton Master* spreadsheet maintains the full phytoplankton record and data analyses.



**Figure 1** Phytoplankton Sampled at Site 40 in Center of Reservoir

Table 1 Average Phytoplankton for 2016 Monitoring Season

Season Mid July-October 2016			
Species	Density #/mL	Biovolume um <sup>3</sup> /mL	Group
<i>Aphanizomenon flos-aquae</i>	7,558	10,467,499	bluegreen
<i>Microcystis aeruginosa</i>	24,465	571,091	bluegreen
<i>Chrysococcus rufescens</i>	17	1,404	cryptophyte
<i>Cryptomonas erosa</i>	109	56,516	cryptophyte
<i>Rhodomonas minuta</i>	191	3,813	cryptophyte
<i>Achnanthes clevei</i>	17	2,478	diatom
<i>Achnanthes lanceolata</i>	31	5,535	diatom
<i>Achnanthes linearis</i>	57	7,560	diatom
<i>Achnanthes minutissima</i>	246	12,406	diatom
<i>Amphora perpusilla</i>	26	5,093	diatom
<i>Caloneis ventricosa minuta</i>	41	12,433	diatom
<i>Cocconeis placentula</i>	30	13,808	diatom
<i>Coscinodiscus sp.</i>	17	12,390	diatom
<i>Cyclotella stelligera</i>	14	771	diatom
<i>Cymbella mexicana</i>	17	90,861	diatom
<i>Cymbella minuta</i>	90	33,159	diatom
<i>Cymbella sinuata</i>	24	3,301	diatom
<i>Diatoma tenue</i>	50	14,373	diatom
<i>Diatoma vulgare</i>	153	319,291	diatom
<i>Fragilaria capucina mesolepta</i>	37	83,035	diatom
<i>Fragilaria crotonensis</i>	17	277,538	diatom
<i>Fragilaria leptostauron</i>	14	5,161	diatom
<i>Fragilaria vaucheria</i>	34	11,650	diatom
<i>Gomphonema angustatum</i>	15	2,749	diatom
<i>Gomphonema olivaceum</i>	36	8,170	diatom
<i>Gomphonema subclavatum</i>	28	17,012	diatom
<i>Gomphonema tenellum</i>	14	2,945	diatom
<i>Gomphonema truncatum</i>	25	34,228	diatom
<i>Hannaea arcus</i>	14	24,541	diatom
<i>Melosira ambigua</i>	29	59,089	diatom
<i>Melosira granulata</i>	19	51,312	diatom
<i>Melosira varians</i>	32	41,000	diatom
<i>Navicula capitata</i>	16	7,858	diatom
<i>Navicula cryptocephala</i>	25	4,656	diatom
<i>Navicula cryptocephala veneta</i>	32	2,996	diatom
<i>Navicula decussis</i>	17	3,347	diatom
<i>Navicula gregaria</i>	36	6,249	diatom
<i>Navicula minima</i>	14	617	diatom
<i>Navicula pupula</i>	47	12,818	diatom
<i>Navicula sp.</i>	25	3,775	diatom
<i>Navicula tripunctata</i>	50	56,375	diatom
<i>Navicula viridula</i>	35	15,627	diatom
<i>Nitzschia communis</i>	14	636	diatom
<i>Nitzschia dissipata</i>	14	3,772	diatom
<i>Nitzschia frustulum</i>	14	1,695	diatom
<i>Nitzschia palea</i>	27	4,935	diatom
<i>Pinnularia borealis</i>	17	3,634	diatom

Season Mid July-October 2016			
Species	Density #/mL	Biovolume um <sup>3</sup> /mL	Group
Pinnularia sp.	14	5,609	diatom
Rhoicosphenia curvata	184	23,300	diatom
Stephanodiscus hantzschii	14	1,695	diatom
Stephanodiscus niagarae	14	113,033	diatom
Synedra rumpens	77	10,772	diatom
Synedra socia	17	5,452	diatom
Synedra ulna	15	30,391	diatom
Ankistrodesmus falcatus	44	1,096	green
Chlamydomonas sp.	14	4,558	green
Cladophora sp.	25	213,923	green
Elakatothrix gelatinosa	25	2,114	green
Oocystis lacustris	17	10,309	green
Scenedesmus quadricauda	14	3,646	green
Ulothrix sp.	25	16,107	green

**Table 2 Phytoplankton Summary by Sample Set**

Sample Date:	25-Jul-16	25-Jul-16	10-Aug-16	22-Aug-16	12-Sep-16	26-Sep-16	17-Oct-16
<b>Total Density (#/mL):</b>	2,466	1,751	1,066	45,290	70,110	46,755	1,653
<b>Total Biovolume (um<sup>3</sup>/mL):</b>	2,029,334	1,368,132	388,858	41,700,409	3,474,182	448,372	361,012
<b>Trophic State Index:</b>	54.9	52.1	43.0	76.8	58.8	44.1	42.5

**Table 3 Species Diversity, Density and Biovolume by Functional Group**

Functional Group	Species	Ave Density #/ml	Ave Biovolume, um <sup>3</sup> /mL
bluegreen	2	14,804	6,226,181
cryptophyte	3	123	29,773
diatom	49	50	34,859
green	7	30	25,504

**Table 4 Monthly Phytoplankton Density, Biovolume and Trophic State Index**

	July	August	September	October
<b>Total Density (#/mL):</b>	2,109	23,178	58,432	1,653
<b>Total Biovolume (um<sup>3</sup>/mL):</b>	1,698,733	21,044,634	1,961,277	361,012
<b>Trophic State Index:</b>	54	60	51	43

**Table 5 Major Phytoplankton Species in 2016**

Major Species	Seasonal Average Biovolume, um <sup>3</sup> /mL	Group
Aphanizomenon flos-aquae	10,467,499	bluegreen
Microcystis aeruginosa	571,091	bluegreen
Cryptomonas erosa	56,516	cryptophyte
Diatoma vulgare	319,291	diatom
Fragilaria crotonensis	277,538	diatom
Stephanodiscus niagarae	113,033	diatom
Cladophora sp.	213,923	green



**Figure 2** *Aphanizomenon flos-aquae*



**Figure 3** *Aphanizomenon flos-aquae* Bloom in BCR

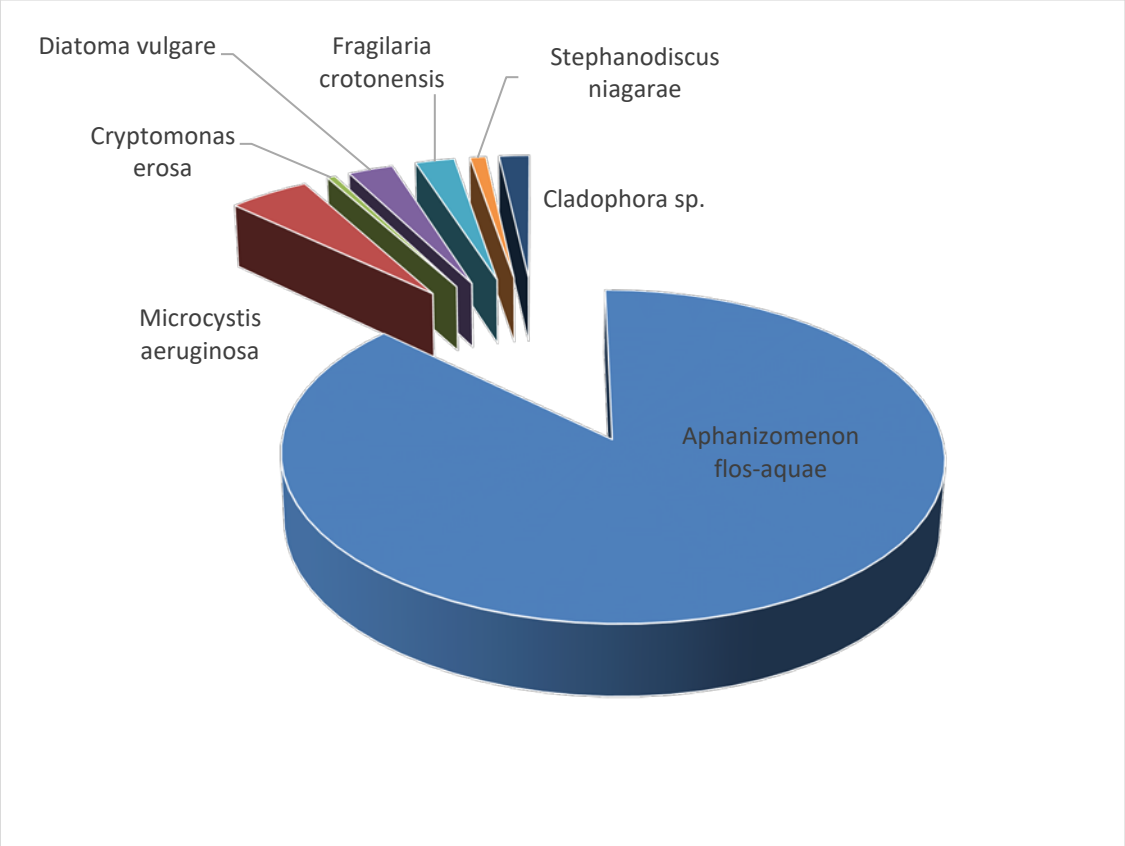


Figure 4 Major Species 2016