Appendix D

An Evaluation of the need for future Ewanowski Spring Pool Stage Data (SWFWMD 2022)

Technical Memorandum

April 25, 2022

TO: Lower Hillsborough River Recovery Assessment File

THROUGH: Chris Zajac, Manager, Environmental Flows and Levels Section

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Subject: An Evaluation of the need for future Ewanowski Spring Pool Stage Data

In April 2022, the District was notified by the current owner of Ewanowski Spring that staff would no longer be granted access to spring pool stage measurements. Ewanowski spring is located in the backyard of a housing residence within the City of Tampa, and it's named for the current owner, Mrs. Ewanowski. The spring is located about 200 yards north-northwest of Blue Sink, one of several sinks located within the Sulphur Springs complex (Figure 1).

1.0 Background

Blue Sink is located in the urbanized area of North Tampa and receives runoff from the Curiosity Creek watershed (Figure 2). In addition, a large spring, known locally as Ewanowski Spring, provides groundwater discharge into Curiosity Creek, before also flowing into Blue Sink. Historically, water from the Curiosity Creek watershed (and Ewanowski Spring) discharged into the Blue Sink and made its way to Sulphur Springs via a natural underground conduit within the Upper Floridan aquifer. Sometime during the 1970s, the connection between Blue Sink and Sulphur Springs began to deteriorate—a combined result of trash/debris accumulation and sediment deposition. By the 1980s, the connection between Blue and Sulphur Springs was totally blocked. As a result, water in the Creek began to back up and flooding incidents in the area began to increase. In order to remove the excess storm and surface waters from the closed Curiosity Creek watershed, the City of Tampa constructed a retention pond (known as F100-C) adjacent to Blue Sink, and in 2002, installed a permanent lift station at the south end of F100-C to convey water out of the watershed and transport it to the Hillsborough River.

Blue Sink is one of several identified sources to assist the City of Tampa in meeting the minimum low flows established for the Lower Hillsborough River. Water pumped from the Blue Sink provides approximately 2 to 3 mgd during the dry season. These flows, along with other sources, are used to help meet Minimum Flow/Recovery level requirements on the Lower Hillsborough River.

1.1 1996 Pumping Test

In April 1996, the City of Tampa initiated a study to evaluate the potential for Ewanowski Spring to provide a water supply source for the City. The spring which is located on residential private property just northwest of Blue Sink, previously flowed into Curiosity Creek—and ultimately into Blue Sink—however, the blocked connection at Blue Sink had resulted in higher water levels in the creek, which prevented the spring from flowing. The city's intent was to pump Blue Sink and reduce water levels in the creek so that springflow would be restored and could potentially

Figure 1. Location of Ewanowski Spring and Blue Sink.

supply the city with good-quality groundwater baseflow during the dry season for a variety of water supply projects.

During the 1996 test, Blue Sink was pumped for a total of 10 days at a rate that fluctuated between 4.3 and 4.6 mgd. Water levels during the test were lowered approximately 2.7 feet, however, the results were somewhat obscured by a large rainfall event that occurred just prior to, and on, the first day of pumping. Surface water level measurements were collected on a daily basis from seven (7) staff gauges located near the sink and F100-C, and groundwater level measurements were collected from four (4) wells located to the north and south of pumping. Water quality samples were collected at Ewanowski Spring, Blue Spring, and at five (5) residential wells for general chemistry, metals, total coliforms, and volatile organics.

Samples were collected from all sites five days prior to testing and on the tenth day of pumping. Additional samples were collected during the test at the spring and the sink.

Conclusions from the report generated for this study stated that at an average pumping rate of 4.3 mgd, a steady water level of 18.5 ft NGVD 29 was observed. This represents a drawdown of 2.7 feet from pre-pumping water levels (of 21.2 ft NGVD 29).

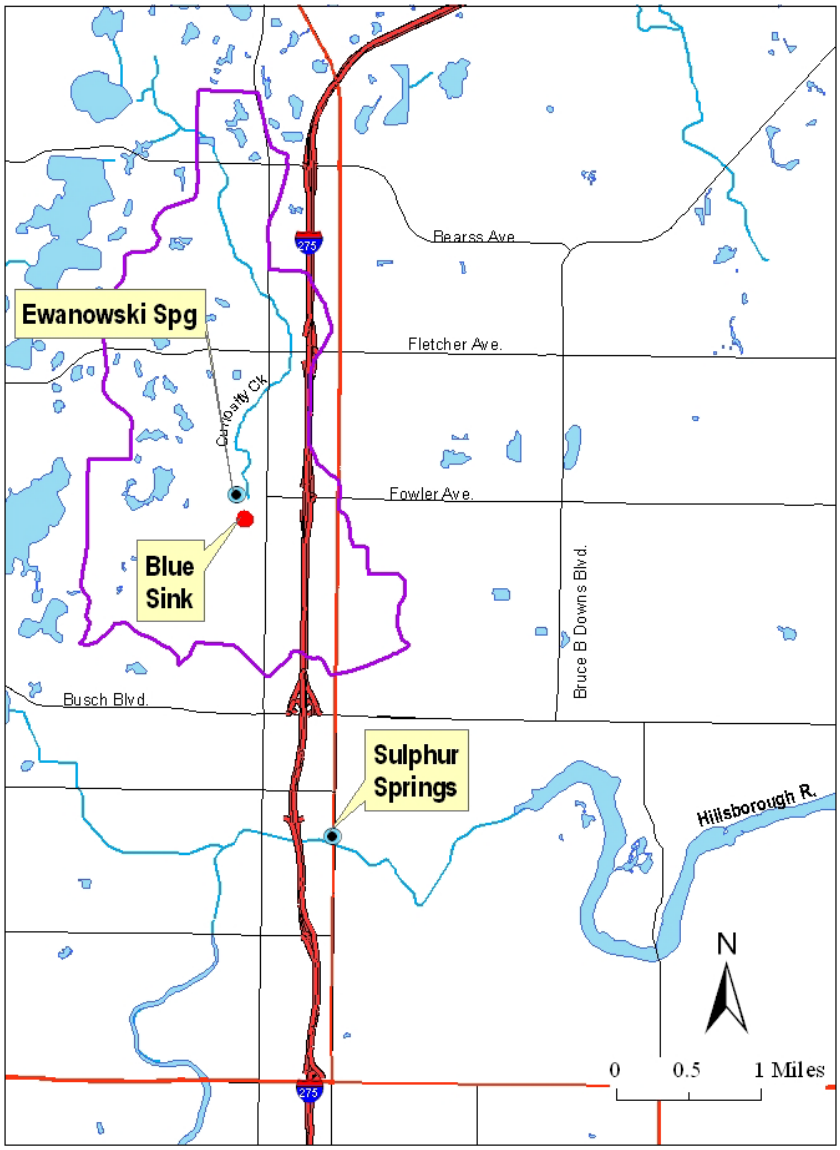

Figure 2. Location of Ewanowski Spring and Blue Sink in Tampa, Florida.

1.2 Emergency Pumping during the drought of 2000

In April 2000, the City initiated an emergency project to pump water from Blue Sink into neighboring Poinsettia Sink in order to supply extra groundwater to the Hillsborough River Reservoir—the primary water supply source for the city—via Sulphur Springs. Pumping began on April 24, 2000. The City initially began pumping at a rate of 4 mgd, however gradually reduced pumping rates after approximately one week, as water levels in the aquifer began to drop. In mid-June, the City was pumping approximately 1.6 mgd, but it was increased to about 2.5 mgd as aquifer levels began recovering with the onset of summer rains. The city shut down pumping at the sink on August 7, 2000.

Lake levels and groundwater levels in the Forest Hills (located west of Ewanowski Spring) and surrounding the sink area, were continuously monitored during the emergency pumping period. These included six (6) lakes and ponds and three (3) groundwater monitor wells. A continuous water level recorder was also installed in a residential well (the Powell well) close (~100 ft) to the Ewanowski Spring pool.

1.3 SWFWMD 30-day Pumping Tests

SWFWMD staff conducted two 30-day pumping tests of Blue Sink in May-June of 2008 and March-April of 2009. While the first 30-day test yielded valuable information on water level changes due to pumping, a temporary pump failure that lasted nearly two days interrupted continuous pumping of the sink for 30 days and therefore a second test was scheduled the following year.

The second pumping test was performed at Blue Sink from 9 a.m. on March 2, 2009, through 9 a.m. on April 1, 2009. Pumping was sustained at approximately 2 mgd. Drawdown within Blue Sink after 30 days of withdrawals was approximately 3.8 ft. Drawdown within the nearby Ewanowski Spring pool was about 3.9 ft during the pumping event. The essentially identical drawdowns in the spring and the sink indicate they are well connected hydrologically. Field survey shows the spring and sink are hydraulically connected by a short conveyance stream channel (Figures 3 and 4). Blue Sink drawdown approached a quasi-steady-state condition after about 25 days of withdrawals as it remained relatively steady around 3.8 ft. No rainfall was recorded until 3 weeks into the pumping test and the total amount for the 30-day test was only 0.74 inches or 0.06 ft.

The average pumping rate for the second test was 1,412 gpm or approximately 2 mgd during the 30-day test. Water levels were collected at several surface water and groundwater locations within and outside of the pumping zone. Calculated drawdown was less than 0.05 ft at all five lakes near the pumping test. Water levels were collected at eight Upper Floridan aquifer (UFA) wells located within the pumping zone. Upper Floridan aquifer drawdown ranged from 2.03 ft at 110 ft away from Blue Sink to less than 0.3 ft at 3,700 ft from the sink.

The results of the second Blue Sink Pumping Test were very similar to the first one that the District conducted in May and early June 2008. In the first test, drawdown averaged about 4.2 ft in the sink and spring pool (drawdown in Blue Sink and Ewanowski Spring Pool is essentially identical) versus 3.8 ft during the second test. Calculated drawdown at the closest well (115th Avenue) located 110 ft from the sink varied from 2.53 ft during the first test to 2.03 ft during the second test. Based on the results of the second test, the anticipated distance from Blue Sink out to one foot of drawdown within the UFA is about 2,000 ft, except toward the northeast where it is closer to 1,600 ft. The distance to two feet of drawdown in the UFA was about 1,100 ft except decreasing to 200 ft to the northeast of the sink. The drawdown pattern around Blue Sink appears to be mostly symmetrical except to the northeast which may be a result of anisotropic conditions or just better well control. Changes to nearby lake levels were not significant during both tests and were all less than 0.1 ft.

Transmissivity and storage coefficients were derived for the UFA based on Theis distance-drawdown and Cooper-Jacob straight line methods. The average transmissivity and storage coefficient from the 30-day pumping test was 67,000 ft^2/d and 0.11, respectively. The storage coefficient value from the test suggests that the UFA is unconfined or very leaky which is consistent with the karst geology surrounding Blue Sink.

Figure 3. Location of stream channel exiting Ewanowski Spring pool.

Figure 4. Location of stream channel entering Blue Sink from Ewanowski Spring.

The results of District testing at Blue Sink indicate that it can likely provide up to 3 cfs (2 mgd) of water to assist in meeting the Minimum Low Flow of the Hillsborough River during the typical spring dry season. Impacts to nearby lakes were not significant and drawdown within the UFA mostly varied from 0.5 to 2.5 ft within one-half mile of Blue Sink. A well inventory is recommended to determine well construction details and the types of pumping equipment within this zone prior to the implementation of this project. Domestic wells that are using submersible pumps should not be adversely impacted by this magnitude of drawdown. However, any homeowner using an above-ground centrifugal pump within 0.5 miles of Blue Sink may be subject to well interference issues given this level of drawdown. Additionally, a monitoring program that includes area lakes and nearby wells in the UFA was recommended to provide a continuous record of conditions prior to and after the implementation of this project.

2.0 Ewanowski Spring Pool Data

Stage monitoring was initiated by the District for both Blue Sink and Ewanowski Spring in late 2007 prior to the first SWFWMD 30-day pumping test. Continuous measurements have occurred at both sites since that time. The third five-year assessment for the Lower Hillsborough Recovery Strategy is due in 2023. There should be ample data to evaluate the Blue Sink pumping and lower Hillsborough River augmentation project based on these two stage histories. In addition to these two sites, there are numerous lakes and monitor wells in the vicinity of Blue Sink and Ewanowski Spring that include five (5) lakes and eight (8) UFA monitor wells where continuous water level data has been recorded since mid-to-late 2007 (https://www.swfwmd.state.fl.us/sites/default/files/documents-and-reports/reports/Final_Blue_Sink_2_Report.pdf).

As of April 2022, District staff are no longer granted access to Ewanowski Spring pool to collect stage observations. The previous 30-day pumping tests conducted by the District showed almost a one-to-one relation between changes in Blue Sink stage and Ewanowski Pool Stage since they are hydraulically connected by a short conveyance ditch. To confirm this understanding, water levels were plotted for both Ewanowski Spring and Blue Sink for their period of record since late 2007 (Figure 5). Upon inspection, both systems are fluctuating almost identically. A linear regression of Ewanowski Spring pool stage versus Blue Sink stage indicates very high correlation with an R^2 value of 0.98 (Figure 6). Therefore, Blue Sink observations should serve as a surrogate stage for Ewanowski Spring Pool in the future. Flow measurements conducted by the USGS in the Ewanowski Spring outlet will also continue to monitor the flow from the Spring to Blue Sink into the foreseeable future.

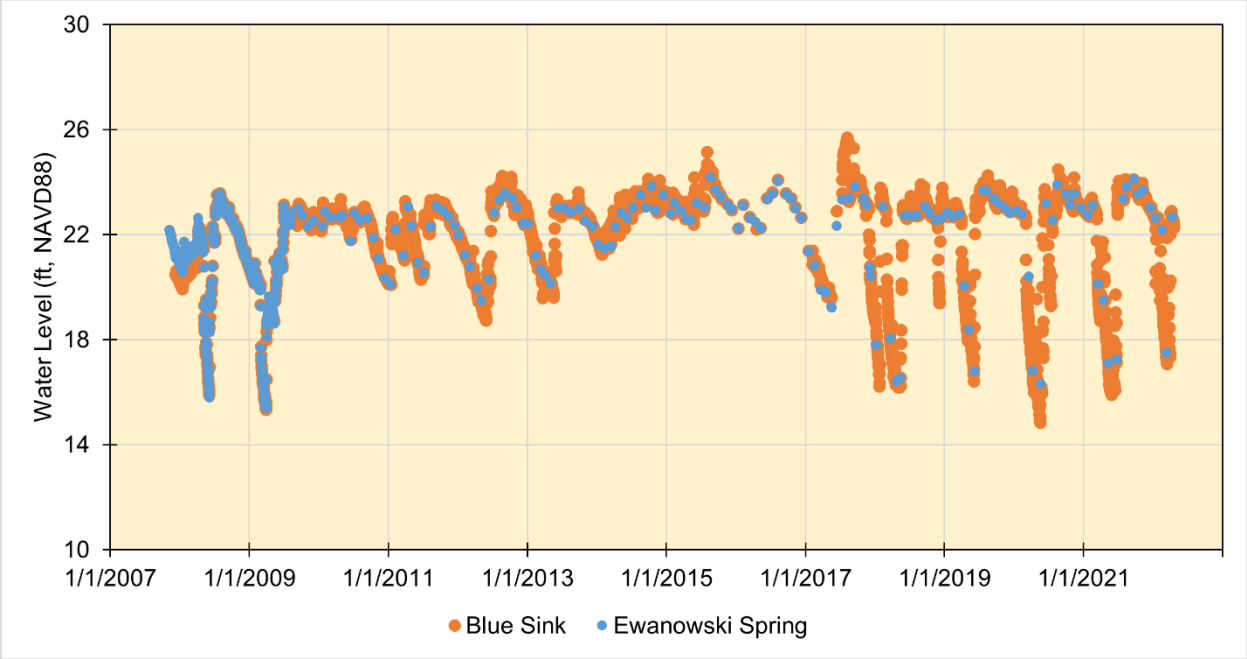

Figure 3. Stage history at Blue Sink and nearby Ewanowski Spring Pool.

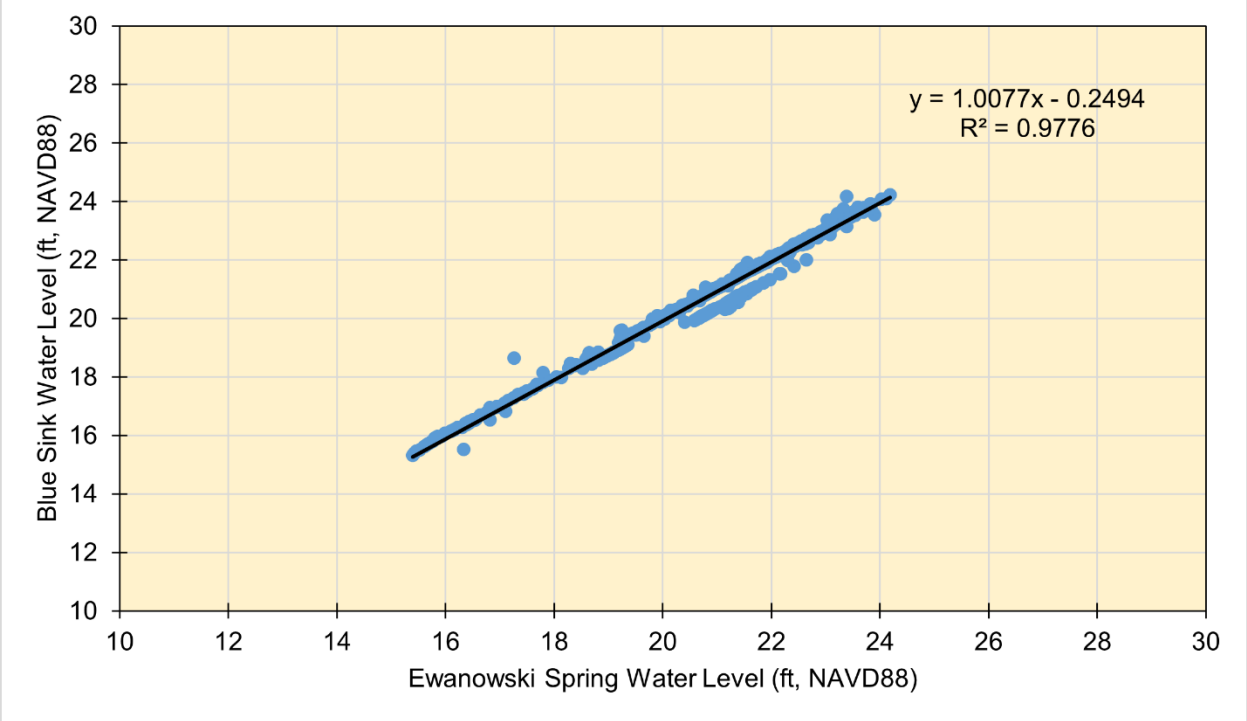

Figure 4. Linear regression of Blue Sink stage with Ewanowski Spring Pool Stage.