FOCL_2023_Season

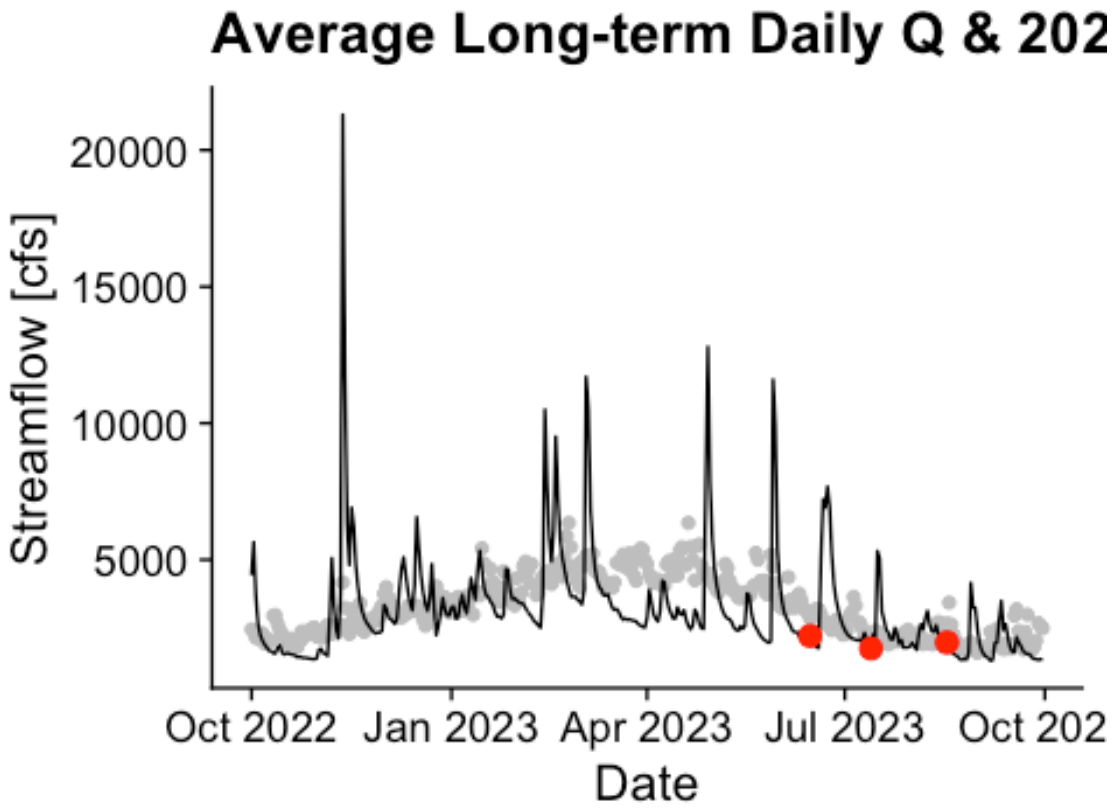
2024-03-15

Summer 2023

During the 2023 summer, 13 water sampling locations were monitored monthly in June, July, and August. Of these sites, 4 were in the primary tributaries that enter the reservoir (Big Reed Creek, Big Macks Creek, Max Creek, and Peak Creek). Samples were collected by FOCL volunteers in conjunction with Virginia Tech researchers. Sampling dates in summer 2023 were: 6/15/23; 7/13/23; 8/17/2023

Samples were collected from each location at the water surface at a depth of approximately 0.5 - 1.0 meters. Direct measurements of water temperature, dissolved oxygen, specific conductance, and secchi depth were made using a handheld YSI meter. Water samples were collected in 250-ml and 1-L bottles and preserved in a dark color at 4degC. Upon return to the laboratory, one bottle was filtered and subsampled for analysis, and the second smaller bottle was used to measure total nutrients and bacteria. Following standard methods, laboratory analyses included bacteria MPN, total and dissolved nitrogen and phosphorus, and chlorophyll-a. Below is a brief snapshot of the data from summer 2023. Chlorophyll-a data will be available in early April 2024.

Hydrologic Context



ı daily streamflow for the 2023 water year (black line) and water quality sampling dates (red circles).

Average summer-flow in the New River at Allisonia.

year	Flow_summer_avg	Percent_Flow_summer_from_avg
2016	1973	69.9
2017	2060	73.0
2018	3935	139.4
2019	3127	110.8
2020	4726	167.4
2021	2401	85.0
2022	2239	79.3
2023	2424	85.9

For 2023, the average annual streamflow was 2,834 cfs. For the summer period (June, July, and August), average streamflow was 86% of the long-term average streamflow for the New River. The figure above highlights the sampling dates on the streamflow record for the 2023 water year (black line), along the the average daily flows (grey dots) from the long-term record. In considering just the summer months (June - August), summer streamflow was 86% of the longer-term average streamflow. While hydrologic conditions were drier

than normal locally, streamflow from the upper Nw River Watershed maintained streamflow closer to normal streamflow over the 2023-summer season.

Water Quality

A summary of the water quality data is below and placed into context with the longer-term data. The first section are the physical variables, then bacteria, and lastly nutrients.

Average physical conditions for river/reservoir and tributaries in the New River/Claytor Lake system.

Location	Water_year	Temp_C	DO_mg_L	Specific_Conductance_uS_cm	Secchi_Depth_m
river	2015	26.0	7.9	NaN	NaN
river	2016	26.2	7.0	NaN	1.5
river	2017	25.0	7.4	112	1.7
river	2018	25.2	6.1	117	1.6
river	2019	25.0	7.8	95	NaN
river	2020	24.7	7.4	118	1.8
river	2021	25.6	6.5	111	2.2
river	2022	26.2	6.6	107	1.7
river	2023	24.6	8.2	111	1.8
trib	2015	25.7	6.2	NaN	NaN
trib	2016	25.2	5.9	NaN	0.9
trib	2017	24.0	6.0	240	1.3
trib	2018	24.2	5.5	242	1.2
trib	2019	23.2	6.8	287	NaN
trib	2020	21.1	6.7	288	1.2
trib	2021	24.9	3.8	229	1.8
trib	2022	25.6	6.3	143	1.2
trib	2023	24.7	8.1	145	1.7

For the 2023 year, physical conditions in the main river/Reservoir and the tributaries were within the long term averages. Dublin Hollow (river/res site) and Hidden Valley (tributary) had the highest 2023 recorded water temperatures in the month of July (27.7C, 27.8C). The State Park (river/res) site and Hidden Valley had the highest 2023 recorded DO values (11.45 mg/L in July, 10.6 mg/L in June). Sprakers on the main channel and Peak Creek @ bridge had the highest specific conductivities, both in June (118 uS/cm, 359 uS/cm).

Average bacteria conditions for river/reservoir and tributaries in the New River/Claytor Lake system.

Location	waterYear	TotalCol	E_Coli
river	2015	1920	346
river	2016	1442	512
river	2017	1038	25
river	2018	1846	501
river	2019	1457	475
river	2020	1369	311
river	2021	1378	31
river	2022	2534	NaN
river	2023	3658	3
trib	2015	1720	28
trib	2016	1847	29
trib	2017	1142	14
trib	2018	2000	75
trib	2019	NaN	NaN
trib	2020	1903	420
trib	2021	2191	48
trib	2022	1768	NaN
trib	2023	6569	18

For the 2023 year, elevated bacteria levels were detected in the main river/Reservoir and the tributaries compared to previous years, but E-coli levels were not above average. The most upstream site on the New River (Allisonia) (river/res site) and the incoming tributary at the New River Trail Tressel (tributary) had the highest 2023 recorded bacteria levels in the month of July (19,180; 27,550). E-coli was also highest at the upstream site on the New River (Allisonia) (17, July), and highest at the Upper Peak Creek site (200, July).

Average nutrient conditions for river/reservoir and tributaries in the New River/Claytor Lake system.

Location	Water_year	TN_mg_L	TP_mg_L
river	2015	NaN	NaN
river	2016	1.1	0.08
river	2017	0.7	0.05
river	2018	0.0	0.46
river	2019	0.2	0.72
river	2020	0.0	0.80
river	2021	0.8	NaN

Location	Water_year	TN_mg_L	TP_mg_L
river	2022	0.7	0.03
river	2023	0.6	0.03
trib	2015	NaN	NaN
trib	2016	NaN	0.07
trib	2017	253.5	NaN
trib	2018	0.1	1.20
trib	2019	0.1	0.88
trib	2020	0.1	1.38
trib	2021	0.7	NaN
trib	2022	0.6	0.03
trib	2023	0.7	0.03

For the 2023 season, total nitrogen (TN) and total phosphorus (TP) were low (below 0.7 mg/L N and 0.03 mg/L P) and within the long-term average values. For the river / reservoir sites, Sprakers was highest for both TN (0.81 mg/L N) and TP (0.05 mg/L P) in August. For the tributaries, TN was highest in June (1.1 mg/L N) in Peak Creek, and TP was highest in August (0.06 mg/L P) at the incoming tributary at the New River Trail Tressel.