Okanagan Lake (Armstrong Central) Phytoplankton Summary Report 2021-2022

Overview

Samples were collected from EMS site #0500239 on Okanagan Lake during 2021 and 2022 (Figure 1; Table 1). Algae were identified to the taxonomic level of species and grouped into broad alga types for analysis.

Table 1: Sample sites and dates sampled in 2021 and 2022

Sample Site (EMS#)	Dates
OKANAGAN L CENTRAL ARMSTRONG ARM (0500239)	2021-06-16
	2021-07-14
	2021-08-18
	2021-09-07
	2022-04-13
	2022-05-18
	2022-06-14
	2022-07-13
	2022-08-17
	2022-09-08
Total= 10 samples	

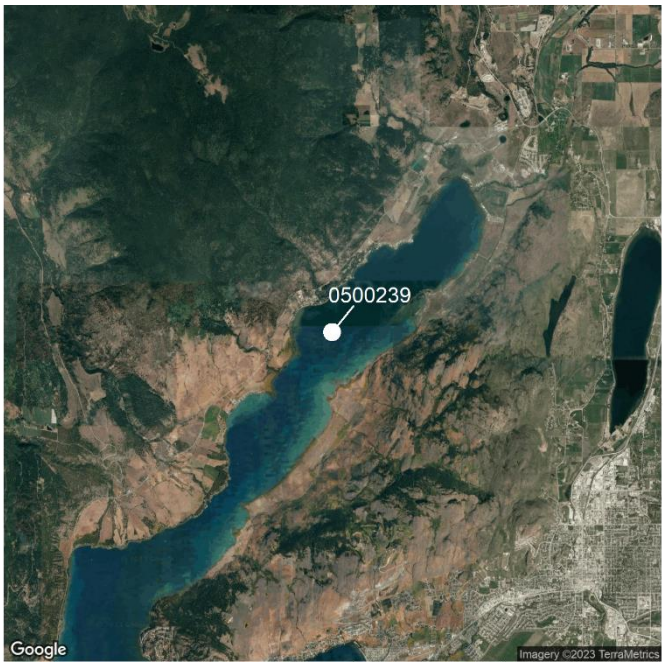

Figure 1: Aerial view of EMS site 0500239 on Okanagan Lake

Samples demonstrated seasonal patterns with elevated diatoms in the spring and elevated cyanobacteria in the summer. Diatom concentrations were slightly elevated from May to June compared to March, April, July, August, and September. Spring blooms of diatoms are common and reflective of increased temperatures, light penetration, and silica in the water following ice thaw (Kong et al., 2021).

Samples collected in at EMS site 0500239 demonstrated elevated concentrations of cyanobacteria compared to Northern sample points in Okanagan Lake (EMS 0500730 and 0500236). EMS site 0500239 collected on 2022-04-13 contained a particularly dense cyanobacteria bloom (Figure 2).

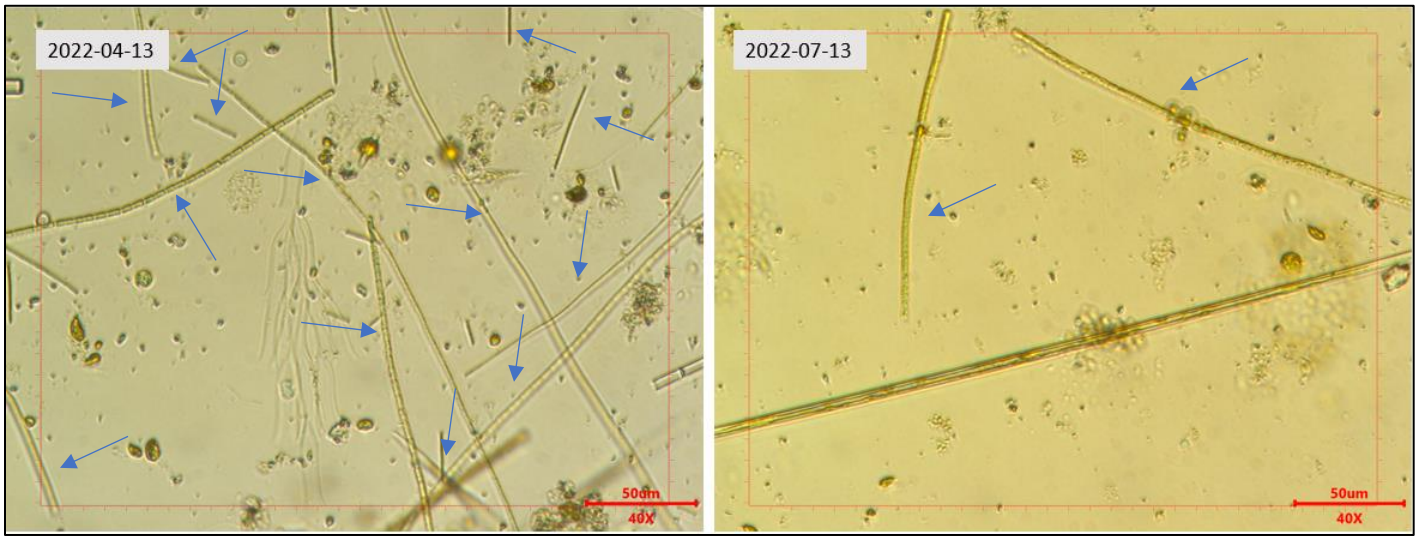

Figure 2: 400x magnification of EMS site 0500239 collected on 2022-04-13 vs 2022-07-13 contrasting cyanobacteria (blue arrows) density

Overview (continued)

A range of algal groups claimed spots in dominant biovolumes at EMS site 0500239 (Figure 3). Cryptomonas species contributed 11% of the biovolume in the 2021 and 2022 samples.

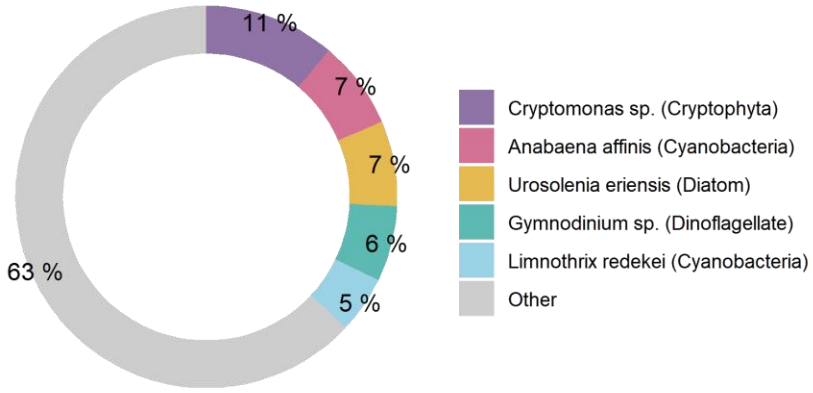

Figure 3: Dominant organisms from Okanagan Lake (Site 0500239) as percent of total biovolume

Cryptomonads are favored elements of freshwater food chains and are selectively consumed by several zooplankton, ciliates, and dinoflagellates (Wehr et al., 2015).

Ninety-nine species in total were identified at EMS site 0500239. *Anabaena affinis* and *Limnothrix redekei* were two of thirty-two species of cyanobacteria identified in the 2021 and 2022 samples (Figure 4).

Figure 4: Species observed in Okanagan Lake (Armstrong Central) sorted into higher level taxa

Algae – why should we care?

Algae blooms are becoming more frequent and severe worldwide due to excessive nutrient loading and warming summer lake temperatures. Diatom blooms can cause filter clogging, and odor issues.

Intense cyanobacteria blooms can threaten human safety and aquatic health through their toxicity. Illness related to cyanotoxins can include liver, kidney, and nerve cell damage, cancer, skin and gut irritation, and neurological issues. Cyanotoxins, including microcystins, are now known to accumulate in the food chain (Lance et al., 2014). Fish from lakes with heavy cyanobacteria blooms can have higher toxin concentrations than the lake water (Greer et al. 2021) and consuming them can increase the risk of liver disease (Zhao et al., 2020).

Cyanobacterial Presence

Summer samples contained elevated densities of cyanobacteria. *Planktolyngbya* was the dominant genus counted, *Aphanizomenon* and *Osillatoria* were also frequently encountered.

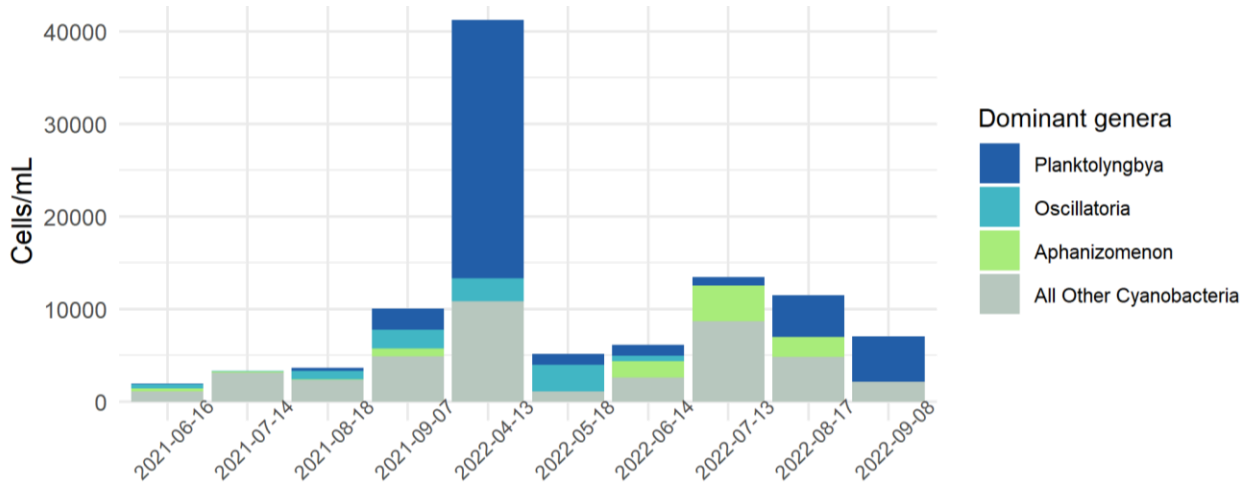

Figure 5: cell abundance for dominant cyanobacteria genera on Okanagan Lake (Armstrong Central)

During blooms, species of *Oscillatoria* and *Aphanizomenon* produce both negative odor/taste compounds and toxic secondary metabolites. *Aphanizomenon* is a filamentous, nitrogen-fixing cyanobacteria capable of forming dense, odorous and toxic blooms in both low and high inorganic nitrogen environments. A*phanizomenon* cells can produce liver toxins, nerve toxins, and skin irritants upon cell lysis (Cirés & Ballot, 2016).

Other dominant cyanobacteria identified in the summer samples are also associated with several cyanotoxins that represent risks to public health (Table 2). Illness related to cyanotoxins can include liver, kidney, and nerve cell damage, cancer, skin and gut irritation, and neurological issues (Lance et al., 2014).

Table 2: Dominant genera of cyanobacteria on Okanagan Lake (Armstrong Central) and their associated toxins

Genus	Maximum Abundance* (cells/mL)	Toxins Produced
Planktolyngbya	11839	Lyngbyatoxin LYN, Microcystin MC, BMAA
Aphanizomenon	3886	Lyngbyatoxin LYN, Lipopolysaccharide LPS, Cylindospermopsin CYN, Microcystin MC, Nodularins NOD, Anatoxins (-a) ATX, Saxitoxins SAX neosaxitoxin NEO, BMAA, Anabaenopeptins APT, Taste and Odor
Oscillatoria	2246	Lyngbyatoxin LYN, Aplysiatoxins APL, Lipopolysaccharide LPS, Cylindospermopsin CYN, Microcystin MC, Anatoxins (-a) ATX, Saxitoxins SAX neosaxitoxin NEO, BMAA, Anabaenopeptins APT, Taste and Odor

Note: * = counted in samples

Cyanobacterial Presence (Continued)

Dominant species of cyanobacteria found in Okanagan Lake (Armstrong Central) can produce cyanotoxins (Table 2).

Okanagan Lake (Armstrong Central) displayed cyanobacteria levels in the low to moderate-risk category, with a mean cyanobacteria abundance of 10,330 cells/mL (Figure 6). Figure 6 exhibits the range of cyanobacterial abundance observed in Okanagan Lake (Armstrong Central) compared to alert levels defined by several authorities including the WHO and EPA.

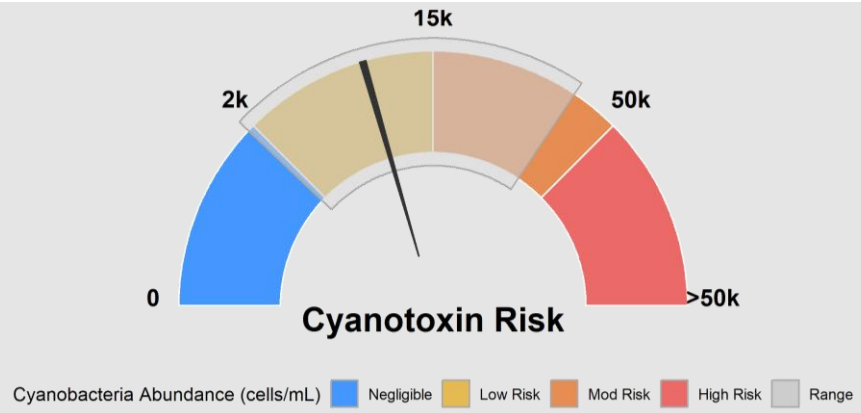

Figure 6: Cyanotoxin risk posed by cyanobacteria blooms in Okanagan Lake (Armstrong Central)

Cyanobacteria frequently dominate algal communities in total cell count, but because of their small cell size their biovolume is usually low relative to the other types of algae present. This is highlighted in Figure 7 where a *Asterionella* (diatom), *Mallomonas* (Chrysophyta), and *Dinobryon* (Chrysophyta) dwarf an adjacent *Anacystis* (cyanobacteria) cell.

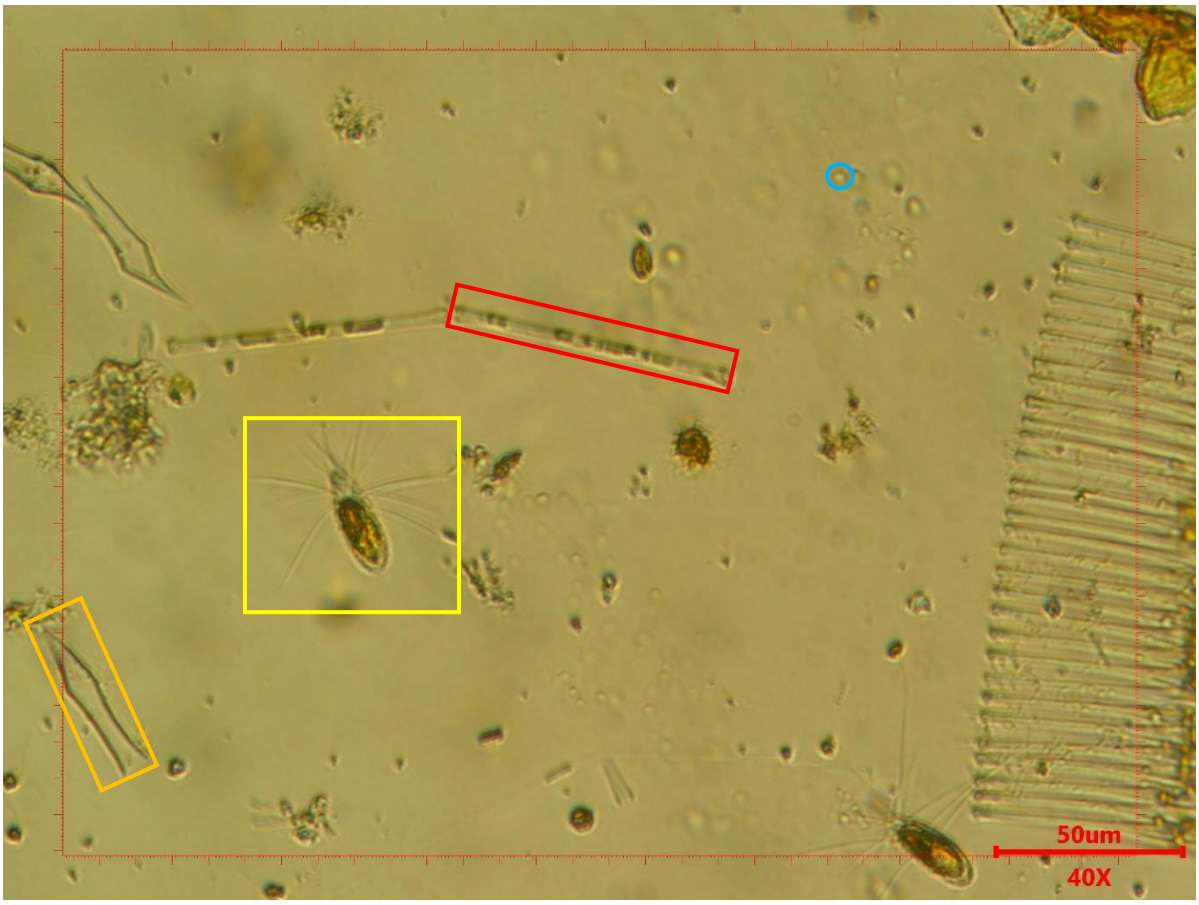

Figure 7: Size comparison of an Asterionella (red box), Mallomonas (yellow box), Dinobryon (orange box), and Anacystis (blue circle) cell

Species Composition

Algae samples were identified to the species level and grouped into broad alga types for analysis. The figures below display the total cell counts for each broad algae group alongside the biovolume represented by each of these groups. The difference between Figure 8 (cell abundance) and Figure 9 (biovolume) illuminates the difference between cell abundance and biovolume.

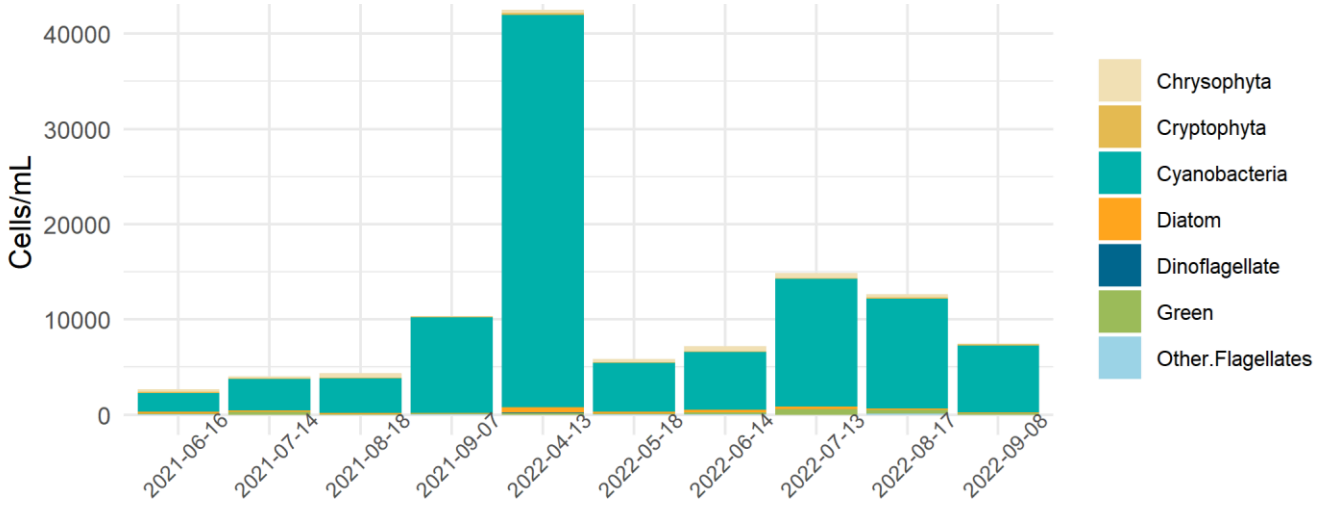

Figure 8: Cell abundance of high-level taxa groups on Okanagan Lake (Armstrong Central)

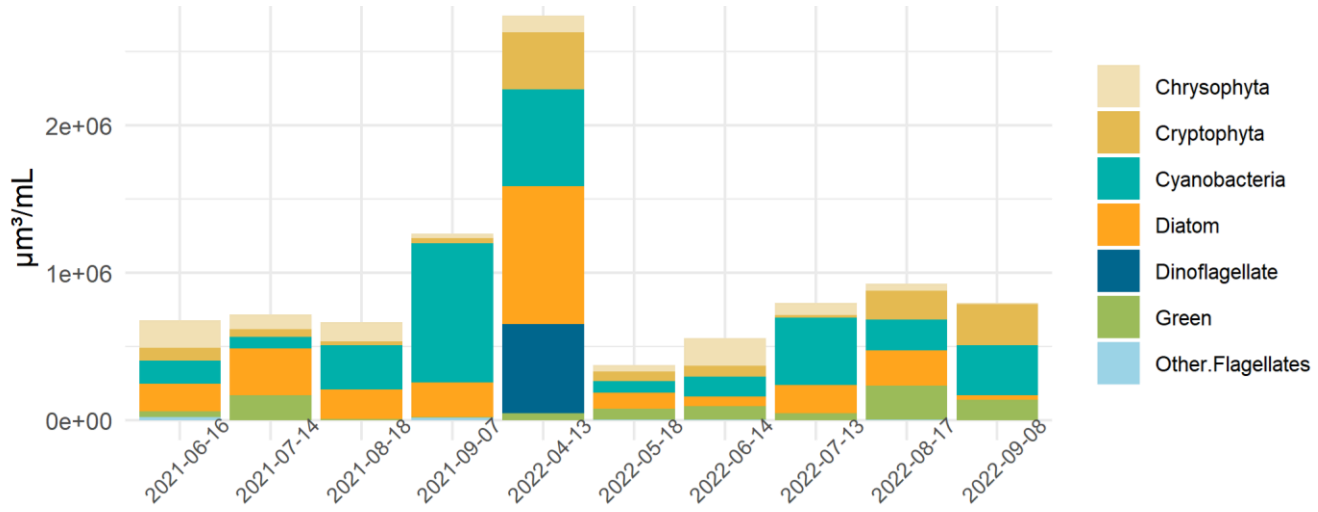

Figure 9: Biovolume of high-level taxa groups on Okanagan Lake (Armstrong Central)

References

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Appendix:

Table 3: Raw Data from 2021 at 0500239

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/ mL)	Biovolume (µm³/mL)
Aulacoseira granulata	Diatom	590863	2021-09-07	61	20065
Pinnularia cf. brebissonii	Diatom	4428	2021-09-07	8	5152
Rapholodia gibba	Diatom	NA	2021-09-07	8	201062
Ulnaria acus	Diatom	970000	2021-09-07	8	8335
Ankistrodesmus sp.	Green	5877	2021-09-07	15	2358
Chlorella vulgaris	Green	5811	2021-09-07	8	558
Oocystis sp.	Green	5827	2021-09-07	30	565
Tetraedron minimum	Green	5661	2021-09-07	8	984
Anathece cf. clathrata	Cyanobacteria	NA	2021-09-07	372	1558
Aphanothece sp.	Cyanobacteria	636	2021-09-07	91	290
Aphanizomenon flos aquae	Cyanobacteria	1191	2021-09-07	873	188457
Anacystis cyanea	Cyanobacteria	609	2021-09-07	76	114
Chroococcus limneticus	Cyanobacteria	654	2021-09-07	30	3831
Anabaena sp.	Cyanobacteria	1100	2021-09-07	1670	125216
Anabaena affinis	Cyanobacteria	1100	2021-09-07	1366	391493
Anabaena variabilis	Cyanobacteria	1100	2021-09-07	379	104980
Planktolyngbya sp.	Cyanobacteria	NA	2021-09-07	1730	21504
Planktolyngbya limnetica	Cyanobacteria	NA	2021-09-07	569	2911
Limnothrix redekei	Cyanobacteria	NA	2021-09-07	152	19101
Oscillatoria sp.	Cyanobacteria	917	2021-09-07	76	680
Oscillatoria tenuis	Cyanobacteria	917	2021-09-07	1897	16985
Pseudanabaena limnetica	Cyanobacteria	1175	2021-09-07	736	67632
Dinobryon sp.	Chrysophyta	1515	2021-09-07	8	12016
Cryptomonas sp.	Cryptophyta	10635	2021-09-07	15	27781
Ochromonas sp.	Chrysophyta	1455	2021-09-07	99	21193
Rhodomonas lacustris	Cryptophyta	10663	2021-09-07	30	3257
UID flagellate	Other.Flagellates	NA	2021-09-07	46	16001
Cocconeis placentula	Diatom	3577	2021-08-18	8	13034
Epithemia sorex	Diatom	5005	2021-08-18	8	26389
Fragilaria crotonensis	Diatom	2932	2021-08-18	159	77204
Stephanodiscus niagarae	Diatom	2415	2021-08-18	8	84010

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/ mL)	Biovolume (µm³/mL)
Oocystis parva	Green	5827	2021-08-18	15	3372
Schroederia sp.	Green	NA	2021-08-18	8	2036
Anathece cf. clathrata	Cyanobacteria	NA	2021-08-18	114	478
Aphanizomenon sp.	Cyanobacteria	1191	2021-08-18	38	1343
Anacystis cyanea	Cyanobacteria	609	2021-08-18	759	1143
Chroococcus sp.	Cyanobacteria	654	2021-08-18	30	1005
Anabaena sp.	Cyanobacteria	1100	2021-08-18	220	16495
Anabaena affinis	Cyanobacteria	1100	2021-08-18	197	56460
Anabaena variabilis	Cyanobacteria	1100	2021-08-18	759	210238
Planktolyngbya limnetica	Cyanobacteria	NA	2021-08-18	304	1555
Oscillatoria sp.	Cyanobacteria	917	2021-08-18	76	680
Oscillatoria tenuis	Cyanobacteria	917	2021-08-18	873	7816
Snowella lacustris	Cyanobacteria	NA	2021-08-18	266	2788
Mallomonas sp.	Chrysophyta	1598	2021-08-18	8	24194
Cryptomonas sp.	Cryptophyta	10635	2021-08-18	15	27781
Ochromonas sp.	Chrysophyta	1455	2021-08-18	501	107249
Aulacoseira granulata	Diatom	590863	2021-07-14	46	15131
Diploneis elliptica	Diatom	4325	2021-07-14	8	30434
Fragilaria crotonensis	Diatom	2932	2021-07-14	8	3884
Stephanodiscus hantzschii	Diatom	2415	2021-07-14	8	63805
Stephanodiscus niagarae	Diatom	2415	2021-07-14	8	84010
Ulnaria nana	Diatom	970000	2021-07-14	8	21000
Ulnaria ulna	Diatom	970000	2021-07-14	15	78820
Tabellaria fenestrata	Diatom	3241	2021-07-14	8	21502
Chlorella vulgaris	Green	5811	2021-07-14	8	558
Chlorococcum sp.	Green	5648	2021-07-14	220	24881
Crucigenia rectangularis	Green	6225	2021-07-14	15	4594
Elakatothrix gelatinosa	Green	9412	2021-07-14	8	1413
Oocystis parva	Green	5827	2021-07-14	61	13713
Staurodesmus subtriangularis	Green	7182	2021-07-14	15	123013
Anathece cf. clathrata	Cyanobacteria	NA	2021-07-14	1100	4608
Aphanothece sp.	Cyanobacteria	636	2021-07-14	152	485
Aphanizomenon sp.	Cyanobacteria	1191	2021-07-14	114	4029
Anacystis cyanea	Cyanobacteria	609	2021-07-14	1138	1713
Chroococcus limneticus	Cyanobacteria	654	2021-07-14	15	1915
Anabaena sp.	Cyanobacteria	1100	2021-07-14	114	8548

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/ mL)	Biovolume (µm³/mL)
Anabaena flos-aquae	Cyanobacteria	1100	2021-07-14	266	51770
Lyngbya sp.	Cyanobacteria	870	2021-07-14	76	60
Phormidium sp.	Cyanobacteria	992	2021-07-14	38	1638
Merismopedia punctata	Cyanobacteria	727	2021-07-14	91	589
Oscillatoria tenuis	Cyanobacteria	917	2021-07-14	76	680
Snowella lacustris	Cyanobacteria	NA	2021-07-14	114	1195
Dinobryon sertularia	Chrysophyta	1515	2021-07-14	8	9837
Dinobryon sp.	Chrysophyta	1515	2021-07-14	38	57076
Cryptomonas sp.	Cryptophyta	10635	2021-07-14	23	42597
Ochromonas sp.	Chrysophyta	1455	2021-07-14	167	35750
Rhodomonas lacustris	Cryptophyta	10663	2021-07-14	76	8252
Aulacoseira granulata	Diatom	590863	2021-06-16	53	17433
Asterionella formosa	Diatom	3116	2021-06-16	46	32031
Cyclotella meneghiniana	Diatom	2439	2021-06-16	15	5950
Diploneis elliptica	Diatom	4325	2021-06-16	8	30434
Fragilaria crotonensis	Diatom	2932	2021-06-16	61	29619
Stephanodiscus hantzschii	Diatom	2415	2021-06-16	8	63805
Ulnaria acus	Diatom	970000	2021-06-16	8	8335
Ankistrodesmus sp.	Green	5877	2021-06-16	15	2358
Chlorella vulgaris	Green	5811	2021-06-16	23	1605
Pediastrum boryanum	Green	6031	2021-06-16	15	25677
Closterium gracile	Green	7257	2021-06-16	8	6355
Scenedesmus abundans	Green	6104	2021-06-16	15	1007
Aphanizomenon flos aquae	Cyanobacteria	1191	2021-06-16	364	78578
Anacystis cyanea	Cyanobacteria	609	2021-06-16	334	503
Anabaena sp.	Cyanobacteria	1100	2021-06-16	23	1725
Anabaena variabilis	Cyanobacteria	1100	2021-06-16	175	48474
Gloeothece rupestris	Cyanobacteria	703	2021-06-16	38	2487
Lyngbya sp.	Cyanobacteria	870	2021-06-16	38	30
Phormidium sp.	Cyanobacteria	992	2021-06-16	379	16334
Planktolyngbya limnetica	Cyanobacteria	NA	2021-06-16	76	389
Limnothrix redekei	Cyanobacteria	NA	2021-06-16	46	5781
Oscillatoria sp.	Cyanobacteria	917	2021-06-16	152	1361
Oscillatoria tenuis	Cyanobacteria	917	2021-06-16	266	2382

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Snowella lacustris	Cyanobacteria	NA	2021-06-16	38	398
Dinobryon sertularia	Chrysophyta	1515	2021-06-16	68	83614
Dinobryon bavaricum	Chrysophyta	1515	2021-06-16	8	17412
Dinobryon sp.	Chrysophyta	1515	2021-06-16	38	57076
Cryptomonas sp.	Cryptophyta	10635	2021-06-16	38	70378
Ochromonas sp.	Chrysophyta	1455	2021-06-16	152	32538
Rhodomonas lacustris	Cryptophyta	10663	2021-06-16	121	13138
UID flagellate	Other.Flagellates	NA	2021-06-16	61	21219

Raw data for 2022 at 0500239

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Aulacoseira granulata	Diatom	590863	2022-04-13	182	44670
Lindavia bodanica	Diatom	NA	2022-04-13	30	47124
Diploneis elliptica	Diatom	4325	2022-04-13	30	114128
Tabellaria fenestrata	Diatom	3241	2022-04-13	30	119212
Ankistrodesmus falcatus	Green	5877	2022-04-13	30	10921
Chlorella vulgaris	Green	5811	2022-04-13	30	3393
Monoraphidium indicum	Green	5990	2022-04-13	30	5177
Mougeotia sp.	Green	7055	2022-04-13	30	23295
Planktolyngbya sp.	Cyanobacteria	NA	2022-04-13	11839	74387
Planktolyngbya limnetica	Cyanobacteria	NA	2022-04-13	3795	31948
Oscillatoria tenuis	Cyanobacteria	917	2022-04-13	2004	97658
Pseudanabaena catenata	Cyanobacteria	1175	2022-04-13	3552	87179
Phormidium granulatum	Cyanobacteria	992	2022-04-13	607	9331
Dinobryon sertularia	Chrysophyta	1515	2022-04-13	61	22266
Cryptomonas sp.	Cryptophyta	10635	2022-04-13	30	116333
Ochromonas sp.	Chrysophyta	1455	2022-04-13	61	6899
Gymnodinium sp.	Dinoflagellate	10031	2022-04-13	61	605669
Aulacoseira granulata	Diatom	590863	2022-09-08	30	7363
Cocconeis placentula	Diatom	3577	2022-09-08	15	18075
Ulnaria acus	Diatom	970000	2022-09-08	15	7580
Ankistrodesmus falcatus	Green	5877	2022-09-08	15	5460
Chlorella vulgaris	Green	5811	2022-09-08	15	1696
Mougeotia sp.	Green	7055	2022-09-08	76	59013
Staurastrum chaetoceras	Green	7440	2022-09-08	46	14144
Staurodesmus subtriangularis	Green	7182	2022-09-08	30	56301
Aphanocapsa sp.	Cyanobacteria	625	2022-09-08	243	1449
Anacystis cyanea	Cyanobacteria	609	2022-09-08	46	81
Anabaena affinis	Cyanobacteria	1100	2022-09-08	1396	236826

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Planktolyngbya sp.	Cyanobacteria	NA	2022-09-08	2474	15545
Planktolyngbya limnetica	Cyanobacteria	NA	2022-09-08	2398	20188
Limnothrix redekei	Cyanobacteria	NA	2022-09-08	455	64324
Dinobryon sertularia	Chrysophyta	1515	2022-09-08	15	5475
cf. Dinobryon cyst	Chrysophyta	NA	2022-09-08	61	5589
Cryptomonas sp.	Cryptophyta	10635	2022-09-08	61	236544
Rhodomonas lacustris	Cryptophyta	10663	2022-09-08	76	38679
Asterionella formosa	Diatom	3116	2022-05-18	76	14250
Lindavia ocellata	Diatom	NA	2022-05-18	61	11977
Diploneis elliptica	Diatom	4325	2022-05-18	15	57064
Fragilaria crotonensis	Diatom	2932	2022-05-18	30	7500
Navicula sp.	Diatom	3649	2022-05-18	15	3581
Ulnaria nana	Diatom	970000	2022-05-18	15	9000
UID Pennate Diatom	Diatom	NA	2022-05-18	15	2513
Chlorella vulgaris	Green	5811	2022-05-18	30	3393
Monoraphidium cf. tortile	Green	5990	2022-05-18	15	240
Closteriopsis acicularis	Green	5926	2022-05-18	15	72106
Anathece clathrata	Cyanobacteria	NA	2022-05-18	531	556
Anacystis cf. delicatissima	Cyanobacteria	609	2022-05-18	273	247
Anabaena sp.	Cyanobacteria	1100	2022-05-18	167	6962
Planktolyngbya sp.	Cyanobacteria	NA	2022-05-18	562	3531
Planktolyngbya limnetica	Cyanobacteria	NA	2022-05-18	592	4984
Oscillatoria sp.	Cyanobacteria	917	2022-05-18	2246	28224
Oscillatoria tenuis	Cyanobacteria	917	2022-05-18	683	33284
Pseudanabaena limnetica	Cyanobacteria	1175	2022-05-18	91	1644
Dinobryon sertularia	Chrysophyta	1515	2022-05-18	15	5475
cf. Dinobryon cyst	Chrysophyta	NA	2022-05-18	76	6964
Cryptomonas sp.	Cryptophyta	10635	2022-05-18	15	58167
Ochromonas sp.	Chrysophyta	1455	2022-05-18	258	29179
Rhodomonas lacustris	Cryptophyta	10663	2022-05-18	15	7634
UID flagellate	Other.Flagellates	NA	2022-05-18	15	1963
Aulacoseira granulata	Diatom	590863	2022-04-13	61	14972
Aulacoseira sp.	Diatom	590863	2022-04-13	30	16493
Asterionella formosa	Diatom	3116	2022-04-13	121	22688
Urosolenia eriensis	Diatom	590843	2022-04-13	61	551915
Kirchneriella cf. obesa	Green	5895	2022-04-13	61	3593
Anathece clathrata	Cyanobacteria	NA	2022-04-13	455	476
Anacystis cyanea	Cyanobacteria	609	2022-04-13	1396	2467
Lyngbya sp.	Cyanobacteria	870	2022-04-13	1214	15256
Planktolyngbya sp.	Cyanobacteria	NA	2022-04-13	5616	35286
Planktolyngbya limnetica	Cyanobacteria	NA	2022-04-13	6679	56227
Limnothrix redekei	Cyanobacteria	NA	2022-04-13	1214	171625
Merismopedia tenuissima	Cyanobacteria	727	2022-04-13	121	266
Oscillatoria tenuis	Cyanobacteria	917	2022-04-13	455	22173
Pseudanabaena limnetica	Cyanobacteria	1175	2022-04-13	121	2186
Pseudanabaena catenata	Cyanobacteria	1175	2022-04-13	2155	52892

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Dinobryon sertularia	Chrysophyta	1515	2022-04-13	121	44167
Mallomonas caudata	Chrysophyta	1598	2022-04-13	30	34558
Cryptomonas sp.	Cryptophyta	10635	2022-04-13	61	236544
Ochromonas sp.	Chrysophyta	1455	2022-04-13	61	6899
Rhodomonas lacustris	Cryptophyta	10663	2022-04-13	61	31045
Chrysochromulina sp.	Chrysophyta	2160	2022-04-13	30	673
Aulacoseira granulata	Diatom	590863	2022-06-14	76	18653
Asterionella formosa	Diatom	3116	2022-06-14	121	22688
Lindavia ocellata	Diatom	NA	2022-06-14	15	2945
Eunotia sp.	Diatom	3337	2022-06-14	15	2460
Fragilaria crotonensis	Diatom	2932	2022-06-14	30	7500
Ulnaria acus	Diatom	970000	2022-06-14	15	7580
UID Pennate Diatom	Diatom	NA	2022-06-14	15	2513
Coelastrum cf. microporum	Green	6273	2022-06-14	121	21731
Monoraphidium cf. tortile	Green	5990	2022-06-14	15	240
Pediastrum boryanum	Green	6031	2022-06-14	30	10391
Staurodesmus subtriangularis	Green	7182	2022-06-14	30	56301
Anathece clathrata	Cyanobacteria	NA	2022-06-14	61	64
Aphanizomenon flos-aquae	Cyanobacteria	1191	2022-06-14	1776	76892
Anacystis cyanea	Cyanobacteria	609	2022-06-14	1123	1985
Anacystis cf. delicatissima	Cyanobacteria	609	2022-06-14	607	549
Chroococcus limneticus	Cyanobacteria	654	2022-06-14	137	9656
Gloeothece rupestris	Cyanobacteria	703	2022-06-14	76	2098
Planktolyngbya sp.	Cyanobacteria	NA	2022-06-14	577	3625
Planktolyngbya limnetica	Cyanobacteria	NA	2022-06-14	546	4596
Oscillatoria tenuis	Cyanobacteria	917	2022-06-14	607	29580
Pseudanabaena catenata	Cyanobacteria	1175	2022-06-14	304	7461
Snowella lacustris	Cyanobacteria	NA	2022-06-14	273	1144
Dinobryon sertularia	Chrysophyta	1515	2022-06-14	152	55482
Dinobryon bavaricum	Chrysophyta	1515	2022-06-14	15	3110
Mallomonas pseudocoronata	Chrysophyta	1598	2022-06-14	15	61575
Mallomonas tonsurata	Chrysophyta	1598	2022-06-14	15	31667
cf. Dinobryon cyst	Chrysophyta	NA	2022-06-14	76	6964
Cryptomonas sp.	Cryptophyta	10635	2022-06-14	15	58167
Ochromonas sp.	Chrysophyta	1455	2022-06-14	258	29179
Rhodomonas lacustris	Cryptophyta	10663	2022-06-14	30	15268
UID flagellate	Other.Flagellates	NA	2022-06-14	30	3927
Asterionella formosa	Diatom	3116	2022-07-13	30	5625
Fragilaria radians	Diatom	2932	2022-07-13	243	170100
Ulnaria acus	Diatom	970000	2022-07-13	30	15159
cf. Coelastrum microporum	Green	NA	2022-07-13	304	34382
Crucigenia tetrapedia	Green	6225	2022-07-13	121	1014
Dictyosphaerium cf. elegans	Green	6297	2022-07-13	61	3992
Monoraphidium cf. tortile	Green	5990	2022-07-13	30	480
UID green coccoid	Green	NA	2022-07-13	30	7351
Anathece clathrata	Cyanobacteria	NA	2022-07-13	2914	3052

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Aphanizomenon flos-aquae	Cyanobacteria	1191	2022-07-13	3886	168245
Anacystis cyanea	Cyanobacteria	609	2022-07-13	1214	2145
Anacystis cf. delicatissima	Cyanobacteria	609	2022-07-13	1032	934
Anabaena lemmermannii	Cyanobacteria	1100	2022-07-13	911	40903
Anabaena spiroides	Cyanobacteria	1100	2022-07-13	152	35098
Planktolyngbya sp.	Cyanobacteria	NA	2022-07-13	911	5724
Limnothrix redekei	Cyanobacteria	NA	2022-07-13	1214	171625
Pseudanabaena catenata	Cyanobacteria	1175	2022-07-13	1214	29796
Dinobryon sertularia	Chrysophyta	1515	2022-07-13	121	44167
cf. Dinobryon cyst	Chrysophyta	NA	2022-07-13	121	11087
Ochromonas sp.	Chrysophyta	1455	2022-07-13	243	27483
Rhodomonas lacustris	Cryptophyta	10663	2022-07-13	30	15268
Chrysochromulina sp.	Chrysophyta	2160	2022-07-13	30	673
Fragilaria crotonensis	Diatom	2932	2022-07-13	212	53000
Fragilaria radians	Diatom	2932	2022-07-13	152	106400
Ulnaria ulna	Diatom	970000	2022-07-13	30	93750
cf. Coelastrum microporum	Green	NA	2022-07-13	273	30876
Dictyosphaerium cf. elegans	Green	6297	2022-07-13	61	3992
Elakatothrix gelatinosa	Green	9412	2022-07-13	30	2535
Cosmarium depressum	Green	7848	2022-07-13	61	26463
Anathece clathrata	Cyanobacteria	NA	2022-07-13	1821	1907
Aphanizomenon flos-aquae	Cyanobacteria	1191	2022-07-13	2368	102523
Aphanizomenon cf. gracile	Cyanobacteria	1191	2022-07-13	425	16923
Anacystis cyanea	Cyanobacteria	609	2022-07-13	6830	12070
Anacystis cf. delicatissima	Cyanobacteria	609	2022-07-13	2580	2334
Anabaena sp.	Cyanobacteria	1100	2022-07-13	243	10131
Gloeothece rupestris	Cyanobacteria	703	2022-07-13	91	2513
Planktolyngbya limnetica	Cyanobacteria	NA	2022-07-13	1943	16357
Merismopedia punctata	Cyanobacteria	727	2022-07-13	61	128
Oscillatoria tenuis	Cyanobacteria	917	2022-07-13	152	7407
Dinobryon sertularia	Chrysophyta	1515	2022-07-13	30	10950
Mallomonas tonsurata	Chrysophyta	1598	2022-07-13	30	63335
cf. Dinobryon cyst	Chrysophyta	NA	2022-07-13	61	5589
Ochromonas sp.	Chrysophyta	1455	2022-07-13	273	30876
Rhodomonas lacustris	Cryptophyta	10663	2022-07-13	61	31045
UID flagellate	Other.Flagellates	NA	2022-07-13	30	3927
nanoflagellates	Other.Flagellates	NA	2022-07-13	61	383
Diploneis elliptica	Diatom	4325	2022-08-17	15	57064
Urosolenia eriensis	Diatom	590843	2022-08-17	15	135717
Ulnaria acus	Diatom	970000	2022-08-17	91	45983
cf. Coelastrum microporum	Green	NA	2022-08-17	121	13685
Monoraphidium cf. tortile	Green	5990	2022-08-17	15	240
Mougeotia sp.	Green	7055	2022-08-17	197	152967
Oocystis parva	Green	5827	2022-08-17	30	4320
Lagerheimia sp.	Green	NA	2022-08-17	15	1257
Staurodesmus subtriangularis	Green	7182	2022-08-17	30	56301

Report Name	High Level Taxa	ITIS Genus Number	Date Sampled	Abundance (cells/mL)	Biovolume (µm³/mL)
Anathece clathrata	Cyanobacteria	NA	2022-08-17	1563	1637
Aphanocapsa sp.	Cyanobacteria	625	2022-08-17	759	4527
Aphanizomenon flos-aquae	Cyanobacteria	1191	2022-08-17	1336	57842
Aphanizomenon cf. gracile	Cyanobacteria	1191	2022-08-17	820	32652
Anacystis cyanea	Cyanobacteria	609	2022-08-17	531	938
Anacystis cf. delicatissima	Cyanobacteria	609	2022-08-17	349	316
Anabaena sp.	Cyanobacteria	1100	2022-08-17	455	18970
Anabaena affinis	Cyanobacteria	1100	2022-08-17	152	25786
Gloeocapsa cf. aeruginosa	Cyanobacteria	682	2022-08-17	30	1431
Planktolyngbya sp.	Cyanobacteria	NA	2022-08-17	1639	10298
Planktolyngbya limnetica	Cyanobacteria	NA	2022-08-17	2929	24658
Limnothrix redekei	Cyanobacteria	NA	2022-08-17	182	25730
Merismopedia punctata	Cyanobacteria	727	2022-08-17	243	510
Pseudanabaena limnetica	Cyanobacteria	1175	2022-08-17	228	4119
Snowella lacustris	Cyanobacteria	NA	2022-08-17	288	1206
Dinobryon sertularia	Chrysophyta	1515	2022-08-17	61	22266
cf. Dinobryon cyst	Chrysophyta	NA	2022-08-17	76	6964
Cryptomonas sp.	Cryptophyta	10635	2022-08-17	46	178378
Nano Cryptomonads	Cryptophyta	NA	2022-08-17	91	16677
Ochromonas sp.	Chrysophyta	1455	2022-08-17	121	13685
Chrysochromulina sp.	Chrysophyta	2160	2022-08-17	46	1033
Chrysococcus sp.	Chrysophyta	1751	2022-08-17	30	4831
nanoflagellates	Other.Flagellates	NA	2022-08-17	121	760
UID flagellate	Other.Flagellates	NA	2022-08-17	15	1963