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Ginnie Springs itself is located in Ginnie Springs Outdoors, a private park consisting of seven springs. Ginnie Springs Outdoors is located approximately 6.5 miles northwest of High Springs, on the south side of the picturesque Santa Fe River. Ginnie Springs is supposedly named for a woman who washed her laundry at the site many years ago (See North Florida, 2012). Water in the spring is very clear and visibility is excellent most of the time. The water varies in color from blue to green with periods of tea-colored tannic water during high rain events. This beautiful water attracts not only human visitors but native flora and fauna (Figure 1). Spring ecosystems are some of the most critically important ecosystems in the world! Thus, protecting and restoring this valuable drinking water, ecosystem, and tourist attraction is imperative.

Figure 1 – Ginnie Springs.

Ginnie Spring is about 90 feet in diameter and 12 feet deep with a sand and limestone bottom. The main spring vent is 55 feet deep. The spring run tapers from the wide pool to perhaps 35 feet in width and flows about 500 feet into the Santa Fe River as shown in Figure 2. The canopied spring and spring run is surrounded mostly by cleared cypress and hardwood forest (Scott, 2004).

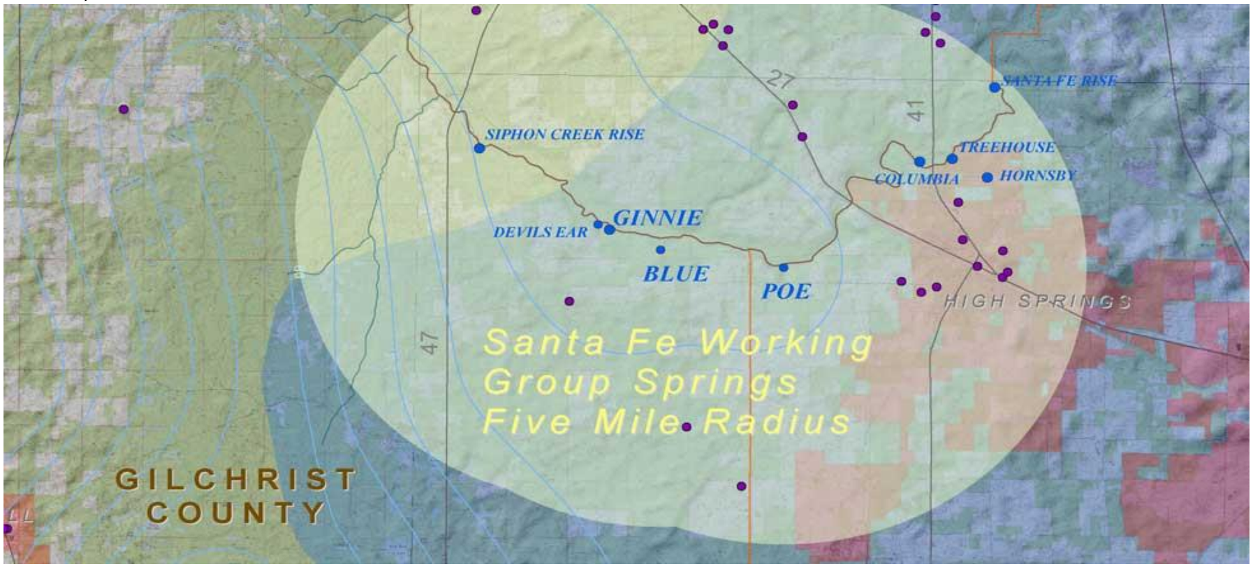

Figure 2 – Ginnie Spring location within the Lower Santa Fe Springshed and sister springs (Santa Fe River Springs Basin Working Group, 2012).

Ginnie Springs offers great outdoor experiences for visitors and enthusiasts and is a popular Florida attraction. The spring offers a chance to introduce the benefits of fresh clear spring water and the resulting unique ecosystem to the public. The park offers open-water and cave diving due to an extensive cave system associated with Ginnie Springs. Divers get a firsthand look at where their drinking water comes from. Water is usually clear with a blue tone, but when the downstream Santa Fe River is high, the floodplain goes under water, and visibility is reduced because of the natural tannins in the river water. During this time of high water, nutrients are introduced to the system and reduce water quality.


Figure 3 – Diving photographs from Ginnie Springs.

Because Ginnie Springs is located with other springs like a string of pearls along the Santa Fe River, it is easy to canoe or kayak or simply float or snorkel down the river to visit each one of the sister springs. Native submerged aquatic plants (SAV) like sagittaria are numerous providing food sources for herbivores like turtles and snails that in turn provide food for the primary producers like birds, fish, and alligators. Beautiful scenery is plenty with turtles resting on logs and wading birds perched along the shoreline. However, the canopied system maintains the SAV by blocking a lot of the sunlight needed by the plants. Thus, exotic aquatic vegetation, like algal mats, is increasing.

Figure 4 – Outdoor activities at Ginnie Springs.

Although Ginnie Springs is in a privately owned park, it remains a special place to Florida and the world with its natural beauty, unique ecosystem, and critically important drinking water. Thousands of people visit the spring bringing millions of tourist dollars to the State. However, the spring and run are being encroached on by development and surrounding agriculture. This area is not a proper area for agriculture due to the unconfined nature of the karst terrain and important rainfall recharge of the Floridan Aquifer through Ginnie Springs and the Santa Fe River basin. Once pristine waters are becoming impaired with dissolved oxygen and nutrients (Florida Department of Environmental Protection, 2012). Discharge rates from Ginnie Springs have been slowly declining due to excessive pumping for water supply and irrigation. Some of the nutrients on the increase are total suspended solids (TSS), nitrate, phosphorus, calcium and iron as studied between 1974 and 2002 (Scott, 2004). Thus, the Class III Ginnie Spring and Santa Fe River recently implemented a total maximum daily load (TMDL) of nitrate inputs of .35 mg/L through a Basin Management Action Plan (BMAP). Florida Statutes require that Class III waters maintain a well-balanced population of fish and wildlife. Thus it is imperative that everyone join the public endeavors of protecting and recovering the health of Ginnie Spring and the Santa Fe River. If you are not a part of the solution then you are a part of the problem!

Assessing Our Success

The success of the BMAP and recovery of the ecosystem largely depends on monitoring the system to determine our success. Basin monitoring will include spring flows, water quality of problematic nutrients, biology, ecology, human use and land use. Monitoring will occur upstream of the spring, in the spring vents, and downstream in the spring run. Figure 5 indicates existing monitoring sites as reported by the BMAP.

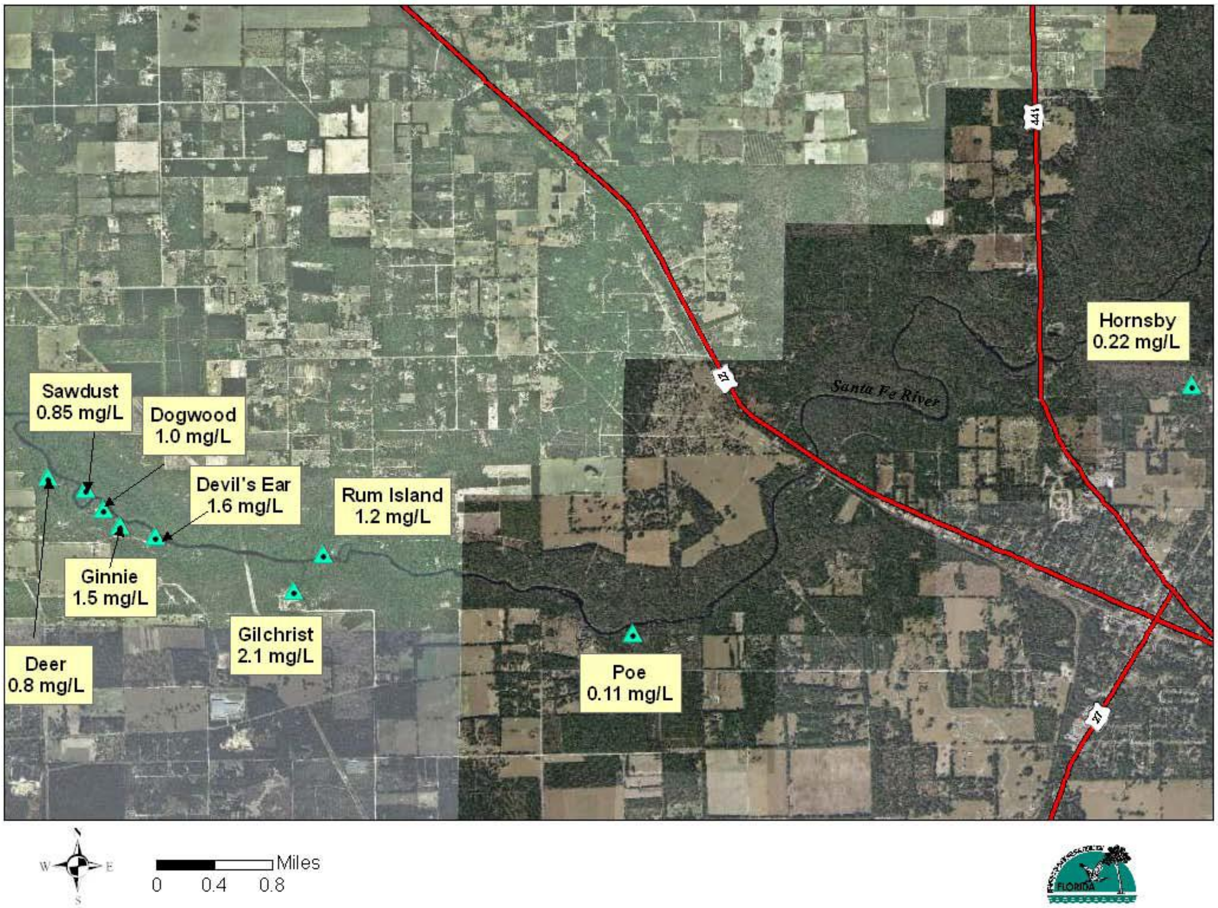

Figure 5 – Stations currently sampled in the Santa Fe River and associated springs (Florida Department of Environmental Protection, 2012).

Although there are a few existing monitoring stations, it would be prudent to increase monitoring of the groundwater throughout the springshed as proposed by the BMAP in Figure 6.

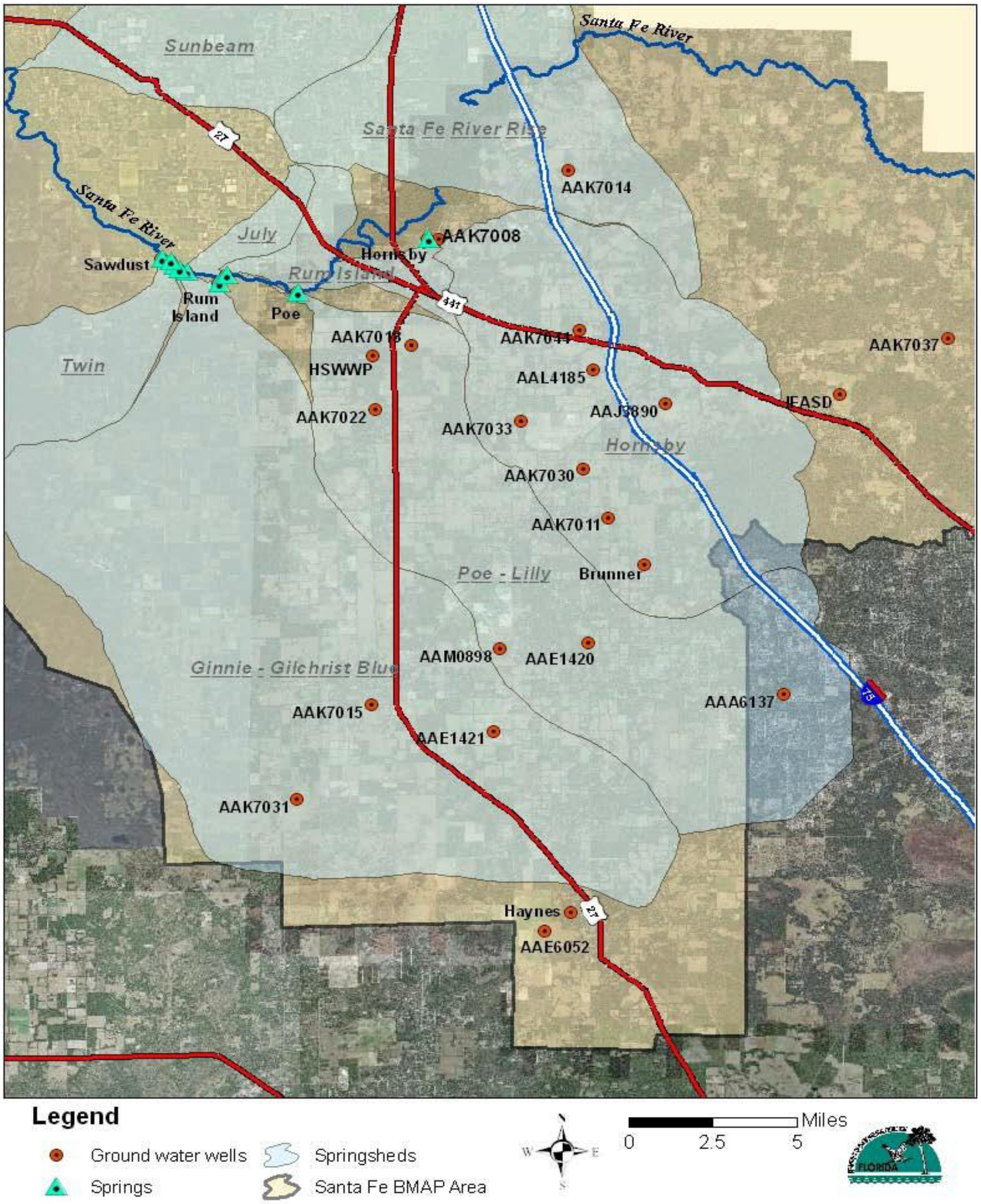

Figure 6 – Twenty proposed monitoring wells in the Santa Fe River basin (Florida Department of Environmental Protection, 2012).

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Monitoring Frequency

Monitoring within the springshed, as shown in Figures 5 and 6, will be based upon previous work and planning by the Wakulla Springs Working Group in 2011 (The Howard T. Odum Florida Springs Institute, 2011). Continuous monitoring will consist of about 10 existing surface stations, LIDAR, and approximately 20 Floridan aquifer wells. Surface station equipment is already installed and capable of obtaining the required data without upgrades. LIDAR survey data will be used to measure surface water levels in karst depressions. The proposed wells will be instrumented with continuous real-time recorders to capture changes in potentiometric levels in the aquifer. Continuous readings of water levels, stream flows and rainfall will be provided by gauges. Human use of the spring and spring run will be monitored on a monthly basis and be performed by in-water counts. Monitoring on a quarterly basis will consist of atmospheric nitrogen deposition, water quality, withdrawal rates from pumping, plant communities, macro-invertebrate productivity, fish biomass, and birds. Biological and ecological monitoring will be more hands-on with visual counts and biomass estimates. Annually, land use changes will be monitored with aerial photographs and fertilizer sales will be monitored in the springshed for estimating nitrogen and phosphorous inputs to the landscape. Table 1 summarizes monitoring frequencies of parameters for Ginnie Spring and the Santa Fe River springshed.

Monitoring Frequency			
Continuous	**Monthly**	**Quarterly**	**Annually**
Water Levels	Human Use	Atmospheric Nitrogen	Land Use Changes
Discharges		Water Quality	Fertilizer Sales
Stream Flows		Withdrawal Rates	
Rainfall		Plant Communities	
		Macroinvertebrates	
		Fish Biomass	

Table 1 – Monitoring frequencies for parameters in Ginnie Spring and Santa Fe River.

Water Quality

Water quality has become a concern in Ginnie Spring and its associated spring run. As mentioned earlier, agriculture is encroaching on the spring and river. Thus, nitrogen, phosphorous, DO, and TSS are impairing the surface and groundwater. Water quality monitoring sites throughout the springshed will assist in determining source locations of nutrients. They will also provide direction in better establishing best management practices (BMP) for farmers and for determining progress with basin restoration. Table 2 identifies water quality parameters for monitoring on a continuous basis.

Water Quality Parameters
pH
Specific Conductance
Temperature
Total Suspended Solids (TSS)
Nitrogen (N)
Phosphorous (P)
Dissolved Oxygen (DO)

Table 2 – Water quality nutrient monitoring.

Reporting

Monitoring, data collection, and storage will follow FDEP approved techniques and procedures. Data analysis will occur on a monthly basis including aquifer levels, spring discharge, water quality parameters with monthly summaries. Annually, a report will be prepared including detailed summaries of monthly data analyses, but also annual average water budgets, nitrogen and nitrogen loading, phosphorus and phosphorous loading, and trend analyses. Every three to five years a more comprehensive report will be prepared that provides indications of progress towards basin restoration goals, assessment of what aspects of the restoration planning efforts are working and recommended changes as needed to optimize restoration success most cost effectively.

Works Cited

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