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Re: Minimum Flows and Levels for the Lower Santa Fe and Ichetucknee Rivers
and Priority Springs; Ginnie Springs Outdoors, LLC's §373.042(5), Fla. Stat.
Request for Independent Scientific Peer Review

Dear Sirs/Madame:

On October 8, 2013, Ginnie Springs Outdoors, LLC ("**GSO**"), through the undersigned, submitted comments on the proposed minimum flows for the Lower Santa Fe River and Springs. We have received no response or acknowledgement of the correspondence.

GSO is extremely concerned that the quantity and quality of water flowing to and through the Ginnie Springs system (and most of the springs in the Suwannee River Water Management District (the "**District**")) are in catastrophic decline. Minimum flows and recovery strategies for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs ("**LSF&IR**") will affect Ginnie Springs and GSO's substantial interests related to Ginnie Springs. Consequently, GSO commissioned a technical review and investigation of the LSF&IR Minimum Flows proposed for adoption by the Department of Environmental Protection (the "**MFLs**"). GSO's discoveries have only heightened GSO's concern.

Some of the results of GSO's investigations are discussed in Sections 1 and 2 below. Section 3 includes a request for peer review pursuant to Section 373.042(5), Florida Statutes.

1. THE DISTRICT FAILED TO DISCLOSE CRITICAL INFORMATION

GSO is very concerned by the District's failure to publicly acknowledge and disclose the extreme limitations of the District's MFL development approach. When reviewed by appropriate independent scientists, the MFLs have been roundly discredited, but much of this information has been withheld from the public. In addition, GSO's review of the model report for the model supporting the MFLs reveals very substantial reporting omissions. The lack of transparency sends a strong signal the MFLs and recovery levels may be inappropriately set.

The District Appears to Have Withheld Critical Peer Reviews

On September 11, 2013, pursuant to a peer review consulting contract, the University of Florida Water Institute provided the District a Draft Panel Report of the Institute's peer review of the draft MFLs. The Report was very critical. The District rejected the Institute's criticisms and told the Institute to re-submit a much more narrow set of comments. The only comments found on the District website are the much narrower comments.

Also in September 2013, pursuant to agreement between the two water management districts, the St. Johns River Water Management District ("**SJRWMD**") staff provided peer review comments regarding the District's proposed MFLs. SJRWMD staff also agreed to apply SJRWMD's MFL methodology to the District's field ecological data, and compare the MFLs developed pursuant to the SJRWMD's methodology with the District's proposed MFLs. SJRWMD staff reported that, appropriately using the most sensitive indicators, they determined the flow deficit in the Lower Santa Fe River to be 135 cfs (87 MGD) beyond the point of "significant harm." A Copy of SJRWMD's September 16, 2013 Comments on the Lower Santa Fe and Ichetucknee River MFLs Report is attached. **SJRWMD's estimate would require 118 cfs (76 MGD) more recovery than the District's recovery goal.** Unless SJRWMD's methods are much worse than the Districts, this analysis shows the Districts MFLs are way off, are far too lenient, and are not protective.

The District did not report or disclose this information. The District's website is silent about SJRWMD's consultation, analysis, and report. The District's "Resolution Document" mentions a point of consistency between District and SJRWMD analyses, but otherwise does not mention the SJRWMD comments or analyses. It certainly appears SJRWMD's analyses and recovery estimates were *buried*.

The MFLs are Based on Inadequate Science

In their draft MFL analysis, the District found that the estimated flow reduction in the Lower Santa Fe was about 188 cfs (121 MGD), and they initially estimated the flow deficit as 51 cfs (33 MGD). The District made several adjustments to its methodologies and the data used. The District established new "baseline" flows using data from as recent as 1990. How the District determined the more recent data does not include anthropogenic change is unclear. The District's methodology adjustments are poorly justified. The resulting MFLs and recovery estimates are much lower.

In the final MFL Report, the District inexplicably continues to rely on modeling the District knows to be inaccurate, and ignores good information and modeling provided by reviewers. The trend suggests the District has systematically chosen analyses indicating less recovery is needed over results showing a much greater level of recovery is needed.

The District relies on a groundwater flow model it procured in 2008: Schneider, J.W., S.B. Upchurch, J. Chen, and C. Cain. 2008. Simulation of Groundwater Flow in North Florida and South-Central Georgia, a 3-Dimensional Model of Groundwater Flow in the Surficial, Intermediate, and Floridan Aquifer Systems: SDII Global, Inc., Prepared for the SRWMD. (the “**NFM Model**”). The MFL Report explains that the District ran the NFM Model under two conditions, one with the water level inputs as originally set up by the modelers in 2008, and a second in which “the groundwater levels provided as input to the General Head boundary condition were adjusted in an effort **to better represent the MFLs for the Lower Santa Fe and Ichetucknee historic changes that occurred to groundwater levels along the lateral boundaries of the model.**” Despite acknowledging that this adjustment would make the boundary conditions in the NFM Model better represent water level changes that have occurred, the District allows the unimproved model outputs to drive the estimated amount of recovery required down substantially, as explained below.

Admitting to the uncertainty of their methods, District staff decided to use a “weight of the evidence” approach to determine the amount of anthropogenic effect on water levels, averaging the two sets of NFM Model outputs and two statistically-based estimates to determine the current level of anthropogenic flow reduction. From the calculated anthropogenic flow reduction, the District calculated the amount of recovery required. Since the District recognizes the unmodified NFM Model’s outputs are based on less realistic boundary conditions, one would expect the District not to include the unmodified NFM Model outputs in the averaging. Had the District reasonably thrown out the unimproved NFM Model outputs, the recovery required for the Lower Santa Fe would be over 36 cfs instead of just 17 cfs. Had the District appropriately rejected the unmodified NFM Model outputs, the recovery required would be more than twice what the District has chosen.

The District has not disclosed how it considered the recovery requirement generated by the SJRWMD staff and the recovery requirement in the District’s own draft MFL report. In light of the District’s non-scientific “weight of the evidence approach,” one would expect the SJRWMD’s estimated recovery requirements and the draft MFL report’s recovery levels would also have weight in the averaging process. As stated above, the SJRWMD’s analysis indicates the recovery needed for the Lower Santa Fe MFL is 118 cfs more than the District’s final recovery goal. The District does not explain why it would rely on analyses known to be uncorrected with respect to critical inputs, but never mention analyses performed by its fellow water management district. Obviously the recovery required would be much much greater if SJRWMD’s estimates and the District’s own prior estimates were given any weight at all.

2. GSO'S REVIEW OF THE NFM MODEL REVEALS FATAL FLAWS

GSO asked GeoHydros, LLC to review the NFM Model used by the District in its MFL development. GeoHydros' Assessment of the 2008 North Florida Numerical Groundwater Flow Model is attached. In summary, GeoHydros found profound flaws in the NFM Model. GeoHydros concluded these flaws substantially limit the model's ability to assess the magnitude and spatial distribution of flow reductions in springs and rivers associated with current and future groundwater extractions.

In addition to exposing a staggering level of nondisclosure, GeoHydros concluded: 1) the NFM Model is poorly constructed and fails to meet broadly accepted measures of quality, and therefore cannot be reliably used to simulate or predict impacts to groundwater flows and levels created by groundwater extractions within or surrounding the District; 2) the approach and software used for the NFM Model do not represent the best available technology; 3) alternative methods and software can be, and could have been used to build a better model that provides substantially more reliable predictions; and 4) by using the NFM Model, the SRWMD is not pursuing a reasonably conservative approach to the characterization and mitigation of impacts to spring and river flows associated with groundwater withdrawals.

The NFM Model is an equivalent porous media numerical groundwater flow model that was constructed with a version of the MODFLOW software. The equivalent porous media model used by the District is not the best available tool for establishing and evaluating minimum flows. The model fails to use the best information regarding well known karstic processes present extensively throughout much of the model domain, affecting both the pattern and rate of groundwater flow to springs. The MODFLOW version used by the District was not even the best available version of MODFLOW.

At the time the NFM Model was constructed, alternative modeling approaches directly addressing karstic processes were available through the use of different software.¹ A similar alternative approach is now even available in MODFLOW, which was developed in part to better simulate highly karstic settings such as the Lower Santa Fe River and Springs area and thereby correct substantial shortcomings in the equivalent porous media approach.²

The District's equivalent porous media model fails to make use of the best information available to describe aquifer permeability such as cave maps and groundwater tracer tests,

¹ DHI-WASY, 2013. *FEFLOW*. Available online at: www.feflow.com

² U.S. Geological Survey, 2013. *MODFLOW-USG: An Unstructured Grid Version of MODFLOW for Simulating Groundwater Flow and Tightly Coupled Processes Using a Control Volume Finite-Difference Formulation*. Available online at: <http://water.usgs.gov/ogw/mfusg/>

opting instead for assignments based entirely on porous media assumptions that ignore the presence and significance of conduit flow processes.

The assumptions underlying the District's equivalent porous media model as well as the coarse resolution of the model design preclude it from being able to adequately simulate flow to specific springs. The porous media assumptions prevent the model from adequately simulating groundwater flow patterns and rates established through groundwater tracing. The coarse resolution, ignoring more specific data, prevents the model from adequately simulating flow to, or impacts from, multiple springs and wells that lie within the same grid cell.

Compliance Will Be Determined Using the NFM Model

GSO agrees with SJRWMD staff's draft comment that: "the key to MFLs compliance is a methodology through which MFLs are linked to groundwater withdrawals." The Recovery Strategy Rule Language indicates the District must use "the best available modeling tools to evaluate permit applications and their potential impact to the MFLs in the Lower Santa Fe River Basin" until the North Florida Southeast Georgia Regional Groundwater ("NFSEG") Flow Model is available, at which time "this regulatory process will be re-evaluated." If the District does not deem the NFM Model to be its best modeling tool for these purposes, it would not have used it in developing the proposed MFLs. The NFSEG Model will not be available for many years. The District will rely on the NFM Model to determine compliance with the proposed MFLs for many years to come.

3. GSO'S SUBSTANTIAL INTERESTS AND REQUEST FOR PEER REVIEW

GSO is entrusted with the operation, management and protection of the world-renowned Ginnie Springs diving, camping and recreation area on GSO's property immediately south of the Santa Fe River in High Springs, Gilchrist County, Florida.

Perhaps the most popular private springs recreation site in the State of Florida, Ginnie Springs is a rare and unique large system of eight crystal-clear, named first and second magnitude springs: Ginnie Spring, Devil's Eye, Devil's Ear, Dogwood Spring, Twin, Deer, Little Devil, and July springs. The springs discharge about 250 millions of gallons per day of crystal-clear water into the Santa Fe River. Ginnie Springs is world-renowned for its cave diving opportunities. Open to the public since 1976, Ginnie Springs' constant 72 degree water is perfect for tubing, swimming, snorkeling, and scuba diving. GSO maintains a dive shop and campground nestled around the springs on over 200 wooded acres along the banks of the Santa Fe River.

GSO's affiliated interests operate a water bottling facility at Ginnie Springs. The recreation, camping and dive shop enterprise, and the spring water bottling facility together provide dozens of jobs and a critical contribution to local tax revenues. These interests all depend on preservation and restoration of the flow of high quality crystal clear spring water.

Minimum flows and recovery strategies established throughout the District, and especially for the Lower Santa Fe and Ichetucknee Rivers and Priority Springs, will profoundly, substantially affect Ginnie Springs and GSO's substantial interests therein.

Pursuant to Section 373.042(5), Florida Statutes, Ginnie Springs Outdoors, LLC, hereby request that the data, methodologies, model and assumptions discussed in Section 2 above and in the attached "Assessment of the 2008 North Florida Numerical Groundwater Flow Model," be subjected to independent scientific peer review as soon as possible. We look forward to the agencies' response and action on this Request for Independent Scientific Peer Review.

Sincerely,

LAW OFFICE OF JOHN R. THOMAS, P.A.

A handwritten signature in black ink, appearing to read "John R. Thomas". The signature is written in a cursive, somewhat stylized font.

John R. Thomas

Enclosures