Monitoring Water Quality Conditions Along the Suwannee River Basin

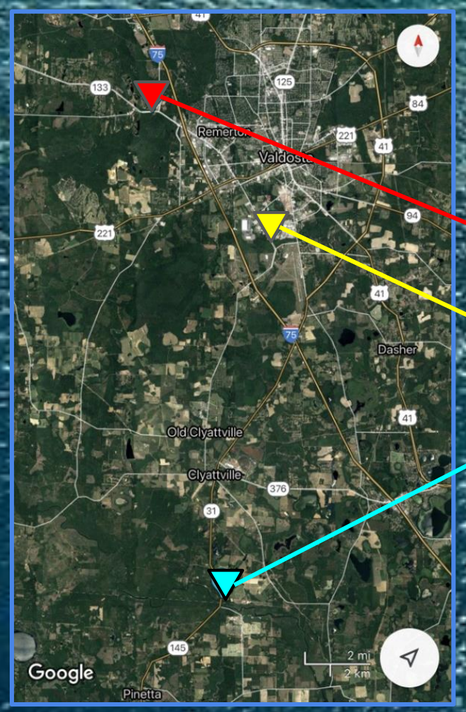
Alex Chesna
Faculty Sponsor: Dr. Can Jon Denizman
Department of Physics, Astrology, and Geosciences

Abstract

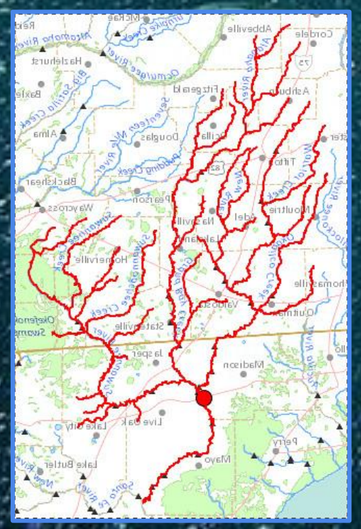
Over the course of several months, water samples were collected and measured along the Suwannee River Basin. The recorded rivers along the basin were Little River, Withlacoochee River, and Mud Swamp. These locations were distributed to monitor incoming flow from the head to the base of the basin near the Georgia Florida border line. Physical and chemical measurements such as PH levels, temperature, total dissolved solids, and total dissolved oxygen were reported. Chemical elements suspended in the water were also identified using the Atomic Absorption Spectrometry Machine. These methods help provide a better understanding of our water quality as well as the impact on surrounding ecosystems along our local river basin.

Dissolved Oxygen using the LaMotte shallow water testing kit

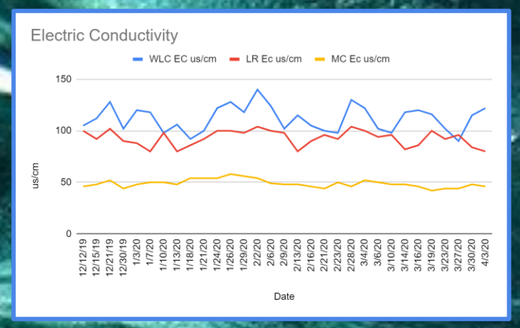
Alec collecting water from Little River at Troupe Ville boating ramp.
First picture from 12/2/2019. Second picture from 2/9/2020.

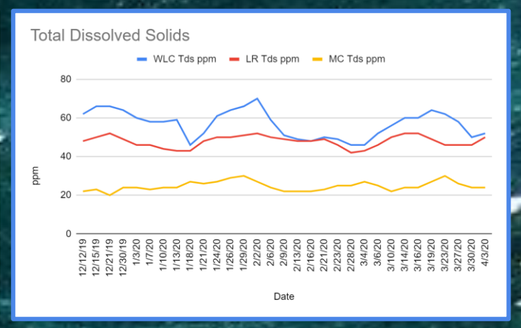


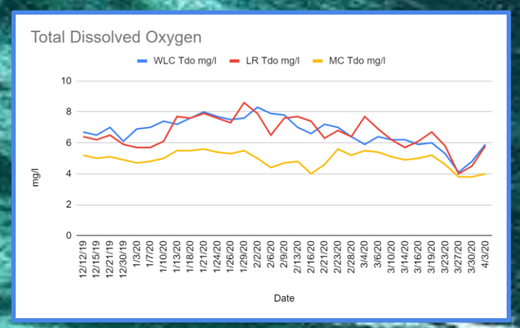
Little River: 30.85149, -83.3476
Mud Swamp: 30.79450, -83.28550
Withlacoochee: 30.63550, -83.31130

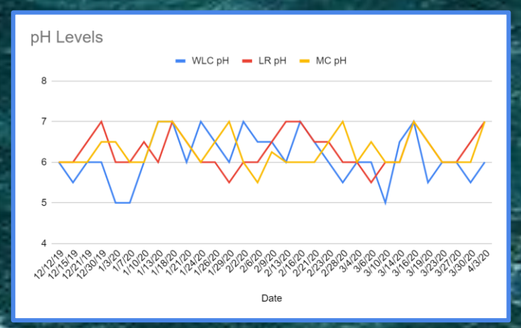


Suwannee River Basin









Date	Outside Temp degrees F	WLC Water Temp degrees F	WLC EC us/cm	WLC pH	WLC Tdo mg/l	WLC Tds ppm	LR Water Temp degrees F	LR Ec us/cm	LR pH	LR Tdo mg/l	LR Tds ppm	MC Water temp degrees F	MC Ec us/cm	MC pH	MC Tdo mg/l	MC Tds ppm
12/12/19	58	51.6	105	6	6.7	62	52.4	100	6	6.4	48	49.6	46	6	5.2	22
12/15/19	67	60.2	112	5.5	6.5	66	63.3	92	6	6.2	50	59.1	48	6	5	23
12/21/19	62	57.3	128	6	7	66	60.1	102	6.5	6.5	52	54.3	52	6	5.1	20
12/30/19	69	64.6	102	6	6.1	64	62.6	90	7	5.9	49	56.4	44	6.5	4.9	24
1/3/20	75	70.4	120	5	6.9	60	69.8	88	6	5.7	46	62.7	48	6.5	4.7	24
1/7/20	67	62.6	118	5	7	58	60.4	80	6	5.7	46	59.1	50	6	4.8	23
1/10/20	78	72.3	98	6	7.4	58	74.4	98	6.5	6.1	44	61.5	50	6	5	24
1/13/20	79	65.4	106	7	7.2	59	65.8	80	6	7.7	43	70.8	48	7	5.5	24
1/18/20	72	66.3	92	7	7.6	46	64.4	86	7	7.6	43	68	54	7	5.5	27
1/21/20	45	39.8	100	6	8	52	48.2	92	6.5	7.9	48	34.2	54	6.5	5.6	26
1/24/20	69	58.4	122	7	7.7	61	56.6	100	6	7.6	50	57.5	54	6	5.4	27
1/26/20	63	59.1	128	6.5	7.5	64	58.6	100	6	7.3	50	54.5	58	6.5	5.3	29
1/29/20	54	49.7	118	6	7.6	66	49.8	98	5.5	8.6	51	50.1	56	7	5.5	30
2/2/20	62	59	140	7	8.3	70	56.3	104	6	7.9	52	55.4	54	6	5	27
2/6/20	78	73.5	124	6.5	7.9	59	64.7	100	6	6.5	50	62.3	49	5.5	4.4	24
2/9/20	67	62.7	102	6.5	7.8	51	62	98	6.5	7.6	49	57.9	48	6.25	4.7	22
2/13/20	79	76.4	115	6	7	49	66.1	80	7	7.7	48	64.1	48	6	4.8	22
2/16/20	56	51.6	105	7	6.6	48	55.6	90	7	7.4	48	50.2	46	6	4	22
2/21/20	59	57.9	100	6.5	7.2	50	57.2	96	6.5	6.3	49	59	44	6	4.6	23
2/23/20	68	55.9	98	6	7	49	56.4	92	6.5	6.8	46	55.5	50	6.5	5.6	25
2/28/20	60	56.1	130	5.5	6.4	46	54.3	104	6	6.4	42	51.2	46	7	5.2	25
3/4/20	78	73.7	122	6	5.9	46	62.3	100	6	7.7	43	69.4	52	6	5.5	27
3/6/20	64	58.5	102	6	6.4	52	58	94	5.5	6.9	46	61	50	6.5	5.4	25
3/10/20	76	71.3	98	5	6.2	56	67.9	96	6	6.2	50	65.9	48	6	5.1	22
3/14/20	84	79	118	6.5	6.2	60	78.4	82	6	5.7	52	78.5	48	6	4.9	24
3/16/20	74	68.9	120	7	5.9	60	71.2	86	7	6.1	52	70.3	46	7	5	24
3/19/20	86	80.3	116	5.5	6	64	76.7	100	6.5	6.7	49	77.8	42	6.5	5.2	27
3/23/20	82	78.4	102	6	5.3	62	74.8	92	6	5.8	46	76.4	44	6	4.6	30
3/27/20	87	82.6	90	6	4.1	58	75.3	96	6	4	46	77.9	44	6	3.8	26
3/30/20	87	85.5	115	5.5	4.8	50	76.1	84	6.5	4.5	46	78	48	6	3.8	24
4/3/20	77	73.1	122	6	5.9	52	73.6	80	7	5.8	50	72.1	46	7	4	24

Methodology

The shallow water testing kit LaMotte, donated by WWALS Watershed Coalition, was used to collect water measurements along the river basin. The instruments used provided in the testing kit were: The Oakton eco-tester to measure the electric conductivity, a wide range pH scale with indicator solution, a thermometer (model 545) to measure outside and water temperatures, and 4 chemicals to help measure the dissolved oxygen.

Before collecting, protective gloves were worn to avoid e-coli contamination as well as chemical burns while measuring the pH and dissolved oxygen. In order to collect water, a long rope was tied to a bucket and rinsed it out with distilled water before every use to avoid misleading measurements. The water was then tested in the shade so temperatures weren't skewed from the sun. After handling the chemicals, they were disposed in a jug labelled "toxic" that later would be emptied down a drainage system. The utility system wasn't connected to an underground-well-water system so chemicals weren't cycled back into drinking water. Water chemistry analysis using Atomic Absorption instrument, as well as an analysis on spatial and temporal rainfall and a basin-wide land use distribution was intended to be measured but was disrupted due to the pandemic.

Conclusion

The data collected in the tables above shows a drastic difference between the stagnant waters of Mud Swamp, MC, and the other two flowing rivers: Little River (LR) and Withlacoochee (WLC). The tannic creek has a low electric conductivity, dissolved oxygen and dissolved solids. This means Mud Swamp has either a large population of algae growth, a high rate of inorganic solids, or both. High levels of phosphorus and nitrogen results in less oxygen in the water. This also indicates less population of aquatic life due to the waters deficiency of oxygen (Aqua Sierra). The electric conductivity is affected by temperature and presence of inorganic dissolved solids (EPA). The AA analysis machine would have detected which inorganic dissolved solids such as sulfate, phosphate, chloride and nitrate anions were in the rivers. Since Mud Swamp has a low dissolved oxygen level, it would make sense as to why the conductivity rate is also low. As for the pH levels, all three rivers ranged between five and seven. The chemistry between the hydrogen ions lean more towards acidic/neutral, this is great for freshwater aquatic life.

Reference:
Aqua Sierra Biologist, Aqua Sierra: *Causes Of Low Dissolved Oxygen and Impact To Fish,* Nov 21, 2016. https://www.aqua-sierra.com/causes-of-low-dissolved-oxygen-and-impact-to-fish/
EPA United States Environmental Protection Agency; *5.9 Conductivity,* March 06, 2012. https://archive.epa.gov/water/archive/web/html/vms59.htm
Quarterman, John S. ,WWALS Watershed Coalition (WWALS), Lowndes County, Georgia, July 21, 2013 .http://wwals.net/2013/07/streamer-on-the-alapaha-and-withlacoochee-rivers.html