Markee Spring
Sampled 2013-2014

Site Information

Markee Spring emerges from the south/west of Sulphur Run in Seminole State Forest. The spring's flow was measured in 2003, 2005, and 2008 by the St. Johns Water Management District. The mean discharge was 0.24 cubic feet per second (cfs), putting it in category as a low fourth magnitude. Water flows from sand boils covered with organic debris. The spring pool is relatively large and oval-shaped, approximately 20 feet long and 10 feet wide. The spring run has a very soft bottom comprised primarily of organic material and flows approximately 500 feet before discharging into Sulphur Run. The riparian zone consist of a normal, expected community of native plants, trees, and shrubs with little evidence of human disturbance.

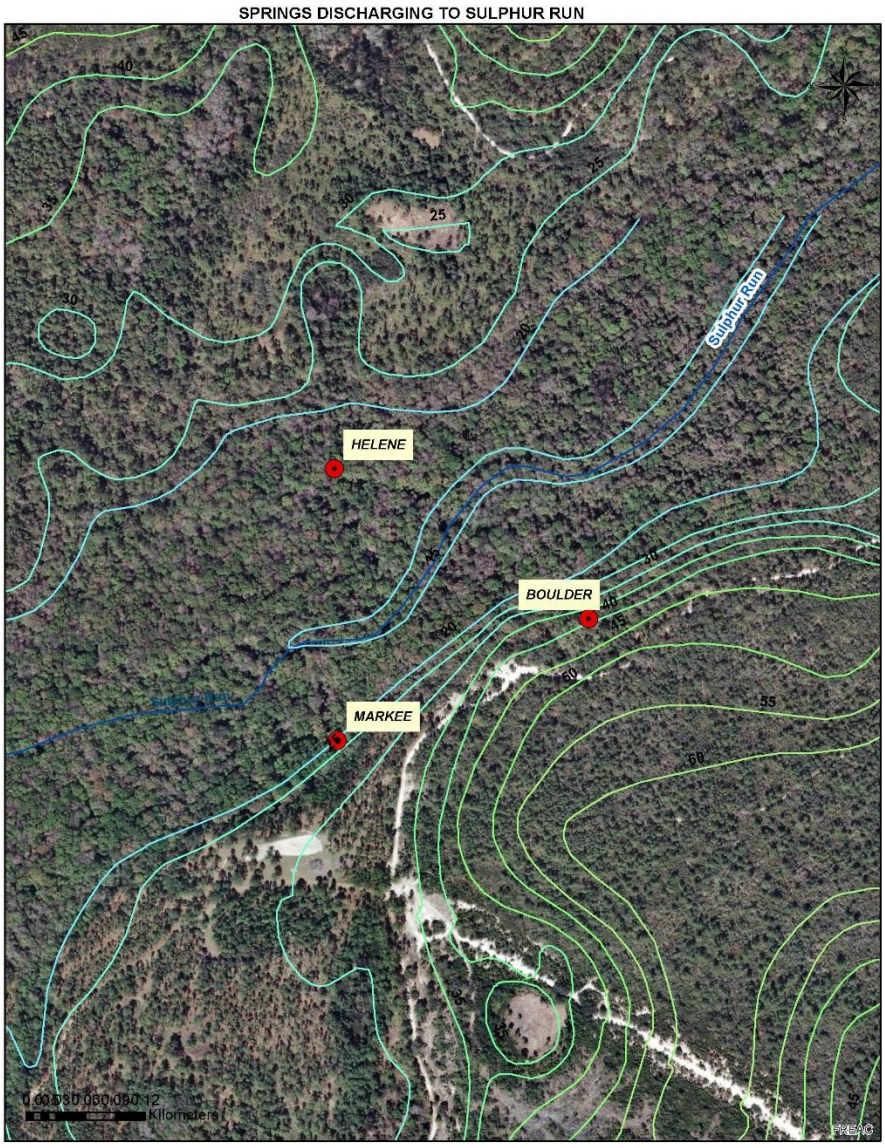

Figure 1-MA. Location of Markee Spring in State Forest in Lake County

(A)

(B)

Figure 2-MA. Markee Spring pool (A) and Spring Run (B)

Results

Water Quality

Water quality was fairly constant throughout all four sampling events (Table 1-MA). The dissolved oxygen (DO) results were low, but that is a natural condition for ground water. Sucralose was not detected and boron results were low. Nitrate/nitrite (NO_{3+2}) results were not detectable and all other nutrients results were low. There are only three NO_{3+2} results. Due to sample contamination, the January 13 sample result was not valid. The data suggest that human activities have not impacted water source of the spring. There is not sufficient data to calculate annual geometric means for nitrate/nitrite for Markee spring, however, all three sample results indicate that NO_{3+2} limit is well within the springs 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."

Table 1-MA. Water Quality Results for Markee Spring

Date Sampled	7/17/2013	10/8/2013	1/15/2014	4/15/2014
pH	7.50	7.48	7.51	7.44
DO mg/L	0.5	0.09	0.97	0.28
DO %	5.8	1.1	13	3.3
Specific Conductance (µmhos/cm)	569	587	566	571
Water temperature (°C)	21.9	21.98	21.95	21.89
Fecal Coliform (cfu/100mL)	2 U	2 U	2 U	2 U
Enterococci (cfu/100mL)	128 B	2 B	n/a	n/a

Turbidity (NTU)	0.10 U	0.1 U	1.7	0.4
Alkalinity (mg CaCO3/L)	146	153	150	144
Chloride (mg Cl/L)	33	33	33	33
Color true (PCU)	4.0 I	3.9	6.8	7
Fluoride (mg/L)	0.22	0.23	0.23	0.24
Sulfate (mg SO4/L)	96	92	89	90
TDS (mg/L)	350	356 A	317	373
TSS (mg/L)	2 U	2 I	2 I	2 I
Ammonia (mg N/L)	0.16	0.16	0.19	0.16
Nitrite/Nitrate (mg N/L)	0.004 U	0.004 U	n/a	0.004 U
Total Phosphorous (mg P/L)	0.078	0.079	0.08	0.077
Total Kjeldahl Nitrogen (mg N/L)	0.25	0.28	0.28	0.23
Organic Carbon (mg C/L)	1.4	1.7	2.0	1.7
Ortho-phosphate (mg P/L)	0.075	0.078	0.075	0.078
Sucralose (µg/L)	0.010 U	n/a	n/a	n/a
Calcium (mg/L)	73.6	74.2	74.3	71.4
Magnesium (mg/L)	17	17.8	17.6	17
Potassium (mg/L)	1.5	1.4	1.2 I	1.3
Sodium (mg/L)	20.8	20.6	n/a	n/a
Boron (µg/L)	24.6	26.4	24.9	27.4

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

A Habitat Assessment was not performed due to accessibility issues of the spring run.

Aquatic Macroinvertebrate Community

Aquatic macroinvertebrates were not collected due to accessibility issues of the spring run.

Periphyton Survey

Periphyton was present in the spring and the spring run. A sample of periphyton was collected on January 15, 2014 and submitted for taxonomic identification to the DEP Biology Laboratory. The dominant taxon was *Cladophora glomerata*, which belongs to Class Chlorophyceae. Other filamentous algae were present in the sample, including *Oedogonium* sp. (Chlorophyceae) and *Phormidium* sp. (Cyanophyceae). Diatoms present in the sample included *Encyonema* sp., *Epithema* sp., and *Gomphonema* sp.

Linear Vegetation Survey

A Linear Vegetation Survey was not performed, but *Pontederia cordata* was noted growing in the spring run.

Summary

Markee Spring is a low fourth 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.