

Snail Spring - Group A

Sampled 2013-2014

Site Information

Snail Spring, located just north of CR 46A was originally mapped in 2005 and the flow was measured in 2005 and 2008 by the St. Johns Water Management District. The mean discharge was 0.26 cubic feet per second (cfs) putting it in category as a fifth magnitude. The spring is composed of a series of sand boils labeled A, B, C, and D. 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 Seminole Creek.

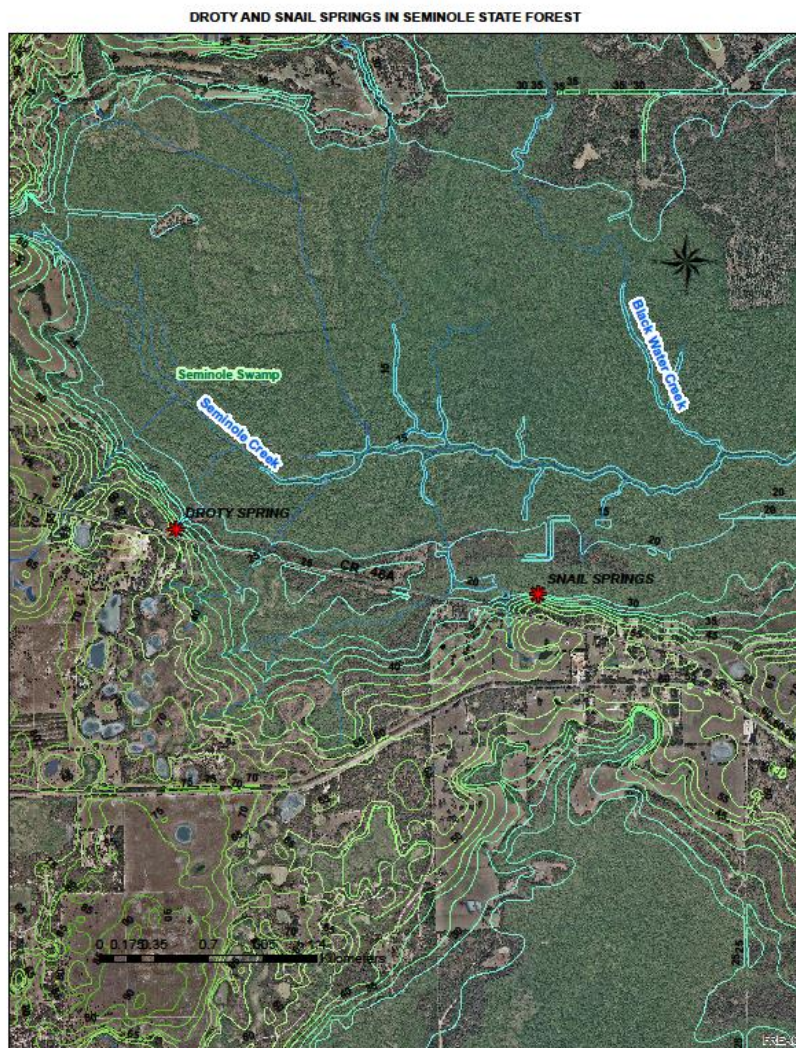


Figure 1-Sn. Location of Snail Spring in Seminole State Forest in Lake County

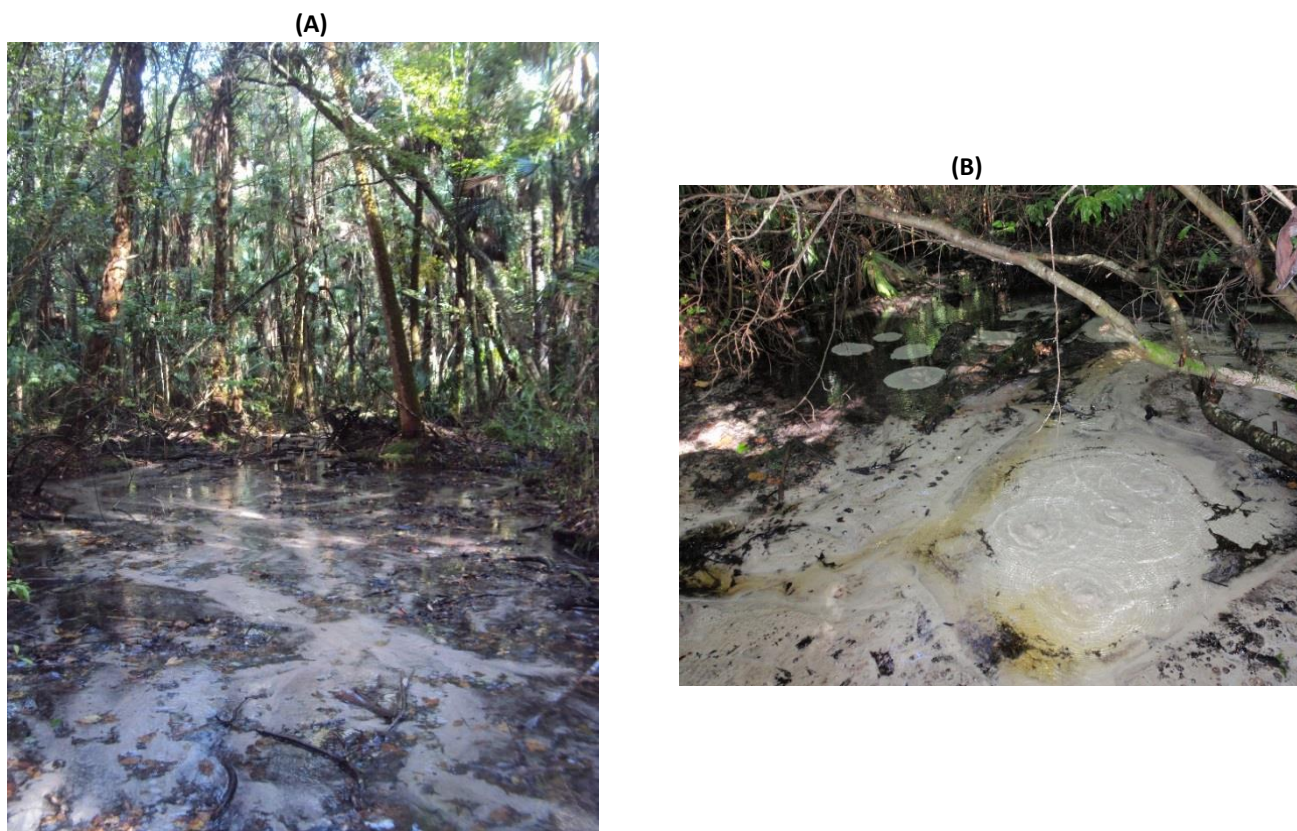


Figure 2-Sn. Snail Spring Run (A) and Group A sand boil (B)

Results

Water Quality

Water quality was fairly constant throughout all four sampling events. The dissolved oxygen (DO) results were low, but that is a natural condition for ground water. The Total Suspended Solids (TSS) result was elevated in April 14 sample most likely due to some sand impacting the sample. Note that all spring vents were very shallow (Figure 2-Sn). Sucralose was not detected and boron results were very low suggesting that human activities are not impacting water source of the spring. Nutrients results, including nitrate/nitrite (NO_3+NO_2) were also low. There are only three NO_3+NO_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+NO_2 annual geometric mean for Snail Spring, the three sample results indicate that NO_3+NO_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 353 and 384 $\mu\text{mhos/cm}$ and was a little higher than conductivity of Drotty Spring located approximately 1.5 miles west of Snail Spring.

Sample results were comparable to results reported by the Lake County for samples collected in 2004 and 2005.

Table 1-Sn. Water Quality Results for Snail Spring

Date Sampled	7/15/2013	10/7/2013	1/13/2014	4/14/2014
pH	7.6	8.1	7.36	7.6
DO mg/L	1.2	1.57	0.58	0.26
DO %	14.6	21.9	6.8	3.2
Specific Conductance (µmhos/cm)	360	384	375	353
Water temperature (°C)	23.5	23.5	23.5	23.4
Fecal Coliform (cfu/100mL)	128 B	2 U	2 U	15 B
Enterococci (cfu/100mL)	n/a	14 B	n/a	n/a
Turbidity (NTU)	3.4 A	0.9	0.3	0.45
Alkalinity (mg CaCO ₃ /L)	109	113	116	115
Chloride (mg Cl/L)	8.3	7.7	7.8	7.7 A
Color true (PCU)	30	3.9	4.8 I	3.7 I
Fluoride (mg/L)	0.21	0.24	0.22	0.24
Sulfate (mg SO ₄ /L)	57	62	60	60 A
TDS (mg/L)	236	227	200	233
TSS (mg/L)	7 I	n/a	2 U	56
Ammonia (mg N/L)	0.12	0.13	0.16	0.12
Nitrite/Nitrate (mg N/L)	0.004 U	0.006	n/a	0.004 U
Total Phosphorous (mg P/L)	0.19	0.16	0.15	0.21
Total Kjeldahl Nitrogen (mg N/L)	0.49	0.22	0.22	0.23
Organic Carbon (mg C/L)	3.3	1.4	1.6	1.5
Ortho-phosphate (mg P/L)	0.15	0.14	0.14	0.14
Sucralose (µg/L)	0.010 U	n/a	n/a	n/a
Calcium (mg/L)	50.6	51.5	49.5	50.2
Magnesium (mg/L)	13.8	14.6	13.7	13.8
Potassium (mg/L)	0.99 I	0.95 I	0.96	0.99 I
Sodium (mg/L)	5.7	5.5	n/a	n/a
Boron (µg/L)	19.6	17.7	21.2	18.7

A- Value reported is the mean of two or more determinations

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 HA score was 123 on January 13, 2014. All secondary parameters reflected the optimal conditions. The primary parameters revealed that only two major macroinvertebrate habitats were present, snags and leaf packs, and they were fairly sparse. The spring run was shallow with mostly sandy bottom and some accumulation of detritus.

Aquatic Macroinvertebrate Community

A total of 14 macroinvertebrate taxa were identified (Table 2-Sn) in a subsample of 290 individuals collected on January 13, 2014. The dominant taxa were the snails, *Floridobia* sp. (193 individuals, 66.6% of the subsample) followed by *Pleurocera* sp. (34 individuals, 11.7% of the subsample). Amphipods were also well represented by

numerous *Gammarus* and *Hyalella azteca* (total of 47 individuals, 16.2 % of the subsample). One sensitive taxon was found, *Microtendipes pedellus* grp.

This taxa list dominated by Hydrobiidae and Pleuroceridae is to be expected for a 5th magnitude spring. It represents invertebrate that can tolerate low levels of dissolved oxygen (DO) either through physiological or behavioral adaptations and/or brief life cycle. Because of the very low DO, very brief recruitment time available in a short run, and very limited habitat, good water quality indicators like EPT and long-lived taxa like hellgrammites and larger odonates would not be expected.

Table 2-Sn. Macroinvertebrate Data

Phylum	Class	Order	Family	Genus and Species	#
Annelida	Oligochaeta	Haplotaxida	Enchytraeidae		1
			Tubificidae		5
Mollusca	Gastropoda	Basommatophora	Anculidae		1
		Mesogastropoda	Hydrobiidae	Floridobia	193
			Pleuroceridae	Pleurocera	34
Arthropoda	Crustacea	Amphipoda	Gammaridae	Gammarus	16
			Hyalellidae	Hyalella azteca	31
Arthropoda	Insecta	Diptera	Ceratopogonidae	Atrichopogon	1
			Chironomidae	Chironomus	3
				Corynoneura lobata	1
				Microtendipes pedellus grp.	1
				Rheotanytarsus exiguus grp.	2
			Syrphidae		1

Periphyton Survey

Periphyton was present near the boils but not within the spring run. Two samples of periphyton were collected on January 13, 2014 and submitted for taxonomic identification to the DEP Biology Laboratory. There were two different algal mats in the sample, therefore the co-dominant taxa were *Cladophora glomerata* (Class Chlorophyceae) and *Symploca muscorum* (Class Cyanophyceae). Other filamentous algae were present in the sample, including *Oscillatoria* sp. (Cyanophyceae) and *Oeodogonium* spp. (Chlorophyceae). The diatoms *Gomphonema* sp. and *Nitzschia* sp. were also present in the sample.

Linear Vegetation Survey

There was less than 2 square meters of plants growing within the reach of spring run. *Hydrocotyle*, *Ludwigia repens* and *Chara* (a plant like algae) were observed.

Summary

Snail Spring 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.