Appendix D

Stakeholder Comments Received Regarding the Recommended Minimum Flow for the Rainbow River System.

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Date: November 14, 2016 at 8:40:06 AM EST
To: Doug Leeper <doug.leeper@swfwmd.state.fl.us>, Ron Basso <ron.basso@swfwmd.state.fl.us>, Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Rainbow River Review 1

Doug, Ron and Melissa,
Last week I received answers to some of my questions from USGS regarding the Rainbow River MFL so I have pulled together some of my comments.
For ease of reading I have put my comments in a word file for you to consider.
I have major concerns regarding the work by ECT. Who was responsible for reviewing the work done by ECT or was it just accepted without question?

I am still waiting for USGS to provide the discharge equations for the two gage sites on Rainbow River. These may address some of the other concerns I have regarding flows.
In addition I have comments regarding the analysis of water quality data, fish data and floodplain habitat which I will address later.

Regarding Crystal River Kings Bay Review tomorrow, what is the room location at the Brooksville Office, I hope to be able to attend in person.

Martyn

From: Doug Leeper
To: Ross Morton; Kym Holzwart; Ron Basso; Yonas Ghile
Subject: FW: Rainbow River USGS Gage Site 20313098
Date: Thursday, October 06, 2016 4:55:00 PM

FYI

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Grimsley, Kevin [mailto:kjgrims@usgs.gov]
Sent: Monday, October 03, 2016 10:31 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Fwd: Rainbow River USGS Gage Site 20313098

Hi Doug. Here is the thread of the conversation I had with Mr. Johnson.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS Caribbean-Florida Water Science Center
4446 Pet Lane, Suite 108
Lutz, FL 33559
kjgrims@usgs.gov
813-498-5064
****

---------- Forwarded message ----------
From: **Alan Martyn Johnson** <martynellijay@hotmail.com>
Date: Sat, Oct 1, 2016 at 8:55 AM
Subject: Re: Rainbow River USGS Gage Site 20313098
To: "Grimsley, Kevin" <kjgrims@usgs.gov>

Kevin,

I never thought USGS had anything to do with the words in the report, and appreciate your candid comment of clarification (disassociation). I shared the quote so you could see what

was being said about the USGS data.

I doubt you to have read the Draft Report and would not recommend it for your reading list!! But, let me share another quote which I find very disturbing, particularly given what you have shared with me over this last week. On page 92(buried) of the 104 page reports is this paragraph:

Quote

Although the recommended minimum flow is applicable to all portions of the Rainbow River System, it is proposed that the more recently installed (in 2013) USGS Rainbow River near Dunnellon, FL (02313098) gage site be identified in minimum flow rules that are developed for the system. Backwater effects at this site are less than those at the downstream, long-term Rainbow River at Dunnellon, FL (02313100) gage, so flows at the newer site are considered more indicative of springflow in the river.

End quote

The only other mention of 02313098 is on page 94 where it is reference in the "Recommended Rule Language". Commentary.....language which for me has no connection with the studies and modelling in the report.

Just thought you may find this 'interesting'.

Would appreciate if you would let me know when the work re the velocity based discharge is completed.

Thanks again,

Martyn

From: Grimsley, Kevin <kjgrims@usgs.gov>
Sent: Friday, September 30, 2016 1:57 PM

To: Alan Martyn Johnson
Subject: Re: Rainbow River USGS Gage Site 20313098

Martyn,

We will have a more accurate discharge in a few months because we'll be using the velocity meter which accounts for backwater. To be clear, that whole paragraph discussing backwater and regressions in the MFL report was not from us and does not represent our gages. That discussion came from the consultant that SWFWMD hired to produce the HEC-RAS model for the river. They used some of our data and did their own analysis to create their own dataset so that does not represent the USGS.

Regarding the nitrate data, I agree that those values might be high for just a degradation effect. I think they're more representative of the consumption of nitrate by the biota in the stream in between the two gages. As you know, there's a lot of SAV in the river. Have a good weekend.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS Caribbean-Florida Water Science Center
4446 Pet Lane, Suite 108
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kjgrims@usgs.gov
813-498-5064
****

On Fri, Sep 30, 2016 at 8:43 AM, Alan Martyn Johnson <martynellijay@hotmail.com> wrote:

> Kevin,
>
> Thanks for taking the time to respond.
>
> From your previous e-mail it sounded like you will have a more accurate picture in a couple of months, but your latest comments do not sound so optimistic.
>
> I would be interested to learn how the backwater effects are going to influence the relation

between calculated discharge and actual discharge and when the effects are likely to occur (after a heavy rain when surface water run to the Withlacoochee causes a rapid rise in the With would be my best speculation i.e. significant change in the steady state). Probably after the data has been collected and analysed we can explore my speculation and I can learn about backwater effects. Presumably a velocity based discharge will be more accurate at least when averaged over a time period, as what is discharging from the spring(s) is not influenced by the backwater effects. I know there are lots of small 'boils' downstream of the main spring but I have not seen any estimate of how these add to the main spring flow.

Quick comment about the nitrate/nitrite; I thought about degradation but discounted this as my estimate was water takes about 3 hours (estimated from the velocity data and limited knowledge of the river from a few kayak trips) to flow from one the newer site to the old one. As you say theoretically that is a possibility. May be when I get time I will read up on degradation rate.

Thanks again for sharing your thoughts and lets talk again when the work/analysis is complete.

Martyn

From: Kevin Grimsley <kjgrims@usgs.gov>
Sent: Thursday, September 29, 2016 8:58:57 PM

To: Alan Martyn Johnson
Subject: Re: Rainbow River USGS Gage Site 20313098

Martyn,

The hope was that the upstream gage would get completely out of the backwater effects from the Withlacoochee, but that hasn't turned out like we hoped. There is some slope between the gages so the effect is less, but it's still there.

I agree that there is a slight difference in nitrate concentrations between the gages. Theoretically, this should represent the uptake of nitrate in the system between those

points.

****
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813-498-5064
****

On Sep 29, 2016, at 9:58 AM, Alan Martyn Johnson <martynellijay@hotmail.com> wrote:

> Kevin,
>
> Things are going well up in N. Georgia...always seem to be busy...have no idea how I ever found time to have a job!!!
>
> Thanks for checking into this and the explanation.
>
> No need to apologize for any confusion as non was caused.
>
> I note this Gage Site is about 1.5 miles upstream on the Rainbow River from the long established site. I have not yet taken the time to convert the NGVD 29 for the older site to NAVD 88, but there must be a difference in elevation over the 1.5 miles. One thought I saw in the SWFWMD MFL report is the newer site may be less influenced by 'backwater effects' and thus implying it is potentially more accurate.
>
> Do you concur with this, or is it too early to draw such 'conclusion' ;that is until the field data is available?
>
> I also noted a small difference in nitrate/nitrite levels, with the newer site being

slightly higher; is this just a matter of the accuracy limits of the instrumentation?

Martyn

P.S. Decided to get the wording from the report where backwater effect is mentioned:

"Generally, a downstream boundary at a USGS gage station where a USGS stage-flow rating curve is available is required for a HEC-RAS model. However, the stage-flow rating association at the USGS Rainbow River at Dunnellon Gage (02313100) at the CR 484 bridge is poor, mostly due to the backwater effects from the Withlacoochee River (Figure 1-1). To improve the rating curve, a multiple regression model was developed using flow records measured at USGS 02313100 (CR 484 bridge) and stage data measured at USGS Withlacoochee River at Dunnellon Gage (02313200) at the US 41 bridge. The flow/stage records from the period of 3/11/2005 through 9/30/2013 were utilized in the multiple regression analysis. The multiple regression analysis improved the correlation coefficient from 0.53 to 0.98, and provided a means to better understand backwater effects from the Withlacoochee River (Figure 6-2)."

From: Grimsley, Kevin <kjgrims@usgs.gov>
Sent: Thursday, September 29, 2016 8:57 AM
To: Alan Martyn Johnson
Subject: Re: Rainbow River USGS Gage Site 20313098

Hi Martyn,

Good to hear from you. I hope everything's going well.

Long story short, the decline you saw was erroneous and due to a miscalculation from one of our technicians that we hadn't caught yet since it was still provisional. The discharge for both of the Rainbow stations is currently calculated using a regression based on the water level from Rainbow Springs Well - 290514082270701. However, we're currently developing velocity ratings at both of these gages that we think will greatly improve the accuracy of our calculations.

The errors in the current discharge calculations for 02313098 are great enough that I've decided to pull them from the web completely. We think we're only a few months away from finalizing the new velocity-based calculation so we

expect everything to be restored soon. I apologize for the problems and any confusion it may have caused.

****
Kevin Grimsley, P.E.
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****

On Tue, Sep 27, 2016 at 9:29 AM, Alan Martyn Johnson <martynellijay@hotmail.com> wrote:

> Kevin,
>
> Some time since we last communicated, trust you are well and enjoying life.
>
> I have recently been looking at the Rainbow River in view of SWFWMD publishing the MFL report. In my attempts to gain a better understanding I have looked at the USGS data.
>
> In the data from 20313098, I note a decline in discharge from mid August to early September. Round numbers:
>
> 8/14 580 cfs,
>
> 8/21 550 cfs,
>
> 8/25 520 cfs,
>
> 8/31 450 cfs
>
> 9/01 484 cfs
>
> 9/04 580 cfs
>
> As far as I can tell discharge data is calculated from gage ht. I realize the data

is provisional, but I am at a loss to have a rational explanation.

This event is leading upto Hermine; the nitrate/nitrite data reflects the heavy rains diluting the nitrate/nitrite from the springs for a short period (1.8 down to 1) and then some a slight decrease to pre-Hermine levels, presumably due to continued rainwater run off.

Would appreciate your thoughts. A computing glitch seems unlikely due to the steady decline, but is the best explanation I can think of.

I have looked at the location maps of this Gage Site and the other on Rainbow, but no not see anything other than adding to thought of a computing glitch.

Noted velocity data was collected at 20313100 in June and July; was this not a good site for velocity, or just so consistent at that point in the river monitoring was not cost justifiable.

Thanks,

Martyn

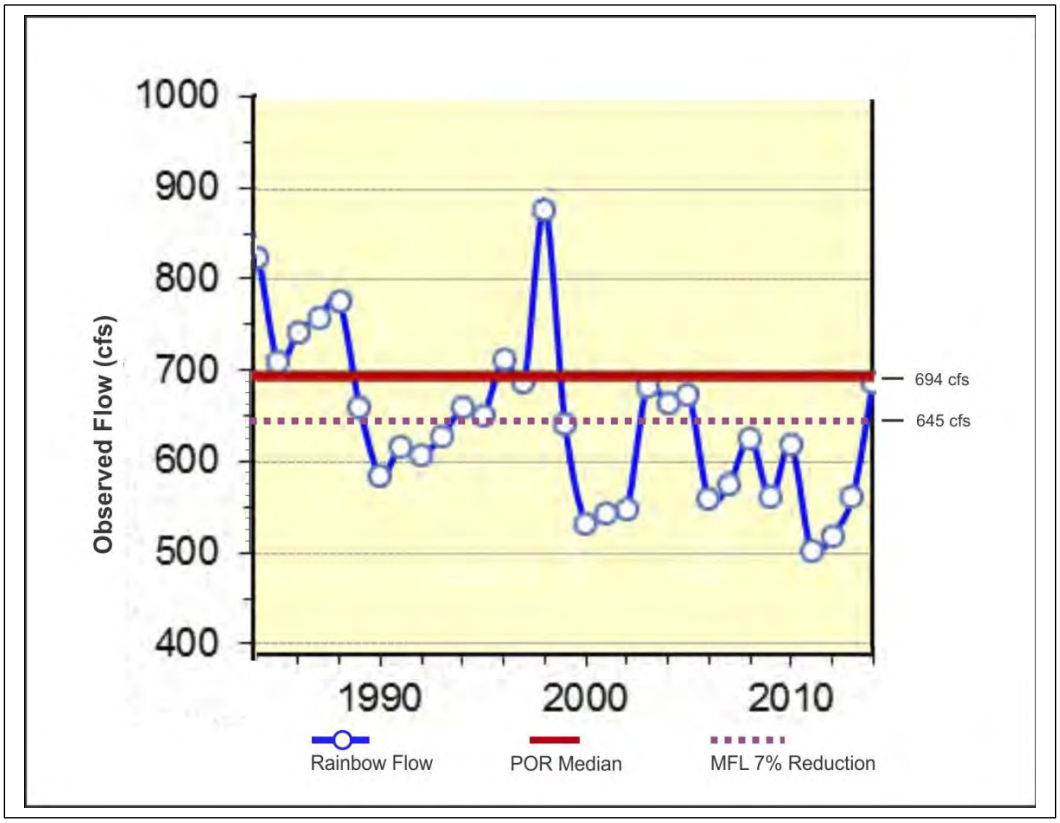
Comment on the Recommended Minimum Flow for the Rainbow River System

Peer Review Draft - August 2016

The draft MFL report on the Rainbow Springs and River System represents a major body of work by the water district and it is good to see the process move forward this peer review taking place to help protect this very special water body. In this written comment I wish to formalize a verbal comment I made at the public meeting at Dunnellon City Hall on September 20, 2016.

The Executive Summary states the annual median springflow from 1929 to 2014 was measured at 694 cubic feet per second (cfs). This is equivalent to 449 million gallons a day. After a review of the modeling approach and the process of developing the MFL, there is a statement that the flow can be reduced to 93 percent of the natural flows not impacted by withdrawals. This sets the MFL at 645 cfs. *The report then states that the since the minimum flow is being met, a recovery strategy is not required at this time.*

When I looked at the data presented in figure 2-8 on page 24, I began to question this conclusion. The figure was expanded around the active data points for the last 30 years and an interior vertical scale was added to interpolate between the major graph flow levels. A dashed line was then drawn at the 645 cfs level. This expanded chart is shown below.



The data shows that 16 of the last 30 years were at or below the minimum flow level listed in the report. The data also shows that 13 of the last 16 years were at or below the minimum flow level defined in the report.

Clearly the level of minimum flows is being breached in more than half the recent years and the trend is getting worse as time has progressed.

When asked what the criterion was for the Water District to take action regarding permit reductions and implementing a recovery plan, it was stated that five successive years below the MFL would be the trigger to take action. As we can see from chart above, we have already had such a condition from 2006 to 2013.

It would seem that this IS the time to "develop a recover plan" that can be put in place when the next five year flow reduction below the MFL takes place (which seems inevitable). Waiting 10 years to review the standard appears to duck the responsibility of the water district.

Paul Marraffino
10/4/16

Brad Rimbey
Oct 13, 2016
Doug,

Can you explain why the Model Limitations section of was eliminated from the NDM 5.0 documentation? It has been every previous version of NDM documentation which I have seen.

Brad Rimbey

Doug Leeper
Oct 14, 2016

Brad: Thanks for your inquiry. According to Ron Basso, the NDM 5 report is an abbreviated form of documentation (compared to the version 4 report) that largely discusses the changes made from version 4 to 5. Overall, the changes made to version 5 include some aquifer parameter refinements in northeast Marion County to include information from aquifer performance testing and local scale modeling, adjusting leakance in southern Lake County, improving the springs package by modifying a small subset of springs based on additional data, adding a 2010 verification run, and the addition of an agricultural return water package. The sensitivity analysis and model limitations discussion from version 4 would also apply to this version. --Doug Leeper

To: Kym Rouse Holzwart

From: William Vibbert, RRC

Date: October 18, 2016

Subject: MFL Comments

First, thank you for arranging a meeting to discuss the draft MFL report. I think it was a positive exchange and we appreciated the opportunity to discuss our concerns with you and the MFL group. Bob Knight will be submitting a letter that focuses on the scientific and technical issues that RRC has supported. I wanted to offer a few general comments on behalf of RRC that I will try and categorize the concerns into a few general areas.

1. **Flow Significance**. With levels of nitrate at historic levels, we believe that maintaining flow is now more critical to sustainability of the aquatic community than ever. Recent measurements show nitrate levels of 2.6 mg/L that are far beyond historic levels, measured at .1 mg/L in 1960. The increase is dramatic. But the aquatic community in the upper river remains in fair condition that would seem to be contrary to what such high levels of nutrients would lead us to expect. We know that the Rainbow River maintains high oxygen levels, but flow is critical to the survival of the diverse aquatic community that is present. The SWIM Plan acknowledges this fact on page 23," Higher flows since 2013 appear to have halted the movement of filamentous algae upstream, but algae mats persist in the lower river." And on page 6, "Adequate flow influences springs ecology by maintaining water temperature, inhibiting algal blooms, reducing detrital buildup, and stimulating productivity. Without flow, the ecology and human use potential of a spring diminishes." We observe these flushing of algae events during periods of high flow that occur intermittently. These events, although they do not appear in vegetation studies or modeling nevertheless may be significant to the sustainability of the aquatic community. We observe a buildup of algae during low flow periods, followed by flushing. Therefore, we strongly feel that maintaining flow is critical to preventing further decline in the Rainbow River aquatic community. The fact that there are still questions regarding the level of existing withdraw adds to our level of concern.
2. **Consistency With Other Legislation:** We acknowledge the mandate that SWFWMD has under Section 373.042 (1) F.S., but there are many other mandates that also must be considered and may seem to be in conflict with the MFL draft recommendation of an additional 7% withdraw. Here are a few:
    - SWIM Act of 1987: Directs the restoration, protection, and management of the surface waters of the state. Maintaining stream flow is an identified goal as well as is protecting natural systems, water quality and water quantity.
    - BMAP: The BMAP initiative was a directive to address Florida's impaired waters and develop strategies to reach a goal of .35 mg/L nitrate. At best, this is a high bar that additional withdraws will put further from reach.
    - Florida Chapter 18-20 (Florida Aquatic Preserves) The legislative intent statement in 18-20.001 makes clear the mission of the Aquatic Preserves: "Established for the purpose of being preserved in an essentially natural or existing condition so that their aesthetic,

biological, and scientific values may endure for future generations." And: "To encourage the protection, enhancement or restoration of the biological, aesthetic, or scientific values of the preserves, not limited to the modification of existing mademade conditions toward their natural condition and discourage activities that would degrade the aesthetic, biological, or scientific values or the quality or utility of the preserve."

3. **Context:** There are few places in Florida that can boast the natural resource designations of the Rainbow River: Outstanding Florida Waterway, National Natural Landmark, Aquatic Preserve and SWIM Priority Water Body. The Florida DEP has stated that it is one of the "Clearest aquatic systems on earth." The Rainbow River is a "Globally Significant Natural Resource." Although the DEP declared the Rainbow River impaired in 2010, the Rainbow River still features a lush and diverse aquatic community. One only has to visit Manatee Spring, Fanning Spring, and many others to see what has been lost. In many Florida springs, the aquatic community consists mainly of lygbya or bare sand bottom with few native plants remaining and little habitat for wildlife. The Rainbow River retains what many remember of the beauty of Florida's springs. The Rainbow River represents the best of Florida and provides enormous economic and recreation benefit to Florida and beyond. Visitors wonder at the clear water and rich wildlife resources.
4. **Downstream Impact:** We recommend that as SWFWMD proceeds with the MFL initiative that consideration be given to the impacts downstream, particularly the Lower Withlacoochee River. We understand that the EPA has ruled that it is a violation of the "No Degradation" standard in the Clean Water Act to convert a fresh water habitat into a salt water habitat. This is already occurring in the lower Withlacoochee perhaps partially due to sea level rise. When we add the cumulative withdraws proposed in various plans we note significant and disturbing total withdraws. If we add the existing Rainbow River estimate of about 20 mgd, the proposed 7% withdraw of about 31 mgd, to what we see in the Withlacoochee Regional Water Supply Authority Plan of 35.6 mgd we see a total withdraw from the lower Withlacoochee of about 86 mgd. We recall that SWIM contains an endorsement of the WRWSA Plan, a statement that RRC objected to at several meetings as it was unrelated to the goals of SWIM.

Summary: There is a strong argument that we should proceed cautiously with the MFL withdraw recommendation for the Rainbow River and remember the future generations that are cited in Chapter 18-20. Are we so confident in the models that we would risk further impairment of one of earth's treasures? When we evaluate the cost/benefit of major additional withdraws we cannot see where the benefit can justify the cost which is unknown. The models cannot possibly predict what level of flow reduction will result in a 15% loss of habitat. And we note that two of the major parameters, fish passage and wetted perimeter inflection were discounted on page 92. As Dr. Eno stated, "There is no therefore."

Finally, we see an awareness across Florida in the need to protect Florida's Springs. We hear the voices of the people of Florida, the legislature, county governments, municipalities, NGO's, scientists, editorial pages, even children that Florida's Springs are natural treasures that should be protected. We urge the MFL group and SWFWMD to hear the voices from across Florida and become the Champion for the Rainbow River and consider the broader public interest.

Respectfully Submitted,
William Vibbert, Rainbow River Conservation

Howard T. Odum
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October 19, 2016

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street
Brooksville, Florida 34604-6899

Transmitted via email to Melissa.Gulvin@swfwmd.state.fl.us

Subject: Florida Springs Institute Comments on Recommended Minimum Flow for the Rainbow River System Peer Review Draft

Dear Melissa:

The Howard T. Odum Florida Springs Institute is a private, non-profit, scientific and educational organization dedicated to the better understanding and wise management of Florida's artesian springs. The Florida Springs Institute is actively involved in conducting springs baseline assessments and in providing science-based recommendations for springs restoration and protection. In this role, the Florida Springs Institute reviews all draft agency actions related to Florida's springs, including the development and implementation of minimum flows and levels.

As required by Florida statutes, protection of Florida's natural water bodies, including artesian springs, is the responsibility of the state's water management districts (WMDs). This oversight requires that your agency first and foremost protect the public trust by preserving the natural structure and function of water bodies, including the Rainbow Springs System. The Rainbow Springs and River has several special designations that establish a very high bar for protection. The Rainbow Springs System is a Florida Class III water body, requiring maintenance of fishable and swimmable conditions and compliance with more than 40 water quality criteria. Rainbow is also a Florida State Park, the "Real Florida"; an Outstanding Florida Water that is protected from any human activity that will cause degradation of water quality compared to conditions in the 1980s; a Surface Water Improvement and Management (SWIM) water body requiring restoration of impaired water

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FEIN: 46-1663401

quality and habitat; an Aquatic Preserve to be restored and protected for the enjoyment of future generations; and a National Natural Landmark, with ecological significance to the entire United States. These protections represent a public mandate for the Southwest Florida WMD to provide the highest level of protection to the natural ecological health of Rainbow Springs and the Rainbow River.

In spite of these special designations, the Rainbow River System is currently the most polluted first-magnitude spring in the Southwest Florida WMD with an average concentration of 2.6 mg/L of nitrate nitrogen, and has a 15% average flow reduction over the past two decades compared to the earlier period-of-record. Excessive in-water recreation results in an additional significant stress on the Rainbow River System.

Ecological research conducted at the Rainbow River System over the past decade has found that the environmental health of the ecosystem is impaired, with expansive blooms of filamentous algae, reduced levels of photosynthetic efficiency, smaller populations of fish and other wildlife, loss of aesthetics due to compromised water clarity, and isolation from the marine fauna that formerly inhabited and enhanced the springs' ecological functions. The Florida Springs Institute recently provided a quantitative ecosystem assessment of the health of the Rainbow System in a report card format (attached document). The Rainbow System received an overall grade of C- with failing grades for Spring Discharge, Nitrate-Nitrogen, and Fish Biomass.

THE CONCLUSION FROM THE ABOVE SUMMARY IS THAT THE RAINBOW SYSTEM CANNOT TOLERATE AND SHOULD NOT BE SUBJECTED TO ANY ADDITIONAL ANTHROPOGENIC IMPACTS.

The WMD's proposal to allow an additional flow reduction of up to 7% is in direct conflict with the hard facts that the Rainbow River system is impaired; is not receiving statutory protections as intended by the Florida Legislature; and should be placed in recovery to restore some or all of its historic flows. The WMD has an undeniable mandate to reduce groundwater pumping to help reverse the significant harm caused by lowered spring flows.

The Southwest Florida WMD's Northern District Model v.5 has estimated that the Rainbow River spring flow has declined by only 1% as a result of consumptive uses. This result is suspect since actual flow data reported above and the three empirical water balances presented by the WMD to the Peer Review panel show that current pumping has already reduced spring flows within a range of 3 to 7%. The Florida Springs Institute has concluded that about one half of the observed 15% flow reduction is due to pumping, a finding supported by the cited empirical water balances. It is critical that the WMD estimate a statistically-based confidence interval around the 1% NDM estimate and exercise an abundance of caution before allowing any additional groundwater extractions in the Rainbow Springshed.

In summary, the Florida Springs Institute provides the following recommendations to the WMD:

- Re-evaluate the effects of existing groundwater pumping in light of the statistical uncertainty applicable to the NDM, combined with the conflicting results from the empirical water balance estimates presented to the peer reviewers;

- Pick the most limiting metric derived during the assessment of significant harm to the protected Rainbow River System water resource and human use analysis, namely floodplain protection, and adopt a minimum flow of no more than an average 5% reduction compared to the pre-1950s baseline flows;
- Contract with the U.S. Geological Survey to estimate a pre-development water balance for the entire WMD and establish a safe groundwater yield that sets a cap on total groundwater pumping in the Southwest Florida WMD to limit all spring flow reductions to no more than 5% of pre-development flows; and
- Fully fund and implement the updated Rainbow River SWIM plan and work with the Florida Department of Environmental Protection and local stakeholders to revise the existing Rainbow Springs Basin Management Action Plan to achieve full compliance with the nitrate Total Maximum Daily Load (89% reduction in nitrogen loading in the Rainbow Springshed).

The Florida Springs Institute previously met with you and other WMD staff on October 11, 2016, to describe and discuss the technical basis of the draft minimum flows and the recommendations provided above. All of the available technical evidence supports the findings that the Rainbow Springs System is:

1. A truly outstanding natural water body with regional and national natural and economic value to human society;
2. Impaired by reduced flows, elevated nitrate concentrations, and excessive recreational pressures; and
3. Will not recover to an acceptably high level of environmental health without a significant reduction in regional groundwater pumping and nitrogen loading and enhanced management of recreational impacts.

Please deliver the message to your Executive Director and Governing Board that we respectfully request that they establish minimum flow limits or a water reservation for the Rainbow River System that ensure and sustain full recovery of healthy environmental conditions.

If you have any questions concerning this information, please call to discuss.

Sincerely,



Robert L. Knight, Ph.D., Director
Howard T. Odum Florida Springs Institute
(352) 538-6620
bknight@floridaspringsinstitute.org

Enclosures

CC: Burt Eno, President Rainbow River Conservation
Dan Hilliard, Chairman, Florida Springs Council

Drew Bartlett, Florida Department of Environmental Protection
Heather Obara, Associate Director, Florida Springs Institute

RAINBOW SPRINGS AND RIVER
ENVIRONMENTAL HEALTH - 2016 REPORT CARD

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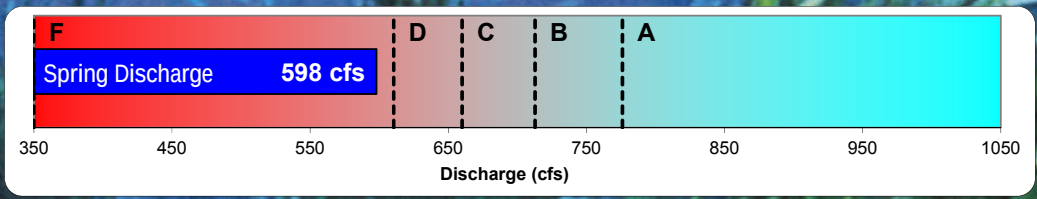

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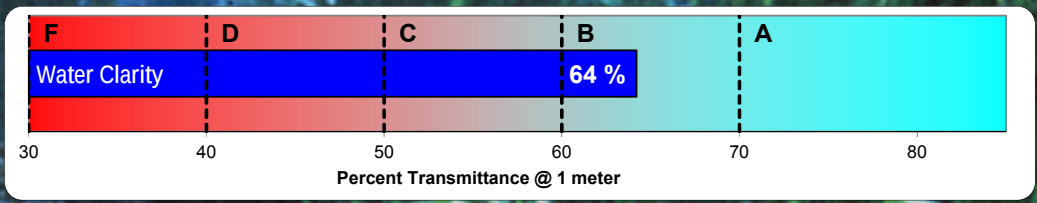

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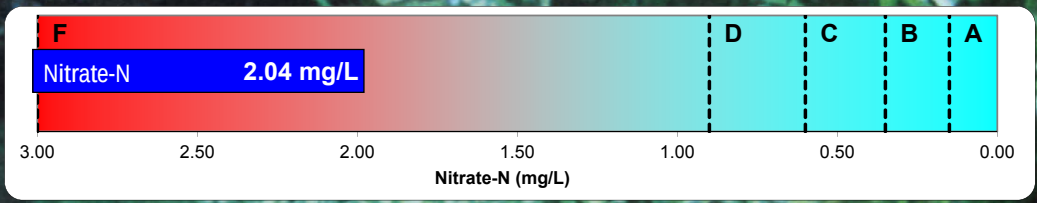

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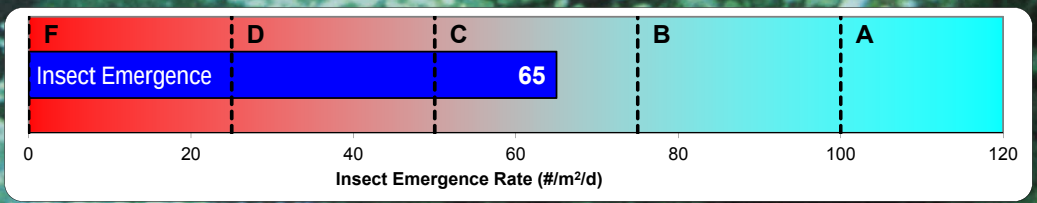

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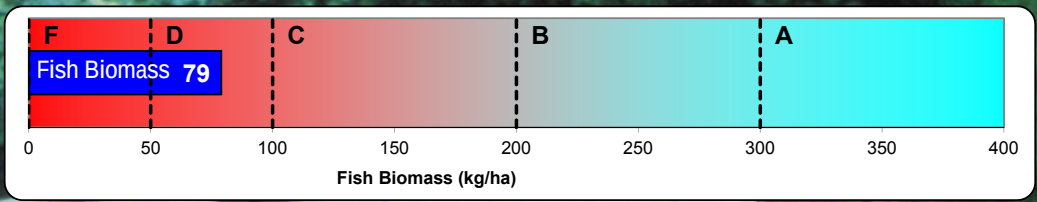

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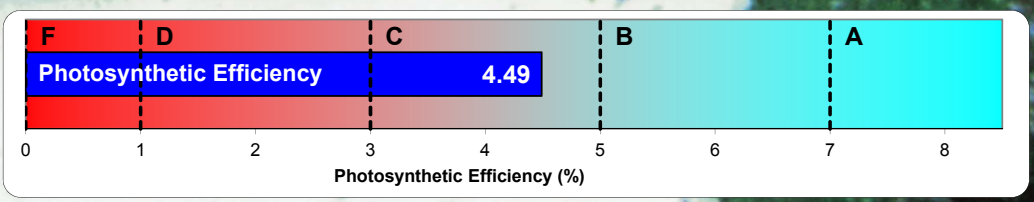

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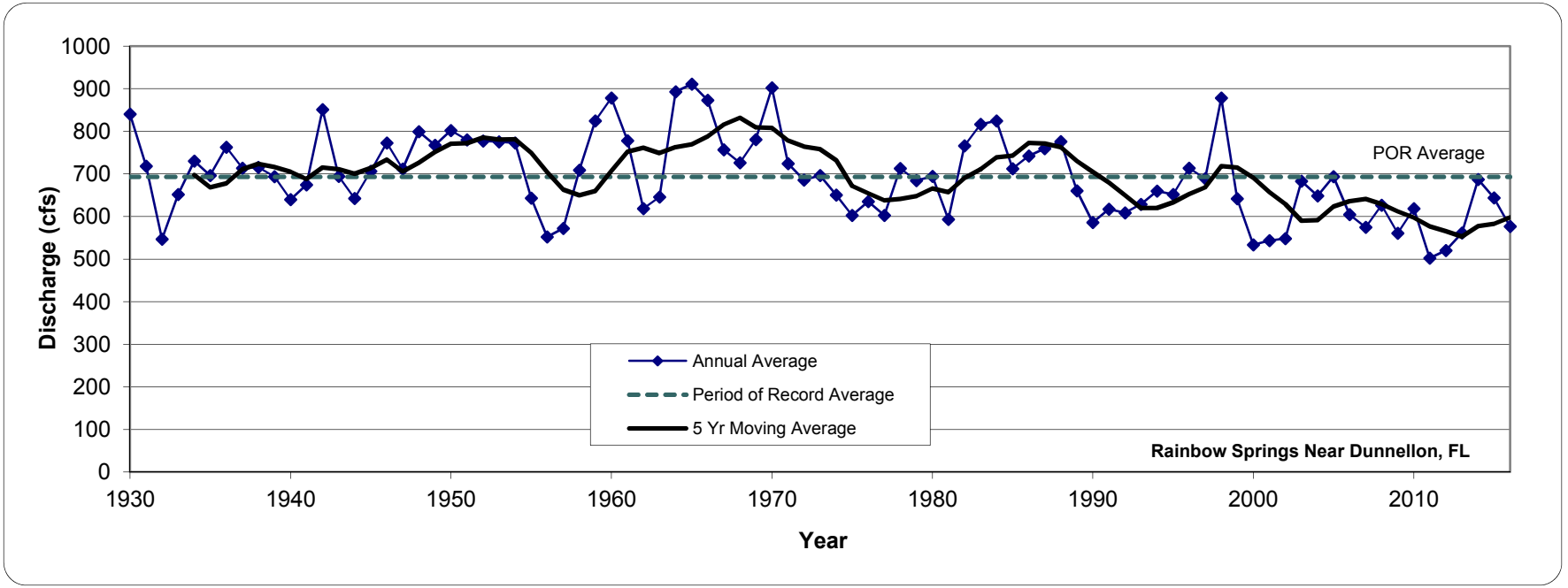
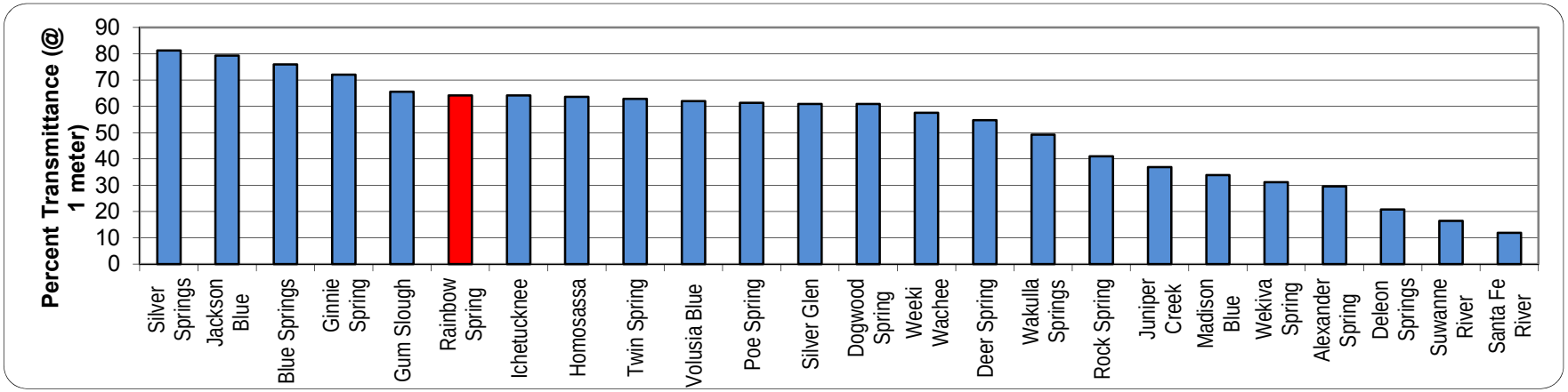
RAINBOW SPRINGS AND RIVER



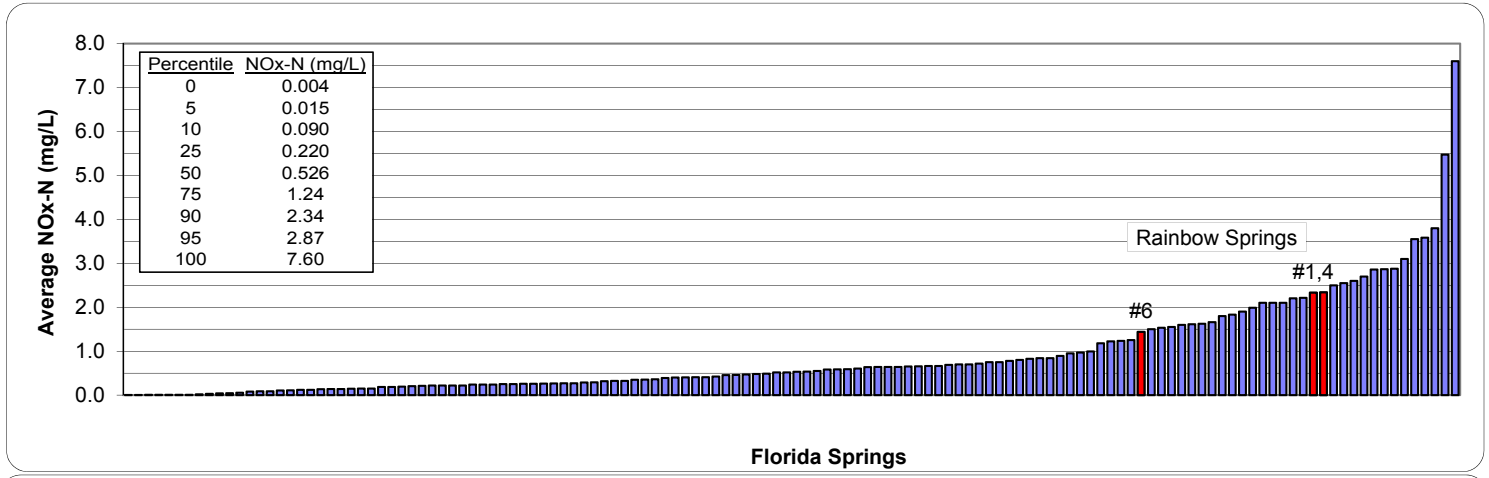
Spring Discharge @ US 484	Grade	Average (2012-2016)	A: > 776 cfs B: 713 - 775 cfs C: 660 - 712 cfs D: 610 - 659 cfs F: < 609 cfs
	F	598 cfs	

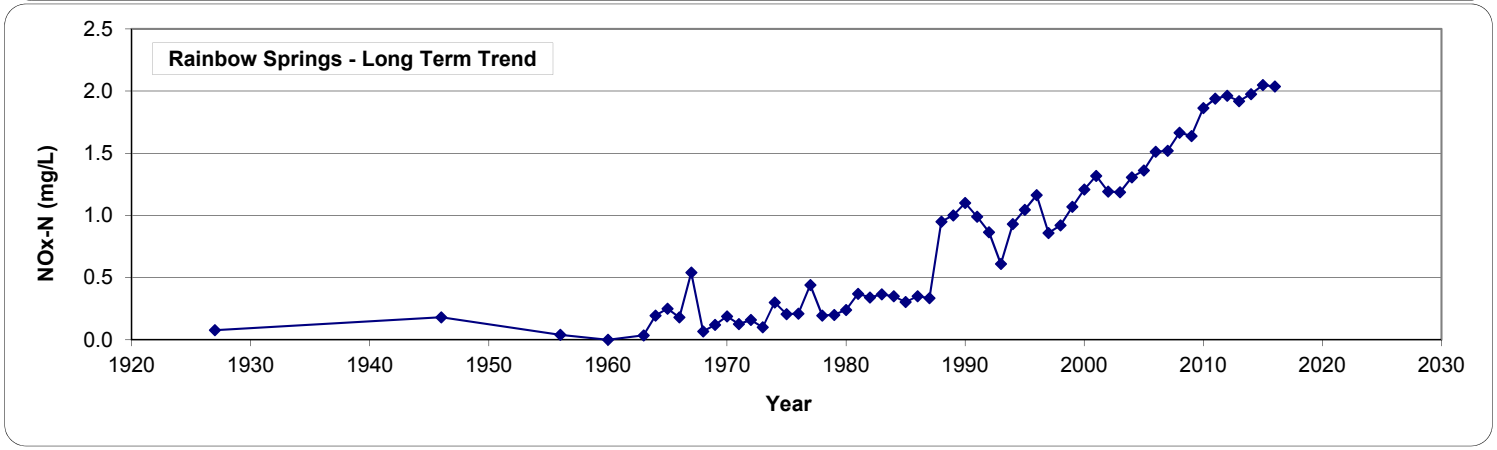
RAINBOW SPRINGS AND RIVER



Water Clarity @ Spring Run	Grade	Average (2015-2016)	A: > 70 % B: 60 - 69 % C: 50 - 59 % D: 40 - 49 % F: < 40 %
	B	**64%** Light Transmittance @ 1 meter	

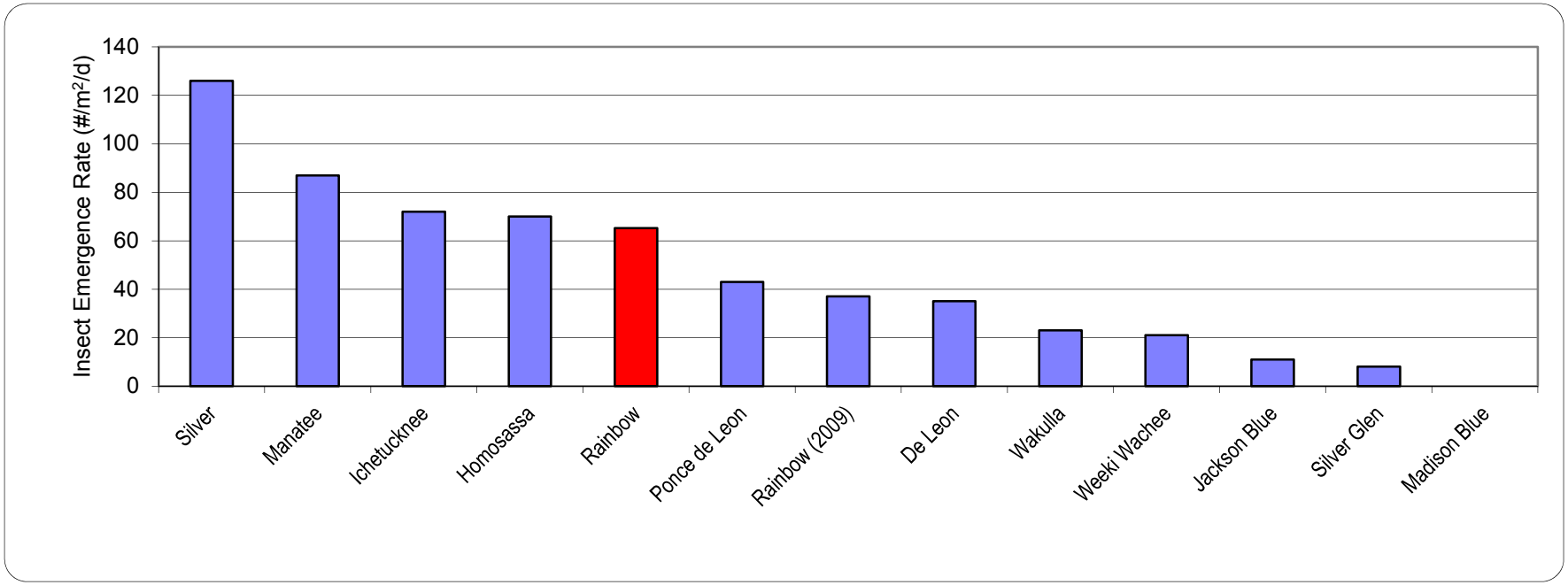
RAINBOW SPRINGS AND RIVER





Nitrate Concentration @ Spring Boil	Grade	Average (2016)	A: < 0.15 mg/L B: 0.15 - 0.35 mg/L C: 0.36 - 0.60 mg/L D: 0.61 - 0.90 mg/L F: > 0.90 mg/L
	F	2.04 mg/L	

RAINBOW SPRINGS AND RIVER



Adult Aquatic Emergence @ Spring Run	Grade	Average (2015-2016)	A: > 100 B: 75 - 99 C: 50 - 74 D: 25 - 49 F: < 24
	C	**65** insects/m²/day	

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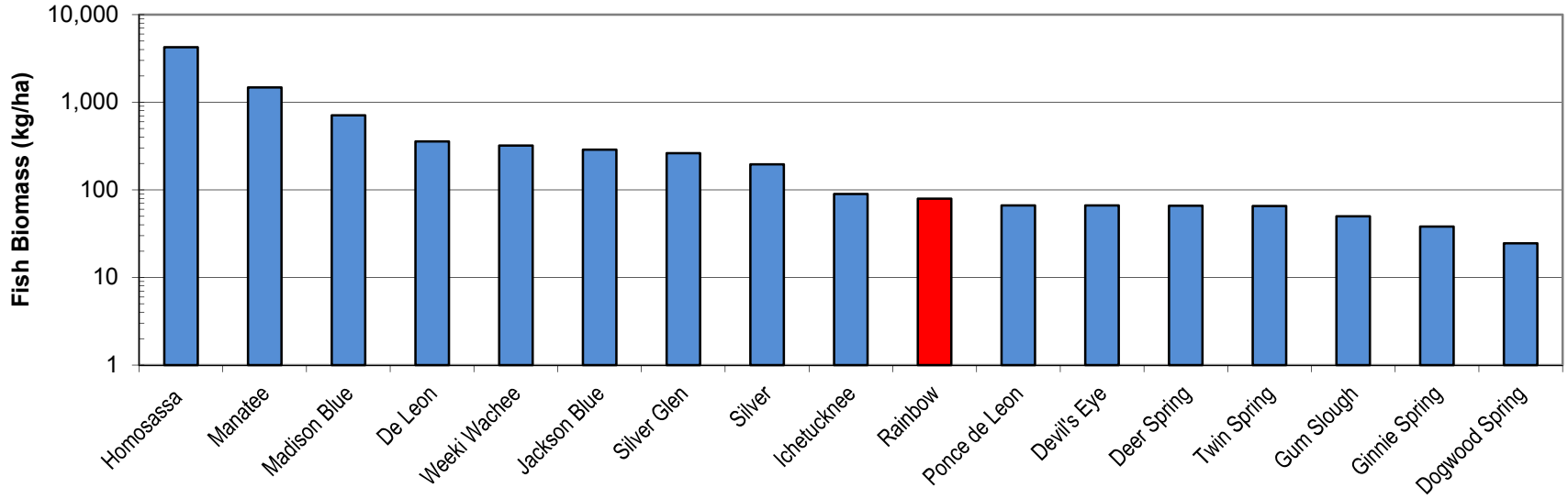
RAINBOW SPRINGS AND RIVER



Fish Biomass	Grade	Average (2016)	A: > 300 B: 200 - 299 C: 100 - 199 D: 50 - 99 F: < 50
	D	79 Biomass kg/ha	

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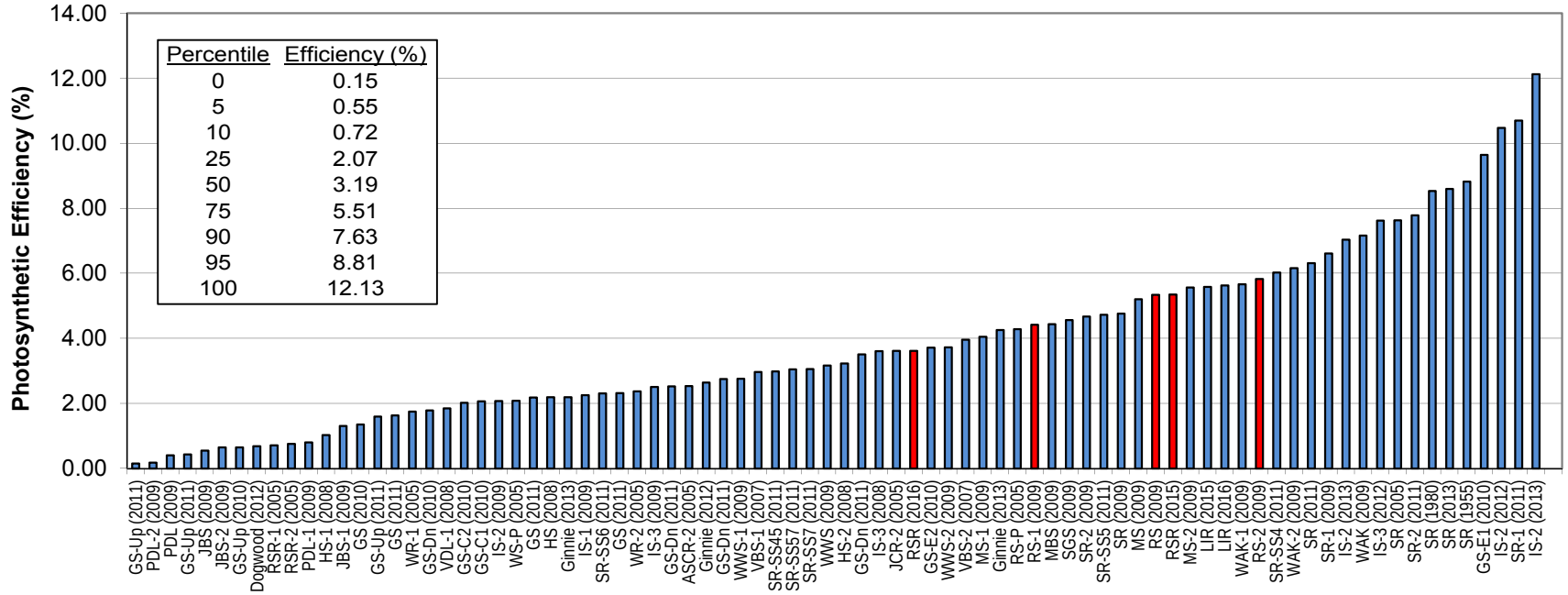
RAINBOW SPRINGS AND RIVER



Photosynthetic Efficiency	Grade	Average (2015-2016)	A: > 7.0 B: 5.0 - 6.99 C: 3.0 - 4.99 D: 1.0 - 2.99 F: <1.0
	C+	4.49 %	

Howard T. Odum FLORIDA SPRINGS INSTITUTE

From: **Grimsley, Kevin** <kjgrims@usgs.gov>
Date: Thu, Nov 10, 2016 at 10:04 AM
Subject: Re: Questions Re Rainbow Gage Sites
To: Alan Martyn Johnson <martynellijay@hotmail.com>

Hi Martyn,

I'm sorry it's taken so long for me to get back to you on this.

1. The datum listed on NWISWeb for 02313098 was not correct. I don't know how that number got entered or where it came from, but it was definitely wrong. That has been corrected now and the correct datum is 22.72 ft above NAVD '88. I'm very sorry for the confusion.

2. Yes, measurements at both stations use the gage heights from the Rainbow well since that's how the continuous discharge is computed.

3. On your third question, I believe the gage heights you see for those measurements are the surface water levels at the measurement locations. The difference between 023103092 and the other 3 gages is that for some reason those gage heights were at a local gage datum instead of elevation. We're adjusting those gage heights now so that all 4 of those station measurements will be referenced to NGVD '29 which is also the reference for 02313100. If you're interested, the conversion from NGVD '29 to NAVD '88 in that area is about -0.78 ft.

4. Backwater is simply when the slope of the water surface is reduced due to downstream effects (Withlacoochee River). Because 02313100 is so close to the confluence with the Withlacoochee, the slope of the water surface is very small between them. It has nothing to do with how much water is coming from upstream. It just means that the relationship between your water level at the gage and the discharge measurements is no longer based solely on the channel geometry downstream.

I must also add that we do not account for any backwater because our computations are based on the well elevations, not the water level at the gage which is what's affected by the backwater effects from downstream.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS Caribbean-Florida Water Science Center
4446 Pet Lane, Suite 108
Lutz, FL 33559
kjgrims@usgs.gov
813-498-5064
****

On Thu, Oct 20, 2016 at 8:38 AM, Alan Martyn Johnson <martynellijay@hotmail.com> wrote:

Kevin,

I finished reading Rainbow MFL Draft a couple of weeks ago, among my copious notes are a few questions you may be able to answer when you get a chance. I appreciate you have lots of other work, but you are someone I can trust to get honest answers. I will try to keep my questions brief.

1. Gage site 02313098. Is the gage datum the zero gage Ht?
   Is the gage datum 27 feet above NAVD 88 on the Location Map waterdata.USGS.... Correct?

   Every method I have tried to compare water level at this gage site to the others I get differences…not by a little, but 5 feet; this can't be right. Where am I going wrong?

2. Field Measurements for 02313098 and 02313100 Rainbow both report Gage Ht; as far as I can tell this is the Ht in the Rainbow Well 29051408227071. Is this correct?

3. Following on from the same point Field Measurements 2006 thru 2010 for 02313092 Rainbow #1, 02313093 Rainbow #4, 02313094 Bubbling Spring, 02313096 Rainbow #6 show Gage Hts which do not match the well level. Particularly Rainbow #1 which are in the 2 to 2.3 ft range. Others are close to well level but not exact and all three show same gage ht. same day. Example, 2008-04-30 gage ht 30.67 at three sites, #1 is 2.33; Rainbow Well 30.80.

   Specifically, is there a known elevation of the water level at the headsprings/#1 spring, which can be compared to 02313100?

   I would like to better understand this as I think the SWFWMD consultant has incorrectly used some of this field measurement data in constructing their HEC-RAS model (in addition to other concerns I have with their work).

4. I am trying hard to understand backwater effect. As far as I can see it stems from the filling or emptying of the river upstream of the gage site due to resistance offered by the Withlacoochee. Unfortunately I am not able to translate this into facts that make this of a magnitude which amounts to concern (other than in very rare situations such as hurricane Hermine). Normal variations of gage ht at 02313100 are 0 to +- 0.03 ft per day (that represents 70% of daily change over the last year and 90% is 0 to +-0.05).
   River area for the first two kilometers upstream of the gage is 22 acres (Zone 61-70, 10 acres plus Zone 71-80, 12 acres from the MFL Report) even if I add 18 additional acres for the pools/lagoons (east and west of the main channel) the quantity of water to fill or empty 40 acres by 0.01 feet over a day is equivalent to 0.2 cfs (10cfs for a change of 0.05 ft). If discharge could be measured that accurately it would be amazing.

   Sorry but I do not see the problem. Am I missing something?

   Note I used the two km as this must be about the point of the rocky shoal mentioned in connection with 02313098 location.

Martyn

P.S. I mentioned the rare situation of hurricane Hermine, if you are interested take a look look at the attached spreadsheet graph. Re the drop before Hermine hit, speculate it is wind related or there is a flood control sluice that was opened. Large increase in the level at the newer gage site is certainly

related to storm water...it must have been an amazing sight at the rocky shoal downstream of the new gage site...whitewater on Rainbow!!

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Date: November 14, 2016 at 8:40:06 AM EST
To: Doug Leeper <doug.leeper@swfwmd.state.fl.us>, Ron Basso <ron.basso@swfwmd.state.fl.us>, Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Rainbow River Review 1

Doug, Ron and Melissa,
Last week I received answers to some of my questions from USGS regarding the Rainbow River MFL so I have pulled together some of my comments.
For ease of reading I have put my comments in a word file for you to consider.
I have major concerns regarding the work by ECT. Who was responsible for reviewing the work done by ECT or was it just accepted without question?

I am still waiting for USGS to provide the discharge equations for the two gage sites on Rainbow River. These may address some of the other concerns I have regarding flows.
In addition I have comments regarding the analysis of water quality data, fish data and floodplain habitat which I will address later.

Regarding Crystal River Kings Bay Review tomorrow, what is the room location at the Brooksville Office, I hope to be able to attend in person.

Martyn

As mentioned in a previous e-mail I was awaiting information from USGS regarding Rainbow River. I have received part of the information which helps me address some of the concerns I have.

Stage Records at Gage Site 02313098

From Rainbow River Appendix C page 3-4

Quote
USGS 02313098 Rainbow River near Dunnellon, Florida, as listed in Table 3-1 and presented in Figure 3-1, was recently installed upstream of a rocky shoal by USGS in 2013. However, review of the stage records provided at this gage suggests that the vertical datum of 27 ft-NAVD appears to be inappropriate when compared with the stage data collected at other river sites. Therefore, the stage data at this short-term USGS gage will be excluded from the subsequent model calibration and verification.
End Quote

It is disappointing that the consulting firm simply chose to ignore the data as it did not 'fit'. A professional approach would have been to make a few simple enquiries.
This is what I received from USGS
Quote
1. The datum listed on NWISWeb for 02313098 was not correct. I don't know how that number got entered or where it came from, but it was definitely wrong. That has been corrected now and the correct datum is 22.72 ft above NAVD '88.
End Quote

Furthermore, to then use this new Gage Site be identified in Rules for the MFL (Draft Report Page 92).

Use Of USGS data to support the model development

Fault 1
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Fault 2
In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%.

This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report.
The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy). Specifically I have taken the Field Measurements (compared in the attached xls file) as the most accurate as these are in river measurements and not subject to the potential inaccuracies of calculated discharge derived from well level. Although I would add the agreement between Field Measurements and Calculated Discharge for 02313100 over the years is remarkably good.

The HEC RAS Model is constructed to look good not to be of any real value. The foundation is faulty(see faults above) and the mathematical manipulation of data such as analysis of Discharge at Rainbow River 02313100 and the Stage at Withlacoochee 02313200 (see page 62 and onward in the Draft Report) are the source of hypothetical estimates which are even questioned in Section 6.2.3 Sources of Uncertainty. Please note my highlighted sentence above; did anyone compare this data/look at the accuracy of the discharge data; there are some 700 Field Measurements of discharge with half of them since 1965 which cover the time period mentioned in 6.1 Page 59 of the Draft Report.

Zero or reverse flow

From Rainbow River Appendix C Page 4-9

Quote
For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stageflow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.
End Quote

Let me first address the 'field observations of severe backwater effects (zero or reverse flow)', I would like to get a statement from the observer(s) of when and where this zero or reverse flow was witnessed. Was reverse flow really witnessed at the CR 484 bridge? This must have been quite a sight, but I have serious doubts this can be substantiated,

Now to "This conclusion is also supported by USGS gage data". All the actual data I have reviewed shows the stage at the gage site 02313100 (Rainbow River) is always higher than the site 02313200 (Withlacoochee). My review initially focused on the extreme high and low stage as presented (best estimate from graph) in Figure 3-6 (the high in mid 2005 of about 28.7 ft and

the low in mid 2012 of about 25.8 ft).
Withlacoochee high on August 8, 2005 was 29.22 ft Rainbow River was 29.63 ft
Withlacoochee low on May 13, 2012 was 26.53 ft Rainbow River was 26.72 ft
These and numerous others I checked always had Rainbow River higher than Withlacoochee.

As far as I can see the only possible explanation for the quoted statement is some mathematical manipulation of data, which is not supported by any actual data. I am open to a factual explanation.

Martyn

Rainbow River Newer Gage Site 2313098 Field Measurements cfs			Rainbow River Older Gage Site 2313100 Field Measurements cfs			Difference	Percentage Difference
10/6/2016 10:30	USGS	609	10/6/2016 13:46	USGS	660	51	8%
9/14/2016 16:53	USGS	608					
9/14/2016 16:09	USGS	601					
9/14/2016 15:16	USGS	622					
9/14/2016 13:58	USGS	630					
9/14/2016 12:44	USGS	625					
8/11/2016 12:50	USGS	590	8/12/2016 10:36	USGS	575	-15	-3%
6/16/2016 13:50	USGS	581	6/16/2016 16:33	USGS	569	-12	-2%
4/14/2016 11:14	USGS	580	4/14/2016 14:05	USGS	601	21	3%
2/11/2016 11:11	USGS	590	2/11/2016 15:01	USGS	604	14	2%
12/3/2015 11:28	USGS	640	12/3/2015 14:47	USGS	652	12	2%
10/8/2015 14:08	USGS	644	10/8/2015 17:55	USGS	661	17	3%
10/8/2015 12:57	USGS	643				18	
8/11/2015 10:49	USGS	680	8/11/2015 15:19	USGS	660	-20	-3%
6/1/2015 14:44	USGS	598	6/1/2015 10:56	USGS	599	1	0%
4/1/2015 9:07	USGS	642	4/1/2015 13:49	USGS	625	-17	-3%
2/3/2015 15:12	USGS	685	2/3/2015 11:26	USGS	676	-9	-1%
2/3/2015 14:37	USGS	698	2/3/2015 10:23	USGS	636	-62	-10%
12/9/2014 10:25	USGS	632	12/8/2014 12:44	USGS	643	11	2%
10/14/2014 11:57	USGS	689	10/14/2014 9:24	USGS	722	33	5%
8/19/2014 9:35	USGS	638	8/18/2014 13:15	USGS	640	2	0%
			8/18/2014 12:21	USGS	654		
6/2/2014 15:03	USGS	707	6/2/2014 11:28	USGS	731	24	3%
6/2/2014 14:14	USGS	755	6/2/2014 10:49	USGS	735	-20	-3%
3/31/2014 14:58	USGS	702	3/31/2014 11:00	USGS	734	32	4%
3/31/2014 14:03	USGS	744				-10	
2/10/2014 16:35	USGS	634	2/10/2014 12:29	USGS	645	11	2%
2/10/2014 15:46	USGS	663					
12/9/2013 12:56	USGS	629	12/9/2013 16:17	USGS	595	-34	-6%
12/9/2013 11:55	USGS	607					

Subject: Emails from Mr. Martyn Johnson with imbedded responses from Southwest Florida Water Management District staff highlighted in blue and grey, with grey highlighting denoting responses to public record requests

Prepared by: XinJian Chen, Gabe Herrick and Doug Leeper
Natural Systems & Restoration Bureau
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
Brooksville, Florida 34605

Date: December 16, 2016

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, December 12, 2016 11:27 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Ross.Morton@swfwmd.stste.fl.us
Subject: Kings Bay Crystal River Salinity

I am still hoping for an explanation of how the spring discharge from Group 2 springs shown in Figure 2-4 can regularly vary from 0 cfs to 250-270 cfs in 6 hours; there is not a shred of evidence to support this.

Staff Response: This kind of variability of the spring flow discharge is caused by tides. The spring discharge shown in Fig. 2-4 of the District's draft minimum flow report was obtained by separating tidal discharge from measured discharge data collected at the G2 cross section based on the principle of mass balance. There could be some small errors associated with the discharge measurement and the measurement of the upstream water surface area; nevertheless, the discharge variation in the order of 250 cfs for Group 2 springs during these particular days should not be a surprise unless there exist significant errors in the measurements or the mass balance principle.

SALINITY Kings Bay Crystal River

I have a number of questions and comments regarding salinity in the Crystal River Kings Bay MFL Report.

1. **Baseline Flow/Discharge re Salinity**
   Salinity is presented as the factor most appropriate for the MFL recommendation of a 12% reduction in flow from the baseline condition which limits harm (loss of 15% volume/area) to the < 2ppt salinity habitat. These numbers are easily found in the report, but exactly how many CFS the baseline discharge is, appears to be missing or

difficult to find. Is baseline the 201 million gallons per day (310 cfs) in the Executive Summary or some other figure. **What is the baseline cfs?**

Staff Response: Baseline discharge varies with time and thus is not a constant value.

Salinity habitats (defined as < 2ppt) in Kings Bay are those areas where SAV is more healthy/prevalent, but the report gives no indication of where the < 2ppt areas are. In response to Review panel request a visual has been posted on the WebForum (copy attached).
The first visual Baseline is an average over 9 years**.**
Do I assume correctly this is output from the model,
What is:
a) the baseline flow in cfs,

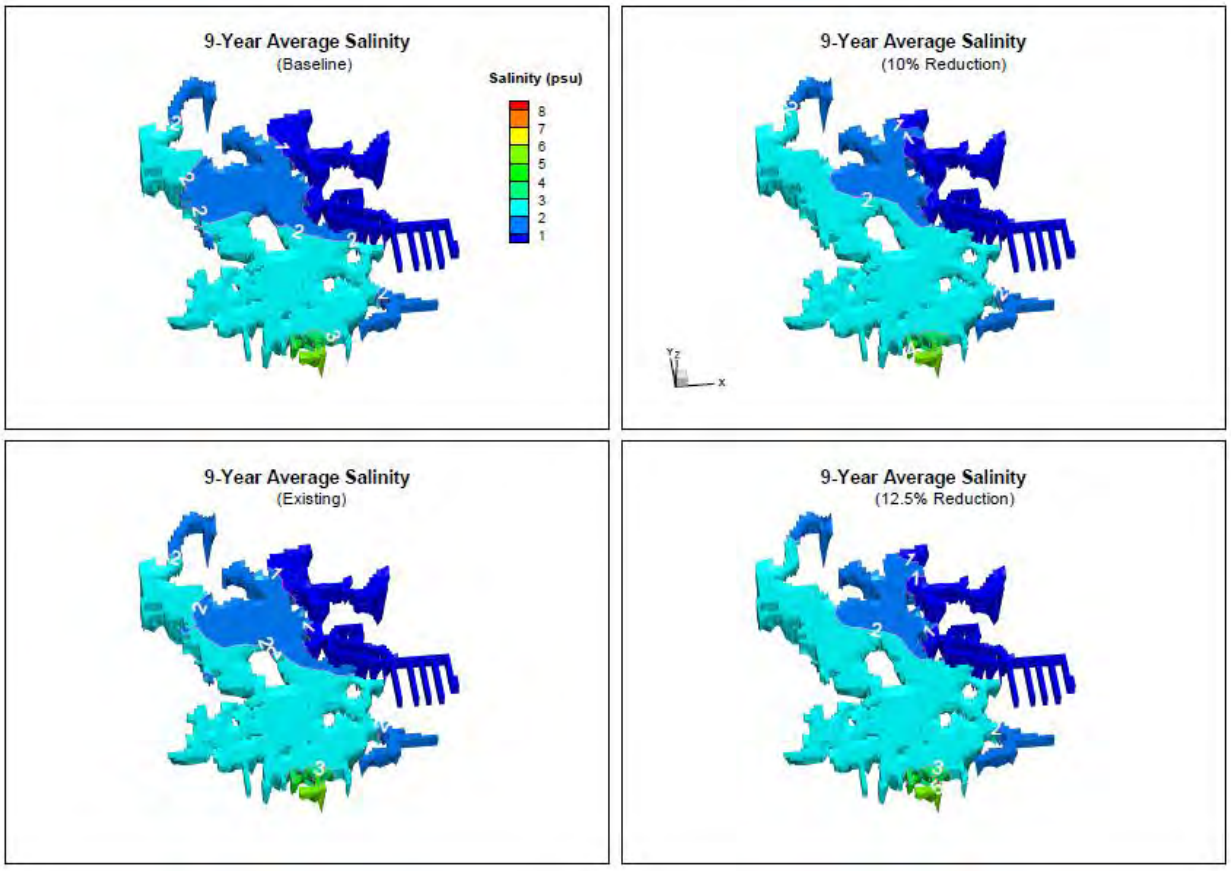
Staff Response: Again, baseline discharge is not a constant; it varies with time.

b) exactly what salinity is averaged over 9 years

Staff Response: Simulated salinity values at each grid cell during the 9-year simulation period were averaged.

c) which 9 years are presented?

Staff Response: The 9-year period is from 10/6/2006 to 10/13/2015.



Is this average daily data if the inflow of spring discharge is fixed and the other model inputs from the USGS Gage Sites are as measured by USGS over 9 years.

Staff Response: No, inflow of spring discharge is not fixed.

It is puzzling how the 3 psu area to the south of Buzzard Island appears to be 'held back' by the 2 psu area from shore to shore north of Buzzard Island.

Staff Response: This could occur because the southern spring vents could be saltier than 3 psu.

What is existing as shown for the bottom left image? Is this baseline without withdrawals and if so where are groundwater withdrawals a model input; not shown in Table 2-2, page 46 but conceptualized in Figure 2-6 page 45.

Staff Response: The "existing" for the bottom left image is the actual condition during the 9-year period. It is not the baseline without withdrawals. Groundwater withdrawal impacts on discharge are predicted as a percent of flow by the Northern District Model (NDM) as shown in Table 1-2 of the draft minimum flow report. Impacted flow is then

converted to baseline flow by dividing by 0.98, which is a conservative estimate, i.e., it likely overestimates impacts and thus overestimates baseline relative to impacted flows. In the conceptual model shown in Figure 2-6 of the draft report, the effect of groundwater withdrawals through groundwater level to spring discharge (3 boxes and two arrows) is estimated by the NDM as a percent impact. That percent impact is then used to adjust spring discharge as estimated by groundwater level and Kings Bay gage height. The conceptualization in Figure 2-6 is a simple visualization that does not capture this level of detailed explanation.

2. **Increased flow Feb 1991 to April 2010**
   In the Section 3.5 Water Quality, Figure 3-4 presents discharge data for 91 dates February 1991 to April 2010 during the time water quality measurements were made. These are interpreted (blue line) to indicate discharge increase from approx 220 cfs to 350 cfs. The origin of this data is not included.
   What is the origin of this data and does the model also show an increasing 'trend' over these years?

   Staff Response: The origin of the discharge data is the topic of section 2.2 "Predicting Freshwater Inflow" within the draft minimum flows report. The origin of Water Quality data is explained in section 2.6 "Water Quality" of the report.

   The district estimates spring discharge (submarine groundwater discharge or SGD) for the system based on an empirical formula. The running average SGD is calculated in equation 10 on page 21 of Chen (2014). Instantaneous SGD for each vent is shown in Equation 1 of the draft minimum flow report on page 41. The discharge plotted on the y-axis in Figure 3-4 within the report is obtained as described in section 2.2 and in Chen (2014) as cited. The dates plotted on the x-axis of Figure 3-4 are those dates on which water quality samples were taken within the database described in Table 2-4 of section 2.6. There is an increasing trend you can see in Figure 3-4 for our estimate of SGD for these dates.

3. **Increased salinity in the 13 zones**
   The report references water quality data from 13 zones representing 535 sampling stations and 9104 entries and concludes "salinity increased in Zones 1 and 3 thru 11 and remained stable in Zones 2, 12 and 13." The stability for Zones 12 and 13 is not surprising as these are off shore.
   I would have thought this data set is important to understanding salinity in Kings Bay, but no mention is made regarding the increases either as percentages or actual values. So far I have been unable to find this data set in SWFWMD's vast data base. I have asked Ron/Doug if they could let me know how to find it.
   What does this data show and how is the increase explained if flow increased over 50% as noted in 2 above.

Staff Response: The data shows trends as described in Table 3-8 within the draft minimum flow report. To reiterate: Mann-Kendall tests showed significant increases in zones 1 and 3-11, no decreases, and no significant trends in zones 2, 12, and 13. The data showing an increase in discharge plotted in Figure 3-4 of the draft minimum flow report is based on daily submarine groundwater discharge on 91 dates for which water quality data was taken. Salinity at any given time and location will be affected by tide stage, offshore wind, and discharge, all of which vary over multiple time scales. Figure 3-4 shows a correlation between discharge and time on water quality sampling dates that had to be removed to remove confounding in the correlations between nitrate and flow and between nitrate and time as shown in Figure 3-5.

It is unlikely that a meaningful trend between daily discharge and instantaneous salinity measurement can be identified. Thus, it is not surprising that instantaneous measurements of salinity showed an increasing trend in 10 zones over 91 dates while a locally weighted regression (LOWESS) shows an increasing trend in discharge over those same dates. This is why a hydrodynamic model is needed to predict salinity at any given place and time throughout the system. Salinity cannot be accurately predicted through regression against current daily discharge when there are so many other factors that will affect salinity aside from daily average discharge on the date of salinity measurement.

4. **Modeling Salinity**

On page 44 of the report it states

Quote

Instantaneous spring discharge for each vent was measured under various tidal conditions. Salinity measurements were taken at the same time (VHB 2010 [included as appendix]). Thus, we are able to model spatially explicit spring flow with corresponding salinity values to accurately predict effects of spring flow on salinity habitats. Discharge was modeled at every spring site using parameters in Equation 1 corresponding to the nearest group (G1 or G2).

End Quote

So it appears the primary driver of the inflow of salinity is the VHB data albeit with the measured discharge being modified by Equation 1.

Note for clarification: Equation 1 for G1 and G2 have different C1 and C2 values. The C values i.e C1G1, C2G1 or C1G2, C2G2 are applied to an individual spring based on the proximity to G1 and G2 X-section.

While I see the other model inputs in Table 2-2 such as data from the USGS Site at Mouth of Kings Bay (salinity gage ht and temp) and meteorological data etc, it appears the volume of tidal inflow to Kings Bay is determined by the gage height and area in Kings Bay.

For each tidal cycle (average change of 2.5 feet gage ht) change over 6 hours) 65 million cubic feet or about 3000 cfs of water ranging in salinity 2000 to 6,000+ specific conductance (1.3 to 3.6 ppt) move in/out of Kings Bay. No data in the report identifies how this large volume of water is distributed in the bay. There is mention of 'tracers' on

page 50, but this modeled with no field data of tracers either chemical or physical to support or verify this modeling. There is mention of bottom roughness page 44. I**t would be interesting to see a visual from the model of the areas both top and bottom salinity at high tide and low tide, as this is really what is of interest. 9 year average is both difficult to comprehend and practically of questionable usefulness.**

Staff Response: During the flood tide, water moves into an estuary, and this "new" water is mainly located in the downstream portion of the estuary and pushes "old" water to the upstream portion of the estuary. During the ebb tide, this process reverses. The local physical shape of the estuary, wind actions, hydrologic loadings, the salinity and temperature distributions, as well as turbulent mixing affect the water movement and thus modify the distribution of the large volume of water you mentioned. The study of this kind of water volume distribution in Kings Bay is an interesting academic exercise but not necessary for our minimum flow evaluation.

The report is aimed at determining how much more water can be withdrawn from the aquifer causing reduction in spring discharge that limits harm to Kings Bay to 15% (starting point not quantified in most cases). Frequently the report attempts to justify the establishment of (percent only) MFL by commentary (summarized in Table 1-7) as protection and promotion. Some of these are more completely;

--In Section 1.7.3……..Our focus on salinity-based habitats will have wide-ranging protective effects on estuarine resources within the Crystal River/Kings Bay system.

--In Section 1.7.5…….By setting the minimum flows for the Crystal River/Kings Bay system at the *minimum* level necessary to prevent *significant* harm, we balance the need to conservatively protect the resources and ecology of the region with the need for fresh water supply.
The question here is what is the starting point; many long term residents recall times when the water was clear and algae blooms infrequent.

Staff Response: The starting point is baseline flow as estimated using the Northern District Model version 5. Minimum flows are not set with the goal to restore a system to any former state, but to set the limit at which further withdrawals would be significantly harmful (Section 373.042, Florida Statutes). Water clarity and algal blooms are affected by many factors and there have been many impacts to the system over the years. The District is currently involved in many cooperative, ongoing projects to improve water clarity and the ecology of the area.

--In 1.7.6……..Residents and users of Kings Bay and Crystal River are concerned with water clarity and preventing / reducing algal blooms (Evans et al. 2007; SWFWMD 2015). In addition, the tourism industry depends upon manatee thermal refuge during cold months. Both of these concerns are addressed in our analysis of salinity habitats and volume of warm water, which should have wide-ranging effects on maintaining natural aesthetic and

scenic attributes, as well as manatee habitat.

--In 1.7.7…….Managing salinity habitats through minimum flow implementation is expected to have far-reaching positive effects on beneficial aquatic vegetation and their associated filtration and absorption of nutrients and other pollutants.

Amazing how allowing destruction of 15% of something has so many beneficial effects. THIS IS NOT CANCER TREATMENT.

Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, December 12, 2016 7:53 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Salinity Kings Bay Crystal River

Doug and Ron,
In the MFL report mention is made of data from 13 Zones. Can you point me to where this data can be seen?

Staff Response: Please see Figure 2-8 and Table 2-5 within the draft minimum flows report for information on zone locations. Also, please note that we are providing you with the full Microsoft Access database which contains the water quality data used in the report. Unfortunately, the database file is too large to send by email, so we have posted it to the District FTP site for you to retrieve. The file, named *CRKB_Combined.accdb*, is storied in the "outgoing" folder on the FTP site.

Here's a link to the "outgoing" folder:
ftp://ftp.swfwmd.state.fl.us/pub/outgoing/

If the link above does not work, please follow the directions for accessing information from the "How to Access Our Anonymous FTP Server" page of the District web site at the link below.
https://www.swfwmd.state.fl.us/data/ftp/

Reference is made to Frazer Kings Bay Salinity Project 2001; where is this UF project reported? I can't find it in the SWFWMD library or on line.

Staff Response: This work is referenced in Table 2.4 within the draft minimum flows report and is cited in the literature cited section (Chapter 5) as follows.

Frazer, T. K., Mark V. Hoyer, S. K. Notestein, J. A. Hale, and D. E. Canfield Jr. 2001. Physical, chemical and vegetative characteristics of five Gulf coast rivers. Final Report. Southwest Florida

Water Management District, Brooksville, Florida.

This report and its associated appendices are available from the District library web site at the following URLs:
http://www15.swfwmd.state.fl.us/LibraryImages/04623.pdf
http://www15.swfwmd.state.fl.us/LibraryImages/04624.pdf

Thanks,
Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, December 09, 2016 8:47 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Brad Rimbey <bwr.crrc@tampabay.rr.com>; ktripp@savethemanatee.org
Subject: Thermal Refuge for manatee Kings Bay

Doug, Ron, Dr. Chen and Melissa,
As you know I have very serious concerns about the credibility of the CrystalRK MFL Report. I am still hoping for an explanation of my concerns regarding spring discharge Group 2 springs going from 0 cfs to 250-270cfs in each tidal cycle (approx 6 hours) as presented in Figure 2-4. (Shared with Doug by e-mail Dec 6)

For now I would like to focus on Thermal refuge for manatee.

The Crystal River Kings Bay MFL Report states:
Page 53
Quote
The UnLESS3D model was able to predict volume and area of water in different temperature fractions throughout the bay. During the coldest 72 hours of the time period modeled, 85% of baseline flow is required to preserve 85% of the volume of water >20°C and deeper than 3.8 ft (Table-3-2, Figure 3-2). During time period with the smallest overall volume of thermal refuge from acute cold stress the volume of refuge was less sensitive to reductions in flow than at other times, however this is the most critical time period corresponding to the unusually cold winter of 2009 - 2010 (Table 3-3, Figure 3-3). At their smallest values, the total volume and area of water warm enough for manatee thermal refuge is sufficient to allow for several hundred thousand manatees.
End Quote
And Page 63
Quote
Although a reduction to 91% of baseline discharge will result in a 15% decrease in acute thermal refuge volume, there will still be enough warm water present for every manatee in the world ten times over (refer to Table 3-2). Thus, we do not find it appropriate to set minimum flows for the Crystal River/Kings Bay system based on manatee thermal refuge, as there appears to be more than enough to sustain the population given present rates of growth. This position is consistent with a report submitted to the U.S. Fish and Wildlife Service, which concluded that warm water is far more abundant than required to support Florida manatee populations, and that manatee protection should focus on forage as the factor limiting population size (Provancha et al. 2012).
End Quote

I**t is unclear where the input data for temperature in this model is obtained from. Could you confirm the source of temperature input data? Is it the temperatures as measured in the VHB reports for each spring, average from VHB or some other source.**

Staff Response: At the downstream boundaries, measured temperature data were used as model input. For spring flows, temperature is assumed to be nearly constant. The measured temperature in July – October 2009 by VHB was about 23.4°C for all spring vents. The model used this temperature for the entire 9-year scenario simulation period, with a small adjustment to allow spring flow during winter months to be slightly colder. At the free surface, heat flux was calculated using measured data for wind, solar radiation, air temperature, and air humidity.

So far I have not found any field studies/data which can be used to verify the output of the model. Does anyone know of any field studies of temperature during winter months.
Katie, Do you know of any field studies/data or even thermal imaging?

Staff Response: The model was calibrated and verified against measured temperature data collected by the U.S. Geologic Survey at Bagley Cove and the Mouth of Kings Bay with a time interval of 15-minutes.

Table 3-3 presents the volume and area of thermal refuge.
What baseline flow is used in modelling these volume and area figures.?

Staff Response: As noted in responses provided above, baseline flow varies with time and is not represented by a single value. It was calculated internally within the model based on the groundwater level in the ROMP TR21-3 well and the water level in Kings Bay.

Martyn
P.S. I have not yet been able to find Provancha 2012 in total, but some abstracts focus attention on available forage for Crystal River.

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, December 06, 2016 12:28 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Fw: Crystal River

Doug,
As I recall there was discussion yesterday by the panelist about how USGS filter the discharge data Bagley Cove. This e-mail from Kevin throws some light on the matter, but not the details of how.

Ken Watson in one of his postings recalled similar issues for Homosassa; he was right, it was mainly the Halls River discharge and the end result was the discharge from Halls River was not

included. Kevin told me the filter they used with Halls River (which frankly did not give meaningful results, hence not used) I think it was Godin tidal filter, but I can't find it to confirm.

Martyn

From: Kevin Grimsley <kjgrims@usgs.gov>
Sent: Monday, October 31, 2016 9:56 PM
To: Alan Martyn Johnson
Subject: Re: Crystal River

Martyn,

The King's Bay gage was destroyed (again) and we are looking for an alternate location that isn't so susceptible to damage. Filtered discharge for our gages isn't computed in real-time. We manually update it periodically so you'll see more data at Bagley cove soon.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS Caribbean-Florida Water Science Center
4446 Pet Lane, Suite 108
Lutz, FL 33559
kjgrims@usgs.gov
813-498-5064
****

On Oct 31, 2016, at 9:16 AM, Alan Martyn Johnson <martynellijay@hotmail.com> wrote:

Kevin,
Just started reading Crystal River MFL and decided to look at the latest data from the Gage Sites. I note 02310742 (mouth Kings Bay) stopped operating May 19 and 02310747 (Bagley Cove) stopped daily Tidally filtered discharge June 9.
Any reason you can share?
Thanks,
Martyn

Staff Response: Thanks for the emails and information regarding discharge measurement at the U.S. Geological Survey's Bagley Cove gage site.

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, December 06, 2016 12:02 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Peer Review Meeting Dec 5

Doug,
Sorry about the poor connection yesterday, I hung up hoping to get a better connection, when I tried reconnecting got only music after the pass code took. I did send a chat message, not sure if you got that, but I said I would send my input by e-mail. Comments are in the attached Word document.

I will leave it to you to share with SWFWMD persons or place it on the WebForum so the Peer Review Panelists can see where I was heading. At this stage I do not want to be seen as torpedoing the process you have in place so I will not post to the WebForum directly.

I know you work hard to keep the process moving forward, but unless these matters are fully resolved it may be better to explain to the management and/or Board there are some credibility issues with the model which need to be addressed.

Martyn

Staff Response: Thanks for the email and contributing to the peer review process. We did not notice your "chat" message delivered through the WebEx utility, and apologize for that. Your submitted comments will be reviewed by staff and incorporated into the project data set along with all other stakeholder input.

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, December 03, 2016 8:59 AM
To: jewilson@usgs.gov; Kevin J Grimsley <kjgrims@usgs.gov>
Cc: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Fw: USGS FOIA 2017-00006 - Response

Janis,
Thank you to yourself and Kevin for making this information available.

I am sharing this with SWFWMD which I trust is in order with the FOIA protocol. Apparantly SWFWMD do not have this specific information although they sponsor the Gage Site and I think it an important factor for their consultant to have in formulating MFL for the Rainbow River.

Martyn Johnson

From: jewilson@usgs.gov <jewilson@usgs.gov> on behalf of Freedom of Information Act, GS-D-EI_ <foia@usgs.gov>
Sent: Friday, December 2, 2016 1:28 PM
To: Alan Martyn Johnson
Cc: GS-GIO Freedom of Information Act
Subject: USGS FOIA 2017-00006 - Response

Dear Mr. Johnson,

I am attaching our final response to USGS FOIA 2017-00006, along with three tables related to the equations you requested. Thank you for your patience while we processed your request. Please let me know if you have any questions.

Sincerely,

Janis Wilson
U.S. Geological Survey
Department of the Interior
Denver Federal Center
Box 25046
Mail Stop 406
Denver, CO 80225-0046
(303) 236-1476 (office)
(303) 236-1451 (fax)
foia@usgs.gov

Staff Response: Thanks for the email and associated attachments regarding discharge measurement at the U.S. Geological Survey's Rainbow River near Dunnellon gage site.

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
BOX 25046 MS 406
Denver Federal Center
Denver, Colorado 80225

Transmitted via Electronic Mail: (martynellijay@hotmail.com)

December 2, 2016

U.S. Geological Survey FOIA #USGS-2017-00006

Dear Mr. Johnson,

This letter is the final response pursuant to your Freedom of Information Act (FOIA) request dated October 3, 2016, and received by the USGS FOIA office on October 10, 2016. The USGS assigned it control number **USGS 2017-00006**. Please cite this number in any future communications with the USGS regarding your request. The USGS acknowledged receipt of your request on October 11, 2016.

You requested the following information:

> **Discharge calculation equations for USGS Gage Sites 02313100 and 02313098 on the Rainbow River, FL.**

USGS Responsive Information

Station 02313098 – Two computation methods have been used at this station:

- The discharge data began on 10/1/2013 and used a direct relationship between discharge measurements at the gage and water level data from 290514082270701, Rainbow Springs Well. This rating does not use an equation, so the lookup table, "02313098.well_rating", is attached. This rating was stopped on 9/30/2015.
- An index-velocity rating was recently finalized and is being used for discharge from 10/1/2015 and forward. The stage-area rating for that method is attached. (See "02313098.area".) The velocity rating equation is:
    - Mean channel velocity = 0.4575 * index velocity + 0.198

Station 02313100 – The discharge at this station is calculated using a direct relationship between discharge measurements at the gage and water level data from 290514082270701, Rainbow Springs Well. This rating does not use an equation, so the lookup table, "02313100.well_rating", is attached. This rating has been in effect since 3/9/2010.

You were classified as an "Other" category requester; however, since we did not comply with any of the FOIA's statutory time limits, we cannot assess search fees associated with your request. See *43 C.F.R. § 2.37(f)(1)*. Therefore, there is no billable fee for the processing of this request.

The 2007 FOIA amendments created the Office of Government Information Services (OGIS) to offer mediation services to resolve disputes between FOIA requesters and Federal agencies as a non-exclusive alternative to litigation. Using OGIS services does not affect your right to pursue litigation. You may contact OGIS in any of the following ways:

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road – OGIS
College Park, MD 20740-6001
Email: ogis@nara.gov
Web: https://ogis.archives.gov
Telephone: (202) 741-5770
Fax: (202) 741-5769
Toll-free: 1-877-684-6448

Please note that using OGIS services does not affect the timing of filing an appeal with the Department's FOIA/Privacy Act Appeals Officer.

You also may seek dispute resolution services from our FOIA Public Liaison, Mr. Brian May, by phone at (443) 498-5521; by fax at (443) 498-5510; by email at foia@usgs.gov; or, by mail at U.S. Geological Survey, FOIA Public Liaison, 5522 Research Park Drive, Baltimore, MD 21228.

If you have any questions concerning your request or our response, please contact me either by electronic mail jewilson@usgs.gov or by phone (303) 236-1476. Thank you for your interest in the USGS.

Sincerely,

Janis Wilson
U.S. Geological Survey
Government Information Specialist

Attachments:
1. Text Document, "02313098.well_rating", 6 KB
2. Text Document, "02313098.area", 4KB
3. Text Document, "02313100.well_rating", 6 KB

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:43:40 EST By kjgrims
Rating for Area (ft^2)
RATING ID: 2.0 TYPE: Velocity-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Area (ft^2)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
2.00	221.7	222.7	223.8	224.9	226.0	227.1	228.2	229.3	230.4	231.5	10.900
2.10	232.6	233.7	234.8	235.9	237.0	238.1	239.2	240.3	241.4	242.5	11.000
2.20	243.6	244.7	245.8	246.9	248.0	249.1	250.2	251.3	252.4	253.5	11.000
2.30	254.6	255.7	256.8	257.9	259.0	260.1	261.2	262.3	263.4	264.5	11.000
2.40	265.6	266.7	267.8	268.9	270.0	271.1	272.2	273.3	274.4	275.5	11.000
2.50	276.6	277.8	279.1	280.3	281.5	282.7	283.9	285.1	286.3	287.6	12.200
2.60	288.8	290.0	291.2	292.4	293.6	294.9	296.1	297.3	298.5	299.7	12.100
2.70	300.9	302.1	303.4	304.6	305.8	307.0	308.2	309.4	310.6	311.9	12.200
2.80	313.1	314.3	315.5	316.7	317.9	319.1	320.4	321.6	322.8	324.0	12.100
2.90	325.2	326.4	327.7	328.9	330.1	331.3	332.5	333.7	334.9	336.2	12.200
3.00	337.4	338.6	339.9	341.1	342.4	343.6	344.9	346.1	347.4	348.6	12.500
3.10	349.9	351.1	352.4	353.6	354.9	356.1	357.4	358.6	359.8	361.1	12.400
3.20	362.3	363.6	364.8	366.1	367.3	368.6	369.8	371.1	372.3	373.6	12.500
3.30	374.8	376.1	377.3	378.6	379.8	381.1	382.3	383.6	384.8	386.1	12.500
3.40	387.3	388.6	389.8	391.1	392.3	393.6	394.8	396.1	397.3	398.6	12.500

3.50	399.8	401.1	402.4	403.7	404.9	406.2	407.5	408.8	410.1	411.4	12.900
3.60	412.7	413.9	415.2	416.5	417.8	419.1	420.4	421.6	422.9	424.2	12.800
3.70	425.5	426.8	428.1	429.4	430.6	431.9	433.2	434.5	435.8	437.1	12.800
3.80	438.3	439.6	440.9	442.2	443.5	444.8	446.1	447.3	448.6	449.9	12.900
3.90	451.2	452.5	453.8	455.0	456.3	457.6	458.9	460.2	461.5	462.8	12.800
4.00	464.0	465.4	466.7	468.0	469.4	470.7	472.1	473.4	474.7	476.1	13.400
4.10	477.4	478.7	480.1	481.4	482.7	484.1	485.4	486.7	488.1	489.4	13.300
4.20	490.7	492.1	493.4	494.7	496.1	497.4	498.8	500.1	501.4	502.8	13.400
4.30	504.1	505.4	506.8	508.1	509.4	510.8	512.1	513.4	514.8	516.1	13.300
4.40	517.4	518.8	520.1	521.4	522.8	524.1	525.5	526.8	528.1	529.5	13.400
4.50	530.8	532.2	533.6	535.0	536.4	537.8	539.2	540.6	542.0	543.4	14.000
4.60	544.8	546.2	547.6	549.0	550.4	551.8	553.2	554.6	556.0	557.4	14.000
4.70	558.8	560.2	561.7	563.1	564.5	565.9	567.3	568.7	570.1	571.5	14.100
4.80	572.9	574.3	575.7	577.1	578.5	579.9	581.3	582.7	584.1	585.5	14.000
4.90	586.9	588.3	589.7	591.1	592.5	593.9	595.3	596.7	598.1	599.5	14.000
5.00	600.9	602.4	603.8	605.3	606.7	608.2	609.6	611.1	612.6	614.0	14.600
5.10	615.5	616.9	618.4	619.8	621.3	622.7	624.2	625.6	627.1	628.5	14.500
5.20	630.0	631.4	632.9	634.3	635.8	637.3	638.7	640.2	641.6	643.1	14.500
5.30	644.5	646.0	647.4	648.9	650.3	651.8	653.2	654.7	656.1	657.6	14.600
5.40	659.1	660.5	662.0	663.4	664.9	666.3	667.8	669.2	670.7	672.1	14.500
5.50	673.6	675.1	676.6	678.0	679.5	681.0	682.5	684.0	685.5	687.0	14.800
5.60	688.4	689.9	691.4	692.9	694.4	695.9	697.4	698.9	700.3	701.8	14.900
5.70	703.3	704.8	706.3	707.8	709.3	710.7	712.2	713.7	715.2	716.7	14.900
5.80	718.2	719.7	721.2	722.6	724.1	725.6	727.1	728.6	730.1	731.6	14.800
5.90	733.0	734.5	736.0	737.5	739.0	740.5	742.0	743.5	744.9	746.4	14.900

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:43:40 EST By kjgrims
Rating for Area (ft^2)
RATING ID: 2.0 TYPE: Velocity-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Area (ft^2)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
6.00	747.9	749.4	750.9	752.5	754.0	755.5	757.0	758.5	760.1	761.6	15.200
6.10	763.1	764.6	766.1	767.6	769.2	770.7	772.2	773.7	775.2	776.7	15.200
6.20	778.3	779.8	781.3	782.8	784.3	785.9	787.4	788.9	790.4	791.9	15.100
6.30	793.4	795.0	796.5	798.0	799.5	801.0	802.6	804.1	805.6	807.1	15.200
6.40	808.6	810.1	811.7	813.2	814.7	816.2	817.7	819.2	820.8	822.3	15.200
6.50	823.8	825.3	826.9	828.4	830.0	831.5	833.1	834.6	836.2	837.7	15.500
6.60	839.3	840.8	842.4	843.9	845.5	847.0	848.6	850.1	851.7	853.2	15.500
6.70	854.8	856.3	857.9	859.4	861.0	862.5	864.1	865.6	867.2	868.7	15.500
6.80	870.3	871.8	873.4	874.9	876.5	878.0	879.6	881.1	882.7	884.2	15.500
6.90	885.8	887.3	888.9	890.4	892.0	893.5	895.1	896.6	898.2	899.7	15.500
7.00	901.3	902.8	904.4	906.0	907.6	909.2	910.7	912.3	913.9	915.5	15.800
7.10	917.1	918.6	920.2	921.8	923.4	925.0	926.6	928.1	929.7	931.3	15.800
7.20	932.9	934.5	936.0	937.6	939.2	940.8	942.4	944.0	945.5	947.1	15.800
7.30	948.7	950.3	951.9	953.4	955.0	956.6	958.2	959.8	961.3	962.9	15.800
7.40	964.5										

ID	Starting Date
2.0	10/01/2015 00:00:00 EDT

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:12:48 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 1.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
30.60	482.1	483.9	485.8	487.6	489.4	491.2	493.0	494.8	496.6	498.5	18.200
30.70	500.3	502.1	503.9	505.7	507.5	509.3	511.1	513.0	514.8	516.6	18.100
30.80	518.4	520.2	522.0	523.8	525.7	527.5	529.3	531.1	532.9	534.7	18.100
30.90	536.5	538.3	540.2	542.0	543.8	545.6	547.4	549.2	551.0	552.9	18.200
31.00	554.7	556.5	558.3	560.1	561.9	563.7	565.6	567.4	569.2	571.0	18.100
31.10	572.8	574.6	576.4	578.2	580.1	581.9	583.7	585.5	587.3	589.1	18.100
31.20	590.9	592.8	594.6	596.4	598.2	600.0	601.8	603.6	605.4	607.3	18.200
31.30	609.1	610.9	612.7	614.5	616.3	618.1	620.0	621.8	623.6	625.4	18.100
31.40	627.2	629.0	630.8	632.6	634.5	636.3	638.1	639.9	641.7	643.5	18.100
31.50	645.3	647.2	649.0	650.8	652.6	654.4	656.2	658.0	659.9	661.7	18.200
31.60	663.5	665.3	667.1	668.9	670.7	672.5	674.4	676.2	678.0	679.8	18.100
31.70	681.6	683.4	685.2	687.1	688.9	690.7	692.5	694.3	696.1	697.9	18.100
31.80	699.7	701.6	703.4	705.2	707.0	708.8	710.6	712.4	714.3	716.1	18.200
31.90	717.9	719.7	721.5	723.3	725.1	727.0	728.8	730.6	732.4	734.2	18.100

32.00	736.0	737.8	739.6	741.5	743.3	745.1	746.9	748.7	750.5	752.3	18.200
32.10	754.2	756.0	757.8	759.6	761.4	763.2	765.0	766.8	768.7	770.5	18.100
32.20	772.3	774.1	775.9	777.7	779.5	781.4	783.2	785.0	786.8	788.6	18.100
32.30	790.4	792.2	794.0	795.9	797.7	799.5	801.3	803.1	804.9	806.7	18.200
32.40	808.6	810.4	812.2	814.0	815.8	817.6	819.4	821.3	823.1	824.9	18.100
32.50	826.7	828.5	830.3	832.1	833.9	835.8	837.6	839.4	841.2	843.0	18.100
32.60	844.8	846.6	848.5	850.3	852.1	853.9	855.7	857.5	859.3	861.1	18.200
32.70	863.0	864.8	866.6	868.4	870.2	872.0	873.8	875.7	877.5	879.3	18.100
32.80	881.1	882.9	884.7	886.5	888.4	890.2	892.0	893.8	895.6	897.4	18.100
32.90	899.2	901.0	902.9	904.7	906.5	908.3	910.1	911.9	913.7	915.6	18.200
33.00	917.4	919.2	921.0	922.8	924.6	926.4	928.2	930.1	931.9	933.7	18.100
33.10	935.5	937.3	939.1	940.9	942.8	944.6	946.4	948.2	950.0	951.8	18.100
33.20	953.6	955.4	957.3	959.1	960.9	962.7	964.5	966.3	968.1	970.0	18.200
33.30	971.8	973.6	975.4	977.2	979.0	980.8	982.7	984.5	986.3	988.1	18.100
33.40	989.9	991.7	993.5	995.3	997.2	999.0	1001				

ID	Starting Date	Ending Date
1.0	10/01/2013 00:00:00 EDT	09/30/2015 23:59:59 EDT

W RIVER AT DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.04942056 LONGITUDE -82.44759948
Date Processed: 11/29/2016 10:27:50 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 4.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
29.40				381.3	382.5	383.8	385.1	386.3	387.6	388.8	12.571
29.50	390.1	391.3	392.6	393.8	395.1	396.4	397.6	398.9	400.1	401.4	12.500
29.60	402.6	403.9	405.1	406.4	407.6	408.9	410.2	411.4	412.7	413.9	12.600
29.70	415.2	416.4	417.7	418.9	420.2	421.5	422.7	424.0	425.2	426.5	12.500
29.80	427.7	429.0	430.2	431.5	432.8	434.0	435.3	436.5	437.8	439.0	12.600
29.90	440.3	441.5	442.8	444.0	445.3	446.6	447.9	449.2	450.5	451.8	12.800
30.00	453.1	454.4	455.7	457.0	458.3	459.6	460.8	462.1	463.4	464.7	12.900
30.10	466.0	467.3	468.6	469.9	471.2	472.5	473.8	475.1	476.4	477.7	13.000
30.20	479.0	480.3	481.6	482.9	484.2	485.5	486.8	488.1	489.4	490.7	13.000
30.30	492.0	493.3	494.6	495.9	497.2	498.5	499.8	501.1	502.4	503.7	13.000
30.40	505.0	506.3	507.6	508.9	510.2	511.5	512.8	514.1	515.4	516.7	13.000
30.50	518.0	519.3	520.6	521.9	523.2	524.5	525.8	527.1	528.4	529.7	13.000
30.60	531.0	532.3	533.6	534.9	536.2	537.5	538.8	540.1	541.4	542.7	13.000
30.70	544.0	545.3	546.6	547.9	549.2	550.5	551.8	553.1	554.4	555.7	13.000
30.80	557.0	558.3	559.6	560.9	562.2	563.5	564.8	566.1	567.4	568.7	13.000
30.90	570.0	571.3	572.6	573.9	575.2	576.5	577.8	579.1	580.4	581.7	13.000
31.00	583.0	584.3	585.6	586.9	588.2	589.5	590.7	592.0	593.3	594.6	12.900

31.10	595.9	597.2	598.5	599.8	601.1	602.4	603.7	605.0	606.3	607.6	13.000
31.20	608.9	610.2	611.5	612.8	614.1	615.4	616.7	618.0	619.3	620.6	13.000
31.30	621.9	623.2	624.5	625.8	627.1	628.4	629.7	631.0	632.3	633.6	13.000
31.40	634.9	636.2	637.5	638.8	640.1	641.4	642.7	644.0	645.3	646.6	13.000
31.50	647.9	649.2	650.5	651.8	653.1	654.4	655.7	657.0	658.3	659.6	13.000
31.60	660.9	662.2	663.5	664.8	666.1	667.4	668.7	670.0	671.3	672.6	13.000
31.70	673.9	675.2	676.5	677.8	679.1	680.4	681.7	683.0	684.3	685.6	13.000
31.80	686.9	688.2	689.5	690.8	692.1	693.4	694.7	696.0	697.3	698.6	13.000
31.90	699.9	701.2	702.5	703.8	705.1	706.4	707.7	709.0	710.3	711.6	13.000
32.00	712.9	714.2	715.5	716.8	718.1	719.4	720.7	721.9	723.2	724.5	12.900
32.10	725.8	727.1	728.4	729.7	731.0	732.3	733.6	734.9	736.2	737.5	13.000
32.20	738.8	740.1	741.4	742.7	744.0	745.3	746.6	747.9	749.2	750.5	13.000
32.30	751.8	753.1	754.4	755.7	757.0	758.3	759.6	760.9	762.2	763.5	13.000
32.40	764.8	766.1	767.4	768.7	770.0	771.3	772.6	773.9	775.2	776.5	13.000
32.50	777.8	779.1	780.4	781.7	783.0	784.3	785.6	786.9	788.2	789.5	13.000
32.60	790.8	792.1	793.4	794.7	796.0	797.3	798.6	799.9	801.2	802.5	13.000
32.70	803.8	805.1	806.4	807.7	809.0	810.3	811.6	812.9	814.2	815.5	13.000
32.80	816.8	818.1	819.4	820.7	822.0	823.3	824.6	825.9	827.2	828.5	13.000
32.90	829.8	831.1	832.4	833.7	835.0	836.3	837.6	838.9	840.2	841.5	13.000
33.00	842.8	844.1	845.4	846.7	848.0	849.3	850.6	851.9	853.1	854.4	12.900
33.10	855.7	857.0	858.3	859.6	860.9	862.2	863.5	864.8	866.1	867.4	13.000
33.20	868.7	870.0	871.3	872.6	873.9	875.2	876.5	877.8	879.1	880.4	13.000
33.30	881.7	883.0	884.3	885.6	886.9	888.2	889.5	890.8	892.1	893.4	13.000

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313100 RAINBOW RIVER AT DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.04942056 LONGITUDE -82.44759948
Date Processed: 11/29/2016 10:27:50 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 4.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
33.40	894.7	896.0	897.3	898.6	899.9	901.2	902.5	903.8	905.1	906.4	13.000
33.50	907.7	909.0	910.3	911.6	912.9	914.2	915.5	916.8	918.1	919.4	13.000
33.60	920.7	922.0	923.3	924.6	925.9	927.2	928.5	929.8	931.1	932.4	13.000
33.70	933.7	935.0	936.3	937.6	938.9	940.2	941.5	942.8	944.1	945.4	13.000
33.80	946.7	948.0	949.3	950.6	951.9	953.2	954.5	955.8	957.1	958.4	13.000
33.90	959.7	961.0	962.3	963.6	964.9	966.2	967.5	968.8	970.1	971.4	13.000
34.00	972.7	974.0	975.3	976.6	977.9	979.2	980.5	981.8	983.1	984.3	12.900
34.10	985.6	986.9	988.2	989.5	990.8	992.1	993.4	994.7	996.0	997.3	13.000
34.20	998.6	999.9	1001	1003	1004	1005	1006	1008	1009	1010	13.400
34.30	1012	1013	1014	1016	1017	1018	1019	1021	1022	1023	13.000
34.40	1025	1026	1027	1029	1030	1031	1032	1034	1035		

ID	Starting Date
4.0	03/09/2010 00:00:00 EST

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, November 30, 2016 9:39 AM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Kings Bay Crystal River Draft Report

I will preface my questions and comments by again recognizing Measuring Spring Discharge into Kings Bay is no simple task.

I have continued to review the data and reports relevant to the Crystal River Kings Bay Draft MFL Report. Unfortunately the more I dig into this my concerns about the validity of what is presented increase.

I will again try to keep this set of questions and comments relatively brief:

- From Dr. Chen's paper Estimation of....2014
  " *A successful model calibration/verification against real-time data measured in Crystal River/Kings Bay during a 2.84-year period from 24 April 2007 to 23 February 2010 confirms that this empirical formula for estimating real-time spring flows out of the numerous vents in Kings Bay is reasonable.*"
  WHERE IS THIS REAL TIME DATA?

  Staff Response: These real-time data can be downloaded from the U.S. Geological Survey's National Water Information System: Web Interface at USGS website [hit control+click to use this link]. If this link does not work, you may try pointing your browser to the following URL: https://waterdata.usgs.gov/fl/nwis/current/?type=flow.

- A clear understanding of the data produced by VHB is essential to link the data with the hypothesized relationship of discharge to well level ROMP TR21-3 and tidal stage. I note VHB are using Mean Sea Level in connection with individual vent and Group measurements in 2009. I assume this was to give relevance to "

  "...*including multiple measurements at some of*

  the larger springs during different tide stages. When possible, measurements were conducted near low tide, especially at spring vents identified as having low flow."
  These levels differ from the USGS Gage measurements of stage and no gage ht is provided with the 2012 discharge data. I have added these (USGS figures) for my own reference and still can not find data to support the relationship of discharge to stage at the Mouth of Kings Bay.
  .

- Most concerning use of MSL is in the presentation of the 15 minute monitoring of discharge thru X Sections G1 and G2. Considering Group 1 for July 27 thru August 4 (which is the easier graph to read in VHB 2009) and Chen 2014 Figure 3 and in the Draft Report Figure 2-4 although no stage data is included... the springs flows are highest at low tide...IF THIS IS TRUE around low tide there should be a positive flow roughly equal to that high springs discharge.
  IS IT POSSIBLE VHB discharge data is off set by the positive discharge velocity being multiplied by a negative area of X-Section due to reference to MSL.
  THE RAW DATA NEEDS TO BE EXAMINED MORE CLOSELY. **I will be happy to look over the raw data for Group 1 July 27 thru August 8 if the XLS file can be shared.**

  Staff Response: We are pleased to provide you with the VHB data in an Excel file named *Group 1 GH Vel Disch and Hydrograph.xls*.

- If discharge for Group 2 springs does range from 0 to 250 cfs as shown in Figure 2-4 of the draft report. In addition to the absence of data to support this, I speculate this would be visually observable at some of these springs as the high discharge is at low tide.

- Relationship between well and stage. I have previously asked for examples of where this relationship is supported by real time data. The wording in Chen 2014 "*For example, a spring vent named H24 in the north portion of Kings Bay was measured on two different days. One was on 23 September 2009 and the other was on 7 October 2009. The first measurement of the discharge was 8.35 cfs, but the second flow measurement was 49.5 cfs, almost six times of the previous measurement*" does not substantiate this beyond question because H24 is measured in a tidal channel. Considering the stage data at the times these two measurements were made does indicate falling tide, resulting in emptying of the pool upstream of the measuring location is a factor which appears not to have been considered. Furthermore in the 2012 VHB monitoring of Spring 32 (a single vent spring) thru a tidal cycle on two different dates does not confirm a clear relationship of lower discharge at higher stage.

- Just for consideration. If SWFWMD are so confident in the discharge which Dr. Chen had published in the Journal of Marine Science Jan 2014 and now used as the basis for all 2016 Draft Report, why was the data in NDM 5 not updated in the most recent version Sept 2016. And equally interesting the graphs and comments in JMS paper appear to have been modified for purposes of the Draft Report. Possibly Dan Yobbi's memo November 2014 was sufficient to throw some light onto the validity negative flow into the spring vents. And the different analysis of the 2009 Group 1 and 2 data...surely the same method can be used for the two sets of data...not some hit and miss approach.

Again, I am willing to take a look at the Group 1 data for 2009 if you can share the raw data files with velocity and x-Section area. I think a total flux thru the x section approach may (as I did for Bagley Cove) may be a more logical approach, which can be used for G1 and G2 alike.

Staff Response: Please see our response to your public records request above.

Martyn

INPUT FROM MARTYN JOHNSON TO PEER REVIEW MEETING DEC 5 2016

It was unfortunate that the telephone connection yesterday was poor. When I tried calling back the system would not connect me. I did send a chat message saying I would send my comments by e-mail. It would have been so much better to discuss these.

Summary
The credibility of the Draft MFL Report for Kings Bay Crystal River is impacted by major aspects of the model calculation which are both intuitively and factually flawed. Discharge figures calculated and presented in Figure 2-4 are not supported by actual measurements by VHB or any other entity.

Let me start out by copying an e-mail.

E-Mail NO REPLY TO DATE
To; Melissa Gulvin, Doug Leeper Ron Basso, And ZinJain Chen on 11/30/2016
I will preface my questions and comments by again recognizing Measuring Spring Discharge into Kings Bay is no simple task.

I have continued to review the data and reports relevant to the Crystal River Kings Bay Draft MFL Report. Unfortunately the more I dig into this my concerns about the validity of what is presented increase.

I will again try to keep this set of questions and comments relatively brief:

- From Dr. Chen's paper Estimation of....2014
  " *A successful model calibration/verification against real-time data measured in Crystal River/Kings Bay during a 2.84-year period from 24 April 2007 to 23 February 2010 confirms that this empirical formula for estimating real-time spring flows out of the numerous vents in Kings Bay is reasonable.*"
  WHERE IS THIS REAL TIME DATA?

  Staff Response: Please see our response to this public records request in the response included in the email above.

- A clear understanding of the data produced by VHB is essential to link the data with the hypothesized relationship of discharge to well level ROMP TR21-3 and tidal stage. I note VHB are using Mean Sea Level in connection with individual vent and Group measurements in 2009. I assume this was to give relevance to "

  "*...including multiple measurements at some of*

  the larger springs during different tide stages. When possible, measurements were conducted near low tide, especially at spring vents identified as having low flow." These levels differ from the USGS Gage measurements of stage and no gage ht is provided with the 2012 discharge data. I have added these (USGS figures) for my own reference and still can not find data to support the relationship of discharge to stage at the Mouth of Kings Bay.

- Most concerning use of MSL is in the presentation of the 15 minute monitoring of discharge thru X Sections G1 and G2. Considering Group 1 for July 27 thru August 4 (which is the easier graph to read in VHB 2009) and Chen 2014 Figure 3 and in the Draft Report Figure 2-4 although no stage data is included... the springs flows are highest at low tide...IF THIS IS TRUE around low tide there should be a positive flow roughly equal to that high springs discharge.
  IS IT POSSIBLE VHB discharge data is off set by the positive discharge velocity being multiplied by a negative area of X-Section in some parts due to reference to MSL time to stage at the USGS being reference NAVD88.
  THE RAW DATA NEEDS TO BE EXAMINED MORE CLOSELY. **I will be happy to look over the raw data for Group 1 July 27 thru August 8 if the XLS file can be shared.**

  Staff Response: Please see our response to this public records request in the response included in the email above.

- If discharge for Group 2 springs does range from 0 to 250 cfs as shown in Figure 2-4 of the draft report the absence of data to support this is missing, I speculate this would be visually observable at some of these springs as the high discharge is at low tide.

- Relationship between well and stage. I have previously asked for examples of where this relationship is supported by real time data. The wording in Chen 2014 "*For example, a spring vent named H24 in the north portion of Kings Bay was measured on two different days. One was on 23 September 2009 and the other was on 7 October 2009. The first measurement of the discharge was 8.35 cfs, but the second flow measurement was 49.5 cfs, almost six times of the previous measurement*" does not substantiate this beyond question because H24 is measured in a tidal channel. Considering the stage data at the times these two measurements were made does indicate falling tide, resulting in emptying of the pool upstream of the measuring location is a factor which appears not to have been

considered. Furthermore in the 2012 VHB monitoring of Spring 32 (a single vent spring) thru a tidal cycle on two different dates does not confirm a clear relationship of lower discharge at higher stage.

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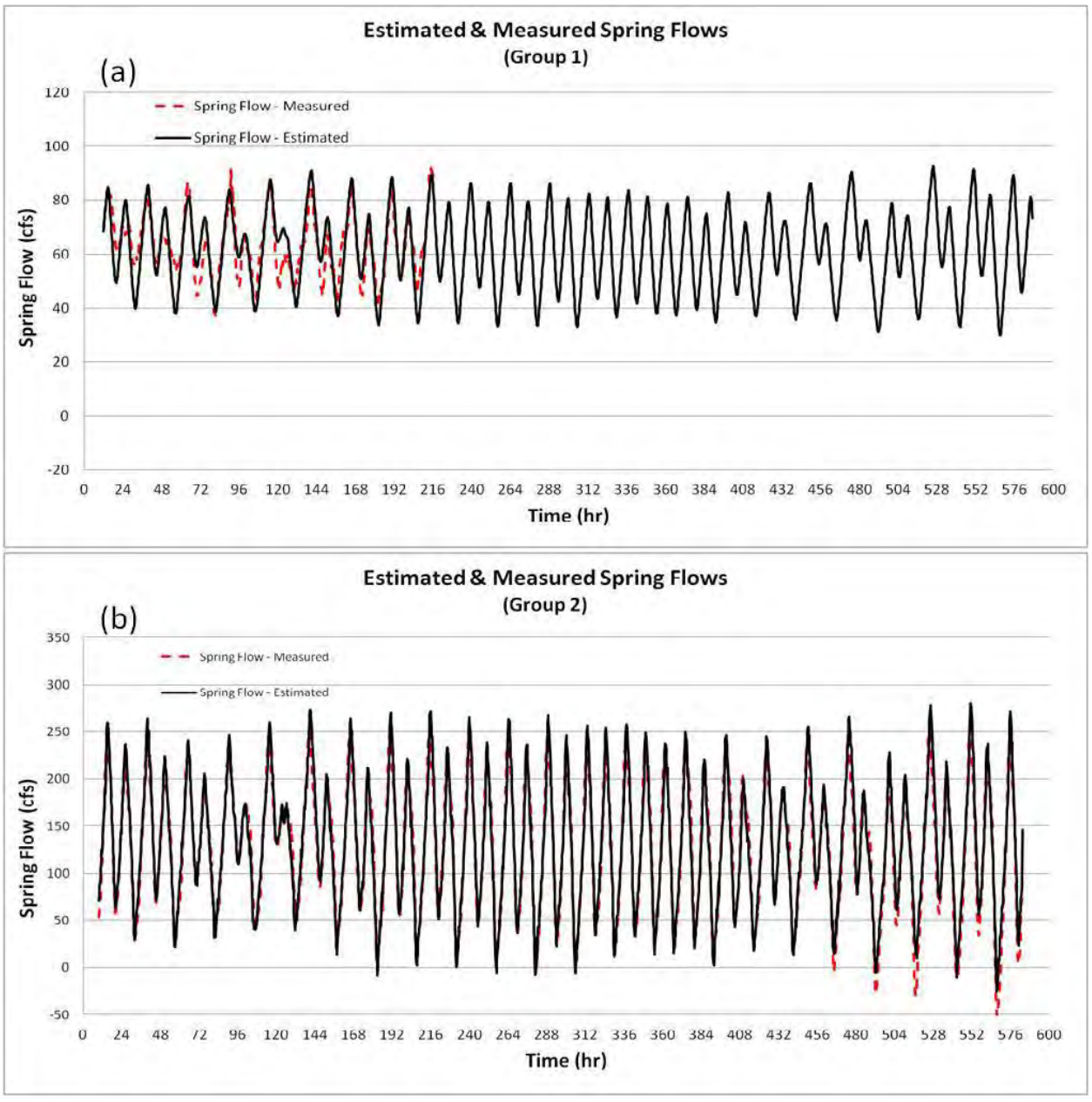
  Again, I am willing to take a look at the Group 1 data for 2009 if you can share the raw data files with velocity and x-Section area. I think a total flux thru the x section approach may (as I did for Bagley Cove) may be a more logical approach, which can be used for G1 and G2 alike.

  Staff Response: Please see our response to this public records request in the response included in the email above.

Martyn
E-Mail End



The point I was making regarding Figure 2-4 is that spring flow for the 8 springs in Group 2 shows changes from 0 to 250-270 cfs in the 6 hour tidal cycle on a number of days. (Note:On some days negative flows are shown; a point mentioned in the text of the original paper.) There is not a shred of evidence supporting this large change. Dr. Chen claimed there is no data on discharges from individual springs over a tidal cycle; however he fails to see the discharge measurements for the individual springs in the 2009 study period do have MSL data, which tends to show consistent discharge not major changes. While the 2012 discharge measurements do not show the corresponding stage data, the time of measurement can be cross-referenced to USGS Gage Mouth of Kings Bay for individual springs. Additionally, an effort was made in 2012 VHB work specifically collect discharge from three springs over a tidal cycle, shown in Table 2 of the Technical Memorandum. I have written in the corresponding

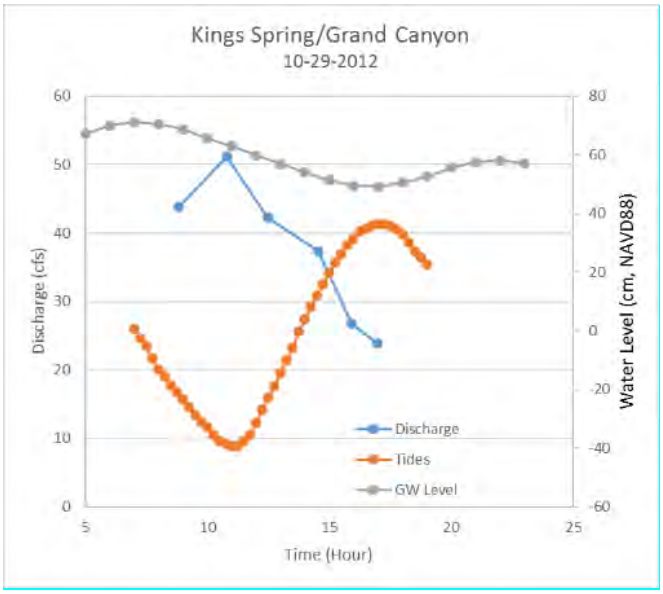
USGS Gage Height for the time of the measurement. Spring 32 does not support changes of the magnitude calculated and shown in Figure 2-4. Note: the model treats all springs close to G2 the same, so Spring 32 is modeled the same as G2, CORRECT?

Staff Response: Yes, Spring 32 is modeled in the same way as that for G2 springs, with the same C_1 and C_2 parameters. However, the ΔG (sometimes also called G_0) parameter is a linear function of the distance to the ROMP TR21-3 well.

In Fig. 2-4 within the draft minimum flows report, the total discharge from the Group 2 springs changed from 0 to 250 – 270 cfs only during spring tides. During neap tides, it changed with a smaller magnitude.

We are pleased that you brought up the 2012 VHB diurnal measurement, especially Spring 32, which was also called Kings Spring/Grand Canyon in the VHB report. In late 2011 and early 2012, a plan was made to measure hourly discharges in three spring vents over two 24-hour periods (the mouth of Crystal River has mixed semidiurnal tidal cycle with two high and two low tides of different sizes every lunar day) to examine effects of tides on spring flow in Kings Bay. Unfortunately, a budgetary restriction at the time limited the duration of the diurnal measurements to only about 8 - 10 hours with some consecutive measurements being separated by more than an hour. Although the 2012 VHB report identified these data as diurnal measurements, they are not truly diurnal data that we were hoping for, because these data didn't give us the entire picture of discharge variation during a tidal cycle, which should be larger than what the 2012 data show. Yet, measured vent flow data at Spring 32 during the two 2010 field trips still gave us some indication of the magnitude of tidal effects on discharge from this spring vent. For example, on October 29, 2012, measured spring flow at Spring 32 changed from 51.19 cfs at 10:48 AM to 23.85 cfs at 16:59 PM, or a decline of 27.34 cfs over 6 hours 11 minutes (see figure below and Table 2 of the 2012 VHB report.) As the trend was still downwards at 16:59 PM, it is expected that the minimum value of spring discharge could be lower than 23.85 cfs on that day.

Although the figure shown below does not give us a whole picture of the spring flow variation during the tidal cycle on October 29, 2012 at Spring 32, it does show that the variability of spring flow during a tidal cycle can be significant, as the flow decline during the 6 hours 11 minutes was about 73% of the mean discharge measured on the day, which was 37.54 cfs. As such, the so-called "diurnal" measurements at Spring 32 in 2012 indeed suggested that the kind of change of magnitude shown in Figure 2-4 is possible. At the minimum, these data did not provide any evidence showing that the kind of change of magnitude presented in Fig 2-4 is not possible.



I also include tides at the mouth of Kings Bay and groundwater level in the ROMP TR21-3 well on 10-29-2012 in the figure above for you to see correlations among these three variables.

While the 0 to 250 cfs for Group 2 emphasize the point, the changes for Group 1 Figure 2-4 of 35 to 90 cfs are similarly not supported by measurements made by VHB or any other entity.

Table 2. Diurnal vent measurement summaries for October 29, 2012 and November 6, 2012.

Site	Site Name	Date	Time	Discharge (cfs)	
SV32121029	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	850 EST	43.86	-0.31
SV32121029b	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	1048 EST	51.19	-1.02
SV32121029d	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	1229 EST	42.26	-1.23
SV32121029f	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	1433 EST	37.35	-0.19
SV32121029i	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	1555 EST	26.75	0.65
SV32121029k	King Spring/Grand Canyon Spring "Manatee sign"	10/29/12	1659 EST	23.85	1.03
SV3220121106	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	0808 EST	29.41	1.93
SV3220121106b	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	0922 EST	32.68	1.55
SV3220121106d	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	1036 EST	32.35	1.05
SV3220121106f	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	1148 EST	39.63	0.50
SV3220121106j	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	1406 EST	43.83	-0.31
SV3220121106l	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	1542 EST	39.47	-0.06
SV3220121106o	King Spring/Grand Canyon Spring "Manatee sign"	11/06/12	1703 EST	37.46	0.53
SV35121029	Golfview	10/29/12	0659 EST	2.67	0.44
SV35121029a	Golfview	10/29/12	0942 EST	3.53	-0.69
SV35121029c	Golfview	10/29/12	1114 EST	5.53	-1.16
SV35121029d	Golfview	10/29/12	1336 EST	2.42	-0.75
SV35121029e	Golfview	10/29/12	1457 EST	1.68	0.13
SV35121029f	Golfview	10/29/12	1615 EST	2.26	0.76
SV3520121106	Golfview	11/06/12	0716 EST	1.82	1.93
SV3520121106a	Golfview	11/06/12	0830 EST	2.98	1.82
SV3520121106b	Golfview	11/06/12	0945 EST	3.10	1.35
SV3520121106c	Golfview	11/06/12	1058 EST	1.74	0.83
SV3520121106d	Golfview	11/06/12	1213 EST	2.44	0.32
SV3520121106e	Golfview	11/06/12	1457 EST	2.44	-0.44
SV3520121106f	Golfview	11/06/12	1604 EST	5.10	0.05
SV3520121106g	Golfview	11/06/12	1615 EST	3.66	0.20
SV39121029	Sid's Spring	10/29/12	0735 EST	1.87	.24
SV39121029a	Sid's Spring	10/29/12	0746 EST	5.39	.13
SV39121029b	Sid's Spring	10/29/12	1018 EST	2.45	-0.85
SV39121029c	Sid's Spring	10/29/12	1020 EST	4.97	-0.85
SV39121029d	Sid's Spring	10/29/12	1159 EST	2.01	-1.29
SV39121029e	Sid's Spring	10/29/12	1201 EST	4.33	-1.29
SV39121029f	Sid's Spring	10/29/12	1402 EST	2.22	-0.47
SV39121029g	Sid's Spring	10/29/12	1405 EST	1.78	-0.47
SV39121029h	Sid's Spring	10/29/12	1525 EST	2.16	-0.39
SV39121029i	Sid's Spring	10/29/12	1527 EST	2.61	-0.39
SV39121029j	Sid's Spring	10/29/12	1638 EST	1.62	0.86
SV39121029k	Sid's Spring	10/29/12	1640 EST	1.93	0.96
SV3920121106	Sid's Spring	11/06/12	0739 EST	1.97	1.96
SV3920121106a	Sid's Spring	11/06/12	0741 EST	2.22	1.96
SV3920121106b	Sid's Spring	11/06/12	0857 EST	2.37	1.68
SV3920121106c	Sid's Spring	11/06/12	0859 EST	2.12	1.68
SV3920121106d	Sid's Spring	11/06/12	1010 EST	2.04	1.14
SV3920121106e	Sid's Spring	11/06/12	1012 EST	3.52	1.14
SV3920121106f	Sid's Spring	11/06/12	1124 EST	2.92	0.63
SV3920121106g	Sid's Spring	11/06/12	1126 EST	2.03	0.63
SV3920121106h	Sid's Spring	11/06/12	1339 EST	2.95	-0.30
SV3920121106i	Sid's Spring	11/06/12	1341 EST	2.09	-0.30

As telephone connection was lost yesterday I was about to move on to point out the Group 1 and Group 2 discharge measurements use MSL which is different to the USGS NAVD88 by about 0.25 to 0.3 feet as best I can read the graphs. Is it possible this makes a difference to the area

which is used to calculate discharge ('look up table' I think is the term for area at different gage heights).

Additionally:

- is the timing of high tide and low tide different, at the springs vents, than at the USGS 02310742 Mouth of Kings Bay (Bagley Cove USGS 02310747 to Mouth of KingsBay USGS 02310742 is about 15 minutes difference between high tide time, and between USGS 02310742 and the spring vents there is a large pool that fills and empties). I speculate there is a difference in time and the tidal stage change may also be different at the spring vents (dampened by the Large Kings Bay 'pool'..

The VHB individual springs measurements, if anything, show essentially consistent discharge thru the tidal cycle, particularly when accuracy is considered. The closest I can find showing a slight correlation of discharge and stage, is SV 20 in the VHB 2009 report pages 17 and 18:
For 7/28/2009
First 3 measurements are averaged, note variation 40 to 30 cfs in 4 minutes. Then the next 3 measurements, which appear to be 3 smaller vents, are added giving
46.72 cfs MSL -0.2 to –0.3

For 7/30/2009
First 3 measurements are averaged, note tighter grouping. Then the next 3 measurements areadded giving
37.38 cfs MSL higher 1.1

For 8/17/2009
4 measurements added giving (assume multiple measurements at the main vent were not taken or discounted for some reason
45.00 cfs MSL 1.37

For 8/19/2009
First 3 measurements averaged, note variation 53.7 to 32.2 cfs 1 minute apart. Then the next 3 measurements added giving
51.91 cfs MSL -0.97

This does have some indication of a relationship between MSL and discharge, hinging mainly on one measurement of 53.7 cfs, supported to some extent by the discharge from the last vent in each set, BUT THE VARIATION IS 45 cfs to 51 cfs OR ABOUT 13%. Bear in mind the variation in discharge measurements a few minutes apart as an indication of accuracy. Look at SV 20 measurements October 23 and November 12 VHB 2012, either the vent almost dried up or the SOP's failed to monitor the correct vent/vents or report correctly.

Agreed the data is limited, but there is not a shred of evidence supporting the discharge

variations show in Figure2-4.

These points, particularly the magnitude of spring flow change in a tidal cycle (high to low or vice versa) as emphasized by the 0 cfs to 270 cfs with no supporting evidence destroys the credibility of the discharge calculations. The discharge calculations are the basis for the model which supports the entire report.

Lastly on this point, it is inconceivable that the methodology of analyzing the movement of water through the x-section for Group1 and Group 2 are different. Whether it is 3 springs and 613111 sq. ft. of pool or 8 springs and 1,785544 sq. ft. of pool this should not make a difference to the methodology as all the springs in the Group must be considered to respond equally. There is certainly nowhere near enough data to say how differently each spring discharge changes thru a tidal cycle. However, I do agree with Dr. Chen's explanation at the meeting I attended in person, that small spring discharge will have different characteristics than large spring discharges. I would consider this dynamic resistance to flow, but I doubt this is very significant.

Adding to the discussion of Bagley Cove USGS discharge data
USGS Discharge data is the best ongoing data set, however it suffers from:

- The magnitude differences of tidal inflow/outflow relative to the springs discharge flow
- The turbulence at the gage site particularly at the time the direction of flow changes.
- The tidal cycle is 24.84 hours and most daily data is presented on a 24 hour basis, and does not account for the volume lost or gained upstream in Kings Bay due to stage change in the 24 hour.

The second bullet point can be seen best by viewing recent days when the field measurements are taken as the time intervals for discharge calculation are set to one minute intervals not 15 minutes. Whether different instrumentation or multiple velocity meters can overcome the turbulence issue I doubt in the short term. Just after USGS implemented the new rating curve in I did look at total flux over three time periods of about a 10 days but starting and finishing with gage heights almost the same at the point of a directional change. This gave positive discharge on all sets run, but totals were not closely grouped. I am sure given the computing skills of others this could be achieved more quickly than my slow manual assessment. I also saw the turbulence by tossing a handful of red/white painted corks in at the gage site on two occasions at direction change time…sorry about the pollution, but worse have been thrown in. The turbulence was amazing to watch. The discharge methods used by Hammett (think it was 1996) when they had five boats with velocity meters anchored across the river (think it was slightly different point in river to current gage site). This measurement was possibly the best thought out approach; unfortunately it has not been repeated. USGS Field Measurements are helpful in identifying the accuracy of calculated discharge highlighting the major issue of accuracy at time of flow direction change.

For consideration when thinking about the 24.84 hour tidal cycle, assume Kings Bay is 600 acres (no doubt the shoreline mapping can get more accurate) but for a 0.1 ft difference in gage height beginning to end of the 24.84 hours (high tide to high tide) represents an average of 30 cfs flow; 1.0 feet which often occurs is 300 cfs average. To repeat my earlier comment I doubt the entire Kings Bay pool has the same tidal change as Bagley Cove…would be interesting to see any available data.

I trust my comments are helpful. Now is a better time to consider them as opposed to when the report is final.

From: BURTON E ENO [mailto:beeno1@bellsouth.net]
Sent: Sunday, December 25, 2016 7:16 PM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Dan Rutkowski <rrutkowski@bellsouth.net>; Roger Barth <barth.ra@gmail.com>; Gordon Hart <gchshutterbug@gmail.com>; Bill Vibbert <bdvibbert@att.net>; Gretchen Martin <gmartin13@yahoo.com>; Herb Reichelt <sgtmockie@comcast.net>; Jerry Rogers <rogers369@cs.com>; Louise Kenny <lkflgator@yahoo.com>; Mary Ann Ermatinger <maemae198@gmail.com>; Bob Knight <bknight@floridaspringsinstitute.org>; Bob Palmer <rpa711@yahoo.com>; Jeff Sowards <jeff.sowards@dep.state.fl.us>
Subject: Rainbow River MFL Critique

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899

Trasmitted via email to
Melissa.Gulvin@swfwmd.state.fl.us

Subject: Rainbow River Conservation (RRC) Comments on Recommended Minimum Flow for the Rainbow River System Peer Review Draft

Dear Melissa:

The following is meant as a review of the Rainbow River MFL Draft. Please transmit it accordingly.

Yours sincerely,
Burt Eno, PhD, RRC President

Critique of Rainbow River MFL Draft dated August 2016

Preface

The recommended minimum flow for the Rainbow River System proposed by SWFWMD in their August 2016 draft seems flawed and driven by a dictate to "find water" regardless of the harmful consequences. As exhibited in the attached list the Rainbow River has maintained its classification of an Outstanding Florida Water until recently. It has had high flow, excellent clarity, and an abundance of healthy aquatic life and wildlife. In the last decade, however, much of these attributes have begun to fail as lower flows, high nitrates, and excessive river recreation have begun to take their toll.

In the last dozen years the nitrate level in the headwaters of the river has doubled to 2.5 mg/l, seven times the TMDL established by FDEP (see MFL Draft Figure 3-4). Sixty-five percent of

this comes from crop fertilizer and animal farms while another nineteen percent comes from septic tanks in the 640 square mile Rainbow Springs recharge area (see MFL Draft Figure 3-1). The consequence of such high nitrate is the rapid growth of filamentous algae (lyngbya) in the river, displacing the normal healthy native vegetation which provides the habitat and food sources for the fish life.

Traffic on the river, particularly tubers, has doubled in the last five years. Tubers in the summertime literally clog the river causing other craft to divert into shallow areas tearing up the river vegetation. The shear numbers of recreationists on the river scare away the wildlife. No effort to date has addressed the seriousness of the excessive recreation problem.

Significant Harm

SWFWMD has adopted the premise that any water body environmental parameter can be harmed fifteen percent in setting a minimum flow. There is no logical basis for this arbitrary number and, considering the harm already imposed upon the Rainbow River, this could be devastating to this Outstanding Florida Water. In 2012 a drought occurred and the flow in the river dropped to 235 mgd. This resulted in a large residence time which seemingly encouraged the spread of lyngbya further upstream in the following year. Natural events such as this are creating enough harm to the river. We don't need to artificially remove flow from the river to force more harm upon it

Relation Between Flow and Nitrate Level

In the last paragraph we noted an anecdotal relationship between reduced flow and increased effect of nitrate residence in the river. As shown in Figure 3-4 of the MFL Draft the nitrate level in the head springs has doubled in the last 15 years. Correspondingly, Figure 2-4 shows that the river flow has been substantially below the long term average flow for the last 15 years. One would suspect an inverse correlation between flow and nitrate level.

Section 3-3 of the MFL Draft presents a study to analyze the effect of flow on nitrate level in the river. Although the influence of time presented in Figure 3-5 is a relatively strong function, indicating increasing nitrate levels introduced from the springs recharge area over time, there does seem to be a significant inverse correlation between flow and nitrate level. This being the case it would be unwise to seek to reduce the river flow further.

Environmental Parameters

Chapter 5 of the MFL Draft lists ten environmental values that should be considered when developing minimum flows. The MFL analysis quickly honed in on fish passage and instream and floodplain fish and wildlife habitats as most sensitive to flow reduction. All other environmental values, such as recreation, navigation, aesthetic and scenic attributes, and absorption of pollutants, were loosely related to fish passage and wildlife habitats. It is hard to see how all these other environmental values could be so readily dismissed or minimized in the analysis.

Setting the Minimum Flow

After a complex computer modeling analysis the conclusion seemed to be that a nine percent flow reduction would create a fifteen percent reduction in instream habitat for largemouth bass and a five percent reduction in flow would create a fifteen percent reduction in floodplain wetlands habitat. The conclusion given was "therefore, a seven percent allowable flow reduction". There is no "therefore". This was another compromise to set a higher flow reduction than dictated by the most limiting environmental value analyzed. This serves to negate the credibility of the analysis and the conclusion drawn. Considering the arbitrary setting of fifteen percent harm and the other factors discussed above it should be clear that no flow reductions to the Rainbow River system should be granted.

Aquifer Pumping

There is a large disagreement concerning aquifer pumping in the Rainbow Springs recharge basin predicted by the Northern District Model (NDM) and the conclusions of the Florida Springs Institute. The Institute, in their letter of October 19, 2016 (attached), pointed out that river flow has decreased fifteen percent in the past two decades and decrease in rainfall only accounts for about half of that reduction. Their assertion is that the aquifer pumping accounts for the other half. They further point out that water balances presented to the MFL Peer Review Panel indicate aquifer pumping at a level of three to seven percent of historic flows.

This gives RRC great concern about the accuracy and legitimacy of the NDM prediction that only 1.0 to 1.7 percent of the river flow has been given up to aquifer pumping. The "sandbox analogy" of the NDM is a gross oversimplification and thus not reliable. Estimates of aquifer pumping within the Rainbow Springs recharge basin are also unreliable due to the fact that there are very few actual water use measurements being made. The liberal granting of water use permits in the District needs to be stopped.

Mandates for the Rainbow River

RRC has, for more than 50 years, sought to preserve and protect the Rainbow River from harmful events and practices. It would seem that the Water Management District would have the same objective, as exhibited in the 2015 SWIM Plan. The MFL Draft does not comply with this desirable objective but rather seeks to further compromise the already impaired river to satisfy the thirst for growth and consumption. The plan to siphon more flow from the river is ill-conceived and shortsighted. There should instead be a plan for restoration of the river.

RRC believes that there is a much stronger dependence of river quality on river flow than implied in the MFL study. Considering such arguments put forth by the peer reviewers, FSI, and RRC board member Bill Vibbert (attached), it seems that the recommendation for additional water withdrawals from the Rainbow River should be rejected and a restoration plan should be established instead.

Ross –

Regarding your question --- I did not receive Mr. Johnson's Jan 3, 2017 email.

Similarly, I did not receive his Nov 4, 2016 email directly. You forwarded it to XinJian, Melissa, Ron, Earl and me on Nov 15, 2016.
Melissa responded to his Nov 4 email on Nov 15, 2016, thanking him for his input, answering his question about a scheduled Crystal River MFLs peer review meeting and noting that staff planned to address his comments during the public input period of the meeting, which he attended. I don't recall Mr. Johnson bringing up any comments on the Rainbow MFLs during the Nov 15 Crystal MFLs peer review meeting.

Regarding the Rainbow MFLs, our Dec 16, 2016 response to numerous emails from Mr. Johnson that mostly concerned the Crystal River MFLs also addressed his Dec 3, 2016 email to the USGS concerning measurement of discharge at the "new" Rainbow River near Dunnellon gage site. In our Dec 16 response, we thanked Mr. Johnson for copying us on the Dec 3 email to the USGS and for providing a letter and other information that he received from the USGS.

So, it seems that staff involved with the Rainbow River MFLs should **review** Mr. Johnson's Jan 3, 2017 email (below) and the two associated attachments (attached to this email). Staff should also review Mr. Johnson's Nov 14, 2016 email (which also included 2 attachments) as well as his Dec 3, 2016 email to the USGS which we addressed in our Dec 16, 2016 response to Mr. Johnson.
I will provide Mr. Johnson's Nov 14 email and attachments and our Dec 16 response document (which includes his Dec 3 email) in a separate email for staff to review.

Once our review is complete, we need to determine what kind or response to provide to Mr. Johnson.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Ross Morton
Sent: Tuesday, January 03, 2017 7:38 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: FW: Rainbow River Review

Let me know if you received this email. Thanks.

Ross T. Morton, P.W.S., CO-OP®, F.S.C.C.M.
2379 Broad Street

Brooksville, FL 34604-6899
Mobile/Office Phone (352)796-7211, (863)534-1448, (813)985-7481, & (941)377-3722
Ext. 6500
Email: ross.morton@watermatters.org
About The Ombudsman: http://www.swfwmd.state.fl.us/about/staff/ombudsman.php

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 03, 2017 7:18 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Fw: Rainbow River Review

RAINBOW RIVER MFL REMINDER
The concerns I raised in my November 14 e-mail regarding the inaccuracies in the discharge data used to develop the Rainbow River Model have so far not been addressed or brought to the attention of the Review Panel. This is disappointing.

I also forwarded the USGS 'look up tables' which further support the concern I raised about additional spring water discharge below the newer USGS Gage Site 02313098. This information also appears to make the idea of backwater effects on the long term gage site discharge data invalid or rarely significant.

The Review Panels Report includes some very telling comments (which I essentially agree with):
Quote

The Panel finds the 2000 flow anomaly a potentially interesting harbinger of change. The springshed is clearly yielding less flow than expected since 2000. Based on the double mass analysis it appears that current flows are substantially below the MFL and there is nothing in the report that assures recovery to the MFL. The Panel understands that the cause is unknown, while groundwater models suggest that local pumping is not the cause, the Panel has major concerns that the flow anomaly must be considered a "departure from natural flow". Resolving the origin of the anomaly is critical to defensibly conclude that the Rainbow River System is, in fact, not impaired and in need of a recovery plan. The Panel appreciates that MFL reports are living documents, updates and improvements should clearly describe knowledge gaps, and that remedying these gaps are a District priority.

End Quote

And

In the absence of key supporting data, the District should consider capping withdrawals at current levels (or with a minimal allowable increase) until the nutrient issues are effectively addressed. In particular, consideration should be given to allow no reduction in flow unless there is a corresponding decrease in loading so that there is no net increase in projected nitrate concentrations. If this cannot be done, the District needs to be explicit as to the water-quality implications of the proposed MFL.

End Quote

No doubt the Board (as well as myself) will be interested to hear Staff's Response to these concerns raised by the panel.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Monday, November 14, 2016 8:40 AM
To: Doug Leeper; Ron Basso; Melissa Gulvin
Subject: Rainbow River Review 1

Doug, Ron and Melissa,
Last week I received answers to some of my questions from USGS regarding the Rainbow River MFL so I have pulled together some of my comments.
For ease of reading I have put my comments in a word file for you to consider.
I have major concerns regarding the work by ECT. Who was responsible for reviewing the work done by ECT or was it just accepted without question?

I am still waiting for USGS to provide the discharge equations for the two gage sites on Rainbow River. These may address some of the other concerns I have regarding flows.
In addition I have comments regarding the analysis of water quality data, fish data and floodplain habitat which I will address later.

Regarding Crystal River Kings Bay Review tomorrow, what is the room location at the Brooksville Office, I hope to be able to attend in person.

Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 17, 2017 10:01 AM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Subject: Fw: Rainbow River 24 Jan Board Notebook

Kym,
The e-mail address I used for you appears incomplete. Lets try this again.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Tuesday, January 17, 2017 9:52 AM
To: Doug Leeper; Ron Basso; Holzwart@swfwmd.state.fl.us
Cc: Kurt Fritsch; Ross.Morton@WaterMatters.org
Subject: Rainbow River 24 Jan Board Notebook

RAINBOW RIVER PEER REVIEW STAFF RESPONSES

I have been reviewing the Staff Responses to the Rainbow River Peer Review and also note these are in the Notebook for the next Board Meeting January 24 Tampa. It is disappointing to see the bent on forcing thru the MFL, although I do note the reduction to 5%. The response to the Review Panels comment about capping withdrawals does not show the respect this deserves. I interpret many of the responses to show the lack of concern for the condition of the springs versus the desire to approve more well permits virtually unimpeded. The summary of no action needed, essentially says to the Board 'no need to read this or concern yourselves with this'.
I almost hate to use it but the word 'disingenuous' comes to mind; I may change that thought as I see the language wording.

Please keep me informed about the February Public Meeting (I have not found it posted yet and the proposed RULE LANGUAGE for the Board due March as I currently understand.

Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 17, 2017 9:57 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Crystal River KB 13 Zones

Doug,
Data for 13 Zones
December 16 you provided me with a link to the data.
CRKB_Combined.accdb, in the “outgoing” folde: ftp://ftp.swfwmd.state.fl.us/pub/outgoing/

I downloaded the large folder and decided to focus attention on salinity (easy to measure and not seasonal), so I Saved the section which appeared to contain the Zones and Salinity data. I did not have time to look any further (family visiting from England more interesting!!) until this last weekend. The data is 2000 to 2005 the majority of which is Zone 3 with some for Zone 1.

Appears I saved the wrong part of the folder, although I did not see anything other than this, regarding Salinity/Zones The accdb file is no longer in the outgoing folder.
Would appreciate if you could have someone repost it; and possibly provide help navigating to salinity.
When making the request I assumed someone had extracted/analyzed the data as it is mentioned in the report.
Thanks and sorry for the inconvenience.

This data is far less important than the VHB xls files for G2 2009 and G1 and G2 for 2012.

Doug,
I have some appreciation of the workload you all must be under to meet concurrent deadlines for a number of MFLs, but the credibility of the models, very specifically the Kings Bay one is critical. 'Uncertainty' is raised a number of times in the CRKB Peer Review Report. My concern with the District model goes much further than 'uncertainty';, however, I am still open to the, so far elusive, shred of logical factual evidence needed to gain credibility. The comment 'should not be a surprise' just does not make the grade.

Thanks for the work you do in organizing responses to my questions and comments.

Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 17, 2017 9:52 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Holzwart@swfwmd.state.fl.us
Cc: Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>
Subject: Rainbow River 24 Jan Board Notebook

RAINBOW RIVER PEER REVIEW STAFF RESPONSES

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deserves. I interpret many of the responses to show the lack of concern for the condition of the springs versus the desire to approve more well permits virtually unimpeded. The summary of no action needed, essentially says to the Board 'no need to read this or concern yourselves with this'.
I almost hate to use it but the word 'disingenuous' comes to mind; I may change that thought as I see the language wording.

Please keep me informed about the February Public Meeting (I have not found it posted yet and the proposed RULE LANGUAGE for the Board due March as I currently understand.

Martyn

From: Nathan Whitt [mailto:nwhitt@bellsouth.net]
Sent: Tuesday, January 17, 2017 1:37 PM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Re: Update on the proposed Rainbow River MFL

Hey Melissa,

Thanks for the update. Sounds like the process was thorough and took a thoughtful approach.

I look forward to working with you in the future.

Nathan Whitt
Cell: 352-427-2388

Sent from my iPhone

On Jan 17, 2017, at 1:05 PM, Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us> wrote:

Hi Nathan,

I hope you are doing well. I wanted to give you an update on the Rainbow River MFL. There is a submit and file report in our Governing Board packet this month (page 276) to present the findings of the peer review panel and staff's response to the peer review. In its report, the panel stated "the analyses were thorough, scientifically reasonable, and based on best available data."

Of note, District staff changed its original minimum flow proposal from 93 to 95 percent of the natural flow. The peer review panel also recommended the more conservative approach. Current impacts from groundwater withdrawal are estimated to reduce flow by 1.5 percent. Therefore, the proposed minimum flow is being met and is projected to be met for at least the next 20 years based on water demand projections.

The District will be hosting a public meeting on Feb. 23 at 4:30 p.m. at the Dunnellon City Hall if you are interested in attending.

Please let me know if you have any questions or would like to schedule a meeting to further discuss the proposed flow. Have a nice afternoon!

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

Martyn:

Thanks for your January 17, 2016 email on the proposed minimum flow for the Rainbow River System.

As you know, there is a submit and file report in our Governing Board packet this month (page 276) to present the findings of the peer review panel and staff's response to the peer review. In its report, the panel stated "the analyses were thorough, scientifically reasonable, and based on best available data." Of note, District staff changed its original minimum flow proposal from 93 to 95 percent of the natural flow. The peer review panel also recommended the more conservative approach. Current impacts from groundwater withdrawal are estimated to reduce flow by 1.5 percent. Therefore, the proposed minimum flow is being met and is projected to be met for at least the next 20 years based on water demand projections.

The District will be hosting a public meeting on Feb. 23 at 4:30 p.m. at the Dunnellon City Hall if you are interested in attending. The address is 20750 River Drive, Dunnellon 34431. This meeting will soon be included on the District Calendar at http://www.swfwmd.state.fl.us/calendar/2017/2/, where we will also post the meeting agenda.

A draft version of potential rule language is included in Section 8.3 of the District's draft report on proposed minimum flows for the system. We will be reviewing and working on this draft rule language as well as updates to the minimum flows report in preparation for presentation of the proposed rule language and revised report to the Governing Board on March 28, 2017.

Please let me know if you have any additional questions or would like to schedule a meeting to further discuss the proposed minimum flow for the Rainbow River System.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 17, 2017 9:52 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Holzwart@swfwmd.state.fl.us
Cc: Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>
Subject: Rainbow River 24 Jan Board Notebook

RAINBOW RIVER PEER REVIEW STAFF RESPONSES

I have been reviewing the Staff Responses to the Rainbow River Peer Review and also note these are in the Notebook for the next Board Meeting January 24 Tampa. It is disappointing to

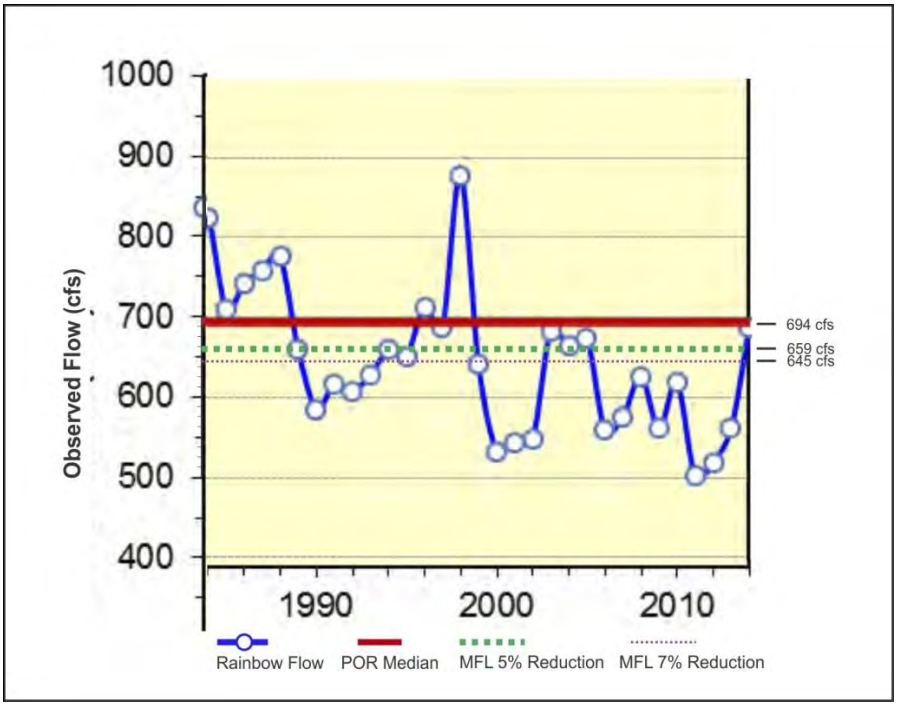
see the bent on forcing thru the MFL, although I do note the reduction to 5%. The response to the Review Panels comment about capping withdrawals does not show the respect this deserves. I interpret many of the responses to show the lack of concern for the condition of the springs versus the desire to approve more well permits virtually unimpeded. The summary of no action needed, essentially says to the Board 'no need to read this or concern yourselves with this'.
I almost hate to use it but the word 'disingenuous' comes to mind; I may change that thought as I see the language wording.

Please keep me informed about the February Public Meeting (I have not found it posted yet and the proposed RULE LANGUAGE for the Board due March as I currently understand.

Martyn

Comment on Updated Proposed MFL Level for the Rainbow River

Recent emails from SWFWMD staff have indicated that the input from the Peer Review process has convinced the Rainbow River MFL team to reduce the MFL standard from 7 % below the long term historic flow raate to 5 % below this standard. This would indicate that instead of the average annual flow on 694 cfs, minimum annual average flow would be 659 cfs before remedial action would need to be taken. This new 5% threshold MFL is overlaid on the chart from Figure 2-8 of the draft MFL report (along with the former proposed 7% level.)



It was noted in an earlier comment to the Peer Review Committee, that 13 of the last 16 years had annual flows that were below the minimum flow level. Updating the MFL level to 5% from 7% strengthened the conclusion from the historic data that the Rainbow River is at a point where serious remediation procedures should be set up and acted upon.

At the September 20, 2016 Peer Review meeting I asked the question of how the water district would declare that a remedial program would have to be put in place and a freeze on issuing water permits be instituted. The answer given was that if the annual flow rates for the Rainbow River were below the MFL threshold for five consecutive years in a row that an emergency would be declared and a recovery strategy would be instituted. The chart shows that we have already have had such a period from 2005 to 2012. The Minimum Flows and Levels Report should detail the process to trigger this decision and the elements of the recovery strategy.

Paul Marraffino
1/18/17

From: Brad Rimbey [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Wednesday, January 18, 2017 7:38 AM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Hilliard Dan <2buntings@comcast.net>
Subject: Re: Update on the proposed Rainbow River MFL

Thanks Melissa. I'm still following the Rainbow and CRKB MFLs. I'm glad to hear District staff accepted the peer review panel's recommendation to adopt a more conservative MFL for Rainbow. Whether it is conservative enough to comply with the requirements of the Federal Clean Water Act to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" remains to be seen.

Brad

From: Melissa Gulvin
Sent: Tuesday, January 17, 2017 12:58 PM
To: Brad Rimby
Subject: Update on the proposed Rainbow River MFL

Hi Brad,

I wanted to give you a quick update on the proposed Rainbow River MFL. There is a submit and file report in our Governing Board packet this month (page 276) to present the findings of the peer review panel and staff's response to the peer review. In its report, the panel stated "the analyses were thorough, scientifically reasonable, and based on best available data."

Of note, District staff changed its original minimum flow proposal from 93 to 95 percent of the natural flow. The peer review panel also recommended the more conservative approach. Current impacts from groundwater withdrawal are estimated to reduce flow by 1.5 percent. Therefore, the proposed minimum flow is being met and is projected to be met for at least the next 20 years based on water demand projections.

The District will be hosting a public meeting on Feb. 23 at 4:30 p.m. at the Dunnellon City Hall if you are interested in attending. The address is 20750 River Drive, Dunnellon 34431.

Please let me know if you have any questions or would like to schedule a meeting to further discuss the proposed flow. I'll also keep you updated on the Crystal River/Kings Bay MFL when that information is available. Have a nice afternoon!

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

_____
From: Rick Hancock
Sent: Wednesday, January 18, 2017 8:30 PM
To: Dawn Bowne
Subject: RE: Update on the proposed Rainbow River MFL

Thanks Melissa,
my only comment would be that 10 years is a long time to re-evaluate these days!

regards
rick

_____
From: Dawn Bowne
Sent: Wednesday, January 18, 2017 6:55 PM
To: Chuck Dillon; Rick Hancock; Larry Winkler; Walter Green; Valerie Hanchar; LARRY WINKLER; Valerie Porter-Hanchar
Subject: FW: Update on the proposed Rainbow River MFL

Dawn M .Bowne
Dawn M.Bowne
City Clerk/Interim City Manager
City of Dunnellon
20750 River Drive
Dunnellon, FL 34431
352-465-8500 ext 1002
dbowne@dunnellon.org<mailto:dbowne@dunnellon.org>
www.dunnellon.org<http://www.dunnellon.org>

Please Note: Florida has a very broad public records law. Written communication to or from city officials regarding city business is public record and open to inspection including names, addresses, and email addresses. Therefore, your email communication may be subject to public disclosure.

From: Melissa Gulvin [mailto:Melissa.Gulvin@swfwmd.state.fl.us]
Sent: Wednesday, January 18, 2017 9:50 AM
To: Rick Hancock <rhancock@dunnellon.org>
Cc: Dawn Bowne <dbowne@dunnellon.org>; mmcquaig@dunnellonpd.org
Subject: RE: Update on the proposed Rainbow River MFL

Good morning, Here are answers to your questions below:

Question: though 20 years of meeting proposed minimum flow sounds like a good thing, does it also mean that more withdrawals could be permitted which could reduce the flow, or the 20 year time frame?

Correct. Adopted MFLs are used in the District's water use permitting program to ensure that withdrawals do not cause significant harm to water resources or the environment. Also MFLs are a protection measure, so if an adopted MFL is projected to not be met during the next 20 years, a

prevention strategy is implemented. If the adopted MFL is not being met, a recovery strategy is implemented. Since, impacts to the Rainbow River are less than the proposed MFL, the same permitting rules will apply for now and applications that meet the requirements for issuance will be issued permits. The District will evaluate if the MFL is being met at least annually, and District staff are recommending reevaluation of this MFL in 10 years, so the impacts and potential impacts of withdrawals will be reviewed prior to the 20 year mark.

Question: if so, what "standard" is there that must be met before more withdrawals are restricted?

If withdrawals cause the flows for the Rainbow River to fall below the established MFLs, or if the withdrawals are expected to cause the flow to fall below the MFL during the next twenty years, the District develops and implements a recovery or prevention strategy<https://www.flrules.org/gateway/ChapterHome.asp?Chapter=40D-80> (Chapter 40D-80, F.A.C.), in accordance with state law (Chapter 373.0421<http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&Search_String=&URL=0300-0399/0373/Sections/0373.0421.html>, Florida Statutes).

Question: And, is this "standard" currently be discussed and ultimately determined through meetings like the one on the 23rd?

The “standard” is part of state law so it is not determined through public meetings like the one on the 23rd. The public meeting is an opportunity for interested and concerned citizens to learn about how District staff collected, developed and analyzed data to propose the MFL using the best information available. It’s also an opportunity for citizens to ask questions and provide comment.

Just want to mention again that the District evaluates if an MFL is being met each year. We also evaluate projected water use demands annually, which is part of our Regional Water Supply Plan<https://www.swfwmd.state.fl.us/documents/plans/RWSP/> process.

Please let me know if you have any additional questions. I’m happy to provide answers and help you better understand the MFL process.

Melissa Gulvin

Government Affairs Program Manager

Southwest Florida Water Management District

2379 Broad Street, Brooksville, FL 34604

(352) 796-7211, ext. 4419

(352) 206-4047 cell

Melissa.Gulvin@WaterMatters.org<mailto:Melissa.Gulvin@WaterMatters.org>

-----Original Message-----

From: Rick Hancock [mailto:rhancock@dunnellon.org]
Sent: Tuesday, January 17, 2017 1:54 PM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us<mailto:Melissa.Gulvin@swfwmd.state.fl.us>>; Dawn Bowne <dbowne@dunnellon.org<mailto:dbowne@dunnellon.org>>; mmcquaig@dunnellonpd.org<mailto:mmcquaig@dunnellonpd.org>
Subject: RE: Update on the proposed Rainbow River MFL

Hi Melissa,

thanks for the info, and I think I understand it!

though 20 years of meeting proposed minimum flow sounds like a good thing, does it also mean that more withdrawals could be permitted which could reduce the flow, or the 20 year time frame?

if so, what "standard" is there that must be met before more withdrawals are restricted?

And, is this "standard" currently be discussed and ultimately determined through meetings like the one on the 23rd?

Also, I don't see the meeting on the 23rd listed on the city calendar...should we get it on there?

thanks

regards

rick

_____

From: Melissa Gulvin [Melissa.Gulvin@swfwmd.state.fl.us]

Sent: Tuesday, January 17, 2017 1:41 PM

To: Rick Hancock

Cc: Dawn Bowne; Mandy Roberts

Subject: Update on the proposed Rainbow River MFL

Hi Councilman Hancock,

I hope you are doing well. I wanted to give you an update on the proposed Rainbow River MFL that Mark and I mentioned to you when we met in December. A little background — a MFL (minimum flows or level) is a regulation to protect springs, spring runs, rivers, lakes, wetlands and aquifers from ground and surface water withdrawals that would cause “significant harm.” They are protective measures and to have one set is always a good thing. The District has set MFLs for 207 water bodies and is currently in the process of setting one for the Rainbow River.

After the District's experienced scientists use numerous tools to collect, develop and analysis data, they propose a MFL using the best information available. Then, their work is thoroughly evaluated by an independent scientific peer review panel. There is a submit and file report in our Governing Board packet<http://www.swfwmd.state.fl.us/calendar/notebooks/govboard_01-24-17_notebook_2765.pdf> this month (page 276) to present the findings of the peer review panel and staff's response to the peer review. In its report, the panel stated "the analyses were thorough, scientifically reasonable, and based on best available data."

Of note, District staff changed its original minimum flow proposal from 93 to 95 percent of the natural flow. The peer review panel also recommended the more conservative approach. Current impacts from groundwater withdrawal are estimated to reduce flow by 1.5 percent. Therefore, the proposed minimum flow is being met and is projected to be met for at least the next 20 years based on water demand projections.

The District will be hosting a public meeting on Feb. 23 at 4:30 p.m. at the Dunnellon City Hall if you are interested in attending.

Please let me know if you have any questions. Have a nice afternoon!

Melissa Gulvin

Government Affairs Program Manager

Southwest Florida Water Management District

2379 Broad Street, Brooksville, FL 34604

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Melissa.Gulvin@WaterMatters.org<mailto:Melissa.Gulvin@WaterMatters.org<mailto:Melissa.Gulvin@WaterMatters.org%3cmailto:Melissa.Gulvin@WaterMatters.org>>

Subject: Emails from Mr. Martyn Johnson concerning the proposed minimum flows for the Rainbow River system

Prepared by: Doug Leeper, Yonas Ghile and Kym Holzwart
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
Brooksville, Florida 34605

Date: January 19, 2017

Several emails from Mr. Martyn Johnson concerning the proposed minimum flows for the Rainbow River system are reproduced in this document along with imbedded responses from Southwest Florida Water Management District staff. District responses and additions to the emails and headers for Mr. Johnson's original email attachments are highlighted in blue. Yellow highlighting is original to Mr. Johnson's emails.

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Monday, November 14, 2016 8:40 AM
To: Doug Leeper; Ron Basso; Melissa Gulvin
Subject: Rainbow River Review 1

Doug, Ron and Melissa,

Last week I received answers to some of my questions from USGS regarding the Rainbow River MFL so I have pulled together some of my comments.
For ease of reading I have put my comments in a word file for you to consider.
I have major concerns regarding the work by ECT. Who was responsible for reviewing the work done by ECT or was it just accepted without question?

I am still waiting for USGS to provide the discharge equations for the two gage sites on Rainbow River. These may address some of the other concerns I have regarding flows.
In addition I have comments regarding the analysis of water quality data, fish data and floodplain habitat which I will address later.

Regarding Crystal River Kings Bay Review tomorrow, what is the room location at the Brooksville Office, I hope to be able to attend in person.

Martyn

Staff response: The hydraulic modeling completed for the District by Environmental Consulting & Technology, Inc. was reviewed by District staff prior to and after acceptance by District project managers.

Attachment: Rainbow River Draft MFL Review 1 Martyn Johnson by Martyn Johnson
As mentioned in a previous e-mail I was awaiting information from USGS regarding Rainbow River. I have received part of the information which helps me address some of the concerns I have.

Stage Records at Gage Site 02313098
From Rainbow River Appendix C page 3-4
Quote
USGS 02313098 Rainbow River near Dunnellon, Florida, as listed in Table 3-1 and presented in Figure 3-1, was recently installed upstream of a rocky shoal by USGS in 2013. However, review of the stage records provided at this gage suggests that the vertical datum of 27 ft-NAVD appears to be inappropriate when compared with the stage data collected at other river sites. Therefore, the stage data at this short-term USGS gage will be excluded from the subsequent model calibration and verification.
End Quote
It is disappointing that the consulting firm simply chose to ignore the data as it did not 'fit'. A professional approach would have been to make a few simple enquiries.
This is what I received from USGS
Quote
1. The datum listed on NWISWeb for 02313098 was not correct. I don't know how that number got entered or where it came from, but it was definitely wrong. That has been corrected now and the correct datum is 22.72 ft above NAVD '88.
End Quote

Staff response: We thank you for providing this information. However, excluding USGS data from U.S. Geological Survey (USGS) site number 02313098 does not change the HEC-RAS model calibration and validation results because it is located between two closely-space sites (i.e., PHAB Pool and Veg4). As can be seen in Figure 2-5 Appendix C, the reach near USGS site number 02313098 includes more transects than the remaining segments of the river. In other words, the area around USGS site number 02313098 is better calibrated and validated than other portions of the river.

Furthermore, to then use this new Gage Site be identified in Rules for the MFL (Draft Report Page 92).

Staff response: The proposed minimum flow is expressed using a percent-of- flow approach and is considered applicable at any location in the river. Of note, staff are currently discussing whether to identify USGS site number 02313098 or the downstream USGS site number 02313100 (Rainbow River at Dunnellon, FL) in draft rules for the proposed minimum flow.

Use Of USGS data to support the model development
Fault 1
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The

problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Fault 2
In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report.
The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy). Specifically I have taken the Field Measurements (compared in the attached xls file) as the most accurate as these are in river measurements and not subject to the potential inaccuracies of calculated discharge derived from well level. Although I would add the agreement between Field Measurements and Calculated Discharge for 02313100 over the years is remarkably good.

The HEC RAS Model is constructed to look good not to be of any real value. The foundation is faulty(see faults above) and the mathematical manipulation of data such as analysis of Discharge at Rainbow River 02313100 and the Stage at Withlacoochee 02313200 (see page 62 and onward in the Draft Report) are the source of hypothetical estimates which are even questioned in Section 6.2.3 Sources of Uncertainty. Please note my highlighted sentence above; did anyone compare this data/look at the accuracy of the discharge data; there are some 700 Field Measurements of discharge with half of them since 1965 which cover the time period mentioned in 6.1 Page 59 of the Draft Report.

Staff response: Field measurements are considered instantaneous records and are most appropriately compared among sites with field measurements taken at the same time. Unfortunately, the field measurements you provided for USGS site number 2313098 and 2313100 (in an Excel file provided as an email attachment and reproduced below) were not collected at the same time and we note that examination of the data indicates substantial variation in flow at individual sites on some dates, indicating that flow variation within a day may be rather large. For example, on 09/14/2016, the flows varied from 601 to 630 cfs within two hours at USGS site number 023132098 (based on the Excel file your provided as an email attachment). Similarly, the flow varied from 707 to 755 cfs on 6/2/2014 within one hour and from 702 to 744 cfs within one hour on 3/31/2014. Further, if you average the field measurements taken on 09/14/2016 at site number 2313098 and compare the resultant average value to the reported daily flow at USGS site number 02313100, the percentage difference is 15%. Similarly, if you compare the 10/6/2016 field measurement at USGS site

number 023132098 with reported daily value at USGS site number 02313100, the difference is 16%. We therefore conclude that although there are no simultaneously collected field measurements for the two sites that can be used for direct comparison, the good agreement between HEC-RAS simulated observed stage data in the vicinity of the USGS site number 023132098 indirectly confirms that the 85% percent flow attribution to the site in question is appropriate.

Zero or reverse flow

From Rainbow River Appendix C Page 4-9

Quote

For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stageflow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.

End Quote

Let me first address the 'field observations of severe backwater effects (zero or reverse flow)', I would like to get a statement from the observer(s) of when and where this zero or reverse flow was witnessed. Was reverse flow really witnessed at the CR 484 bridge? This must have been quite a sight, but I have serious doubts this can be substantiated,

Now to "This conclusion is also supported by USGS gage data". All the actual data I have reviewed shows the stage at the gage site 02313100 (Rainbow River) is always higher than the site 02313200 (Withlacoochee). My review initially focused on the extreme high and low stage as presented (best estimate from graph) in Figure 3-6 (the high in mid 2005 of about 28.7 ft and the low in mid 2012 of about 25.8 ft).
Withlacoochee high on August 8, 2005 was 29.22 ft Rainbow River was 29.63 ft
Withlacoochee low on May 13, 2012 was 26.53 ft Rainbow River was 26.72 ft
These and numerous others I checked always had Rainbow River higher than Withlacoochee.

As far as I can see the only possible explanation for the quoted statement is some mathematical manipulation of data, which is not supported by any actual data. I am open to a factual explanation.

Staff response: Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

Martyn

Attachment: Rainbow Field Measurement Comparison by Martyn Johnson

Rainbow River Newer Gage Site 2313098 Field Measurements cfs			Rainbow River Older Gage Site 2313100 Field Measurements cfs			Difference	Percentage Difference
10/6/2016 10:30	USGS	609	10/6/2016 13:46	USGS	660	51	8%
9/14/2016 16:53	USGS	608					
9/14/2016 16:09	USGS	601					
9/14/2016 15:16	USGS	622					
9/14/2016 13:58	USGS	630					
9/14/2016 12:44	USGS	625					
8/11/2016 12:50	USGS	590	8/12/2016 10:36	USGS	575	-15	-3%
6/16/2016 13:50	USGS	581	6/16/2016 16:33	USGS	569	-12	-2%
4/14/2016 11:14	USGS	580	4/14/2016 14:05	USGS	601	21	3%
2/11/2016 11:11	USGS	590	2/11/2016 15:01	USGS	604	14	2%
12/3/2015 11:28	USGS	640	12/3/2015 14:47	USGS	652	12	2%
10/8/2015 14:08	USGS	644	10/8/2015 17:55	USGS	661	17	3%
10/8/2015 12:57	USGS	643				18	
8/11/2015 10:49	USGS	680	8/11/2015 15:19	USGS	660	-20	-3%
6/1/2015 14:44	USGS	598	6/1/2015 10:56	USGS	599	1	0%
4/1/2015 9:07	USGS	642	4/1/2015 13:49	USGS	625	-17	-3%
2/3/2015 15:12	USGS	685	2/3/2015 11:26	USGS	676	-9	-1%
2/3/2015 14:37	USGS	698	2/3/2015 10:23	USGS	636	-62	-10%
12/9/2014 10:25	USGS	632	12/8/2014 12:44	USGS	643	11	2%
10/14/2014 11:57	USGS	689	10/14/2014 9:24	USGS	722	33	5%
8/19/2014 9:35	USGS	638	8/18/2014 13:15	USGS	640	2	0%
			8/18/2014 12:21	USGS	654		
6/2/2014 15:03	USGS	707	6/2/2014 11:28	USGS	731	24	3%
6/2/2014 14:14	USGS	755	6/2/2014 10:49	USGS	735	-20	-3%
3/31/2014 14:58	USGS	702	3/31/2014 11:00	USGS	734	32	4%
3/31/2014 14:03	USGS	744				-10	
2/10/2014 16:35	USGS	634	2/10/2014 12:29	USGS	645	11	2%
2/10/2014 15:46	USGS	663					
12/9/2013 12:56	USGS	629	12/9/2013 16:17	USGS	595	-34	-6%

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, December 03, 2016 8:59 AM
To: jewilson@usgs.gov; Kevin J Grimsley <kjgrims@usgs.gov>
Cc: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Fw: USGS FOIA 2017-00006 - Response

Janis,
Thank you to yourself and Kevin for making this information available.

I am sharing this with SWFWMD which I trust is in order with the FOIA protocol. Apparantly SWFWMD do not have this specific information although they sponsor the Gage Site and I think it an important factor for their consultant to have in formulating MFL for the Rainbow River.

Martyn Johnson

From: jewilson@usgs.gov <jewilson@usgs.gov> on behalf of Freedom of Information Act, GS-D-EI_ <foia@usgs.gov>
Sent: Friday, December 2, 2016 1:28 PM

To: Alan Martyn Johnson
Cc: GS-GIO Freedom of Information Act
Subject: USGS FOIA 2017-00006 - Response

Dear Mr. Johnson,

I am attaching our final response to USGS FOIA 2017-00006, along with three tables related to the equations you requested. Thank you for your patience while we processed your request. Please let me know if you have any questions.

Sincerely,

Janis Wilson
U.S. Geological Survey
Department of the Interior
Denver Federal Center
Box 25046
Mail Stop 406
Denver, CO 80225-0046
(303) 236-1476 (office)
(303) 236-1451 (fax)
foia@usgs.gov

Staff Response: Thanks for the email and associated attachments regarding discharge measurement at the U.S. Geological Survey's Rainbow River near Dunnellon gage site.

United States Department of the Interior

U. S. GEOLOGICAL SURVEY
BOX 25046 MS 406
Denver Federal Center
Denver, Colorado 80225

Transmitted via Electronic Mail: (martynellijay@hotmail.com)

December 2, 2016

U.S. Geological Survey FOIA #USGS-2017-00006

Dear Mr. Johnson,

This letter is the final response pursuant to your Freedom of Information Act (FOIA) request dated October 3, 2016, and received by the USGS FOIA office on October 10, 2016. The USGS assigned it control number **USGS 2017-00006**. Please cite this number in any future communications with the USGS regarding your request. The USGS acknowledged receipt of your request on October 11, 2016.

You requested the following information:

> **Discharge calculation equations for USGS Gage Sites 02313100 and 02313098 on the Rainbow River, FL.**

USGS Responsive Information

Station 02313098 – Two computation methods have been used at this station:

- The discharge data began on 10/1/2013 and used a direct relationship between discharge measurements at the gage and water level data from 290514082270701, Rainbow Springs Well. This rating does not use an equation, so the lookup table, "02313098.well_rating", is attached. This rating was stopped on 9/30/2015.
- An index-velocity rating was recently finalized and is being used for discharge from 10/1/2015 and forward. The stage-area rating for that method is attached. (See "02313098.area".) The velocity rating equation is:
    - Mean channel velocity = 0.4575 * index velocity + 0.198

Station 02313100 – The discharge at this station is calculated using a direct relationship between discharge measurements at the gage and water level data from 290514082270701, Rainbow Springs Well. This rating does not use an equation, so the lookup table, "02313100.well_rating", is attached. This rating has been in effect since 3/9/2010.

You were classified as an "Other" category requester; however, since we did not comply with any of the FOIA's statutory time limits, we cannot assess search fees associated with your request. See *43 C.F.R. § 2.37(f)(1)*. Therefore, there is no billable fee for the processing of this request.

The 2007 FOIA amendments created the Office of Government Information Services (OGIS) to offer mediation services to resolve disputes between FOIA requesters and Federal agencies as a non-exclusive alternative to litigation. Using OGIS services does not affect your right to pursue litigation. You may contact OGIS in any of the following ways:

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road – OGIS
College Park, MD 20740-6001
Email: ogis@nara.gov
Web: https://ogis.archives.gov
Telephone: (202) 741-5770
Fax: (202) 741-5769
Toll-free: 1-877-684-6448

Please note that using OGIS services does not affect the timing of filing an appeal with the Department's FOIA/Privacy Act Appeals Officer.

You also may seek dispute resolution services from our FOIA Public Liaison, Mr. Brian May, by phone at (443) 498-5521; by fax at (443) 498-5510; by email at foia@usgs.gov; or, by mail at U.S. Geological Survey, FOIA Public Liaison, 5522 Research Park Drive, Baltimore, MD 21228.

If you have any questions concerning your request or our response, please contact me either by electronic mail jewilson@usgs.gov or by phone (303) 236-1476. Thank you for your interest in the USGS.

Sincerely,

Janis Wilson
U.S. Geological Survey
Government Information Specialist

Attachments:
1. Text Document, "02313098.well_rating", 6 KB
2. Text Document, "02313098.area", 4KB
3. Text Document, "02313100.well_rating", 6 KB

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:43:40 EST By kjgrims
Rating for Area (ft^2)
RATING ID: 2.0 TYPE: Velocity-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Area (ft^2)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
2.00	221.7	222.7	223.8	224.9	226.0	227.1	228.2	229.3	230.4	231.5	10.900
2.10	232.6	233.7	234.8	235.9	237.0	238.1	239.2	240.3	241.4	242.5	11.000
2.20	243.6	244.7	245.8	246.9	248.0	249.1	250.2	251.3	252.4	253.5	11.000
2.30	254.6	255.7	256.8	257.9	259.0	260.1	261.2	262.3	263.4	264.5	11.000
2.40	265.6	266.7	267.8	268.9	270.0	271.1	272.2	273.3	274.4	275.5	11.000
2.50	276.6	277.8	279.1	280.3	281.5	282.7	283.9	285.1	286.3	287.6	12.200
2.60	288.8	290.0	291.2	292.4	293.6	294.9	296.1	297.3	298.5	299.7	12.100
2.70	300.9	302.1	303.4	304.6	305.8	307.0	308.2	309.4	310.6	311.9	12.200
2.80	313.1	314.3	315.5	316.7	317.9	319.1	320.4	321.6	322.8	324.0	12.100
2.90	325.2	326.4	327.7	328.9	330.1	331.3	332.5	333.7	334.9	336.2	12.200
3.00	337.4	338.6	339.9	341.1	342.4	343.6	344.9	346.1	347.4	348.6	12.500
3.10	349.9	351.1	352.4	353.6	354.9	356.1	357.4	358.6	359.8	361.1	12.400
3.20	362.3	363.6	364.8	366.1	367.3	368.6	369.8	371.1	372.3	373.6	12.500
3.30	374.8	376.1	377.3	378.6	379.8	381.1	382.3	383.6	384.8	386.1	12.500
3.40	387.3	388.6	389.8	391.1	392.3	393.6	394.8	396.1	397.3	398.6	12.500

3.50	399.8	401.1	402.4	403.7	404.9	406.2	407.5	408.8	410.1	411.4	12.900
3.60	412.7	413.9	415.2	416.5	417.8	419.1	420.4	421.6	422.9	424.2	12.800
3.70	425.5	426.8	428.1	429.4	430.6	431.9	433.2	434.5	435.8	437.1	12.800
3.80	438.3	439.6	440.9	442.2	443.5	444.8	446.1	447.3	448.6	449.9	12.900
3.90	451.2	452.5	453.8	455.0	456.3	457.6	458.9	460.2	461.5	462.8	12.800
4.00	464.0	465.4	466.7	468.0	469.4	470.7	472.1	473.4	474.7	476.1	13.400
4.10	477.4	478.7	480.1	481.4	482.7	484.1	485.4	486.7	488.1	489.4	13.300
4.20	490.7	492.1	493.4	494.7	496.1	497.4	498.8	500.1	501.4	502.8	13.400
4.30	504.1	505.4	506.8	508.1	509.4	510.8	512.1	513.4	514.8	516.1	13.300
4.40	517.4	518.8	520.1	521.4	522.8	524.1	525.5	526.8	528.1	529.5	13.400
4.50	530.8	532.2	533.6	535.0	536.4	537.8	539.2	540.6	542.0	543.4	14.000
4.60	544.8	546.2	547.6	549.0	550.4	551.8	553.2	554.6	556.0	557.4	14.000
4.70	558.8	560.2	561.7	563.1	564.5	565.9	567.3	568.7	570.1	571.5	14.100
4.80	572.9	574.3	575.7	577.1	578.5	579.9	581.3	582.7	584.1	585.5	14.000
4.90	586.9	588.3	589.7	591.1	592.5	593.9	595.3	596.7	598.1	599.5	14.000
5.00	600.9	602.4	603.8	605.3	606.7	608.2	609.6	611.1	612.6	614.0	14.600
5.10	615.5	616.9	618.4	619.8	621.3	622.7	624.2	625.6	627.1	628.5	14.500
5.20	630.0	631.4	632.9	634.3	635.8	637.3	638.7	640.2	641.6	643.1	14.500
5.30	644.5	646.0	647.4	648.9	650.3	651.8	653.2	654.7	656.1	657.6	14.600
5.40	659.1	660.5	662.0	663.4	664.9	666.3	667.8	669.2	670.7	672.1	14.500
5.50	673.6	675.1	676.6	678.0	679.5	681.0	682.5	684.0	685.5	687.0	14.800
5.60	688.4	689.9	691.4	692.9	694.4	695.9	697.4	698.9	700.3	701.8	14.900
5.70	703.3	704.8	706.3	707.8	709.3	710.7	712.2	713.7	715.2	716.7	14.900
5.80	718.2	719.7	721.2	722.6	724.1	725.6	727.1	728.6	730.1	731.6	14.800
5.90	733.0	734.5	736.0	737.5	739.0	740.5	742.0	743.5	744.9	746.4	14.900

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:43:40 EST By kjgrims
Rating for Area (ft^2)
RATING ID: 2.0 TYPE: Velocity-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Area (ft^2)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
6.00	747.9	749.4	750.9	752.5	754.0	755.5	757.0	758.5	760.1	761.6	15.200
6.10	763.1	764.6	766.1	767.6	769.2	770.7	772.2	773.7	775.2	776.7	15.200
6.20	778.3	779.8	781.3	782.8	784.3	785.9	787.4	788.9	790.4	791.9	15.100
6.30	793.4	795.0	796.5	798.0	799.5	801.0	802.6	804.1	805.6	807.1	15.200
6.40	808.6	810.1	811.7	813.2	814.7	816.2	817.7	819.2	820.8	822.3	15.200
6.50	823.8	825.3	826.9	828.4	830.0	831.5	833.1	834.6	836.2	837.7	15.500
6.60	839.3	840.8	842.4	843.9	845.5	847.0	848.6	850.1	851.7	853.2	15.500
6.70	854.8	856.3	857.9	859.4	861.0	862.5	864.1	865.6	867.2	868.7	15.500
6.80	870.3	871.8	873.4	874.9	876.5	878.0	879.6	881.1	882.7	884.2	15.500
6.90	885.8	887.3	888.9	890.4	892.0	893.5	895.1	896.6	898.2	899.7	15.500
7.00	901.3	902.8	904.4	906.0	907.6	909.2	910.7	912.3	913.9	915.5	15.800
7.10	917.1	918.6	920.2	921.8	923.4	925.0	926.6	928.1	929.7	931.3	15.800
7.20	932.9	934.5	936.0	937.6	939.2	940.8	942.4	944.0	945.5	947.1	15.800
7.30	948.7	950.3	951.9	953.4	955.0	956.6	958.2	959.8	961.3	962.9	15.800
7.40	964.5										

ID	Starting Date
2.0	10/01/2015 00:00:00 EDT

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313098 RAINBOW RIVER NEAR DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.07130556 LONGITUDE -82.42661111
Date Processed: 11/29/2016 10:12:48 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 1.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
30.60	482.1	483.9	485.8	487.6	489.4	491.2	493.0	494.8	496.6	498.5	18.200
30.70	500.3	502.1	503.9	505.7	507.5	509.3	511.1	513.0	514.8	516.6	18.100
30.80	518.4	520.2	522.0	523.8	525.7	527.5	529.3	531.1	532.9	534.7	18.100
30.90	536.5	538.3	540.2	542.0	543.8	545.6	547.4	549.2	551.0	552.9	18.200
31.00	554.7	556.5	558.3	560.1	561.9	563.7	565.6	567.4	569.2	571.0	18.100
31.10	572.8	574.6	576.4	578.2	580.1	581.9	583.7	585.5	587.3	589.1	18.100
31.20	590.9	592.8	594.6	596.4	598.2	600.0	601.8	603.6	605.4	607.3	18.200
31.30	609.1	610.9	612.7	614.5	616.3	618.1	620.0	621.8	623.6	625.4	18.100
31.40	627.2	629.0	630.8	632.6	634.5	636.3	638.1	639.9	641.7	643.5	18.100
31.50	645.3	647.2	649.0	650.8	652.6	654.4	656.2	658.0	659.9	661.7	18.200
31.60	663.5	665.3	667.1	668.9	670.7	672.5	674.4	676.2	678.0	679.8	18.100
31.70	681.6	683.4	685.2	687.1	688.9	690.7	692.5	694.3	696.1	697.9	18.100
31.80	699.7	701.6	703.4	705.2	707.0	708.8	710.6	712.4	714.3	716.1	18.200
31.90	717.9	719.7	721.5	723.3	725.1	727.0	728.8	730.6	732.4	734.2	18.100

32.00	736.0	737.8	739.6	741.5	743.3	745.1	746.9	748.7	750.5	752.3	18.200
32.10	754.2	756.0	757.8	759.6	761.4	763.2	765.0	766.8	768.7	770.5	18.100
32.20	772.3	774.1	775.9	777.7	779.5	781.4	783.2	785.0	786.8	788.6	18.100
32.30	790.4	792.2	794.0	795.9	797.7	799.5	801.3	803.1	804.9	806.7	18.200
32.40	808.6	810.4	812.2	814.0	815.8	817.6	819.4	821.3	823.1	824.9	18.100
32.50	826.7	828.5	830.3	832.1	833.9	835.8	837.6	839.4	841.2	843.0	18.100
32.60	844.8	846.6	848.5	850.3	852.1	853.9	855.7	857.5	859.3	861.1	18.200
32.70	863.0	864.8	866.6	868.4	870.2	872.0	873.8	875.7	877.5	879.3	18.100
32.80	881.1	882.9	884.7	886.5	888.4	890.2	892.0	893.8	895.6	897.4	18.100
32.90	899.2	901.0	902.9	904.7	906.5	908.3	910.1	911.9	913.7	915.6	18.200
33.00	917.4	919.2	921.0	922.8	924.6	926.4	928.2	930.1	931.9	933.7	18.100
33.10	935.5	937.3	939.1	940.9	942.8	944.6	946.4	948.2	950.0	951.8	18.100
33.20	953.6	955.4	957.3	959.1	960.9	962.7	964.5	966.3	968.1	970.0	18.200
33.30	971.8	973.6	975.4	977.2	979.0	980.8	982.7	984.5	986.3	988.1	18.100
33.40	989.9	991.7	993.5	995.3	997.2	999.0	1001				

ID	Starting Date	Ending Date
1.0	10/01/2013 00:00:00 EDT	09/30/2015 23:59:59 EDT

W RIVER AT DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.04942056 LONGITUDE -82.44759948
Date Processed: 11/29/2016 10:27:50 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 4.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
29.40				381.3	382.5	383.8	385.1	386.3	387.6	388.8	12.571
29.50	390.1	391.3	392.6	393.8	395.1	396.4	397.6	398.9	400.1	401.4	12.500
29.60	402.6	403.9	405.1	406.4	407.6	408.9	410.2	411.4	412.7	413.9	12.600
29.70	415.2	416.4	417.7	418.9	420.2	421.5	422.7	424.0	425.2	426.5	12.500
29.80	427.7	429.0	430.2	431.5	432.8	434.0	435.3	436.5	437.8	439.0	12.600
29.90	440.3	441.5	442.8	444.0	445.3	446.6	447.9	449.2	450.5	451.8	12.800
30.00	453.1	454.4	455.7	457.0	458.3	459.6	460.8	462.1	463.4	464.7	12.900
30.10	466.0	467.3	468.6	469.9	471.2	472.5	473.8	475.1	476.4	477.7	13.000
30.20	479.0	480.3	481.6	482.9	484.2	485.5	486.8	488.1	489.4	490.7	13.000
30.30	492.0	493.3	494.6	495.9	497.2	498.5	499.8	501.1	502.4	503.7	13.000
30.40	505.0	506.3	507.6	508.9	510.2	511.5	512.8	514.1	515.4	516.7	13.000
30.50	518.0	519.3	520.6	521.9	523.2	524.5	525.8	527.1	528.4	529.7	13.000
30.60	531.0	532.3	533.6	534.9	536.2	537.5	538.8	540.1	541.4	542.7	13.000
30.70	544.0	545.3	546.6	547.9	549.2	550.5	551.8	553.1	554.4	555.7	13.000
30.80	557.0	558.3	559.6	560.9	562.2	563.5	564.8	566.1	567.4	568.7	13.000
30.90	570.0	571.3	572.6	573.9	575.2	576.5	577.8	579.1	580.4	581.7	13.000
31.00	583.0	584.3	585.6	586.9	588.2	589.5	590.7	592.0	593.3	594.6	12.900

31.10	595.9	597.2	598.5	599.8	601.1	602.4	603.7	605.0	606.3	607.6	13.000
31.20	608.9	610.2	611.5	612.8	614.1	615.4	616.7	618.0	619.3	620.6	13.000
31.30	621.9	623.2	624.5	625.8	627.1	628.4	629.7	631.0	632.3	633.6	13.000
31.40	634.9	636.2	637.5	638.8	640.1	641.4	642.7	644.0	645.3	646.6	13.000
31.50	647.9	649.2	650.5	651.8	653.1	654.4	655.7	657.0	658.3	659.6	13.000
31.60	660.9	662.2	663.5	664.8	666.1	667.4	668.7	670.0	671.3	672.6	13.000
31.70	673.9	675.2	676.5	677.8	679.1	680.4	681.7	683.0	684.3	685.6	13.000
31.80	686.9	688.2	689.5	690.8	692.1	693.4	694.7	696.0	697.3	698.6	13.000
31.90	699.9	701.2	702.5	703.8	705.1	706.4	707.7	709.0	710.3	711.6	13.000
32.00	712.9	714.2	715.5	716.8	718.1	719.4	720.7	721.9	723.2	724.5	12.900
32.10	725.8	727.1	728.4	729.7	731.0	732.3	733.6	734.9	736.2	737.5	13.000
32.20	738.8	740.1	741.4	742.7	744.0	745.3	746.6	747.9	749.2	750.5	13.000
32.30	751.8	753.1	754.4	755.7	757.0	758.3	759.6	760.9	762.2	763.5	13.000
32.40	764.8	766.1	767.4	768.7	770.0	771.3	772.6	773.9	775.2	776.5	13.000
32.50	777.8	779.1	780.4	781.7	783.0	784.3	785.6	786.9	788.2	789.5	13.000
32.60	790.8	792.1	793.4	794.7	796.0	797.3	798.6	799.9	801.2	802.5	13.000
32.70	803.8	805.1	806.4	807.7	809.0	810.3	811.6	812.9	814.2	815.5	13.000
32.80	816.8	818.1	819.4	820.7	822.0	823.3	824.6	825.9	827.2	828.5	13.000
32.90	829.8	831.1	832.4	833.7	835.0	836.3	837.6	838.9	840.2	841.5	13.000
33.00	842.8	844.1	845.4	846.7	848.0	849.3	850.6	851.9	853.1	854.4	12.900
33.10	855.7	857.0	858.3	859.6	860.9	862.2	863.5	864.8	866.1	867.4	13.000
33.20	868.7	870.0	871.3	872.6	873.9	875.2	876.5	877.8	879.1	880.4	13.000
33.30	881.7	883.0	884.3	885.6	886.9	888.2	889.5	890.8	892.1	893.4	13.000

U.S. DEPARTMENT OF THE INTERIOR - U.S. GEOLOGICAL SURVEY - WATER RESOURCE

STATION NUMBER 02313100 RAINBOW RIVER AT DUNNELLON, FL SOURCE AGENCY USGS
LATITUDE 29.04942056 LONGITUDE -82.44759948
Date Processed: 11/29/2016 10:27:50 EST By kjgrims
Rating for Discharge (ft3/s)
RATING ID: 4.0 TYPE: Stage-Discharge EXPANSION: STATUS: Approved

EXPANDED RATING TABLE

Stage (ft)	Discharge (ft3/s)										DIFF IN Q PER
	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09	.1 UNITS
33.40	894.7	896.0	897.3	898.6	899.9	901.2	902.5	903.8	905.1	906.4	13.000
33.50	907.7	909.0	910.3	911.6	912.9	914.2	915.5	916.8	918.1	919.4	13.000
33.60	920.7	922.0	923.3	924.6	925.9	927.2	928.5	929.8	931.1	932.4	13.000
33.70	933.7	935.0	936.3	937.6	938.9	940.2	941.5	942.8	944.1	945.4	13.000
33.80	946.7	948.0	949.3	950.6	951.9	953.2	954.5	955.8	957.1	958.4	13.000
33.90	959.7	961.0	962.3	963.6	964.9	966.2	967.5	968.8	970.1	971.4	13.000
34.00	972.7	974.0	975.3	976.6	977.9	979.2	980.5	981.8	983.1	984.3	12.900
34.10	985.6	986.9	988.2	989.5	990.8	992.1	993.4	994.7	996.0	997.3	13.000
34.20	998.6	999.9	1001	1003	1004	1005	1006	1008	1009	1010	13.400
34.30	1012	1013	1014	1016	1017	1018	1019	1021	1022	1023	13.000
34.40	1025	1026	1027	1029	1030	1031	1032	1034	1035		

ID	Starting Date
4.0	03/09/2010 00:00:00 EST

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 03, 2017 7:18 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Fw: Rainbow River Review

RAINBOW RIVER MFL REMINDER
The concerns I raised in my November 14 e-mail regarding the inaccuracies in the discharge data used to develop the Rainbow River Model have so far not been addressed or brought to the attention of the Review Panel. This is disappointing.

I also forwarded the USGS 'look up tables' which further support the concern I raised about additional spring water discharge below the newer USGS Gage Site 02313098. This information also appears to make the idea of backwater effects on the long term gage site discharge data invalid or rarely significant.

The Review Panels Report includes some very telling comments (which I essentially agree with):
Quote

The Panel finds the 2000 flow anomaly a potentially interesting harbinger of change. The springshed is clearly yielding less flow than expected since 2000. Based on the double mass analysis it appears that current flows are substantially below the MFL and there is nothing in the report that assures recovery to the MFL. The Panel understands that the cause is unknown, while groundwater models suggest that local pumping is not the cause, the Panel has major concerns that the flow anomaly must be considered a "departure from natural flow". Resolving the origin of the anomaly is critical to defensibly conclude that the Rainbow River System is, in fact, not impaired and in need of a recovery plan. The Panel appreciates that MFL reports are living documents, updates and improvements should clearly describe knowledge gaps, and that remedying these gaps are a District priority.

End Quote

Staff response: The minimum flow for the Rainbow River System is currently being met and is expected to be met during the coming 20-year planning period.

And

In the absence of key supporting data, the District should consider capping withdrawals at current levels (or with a minimal allowable increase) until the nutrient issues are effectively addressed. In particular, consideration should be given to allow no reduction in flow unless there is a corresponding decrease in loading so that there is no net increase in projected nitrate concentrations. If this cannot be done, the District needs to be explicit as to the water-quality implications of the proposed MFL.

End Quote

Staff response: Based on available data and analyses performed to date, there is no basis for capping withdrawals at current levels, or at a level different than what is currently being proposed.

No doubt the Board (as well as myself) will be interested to hear Staff's Response to these concerns raised by the panel.

Martyn

Email string by Martyn Johnson

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Monday, November 14, 2016 8:40 AM
To: Doug Leeper; Ron Basso; Melissa Gulvin
Subject: Rainbow River Review 1

Doug, Ron and Melissa,
Last week I received answers to some of my questions from USGS regarding the Rainbow River MFL so I have pulled together some of my comments.
For ease of reading I have put my comments in a word file for you to consider.
I have major concerns regarding the work by ECT. Who was responsible for reviewing the work done by ECT or was it just accepted without question?

I am still waiting for USGS to provide the discharge equations for the two gage sites on Rainbow River. These may address some of the other concerns I have regarding flows.
In addition I have comments regarding the analysis of water quality data, fish data and floodplain habitat which I will address later.

Regarding Crystal River Kings Bay Review tomorrow, what is the room location at the Brooksville Office, I hope to be able to attend in person.

Martyn

Attachment: Rainbow Field Measurement Comparison by Martyn Johnson

As mentioned in a previous e-mail I was awaiting information from USGS regarding Rainbow River. I have received part of the information which helps me address some of the concerns I have.

Stage Records at Gage Site 02313098

From Rainbow River Appendix C page 3-4
Quote
USGS 02313098 Rainbow River near Dunnellon, Florida, as listed in Table 3-1 and presented in Figure 3-1, was recently installed upstream of a rocky shoal by USGS in 2013. However, review of the stage records provided at this gage suggests that the vertical datum of 27 ft-NAVD appears to be inappropriate when compared with the stage data collected at other river sites. Therefore, the stage data at this short-term

USGS gage will be excluded from the subsequent model calibration and verification.
End Quote
It is disappointing that the consulting firm simply chose to ignore the data as it did not 'fit'. A professional approach would have been to make a few simple enquiries.
This is what I received from USGS
Quote
1. The datum listed on NWISWeb for 02313098 was not correct. I don't know how that number got entered or where it came from, but it was definitely wrong. That has been corrected now and the correct datum is 22.72 ft above NAVD '88.
End Quote

Furthermore, to then use this new Gage Site be identified in Rules for the MFL (Draft Report Page 92).

Use Of USGS data to support the model development

Fault 1
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Fault 2
In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report.
The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy). Specifically I have taken the Field Measurements (compared in the attached xls file) as the most accurate as these are in river measurements and not subject to the potential inaccuracies of calculated discharge derived from well level. Although I would add the agreement between Field Measurements and Calculated Discharge for 02313100 over the years is remarkably good.

The HEC RAS Model is constructed to look good not to be of any real value. The foundation is faulty(see faults above) and the mathematical manipulation of data such as analysis of Discharge at Rainbow River 02313100 and the Stage at Withlacoochee 02313200 (see page 62 and onward in the Draft Report) are the source of hypothetical estimates which are even questioned in Section 6.2.3 Sources of Uncertainty. Please note my highlighted sentence above; did anyone compare this data/look at the accuracy of the discharge data; there are some 700 Field Measurements of discharge with half of them since 1965 which cover the time period mentioned in 6.1 Page 59 of the Draft Report.

Zero or reverse flow

From Rainbow River Appendix C Page 4-9

Quote
For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stageflow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.
End Quote

Let me first address the 'field observations of severe backwater effects (zero or reverse flow)', I would like to get a statement from the observer(s) of when and where this zero or reverse flow was witnessed. Was reverse flow really witnessed at the CR 484 bridge? This must have been quite a sight, but I have serious doubts this can be substantiated,

Now to "This conclusion is also supported by USGS gage data". All the actual data I have reviewed shows the stage at the gage site 02313100 (Rainbow River) is always higher than the site 02313200 (Withlacoochee). My review initially focused on the extreme high and low stage as presented (best estimate from graph) in Figure 3-6 (the high in mid 2005 of about 28.7 ft and the low in mid 2012 of about 25.8 ft).
Withlacoochee high on August 8, 2005 was 29.22 ft Rainbow River was 29.63 ft
Withlacoochee low on May 13, 2012 was 26.53 ft Rainbow River was 26.72 ft
These and numerous others I checked always had Rainbow River higher than Withlacoochee.

As far as I can see the only possible explanation for the quoted statement is some mathematical manipulation of data, which is not supported by any actual data. I am open to a factual explanation.

Martyn

Staff response: Please see our comment above regarding this email.

Attachment: Rainbow Field Measurement Comparison by Martyn Johnson

Rainbow River Newer Gage Site 2313098 Field Measurements cfs			Rainbow River Older Gage Site 2313100 Field Measurements cfs			Difference	Percentage Difference
10/6/2016 10:30	USGS	609	10/6/2016 13:46	USGS	660	51	8%
9/14/2016 16:53	USGS	608					
9/14/2016 16:09	USGS	601					
9/14/2016 15:16	USGS	622					
9/14/2016 13:58	USGS	630					
9/14/2016 12:44	USGS	625					
8/11/2016 12:50	USGS	590	8/12/2016 10:36	USGS	575	-15	-3%
6/16/2016 13:50	USGS	581	6/16/2016 16:33	USGS	569	-12	-2%
4/14/2016 11:14	USGS	580	4/14/2016 14:05	USGS	601	21	3%
2/11/2016 11:11	USGS	590	2/11/2016 15:01	USGS	604	14	2%
12/3/2015 11:28	USGS	640	12/3/2015 14:47	USGS	652	12	2%
10/8/2015 14:08	USGS	644	10/8/2015 17:55	USGS	661	17	3%
10/8/2015 12:57	USGS	643				18	
8/11/2015 10:49	USGS	680	8/11/2015 15:19	USGS	660	-20	-3%
6/1/2015 14:44	USGS	598	6/1/2015 10:56	USGS	599	1	0%
4/1/2015 9:07	USGS	642	4/1/2015 13:49	USGS	625	-17	-3%
2/3/2015 15:12	USGS	685	2/3/2015 11:26	USGS	676	-9	-1%
2/3/2015 14:37	USGS	698	2/3/2015 10:23	USGS	636	-62	-10%
12/9/2014 10:25	USGS	632	12/8/2014 12:44	USGS	643	11	2%
10/14/2014 11:57	USGS	689	10/14/2014 9:24	USGS	722	33	5%
8/19/2014 9:35	USGS	638	8/18/2014 13:15	USGS	640	2	0%
			8/18/2014 12:21	USGS	654		
6/2/2014 15:03	USGS	707	6/2/2014 11:28	USGS	731	24	3%
6/2/2014 14:14	USGS	755	6/2/2014 10:49	USGS	735	-20	-3%
3/31/2014 14:58	USGS	702	3/31/2014 11:00	USGS	734	32	4%
3/31/2014 14:03	USGS	744				-10	
2/10/2014 16:35	USGS	634	2/10/2014 12:29	USGS	645	11	2%
2/10/2014 15:46	USGS	663					
12/9/2013 12:56	USGS	629	12/9/2013 16:17	USGS	595	-34	-6%

Martyn:

I'm writing in response to your recent email to Kym Holzwart.

Requests for new water use permits and permit renewals will continue to be evaluated by the District's Regulation Division relative to statutory and rule guidelines to determine if the requested use of water is reasonable and beneficial, does not interfere with any presently existing legal use of water, and is consistent with the public interest. These evaluations include, among other considerations, assessing the effects of a requested withdrawal on established minimum flows and levels. Because groundwater withdrawal effects on specific water bodies are dependent upon the magnitude of the withdrawal, local geologic and hydrologic conditions, and proximity of the withdrawal point or points to water bodies with established minimum flows and levels, the District has not identified a withdrawal rate associated with "capping" water withdrawals within the District. Specific to the Rainbow River System, we note that current withdrawal rates and those based on projected water-use demand for the next 20-year planning horizon are not expected to cause the proposed minimum flow to be exceeded.

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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, January 18, 2017 9:32 AM
To: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Capping Rainbow Watershed Groundwater Withdrawals

The following is from the Districts Responses to the Peer Review Panels Report (page 9 from numbering I see)
"Based on the data and analyses performed to date, there is no basis for capping withdrawals at current levels, or at a level different than what has been proposed."

As the author and presenter to the Board, can you specify what the proposed figure is for capping withdrawals.
Or, put another way what is the limit at which pumping will be 'capped' as million gallons per day average month/day/year gallons and the peak daily gallons if that has been considered.

The Board may be interested to clearly understand this.

Martyn

Response to Paul Marraffino:

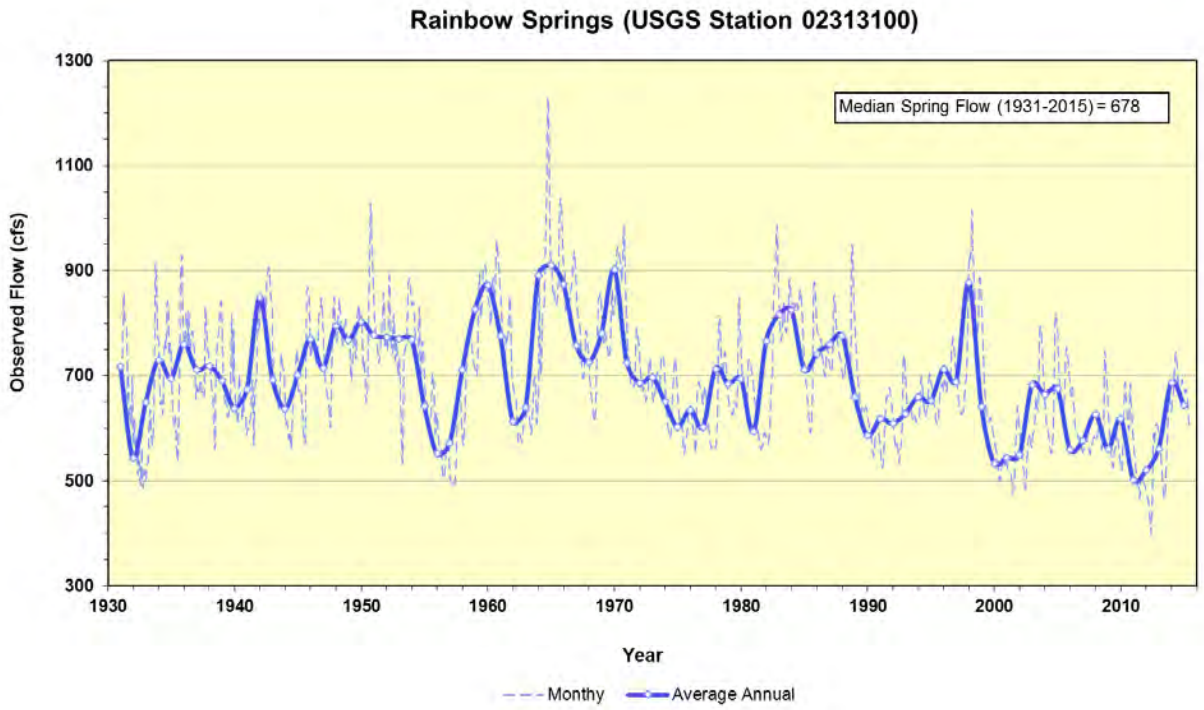
The MFL is set to protect a system from the impacts of groundwater withdrawals. Monitoring shows the water level trend in the aquifer since 1990 has remained stable, therefore, the District is confident the post-2000 flow anomaly is not due to groundwater withdrawal.

The draft minimum flow report for the Rainbow River System and supplemental information provided to the Peer Review Panel offers detailed evidence that the post-2000 flow changes in the river are not related to groundwater withdrawals. That supplemental information includes the description of the hydrogeology, measured water level data, springshed delineation through time, groundwater withdrawn within the springshed and region, and numerical modeling. However, the District understands this is an important issue and will study the 2000 flow anomaly during the re-evaluation planned for the river system. Also, to assist in this reevaluation, the District recently funded the installation of another flow measuring station closer to the headsprings.

The District's approach to MFLs development and monitoring for the Rainbow River System involves assessing change in the long-term average flow because it's largely a groundwater driven system. Assessments of whether the river flows are meeting the minimum flow requirement are made primarily through use of numerical models and water budget analyses.

If the median flow is 678 cfs for the 80-year period of record, then based on statistics alone, half the time flows would be above 678 cfs and half the time flows would be below this flow rate. Please note, springflow has been low in the past unrelated to groundwater withdrawals (see attached figure). For example, in August and October of 1932 Rainbow Springs flow was 487 and 492 cubic feet per second (cfs), respectively. And in April and May of 1957, reported flows ranged from 487 to 490 cfs.

If withdrawals cause the flows for the Rainbow River to fall below the established minimum flow, or if the withdrawals are expected to cause the flow to fall below the minimum flow during the next twenty years, the District develops and implements a recovery or prevention strategy (Chapter 40D-80, F.A.C.), in accordance with state law (Chapter 373.0421, Florida Statutes). Development of a recovery or prevention strategy is not currently warranted because the proposed minimum flow for the Rainbow River System is being met and is projected to be met based on 20-year water use demand estimates.


Rainbow Springs (USGS Station 02313100)
Median Spring Flow (1931-2015) = 678
Observed Flow (cfs)
1300
1100
900
700
500
300
1930
1940
1950
1960
1970
1980
1990
2000
2010
Year
Monthy
Average Annual

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, January 21, 2017 8:36 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>
Subject: Re: Inquiries - Rainbow River minimum flows

Crossed my mind that there is a possibility not all cc's saw the staff responses I am referring to.

For those who wrote/agreed the responses I would encourage you to take another look and share some specifics. I really do not enjoy having to question/correct inaccuracies; it is much more beneficial if you are given a chance to reconsider.

Take a look at the data from 02313100 (the long established gage) from August 1, 2016 thru December 31, 2016 and take a wag at explaining it.

There is another USGS Field Measurement 2016-12-07 @ 13:36. Compare that and all the others in the xls sheet with gage 02313100 reported discharges.
Your thoughts about which data is more accurate may help you make a point. Possibly a field visit next time USGS people plan on a Field Measurement would help your understanding of the great work they do. USGS do have a well planned schedule so it would not be difficult for you to coordinate.

The real interesting one is the nitrate-nitrogen...just maybe the increase from 1.70 August 1 to 1.82 December 31 results from rain taking more nitrates into the upper parts of the aquifer than during the dry period going back to April May. SWIM Team may be interested.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Friday, January 20, 2017 7:49 AM
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross.Morton@WaterMatters.org
Subject: Re: Inquiries - Rainbow River minimum flows

I will respond to these Staff Responses specifically as time permits.

However, let me summarize by hoping these responses are not all like the one suggesting there were occasions when the water level at the Withlacoochee Site 02313200 was 2-4 feet higher than the Rainbow River Site 02313100.
These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Thursday, January 19, 2017 12:10 PM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile
Subject: Inquiries - Rainbow River minimum flows

Martyn:

Attached file includes a number of your emails (with associated email strings) concerning the proposed minimum flow for the Rainbow River System and also includes staff responses that are highlighted in blue.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, January 21, 2017 7:34 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Sky Notestein <Sky.Notestein@swfwmd.state.fl.us>; Chris Anastasiou <Chris.Anastasiou@swfwmd.state.fl.us>
Subject: Re: Response to meeting invitation for Jan 23

Doug,
Thanks for the response.
Appreciate the info about Mike; I trust he is as healthy as age permits and enjoying retirement.

I completely agree this 'coffee conversation' should be brief and to the point ;
Why do you (individually) think Kings Bay Springs are different/unique (max 3 minutes per person).

You know my opinion or I would not be asking the question. But, just in case someone on the list has not been so closely involved;
In summary, I think the model is wrong. There is no evidence to support the magnitude of discharge variation thru a tidal change as the model predicts.

This is your chance to make me question my thought thru a logical explanation; Kings Bay Springs are different because...

I will be there at 9:00 or shortly before and will leave latest 9:55 am.

Look forward to hearing from you all in person or brief e-mail.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Friday, January 20, 2017 3:56 PM
To: martynellijay@hotmail.com
Cc: Gabe I. Herrick; Ron Basso; Xinjian Chen; Melissa Gulvin; Ross Morton; Kurt Fritsch; Sky Notestein; Chris Anastasiou
Subject: Response to meeting invitation for Jan 23

Martyn:

I can meet with you in the District cafeteria prior to 10:00 am on Monday, January 23rd. Please note that I have another meeting scheduled for Monday morning from 10:00 to 11:30 am, so I would have to wrap-up our meeting by about 9:55 am. Please note also that XinJian Chen is on vacation through the early part of February and will therefore not be available to discuss any issues you may have. That's unfortunate as it seems to me that many of your questions are associated with modeling concerns. I also know for sure that Chris Anastasiou cannot participate as he has jury duty on Monday. In addition, Mike Heyl definitely won't be available – he has retired from the District.

Assuming you still plan on traveling to Brooksville, let me know whether you still plan to arrive at 9:00 am. I'll forward any response from you to those copied on your original email (with the exception of Mike Heyl) so they can determine whether they can participate in the planned meeting.

Doug Leeper
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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, January 19, 2017 8:22 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Xinjian Chen <Xinjian.Chen@swfwmd.state.fl.us>; Gabe I. Herrick <Gabe.Herrick@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Mike Heyl <mike.heyl@swfwmd.state.fl.us>; Sky Notestein <Sky.Notestein@swfwmd.state.fl.us>; Chris Anastasiou <Chris.Anastasiou@swfwmd.state.fl.us>
Subject: Why are Kings Bay Springs different? Monday 9:30 am January 23 coffee, donuts, cookies

My e-mails are often long and detailed, in the weeds you may say.
Today and thru the weekend I would encourage you individually to forget about the devil in the detail and to cogitate the following:
What makes Kings Bay Springs so unique that discharges change in some springs two fold from high tide to low tide and other springs more like a hundred fold?
Other springs in the area such as Chassahowitzka and Homosassa do not exhibit changes anyway near this magnitude.
I believe that many ideas and answers come from coffee machine conversations. Consequentially, I hope to discuss your thoughts and ideas from your weekend cogitations by planning to be in the Brooksville Office Cafeteria about 9:30 am Monday January 23. I will be there from 9:00-10:00 with donuts and cookies (I assume the caferteria is open for coffee at that time) and will pay for coffee.
Martyn
The following points may be helpful to frame your thoughts and the discussion. If you are not available you can return your thoughts/ideas by e-mail.

1. Do I agree the discharges vary as per the District Model. Yes or No.

2. I think Kings Bay Springs are different to other springs in the area because….

3. I think there is some tidally related variation in Kings Bay springs discharge which is:
   a) a little less,
   b) about half or,
   c) much less,
   than the District Model predicts.
4. I have had doubts about the changes such as 0 cfs to 250 cfs for G2 springs, but consider model data the best available. Yes or No.

Martyn:

I'm responding today to your comment on a response included on page 4 of the January 19, 2017 staff responses to an older email you sent concerning flows in the Rainbow River. We took another look at the reported stage data for the Withlacoochee River at Dunnellon, FL (no. 02313200) and Rainbow River at Dunnellon, FL (no. 02313100) sites and note that the stage is lower at the Withlacoochee River site for all paired records collected between 2005 and 2016. We misaligned the stage data for the two sites in our original spreadsheet and calculated incorrect differences between the two records. Seems that as you did, we should have questioned the large stage differences (up to 4 feet) that we identified in our response. Thanks for catching our mistake.

With regard to your inquiry concerning the reported observations of no flow or negative flow in the lower Rainbow in the ECT, Inc. HEC-RAS modeling report, we've contacted an author of the report to discuss the origin of the observations. I'll keep you apprised of what we learn about this issue.

Finally, thanks for the good discussion on the Crystal MFLs this past Monday and thanks for noticing my jacket and giving it to the District receptionist.

Doug Leeper
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1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, January 20, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton Ross.Morton@swfwmd.state.fl.us
Subject: Re: Inquiries - Rainbow River minimum flows

I will respond to these Staff Responses specifically as time permits.

However, let me summarize by hoping these responses are not all like the one suggesting there were occasions when the water level at the Withlacoochee Site 02313200 was 2-4 feet higher than the Rainbow River Site 02313100.
These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

Martyn:

Following discussion of the reported observations of no flow or negative flow in the lower Rainbow in the 2015 ECT, Inc. HEC-RAS modeling report, ECT, Inc. has revised the report by deleting the last sentence of paragraph 4 on page 4-9 that referenced the observed "zero or reverse flows."

Thanks for bringing our attention to this issue.

Doug Leeper
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Southwest Florida Water Management District
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352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, January 25, 2017 8:30 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Withlacoochee-Rainbow stage differences

Doug,
Thanks for looking into this. No problem.
I trust all the staff responses in that same e-mail are carefully reconsidered as well as the follow up with ETC.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Tuesday, January 24, 2017 2:43 PM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton
Subject: Withlacoochee-Rainbow stage differences

Martyn:

I'm responding today to your comment on a response included on page 4 of the January 19, 2017 staff responses to an older email you sent concerning flows in the Rainbow River. We took another look at

the reported stage data for the Withlacoochee River at Dunnellon, FL (no. 02313200) and Rainbow River at Dunnellon, FL (no. 02313100) sites and note that the stage is lower at the Withlacoochee River site for all paired records collected between 2005 and 2016. We misaligned the stage data for the two sites in our original spreadsheet and calculated incorrect differences between the two records. Seems that as you did, we should have questioned the large stage differences (up to 4 feet) that we identified in our response. Thanks for catching our mistake.

With regard to your inquiry concerning the reported observations of no flow or negative flow in the lower Rainbow in the ECT, Inc. HEC-RAS modeling report, we've contacted an author of the report to discuss the origin of the observations. I'll keep you apprised of what we learn about this issue.

Finally, thanks for the good discussion on the Crystal MFLs this past Monday and thanks for noticing my jacket and giving it to the District receptionist.

Doug Leeper
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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, January 20, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton Ross.Morton@swfwmd.state.fl.us
Subject: Re: Inquiries - Rainbow River minimum flows

I will respond to these Staff Responses specifically as time permits.

However, let me summarize by hoping these responses are not all like the one suggesting there were occasions when the water level at the Withlacoochee Site 02313200 was 2-4 feet higher than the Rainbow River Site 02313100.
These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

Additional Comment on MFL for Rainbow River System

Thank you for your response to my email comment of January 18, 2017 regarding the Draft Proposed MFL for the Rainbow River System. Your attached MS Word document detailed the water district's position on the MFL process. The reference to the Florida Statute 373.041 was helpful in pointing me to the statute location for the legal basis for MFL requirements.

I am uncomfortable with some of the response in your note and also the conclusion.

First, the 2016 MFL draft document clearly states in paragraph 2.3 and figure 2.8 that the average annual flow of the Rainbow Springs is 694 cfs. Yet paragraph 3 of the response letter posits "If the medium flow is 678 cfs for the 80 year period of record ..." Both the Draft Report and the response refer to the same gauge on the CR 484 bridge and the same period of history. It appears that the draft report average flow data is being changed from 694 cfs to 678 cfs without an explanation.

Second, it is my understanding that the proposed MFL threshold level has been updated to be 5% below the historic average. This would imply an MFL of 659 cfs for the Rainbow River System.

Florida Statute 373.0421 Establishment and implementation of minimum flows and minimum water levels states:

"(2) If, at the time a minimum flow or minimum water level is initially established for a water body pursuant to s. 373.042 or is revised, the existing flow or water level in the water body is below, or is projected to fall within 20 years below, the applicable minimum flow or minimum water level, the department or governing board, as part of the regional water supply plan described in s. 373.709, shall concurrently adopt or modify and implement a recovery or prevention strategy."

Using the USGS web site, the annual median springflow for the 20 year period 1997 to 2016 has been recorded and is shown in the table below. The data shows that 15 of the last 20 years have had annual flows less than the 659 cfs MFL threshold level. In addition 9 of the last 10 years have had flows below the MFL Level. The data has also been sorted from highest to lowest and shows that the median value would be 622.35 cfs, well below the MFL level.

Both the *average* and *median* annual flow levels for the last 20 years are below the proposed minimum flow levels of the Rainbow River System. The statement that "the minimum flow for the Rainbow River System is being met" does not seem credible. At this time The Southwest Florida Water Management District should start a Recovery or Preventions Strategy Program per Chapter 373.0421.

Paul Marraffino
2/28/17

Rainbow River Flow as measured at USGS gage (02313100)

694	Annual median springflow from 1929 to 2014*
659.3	Proposed Annual Minimum Flow and Level (MFL) 5% reduction

20 Year Period		cfs	Flow (cubic feet per second)		Sorted by flow level		
1	1997	688.8	Red values are below	1	1997	688.8	
2	1998	878.3	proposed MFL	2	2005	693.3	
3	1999	641.5		3	1998	878.3	
4	2000	533.3		4	2003	683.3	
5	2001	543.6		5	2014	687	
6	2002	548.4		6	2013	561.3	
7	2003	683.3		7	2004	648.5	
8	2004	648.5		8	2015	643.8	
9	2005	693.3		9	1999	641.5	
10	2006	604.6		10	2008	626.4	
11	2007	574.8		11	2010	618.3	
12	2008	626.4		12	2006	604.6	
13	2009	561		13	2016	576.6	
14	2010	618.3		14	2007	574.8	
15	2011	502.1		15	2009	561	
16	2012	520		16	2002	548.4	
17	2013	561.3		17	2001	543.6	
18	2014	687		18	2000	533.3	
19	2015	643.8		19	2012	520	
20	2016	576.6		20	2011	502.1	
		616.745	Average			622.35	Median

* Draft - Recommended Minimum Flow for the Rainbow River System page 22, and Figure 2-8
Principle author Kym Rouse Holzwart

Source USGS web site

pvm 1-28-17

https://waterdata.usgs.gov/nwis/annual?referred_module=sw&search_site_no=02313100&format=sites_selection_links

Doug et al,
Deleting the sentence may remove the 'field observation' reference from the report, but it also removes the conclusion being supported by USGS gage data, leaving Figure 4-9 unsupported. I have copied the paragraph wording at the end of this e-mail for ease of reference by others; sentence highlighted.

May be the intent is to remove only the wording about field observation (witness no longer available). So this leaves me to ask where is the USGS gage data that supports the conclusion of a backwater effect?
Possibly this phenomena of backwater effect is only in the model.
The Peer Review Panel also appear to have some reservations about backwater effects commenting; Quotes

- The effects of backwater on Rainbow River flows during high flow conditions on the Withlacoochee River and resulting rating-curve development issues should be investigated.
- Confounding the estimates of flow is a transient discharge rating and backwater effects from the Withlacoochee River. For this reason, it is recommended that the stability of the discharge rating and effects of backwater on rating-curve development be investigated (e.g. German, 2009).
- The stability of the discharge rating is essential to both the analysis and interpretation of the hydrologic record and its proper application of the biological and environmental criteria.
- The description of the use of the PHABSIM model is clear; however, more information should be presented to justify use of the weighting values associated with backwater conditions. .End Quotes

How often do backwater conditions occur?
Comparison of stage at the two USGS Gage Stations does not show dates when this backwater effect occurs. Unless I am missing something the backwater effect occurs only when there is a higher water level in the Withlacoochee than in the Rainbow River. Exactly when is this?

I am assuming the 450 days mentioned in an earlier e-mailed Staff Response is in error for the same reason the 2-4 ft was.
Staff response: Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

The model appears to rely heavily on regression analyses trying to find a relationship between flow records in the Rainbow River (02313100) and stage at the bridge over the Withlacooche (USGS 02313200). It appears to me that these are largely independent. If there were gage heights and flow data a comparable distance upstream, of the confluence, in the Withlacoochee an interdependent relationship could be considered.

I will comment on the other Staff Responses in that same pdf file, but the writer(s) may want to check expected accuracy of field measurements in the Rainbow River with USGS. I think +- 3% would be considered good. Also, the writer(s) should spend some time considering hurricane Hermine and how its influence was manifested in flows in the Rainbow River and the level in Rainbow Well....timing.

Martyn

Wording page 4-9 ETC Report

For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stage flow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.

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Sent: Friday, January 27, 2017 8:53 AM
To: Alan Martyn Johnson
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: RE: Withlacoochee-Rainbow stage differences

Martyn:

Following discussion of the reported observations of no flow or negative flow in the lower Rainbow in the 2015 ECT, Inc. HEC-RAS modeling report, ECT, Inc. has revised the report by deleting the last sentence of paragraph 4 on page 4-9 that referenced the observed “zero or reverse flows.”

Thanks for bringing our attention to this issue.

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Subject: Re: Inquiries - Rainbow River minimum flows

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These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

I hope you are carefully considering the concerns I raised in my e-mail Monday about the backwater effect, which prominently features in the Draft Rainbow River MFL. My concerns were originally mentioned in my November 14, 2016 e-mail albeit not as specifically as this week.

November 14, 2016 I sent you some questions about the Rainbow MFL Report. There were a lot of questions/comments, but the answers I received as Staff Responses indicated a steadfast belief all was just fine with the Rainbow MFL Report. When you finally recognized how far off the mark some of the answers were, it appears there was a belief that removing a sentence from the ETC Report was going to solve the issue of backwater effect. Please keep me informed regarding thoughts you may have on the reality of the backwater effect.

I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment.
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading up to Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.

Also in the January 19 Staff Response to my November 14 questions/concerns:

My comment.
In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report. The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy).

Staff response: Field measurements are considered instantaneous records and are most appropriately compared among sites with field measurements taken at the same time. Unfortunately, the field measurements you provided for USGS site number 2313098 and 2313100

(in an Excel file provided as an email attachment and reproduced below) were not collected at the same time and we note that examination of the data indicates substantial variation in flow at individual sites on some dates, indicating that flow variation within a day may be rather large. For example, on 09/14/2016, the flows varied from 601 to 630 cfs within two hours at USGS site number 023132098 (based on the Excel file your provided as an email attachment). Similarly, the flow varied from 707 to 755 cfs on 6/2/2014 within one hour and from 702 to 744 cfs within one hour on 3/31/2014. Further, if you average the field measurements taken on 09/14/2016 at site number 2313098 and compare the resultant average value to the reported daily flow at USGS site number 02313100, the percentage difference is 15%. Similarly, if you compare the 10/6/2016 field measurement at USGS site number 023132098 with reported daily value at USGS site number 02313100, the difference is 16%. We therefore conclude that although there are no simultaneously collected field measurements for the two sites that can be used for direct comparison, the good agreement between HEC-RAS simulated observed stage data in the vicinity of the USGS site number 023132098 indirectly confirms that the 85% percent flow attribution to the site in question is appropriate.

The responder(s) appear to need to spend some time reconsidering this response. I did provide some food for thought in my earlier e-mail (what accuracy can be expected in field measurements of 700 cfs and how quickly does the Rainbow Well react to events such as Hermine cf the water getting into the aquifer and karst channels feeding the springs).

HEC-RAS simulations are derived from the inputs including data in Table 2-3 and 2-2, some of which was developed by ""linear interpolation"" (last sentence page 2-8 Appendix C). I think it was those words that raised the red flag for me and made me look further. Somehow USGS field measurement data from 02313098 escaped notice by the consultant and the responder(s). Please note field measurement data was the source of flow data for the four other USGS sites; they were not taken at the same time (see first sentence of the Staff Response). Very disappointing.

May be a whoops, sorry we did not catch that when resorting to linear interpolation at the time the model was being developed.

I would suggest with about 100 cfs entering the river upstream of 02313098 will make a significant difference in the HEC-RAS model compared to this flow being added downstream in the model.

There appear to be a number of errors in the HEC-RAS model development that may require the Draft Report to be recalled. It is your reputation. Mine, the responder(s) has (have) clearly addressed by the steadfast belief 'they are right' and I am wrong. Please reconsider.

Martyn

Martyn:

Please see our responses to your January 30th inquiries concerning HEC-RAS modeling for the Rainbow River System. The responses are imbedded in your email below and are presented in italics and highlighted in gray.

Doug Leeper
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Subject: Re: Withlacoochee-Rainbow Witness no longer available

Doug et al,
Deleting the sentence may remove the 'field observation' reference from the report, but it also removes the conclusion being supported by USGS gage data, leaving Figure 4-9 unsupported. I have copied the paragraph wording at the end of this e-mail for ease of reference by others; sentence highlighted.

May be the intent is to remove only the wording about field observation (witness no longer available). So this leaves me to ask where is the USGS gage data that supports the conclusion of a backwater effect?

Staff Response (2/3/2017): *When the new USGS gage was installed in 2005 near RS 3.33, upstream of the rock shoal, District and USGS staff assumed that this site is high enough to not be subject to substantial backwater impacts from the Withlacoochee River. Downstream of the site is, however, assumed to be impacted by backwater from the Withlacoochee River. In their original 2010 HEC-RAS modeling report, ECT, Inc. cited this assumption in support of Figure 4-9. As we have noted previously, the last sentence of paragraph 4 on page 4-9 in the 2010 modeling that addresses this issue has been deleted from the revised 2017 version of the report. However, this doesn't mean that Site RS 1.36 is not impacted by backwater. The existing section of the 2017 version of the report continues to reference Figure 4-9, which shows stage-flow rating curves for an example site in the river based on HEC-RAS model output data. It is important to note that the water level in Withlacoochee River doesn't necessarily need to be higher than the Rainbow River water level for a backwater effects to occur. Backwater effects*

in the Rainbow River occur when water is held in its course by water in the Withlacoochee River or by any obstructions along the Rainbow river.

Possibly this phenomena of backwater effect is only in the model.
The Peer Review Panel also appear to have some reservations about backwater effects commenting; Quotes

- The effects of backwater on Rainbow River flows during high flow conditions on the Withlacoochee River and resulting rating-curve development issues should be investigated.
- Confounding the estimates of flow is a transient discharge rating and backwater effects from the Withlacoochee River. For this reason, it is recommended that the stability of the discharge rating and effects of backwater on rating-curve development be investigated (e.g. German, 2009).
- The stability of the discharge rating is essential to both the analysis and interpretation of the hydrologic record and its proper application of the biological and environmental criteria.
- The description of the use of the PHABSIM model is clear; however, more information should be presented to justify use of the weighting values associated with backwater conditions. .End Quotes

How often do backwater conditions occur?

Staff Response (2/3/2017): *Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions. The District plans to continue to study factors that may contribute to backwater effects in the Rainbow River System in support of the planned reevaluation of the minimum flows that are to be adopted for the system.*

Comparison of stage at the two USGS Gage Stations does not show dates when this backwater effect occurs. Unless I am missing something the backwater effect occurs only when there is a higher water level in the Withlacoochee than in the Rainbow River. Exactly when is this?

Staff Response (2/3/2017): *The backwater effect in the Rainbow River exists any time when water level in the Withlacoochee River provides resistance to Rainbow flow that elevates water levels in the Rainbow River.*

I am assuming the 450 days mentioned in an earlier e-mailed Staff Response is in error for the same reason the 2-4 ft was.
Staff response: Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS

site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

Staff Response (2/3/2017): *Your assumption is correct.*

The model appears to rely heavily on regression analyses trying to find a relationship between flow records in the Rainbow River (02313100) and stage at the bridge over the Withlacooche (USGS 02313200). It appears to me that these are largely independent. If there were gage heights and flow data a comparable distance upstream, of the confluence, in the Withlacoochee an interdependent relationship could be considered.

Staff Response (2/3/2017): *The regression equation was not used to "try" to find a relationship between flow records in the Rainbow River and the stage at USGS station 02313200. The regression is based on flow records in the Rainbow River and stage at USGS station 02313200 as independent variables to simulate the stage at USGS station 02313100. This was required because the observed USGS stage data at 02313100 is impacted by backwater from Withlacoochee River and cannot be used as input into the HEC-RAS model. Even if there were stage data upstream of the confluence, the stage-flow rating curve at station 02313100 is required in the HEC-RAS model as a boundary condition.*

I will comment on the other Staff Responses in that same pdf file, but the writer(s) may want to check expected accuracy of field measurements in the Rainbow River with USGS. I think +- 3% would be considered good. Also, the writer(s) should spend some time considering hurricane Hermine and how its influence was manifested in flows in the Rainbow River and the level in Rainbow Well....timing.

Martyn

Wording page 4-9 ETC Report

For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stage flow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.

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Doug,
Thanks for looking into this. No problem.
I trust all the staff responses in that same e-mail are carefully reconsidered as well as the follow up with ETC.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Tuesday, January 24, 2017 2:43 PM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton
Subject: Withlacoochee-Rainbow stage differences

Martyn:

I'm responding today to your comment on a response included on page 4 of the January 19, 2017 staff responses to an older email you sent concerning flows in the Rainbow River. We took another look at the reported stage data for the Withlacoochee River at Dunnellon, FL (no. 02313200) and Rainbow River at Dunnellon, FL (no. 02313100) sites and note that the stage is lower at the Withlacoochee River site for all paired records collected between 2005 and 2016. We misaligned the stage data for the two sites in our original spreadsheet and calculated incorrect differences between the two records. Seems that as

you did, we should have questioned the large stage differences (up to 4 feet) that we identified in our response. Thanks for catching our mistake.

With regard to your inquiry concerning the reported observations of no flow or negative flow in the lower Rainbow in the ECT, Inc. HEC-RAS modeling report, we've contacted an author of the report to discuss the origin of the observations. I'll keep you apprised of what we learn about this issue.

Finally, thanks for the good discussion on the Crystal MFLs this past Monday and thanks for noticing my jacket and giving it to the District receptionist.

Doug Leeper
MFLs Program Lead
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2379 Broad Street
Brooksville, FL 34609
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352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, January 20, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton Ross.Morton@swfwmd.state.fl.us
Subject: Re: Inquiries - Rainbow River minimum flows

I will respond to these Staff Responses specifically as time permits.

However, let me summarize by hoping these responses are not all like the one suggesting there were occasions when the water level at the Withlacoochee Site 02313200 was 2-4 feet higher than the Rainbow River Site 02313100.
These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

Doug,
Thanks for relaying these responses.

Be it severe or substantial backwater effects this conclusion is not supported with any data. Only a few e-mails ago Staff Response was using USGS data to support the 'conclusion', but as we now know, somehow the data got mis-aligned.

The new USGS Gage Station was not installed in the year indicated from the information I have, District and USGS 'assumptions' are just that until proven. Wording I have from USGS do not appear to support them making any assumption. They talk of negative slope. for a back water effect.

I do not find a 2010 ECT 'original' report; the only one I have is from the Appendix C which is September 25, 2015.

I will look further for the *USGS Scientific Investigations Report 2009-45124,* it was not found on a Google Search, but I will look in the USGS on-line reports.

Bottom line...no evidence of backwater effect, substantial or otherwise.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Friday, February 3, 2017 2:55 PM
To: Alan Martyn Johnson
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Response to 2017-01-30 email on Rainbow HEC-RAS

Martyn:

Please see our responses to your January 30th inquiries concerning HEC-RAS modeling for the Rainbow River System. The responses are imbedded in your email below and are presented in italics and highlighted in gray.

Doug Leeper
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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, January 30, 2017 7:53 AM

To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Withlacoochee-Rainbow Witness no longer available

Doug et al,
Deleting the sentence may remove the 'field observation' reference from the report, but it also removes the conclusion being supported by USGS gage data, leaving Figure 4-9 unsupported. I have copied the paragraph wording at the end of this e-mail for ease of reference by others; sentence highlighted.

May be the intent is to remove only the wording about field observation (witness no longer available). So this leaves me to ask where is the USGS gage data that supports the conclusion of a backwater effect?

Staff Response (2/3/2017): *When the new USGS gage was installed in 2005 near RS 3.33, upstream of the rock shoal, District and USGS staff assumed that this site is high enough to not be subject to substantial backwater impacts from the Withlacoochee River. Downstream of the site is, however, assumed to be impacted by backwater from the Withlacoochee River. In their original 2010 HEC-RAS modeling report, ECT, Inc. cited this assumption in support of Figure 4-9. As we have noted previously, the last sentence of paragraph 4 on page 4-9 in the 2010 modeling that addresses this issue has been deleted from the revised 2017 version of the report. However, this doesn't mean that Site RS 1.36 is not impacted by backwater. The existing section of the 2017 version of the report continues to reference Figure 4-9, which shows stage-flow rating curves for an example site in the river based on HEC-RAS model output data. It is important to note that the water level in Withlacoochee River doesn't necessarily need to be higher than the Rainbow River water level for a backwater effects to occur. Backwater effects in the Rainbow River occur when water is held in its course by water in the Withlacoochee River or by any obstructions along the Rainbow river.*

Possibly this phenomena of backwater effect is only in the model.
The Peer Review Panel also appear to have some reservations about backwater effects commenting; Quotes

- The effects of backwater on Rainbow River flows during high flow conditions on the Withlacoochee River and resulting rating-curve development issues should be investigated.
- Confounding the estimates of flow is a transient discharge rating and backwater effects from the Withlacoochee River. For this reason, it is recommended that the stability of the discharge rating and effects of backwater on rating-curve development be investigated (e.g. German, 2009).
- The stability of the discharge rating is essential to both the analysis and interpretation of the hydrologic record and its proper application of the biological and environmental criteria.
- The description of the use of the PHABSIM model is clear; however, more information should be presented to justify use of the weighting values associated with backwater conditions. .End Quotes

How often do backwater conditions occur?

Staff Response (2/3/2017): *Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions. The District plans to continue to study factors that may contribute to backwater effects in the Rainbow River System in support of the planned reevaluation of the minimum flows that are to be adopted for the system.*

Comparison of stage at the two USGS Gage Stations does not show dates when this backwater effect occurs. Unless I am missing something the backwater effect occurs only when there is a higher water level in the Withlacoochee than in the Rainbow River. Exactly when is this?

Staff Response (2/3/2017): *The backwater effect in the Rainbow River exists any time when water level in the Withlacoochee River provides resistance to Rainbow flow that elevates water levels in the Rainbow River.*

I am assuming the 450 days mentioned in an earlier e-mailed Staff Response is in error for the same reason the 2-4 ft was.
Staff response: Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

Staff Response (2/3/2017): *Your assumption is correct.*

The model appears to rely heavily on regression analyses trying to find a relationship between flow records in the Rainbow River (02313100) and stage at the bridge over the Withlacooche (USGS 02313200). It appears to me that these are largely independent. If there were gage heights and flow data a comparable distance upstream, of the confluence, in the Withlacoochee an interdependent relationship could be considered.

Staff Response (2/3/2017): *The regression equation was not used to "try" to find a relationship between flow records in the Rainbow River and the stage at USGS station 02313200. The regression is based on flow records in the Rainbow River and stage at USGS station 02313200 as independent variables to simulate the stage at USGS station 02313100. This was required because the observed USGS stage data at 02313100 is impacted by backwater from Withlacoochee River and cannot be used as input into the HEC-RAS model. Even if there were stage data upstream of the confluence, the stage-flow rating curve at station 02313100 is required in the HEC-RAS model as a boundary condition.*

I will comment on the other Staff Responses in that same pdf file, but the writer(s) may want to check expected accuracy of field measurements in the Rainbow River with USGS. I think +- 3% would be considered good. Also, the writer(s) should spend some time considering hurricane Hermine and how its influence was manifested in flows in the Rainbow River and the level in Rainbow Well....timing.

Martyn

Wording page 4-9 ETC Report

For example at the river site Veg 1 at RS 1.36 (Figure 3-1), review of the resultant stage flow rating curves in Figure 4-9 suggests the stage in Withlacoochee River is the major factor controlling the water surface elevations at this site. This conclusion is also supported by the historic USGS gage data as well as the field observations of the severe backwater effects (zero or reverse flow) from the downstream Withlacoochee River, particularly in the river segment downstream of the rocky shoal near RS 3.10.

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Friday, January 27, 2017 8:53 AM
To: Alan Martyn Johnson
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: RE: Withlacoochee-Rainbow stage differences

Martyn:

Following discussion of the reported observations of no flow or negative flow in the lower Rainbow in the 2015 ECT, Inc. HEC-RAS modeling report, ECT, Inc. has revised the report by deleting the last sentence of paragraph 4 on page 4-9 that referenced the observed “zero or reverse flows.”

Thanks for bringing our attention to this issue.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
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Brooksville, FL 34609
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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, January 25, 2017 8:30 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch

<Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Withlacoochee-Rainbow stage differences

Doug,
Thanks for looking into this. No problem.
I trust all the staff responses in that same e-mail are carefully reconsidered as well as the follow up with ETC.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Tuesday, January 24, 2017 2:43 PM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton
Subject: Withlacoochee-Rainbow stage differences

Martyn:

I'm responding today to your comment on a response included on page 4 of the January 19, 2017 staff responses to an older email you sent concerning flows in the Rainbow River. We took another look at the reported stage data for the Withlacoochee River at Dunnellon, FL (no. 02313200) and Rainbow River at Dunnellon, FL (no. 02313100) sites and note that the stage is lower at the Withlacoochee River site for all paired records collected between 2005 and 2016. We misaligned the stage data for the two sites in our original spreadsheet and calculated incorrect differences between the two records. Seems that as you did, we should have questioned the large stage differences (up to 4 feet) that we identified in our response. Thanks for catching our mistake.

With regard to your inquiry concerning the reported observations of no flow or negative flow in the lower Rainbow in the ECT, Inc. HEC-RAS modeling report, we've contacted an author of the report to discuss the origin of the observations. I'll keep you apprised of what we learn about this issue.

Finally, thanks for the good discussion on the Crystal MFLs this past Monday and thanks for noticing my jacket and giving it to the District receptionist.

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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, January 20, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile

<Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton Ross.Morton@swfwmd.state.fl.us
Subject: Re: Inquiries - Rainbow River minimum flows

I will respond to these Staff Responses specifically as time permits.

However, let me summarize by hoping these responses are not all like the one suggesting there were occasions when the water level at the Withlacoochee Site 02313200 was 2-4 feet higher than the Rainbow River Site 02313100.
These sites are just over a mile apart, 2-4 feet seriously!

Remember I asked about the persons who claimed they had seen reverse flow under the bridge at the Rainbow River gage site. Now we have a 'computer confirmation' of an even more dramatic event.

Just may be there is a time to step back and ask is this logical.

Martyn

Found the USGS Report.
The number quoted has an extra 4 in it. 2009-5124 is correct.

I have certainly not read the whole report, but I have checked out the discussion of backwater effect and it reads:
The northernmost station located near Dunnellon (fig. 1) was not used for analysis because of backwater conditions from Lake Rousseau, thus 12 stations were used for analysis.

I would also add the Dunnellon Station does not have flow data which is a key aspect of the report. So is the potential backwater effect again an assumption or fact.

So I am not sure how that one sentence supports the Staff Response; it does not note or quantify the extent of fluctuations of water level in Lake Rousseau and does not mention Rainbow River.
I also note Dan Yobbi was a co-author of the USGS report 2009-5142, yet as Chairman of the Peer Review the second recommendation is backwater effects during high flow conditions be investigated. This tends to leave the impression that the panel considers backwater effect an unusual not regular effect which needs to be investigated.

Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Saturday, February 4, 2017 10:05 AM
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Re: Response to 2017-01-30 email on Rainbow HEC-RAS

Doug,
Thanks for relaying these responses.

Be it severe or substantial backwater effects this conclusion is not supported with any data. Only a few e-mails ago Staff Response was using USGS data to support the 'conclusion', but as we now know, somehow the data got mis-aligned.

The new USGS Gage Station was not installed in the year indicated from the information I have, District and USGS 'assumptions' are just that until proven. Wording I have from USGS do not appear to support them making any assumption. They talk of negative slope. for a back water effect.

I do not find a 2010 ECT 'original' report; the only one I have is from the Appendix C which is September 25, 2015.

I will look further for the *USGS Scientific Investigations Report 2009-45124,* it was not found on a Google Search, but I will look in the USGS on-line reports.

Bottom line...no evidence of backwater effect, substantial or otherwise.

Martyn

From: Doug Leeper
To: Alan Martyn Johnson
Cc: Ron Basso; Ross Morton; Kurt Fritsch; Melissa Gulvin; Kym Holzwart; Yonas Ghile
Subject: RE: Rainbow River Two more Staff Responses from Jan 19
Date: Thursday, February 09, 2017 8:14:41 AM

Martyn:

I'm following-up on the inquiries/requests included in your February 2, 2017 email to District staff concerning hydraulic modeling for the Rainbow River System. Please see our "new" responses in italics with gray highlighting that are imbedded in your original email below. As you know, the blue highlighted text identifies original responses from staff that were included in a previous email.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
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1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 02, 2017 8:03 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Rainbow River Two more Staff Responses from Jan 19

I hope you are carefully considering the concerns I raised in my e-mail Monday about the backwater effect, which prominently features in the Draft Rainbow River MFL. My concerns were originally mentioned in my November 14, 2016 e-mail albeit not as specifically as this week.

November 14, 2016 I sent you some questions about the Rainbow MFL Report. There were a lot of questions/comments, but the answers I received as Staff Responses indicated a steadfast belief all was just fine with the Rainbow MFL Report. When you finally recognized how far off the mark some of the answers were, it appears there was a belief that removing a sentence from the ETC Report was going to solve the issue of backwater effect. Please keep me informed regarding thoughts you may have on the reality of the backwater effect.

I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment.

From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional

judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading upto Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.

Staff response (2/9/2017) based on consultant input: *As we previously noted, Table 2-2 of the HEC-RAS report identifies the average percentage of the flow at CR 484 (i.e., at the Rainbow River at Dunnellon station) is 55% at RS 5.94 (i.e., at site Rainbow No. 3 Spring) within the HEC-RAS model. This percentage is considerably higher than the flow percentage values at the downstream RS 5.77 and RS 5.5 sites. Based on the assumption that flow rates should be higher in downstream segments, the 55% value at RS 5.94 was manually reduced to 40%, which is lower than the 45.3% value at RS 5.77. This 40% value was estimated by a project engineer, based on information indicating the 3.6% contribution from Bubbling Spring (assigned to RS 5.77 to RS 5.84 within the model) and potential inflows between RS 5.94 and RS 5.77.*

Also in the January 19 Staff Response to my November 14 questions/concerns:

My comment.

In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report. The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy).

Staff response: Field measurements are considered instantaneous records and are most appropriately compared among sites with field measurements taken at the same time. Unfortunately, the field measurements you provided for USGS site number 2313098 and 2313100 (in an Excel file provided as an email attachment and reproduced below) were not collected at the same time and we note that examination of the data indicates substantial variation in flow at individual sites on some dates, indicating that flow variation within a day may be rather large. For example, on 09/14/2016, the flows varied from 601 to 630 cfs within two hours at USGS site number 023132098 (based on the Excel file your provided as an email attachment). Similarly, the flow varied from 707 to 755 cfs on 6/2/2014 within one hour and from 702 to 744 cfs within one hour on 3/31/2014. Further, if you average the field measurements taken on 09/14/2016 at site number 2313098 and compare the resultant average value to the reported daily flow at USGS site

number 02313100, the percentage difference is 15%. Similarly, if you compare the 10/6/2016 field measurement at USGS site number 023132098 with reported daily value at USGS site number 02313100, the difference is 16%. We therefore conclude that although there are no simultaneously collected field measurements for the two sites that can be used for direct comparison, the good agreement between HEC-RAS simulated observed stage data in the vicinity of the USGS site number 023132098 indirectly confirms that the 85% percent flow attribution to the site in question is appropriate.

The responder(s) appear to need to spend some time reconsidering this response. I did provide some food for thought in my earlier e-mail (what accuracy can be expected in field measurements of 700 cfs and how quickly does the Rainbow Well react to events such as Hermine cf the water getting into the aquifer and karst channels feeding the springs).

HEC-RAS simulations are derived from the inputs including data in Table 2-3 and 2-2, some of which was developed by ""linear interpolation"" (last sentence page 2-8 Appendix C). I think it was those words that raised the red flag for me and made me look further. Somehow USGS field measurement data from 02313098 escaped notice by the consultant and the responder(s). Please note field measurement data was the source of flow data for the four other USGS sites; they were not taken at the same time (see first sentence of the Staff Response). Very disappointing.

May be a whoops, sorry we did not catch that when resorting to linear interpolation at the time the model was being developed.

Staff response (2/9/2017): *We note that the linear interpolation used to estimate percentage flows for the numerous ungauged HEC-RAS transects (see Figure 3-1) located between the sites listed in Table 2-3 is a standard approach for hydraulic modeling. In addition, we acknowledge that the flow information identified in Table 2-2 of the modeling report includes historic measurements by the USGS at headspring sites and field-data collection by District staff at river sites. These data could have been supplemented by additional field measurements made by the USGS for river sites, although the model that was developed was considered sufficiently calibrated and verified for use in the minimum flow analyses. Finally, we note that the District is, in general, committed to continued refinement of hydraulic and other hydrologic models uses for minimum flow analyses, and is committed to these processes specifically for the planned reevaluation of the minimum flow that will be established for the Rainbow River System.*

I would suggest with about 100 cfs entering the river upstream of 02313098 will make a significant difference in the HEC-RAS model compared to this flow being added downstream in the model.

There appear to be a number of errors in the HEC-RAS model development that may require the Draft Report to be recalled. It is your reputation. Mine, the responder(s) has(have) clearly addressed by the steadfast belief 'they are right' and I am wrong. Please reconsider.

Martyn

From:	Doug Leeper
To:	martynellijay@hotmail.com
Cc:	Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject:	RE: USGS 2009-5124
Date:	Thursday, February 09, 2017 8:18:42 AM
Attachments:	Rabon 1966 Inflow-outflow...Lake Rousseau....pdf Downing et al. 1989 - SWFWMD Lake Rousseau Operations and Management Study.pdf

Martyn:

I'm following-up on your two emails sent February 5, 2017 (reproduced below with your original yellow and gray highlighting) regarding the email I sent on February 3, 2017 concerning flow and hydraulic modeling for the Rainbow River System.

- The 2005 date identified in the email I sent for the Rainbow River near Dunnellon, FL (USGS station no. 02313098) is incorrect. Review of the USGS National Water Information System: Web Interface indicates that data are available for the site from November 2013 to the present.
- The 2015 Rainbow River HEC-RAS model report by ECT, Inc. that you have is the "original" report referenced in my email. I incorrectly noted that it was dated 2010 in my email.
- Good to hear you found the USGS Scientific Investigations Report 2009-5124 by Trommer and others despite the typo for the report number in my email.
- With regard to backwater effects in the Withlacoochee River that are noted by Trommer et al. (2009) , you may want to look at the attached 1989 District report by H.C. Downing and others. See especially, pages 2-30 and 2-34 where effects on water levels in the Withlacoochee and Rainbow rivers associated with the simulated lowering of Lake Rousseau are discussed. Also of interest is the attached 1966 USGS report by Rabun, especially page 5 where the backwater effect of Lake Rousseau at the Withlacoochee River at Dunnellon station is discussed.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
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352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, February 05, 2017 8:41 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>

Subject: USGS 2009-5124

Found the USGS Report.
The number quoted has an extra 4 in it. 2009-5124 is correct.

I have certainly not read the whole report, but I have checked out the discussion of backwater effect and it reads:
The northernmost station located near Dunnellon (fig. 1) was not used for analysis because of backwater conditions from Lake Rousseau, thus 12 stations were used for analysis.

I would also add the Dunnellon Station does not have flow data which is a key aspect of the report. So is the potential backwater effect again an assumption or fact.

So I am not sure how that one sentence supports the Staff Response; it does not note or quantify the extent of fluctuations of water level in Lake Rousseau and does not mention Rainbow River.
I also note Dan Yobbi was a co-author of the USGS report 2009-5142, yet as Chairman of the Peer Review the second recommendation is backwater effects during high flow conditions be investigated. This tends to leave the impression that the panel considers backwater effect an unusual not regular effect which needs to be investigated.

Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Saturday, February 4, 2017 10:05 AM
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Re: Response to 2017-01-30 email on Rainbow HEC-RAS

Doug,
Thanks for relaying these responses.

Be it severe or substantial backwater effects this conclusion is not supported with any data. Only a few e-mails ago Staff Response was using USGS data to support the 'conclusion', but as we now know, somehow the data got mis-aligned.

The new USGS Gage Station was not installed in the year indicated from the information I have, District and USGS 'assumptions' are just that until proven. Wording I have from USGS do not appear to support them making any assumption. They talk of negative slope. for a back water effect.

I do not find a 2010 ECT 'original' report; the only one I have is from the Appendix C which is September 25, 2015.

I will look further for the *USGS Scientific Investigations Report 2009-45124,* it was not found on a Google Search, but I will look in the USGS on-line reports.

Bottom line...no evidence of backwater effect, substantial or otherwise.

Martyn

From: Ron Basso
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017
Date: Thursday, February 09, 2017 8:37:44 AM

Mr. Johnson:

My suggestion is let's hold off on responding to these questions until you have a chance to review our revised Rainbow River MFL report which we're planning to put on our website in the next week or so. Staff did a fair amount of updating to the report based on the peer review panel's review. Perhaps some of your questions will be answered with the new report – yes I know, I'm an eternal optimist at heart. ☺

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 09, 2017 8:09 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Subject: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

I have read the District Response to the Peer Review Report and have a number of areas of concern as follows;

1. Chapter 1-2
   The panel raised a very important point regarding the relationship of groundwater withdrawals and flow.

   How will District determine the groundwater withdrawals so these can be compared to spring flow?

   A specific reference to the data measuring/tracking all groundwater withdrawals in the Rainbow River springshed is needed in the Rule Language to relate to spring discharge into the river.

The concept of the percent flow works with surface water systems where withdrawals from lower river reaches (permitted industrial, public supply etc) can be directly related to upstream measurements of natural flow (seasonal where appropriate).

2. Chapter 2-1

Where are the multiple analyses mentioned in the District Response?

Be it groundwater level or spring flow related to groundwater withdrawals. No such analyses are in Section 2.3.1. The only mention is, "Examination of the USGS flow record on the Rainbow River indicates an extremely low-flow period since 2000 that appears anomalous given our understanding of climatic conditions or groundwater withdrawal impacts."

Are the multiple analyses only what is in Section 2.4 i.e. the NDM?

3. Item 16

District Response Quote

There is an anomaly in flow post 2000 that is unrelated to groundwater withdrawals. **This was documented** in the report as the relation between Upper Floridan Aquifer (UFA) water levels and flow changed post 2000.

End quote

The response appears to imply there is not a decline in spring discharge (which is what the panel were referring to) and decline seen in the data is all because of the anomaly in flow post 2000.

The second sentence appears to distance any relationship of reduced flow being related to groundwater withdrawals, which I do not find in the Draft Report.

Regarding the anomaly, has anyone asked USGS when they made changes to the relationship between the level in Rainbow Well and discharge at Gage Station 02313100?

I did last week. No response so far.

Indications are there have been two relationships used prior to the present one. I would speculate these were made as there was a declining agreement in the relationship with the actual measurements (USGS field measurements).

4. Item 17

The response raises a relevant point regarding averaging of flow.

Where is this annual versus say monthly or daily flow addressed in context of the MFL.?

The response uses single point USGS Field Measurements, such as the 1932 and 1957 numbers, and then switches to long term averaging... although it is not clear where the 1930 annual average comes from. There was only one measurement 1930-10-8.

The response does not mention the low flows seen October 2011 thru June 2012, which is evident in both the USGS Field Measurements and the discharge reported for the Gage Station 02313100.

The lowest Field Measurement was March 27, 2012 436 cfs, and the lowest monthly reported discharge was May 2012 at 400.9 cfs

Disappointing answer to a very important question...How does this MFL in really work? Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From: Alan Martyn Johnson
To: Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Ron Basso; Yonas Ghile
Subject: District Resonse to Peer Panel Review of MFL Rainbow River January 2017
Date: Thursday, February 09, 2017 8:09:08 AM

I have read the District Response to the Peer Review Report and have a number of areas of concern as follows;

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Martyn

From: Alan Martyn Johnson
To: Ron Basso; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017
Date: Friday, February 10, 2017 7:48:07 AM

Ron,

Thanks for responding.

Buying time, assuming it is spent wisely, is always a good idea.

I am also optimistic that the errors/omissions will be addressed/corrected.

Most notably the peer review panels idea of buying some time (not just a week or two to make editorial niceties) by capping withdrawals at current levels until we all understand the potential impact of issuing more well permits, and in the process further destroying yet another of Florida's beautiful springs/rivers. Sorry that was a long sentence but I am not working for a literary prize this morning.

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:37 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

My suggestion is let's hold off on responding to these questions until you have a chance to review our revised Rainbow River MFL report which we're planning to put on our website in the next week or so. Staff did a fair amount of updating to the report based on the peer review panel's review. Perhaps some of your questions will be answered with the new report – yes I know, I'm an eternal optimist at heart. ☺

Ron Basso, P.G.
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Water Resources Bureau
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Ph 800-423-1479 (Florida only)
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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 09, 2017 8:09 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
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Martyn

From: Alan Martyn Johnson
To: Doug Leeper
Cc: Ron Basso; Ross Morton; Kurt Fritsch; Melissa Gulvin; Kym Holzwart; Yonas Ghile
Subject: Re: Rainbow River Two more Staff Responses from Jan 19
Date: Friday, February 10, 2017 7:47:03 AM

Doug,
This is not an acceptable.

Someone still can't be bothered to go back and look at the data before trying to justify what the consultant's project engineer did. I clearly pointed USGS 02313096 is one mile downstream of where the adjusted 40 % flow was assigned in the model input. Has no one considered that before writing these responses? I can see I will have to take the consultant and staff who thru the basics of checking data and recognizing the difficulty of obtaining good discharge data at the headsprings. USGS 02313096 probably represents the first location on the river where reliable discharge data is available, bar data you have from staff measurements of discharge.

Expect an e-mail in the next day or two unless you want to have someone recheck the data before I go back to my original review.

As for the apparent desire to stay with the linear interpolation to obtain a river flow profile, this is not using the best information available.

The flow profile (where spring discharges adds to the river flow along its path) must be a major input into the model. Incorrectly assigning approximately 100 cfs. to entering the river much further downstream must make a significant difference. This error should be corrected now, not delayed for many years. Management actions of pursuing this MFL with the knowledge of a major error in the model will not be viewed favorably in the court of public opinion or by a judge. I trust senior management are fully aware of this issue.

Martyn
P.S. Where is the discharge data collected by SWFWMD which is used in generating the models river profile?

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:14 AM
To: Alan Martyn Johnson
Cc: Ron Basso; Ross Morton; Kurt Fritsch; Melissa Gulvin; Kym Holzwart; Yonas Ghile
Subject: RE: Rainbow River Two more Staff Responses from Jan 19

Martyn:

I'm following-up on the inquiries/requests included in your February 2, 2017 email to District staff concerning hydraulic modeling for the Rainbow River System. Please see our "new" responses in italics with gray highlighting that are imbedded in your original email below. As you know, the blue highlighted text identifies original responses from staff that were included in a previous email.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 02, 2017 8:03 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Rainbow River Two more Staff Responses from Jan 19

I hope you are carefully considering the concerns I raised in my e-mail Monday about the backwater effect, which prominently features in the Draft Rainbow River MFL. My concerns were originally mentioned in my November 14, 2016 e-mail albeit not as specifically as this week.

November 14, 2016 I sent you some questions about the Rainbow MFL Report. There were a lot of questions/comments, but the answers I received as Staff Responses indicated a steadfast belief all was just fine with the Rainbow MFL Report. When you finally recognized how far off the mark some of the answers were, it appears there was a belief that removing a sentence from the ETC Report was going to solve the issue of backwater effect. Please keep me informed regarding thoughts you may have on the reality of the backwater effect.

I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment.

From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the

percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading upto Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.

Staff response (2/9/2017) based on consultant input: *As we previously noted, Table 2-2 of the HEC-RAS report identifies the average percentage of the flow at CR 484 (i.e., at the Rainbow River at Dunnellon station) is 55% at RS 5.94 (i.e., at site Rainbow No. 3 Spring) within the HEC-RAS model. This percentage is considerably higher than the flow percentage values at the downstream RS 5.77 and RS 5.5 sites. Based on the assumption that flow rates should be higher in downstream segments, the 55% value at RS 5.94 was manually reduced to 40%, which is lower than the 45.3% value at RS 5.77. This 40% value was estimated by a project engineer, based on information indicating the 3.6% contribution from Bubbling Spring (assigned to RS 5.77 to RS 5.84 within the model) and potential inflows between RS 5.94 and RS 5.77.*

Also in the January 19 Staff Response to my November 14 questions/concerns:

My comment.

In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report. The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy).

Staff response: Field measurements are considered instantaneous records and are most appropriately compared among sites with field measurements taken at the same time. Unfortunately, the field measurements you provided for USGS site number 2313098 and 2313100 (in an Excel file provided as an email attachment and reproduced below) were not collected at the same time and we note that examination of the data indicates substantial variation in flow at individual sites on some dates, indicating that flow variation within a day may be rather large. For example, on 09/14/2016, the flows varied from 601 to 630 cfs within two hours at USGS site number 023132098 (based on the Excel file your provided as an email attachment). Similarly, the flow varied from 707 to 755 cfs on 6/2/2014 within one hour and from 702 to 744 cfs within one hour on 3/31/2014. Further, if you average the field measurements taken on 09/14/2016 at site number 2313098 and compare the resultant average value to the reported daily flow at USGS site number 02313100, the percentage difference is 15%. Similarly, if you compare the 10/6/2016 field measurement at USGS site number 023132098 with reported daily value at USGS site number 02313100, the difference is 16%. We therefore conclude that although there are no simultaneously collected field measurements for the two sites that can be used for direct comparison, the good agreement between HEC-RAS simulated observed stage data in the vicinity of the USGS site number

023132098 indirectly confirms that the 85% percent flow attribution to the site in question is appropriate.

The responder(s) appear to need to spend some time reconsidering this response. I did provide some food for thought in my earlier e-mail (what accuracy can be expected in field measurements of 700 cfs and how quickly does the Rainbow Well react to events such as Hermine cf the water getting into the aquifer and karst channels feeding the springs).

HEC-RAS simulations are derived from the inputs including data in Table 2-3 and 2-2, some of which was developed by ""linear interpolation"" (last sentence page 2-8 Appendix C). I think it was those words that raised the red flag for me and made me look further. Somehow USGS field measurement data from 02313098 escaped notice by the consultant and the responder(s). Please note field measurement data was the source of flow data for the four other USGS sites; they were not taken at the same time (see first sentence of the Staff Response). Very disappointing.

May be a whoops, sorry we did not catch that when resorting to linear interpolation at the time the model was being developed.

Staff response (2/9/2017): *We note that the linear interpolation used to estimate percentage flows for the numerous ungauged HEC-RAS transects (see Figure 3-1) located between the sites listed in Table 2-3 is a standard approach for hydraulic modeling. In addition, we acknowledge that the flow information identified in Table 2-2 of the modeling report includes historic measurements by the USGS at headspring sites and field-data collection by District staff at river sites. These data could have been supplemented by additional field measurements made by the USGS for river sites, although the model that was developed was considered sufficiently calibrated and verified for use in the minimum flow analyses. Finally, we note that the District is, in general, committed to continued refinement of hydraulic and other hydrologic models uses for minimum flow analyses, and is committed to these processes specifically for the planned reevaluation of the minimum flow that will be established for the Rainbow River System.*

I would suggest with about 100 cfs entering the river upstream of 02313098 will make a significant difference in the HEC-RAS model compared to this flow being added downstream in the model.

There appear to be a number of errors in the HEC-RAS model development that may require the Draft Report to be recalled. It is your reputation. Mine, the responder(s) has(have) clearly addressed by the steadfast belief 'they are right' and I am wrong. Please reconsider.

Martyn

From: Alan Martyn Johnson
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Re: USGS 2009-5124
Date: Friday, February 10, 2017 7:37:40 AM

Doug,

Thank you for your e-mail.

I appreciate anyone who can stand up accept responsibility for an error and correct it. But somehow, in all honesty, I do not believe it was you who made the errors. I think those who wrote the responses owe you an apology.

Thank you for the attachments...they are old...well not so old!

I have reviewed the pages you pointed me to and some of the key points in the reports. In general the reports are again simulations and estimates and spent a lot of time considering major draw downs of Lake Rosseau. Even these simulations, from what I have read so far, result in small changes at the Rainbow headsprings.

So let me ask:

What is the actual change made in the model to create the low, medium and high backwater conditions?

May be the answer is in the reports, but last time I searched I did not find it.

See Page 6

Output from the HEC-RAS model for three backwater simulations, representing low (25 percent), medium (50 percent), and high (75 percent) backwater conditions,

May be this will help flush out this backwater thought in the absence of actual data and the comment in the peer review report about backwater effect and high flows in the Withlacoochee.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:18 AM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: RE: USGS 2009-5124

Martyn:

I'm following-up on your two emails sent February 5, 2017 (reproduced below with your original yellow and gray highlighting) regarding the email I sent on February 3, 2017 concerning flow and hydraulic modeling for the Rainbow River System.

- The 2005 date identified in the email I sent for the Rainbow River near Dunnellon, FL (USGS station no. 02313098) is incorrect. Review of the USGS National Water Information System: Web Interface indicates that data are available for the site from November 2013 to the present.
- The 2015 Rainbow River HEC-RAS model report by ECT, Inc. that you have is the "original" report referenced in my email. I incorrectly noted that it was dated 2010 in my email.
- Good to hear you found the USGS Scientific Investigations Report 2009-5124 by Trommer and others despite the typo for the report number in my email.
- With regard to backwater effects in the Withlacoochee River that are noted by Trommer et al. (2009) , you may want to look at the attached 1989 District report by H.C. Downing and others. See especially, pages 2-30 and 2-34 where effects on water levels in the Withlacoochee and Rainbow rivers associated with the simulated lowering of Lake Rousseau are discussed. Also of interest is the attached 1966 USGS report by Rabun, especially page 5 where the backwater effect of Lake Rousseau at the Withlacoochee River at Dunnellon station is discussed.

Doug Leeper
MFLs Program Lead
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Southwest Florida Water Management District
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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, February 05, 2017 8:41 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: USGS 2009-5124

Found the USGS Report.
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I have certainly not read the whole report, but I have checked out the discussion of backwater

effect and it reads:
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I would also add the Dunnellon Station does not have flow data which is a key aspect of the report. So is the potential backwater effect again an assumption or fact.

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Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Saturday, February 4, 2017 10:05 AM
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Re: Response to 2017-01-30 email on Rainbow HEC-RAS

Doug,
Thanks for relaying these responses.

Be it severe or substantial backwater effects this conclusion is not supported with any data. Only a few e-mails ago Staff Response was using USGS data to support the 'conclusion', but as we now know, somehow the data got mis-aligned.

The new USGS Gage Station was not installed in the year indicated from the information I

have, District and USGS 'assumptions' are just that until proven. Wording I have from USGS do not appear to support them making any assumption. They talk of negative slope. for a back water effect.

I do not find a 2010 ECT 'original' report; the only one I have is from the Appendix C which is September 25, 2015.

I will look further for the *USGS Scientific Investigations Report 2009-45124,* it was not found on a Google Search, but I will look in the USGS on-line reports.

Bottom line...no evidence of backwater effect, substantial or otherwise.

Martyn

From: Doug Leeper
To: Alan Martyn Johnson
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch; Ron Basso
Subject: RE: District Response to Peer Panel Review of MFL Rainbow River January 2017
Date: Friday, February 10, 2017 9:03:22 AM

Martyn:

Just writing to let you know the District's revised, draft minimum flow report for the Rainbow River System is now posted to our Minimum Flows and Levels (Environmental Flows) Documents and Reports web page at:

http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 10, 2017 7:48 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Ron,

Thanks for responding.

Buying time, assuming it is spent wisely, is always a good idea.

I am also optimistic that the errors/omissions will be addressed/corrected.

Most notably the peer review panels idea of buying some time (not just a week or two to make editorial niceties) by capping withdrawals at current levels until we all understand the potential impact of issuing more well permits, and in the process further destroying yet another of Florida's beautiful springs/rivers. Sorry that was a long sentence but I am not working for a literary prize this morning.

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:37 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

My suggestion is let's hold off on responding to these questions until you have a chance to review our revised Rainbow River MFL report which we're planning to put on our website in the next week or so. Staff did a fair amount of updating to the report based on the peer review panel's review. Perhaps some of your questions will be answered with the new report – yes I know, I'm an eternal optimist at heart. ☺

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

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Subject: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

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   A specific reference to the data measuring/tracking all groundwater withdrawals in the Rainbow River springshed is needed in the Rule Language to relate to spring discharge into the river.

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   District Response Quote
   There is an anomaly in flow post 2000 that is unrelated to groundwater withdrawals.

This was documented in the report as the relation between Upper Floridan Aquifer (UFA) water levels and flow changed post 2000.
End quote
The response appears to imply there is not a decline in spring discharge (which is what the panel were referring to) and decline seen in the data is all because of the anomaly in flow post 2000.
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I did last week. No response so far.

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The response raises a relevant point regarding averaging of flow.
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The response uses single point USGS Field Measurements, such as the 1932 and 1957 numbers, and then switches to long term averaging... although it is not clear where the 1930 annual average comes from. There was only one measurement 1930-10-8.

The response does not mention the low flows seen October 2011 thru June 2012, which is evident in both the USGS Field Measurements and the discharge reported for the Gage Station 02313100.

The lowest Field Measurement was March 27, 2012 436 cfs, and the lowest monthly reported discharge was May 2012 at 400.9 cfs

Disappointing answer to a very important question...How does this MFL in really work? Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From: Melissa Gulvin
To: Ron Basso; Eric DeHaven; Mark Hammond; Kym Holzwart; Doug Leeper
Subject: Fwd: Rainbow River MFL updates
Date: Friday, February 10, 2017 6:15:46 PM

Just for point of reference, Mr. Vibbert is one of the RRC members. He was in the original meeting we had with them and Bob Knight in Dunnellon. I think it is worth our time compiling a response next week. We have comments previously drafted on some of these concerns. Including those that address conservation and reduced water use in the region despite increases in population. In the response, I would also like to reiterate that the District is required to set an MFL by July 1, that the District will be reevaluating the MFL, continuously monitoring water levels, etc.

Thoughts?

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
Office: (352) 796-7211 ext. 4419
Cell: (352) 206-4047
Email: Melissa.Gulvin@WaterMatters.org

From: william vibbert <bdvibbert@att.net>
Sent: Friday, February 10, 2017 5:32 PM
Subject: RE: Rainbow River MFL updates
To: Melissa Gulvin <melissa.gulvin@swfwmd.state.fl.us>
Cc: Bob Knight <bknight@floridaspringsinstitute.org>, BURTON E ENO <beeno1@bellsouth.net>, Paul Marraffino <paulm@westnet.com>, 'Hilliard Dan' <2buntings@comcast.net>

Thank You, Melissa,

I am sorry that you have a cold. We are discussing our approach with our partners and will have some points for you on the 23rd. You do know we have concerns in a number of areas including the recommendations of the peer review (no further withdraw), model errors, conflicts with other statutes, errors in the data, over reliance on models to predict 15% habitat loss, , intermittent flow events that flush algae are not considered (SWIM), importance of flow given the nitrate levels, importance of residence time, limited parameters chosen, flow already below legislation requirement (Paul's report) , downstream impact of aggregate withdraws (converting fresh to salt in the lower Withlacoochee, Clean Water Act rule against degredation), public interest, context meaning "The Rainbow River globally significant resource."

We would be happy if the District would give the Rainbow River a pass and even begin recovery planning. When one looks across Florida and observes the state of our springs, we are alarmed. Water conservation should be at the top of the District's list. Few springs have the aquatic community that the Rainbow does and we feel that flow is critical to keeping what exists now. We look forward to meeting with you on the 23rd. Thank you for the update. Hope your cold is better.

Bill Vibbert

From: Melissa Gulvin [mailto:Melissa.Gulvin@swfwmd.state.fl.us]
Sent: Friday, February 10, 2017 3:03 PM
To: Burt Eno <burteno@bellsouth.net>; Burt Eno (beeno1@bellsouth.net) <beeno1@bellsouth.net>; Paul Marraffino <paulm@westnet.com>; Bill Vibbert <bdvibbert@att.net>
Subject: Rainbow River MFL updates

Hi Mr. Eno, Mr. Marraffino and Mr. Vibbert,

I hope you're all doing well. I'm recovering from a cold, just in time to enjoy the weekend!

I wanted to let you know the final draft of the Rainbow River MFL report was posted online yesterday — WaterMatters.og/projects/mfl/mfl_reports.php. The appendices have been updated as well. As you know, District staff took a more conservation approach and changed from the originally proposed 93 percent to protect 95 percent of the natural flow.

Please let me know if you'd like to meet with our staff to discuss the MFL or revised report. I'd be happy to set something up.

There will be a public meeting on Feb. 23 at 4:30 p.m. at the Dunnellon City Hall. Agenda attached. The presentation and request for approval from our Governing Board is scheduled for the March 28 Board meeting, which will be here at our Brooksville office at 9 a.m.

Please don't hesitate to contact me with any questions or concerns. Have a great weekend!

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

From: Alan Martyn Johnson
To: Ron Basso; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017
Date: Saturday, February 11, 2017 8:05:56 AM

Ron,

Please can you explain how I can make sense of your February 9 e-mail stating plans were to post in the next week or so the revised Rainbow River MFL Report, when a new draft showing you as author of the pdf file and signatory, was already or almost simultaneously posted in the MFL documents section of SWFWMD web site?

Presumably there is an annotated version of the original report which was shared with your colleagues/co authors (as stated on the revised report Kym, Yonas, Doug and Sean); I would appreciate if that can be made available for any interested parties, including myself, to review the changes more easily (additions/deletions would be great, rationale even better).

Thanks,

Martyn

P.S. I note the 'original' draft report posted in MFL documents section was authored by XinJian Chen.

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:37 AM
To: Alan Martyn Johnson; Doug Leeper
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Disappointing answer to a very important question...How does this MFL in really work? Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From:	Alan Martyn Johnson
To:	Doug Leeper; Ron Basso; Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ross Morton; Kurt Fritsch
Subject:	Errors in Rainbow River Modeling to consider thoughfully
Date:	Sunday, February 12, 2017 7:14:59 PM
Attachments:	Rainbow River USGS 2006-2010 Data Comparison.xlsx

As promised.

Attached is an xls file with the four USGS Stations at which field discharge measurements were made 2006 thru 2010 (16 measurements at each station). The discharge measurements are copied directly from USGS on-line. Daily discharge data for USGS 02313100 for the corresponding days was manually obtained from on line record and added to the spreadsheet. From the data, % discharge is shown for each station relative to the long term gage station (02313100).

Someone obviously got this far in preparing Table 2-2 ECT 2015 Report, but then forgot to note the USGS 02313096 is Rainbow 6; as it clearly states on line. Please take the time to go check https://www.google.com/#q=usgs+02313096 Also, the location map and latitude longitude show 02313096 is about one mile downstream of the headsprings.

Then compounding the matter the data was designated as Spring 3.

Then the professional project engineer thought it was illogical to have a discharge higher upstream than a point downstream and used "professional judgment" to change the 55% (which had obviously been calculated see spreadsheet) to 40%. But, the data is logical if the correct location had been recognized. In fact I would go as far as to suggest this is the best set of data out of all four sets.

Unfortunately the 'professional' failed to notice similar illogical data in Springs 1 and 4; locations that are about 200 feet apart. These numbers are displayed in red in the spreadsheet for ease of reference. But, the ECT project engineer plowed right ahead (in 2015) with this data, to construct a flow profile for the HEC-RAS model (Table 2-3 ECT Report).

Possibly the 'professional project engineer' considered there are about 8 vents discharging into the less than one acre headspring making it difficult to accurately segregate/assign measurements to individual spring vents. But, plowing right ahead the data from Spring 1 was used to generate Figure 3-5…without even a thought of eliminating the obviously low first readings highlighted in yellow.

Then some member of the public who has interest just enough to read the reports has red flag warnings and asks why this change, 55% to 40% was made. Not once, but twice the staff response (quoted below) fail to recognize the error and plow right ahead trying to justify all is OK...no problem.

Disappointing was an understatement!!

I have similarly questioned the 'backwater effect' which features prominently in both the original August 2016 and the February 2017 report (48 times, including in the Executive Summary) in the ECT Report on HEC-RAS modeling (Appendix C) backwater is mentioned 7 times in the 2015 report and 6 times in the 2017 version (Appendix H). The latest ECT Report (which incidentally is shown as 2015 in the header of Appendix H) removed one sentence: as the witness is no longer available, but continues to plow right ahead mentioning 'severe backwater effect' conclusion for which is by comparing stage records from two USGS gage stations.

You will no doubt recall the staff response regarding this comparison was deemed incorrect as columns had been mis-aligned…but may be some 'professional' at ECT can reveal why the staff response was incorrect.
Disappointing or a growing credibility gap?

Adding to all of this is the failure to go Whoops we used linear interpolation to generate the flow profile in the lower reaches of the river, before recognizing recent USGS data show there are nowhere near 100 cfs spring discharges downstream of the newer gage station 02313098. This river flow of about 100cfs is not assigned correctly; and no doubt increases stage/flow upstream of newer gage station… in round terms this is about half the river run.

Just keep on plowing, but reality is the whole model is inaccurate. It is time to step back and realize it is time correct the model and the report. I have nothing to gain or lose by trying to help you by pointing out these error, but you SWFWMD will have a lot of face saving to do if these errors are revealed in court. That is not a threat from me, I do not have the financial means let alone time to take you to court.

I look forward to your thoughtful response regarding taking a break from this plowing right ahead.

Martyn

Quote from e-mails.
I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment..
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional

judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading upto Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.

Staff response (2/9/2017) based on consultant input: *As we previously noted, Table 2-2 of the HEC-RAS report identifies the average percentage of the flow at CR 484 (i.e., at the Rainbow River at Dunnellon station) is 55% at RS 5.94 (i.e., at site Rainbow No. 3 Spring) within the HEC-RAS model. This percentage is considerably higher than the flow percentage values at the downstream RS 5.77 and RS 5.5 sites. Based on the assumption that flow rates should be higher in downstream segments, the 55% value at RS 5.94 was manually reduced to 40%, which is lower than the 45.3% value at RS 5.77. This 40% value was estimated by a project engineer, based on information indicating the 3.6% contribution from Bubbling Spring (assigned to RS 5.77 to RS 5.84 within the model) and potential inflows between RS 5.94 and RS 5.77.*

End Quote

From: Ron Basso
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017
Date: Monday, February 13, 2017 8:38:16 AM

Mr. Johnson:

Kym Holzwart from our staff oversaw the effort to get the revised report out based on the outside peer review. I apologize, I should have checked with her prior to sending out my reply to you the other day. We had set a tentative goal of getting the revised report out a week ahead of the public workshop on the 23rd but I'm happy to see we did so about a week early. This gives the public about two weeks to review the revised report ahead of the public meeting.

Not sure about the original author being Dr. Xinjian Chen. He is part of our Crystal River/Kings Bay MFL team. The authors for the original Rainbow Springs draft report were Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Stacey Day, and Doug Leeper. The revised report authors are Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Doug Leeper, and Sean King. The signature page you are referring to is my professional geologist signed and sealed statement which is required under Florida Statutes for any report with geological interpretation.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, February 11, 2017 8:06 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
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The lowest Field Measurement was March 27, 2012 436 cfs, and the lowest monthly

reported discharge was May 2012 at 400.9 cfs

Disappointing answer to a very important question...How does this MFL in really work? Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From:	Alan Martyn Johnson
To:	Ron Basso; Doug Leeper
Cc:	Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject:	Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017 and February Draft
Date:	Friday, February 17, 2017 7:50:41 AM
Attachments:	Silver River Rainbow River Comparison USGS Annual Discharge.xlsx

---

Ron,
Thanks for your response.
I have been in North Georgia this week.

I have the following comments:

- Regarding XinJian Chen as author. I did not have knowledge of how these pdf documents are produced or secured, but XinJian Chen shows as the 'author' if you go to the file properties for both the original and revised Rainbow MFL Reports.

  I now understand that 'author' means he converted the files to pdf format. I apologize for my lack of knowledge.

  Possibly what lead me to the thought of the 'author' having a wider meaning was the ECT Report 2015 where XinJain's involvement in Rainbow is clearly evident:
  Quote
  2.1.2 CROSS-SECTION CUTLINES
  The primary data source used in characterizing cross-sections in the study area is the cross-section dataset provided by Dr. Xinjian Chen of SWFWMD, which includes a total of 165 cross-sections in the project study area. The secondary data sources include:
  End Quote

  and from Table 2-1
  Quote
  2015 Cross-Section Dataset
  SWFWMD (Dr. Chen) 165
  Provided in MS Excel Table (X, Y, Z).Cross-sections at a 164-foot interval
  A FORTRAN code was developed by Dr. Chen to calculate cross-section geometry data on the basis of
  2015 bathymetry survey provided by University of South Florida (USF) and 2003 LiDAR DEM data by SWFWMD.
  End Quote
  <!--[if !supportLineBreakNewLine]-->
  <!--[endif]-->
- As regards your signature page I note it was not present in the August 2016 Draft, but may be this is a newer Statute requirement.

<!--[if !supportLineBreakNewLine]-->
<!--[endif]-->

- I am not sure which parts of the February Draft Report are 'geological evaluation and interpretation', but a major concern I have, is the progress of how the "post 2000 anomaly" is addressed.

From the original Rainbow MFL Report Page 28
Quote
These lower flows do coincide with low-flow conditions documented by the St. Johns River Water Management District (SJRWMD) on nearby Silver River during the same time period. Reductions in Silver River flows have been attributed to submerged aquatic vegetation and invasive hydrilla that increased pool stage at the spring, thereby significantly lowering flow (Baird et al. 2013). The SJRWMD estimated this flow reduction to be 100 to 150 cfs. At this time, it is unknown what the cause in the change in relation between UFA water levels and flows is at Rainbow Springs.
End quote.

From District Response to Peer Review Re Chapter 2-1 page 9 para 6
Quote
District staff explicitly identified the change in the relationship between groundwater levels and spring flow beginning around 2000 in the report. Multiple analyses indicate that the change is not related to groundwater withdrawals.
End quote

In the February 2017 Draft Rainbow MFL (latest) Page 32
Quote
The main cause of reduced flow at Rainbow post-2000 is currently poorly understood except for the fact that it is not related to groundwater withdrawal impacts. In addition, it is not known whether this flow condition at Rainbow Springs is permanent or temporary.
End quote

The edits show an increasing trend to dis-associate reduced discharge and groundwater withdrawal without any facts. You will no doubt recall in Point 2 of my February 9 email, I asked about these multiple analyses. The addition of "not known if the flow condition is permanent or temporary" is beyond rational thinking/speculation.
I restate my question; where are the multiple analyses?

<!--[if !supportLineBreakNewLine]-->

<!--[endif]-->

In closing please take a look at the attached xls spreadsheet comparing the annual discharge for Silver River and Rainbow River. The pattern and trend are remarkably similar. May be this is not an anomaly (still awaiting USGS FOIA response), but fact for which there is a logical explanation. May I venture to suggest the impact of groundwater withdrawals region wide may be greater than any model suggests or SWFWMD dare consider.

Martyn

P.S. I added the USGS Silver River Field Measurements to the spreadsheet. The pairs of measurements on each day give a good indication of the accuracy of these types of measurements (you are welcome to extent the plus minus accuracy to the entire set if you wish).

It is not clear why Field Measurements prior to December 2003 are not shown; possibly they are available off line. I did plot of all the Rainbow Field Measurements which shows the same downward trend but the plot is not useful as the intervals between measurements is not consistent so I removed that sheet.

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Monday, February 13, 2017 8:38 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

Kym Holzwart from our staff oversaw the effort to get the revised report out based on the outside peer review. I apologize, I should have checked with her prior to sending out my reply to you the other day. We had set a tentative goal of getting the revised report out a week ahead of the public workshop on the 23rd but I'm happy to see we did so about a week early. This gives the public about two weeks to review the revised report ahead of the public meeting.

Not sure about the original author being Dr. Xinjian Chen. He is part of our Crystal River/Kings Bay MFL team. The authors for the original Rainbow Springs draft report were Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Stacey Day, and Doug Leeper. The revised report authors are Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Doug Leeper, and Sean King. The signature page you are referring to is my professional geologist signed and sealed statement which is required under Florida Statutes for any report with geological interpretation.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager

Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, February 11, 2017 8:06 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Ron,
Please can you explain how I can make sense of your February 9 e-mail stating plans were to post in the next week or so the revised Rainbow River MFL Report, when a new draft showing you as author of the pdf file and signatory, was already or almost simultaneously posted in the MFL documents section of SWFWMD web site?

Presumably there is an annotated version of the original report which was shared with your colleagues/co authors (as stated on the revised report Kym, Yonas, Doug and Sean); I would appreciate if that can be made available for any interested parties, including myself, to review the changes more easily (additions/deletions would be great, rationale even better).

Thanks,

Martyn
P.S. I note the 'original' draft report posted in MFL documents section was authored by XinJian Chen.

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:37 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

My suggestion is let's hold off on responding to these questions until you have a chance to review

our revised Rainbow River MFL report which we're planning to put on our website in the next week or so. Staff did a fair amount of updating to the report based on the peer review panel's review. Perhaps some of your questions will be answered with the new report – yes I know, I'm an eternal optimist at heart. ☺

Ron Basso, P.G.
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Resource Evaluation Section
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352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 09, 2017 8:09 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Subject: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

I have read the District Response to the Peer Review Report and have a number of areas of concern as follows;

1. Chapter 1-2
   The panel raised a very important point regarding the relationship of groundwater withdrawals and flow.

   How will District determine the groundwater withdrawals so these can be compared to spring flow?

   A specific reference to the data measuring/tracking all groundwater withdrawals in the Rainbow River springshed is needed in the Rule Language to relate to spring discharge into the river.

   The concept of the percent flow works with surface water systems where withdrawals from lower river reaches (permitted industrial, public supply etc) can be directly related to upstream measurements of natural flow (seasonal where appropriate).
2. Chapter 2-1
   Where are the multiple analyses mentioned in the District Response?

Be it groundwater level or spring flow related to groundwater withdrawals. No such analyses are in Section 2.3.1. The only mention is, "Examination of the USGS flow record on the Rainbow River indicates an extremely low-flow period since 2000 that appears anomalous given our understanding of climatic conditions or groundwater withdrawal impacts."

Are the multiple analyses only what is in Section 2.4 i.e. the NDM?

3. Item 16

District Response Quote

There is an anomaly in flow post 2000 that is unrelated to groundwater withdrawals. **This was documented** in the report as the relation between Upper Floridan Aquifer (UFA) water levels and flow changed post 2000.

End quote

The response appears to imply there is not a decline in spring discharge (which is what the panel were referring to) and decline seen in the data is all because of the anomaly in flow post 2000.

The second sentence appears to distance any relationship of reduced flow being related to groundwater withdrawals, which I do not find in the Draft Report.

Regarding the anomaly, has anyone asked USGS when they made changes to the relationship between the level in Rainbow Well and discharge at Gage Station 02313100?

I did last week. No response so far.

Indications are there have been two relationships used prior to the present one. I would speculate these were made as there was a declining agreement in the relationship with the actual measurements (USGS field measurements).

4. Item 17

The response raises a relevant point regarding averaging of flow.

Where is this annual versus say monthly or daily flow addressed in context of the MFL.?

The response uses single point USGS Field Measurements, such as the 1932 and 1957 numbers, and then switches to long term averaging... although it is not clear where the 1930 annual average comes from. There was only one measurement 1930-10-8.

The response does not mention the low flows seen October 2011 thru June 2012, which is evident in both the USGS Field Measurements and the discharge reported for the Gage Station 02313100.

The lowest Field Measurement was March 27, 2012 436 cfs, and the lowest monthly reported discharge was May 2012 at 400.9 cfs

Disappointing answer to a very important question...How does this MFL in really work?

Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From: Doug Leeper
To: Alan Martyn Johnson
Cc: Ron Basso; Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ross Morton; Kurt Fritsch
Subject: RE: Errors in Rainbow River Modeling to consider thoughfully
Date: Friday, February 17, 2017 3:28:26 PM

Martyn –

Thanks for sending the USGS spring flow data. Hopefully, my previous email from earlier today has shed some light on the Rainbow HEC-RAS issues you've helped us identify.

In the spirit of the January 23rd "cafeteria" discussion regarding Kings Bay springs, I'd like to suggest a phone call next week if you have any questions concerning the Rainbow HEC-Ras modeling issues we've been corresponding about.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
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352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, February 12, 2017 7:15 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Errors in Rainbow River Modeling to consider thoughfully

As promised.
Attached is an xls file with the four USGS Stations at which field discharge measurements were made 2006 thru 2010 (16 measurements at each station). The discharge measurements are copied directly from USGS on-line. Daily discharge data for USGS 02313100 for the corresponding days was manually obtained from on line record and added to the spreadsheet. From the data, % discharge is shown for each station relative to the long term gage station (02313100).

Someone obviously got this far in preparing Table 2-2 ECT 2015 Report, but then forgot to note the USGS 02313096 is Rainbow 6; as it clearly states on line. Please take the time to go check https://www.google.com/#q=usgs+02313096 Also, the location map and latitude longitude show 02313096 is about one mile downstream of the headsprings.

Then compounding the matter the data was designated as Spring 3.
Then the professional project engineer thought it was illogical to have a discharge higher upstream than a point downstream and used "professional judgment" to change the 55% (which had obviously been calculated see spreadsheet) to 40%. But, the data is logical if the correct location had been recognized. In fact I would go as far as to suggest this is the best set of data out of all four sets.

Unfortunately the 'professional' failed to notice similar illogical data in Springs 1 and 4; locations that are about 200 feet apart. These numbers are displayed in red in the spreadsheet for ease of reference. But, the ECT project engineer plowed right ahead (in 2015) with this data, to construct a flow profile for the HEC-RAS model (Table 2-3 ECT Report).
Possibly the 'professional project engineer' considered there are about 8 vents discharging into the less than one acre headspring making it difficult to accurately segregate/assign measurements to individual spring vents. But, plowing right ahead the data from Spring 1 was used to generate Figure 3-5…without even a thought of eliminating the obviously low first readings highlighted in yellow.
Then some member of the public who has interest just enough to read the reports has red flag warnings and asks why this change, 55% to 40% was made. Not once, but twice the staff response (quoted below) fail to recognize the error and plow right ahead trying to justify all is OK...no problem.
Disappointing was an understatement!!

I have similarly questioned the 'backwater effect' which features prominently in both the original August 2016 and the February 2017 report (48 times, including in the Executive Summary) in the ECT Report on HEC-RAS modeling (Appendix C) backwater is mentioned 7 times in the 2015 report and 6 times in the 2017 version (Appendix H). The latest ECT Report (which incidentally is shown as 2015 in the header of Appendix H) removed one sentence: as the witness is no longer available, but continues to plow right ahead mentioning 'severe backwater effect' conclusion for which is by comparing stage records from two USGS gage stations.

You will no doubt recall the staff response regarding this comparison was deemed incorrect as columns had been mis-aligned…but may be some 'professional' at ECT can reveal why the staff response was incorrect.
Disappointing or a growing credibility gap?

Adding to all of this is the failure to go Whoops we used linear interpolation to generate the flow profile in the lower reaches of the river, before recognizing recent USGS data show there are nowhere near 100 cfs spring discharges downstream of the newer gage station 02313098. This river flow of about 100cfs is not assigned correctly; and no doubt increases

stage/flow upstream of newer gage station… in round terms this is about half the river run.

Just keep on plowing, but reality is the whole model is inaccurate. It is time to step back and realize it is time correct the model and the report. I have nothing to gain or lose by trying to help you by pointing out these error, but you SWFWMD will have a lot of face saving to do if these errors are revealed in court. That is not a threat from me, I do not have the financial means let alone time to take you to court.

I look forward to your thoughtful response regarding taking a break from this plowing right ahead.

Martyn

Quote from e-mails.
I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment..
From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.
Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).
Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading upto Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.
Staff response (2/9/2017) based on consultant input: *As we previously noted, Table 2-2 of the HEC-RAS report identifies the average percentage of the flow at CR 484 (i.e., at the Rainbow River at Dunnellon station) is 55% at RS 5.94 (i.e., at site Rainbow No. 3 Spring) within the HEC-RAS model. This percentage is considerably higher than the flow percentage values at the downstream RS 5.77 and RS 5.5 sites. Based on the assumption that flow rates should be higher in downstream segments, the 55% value at RS 5.94 was manually reduced to 40%, which is lower than the 45.3% value at RS 5.77. This 40% value was estimated by a project engineer, based on information indicating the 3.6% contribution from Bubbling Spring*

(assigned to RS 5.77 to RS 5.84 within the model) and potential inflows between RS 5.94 and RS 5.77.

End Quote

From: Alan Martyn Johnson
To: Melissa Gulvin
Cc: Doug Leeper; Kym Holzwart; Eric DeHaven
Subject: Public Hearing last Thursday
Date: Monday, February 27, 2017 8:00:20 AM

Melissa,

I am directing these questions to you as it appeared you were coordinator of last Thursday's Public Meeting regarding Rainbow MFL. If this is not directed correctly, please forward or inform me accordingly.

- Do I assume correctly the video recording was done by SWFWMD. I realize there was a lot of noise at the start of the meeting, but I did not hear any announcement to that effect. I intended to ask you when I introduced myself as I left the meeting; but it slipped my mind.
- What will happen regarding the meeting moving forward? Will some form of summary be prepared for senior management/the Governing Board. I trust this will not simply be left as 'a public meeting was held'.

Please note I did make reference, although very brief, to the MFL's for Chassahowizka, Homosassa and Weeki Wachee being meaningless as entered into the FAC, because they refer to withdrawals downstream of the respective gage sites.

Martyn

FYI

I did get a Hearing before the Rules for Chassahowitzka and Homosassa were finally filed (I left a copy of the PowerPoint presentation with the District). The Chronicle article is still in the archives, The Governing Board Member who chaired the Hearing reported back to the Board, his comments/report are on tape at the following Board Meeting. Two years later I made a presentation (3 minutes) to the Governing Board January 27, 2015. Board Member Paul Senft said they would get a response to me. I remain convinced the response signed by Mark Hammond dated February 10, 2015 was written by someone from legal who either could not read or listen to my concern about the Rules referring to withdrawals downstream of the reference gage sites. Please note reference was made to Chassahowitzka and Homosassa MFL Rules at Thursday's meeting as if these were in place and working.

From: Doug Leeper
To: martynellijay@hotmail.com
Cc: Ron Basso; Ross Morton; Kurt Fritsch; Melissa Gulvin; Kym Holzwart; Yonas Ghile
Subject: RE: Rainbow River Two more Staff Responses from Jan 19
Date: Friday, February 17, 2017 2:59:44 PM
Attachments: WSE_Flows_Rainbow_River_all_2005_2013_ECT.xlsx

Martyn:

Please see our responses to your February 10th inquiries concerning HEC-RAS modeling for the Rainbow River System. Our responses made today are imbedded in your email below using italics and green highlighting.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 10, 2017 7:47 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Subject: Re: Rainbow River Two more Staff Responses from Jan 19

Doug,

This is not an acceptable.

Someone still can't be bothered to go back and look at the data before trying to justify what the consultant's project engineer did. I clearly pointed USGS 02313096 is one mile downstream of where the adjusted 40 % flow was assigned in the model input. Has no one considered that before writing these responses? I can see I will have to take the consultant and staff who thru the basics of checking data and recognizing the difficulty of obtaining good discharge data at the headsprings. USGS 02313096 probably represents the first location on the river where reliable discharge data is available, bar data you have from staff measurements of discharge.

Staff response (2/17/2017): *We have determined that as you've noted, USGS station 02313096 (Rainbow Number 6 Spring near Dunnellon, FL) was named Rainbow No. 3 Spring and incorrectly located in the original data set used for the flow distribution analysis used to develop the HEC-RAS model for the Rainbow River system. The correct location for this site is shown below. The*

apportionment of 55% of the average percentage of flow at the downstream Rainbow River at Dunnellon gage makes sense for the Rainbow Number 6 Spring as it lies just upstream from site PHAB 1, which was associated with 58.8% of the average flow at the Dunnellon gage (see Table 2-2 below from the ECT, Inc. HEC-RAS modeling report). Although the "Rainbow No 3 Spring" site was incorrectly located in the headspring area, it is fortunate that for model development, the originally identified 55% contribution of the average flow at the Dunnellon gage for the site was reduced to 40%, a value that is appropriate for the incorrect location that was used for the site. Also, fortunately, we note that a large number (n=179) of cross-sections were used for modeling purposes (see Figure 2-5 below from the HEC-RAS report), including several in the vicinity of the correct location of Rainbow Number 6 Spring. To follow-up on this issue we removed the 40% flow assignment from the incorrectly located Spring No. 3 in the headspring area in the HEC-RAS model and inserted a 55% flow contribution in the correct location for Rainbow Number 6 Spring. We then performed new steady-state HEC-RAS modeling and found no difference in predicted water levels between the original analyses and the new model runs. This confirmed our expectations that the original simulations are appropriate, given that the percentage flow contribution for the incorrectly located site had been adjusted from 55% to 40%. We plan to correct the labelling and location error for Rainbow Number 6 Spring in the revised version of the Rainbow River System minimum flows report. A labelling error for a second spring, discussed in our comment below, will also be corrected in the revised report.



Table 2-2. Summary of Flow Distribution Analysis Results

Site Name	RS in HEC-RAS	Selected Duration	Data Count	Avg. % of Flow @ CR 484	Involvement in Channel Flow Profile Development
Rainbow No. 1 Spring	6.00	2006-2010	16	31.2%	Selected!
Rainbow No. 2 Spring	5.97	2006-2010	16	33.3%	Selected!
Rainbow No. 3 Spring	5.94	2006-2010	16	55.0%	Selected! Use 40.0%
Bubbling Spring	5.77-5.84*	2004-2010	22**	3.6%	Selected!
Veg 7 (SJR T4)	5.77	2009-2013	11	45.3%	Selected!
Veg 6	5.55	2009-2013	6	49.7%	Selected!
PHAB 1	4.96	2009-2013***	10	58.8%	Selected!
PHAB Pool	3.37	2009-2013***	10	84.1%	Selected!
Veg 4	3.25	2009-2013	2	77.0%	Not Selected!
PHAB 2 (SJR T2)	3.09	2009-2013***	10	86.5%	Selected!
Veg 3	2.88	2009-2013	6	89.3%	Selected!
Veg 2.5	2.66	2009-2013	6	85.3%	Not Selected!
Veg 2 (SJR T1)	1.97	2009-2013	6	92.9%	Selected!
Veg 1	1.36	2009-2013	9	94.7%	Selected!
Veg Below Borrow Pit	1.05	2009-2013	7	94.6%	Not Selected!
USGS Station	0.90	2009-2010	3	84.9%	Not Selected!

* It is assumed that discharge from Bubbling Spring is evenly distributed to the River from RS 5.77 to RS 5.84
** Two data outliers were eliminated
*** To be consistent with other vegetation transect sites, flow records prior to 2009 at the PHAB transect sites were excluded

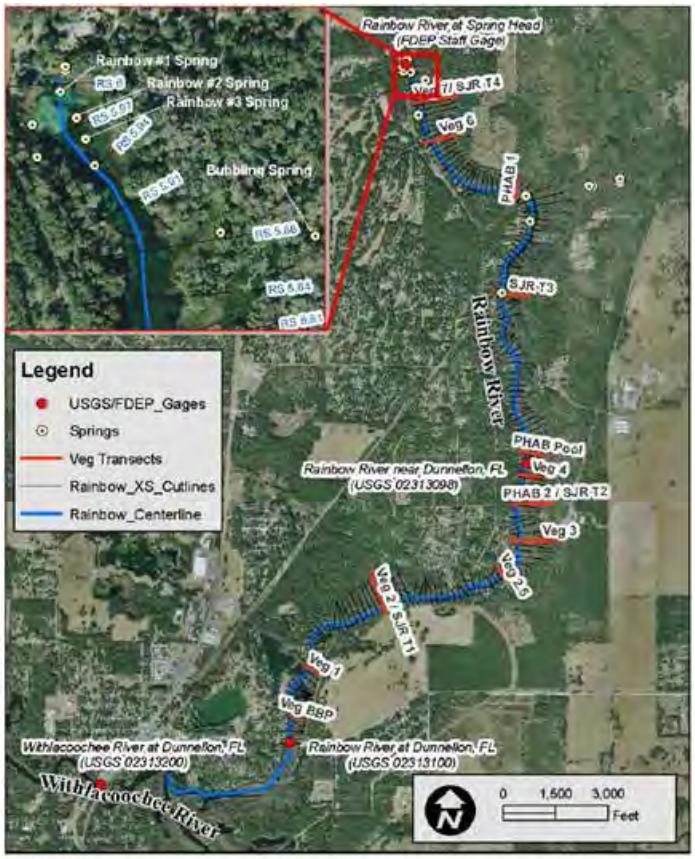

Figure 2-5. Locations of USGS/SWFWMD Flow/Stage Measurement in Rainbow River

Expect an e-mail in the next day or two unless you want to have someone recheck the data before I go back to my original review.

As for the apparent desire to stay with the linear interpolation to obtain a river flow profile, this is not using the best information available.

The flow profile (where spring discharges adds to the river flow along its path) must be a major input into the model. Incorrectly assigning approximately 100 cfs. to entering the river much further downstream must make a significant difference. This error should be corrected now, not delayed for many years. Management actions of pursuing this MFL with the knowledge of a major error in the model will not be viewed favorably in the court of public opinion or by a judge. I trust senior management are fully aware of this issue.

Martyn

P.S. Where is the discharge data collected by SWFWMD which is used in generating the models river profile?

Staff response (2/17/2017): *The discharge data collected by District staff that were used in the flow distribution analysis for determining channel flow profiles are summarized in Table 2-2 of the HEC-RAS modeling report prepared by ECT, Inc. The original data set used for that summary are included in the attached Excel file named "WSE_Flows_Rainbow_River_all_2005_2013_ECT", which also includes USGS flow data for four spring sites. Note that the file includes naming errors in the "Spring Name" column of sheet "Rainbow Springs." As indicated above, Rainbow No. 3 should be labeled Rainbow Number 6 Spring near Dunnellon, FL (USGS station no. 02313096). In addition, Rainbow No. 2 should be labeled Rainbow Number 4 Spring near Dunnellon, FL (USGS station no. 02313093).*

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:14 AM
To: Alan Martyn Johnson
Cc: Ron Basso; Ross Morton; Kurt Fritsch; Melissa Gulvin; Kym Holzwart; Yonas Ghile
Subject: RE: Rainbow River Two more Staff Responses from Jan 19

Martyn:

I'm following-up on the inquiries/requests included in your February 2, 2017 email to District staff concerning hydraulic modeling for the Rainbow River System. Please see our "new" responses in italics with gray highlighting that are imbedded in your original email below. As you know, the blue highlighted text identifies original responses from staff that were included in a previous email.

Doug Leeper

MFLs Program Lead

Natural Systems and Restoration Bureau

Southwest Florida Water Management District

2379 Broad Street

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1-800-423-1476, ext. 4272

352-796-7211, ext. 4272

doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 02, 2017 8:03 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Rainbow River Two more Staff Responses from Jan 19

I hope you are carefully considering the concerns I raised in my e-mail Monday about the backwater effect, which prominently features in the Draft Rainbow River MFL. My concerns were originally mentioned in my November 14, 2016 e-mail albeit not as specifically as this week.

November 14, 2016 I sent you some questions about the Rainbow MFL Report. There were a lot of questions/comments, but the answers I received as Staff Responses indicated a steadfast belief all was just fine with the Rainbow MFL Report. When you finally recognized how far off the mark some of the answers were, it appears there was a belief that removing a sentence from the ETC Report was going to solve the issue of backwater effect. Please keep me informed regarding thoughts you may have on the reality of the backwater effect.

I will now address two other Staff Responses in your January 19 e-mail to my November 14 questions/comments. I have given you the opportunity to reconsider the responses, but you apparently have not.

My comment.

From Appendix C Table 2-2 the flow from the USGS data 2006-2010 was adjusted by "professional judgment' from 55% to 40% for Rainbow No. 3 Spring (RS 5.94mile). The problem with this is someone failed to recognize the USGS data is from Gage Site 02313096 which is located about ONE MILE DOWNSTREAM resulted in the 55%.

Staff response: The average 55% of flow at Rainbow No. 3 Spring included in Table 2-2 of Appendix C is the percent flow at USGS site number 02313100 (Rainbow River at Dunnellon, FL), not the percent flow at USGS site number 02313096 (Rainbow Number 6 Springs near Dunnellon, FL).

Maybe my wording was inadequate to convey my concerns. My concern was the changing of data by "professional judgment". This type of commentary in any report should raise a red flag. Why would someone change data? Most professionals would investigate and then reject the data if it was invalid…but change it? Red flag…so I chose to investigate. Appendix C; the wording leading upto Table 2.2 clearly indicates four USGS stations at the headsprings 2004 through 2010. So I checked them. Spring 3 was not one of them, but Spring 6 was. Its location is clear. The 'professional' who change the location and changed the data was in error. And the responder(s) also failed to recognize this. Disappointing.

Staff response (2/9/2017) based on consultant input: *As we previously noted, Table 2-2 of the HEC-RAS report identifies the average percentage of the flow at CR 484 (i.e., at the Rainbow River at Dunnellon station) is 55% at RS 5.94 (i.e., at site Rainbow No. 3 Spring) within the HEC-RAS model. This percentage is considerably higher than the flow percentage values at the downstream RS 5.77 and RS 5.5 sites. Based on the assumption that flow rates should be higher in downstream segments, the 55% value at RS 5.94 was manually reduced to 40%, which is lower than the 45.3% value at RS 5.77. This 40% value was estimated by a project engineer, based on information indicating the 3.6% contribution from Bubbling Spring (assigned to RS 5.77 to RS 5.84 within the model) and potential inflows between RS 5.94 and RS 5.77.*

Also in the January 19 Staff Response to my November 14 questions/concerns:

My comment.

In the Draft Report Table 6-1 (Table 2-3 from Appendix C) shows about 85% of the flow is present around PHAB Pool at RS 3.37 84.1% and PHAB(SJR T2) at RS 3.09 86.5%. This indicates the model has approaching 100 cfs of spring flow added downstream of the newer USGS Gage Site 02313098 which is located just upstream of the rocky shoal which is identified as RS 3.1 and shown in Figure 6-1 in Draft Report. The problem with this is data from the two USGS Gage Sites 02313100 and 02313098 show the discharge data to be the same (within the expected accuracy).

Staff response: Field measurements are considered instantaneous records and are most appropriately compared among sites with field measurements taken at the same time. Unfortunately, the field measurements you provided for USGS site number 2313098 and 2313100 (in an Excel file provided as an email attachment and reproduced below) were not collected at the same time and we note that examination of the data indicates substantial variation in flow at individual sites on some dates, indicating that flow variation within a day may be rather large. For example, on 09/14/2016, the flows varied from 601 to 630 cfs within two hours at USGS site number 023132098 (based on the Excel file your provided as an email attachment). Similarly, the flow varied from 707 to 755 cfs on 6/2/2014 within one hour and from 702 to 744 cfs within one hour on 3/31/2014. Further, if you average the field measurements taken on 09/14/2016 at site number 2313098 and compare the resultant average value to the reported daily flow at USGS site number 02313100, the percentage difference is 15%. Similarly, if you compare the 10/6/2016 field measurement at USGS site number 023132098 with reported daily value at USGS site number 02313100, the difference is 16%. We therefore conclude that although there are no simultaneously

collected field measurements for the two sites that can be used for direct comparison, the good agreement between HEC-RAS simulated observed stage data in the vicinity of the USGS site number 023132098 indirectly confirms that the 85% percent flow attribution to the site in question is appropriate.

The responder(s) appear to need to spend some time reconsidering this response. I did provide some food for thought in my earlier e-mail (what accuracy can be expected in field measurements of 700 cfs and how quickly does the Rainbow Well react to events such as Hermine cf the water getting into the aquifer and karst channels feeding the springs).

HEC-RAS simulations are derived from the inputs including data in Table 2-3 and 2-2, some of which was developed by ""linear interpolation"" (last sentence page 2-8 Appendix C). I think it was those words that raised the red flag for me and made me look further. Somehow USGS field measurement data from 02313098 escaped notice by the consultant and the responder(s). Please note field measurement data was the source of flow data for the four other USGS sites; they were not taken at the same time (see first sentence of the Staff Response). Very disappointing.

May be a whoops, sorry we did not catch that when resorting to linear interpolation at the time the model was being developed.

Staff response (2/9/2017): *We note that the linear interpolation used to estimate percentage flows for the numerous ungauged HEC-RAS transects (see Figure 3-1) located between the sites listed in Table 2-3 is a standard approach for hydraulic modeling. In addition, we acknowledge that the flow information identified in Table 2-2 of the modeling report includes historic measurements by the USGS at headspring sites and field-data collection by District staff at river sites. These data could have been supplemented by additional field measurements made by the USGS for river sites, although the model that was developed was considered sufficiently calibrated and verified for use in the minimum flow analyses. Finally, we note that the District is, in general, committed to continued refinement of hydraulic and other hydrologic models uses for minimum flow analyses, and is committed to these processes specifically for the planned reevaluation of the minimum flow that will be established for the Rainbow River System.*

I would suggest with about 100 cfs entering the river upstream of 02313098 will make a significant difference in the HEC-RAS model compared to this flow being added downstream in the model.

There appear to be a number of errors in the HEC-RAS model development that may require the Draft Report to be recalled. It is your reputation. Mine, the responder(s) has(have) clearly addressed by the steadfast belief 'they are right' and I am wrong. Please reconsider.

Martyn

From: Doug Leeper
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: RE: USGS 2009-5124
Date: Friday, February 17, 2017 2:44:50 PM

Martyn:

Please see our response to your February 10th inquiry concerning HEC-RAS modeling for the Rainbow River System. The response is imbedded in your email below using italics and blue highlighting.

Doug Leeper
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Southwest Florida Water Management District
2379 Broad Street
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352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 10, 2017 7:38 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: USGS 2009-5124

Doug,

Thank you for your e-mail.

I appreciate anyone who can stand up accept responsibility for an error and correct it. But somehow, in all honesty, I do not believe it was you who made the errors. I think those who wrote the responses owe you an apology.

Thank you for the attachments...they are old...well not so old!

I have reviewed the pages you pointed me to and some of the key points in the reports. In general the reports are again simulations and estimates and spent a lot of time considering major draw downs of Lake Rosseau. Even these simulations, from what I have read so far, result in small changes at the Rainbow headsprings.

So let me ask:

What is the actual change made in the model to create the low, medium and high backwater

conditions?

Staff response (2/17/2017): *Steady-state flow analyses were conducted with the HEC-RAS model for 225 scenarios that represent combinations of the 15 flows in the Rainbow River at USGS station 0231000 (1 to 99 percent non-exceedance values) and 15 downstream boundary stages in the Withlacoochee River at USGS station 02313200 (1 to 99 percent non-exceedance values). Results from all of these HEC-RAS simulations were used in the minimum flow analyses, including the assessments of floodplain habitat and woody habitat inundation. HEC-RAS output was also used in the PHABSIM modeling analysis of instream habitat availability. However, it was not possible to complete 225 sets of simulations for the PHABSIM modeling. Rather, three representative sets of HEC-RAS output were used for the PHABSIM modeling to assess potential flow-related instream habitat availability changes under low, medium and high back-water conditions that corresponding with the 25th, 50th and 75th percent downstream boundary stage values.*

May be the answer is in the reports, but last time I searched I did not find it.

See Page 6

Output from the HEC-RAS model for three backwater simulations, representing low (25 percent), medium (50 percent), and high (75 percent) backwater conditions,

May be this will help flush out this backwater thought in the absence of actual data and the comment in the peer review report about backwater effect and high flows in the Withlacoochee.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:18 AM
To: martynellijay@hotmail.com
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: RE: USGS 2009-5124

Martyn:

I'm following-up on your two emails sent February 5, 2017 (reproduced below with your original yellow and gray highlighting) regarding the email I sent on February 3, 2017 concerning flow and hydraulic modeling for the Rainbow River System.

- The 2005 date identified in the email I sent for the Rainbow River near Dunnellon, FL (USGS station no. 02313098) is incorrect. Review of the USGS National Water Information System: Web Interface indicates that data are available for the site from November 2013 to the present.

- The 2015 Rainbow River HEC-RAS model report by ECT, Inc. that you have is the "original" report referenced in my email. I incorrectly noted that it was dated 2010 in my email.

- Good to hear you found the USGS Scientific Investigations Report 2009-5124 by Trommer

and others despite the typo for the report number in my email.

- With regard to backwater effects in the Withlacoochee River that are noted by Trommer et al. (2009) , you may want to look at the attached 1989 District report by H.C. Downing and others. See especially, pages 2-30 and 2-34 where effects on water levels in the Withlacoochee and Rainbow rivers associated with the simulated lowering of Lake Rousseau are discussed. Also of interest is the attached 1966 USGS report by Rabun, especially page 5 where the backwater effect of Lake Rousseau at the Withlacoochee River at Dunnellon station is discussed.

Doug Leeper

MFLs Program Lead

Natural Systems and Restoration Bureau

Southwest Florida Water Management District

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doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, February 05, 2017 8:41 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: USGS 2009-5124

Found the USGS Report.

The number quoted has an extra 4 in it. 2009-5124 is correct.

I have certainly not read the whole report, but I have checked out the discussion of backwater effect and it reads:

The northernmost station located near Dunnellon (fig. 1) was not used for analysis because of backwater conditions from Lake Rousseau, thus 12 stations were used for analysis.

I would also add the Dunnellon Station does not have flow data which is a key aspect of the report. So is the potential backwater effect again an assumption or fact.

So I am not sure how that one sentence supports the Staff Response; it does not note or quantify the extent of fluctuations of water level in Lake Rousseau and does not mention Rainbow River.

I also note Dan Yobbi was a co-author of the USGS report 2009-5142, yet as Chairman of the Peer Review the second recommendation is backwater effects during high flow conditions be investigated. This tends to leave the impression that the panel considers backwater effect an unusual not regular effect which needs to be investigated.

Backwater effects in the Rainbow River are dependent upon stage/flow in the Withlacoochee River and in part, the stage/flow in the Withlacoochee is dependent upon structure operations. In the USGS Scientific Investigations Report 2009-45124 on surface-water and groundwater interactions in the Withlacoochee River area, Trommer et al. (2009) described data collected in the Withlacoochee River from and upstream of the USGS gaging station near Holder (02313000; which is upstream of the confluence of the Withlacoochee and Rainbow rivers) noting that the Holder site is the farthest downstream gaging station on the Withlacoochee River where streamflow is not affected by fluctuating water levels in the impounded section of the river known as Lake Rousseau. Within the Rainbow River, backwater effects are expected to occur in the lower portion of river at all times and effects are propagated upstream at variable magnitude and temporal scales depending upon downstream conditions.

Martyn

From: Alan Martyn Johnson <martynellijay@hotmail.com>
Sent: Saturday, February 4, 2017 10:05 AM
To: Doug Leeper
Cc: Kym Holzwart; Yonas Ghile; Melissa Gulvin; Ron Basso; Ross Morton; Kurt Fritsch
Subject: Re: Response to 2017-01-30 email on Rainbow HEC-RAS

Doug,

Thanks for relaying these responses.

Be it severe or substantial backwater effects this conclusion is not supported with any data.

Only a few e-mails ago Staff Response was using USGS data to support the 'conclusion', but as we now know, somehow the data got mis-aligned.

The new USGS Gage Station was not installed in the year indicated from the information I have, District and USGS 'assumptions' are just that until proven. Wording I have from USGS do not appear to support them making any assumption. They talk of negative slope. for a back water effect.

I do not find a 2010 ECT 'original' report; the only one I have is from the Appendix C which is September 25, 2015.

I will look further for the *USGS Scientific Investigations Report 2009-45124,* it was not found on a Google Search, but I will look in the USGS on-line reports.

Bottom line...no evidence of backwater effect, substantial or otherwise.

Martyn

From:	Doug Leeper
To:	Ross Morton; Kurt Fritsch
Cc:	Kym Holzwart; Yonas Ghile; Ron Basso; Sean King; Mark A. Green; Jennette Seachrist; Eric DeHaven; Melissa Gulvin
Subject:	RE: USGS FOIA 2017-00069 - Acknowledgement of Your FOIA Request
Date:	Friday, February 17, 2017 3:52:56 PM
Attachments:	Email from USGS to MJohnson-Re_ USGS FOIA 2017-00069-Acknowledgement FOIA Request.pdf

Ross – Seems to me the USGS is working on Mr. Johnson's FOI request (see attachment), so I don't think I need to do anything regarding his request to you and Kurt.

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, February 11, 2017 8:16 AM
To: Freedom of Information Act, GS-D-EI_ <foia@usgs.gov>
Cc: Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Subject: Re: USGS FOIA 2017-00069 - Acknowledgement of Your FOIA Request

Janis,

Thank you for the e-mail acknowledging my request.

Please proceed as expeditiously as possible.

I was hoping to have this information before a February 23 meeting and most certainly before the March meeting of the South West Florida Water Management Districts Governing Board.

By copy of this e-mail to Kurt Fritsch, Inspector General SWFWMD and Ross Morton SWFWMD Ombudsman I am requesting them to pass my request to who ever in SWFWMD coordinates with USGS, possibly directly at the Tampa Office, to see if we can all get a quicker answer.

In making this request to Kurt and Ross please do not take it the wrong way, I fully understand that a request from an individual member of the public should not have the same priority as a request from a sponsor of so many USGS Gaging Stations.

I will share any relevant information from Kurt or Ross as soon as I have any, to avoid duplication of effort.

Thanks,

Martyn Johnson

From: jewilson@usgs.gov <jewilson@usgs.gov> on behalf of Freedom of Information Act, GS-D-EI_ <foia@usgs.gov>
Sent: Friday, February 10, 2017 3:37 PM
To: Alan Martyn Johnson
Cc: GS-GIO Freedom of Information Act
Subject: USGS FOIA 2017-00069 - Acknowledgement of Your FOIA Request

Dear Mr. Johnson,

On February 2, 2017, the USGS Freedom of Information Act (FOIA) office received your FOIA request, dated February 2, 2017, and assigned it control number **USGS-2017-00069**. Please cite this number in any future communications with our office regarding your request. You request the following:

You are requesting further information related to USGS FOIA 2017-00006, in which you requested discharge calculation equations for USGS Gage Sites 02313100 and 02313098 on the Rainbow River, FL. The records for USGS 2017-00006 were released to you in full.

You are now requesting: "It appears over the years there have been at least three (including the present one you sent me) look up charts for relating the Discharge in Rainbow River to the level in the Rainbow Well. Is it possible for you to obtain the older versions and the dates they were in effect."

Before proceeding with your request, I want to inform you that this request presents unusual circumstances because there is a need to search for or collect records from a

field facility or establishment separate from the office processing the request. Therefore, we are taking a 10-workday extension under *43 C.F.R. § 2.19(b)*.

As a result of the unusual circumstances, your request meets the exceptions to Section 2 of the FOIA Improvement Act of 2016 rule against assessing FOIA processing fees. We will notify you if we need to take an additional extension.

We have classified you as an "other-use" requester. As such we may charge you for some of our search and duplication costs, but we will not charge you for our review costs. You are also entitled to up to two hours of search time and 100 pages of photocopies (or an equivalent volume) for free. *See 43 C.F.R. § 2.39*. If, after taking into consideration your fee category entitlements, our processing costs are less than $50.00, we will not bill you because the cost of collection would be greater than the fee collected. *See 43 C.F.R. § 2.49(a)(1)*.

If search time exceeds the two free hours and $50.00, for which you would not be billed, and if we find that this will not cover the cost of processing your request, we will let you know before we incur additional charges. You can then either agree to pay the additional amount needed or narrow the scope of your request. (I have attached a prior email from Mr. Brian May explaining fees and unusual circumstances for USGS FOIA 2017-00006.)

We use Multitrack Processing to process FOIA requests. The Simple track is for requests that can be processed in one to five workdays. The Normal track is for requests that can be processed in six to twenty workdays. The Complex track is for requests that can be processed in twenty-one to sixty workdays. The Exceptional/Voluminous track is for requests requiring more than sixty workdays for processing. The Expedited track is for requests that have been granted expedited processing. Within each track, requests are usually processed on a first-in, first-out basis.

Your request falls into the **Complex** processing track. We therefore anticipate that we will complete a final response to you by **April 28, 2017**.

You may limit the scope of your request, which may enable us to process it more quickly, or agree to an alternative time period for processing by communicating with us or our USGS FOIA Public Liaison, Mr. Brian May. The contact information for Mr. May is:

USGS
5522 Research Park Drive
Baltimore, Maryland 21228

Email: foia@usgs.gov
Telephone: (443) 498-5521
Fax: (443) 498-5510

Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows:

Office of Government Information Services
National Archives and Records Administration
8601 Adelphi Road-OGIS
College Park, Maryland 20740-6001

Email: ogis@nara.gov
Web: https://ogis.archives.gov
Telephone: (202) 741-5770
Toll Free: 1 (877) 684-6448
Fax: (202) 741-5769

If you have any questions concerning your request, please contact me by email at foia@usgs.gov or by phone at (303) 236-1476.

Thank you for your interest in the U.S. Geological Survey.

Sincerely,

J
anis Wilson
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Box 25046
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Denver, CO 80225-0046
(303) 236-1476 (office)
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foia@usgs.gov

From: Ron Basso
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017 and February Draft
Date: Friday, February 17, 2017 3:55:40 PM

Mr. Johnson:

Glad we cleared things up with Xinjian. The reason the PG page is attached is staff feels that the MFL report is pretty close to being final. The signed and sealed page is required for all final reports. If you read through Chapter 2 there are plenty of interpretations of geology and hydrogeology so it is required. Now, on to answering your specific question. I'll repeat it below:

The edits show an increasing trend to dis-associate reduced discharge and groundwater withdrawal without any facts. You will no doubt recall in Point 2 of my February 9 email, I asked about these multiple analyses. The addition of "not known if the flow condition is permanent or temporary" is beyond rational thinking/speculation.
I restate my question; where are the multiple analyses?

The MFL report provides substantial evidence that the post-2000 flow change in unrelated to groundwater withdrawals by the analysis showing the change in head relation at the Rainbow well with flow that occurred in the year 2000. For each decade of a 30 year period from 1970-1999, that relation between head and flow was fairly consistent. Post-2000 there's been a big shift in that relationship (Figures 2-16 and 2-17). For example, at an Upper Floridan aquifer (UFA) water level of 31 Ft NGVD29 at the Rainbow well, flows prior to 2000 would have been approximately 650 cfs and at that same elevation post-2000 they would be about 600 cfs. Double mass analysis of rainfall and UFA water level show no change in slope from 1965-2015 which infers that water levels in the aquifer are fluctuating due to natural rainfall variability (Figure 2-13). However, double mass analysis of Rainbow River flow and UFA water level show a distinct break in 2000 (Figure 2-14). Similarly, double mass analysis between flow and rainfall show the same break in 2000 (Figure 2-15).

Other information to support the flow change post-2000 is not groundwater withdrawal related is the analysis of water level trends from 16 monitor wells in both the Rainbow and Silver Springsheds from 1990-2010. All wells showed an increase in water levels over this period of 0.5 to greater than two feet (Figure 2-12). If withdrawals were causing a 50-100 cfs flow decline, we would see aquifer water levels decline during this period. In addition, metered and estimated groundwater use in the Rainbow Springshed and surrounding area has fallen over the last 10 years (Figures 2-21 through 2-23). Springshed withdrawals, when accounting for water returned to the aquifer, only make up a little more than two percent of average springflow at Rainbow if we assume every gallon of consumptively-used groundwater results in a gallon decline in springflow (section 2.4.2) – and this is a conservatively high assumption since water pumped from an aquifer can come from decreases in ET, runoff, leakage from the overlying surficial aquifer, or seepage from lakes and wetlands in addition to springflow. Our groundwater flow model predictions line up nicely with these water budget estimates of flow impact (Table 2-3). Finally, the geology within the springshed consists of a largely unconfined UFA with high recharge and large storage characteristics. This type of system

limits the impacts of groundwater withdrawals and regional pumping impacts when compared to well-confined portions of the UFA in the state (Section 2.1 and Figures 2-1 through 2-4). To cause a reduction of 50-100 cfs in flows due to withdrawals in this type of system, pumping would have to be 5 to 10 times greater in the springshed – which given our data is not plausible.

As outlined above, the report includes several pieces of key data indicating that the post-2000 flow anomaly is not related to groundwater withdrawals (or rainfall). And just to be clear, the District is not saying there is zero impact from withdrawals or rainfall, it's just that the vast majority of flow change post-2000 is related to something else. Now we can speculate on that something else such as increased frictional forces in the outlet river due to increases in submerged aquatic vegetation and hydrilla (which has been documented by the University of Florida and SJRWMD at the Silver River) or the plugging off of spring vents, but as scientists we don't care to speculate. The factor that limits our direct interpretation of the cause of post-2000 flow changes is that we don't have a long continuous record of pool stage history like Silver Springs – where they have documented a substantial rise is stage post-2000 associated with frictional effects in the outlet river. A rising pool stage decreases flow at springs. We do plan to study this issue during the re-evaluation period and have funded the installation of a new flow and stage measuring station closer to the headsprings.

I plan to cover much of this at the workshop on the 23rd . If you have any additional questions, please bring them up at the public meeting and I'll be happy to address them.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 17, 2017 7:51 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017 and February Draft

Ron,
Thanks for your response.
I have been in North Georgia this week.

I have the following comments:

- Regarding XinJian Chen as author. I did not have knowledge of how these pdf documents are produced or secured, but XinJian Chen shows as the 'author' if you go to the file properties for both the original and revised Rainbow MFL Reports.

  I now understand that 'author' means he converted the files to pdf format. I apologize for my lack of knowledge.

  Possibly what lead me to the thought of the 'author' having a wider meaning was the ECT Report 2015 where XinJain's involvement in Rainbow is clearly evident:
  Quote
  2.1.2 CROSS-SECTION CUTLINES
  The primary data source used in characterizing cross-sections in the study area is the cross-section dataset provided by Dr. Xinjian Chen of SWFWMD, which includes a total of 165 cross-sections in the project study area. The secondary data sources include:
  End Quote

  and from Table 2-1
  Quote
  2015 Cross-Section Dataset
  SWFWMD (Dr. Chen) 165
  Provided in MS Excel Table (X, Y, Z).Cross-sections at a 164-foot interval
  A FORTRAN code was developed by Dr. Chen to calculate cross-section geometry data on the basis of
  2015 bathymetry survey provided by University of South Florida (USF) and 2003 LiDAR DEM data by SWFWMD.
  End Quote

- As regards your signature page I note it was not present in the August 2016 Draft, but may be this is a newer Statute requirement.

- I am not sure which parts of the February Draft Report are 'geological evaluation and interpretation', but a major concern I have, is the progress of how the "post 2000 anomaly" is addressed.

  From the original Rainbow MFL Report Page 28
  Quote
  These lower flows do coincide with low-flow conditions documented by the St. Johns River Water Management District (SJRWMD) on nearby Silver River during the same time period. Reductions in Silver River flows have been attributed to submerged aquatic

vegetation and invasive hydrilla that increased pool stage at the spring, thereby significantly lowering flow (Baird et al. 2013). The SJRWMD estimated this flow reduction to be 100 to 150 cfs. At this time, it is unknown what the cause in the change in relation between UFA water levels and flows is at Rainbow Springs.
End quote.

From District Response to Peer Review Re Chapter 2-1 page 9 para 6
Quote
District staff explicitly identified the change in the relationship between groundwater levels and spring flow beginning around 2000 in the report. Multiple analyses indicate that the change is not related to groundwater withdrawals.
End quote

In the February 2017 Draft Rainbow MFL (latest) Page 32
Quote
The main cause of reduced flow at Rainbow post-2000 is currently poorly understood except for the fact that it is not related to groundwater withdrawal impacts. In addition, it is not known whether this flow condition at Rainbow Springs is permanent or temporary.
End quote

The edits show an increasing trend to dis-associate reduced discharge and groundwater withdrawal without any facts. You will no doubt recall in Point 2 of my February 9 email, I asked about these multiple analyses. The addition of "not known if the flow condition is permanent or temporary" is beyond rational thinking/speculation.
I restate my question; where are the multiple analyses?

In closing please take a look at the attached xls spreadsheet comparing the annual discharge for Silver River and Rainbow River. The pattern and trend are remarkably similar. May be this is not an anomaly (still awaiting USGS FOIA response), but fact for which there is a logical explanation. May I venture to suggest the impact of groundwater withdrawals region wide may be greater than any model suggests or SWFWMD dare consider.

Martyn

P.S. I added the USGS Silver River Field Measurements to the spreadsheet. The pairs of measurements on each day give a good indication of the accuracy of these types of measurements (you are welcome to extent the plus minus accuracy to the entire set if you wish).

It is not clear why Field Measurements prior to December 2003 are not shown; possibly they are available off line. I did plot of all the Rainbow Field Measurements which shows the same downward trend but the plot is not useful as the intervals between measurements is not consistent so I removed that sheet.

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Monday, February 13, 2017 8:38 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile; Ross Morton; Kurt Fritsch
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

Kym Holzwart from our staff oversaw the effort to get the revised report out based on the outside peer review. I apologize, I should have checked with her prior to sending out my reply to you the other day. We had set a tentative goal of getting the revised report out a week ahead of the public workshop on the 23rd but I'm happy to see we did so about a week early. This gives the public about two weeks to review the revised report ahead of the public meeting.

Not sure about the original author being Dr. Xinjian Chen. He is part of our Crystal River/Kings Bay MFL team. The authors for the original Rainbow Springs draft report were Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Stacey Day, and Doug Leeper. The revised report authors are Kym Rouse Holzwart, Yonas Ghile, Ron Basso, Doug Leeper, and Sean King. The signature page you are referring to is my professional geologist signed and sealed statement which is required under Florida Statutes for any report with geological interpretation.

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

Resource Evaluation Section

Water Resources Bureau

Southwest Florida Water Management District

Ph 800-423-1479 (Florida only)

352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Saturday, February 11, 2017 8:06 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>; Ross Morton <Ross.Morton@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Ron,

Please can you explain how I can make sense of your February 9 e-mail stating plans were to post in the next week or so the revised Rainbow River MFL Report, when a new draft showing you as author of the pdf file and signatory, was already or almost simultaneously posted in the MFL documents section of SWFWMD web site?

Presumably there is an annotated version of the original report which was shared with your colleagues/co authors (as stated on the revised report Kym, Yonas, Doug and Sean); I would appreciate if that can be made available for any interested parties, including myself, to review the changes more easily (additions/deletions would be great, rationale even better).

Thanks,

Martyn

P.S. I note the 'original' draft report posted in MFL documents section was authored by XinJian Chen.

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Thursday, February 9, 2017 8:37 AM
To: Alan Martyn Johnson; Doug Leeper
Cc: Kym Holzwart; Melissa Gulvin; Yonas Ghile
Subject: RE: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

Mr. Johnson:

My suggestion is let's hold off on responding to these questions until you have a chance to review our revised Rainbow River MFL report which we're planning to put on our website in the next week or so. Staff did a fair amount of updating to the report based on the peer review panel's review. Perhaps some of your questions will be answered with the new report – yes I know, I'm an eternal optimist at heart. ☺

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

Resource Evaluation Section

Water Resources Bureau

Southwest Florida Water Management District

Ph 800-423-1479 (Florida only)

352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, February 09, 2017 8:09 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>

Subject: District Resonse to Peer Panel Review of MFL Rainbow River January 2017

I have read the District Response to the Peer Review Report and have a number of areas of concern as follows;

1. Chapter 1-2
   The panel raised a very important point regarding the relationship of groundwater withdrawals and flow.

   How will District determine the groundwater withdrawals so these can be compared to spring flow?

   A specific reference to the data measuring/tracking all groundwater withdrawals in the Rainbow River springshed is needed in the Rule Language to relate to spring discharge into the river.

   The concept of the percent flow works with surface water systems where withdrawals from lower river reaches (permitted industrial, public supply etc) can be directly related to upstream measurements of natural flow (seasonal where appropriate).
2. Chapter 2-1
   Where are the multiple analyses mentioned in the District Response?
   Be it groundwater level or spring flow related to groundwater withdrawals. No such analyses are in Section 2.3.1. The only mention is, "Examination of the USGS flow record on the Rainbow River indicates an extremely low-flow period since 2000 that appears anomalous given our understanding of climatic conditions or groundwater withdrawal impacts."

   Are the multiple analyses only what is in Section 2.4 i.e. the NDM?
3. Item 16
   District Response Quote
   There is an anomaly in flow post 2000 that is unrelated to groundwater withdrawals. **This was documented** in the report as the relation between Upper Floridan Aquifer (UFA) water levels and flow changed post 2000.
   End quote
   The response appears to imply there is not a decline in spring discharge (which is what the panel were referring to) and decline seen in the data is all because of the anomaly in flow post 2000.
   The second sentence appears to distance any relationship of reduced flow being related to groundwater withdrawals, which I do not find in the Draft Report.

Regarding the anomaly, has anyone asked USGS when they made changes to the relationship between the level in Rainbow Well and discharge at Gage Station 02313100?
I did last week. No response so far.

Indications are there have been two relationships used prior to the present one. I would speculate these were made as there was a declining agreement in the relationship with the actual measurements (USGS field measurements).

4. Item 17

The response raises a relevant point regarding averaging of flow.
Where is this annual versus say monthly or daily flow addressed in context of the MFL.?

The response uses single point USGS Field Measurements, such as the 1932 and 1957 numbers, and then switches to long term averaging... although it is not clear where the 1930 annual average comes from. There was only one measurement 1930-10-8.

The response does not mention the low flows seen October 2011 thru June 2012, which is evident in both the USGS Field Measurements and the discharge reported for the Gage Station 02313100.

The lowest Field Measurement was March 27, 2012 436 cfs, and the lowest monthly reported discharge was May 2012 at 400.9 cfs

Disappointing answer to a very important question...How does this MFL in really work? Some examples of how we will know when it has been exceeded would be helpful.

Martyn

From: Doug Leeper
To: DeAnn Thompson
Cc: Floridaspringscouncil@gmail.com
Subject: RE: Sabal Trails Pipeline
Date: Monday, February 27, 2017 8:24:59 AM

Ms. Thompson:

Thank you for your input on the proposed minimum flow for the Rainbow River System. The proposed minimum flow requires the maintenance of 95% of the natural flow in the river, which is the flow expected in the absence of water-withdrawal impacts. Historic through recent water withdrawals have resulted in about a 1% reduction in river flow and impacts associated with withdrawals for projected water-use demand in 2035 are 2.5%, or 2% with implementation of conservation and reuse measures.

The District will continue monitoring and assessing the Rainbow River to ensure protection of this important natural resource. We plan to implement a general, three-pronged prevention strategy that includes monitoring, protective water use permitting, and regional water supply planning to ensure that the adopted minimum flow for the Rainbow River System continues to be met. Minimum flow status assessments for the system will be completed on an annual basis by the District, on a five-year basis as part of the regional water supply planning process, and on an as-needed basis in association with permit and project activities. In addition, we will be conducting new studies to support the planned reevaluation of minimum flows established for the river system.

Thanks again for your input.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: DeAnn Thompson [mailto:h.deann.thompson@gmail.com]
Sent: Thursday, February 23, 2017 12:54 PM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Floridaspringscouncil@gmail.com
Subject: Sabal Trails Pipeline

Dear Mr. Leeper,

I understand that there is a public workshop this afternoon to present the proposed Minimum Flow for the Rainbow River System. The MFL proposes a 5% future allowable reduction in flow and continued pumping from an already impaired spring and aquifer system.

Being a Florida native as well as a an avid diver and a nature lover, I am concerned about the future pumping and what damage it will do to our Rainbow River system. I understand that the studies show that the levels of return are within the acceptable guidelines, however, can you guarantee that the return periods will hold true? With new demands of developmental growth and the impending Sabal Trail Pipeline which could all have great impacts to our water supply, can we be assured that this study can guarantee that our wetland communities, our water tables, our fish, our water will not suffer more by even a extra 1%?

Please, let mother nature take care of this, let's stop robbing from our resources and instead allow the beautiful Rainbow River to flow.

Thank you for your time,

DeAnn Thompson

May/June • 2000

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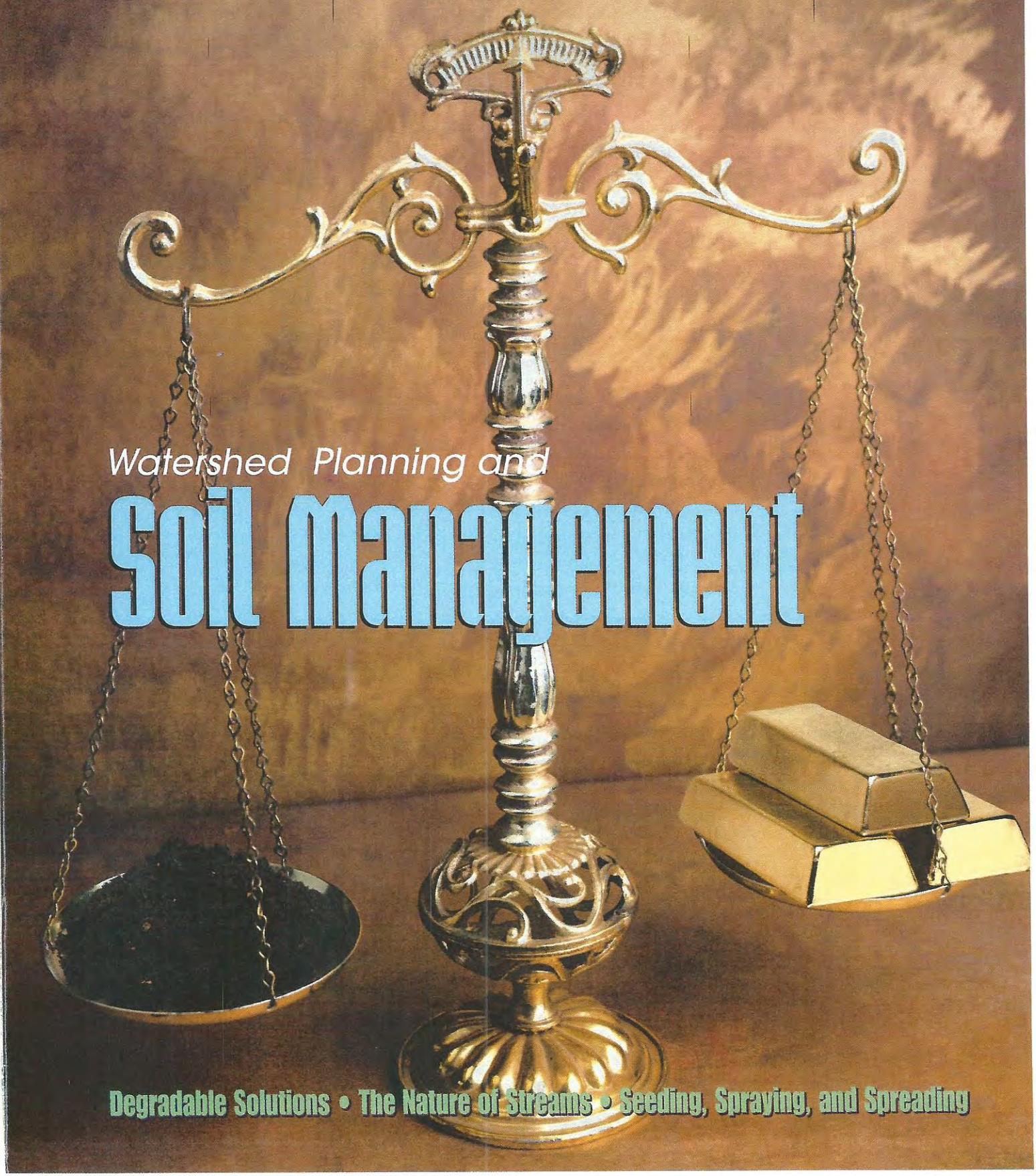

Watershed Planning and

Soil Management

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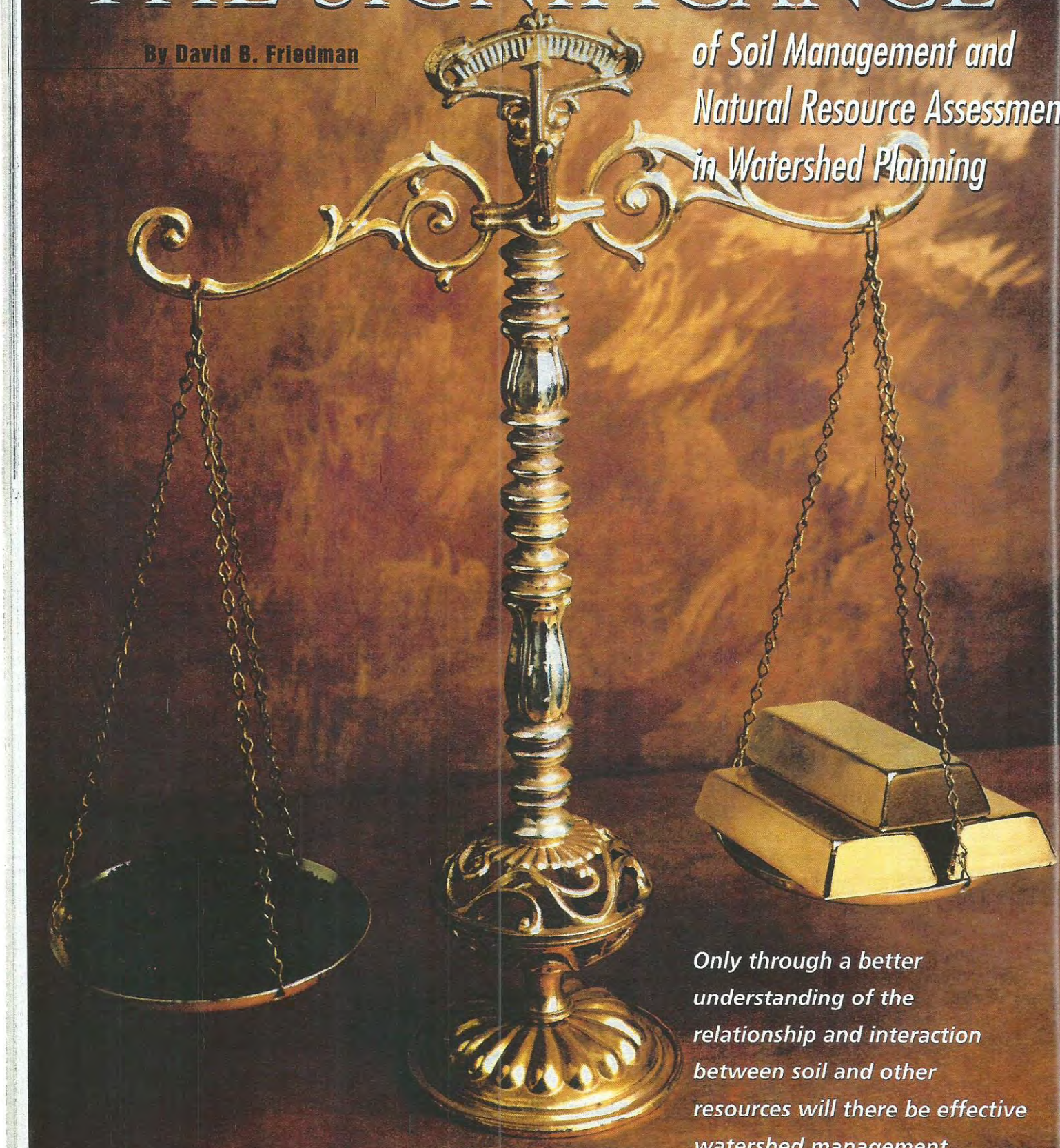
UNDERSTANDING THE SIGNIFICANCE

of Soil Management and Natural Resource Assessment in Watershed Planning

By David B. Friedman



Only through a better understanding of the relationship and interaction between soil and other resources will there be effective watershed management.

Soil, the thin layer of the earth's crust, serves as the fundamental natural resource for restoring, maintaining, and enhancing the water resources of every watershed. Healthy soil is like a sponge—biologically active and porous, filtering nutrients and water for all plants and animals (Sachs, 1999).

Soil management places an emphasis on managing rainfall at the point of impact, thereby improving soil health, water quality, water quantity, and the health of the ecosystem. Soil management practices would minimize the impact of land uses, and the use of soil management tools would maintain healthy soils and sustain environmental quality. The overall goal is to apply techniques and practices to improve soil structure, organic-matter content, and infiltration ability of soils.

Understanding the Problems, Needs, and Opportunities

One important function of soil is its ability to act like a sponge. The porous nature of healthy soils containing organic matter will typically allow much of the rainfall to infiltrate. Rainfall infiltrates slowly to recharge groundwater supplies. The rate of water flow through the soil is much less than that of water running off the soil surface. Therefore, precipitation that filters through the soil is slower to discharge to surface waters (Pielov, 1998). Runoff from compacted soils is quicker, with higher peak flows. Less water is infiltrated, which reduces base flow conditions. This could result in such structures as bridges and culverts being underdesigned and could have profound economic and environmental impact.

In the simplest terms, healthy soils offer the opportunity to infiltrate rainfall at the point of impact, thus limiting runoff quantities and providing treatment of stormwater as it seeps into the ground. New water-quality goals, such as total maximum daily load, offer unique opportunities to apply the principles of soil management to future land development in order to contain polluted runoff and its associated pollutants. These new regulations make it imperative for water-quality issues to be addressed as soon as a raindrop hits the soil. Soil management is about protecting our waterways. It provides a key opportunity to meet the goals of the National Pollutant Discharge Elimination System Phase II, reducing polluted runoff from construction sites. It also offers practical solutions for minimizing nonpoint pollution sources from farmlands. Federal and state programs should be encouraged to install agricultural practices integrated with practices that support soil management.

The increasing demand for water resources requires decisions that cannot be made without natural resource data. Some resource data within our watersheds exist as disconnected pieces of information for answering specific questions. Because the management and use of soil affect water and other natural resources, this interaction must be taken into consideration. No existing inventories give a clear picture of the holistic soil and land-use composition that would lead us to understand how other resources are integrated and interact when soils are compacted through changing land uses. Without this information, planners cannot predict the impact or recommend best management practices for proposed land uses.

Soil and related natural resource information is useful for several levels of planning, ranging from national to local levels. Local land-use proposals must be based not only on local ecological conditions, but also on the relation between local conditions and the overall watersheds. The impact of future land uses can be reduced by first developing a soil/land-use resource inventory, then by encouraging the use of such information when reviewing future land uses.

Soil Structure

The structure of a soil influences its ability to support plant growth, receive and store water and nutrients, and resist erosion. Therefore, it is important to pay particular attention to soil structure where human activities can cause changes with either positive or detrimental impacts on the functions of soils within the watershed. Determining how soils react to these changes applied to them is a key concern (Winegardner, 1996).

The US Department of Agriculture's (USDA) Natural Resource Conservation Service (NRCS) has been working closely with New Jersey's Ocean County Soil Conservation District (OCSCD) in conducting soil bulk-density tests on various land uses. These field experiences on both agricultural and urban soils have led to a visual assessment of structural form, complemented by the quantitative analysis of samples. Bulk density is the *key physical property* of soil and will change in response to land disturbance (Sumner, 1999). It can be described as the weight of a unit volume of dry soil expressed as milligrams per cubic meter. Generally, soil having a bulk density of 1.33 mg/m^3 is considered ideal, whereas bulk densities greater than 1.60 mg/m^3 will inhibit plant-root penetration. Bulk density varies with the packing of soil properties. Similarly, sandy soils pack more closely, and clays cannot be packed as tightly (Sumner, 1999).

	Forest		Lawns/Athletic Fields	
Depth	**Sandy (5)**	**Loamy (14)**	**Sandy (4)**	**Loamy (8)**
0-2 in.	1.26	1.28	1.54	1.69
2-4 in.	1.26	1.31	1.54	1.69
4-6 in.	1.32	1.43	1.59	1.77
6-8 in.	1.44	1.43	1.65	1.83
8-10 in.	1.44	1.47	1.68	1.82
10-12 in.	1.56	1.51	1.68	1.84
12-14 in.	1.46	1.55	1.77	1.75
14-16 in.	1.51	1.56	1.87	1.74
16-18 in.	1.51	1.60	1.86	1.73
18-20 in.	1.51	1.62	1.86	1.69

The following is a summary of the insitu bulk-density measurements tested to date. Note that the numbers in parentheses indicate how many sites were tested and that the data are averaged.

Soil conservationists use several words to explain soil properties, including the term *structural stability*. Structural stability is the ability of soil to retain its arrangement of solid and void space when exposed to different stresses. Stability characteristics are specific for a characteristic of each structural form and the type of stress applied (Croul, 1999). Stresses that create compaction could arise from tillage on farmlands, foot traffic on U-Pick farms, construction-equipment traffic, and lawn maintenance practices. The compaction causes a decrease in total pore space. The response of both the void and solid space to these stresses

must be measured for various soils under different land management.

Soil resiliency is the ability of soil to recover its structural form through natural processes when the stresses are reduced or removed. Resiliency can normally arise from freezing/thawing, wetting/drying, and biological activity. When soils become highly compacted, however, water cannot penetrate the most restricted or compacted layer, and these natural processes to recover soil structure do not occur.

Soil texture has a major influence on the form, stability, and resiliency of soil structure (Sumner, 1999). In their simplest form, coastal plain soils are made up of single sand grains. The characteristics of their structural form are determined by the distribution of grain sizes and modification from traffic, grading, or tillage. Clay or silt-size particles may be present and can exist as coatings on the sand grains or provide some filling between the grains. This kind of structure does not shrink or swell and is not responsive to freezing. Since the organic matter is low, there is little cementation between the grains. These coastal plain soils are very vulnerable to compaction and are the least stable under a given stress. Therefore, they have little resiliency and do not recover under natural processes.

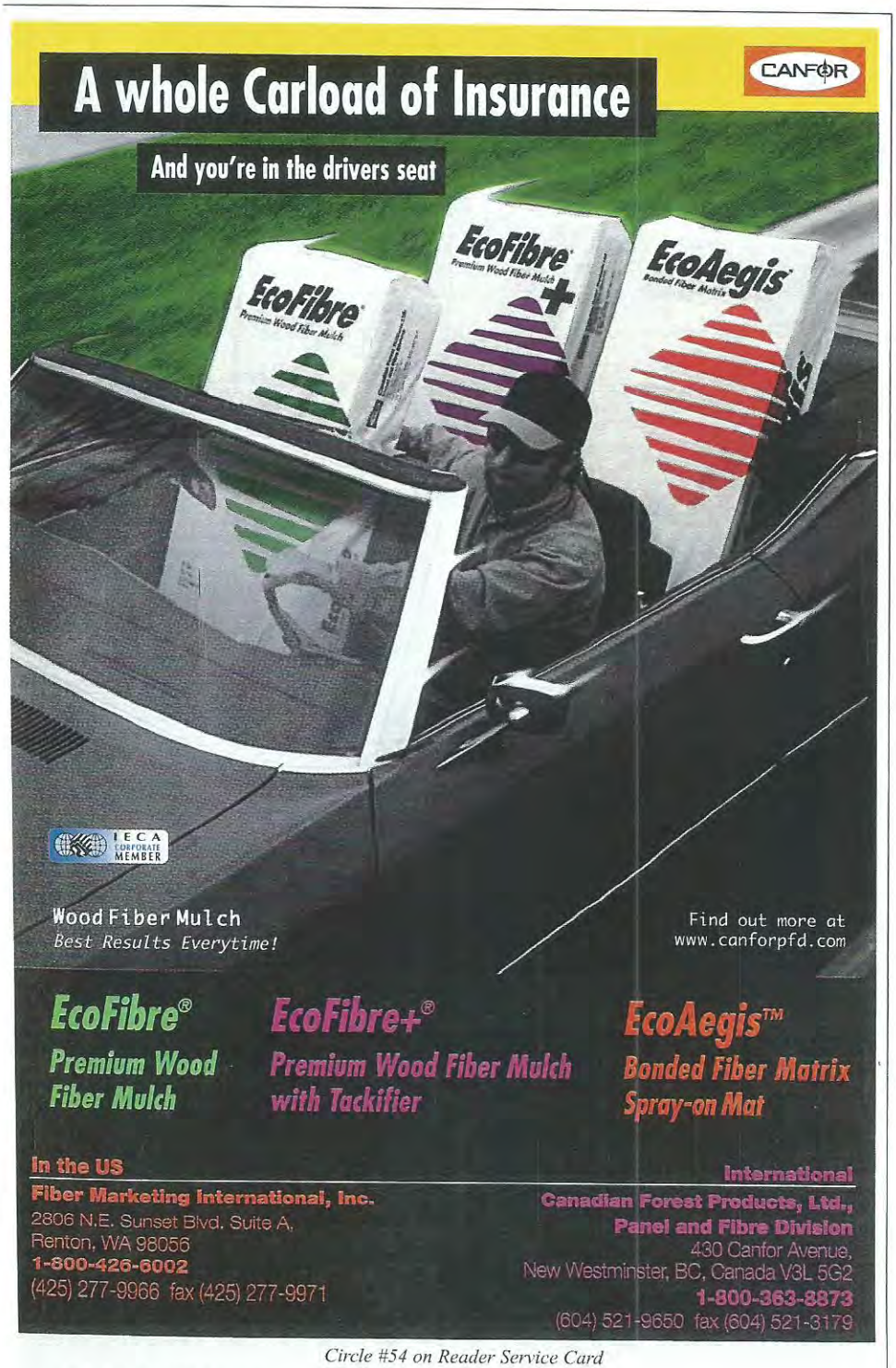
Healthy soils, with a good soil structure, support plant growth, cycle nutrients, receive and store water, resist soil erosion, and filter nonpoint pollutant sources. The activities of traffic and land grading and their associated soil compaction will lead to changes in the structure of the seedbed. The success of establishing plant growth in new seedbeds is dependent upon the degree of compaction and structural characteristics that control oxygen, water availability to the plants, and resistance to the penetration of roots.

Root development in plants is strongly influenced by soil structure. The root systems of many plants form a dense network in soils and lead to soil stabilization and reinforcement for streambanks and lake embankments. Soil cover provided by plants influences soil structure by reducing raindrop impact and allowing soil to absorb and retain water. Root growth, however, decreases as the resistance to penetration increases. Roots encounter increased resistance to penetration with increases in bulk density. OCSCD and NRCS have been using soil penetrometers to help determine root resistance. The output readings on the penetrometer measure the resistance related to root growth in a vertical direction only. These readings could be used to create a map of land use versus soil compaction problems within a subwatershed of Barnegat Bay and help provide needed natural resource data for future watershed planning. Such data could be used to map the extent of the compaction problem within a watershed and plotted on a Geographic Information System.

Soil erodibility defines the susceptibility of soils to erosion and largely depends on soil structure. Therefore, maintaining a good soil structure will help to build healthy soils, reducing the detachability of soil particles and the susceptibility of soil crusting. Soil management is an important component in preventing soil erosion, improving water management, encouraging plant growth, and improving water quality on our farms and in urban land uses.

Soil Management Components

Soil management encourages the natural function of a watershed. It supports the biological, chemical, and physical systems that are all linked through the soil so that a change in soil structure may cause changes in water and other natural resources. Applying soil management in land-use planning considers the interrelationship



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among proposed landscapes and provides a basis for making predictions, thus leading to better recommendations in site-plan review.

Protection of our soil resource is a key component of this approach. Such protection can prevent erosion and sedimentation, minimize flooding, and prevent water pollution. This approach requires the development of practices that will prevent soil compaction. As discussed earlier, compaction by traffic or grading is detrimental to soil structure, reducing soil porosity and the ability to grow vegetation. Decreasing the amount of clearing activities during the initial construction phase can minimize soil movement and reduce construction costs (Delaware Department of Natural Resources, 1997). While subsoiling may minimize compaction on farmlands, it is extremely costly and labor-intensive to undertake restoration of compacted soils on residential lawns. Irrigation systems, installed on many lawns, make it difficult to use aeration equipment. NRCS and OCSCD have tried to manually bore holes, and although meeting with some success, it is a laborious process. Further investigation is needed to find alternatives to restoration as well as to planning approaches so as to minimize grading, cut, and fill.



Improving soil health has social, economic, and environmental benefits. The application of the research of natural soil structure and bulk density and the development of methods for maintaining a good soil structure will lead to a reduction in runoff that transports pollutants to surface waters (Cahill Associates, 1992). That result will improve the soil's physical characteristics and the storage of water and nutrients for plants (Zentner, 1997). This scenario is a major component of soil management.

Outcomes of Soil Management Program

- Ability to relate land use with the soil's capabilities.
- Development of support information to guide land-use decisions.
- Soil and water management practices will be identified, developed, and evaluated for farmers and builders to better measure and minimize soil compaction.
  - Soil productivity and farm profitability will increase with the development of soil management recommendations.
  - Better understanding of the importance of soil management will lead to a more effective use of water resources, enhance nutrient conservation, and improve soil quality.
  - Improved management practices will help restore degraded and compacted soils.
- Tools and interpretative information will be available to provide an assessment of soil health and the economic impact of improving soil quality.
- Improved design manuals and watershed models, through better engineering practices in stormwater management and soil conservation, will be available.

Conclusion

A review of scientific publications, staff experiences in the field with landscapers and contractors, and contact with professional soil scien-

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tists, planners, and engineers confirm that land development and agricultural practices have changed stormwater runoff patterns from diffused overland flows to increased and concentrated flows. Therefore, we must adopt an interdisciplinary approach toward the use of soils on farms and in urban landscapes if we are to restore the hydrologic water cycle and emulate natural drainage conditions.

What can we do to prepare ourselves for effective soil erosion control and better watershed management? What opportunities exist for future developments to reestablish a percentage of healthy soils? What benefits and costs would be associated with the pursuit of these opportunities? Besides water quality, what other benefits can be realized? These questions are fundamental when considering the integration of soil management practices into farm conservation plans and also when reviewing future development proposals. Urban developments tend to generate an increased amount of stormwater runoff and volumes along with increased quantities of pollutants contained in sediments, fertilizers, pesticides, and other toxic substances. Conventional developments strive to maximize building density, preserving open space on individual lots. Some open space is created, as required by local ordinances, for stormwater and/or recreational purposes. Stormwater management in a conventional development is concerned only with minimizing onsite and downstream flooding. The result is a constructed stormwater system to convey runoff and a detention basin and outlet structure to control stormwater release rates.

Healthy soils can provide years of essentially free stormwater management service and the conservation of water resources for future generations. Soil erosion control and administering watershed management programs require us to be concerned about infiltration and water-flow processes in soils. Infiltration is a key process because it determines how much rainfall enters the soil and how much becomes runoff. It is the key process in erosion and nonpoint pollution control because there is no erosion without runoff that transports sediment and other pollutants.

Soil management is fundamental to the well being of a watershed. To maintain productivity, to filter and regulate water flow through a watershed, and to cycle nutrients, it is critical—in the interest of human health and well being—that soil be properly managed.

References

Delaware Department of Natural Resources. *Conservation Design for Stormwater Management*. Delaware Department of Natural Resources and Environmental Conservation. 1997.

Croul, Phillip J. Urban Soils: *Applications and Practices*. New York: John Wiley & Sons. 1999.

Cahill Associates. *Limiting Nonpoint Source Pollution From New Development in the New Jersey Coastal Zone: Summary*. 1992.

Pielov, E. *Fresh Water*. Chicago, IL: The University of Chicago. 1998.

Sachs, Paul. *Edophos: Dynamics of a Natural Soil System*. Newbury, VT: The Edaphic Press. 1999.

Sumner, Malcolm. *Handbook of Soil Science*. Boca Raton, FL: CRC Press. 1999.

Winegardner, Duane. *Soils for Environmental Professionals*. Boca Raton, FL: CRC Press. 1996.

Zentner, John. "Soil Considerations in Riparian Restoration." *Restoration and Management Notes*, 15:1. Summer 1997. EC

David B. Friedman *is director of the Ocean County Soil Conservation District in Forked River, NJ.*

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From:	David Friedman
To:	Kym Holzwart
Subject:	Re: Communicating about the significance of functional soil ecosystems
Date:	Tuesday, February 21, 2017 12:09:14 PM
Attachments:	Soil Management Article In Erosion Control Mag.pdf

Soilscape History

http://www.pinellascounty.org/resident/workinginpinellas.htm

Hi

I am a retired Soil Conservationist from outer coastalplain of NJ. I spent my first 17 years residing in Florida my Dad was a Navy veteran we resided in Miami and Jacksonville before he was transferred to Lakehurst, NJ. My wife and I recently purchased a home in Largo where we plan to retire. Worked for Rutgers University and District Director, Ocean County Soil Conservation District 39 years. Much of my career assisting towns, county and state government in restoration of soils to replenish groundwater resources, base flows, improve and sustain water quality etc. I am attaching a couple documents I preprared and a study I coauthored with USDA.

I understand you are preparing for a Public Meeting on the Rainbow River System. I don't expect you to read the entire study below, but if you have a moment please see the graphs on page 6....

I had to balance my career not opposing growth but, working with builders, planning boards to seek effectual conservation practices that minimize rainfall runoff and support replenishment of water supplies. I am sure you and your partners understand this very well.

My intentions in writing is just communications, I do not pretend to know it all, nor do I wish to push my work and experiences.

My article below was published in Erosion Control magazine, and again simply wish to share.

David Friedman
732-597-4286

--
David Friedman

From: stan stephens
To: Kym Holzwart
Subject: rainbow river min flow
Date: Tuesday, February 21, 2017 8:43:12 AM

---

can you give a general overview of what this will mean to the residents that live on the river or the thousands that use it for recreation yearly..Thanks

Sent from my Samsung Galaxy Tab®4

From: Leslie Senac
To: Kym Holzwart
Subject: Rainbow river
Date: Wednesday, February 22, 2017 9:00:14 PM

Please do everything in your power to protect Rainbow River and all State Park resources from private interest. These natural resources need to be preserved for future generations and for naturally occurring processes. Thank you for saving our Rainbow River 100%.

Leslie Harris
941.925.9256

5109 S. US 41
Sarasota, FL 34231

From:	Melissa Gulvin
To:	Mark Hammond; Eric DeHaven
Cc:	Terri Behling; Mark A. Green; Ron Basso; Kym Holzwart; Sky Notestein; Michele A. Sager
Subject:	Fwd: Rainbow MFL Statement
Date:	Wednesday, February 22, 2017 3:40:48 PM

FYI on this supportive email and Facebook post from the former Mayor of Dunnellon.

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
Office: (352) 796-7211 ext. 4419
Cell: (352) 206-4047
Email: Melissa.Gulvin@WaterMatters.org

From: Nathan Whitt <nwhitt@bellsouth.net>
Sent: Wednesday, February 22, 2017 3:32 PM
Subject: Rainbow MFL Statement
To: Sky Notestein <sky.notestein@swfwmd.state.fl.us>
Cc: Melissa Gulvin <melissa.gulvin@swfwmd.state.fl.us>

Hi Sky,

I apologize that I am out of town and can't make the upcoming MFL meeting.

I hope you are aware of the social media buzz about the upcoming MFL meeting. I believe folks are being intentionally misinformed.

I have issued this statement on social media in an attempt to bring a few important facts into the conversation:

The Minimum Flow Level (MFL) that the Southwest Florida Water Management District (SWFWMD) is proposing for the Rainbow Spring is a necessary step in the right direction. Until now, there has been no MFL and no true limit to the amount of water use permits issued by SWFWMD. Also, the fact that the MFL is based on historic flow levels, is setting a high bar for any new permits issued. As the historic flow fluctuates, so will the amount of allowable drawdown. We should gather all the facts we can before criticizing the hard work and research that has gone into reaching this very conservative MFL.

Nathan Whitt - Former Mayor of Dunnellon and Owner of Rainbow River Canoe and Kayak

Sent from my iPhone

Comment on Recommended Minimum Flow Plan for the Rainbow River System

Paul Marraffino 2/22/17

The development of the Minimum Flow Plan for the Rainbow River System is a significant body of work. Thank you for producing this document and coming to Dunnellon for this public hearing.

Water is essential for all living things, animals, plants, our springs and our communities. In Florida we are moving from an epoch of water abundance to one of water scarcity. Water is a community resource and it is proper for the State of Florida to institute systems and regulations that assure sustainable availability of this essential resource.

The Proposed Minimum Flow for the Rainbow River System document details many factors of water in the Rainbow River based on numerous studies by FDEP, USGS and the Southwest Florida Water Management District and others. A very compelling part of this data has been collected by the US Geological Service (USGS) and shows a historic data of the Median Annual Flow of 694 cubic feet per second over an 80 years period. This is the baseline that the MFL standard is based on. The Minimum Flow proposed for implementation is 95% of the historic flow or 659 cfs.

The data described in chapter 2 of the report and USGS data shows that during 15 of the last 20 years and 9 of the last 10 years the annual flow has been below this minimum flow standard (Attachment A.) The USGS data for the last 10 years shows an average of 587 cfs or 15% below the historic average.

Florida Statute 373.0421 Establishment and implementation of minimum flows and minimum water levels states:

"(2) If, at the time a minimum flow or minimum water level is initially established for a water body pursuant to s. 373.042 or is revised, the existing flow or water level in the water body is below, or is projected to fall within 20 years below, the applicable minimum flow or minimum water level, the department or governing board, as part of the regional water supply plan described in s. 373.709, shall concurrently adopt or modify and implement a recovery or prevention strategy."

The Executive Summary of the Minimum Flow document states that "pumping is approximately one per cent and the minimum flow is being met." Florida Statute does not refer to pumping or a modeling system with approximations that estimates pumping, the statute refers to FLOW. Using the Flow data which is measured, rather than the pumping data which is not measured, the Minimum Flow for the river system is not being met. The SWFWMD proposal in this document should have a conclusion and output goal of developing and implementing a "recovery program" for the Rainbow River System.

There is a section in the document which alludes to a "Atlantic Multidecadal Oscillation" which may help to explain the recent reduction in annual rainfall and therefor the rate of aquifer recharge and river flow. Although this discussion is interesting, the topic does not address the problem of reduced flow. The fish, turtles and benthic critters in the Rainbow River will not have a chance to live out the 10 to 20 year oscillation cycle that has been modeled to see if rainfall and flow recover. There is a problem now and it should be addressed now.

This proposed MFL report should include the recommendation that a Recovery Program for the Rainbow River System be implemented.

Attached A. Flow Data for the Rainbow River System

Rainbow River Flow as measured at USGS gage (02313100)

694	**Annual median springflow from 1929 to 2014***
659.3	**Proposed Annual Minimum Flow and Level (MFL) 5% reduction**

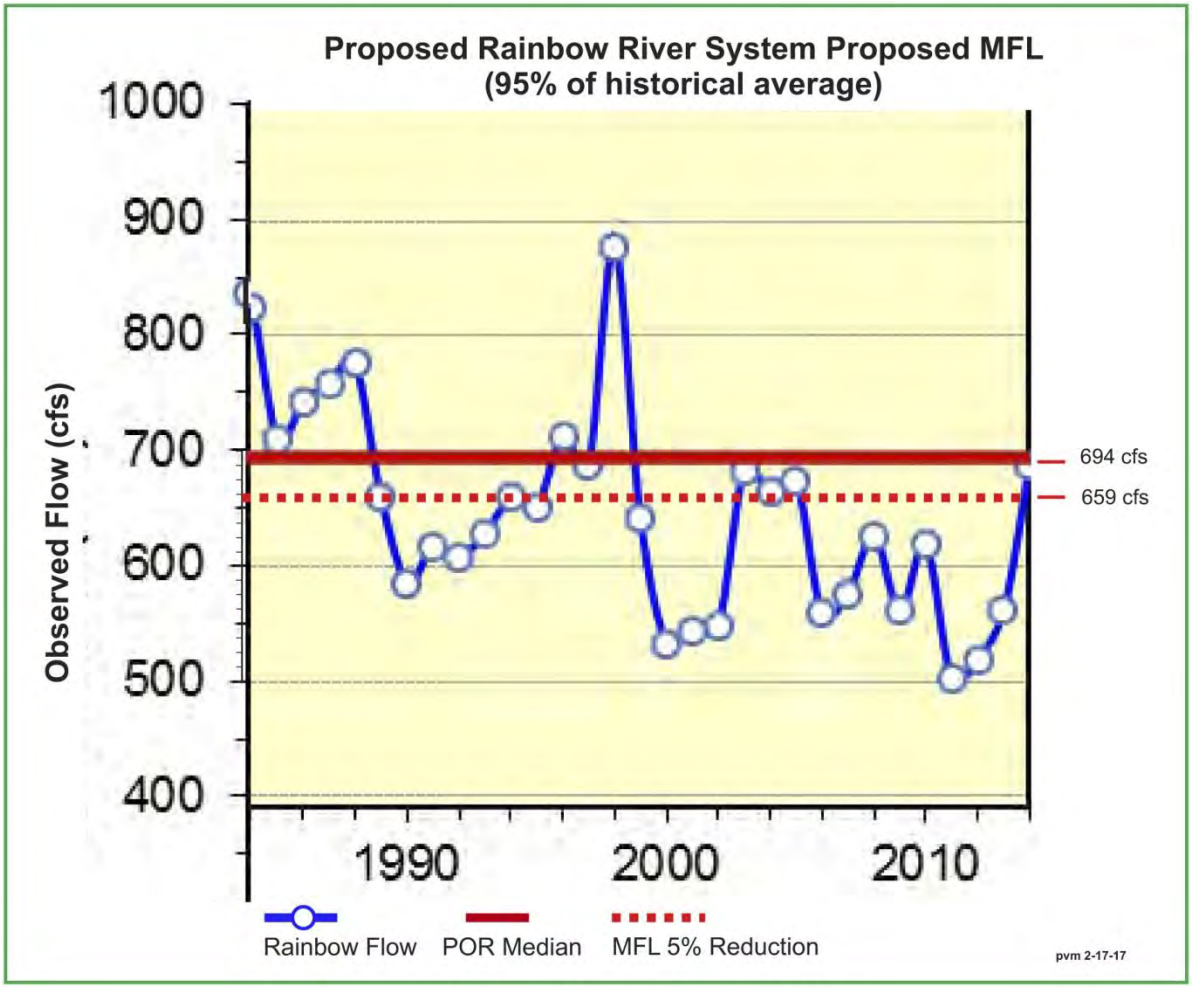
20 Year Period		cfs	Flow (cubic feet per second)		Sorted by flow level		
1	1997	**688.8**	Red values are below	1	1997	**688.8**	
2	1998	**878.3**	proposed MFL	2	2005	**693.3**	
3	1999	**641.5**		3	1998	**878.3**	
4	2000	**533.3**		4	2003	**683.3**	
5	2001	**543.6**		5	2014	**687**	
6	2002	**548.4**		6	2013	**561.3**	
7	2003	**683.3**		7	2004	**648.5**	
8	2004	**648.5**		8	2015	**643.8**	
9	2005	**693.3**		9	1999	**641.5**	
10	2006	**604.6**		10	2008	**626.4**	
11	2007	**574.8**		11	2010	**618.3**	
12	2008	**626.4**		12	2006	**604.6**	
13	2009	**561**		13	2016	**576.6**	
14	2010	**618.3**		14	2007	**574.8**	
15	2011	**502.1**		15	2009	**561**	
16	2012	**520**		16	2002	**548.4**	
17	2013	**561.3**		17	2001	**543.6**	
18	2014	**687**		18	2000	**533.3**	
19	2015	**643.8**		19	2012	**520**	
20	2016	**576.6**		20	2011	**502.1**	
		616.745	**Average**			**622.35**	**Median**

* Draft - Recommended Minimum Flow for the Rainbow River System page 22, and Figure 2-8
Principle author Kym Rouse Holzwart

Source USGS web site

pvm 1-28-17

https://waterdata.usgs.gov/nwis/annual?referred_module=sw&search_site_no=02313100&format=sites_selection_links


Proposed Rainbow River System Proposed MFL
(95% of historical average)
Observed Flow (cfs)
1000
900
800
700
600
500
400
1990
2000
2010
694 cfs
659 cfs
Rainbow Flow
POR Median
MFL 5% Reduction
pvm 2-17-17

From: Paul Marraffino
To: Melissa Gulvin; Kym Holzwart; Ron Basso
Subject: Written Comment on Proposed MFL for Rainbow System
Date: Friday, February 24, 2017 11:55:13 AM
Attachments: Comment on Minimum Flow Plan for the Rainbow River System 2-23-17.pdf

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Thank you all for coming to Dunnellon and presenting the Proposed Minimum Flow for the Rainbow System yesterday.

Attached is a digital copy of my comment on the proposed MFL that I summarized yesterday in the meeting at Dunnellon City Hall.

This morning I again reviewed Florida Statute 373.042 and 373.0421 and could not find any reference to take into consideration the impact of reduced rainfall in recent years. There is a historical record that includes wet and dry years. When the flow is below the defined minimum flow (95% of the historic flow), the statute states that a recovery or prevention plan shall be developed and implemented. This would imply in the short run capping of permits and in the longer run all existing users in the Rainbow River System recharge basin would have to reduce their consumptive use.

The discussion and recent updates to the report described potential impact of the Atlantic Multidecadal Oscillation which may be responsible for lower rainfall over long time cycles. The Florida Statute clearly does not have an exclusion or adjustment for such global concepts. The flow of the river, which is measured by USGS, is the flow. It has been below the MFL level for 9 of the last 10 years. If the ten year annual numbers are averaged, it is 15 % below the historical base level. If Central Florida is being impacted by Global Climate Change which will reduce rainfall over a 20 to 50 year period, thre is more reason to develop and implement a recovery plan.

Regards,

Paul Marraffino
2-24-17

From: Melissa Gulvin
To: Mark Hammond; Terri Behling; Eric DeHaven
Cc: Kym Holzwart; Ron Basso; Doug Leeper
Subject: FW: Good Job
Date: Friday, February 24, 2017 2:56:04 PM

Nice feedback from Bill Vibbert of the RRC about last night's meeting.

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

From: Melissa Gulvin
Sent: Friday, February 24, 2017 2:54 PM
To: 'william vibbert' <bdvibbert@att.net>
Subject: RE: Good Job

Thank you Mr. Vibbert.
I truly appreciate your feedback. You say it well "the goal is not agreement, but civil participation." We were happy with such a large turnout and are compiling all comments to provide to our Governing Board. The sound system wasn't too disruptive! We were thankful for the use of the building and the assistance of City staff in preparing for the large crowd.
Have a nice weekend!

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

From: william vibbert [mailto:bdvibbert@att.net]
Sent: Friday, February 24, 2017 2:41 PM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Good Job

Hi Melissa,
I wanted to thank you for holding last night's meeting, you did a great job. The meeting was well organized, great participation, good information from SWFWMD and people left feeling that you really wanted their participation. When running a meeting, the goal is not agreement, but civil participation and you achieved that. I wrote to Dawn (the second time) about the disruptive sound

system, no excuse as it has been an issue for a long time issue. Good work!

Bill

From:	Alan Martyn Johnson
To:	Ron Basso; Doug Leeper
Cc:	Kym Holzwart; Melissa Gulvin; Kurt Fritsch; Ross Morton; Yonas Ghile; Eric DeHaven
Subject:	Fw: USGS FOIA 2017-00069 - Final Response
Date:	Saturday, February 25, 2017 7:35:29 PM
Attachments:	Rainbow rating 1.txt 2017-00069 - Response.pdf Rainbow rating 2.txt Rainbow rating 3.txt Rainbow rating dates.pdf

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This is the information from USGS re my FOIA request for historic rating charts for Rainbow River.

Think we have the explanation for the perceived anomaly.

Let me try to summaries for those who may not have time to study. I have used the discharge at well level 31 feet as this is the one used in the MFL Report.

- Rating 1 was in use 1901-1985 and at 31 feet gave 650 cfs
- Rating 2 was in use 1985-1988 and at 31 feet gave 690 cfs
- Rating 1 was in use 1988-2000 same 650 cfs at 31 feet
- Rating 3 was in use 2000-2010 and at 31 feet gave 610 cfs
- Rating 4, which I think is the same one I shared previously (although it was not noted as Rating 4) has been in use since 2010 and gives 583 cfs at 31 feet

I suggest this confirms there are forces back in the aquifer controlling spring discharge other than the level in Rainbow Well. An example is the information I shared regarding levels and discharge before and after Hurricane Hermine (e-mail earlier today to Ron and Doug).

Disappointing no one checked with USGS before writing the report page 32 of the most recent draft report or the original page 28.

Martyn

Next step is to understand backwater effect;
ECT Report
Page 1-2 and 1-3
Severe backwater effects are concluded by comparing the stage records collected at this USGS gages and USGS gage 02313100 in the River.
Page 4-15
Therefore, the stage at the spring head appears to be influenced by the stage in Withlacoochee River, to a certain extent, while significant influence of backwater effect was observed in the lower portion
of the River.

Remember a sentence was removed from the first report as the observer apparently vanished. The above 'was observed' could refer to the comparison of gage heights.

Where is the data? Backwater effect appears to be lacking any factual basis unless the data is available. Someone had stab at this weeks ago and retracted it as they had mis-aligned columns (I am not going to look for that e-mail right now).

From: jewilson@usgs.gov <jewilson@usgs.gov> on behalf of Freedom of Information Act, GS-D-EI_ <foia@usgs.gov>
Sent: Friday, February 24, 2017 12:15 PM
To: Alan Martyn Johnson
Cc: GS-GIO Freedom of Information Act; Emmanuel Charles
Subject: USGS FOIA 2017-00069 - Final Response

Dear Mr. Johnson,

I am attaching our final response to USGS FOIA 2017-00069, along with the charts and other information you requested. Please let me know if you have any questions.

Sincerely,

Janis Wilson
U.S. Geological Survey
Department of the Interior
Denver Federal Center
Box 25046
Mail Stop 406
Denver, CO 80225-0046
(303) 236-1476 (office)
(303) 236-1451 (fax)
foia@usgs.gov

From: Melissa Gulvin
To: Alan Martyn Johnson
Cc: Doug Leeper; Kym Holzwart; Eric DeHaven
Subject: RE: Public Hearing last Thursday
Date: Monday, February 27, 2017 9:12:58 AM

Martyn,
Thank you for attending the public meeting on Thursday. It was nice to meet you. The District did not film the meeting. The organization filming was a separate entity working on a springs documentary. I never got a chance to talk with them, so I don't know details of the organization.

Yes, executive staff and the District's Governing Board will be provided a summary of all oral and written comments received at the public meeting as well as all comments received in advance of and after the public meeting leading up to the Board meeting on March 28.

Our meeting notes reflect your comment that the rule language for Chassahowizka and Homosassa is meaningless and you hope to see better rule language this time around.

Thanks again for your participation in this process.

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604
(352) 796-7211, ext. 4419
(352) 206-4047 cell
Melissa.Gulvin@WaterMatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, February 27, 2017 8:00 AM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Subject: Public Hearing last Thursday

Melissa,
I am directing these questions to you as it appeared you were coordinator of last Thursday's Public Meeting regarding Rainbow MFL. If this is not directed correctly, please forward or inform me accordingly.

- Do I assume correctly the video recording was done by SWFWMD. I realize there was a lot of noise at the start of the meeting, but I did not hear any announcement to that effect. I intended to ask you when I introduced myself as I left the meeting; but it slipped my mind.
- What will happen regarding the meeting moving forward? Will some form of summary

be prepared for senior management/the Governing Board. I trust this will not simply be left as 'a public meeting was held'.

Please note I did make reference, although very brief, to the MFL's for Chassahowizka, Homosassa and Weeki Wachee being meaningless as entered into the FAC, because they refer to withdrawals downstream of the respective gage sites.

Martyn

FYI

I did get a Hearing before the Rules for Chassahowitzka and Homosassa were finally filed (I left a copy of the PowerPoint presentation with the District). The Chronicle article is still in the archives, The Governing Board Member who chaired the Hearing reported back to the Board, his comments/report are on tape at the following Board Meeting. Two years later I made a presentation (3 minutes) to the Governing Board January 27, 2015. Board Member Paul Senft said they would get a response to me. I remain convinced the response signed by Mark Hammond dated February 10, 2015 was written by someone from legal who either could not read or listen to my concern about the Rules referring to withdrawals downstream of the reference gage sites. Please note reference was made to Chassahowitzka and Homosassa MFL Rules at Thursday's meeting as if these were in place and working.

From:	Alan Martyn Johnson
To:	Eric DeHaven; Kym Holzwart
Cc:	Doug Leeper; Melissa Gulvin
Subject:	Chronicle Newspaper Sunday
Date:	Monday, February 27, 2017 8:15:54 AM

Kym and Eric,

An interesting article in yesterday's Chronicle which I have no doubt you read. It is fairly typical of a newspaper reporter's coverage; he reported a two hour meeting on a specific subject for the general readership and did a reasonable good job. My interest this morning is to ask about the quotes used from Kym and Eric:

- <!--[if !supportLists]--><!--[endif]--> Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.

  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.

- <!--[if !supportLists]--><!--[endif]--> "We all have to do our part," Eric DeHaven, assistant director of the district's resource management division, said. "Everyone has a role in it."

Would either of you care to expand on what these comments mean?
Possible 3 or 4 key bullet points is all that is needed.

I am particularly interested in what misinformation Kym says is 'out there'.
What the District is doing to save the Rainbow River by suggesting there can be further reduction in spring discharge by allowing more withdrawals from the aquifer. SWIM and MFL often appear to be treated as mutually exclusive (Federal as opposed to District may be).

Thanks in anticipation of a brief reply.

Martyn

From: Eric DeHaven
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday
Date: Tuesday, February 28, 2017 12:58:56 PM

Hello Martyn,

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

1. Adopting a minimum flow for the Rainbow River System harms the river.
2. The District is not required to adopt a minimum flow.
3. The District is attempting to "take" water from the river.
4. The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).
5. The minimum flow is developed in the office "behind closed doors" without using real information.
6. The impact of groundwater pumping in the Rainbow River Springshed is large, and pumping from outside the groundwater boundaries (e.g., Jacksonville, Orlando) is affecting Rainbow Springs.
7. The decline in Rainbow Springs flow the past 20 years or so is due to excessive groundwater pumping.

Eric DeHaven, P.G., Assistant Director
Resource Management Division
Southwest Florida Water Management District
7601 HWY 301 N
Tampa, FL 33637
(813) 985-7481 X2118

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, February 27, 2017 8:16 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Chronicle Newspaper Sunday

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- Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.
  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.

- "We all have to do our part," Eric DeHaven, assistant director of the district's resource management division, said. "Everyone has a role in it."

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Possible 3 or 4 key bullet points is all that is needed.

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What the District is doing to save the Rainbow River by suggesting there can be further reduction in spring discharge by allowing more withdrawals from the aquifer. SWIM and MFL often appear to be treated as mutually exclusive (Federal as opposed to District may be).

Thanks in anticipation of a brief reply.

Martyn

From: Alan Martyn Johnson
To: Melissa Gulvin; Eric DeHaven; Doug Leeper; Kym Holzwart
Cc: Kurt Fritsch; Ross Morton
Subject: Re: SWFWMD"s MFL MESS
Date: Tuesday, February 28, 2017 9:08:34 AM

Melissa,
Appreciated. Good job for fast follow up.
Thank you,
Martyn

From: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 8:44 AM
To: Alan Martyn Johnson; Eric DeHaven; Doug Leeper; Kym Holzwart
Cc: Kurt Fritsch; Ross Morton
Subject: Re: SWFWMD's MFL MESS

Good morning Martyn,
I just asked Terri who was our media point of contact at the meeting. The gentleman filming was with Save Our Florida Waters Now.

Melissa Gulvin
Government Affairs Program Manager
Southwest Florida Water Management District
Office: (352) 796-7211 ext. 4419
Cell: (352) 206-4047
Email: Melissa.Gulvin@WaterMatters.org

On Tue, Feb 28, 2017 at 8:40 AM -0500, "Alan Martyn Johnson" <martynellijay@hotmail.com> wrote:

> Melissa et al,
> Surprised you are not aware of who was filming the meeting, but I assume the lady sat next to you was taking the notes/transcript. My comment about the Chassahowitzka and Homosasa Rules being meaningless also included a suggestion to go read them. For those who have not, or need a reminder, here they are;
>
> (16) Minimum Flow for the Chassahowitzka River System.
> (a) For purposes of this rule, the Chassahowitzka River System includes the watercourse from the

Chassahowitzka Main Springs Complex to the Gulf of Mexico, including contributing tributaries, Blind Springs and all named and unnamed springs that discharge to the river.

(b) The Minimum Flow for the Chassahowitzka River System is 97% of the natural flow as measured at the United States Geological Survey (USGS) Gage Chassahowitzka River near Homosassa (Gage No. 02310650). Natural flow is defined for the purpose of this rule as the flow that would exist in the absence of water withdrawal impacts. **The Minimum Flow at any point downstream from this Gage is measured as the previous day's natural flow at that point minus 3%.**

(c) The District will reevaluate the Minimum Flow within six years of adoption of this rule.

(17) Minimum Flow for the Homosassa River System.

(a) For purposes of this rule, the Homosassa River System includes the watercourse from the Homosassa Main Springs Complex to the Gulf of Mexico, including the southeast fork of the Homosassa River, Halls River, Hidden River and all named and unnamed springs that discharge to these rivers.

(b) The Minimum Flow for the Homosassa River System is 97% of the combined natural flow as measured at the United States Geological Survey (USGS) Homosassa Springs at Homosassa Springs, FL Gage (No. 02310678), and the USGS SE Fork Homosassa Spring at Homosassa Springs, FL Gage (No. 02310688). Natural flow is defined for the purpose of this rule as the flow that would exist in the absence of water withdrawal impacts. **The Minimum Flow at any point downstream from these Gages are measured as the previous day's natural flow at that point minus 3%.**

(c) The District will reevaluate the Minimum Flow within six years of adoption of this rule.

The last page of my handout to the Governing Board January 27, 2015 was as above black large type and had downstream circled.

Meaningless. Yes. After all the millions of dollars of taxpayer money spent on the studies and modeling. all the public meetings and time spent by staff investigation how reduced flow from the springs....due to groundwater withdrawals from the aquifer....would likely harm these rivers; and someone wrote these rules (may I add after the final report was presented to and approved by the Governing Board). AND MOST DISTURBING IS THE GOVERNING BOARD BOUGHT IT.

Even when I pointed it out to the Governing Board in person at the January 27. 2015 Board Meeting the response was still some half baked letter that did not address the failure of these Rule to address groundwater withdrawals.

You all have seen my determination to keep you honest and accurate about the MFL Reports for Rainbow and Kings Bay. As you all well know my opinion is both reports are seriously flawed. But let me assure you all, my determination to do all I can to stop MEANINGLESS rules being entered into the FAC is even greater than trying to help you be accurate.

Martyn

From: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Sent: Monday, February 27, 2017 9:12 AM
To: Alan Martyn Johnson
Cc: Doug Leeper; Kym Holzwart; Eric DeHaven

Subject: RE: Public Hearing last Thursday

Martyn,
Thank you for attending the public meeting on Thursday. It was nice to meet you. The District did not film the meeting. The organization filming was a separate entity working on a springs documentary. I never got a chance to talk with them, so I don't know details of the organization.

Yes, executive staff and the District's Governing Board will be provided a summary of all oral and written comments received at the public meeting as well as all comments received in advance of and after the public meeting leading up to the Board meeting on March 28.

Our meeting notes reflect your comment that the rule language for Chassahowizka and Homosassa is meaningless and you hope to see better rule language this time around.

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Melissa Gulvin
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2379 Broad Street, Brooksville, FL 34604
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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, February 27, 2017 8:00 AM
To: Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
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Please note I did make reference, although very brief, to the MFL's for Chassahowizka,

Homosassa and Weeki Wachee being meaningless as entered into the FAC, because they refer to withdrawals downstream of the respective gage sites.

Martyn

FYI

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From: Jennifer L. Rosinski
To: Kym Holzwart
Subject: Rainbow Springs MFL
Date: Tuesday, February 28, 2017 11:03:59 AM

Hi Kym,
Due to the crowds, I was not able to attend the public workshop on Feb 23. Will the meeting minutes and presentation be made available?
Thanks,
Jenn

Jennifer L. Rosinski, Ph.D., PWS
Senior Scientist
Breedlove, Dennis and Associates, Inc.
30 East Liberty Street
Brooksville, FL 34601

Phone: 352-799-9488
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Withlacoochee Aquatic Restoration
W.A.R. Inc.
To implement civic action and to promote the common good of residents of the community with a focus on public awareness and responsible stewardship of regional water sources; the basis for all the natural systems that define Florida's Nature Coast

2-28-17

TO: Doug Leeper
Chief Environmental Scientist
Resource Projects Dept.
Ecologic Evaluation Section
Southwest Florida Water Management District

CC: Melissa Gulvin
Government Affairs Program Manager

Subject: Rainbow Springs MFL Rule Development

The following input is provided to express concerns and suggest that a more cautionary position by District staff may be appropriate in development of recommendations to the Governing Board for rule adoption. The comments are not technical in nature, but rather directed at process and public perception.

While the legislative schedule requirements are understood to result in a rather harried process, we are mindful of the ultimate objective in rule development, specifically, to promote protection of the resource while providing reasonable basis for water supply permitting in the future. Complicating the matter is impaired water status for the system due to nutrients and resulting algal proliferation in the spring run.

Public Perception in General: In very simple terms, citizens perceive the draft recommendations as promoting development at the additional expense of a resource that is listed by FDEP as impaired waters. In support is recognition of impacts from existing high nutrient pollution levels are compounded by potential increases of residence time resulting from further reductions in flow due to WUP issuance. Draft recommendations present as placing a priority on water supply at the expense of other District areas of responsibility, specifically, water quality (ex: chlorophyll-A) and protection of natural systems.

Importance of Nutrient Pollution and Flow: Acknowledgement of the relationship between nutrient pollution and flow (residence time) is made in the draft, but in a somewhat dismissive fashion. It is, in simple terms, a fundamental issue in the public eye. Reduction of scouring action and relationship between algal proliferation and increasing residence time is generally understood by the public, and relevant to the proceedings. It is recognized that nutrient concentration does not significantly change as a function of flow rate, but there is a known corollary to residence time, algal proliferation and natural system function.

It is an issue which should suggest a cautionary development of the rule that is complimentary of existing or developing objectives found in FDEP TMDL and BMAP documents. The perception is that two state agencies are working at cross purposes in management of the state's most valuable resource.

Importance of Salinity Ingress: There is a perception that the process focuses on individual elements of the riverine system at the expense of overall system health and function. As example, there was oral comment rendered at the 23 Feb 2017 public hearing in Dunnellon to the point that potential impacts to the system in form of increasing salinity ingress in the river segment below the Inglis Bypass Spillway were not evaluated.

District information regarding the system suggests the majority of system flows (65-70%) west of Holder originates from base and spring flow and is largely supported by Rainbow River/Springs. This particular issue is one of very high concern to residents of Inglis and Yankeetown, many of which were present at the referenced hearing. Residents on the south side of the river channel are dependent upon private wells for

water supply, live on an island which is isolated from the regional surficial aquifer and extremely vulnerable to salt water intrusion into the supporting aquifer.

They are correct on the point of this omission in development of the draft.

Permitting Cap: The Peer Review Panel made specific recommendations to cap permitting within the basin at present levels or at most provide minor allowance for permitting. The Panel expressed concerns about the sufficiency of data and/or analytical processes in draft development and opined that further study was justified while proceeding with caution. The view of the Panel generally resonates with concerned citizens.

Within the current draft are estimates of existing use and future demand for the resource in the contributing basin. It is suggested that within the planning period ending 2035 that total impact will rise to 3% of average system flow. Staff has recommended a 10 year review cycle which would provide an opportunity in 2027 for update of the rule, ostensibly with an enhanced data set.

It was noted during public input at the meeting in Dunnellon that the proposed 5% recommendation is inconsistent with the historical record over the most recent 20 years. In short, a super majority of annual flow records in that period are already below the proposed threshold. See Marraffino comments/2-22-17 (attached).

Recommendations: With a view tempered by the preceding discourse, we make the following recommendations intent on facilitating a functional draft recommendation.

1. Given that recent annual average flows are, in the majority, below the draft 5% flow reduction threshold which defines significant harm to the system, and consistent with Peer Review Panel recommendations, cap further WUP issuance and recommend development of a recovery plan for the system. If de minimis impact (estimated +.5-1%) is required to facilitate development of a recovery plan due to legislated time constraints, it would be accepted by this organization.
2. Maintain the 10 year review cycle, or increase frequency as deemed appropriate.
3. Make clear unequivocal recommendation to the Governing Board that the District collaborate with FDEP in further analysis of the nutrient/residence time puzzle; sufficient that definitive understanding of the relationship and thresholds which trigger unacceptable algal proliferation are understood and properly evaluated within the framework of MFL rule development and review.
4. Seek the assistance of the Florida legislature in developing a regulatory definition of Significant Harm.

Respectfully submitted,

Dan Hilliard
President
W.A.R., Inc.
352-527-0023

From: Eric DeHaven
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday
Date: Thursday, March 02, 2017 4:46:29 PM

Martyn, thanks for the comments. Here is a link to some work that has been done to date spring/aquifer water:

https://pubs.er.usgs.gov/publication/wsp2409

http://www.swfwmd.state.fl.us/files/database/site_file_sets/2173/Rainbow_Springs.pdf - Page 64

I would also indicate that you are correct on the first point below – adopting a minimum flow for the Rainbow River can harm the river. Need to put this answer in the context of harm versus significant harm. As you know, the MFL charge is focused on significant harm.

Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or as needed model runs to determine how withdrawals are impacting flows. We would be happy to discuss this further with you.

We realize how important setting MFL's are – hence the detail in your email. That is also why we apply significant staff resources to the current effort and will continue to do so even after the MFL is set for future re-evaluations.

Eric DeHaven, P.G., Assistant Director
Resource Management Division
Southwest Florida Water Management District
7601 HWY 301 N
Tampa, FL 33637
(813) 985-7481 X2118

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, March 02, 2017 8:48 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
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Let me respond to each point which I have italicized.

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

There is no doubt septic tanks are an issue, but may I suggest we all need to keep this issue in balance with the other sources of nitrate/nitrite; I think the FDEP came up with the estimates Figure 3-2 in the MFL Report that 66% of nitrate comes from cattle/horse/crop agriculture and 19% from septic. I also seem to recall cattle/horse head count are increasing much quicker that the human population. So can I suggest that ranchers/farmers are included in we all have a role to play. Given the legacy concept we may see further increases due to the increased ag activities. Just a thought but has any work been done to 'date' the nitrate in spring discharge? Let us not forget the urban sources where I think golf courses feature heavily; do all those golfers realize their part of the grand scheme of nitrate increases…golf ranges may be a way to reduce that!!

Further, the push to get households off septic tanks and on to central sewage systems is not as easy a fix as we are often lead to believe. For example, look at the situation with Crystal River Sewage Treatment Plant discharging into Cedar Cove (trust I got the name correct from memory), there is a major nitrate discharge at one location. Just makes me think about all the other treatment plants and where the discharge goes. Treatment plants reduce but not eliminate.

To respond to your question, the District did a past study to

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

1. *Adopting a minimum flow for the Rainbow River System harms the river.*
   I do not understand how Kym can say this is clearly incorrect when the whole point of MFL is to permit additional harm, agreed the additional harm is limited to 15% (not that the 15% is legislated, as opposed to generally accepted by water management districts). A follow up to that is ""additional harm starting when"". The very essence of MFL is it allows harm to the river. Yes, the MFL is supposed to limit further harm, but all those people who spoke last Thursdays believe the river has already been harmed enough.
   All the people who expressed similar sentiments at the Chassahowitzka and Homosassa meetings were rewarded with meaningless Rules placed in the FAC.

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Trying to be fair about this it appears to me this is simply a matter of semantics.. Yes I am sure some of the folks do think there will be withdrawals from the river. Even newspaper articles sometimes miss being precisely accurate in the wording sometimes.

4. *The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).*

The issue here is no one from SWFWMD can explain how this percent approach works for a spring fed river. I have repeatedly ask for some examples (theoretical) to explain this. Most recently I touched on this briefly in an e-mail to Doug February 9. Someone needs to put themselves in the position of explaining this to your permitting team. At present permits for all the springsheds are issued like candy to kids who manage to complete the application form correctly. Just look at the permit applications, particularly those rejected.

Lets get some explanation of how this concept works for a spring fed river and stop hiding behind the application to a surface water system with or without seasonal blocks.

5. *The minimum flow is developed in the office "behind closed doors" without using real information.*

This is possibly an impression you all create which stems from all the modeling. Let me speak personally to this point. There are questions regarding the development of the models (highly complex computer programs) which often do not make logical sense or poorly relate to reality. Examples; reverse flow was observed, backwater effect appears, a linear interpolation approach was used (agreed USGS data indicating this was not correct was not initially available other than DEP reports mention of numerous small boils in the upper 2 miles). Some of my examples also apply to Kings Bay, so let us not forget the "pulsing springs of Kings Bay"; watch this space for more on the "pulsing springs of Kings Bay" next week.

Further, the changes in percent after a few comments is a pattern that detracts from the scientific (modeled) strength of the initial MFL. A last minute' more conservative approach has been the case with Homosassa, Chassahowitzka (you even had to submit corrections to the Rules as initially filed with the FAC). These made some folks happy as has the Rainbow change 7% to 5%, but it only adds to thoughts of bad science.

6. The impact of groundwater pumping in the Rainbow River Springshed is large, and pumping from outside the groundwater boundaries (e.g., Jacksonville, Orlando) is affecting Rainbow Springs.

The list of withdrawals specifically from the springsheds each year is not readily available. Confusion does result from the adjustments made for immediate return of 'non consumed' water from septic and sewage to the aquifer (see staff response to my early questions/comments on Rainbow).

nAnd, the consolidation of Domain-wide withdrawals as presented Table 2-3 Rainbow MFL report rather than presenting springshed specific withdrawals in this and similar Tables for other springs does not help clarify the withdrawals. It leaves me questioning how this NDM splits out the springshed withdrawals. May be there is need to recognize the modelers intent that NDM is Regional and not applicable at the individual spring level. They have cautioned users from incorrectly using the model output. See the model Reports.

Quote

Potential users of the NDM should note that because of recognized data deficiencies, model simulation is more appropriate at the sub-regional and regional scales rather than at the local or site-specific scales for simulation of hydrologic conditions. In addition, other recognized deficiencies include understanding of the spatial extent and hydraulic properties of the MCU I. Also, there is a need for improved information about both the degree of interaction between lakes and the underlying UFA and the spatial distribution of unconfined conditions in the UFA. A review and discussion about boundary conditions and the recharge methodology used in the model should be undertaken to assess their strengths and limitations for future model applications.

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   Not quite sure how 'excessive' got into this. The argument of proving (yes proving) a negative may be equally difficult to make as proving the groundwater withdrawals are responsible. I have recently started to look at the arguments to show the decreased flow is not due to groundwater withdrawals. Ron Basso has been very helpful in answering my questions and we have had a good discussion on going.

I realize my comments are lengthy, but this matter of MFL's, deterioration of Rainbow and other spring-fed rivers and bays in the area is no simple matter. There is no question there has been serious deterioration. We all know mankind is partly responsible by ignoring the fact that we have to deal with what Mother Nature gives us in the way of rainfall and an amazing aquifer to store some of it. As we abuse these gifts we must ask how our grandkids will view our actions in 20-30 years. Are we sucking too much. Read my piece entitled Destruction by Suction.

Have a great day,

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 12:58 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

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Would either of you care to expand on what these comments mean?
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From: Alan Martyn Johnson
To: Doug Leeper; Kym Holzwart
Cc: Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven
Subject: Rainbow River MFL
Date: Friday, March 03, 2017 7:49:22 AM

Doug and Kym,

It was November 14, 2016 when I first asked questions and expressed concerns about the Rainbow River MFL Report. In the months since then I have given you my thoughts on some of the key issues. As you face a deadline to present the Final Report to the Governing Board at the end of the month I would appreciate if you would give me the courtesy of direct answers to the following points/questions. A simple yes or no answer to each question is all I ask.

1. Backwater Effect.
   Do SWFWMD maintain there is a severe backwater effect despite no hard data to support this in the form of comparison of the comparison of gage ht Withlacoochee 02313200 and Rainbow 02313100, and that this backwater effect remains in the model construction?
   <!--[if !supportLineBreakNewLine]-->
   <!--[endif]-->
2. Spring Water Discharge Profile.
   Do SWFWMD continue to use linear interpolation to assign approximately 15% of total spring discharges to the reach downstream of the newer USGS Gage Station 02313098, despite the Field Measurements from December 2013 thru February 2017 showing the flows at this gage and 02313100 to be essentially the same? I would again point out Field Measurements are the most definitive measurement of flow and they are the basis for development of the rating curve/look up charts with Rainbow Well for the discharges reported at 02313100.

   <!--[if !supportLineBreakNewLine]-->
   <!--[endif]-->
3. Do SWFWMD continue to claim an anomaly in discharge post 2000 thereby rejecting USGS changes to the rating are the origin of the perceived anomaly, and thereby rejecting the USGS discharge data as being the best available on going discharge data since 2000?

   <!--[if !supportLineBreakNewLine]-->
   <!--[endif]-->
4. Do SWFWMD dismiss the recommendation by the Peer Review Panel to consider capping of further withdrawals (no new well permits) until the cause of reduced flow and nitrate issues (putting Rainbow River on the impaired list) are investigated.
   I would suggest a discussion with your legal team to consider the possibility of using the

'emergency rule' provision in the Statue re the July deadline. I am no lawyer but it should be explored with the experts.

5. Do SWFWMD intend to have a clear annual report showing all withdrawals in the Rainbow springshed to avoid differences/confusion between NDM groundwater withdrawals Table 2-3 (about 5mgd) and Figure 2-21 (20-30 mgd)?
   The Annual Estimated Springshed Withdrawals Report should clearly define actual withdrawals and any adjustments made for non consumptive uses.

I will continue to watch developments and any ideas to explain the decreased discharge, but my attention for Rainbow will turn to Rule Language.

Thank you in anticipation of five to the point answers. I hope my questions are concise and clear.
Martyn

From: Alan Martyn Johnson
To: Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: Re: Chronicle Newspaper Sunday
Date: Friday, March 03, 2017 8:18:53 AM

Eric,
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Subject: RE: Chronicle Newspaper Sunday

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(813) 985-7481 X2118

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Sent: Thursday, March 02, 2017 8:48 AM
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Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
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Have a great day,
Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 12:58 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

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Sent: Monday, February 27, 2017 8:16 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
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Kym and Eric,
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- Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.
  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.
- "We all have to do our part," Eric DeHaven, assistant director of the district's resource

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Would either of you care to expand on what these comments mean?
Possible 3 or 4 key bullet points is all that is needed.

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Thanks in anticipation of a brief reply.

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From: Ron Basso
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday
Date: Friday, March 03, 2017 9:28:32 AM

Martyn:

Regarding your last sentence where groundwater withdrawals from an aquifer are a concern for springflow, I've included a link of a report I authored on the Hydrology of the Upper Peace River which documents the impact of decades of groundwater extraction in our Southern GW Basin on Kissengen Spring and the Upper Peace River. You may find it interesting or if not, perhaps a cure for late night insomnia. ☺

http://www.swfwmd.state.fl.us/documents/reports/upperpeace_withdrawls.pdf

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 8:19 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
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From:	Doug Leeper
To:	Alan Martyn Johnson
Cc:	Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject:	RE: Rainbow River MFL
Date:	Tuesday, March 07, 2017 2:42:21 PM

Martyn:

Thanks for the five questions concerning the Rainbow River that you submitted last Friday. Please see our responses to your questions imbedded using blue italics in your original email below.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
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Subject: Rainbow River MFL

Doug and Kym,
It was November 14, 2016 when I first asked questions and expressed concerns about the Rainbow River MFL Report. In the months since then I have given you my thoughts on some of the key issues. As you face a deadline to present the Final Report to the Governing Board at the end of the month I would appreciate if you would give me the courtesy of direct answers to the following points/questions. A simple yes or no answer to each question is all I ask.

1. Backwater Effect.
   Do SWFWMD maintain there is a severe backwater effect despite no hard data to support this in the form of comparison of the comparison of gage ht Withlacoochee 02313200 and Rainbow 02313100, and that this backwater effect remains in the model construction?
   District Response: *Staff maintains that the Withlacoochee River exerts a backwater effect on the Rainbow River System and notes that this effect was considered for the*

analyses used to support development of the recommended minimum flow. The water level in Withlacoochee River doesn't necessary need to be higher than the Rainbow River water level for a backwater effect to occur. Backwater effects occur when water is held in its course by stagnant water in the Withlacoochee River. The poor rating curve between stage and flow at USGS station 02313100 confirms the influence of backwater. When the stage data at USGS station 02313200 was included in the rating curve, the association exhibited considerable improvement, with the R^2 value increasing from 0.53 to 0.98. The severe backwater at CR484 is the main reason for using the well station near Dunnellon in the rating curve used for reporting discharge at station 02313100.

2. Spring Water Discharge Profile.
   Do SWFWMD continue to use linear interpolation to assign approximately 15% of total spring discharges to the reach downstream of the newer USGS Gage Station 02313098, despite the Field Measurements from December 2013 thru February 2017 showing the flows at this gage and 02313100 to be essentially the same? I would again point out Field Measurements are the most definitive measurement of flow and they are the basis for development of the rating curve/look up charts with Rainbow Well for the discharges reported at 02313100.

   District Response: *There are four District stations with field-measured data from 2009-2013, located downstream of the USGS Gage 02313098. As can be seen in Table 2-3 of the HEC-RAS hydraulic modeling report prepared by ECT, Inc., their respective flow distribution, from upstream to downstream represents 86.5%, 89.3%, 92.9% and 94.7% of the total flow at USGS gage 02313100. Based on these observations the flow distribution at USGS Station 02313098 was approximated to be 85% of the total flow at USGS gage 02313100. However, we acknowledge that there is uncertainty in assigning flow distribution due to limited data and we are committed to refining inputs used in hydraulic and other hydrologic models for the planned reevaluation of the Rainbow River minimum flow.*

3. Do SWFWMD continue to claim an anomaly in discharge post 2000 thereby rejecting USGS changes to the rating are the origin of the perceived anomaly, and thereby rejecting the USGS discharge data as being the best available on going discharge data since 2000?

   District Response*: When staff describe the anomaly in flow post-2000, it's discussed as a major change in Upper Floridan aquifer (UFA) head relation with flow that is clearly evident in Figures 2-16 and 2-17 in the MFL report. The rating curve information you sent us from the USGS largely supports this analysis in that other than a brief period in the 1980s, the rating between discharge and well water level was consistent prior to the year 2000. There are a variety of factors that could lead to this change in*

head/flow relationship in 2000. They include increased friction effects in the outlet river, change in structure operations at the Lake Rousseau Dam, natural plugging off of spring vents (karst systems are dynamic), or some change in measurement technique, equipment, or methodology by the USGS. What is certain from a groundwater science standpoint is that the rather abrupt change is not related to groundwater withdrawals. The evidence to support this is substantial: groundwater quantities withdrawn in the springshed are relatively small (consumptively-used withdrawals make up a little more than two percent of springflow), actual groundwater use has declined by 20% the last 10 years in both the springshed and our northern six counties, UFA water levels are stable or slightly rising since 1990 in both the Rainbow and Silver Springsheds, the NDM 5 model predictions of withdrawal impacts align closely with water budget information, and this type of geology – unconfined UFA with high recharge, storage, and permeability – tends to limit the effects of groundwater withdrawn compared to well-confined aquifers and make them more localized rather than regional. And one other factor to note, groundwater withdrawals did increase in the very dry year of 2000 – about 10% from the previous year in the springshed and northern six counties. However, they declined thereafter through 2005 and were similar to those in the late 1990s. This is strong evidence that a major spike in withdrawals did not occur to even remotely suggest the change is related to groundwater withdrawals. Withdrawals would have had to increase by 5 to 10 times what they are today (100 to 200 mgd in the springshed) and be sustained through the 10 year period after the year 2000 for this to be groundwater related flow decline.

4. Do SWFWMD dismiss the recommendation by the Peer Review Panel to consider capping of further withdrawals (no new well permits) until the cause of reduced flow and nitrate issues (putting Rainbow River on the impaired list) are investigated.
I would suggest a discussion with your legal team to consider the possibility of using the 'emergency rule' provision in the Statue re the July deadline. I am no lawyer but it should be explored with the experts.

District Response: *Staff plan to recommend that the District Governing Board initiate rulemaking and approve adoption of amendments to Rule 40D-8.041, Florida Administrative Code, to establish a minimum flow of 95% of the natural flow for the Rainbow River System. A recommendation regarding emergency rulemaking is also being considered for presentation to the Board.*

5. Do SWFWMD intend to have a clear annual report showing all withdrawals in the Rainbow springshed to avoid differences/confusion between NDM groundwater withdrawals Table 2-3 (about 5mgd) and Figure 2-21 (20-30 mgd)?
The Annual Estimated Springshed Withdrawals Report should clearly define actual withdrawals and any adjustments made for non consumptive uses.
District Response: *Staff is unsure about the differences cited in Table 2-3 (about 5*

mgd) and Figure 2-21 (20-30 mgd). Table 2-3 lists the groundwater withdrawn in the NDM 5 model for the entire active domain (which includes large withdrawals in the central and eastern GW basins) for 2010, 2014, and 2035. In the model, we do adjust domestic self-supply withdrawals for septic tank recharge and include irrigation return water applied to layer 1 in the NDM – so we have return water accounted for in the model. Figure 2-21 is just the total estimated and metered groundwater use in the Rainbow Springshed (boundary defined using the May 2005 potentiometric surface). This graph of historic groundwater use is from 1992 through 2014 and it includes both water use permitted withdrawals and estimates of domestic self-supply. This data does not come from the NDM – it's from a separate GIS database that we update annually. No adjustments are made to this pumping data. We are currently in the process of updating to 2015 and will have that information in a few months. We annually update both the radar-estimated rainfall and groundwater withdrawals in our magnitude 1 springsheds to track this data through time.

I will continue to watch developments and any ideas to explain the decreased discharge, but my attention for Rainbow will turn to Rule Language.

Thank you in anticipation of five to the point answers. I hope my questions are concise and clear.

Martyn

From: Ron Basso
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday
Date: Monday, March 06, 2017 8:37:17 AM

Martyn:

My point was related to Kissengen Spring and the clear case of groundwater withdrawal impacts that caused it to cease flow since I interpreted the sentence in your email as you were looking for evidence of that occurring at any spring. No worries if I misunderstood you. On Rainbow, it's not unexpected to have different head gradients from wells on opposite sides of the spring as these are controlled by the permeability within the aquifer and the elevation of the flow field in the UFA.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, March 06, 2017 7:59 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Ron,

Thanks...I slept well over the weekend despite not reading the article!!!!

Not completely sure about the point you were making. Yes I realize there is an MFL for the Upper Peace River. The Upper Peace River is way different to the Rainbow it is also recipient of large surface water flows during the wet season. Both situations are covered in the MFL for this ecological disaster. My suggestion for the Upper Peace River is stop throwing money at it. What is the budgeted figure many many millions.

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The variations in the monitoring wells during the year was interesting and I will find time to read the complete paper.

Rainbow

Just a quick point about the levels we touched on last week, ROMP 128 and Rainbow Well. I just checked the distances from the Rainbow Springs head water. ROMP is 0.95 miles and Rainbow Well is 1.36 miles so not clear how Mother Natures well has a different effect at the two locations. No big deal right now...just interesting.

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Friday, March 3, 2017 9:28 AM
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday

Martyn:

Regarding your last sentence where groundwater withdrawals from an aquifer are a concern for springflow, I've included a link of a report I authored on the Hydrology of the Upper Peace River which documents the impact of decades of groundwater extraction in our Southern GW Basin on Kissengen Spring and the Upper Peace River. You may find it interesting or if not, perhaps a cure for late night insomnia. ☺

http://www.swfwmd.state.fl.us/documents/reports/upperpeace_withdrawls.pdf

Predicted Change in Hydrologic Conditions along the Upper

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www.swfwmd.state.fl.us

Predicted Change in Hydrologic Conditions along the Upper Peace River due to a Reduction in Ground-Water Withdrawals Hydrologic Evaluation Section

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

Resource Evaluation Section

Water Resources Bureau

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352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 8:19 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Eric,

Thanks.

I have just read the abstract and the part of the report you pointed me to.

Good point age of the water is equal to the age of the contaminants. As I suggested yesterday...there is more to come, the picture is still developing.

I did read on past the page reference you pointed to. Absolutely fascinating that there are indications of the origin of the nitrates. I will read the full article later.

As regards harm and significant harm, it is just a matter of how much it hurts until treatment is required. The fact Rainbow has been placed on the Impaired List says it is hurting bad; reduced discharge may not hurt the same 'organ' but the patient as a whole can only tolerate so much. Pain may be exponential.

I look forward to the discussion of the percent approach for a spring-fed river, so far there has not been one that I am aware of. May be someone can point me to one where groundwater withdrawals from an aquifer are the concern. Always happy to learn.

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Thursday, March 2, 2017 4:46 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

Martyn, thanks for the comments. Here is a link to some work that has been done to date spring/aquifer water:

https://pubs.er.usgs.gov/publication/wsp2409

Chemical and isotopic composition and potential for ...

pubs.er.usgs.gov

Chemical and isotopic composition and potential for contamination of water in the upper Floridan Aquifer, west-central Florida, 1986-89 Water Supply Paper 2409

http://www.swfwmd.state.fl.us/files/database/site_file_sets/2173/Rainbow_Springs.pdf - Page 64

I would also indicate that you are correct on the first point below – adopting a minimum flow for the Rainbow River can harm the river. Need to put this answer in the context of harm versus significant harm. As you know, the MFL charge is focused on significant harm.

Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or as needed model runs to determine how withdrawals are impacting flows. We would be happy to discuss this further with you.

We realize how important setting MFL's are – hence the detail in your email. That is also why we apply significant staff resources to the current effort and will continue to do so even after the MFL is set for future re-evaluations.

Eric DeHaven, P.G., Assistant Director

Resource Management Division

Southwest Florida Water Management District

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(813) 985-7481 X2118

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, March 02, 2017 8:48 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Eric,

Appreciate your response and conveying Kym's concerns of mis- information.

Let me respond to each point which I have italicized.

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

There is no doubt septic tanks are an issue, but may I suggest we all need to keep this issue in balance with the other sources of nitrate/nitrite; I think the FDEP came up with the estimates Figure 3-2 in the MFL Report that 66% of nitrate comes from cattle/horse/crop agriculture and 19% from septic. I also seem to recall cattle/horse head count are increasing much quicker that the human population. So can I suggest that ranchers/farmers are included in we all have a role to play. Given the legacy concept we may see further increases due to the increased ag activities. Just a thought but has any work been done to 'date' the nitrate in spring discharge? Let us not forget the urban sources where I think golf courses feature heavily; do all those golfers realize their part of the grand scheme of nitrate increases…golf ranges may be a way to reduce that!!
Further, the push to get households off septic tanks and on to central sewage systems is not as easy a fix as we are often lead to believe. For example, look at the situation with Crystal River Sewage Treatment Plant discharging into Cedar Cove (trust I got the name correct from memory), there is a major nitrate discharge at one location. Just makes me think about all the other treatment plants and where the discharge goes. Treatment plants reduce but not eliminate.

To respond to your question, the District did a past study to

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

Adopting a minimum flow for the Rainbow River System harms the river.

I do not understand how Kym can say this is clearly incorrect when the whole point of MFL is to permit additional harm, agreed the additional harm is limited to 15% (not that the 15% is legislated, as opposed to generally accepted by water management districts). A follow up to that is ""additional harm starting when"". The very essence of MFL is it allows harm to the river. Yes, the MFL is supposed to limit further harm, but all those people who spoke last Thursdays believe the river has already been harmed enough.

All the people who expressed similar sentiments at the Chassahowitzka and Homosassa meetings were rewarded with meaningless Rules placed in the FAC.

The District is not required to adopt a minimum flow.

Kym is right on this, no question. AS we know the legislation was passed years ago. Re Rainbow, SWFWMD have from what Ron, I think I am correct, said have been working on the Rainbow MFL since 2005…we all know last minute attempts to fix a problem are fraught with danger. The situation has been worsening over that 12 year period, let alone the deterioration prior to 2005. Possibly the legislators would prefer to see meaningful Rules that are better understood than poor rules adopted last minute with uncertainty or questions. A temporary capping makes good sense as regards legal compliance and good science. Think about it...what harm is done by a temporary stop on new well permit approval for say 6 months to a year. Note NEW renewals would be allowed.

The District is attempting to "take" water from the river.

Trying to be fair about this it appears to me this is simply a matter of semantics.. Yes I am sure some of the folks do think there will be withdrawals from the river. Even newspaper articles sometimes miss being precisely accurate in the wording sometimes.

The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).

The issue here is no one from SWFWMD can explain how this percent approach works for a spring fed river. I have repeatedly ask for some examples (theoretical) to explain this. Most recently I touched on this briefly in an e-mail to Doug February 9. Someone needs to put themselves in the position of explaining this to your permitting team. At present permits for all the springsheds are issued like candy to kids who manage to complete the application form correctly. Just look at the permit applications, particularly those rejected.

Lets get some explanation of how this concept works for a spring fed river and stop hiding behind the application to a surface water system with or without seasonal blocks.

The minimum flow is developed in the office "behind closed doors" without using real information.

This is possibly an impression you all create which stems from all the modeling. Let me speak

personally to this point. There are questions regarding the development of the models (highly complex computer programs) which often do not make logical sense or poorly relate to reality. Examples; reverse flow was observed, backwater effect appears, a linear interpolation approach was used (agreed USGS data indicating this was not correct was not initially available other than DEP reports mention of numerous small boils in the upper 2 miles). Some of my examples also apply to Kings Bay, so let us not forget the "pulsing springs of Kings Bay"; watch this space for more on the "pulsing springs of Kings Bay" next week.

Further, the changes in percent after a few comments is a pattern that detracts from the scientific (modeled) strength of the initial MFL. A last minute' more conservative approach has been the case with Homosassa, Chassahowitzka (you even had to submit corrections to the Rules as initially filed with the FAC). These made some folks happy as has the Rainbow change 7% to 5%, but it only adds to thoughts of bad science.

6. The impact of groundwater pumping in the Rainbow River Springshed is large, and pumping from outside the groundwater boundaries (e.g., Jacksonville, Orlando) is affecting Rainbow Springs.

The list of withdrawals specifically from the springsheds each year is not readily available. Confusion does result from the adjustments made for immediate return of 'non consumed' water from septic and sewage to the aquifer (see staff response to my early questions/comments on Rainbow).

nAnd, the consolidation of Domain-wide withdrawals as presented Table 2-3 Rainbow MFL report rather than presenting springshed specific withdrawals in this and similar Tables for other springs does not help clarify the withdrawals. It leaves me questioning how this NDM splits out the springshed withdrawals. May be there is need to recognize the modelers intent that NDM is Regional and not applicable at the individual spring level. They have cautioned users from incorrectly using the model output. See the model Reports.

Quote

Potential users of the NDM should note that because of recognized data deficiencies, model simulation is more appropriate at the sub-regional and regional scales rather than at the local or site-specific scales for simulation of hydrologic conditions. In addition, other recognized deficiencies include understanding of the spatial extent and hydraulic properties of the MCU I. Also, there is a need for improved information about both the degree of interaction between lakes and the underlying UFA and the spatial distribution of unconfined conditions in the UFA. A review and discussion about boundary conditions and the recharge methodology used in the model should be undertaken to assess their strengths and limitations for future model lications.

End quote.

I know where the idea/concept of withdrawals outside the springshed comes from, but I have to say I am not convinced by either argument. I must yield my opinion to people like Dan Yobbi and Bob Knight whom I would like to hear discuss their respective points of view over coffee. It is hard to accept the boundaries to a springshed are so well defined in the depths of the aquifer as they may be given by surface topography. How the two combine to get defined springshed areas that are 'totally' independent is not easy to comprehend.

The decline in Rainbow Springs flow the past 20 years or so is due to excessive groundwater pumping.

Not quite sure how 'excessive' got into this. The argument of proving (yes proving) a negative may be equally difficult to make as proving the groundwater withdrawals are responsible. I have recently started to look at the arguments to show the decreased flow is not due to groundwater withdrawals. Ron Basso has been very helpful in answering my questions and we have had a good discussion on going.

I realize my comments are lengthy, but this matter of MFL's, deterioration of Rainbow and other spring-fed rivers and bays in the area is no simple matter. There is no question there has been serious deterioration. We all know mankind is partly responsible by ignoring the fact that we have to deal with what Mother Nature gives us in the way of rainfall and an amazing aquifer to store some of it. As we abuse these gifts we must ask how our grandkids will view our actions in 20-30 years. Are we sucking too much. Read my piece entitled Destruction by Suction.

Have a great day,

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 12:58 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

Hello Martyn,

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

1. Adopting a minimum flow for the Rainbow River System harms the river.
2. The District is not required to adopt a minimum flow.
3. The District is attempting to "take" water from the river.
4. The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).
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Eric DeHaven, P.G., Assistant Director

Resource Management Division

Southwest Florida Water Management District

7601 HWY 301 N

Tampa, FL 33637

(813) 985-7481 X2118

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, February 27, 2017 8:16 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>

Subject: Chronicle Newspaper Sunday

Kym and Eric,

An interesting article in yesterday's Chronicle which I have no doubt you read. It is fairly typical of a newspaper reporter's coverage; he reported a two hour meeting on a specific subject for the general readership and did a reasonable good job. My interest this morning is to ask about the quotes used from Kym and Eric:

- Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.
  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.

- "We all have to do our part," Eric DeHaven, assistant director of the district's resource management division, said. "Everyone has a role in it."

Would either of you care to expand on what these comments mean?
Possible 3 or 4 key bullet points is all that is needed.

I am particularly interested in what misinformation Kym says is 'out there'.
What the District is doing to save the Rainbow River by suggesting there can be further reduction in spring discharge by allowing more withdrawals from the aquifer. SWIM and MFL often appear to be treated as mutually exclusive (Federal as opposed to District may be).

Thanks in anticipation of a brief reply.

Martyn

From: Alan Martyn Johnson
To: Ron Basso; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: Re: Chronicle Newspaper Sunday
Date: Monday, March 06, 2017 7:58:59 AM

Ron,
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Not completely sure about the point you were making. Yes I realize there is an MFL for the Upper Peace River. The Upper Peace River is way different to the Rainbow it is also recipient of large surface water flows during the wet season. Both situations are covered in the MFL for this ecological disaster. My suggestion for the Upper Peace River is stop throwing money at it. What is the budgeted figure many many millions.

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To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
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Predicted Change in Hydrologic Conditions along the Upper ...

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Predicted Change in Hydrologic Conditions along the Upper Peace River due to a Reduction in Ground-Water Withdrawals Hydrologic Evaluation Section

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Water Resources Bureau
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Sent: Friday, March 03, 2017 8:19 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
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http://www.swfwmd.state.fl.us/files/database/site_file_sets/2173/Rainbow_Springs.pdf - Page 64

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Sent: Thursday, March 02, 2017 8:48 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

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Appreciate your response and conveying Kym's concerns of mis- information.
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Have a great day,
Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 12:58 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

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Eric DeHaven, P.G., Assistant Director
Resource Management Division
Southwest Florida Water Management District
7601 HWY 301 N
Tampa, FL 33637
(813) 985-7481 X2118

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, February 27, 2017 8:16 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Chronicle Newspaper Sunday

Kym and Eric,
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- Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.
  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.
- "We all have to do our part," Eric DeHaven, assistant director of the district's resource management division, said. "Everyone has a role in it."

Would either of you care to expand on what these comments mean?
Possible 3 or 4 key bullet points is all that is needed.

I am particularly interested in what misinformation Kym says is 'out there'.
What the District is doing to save the Rainbow River by suggesting there can be further reduction in spring discharge by allowing more withdrawals from the aquifer. SWIM and MFL often appear to be treated as mutually exclusive (Federal as opposed to District may be).

Thanks in anticipation of a brief reply.

Martyn

From: Alan Martyn Johnson
To: Ron Basso; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: Re: Chronicle Newspaper Sunday
Date: Tuesday, March 07, 2017 9:21:58 AM

Ron,

I now see where the communication gap occurred. I was asking about the percent of flow approach in an MFL for a spring fed river. This was comment on Eric's point

'Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or as needed model runs to determine how withdrawals are impacting flows.'

As you say no worries; the few extra steps made for an interesting side journey.

FOR ALL

The point still remains that no one has yet explained the percent approach for an MFL with a spring fed river. I agree it works fine for a surface river to control withdrawals from the river downstream of a gage station (such as a metered withdrawal for public supply). Additionally I will add a point I have made before, MFL's in the law were, I assume, presumed in construction of the law to be real measurements, not 'model runs' as Eric indicated.

Lets try these examples;

1. Given the flow according to USGS this last week has been 537 cfs: What percent of natural flow is this?
2. Given the annual flow for calendar year 2015 was 644 cfs: What percent of natural flow was this? And given the flow for the entire month of June averaged 575 cfs which is 11% lower than the annual average for 2015. Is this relevant or not?
3. Annual Average (calendar year) from 2000 thru 2015 has been below 600 cfs 8 years, the lowest was 2011 at 502 cfs. What percent of natural flow was this? June 2011 was average 467 cfs or 93% of the average for 2011. Is this relevant or not?

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Monday, March 6, 2017 8:37 AM
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday

Martyn:

My point was related to Kissengen Spring and the clear case of groundwater withdrawal impacts that caused it to cease flow since I interpreted the sentence in your email as you were looking for evidence of that occurring at any spring. No worries if I misunderstood you. On Rainbow, it's not unexpected to have different head gradients from wells on opposite sides of the spring as these are controlled by the permeability within the aquifer and the elevation of the flow field in the UFA.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
Ph 800-423-1479 (Florida only)
352-796-7211, ext. 4291

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, March 06, 2017 7:59 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Ron,
Thanks...I slept well over the weekend despite not reading the article!!!!

Not completely sure about the point you were making. Yes I realize there is an MFL for the Upper Peace River. The Upper Peace River is way different to the Rainbow it is also recipient of large surface water flows during the wet season. Both situations are covered in the MFL for this ecological disaster. My suggestion for the Upper Peace River is stop throwing money at it. What is the budgeted figure many many millions.

I also recall a video of Mark Hammond visiting the Upper Peace River which if memory serves was after it again dried up...I certainly recall the video, but the date of the river drying up completely may not have had a direct link. Sad story.

The variations in the monitoring wells during the year was interesting and I will find time to read the complete paper.

Rainbow
Just a quick point about the levels we touched on last week, ROMP 128 and Rainbow Well. I

just checked the distances from the Rainbow Springs head water. ROMP is 0.95 miles and Rainbow Well is 1.36 miles so not clear how Mother Natures well has a different effect at the two locations. No big deal right now...just interesting.

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Friday, March 3, 2017 9:28 AM
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday

Martyn:

Regarding your last sentence where groundwater withdrawals from an aquifer are a concern for springflow, I've included a link of a report I authored on the Hydrology of the Upper Peace River which documents the impact of decades of groundwater extraction in our Southern GW Basin on Kissengen Spring and the Upper Peace River. You may find it interesting or if not, perhaps a cure for late night insomnia. ☺

http://www.swfwmd.state.fl.us/documents/reports/upperpeace_withdrawls.pdf

Predicted Change in Hydrologic Conditions along the Upper

...

www.swfwmd.state.fl.us

Predicted Change in Hydrologic Conditions along the Upper Peace River due to a Reduction in Ground-Water Withdrawals Hydrologic Evaluation Section

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 8:19 AM

To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Eric,
Thanks.

I have just read the abstract and the part of the report you pointed me to.

Good point age of the water is equal to the age of the contaminants. As I suggested yesterday...there is more to come, the picture is still developing.

I did read on past the page reference you pointed to. Absolutely fascinating that there are indications of the origin of the nitrates. I will read the full article later.

As regards harm and significant harm, it is just a matter of how much it hurts until treatment is required. The fact Rainbow has been placed on the Impaired List says it is hurting bad; reduced discharge may not hurt the same 'organ' but the patient as a whole can only tolerate so much. Pain may be exponential.

I look forward to the discussion of the percent approach for a spring-fed river, so far there has not been one that I am aware of. May be someone can point me to one where groundwater withdrawals from an aquifer are the concern. Always happy to learn.

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Thursday, March 2, 2017 4:46 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

Martyn, thanks for the comments. Here is a link to some work that has been done to date spring/aquifer water:

https://pubs.er.usgs.gov/publication/wsp2409

Chemical and isotopic composition and potential for ...

pubs.er.usgs.gov

Chemical and isotopic composition and potential for contamination of water in the upper

http://www.swfwmd.state.fl.us/files/database/site_file_sets/2173/Rainbow_Springs.pdf - Page 64

I would also indicate that you are correct on the first point below – adopting a minimum flow for the Rainbow River can harm the river. Need to put this answer in the context of harm versus significant harm. As you know, the MFL charge is focused on significant harm.

Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or as needed model runs to determine how withdrawals are impacting flows. We would be happy to discuss this further with you.

We realize how important setting MFL's are – hence the detail in your email. That is also why we apply significant staff resources to the current effort and will continue to do so even after the MFL is set for future re-evaluations.

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Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
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Martyn

From: Ron Basso
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday
Date: Wednesday, March 08, 2017 2:37:08 PM

Martyn:

The many instances you cite of Rainbow River flows are all due mostly to natural variation from climatic or non-groundwater related factors. To each of your examples, you could add one to two percent to the flow rate and this would be the natural flow in the absence of groundwater withdrawals. There is a large degree of flow variation due to natural variation in rainfall – just look at the historical record when monthly flows varied from less than 500 cfs in 1957 to more than 900 cfs by 1959 during a period when groundwater withdrawals were essentially zero. The MFLs statute by definition addresses significant harm due to withdrawals – we use hydrologic data, models and water budgets to assess that impact. MFLs are by necessity tied to flow gage stations to identify the feature we are protecting, and rule language associated with MFLs is written to address potential withdrawal impacts upstream of gage sites or throughout the minimum flow water body. It is important to note, however, that the tools we'll use to evaluate whether an MFL is being met or not are largely models and springshed water budgets, which are constructed using available data and represent long-term changes to the system.

Ron Basso, P.G.
Chief Hydrogeologist/Acting Manager
Resource Evaluation Section
Water Resources Bureau
Southwest Florida Water Management District
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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, March 07, 2017 9:22 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Ron,

I now see where the communication gap occurred. I was asking about the percent of flow approach in an MFL for a spring fed river. This was comment on Eric's point
'Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or

as needed model runs to determine how withdrawals are impacting flows.'

As you say no worries; the few extra steps made for an interesting side journey.

FOR ALL

The point still remains that no one has yet explained the percent approach for an MFL with a spring fed river. I agree it works fine for a surface river to control withdrawals from the river downstream of a gage station (such as a metered withdrawal for public supply). Additionally I will add a point I have made before, MFL's in the law were, I assume, presumed in construction of the law to be real measurements, not 'model runs' as Eric indicated.

Lets try these examples;

1. Given the flow according to USGS this last week has been 537 cfs: What percent of natural flow is this?
2. Given the annual flow for calendar year 2015 was 644 cfs: What percent of natural flow was this? And given the flow for the entire month of June averaged 575 cfs which is 11% lower than the annual average for 2015. Is this relevant or not?
3. Annual Average (calendar year) from 2000 thru 2015 has been below 600 cfs 8 years, the lowest was 2011 at 502 cfs. What percent of natural flow was this? June 2011 was average 467 cfs or 93% of the average for 2011. Is this relevant or not?

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Monday, March 6, 2017 8:37 AM
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday

Martyn:

My point was related to Kissengen Spring and the clear case of groundwater withdrawal impacts that caused it to cease flow since I interpreted the sentence in your email as you were looking for evidence of that occurring at any spring. No worries if I misunderstood you. On Rainbow, it's not unexpected to have different head gradients from wells on opposite sides of the spring as these are controlled by the permeability within the aquifer and the elevation of the flow field in the UFA.

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Monday, March 06, 2017 7:59 AM
To: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Ron,

Thanks...I slept well over the weekend despite not reading the article!!!!

Not completely sure about the point you were making. Yes I realize there is an MFL for the Upper Peace River. The Upper Peace River is way different to the Rainbow it is also recipient of large surface water flows during the wet season. Both situations are covered in the MFL

for this ecological disaster. My suggestion for the Upper Peace River is stop throwing money at it. What is the budgeted figure many many millions.

I also recall a video of Mark Hammond visiting the Upper Peace River which if memory serves was after it again dried up...I certainly recall the video, but the date of the river drying up completely may not have had a direct link. Sad story.

The variations in the monitoring wells during the year was interesting and I will find time to read the complete paper.

Rainbow

Just a quick point about the levels we touched on last week, ROMP 128 and Rainbow Well. I just checked the distances from the Rainbow Springs head water. ROMP is 0.95 miles and Rainbow Well is 1.36 miles so not clear how Mother Natures well has a different effect at the two locations. No big deal right now...just interesting.

Martyn

From: Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Sent: Friday, March 3, 2017 9:28 AM
To: Alan Martyn Johnson; Eric DeHaven; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin
Subject: RE: Chronicle Newspaper Sunday

Martyn:

Regarding your last sentence where groundwater withdrawals from an aquifer are a concern for springflow, I've included a link of a report I authored on the Hydrology of the Upper Peace River which documents the impact of decades of groundwater extraction in our Southern GW Basin on Kissengen Spring and the Upper Peace River. You may find it interesting or if not, perhaps a cure for ☺

late night insomnia.

http://www.swfwmd.state.fl.us/documents/reports/upperpeace_withdrawls.pdf

Predicted Change in Hydrologic Conditions along the Upper ...

www.swfwmd.state.fl.us

Predicted Change in Hydrologic Conditions along the Upper Peace River due to a Reduction in Ground-Water Withdrawals Hydrologic Evaluation Section

Ron Basso, P.G.

Chief Hydrogeologist/Acting Manager

Resource Evaluation Section

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 8:19 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Eric,

Thanks.

I have just read the abstract and the part of the report you pointed me to.

Good point age of the water is equal to the age of the contaminants. As I suggested yesterday...there is more to come, the picture is still developing.

I did read on past the page reference you pointed to. Absolutely fascinating that there are indications of the origin of the nitrates. I will read the full article later.

As regards harm and significant harm, it is just a matter of how much it hurts until treatment is required. The fact Rainbow has been placed on the Impaired List says it is hurting bad; reduced discharge may not hurt the same 'organ' but the patient as a whole can only tolerate so much. Pain may be exponential.

I look forward to the discussion of the percent approach for a spring-fed river, so far there has not been one that I am aware of. May be someone can point me to one where groundwater withdrawals from an aquifer are the concern. Always happy to learn.

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Thursday, March 2, 2017 4:46 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

Martyn, thanks for the comments. Here is a link to some work that has been done to date spring/aquifer water:

https://pubs.er.usgs.gov/publication/wsp2409

Chemical and isotopic composition and potential for ...

pubs.er.usgs.gov

Chemical and isotopic composition and potential for contamination of water in the upper Floridan Aquifer, west-central Florida, 1986-89 Water Supply Paper 2409

http://www.swfwmd.state.fl.us/files/database/site_file_sets/2173/Rainbow_Springs.pdf - Page 64

I would also indicate that you are correct on the first point below – adopting a minimum flow for the Rainbow River can harm the river. Need to put this answer in the context of harm versus significant harm. As you know, the MFL charge is focused on significant harm.

Regarding #4, the percent of flow approach works fine for MFL compliance. It is based on annual or as needed model runs to determine how withdrawals are impacting flows. We would be happy to discuss this further with you.

We realize how important setting MFL's are – hence the detail in your email. That is also why we apply significant staff resources to the current effort and will continue to do so even after the MFL is set for future re-evaluations.

Eric DeHaven, P.G., Assistant Director

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, March 02, 2017 8:48 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>
Subject: Re: Chronicle Newspaper Sunday

Eric,

Appreciate your response and conveying Kym's concerns of mis- information.

Let me respond to each point which I have italicized.

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

There is no doubt septic tanks are an issue, but may I suggest we all need to keep this issue in balance with the other sources of nitrate/nitrite; I think the FDEP came up with the estimates Figure 3-2 in the MFL Report that 66% of nitrate comes from cattle/horse/crop agriculture and 19% from septic. I also seem to recall cattle/horse head count are increasing much quicker that the human population. So can I suggest that ranchers/farmers are included in we all have a role to play. Given the legacy concept we may see further increases due to the increased ag activities. Just a thought but has any work been done to 'date' the nitrate in spring discharge? Let us not forget the urban sources where I think golf courses feature heavily; do all those golfers realize their part of the grand scheme of nitrate increases…golf ranges may be a way to reduce that!!
Further, the push to get households off septic tanks and on to central sewage systems is not as easy a fix as we are often lead to believe. For example, look at the situation with Crystal River Sewage Treatment Plant discharging into Cedar Cove (trust I got the name correct from memory), there is a major nitrate discharge at one location. Just makes me think about all the other treatment plants and where the discharge goes. Treatment plants reduce but not eliminate.

To respond to your question, the District did a past study to

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

Adopting a minimum flow for the Rainbow River System harms the river.
I do not understand how Kym can say this is clearly incorrect when the whole point of MFL is to permit additional harm, agreed the additional harm is limited to 15% (not that the 15% is legislated, as opposed to generally accepted by water management districts). A follow up to that is ""additional harm starting when"". The very essence of MFL is it allows harm to the river. Yes, the MFL is supposed to limit further harm, but all those people who spoke last Thursdays believe the river has already been harmed enough.
All the people who expressed similar sentiments at the Chassahowitzka and Homosassa meetings were rewarded with meaningless Rules placed in the FAC.

The District is not required to adopt a minimum flow.
Kym is right on this, no question. AS we know the legislation was passed years ago. Re Rainbow, SWFWMD have from what Ron, I think I am correct, said have been working on the Rainbow MFL since 2005…we all know last minute attempts to fix a problem are fraught with danger. The situation has been worsening over that 12 year period, let alone the deterioration prior to 2005. Possibly the legislators would prefer to see meaningful Rules that are better understood than poor rules adopted last minute with uncertainty or questions. A temporary capping makes good sense as regards legal compliance and good science. Think about it...what harm is done by a temporary stop on new well permit approval for say 6 months to a year. Note NEW renewals would be allowed.

The District is attempting to "take" water from the river.
Trying to be fair about this it appears to me this is simply a matter of semantics.. Yes I am sure some of the folks do think there will be withdrawals from the river. Even newspaper articles sometimes miss being precisely accurate in the wording sometimes.

The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).
The issue here is no one from SWFWMD can explain how this percent approach works for a spring fed river. I have repeatedly ask for some examples (theoretical) to explain this. Most recently I touched on this briefly in an e-mail to Doug February 9. Someone needs to put themselves in the position of explaining this to your permitting team. At present permits for all the springsheds are issued like candy to kids who manage to complete the application form correctly. Just look at the

permit applications, particularly those rejected.
Lets get some explanation of how this concept works for a spring fed river and stop hiding behind the application to a surface water system with or without seasonal blocks.

The minimum flow is developed in the office "behind closed doors" without using real information.
This is possibly an impression you all create which stems from all the modeling. Let me speak personally to this point. There are questions regarding the development of the models (highly complex computer programs) which often do not make logical sense or poorly relate to reality. Examples; reverse flow was observed, backwater effect appears, a linear interpolation approach was used (agreed USGS data indicating this was not correct was not initially available other than DEP reports mention of numerous small boils in the upper 2 miles). Some of my examples also apply to Kings Bay, so let us not forget the "pulsing springs of Kings Bay"; watch this space for more on the "pulsing springs of Kings Bay" next week.
Further, the changes in percent after a few comments is a pattern that detracts from the scientific (modeled) strength of the initial MFL. A last minute' more conservative approach has been the case with Homosassa, Chassahowitzka (you even had to submit corrections to the Rules as initially filed with the FAC). These made some folks happy as has the Rainbow change 7% to 5%, but it only adds to thoughts of bad science.

6. The impact of groundwater pumping in the Rainbow River Springshed is large, and pumping from outside the groundwater boundaries (e.g., Jacksonville, Orlando) is affecting Rainbow Springs.

The list of withdrawals specifically from the springsheds each year is not readily available. Confusion does result from the adjustments made for immediate return of 'non consumed' water from septic and sewage to the aquifer (see staff response to my early questions/comments on Rainbow).

nAnd, the consolidation of Domain-wide withdrawals as presented Table 2-3 Rainbow MFL report rather than presenting springshed specific withdrawals in this and similar Tables for other springs does not help clarify the withdrawals. It leaves me questioning how this NDM splits out the springshed withdrawals. May be there is need to recognize the modelers intent that NDM is Regional and not applicable at the individual spring level. They have cautioned users from incorrectly using the model output. See the model Reports.
Quote

Potential users of the NDM should note that because of recognized data deficiencies, model simulation is more appropriate at the sub-regional and regional scales rather than at the local or site-specific scales for simulation of hydrologic conditions. In addition, other recognized deficiencies include understanding of the spatial extent and hydraulic properties of the MCU I. Also, there is a need for improved information about both the degree of interaction between

lakes and the underlying UFA and the spatial distribution of unconfined conditions in the UFA. A review and discussion about boundary conditions and the recharge methodology used in the model should be undertaken to assess their strengths and limitations for future model lications.

End quote.

I know where the idea/concept of withdrawals outside the springshed comes from, but I have to say I am not convinced by either argument. I must yield my opinion to people like Dan Yobbi and Bob Knight whom I would like to hear discuss their respective points of view over coffee. It is hard to accept the boundaries to a springshed are so well defined in the depths of the aquifer as they may be given by surface topography. How the two combine to get defined springshed areas that are 'totally' independent is not easy to comprehend.

The decline in Rainbow Springs flow the past 20 years or so is due to excessive groundwater pumping.

Not quite sure how 'excessive' got into this. The argument of proving (yes proving) a negative may be equally difficult to make as proving the groundwater withdrawals are responsible. I have recently started to look at the arguments to show the decreased flow is not due to groundwater withdrawals. Ron Basso has been very helpful in answering my questions and we have had a good discussion on going.

I realize my comments are lengthy, but this matter of MFL's, deterioration of Rainbow and other spring-fed rivers and bays in the area is no simple matter. There is no question there has been serious deterioration. We all know mankind is partly responsible by ignoring the fact that we have to deal with what Mother Nature gives us in the way of rainfall and an amazing aquifer to store some of it. As we abuse these gifts we must ask how our grandkids will view our actions in 20-30 years. Are we sucking too much. Read my piece entitled Destruction by Suction.

Have a great day,

Martyn

From: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Sent: Tuesday, February 28, 2017 12:58 PM
To: Alan Martyn Johnson; Kym Holzwart
Cc: Doug Leeper; Melissa Gulvin; Ron Basso
Subject: RE: Chronicle Newspaper Sunday

Hello Martyn,

In reference to my comment, I was referring to septic systems that homeowners have and their impact on nutrients discharged from the spring.

Kym was referring to a number of points we have heard that are clearly incorrect. A few, as examples:

1. Adopting a minimum flow for the Rainbow River System harms the river.
2. The District is not required to adopt a minimum flow.
3. The District is attempting to "take" water from the river.
4. The minimum flow applies to natural variation in flow (e.g., things other than water withdrawals like droughts and low rainfall).
5. The minimum flow is developed in the office "behind closed doors" without using real information.
6. The impact of groundwater pumping in the Rainbow River Springshed is large, and pumping from outside the groundwater boundaries (e.g., Jacksonville, Orlando) is affecting Rainbow Springs.
7. The decline in Rainbow Springs flow the past 20 years or so is due to excessive groundwater pumping.

Eric DeHaven, P.G., Assistant Director

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]

Sent: Monday, February 27, 2017 8:16 AM
To: Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>
Subject: Chronicle Newspaper Sunday

Kym and Eric,

An interesting article in yesterday's Chronicle which I have no doubt you read. It is fairly typical of a newspaper reporter's coverage; he reported a two hour meeting on a specific subject for the general readership and did a reasonable good job. My interest this morning is to ask about the quotes used from Kym and Eric:

- Experts with the Southwest Florida Water Management District say they don't want the Rainbow destroyed. Instead, they're trying to save it.
  "There's quite a bit of gloom-and-doom misinformation out there," said Kim Rouse Holzwart, senior environmental scientist with the district.

- "We all have to do our part," Eric DeHaven, assistant director of the district's resource management division, said. "Everyone has a role in it."

Would either of you care to expand on what these comments mean?
Possible 3 or 4 key bullet points is all that is needed.

I am particularly interested in what misinformation Kym says is 'out there'.
What the District is doing to save the Rainbow River by suggesting there can be further reduction in spring discharge by allowing more withdrawals from the aquifer. SWIM and MFL often appear to be treated as mutually exclusive (Federal as opposed to District may be).

Thanks in anticipation of a brief reply.

Martyn

From:	Alan Martyn Johnson
To:	Doug Leeper
Cc:	Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject:	Re: Rainbow River MFL
Date:	Sunday, March 12, 2017 10:19:27 AM

Doug,

Re staff responses in your March 7 e-mail.

1. My question was 'severe backwater effect' which is the wording in Appendix H page 2 (the stage comparison which lead to the conclusion in that same sentence has never materialized), and page 2-11. Draft report page 7 it states HEC-RAS was used to account for backwater effect. There are no facts/supporting evidence of the backwater effect.

   So the short answer to my question:

   District maintains the position regarding backwater effect. Albeit with no evidence yet presented.

   Note.

   The stage comparison reference on page 2 remains elusive. However, I note ""stagnant"" in the response; could this be from the same person who observed "reverse flow". Is it possible the data leading to Staff Response January 19 originated during construction of the model and writing the report? That data if believed would giving rise to use of the term ""severe"" in the report and the model incorporating the ability to consider various backwater effects? The January 19 response was:

   Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

   I agree it was later retracted, but someone still has this in their mind or may be belief to now use ""stagnant"". Severe (very bad, serious) comes from somewhere be that origin factually accurate or not.

2. I can read the referenced Table 2-3 ECT and Table 6-1 in the Draft Report. I can also read page 2-8 ECT report where it states linear interpolation was used. However, the writer of the response appears to understand these were ""observations"" (I have highlighted and bold the wording in the response) and I think you will find these were not observations, but calculations . Think deeply about how the source of this water has escaped any observation of springs/boils which can account for almost 100 cfs. Let

alone the more recent information of field measurements at 02313098 by USGS. A FDEP report on the Impaired status is possibly the best source of all named springs and mentions numerous small boils in the first 2 miles. Additionally in the 1996 SWFWMD report Eric shared with me couple of weeks ago about nitrate source and age,. that report states 89% of the flow enters the river in the first 1.5 miles (point 6 Executive Summary). Someone used linear interpolation without thinking

So short answer is: **District are not correcting the Channel Flow Profile.** Despite evidence it is incorrect.

3. So staff are suggesting the primary factor ''controlling" spring discharge is the gage height at Rainbow Well. USGS have used Rainbow Well as a reference point for determining a relationship to actual discharge which they physically measure in the river (Field Measurements) and then correlate these field measurements to the reference point. At various times they check to see if the relationship is still close or needs adjusting. They do the same with wells such as Weeki Wachee for discharges from Homosassa main (but add to that a factor to account for gage height). To suggest in the response USGS may have faulty methods is disrespectful.

Do I recall somewhere there was a thought about the anomaly being permanent or temporary. The reduced flow is real: just look at the Field Measurements over time, these are actual in river measurements, not estimates from an indirect relationship. Lets hope efforts to get velocity based discharges do not take much longer.

So the short answer is: **District will continue to say there is an anomaly (abnormality) in the discharges post 2000.**

Incidentally, I do not think I mentioned groundwater withdrawal in my question 3, so I will leave that for the moment.

4. I am pleased to hear staff are discussing the idea of an emergency rule making, which hopefully will stop or severely limit any new well permits being approved, per Peer Review Panel's recommendation. What harm does 'buying' say a year to do the additional work which is mentioned particularly in the response to the peer review. This is far more acceptable than kicked the can down the road for 10, 20 years.

So, is the short answer: **Staff will have proposed Rule Language, which has input from legal, ready for presentation at the March Governing**

Board Meeting.

5. My point is the numbers do not match and my point was to have a clear table of all actual and estimated withdrawals for the springshed. But, as Staff do not understand let me go through the mismatches one at a time:
--I realize the figure in column 2 of Table 2-3 is for the entire Domain, but column 5 indicates pumpage is 6.07 cfs (3.92 mgd) or (0.9%) for Rainbow.

--On page 7 of the report withdrawals referencing NDM 4 are 1.7 percent of natural flow after 1995, NDM 4 uses the same 659 cfs as NDM 5 so pumpage is 11.2 cfs (7.2 mgd). May be I confused you by using a round number of 5 mgd for these NDM derived pumpages to compare to the next figure.

--Table 2-21, which is titled use history within the Rainbow Springshed, shows withdrawals as 20-30 mgd. As indicated these come from a data base the District maintains. This data is published as Estimated Annual Water Use Report. The problem is the data base in the published reports is for the part of Marion County which is in the SWFWMD's area.

--Page 37 under 2.4.2 states
Long-term average flow for Rainbow Springs is 446 mgd (690 cfs). Groundwater withdrawals in 2014 were estimated at 22.1 mgd, with domestic self-supply estimated quantities included. In 2014, groundwater withdrawals in the basin constituted about 4.9 percent of average flow.
The 2013 Use Report shows 22.22 mgd and 2014 shows 19.5 mgd The * next to Marion defines these as being for "only the portion of the county within the District boundaries". For 2015 published November 30, 2016 Marion County for portion in SWFWMD boundaries is 18.5 mgd.

So is the District response now; **Whoops we forgot about the parts of Rainbow Springshed that are in Levy County and those parts that are in the SJRWMD. May be a Table to track withdrawals in the Springshed would be useful.**

While on this subject let me not forget to mention the Water Budget for the Rainbow Springshed Tables 2-4 and 2-5 where pumpage is given as 0.87 inches and 0.8 inches. This is 43 cfs or 28 mgd which is 6.2% of the long term average flow 446 mgd. Considering 2011, a low flow year, this is 8.5%.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Tuesday, March 7, 2017 2:42 PM
To: Alan Martyn Johnson
Cc: Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject: RE: Rainbow River MFL

Martyn:

Thanks for the five questions concerning the Rainbow River that you submitted last Friday. Please see our responses to your questions imbedded using blue italics in your original email below.

Doug Leeper
MFLs Program Lead
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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Subject: Rainbow River MFL

Doug and Kym,
It was November 14, 2016 when I first asked questions and expressed concerns about the Rainbow River MFL Report. In the months since then I have given you my thoughts on some of the key issues. As you face a deadline to present the Final Report to the Governing Board at the end of the month I would appreciate if you would give me the courtesy of direct answers to the following points/questions. A simple yes or no answer to each question is all I ask.

1. Backwater Effect.
   Do SWFWMD maintain there is a severe backwater effect despite no hard data to support this in the form of comparison of the comparison of gage ht Withlacoochee

02313200 and Rainbow 02313100, and that this backwater effect remains in the model construction?

District Response: *Staff maintains that the Withlacoochee River exerts a backwater effect on the Rainbow River System and notes that this effect was considered for the analyses used to support development of the recommended minimum flow. The water level in Withlacoochee River doesn't necessary need to be higher than the Rainbow River water level for a backwater effect to occur. Backwater effects occur when water is held in its course by stagnant water in the Withlacoochee River. The poor rating curve between stage and flow at USGS station 02313100 confirms the influence of backwater. When the stage data at USGS station 02313200 was included in the rating curve, the association exhibited considerable improvement, with the R^2 value increasing from 0.53 to 0.98. The severe backwater at CR484 is the main reason for using the well station near Dunnellon in the rating curve used for reporting discharge at station 02313100.*

2. Spring Water Discharge Profile.

   Do SWFWMD continue to use linear interpolation to assign approximately 15% of total spring discharges to the reach downstream of the newer USGS Gage Station 02313098, despite the Field Measurements from December 2013 thru February 2017 showing the flows at this gage and 02313100 to be essentially the same? I would again point out Field Measurements are the most definitive measurement of flow and they are the basis for development of the rating curve/look up charts with Rainbow Well for the discharges reported at 02313100.

   District Response: *There are four District stations with field-measured data from 2009-2013, located downstream of the USGS Gage 02313098. As can be seen in Table 2-3 of the HEC-RAS hydraulic modeling report prepared by ECT, Inc., their respective flow distribution, from upstream to downstream represents 86.5%, 89.3%, 92.9% and 94.7% of the total flow at USGS gage 02313100. Based on* ***these observations*** *the flow distribution at USGS Station 02313098 was approximated to be 85% of the total flow at USGS gage 02313100. However, we acknowledge that there is uncertainty in assigning flow distribution due to limited data and we are committed to refining inputs used in hydraulic and other hydrologic models for the planned reevaluation of the Rainbow River minimum flow.*

3. Do SWFWMD continue to claim an anomaly in discharge post 2000 thereby rejecting USGS changes to the rating are the origin of the perceived anomaly, and thereby rejecting the USGS discharge data as being the best available on going discharge data since 2000?

District Response*: When staff describe the anomaly in flow post-2000, it's discussed as a major change in Upper Floridan aquifer (UFA) head relation with flow that is clearly evident in Figures 2-16 and 2-17 in the MFL report. The rating curve information you sent us from the USGS largely supports this analysis in that other than a brief period in the 1980s, the rating*

between discharge and well water level was consistent prior to the year 2000. There are a variety of factors that could lead to this change in head/flow relationship in 2000. They include increased friction effects in the outlet river, change in structure operations at the Lake Rousseau Dam, natural plugging off of spring vents (karst systems are dynamic), or some change in measurement technique, equipment, or methodology by the USGS. What is certain from a groundwater science standpoint is that the rather abrupt change is not related to groundwater withdrawals. The evidence to support this is substantial: groundwater quantities withdrawn in the springshed are relatively small (consumptively-used withdrawals make up a little more than two percent of springflow), actual groundwater use has declined by 20% the last 10 years in both the springshed and our northern six counties, UFA water levels are stable or slightly rising since 1990 in both the Rainbow and Silver Springsheds, the NDM 5 model predictions of withdrawal impacts align closely with water budget information, and this type of geology – unconfined UFA with high recharge, storage, and permeability – tends to limit the effects of groundwater withdrawn compared to well-confined aquifers and make them more localized rather than regional. And one other factor to note, groundwater withdrawals did increase in the very dry year of 2000 – about 10% from the previous year in the springshed and northern six counties. However, they declined thereafter through 2005 and were similar to those in the late 1990s. This is strong evidence that a major spike in withdrawals did not occur to even remotely suggest the change is related to groundwater withdrawals. Withdrawals would have had to increase by 5 to 10 times what they are today (100 to 200 mgd in the springshed) and be sustained through the 10 year period after the year 2000 for this to be groundwater related flow decline.

4. Do SWFWMD dismiss the recommendation by the Peer Review Panel to consider capping of further withdrawals (no new well permits) until the cause of reduced flow and nitrate issues (putting Rainbow River on the impaired list) are investigated.
   I would suggest a discussion with your legal team to consider the possibility of using the 'emergency rule' provision in the Statue re the July deadline. I am no lawyer but it should be explored with the experts.

   District Response: *Staff plan to recommend that the District Governing Board initiate rulemaking and approve adoption of amendments to Rule 40D-8.041, Florida Administrative Code, to establish a minimum flow of 95% of the natural flow for the Rainbow River System. A recommendation regarding emergency rulemaking is also being considered for presentation to the Board.*

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   The Annual Estimated Springshed Withdrawals Report should clearly define actual withdrawals and any adjustments made for non consumptive uses.

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I will continue to watch developments and any ideas to explain the decreased discharge, but my attention for Rainbow will turn to Rule Language.

Thank you in anticipation of five to the point answers. I hope my questions are concise and clear.

Martyn

From:	Doug Leeper
To:	Alan Martyn Johnson
Cc:	Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject:	RE: Rainbow River MFL
Date:	Friday, March 17, 2017 4:50:55 PM

Martyn:

Thanks for your March 12th email concerning the proposed minimum flow for the Rainbow River System. Staff will continue to consider all of your input on this system and will make your recent email available to District Governing Board members in advance of their March 28th meeting.

Doug Leeper
MFLs Program Lead
Natural Systems and Restoration Bureau
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34609
1-800-423-1476, ext. 4272
352-796-7211, ext. 4272
doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, March 12, 2017 10:19 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Sean King <Sean.King@swfwmd.state.fl.us>; Mark A. Green <Mark.Green@swfwmd.state.fl.us>; Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
Subject: Re: Rainbow River MFL

Doug,

Re staff responses in your March 7 e-mail.

1. My question was 'severe backwater effect' which is the wording in Appendix H page 2 (the stage comparison which lead to the conclusion in that same sentence has never materialized), and page 2-11. Draft report page 7 it states HEC-RAS was used to account for backwater effect. There are no facts/supporting evidence of the backwater effect.

   So the short answer to my question:

   District maintains the position regarding backwater effect. Albeit with no evidence yet presented.

Note.

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Between 2005 and 2016, there are more than 450 days where the stage at USGS site number 02313200 (Withlacoochee River at Dunnellon, FL) is higher than the stage at USGS site number 02313100 (Rainbow River at Dunnellon, FL). The range is 2-4 feet. Good examples of these reported differences can be found by comparing stage values reported for the two sites in October 2007, June 2008 and December 2013.

I agree it was later retracted, but someone still has this in their mind or may be belief to now use ""stagnant"". Severe (very bad, serious) comes from somewhere be that origin factually accurate or not.

2. I can read the referenced Table 2-3 ECT and Table 6-1 in the Draft Report. I can also read page 2-8 ECT report where it states linear interpolation was used. However, the writer of the response appears to understand these were ""observations"" (I have highlighted and bold the wording in the response) and I think you will find these were not observations, but calculations . Think deeply about how the source of this water has escaped any observation of springs/boils which can account for almost 100 cfs. Let alone the more recent information of field measurements at 02313098 by USGS. A FDEP report on the Impaired status is possibly the best source of all named springs and mentions numerous small boils in the first 2 miles. Additionally in the 1996 SWFWMD report Eric shared with me couple of weeks ago about nitrate source and age,. that report states 89% of the flow enters the river in the first 1.5 miles (point 6 Executive Summary). Someone used linear interpolation without thinking

So short answer is: **District are not correcting the Channel Flow Profile.** Despite evidence it is incorrect.

3. So staff are suggesting the primary factor ''controlling" spring discharge is the gage height at Rainbow Well. USGS have used Rainbow Well as a reference point for determining a relationship to actual discharge which they physically measure in the river (Field Measurements) and then correlate these field measurements to the

reference point. At various times they check to see if the relationship is still close or needs adjusting. They do the same with wells such as Weeki Wachee for discharges from Homosassa main (but add to that a factor to account for gage height). To suggest in the response USGS may have faulty methods is disrespectful.

Do I recall somewhere there was a thought about the anomaly being permanent or temporary. The reduced flow is real: just look at the Field Measurements over time, these are actual in river measurements, not estimates from an indirect relationship. Lets hope efforts to get velocity based discharges do not take much longer.

So the short answer is: **District will continue to say there is an anomaly (abnormality) in the discharges post 2000.**

Incidentally, I do not think I mentioned groundwater withdrawal in my question 3, so I will leave that for the moment.

4. I am pleased to hear staff are discussing the idea of an emergency rule making, which hopefully will stop or severely limit any new well permits being approved, per Peer Review Panel's recommendation. What harm does 'buying' say a year to do the additional work which is mentioned particularly in the response to the peer review. This is far more acceptable than kicked the can down the road for 10, 20 years.

So, is the short answer: **Staff will have proposed Rule Language, which has input from legal, ready for presentation at the March Governing Board Meeting.**

5. My point is the numbers do not match and my point was to have a clear table of all actual and estimated withdrawals for the springshed. But, as Staff do not understand let me go through the mismatches one at a time:
--I realize the figure in column 2 of Table 2-3 is for the entire Domain, but column 5 indicates pumpage is 6.07 cfs (3.92 mgd) or (0.9%) for Rainbow.

--On page 7 of the report withdrawals referencing NDM 4 are 1.7 percent of natural flow after 1995, NDM 4 uses the same 659 cfs as NDM 5 so pumpage is 11.2 cfs (7.2 mgd). May be I confused you by using a round number of 5 mgd for these NDM derived pumpages to compare to the next figure.

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Long-term average flow for Rainbow Springs is 446 mgd (690 cfs). Groundwater withdrawals in 2014 were estimated at 22.1 mgd, with domestic self-supply estimated quantities included. In 2014, groundwater withdrawals in the basin constituted about 4.9 percent of average flow.

The 2013 Use Report shows 22.22 mgd and 2014 shows 19.5 mgd The * next to Marion defines these as being for "only the portion of the county within the District boundaries". For 2015 published November 30, 2016 Marion County for portion in SWFWMD boundaries is 18.5 mgd.

So is the District response now; **Whoops we forgot about the parts of Rainbow Springshed that are in Levy County and those parts that are in the SJRWMD. May be a Table to track withdrawals in the Springshed would be useful.**

While on this subject let me not forget to mention the Water Budget for the Rainbow Springshed Tables 2-4 and 2-5 where pumpage is given as 0.87 inches and 0.8 inches. This is 43 cfs or 28 mgd which is 6.2% of the long term average flow 446 mgd. Considering 2011, a low flow year, this is 8.5%.

Martyn

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Tuesday, March 7, 2017 2:42 PM
To: Alan Martyn Johnson
Cc: Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject: RE: Rainbow River MFL

Martyn:

Thanks for the five questions concerning the Rainbow River that you submitted last Friday. Please see our responses to your questions imbedded using blue italics in your original email below.

Doug Leeper

MFLs Program Lead

Natural Systems and Restoration Bureau

Southwest Florida Water Management District

2379 Broad Street

Brooksville, FL 34609

1-800-423-1476, ext. 4272

352-796-7211, ext. 4272

doug.leeper@watermatters.org

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Subject: Rainbow River MFL

Doug and Kym,

It was November 14, 2016 when I first asked questions and expressed concerns about the Rainbow River MFL Report. In the months since then I have given you my thoughts on some of the key issues. As you face a deadline to present the Final Report to the Governing Board at the end of the month I would appreciate if you would give me the courtesy of direct answers to the following points/questions. A simple yes or no answer to each question is all I ask.

1. Backwater Effect.
   Do SWFWMD maintain there is a severe backwater effect despite no hard data to support this in the form of comparison of the comparison of gage ht Withlacoochee 02313200 and Rainbow 02313100, and that this backwater effect remains in the model

construction?

District Response: *Staff maintains that the Withlacoochee River exerts a backwater effect on the Rainbow River System and notes that this effect was considered for the analyses used to support development of the recommended minimum flow. The water level in Withlacoochee River doesn't necessary need to be higher than the Rainbow River water level for a backwater effect to occur. Backwater effects occur when water is held in its course by stagnant water in the Withlacoochee River. The poor rating curve between stage and flow at USGS station 02313100 confirms the influence of backwater. When the stage data at USGS station 02313200 was included in the rating curve, the association exhibited considerable improvement, with the R^2 value increasing from 0.53 to 0.98. The severe backwater at CR484 is the main reason for using the well station near Dunnellon in the rating curve used for reporting discharge at station 02313100.*

2. Spring Water Discharge Profile.
   Do SWFWMD continue to use linear interpolation to assign approximately 15% of total spring discharges to the reach downstream of the newer USGS Gage Station 02313098, despite the Field Measurements from December 2013 thru February 2017 showing the flows at this gage and 02313100 to be essentially the same? I would again point out Field Measurements are the most definitive measurement of flow and they are the basis for development of the rating curve/look up charts with Rainbow Well for the discharges reported at 02313100.

District Response: *There are four District stations with field-measured data from 2009-2013, located downstream of the USGS Gage 02313098. As can be seen in Table 2-3 of the HEC-RAS hydraulic modeling report prepared by ECT, Inc., their respective flow distribution, from upstream to downstream represents 86.5%, 89.3%, 92.9% and 94.7% of the total flow at USGS gage 02313100. Based on* ***these observations*** *the flow distribution at USGS Station 02313098 was approximated to be 85% of the total flow at USGS gage 02313100. However, we acknowledge that there is uncertainty in assigning flow distribution due to limited data and we are committed to refining inputs used in hydraulic and other hydrologic models for the planned reevaluation of the Rainbow River minimum flow.*

3. Do SWFWMD continue to claim an anomaly in discharge post 2000 thereby rejecting USGS changes to the rating are the origin of the perceived anomaly, and thereby rejecting the USGS discharge data as being the best available on going discharge data since 2000?

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4. Do SWFWMD dismiss the recommendation by the Peer Review Panel to consider capping of further withdrawals (no new well permits) until the cause of reduced flow and nitrate issues (putting Rainbow River on the impaired list) are investigated.
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Thank you in anticipation of five to the point answers. I hope my questions are concise and clear.

Martyn

From:	Alan Martyn Johnson
To:	Doug Leeper
Cc:	Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject:	Re: Rainbow River MFL
Date:	Monday, March 20, 2017 8:36:12 AM

Doug,

Thank you for your brief e-mail which I have to admit I am struggling to understand. I am pleased to see in the Notebook for the Governing Board's Meeting, the possibility of an emergency rule is being considered. However, it is unclear how an emergency rule can be used, FS says:

The emergency rules shall remain in effect during the pendency of procedures to adopt rules addressing the subject of the emergency rules.

I would have thought an emergency rule could be justified by the issues and questions identified during the review process; some of which warrant detailed time consuming investigation before a final MFL can be presented. But, that is for the lawyer to understand what an emergency rule is.

I also note the wording in the notebook about Rulemaking being Initiated after the Governing Board accepts the report. This is exactly where the process derailed for the Chassahowitzka and Homosassa; the attorney who wrote those Rules did not have a clue about what the language meant. Yes those rules are still there; meaningless to the withdrawal of groundwater from the aquifer.

At least this time we have Exhibit A. Unfortunately, Exhibit A in the Notebook, suffers from some of the same in that there is no indication of where the withdrawals are to be found. Yet, again I would ask for examples of how this "Rule" is to be interpreted by your Water Use Permitting Officers. How do they know how close to the limit the next WUP puts them?

I am sorry but taking one percent from the NDM does not cut it for me. When the flow is:

644 cfs the withdrawals are 4.16 mgd,

when flow is 467 cfs withdrawals are 3.08 mgd and

when flow is 900 cfs withdrawals are 5.81 mgd

I do not see the logic; the flow does not control how much water all those pumps suck out of the ground.

Martyn

P.S. Small suggestion re non-consumptive groundwater returning to the aquifer.

It has troubled me for sometime about 'non-consumptive' groundwater returned to the aquifer, particularly in these springsheds where there is high nitrate. It seems intuitive that irrigating crops and golf courses (let alone septic tanks) with water that is already much higher in 'nitrogen' than rainwater only results in the 'returned water' being higher in nitrate/nitrite (agreed the percent of recharge from these sources are different). While I have

no evidence to back up this intuitive thought, other than nitrates are very soluble; possibly someone has thought this through. There must be sampling wells at some farms etc. Yes, no? If Not Suggestion:

Maybe, WS Farms Williston Levy County (current WUP 84,000 gpd appears to be in Rainbow springshed), who are getting financial assistance (H750) could be asked to co-operate by having shallow sampling stations to monitor nitrate increases (or decreases) in the water returning to the aquifer. I am not sure what a fertilization station is but I assume this is where liquid fertilizer is added directly to the withdrawn groundwater, so monitoring would be very controlled (source water, sprayed water, 20 feet sampling).

Just a thought.

From: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Sent: Friday, March 17, 2017 4:50 PM
To: Alan Martyn Johnson
Cc: Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile
Subject: RE: Rainbow River MFL

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Sent: Sunday, March 12, 2017 10:19 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>; Sean King <Sean.King@swfwmd.state.fl.us>; Mark A. Green <Mark.Green@swfwmd.state.fl.us>;

Yonas Ghile <Yonas.Ghile@swfwmd.state.fl.us>
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   So the short answer to my question:

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To: Alan Martyn Johnson
Cc: Ron Basso; Melissa Gulvin; Kurt Fritsch; Eric DeHaven; Kym Holzwart; Sean King; Mark A. Green; Yonas Ghile

Subject: RE: Rainbow River MFL

Martyn:

Thanks for the five questions concerning the Rainbow River that you submitted last Friday. Please see our responses to your questions imbedded using blue italics in your original email below.

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From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, March 03, 2017 7:49 AM
To: Doug Leeper <Doug.Leeper@swfwmd.state.fl.us>; Kym Holzwart <Kym.Holzwart@swfwmd.state.fl.us>
Cc: Ron Basso <Ron.Basso@swfwmd.state.fl.us>; Melissa Gulvin <Melissa.Gulvin@swfwmd.state.fl.us>; Kurt Fritsch <Kurt.Fritsch@swfwmd.state.fl.us>; Eric DeHaven <Eric.Dehaven@swfwmd.state.fl.us>
Subject: Rainbow River MFL

Doug and Kym,
It was November 14, 2016 when I first asked questions and expressed concerns about the Rainbow River MFL Report. In the months since then I have given you my thoughts on some of the key issues. As you face a deadline to present the Final Report to the Governing Board at the end of the month I would appreciate if you would give me the courtesy of direct answers to the following points/questions. A simple yes or no answer to each question is all I ask.

1. Backwater Effect.
   Do SWFWMD maintain there is a severe backwater effect despite no hard data to support this in the form of comparison of the comparison of gage ht Withlacoochee 02313200 and Rainbow 02313100, and that this backwater effect remains in the model construction?
   District Response: *Staff maintains that the Withlacoochee River exerts a backwater effect on the Rainbow River System and notes that this effect was considered for the analyses used to support development of the recommended minimum flow. The water level in Withlacoochee River doesn't necessary need to be higher than the Rainbow River water level for a backwater effect to occur. Backwater effects occur when water*

is held in its course by stagnant water in the Withlacoochee River. The poor rating curve between stage and flow at USGS station 02313100 confirms the influence of backwater. When the stage data at USGS station 02313200 was included in the rating curve, the association exhibited considerable improvement, with the R^2 value increasing from 0.53 to 0.98. The severe backwater at CR484 is the main reason for using the well station near Dunnellon in the rating curve used for reporting discharge at station 02313100.

2. Spring Water Discharge Profile.

   Do SWFWMD continue to use linear interpolation to assign approximately 15% of total spring discharges to the reach downstream of the newer USGS Gage Station 02313098, despite the Field Measurements from December 2013 thru February 2017 showing the flows at this gage and 02313100 to be essentially the same? I would again point out Field Measurements are the most definitive measurement of flow and they are the basis for development of the rating curve/look up charts with Rainbow Well for the discharges reported at 02313100.

   District Response: *There are four District stations with field-measured data from 2009-2013, located downstream of the USGS Gage 02313098. As can be seen in Table 2-3 of the HEC-RAS hydraulic modeling report prepared by ECT, Inc., their respective flow distribution, from upstream to downstream represents 86.5%, 89.3%, 92.9% and 94.7% of the total flow at USGS gage 02313100. Based on* ***these observations*** *the flow distribution at USGS Station 02313098 was approximated to be 85% of the total flow at USGS gage 02313100. However, we acknowledge that there is uncertainty in assigning flow distribution due to limited data and we are committed to refining inputs used in hydraulic and other hydrologic models for the planned reevaluation of the Rainbow River minimum flow.*

3. Do SWFWMD continue to claim an anomaly in discharge post 2000 thereby rejecting USGS changes to the rating are the origin of the perceived anomaly, and thereby rejecting the USGS discharge data as being the best available on going discharge data since 2000?

District Response*: When staff describe the anomaly in flow post-2000, it's discussed as a major change in Upper Floridan aquifer (UFA) head relation with flow that is clearly evident in Figures 2-16 and 2-17 in the MFL report. The rating curve information you sent us from the USGS largely supports this analysis in that other than a brief period in the 1980s, the rating between discharge and well water level was consistent prior to the year 2000. There are a variety of factors that could lead to this change in head/flow relationship in 2000. They include increased friction effects in the outlet river, change in structure operations at the Lake Rousseau Dam, natural plugging off of spring vents (karst systems are dynamic), or some change in measurement technique, equipment, or methodology by the USGS. What is certain from a groundwater science standpoint is that the rather abrupt change is not related to groundwater withdrawals. The evidence to support this is substantial: groundwater quantities withdrawn in the springshed are relatively small (consumptively-used withdrawals make up a*

little more than two percent of springflow), actual groundwater use has declined by 20% the last 10 years in both the springshed and our northern six counties, UFA water levels are stable or slightly rising since 1990 in both the Rainbow and Silver Springsheds, the NDM 5 model predictions of withdrawal impacts align closely with water budget information, and this type of geology – unconfined UFA with high recharge, storage, and permeability – tends to limit the effects of groundwater withdrawn compared to well-confined aquifers and make them more localized rather than regional. And one other factor to note, groundwater withdrawals did increase in the very dry year of 2000 – about 10% from the previous year in the springshed and northern six counties. However, they declined thereafter through 2005 and were similar to those in the late 1990s. This is strong evidence that a major spike in withdrawals did not occur to even remotely suggest the change is related to groundwater withdrawals. Withdrawals would have had to increase by 5 to 10 times what they are today (100 to 200 mgd in the springshed) and be sustained through the 10 year period after the year 2000 for this to be groundwater related flow decline.

4. Do SWFWMD dismiss the recommendation by the Peer Review Panel to consider capping of further withdrawals (no new well permits) until the cause of reduced flow and nitrate issues (putting Rainbow River on the impaired list) are investigated.
   I would suggest a discussion with your legal team to consider the possibility of using the 'emergency rule' provision in the Statue re the July deadline. I am no lawyer but it should be explored with the experts.

   District Response: *Staff plan to recommend that the District Governing Board initiate rulemaking and approve adoption of amendments to Rule 40D-8.041, Florida Administrative Code, to establish a minimum flow of 95% of the natural flow for the Rainbow River System. A recommendation regarding emergency rulemaking is also being considered for presentation to the Board.*

5. Do SWFWMD intend to have a clear annual report showing all withdrawals in the Rainbow springshed to avoid differences/confusion between NDM groundwater withdrawals Table 2-3 (about 5mgd) and Figure 2-21 (20-30 mgd)?
   The Annual Estimated Springshed Withdrawals Report should clearly define actual withdrawals and any adjustments made for non consumptive uses.

District Response: *Staff is unsure about the differences cited in Table 2-3 (about 5 mgd) and Figure 2-21 (20-30 mgd). Table 2-3 lists the groundwater withdrawn in the NDM 5 model for the entire active domain (which includes large withdrawals in the central and eastern GW basins) for 2010, 2014, and 2035. In the model, we do adjust domestic self-supply withdrawals for septic tank recharge and include irrigation return water applied to layer 1 in the NDM – so we have return water accounted for in the model. Figure 2-21 is just the total estimated and metered groundwater use in the Rainbow Springshed (boundary defined using the May 2005 potentiometric surface). This graph of historic groundwater use is from 1992 through 2014 and it includes both water use permitted withdrawals and estimates of domestic self-supply. This data does not come from the NDM – it's from a separate GIS database that we update annually. No adjustments are made to this pumping data. We are currently in the process of*

updating to 2015 and will have that information in a few months. We annually update both the radar-estimated rainfall and groundwater withdrawals in our magnitude 1 springsheds to track this data through time.

I will continue to watch developments and any ideas to explain the decreased discharge, but my attention for Rainbow will turn to Rule Language.

Thank you in anticipation of five to the point answers. I hope my questions are concise and clear.

Martyn