Blue Algae Boil Spring
Sampled 2013-2014

Site Information

Blue Algae Boil Spring, emerges from the north/west side of Sulphur Island in Seminole State Forest. The spring's flow was measured in 2005 by the St. Johns Water Management District. The mean discharge was 0.14 cubic feet per second (cfs) putting it in category as a fifth magnitude. One vent was identified and sampled, but more vents might be present discharging to a shallow pool, approximately 10x15 feet, with a soft bottom covered by detritus, coontails, and white sulfur reducing bacteria. The spring run is short, less than 100 m and becomes wetland like. The riparian zone consist of a normal, expected community of native plants, trees, and shrubs including cabbage palms, sweet gum trees, oaks, and no evidence of human disturbance. The spring run flows through heavily shaded woods, with sandy bottom until it enters Sulphur Run.

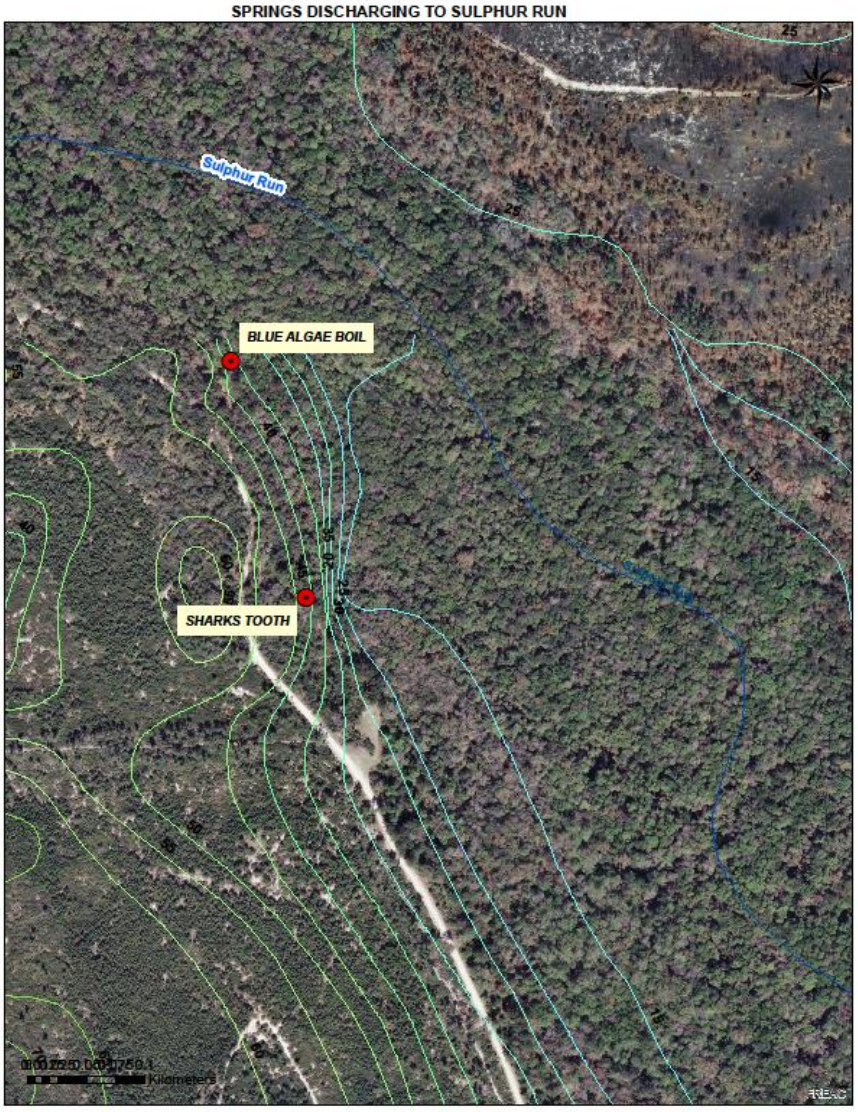

Figure 1-BA. Location of Blue Algae Boil in State Forest in Lake County

(A)

(B)

Figure 2-BA. Blue Algae Spring Run (A) and Spring Vent

Results

Water Quality

Water quality was fairly constant throughout all four sampling events (Table 1-BA) and suggest that human activities have minimal impact on water source of the spring. The dissolved oxygen (DO) results were low, but that is a natural condition for ground water. Sucralose was not detected. Boron results were somewhat elevated, however that is due to natural occurrence. Nutrients results were low including nitrate/nitrite (NO_3+_2) which were none detect. There are only three NO_3+_2 results. Due to sample contamination, the January 13 sample result was not valid. Even though there is not sufficient data to calculate NO_3+_2 annual geometric mean for Blue Algae Boil, the three sample results indicate that NO_3+_2 limit is well within the surface water criteria rule 62-302.531(2)(b)2 which states: "For spring vents, the applicable numeric interpretation of the narrative nutrient criterion …is 0.35 mg/L of nitrate-nitrite as an annual geometric mean, not to be exceeded more than once in any three calendar year period." Conductivity vary between 1308 - 1668 µmhos/cm and was approximately twice as high as at Sharks Tooth Spring which was approximately 0.25 km away.

Table 1-BA. Water Quality Results for Blue Algae Boil

Date Sampled	7/15/2013	10/7/2013	1/13/2014	4/14/2014
pH	7.31	7.45	7.4	7.45
DO mg/L	0.21	2.44	2.14	0.38
DO %	2.5	30.8	23	4.5
Specific Conductance (µmhos/cm)	1657	1668	1308	1657
Water temperature (°C)	22.7	23	22.96	22.7
Fecal Coliform (cfu/100mL)	2 U	2 U	88	2 U
Enterococci (cfu/100mL)	n/a	12 B	n/a	n/a
Turbidity (NTU)	0.5	0.10 U	0.10 U	0.15
Alkalinity (mg CaCO3/L)	152	148	147	148
Chloride (mg Cl/L)	320	330	340	300
Color true (PCU)	2.7 I	3.4 I	3.2 I	2.5 U
Fluoride (mg/L)	0.21	0.24	0.22	0.24
Sulfate (mg SO4/L)	170	180	180	150
TDS (mg/L)	934	878	877	873
TSS (mg/L)	2 I	2 U	2 I	2 U
Ammonia (mg N/L)	0.16	0.17	0.19	0.17
Nitrite/Nitrate (mg N/L)	0.004 U	0.004 U	n/a	0.004 U
Total Phosphorous (mg P/L)	0.061	0.092	0.06	0.061
Total Kjeldahl Nitrogen (mg N/L)	0.26	0.19	0.25	0.28
Organic Carbon (mg C/L)	1.3	1.3	1.4	1.3
Ortho-phosphate (mg P/L)	0.056	0.086	0.06	0.061
Sucralose (µg/L)	0.010 U	n/a	n/a	n/a
Calcium (mg/L)	107	106	103	104
Magnesium (mg/L)	32.9	33.6	32.6	33
Potassium (mg/L)	5.7	5.7	5.6	5.6
Sodium (mg/L)	184	183	n/a	n/a
Boron (µg/L)	65.8	65	67	68.5

B- Results based on colony counts outside the acceptable range

I- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

U - Indicates that the compound was analyzed for but not detected.

n/a - not collected or not reported due to data quality concerns

Habitat Assessment

The spring run was short and filled with *Ceratophyllum demersum*. Only a partial (50 m of run) was assessed during April 14, 2014 sampling. All secondary parameters reflected the optimal conditions. Three macroinvertebrate habitats were present: snags, leaf mats, and vegetation, however vegetation was a dominant habitat. The spring run was shallow with mostly soft bottom covered by decaying organic material and some sand.

Aquatic Macroinvertebrate Community

A total of 19 macroinvertebrate taxa were identified (Table 2-BA) in a subsample of 299 individuals collected on April 14, 2014. The dominant taxa were amphipods, *Gammarus sp*. (46 individuals) and *Hyalella azteca* (134 individuals) representing 44.8% of the subsample. Twenty nine percent of the subsample was represented by snails: *Floridobia sp.* and *Pleurocera sp*. A sensitive mayfly, Heptageniidae was identified in addition to a sensitive

isopod, *Caecidotea sp*. Several of the taxa present here are characteristic of vegetation in slow-moving or stagnant systems (e.g. *Atrichopogon, Caecidotea*, *Pelocoris,* and Culicidae).

Table 2-BA. Macroinvertebrate Data for Blue Algae Boil

Phylum	Class	Order	Family	Genus and Species	# of taxa
Annelida	Oligochaeta	Lumbriculida	Lumbriculidae	Lumbriculus variegatus	1
		Haplotaxida	Naididae		1
			Tubificidae		2
Arthropoda	Insecta	Diptera	Ceratopogonidae	Atrichopogon sp.	3
			Chironomidae	Cricotopus bicinctus	2
			Culicidae		1
		Ephemeroptera	Heptageniidae		1
		Heteroptera	Naucoridae	Pelocoris sp.	2
			Veliidae	Rhagovelia sp.	1
		Megaloptera	Corydalidae		1
		Odonata	Coenagrionidae	Argia sp.	12
	Crustacea	Amphipoda	Hyalellidae	Hyalella azteca	134
			Gammaridae	Gammarus sp.	46
		Isopoda	Asellidae	Caecidotea sp.	1
Mollusca	Gastropoda	Basommatophora	Ancylidae		5
		Mesogastropoda	Hydrobiidae	Floridobia sp.	72
			Pleuroceridae	Pleurocera sp.	14

Periphyton Survey

Small amount of periphyton was present in a run but not near the vents. Sample of periphyton was collected on January 13, 2014 and submitted for taxonomic identification to the DEP Biology Laboratory. The dominant taxon was *Phormidium* sp., which belongs to Class Cyanophyceae. There were also a few *Oscillatoria* sp. (Cyanophyceae) in the mat. The diatom, *Gomphonema* sp., was also present in the sample.

Linear Vegetation Survey

Only first 50 m of the spring run was accessed. *Ceratophyllum demersum* was the dominant macrophyte. Also present were *Hydrocotle spp*., *Lemna spp*., and *Saururus cermuus,* which are all native plants.

Summary

Blue Algae Boil is a fifth magnitude spring located within Seminole State Forest. It is surrounded by natural area with minimal human disturbance. The spring's discharge and water quality are consistent throughout a year. Water quality meets surface water criteria specified in Chapter 62.302, F.A.C. The plant and macroinvertebrate community are normal for small springs and spring run systems.

Acknowledgement

Thank you to Dana Denson, Macroinvertebrate Biology Coordinator with Reedy Creek Improvement District, for his help with macroinvertebrate data interpretation.