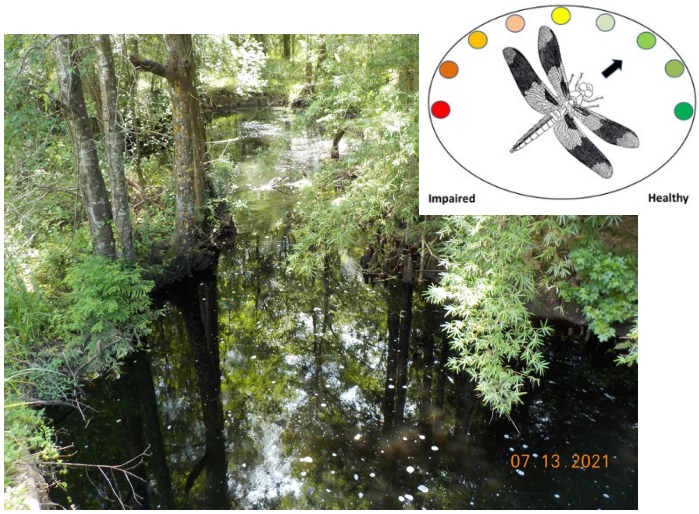
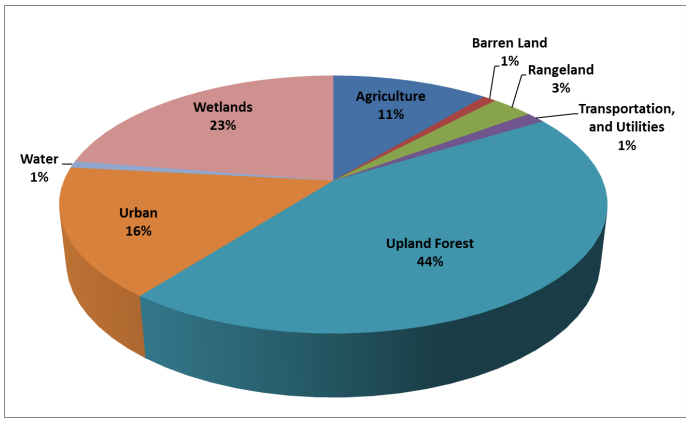
Waterbody: Northeast Black Creek



Basin: Bird Sink

Northeast Black Creek is a tannic, acidic, predominantly nitrogen-limited stream located in northeastern Leon County. The stream forms near Centerville Road and the Chemonie Plantation subdivision and flows southeast through the Miccosukee Land Cooperative before crossing under Capitola Road. The creek then turns northeast to join Still Creek and then flows into Bird Sink.

As shown in the following pie chart, approximately 31% of the 15,783-acre watershed is comprised of urban, agriculture/rangeland, transportation, and utilities land uses. Increases in stormwater runoff and waterbody nutrient loads can often be attributed to these types of land uses.



Background

Healthy, well-balanced stream communities may be maintained with some level of human activity, but excessive human disturbance may result in waterbody degradation. Human stressors may include increased inputs of nutrients, sediments, and/or other contaminants from watershed runoff, adverse hydrologic alterations, undesirable removal of habitat or riparian buffer vegetation, and introduction of exotic plants and animals. Water quality standards are designed to protect designated uses of the waters of the state (e.g., recreation, aquatic life, fish consumption), and exceedances of these standards are associated with interference of the designated use.

Due to ongoing beaver activity, station BC1 is no longer sampled. Leon County staff continue to evaluate the hydrological and plant community changes that are occurring in this section.

Methods

Surface water samples were collected to determine the health of Northeast Black Creek and met the requirements of the Florida Department of Environmental Protection (FDEP).

Results

Nutrients

According to FDEP requirements, four temporally independent samples per year are required to be collected to fulfill data requirements for the Numeric Nutrient Criteria (NNC) thresholds. Unfortunately, due to stagnant streamflow conditions not suitable for sampling, collecting the amount of data required by FDEP has been difficult (Tables 1 and 2). The NNC (based on a geometric mean) has never been exceeded during the period of record.

For illustrative purposes, individual data points were plotted to determine any possible trends (Figures 1 and 2). With few exceptions, individual values did not exceed the instream criteria for total phosphorus or total nitrogen. Elevated nutrient values during the 2nd

quarter of 2020 and the 3rd quarter of 2021 were the result of localized rainfall events that occurred before the sampling events. The associated runoff pushed nutrient laden material into the stream, causing a temporary increase in nutrients.

Table 1. FDEP's total phosphorus criteria for streams applied to Northeast Black Creek. Due to conditions not suitable for sampling, the state Numeric Nutrient Criteria data requirements could not always be calculated for stations during the period of record.

Northeast Black Creek	Instream Protection Criteria TP (0.18 mg/L)			
Year	**BC1**	**BC2M**	**BC3**	**BC4**
2006	-	-	-	-
2007	0.18	-	-	-
2008		-	-	-
2009	0.08	-	0.07	0.06
2010	0.08	-	-	-
2011-2012	-	-	-	-
2013	0.08	0.09	0.07	0.07
2014	-	-	-	-
2015	-	-	0.06	-
2016-2017	-	-	-	-
2018	-	-	0.07	0.03
2019	-	-	-	-
2020	-	0.08	-	-
2021	-	-	-	-

Table 2. FDEP's total nitrogen criteria for streams applied to Northeast Black Creek. Due to conditions not suitable for sampling, the state Numeric Nutrient Criteria data requirements could not always be calculated for stations during the period of record.

Northeast Black Creek	Instream Protection Criteria TN (1.03 mg/L)			
Year	**BC1**	**BC2M**	**BC3**	**BC4**
2006	0.36	-	-	-
2007	-	-	-	-
2008	-	-	-	-
2009	0.27	-	0.69	0.72
2010	0.41	-	-	-
2011-2012	-	-	-	-
2013	0.40	0.71	0.61	0.47
2014	-	-	-	-
2015	-	-	0.66	-
2016-2017	-	-	-	-
2018	-	-	0.64	0.68
2019	-	-	-	-
2020	-	0.78	-	-
2021	-	-	-	-

Escherichia coli (E. coli)

The *E. coli* water quality limit of > 410 in 10% of samples collected over a thirty-day period was exceeded several times at stations BC2M, BC3 and BC4 (Figure 3). Based on anthropogenic land use, FDEP considers the exceedances possibly the result of residential development in the watershed (e.g., improperly functioning septic tanks). Other causes could be wild animals and/or agriculture.

Dissolved Oxygen

As Figure 4 shows, Northeast Black Creek stations occasionally did not meet the Class III criteria for dissolved oxygen (DO). Staff believes that this is a natural condition for this location, since the creek is a low gradient blackwater stream that drains wetlands.

Biochemical Oxygen Demand (BOD)

BOD levels were elevated at stations BC2M (5.5 mg/L) and BC3 (3.0 mg/L) during the 2nd quarter sampling event in 2021. Other water quality parameters taken at station BC3 were typical of the stream, so it is unknown why the BOD level was elevated. However, along with an elevated BOD level at station BC2M, the pheophytin result (31.1 µg/L) was elevated at the station as well. Pheophytin (a degradation product of chlorophyll) can contribute to higher levels of BOD.

Stream Condition Index and Habitat Assessment

The Habitat Assessment Scores for stations BC2M (128) and BC3 (126) were in the Suboptimal/Optimal category while station BC4 (106) was in the Suboptimal category (Table 3). The Stream Condition Index (SCI) scores (Table 4) for stations BC2M (66), BC3 (51), and BC4 (52) indicate the presence of a stream biological community that is healthy.

<u>Station BC2M</u>

The results of the Habitat Assessment score (128) for station BC2M characterize the stream habitat between the high-Suboptimal to low-Optimal categories, with the score being influenced by substrate availability and areas with high bank angles,

particularly in the bends. The SCI score (66) is the average of scores from the two independently sorted vials and translates to the high end of the Healthy category. For comparison, the previous sample event completed in November of 2018 scored 69 which is on the low end of the Exceptional category. During the March 2021 sample event, vial 1 scored within the Healthy category, while vial 2 scored within the Exceptional category. No taxa dominance was expressed in either vial, or in the sample as a whole. Within both vials (294 macroinvertebrates sorted), the most numerous taxa were the freshwater clam *Musculium* sp. (34), and the blackfly *Simulium ubiquitum* (36).

From the total taxa collected, nine are listed as sensitive taxa by the FDEP while three are listed as very tolerant. The Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa (EPT) are widely regarded as the groups of aquatic insects that contain a large number of pollution sensitive taxa. The EPT score for the station is five. No Plecoptera or Ephemeroptera taxa were noted in the SCI. However, the Trichoptera were represented by five species: three Leptoceridae (*Oecetis nocturna*, *Oecetis* sp. E and *Triaenodes ignita*), one Hydropsychidae (*Cheumatopsyche* sp.) and one Hydroptilidae (*Oxyethira* sp.). For reference, the EPT score in 2018 was four.

No long-lived taxa were noted in the 2021 SCI and only one long-lived taxa (a crayfish) was noted as present in the 2018 SCI. From observation over the years, this station is the first within the monitoring sites on East Black Creek to go dry in drought, especially during late-spring dry periods. Over the past five years the channel has been dry at least once in every year, although flow is maintained for most of the year.

Station BC3

The results of the Habitat Assessment score (126) for station BC3 characterize the stream habitat in the high-Suboptimal to low-Optimal range. Water levels and the lack of leaf material were the primary influencers on the scoring. The SCI score (51) is the average of scores from two independently sorted vials and translates to a categorical score of Healthy.

Compared to the 2018 event, this SCI score is 5 points lower but within the same Healthy categorical rating.

A total of 36 taxa were collected from station BC3 during the SCI sampling. The most numerous invertebrates sorted in both vials was the Trichopteran taxa *Cheumatopsyche* sp. Overall, this taxa expressed a slight dominance (28.4%) of total individuals sorted (84 of 296). From the total taxa collected, six are listed as sensitive taxa by the FDEP while five are listed as very tolerant. The Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa (EPT) are widely regarded as the groups of aquatic insects that contain a large number of pollution sensitive taxa. The EPT score for the station is four. No Plecoptera were noted in the SCI. One Ephemeropteran species was collected, the "sensitive" species *Stenonema mexicanum*. The Trichoptera were represented by three taxa, including the dominant taxa *Cheumatopsyche* sp.

Station BC4

The results of the Habitat Assessment score for Station BC4 characterize the stream habitat as Suboptimal, with the score being influenced by man-made modified channel morphology in the lower portion of the sampling transect and the lack of a major leaf habitat. The SCI score at BC4 is 52. This score is the average of scores from the two independently sorted vials and translates to a categorical score of Healthy. The last time a SCI was completed in this station was the winter of 2018. During that event, the station received a score of 69 which was in the Exceptional category.

The macroinvertebrate community at BC4 expressed a moderate dominance by the chironomid *Tribelos jucundum*, which is a FDEP sensitive species. Of the 313 invertebrates sorted between both samples, 108 (34.5%) of them were *Tribelos jucundum*. From the total taxa collected, nine are listed as sensitive taxa,

while seven taxa are listed as very tolerant. The Ephemeroptera (mayflies), Plecoptera (stoneflies) and Trichoptera (caddisflies) taxa (EPT) are widely regarded as the groups of aquatic insects that contain a large number of pollution sensitive taxa. The EPT score for the station is four. No Plecoptera were noted in the SCI. One Ephemeropteran species was collected, the "sensitive" genus *Stenonema*. The Trichoptera were represented by three taxa, including the "sensitive" genus *Triaenodes*. Also, of note, the rare new species of *Rhyacophila* previously collected at this station was not recovered during this sampling event.

The shift to a slightly lower SCI score lies in the reduction of Ephemeropteran and Trichopteran taxa present, fewer total taxa and an increase in very tolerant taxa.

For more information about the SCI and Habitat Assessment, click Here.

Other Parameters

Other water quality parameters appear to be normal for the area and no impairments were noted.

Conclusions

Based on ongoing sampling, Northeast Black Creek met, with few exceptions, the nutrient thresholds for the East Panhandle Region. Occasionally the stations did not meet the Class III criteria for DO. This is the result of normally low DO in low gradient, wetland fed systems like this stream. The *E. coli* water quality limit was exceeded several times during the period of record.

BOD levels were elevated at stations BC2M and BC3 during the 2nd quarter sampling event. While other water quality parameters taken at station BC3 were typical of the stream, pheophytin was elevated at station BC2M and may have contributed to higher levels of BOD.

The Habitat Assessment Scores for stations BC2M and BC3 were in the Suboptimal/Optimal category while station BC4 was in the Suboptimal category. The SCI scores for all stations indicates the presence of a stream biological community that is healthy.

Other water quality parameters appear to be normal for the area and no other impairments were noted.

Thank you for your interest in maintaining the quality of Leon County's water resources. Please feel free to contact us if you have any questions.

Contact and resources for more information

www.LeonCountyWater.org

Click here to access the results for all water quality stations sampled in 2021.

Click here for a map of the watershed – Sample Stations BC2M, BC3 and BC4.

Johnny Richardson, Water Resource Scientist
(850) 606-1500
Richardsonjo@leoncountyfl.gov

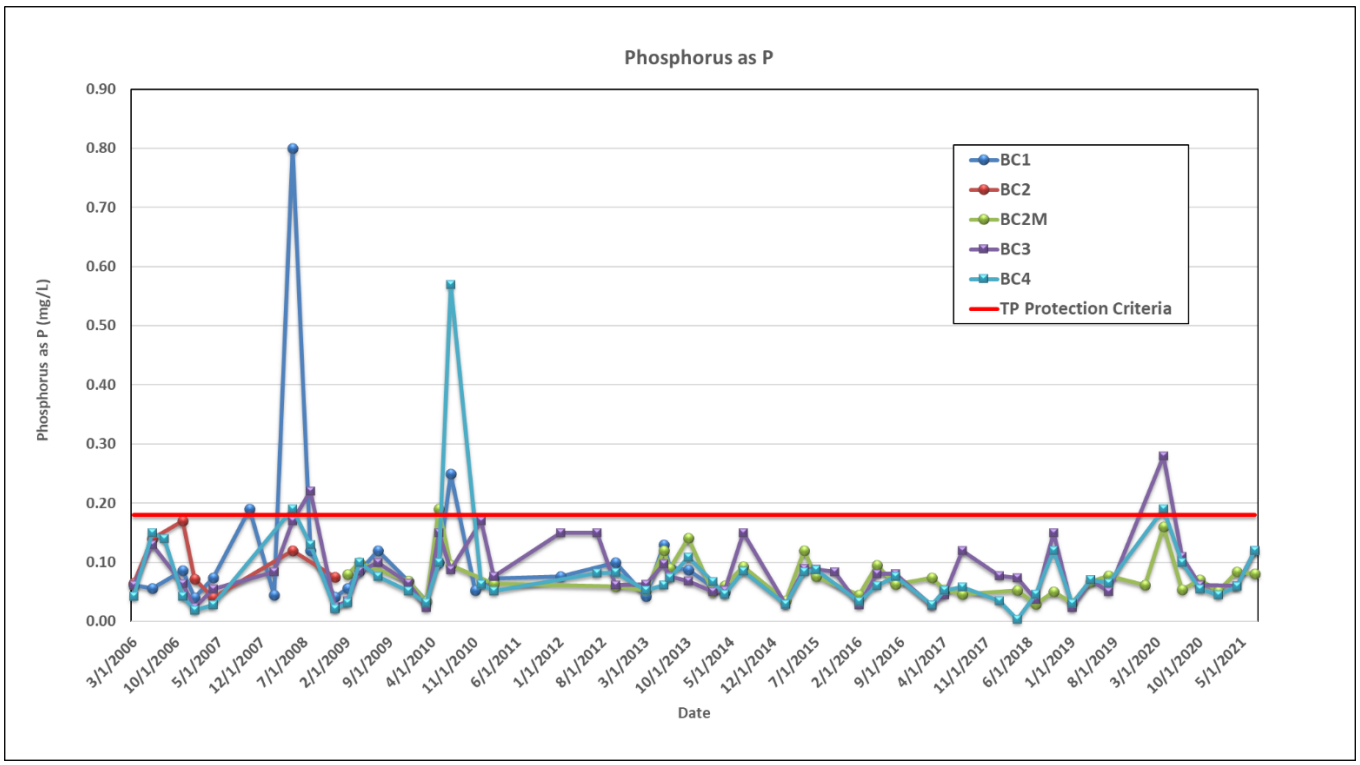


Figure 1. Total phosphorus results for Northeast Black Creek.

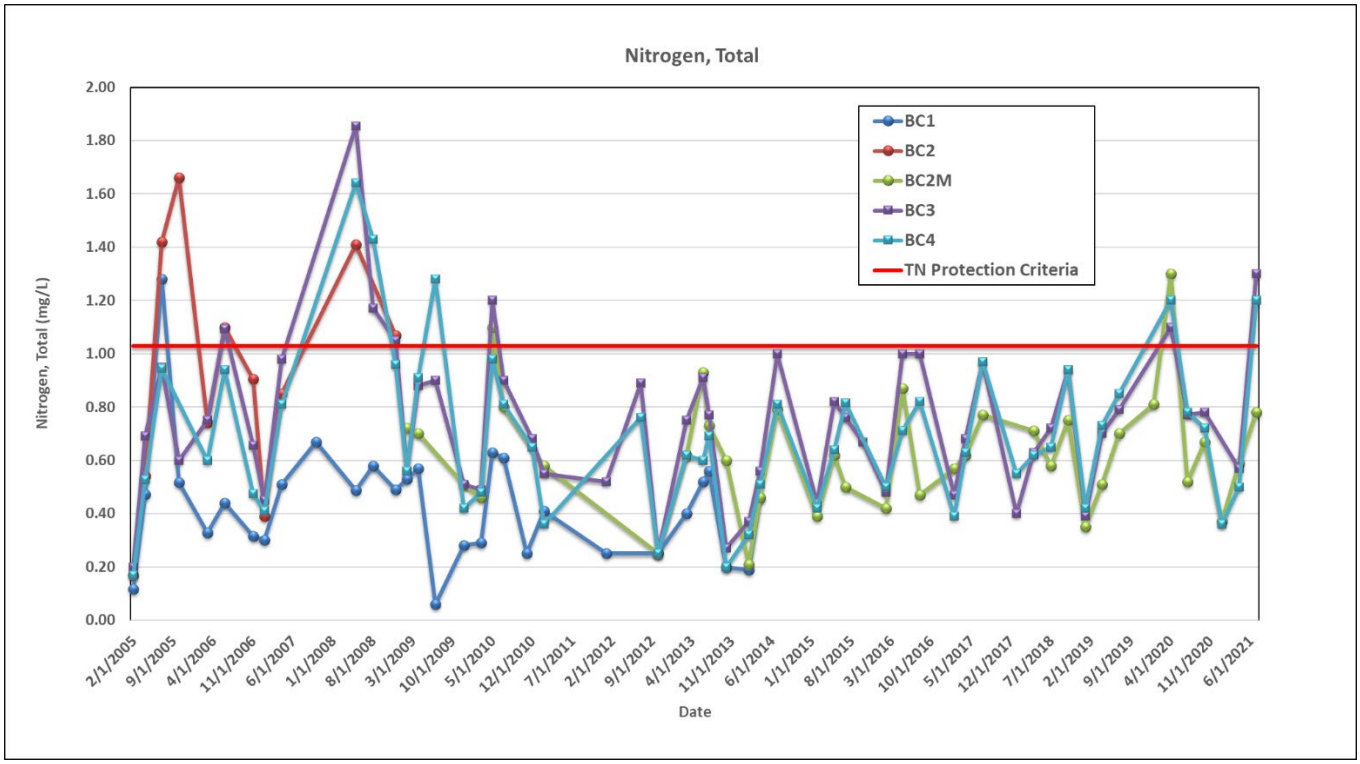


Figure 2. Total nitrogen results for Northeast Black Creek.

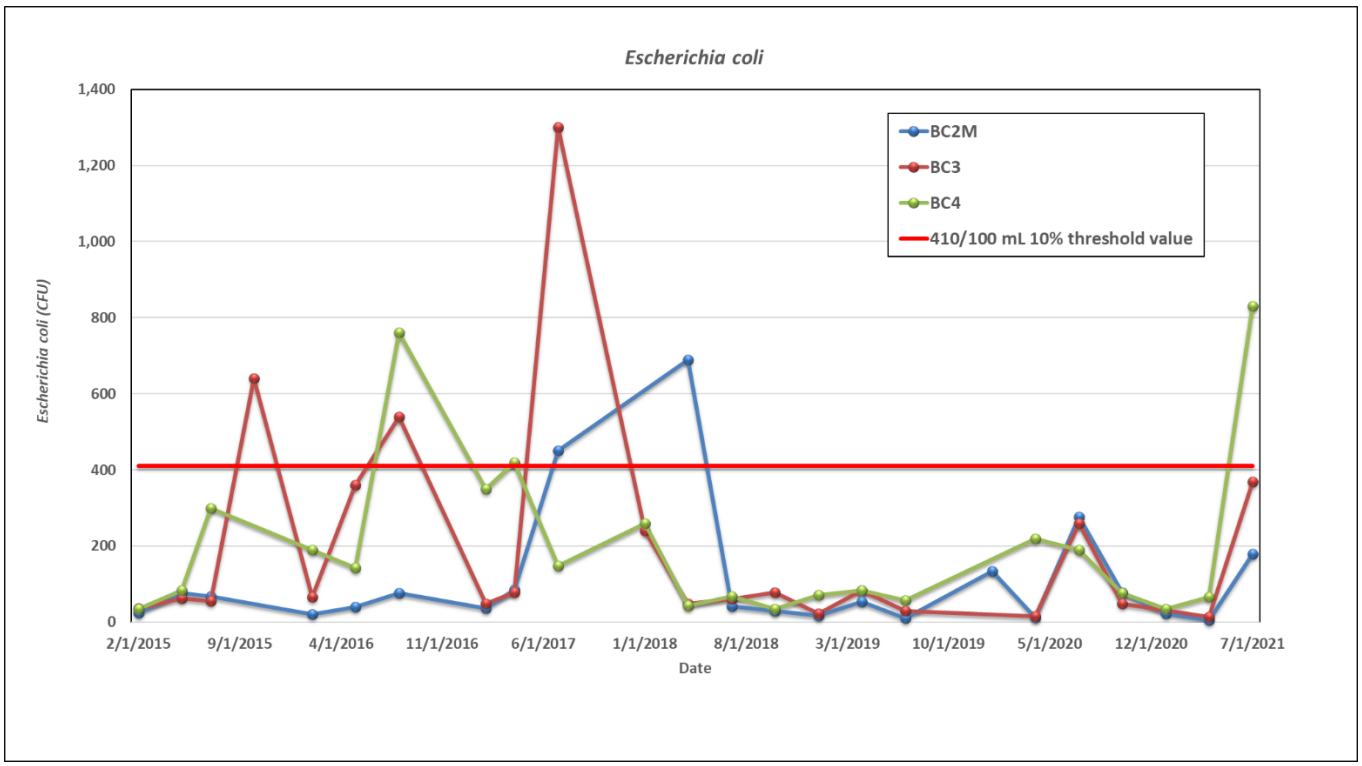


Figure 3. *E. coli* results for Northeast Black Creek.

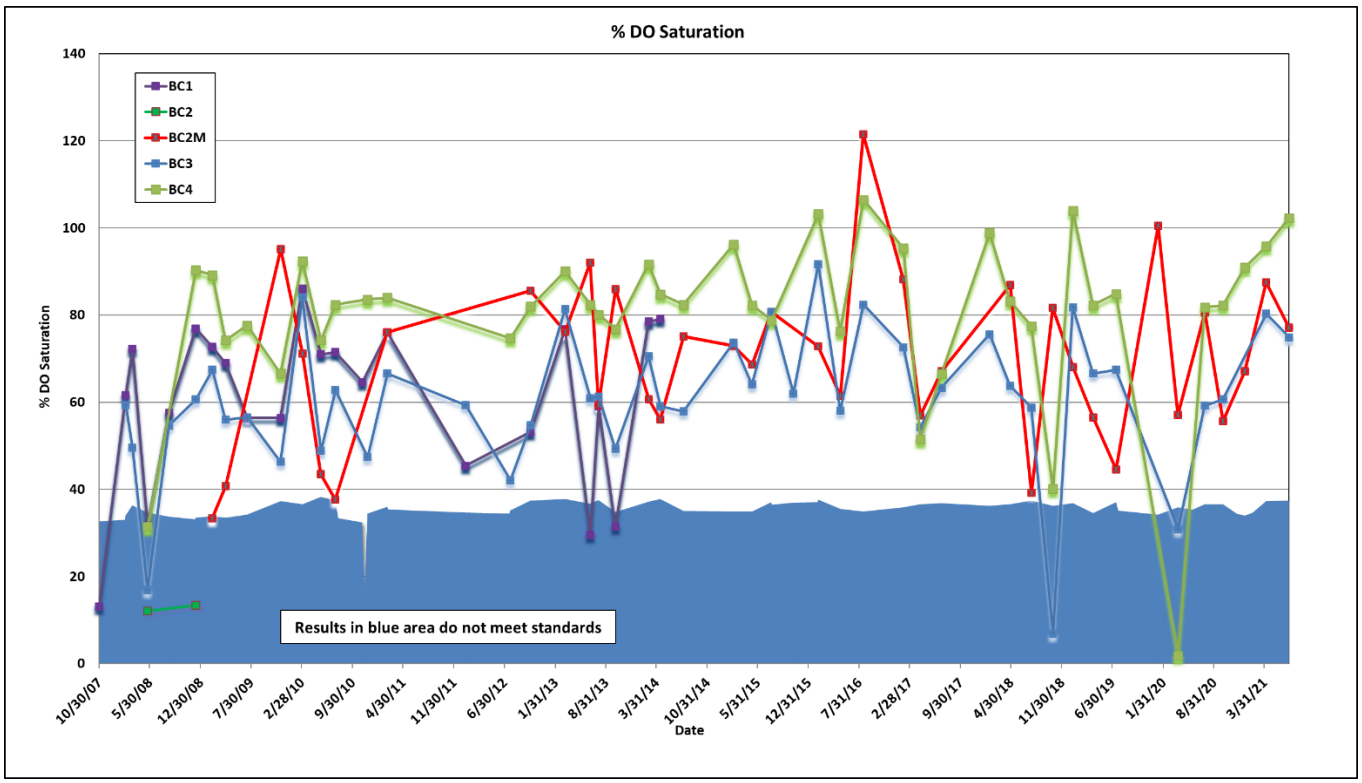


Figure 4. Dissolved Oxygen Percent Saturation results for Northeast Black Creek.

Table 3. Habitat Assessment results for Northeast Black Creek.

Northeast Black Creek Stations	BC2M Score	Category	BC3 Score	Category	BC4 Score	Category
Substrate Diversity	12	Suboptimal	13	Suboptimal	10	Marginal
Substrate Availability	8	Marginal	7	Marginal	6	Marginal
Water Velocity	20	Optimal	12	Suboptimal	8	Marginal
Habitat Smothering	16	Suboptimal	14	Suboptimal	15	Suboptimal
Artificial Channelization	20	Optimal	20	Optimal	14	Suboptimal
Bank Stability	7, 7	Suboptimal, Suboptimal	10, 10	Optimal, Optimal	7, 8	Suboptimal, Suboptimal
Riparian Zone Width	10, 10	Optimal, Optimal	10, 10	Optimal, Optimal	10, 10	Optimal, Optimal
Riparian Vegetation Quality	9, 9	Optimal, Optimal	10, 10	Optimal, Optimal	9, 9	Optimal, Optimal
Final Habitat Assessment Score	**128**		**126**		**106**	
Interpretation	**Suboptimal/Optimal**		**Suboptimal/Optimal**		**Suboptimal**	

Table 4. Stream Condition Index results for Northeast Black Creek.

Northeast Black Creek Stations	BC2M Vial 1	BC2M Vial 2	BC3 Vial 1	BC3 Vial 2	BC4 Vial 1	BC4 Vial 2
Stream Condition Index Metrics Scores						
Total Taxa	6.52	7.39	2.61	3.04	6.09	6.52
Ephemeroptera Taxa	0	0	0	2	0	2
Trichoptera Taxa	5.71	5.71	2.86	2.86	2.86	2.86
% Filter Feeder	7.57	7.57	6.59	7.83	1.58	1.92
Long-lived Taxa	0	0	3.33	3.33	0	6.67
Clinger Taxa	5	7.5	3.75	7.5	2.5	6.25
% Dominance	9.78	9.92	7.23	6.87	5.49	6.35
% Tanytarsini Taxa	8.52	9.07	5.33	8.38	7.55	5.92
Sensitive Taxa	7	7	2	4	6	8
% Tolerant Taxa	7.54	7.55	5.88	6.59	8.19	7.23
SCI Vial Score	64.03	68.58	43.97	58.21	44.72	59.67
Stream Condition Index Score	**66**		**51**		**52**	
Score Interpretation	**Healthy**		**Healthy**		**Healthy**	