

FISH KILL INVESTIGATION:

Indian Creek
Franklin County
Broad River Drainage

By
Anthony Rabern
Fisheries Biologist

Georgia Department of Natural Resources
Wildlife Resources Division
Social Circle, Georgia

October 9, 2019

This investigation was supported with state and federal funds allocated to the Fisheries Section's North Region.

Indian Creek
Franklin County
October 5-8, 2019

On Saturday, October 5, 2019 at 1652 hours, Tony Anderson (Fisheries Tech 3; ((706) 936-9580)) received a phone call from Fisheries Biologist Hunter Roop ((404) 783-4933) regarding a potential fish kill in Indian Creek located in Franklin County, Georgia. Mr. Anderson called the State Operations Center (SOC), which provided him with the contact information for Mr. Dennis Barron ((706) 384-3400), who reported the fish kill to the SOC. Mr. Anderson arrived at the Indian Creek stream crossing on Mr. Barron's farm (Site 6, Figure 1) at 1930 hours and confirmed the presence of dead fish. At Site 6, Mr. Anderson measured a pH of 4.5, dissolved oxygen (DO) of 2.8 mg/L and water temperature of 19.9°C. Mr. Anderson also observed a black coloration and strong odor in the stream at this location. Due to darkness, Mr. Anderson suspended his investigation until the next morning.

That evening, Mr. John Maddox from the Environmental Protection Division's Emergency Response Team ((470) 829-1284) contacted Mr. Anderson and reported that the probable cause of the incident was associated with runoff from a fire at the Franklin Biomass Generating Facility (Figure 1) located at 3465 Highway 198, Carnesville, GA 30521. Mr. Anderson also briefed his supervisor, Anthony Rabern ((404) 695-7816), by phone and together they developed a plan for investigating the incident the following day.

On Sunday morning, October 6, 2019, Mr. Anderson located stream access points along Indian Creek and measured water quality at Sites 1, 5, 6, and 7 (Figure 1). In addition, he measured water quality at Site 9 (Figure 1) located in the Middle Fork Broad River downstream of the confluence with Indian Creek. As the day progressed, Mr. Anderson and I established other water quality locations at Sites 2, 3, 4 and 8 (Figure 1). Water quality data measured by Mr. Anderson on October 6, 2019 are summarized in Table 1.

At 1300 hours on October 6, 2019, Mr. Anderson met me at the Franklin Biomass Generating Facility (FBGF). I spoke with the Operations Supervisor, Mr. Scotty Smith ((252) 813-8804), who put me in contact via his cell phone with the Plant Manager, Mr. David Groves ((910) 477-1198). Mr. Groves explained that the wood pile that fuels the generating facility self-combusted on Saturday afternoon (10/5/19). FBGF staff used large-volume water cannons permanently mounted next to the wood pile to suppress the fire with thousands of gallons of water. Runoff from the water-soaked wood pile overwhelmed the stormwater retention system and overflowed into an Unnamed Tributary that originates on the property and eventually flows into Indian Creek (Photos 1-4). While at the facility, I observed a light amount of smoke bellowing from the wood pile. I also observed residual runoff from the wood pile that was black in color.

Mr. Anderson and I proceeded to Site 3 (Figure 1), located in the stormwater drainage system, to measure water quality in the black runoff from FBGF. We followed the stormwater retention system downstream and observed black effluent flowing from the retention pond and into the Unnamed Tributary of Indian Creek (Photo 5). The water in the Unnamed Tributary of Indian Creek was black in color and clarity was zero (Photo 6). Because of this black color, we were not able to visually ascertain the presence/absence of aquatic organisms in the Unnamed Tributary of Indian Creek nor use the Hach Kit to measure pH and total hardness. We followed the Unnamed Tributary of Indian Creek downstream for approximately 0.7 miles to its confluence with Indian Creek. Just upstream of the confluence of the Unnamed Tributary of Indian Creek with Indian Creek proper at Site 2 (Figure 1), the water was clear and live fish were abundant (Photo 7). Water quality parameters (temperature, dissolved oxygen, pH, and total hardness) at Site 2 were suitable to support aquatic life and the water chemistry at this location as well as at

Site 1 were not affected by the black effluent draining just downstream from the Unnamed Tributary of Indian Creek.

The first fish mortality was observed at Site 4 (Figure 1) in Indian Creek, which was located about 25 m downstream from the confluence with the Unnamed Tributary of Indian Creek. Although Site 2, upstream of the confluence, and Site 4, downstream of the confluence, were only 50 meters apart, a significant change in water quality was measured between these two stations. At Site 4, the pH decreased by four units, total hardness increased by 500% and dissolved oxygen decreased by 1.2 mg/L. In addition, there was a dramatic color change at Site 4 from clear to black and a strong odor like that of burnt wood.

Having established that the upstream terminus of the fish kill zone was at Site 4, Mr. Anderson and I hiked back to our trucks and then drove to each downstream access point along Indian Creek (Sites 5 through 8, Figure 1) to quantify the fish kill using the subsampling procedures outlined in Southwick and Loftus (2017). At each site, we waded approximately 50 m upstream before collecting and enumerating all fish mortalities over a 100 m reach. All fish mortalities were identified to species, enumerated and measured to the nearest inch (Photos 8 & 9). No live fish were observed at Sites 4, 5, 6 and 7; however, a combination of both live and dead fish was observed at Site 8 (Figure 1). Based on the presence of live fish at Site 8 and low numbers of dead fish, we concluded that Site 8 was the downstream terminus of the fish kill zone. To evaluate latent mortality from the black effluent flowing downstream, follow-up monitoring was conducted at Site 8 on October 7, 2019 and at Site 9 on the Middle Fork Broad River on October 8, 2019. No latent mortalities or water quality impacts were observed at these two lower sites.

Based on the findings from our water quality measurements, visual stream observations and fish counts on October 6, 2019, a total die-off of fish occurred in 4.6 miles of Indian Creek. The fish kill was caused by significant water quality changes in Indian Creek associated with run-off from a smoldering wood pile at FBGF. The resulting black effluent that drained from FBGF into Indian Creek significantly reduced pH and dissolved oxygen concentrations in a very short time period to levels that were potentially lethal to fish in the 4.6-mile impact zone. The total number of fish mortalities in Indian Creek on October 6, 2019 was estimated to be 2,159 fish (Table 2), which included seven species of fish including those pictured in Photos 8 and 9. The total number of fish mortalities was estimated by expanding the total number of fish collected in each 100 m subsample reach over the total distance for each reach. Expanded fish counts were then summed for all subsample reaches to provide a total fish mortality estimate. Using the replacement values of fish reported in Southwick and Loftus (2017), the monetary value of these fish mortalities totaled \$1,428.67. Investigative costs for personnel and vehicles used in this fish kill investigation totaled \$3,366.78 (Table 3). The investigative costs plus monetary value of fish brought the total cost of the fish kill to \$4,795.45.

Literature Cited

Southwick, R.I, and A.J. Loftus, editors. 2017. Investigation and Monetary Values of Fish and Freshwater Mollusk Kills. American Fisheries Society, Special Publication 35, Bethesda, Maryland. 165pp.

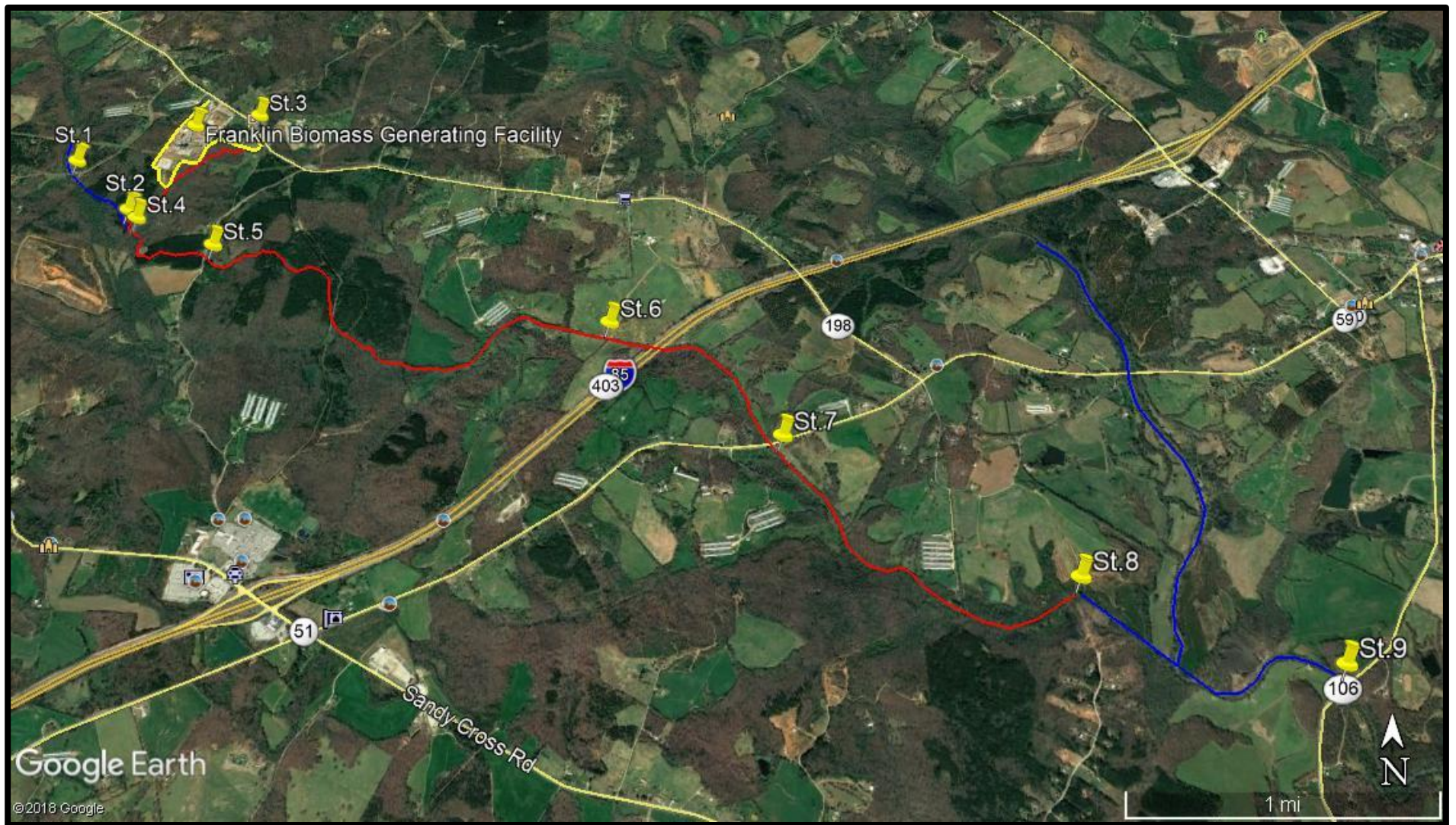


Figure 1. Map of sites visited by WRD Fisheries personnel on October 5-8, 2019 during a fish kill investigation of Indian Creek and an Unnamed Tributary of Indian Creek (Franklin County, Georgia). The red line highlights the fish kill zone. Sites are identified in the text and in Table 1.

Table 1. Water chemistry measurements taken on October 6, 2019 by WRD Fisheries Section personnel during a fish kill investigation on Indian Creek and an Unnamed Tributary of Indian Creek in Franklin County. Sites are identified in the text and in Figure 1.

Figure 1 Site Number	Site Description	Time	Water Temperature (°C)¹	Dissolved Oxygen (mg/L)¹	pH²	Total Hardness (mg/L)²	Dead Fish Present?
1	Indian Creek at Burke Road	1130	19.1	7.5	7.0	17	No
2	Indian Creek Upstream from Confluence with the Unnamed Tributary of Indian Creek	1415	19.3	7.9	7.0	17	No
3	Stormwater retention pond at Franklin Biomass Generating Facility	1340	22.3	0.8	NS ³	NS ³	No
4	Indian Creek Downstream from Confluence with the Unnamed Tributary of Indian Creek	1430	19.3	6.7	4.0	86	Yes
5	Indian Creek at Culpepper Road	1050	18.4	3.8	4.5	103	Yes
6	Indian Creek at Dennis Barron's Farm	1230	18.8	4.3	5.0	103	Yes
7	Indian Creek at Highway 59	1010	18.5	5.2	5.5	86	Yes
8	Indian Creek at Nelms Road Farm	1744	20.1	5.5	6.5	86	Yes
9	Middle Fork Broad River at Highway 106	0900	19.4	8.3	7.0	25	No

¹ YSI Model Pro20, dissolved oxygen and temperature meter.

² HACH kit model AL-36-W

³ Total hardness and pH were not measured at Site 3 because the black water prevented detection of color changes in the chemical test kits.

Photos 1&2. Large woodpile at the Franklin Biomass Generating Facility. The photo on the right also shows the catch basin for collecting runoff from the woodpile where black residue from recent runoff was noticeable. Photographs were taken by Anthony Rabern on October 6, 2019.



Photos 3&4. Two stormwater retention ponds at the Franklin Generating Biomass Facility with each pond containing black water. Photographs were taken by Anthony Rabern on October 6, 2019.



Photo 5. Stormwater retention pond outlet at the Franklin Generation Biomass Facility releasing black effluent into the Unnamed Tributary of Indian Creek. Photograph was taken by Anthony Rabern on October 6, 2019.



Photo 6. Unnamed Tributary of Indian Creek containing black effluent from Franklin County Generating Facility's retention ponds on October 6, 2019. Photograph was taken by Anthony Rabern.



Photo 7. Confluence of Indian Creek (left) and the Unnamed Tributary of Indian Creek (right) that drained the Franklin Biomass Generating Facility's retention ponds. Photograph taken by Anthony Rabern on October 6, 2019.



Photos 8&9. Fish mortalities collected by Anthony Rabern in Indian Creek downstream of the Unnamed Tributary of Indian Creek on October 6, 2019. Photographs were taken by Anthony Rabern.

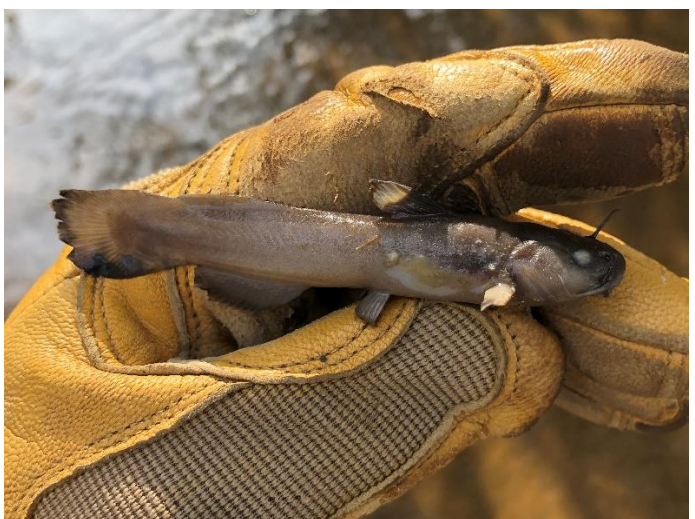


Table 2. Total numbers and monetary values of dead fish observed during a WRD Fisheries Section fish kill investigation conducted on October 6, 2019 on Indian Creek, Georgia (Franklin County).

Species	Total Number	Total Value ¹
Bluehead Chub (<i>Nocomis leptocephalus</i>)	641	\$ 76.94
Yellowfin Shiner (<i>Notropis lutipinnis</i>)	305	\$ 36.56
Bluegill (<i>Lepomis macrochirus</i>)	400	\$ 24.85
Redbreast Sunfish (<i>Lepomis auritus</i>)	37	\$ 14.90
Northern Hogsucker (<i>Hypentelium nigricans</i>)	143	\$ 223.40
Blackbanded Darter (<i>Percina nigrofasciata</i>)	282	\$ 345.83
Snail Bullhead (<i>Ameiurus brunneus</i>)	351	\$ 506.18
GRAND TOTAL	2,159	\$ 1,428.67

¹ Southwick, R.I, and A.J. Loftus, editors. 2017. *Investigation and Monetary Values of Fish and Freshwater Mollusk Kills*. American Fisheries Society, Special Publications 35, Bethesda, Maryland. 165pp.

Table 3. WRD Fisheries Section investigative costs associated with an October 5-8, 2019 fish kill investigation on Indian Creek, Georgia (Franklin County).

Personnel	Effort (hours)	Rate	Value
Fisheries Biologist III	30	\$65.21/hour	\$1,956.30
Fisheries Technician III	23	\$50.28/hour	\$1,156.44
Vehicles	Miles	Rate	Value
#144952	328	\$0.58/mile	\$190.24
#136042	110	\$0.58/mile	\$63.80
Total Cost			\$3,366.78