11.18 Report Reviews and District Responses

Note – This section contains reviews and comments received by the District prior to July 15, 2012 regarding the 4/2010 and 11/2010 draft reports along with the District's responses. The responses do not reflect the results of the re-evaluation described in the final report and published in July 2012.

To the extent possible, the highlighting, font, emphasis (bold, underline, color etc.) of the original message and that of the response has been retained. In most cases, signature blocks in electronic mail have been truncated and in some cases, extensive distribution lists or data tables embedded in electronic correspondence has been removed.

An attempt has been made to include dialogue that focused on technical questions regarding the District's approach, or the data used in the evaluation. In addition, correspondence reflecting an opinion that was clearly expressed for District consideration has been included. As such, not all correspondence is included. Examples that have been excluded are simple acknowledgement of response (e.g. 'thank you') or dialogues between stakeholders that included District staff as carbon copy recipients.

Contents

11.18.1 Peer Review Panel and Responses

SCIENTIFIC REVIEW OF THE CHASSAHOWITZKA RIVER SYSTEM RECOMMENDED MINIMUM FLOWS AND LEVELS

Scientific Peer Review Report

June 30, 2010

Prepared For:
Southwest Florida Water Management District
2379 Broad Street
Brooksville, Florida 34609-6899

Prepared By:
Scientific Peer Review Panel

Panel Chair and Report Editor:
Gary L. Powell, President
Aquatic Science Associates
8308 Elander Drive
Austin, TX 78750
garypowell@austin.rr.com

Panel Members:

Billy H. Johnson, Ph.D., P.E., D.WRE
Computational Hydraulics and Transport LLC
300 Front Street
P.O. Box 569
Edwards, MS 39066
cht@canufly.net

Courtney T. Hackney, Ph.D.
Director of Coastal Biology and Biology Department Chair
University of North Florida, 1 UNF Drive
Jacksonville, FL 32224
c.hackney@unf.edu

Scientific Peer Review of Proposed Minimum Flows and Levels for the Chassahowitzka River System, Florida

EXECUTIVE SUMMARY

These studies were conducted by the Southwest Florida Water Management District (the District) because Florida Statutes (§373.042) mandate the District's evaluation of minimum flows and levels (MFLs) for the purpose of protecting the water resources and the ecology of the Chassahowitzka River, Bay and Estuary System from "significant harm" that might result from continued reductions of freshwater inflows from the contributing watersheds in the future. With appropriate water management, including science-based MFL rules for environmentally safe operation of water supply projects from ground and surface water resources, the District can ensure that the Chassahowitzka ecosystem and its associated tidal (estuarine) marshes, brackish wetlands and artesian springs will continue to provide essential food and cover for the myriad of marine and estuarine-dependent fish and wildlife, as well as freshwater species in the headwaters, that need them for successful survival, growth and reproduction in these beautiful waters of interest.

The District is to be commended for voluntarily committing to independent scientific peer review of its MFLs determinations. The Scientific Review Panel (the Panel) finds that the District's goals, data, methods and conclusions, as developed and explained in the MFL report, are reasonable and appropriate. The District's multi-species approach is to be applauded because it does not ignore species with variable life history requirements. The District approached this analysis in an appropriately holistic manner; that is, with attention paid to both the ecological requirements of the river system and to the various watershed and springshed segments of the contributing landscape already modified by humans.

The Panel supports the District's finding that changes in the shallow-water distribution of estuarine-dependent fishes and shellfish is related to freshwater inflow and salinity regimes. Freshwater discharges attract these organisms, particularly the young-of-the-year, into areas that provide habitat (i.e., food and cover) in which they can survive and grow. In particular, the Panel notes that the entire Chassahowitzka River System appears to be tidal (read: estuarine) and the ecosystem contains many important nursery habitats for fish and wildlife, including intertidal marshes and spring run wetlands that deserve special consideration and protection. The Panel recognizes the Chassahowitzka springs, river, bay and estuary as parts of one ecosystem, which serves as a prime example of the classic artesian systems found on the Florida Springs Coast, where the mineral content in the spring water resembles minerals found in sea water, allowing an interesting mix of freshwater, estuarine and marine species.

Overall, it appears to the Panel that the MFL determination is adequate and based on the best available data, but the lack of detailed knowledge about the hydrogeology of the contributing springs, which seem to behave differently from each other and vary in water quality, would suggest that any MFL expressed in cfs alone may be somewhat inadequate or at least requires careful monitoring during implementation. Especially if groundwater withdrawals on the inland side of the aquifer, seawater intrusion into the artesian formation on the Gulf side, or other potential impacts (e.g., increased nitrogen and other pollutants) can affect the water quality of the Chassahowitzka ecosystem in the future, weakening the value and accuracy of the MFL as the District goes forward

with water management in this area. Until then, the Panel recommends that the District follow the Precautionary Principle and establish the initially recommended MFL as based on best available data and analyses until more and better scientific information is available in the future to better understand how changes in the springshed and the spring flows, both in quantity and quality, will affect the Chassahowitzka River System.

As the District moves forward to plan and supply water in the future to the people of the region, their economy and their environment, the Panel strongly recommends that the District continue to monitor the system for the purpose of verifying that the MFL is having its intended effect of maintaining the ecological health and productivity of this outstanding waterway. The verification monitoring might include spring flows, stream flows, tidal flows, basic water quality (e.g., temperature, salinity, pH, DO, chlorophyll, minerals and nutrients) and changes in vegetation, benthos, fish and shellfish, particularly during the spring season, which coincides with the beginning of peak utilization of nursery habitats by many estuarine-dependent fish and shellfish species in this part of Florida.

INTRODUCTION

The Southwest Florida Water Management District (the District) is mandated by Florida statutes to establish minimum flows and levels (MFLs) for state surface waters and aquifers within its boundaries for the purpose of protecting water resources and the ecology of the area from "significant harm" (Florida Statutes, 1972 as amended, Chapter 373, §373.042). The District implements the statute directives by periodically updating a list of priority water bodies for which MFLs are to be established and identifying which of these will undergo a voluntarily independent scientific review. Under the statutes, MFLs are defined as follows:

1. A minimum flow is the flow of a watercourse below which further water withdrawals will cause significant harm to the water resources or ecology of the area; and
2. A minimum level is the level of water in an aquifer or surface water body at which further water withdrawals will cause significant harm to the water resources of the area.

Revised in 1997, the Statutes also provide for the MFLs to be established using the "best available information," for the MFLs "to reflect seasonal variations," and for the District's Board, at its discretion, to provide for "the protection of nonconsumptive uses."

In addition, §373.0421 of the Florida Statutes states that the District's Board "shall consider changes and structural alterations to watersheds, surface waters and aquifers, and the effects such changes or alterations have had, and the constraints such changes or alterations have placed on the hydrology of the affected watershed, surface water, or aquifer…." As a result, the District generally identifies a baseline condition that realistically considers the changes and structural alterations in the hydrologic system when determining MFLs. While flow-related alterations were consider minimal in this MFL Report, it is still important to understand because the Chassahowitzka River System has source waters that are dominated by artesian spring flows from the Floridan aquifer, and these are directly affected by groundwater pumping and pollution.

Current state water policy, as expressed by the State Water Resources Implementation Rule (Chapter 62-40.473, Florida Administrative Code) contains additional guidance for the establishment of MFLs, providing that "…consideration shall be given to the protection of water resources, natural seasonal fluctuations, in water flows or levels, and environmental values associated with coastal, estuarine, aquatic and wetlands ecology, including:

1. Recreation in and on the water;
2. Fish and wildlife habitats and the passage of fish;
3. Estuarine resources;
4. Transfer of detrital material;
5. Maintenance of freshwater storage and supply;
6. Aesthetic and scenic attributes;
7. Filtration and absorption of nutrients and other pollutants;
8. Sediment loads;
9. Water quality; and
10. Navigation."

The Panel notes that Chapter 373.042(2) of the Florida Statutes directs the state water management districts to adopt MFLs for "all first magnitude springs, and all second magnitude springs within state or federally owned lands purchased for conservation purposes." Presumably, this would include the Chassahowitzka River Swamp Sanctuary, the Chassahowitzka National Wildlife Refuge, and other parts of the 60,348 acres of land and water habitats that have been preserved. Therefore, in addition to establishing an MFL for the Chassahowitzka River System, the District may be required to specifically identify or otherwise estimate MFLs for Chassahowitzka Springs and the other major springs that contribute flow to the river system, depending on land ownership. At some future time, the District may consider revising this flow recommendation in such a way that MFLs are specified for each contributing major spring, as well as for the overall river, bay and estuary system.

After a site visit on March 16, 2010 to perform a reconnaissance survey of the Chassahowitzka River System, the Panel held an initial meeting, discussed the scope of work and subsequently prepared their independent scientific reviews of the District's April 2010 draft report and associated study documents (e.g., appendices). The peer reviews were compiled by the Panel Chair and edited by all Panel Members into the consensus report presented herein.

BACKGROUND

The quantity, quality and timing of freshwater input are characteristics that define an estuary. Freshwater inflows affect estuarine (tidal) areas at all levels; that is, with physical, chemical and biological effects that create a vast and complicated network of ecological relationships (Longley 1994). The effects of changes in inflows to estuaries are also described in Sklar and Browder (1998) and reviewed in Alber (2002). This scientific literature describes and illustrates how changing freshwater inflows can have a profound impact on estuarine conditions: circulation and salinity patterns, stratification and mixing, transit and residence times, the size and shape of the estuary. In the end, the distribution of dissolved and particulate materials, including nutrients and sediments, may all be altered in ways that negatively affect the ecological health and productivity of coastal bays and estuaries.

Consequently, inflow-related changes in estuarine conditions will affect living estuarine resources, both directly and indirectly. Many estuarine organisms are directly linked to salinity, which determines the distribution of plants, benthic organisms and fishery species (Drinkwater and Frank 1994, Ardisson and Bourget 1997). If the distributions become uncoupled from their food source or preferred habitat, estuarine biota may be restricted to areas that are no longer suitable habitat for their survival, growth and reproduction. Potential effects of human activities, particularly reductions in fresh ground and surface water resources, on the adult and larval stages of fish and invertebrates include impacts on migration patterns, spawning and nursery habitats, species diversity and distribution, and production of lower trophic level (food) organisms (Drinkwater and Frank 1994, Longley 1994). Changes in inflow will also affect the delivery of nutrients, organic matter and sediments, which in turn can indirectly affect estuarine productivity rates and trophic structure (Longley 1994).

There are a number of approaches for setting freshwater inflow requirements of an estuary. The District prefers to use a "percent-withdrawal" method that sets upstream limits on water diversions or losses as a proportion of river flow. This links daily withdrawals to daily inflows, thereby preserving natural streamflow variations to a large extent. In some cases, a low-flow threshold or limit is employed as well. This type of inflow-based policy is very much in keeping with the approach that is often advocated for river management, where flow is considered a master variable because it is correlated with so many other factors in the ecosystem (Poff *et al.* 1997; Richter *et al.* 1997). In most cases, the emphasis is on maintaining the natural flow regime while skimming off surplus flows along the way to meet water supply needs. Normally, regulations are designed to prevent impacts to freshwater and estuarine resources during sensitive low-inflow periods, and to allow water supplies to become gradually more available as inflow increases. The rationale for the District's MFL setting, along with some of the underlying biological studies that support the percent-of-flow approach, is detailed in Flannery *et al.* (2002).

REVIEW

Developing minimum flow rules requires several steps: (1) setting appropriate management goals; (2) identifying indicators to measure characteristics that can be mechanistically linked to the management goals; (3) reviewing existing data and collecting new data on the indicators; and (4) assembling conceptual, qualitative, and quantitative models to predict behavior of the indicators under varying flow regimes. The first two steps above represent the overall approach to setting the minimum flow rule.

The District's management goal for the Chassahowitzka River System is to maintain ecosystem integrity and, thereby, protect ecological health and productivity. As a result, the District's MFL was developed to limit potential changes in aquatic and wetland habitat availability associated with reductions in freshwater inflows that are dominated by spring flows (SWFWMD 2010). When biologically meaningful thresholds or breakpoints were not found in the more or less continuous physical, chemical and biological responses, as is often the case in field studies, a criterion of no more than a 15% loss of habitat or other resources, as compared to the estuary's baseline condition, was used as the limit for "significant harm." While the use of 15% as a constraint in the MFL analysis is a more or less arbitrary management decision, the Panel agrees that it is a reasonable approach for avoiding the most serious negative impacts, particularly where the

ecosystem has not been as well studied and has little historical data available on its essential parts. The remainder of this report is focused on review of data, methods and analyses used as a basis for the District's recommended MFL.

Specifically, the District's proposed MFL was determined based on the following information and procedures:

1. The Chassahowitzka River, located north of Tampa Bay on the Florida Springs Coast, has been designated as an "Outstanding Florida Water." River flows are dominated by artesian spring discharges from the upper Floridan Aquifer. The headwater springs alone are estimated to contribute 50% of the total river flows. The river system drains a surficial watershed of approximately 89 square miles (~56,960 acres); however, most of its stream flow comes from near coastal springs that have a 180 mi² (~115,200 acre) contributing area in their groundwater springshed. Although streamgaging did not occur before February 1997, the District estimated the overall median flow of the river at 63 cfs from 1967-2007 using a regression relationship with water levels in a nearby Floridan aquifer well at Weeki Wachee. All 5.6 miles (9 km) of the river are tidally influenced from the headwaters to Chassahowitzka Bay on the Gulf of Mexico (Figure 1).

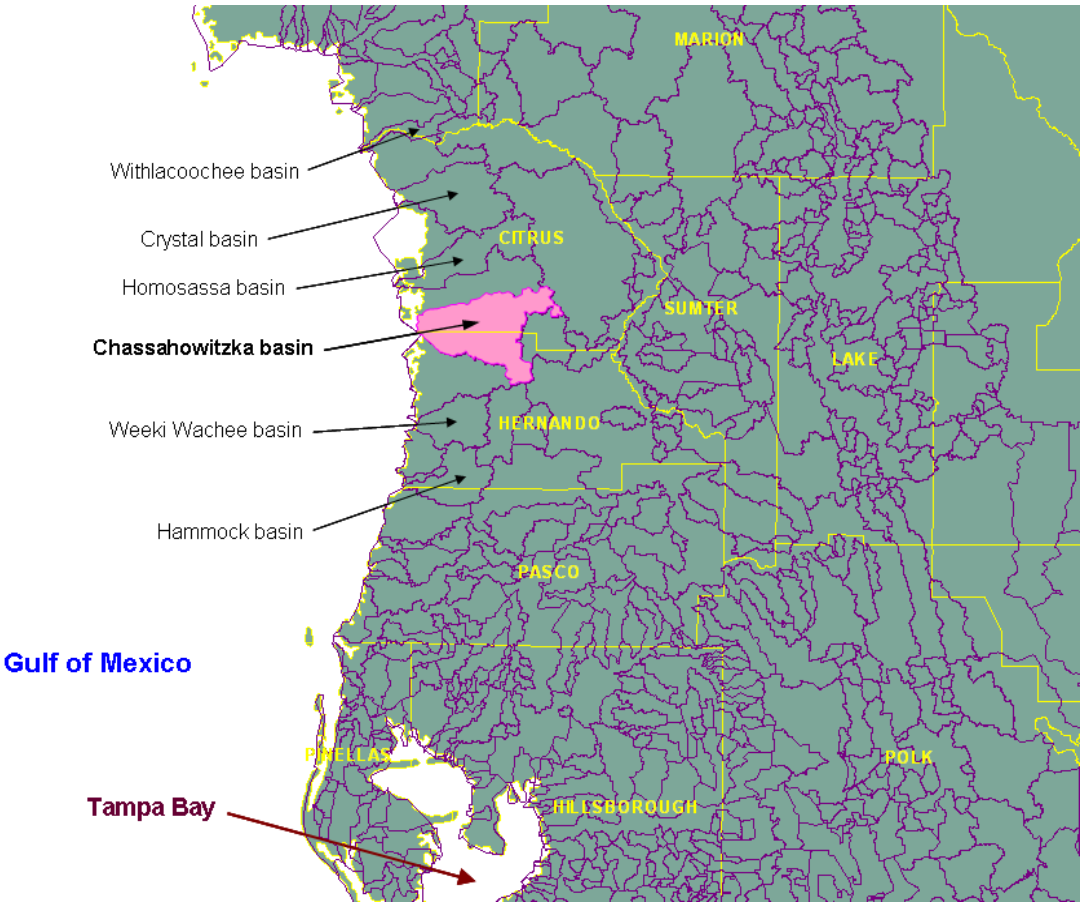


Figure 1. Location of the Chassahowitzka River Basin, Florida.

2. Ecological resources of concern identified by the District included submerged aquatic vegetation, benthic macroinvertebrates, mollusks, planktonic and nektonic fish and invertebrates, salinity-based habitat, and thermal refuge habitat for Manatees during critical cold periods. Numeric models and empirical regressions were used to assess their responses to reduced inflows (SWFWMD 2010).

3. The District evaluated 29 ecologically relevant responses. Since no inflection points or reasonable thresholds in the ecological responses were observed, the District used the previously mentioned 15% loss of habitat or resources as a default for the point of "significant harm." The abundance of mollusks and the diversity of benthic macroinvertebrates were both positively related to salinity, which is inversely related to freshwater inflows and, thus, they were not used in the District's minimum flow analysis. Also, a lack of confidence in the unusual responses from the SAV model (a 4^{th} order polynomial salinity/SAV density equation) resulted in its omission from the MFL analysis as well. Similarly, the estimated hypersensitive responses (i.e., abundances predicted near zero with only 1-2 % flow reduction) of some planktonic fish and invertebrate taxa were considered suspect and were not used because the actual river flows had little variability (~11%) over the two-year sampling period (Greenwood *et al.* 2008). A couple of taxa in the seine and trawl sample analysis also had estimated hypersensitive seasonal responses that seemed unreasonable and were not used. The Panel believes that these were probably the result of the rather limited duration of the sampling program over a period with minimal changes in flow, which leaves little in the field of variation to be explained by the statistical routine.

As a result, the District decided to compute the median allowable flow reduction over all 10 of the fish and invertebrate taxa included in the response analysis and use that value (11%) in the MFL. Support for this MFL value comes from the Manatee thermal refuge analysis that indicates a 15% loss of thermal refuge area in the stream occurs at an 11% reduction in flows.

Long-term compliance standards in the form of five- and ten-year mean and median flows were then developed to accommodate variations in climate. The District's intent is that these minimum long-term flow statistics should be maintained in the presence of future withdrawals in order to maintain 89% of the system's baseline flow.

Hydrologic and Hydrodynamic Simulations

This part of the scientific review focuses on the District's MFL report and the supporting numerical modeling discussed in the appendices (SWFWMD 2010). Appendix 11.2 discusses the application of the well known three-dimensional (3-D) groundwater model, MODFLOW (McDonald and Harbaugh 1988), supported by the U.S. Geological Survey and used here to assess the impact of groundwater withdrawals on spring flows in the river. Groundwater withdrawals within a 10-mile radius of the Chassahowitzka Springs were estimated at 14.4 mgd in 2005, mostly for non-consumptive uses associated with limestone mining (SWFWMD 2010, Appendix 11.2). Modeling 2005 groundwater withdrawals resulted in the conclusion that it caused only a 0.7 cfs reduction in the discharge of the main Chassahowitzka spring. This was considered insignificant; therefore, the impact of existing groundwater withdrawals was not used to correct or

otherwise adjust the estimated baseline flows from 1967-2007, nor was it considered in determining the MFL.

The Panel believes that the MODFLOW application is appropriate and the modeling effort seems well founded. Nevertheless, the detailed hydrogeology of the springs is not well known, unusual differences in flow quantity and quality are commonly exhibited by the contributing springs, and nitrate levels are increasing from pollution in both the watershed and the springshed.

The review of the 3-D hydrodynamic / salinity / temperature modeling effort discussed in Appendix 11.13 focused on addressing the following questions:

1. Was an appropriate numerical model employed?
2. Were the data employed adequate?
3. Was the development of the numerical grid employing available bathymetry data adequate?
4. Were boundary conditions appropriate?
5. Were the calibration / validation of the numerical model adequate?
6. Were the scenarios simulated by the model appropriate for determining an MFL?

Was an Appropriate Model Employed?

As stated in the main report and Appendix 10, the purpose for conducting the 3-D numerical hydrodynamic / salinity / temperature model study was to:

- Predict available thermal refuge habitat for Manatees during critically cold conditions.
- Predict the impact of various spring flow reductions on salinity zones in the estuary.

To address these issues, the District's consultant selected the Environmental Fluid Dynamics Computations (Hamrick 1992). EFDC is a well known general-purpose modeling package for simulating 3-D flow, transport, and some biogeochemical processes in surface water systems including coastal rivers, bays and estuaries. The model is supported by the EPA and used by several federal and state agencies. A discussion of the basic model's properties is provided in Appendix 11.2 and will not be repeated here. It should be noted that the version of EFDC applied here is one that interfaces with various pre- and post-processing routines developed by the District's consultant (Dynamic Solutions, LLC) that make the application of the model easier and allows for an improved processing of model output. The Panel finds that EFDC is an adequate hydrodynamic model code to apply to the Chassahowitzka River to address the issues of interest here.

Were the Data Employed Adequate?

In most numerical modeling studies, one always would like to have more data. Starting at the beginning, there must be sufficient data, especially bathymetry data on the water body's physical dimensions, to at least generate a computational grid, set numerical boundary conditions, and compare model results to data collected in the interior of the

numerical grid. An intensive bathymetry survey of the entire Chassahowitzka River System was supported by the District and conducted by the University of South Florida in 2007. These data along with bathymetry data for Chassahowitzka Bay obtained from NOAA resulted in the development of a good physical representation of the modeled length, area and volume of the system.

Water surface elevations, salinity, and temperature data were available at four USGS Stations (Nos. 02310674, 02310673, 02310663, and 02310650) beginning at the mouth of the Chassahowitzka River and extending up to the headwaters and the main springs at the upper end of the numerical grid. Data for the first station were collected from September 2006 – September 2007. Data for the next two stations were collected from October 2005 – September 2007. Water stage, salinity and temperature data were collected from May 2003 – September 2007 at the last station near the headwaters of the river. In addition, daily averaged flow data from the main spring were available for February 1997 – November 2007. Flow data and salinity data at five other springs that contribute to the Chassahowitzka River were very limited and based on just a few observations.

The Panel believes that there were sufficient data available to calibrate the model, although the calibration period involved a relatively low flow period. It is technically preferred that the calibration period cover a wider range of physical events in the system (e.g., a more complete range of flows, set ups and set downs of the ocean water surface, etc.). The more or less constant flow regime, dominated by the springs, led the modelers to be more comfortable with the shortened period.

Normally after calibrating a numerical model, it is applied to a separate set of data in what is called a “validation” phase of the model application. This was not done in the modeling study under review here. If the calibration period is long (e.g., a year or more), many modelers believe that both calibration and validation have been satisfied. Unfortunately, the calibration period in this study was only four months. The Panel questions whether calibration and validation have been accomplished with this rather short simulation period.

Water surface elevations, spring flow and temperature data were needed for the entire baseline period of 1967 – 2007 to determine worst case critical conditions for manatee habitat. A regression equation was developed using long term water surface levels from a USGS station located at Cedar Key, about 124 miles (200 km) from Chassahowitzka Bay. Historical data from 1997 - 2007 exist for spring flow only from the main spring. A regression equation relating the spring flow to water levels in a groundwater monitoring well nearby at Weeki Wachee was developed to generate flow estimates for the baseline period.

To generate a time series for temperature data at USGS Station No. 02310663, a regression equation was developed relating the water temperature to the air temperature at the St. Petersburg Airport. Each of these regressions had R^2 values above 0.75. As a result, the Panel agrees that the modeling study utilized all the data available, generated appropriate regressions to fill in missing data, and the data were adequate for conducting the modeling study, including the synthesized time series data used for determining critical three-day cold events for Manatee during the 1967-2007 baseline period.

Was the Numerical Grid Adequate?

The numerical grid over most of the river contained four cells across the river and four sigma layers in the water column profile. A sensitivity simulation using eight sigma layers was conducted. Doubling the number of vertical layers had more impact on the predicted salinity than the predicted temperature. Based on the beneficial salinity impact, perhaps eight layers should have been used. However, the report states that the time-step for stable computations was only 5 seconds. This means that computing time (i.e., CPU hours) might have become excessive with eight layers.

Since EFDC is a semi-implicit model, a basic question arises as to why the time-step had to be so small. The Panel understands that the controlling criterion on the time-step in this model is the water velocity through the computational grid cells. With horizontal grid cells being typically 164 feet by 282 feet, the Panel wonders why a much larger time-step could not have been used. In view of the reported effect of increasing the vertical layers in the aforementioned sensitivity analysis, the Panel would like to have seen the impact of doubling the number of horizontal cells across the river as well in order to evaluate any impacts on the simulation of shoreline salinity regimes under various flow reductions.

There is a lot of estuarine marsh area from the river mouth up to about river mile 3.1 (km 5) and the District's MFL report states that much of this marsh area is flooded during normal high tide levels, not just with storm tides. Because of this important inundation effect, the Panel believes that there should have been some discussion as to why the computational grid used in the modeling study did not incorporate the wetland marsh areas. This is especially puzzling since the EFDC model allows for wetting and drying of grid cells for just such a purpose.

Although the Panel believes that the questions above should be addressed, it also finds that the numerical grid is adequate to allow basic comparison of one model simulation of flows, salinities and temperatures with another in a precise, if not always the most accurate, manner.

Were the Boundary Conditions Adequate?

There were three separate modeling efforts. The **first** centered on calibrating the basic hydrodynamic, salinity, and temperature model. A four month period, November 2006 – February 2007, had overlapping periods where the data coverage was good for water levels (stage), salinity and temperature variations. In addition, data were available for the main spring discharge, salinity and temperature. The groundwater discharge and salinity for five other significant springs were based on very limited data and assumed to be constant. This seems to be a more or less reasonable assumption at first glance since conditions at the springs appear not to change much, at least over short periods of time (i.e., days to months). However, based on salinity measurements taken in the various springs during the Panel's March 16, 2010 field trip to the site, the Panel questions the salinity boundary conditions at the springs, which may not be always accurately represented in the model. Overall, the Panel finds that the boundary conditions were based on observed data and are, thereby, considered best available over this four month period.

Water surface elevations, salinity and temperature on the open bay portion of the grid were represented by USGS Station No. 02310674, which is located near the mouth of Chassahowitzka River. However, the salinity was "adjusted" by 4 ppt to better match observed salinities at the mouth of the river.

The **second** modeling effort centered on predicting manatee habitat for both chronic and acute criteria. These are given as follows:

- Chronic--Minimum depth of 3.8 ft with temperatures remaining above 68º F for the duration of critically cold three-day periods.
- Acute--Minimum depth of 3.8 ft with temperatures not be less then 59º F for four or more hours.

Using the long-term time series data developed for water level, flow and temperature discussed above, a joint probability analysis was conducted to determine critical condition periods with a return interval of 50 years. This analysis resulted in selecting the January 4-6, 2002 period for simulation. Water depths and temperatures on the open portion of the grid were obtained from the regression equations previously discussed. The salinity was taken from the four month calibration period. Measured discharge, salinity and temperature at the main spring were employed at the head of the numerical grid. Discharge, salinity and temperature were the same as from the calibration period for the other springs. Metrological data needed to compute surface heat exchange and equilibrium temperatures were taken from observations at the St. Petersburg Airport. The Panel finds that the assumptions made in setting the boundary conditions and the data employed are appropriate for this simulation effort.

The **third** modeling effort centered on assessing the impact of spring flow reductions on salinity. A three-year period (2004 – 2006) was selected for simulation. An analysis of the flow record for the 1967 – 2007 baseline period revealed that the cumulative distribution function (CDF) for flow during the three-year period was fairly typical of that for the longer baseline period. This would suggest that the simulation period was more or less representative of the baseline period. Again, measured data were employed where available and other data for setting boundary conditions were obtained from the regression equations. The Panel finds that the data utilized for setting boundary conditions and assessing the impact of flow reductions are appropriate and best available.

Were Calibration / Validation of the Model Adequate?

A four-month period (November 2006 – February 2007) was used for calibration of the hydrodynamic model. The calibration centered on comparing model results for water levels (stage), salinity and temperature at USGS Stations Nos. 02310674, 02310673 and 02310663. The calibration involved the visual inspection of graphical time series comparisons of observed and simulated measures, as well as statistical analyses. One statistic was the Nash-Sutcliffe efficiency coefficient. This statistic was developed to assess the goodness-of-fit of hydrology models, but it can be used for many other variables. The Panel believes that it is appropriate to employ this statistic, but recognizes that it has not been used often in other estuarine modeling efforts. The second statistic used was the Root Mean Square Error (RMSE). The Panel finds this statistic to be routinely employed in estuarine modeling and easy to understand.

Water Level Calibration

The calibration on water surface elevations (stage level) is very good, but in a relatively small system only 5.6 miles (9 km) long this is to be expected if the open boundary water tidal elevations are accurate. There is little dampening between USGS Stations 02310673 and 02310663, where the tidal ranges are about 3-4 feet at both locations. There is a Gulf tidal influence all the way to the main spring at Station No. 02310650, but the range of water level fluctuations there is only about 1 foot between normal ebb and flood tides. Unfortunately, results aren't presented for this station (Figure 2), which means that the Panel can not evaluate the model's ability to simulate the important observed tidal dampening between Station 02310663 and upstream Station 02310650.

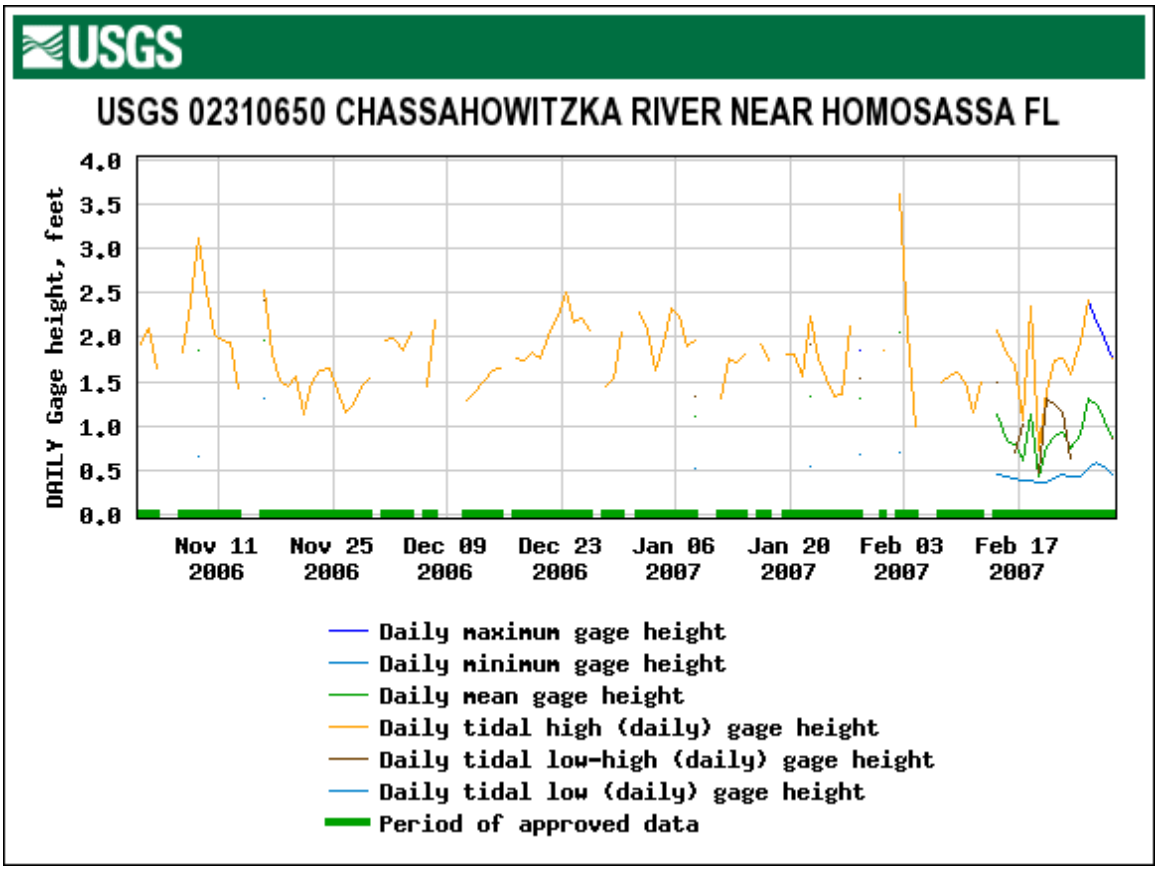


Figure 2. Daily Water Surface Elevations at USGS Station No. 02310650 during the November 2006 – February 2007 model calibration period.

Salinity Calibration

A time series comparison of salinity at Station 02310674 at the river mouth isn't given, although some statistics are presented. The statistics don't appear to be very good, which is somewhat surprising after the modelers made a special effort to "adjust" the open boundary salinity by 4 ppt in order to force a better match at the mouth of the river. The calibration at Stations 02310673 and 02310663 are better. An inspection of the time series plots shows that observed and computed salinities can differ by as much as 5 ppt, with the RMSE errors generally being around 2.0 – 2.5 ppt. The U.S.

Environmental Protection Agency (EPA 1990) recommends the Relative Mean Absolute Error (RMAE), a statistic defined as:

RMAE = SUM (ABS (O_i - C_i)) / SUM (O_i),

where O_i are observed values and C_i are computed values.

The EPA guideline for a calibrated salinity model is that the RMAE should be less than 20%. Since the model results are only being compared to other flow reduction simulation of the same model in the District's MFL analysis, rather than being used to make absolute predictions of the actual salinity levels, the Panel concludes that the salinity calibration is adequate for estimating relative differences due to reduced freshwater inflows. However, it should be noted that determining the level of uncertainty in a model, or a cascade of models, is a normal procedure in some scientific disciplines, but it is only just beginning to be applied to water resources projects. Therefore, the District should consider conducting quantitative uncertainty analyses on the models it uses for flow recommendations.

Temperature Calibration

A visual comparison of the temperature calibration shows that during flood stage there can be differences of 5 – 10 ºF. However, the Nash-Sutcliffe statistic here is better (i.e., the values are closer to 1.0) than it was in the salinity calibration. The Panel understands that in large coastal bays, the water temperature is primarily driven by surface heart exchange; however, in smaller bodies of water such as the Chassahowitzka River estuary, the temperature of the artesian spring flow is also a major factor in determining water temperature in the river near the sources. The metrological data used to compute the surface heat exchange came from the St Petersburg Airport. If metrological data closer to the river had been available, the calibration might have been better. The Panel finds that the model does reproduce the cooling and warming trends very well and, thus, the temperature calibration is considered to be adequate.

Were the Simulated Scenarios Adequate for Determining a MFL?

The basic scenarios were simulated to predict available thermal Manatee habitat during critically cold spells, as well as the impact of various spring flow reductions on the length, area and volume of salinity habitats in the river. As previously discussed, time series data for water level (stage), temperature and spring discharge for the baseline period were generated from regression equations and were used in a joint probability analysis to determine critical condition periods for manatee habitat. The simulation of a critical period over January 4-6, 2002 revealed that there was no habitat satisfying the chronic criteria of at least 3.8 ft water depth at low tide with a water temperature greater than 68 ºF. The major factor leading to the troubling finding was the controlling criterion for water depth. This result led the modelers to suggest, and the Panel agrees, that more refined bathymetry data should be collected to better define narrow channels in the upper river. Increasing the grid resolution with better bathymetry might yield some

available habitat after all. If the District supports additional modeling at some future time, the Panel recommends that this be done.

Salinity regimes in the river were simulated over the 2004-2006 three-year interval with spring flow reductions of 10%, 20% and 40%. Model results were then used to assess the impact of flow reductions on the length, area and volume of aquatic habitats in salinity zones of 0-2 ppt, 0-5 ppt, 0-10 ppt and 15 ppt. Cumulative Distribution functions were developed and areas under each of the curves for the different flow reductions were determined and compared to the no-flow reduction case. The analysis of salinity-based habitats (i.e., shoreline length, surficial area and water volume at 2, 5, 10 and 15 ppt) produced 12 estimates of habitat loss. The most sensitive were the length of shoreline habitat less than 5 ppt (15% loss at 13 % flow reduction), the volume of aquatic habitats less than 5 ppt (15% loss at 13% flow reduction), and the amount of habitat area less than 5 ppt (15% loss at 15% flow reduction).

This analysis led to the result that a 13% reduction in flow would result in a 15% loss of habitat for the low-salinity (0-5 ppt) zone. As a result, the Panel concludes that the application of the calibrated model to evaluate thermal and salinity habitats is appropriate and can be used to help determine a MFL for the Chassahowitzka River System.

Biota and Ecology of the Chassahowitzka River System

The District's effort to follow the legislative study mandate is focused on limiting flow reductions that could be significantly harmful to the natural resources of the area. The basic approach is to use a quantifiable reduction in habitat as the metric of choice, which is normally a good one. Since estuarine plants and animals live in a fluctuating salinity environment, they commonly have broad tolerances to changes in flows and mechanisms for dealing with physiological stress. Nevertheless, it is especially important at the fresh/brackish interface, where modest flow reductions can move the isohalines upstream, significantly reducing suitable freshwater habitat. As a result, the Panel agrees with the District that this would normally be the most relevant part of the spring-fed system to evaluate here. On the other hand, freshwater plants and animals are usually very intolerant of even low salinity conditions and are, thus, more likely to be impacted by lower freshwater inflows and increasing intrusion of brackish waters into previously fresh water habitat. In most riverine estuaries, seasonal low flow conditions are all that is required to eliminate intolerant freshwater species from the area of tidal influence.

The Panel understands and observed that the water of the Chassahowitzka River is mostly clear, slightly alkaline pH, extremely low in phosphorus concentrations, but high in nitrogen (SWFWMD 2010, Figure 4-4). The lack of phosphorus produces a general oligotrophic condition in the estuary where primary production, phytoplankton in particular, is also low. Although the nitrogen concentrations do not appear significantly related to the amount of spring flow, there is one troubling aspect to this nutrient, it exhibits a strong significant increase ($p = 0.0005$) with time (SWFWMD 2010, Figure 4-6).

Since it is primarily spring-fed, the Chassahowitzka River System has little seasonal variation. The Panel agrees that measuring the extent of and changes to the sensitive freshwater zone from reductions in flow is a logical approach to the MFL determination,

although it would be more comforting if the contributing springs could all be considered "fresh." There were several important data sets in the study that suggest the analytical results utilized by the District for setting the MFL for the Chassahowitzka River System are still problematic at low flows because of the potential for saline discharges from the springs.

The District's approach to the MFL can be interpreted as assuming that the major contributing springs and the headwaters of the river feeding the estuary are essentially fresh; however, Figure 4.1 (SWFWMD 2010) reveals that the entire system from headwaters to mouth has substantial salinity levels and qualifies as estuarine, not fresh waters. The biological significance here is related to the fact that even marine animals intolerant of freshwater can survive under near fresh (< 5 ppt) conditions if the important marine dissolved solids are sufficiently abundant to allow osmoregulatory substitution of critical ions. This expands their metabolic scope for activity and, thereby, their potential range of distribution in the ecosystem.

The floral and faunal communities present at the time of the Panel's site visit and reconnaissance survey suggested that dissolved ions must be abundant in all of the springs, and this was confirmed by the District's MFL Report and Appendices (SWFWMD 2010). For example, the Panel observed marine fishes, including the Mangrove snapper (*Lutjanus griseus*), all the way up to the headwaters and even in the main spring area, because salinity was still a couple parts per thousand salt above freshwater. Marine mammals, including Manatee (*Trichechus manatus latirostris*) and Bottle-nose dolphin (*Tursiops truncates*), were also present in the immediate area that day. At Crab Spring, the water at the surface was notably saline. Here and in at least one other spring, the Panel observed a brown floc that has been described variously as brown diatom clusters or as iron-based precipitates, with visible deposits on the bottom. The latter would again suggest that the spring water contained high concentrations of dissolved solids. Data from the District showed iron (Fe) concentrations as high as 80 µg/L in Crab Spring.

The District's MFL Report also provides faunal evidence that the headwaters were not populated by insect larvae and peracarid crustaceans considered typical of fully freshwater regions of other Florida estuaries. For example, the burrowing anthurid isopod, *Cyathura polita,* is considered a mesohaline species (Burbanck 1967), but in the Chassahowitzka River System it was a constituent of the plankton and benthic community virtually everywhere, including the headwaters. Again, this suggests that the fauna did not recognize the upper reaches of the Chassahowitzka River as a freshwater ecosystem. The District's report notes that there is currently no freshwater/saltwater boundary in the river system. Perhaps this is why several of the biotic analyses produced ambiguous results or, like the benthos, respond to salinity in a positive way such that flow reductions increase salinity and their biotic diversity in this estuary.

It is not clear to the Panel that there is enough data on the discharge rates and water quality from the contributing springs prior to 1997 to be able to fully understand the pre-pumping state of the Chassahowitzka groundwater system. It is clear that the District can evaluate prior hydraulic pressure that drives the springs, but without more detailed hydrogeology of the artesian system, it is questionable if historical spring conditions can be adequately evaluated beyond some estimate of flow volume.

The various artesian springs that constitute the primary flow of the river have a wide range of discharges and salinities suggesting that they intersect different portions, or perhaps different depths, of the aquifer formation. For example, an analysis of solutes in water samples collected from Crab Spring suggests that the solutes are derived from ocean water. The oceanic ratio of Na to Mg is 8.213 (Sverdrup *et al.* 1942), while the ratio in the spring was reported at 7.680 (October 11, 1993), 8.322 (July 21, 1994) and 8.260 (October 25, 1994). The Panel's calculation of other ion ratios produces similar results, providing another piece of evidence that the dissolved solids in these springs were from oceanic sources (e.g., Gulf saline intrusion) rather than dissolved from the internal geology (read: rock strata) of the groundwater aquifer formation.

Scott *et al.* (2004) provide an additional analysis of the Chassahowitzka springs that argues that the saline water in these springs is derived from a past sea level high, which inundated the karst landscape and flooded the underlying aquifer with sea water. If this is correct, then the ocean-derived salts discharging from these springs today are fossil water contributions. There is a boundary layer in the aquifer above which freshwater sits and below which more saline water can be found. This means that future withdrawals of freshwater from the top can increase the amount of saline water in the aquifer, resulting in more saline discharges at the springs.

The Panel notes that reported chloride levels in the springs vary by an order of magnitude (SWFWMD 2010, Table 2.5) suggesting that the ultimate origin of their water could be from very different parts of the Floridan Aquifer. This concerns the Panel if modest changes in future aquifer pumping rates can potentially alter the amount and proportion of salts discharged from these springs. Unfortunately, the District's simple regression equation of river flow and water levels may be too inaccurate during low flow periods to adequately address the potential contribution of saline waters in spring discharges to the river. This means that the springflow MFL may have to be adjusted in the future as the District goes forward with its regional water management duties and responsibilities.

The Panel additionally finds that Chassahowitzka Springs data from the past half century strongly suggest that there has been a substantial change in the concentration of salt ions (e.g., Na and Cl), although the Cl/Na ratio appears to be ocean derived and varies little from the 1.8 ocean ratio (Sverdrup *et al.* 1942). Specifically, the concentration of chloride was 53 mg/L in 1941, 320 mg/L in 1971 and 680 mg/L in 2001 (Scott *et al.* 2004). Changes in levels of ocean-derived salts can be attributed to ground water withdrawals affecting the pathway of water discharged from the aquifer, or to severe and prolonged drought.

In the end, the Panel believes that a better understanding of the hydrogeology of these springs and an investigation of how groundwater withdrawals can affect the concentration of salts in these springs, as well as a better accounting of their individual contributions to the overall flow, will be required to fully address the MFL issues here.

Saltwater intrusion is a problem that has crept up on coastal water managers in many parts of the nation, and Florida is no exception, even if it's not the main problem at Chassahowitzka Springs right now. Continued development in the springshed can increase demand for freshwater water and the resulting strain on groundwater supplies can open the gates for more saltwater intrusion. According to the District, deposits of remnant sea water were left over from a time when much of the Florida Peninsula was

submerged thousands of years ago. When the oceans receded, not all the sea water was flushed out of the surficial aquifer systems. The Panel observes that this source of contamination, also known as "connate sea water," is the least common and least studied form of saltwater intrusion. While that may explain the past situation, it may not adequately predict the future of the Chassahowitzka River System.

Other Panel Comments

The District is to be commended for the thorough response to the questions and data requests from the Panel Members after their initial reading of the District's draft report.

Overall, it appears to the Panel that the MFL determination is adequate and based on the best available data, but the lack of detailed knowledge about the hydrogeology of the contributing springs, which seem to behave differently from each other and vary in water quality, would suggest that any MFL expressed in cfs alone may be somewhat inadequate or at least requires careful monitoring during implementation. Especially if groundwater withdrawals on the inland side of the aquifer, seawater intrusion into the artesian formation on the Gulf side, or other potential impacts of nutrients and pollutants can affect the water quality of the Chassahowitzka ecosystem in the future, weakening the value and accuracy of this initial MFL recommendation.

Therefore, the Panel recommends that the District follow the Precautionary Principle and establish the initially recommended MFL, which is based on the best available data and analyses, until more and better scientific information is available in the future to better understand how changes in the springshed and spring flows, both quantity and quality, will affect the Chassahowitzka River System.

As the District moves forward to plan and supply water in the future to the people, their economy and their environment, the Panel strongly recommends that the District continue to monitor the system for the purpose of verifying that the MFL is having its intended effect of maintaining the ecological health and productivity of the Chassahowitzka River System, including the associated bay and estuary. The verification monitoring might include spring flows, stream flows, tidal flows, basic water quality (e.g., temperature, salinity, pH, DO, chlorophyll, minerals and nutrients), and changes in wetland vegetation, benthos, fish and shellfish, particularly during the dry season, which coincides with the beginning of peak utilization of nursery habitats by estuarine-dependent fish and shellfish species in Florida.

ERRATA and EDITORIAL COMMENTS

Page	Paragraph	Line	Comment
9	3	3	Insert comma after Chapter 3.
9	4	3	Insert comma after Chapter 6.
10	Footnote		Elevate footnote 2 into superscript font [2].
11	Footnote		Elevate footnote 3 into superscript font [3].
12	Last	2	Put parentheses around "See Figure 2-5 in section 2.3.1"
13	1	1	Change "sewer. [4]" to "sewer[4]."
13	Footnote		Elevate footnote 4 into superscript font [4].
14	1	3	Insert comma after "(1892-2006)."
20	1	4	Insert space after "Figure 2.6"
20	Last	1	Remove space between "(" and "Figure 2.6)."
20	Last	3	Insert comma after "mid-1960's"
31	1	8	Insert "Inc." after "Janicki Environmental"
37	3	17	Insert comma after "However" and put period at end of "Williams *et al.*"
40	3	4	Insert comma after "Thus"
46	3		Put period at end of last sentence.
54	7	4	The Goldspotted killifish is *Floridichthys carpio*, not *Cyprinodon variegatus*, which is the Sheepshead minnow, a common species of pupfish. It is noted that the endemic Eustis Pupfish (*Cyprinodon variegatus hubbsi*) is present in the nearby Oklawaha River, Florida (Jordan 1993). Also, *C. variegatus* is <u>not</u> very sensitive to low D.O. and tolerates hypoxic (< 2 mg/L) waters rather well, while *F. carpio* exhibits extreme osmotic stress at moderate 4-5 mg/L D.O. concentrations (Kraill 1967).
55	Last	2	Insert comma after "transformation"
59	2	7	Insert comma after "determination"
63	Last	2	Insert comma after "composition"
64	Last		Change last word from "sytem" to "system"
66	Footnote		Elevate footnote 7 into superscript font [7].
67	Footnote		Elevate footnote 8 into superscript font [8].

REFERENCES

Alber, M. 2002. A Conceptual Model of Estuarine Inflow Management. *Estuaries* 25: 1246-1261.

Ardisson, P.-L., and E. Bourget. 1997. A study of the relationship between freshwater runoff and benthos abundance: a scale-oriented approach. *Estuarine, Coastal and Shelf Science* 45: 535-545.

Burbanck, W.D. 1967. Evolutionary and ecological implications of the zoogeography, physiology, and morphology of *Cyathura* (Isopoda). Pages 564-573 in book *Estuaries*, G.H. Lauff, ed. Amer. Assoc. Advmt. Sci., Washington, D.C. 757 pp.

Drinkwater, K. F., and K. T. Frank. 1994. Effects of river regulation and diversion on marine fish and invertebrates. *Aquatic Conservation: Freshwater and Marine Ecosystems* 4: 135-151.

Environmental Protection Agency. 1990. "Technical Guidance Manuel for Performing Waste Load Allocation, Book III, Estuaries--Part 2, Application of Estuarine Waste Load Allocation Models." EPA 823-R-92-003. 173 pp.

Flannery, M. S., E. B. Peebles and R. T. Montgomery. 2002. A Percentage-of-Streamflow Approach for Managing Reductions of Freshwater Inflows from Unimpounded Rivers to Southwest Florida Estuaries. *Estuaries* 25: 1318-1332.

Greenwood, M.F.D., E.B. Peebles, S.E. Burghart, T.C. MacDonald, R.E. Matheson, Jr., and R.H. McMichael, Jr. 2008. Freshwater Inflow Effects on Fishes and Invertebrates in the Chassahowitzka River and Estuary. Prepared for the Southwest Florida Water Management District by the University of South Florida and the Florida Fish and Wildlife Conservation Commission and the University of South Florida at St. Petersburg, FL. 87 pp. + 155 pp. appendices.

Hamrick, J.M., 1992. A Three-Dimensional Environmental Fluid Dynamics Computer Code: Theoretical and Computational Aspects. Special Report No. 317 in Applied Marine Science and Ocean Engineering, Virginia Institute of Marine Science, Gloucester Point, VA. 64pp.

Jordan, F., D.C. Haney and F.G. Nordie. 1993. Plasma Osmotic Regulation and Routine Metabolism in the Eustis Pupfish, *Cyprinodon variegatus hubbsi* (Teleostei Cyprinodontidae). *Copeia* 1993 (3): 784-789.

Kaill, WM. 1967. Ecology and behavior of the cyprinodontid fishes *Jordanella floridae (*Goode & Bean*), Floridichthys carpio (*Günther*)* and *Cyprinodon variegatus (*Lacépède*).* Ph.D. Dissertation, Cornell University, Ithaca, NY. 172 pp.

Longley, William L., (ed.) *et al.* 1994. Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determination of Needs. Texas Water Development Board and Texas Parks and Wildlife Department, Austin, TX. 386 pp.

McDonald, M.G. and A.W. Harbaugh. 1988. A modular three-dimensional finite-difference groundwater flow model. U.S. Geological Survey Techniques of Water-Resources Investigations Book 6, Chapter A1.

Poff, N. L., J. D. Allan, M. B. Bain, J. R. Karr, K. L. Prestegaard, B. D. Richter, R. E. Sparks and J. C. Stromberg. 1997. The Natural Flow Regime: A Paradigm for River Conservation and Restoration. *BioScience* 47: 769-784.

Richter, B. D., J. V. Baumgartner, R. Wigington and D. P. Braun. 1997. How Much Water Does a River Need? *Freshwater Biology* 37: 231-249.

Scott, T.M., G.H. Moore, R.P. Meegan, R.C. Means, S.B. Upchurch, R.E. Copeland, J. Jones, T. Roberts, and A. Willet. 2004. Bulletin #66, Springs of Florida, Florida Geological Society. 377 pp.

Sklar, F. H., and J. A. Browder. 1998. Coastal Environmental Impacts Brought About by Alterations to Freshwater Flow in the Gulf of Mexico. *Environmental Management* 22: 547-562.

Southwest Florida Water Management District. 2010. Chassahowitzka River Recommended Minimum Flow and Levels (Peer Review Draft). Brooksville, FL. 104 pp. + 1958 pp. appendices.

Sverdrup, Johnson & Fleming. 1942. The Oceans. Prentice-Hall, Englewood Cliffs, NJ. 1087 pp.

11.18.1.1 Response to Peer Review Panel Provided to Governing Board

(Submitted to Governing Board 8/24/2010)

Resource Management Committee
August 24, 2010

Submit & File Report
Report from the Scientific Peer Review for Chassahowitzka River System and Staff Response (B209)

Purpose
To present the report documenting the findings of the voluntary independent scientific peer review of the *Chassahowitzka River Recommended Flows and Levels – April 2010 Draft.* Staff will be returning at a future date with proposed rule language and a request to initiate rulemaking.

Background/History
Staff completed a draft report recommending minimum flows for the Chassahowitzka River system that was submitted to the Governing Board at its April 27, 2010 meeting. The recommended Minimum Flow and Level (MFL) is to limit reductions in

Chassahowitzka River flow to 11 percent of the baseline flow (i.e., unaffected by withdrawals). The basis of the recommended MFL is contained in the report *Chassahowitzka River System Recommended Minimum Flows and Levels*. This report was submitted to an independent scientific peer review panel (Panel) for voluntary review. The Panel was composed of three scientists who have extensive experience in hydrology, ecology and freshwater inflow relationships. On March 16, 2010, staff accompanied the Panel on a field trip covering the 5.6 miles downstream from the main spring to the Gulf of Mexico. Several of the minor contributing spring runs (Crab Creek, Ryles Creek) were also traversed to their respective headsprings.

The Chassahowitzka River System is located on the west coast of Florida in Hernando and Citrus counties approximately 17 miles northwest of Brooksville. The headwater for the Chassahowitzka River is the Chassahowitzka Main Spring, but more than a dozen springs discharge additional Floridan aquifer flow into the Chassahowitzka River. The river receives a small amount of surface runoff from its 89 square mile watershed, but the overwhelming majority of flow arises from the 180 square mile springshed that produces a relatively constant discharge with little seasonal variation. It is designated an "Outstanding Florida Water" and the lower half of the river is part of the approximately 31,000-acre Chassahowitzka National Wildlife Refuge. For purposes of establishing MFLs, the main river, all named and unnamed springs and contributing tributaries and Blind Spring are considered part of the river system.

The main river is tidally influenced to the Main Spring. There is minimal development below the main spring but above the Main Spring, canals have been constructed and there is a small enclave of residences. Estimated discharge from the Main Spring has averaged 63 cubic feet per second (cfs) for the period 1967-2007.

Purpose/Approach
The District received the report of the Panel (Exhibit "A" attached) on June 30, 2010. The report was supportive of the District's conclusions, but recommended additional monitoring to advance the understanding of the reaction of the various smaller springs to increased groundwater withdrawals. In summary, the Panel concluded "*The Scientific Review Panel (Panel) finds that the District's goals, data, methods and conclusions, as developed and explained in the report, are reasonable and appropriate. The District's multi-species approach is to be applauded because it does not ignore species with variable life history requirements. The District approached this analysis in an appropriately holistic manner; that is, with attention paid to both the ecological requirements of the river system and to the various watershed and springshed segments of the contributing landscape already modified by humans."*

Overall, the Panel made only a few specific recommendations and most were related to the future application of the hydrodynamic model. The Panel suggested that the District incorporate a quantitative uncertainty analysis, and the acquisition of additional bathymetric measurements to better define the narrow channels in the upper river so that the area modeled can be expanded to include the wetland marsh areas. Staff agrees with these suggestions. The District is committed to periodic re-evaluation of its MFLs and these recommendations will be incorporated into the re-evaluation.

The report goes on to state, "*Overall, it appears to the Panel that the MFL is adequate and based on the best available data, but the lack of detailed knowledge about the*

hydrogeology of the contributing springs, which seem to behave differently from each other and vary in water quality, would suggest that any MFL expressed as cfs alone may be somewhat inadequate or at least requires careful monitoring during implementation. . . . Until then, the Panel recommends that the District follow the Precautionary Principle and establish the initially recommended MFL as based on best available data and analysis until more and better scientific information is available in the future to better understand how changes in the springshed and the spring flows, both in quantity and quality, will affect the Chassahowitzka River System."

Staff agrees with the Panel's recommendation. The District is committed to better understanding the karst nature of all the springs and currently supports field-mapping efforts of the major spring systems. In addition, the District continues to monitor the water quality of both major and minor springs through the Water Quality Monitoring Program. The District is collecting water quality data eight of the springs in the Chassahowitzka River system and this data will provide the basis for the type of review suggested by the Panel.

Staff will return to the Board in the near future with proposed rule language necessary to establish the minimum flow for the Chassahowitzka River system.

Staff Recommendation: See Exhibit

This item is provided for the Committee's information only; no action is required.

Presenter: Mike Heyl, Chief Environmental Scientist
Resource Projects Department

ChassMFL_Reviews.docx
1/22/2013 8:08 AM
cc: Ecologic Evaluation Project File
PRJ File

11.18.1.2 Additional Comments Regarding Peer Review Report

[In addition to the Panel's primary recommendation that a better understanding of spring flow and water quality needs to be developed, the Panel did make several other comments that warrant discussion. Excerpts from the Panel's report are in black text and District comments are in blue italic.]

Page 15. Paragraph 2. ". . . With horizontal grid cells being typically 164 feet by 282 feet, the Panel wonders why a much larger time-step could not have used. In view of the reported effect of increasing the vertical layers in the aforementioned sensitivity analysis, the Panel would like to have seen the impact of doubling the number of horizontal cells across the river as well in order to evaluate any impacts on the simulation of shoreline salinity regimes under various flow reductions." *The Chassahowitzka EFDC model used a curvilinear grid structure. To cover the complexity of the stream network, along with the typical grid size, there is also a fine grid part of the domain. EFDC uses a Finite Difference explicit scheme that is subject to the Courant-Freidrich-*

Lewy (CFL) time step limits. It varies from 1.5 to 30 seconds. To achieve stability during the full computational period, a 5 second time step was used.
The number of cells was determined during the model development phase to optimize resolution while balancing runtimes. Doubling or changing the horizontal model grid resolution represents additional effort that was not deemed necessary for the sensitivity analysis. Based on experience and objectives of the study, the resolution of the horizontal grid was deemed sufficiently refined to represent the system.

Page 15. Paragraph 3 -4. "There is a lot of estuarine marsh area from the river mouth up to about river mile 3.1 (km 5) and the District's MFL report states that much of this marsh area is flooded during normal high tide levels, not just storm tides. Because of this important inundation effect, the Panel believes that there should have been some discussion as to why the computational grid used in the modeling study did not incorporate the wetland marsh areas. This is especially puzzling since the EFDC model allows for wetting and drying of grid cells for just such a purpose."

"Although the Panel believes that the questions above should be addressed, it also finds that the numerical grid is adequate to allow basic comparison of one model simulation of flows, salinities and temperatures with another in a precise, if not always the most accurate, manner."

The District agrees that the model would be improved by incorporating the marsh areas, but the basic limitation is that there is no bathymetry to support development of model grids over these areas and they are inaccessible except by airboat. Indeed the very existence of the marsh has complicated development of flow discharge measurements downstream of the marsh demarcation.

Page 19. Paragraph 2. ". . . , the Panel concludes that the salinity calibration is adequate for estimating relative differences due to reduced freshwater inflows. However, it should be noted that determining the level of uncertainty in a model, or a cascade of models, is a normal procedure in some scientific disciplines, but it is only just beginning to be applied to water resource projects. Therefore, he District should consider conducting quantitative uncertainty analyses on the models it uses for flow recommendations."

The District concurs with this suggestion and will include an evaluation of uncertainty in future model development and during re-evaluation of the current MFLs.

Page 22. Paragraph 4. "The District's approach to the MFL can be interpreted as assuming that the major contributing springs and the headwaters of the river feeding the estuary are essentially fresh; however Figure 4-1 (SWFWMD 2010) reveals that the entire system from headwaters to mouth has substantial salinity levels and qualifies as estuarine, not fresh waters."

The hydrodynamic model developed for the salinity evaluation did not assume freshwater discharge from the major springs. The observed salinity time series from location USGS 02310650 (Chassahowitzka nr Homosassa) was used as a boundary condition in the main river. The data for other sources is limited in

terms of rate of flow and salinity, but the following assumptions were incorporated into the EFDC model.

Spring	***Discharge (cfs)***	***Salinity (ppt)***
Crab Creek	*48.7*	*3.2*
Potter Creek	*18.6*	*5.5*
Baird	*5.7*	*6.5*
Beteejay Head Spring	*6.4*	*<1*
Blue Run	*6.6*	*4.3*

Public and agency comments

Note – All correspondence is public record under Florida law and the complete, original correspondence is available upon request. In the interest of conserving space, lengthy signature blocks have been removed after first use and lengthy distribution lists have been truncated, but are available upon request to Mike.Heyl@SWFWMD.state.fl.us .

The remainder of this page intentionally left blank.

11.18.2 Review Comments from Florida Fish and Wildlife Conservation Commission and District Response.

(Reproduced from Florida Fish and Wildlife Conservation Commission (FWC) correspondence to Mr. Marty Kelly dated June 7, 2010. FWC text in black. District responses are in italic blue text)

June 7, 2010

Mr. Marty Kelly
Ecologic Evaluation
Southwest Florida Water Management District
7601 U.S. Highway 301
Tampa, FL 33637-6759

RE: Chassahowitzka River Recommended Minimum Flows and Levels, April 2010 Draft, Southwest Florida Water Management District

Dear Mr. Kelly:

The Division of Habitat and Species Conservation, Habitat Conservation Scientific Services Section, of the Florida Fish and Wildlife Conservation Commission (FWC) has coordinated our agency's review of the Southwest Florida Water Management District's (SWFWMD) Chassahowitzka River Recommended Minimum Flows and Levels (MFL) draft report and provides the following comments and recommendations.

Project Description

The following has been taken directly from the draft report:

SWFWMD MFL Executive Summary

The headwaters for the Chassahowitzka River are formed by the Chassahowitzka Main Spring. More than a dozen springs discharge additional flow into the Chassahowitzka River from the Floridan aquifer. For the purpose of minimum flows development and implementation, the Chassahowitzka River and associated springs are collectively considered to be the Chassahowitzka River system. The river receives a small amount of surface runoff from its 89 square miles watershed, but the overwhelming majority of flow arises from the 180 square miles springshed which produces a discharge that varies little with season. The river flows 5.6 miles (9 km) from the headspring to the Gulf of Mexico at Chassahowitzka Bay. It is designated an "Outstanding Florida Water" and the lower half of the river is part of the more than 31,000-acre Chassahowitzka National Wildlife Refuge.

Salinity in the Chassahowitzka River system may vary from fresh to brackish at the headwater and increases substantially as water moves through the marsh and into the estuary, mixing with more saline Gulf of Mexico water. The river transitions from salt marsh at the river's mouth to freshwater forested wetland approximately 3.1 miles (5 km) upstream from the river mouth.

Spring discharge is the primary freshwater source into the Chassahowitzka River system. However, continuous records are only available for the Chassahowitzka Main Spring. Flows from the spring are monitored by the United States Geological Survey (USGS). The discharge record begins in 1997 and stage begins in 1999. Spring discharge was estimated for periods preceding the initiation of USGS discharge measurement based on a regression equation developed for river flows and water levels in a Floridan Aquifer. The median flow of the Chassahowitzka River based on estimated and measured flows for the baseline period (1967-2007) used for determination of the minimum flows recommended in this report was 63 cubic feet per second (cfs).

There are currently no surface water withdrawals from the Chassahowitzka River currently permitted by the District. Groundwater withdrawals may, however, reduce discharge from the springs that contribute to the river's flow. A regional surface water/groundwater integrated model was used to determine that estimated water use in the region for 2005 resulted in a 0.7 cfs reduction is flows. For purposes of minimum flows development, this impact was considered insignificant and the evaluation proceeded without correction or modification of the reference period discharge record.

A variety of ecological resources of concern were identified and evaluated for response to reduced flows using both numeric models and empirical regressions. Resources of concern included submersed aquatic vegetation, benthic macroinvertebrates, molluscs, planktonic and nektonic fish and invertebrates, salinity-based habitat, and thermal refuge habitat for manatees during critically cold periods. Break-points in ecological response were not observed, and a fifteen percent loss of resource was adopted as representing significant harm.

The MFL recommendation is based on the resource most sensitive to reduced flow. Twenty-nine responses were evaluated, of which twenty-one were incorporated into development of the minimum flow for the Chassahowitzka River system. The two most restrictive components evaluated were the acute thermal refuge and the fish/invertebrate community. In both cases, an 11 percent reduction in baseline flow results in a 15 percent loss of volumetric thermal refuge for the West Indian manatee and a 15 percent loss of abundance (median value for seven taxa) of juvenile fish. Therefore, it is recommended that the minimum flow for the Chassahowitzka River system (including all contributing springs and associated creeks) be maintained at 89 percent of the baseline flow(see Table 8.2). In the absence of locally measured flows, the Chassahowitzka River System MFL shall also apply to Blind Springs.

The following Table is also taken from the draft report:

Table 8-2[1]
Long term expected minimum flows corresponding to recommended MFL

Criterion	Minimum Flow (cfs)
Minimum 10-Year Moving Average (based on annual average flows)	50.31 cfs
Minimum 10-Year Moving Average (based on annual median flows)	50.81 cfs
Minimum 5-Year Moving Average (based on annual average flows)	48.97 cfs
Minimum 5-Year Moving Average (based on annual median flows)	49.16 cfs

Comments and Recommendations

Overall, we find that the Southwest Florida Water Management District has done a commendable job of looking at the available data and collecting additional data where necessary. We also believe that the majority of the analysis is scientifically sound. We do, however, have concerns that some data might have been down-weighted for reasons that are not supported by the biology of the animals involved.

A healthy estuary represents a continuum from freshwater to marine. The proposed MFL for the Chassahowitzka River, however, appears to have the potential to adversely impact the freshwater fish community in this system. The modeling results for two freshwater fish species [blue fin killifish (Lucania goodie) and spotted sunfish (Lepomis punctatus)] retained in the assessment were largely discounted because responses were "very sensitive to flow changes" (paragraphs 3 and 4, p. 73 of94). We request a further explanation of the reasoning used to discount these species, and a consideration to use these species to help define the MFL. Since these two species require freshwater habitats to recruit and for subsequent survival and reproduction, any inflow changes that reduce the available freshwater habitat would impact their abundance and distribution. Instead of being discounted as overly sensitive, the responses of these two species should be viewed as an indication that inflow reductions can reduce the available freshwater habitat and adversely impact the freshwater nekton community in this system. When flows are relatively high (>=65cfs) individuals of these two species are relatively abundant in the main stem of the Chassahowitzka River. When flows are reduced to <55cfs, however, individuals of these species become much less abundant (MFL Appendices). Under these low flow conditions, these two species serve as early indicators that the freshwater nekton community most likely retreats to freshwater refugia at the headsprings from which they can re-populate to the main stem of the system when flow conditions increase. According to our analysis, the proposed MFL of approximately 50 cfs would limit these species to the headsprings at best.

Table 8-2 has been misinterpreted as representing the MFL. The District is not proposing a 50 cfs MFL, but rather the proposed MFL is maintenance of 89 percent of the baseline daily flow (11 percent of the daily flow may be withdrawn).The basis for the MFL is the most conservative reduction in flow that results in a loss of 15 percent of the habitat or resource. In the case of the

[1] *There are several typos in the District's Table 8-2. Reading from top to bottom the results should be 50.30, 49.85, 48.97 and 48.32 cfs)*

Chassahowitzka MFL, the basis for selecting 11 percent is both the median fish/invertebrate response and the loss of acute thermal refuge for the manatee (See Table 8-1 in the draft report).

Development of the referenced table is described in section 8.2 of the report. The table represents the lowest 5-yr average flow that would be expected if 11 percent of the daily flow were removed from the 41-year record of flow. To put this in perspective, the lowest 5-yr moving average of the naturally occurring (baseline) flows in the absence of any proposed withdrawals is 55.0 cfs. Under the proposed MFL, this value would fall to 49.0 cfs but a five-year average flow this low has an expected return interval of approximately 38 years.

This section will be re-written and references to "compliance" will be eliminated.

Discounting the abundance-flow relationships for these two species is to risk extirpating them and similar species. Because the salinity characteristics of the river are expected to change as the suggested minimum flows are achieved, we believe it is important to use freshwater fish species (and perhaps these two in particular) to help determine these minimum flows

This comment is in reference to the discussion contained in Section 7.1 of the peer review draft. This section and Table 7-1 will be re-written in the final report to correct a number of errors. First, the response for F. grandis was erroneously omitted from the final analysis. Second, the consultants (USF and FWC) treated flow data differently in developing their response regression. FWC added a one to the flow, while USF did not. In the initial draft that was circulated internal to the District, flow was erroneously transformed for both the plankton tow and the fish/invertebrate seine and trawl. The text and table contained in this section unfortunately reflects a mix of correct (seine and trawl) and incorrect (plankton tow) transformations of flow. The table that follows includes all taxa from Tables 5-5 and 5-6 that met the original criteria and were promoted to evaluation, and the sub-set selected for the MFL determination. Table 7-1 will be corrected in the final report.

If all taxa identified in Tables 5-5 and 5-6 are retained, the resource median is 11.1 percent flow reduction, but for reasons described in the discussion beginning on paragraph 4 of page 73 and extending onto page 74, the District feels that the hypersensitive responses based on seasonal results should not be included in the establishment of a non-seasonal MFL determination (See response to FDEP comment 20). Excluding these taxa results in a median resource reduction of 11.5 percent. However, the recommended MFL will not be changed in the final report because the most conservative MFL is 11 percent for the acute thermal refuge for the manatees.

Taxa	Type of Regression	Flow Reduction (%)		
		As Presented in Peer Draft	All Taxa (corrected)	As Presented In Final Report
Plankton Net				
Anchoa mitchilli juveniles	Linear	1.0	2.6	2.6
Hargeria rapax	Linear	1.9	3.5	3.5
Dipterans, chironomid larvae	Linear	2.3	3.9	3.9
Seine and Trawl				
Farfantepenaeus duorarum (S)	Quadratic	17.2	17.2	17.2
Farfantepenaeus duorarum (T)	Quadratic	15.2	15.2	15.2
Fundulus grandis	Quadratic		11.9	11.9
Lucania parva	Quadratic	11.1	11.1	11.1
Lucania goodei	Linear		0.9	
Poecilia latipinna	Quadratic	13.3	13.3	13.3
Lepomis punctatus	Linear		1.6	
Lagodon rhomboides	Quadratic		17.9	
Median for resource		**11.1**	**11.1**	**11.5**

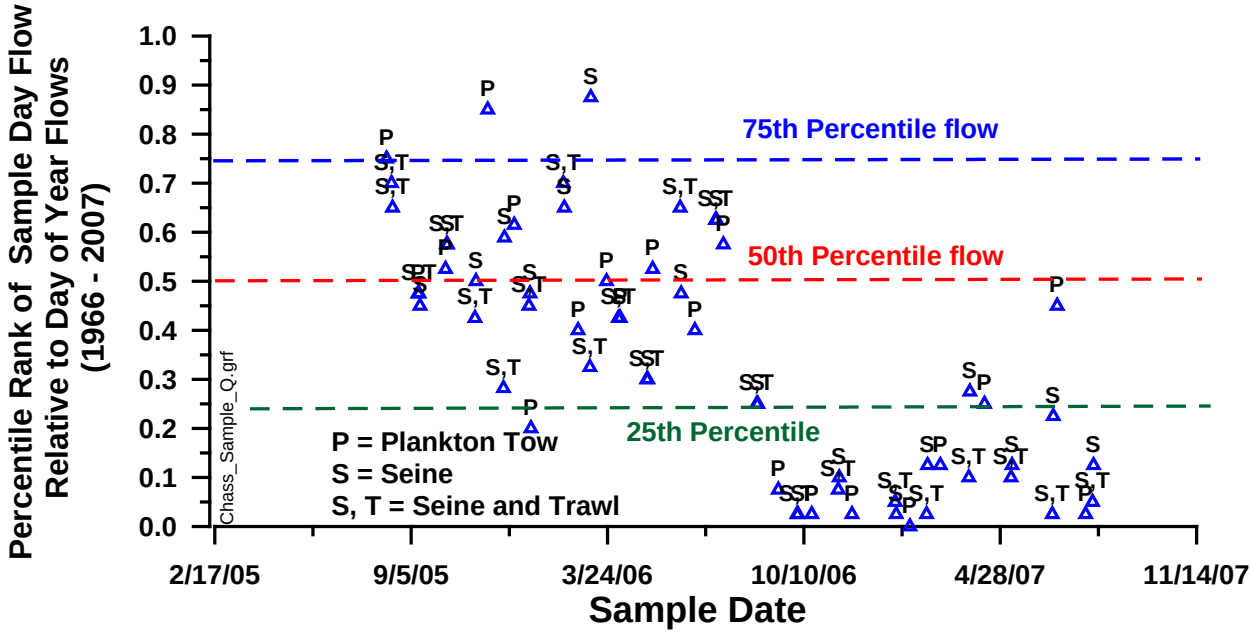
Section 5.2.1 describes a two-year study of freshwater inflow effects on habitat use by estuarine nekton that was conducted by the Fisheries-Independent Monitoring (FIM) program. Paragraph 1, p. 53 of 94 states that "These regressions can be applied to any proposed alterations of freshwater inflows that fall within the range of natural variation documented ... " The proposed MFL (~50 cfs) represents the 25th percentile of flows encountered during the FIM program sampling period. It is possible that the proposed MFL would shift the lower range of "natural variation" outside of the flow range that was sampled by the FIM program for some, if not all, of the assessed nekton species.

*The District's evaluation was based on a 41-year period of record. The 2005-2007 – period sampled by FWC was a dry period representing the 62nd, 22nd and 12th annual percentile ranks respectively. The lowest 5-yr moving average (49.0 cfs) represents the 5-yr moving average for years 1993-1997 and represents an estimated return probability of 0.03 (*e.g. *rank 1 of 37 five-year periods evaluated.)*

On p. 74 of 94, the following statement indicates" ... seasonally variable MFLs are not appropriate for this system." The monthly ranges used in the FIM program regressions match timeframes when each species was available to the FIM program's sampling gears. That does not imply, however, that a species is only present during the indicated months. During months outside of the indicated range, the animal is not efficiently captured by these gear types (i.e., size-specific escapement, ontogenetic habitat shifts, emigration, etc.) and the data cannot be used to assess their responses to inflow. Absence of a species from the FIM program's collections does not necessarily indicate absence from the system. Seasonally variable MFLs may not be appropriate, but it is important to maintain flow for the species that require it during each of their life-history stages.

This comment is not understood. Were the results sub-set into pre-selected periods and if so, what was the basis of the selection? The data presented

indicates that both seines and trawls were deployed throughout the calendar year. Sample dates reported for each are as follows (along with the percentile rank across 41 years for that day of year). If these taxa were simply not captured outside of the seasonal window reported, why wasn't a zero entered for the catch? If they were captured outside the May – November window, is there another regression reflecting the full data set?



The 15 percent loss of abundance criterion may not be the appropriate criterion to consider as causing ecological harm. The effect to species other than the presented species (such as freshwater species) needs to be considered as well. A 15 percent decrease in abundance for one species may be acceptable, especially for an abundant species; however, the extirpation of another set of species may be viewed quite differently.

The District acknowledges the comment and accepts the view. However, the legislature did not define 'significantly harmful' when promulgating the MFL statute and several peer review panels have commented on the District's use of 15 percent loss of habitat or resource. The majority of those comments have been supportive and it there does not appear to be primary literature supporting a quantitative acceptable value. For the past two years, the District has had an on-going contract Dr. Cichra at the University of Florida to identify peer-reviewed documentation identifying a threshold for 'significantly harmful' loss associated with flow reductions. In the absence of such literature, the District is developing a stream-diversion experiment to evaluate the effect of reduced stream flow. If a quantifiable and defensible definition of 'significantly harmful' is identified, the District will reconsider the currently applied15 percent value during the next re-evaluation of the Chassahowitzka MFL.

The proposed MFL would decrease the amount of potential warm-water habitat that may currently be available at certain tidal and flow conditions to the West Indian manatee (Trichechus manatus latirostris). Warm-water habitat is considered the limiting factor for the manatee population in Florida. Warm-water habitat for manatees provided by natural spring systems is therefore critical to the recovery of this species into the future, and FWC therefore does not support a loss of warm-water habitat (FWC Florida Manatee Management Plan, 2007). For the purposes of establish an MFL for the Chassahowitzka, however, this is not likely to become an issue since the Chassahowitzka River is used primarily as warm-season habitat and the possible loss of a small portion of the marginal warm-water habitat that may be periodically available should not have a significant effect upon the survival of the West Indian manatee.

Comment noted.

We have enclosed additional comments from our staff for your consideration and for revision of the Chassahowitzka River MFL document. We believe that the proposed MFL is too low and would shift flows to the lower range of "natural variation", which risks extirpating certain freshwater species from the system. In this case, we believe that the more sensitive species would be sound indicators for assessing and monitoring the effects of a proposed MFL. In systems that have developed under a relatively constant inflow, we'd suggest that MFLs fault on the side of being overly conservative.

As discussed with your staff, if you or your staff would like to coordinate further on the recommendations contained in this report, please contact Mr. Theodore Hoehn 850-488-3831 or email at ted.hoehn@myFWC.com.

Sincerely,

Mary Ann Poole
Commenting Program Administrator

Additional FWC comments:

• "much of the Chassahowitzka estuary exists in the unconfined broad shelf beyond Rkm=O ... " (Paragraph 3, pg. 40 of 94) is not supported by data presented here and is likely not an accurate statement. We do not know how much of the area outside of Rkm zero is actually impacted by the flow from the Chassahowitzka. It seems reasonable that this river's small freshwater signature quickly dissipates in the greater Gulf of Mexico outside of RkmO. We believe that the bulk of the Chassahowitzka estuary is actually contained within the extensive salt marshes and tidal creeks that extend north and south from the river starting at approximately Rkm 5. Of these areas, we know very little.

Comment noted. In the context of the statement, the District was simply acknowledging that additional mixing continues beyond Rkm 0 and that the Chassahowitzka contributes freshwater to that area. In that context, it is an extension of the Chassahowitzka estuary. The District considered extending the boundary, but the area beyond Rkm 0 is admittedly affected by flows from [other] sources as well (See Dixon and Estevez (2001) for additional discussion about

the near-coastal areas beyond Rkm 0). The statement will be edited in the final report.

• The flow rates used in the salinity profiles plots (4-3) on pgs. 42 and 43 of 94 seem very high for this system (71 to 150 cfs). Fisheries Independent Monitoring (FIM) program staff sampled this system from August 2005 thru July 2007. The median flow during this period was 61.7 cfs with a range from 25 to 87 cfs. What flows were used in these plots and why are they so high?

As identified in the Figure *captions, the salinity profile plots were adapted from plots originally presented in USGS WRI 88-4044 (See* Figure *8 in Yobbi and Knochenmus, 1989) and represent flows measured during the 1984-86 study. The USGS reports that the discharge records were produced from a relationship between discharge and groundwater levels (see page 6 of Yobbi and Knochenmus, 1989).*

Prior to 1997, flow for USGS station 02310650 included the contribution from Main Spring, Chassahowitzka #1, Chassahowitzka #2 and Crab Creek, while post-1997discharge reported for this site does not include Crab Creek (D.Yobbi, personal communication). A statement to this effect will be added to the final report.

• Referring to same plots as above, at 71 cfs a salinity of 3 ppt is found almost at Rkm 7.This leaves very little room for oligohaline and freshwater zones before the springhead at Rkm 9.

Comment noted.
See USGS quote that follows.
"In this report, a salinity of 3 ppt is used to establish the upstream extent of the zone of freshwater mixing in the Chassahowitzka, . . . These concentrations were selected because they are only slightly higher that the background salinity of the inflowing water from each river . . . (Yobbi and Knochenmus, 1989. Page 3)"

• "very slightly alkaline" (paragraph 2, pg. 46 of 94). Very and slightly would seem to nullify each other. Was something else intended, such as "are slightly alkaline" or "are very alkaline"?

The intent was to indicate that the pH was greater than 7.0 but only by a small amount. In this usage, the word 'very' means 'comparatively'.

• Robust regression (paragraph 1, pg. 59 of 94). As written, this technique appears to have been only applied to the seine and trawl data. However, staff believes, based upon later text, that it was also applied to the plankton data as well. Clarification of this point should be considered. If it was not applied to the plankton data, some explanation as to why would be appropriate.

The decision to apply robust regressions was made primarily to determine if the quadratic equations used only with the seine and trawl data by FWC were influenced by high leverage points or outliers. In the case of the original Chassahowitzka evaluation of the results (Greenwood et al. 2008), 61 percent of the best-fit significant flow/abundance responses were reported as quadratic responses.

• " ... strongest positive abundance/flow responses ... " (Section 6.1.2, pg. 70 of 94): Staff is uncertain that "strongest" is the correct word here. There were regressions with a better fit (adjusted r2) that were discarded because of the robust regression results.

Final report will be edited to reflect that fact that these were the strongest relationships meeting all of the criteria.

• Table 8-2 (pg. 83 of 94): each of the proposed MFLs is centered around 50 cfs. During the FIM program's study of this system, the 25th percentile of flow was 50 cfs.

Comment noted. See prior explanation.

Citations:

Dixon, L.K. and E.D. Estevez, 2001. Summary of information: water quality and submerged aquatic vegetation in the Chassahowitzka National Wildlife Refuge 1996-2001. Mote Marine Laboratory Technical Report Number 759. Prepared for U.S. Fish and Wildlife Service July 6 2001. Denver, Colorado.

Greenwood, M.F.D., E.B. Peebles, S.E. Burghart, T.C. MacDonald, R.E. Matheson, Jr., and R.H. McMichael, Jr. 2008. Freshwater inflow effects on the fishes and invertebrates in the Chassahowitzka River and estuary. University of South Florida and Florida Fish and Wildlife Conservation Commission. St. Petersburg, Florida. Prepared for Southwest Florida Water Management District. Brooksville, Florida.

Yobbi, D and L.A. Knochenmus, 1989. Salinity and Flow Relationships and Effects of Reduced Flow in the Chassahowitzka River and Homosassa River Estuaries, Southwest Florida.USGS Water Resources Investigation Report 88-4044.

11.18.3 Review Comments from Florida Department of Environmental Protection and District Response.

DEP Comments
Chassahowitzka River MFL (April 2010 Draft)

1. Page 11, line 2 – From the description, it is not clear where Spring #1 is. It is 350' upstream of what? Similarly, in line 5, the main spring is 200' NE of SR 480, but it is not clear where this road is located. A reference to Figure 2-4 could be helpful here, except that the spring names in Figure 2-4 are mostly illegible. We recommend using a map the size of Figure 3-8, page 36, instead of the current Figure 2-4.

   The designation of the road will be corrected to read county road instead of state road. CR 480 dead-ends at a boat ramp located at the Citrus County Chassahowitzka River Campground. The Main spring is located approximately 200' NE of the ramp. A short (150') creek enters on the north side of the river 150' upstream of the Main spring. Chassahowitzka #1 and Chassahowitzka #2 are located at the headwaters of this creek. Figure 2-4 will be expanded to match the size of Figure 3-8.

2. Page 12, Section 2.1.1, paragraph 1, midway down – The references to Crawford Creek and Dog Island would be helped by a reference to the river kilometers shown in Figure 3-8. Also, note the typos in the parentheses "…Crawford Creek (R km 3.5. See)…" *A reference will be included in the final report.*

   Paragraph 2 – The text references Figure 2-5, yet Figures 2-3 and 2-4 have not been introduced at this point. Also, the second sentence mentions development when it references Figure 2-5, but Figure 2-5 is a graph of river discharge, not urbanization. *The reference will be corrected to read Figure 2-4.*

3. Pages x and 18 cite that historic flows were determined by a regression equation developed for river flows with water levels from a Floridian Aquifer well. (Note the missing word "well" on p. x.) It would seem more appropriate for a regression equation for estimating historic flows be based upon rainfall, Floridian Aquifer levels, and spring discharges as the report cites that spring discharges are the overwhelming contribution to the rivers flow volume. Or, that such a comparison be done for the period of record for field measures*. Flow in the Chassahowitzka is dominated by spring flow arising from the Floridan aquifer with very little surface runoff. The USGS has developed discharge relationships from water level in the Floridan aquifer for many of the rivers in the springs coast. (See Table 1 in USGS Water Resources Investigation Report 01-4230). Many of these relationships have coefficients of determination in excess 0.8 indicating that the majority of discharge can be accounted for without including the surface runoff. For many years, the USGS has estimated the discharge of springs in this area using relationships to Floridan aquifer levels. The*

approach used to hind cast flows for the Chassahowitzka are based on an approach similar to the USGS. Daily discharge reported by the USGS for site 02310650 was paired with daily water levels reported for the Weeki Wachee Well (283201082315601) and a linear regression developed. (r^2 = 0.75, n =3260). This regression was then used to hind cast discharge back to the beginning of the Weeki Wachee Well record.

4. The evaluation was based on the discharge data from the uppermost USGS station, just downstream of Chassahowitzka Main spring. Although this approach may be the simplest by eliminating tidal influence to the greatest extent possible, it also means that the other tributary springs' contributions are not considered. We recommend that all data available from these other spring systems be used in the model to the extent practicable. *To clarify, in addition to the discharge from Chassahowitzka #1 and #2, and the Main spring, the hydrodynamic modeling included mean discharge and salinity measurements for Crab Creek, Potter Creek, Baird spring, Blue Run and Beteejay head spring entering the model at appropriate model cells. The hydrodynamic model was used to establish allowable flow reductions for shoreline, bottom area, salinity volume and thermal habitat. The salinity regression model included discharges only from Chassahowitzka #1 and #2, and the Main spring and was used to assess benthos, mollusc, SAV, and fish/invertebrate response to reduced flows.*

For example, in calculating the overall median flow of 63 cfs, the discharge from Crab Creek Spring was eliminated from the analysis. Crab Creek Spring appears also to be a headwater and to contribute about 33% of the flow, making it a significant water source (see Figure 3-8, p. 36, and the Crab Creek flow information, pp. 11, 12, and 18). Along with Chass Main and Chass #1, the three springs cumulatively contribute about 83% of the flow, indicating the 63 cfs used in the MFL analysis is too low. We do not know from the report how many discharge measurements exist for this spring and when they were taken (see p. 19, Figure 2-5). Is this information available? If needed, could discharge for this spring be estimated using the Weeki Wachee well? *Sufficient discharge measurements have been made at Crab Creek, and an 'unnamed' tributary to develop a regression and the USGS has done so (See WRI 01-4230). However, the USGS does not report daily flow for either of these sites. If the MFL were established based on discharge from an unreported source, compliance would be more difficult to assess. The District acknowledges that true total flow in the Chassahowitzka is unknown, but in accordance with FS 373.042, the MFL was based on the "best information available".*

Similarly, the Bettejay group of springs may be an important source of fresh water of the system. We noticed that observations for this spring group exist from 1961-1964, before the reference period chosen for the analyses. Section 2.3.2 (p. 20) does not provide the rationale for selecting this time particular reference period. Could the District expand the reference period in order to use more of the available data? *The reference period represents the historical limit of water level measurements in*

the Weeki Wachee Well, which is the basis for estimating discharge in the Chassahowitzka River.

Moreover, flow data from Rossenau *et al.* 1977, covering 1930 to 1972 and including some 81 measurements, show that the average discharge for the Chassahowitzka River just below Crab Creek was 138.5 cfs—significantly higher than the current 63 cfs median calculated in the report. This large difference suggests that either these measurements are in error, important springs amounts have been eliminated from the analyses, or there have been significant declines in flow. If this change were from declining flows, it seems that the Chassahowitzka River has already been impacted and any further reduction in flow could exacerbate an existing problem. Declining flows also indicate further investigation of possible anthropogenic influences from area groundwater withdrawals or other causes might be necessary. *Presently, discharge reported by the USGS for station 02310650 includes flow from Chassahowitzka #1, Chassahowitzka #2, and the Mainspring. Flow from Crab Creek is not presently included, although it was included in discharge measurements reported for this station prior to 1997 (D. Yobbi, personal communication. This information became known after the draft report was released, and a caution will be added to the final report.) The District did not use any USGS reported discharge from this station prior to 1997, but comparing flows in the older USGS reports should be done cautiously. Since the regression developed by the District is based on post-1997 discharge (which does not include Crab Creek), estimate of pre-1997 flows from that regression does not include contribution from Crab Creek either.*

The District acknowledges a statistically significant decline in flows (See Section 2.4, but the District believes that the decline is the result of climate change and is unrelated to anthropogenic activities. Modeling of current withdrawals within 14 miles of Chassahowitzka projects less than 1 cfs decline due to groundwater pumpage and there are no surface water withdrawals from the river.

5. Pages 19-20, Table 2-4, Figures 2-5 and 2-6 – Which springs are included in these Tables/graphs? *Chassahowitzka #1, #2, and Main spring.*

6. Page 21, Table 2-5 – Is the information for Chassahowitzka Spring referring to Chass Main, Chass #1, or both? *According to the author of the USGS report, discharge measurements prior to 1997 included the Chassahowitzka #1, #2, Main spring and Crab Creek.*

Last paragraph (italicized) – It is unclear where “the USGS site” being discussed is located. In the paragraph above, which USGS gauges are considered “long-term?” Without this information, the argument is hard to follow. *See Figure 2-7 and appendix 3 for the original report and a location map. The “long-term” gage refers to 0231065. Clarifying language will be added to the final report.*

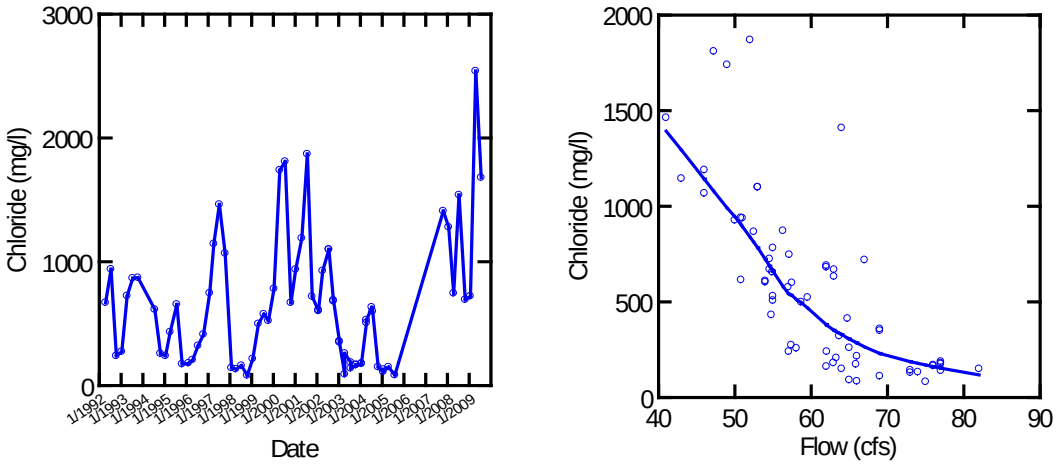
(There also are typos in the next to last sentence of paragraph 1.)

7. Page 24, Figure 3-1 – The major springs in this system are found within the freshwater wetland forested areas of the basin boundary as defined in this document. (There may also be many currently undocumented seepages throughout the tidal marsh systems, particularly at the heads of tidal creeks). The draft document includes a discussion of this riparian habitat, both at this system and in minimum flow determination for other rivers, and Figure 3-8 depicts the marsh-forest demarcation line, yet plant communities were not included in resources of concern. The salinity habitat criteria was considered to be "a surrogate" for many of the riverine functions, but it is not clear that this would be protected of the most restrictive, freshwater habitats in the river system that are contiguous with and reflective of the springs and the spring runs. *Comment noted. The District believes that maintaining the same salinity in the future as exists now for 85 percent of the shoreline, volume and bottom habitat is an appropriate management approach for establishing an MFL. Within the 85 percent of this habitat that remains unchanged, it is unclear how a freshwater habitat would not be protected by this approach.*

8. Page 33, last paragraph – Although Chassahowitzka was part of the multi-river study by Clewell, et al (2002), the quoted conclusion that "breaks in vegetation…are not reliable as predictors of specific salinity regimes" summarizes finding of both spring-fed systems and surface-water driven systems. This conclusion may not be as applicable to this system, which is characterized by little seasonal variations in spring flow, resulting in more stable ecological communities. Furthermore, most of the Clewell *et al.* sampling stations along the Chassahowitzka were within marsh systems, and not within the forested systems. *Comment noted. The District quantified (See Table 7-4) the length of shoreline above the 2, 5, 10, and 15 ppt isohaline at median flow conditions.*

9. Page 41, paragraph 2 – The text refers to two studies, but the preceding paragraph mentions three studies. *The unpublished data is an addendum to the Dixon and Estevez study reflecting newer data collected subsequent to the 2001 publication. Effectively it is one continuing data collection with the early data summarized in the published report.* Also, it is unclear if longitudinal (title of the section) or vertical (subject of the preceding paragraph) salinity is being discussed, why these discussions are not in the appropriate subsections that follow (i.e., longitudinal and vertical salinity), and what parameters are being correlated. Should the title of Section 4.2 (page 39) simply be "Salinity"? *The material presented on pages 39 through 41 describe longitudinal salinity variation. The sub-heading 4.2.1 will be eliminated to clarify this point. The text beginning on page 42 is intended to illustrate the vertical salinity variation as a function of flow and location. The Chassahowitzka if a well mixed system as illustrated by the fact that in most combinations of tide and flow, there is little to no difference between the surface salinity and the salinity at the bottom. Plates C and D illustrate that at low flow and high salinity, some displacement occurs. For example, the location of the 15 ppt surface isohaline is displaced seaward from the location of the 15 ppt bottom isohaline.*

10. Florida Geological Survey Bulletin 69 shows that spring water is becoming increasingly saline. If this is the case in the Chassahowitzka River, then additional reductions in flow may seriously affect the salinity of the system since the majority of flow in the river comes from groundwater discharge through springs. *Comment noted. The basis of the District's MFL is to determine the amount of flow reduction that will result in significant harm. All of the major springs in this complex have exhibited changes in salinity and chemistry over the years. The figure below illustrates the variation in chloride through time (left panel) and by flow (right panel) in flow from Chassahowitzka Main for the period 1992 - 2007. Clearly, the variation in chloride concentration is a function of flow, but the District's groundwater modeling indicates that change in flow resulting from groundwater withdrawals is approximately 0.7 cfs. The premise of the District's MFL evaluation is that significant harm will occur when withdrawals cause an 11 percent decline in habitat or resource.*



11. There is a possible connection between algal abundance and flow. Photographs taken in early June of this year by DEP staff show the Chassahowitzka River already experiences algal problems. What would be the impact on the system of further reductions in flow? *The response could take several forms and be either negative or positive depending on how the abundance is related to flow. For example, if macro- algae is drift or attached to the substratum and flow is a significant nutrient source (as is the case of elevated nitrates.), then one might expect a reduction in flow to result in a reduction in algae. On the other hand, if micro-algae are suspended in the water column, a reduction in flow will increase residence time, potentially allowing bloom conditions to form within the river.*

12. In establishing ecological criteria to be evaluated, i.e., "resources of concern," an evaluation of palustrine wetlands via a change assessment would provide a valuable landscape indicator. *Comment noted. The District evaluated the available Chassahowitzka aerial coverages and associated land use codes in an*

attempt to perform a change analysis related to tree die-off. The District found that resolution was lacking. Yet, even if the resolution existed, it was unclear to District staff how to remove the other environmental stresses that are unrelated to flow reductions in order to establish a quantifiable flow-based response. For example, Dixon and Estevez (2001) documented the effect on the SAV community when a single day, high-stage event flooded much of the river system with saline Gulf water. This change in community structure was unrelated to flow or withdrawals and had it not been documented, interpreting the SAV results in terms of flow alone would be difficult at best. In terms of the palustrine wetland, it should be noted that the Chassahowitzka River is tidal above the Main spring and bottom salinity at the Main spring presently (August 1-2, 2010) has a daily range from 0.9 to 4.2 ppt.

13. The basis of establishing 15% of natural resource loss, as being the measure of impairment, would be well served by first defining the resources, the components of ecosystems, and system functions all within a single system context. This would allow the impact due to loss of a given species to be related to the whole system as well as related to economic values, ecological economic values, etc. *Comment noted.*

14. One potential means of assessing and evaluating the dynamics needed to maintain a system, riverine system, would be to perform a change analysis using a variety of landscape scale measures. This could be accomplished by utilizing differing satellite platforms offering visible, near infrared, to microwave platforms that can measure plant health, cover types, even water levels and soil saturation. These dynamic measures may be correlated to measured rainfall, flow, spring discharge, and changes within a watershed such as land development and land conversions. Thus, the dynamics of a river system might be captured both in response to natural events such as rainfall, but also captured against what may be significant anthropogenic influences, impacts, such as land cover change, with its associated impacts such as stormwater runoff. *Comment noted. See limitations noted in response to point number 12.*

15. The MFL also might be evaluated by consideration of potential critical refugia and impacts of conductivity to species, especially larval forms. *Comment noted. The MFL does include an evaluation of the thermal refuge provided by the Chassahowitzka system for the West Indian Manatee and larval forms were captured and evaluated as part of the fish/invertebrate response to reduction in flow.*

16. Consideration should be made for evaluating, external to model results, extreme conditions of drought which may dramatically reduce flow from the spring system, and establish a natural baseline as to minimum flow for ecological resiliency of the system. *Comment noted.*

17. *Vallisneria americana* is a known food source for the West Indian Manatee. If densities are affected by flow reduction in the Chassahowitzka River system, how will that affect the manatee especially when utilized during the critical cold weather

periods? *The relationship between warm refuge and forage response appears to remain open for debate. For a brief literature review, see the Florida Fish and Wildlife Conservation Commission discussion at http://myfwc.com/wildlifehabitats/manatee_habitat_foraging.htm. In order to make the linkage suggested by the reviewer, a defensible and quantifiable relationship between reduced flow and V. americana density would be required. A separate quantifiable demonstration that the loss of V. americana in the Chassahowitzka constitutes a 'significant harm' to the West Indian Manatee would also be required. The District has attempted on several occasions (*e.g. *Chassahowitzka MFL and Weeki Wachee MFL) to quantify the effects of reduced flow on SAV and seagrass without success. (See section 7.2). Furthermore, there is evidence that manatees have nutrient preferences that can influence foraging patterns during the winter. Rathburn et al. (1990)[2] states ". . .as a result of our radio-tracking studies, we learned that manatees in both the Homosassa and Crystal Rivers frequently left the warm headwaters during the coldest months to feed on Ruppia maritima and Potamogeton pectinatus downriver, despite the abundance of other plants near or in the warm water" (cited in Warm-Water Task Force, 2004[3]). Such behavior is unrelated to reduced flows, and would complicate the relationship(s) needed to make this a quantifiable MFL metric.*

Manatee survey results obtained from U.S. Fish and Wildlife Service indicate that the Chassahowitzka is used more often during warmer months than during the cold months. This is probably the result of the fact that warm water of sufficient depth is largely absent during the colder months. Through 2006, there were no recorded aerial surveys on the Chassahowitzka River for the months of September through December. For the months of January through May, the average number of animals sighted are 0.1(Jan), 1.2 (Feb), 13.5(Mar), 8.0 (Apr) and 24 (May).

18. Page 73, paragraphs 3 and 4 – The reduced flows and percents for plankton presented in paragraph 3 are different from the values shown in Table 7-1. Data for the seine and trawl species mentioned in paragraph 4 also are not found in the referenced Table 7-1*. This section and Table 7-1 will be re-written in the final report to correct a number of errors. First, the response for F. grandis was erroneously omitted from the final analysis. Second, the consultants (USF and FWC) treated flow data differently in developing their response regression. FWC added a one to the flow, while USF did not. In the initial draft that was circulated internal to the District, flow was erroneously transformed for both the plankton tow and the fish/invertebrate seine and trawl. The text and table contained in this section unfortunately reflects a mix of correct*

[2] Rathbun, G. B., J. P. Reid, and G. Carowan**.** 1990, Distribution and movement patterns of manatees (*Trichechus manatus*) in northwestern peninsular Florida. Florida Marine Research Institute Publication Number 48: 1-33.

[3] Draft Recommendations For Future Manatee Warm-Water Habitat. Warm Water Task Force. December 27, 2004.

(seine and trawl) and incorrect (plankton tow) transformations of flow. The table that follows includes all taxa from Tables 5-5 and 5-6 that met the original criteria and were promoted to evaluation, and the sub-set selected for the MFL determination. Table 7-1 will be corrected in the final report.

If all taxa identified in Tables 5-5 and 5-6 are retained, the resource median is 11.1 percent flow reduction, but for reasons described in the discussion beginning on paragraph 4 of page 73 and extending onto page 74, the District feels that the hypersensitive responses based on seasonal results should not be included in the establishment of a non-seasonal MFL determination (See response to FDEP comment 20). Excluding these taxa results in a median resource reduction of 11.5 percent. However, the recommended MFL will not be changed in the final report because the most conservative MFL is an 11 percent flow reduction associated with the acute thermal refuge for the manatees.

Taxa	Type of Regression	Flow Reduction (%)		
		As Presented in Peer Draft	All Taxa (corrected)	As Presented In Final Report
Plankton Net				
Anchoa mitchilli juveniles	Linear	1.0	2.6	2.6
Hargeria rapax	Linear	1.9	3.5	3.5
Dipterans, chironomid larvae	Linear	2.3	3.9	3.9
Seine and Trawl				
Farfantepenaeus duorarum (S)	Quadratic	17.2	17.2	17.2
Farfantepenaeus duorarum (T)	Quadratic	15.2	15.2	15.2
Fundulus grandis	Quadratic		11.9	11.9
Lucania parva	Quadratic	11.1	11.1	11.1
Lucania goodei	Linear		0.9	
Poecilia latipinna	Quadratic	13.3	13.3	13.3
Lepomis punctatus	Linear		1.6	
Lagodon rhomboides	Quadratic		17.9	
Median for resource		**11.1**	**11.1**	**11.5**

19. Page 74, partial paragraph – If seasonal flow variation is minimal, and data exist for *L. goodie* and *L. punctatus* during the low flow and high flow months (May – July and September – November, respectively; see page 18), why are these "hypersensitive" species eliminated from the analysis? What criteria define "hypersensitivity?" Eliminating these species eliminates all linear response species. *All of the plankton tow results are linear responses and are provided as the top three taxa on Table 7-1 under the heading "Plankton Net". One of the taxa eliminated from further evaluation was a quadratic response and two were linear responses. See Table 5-5 and 5-6 for coefficients.* What happens if you make assumptions allowing the inclusion of these two linear response species in the analysis? *(See prior response)* Are the remaining species as sensitive to flow as the three eliminated species? *The response of each taxa is given in the last column of*

Table 7-1. Table 7-1 will be revised in the final report to document the reductions of all taxa.

The District's main concern with including these two taxa in the MFL determination is the reasonableness of any response curve that is ultra-sensitive to changes in flow. Using the response regression for L. goodie indicates that a reduction of 0.9 percent in flow will result in the loss of 15 percent of the organisms. Extending the application of the regression, if the 175-day average flow (representing the flow lag term in the regression) is reduced 8 cfs (from 63 cfs to 55 cfs), the regression predicts that ninety-five percent (see Figure 7-1) of this taxa will be eliminated from the system. To put this in perspective, in the absence of any withdrawals, historically this taxa would have been extirpated from the river 2,156 times between 1967 and 2007. A similar evaluation of L. punctatis results in extirpation 1,513 times over the same period. It seems unreasonable that killifish are eliminated so easily and so frequently from this system.

The District arguably should have eliminated several other taxa from consideration, but results for the taxa that were eliminated were based on a seasonal subset of the sampling data that does not reflect annual response. In order to partially address these concerns, the District used the median of the individual fish and invertebrate responses in lieu of selecting the most conservative taxa.

There are a number of potential explanations for this apparent aberration. It may be that the flow domain of the collection period was insufficient, or that the spatial sampling domain is not representative for freshwater taxa. Nevertheless, the District questions whether such sensitive response regressions are representative or reasonable.

It should also be noted that fish/invertebrates were not the only resource exhibiting hypersensitivity to flow reduction. Similar issues were encountered when attempting to relate SAV density to flow. Flow reductions less than 2 percent were predicted to result in loss of 15 percent of the SAV density. These flow reductions result in predicted salinity change of approximately 0.2 ppt for Vallisneria americana which has a reported salinity tolerance from 0 to 9 ppt.

Last paragraph – The data for *F. duorarum* presented in the text do not match the values shown in Table 7-1.This will be corrected in the final report. Also, the last sentence's reference to Figure 7-1 seems odd since this graph is for an eliminated species. *Corrected*

20. If salinity is a major factor in environmental change in this system, the impact of rising sea-level and climate change on the Chassahowitzka River system should be addressed. *The District acknowledges that changes in sea-level will change the salinity regime throughout the system, but it not obvious how to estimate*

and incorporate the rise into the present MFL especially in light of the widely varying estimates of the rate. The District is committed to re-evaluating the MFLs periodically. When the re-evaluation is undertaken, it is anticipated that new salinity data will be collected, and related to flow through new regression and modeling efforts at the time of re-evaluation.

21. Pages 77-78 – It would be helpful to have a discussion of the results presented in Table 7-4. Table *7-4 lists the reduction in flow that will cause a 15 percent reduction in either volume, area or wetted shoreline for a specified maximum salinity. The discussion is contained in the last paragraph on page 77. For example, if flow is reduced 22 percent there will be loss of 85 percent of the water (volume) that is at, or below 2 ppt salinity.*

22. Page 78, paragraph 1 – What does "worst case" mean? Is it simply January 4-7, 2007, or does Figure 7-2 also consider high tides? *The reference to section 6.1.5 on page 78 is incorrect and should read section 6.1.6. The "worst case" scenario is based on a joint probability of conditions during the Manatee season (October to March) and consists of cold water, low discharge of warm water and high tide to maximize the intrusion of cold Gulf Water. A return interval of 50 years was chosen to represent the average life expectancy of the manatee. During the period chosen, the minimum temperature ranged from 13.5 to 15.0 oC, discharge 48-48 cfs and stage from 0.3 to 1.7 ft.*

Paragraph 2 – What are the "acute conditions" and when does this suitable habitat occur? (Also, correct the typo "or" in the last sentence.) *"Acute" and "chronic" conditions are defined in section 6.1.6. Chronic refers to three consecutive days of critically cold conditions, while acute refers to four consecutive hours of critically cold conditions.*

23. The analysis should quantify any degradation that has occurred in the Chassahowitzka River system, as significant harm may have taken place already. (The river is currently being considered for listing as impaired by DEP's TMDL section.) Historical aerial photography would provide an insight into how the Chassahowitzka River ecology has changed over time and may provide insight into how much the system has already been impacted*. Under the MFL statute, 'significant harm' is evaluated solely within the context of withdrawals. There are no surface water withdrawals on the River and the impact due to groundwater withdrawals has been shown to be insignificant (*e.g. *0.7 cfs).The District acknowledges that nutrients (namely nitrate) are increasing, but the increase appears to be independent of flow (see discussion in Section 4.3). This type of water quality degradation and the regulation thereof is not within the District's authority under the MFL statute*

24. Page 80, last paragraph – What is the justification for using a median value to determine the MFL, instead of using the most sensitive species, as in previous reports? This methodology conflicts with the earlier statement (page x, last paragraph) that "[t]he MFL recommendation is based on the resource most sensitive

to reduced flow." The statement (page 80) "… it was determined that the median… should be used" is too vague. How was this determination made? A discussion of the reasoning behind this decision is needed. *In the present application, several of the fish/invertebrate taxa exhibited apparent sensitivity to flow reductions that simply do not seem reasonable for estuarine taxa. There are four estuarine taxa that are reported to decline 15 percent with flow reductions less than 2.5 percent. To put this in perspective, a 2.5 percent flow reduction is expected to cause a 0.4 ppt increase in salinity at the mouth of the river (Rkm =0) and an equivalent increase at a location one-half the distance to the Main spring. Salinity at the Main spring presently (August 1-2, 2010) ranges from 0.9 to 4.2 ppt.*

Again, regarding the "hypersensitive" characterization, it seems the *A. mitchilli* results indeed could be an ecological response, and the conservative (protective) approach would be to choose the flow that does not cause significant harm to this species. What do the models show would happen to the populations of each of the three "sensitive" fish/invertebrate species eliminated from the analysis if flows were reduced by 11% instead of 1-2*%? See Figure 7-1 and response to comment 19. If flow were reduced by 11 percent, according to the robust regression the abundance of L. punctatus would decline by 78 percent.*

25. Page 81, Table 8-1 – The resulting MFL summary shows a 15% loss of volume, area, and shoreline in the 5 ppt habitat at 13, 15, and 13% flow reduction, respectively. Given that the proposed MFL is for 11% reduction, the freshwater and low salinity systems may not be sufficiently protected by this proposal. This potential habitat impact has not been directly addressed by this document. *This comment is not understood, as allowing an 11 percent reduction in flow would be more protective of the 5 ppt habitat than allowing a 13 percent or 15 percent reduction in flow. More 5 ppt habitat will exist at an 11 percent reduction than at a 15 percent reduction.*

26. Page 82, paragraph 1 – The report recommends maintaining the Chassahowitzka River flow at 89% of baseflow and that this MFL be applied to associated creeks and springs, including Blind Spring. It is not clear, however, that these systems will be monitored – collectively or individually – and in comparison to which baseflow, given that only one USGS station was used in the development of the MFL. The means of monitoring to determine compliance with the MFL should explained. *All of the springs and associated creeks exhibit tidal fluctuations making direct monitoring of discharge expensive and problematic. The lack of individual, long-term discharge measurements at the creeks and springs prohibits setting individual MFLs for these systems. As a result, the MFL derived for the Main spring will be used as a surrogate for the entire system. The USGS reported discharge for station 02310650 (reporting collective discharge from Main, #1 and #2) will be used to assess compliance in accordance with the long-term expected flow statistics presented in Table 8 -2.*

27. Given that the surface water basin for the Chassahowitzka River System is different from the spring recharge basin (or springshed), which of these basins will be used in

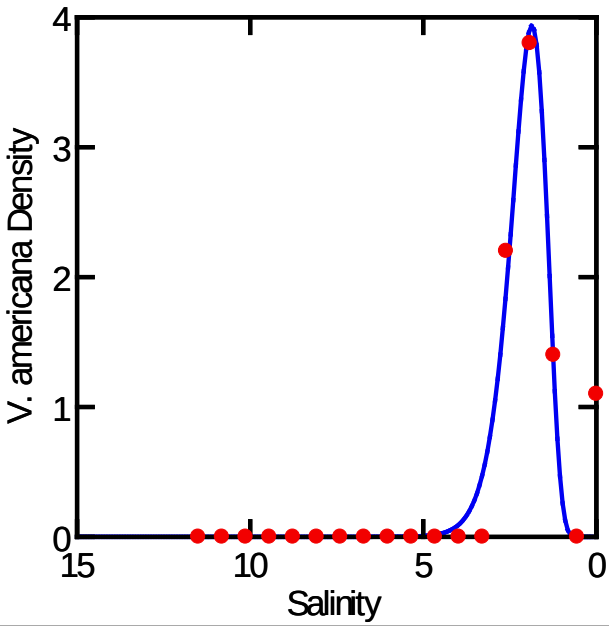
determining if water use permitting will be in compliance with the MFL? The document is silent on this matter. It is recommended that both basins be used. *Withdrawals from the groundwater basin or direct surface water withdrawals will be subject to the MFL rule.*

28. Several references need correction: *Will be corrected in the final report.*

a. Page 15, last line – Table 2-6 does not exist.
b. Page 23, section 3.1.2, paragraph 2, last line – The reference should be to Table 3-1.
c. Page 33, paragraph 2, last line – Table 3-4 does not exist.
d. Page 41, top line – The reference is to Section 4.2.1 (longitudinal salinity variability), yet the sentence discusses vertical mixing.
e. Page 76, paragraph 1 – Figure 5-4 is about manatees, not SAV. There does not appear to be a Figure corresponding to the discussion presented in the text. Also, in paragraph 3, should the Rkm cited be 6 instead of 7 (see Table 7-3)? *Corrected. The table will be modified to identify the Rkm of maximum density.*

As an aside, after the draft report was distributed, the SAV was re-evaluated using the optimal salinity regression form identified for evaluation of mollusc. This form has the advantage of identifying peak, or optimal salinity and the results confirmed the results reported in the draft report.

The results for V.americana follow. This regression exhibits an r^2 of 0.92 (n=17). When this expression is coupled with the salinity/flow model, an increase of 0.76 ppt salinity is predicted to reduce the density by 15 percent compared to a 0.20 ppt increase predicted by the polynomial regression described in the report.



Optimization model of *V. americana* density as function of salinity.

29. It would be helpful if the appendices were broken down into separate documents instead of one large .pdf file. *Suggestion noted. Individual documents will be made available on the District's web site.*

11.18.4 Bryant, Richard

Richard M. Bryant
805 S. Longneedle Drive
St. Augustine, FL 32092

Dave Moore, Executive Director
Southwest Florida Water Management District
2379 Broad St.
Brooksville, FL 34604

November 2, 2010

RE: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Moore,

I have recently had an opportunity to review the Draft Minimum Flows and Levels study for the Chassahowitzka River dated April 2010. It with a great deal of dismay that I see your staff has recommended a reduction of 11% in the flows of this river system. Clearly the science behind this study is not correct or thought out.

The assumption and models used in this study are based on flawed data and missing information. In Table 2.3 the information states that the mean flow from the Main Spring and Crab Creek Spring was 140 cfs calculated from two different studies prior to 2001. Yet you do not use this figure....instead you rely on a figure of flows calculated from a well at Weeki Wachee (page 18). All assumption and modelling are based on this well data and do not seem to take into account published data from what appear to be peer-reviewed publications. This is a fatal flaw as it ignores scientific data!

On page 20, the draft report states there has been a "statistically significant" decline in the average annual flow of the Chassahowitzka River springs. Yet that decline is not acknowledged in the remainder of the report.

On page 35, the draft report discusses changes observed in aerial photographs between 1990 and 2007 and states that little has changed in the vegetation makeup. While that may be true on a gross scale used in aerial photographs, the change in habitat along the river bank is very pronounced, as the local residents and users familiar with the river can attest to. The changes to the hydric habitat are limited to that area immediately adjacent to the river bank and will not be detectable in aerial photographs.

I recently retired as a biologist from a federal agency here in Florida. Much of my carrier was dealing with water quality. But vastly more important than my biological background is my first hand knowledge of the Chassahowitzka River. My family has owned property on the river since 1939 and having grown up in the river, I have seen 57 years of change to the river system. This familiarity with the river and its hydric hammocks directly relates to four anecdotal observations of the flows from the Main Chassahowitzka and nearby springs.

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

November 18, 2010

Mr. Richard M. Bryant
805 S. Longneedle Drive
St. Augustine, Florida 32092

Subject: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Bryant:

Thank you for your correspondence dated November 2, 2010, regarding the establishment of minimum flows for the Chassahowitzka River system by the Southwest Florida Water Management District (District). As you are aware, consideration of the proposed MFL by the Governing Board was deleted from their November agenda; and consideration of this item will be delayed until all interested parties are provided adequate opportunity for review and comment. You will be advised when the item will be presented to the Governing Board.

I would like to take this opportunity to address some of your comments and clarify the District's position with regard to the establishment of a minimum flow and level (MFL) for the Chassahowitzka River system.

In discussing flow in the Chassahowitzka River, it is important to identify the springs included as well as the period of observations. This is particularly important because the United States Geological Survey (USGS) changed the method of reporting in 1997. Prior to that year, USGS publications citing flow at USGS sites included the discharge from Chassahowitzka #1, Chassahowitzka #2, Chassahowitzka Main and Crab Creek Springs. Flows reported by the USGS from 1997 to present do not include discharge from Crab Creek, which as indicated in Table 2.3 averaged 48.7 cfs for the period 1932-1970. Comparing USGS discharge values prior to 1997 with discharge values reported after that date must include a correction for flows from Crab Creek. Unfortunately, there is no record of daily discharge values for Crab Creek to facilitate this correction.

It should also be noted that the present daily discharge estimates published by the USGS (Site #02310650) for the Chassahowitzka River are derived from a calculation involving the water level in the Upper Florida aquifer (UFA)

measured at USGS Site Weeki Wachee Well nr. Weeki Wachee (Site #283201082315601). The Weeki Wachee Well provides a long-term record of changes in the artesian pressure that causes discharge from the springs along the Springs Coast. This has been a standard USGS practice for years.

Some clarification is warranted regarding how flow from Crab Creek (and others) was incorporated into the hydrodynamic model that was used to establish the manatee thermal refuge (the basis for the recommended MFL) and the salinity habitat. The model used discharge data reported by the USGS for Site #023107650. The model also included a constant inflow (average flow reported by the USGS) and discharge salinity for Crab Creek and others as shown in Table 1 below. These flows were introduced into the model numeric grid at spatially appropriate locations.

Table 1. Minor spring discharges incorporated into Chassahowitzka River hydrodynamic model.

Springs Name	Average Discharge (cms)	(cfs)	Salinity (ppt)
Crab Creek	1.38	48.7	3.2
Potter Creek	0.53	18.6	5.5
Baird	0.16	5.7	6.5
Beteejay Head Spring	0.18	6.4	<1
Blue Run	0.19	6.6	4.3

In contrast to the hydrodynamic model, the empirical salinity/flow regression used to evaluate the fish/invertebrates, benthic community, mollusc and submerged aquatic vegetation utilized flow from the Main Spring (and sources upstream), but not Crab Creek or other sources downstream. As this was an empirical model comparing observed salinity and observed flow at Chassahowitzka Main (and upstream sources), the 'additional' freshening provided by Crab Creek and other sources downstream is implicitly incorporated in the flow/salinity slope term.

The District acknowledges a statistically significant decline in flows has occurred at Chassahowitzka Main, but believes that these are largely the result of drought conditions. The following Figure 1 is reproduced from Figure 30 of the USGS Water Resources Investigation (WRI) 01-4230 titled *Hydrology of the Coastal Springs Ground-Water Basin and Adjacent Parts of Pasco, Hernando, and Citrus Counties, Florida*. The plot illustrates the cumulative departure from average rainfall at the Brooksville Chinsegut Hill weather station. Superimposed on the cumulative departure are two trend lines representing the period 1931-1960 and 1960-1998, respectively. The former, illustrated in red, is a statistically significant ($p<0.000$) increasing trend for the period 1931-1960. The blue regression line represents the cumulative decline from annual rainfall during the period 1961-1998 and is significant at $p<0.000$. Thus, while there may

be no "long-term" change in rainfall, it is necessary to identify the period analyzed because opposing trends within the long-term evaluation will statistically cancel out. The changes to hydric habitat that you mention is also acknowledged, but the District believes that these inevitable changes are due to a combination of drought conditions and rising sea level. Figure 2, which follows on Page 4, illustrates a long-term trend in sea level; while Figure 3 illustrates the short-term changes near the Chassahowitzka. Both figures predict increasing salinity and the type of habitat changes that are occurring. The rate of rise at Chassahowitzka has not been measured, but it is reasonable to assume that it has been within the range measured at bordering

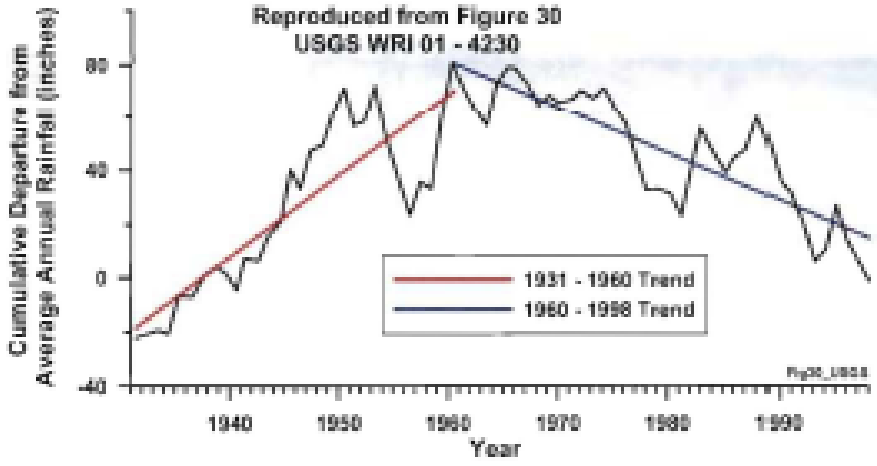


Figure 1. Trends associated with Chinsegut Hill rainfall.

locations. From the period 1931-2010, sea level has probably risen between 5.7 inches and 7.4 inches at the Chassahowitzka River based on observations by the National Oceanic and Atmospheric Administration.

In response to your comment about navigation, the District completed an additional run of the hydrodynamic model in order to address the question. The decrease in average water level expected at the Chassahowitzka due to an 11 percent reduction in flow was evaluated using the same hydrodynamic model used to establish the MFL. The model was executed for the three-year period 2004-2006 and average hourly water levels extracted. The model was executed without withdrawals and in the presence of the assumed 11 percent withdrawal and the difference in water levels computed. Table 2, which follows on Page 5, provides the difference at three locations in the river. The average reduction in water level expected at the boat ramp is 0.01 foot.

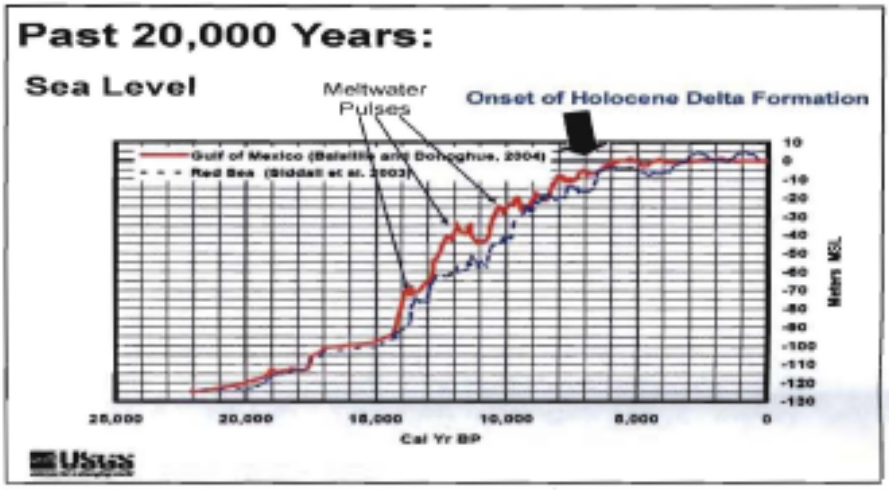


Figure 2. Gulf of Mexico sea level rise (red line)

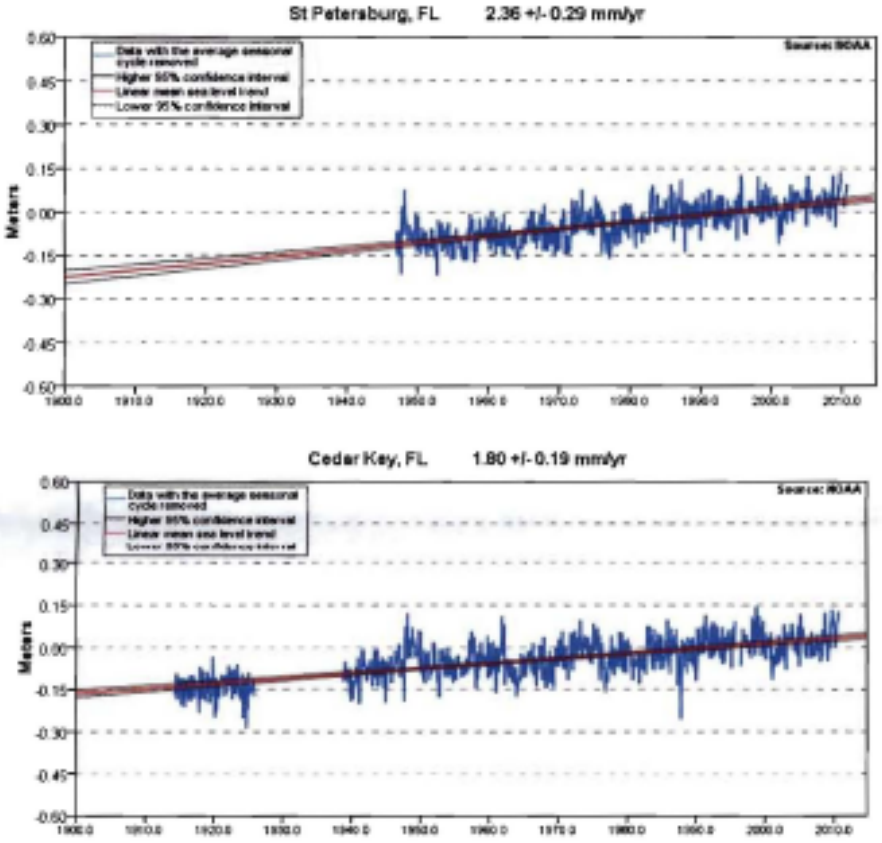


Figure 3. Sea level rise at St. Petersburg and Cedar Key, FL

Table 2: Water level reduction: Comparison of baseline and 11 percent flow reduction.

Location	Water Level Reduction (ft)		
	75 Percentile	Mean	25 Percentile
USGS 02310663	0.0024	0.0014	0.0019
Baird	0.0155	0.0059	0.0034
Boat Ramp	0.0225	0.0105	0.0050

In conclusion, the District agrees that spring discharge in the Chassahowitzka River system has declined since the 1960s and that area ecology is changing. The District considers these changes related primarily to natural variations in climate and sea level and for the most part unrelated to groundwater pumpage. Climate change and sea level change are cyclic and have occurred often in the past. These cycles will likely continue to repeat in the future.

Again, I thank you for your comments regarding establishment of minimum flows for the Chassahowitzka River system.

Sincerely,

David L. Moore
Executive Director
Southwest Florida Water Management District

DLM:jch
cc: Governing Board Members
Bruce Wirth
Mark Hammond
Gene Schiller
Lou Kavouras
Richard Owen
Bill Bilenky
Karen Lloyd
Marty Kelly
Mike Heyl
Chassahowitzka River Restoration Committee
Log #24921-10

==========

From: rangerrb [mailto:rangerrb@bellsouth.net]
Sent: Monday, May 23, 2011 9:50 AM
To: Doug Leeper
Cc: rangerrb@bellsouth.net
Subject: Minimum flows for Chassahowitzka

Mr. Leeper,
Due to previous commitments, I will be unable to attend the public workshop dealing with minimum flow levels for the Chassahowitzka River being held on June 8, 2011. However, as a property owner on the Chassahowitzka River and being a biologist, I am very interested in the topic. It is my observations that previous information used by the Water Management District to determine minimum flows has been incomplete, inaccurate and with flawed assumptions.

For the above reasons, I would like to receive any sort of summary, executive summary, notes or any other written records resulting from this or subsequent meeting dealing with the minimum flows for the Chassahowitzka River. My contact information is as follows:

Mailing address: 805 S. Longneedle Drive
St. Augustine, FL 32092

email address: rangerrb@bellsouth.net

Sincerely,

Richard M. Bryant

==========

From: Doug Leeper
Sent: Monday, May 23, 2011 10:56 AM
To: rangerrb
Subject: Comments on minimum flows for Chassahowitzka and public workshop request

Mr. Bryant:

Thanks for your input regarding development of minimum flows for the Chassahowitzka River system. Your comments, along with input on proposed minimum flows for the Chassahowitzka from all other interested stakeholders will be included in the appendices of a future version of the Southwest Florida Water Management District minimum flows and levels report for the system. The revised report will be made available for public review and will be presented to the District Governing Board to support the Board's consideration of rule amendments associated with the proposed minimum flows.

I am sorry to hear that you will be unable to attend the first Springs Coast Minimum Flows and Levels public workshop on June 8th. Per your request, I will be sure to provide you with workshop summary information for this and subsequent workshops in the series. I anticipate that information exchange for the workshops will occur primarily through use of e-mail, and expect that summary information will also be posted on the District web site, on a web-page or web pages dedicated to the workshop series.

Please do not hesitate to contact me again if you have additional comments or questions regarding development of minimum flows on the Springs Coast.

Douglas A. Leeper, Chief Environmental Scientist

The remainder of this page intentionally left blank.

Richard M. Bryant
805 S. Longneedle Drive
St. Augustine, FL 32092

Blake Guillory, Executive Director
Southwest Florida Water Management District
2379 Broad St.
Brooksville, FL 34604

May 8, 2012

RE: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Guillory,

I have recently reviewed the documentation provided on the District's website for the Minimum Flow determination for the Spring Coast. While the body of research is vast and far ranging, I am concerned with the lack of **quality** data and pertinence to the springs of the Chassahowitzka River.

Many of the studies and models do not seem to be applicable to the Florida west coast area and many assumption used in these models are based on flawed or incomplete data. In several cases, data that is pertinent has been ignored (example - rainfall data that does not show any trends was disregarded and instead you have assumed that rainfall amounts are dropping). While there is spring flow data dating back to 1930, you instead chose to use only data from a well located miles south of the Chassahowitzka. Many models do not take into account the rising level of the Gulf water, but the District does acknowledge that sea levels are increasing. Most studies of spring output do show a statistical decrease in flow amounts, yet most of the models used in the studies assume no decrease in flow rates.

I spent nearly half of my 32-year career for the U.S. Department of Interior – National Park Service working on the ecological processes of Florida habitats. This included water monitoring and the impacts of changes to natural flows. As a biologist and a land owner on the Chassahowitzka River, I urge you to use common sense and logic instead of flawed data and non-pertinent models that have not been validated.

The Chassahowitzka River is already stressed. The following items attest to the impacted condition of the Chassahowitzka River:

1. Currently the Chassahowitzka River in the on the list of impaired water for dissolved oxygen.
2. The main spring has declined in flow over historic times. This is shown both by a look at the records from 1930 to present day and as noted by the District in a study to remove

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

June 27, 2012

Richard M. Bryant
805 S. Longneedle Drive
St. Augustine, FL 32092
Subject: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Bryant,

Thank you for your continued interest in the Southwest Florida Water Management District's development of Minimum Flows and Levels (MFLs) for the Chassahowitzka River system. Mr. Guillory has forwarded your inquiry to me and asked that I respond to your questions.

As you are aware, the District welcomes comments from the public. The District convened a Springs Coast MFLs Working group for stakeholders and interested citizens, and hosted a series of public meetings during 2011 to facilitate exchange of ideas. The purpose of those meetings was to have the stakeholders and interested citizens identify quality datasets and alternative techniques for analyzing the data.

In your letter, you indicated that you felt many of the studies and models used in developing the MFLs proposed for the Chassahowitzka River system were not applicable to the Florida West Coast. The proposed Chassahowitzka MFLs are based entirely on data and models collected in the Chassahowitzka or nearby areas along the west coast of Florida. The following studies and models were used to develop quantitative withdrawal limits that would be associated with the proposed Chassahowitzka MFLs:

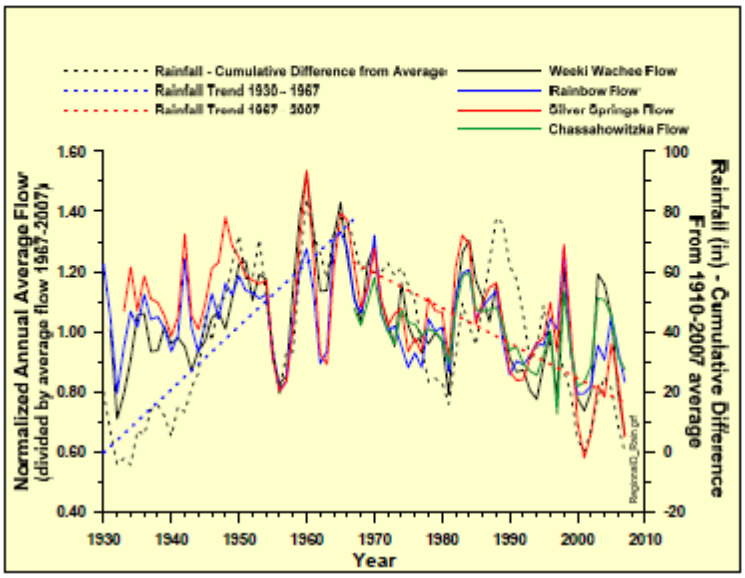
Salinity - Data collected in the Chassahowitzka 1996 – 2008.
Benthic community – Data collected in the Chassahowitzka during 2005 and 2008.
Mollusc – Data collected in the Chassahowitzka during 2007.
Submerged Aquatic Vegetation – Data collected in the Chassahowitzka from 1997 – 2005.
Fish/Invertebrates – Data collected in the Chassahowitzka during 2005 – 2007.
Groundwater impacts – Data collected within the hydrogeologic domain from southern Alachua County to southern Tampa Bay including watersheds and springsheds directly contributing to the discharge of the Chassahowitzka spring system.
Habitat evaluation (salinity and thermal) using hydrodynamic model - Discharge, salinity and temperature data collected in the Chassahowitzka and reported by the USGS. Supplemented with meteorological data from St. Petersburg, and historical tide water level data from Cedar Key Florida.

The proposed MFLs threshold developed for the West Indian Manatee was based on thermal habit in the Chassahowitzka River. Typical manatee dimensions, and observed density of use were based on data collected on the East Coast of Florida. The U.S. Fish and Wildlife aerial counts of manatee usage of the Chassahowitzka were also reported, but the MFLs threshold proposed for manatees in the Chassahowitzka was independent of these results and was based solely on change in available habitat within the Chassahowitzka River.

You cited rainfall as pertinent data that you feel was ignored by the District. The District has always maintained that departures from average rainfall increased from 1910 until around 1966, followed by a decrease in rainfall that continued through 2007.The increasing trend from 1910 until 1967 is statistically significant and the decreasing trend from 1967 until 2007 is statistically significant. This decrease was not simply 'assumed' by the District. When discussing trends, it is essential that the evaluation period be clearly defined. The District agrees that there has been very little trend in rainfall when evaluating the period 1910 through 2007, but notes that the lack of a rainfall trend for this extended period is the result of an early increasing trend cancelling out a later decreasing trend.

Please recall that in the District's November 2010 response to you on local rainfall trends, a figure from United States Geological Survey (USGS) Water Resource Investigation 01-4230 was included. Figure 1 expands on the USGS figure and includes estimated spring flows and cumulative departure from average rainfall information for the same period. The figure demonstrates that spring discharge from the Weeki Wachee, Rainbow, and Chassahowitzka rivers and Silver Springs has closely tracked changes in rainfall for the nearly 100-year record shown.

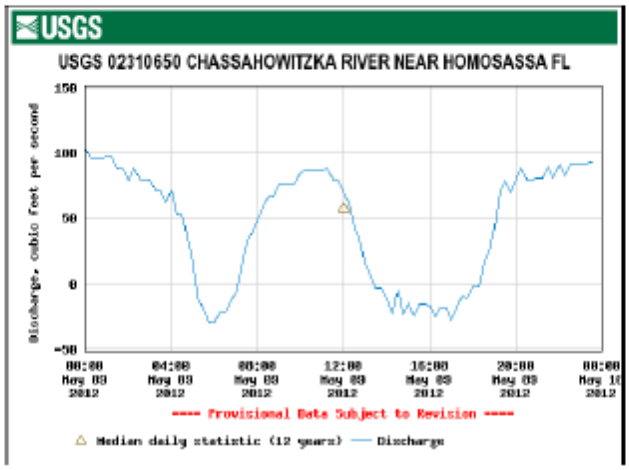
Figure 1. Cumulative departure from 1910-2007 average rainfall at Chinsegut Hill, Florida and normalized spring discharge.



The District's decision to use the Weeki Wachee well to predict discharge from the Chassahowitzka was based on a procedure establish by the USGS decades prior. The discharge values reported by the USGS for the Chassahowitzka, Weeki Wachee, Homosassa, and Homosassa Southeast Fork are all derived in part from the water level in the Weeki Wachee well. Measurements of water level in that well commenced in 1967 and thus, the Chassahowitzka flow record could only be estimated back to that point in time. The flow in all of the systems studied has declined since the mid-1960s.

You correctly indicated that the spring flow measurements in the Chassahowitzka River began in the 1930s. However, using the earlier data is problematic for several reasons. First, the data is sporadic, averaging 186 days between observations. A continuous record of daily average flow is preferred for determining an MFL. Second, the data was collected at a different location in the river than the current daily measurements. The early data included discharge from Crab Creek, which has not been included in the current USGS daily measurements that began in 1997. Finally, of the 143 historical measurements identified between 1930 and 1997, 90 percent represent only a single point measurement during a calendar day. This site is affected by tides and in order to obtain an accurate estimate of discharge, multiple measurements must be completed over the entire tide cycle. For consideration of this issue, please see Figure 2, which is a graph of USGS discharge reported for May 9, 2011 downstream of Chassahowitzka Main spring. If the single discharge measurement representing this day were taken at midnight, the flow would be +100 cfs (toward) the Gulf of Mexico. On the other hand, if the single measurement were taken at 6:00 AM the flow would be -30 cfs (incoming) flow. The USGS reported the average daily flow for May 9th as +46 cfs. Comparison of these three flows (+100, -30 and +46 cfs) illustrates how misleading it may be to represent net daily flow using a single daily observation in a system so strongly affected by tides.

Figure 2. Chassahowitzka discharge May 9, 2012.



The District is unaware of an impaired designation for dissolved oxygen in the Chassahowitzka River, although the District does acknowledge that the Florida Department of Environmental Protection (FDEP) has designated nine water body reaches in the Chassahowitzka Planning area as impaired for other parameters. Six are classified as impaired by mercury contamination of fish flesh. Statewide there are 120 water body reaches designated as impaired for mercury. The spatial extent is so vast that FDEP is preparing a statewide solution. There is no evidence that the impairment is unique to the Chassahowitzka River or related to flow.

In addition to the mercury impairment, five of the Chassahowitzka water bodies have been classified as impaired for nutrients as evidenced by algal mats. The FDEP has commented that the cause of impairment is nitrate+nitrite nitrogen (NO_x-N). The District has evaluated the relationship between NO_x-N and both flow and time in the Chassahowitzka River. The results are included in Section 4.3 of the November 2010 MFL report that you cited. The increase in NO_x-N is not related to changes in flow.

The District acknowledges that a rise in sea level is resulting in the loss of hydric hammocks and that a widespread shift in vegetation is likely to continue along Florida's west coast and elsewhere. Photographic evidence provided by the U.S. Fish and Wildlife Service at the September 2011 stakeholder meeting suggests that the change may have begun several decades ago, and possibly pre-dates the District's first record (1975) of groundwater withdrawals. On a longer time-scale, cycles of changing sea level have been repeated many times. The District has reacted to stakeholder comments concerning the effects of sea level change by evaluating scenarios involving low, medium and high estimates of rise. The results were presented at the July 2011 stakeholder meetings, and have been incorporated in the most recent drafts of the Chassahowitzka and Homosassa River MFLs reports. Those reports are currently undergoing an internal review, and it is expected that the reports will be posted on the District's web site within a few weeks. The stakeholder presentations can be viewed at http://www.swfwmd.state.fl.us/projects/mfl/springs-coast-mfl.php . The final reports will be posted at http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php when available.

In your letter, you also expressed a concern that "quality data" was not used by the District and that the models were based on 'flawed or incomplete data". It would be helpful to our program if you would specifically identify the data you referenced in your letter and more importantly, if you could identify an existing dataset that you feel would be more appropriate for the District to consider. Section 373.042 of The Florida Statutes require that the District or the FDEP use the *'best information available'* and to the best of our knowledge, we have done so.

Again, I thank you for your comments regarding the establishment of minimum flows for the Chassahowitzka River system.

Sincerely,

Michael G. Heyl
Chief Environmental Scientist
Natural Systems & Restoration Bureau
Environmental Section - Tampa Office
Southwest Florida Water Management District.

cc: Blake Guillory, Executive Director
Colleen Thayer, Bureau Chief, Public Affairs
Eric DeHaven, Bureau Chief, Natural Systems & Restoration
Veronica Craw, Manager, Environmental, Natural Systems & Restoration
Chris Zajac, Program Manager, Community Affairs

11.18.5 Czerwinski, Michael

From: Mike Heyl
Sent: Monday, February 28, 2011 8:56 AM
To: Michael G. Czerwinski (mczerwinski@mgcenvironmental.com)
Cc: Marty Kelly
Subject: Chassahowitzka isohale movement
Attachments: Chas_5ppt_MFL.pdf

Michael – After the Chassahowitzka MFL presentation in December you asked if we could prepare a figure illustrating the movement of a salinity isohale under the proposed MFL. We have completed re-processing the hydrodynamic model output to illustrate the movement of the 5 ppt isohale. The mean location under current conditions is 4.69 km and the mean location under the proposed 11 % flow reduction is 4.89 km. See attached figure for the daily/vertically averaged results.

MGH

==========

Michael G. Heyl - Chief Environmental Scientist

Mike.Heyl@SWFWMD.state.fl.us or Mike.Heyl@WaterMatters.org

==========

SWFWMD/Ecologic Evaluation (7:00 am - 3:30 pm)

7601 U.S. Highway 301 1-813-985-7481 Ext 2211

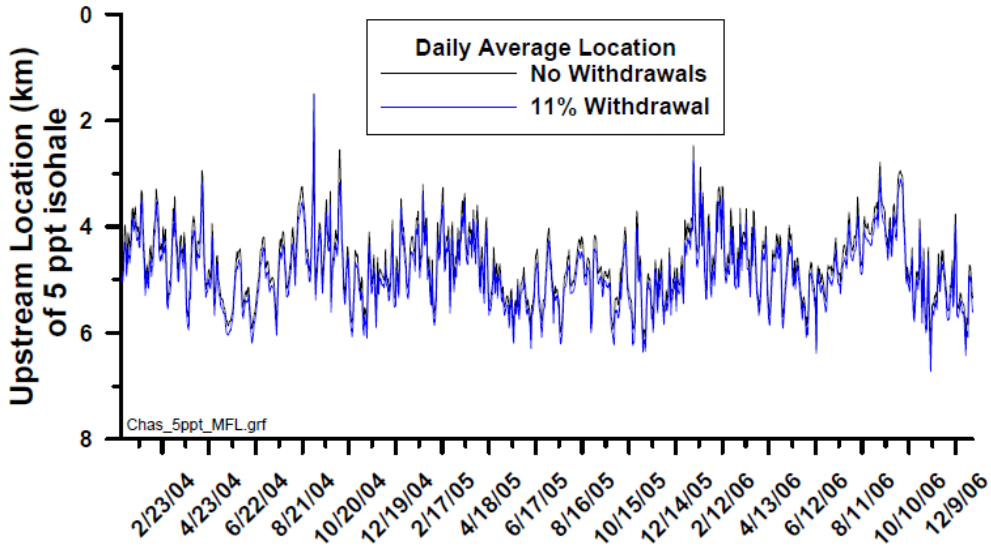
Tampa, Fl. 33637-6759 1-813-987-6747 (Fax)

--------- Note : District Limit for Incoming Email is 5 Megabytes -------

An ftp site is available for larger attachments : http://ftp.swfwmd.state.fl.us/

This email consists of 100% recycled electrons. Consider the environment before printing

==========



11.18.6 Citrus County

From: Robert Knight [mailto:Robert.Knight@bocc.citrus.fl.us]
Sent: Thursday, December 09, 2010 9:44 AM
To: Marty Kelly
Cc: Eber Brown

Subject: MFL's for Chazz and Homosassa
I'm sure you know the person who can get this for me. I need to know the following for the proposed MFL's for Chassahowitzka and Homosassa: What were the parameters for each that were considered and what was the projected harm at the proposed levels of reduced flows? Also, with some specificity, which parameter(s) would have significant harm if flows were less than proposed? For these, how was that (or those) determined? Thanks.

==========

From: Mike Heyl
Sent: Thursday, December 09, 2010 1:10 PM
To Robert Knight
Cc: Cara S. Martin, Marty Kelly, Doug Leeper
Subject: RE: MFL's for Chazz and Homosassa

Mr. Knight – Attached please find a very brief summary of the components and results of the Chassahowitzka MFL. The first page lists the habitats (salinity and manatee thermal refuge) that were numerically evaluated. However, for a variety of reasons not all of these results were carried forward. For example, the 'chronic' thermal refuge for manatee must have water at least 3.8 feet deep and over 68 degrees temperature for three continuous days during a critically cold event. As it turns out, the location of the warm water was in an area too shallow to support manatees. Consequently, the chronic refuge evaluation was not carried forward. In contrast, the acute thermal refuge only requires that an area of sufficient depth maintain a temperature over 59 degrees for four hours. We did find an area of co-located depth and temperature meeting the acute thermal requirements and this metric was promoted to further evaluation.
The second page of the attachment is a graphic representation of the parameters retained for evaluation. The y-axis is the amount of reduction in flow that results in a 15% loss of the habitat or resource. For some habitat (or resource), it would require over a 40 percent reduction in flow to reduce the baseline habitat (or resource) by 15%. Examples include reduction in bottom area, or shoreline length that is in contact with water having a salinity of 15 parts per thousand (ppt) or less (Seawater has a salinity of about 35 parts per thousand. In other words, these two MFL parameters are not very sensitive to flow reductions. On the other hand, the acute thermal

refuge, fish/invertebrates and 5 ppt shoreline length and volume are more sensitive. A reduction of 11 – 13 % of the baseline flow will reduce these habitats by 15%.
The recommended MFL is the smallest reduction in flow, which in this case is 11% (resulting from the acute thermal refuge loss).
The final three pages are the detailed results for each parameter initially considered. The right-hand column identifies the percentage of reduction in baseline flow that will result in a 15% loss of the habitat or resource. I do not have a ready answer for your question ". . .what is the projected harm at the proposed level of reduced flows?" other than to say it would be 15% or less. In the case of 15 ppt volume, it would much, much less, because it would take a reduction of over 40% to cause a 15% reduction. On the other hand, for the 5 ppt volume, it would be very close to 15% loss because a 15% loss occurs with a 13% reduction in flow.
Results with grey background were initially evaluated, but not considered in the final analysis. If you are interested, I can provide more detail on the individual reasons that these were eliminated.
If I failed to answer your questions, please feel free to contact me at the number below.
MGH

From: Robert Knight [mailto:Robert.Knight@bocc.citrus.fl.us]
Sent: Thursday, January 06, 2011 6:01 PM
To: Marty Kelly
Cc: Eber Brown; Mary Glancy
Subject: Proposed MFL's for Chassahowitzka and Homosassa Springs and Associated Rivers

I'm providing my comments as the Director of Water Resources for Citrus County and as a member of the Water Management District's Water Supply Users Advisory Committee.

I have reviewed the basis upon which proposed minimum flows and levels (MFL's) have been evaluated and proposed for both Chassahowitzka and Homosassa Springs and associated rivers. I have had communications with the two employees of the District who were in charge of these studies and have reviewed their findings and conclusions. Although by no means am I a hydrogeologist, I do have a working understanding of the guidelines by which the proposed levels are to be established.

Based on my working knowledge of this process and a review of the methodology applied specifically in the proposed MFL's for these two waters, I conclude that the proposed MFL's are appropriate and supportable as being consistent with established and required methodologies.

Robert Knight,
Director of Water Resources
Citrus County, Florida

11.18.7 Corona, Hope

Email from Hope Corona to Mike Heyl dated October 28, 2010
With District response in blue italic text.

Hello Mike,

I was unable to attend the October meeting regarding the draft minimum flow report, but my husband attended and has provided me with links to relevant reports posted on the SWFWMD site.

Looking over the presentation online, I noticed that most of the species referenced in the report are euryhaline, and likely able to survive gradual changes in salinity in the first few years of overpumping. Virtually NO spring run species are even mentioned in the report.
The report seems mostly concerned with estuarine species, yet the District and State are statutorily obliged to protect and preserve all of the habitats within the Chassahowitzka River and watershed.

It is assumed that this comment is in reference to the fish and invertebrate taxa. A complete description of the sampling techniques and a detailed listing of the taxa collected are contained in Appendix 10 available at http://www.swfwmd.state.fl.us/projects/mfl/reports/Chass_Appendices-section10.pdf .

The District did not favor or select euryhaline taxa, but followed a systematic approach in selecting which taxa to evaluate. Three criteria were established a priori for all habitat and biological (benthos, fish/invertebrates/SAV and mollusc) resource evaluations. Those minimum criteria are:

1) *Statistical relationship between habitat (or resource) and flow (or salinity) must be statistically significant at $p \leq 0.05$.*
2) *There must be a minimum of ten observations (e.g. $n \geq 10$)*
3) *The strength of the relationship (measured as the coefficient of determination) must be equal to or greater than 0.3. Restated, at least 30% of the observed response must be related to flow or salinity.*

For the fish/invertebrate evaluations, two additional criteria were used to select taxa for further evaluation.

4) *If the flow to abundance relationship was a linear response, it must be positive linear (the number of organisms must increase as flow increase). A negative linear response would indicate that the number of organisms would increase as the flow was reduced. Such a response is contrary to intent of establishing a Minimum Flow and Level (MFL), but it was a very common occurrence.*

5) *Many of the flow to fish/invertebrate responses were quadratic in nature as illustrated in Figure 1.The second criteria unique to fish/invertebrate evaluation is that quadratic responses must reflect a single optimal (mid-flow maximum) flow such as the right hand panel of Figure 1.*

In order to be considered as a metric for MFL determination, all five of these criteria must be met. Using the Chassahowitzka plankton tow results as an example, sixty-six different taxa were collected during the course of the study, but only thirteen exhibited statistically significant response to variation in flow (criterion 1). Of these, thirteen (see Table 3.8.1.1 in Appendix 11.3), ten were negative linear responses (criterion 4). The three remaining taxa responses were then compared to the minimum number of observations (criterion 2) and the coefficient of determination criterion (criterion 3). The responses of all three taxa met the criteria and were included in the MFL determination. These three taxa represent 4.5% of the original sixty-six taxa captured.

A similar evaluation using the results from the seine and trawl gear also resulted in the elimination of the majority of taxa captured. There were forty-six taxa captured and the

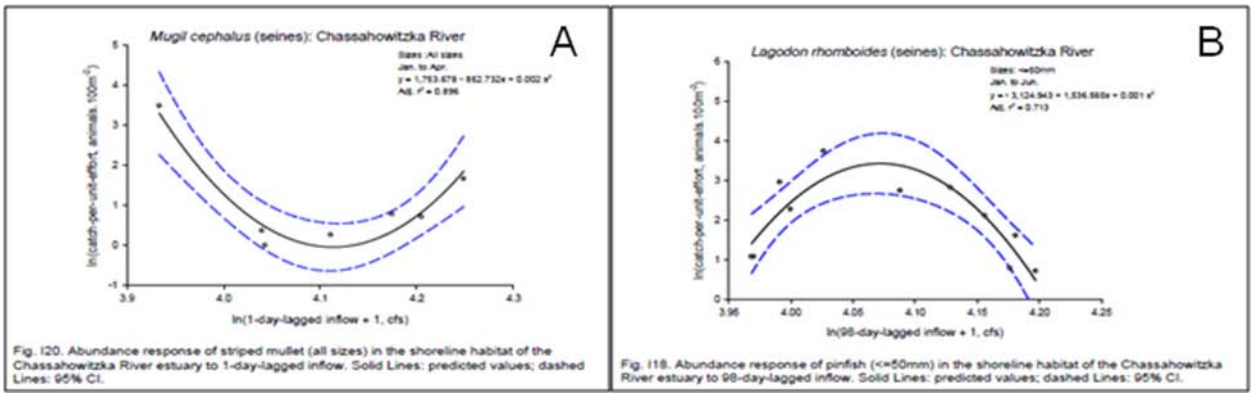


Figure 1. Examples of mid flow 'minimum' (panel A) and'maximum'(panel B) response. Source: Greenwood et al. 2008. Freshwater Inflow Effects on Fishes and Invertebrates in the Chassahowitzka River and Estuary. Appendix 10.3 in Chassahowitzka River Recommended Minimum Flow and Levels SWFWMD 2010.

abundance of twenty-three was significantly (criterion 1) related to flow. Of the twenty-three (See Table 3.8.2.1), nine exhibited linear response, but only three of these were positive linear responses (criterion 4). Of the fourteen quadratic responses, four were mid-flow minimum (criterion 5). Of the remaining thirteen relationships (three positive linear and ten mid-flow maximum quadratic responses), seven met the remaining criteria for number of observations (criterion 2) and coefficient of determination (criterion 3). Fifteen percent of the forty-six pseudo-taxa collected were retained for further evaluation. Combining the plankton tow results with the seine/trawl results, only nine percent of the taxa captured met all of the criteria established quantifiable minimum flow reductions.

The District itself has reiterated its duties to preserve pristine conditions within the entire Chassahowitzka system in its 1994 "Plan for Use and Management of the Chassahowitzka Riverine Swamp Sanctuary" documents.
"The Chassahowitzka River has been designated a "priority water body" of the District's Surface Water Improvement and Management Program, and it has also been designated an Outstanding Florida Water by the State of Florida. These designations allude to the significant natural values and pristine condition of the entire Chassahowitzka system."

The District's July 1994 A Plan for the Use and Management of the Chassahowitzka Riverine Swamp proposes "an overall management philosophy which requires that the preservation of water management benefits and natural systems take priority over other uses."

As a point of clarification, the Chassahowitzka River was identified as an unranked Conservation/Preservation priority water body in 1988. However, that designation was not retained in the 1998 SWIM priority water body list, when the 1988 list of twenty-eight waterbodies was reduced to ten.

Page 7 of the same 1994 report acknowledges,

"The river and its tributaries derive the vast majority of their streamflow (approximately 90%) from artesian springs and represent true springrun communities."
It also warns, "Recent studies have correlated reduced rates of discharge at other spring sites with groundwater pumpage from the area surrounding the spring."

I have read USGS reports of how overpumping in other areas of Florida led to cessation of spring flow, notably Kissengen Spring, which once a second magnitude spring, ceased flowing due to excessive withdrawals from wells in its watershed. The average discharge of Kissengen spring, prior to the onset of a progressive decline beginning about 1937, was about 19mgd. Withdrawals from wells in the area increased to the extent that the decline in artesian pressure caused the spring to cease flowing in February 1950.

The District has previously documented pumpage impacts to flow at Kissengen Spring in Polk County which led to it ceasing continuous flow in 1950 (http://www.swfwmd.state.fl.us/documents/reports/upperpeace_withdrawls.pdf). This spring is located in a much different geologic setting and within an area where historic withdrawals for phosphate mining and agriculture impacted springflow as early as the late-1930s. The geology of the Chassahowitzka Spring area is much different than Kissengen and the current rate of groundwater withdrawals is much less than in Polk County. Aquifer drawdown near Kissengen Spring was on the order of 15-20 feet when the spring ceased discharging. In contrast, the drawdown of the UFA near Chassahowitzka was on the order of three inches in 2005. The District has evaluated the impact on the Chassahowitzka River using state-of-the-art tools and finds only minimal impact (< 0.7 cfs – about one percent of flow decline due to withdrawals) at the present time. The proposed MFL for the Chassahowitzka would limit future pumpage impacts to 11% of the present flow.

Chassahowitzka springs are at risk, as our head pressure is not that great to start with, and reportedly is 0 in some areas at high tide. Further diminishing of head pressure can lead to salt water intrusion and contamination of the aquifer, can it not?

The District's July 2005 Plan for Use and Management of the Chassahowitzka Riverine Swamp Sanctuary describes the District's efforts to meet its four primary Areas of Responsibility, and in the section under "Water Supply Protection states:
"The continuous freshwater discharge provided by the river and its tributaries is a critical element in the creation and maintenance of its surrounding floodplain and the

downstream Chassahowitzka estuary. The build up of water in these systems creates a hydraulic head, which protects against salt-water intrusion from the Gulf of Mexico, thereby protecting and maintaining inland groundwater that serves as a source of public supply."
Under the section Water Quality Protection and Enhancement the report states "The Chassahowitzka River system remains in an almost entirely natural state and may ultimately be one of the few spring run streams in Florida that will retain its wilderness character. The State of Florida has designated it as an Outstanding Florida Water. The intent of this designation, which was conferred in 1992, is to ensure that existing water quality conditions will be maintained. The District's management of the Sanctuary will be designed to remain in compliance with these designations and to achieve the preservation objectives implied by such recognition."

When a water body is designated an Outstanding Florida Water (OFW), the ambient water quality in the year prior to designation becomes the baseline for future permitting decisions. Water quality cannot be degraded from this baseline by discharge of additional pollutants into the water body. The primary purpose of rule 62-302.700(1) F.A.C. is to regulate the discharge into a water body. The rule is not intended to regulate withdrawals. Regulation of withdrawals is addressed in 40D F.A.C., principally 40D-2, F.A.C., and are subject to the Minimum Flow and Levels specified in 40D-8.041.

Under the section "Natural Systems Protection," the report acknowledges, "Many imperiled species of wildlife also depend upon habitat provided by spring run systems..."

However, page 32 of the same report admits,
"exhaustive surveys to document the occurrence of threatened and endangered species have not been conducted. There is a high likelihood that additional species meriting special attention and consideration in land management planning will be documented on the property."
The imperiled species and habitats of the Spring Run and hydric hammocks of the Chassahowitzka River System should certainly be included in the District and State's assessment of species and habitats impacted by further drawdown. The potential habitat loss in these rare Florida ecosystems (not only the estuarine ones) should be considered (and was not) in the minimum flow analysis.

*Evaluation of changes in low-salinity to fresh-water habitat is a major component of each coastal MFL. In the case of the Chassahowitzka River, the volume, bottom area and shoreline length was evaluated as a function of existing salinity, and salinity under the proposed MFL. Those metrics are fully described and quantified in the report. However, using these metrics would have resulted in a higher allowable reduction (*e.g. *thirteen percent) in flow than using the acute thermal refuge (eleven percent reduction in flow) for the manatee and the more conservative value is the recommended MFL for the Chassahowitzka River system.*

The spring flow data for each of the springs in the Chassahowitzka system is sporadic, and has not been maintained with a frequency or duration that could lead to valid conclusions regarding flow. More frequent monitoring (in both wet and dry seasons, and across raining and droughty years) is necessary to yield scientifically valid data and conclusions about minimum flow in this complex spring run river system.

Substituting data from other rivers, like the Weeki Wachee is NOT appropriate, and not scientifically valid. The Weeki Wachee, by the district's own maps, does not share our same aquifer, and enjoys a much deeper fresh water resource.

The District has not substituted flow from the Weeki Wachee River for the present evaluation of the Chassahowitzka. However, the discharge of both systems is dependent upon the water level in the Upper Floridan Aquifer (UFA) and the United States Geological Survey (USGS) uses a common UFA well to calculate discharge in these rivers. The discharge that the USGS reports for Chassahowitzka just downstream of the Main spring is calculated from a well site named Weeki Wachee Well near Weeki Wachee Fl. Real time water levels in this well may be viewed at:
(http://waterdata.usgs.gov/nwis/uv?cb_72020=on&format=gif_default&period=90&site_no=283201082315601)

Recently the District received a similar comment regarding the use of this well to calculate discharge in the Homosassa. The USGS (K.Grimsley. Supervisory Hydrologist-Tampa, Fl.) responded to that inquiry with the following electronic correspondence dated 11/15/2010:
"Question 4: Why is the ground water level at the Weeki Watchee Well used and not the Lecanto Well 2? The Weeki Watchee Well does not appear to be in the Homosassa Groundwater Basin and in the ***Water Use Impacts on Spring Discharge*** the modeling done by Basso references the Lecanto well not the Weeki Wachee Well.
Weeki Wachee well was selected as the index groundwater site by Dann Yobbi and Lari Knochemus because it is the oldest operating ground-water station in the study area detailed in WRIR 01-4230, which encompasses the Coastal Springs Ground-Water Basin as well as adjacent areas of Pasco and Hernando Counties. The well is useful for the computation of continuous discharge because of the length of its period of record and because it is monitored for real-time data. To my knowledge, we do not have as lengthy a period of record for any other well in the area. The well was intended to serve as a regional indicator of groundwater conditions rather than a specific indicator for each spring system being studied. "

Mike, we understand that in this time of economic uncertainty, the evil and greedy in our society will use people's need for "new jobs" and municipalities needs for greater tax base to push through ill thought high density developments in our watershed. Some municipalities to our south seem only to happy to bend over and satisfy every developer who proposes a DRI, new school, golf course community, or other un-necessary aquifer-sucking, nitrate- polluting assault to our watershed. (While already platted vacant lots, and empty homes in that same watershed, though presently unoccupied, enjoy vested rights to the groundwater beneath them, and will eventually be other "straws" sucking water away from Chassahowitzka). Please don't make it any easier for the greedy to wantonly destroy the fragile, beautiful, natural Florida that nurtures and delights us all.

Please don't let Chassahowitzka Springs go the way of Kissengen Spring. Please don't allow further loss to our Chassahowitzka River and Spring Run ecosystems.

Thank you, Hope Corona

.
Email from Hope Corona to Mike Heyl dated November 5, 2010

With District response in blue italic text.

Mr. Heyl,

I am having difficulty maintaining an internet connection to view the "final report" and peer review in its entirety, of the Chassahowitzka Minimum Flow, however, prior to my connection failing, I noticed that the review section mirrored some of my own concerns regarding fresh water indicator species not being used. Here is a quote from the review that I find particularly notable,
"**Discounting the abundance-flow relationships for these two species is to risk extirpating them and similar species. Because the salinity characteristics of the river are expected to change as the suggested minimum flows are achieved, we believe it is important to use freshwater fish species (and perhaps these two in particular) to help determine these minimum flows."**
The District's reply to the review is very dismissive, as though the District is committed to the 11% reduction that even conservative scientific review finds risky and objectionable. The District's reply suggests that in spite of Florida's Sunshine Laws, pertinent data regarding potential lethal effects to species will be eliminated, and replaced by data that supports District's apparent fore-gone conclusion regarding further withdrawals. Here is the District's quote, "the recommended MFL will not be changed in the final report because the most conservative MFL is 11 percent for the acute thermal refuge for the manatees."
What?

See prior response to your October 28 email for a description of how the fish and invertebrate taxa were selected for further evaluation. With regard to the statement above, the median flow reduction for all eleven pseudo-taxa evaluated is 11.1 percent. The median flow for those eight taxa that represent an annual response is 11.5 percent. The acute manatee habitat flow reduction is 11.0 percent. Thus, the most conservative (lowest) minimum flow and level is the acute manatee habitat. If the manatee habitat flow reduction were higher than the 11.5 percent representing the fish/invertebrates then the recommended MFL would be slightly higher at 11.5 percent.

To recap, the five most conservative Chassahowitzka MFL metrics are:

1) *Manatee acute thermal refuge volume 11.0 percent*
2) *Fish/Invertebrate abundance 11.5 percent*
3) *5ppt shoreline reduction 13.0 percent*
4) *5 ppt volume reduction 13.0 percent*

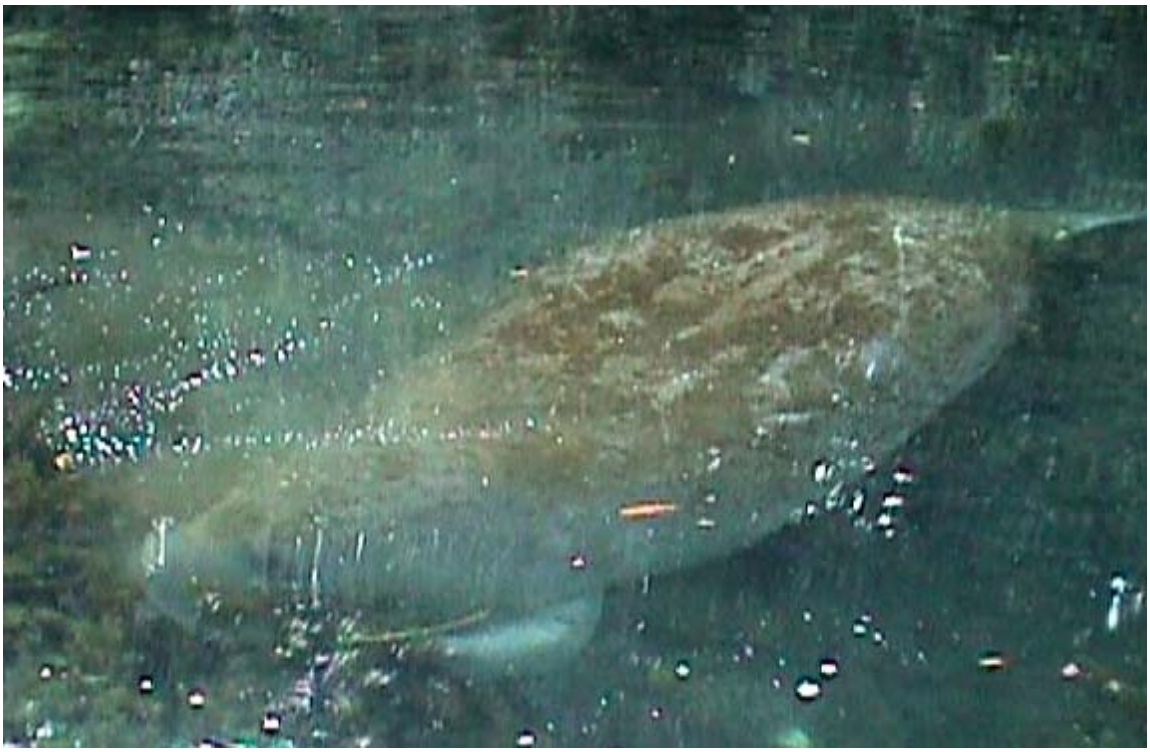
The manatee data is flawed, as you know, and residents are actively out photographing and filming in order to present graphic contrary data for manatee's winter use of our up-river springs.
To stand by an inaccurate conclusion, based on inaccurate data, and faulty models, AND with disregard to scientific review is NOT Scientific Method.

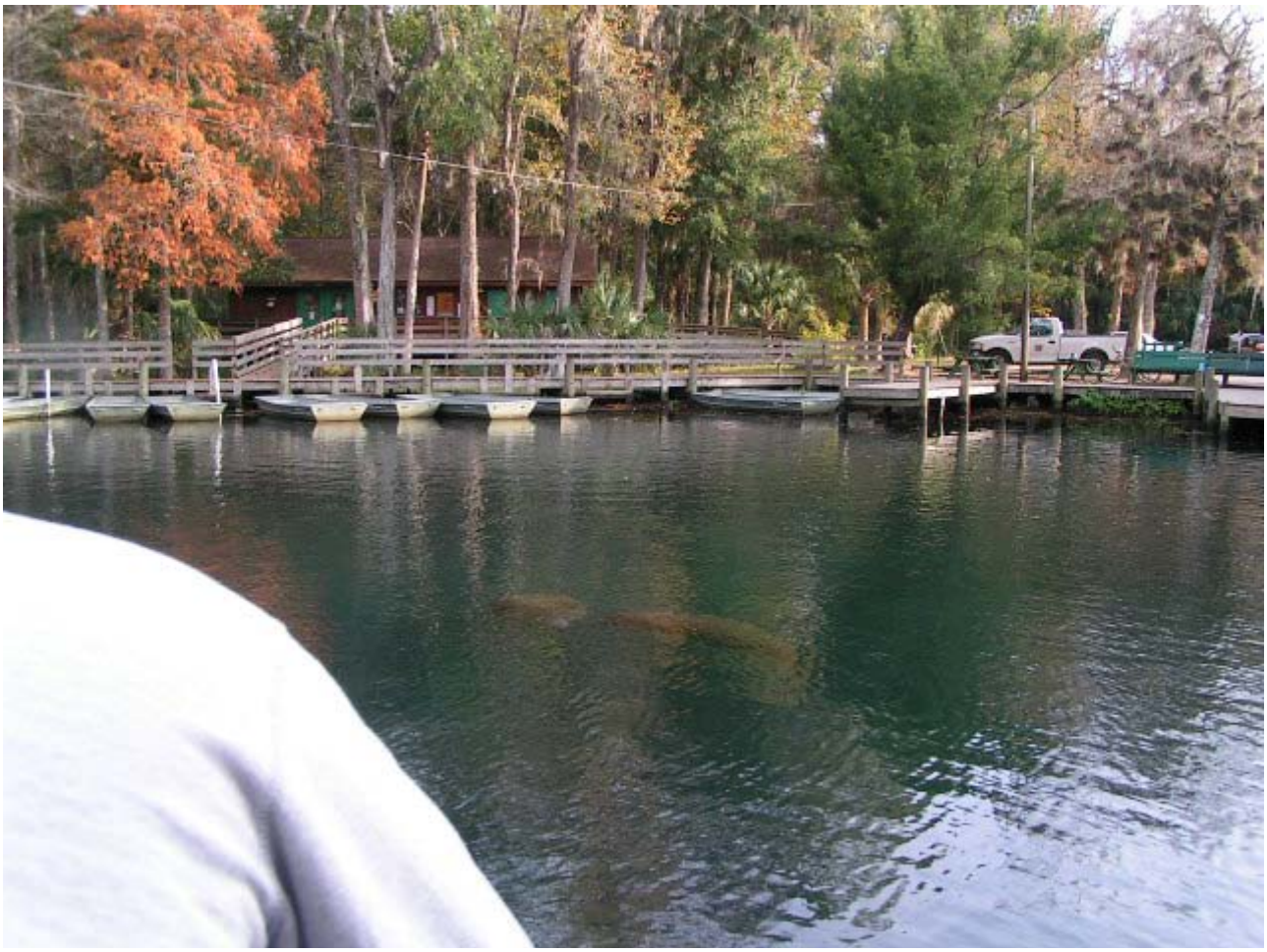
Although it is discussed in the MFL report, the number of manatees using the Chassahowitzka River was not a factor in establishing the MFL. The MFL was based on a reduction of manatee thermal habitat regardless of the number of animals using the refuge. However, the thermal refuge has a carrying capacity that greatly exceeds the Florida population of manatees.

The peer review clearly indicates numerous reasons why District should back off of the 11% reduction, and perhaps even consider the Chassahowitzka River to be in need of conservation methods (no reduction in flow).

Here are some winter manatee images from my own camera (f.y.i.):

Manatees in Chassahowitzka main spring (near boat ramp) Oct. 11, 2000





Manatees in Chassahowitzka main spring December 9, 2008

This is from Snapper Hole 11-23-2008. I am pointing to one of the Manatee calves that "Moms" left in the Snapper Hole "nursery" while Moms go out to feed in the more dangerous main river and estuary. During the winter months, it is not uncommon to see up to 4 calf to sub-adult and adult manatees in Snapper hole (which is located on the south side of the river, east of Baird, and west of boat launch. It is difficult to photograph manatees from a kayak, especially since the photographer usually does not have a polarized filter. By the time the photographer located the calf, it was already sniffing at the finger I was using to "point" to its underwater location. The habitual use of Snapper Hole as a winter nursery for fragile calves, makes the fresh water inflow to this area vital to the Chassahowitzka over-wintering manatee population. Tranquil areas, spring-fed areas, like Snapper Hole, that are out of the main channel and boat traffic area are very rare in the Chassahowitzka River. Snapper Hole's spring seems, to this amateur, to be getting less clear, and perhaps more saline, over the 10+ years we have lived here. Further reduction of spring flow could mean there would be NO warm water protected nursery area in the future.

Yes, there are warm season nursery areas (like at the mouth of Crawford Creek, and in the big bend bayou on the north side of the river, just before the midden; but these areas do not enjoy warm spring flow for winter use, and are quite turbid, making it harder for boats to see the manatees below. We have found manatee bones at the mouth of Crawford.

I'm sure we have other manatee wintering pictures. I know other residents are avidly taking more this winter.

I fear that unless the District reverses its recommendation for further reduction in flow, all of our precious images of the spring-runs, and unique species in Chassahowitzka will become "historic" images of the amazing diverse spring run habitat that used to be Chassahowitzka.

Please do what you can to help bring other "decision makers" in SWFWMD to a more open and environmentall conscious mind-set. I'm sure none of them want to be remembered as part of the "machine" that rubber-stamped "development" while stamping out what remained of our once pristine Nature Coast, its springs, or its wildlife.

My friend told me about a court case in Florida where the District in question was held accountable for the potential damage to the environment a misguided-guided "recommendation" was about to cause. I don't have the case in front of me, but the judge's comment to the district was something like, "we don't need a scientific definition of an unreasonable amount of damage to the environment, we can look at Webster's dictionary and conclude the amount of damage that would be inflicted on this environment is unreasonable." Like I said, I don't have the case in front of me, and my computer is having problems downloading large files, but I know there's Florida case law regarding a district's responsibility to protect the environment beyond other "interests."

It's an easy call here to do what's moral and what's right; what the collective next generations (of humans, manatees, and fresh-water biota) would approve. The next generation of Florida biota, in all its species, would **not** "vote" for 11% reduction in spring flow to the Chassahowitzka River; they would ask that we please mitigate the damage that has begun, and seek to preserve the fragile Chassahowitzka spring watershed. The next generation would (and likely will) see a recommendation for further withdrawal it for what it is, further destruction of Florida's last remaining wilderness in the name of profit for developers (and whatever other powerful pockets they are currently lining). The District is supposed to protect our environment, not sell it to the highest bidder or trade it to a crony. When the District scoffs at peer review and public outcry, the public must wonder what is really motivating the decision-makers at the District? How can they so swiftly, decisively, and pre-meditatively strike a potentially lethal blow to the defense-less environment they were appointed to protect?

Mike,
I am sorry to become so heated in the final paragraph, but it's hard to watch the steamroller chugging towards the baby lying helpless in the street. It's like being Jewish in Nazi Germany; or black in Alabama; I feel like I'm pleading with an authority, which, though clearly morally corrupt, exists in an atmosphere where "greed is good," and will only be seen as destructive or misguided by a more enlightened future which, apparently, has not yet arrived. There was a time in Florida when fashionable women wore egret plumes, a time when Gopher Tortoise were "hoover chickens," a time when swamps were drained for agriculture, and estuaries were dredged to make waterfront real estate "fingers." During those times the people were perhaps ignorant of essential habitats or keystone species; they did what was profitable, fashionable, short-sighted. I thought those times were largely behind us.
There's still time for the District to NOT be viewed as our generation's environmental Nazi, or Clan, or whatever the future will call the present environmental villains. It's hard to be one of the marchers at Selma, but I'd rather be one of those marching than one of the "authorities" wielding the night stick.

I am happy to admit when I am wrong, and I will happily apologize profusely to all I may have offended, when they do the right thing, and stop further loss to our Chassahowitzka springs.

Thank you,
Hope Corona

==========

From: Hope [mailto:hopecorona@tampabay.rr.com]
Sent: Friday, November 12, 2010 12:55 PM
To: rsrvc@tampabay.rr.com
Subject: Chassahowitzka Spring Runs & Minimum Flow report

Hello Miss Whitehead,

I called SWFWMD this morning, and they told me that you were the Board member for our area (Citrus County). I don't know if you and the other Board members have been copied any of the public or peer review comments on the Minimum Flow report for the Chassahowitzka River. There are numerous flaws, and missing and inaccurate data in the Chassahowitzka Minimum Flow Report. Many of us responded immediately to the inaccuracies we immediately observed, but we passed along some of our concerns to well respected biologists and hydrologists in Florida so they could also email comments within the "public comment period." We noticed that SWFWMD published their "final report" in spite of, or perhaps scoffing at, objections raised by Public and Peer Review professionals. We are counting on you, our representatives, to say "NO" to SWFWMD's misguided efforts to further draw down our already stressed Chassahowitzka River and Spring Run communities.

My original objections to the report and recommendations follow below. A formal response from the Chassahowitzka community is attached (our neighbor Brad supplied a draft copy for my reference).

The Chassahowitzka springs are perhaps the most fragile spring run community on the Nature Coast, and draw from the most shallow and "at risk" aquifer. There are already thousands of platted lots and empty foreclosure homes in the Chassahowitzka watershed (Royal Highlands, etc.). The existing platted parcels, already enjoying water rights will tax this watershed enough. There is no amount of further economic "development" that would justify killing an entire spring run river and the numerous listed species that depend upon fresh water habitat for their survival.

Allowing SWFWMD's recommended 11% reduction to the Chassahowitzka Springs and River will be a historically bad decision that future generations will never forget. Kissengen springs in Polk County ceased flowing due to excessive withdrawals. Please don't let that happen here. Floridians, for generations, have preserved Chassahowitzka Springs and spring runs so that future generations, like ours, could know the ethereal beauty and wonder of such a rare, almost mystical habitat. Each winter, growing populations of Manatee bring their calves to Snapper Hole and to Chassahowitzka's main spring to rest and feed on our less busy spring-fed river. You can hike to thousands year old giant Cypress in Chassahowitzka's spring-run hydric hammock (there are giant cypress on both the North and South forests of the Chassahowitzka). There are endangered crayfish and mollusks in our spring runs, orchids in our trees...we'll be happy to send you exhaustive lists of the rare and endangered biota that call Chassahowtizka spring runs and hydric hammocks "home."

My husband and I would be delighted to take you, your children, and hopefully, one day, your grandchildren to see the amazing, enchanting diverse wonders of our hidden springs, giant cypress, and endangered species. To know them is to love them, like your children, and want to protect them forever.
Please call us 352-382-2809 or cell 352-302-4466 if you'd like to see some of our wonders before the meeting. Let me know if you need pictures, and I can send you some.
Thank you,
Hope Corona
email to Mr. Heyl follows below;
our neighbor Brad supplied me with a copy of the Chassahowitzka River Restoration Committee letter also sent to SWFWMD

==========

From: Hope [hopecorona@tampabay.rr.com]
Sent: Tuesday, December 21, 2010 8:38 AM
To: Mike Heyl; Marty Kelly
Subject: Vallisneria and Salinity

Hello Mr. Heyl and Mr. Kelly,

Regarding the Vallisneria data that we discussed briefly at the Second Public Workshop:

My anecdotal experience on the Chassahowitzka River system is that the healthy Vallisneria populations are observed in the clear, flowing areas of our spring runs and river, and diminishes substantially as the river becomes more brackish. I did not want to assume that my anecdotal observations were scientifically defensible, so I went to the internet when I got home from the meeting, and found several online articles and papers which discussed relationship between Vallisneria and salinity. Here's a link to one of the more recent papers (2009) that might be of interest:
http://www.springerlink.com/content/700uj657143x6260/fulltext.pdf

There are other similar studies online, but this one also controlled for other growth factors (like light/shading), and was conducted in Florida in a fresh to brackish system.

Vallisneria, in my anecdotal experience, seems an important component of a healthy spring/river system, and essential habitat for numerous organisms (from the tiny ones that attach to its leaves, to the invertebrate larvae, fish, waterfowl, herptiles, manatees, herbivores and detrital feeders, that use it for everything from cover to food to egg/larval attachment). Vallisneria seems an important data set to keep in the MFL report of a fresh to brackish system like our Chassahowitzka.

Thank you for considering the recent scientific data on Vallisneria and salinity.

Your friend in science and ecology,
Hope Corona

==========
From: Hope [mailto:hopecorona@tampabay.rr.com]
Sent: Friday, December 17, 2010 12:18 PM
To: Mike Heyl
Subject: Re: Mailing Address

Thank you Mike!
My mailing address is:
10024 S. Riviera Pt.
Homosassa, FL 34448

Just wanted to compliment you on the very professionally done powerpoint presentation. I know that was a ton of hours, getting all those graphics, images, and charts together. I think your power point presentation really helped a lot of the "lay people" (citizens like myself who attended for the first time last night) better understand the MFL process, and the challenges you face organizing such an enormous mass of data, and data that seems at times to be of questionable use or quality (that must be frustrating for you to order and pay for a task, and get lesser quality data than was expected and needed).

I think Mr. Kelly did a good job explaining the "forced" nature of the task you have been handed by the State; and your mutual frustration that there's not a better method or frame-work for the MFL process that is uniform within the state. Mr. Basso's presentation, I think, brought to light how much we all still don't know about the intricacies of our karst topography and network of underground caverns and connections. Mr. Czerwinski (in the row in front of me) seemed to have some insight into further research which could help better identify water movement within the aquifer up here.

I'm sorry I had so many questions for you during your presentation (my husband and next-door neighbor scolded me afterward). Your powerpoint presentation had the most complex and data-rich slides for the myopic folk (like me) in your audience (who have a hard time transitioning from our "close up notes" to the "far away screen" with our middle-aged eyes and questionable prescription lenses:) It takes us "nearly blind people" longer to read distance items than the younger better-sighted people. My eyes could not keep up with the aural narration coming in my ears:)

Thanks again for the print material.

Hope Corona
10024 S. Riviera Pt.
Homosassa, FL 34448
[Note – Printed copy of MFL report appendices mailed to H. Corona]

==========
From: Hope [hopecorona@tampabay.rr.com]
Sent: Thursday, January 06, 2011 12:55 PM
To: Carolyn.Voyles@dep.state.fl.us
Cc: Marty Kelly; Mike Heyl
Subject: Comments on Chassahowitkza MFL: Freshwater mussels in Chassahowitzka

Hello Carolyn at DEP, and Mike and Marty at SWFWMD,

Pursuant to our on-going conversations regarding some of the freshwater species that were not addressed in the recent Chassahowitzka MFL report, but are present in the Chassahowitzka sprngs ecosystem, and may be potentially affected, if not "extirpated" (like the fish species mentioned in the original comments from FFWCC, or the Vallisneria data that was excluded) if the proposed Chassahowitzka MFL reduction moves forward at the aggressive 11% reduction.

I recently contacted a Mussel Ecologist at the USGS-SESC in Gainesville, to whom I subsequently sent photographs of the fresh water mussels and bivalves we encountered in the spring runs North of Riviera Point, and east of the main spring complex in Chassahowitzka (after my original USGS web site inquiry was routed). Mr. Kelly and Mr. Heyl emphasized at the Second Public Hearing that they would only consider "scientific" evidence, thus I have made every effort to contact a credentialed US scientist when I had questions about a Chassahowitzka species or habitat. In my USGS inquiry I also asked how the proposed MFL might potentially affect the mussels, their glochida host fish species, and habitat.

The USGS reply follows, but I have deleted the name of the scientist, as I have heard that some of the State employees and field biologists I have contacted with questions or concerns have been reprimanded or threatened by their superiors, and I do not wish to endanger yet another honest person doing their best to answer a tax-paying citizen's questions about the species and habitats they are entrusted to preserve and protect by State and Federal laws.

I think I have already sent all of you the same mussel and spring run photographs, but if you'd like them again, I'll be happy to send them. I know this is a difficult political atmosphere for all of you who are doing your best to protect and conserve Florida's Natural Resources, habitats, and wildlife, when powerful self-serving greedy wealthy lobbyists for developers appear to have the ears and pockets of some of our legislators. I think all of you want to do what's right for Florida's threatened habitats and wildlife.

Our Springs are a national treasure, if not one of the world's treasures - like the Everglades, Amazon, and Reefs - and the rare species that depend on these fragile, productive habitats will certainly perish if a few good, honest people with regulatory power do not stem the destruction of Florida natural resources caused by human greed.

Carolyn, Marty, and Mike: please do whatever is in your power to stop this wonton destruction of some of the last Florida treasures before it is too late, and encourage your agency superiors to do likewise. History does not forget or look kindly upon the names of those who had the power to stem disaster, but for cowardice or greed neglected to do so. I encourage you all to be agents for the good, not the greedy; and to stand up for the rights of Florida's nature and wildlife, which are powerless to advocate for themselves. In the end, preserving Florida's natural habitats will also serve humans and the economy, preserving a more healthy water supply, air quality, and quality of life for residents; and a "greener" sustainable economy, supported by green jobs (solar-pv, rainwater capture and storage systems, green remodeling of

existing homes and commercial sites, green energy and non-motorized infrastructure), eco-tourism, higher education, sustainable health care, and research (the next great cure could presently be living in one of our rare spring or wetland habitats, or in the native upland ecosystem that recharges it).

USGS reply regarding the mussels in the Chassahowitzka spring runs follows.
Thanks again for your consideration,
Hope Corona

Hello Hope -

Thanks for the inquiry. I am the Mussel Ecologist at the USGS-SESC in Gainesville. I am happy to help with your question and wish to learn more about the Chassahowitzka MFL. The proposed 11% reduction is probably bad news for mussels and other aquatics. Over the past 3+ years of sampling in the ACF basin, I have witnesses 100's of mussels stranded without water. It is a grim site and undoubtedly has negative impacts on their populations.

I've yet to sample the Chassahowitzka but based on my experience in that area and the photos you provided, you may have two species, Elliptio jayensis and Uniomerus caroliniana. The host fishes for these two species are unknown. Glochidia from other Elliptio species have been confirmed to transform on the following: Pomoxis annularis, Alosa chrysochloris, Etheostoma artesiae, Percina nigrofaciata, Lepomis macrochirus, Micropteris salmoides, Gambusia holbrooki, Ammocrypta meridiana and Fundulus diaphanus. Species diversity within the Genus Elliptio is high (30+ species) therefore, it would be necessary to conduct a host fish study to confirm suitable host fishes for Elliptio jayensis.

Host fish for Uniomerus are almost completely unknown. I know of one study, which tested and confirmed Notemigonus crysoleucas as host for Uniomerus tetralasmus. In fact, host fish information is lacking for most of peninsular Florida's unionid fauna. This is a ripe area for research and directly related to my research interests and experimental capabilities at USGS-SESC.

Let me know if you have additional questions or research needs, especially those specific to freshwater
mussels.

Transaction=GSFGWNR3 [20DEC2010 17:31:41UTC]
Customer email: hopecorona@tampabay.rr.com
Customer: Hope Corona
Customer phone: 352-382-2809
Subject: Elliptio mussels in Chassahowitzka
Primary response: mcmcesic@usgs.gov

USGS PERSONNEL: This email was generated through the Contact USGS system. When replying to the customer PLEASE BE SURE TO CC archive_ask@usgs.gov. (Customers, please do not send email to archive_ask, as it will not be answered.) If you answer by phone, simply forward this email

to archive_ask@usgs.gov. You can see more information about replying to customers at <http://answers.usgs.gov/usgs/responding.htm> (USGS only).
==========
Hello,
I'm having trouble finding information about host fish for the Elliptio mussels we are finding in the spring runs North of Riviera Point, and east of the main spring complex of the Chassahowitzka River. SWFWMD is presently recommending a very aggressive flow reduction (11.1% reduction in flow) in their current Chassahowitzka MFL Report. We are concerned that the SWFWMD has not adequately addressed consequences of flow reduction to some of the imperiled freshwater species and habitats in Chassahowitzka River system. I have jpg images of the Elliptio and spring run, if that will help. I have thus far been unable to find Elliptio host fish information in online references, but noticed that you had some postings on Florida mussel and host research. Thanks for any insight or help you can offer.

==========
From: Doug Leeper
Sent: Friday, January 21, 2011 4:14 PM
To: Hope
Subject: RE: Vallisneria and Salinity

Ms. Corona:

It was good to speak with you today regarding minimum flows for the Chassahowitzka River system and other local, tidal rivers. As you know from the e-mail that I copied you on earlier today, Carol Kraft, a Staff Hydrologist with the District's Water Quality Monitoring Program Section has agreed to assist with your request for information on wells in the vicinity of the Chassahowitzka River.

Thank you for forwarding the link to the 2010 paper by Boustany and others on the effects of salinity and light on Vallisneria americana. I have seen this paper previously, but it was good to take another look at it. As a follow-up to our discussion on Vallisneria, I have loaded a number of documents containing information on salinity tolerances for the species into a zipped file that you may retrieve from the District FTP site. Directions for retrieving files from our FTP site may be found on the "How to Access our Anonymous FTP Server" page of the District web site at the following link:

http://www.swfwmd.state.fl.us/data/ftp/
The file is named Docs_forHCorona.zip and is located in the Public – Outgoing folder.

Please let me know if you have any problems obtaining the zipped file from our FTP site or are unable to unzip the file.

Douglas A. Leeper, Chief Environmental Scientist
Resource Projects Department, Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604-6899
Telephone: 1-800-423-1476, ext. 4272 (FL only) or 352-796-7211, ext. 4272
Fax: 352-754-6885
E-Mail: doug.leeper@watermatters.org
Web Site: watermatters.org

From: Hope <hopecorona@tampabay.rr.com>
To: Smith, Jimmie
Cc: Daniels, Chase
Sent: Fri Jan 21 16:33:47 2011
Subject: Comments from Katie Tripp PhD, Dir of Science & Conservation
Dear Representative Smith,

Per my conversation today with Chase Daniels, I am sending you and Chase some of the scientific community's comments regarding SWFWMD's plan to further diminish fresh water flow to the Chassahowitzka River and Springs.

Attached is one of the most comprehensive and eloquent responses, from Katie Tripp, Ph.D., Director of Science and Conservation at Save the Manatee.

[Editor Note – Referenced comments from K. Tripp are included under Save the Manatee Correspondence]

I spoke with Joyce Kleen, Wildlife Biologist at Chassahowitzka National Wildlife Refuge, today, who emphasized her observations that the "Chassahowitzka River system has already degraded," and that "SWFWMD is using only recent data," the historic data - spring flow, submerged aquatic vegetation, aerials would illustrate (with scientific data) the former water and habitat quality, and how much this system has already degraded since the 1990s. Joyce admits that rising sea level is part of the problem, but agrees that SWFWMD shouldn't hasten the march of seawater inland by diminishing spring flow (head pressure that presently prevents the salt water from rushing farther east into the aquifer). "Flying over" during refuge surveys, Joyce tells me, "all the tree islands have died...the palms are dead."

Imperiled wildlife species like our Whooping Cranes, Chassahowitzka Black Bear, and West Indian Manatee, rely upon the fresh water habitats and thermal refuge provided by Chassahowitza's spring-runs, springs, and fresh water forested wetlands. As the saltwater intrudes farther upstream, fresh water submerged vegetation, like Vallisneria will die; the emergent vegetation, shrubs, and trees - our Magnolias, bays, maples, hollies, palms, persimmons, cypress, will likewise die, and will no longer provide forage (food) or refugia to the native waterfowl or wildlife that depended upon that habitat for survival. Storm surges will be worse, as lack of vegetation to absorb the energy and water, will allow the tidal surge to travel farther inland. By then, even our municipal wells as far east as Sugarmill will likely be infiltrated by salt water, and then where will we go?

The only difference between our comfortable life now, and a more "third world" existence, is the availability and convenience of "indoor plumbing" and fresh water to drink, bathe, clean, and irrigate our crops. Fresh water is life, as we know it. We should not squander it.

Thank you for anything you can do to prevent further degradation of our

Chassahowitzka springs and fresh water dependent forested wetlands.

Hope Corona
==========
From: Doug Leeper
Sent: Friday, January 21, 2011 2:00 PM
To: Carol Kraft
Cc: hopecorona@tampabay.rr.com
Subject: Well Data Request from Hope Corona

Carol:

Per our phone discussion, I'm providing some information pertaining to Ms. Hope Corona's request from earlier today for data associated with wells in the Chassahowitzka River headwaters area. I've copied Ms. Corona on this e-mail, so she will know that you are working on her data request and will contact her.

Phone: 352-382-2809 Home, 352-302-4466 Cell
E-mail: hopecorona@tampabay.rr.com

1. Ms. Corona asked for well location, depth and salinity data for wells near Chassahowitzka River headwaters. In particular, she is interested in wells located north of the river near Lykes Trail Road and also south of the river (general area map below). You may want to contact her regarding the scope of the area she is interested in, as it is may be larger than the area depicted in the image below.
2. She also asked whether the District or the USGS monitors wells in the area. I'm guessing that we will be able to provide her with District well information, but may have to direct her to the USGS web site or staff for USGS well data.

==========
From: Carol Kraft
To: hopecorona@tampabay.rr.com
Sent: Friday, February 04, 2011 9:37 AM
Subject: RE: Well Data Request from Hope Corona

Good Morning Ms. Corona,

Please find attached the groundwater quality data and associated well specifications you requested for your area of interest. I have included a .pdf file of the entire period of record water quality data and all parameters analyzed for that we currently have available for these wells, along with the associated well specifications, well site location map, and a Figure depicting the hydrogeology of western Citrus County.

My query returned 4 wells with water quality data. These wells are either monitor wells or private residential wells that were/are sampled as part of one of the SWFWMD's groundwater quality monitoring networks. The water quality data within the .pdf file are sorted according to Site ID (SID).
This number is unique to each site and can be used as a cross-reference within the well specifications table and site location map enclosed. The SID can also be used to look up data within our online data retrieval tool known as the Water Management Information System (WMIS). The link to WMIS is included in my signature line. Please

do not hesitate to contact me if you require any additional water quality data or assistance with WMIS.

Thank you,

Carol Kraft
Staff Hydrologist
Water Quality Monitoring Program
Resource Data and Restoration Department
Southwest Florida Water Management District
7601 Hwy 301 N.
Tampa, FL 33637
Toll Free: 1-800-836-0797
Office: (813) 985-7481 ext. 2119
Fax: (813) 987-6585
email: carol.kraft@swfwmd.state.fl.us
District Website: http://www.watermatters.org
WMIS Link: http://www8.swfwmd.state.fl.us/WMIS/ResourceData/ExtDefault.aspx
WMIS Help Document: http://www.swfwmd.state.fl.us/data/resource_data_help.pdf

==========

From: Hope [mailto:hopecorona@tampabay.rr.com]
Sent: Friday, February 04, 2011 4:54 PM
To: Carol Kraft
Subject: Re: Well Data Request from Hope Corona

Thanks, Carol.

Wow, some of the wells are much deeper than those typical of our neighborhood's private wells.

I'm curious whether it's the Sodium or the Chloride that indicates salt water, (or should I be looking at "Specific Conductance"), and what the "standard" or acceptable ranges are for all of the sampled analytes.

Is there some kind of standard chart that describes the "normal" range - expressed in mg/L, or uS/cm, respectively - of the sampled analytes for "fresh" or potable water? If so, could you send me a link?

The original map Doug sent me showed more wells, and I'm particularly interested in the one at the headwaters of Baird Creek, West of Pitcher Point. (See screen capture below of map I received in our original email correspondence; it's the west-most, south-most dot). Could you send me that data also?

If either Sodium or Chloride values are an indicator of salinity, then, per our telephone discussion, the well South of the River (with triple digit Sodium & Chloride values) seems to be in a much "saltier" area of the aquifer than those to the North (with mostly single and double digit values), and may suggest that the near-by south-of-river springs may also be "fed" by a different source, that

is already approaching dangerously "impaired" conditions, that can certainly not withstand further reduction in fresh water flow.

The spring known as "Snapper Hole," where the Manatee "moms" customarily leave their juveniles in winter months, is on the South side of the River, just east of Baird, and we are concerned that additional reductions in flow will threaten the thermal refuge currently provided in the Snapper Hole "nursery." Snapper Hole is East of Baird Creek, where Baird meets the main Chassahowitzka River. I don't think Snapper is monitored at all.
It will be interesting to see the data for Baird, and if it correlates with nearby well 21031.The Chassahowitzka MFL does not adequately address fresh water flow to the springs and fresh water habitats in the eastern portion of our river, much less the southeastern springs, like Baird, and Snapper Hole.We fear that the proposed 11% reduction in flow may cause fresh water to "cease flowing" to both Baird and Snapper, and this would be devastating to the Manatees who depend upon Snapper Hole as their main thermal refuge for juveniles and sub-adults.
Thanks again for your help,
Hope

The West-most, south-most dot.

==========
From: Carol Kraft
Sent: Wednesday, February 09, 2011 7:35 AM
To: 'hopecorona@tampabay.rr.com'
Subject: RE: Well Data Request from Hope Corona

Good Morning Ms. Corona,

Sodium, chloride, and specific conductance can all be used to indicate how saline water is. The websites for the Florida Administrative Code, Environmental Protection Agency, and Florida Department of Environmental Protection, all contain the groundwater guidance concentrations for drinking water quality. By searching the aforementioned agency's websites you should also be able to locate further information on saline indicators, ranges, and additional information on various water quality parameters.

* Chapter 62-550, Florida Administrative Code. Chapter Title: DRINKING WATER STANDARDS MONITORING, AND REPORTING
https://www.flrules.org/gateway/ChapterHome.asp?Chapter=62-550
* Florida Department of Environmental Protection, Home Page:
http://www.dep.state.fl.us/
o Florida Department of Environmental Protection, 2010. Maximum Contaminant Levels for Drinking water in Florida. Available at:
http://www.dep.state.fl.us/water/drinkingwater/standard.htm
* United States Environmental Protection Agency, Home Page:
http://www.epa.gov/
o United States Environmental Protection Agency, 2010. Drinking Water Contaminants, Maximum Contaminant Level Goal. Available at:
(http://www.epa.gov/safewater/contaminants/index.html)
* An additional resource - United States Geological Survey, Home Page:
http://www.usgs.gov/

The map that was provided in the email dated Friday, January 21, 2011 2:00 PM includes site locations of all our groundwater resource data collection sites within the map's extent. This potentially includes locations of spring sites and/or well sites that at one point in time could have had atmospheric, geohydrologic, water level, and/or water quality data collected at them. The water quality data that I previously provided you were all the data that we have available from all wells located within the map's extent (map - from email dated Friday, January 21, 2011 2:00 PM). The west-most, south-most point on the map (from email dated Friday, January 21, 2011 2:00 PM) is a spring site not a well site. All of these data are available on our on-line data retrieval system known as the Water Management Information System (WMIS). Site types (atmospheric, groundwater/geologic (well, spring, etc.), surface water, etc) as well as the types of data collected (atmospheric, water level, geohydrologic, water quality, etc.) at each can also be determined from the WMIS. For your reference, the link to WMIS is included within my signature line below. Please let me know if you have any difficulty navigating or retrieving data from the WMIS.

Thank you,

Carol Kraft
Staff Hydrologist
==========
From: Mike Heyl
Sent: Friday, March 11, 2011 8:53 AM
To: 'Hope'
Cc: Jimmie T. Smith (Jimmie.Smith@myfloridahouse.gov); Chase Daniels (Chase.Daniels@myfloridahouse.gov); Carolyn Voyles (Carolyn.Voyles@dep.state.fl.us); Dennis Dutcher (Dennis3ds@aol.com); Marty Kelly; Cara S. Martin
Subject: Correspondence with Representative Jimmie Smith
Attachments: Corona_response_2011_02_23.pdf

Ms. Corona – Representative Smith' office forwarded your correspondence regarding the proposed Chassahowitzka MFL to the District. Attached, please find our response to your inquiries and comments.

MGH

==========

[Note H. Corona's letter to Representative Smith inserted here – followed by M.Heyl response to Representative Smith and H. Corona]

==========
From: Hope <hopecorona@tampabay.rr.com>
To: Daniels, Chase
Cc: Smith, Jimmie
Sent: Fri Jan 21 14:54:50 2011
Subject: Chassahowitzka River MFL: Fw: Vallisneria and Salinity

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

From: Hope
To: Carolyn.Voyles@dep.state.fl.us
Sent: Tuesday, December 21, 2010 8:44 AM
Subject: Chassahowitzka River MFL: Fw: Vallisneria and Salinity

Hello Carolyn,

Just wanted to keep you in the loop. I attended the Second Public Workshop for the Chassahowitzka MFL, and Mr. Heyl and Mr. Kelly reiterated that they had heard a lot of passion from the public, but could only be moved by "new scientific data." I hope existing scientific data (perhaps "new" to SWFWMD) might also be considered. Those that attended the Second Public Workshop were taken aback when they found out that some available data sets were "thrown out," and particularly concerned about the Vallisneria, which even the "lay people" on the river readily observe as important SAV (submerged aquatic vegetation) habitat for fish, waterfowl, and Manatees (among others). We all felt that Vallisneria is an important part of the Chassahowitzka Spring/River system, and should be kept in the MFL report.
Thank you for your continued interest in the Chassahowitzka River,
Hope Corona

----- Original Message -----
From: Hope
To: Mike Heyl ; Marty Kelly
Sent: Tuesday, December 21, 2010 8:37 AM
Subject: Vallisneria and Salinity

Hello Mr. Heyl and Mr. Kelly,

Regarding the Vallisneria data that we discussed briefly at the Second Public Workshop:

My anecdotal experience on the Chassahowitzka River system is that the healthy Vallisneria populations are observed in the clear, flowing areas of our spring runs and river, and diminishes substantially as the river becomes more brackish. I did not want to assume that my anecdotal observations were scientifically defensible, so I went to the internet when I got home from the meeting, and found several online articles and papers which discussed relationship between Vallisneria and salinity. Here's a link to one of the more recent papers (2009) that might be of interest:
http://www.springerlink.com/content/700uj657143x6260/fulltext.pdf

There are other similar studies online, but this one also controlled for other growth factors (like light/shading), and was conducted in Florida in a fresh to brackish system.

Vallisneria, in my anecdotal experience, seems an important component of a healthy spring/river system, and essential habitat for numerous organisms (from the tiny ones that attach to its leaves, to the invertebrate larvae, fish, waterfowl, herptiles, manatees, herbivores and detrital feeders, that use it for everything from cover to food to egg/larval attachment). Vallisneria seems an important data set to keep in the MFL report of a fresh to brackish system like

our Chassahowitzka.

Thank you for considering the recent scientific data on Vallisneria and salinity.

Your friend in science and ecology,
Hope Corona

==========

From: Hope <hopecorona@tampabay.rr.com>
To: Daniels, Chase
Cc: Smith, Jimmie
Sent: Fri Jan 21 14:54:50 2011
Subject: Chassahowitzka River MFL: Fw: Vallisneria and Salinity

----- Original Message -----
From: Hope
To: Carolyn.Voyles@dep.state.fl.us
Sent: Tuesday, December 21, 2010 8:44 AM
Subject: Chassahowitzka River MFL: Fw: Vallisneria and Salinity

Hello Carolyn,

Just wanted to keep you in the loop. I attended the Second Public Workshop for the Chassahowitzka MFL, and Mr. Heyl and Mr. Kelly reiterated that they had heard a lot of passion from the public, but could only be moved by "new scientific data." I hope existing scientific data (perhaps "new" to SWFWMD) might also be considered. Those that attended the Second Public Workshop were taken aback when they found out that some available data sets were "thrown out," and particularly concerned about the Vallisneria, which even the "lay people" on the river readily observe as important SAV (submerged aquatic vegetation) habitat for fish, waterfowl, and Manatees (among others). We all felt that Vallisneria is an important part of the Chassahowitzka Spring/River system, and should be kept in the MFL report.
Thank you for your continued interest in the Chassahowitzka River,
Hope Corona

==========

From: Hope <hopecorona@tampabay.rr.com>
To: Smith, Jimmie
Cc: Daniels, Chase
Sent: Thu Feb 03 13:33:16 2011
Subject: More scientific evidence to suggest Chassahowitzka River cannot handle decreased flow
Representative Smith, and Mr. Daniels,

Thank you again for your concern with the impending threat to our Chassahowitzka springs and fresh water habitats due to the MFL currently proposed by SWFWMD, the 3 major wellfields planned within our watershed, and the proposed "Development of Regional Impact" (Quarry Preserve) - which threaten our coastal springs.

Per our previous telephone conversations and emails, in which you requested more "scientific evidence" to support your efforts to save our Chassahowitzka

springs and freshwater dependent habitats:

I attempted to send you a 2004 study (Hoyer *et al.*) of "Vegetative Characteristics of Three Low-Lying Florida Coastal Rivers" (Chassahowitzka, Homosassa, Crystal River), which suggests that the Chassahowitzka River may already be impaired, and that between 1998 and 2000, the Chassahowitzka River experienced a decline in freshwater habitat and freshwater dependent Submerged Aquatic Vegetation, due to the combined effects of drought, freshwater withdrawals, and saltwater intrusion farther upriver (eastward) towards the springs.

SWFWMD's Chassahowitzka MFL did not include the Vallisneria data which had been collected for the MFL, but which suggested "significant harm" at a mere 1% reduction in flow.

I have sent you previous scientific reports on the significance of freshwater-dependent Vallisneria. Excerpts from the 2004 Hoyer *et al.* study (which is apparently too large a file to successfully email you on my server) follow, and echo our concerns about diminished fresh water habitat and Submerged Aquatic Vegetation (SAV) like Vallisneria due to overdrafting of our river's aquifer, and consequent salt water intrusion into this spring-fed freshwater river:

"The Chassahowitzka, Homosassa and Crystal rivers were studied from 1998 to 2000 to identify factors controlling the abundance and distribution of submersed aquatic vegetation (SAV)"

"...development is increasing rapidly throughout their watersheds....Increased human development is expected also to lead to an increase in demand for freshwater with possible declines in aquifer levels and resultant spring discharge."
"The potential effects of reduced stream flow as a consequence of a decline in spring discharge may lead to alterations in the vegetative communities within these rivers..."

"...stream velocity is often the dominant factor underlying the presence, distribution and abundance of aquatic plants. In low-lying coastal rivers, other environmental factors such as storm events and changing salinity regimes (as a consequence of storm related tidal surges and/or decreased fresh water flow) can also have profound effects on submersed aquatic plant communities (Hart *et al.*, 1990)"

"Light availability and salinity were determined to be major factors affeccting the distribution and abundance of SAV."

"Low SAV biomass was linked to sites where annual average salinities exceeded 3.5%."

"SAV biomass was almost always zero where annual average salinity was greater than 3.5%....These data implicate salinity as a major determinant of the distribution and abundance of SAV in these three coastal rivers, with a breakpoint of approximately 3.5% above which little or no SAV exists."

"Over the course of this investigation, rainfall decreased dramatically and severe drought conditions were evident by the summer of 2000...The drought resulted in a general decrease in annual average river discharge and concomitant increases in salinity in the lower sections of the rivers. Coincident with the increased salinities we observed marked declines in SAV distribution and biomass."

"Drought induced changes in salinity in each of the rivers resulted in shifts in species composition. The presence of more saltwater intolerant species(e.g., H. verticillata) decreased, whereas the presence of more saltwater tolerant speices like Ruppia maritima became more prevalent."

"For example, in the Chassahowitzka River, H. verticillata was found at 29 stations in 1998 and as far downstream as transect 10, but in 2000 this species was found at only 13 stations and only as far downstream as Transect 3. conversely, Ruppia maritima was found at only one lower-river station in the Chassahowitzka River in 1998, but was sampled at 15 stations in 2000 and was observed as far up the river as Transect 3."

I also had difficulty emailing you another pdf document (Toutant *et al.* 2004 "Change Analysis of Submerged Aquatic Vegetation in the Chassahowitzka National Wildlife Refuge 1996-2000), a Mote marine Laboratory Technical Report No. 972, that provides additional evidence that habitat in the Chassahowitzka River and National Wildlife Refuge has declined from historic levels. Some excerpts from this report follow:

"The largest discharge for the Chassahowitzka River appeared to be the main boil (Station R0.0) immediately to the northeast of the Citrus County boat launching facility. Numerous smaller vents were also observed upstream. Based on Florida aquifer potentiomentric surface data, discharges were near normal in 1996, below normal in 1997, above normal in 1998, with declining levels since 1998."

"Historically, contiguous beds of dense, SAV cover more than 90% of inshore (<2m depth) areas (McNulty *et al.*, 1972; Wolfe, 1990)."

"Clear, mineralized flows in the spring runs have historically permitted luxuriant growth of tape grass (Vallisneria neotropicalis) although long-time residents report that filamentous forms of algae are becoming more prevalent."

"For vascular SAV species, assemblages at riverine stations were salinity intolerant and differed from the species found at coastal stations."

"The salinity of the discharge from the main spring appeared inversely correlated to regional groundwater levels."

"A groundwater and spring discharge monitoring program together with other trend analyses conducted by the Southwest Florida Water Management District (SWFWMD, 1994; Jones *et al.*, 1997; Dixon, 1997) has documented increasing trends of nitrogen in spring discharges with sources attributed to inland development and subsequent residential and golf course fertilization (Jones, *et al.*, 1997)."

Both of the above studies indicate that the water and habitat quality of the Chassahowitzka River and NWR have already experienced some degradation due to development within the watershed, and increased freshwater withdrawals from the aquifer. Both studies suggest that further degradation (and movement of saltwater inland) is likely to significantly harm freshwater-dependent Submerged Aquatic Vegetation (like Vallisneria), and cause the Chassahowitzka springs to become increasingly saline.

There is ample scientific evidence (we can send more) that allowing any further loss of freshwater flow to the Chassahowtizka would be highly deleterious to this fragile, spring-fed River, and associated freshwater habitats.

I have heard from friends in North and South Florida, who similarly live near rivers with both fresh water and estuarine habitats that their Water Management Districts are starting to include Valued Ecosystem Component Approaches, Salinity Criteria, Relevant Water Resources Values, Ecology (Aquatic and Wetland Communities), and other habitat components to their MFL analysis in order to insure that both freshwater-dependent organisms and habitats in the springs and freshwater areas are protected, and that estuarine resources are also considered.

An example of a "Valued Ecosystem Component Approach" was utilized in the Caloosahatchee MFL as follows,
"The Caloosahatchee MFL is intended to establish a salinity environment that indicates conditions that will result in significant harm to submerged Vallisneria americana grass beds in the upper estuary. A major assumption of htis approach is that salinity and flow condtions that protect V. americana will also protect other key organisms in the estuary."

The Chassahowitzka MLF presently ignores the springs and spring-run habitats and species, as well as the freshwater dependent forested wetlands surrounding them.

The Chassahowitzka MFL editor, according to the presentation we were given at the Chassahowitzka MFL Second Public Workshop, "threw out" the Vallisneria data, but informed us that the Vallisneria data suggested "significant harm" at a mere 1% reduction in flow.

If other Florida River MFLs are using Vallisneria data as a critical indicator of "significant harm," shouldn't SWFWMD be including the Vallisneria data in our Chassahowitzka MFL?
I think so. Hope you agree. Our Nature Coast Spring-fed rivers have unique habitats worthy of protection. Our MFLs should include "Valued Ecosystem Approaches" and monitoring too.

Thank you for standing up for ALL of your constituents (not just the few, powerful, wealthy developers who think they "own" some of our legislature), and for the habitats and wildlife in your district which have no voice, but yours.

Thanks again (it's a tough job to be one of the "honest guys in Tallahassee," but, for Florida's sake, somebody's got to do it); we do so appreciate your

efforts to defend what's left of Florida,

Hope

[District Response to correspondence with Representative Smith. Sent to H. Corona and Representative Smith on March 11, 2011]

Ms. Corona –

Thank you for your continued interest and comments regarding the proposed MFL for the Chassahowitzka River. Staff would like to respond to several emails concerning the scientific basis of the proposed rule that you sent to Rep. J. Smith, which were forwarded to the District for consideration.

In your correspondence, you have raised questions concerning how the submerged aquatic plant *Vallisneria americana,* was used to develop the MFL, and you shared some comments about freshwater mussels that you received from a USGS scientist.

Regarding *V. americana*, my colleague Doug Leeper recently sent you several dozen articles describing the natural history and environmental requirements of this plant, as well as excerpts from the South Florida Water Management District (SFWMD) Caloosahatchee MFL, which was based on the protection of *V. americana*. The MLF rule adopted by the SFWMD states:

> *40E-8.221 Minimum Flows and Levels: Surface Waters.*
>
> *The MFLs contained in this Part identify the point at which further withdrawals would cause significant harm to the water resources, or ecology, of the area as applicable, pursuant to Sections 373.042 and 373.0421, F.S. It is the District's intent to correct or prevent the violation of these MFLs through management of the water resources and implementation of a recovery strategy.*
>
> *(2) Caloosahatchee River. A minimum mean monthly flow of 300 CFS is necessary to maintain sufficient salinities at S-79 in order to prevent a MFL exceedance. A MFL exceedance occurs during a 365-day period, when:*
>
> *(a) A 30-day average salinity concentration exceeds 10 parts per thousand at the Ft. Myers salinity station (measured at 20% of the total river depth from the water surface at a location of latitude 263907.260, longitude 815209.296; or*
>
> *(b) A single, daily average salinity exceeds a concentration of 20 parts per thousand at the Ft. Myers salinity station. Exceedance of either paragraph (a) or (b), for two consecutive years is a violation of the MFL.*

The salinity tolerance of *V. americana* is widely reported in the literature as 0 to ~10 ppt, and some work in southwest Florida suggests that it may be higher than 15 ppt (Kraemer et al. 1999). Under typical flow conditions (63 cfs) in the Chassahowitzka River, a salinity of 10 ppt would not be encountered until around river kilometer 1.1.

Rather than limit the MFL evaluation to a single "valued eco-system component" as suggested in your correspondence, the District's approach was to consider and quantify flow impacts to various biotic components such as the benthic community, the fish/invertebrate community, molluscs and the SAV community in addition to fourteen separate habitat measures.

The question then is, "Why is *V. americana* not present over a much broader area of the Chassahowitzka?" The literature regarding salinity tolerance suggests that *V. americana* should be present much further seaward in the Chassahowitzka, but currently is not and historically has

not been present seaward of river kilometer 4.9 (data from 1997, 1998, 1999, 2000 and 2006). There are numerous factors other than salinity that may be controlling the growth and distribution of *V. americana* in the Chassahowitzka. Examples include unsuitable substrate (lack of sediment), canopy shading, herbivory (grazing by manatee, mullet, cow nose rays, turtles etc), meteorologically driven extreme high tides and prop scars. Because these potentially controlling factors are rarely documented or quantified, the District always includes an evaluation of the salinity habitat as part of the estuarine MFL process. We frequently encounter biological responses that cannot be explained directly by salinity or flow alone, so the District incorporates an evaluation of salinity habitat as well.

To continue the concept of biological resource protection through habitat protection, it may be informative to look at the change in bottom area salinity as it relates to *V. americana*. Under baseline flow conditions in the Chassahowitzka, approximately 0.8 square miles (506 acres) of river bottom area are exposed to salinities less than 10 ppt. Analysis indicates that it would take a twenty-six percent reduction in flow to reduce this area by fifteen percent, but even at that point, there would still be 430 acres with suitable salinity habitat to support *V. americana*. Even if staff chose to use 5 ppt for this example, it would take a fifteen percent flow reduction to reduce the area fifteen percent. Both of these reductions are greater than the currently proposed eleven percent reduction.

In your correspondence to Representative Smith, you wrote:

> "The Chassahowitzka MFL editor, according to the presentation we were given at the Chassahowitzka MFL Second Public Workshop, "threw out" the Vallisneria data, but informed us that the Vallisneria data suggested "significan harm" at a mere 1% reduction in flow."

To clarify, please note that staff did not discard the *V. americana* data presented in the MFL report, but made several efforts to develop a salinity response model using the data, but felt that the results were unreasonable and thus staff did not include the salinity response in developing the proposed MFL. The relationship developed between salinity and density (Braun-Blanchet method) of *V. americana* indicated that density would be reduced fifteen percent for each 1% reduction in flow at river kilometer 7.0 where V. americana was found in the highest density. Re-framed in terms of salinity, if the salinity increases from 1.9 ppt to 2.1 ppt, the regression model predicted that fifteen percent of the density would be lost. Those regressions also predicted the demise of *V. americana* (maximum density reduced 95%) when salinity reaches 3.8 ppt. Clearly, these salinities are well within the reported tolerance range for this taxa, and, thus, there are probably other factors, unrelated to salinity, that are regulating the growth of *V. americana* in the Chassahowitzka system.

In your correspondence regarding mussels in the Chassahowitzka, it appears that the USGS researcher that you contacted may not have realized that the entire Chassahowitzka system is tidal and will not go dry, and mussels will not be stranded as they were in the research your contact referenced. Research conducted by the United States Fish and Wildlife Service in the Apalachicola/Chattahoochee/Flint (ACF) river system related to declines in mussels showed that the ACF system is highly modified with multiple reservoirs and associated controlled releases. As a result, channel incision has occurred such that much of the natural littoral habitat is no longer inundated to the same extent that it was in the past.

In correspondence to Representative Smith, you quoted USFWS biologist Joyce Kleen as saying the District used "only recent data". However, please note that SAV data extend from

1997; the USFWS manatee counts begin in 1985; water quality data date to 1994, and staff went to considerable effort to hind cast flows back to 1967.

Please note that the work you cite by Hoyer et al. (2004) was also cited in the April 2010 and all subsequent draft MFL documents for the Chassahowitzka. Staff agrees with these researchers, that in low-lying coastal rivers, a wide variety of environmental factors can profoundly affect the growth and distribution of submersed aquatic vegetation and staff also agrees that storm related tidal surges and/or reduced spring discharge may lead to alterations in vegetative communities. The discharge in the Chassahowitzka River has declined, and salinity is increasing, but, as described in the MFL document, staff believes that groundwater withdrawals are a negligible contributor to these changes and that the major causes are extended drought and sea level rise. Hoyer et al. (2004) even remark that their study period was conducted during a severe drought that resulted in decreased discharge, increased salinity and marked declines in SAV distribution and biomass. Hoyer et al. (2004) go on to describe the shift in SAV community, and note the loss of the exotic *Hydrilla verticillata* and the increase in presence of more salt tolerant species like *Ruppia maritima*. The replacement of an exotic nuisance plant[1] with a native species should probably not be considered 'degradation'. Rather this is a shift from fresh water taxa to more marine taxa. It should be noted that the Hoyer et al. (2004) results were limited to the sampling domain shown in Figure 1. Our results suggest that the long-term salinity at the limits of their study is around 4.5 ppt. Had the sampling extended as far offshore as the Mote Marine Laboratory studies (Figure 2.), Hoyer et al. (2004) likely would have encountered more estuarine/marine SAV taxa.

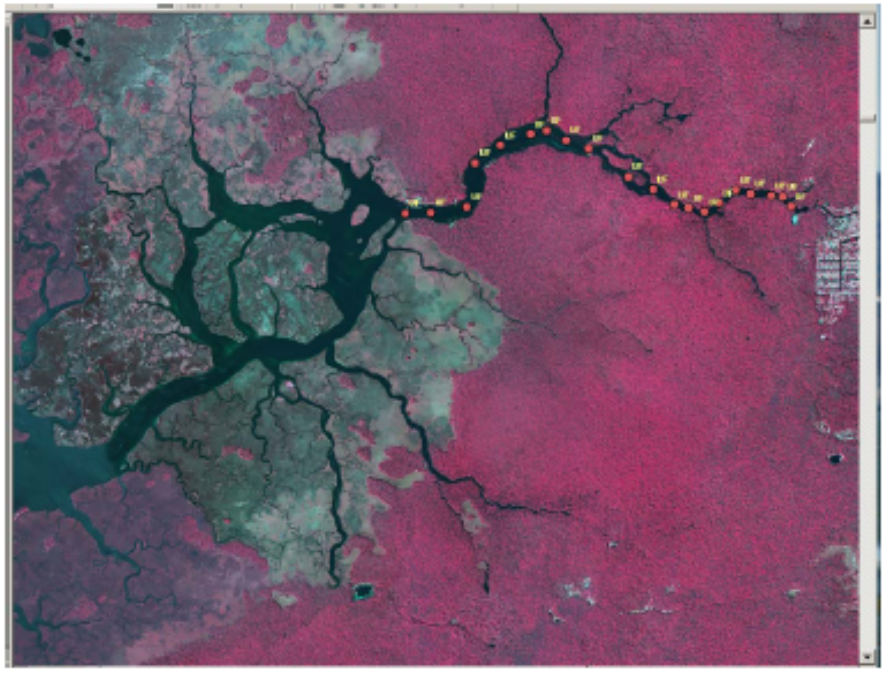
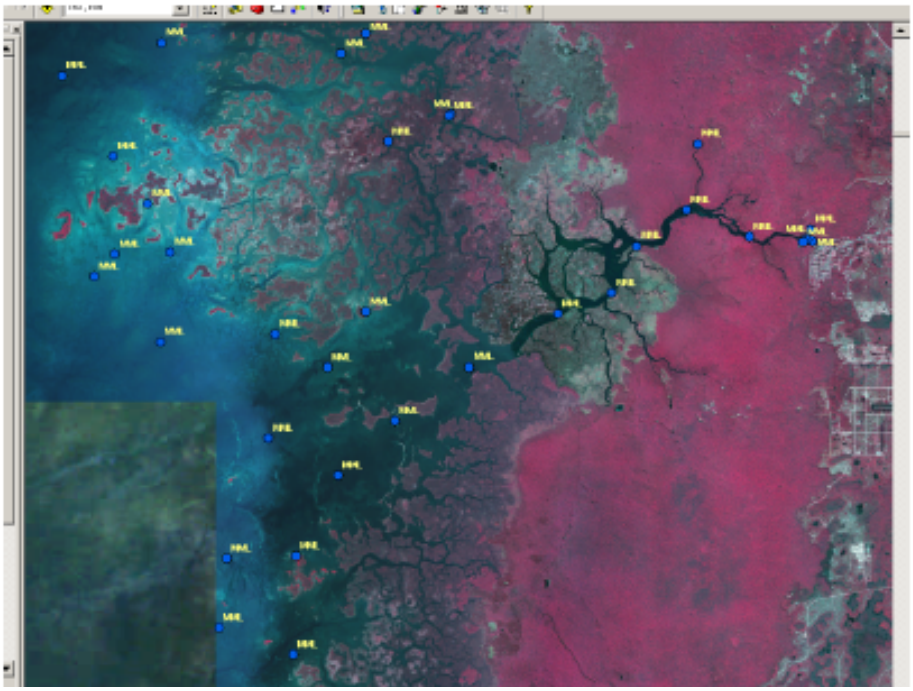


Figure 1. Limits of SAV and physical sampling by UF in Chassahowitzka.

[1] In 2005, Florida spent $10M attempting to control hydrilla. http://edis.ifas.ufl.edu/pi175



Citations

Frazer, T.K, M. V. Hoyer, K.K. Notestein, J.A. Hale and D.E. Canfield, Jr. 2001. Physical, Chemical and Vegetative Characteristics of Five Gulf Coast Rivers. Final report prepared by Univ. Florida Institute of Food and Agricultural Sciences for Southwest Florida Water Management District.

Hoyer, M.V., T.K. Frazer, S.K. Notestein and D.K.Canfield. 2004. Vegetative characteristics of three low-lying Florida coastal rivers in relation to flow, light, salinity and nutrients. Hydrobiologia 538: 31-43.

Kraemer, G.P., R.H. Chamberlain, P.H. Doering, A.D. Steinman and M.D. Hanisak. 1999. Physiological Responses o Transplants of the Freshwater Angiosperm *Vallisneria americana* Along a Salinity Gradient in the Caloosahatchee Estuary (Southwestern Florida). Estuaries Vol. 22, No.1, p 138-146.

Toutant, T, J.S. Perry, L.K.Dixon. 2004. Change Analysis of Submerged Aquatic Vegetation in the Chassahowitzka National Wildlife Refuge 1996-2000. Prepared by Mote Marine Laboratory for U.S. Fish and Wildlife Service. MML Technical Report 972.

. . . and the challenges you face organizing such an enormous mass of data, and data that at times seems to be of questionable use or quality (that must be

frustrating for you to order and pay for a task, and get lesser quality data than was expected and needed). "

I would like to clarify that the District does not feel that the data is of "lesser quality", but does acknowledge that sometimes the results do not yield quantifiable results. Such is the nature of scientific data. However, such surprises in no way detract from the quality of the raw data.

Sincerely,

Michael G. Heyl

Chief Environmental Scientist

Southwest Florida Water Management District.

Cc: Representative Jimmie Smith, Florida House of Representatives
Chase Daniels, Florida House of Representative
Carolyn Voyles, Florida Department of Environmental Protection
Dennis Dutcher, United Waterfowlers-Florida, Inc.
Dr. Marty Kelly, Southwest Florida Water Management District
Cara Martin, Southwest Florida Water Management District

==========
==========

From: Hope [mailto:hopecorona@tampabay.rr.com]
Sent: Tuesday, October 25, 2011 3:14 AM
To: Doug Leeper
Subject: Re: Chassahowitzka Modeling Report Posted on MFLs Web Site

Hi Doug,

I think I finally got my computer able to "surf" the web again (apparently I am missing some critical "add-ons" or something). I was so bummed that my systemic poison ivy kept me from the last MFL meeting; everyone that I know who attended the last MFL meeting told me that "Doug's sea level rise presentation is a must see." I've been trying to locate it on the site, but I can't find it. Could you send me the direct link to your presentation? Is it a slide show? Do I need to download a special program to view it?

On a personal note: I am discouraged nearly to the point of despondency, with the in-our-face corporate coup d'état of our state government. When the government is oligarchy, how can the citizen hope to appeal? I just read a forwarded email from some folks in the SRWMD area who are reporting that proceeds from the sale of

SRWMD "surplus" lands are being used to fund shady purchases of "conservation easements" at above market prices on lands belonging to wealthy, connected friends of the current political regime. Have you heard anything about this? Is it true?

It's like we're back in feudal times, where the rich and powerful steal from the poor to give to the rich; continually eroding the real "wealth" and independence of the "citizens" (slaves) in what is certainly no longer a democracy. How long will the 99% allow this robbery and enslavement to continue? There is no democracy, no real "free market" when the corporate state writes all the laws to benefit the corporations, and eliminates all the laws and regulations that should protect the citizens and the collective resources of the land?

Thanks, again, for listening....and for sending me the link to your sea level rise presentation from the meeting I missed. I feel like Job sometimes; the oozing poison ivy "pox" dripping down over my swollen shut eyes and bandaged-wrapped legs seemed almost "biblical" in its ability to "redirect" my activities and keep me trapped and isolated for a while. The next "plague" of computer crashes seemed an additional "message" from the cosmos to adjust my "focus" in life.

So, what's the cosmos saying to Hope, "Greed always wins....just stop trying.....all hope is lost?" I resist that message; I believe that there are more "good" and "honest" people than "greedy" and "evil" ones. I have faith that truth will be uncovered, criminal deeds revealed, and justice will prevail. Florida's miserable 4 years "wandering" in the desert of despotism, will end; we'll recover our stolen lands, banish our despots, and embark upon a more egalitarian time with ethical leaders whose decisions are based on the will of the electorate (not the wealthy or corporate benefactors), and the laws are crafted to protect (not exploit) our natural resources and citizens. Historically, good usually prevails: Moses led the Israelites out of Egyptian slavery; the Holocaust ended; most tyrants are deposed; most corrupt governments are overthrown; it's just a matter of time....and the rise of the "Occupy Florida" movement gives me hope that the fed-up electorate are beyond ready to provoke change and reclaim their rights as citizens of a democracy.

Feel free to say something encouraging and optimistic.....you seem like you might be one of the "good" people, but I also fear that you, like many people in state government, may be being pressured to "toe the party line," and defend a process that is fundamentally corrupt; forced to use data that is flawed and incomplete, in order to "arrive" at a pre-determined result or "target number" demanded by those poised to exploit the resource for their own profit. This thing doesn't have to be a "run away train." Together, the "good" and "honest" people can stand up against the corrupt, wealthy, and powerful. It's "our" Florida to save. We can save it together. The greedy and powerful don't have to win here.

I still believe that, working together, we (the citizens and the government) can have an "outcome" that, like Boyd Blihovde suggested, "you (SWFWMD) can live with and the people and wildlife can live with."

I appreciate your hard work; your exemplification of the "Sunshine law," and your willingness to work with "we the people" in the pursuit of environmental and civil justice.

Thanks again,
Hope

==========

----- Original Message -----
From: Doug Leeper
Sent: Tuesday, October 25, 2011 8:21 AM
To: Hope
Subject: RE: Chassahowitzka Modeling Report Posted on MFLs Web Site

Hope:

Here's a direct link to an Adobe PDF version of the slides that I showed at the July 18th workshop. This set of slides includes my presentation on sea level rise, and should be readily viewable if you have downloaded the Adobe Reader software that is available for free on the internet.
http://www.swfwmd.state.fl.us/files/database/site_file_sets/1968/SWFWMD_SLIDES_SHOWN_AT_MEETING_-_Springs_Coast_MFLs_Publ_Wrkshp_18jul2011.pdf

Also, here's are direct links to the slides that I presented at the September 6th and June 8th workshops.

http://www.swfwmd.state.fl.us/files/database/site_file_sets/2002/SWFWMD_Presentation_for_September_6_2011_MFLs_Workshop.pdf
http://www.swfwmd.state.fl.us/files/database/site_file_sets/1871/Slides_Springs_Coast_MFLs_Public_Workshop_08jun2011.pdf
Note that the Springs Coast Minimum Flows and Levels Public Workshop web page also includes the slides shown by other presenters at the workshops, additional information about the workshops, and links to numerous documents containing background or supporting information. The workshop web page may be found at:

http://www.WaterMatters.org/SpringsCoastMFL

With regard to your questions concerning the sale of surplus lands in the St. Johns River Water Management District, I would note that I have not heard or read anything about this matter.

Finally, thanks for your words of encouragement and appreciation regarding my efforts and those of others that are directed toward development of minimum flows for the Springs Coast area. I believe that the District and interested stakeholders are benefitting from the ongoing exchange of information on this issue and also believe that the end result or our efforts will be protective of our valuable natural resources.

Douglas A. Leeper
Chief Environmental Scientist
Southwest Florida Water Management District
[Signature block available upon request]

==========

From: Doug Leeper

To: Hope
Cc: Marty Kelly ; Mike Heyl
Sent: Wednesday, October 26, 2011 9:54 AM
Subject: Response to Question about Sea Level Rise Modeling
Hope:
I'm glad we were able to talk this morning about the recently completed sea level rise and salinity habitat modeling for the Chassahowitzka River system.
I hope our discussion also addressed the question posed in your recent e-mail. The slides you refer to from my July 18th presentation were shown to provide a conceptual overview for how the District's modeling of future sea level rise conditions could be factored into minimum flow recommendations. The basic idea is to determine allowable percent of flow reductions based on existing baseline conditions and baseline conditions associated with various sea level rise scenarios to identify an appropriate percent of flow reduction that may be incorporated into our minimum flow recommendation.
See you later today.
Douglas A. Leeper
Chief Environmental Scientist

==========
From: Hope [mailto:hopecorona@tampabay.rr.com]
Sent: Wednesday, October 26, 2011 11:10 AM
To: Doug Leeper
Subject: Chassahowitzka Re: Response to Question about Sea Level Rise Modeling

Thanks Doug, I appreciate your time in helping me correctly read the charts in the Dynamic Solutions report, which, as we both agree, does not take into consideration the probable changes in spring flow chemistry, nor the potential effects of sea level rise on the surrounding fresh water ecosystems (the spring run systems, hydric hammocks, riverine swamps, deciduous hardwoods, littoral zones, and other primarily fresh water systems affected by saturated soils and chemistry/biology thereof).

I am presently reading WAR's 25 October 2011 "MFL Position - final," and see that they raise similar concerns about the current MFL process's ability to monitor and predict changes to our springs coasts ecosystems.
I gather that, based on what you're reading in Mr. Knight's outline, that he too may have some suggestions regarding on-going monitoring of the "health" of the springs coast ecosystems.

I don't think there have been any comprehensive field investigations of the Chassahowitzka system that have documented baseline ecological community compositions and present conditions. I think this needs to be done. Chassahowitzka is a very diverse and complex ecosystem, with numerous micro-communities that inter-relate. Perhaps a few key "keystone" habitats within our greater Chassahowitzka ecosystem could be identified and monitored annually or semi-annually in order to accurately report any changes to the system.

I think there needs to be some kind of biological survey and mapping system in place that could be referenced, updated, and monitored. I'm thinking GIS with overlays and links to supporting documentation. Dan at FNAI tells me there are few "incidence reports" for our area, which speaks to the lack of biological surveying, investigation, and reporting yet done for this amazingly diverse and listed species-rich area.

Even the "lay people" in our Chassahowitzka community are noticing visible changes in the biological composition of some of the most sensitive areas of our tenuous fresh water habitats. Rapid changes in shoreline and canopy vegetation on Potter Creek are obvious. Per our previous conversations, perhaps analysis of soils chemistry and microbiology could reveal some of the underlying, and perhaps more mathematically definable, changes in chemistry and salinity to these saturated soils that provoke the visual clues, so that they could better "plug into" the existing models presently available. I think that there may be a way, in the future, to relate the actual, observable changes in habitat to the models you're using IF we do the initial documentation and can show a relationship between actual habitat (soils, vegetation, canopy) in the terrestrial communities surrounding the spring runs and river, to the existing data which is (sadly) primarily main channel waters.

I envision a GIS overlay, similar to but better than the LULC (land use land cover) or Soils analysis layers that would accurately show the habitats and micro-habitats in this incredibly diverse Chassahowitzka River and Coastal Swamps Sanctuary ecosystem. Similar to the Property Appraiser data base programs, if the habitats were monitored annually or even seasonally, then one could use the system to "turn on" layers that would show "historic" as well as "present" conditions; for example one might chose the "July 2011" map, or the "February 2012" map, and turn on desired "layers" which might include "listed species occurrences" or "salinity" or "SO4 levels in soils" or "mast production at monitored stations" or whatever other data the various contributors to the process may feel are relevant to the monitoring and maintenance of a healthy springs coast ecosystem.

It's do-able. As a former field biologist for lands slated for development, I am familiar with many of the tools and processes that would be required, and it's not terribly expensive, even in the private sector. :)
Just my thoughts.

Thanks for listening. I appreciate your calmness, compassion, and kind treatment of the "public" (people like me who occasionally call SWFWMD looking for.....hope.)

Thanks again,
bambi-ologist at large,
Hope Corona

11.18.8 CRRC / Brad Rimbey

[Note – Black text in following is from a letter sent by B. Rimbey for the Chassahowitzka River Restoration Committee. Blue text is the District response dated 11/9/2010]

Chassahowitzka River Restoration Committee

A Grass Roots Organization for the Protection of the Chassahowitzka River

October 25, 2010

Michael G. Heyl Southwest Florida Water Management District 7601 Highway 301 North Tampa, Florida 33637-6759

RE: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Heyl,

Thank you for your presentation on the Chassahowitzka River Recommended Minimum Flows and Levels at the workshop on October 6, 2010. Your patience in addressing the concerns raised by the public was much appreciated. I would also like to take this opportunity to apologize for the rude behavior exhibited by some members of the audience. SWFWMD's contention that an 11% reduction of baseline flow would be acceptable in the Chassahowitzka River system was surprising and disturbing to the community of Chassahowitzka.

I hope you can appreciate that it is extremely frustrating for the community of Chassahowitzka to see the environmental damage which has already been done by increasing salinity in the river. To then have SWFWMD recommend any reduction of fresh water flow in the Chassahowitzka River is really unfathomable.

Although we do not have long-term salinity data for the Chassahowitzka to support increasing salinity, the District acknowledges salinity has most likely increased in the Chassahowitzka since the 1960s. The data the District has collected since 1992 indicates a strong relationship between discharge and conductivity (a gross measurement of salt in water) of the water discharged from the Main Spring (See Figure 1). However, the District does not believe that this is due to withdrawals, but rather is the direct result of sea level rise and climate. Sea level has risen an estimated 5.7 inches at Cedar Key[4] to the north and 7.4 inches to the south at St. Petersburg[5] since 1931. (Rainfall deficits during this period are discussed later in this response.). In essence, the increase noted is a natural response to declining flows and sea level rise. Except as noted in the MFL report, the District has no evidence the changes in ecology are related to groundwater pumpage.

[4] http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8727520
[5] http://tidesandcurrents.noaa.gov/sltrends/sltrends_station.shtml?stnid=8726520

As you know, the Chassahowitzka River System is listed as an Outstanding Florida Water in Section 62-302.700(9) F.A.C. This includes: Potter, Salt, Baird, Johnson, Crawford, Ryle, and Stevenson Creeks, and other tributaries to the Chassahowitzka River. The waters of the

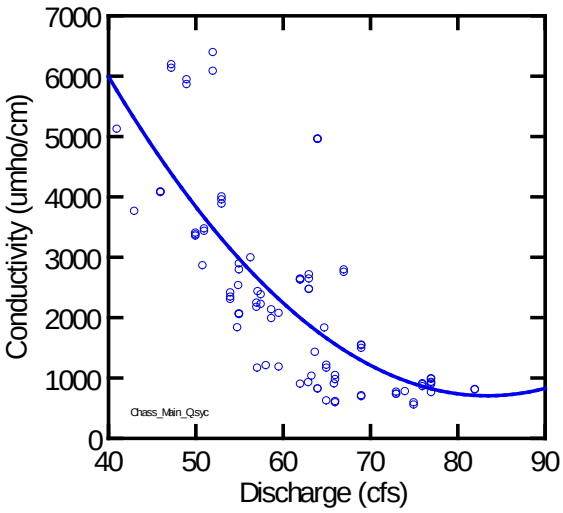


Figure 1. Chassahowitzka Main – Conductivity vs. Discharge

Chassahowitzka Swamp and the Chassahowitzka Wildlife refuge are also listed as Outstanding Florida Waters.
As stated in 62-302.700(1) F.A.C. "It shall be the Department policy to afford the highest protection to Outstanding Florida Waters and Outstanding National Resource Waters. No degradation of water quality, other than that allowed in Rule 62-4.242(2) and (3), F.A.C., is to be permitted in Outstanding Florida Waters and Outstanding National Resource Waters, respectively, notwithstanding any other Department rules that allow water quality lowering."
It is obvious that that any reduction in fresh water flow will result in a degradation of water quality to the Chassahowitzka River System. When fresh water is removed from a tidal system it will be replaced by salt water. Is there a Department ruling that states contamination of an Outstanding Florida Waters' fresh water system with saltwater is not a degradation of water quality?

When a water body is designated an Outstanding Florida Water (OFW), the ambient water quality at the time of designation becomes the baseline and that water quality cannot be degraded with an increase in pollutants discharged into the water body. The primary purpose of rule 62-302.700(1) F.A.C. is to regulate the discharge into a water body. The rule is not intended to regulate withdrawals. Regulation of withdrawals is addressed in 40D F.A.C., principally 40D-2, F.A.C., and subject to the Minimum Flow and Levels specified in 40D-8.041.

As stated in 373.042 F.S., "The minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." According to your report, SWFWMD has decided that anything less than a 15% loss of resource or habitat is insignificant and the therefore in compliance with the provisions of 373.042 F.S. SWFWMD makes no distinction on this criterion when it is applied to Outstanding Florida Waters which are to receive "the highest protection" and have "no

degradation of water quality." In other words, the highest and lowest levels of ecological protection are one and the same for SWFWMD.

On pages 1-2 of your report, you list ten criteria which are to be considered when establishing the minimum flows and levels pursuant to 62.40-473(1). The last of the 10 items listed is navigation. You may recall that during your October 6, 2010 presentation I asked you whether SWFWMD had evaluated the effect on navigation if the baseline flow of the Chassahowitzka River was reduced by 11%. You answered no.
Anyone who is familiar with the Chassahowitzka River knows the river is very shallow and, in recent years, has become virtually unnavigable during winter months on low tides. Lowering the flow level of the Chassahowitzka River will undoubtedly alter the navigable condition and capacity of the River. This would seemingly put SWFWMD in direct violation of Title 33 U.S.C. § 403 Obstruction of Navigable Waters (aka Section 10 of the Rivers and Harbors Appropriation Act of 1899) which specifically prohibits such alterations in any navigable water in the United States unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of War prior to beginning the same http://water.epa.gov/lawsregs/guidance/wetlands/sect10.cfm.
The Chassahowitzka River is traversed daily for commercial and recreational activities. The primary commercial activities on the River consist of crabbing, professionally guided fishing and seasonal scalloping trips, kayak and canoe rentals, site-seeing river tours, and seasonal manatee viewing tours. The River is also used as the only means of access by homeowners who maintain homes down-river. Reducing the navigability of the River would present an obvious hardship on these individuals and commercial activities.
The decrease in average water level expected at the Chassahowitzka boat ramp due to an 11 percent reduction in flow was evaluated using the hydrodynamic model used to establish the MFL. The model was executed for the three-year period 2004-2006 and average hourly water levels extracted. The model was executed without withdrawals and in the presence of the assumed 11 percent withdrawal and the difference in water levels computed. Table 1 provides the difference at three locations in the river. The average reduction in water level expected is 0.01 foot.
Table 1: Water level reduction: Comparison of baseline and 11 percent flow reduction case

Location	Water Level Reduction (ft)		
	75 Percentile	Mean	25 Percentile
USGS 02310663	0.0024	0.0014	0.0019
Baird	0.0155	0.0059	0.0034
Boat Ramp	0.0225	0.0105	0.0050

Aside from the technical results, the establishment of a minimum flow for the Chassahowitzka pursuant to 373.42, F.S., is not within the scope of prohibited activities of 33 U.S.C. 403, Obstruction of Navigable Waters, and therefore is not within the jurisdiction of the Chief Engineer or Secretary of the Army under that section to regulate the creation or construction of obstructions to navigation, or the dredging or filling in, or alteration of, navigable waters.
On page 11 of your report, you mention that the Chassahowitzka is frequently listed as a 1st magnitude spring (e.g. flow greater than 100 cfs) and that designation probably includes flows from Crab Creek and Chassahowitzka # 1 in addition to Chassahowitzka main. Bulletin No. 31, "Springs of Florida" (revised 1977), states "The measuring site for the

Chassahowitzka Springs is on the left side of Chassahowitzka River just downstream of Crab Creek, or 0.5 mi upstream from Baird Creek; therefore, the discharge as measured includes the flow of Crab Creek Springs. Between 1930 and 1972, the combined streamflow was measured 81 times." The maximum combined streamflow was 197.0 cfs on May 18, 1966. The minimum combined streamflow was 31.8 cfs on July 8, 1964. The average combined streamflow was 138.5 cfs.

On page 15 of your report, you indicate USGS gauging station 02310650 began gathering discharge (flow) data in 1997 at what appears to be the current gauging station which is located downstream from Chassahowitzka Main and upstream of Crab Creek. That station actually began recording periodic discharge (flow) data in 1964 but only has continuous records since 1997 according to http://waterdata.usgs.gov/nwis/uv?02310650.

Presently, discharge reported by the USGS for station 02310650 includes flow from Chassahowitzka #1, Chassahowitzka #2, and the Main spring. The USGS calculates this discharge from the water level in the Upper Floridan Aquifer (UFA) measured at Weeki Wachee Well nr Weeki Wachee (USGS station 283201082315601) and tide stage. This is the same well that I used to estimate the flow in the Chassahowitzka prior to 1997.

Flow from Crab Creek is not presently included, although it was included in discharge measurements reported by the USGS for this station prior to 1997 (D. Yobbi, personal communication[6]. This information became known after the draft report was released. Clarification has been added to the final report.) The District did not use any USGS reported discharge from this station prior to 1997 to establish the MFL, but comparing flows in the older USGS reports should be done cautiously. Since the regression developed by the District is based on post-1997 discharge (which does not include Crab Creek), estimate of pre-1997 flows using that regression does not include contribution from Crab Creek either.

Appendix B of the USGS report titled 'Hydrology of the Coastal Springs Ground-Water Basin and Adjacent Parts of Pasco, Hernando, and Citrus Counties, Florida (USGS WRI 01-4230)' lists the measured values for station 02310650. Note on page 78 beginning in 1997, the USGS quotes two discharge measurements for each day of observation. The one listing in column "Q" apparently include Crab Creek, while the results in column "Q*" are for the Main Spring and above.

In any event, on page 18 of your report, you chose to derive flow for the Chassahowitzka River from 1967 to 1997 by using data from a well in Weeki Wachee. Based on Figure 2-2 (page 11) of your report, Weeki Wachee is not even in the Chassahowitzka springshed. What scientific relevance does this well have to flow in the Chassahowitzka River?

The Weeki Wachee well is used to measure artesian water level in the Upper Floridan aquifer in the Coastal Springs groundwater basin. Over the course of time, the USGS measured discharge at many of the springs in the area and have related them to water level in the Weeki Wachee well. The USGS then prepares a relationship using the water level in the Weeki Wachee well to estimate daily discharge in these systems, many of

[6] Dann Yobbi is retired from the USGS. During his tenure with USGS, he conducted many studies on the spring systems within the District. He is author, or co-author on several pertinent publications about the Chassahowitzka River including Water Resource Investigations(WRI) 88-4044,WRI 92-4069 and WRI 01-4230 cited by Chassahowitzka River Restoration Committee in this comment letter.

which are tidally affected. Discharge at tidally affected stations cannot be estimated with the traditional 'stage/discharge' curves. The raw discharge measurements used to develop these relationships are provided in appendix B of USGS WRI 01-4230. Table 1 of that publication also provides discharge equations for nine spring systems from Bobhill Spring on the Pasco County line to Homosassa Springs using the UFA water level measured in the Weeki Wachee Well.

As per your report, the flow in Chassahowitzka Main, Chassahowitzka # 1, and Crab Creek all emanate from the Upper Floridan aquifer. Since they are all located within approximately one tenth (1/10) mile of each other, it seems reasonable to assume that their flows have responded similarly to historic climatic conditions. That being the case, a more practical approach to establishing the historic flow of Chassahowitzka Main and Chassahowitzka #1 would simply have been to measure the present flow of Crab Creek. You could then compare that flow to the present flow of Chassahowitzka Main and Chassahowitzka #1, as measured at the USGS gauging station 02310650, and derive a correction factor for the older data taken downstream of Crab Creek.

Some clarification is warranted regarding how flow from Crab Creek (and others) was incorporated into the hydrodynamic model which was used to establish the manatee thermal refuge (the basis for the recommended MFL) and the salinity habitat. The model included a constant inflow (average flow reported by the USGS) and discharge salinity for Crab Creek and others as shown in Table 2 (See appendix 11.2 of the MFL report). These flows were introduced into the model numeric grid at spatially appropriate locations.

Table 2. Minor spring discharges incorporated into Chassahowitzka River hydrodynamic model.

Springs Name	Average Discharge (cms)	(cfs)	Salinity (ppt)
Crab Creek	1.38	48.7	3.2
Potter Creek	0.53	18.6	5.5
Baird	0.16	5.7	6.5
Beteejay Head Spring	0.18	6.4	<1
Blue Run	0.19	6.6	4.3

Total flow in the Chassahowitzka will likely never be known and Crab Creek is only one of several ungaged sources of water in the Chassahowitzka River. Most will never be routinely measured. However, flow estimated at a single location can serve as a representation of the total flow, provided the relationship(s) to the unknown flow remains relatively constant. This principal was the basis for establishing salinity/flow relationship (see section 4.2 of MFL report) using flow at the USGS gage just downstream of Chassahowitzka Main spring. This regression was used to evaluate the other MFL metrics such as fish/invertebrates, submerged aquatic vegetation, and the benthic community response.

If you had used the corrected flow data from 1930-1972 to determine the historic flow in the Chassahowitzka River, I suspect you would have found that the present flow is significantly

down from its historic average. This finding would be consistent with anecdotal information from local residents whose families have lived and worked on the Chassahowitzka River for generations. I believe you would also find that the current river flow is down disproportionately to the annual rainfall totals in Chassahowitzka's springshed for the same time period.

The District agrees that discharge has probably declined since the 1960s, but also believes that it increased from the 1930s until the 1960s. See discussion that follows about Weeki Wachee flow, which, like the Chassahowitzka, is dependent upon artesian pressure in the UFA. The USGS uses the same UFA well to estimate discharge in the Weeki Wachee River (http://waterdata.usgs.gov/nwis/uv?02310525) and discharge in the Chassahowitzka River (http://waterdata.usgs.gov/nwis/uv?02310650).

The nearest NOAA weather station to Chassahowitzka's springshed appears to be at Chinsegut Hill. Rainfall totals from Chinsegut Hill for 1931–1998 are presented on page 47 of USGS report "Hydrology of the Coastal Springs Ground-Water Basin and Adjacent Parts of Pasco, Hernando, and Citrus Counties, Florida" which is available online at http://fl.water.usgs.gov/PDF_files/wri01_4230_knochenmus.pdf. As stated on page 45 of the USGS report, "No statistically significant long-term change (trend) in rainfall was deduced using all available rainfall records (period of records)."

The USGS Water Resources Investigation (WRI 01-4230) cited goes on to say: *Brooksville Chinsegut Hill rainfall records were analyzed for 1931-98, which coincides with the length of* spring-flow records for the Weeki Wachee River gaging station (fig.30). In Figure *30, the rising limbs and peaks in the 1940's represent above average rainfall; falling limbs and valleys in the early 1950's represent periods of drought. The early half of the record (prior to 1966) generally reflects above average rainfall and the later half (after 1965) reflects below average rainfall.* (Emphasis added)

This USGS document expands on the lack of long-term change, but also states that trends exist for *shorter time periods*. The rainfall record (1931-1998) described by the USGS was chosen to correspond to the length of discharge record for the Weeki Wachee River. The following two figures continue with the analysis described by the USGS. The first figure illustrates three trends for the Weeki Wachee River. The black trend covers the period 1931 through 1998, and is not statistically significant. The red trend line represents the flow from 1931 through 1960 and is a statistically significant ($p<0.001$) increasing trend. The blue line represents a statistically significant ($P< 0.000$) decline in flow.

The second figure illustrates the same trends in the Brooksville Chinsegut Hill rainfall records. The data in Figure 30 of the above document were digitized and are presented below along with a) an increasing trend for the period 1931 – 1960 represented by the red line ($p< 0.000$), and b) a blue regression line representing the cumulative decline from annual rainfall during the period 1961 through 1998 ($p<0.000$). Thus, while there may be no "long-term" change in rainfall, it is necessary to identify the period analyzed. In essence, an increasing trend prior to 1960, followed by a declining trend after 1960 tend to cancel each other if the entire period of record is evaluated.

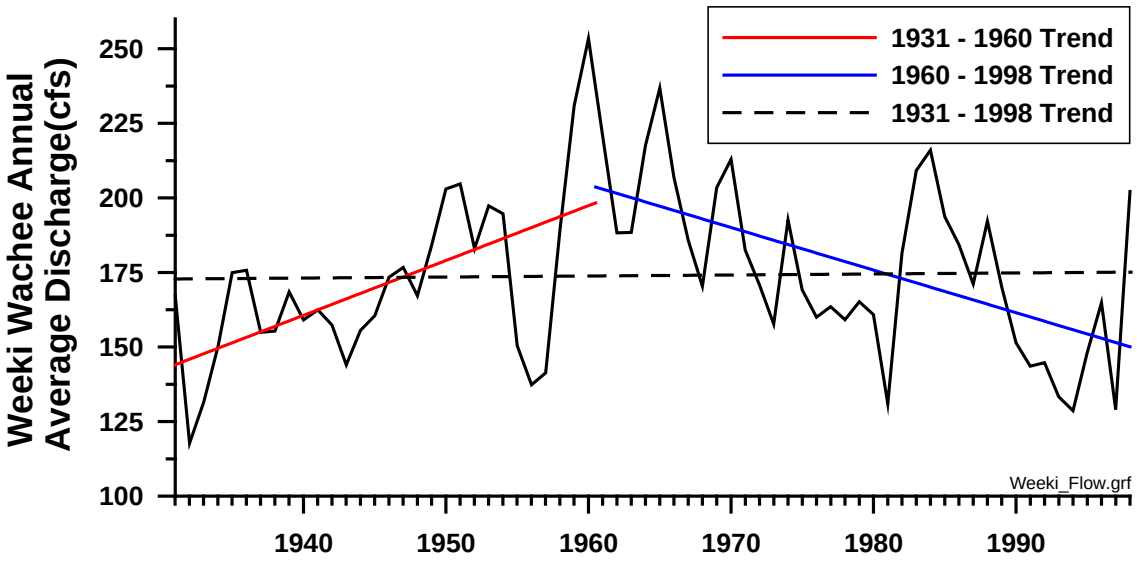


Figure 1. Trends associated with Weeki Wachee discharge.

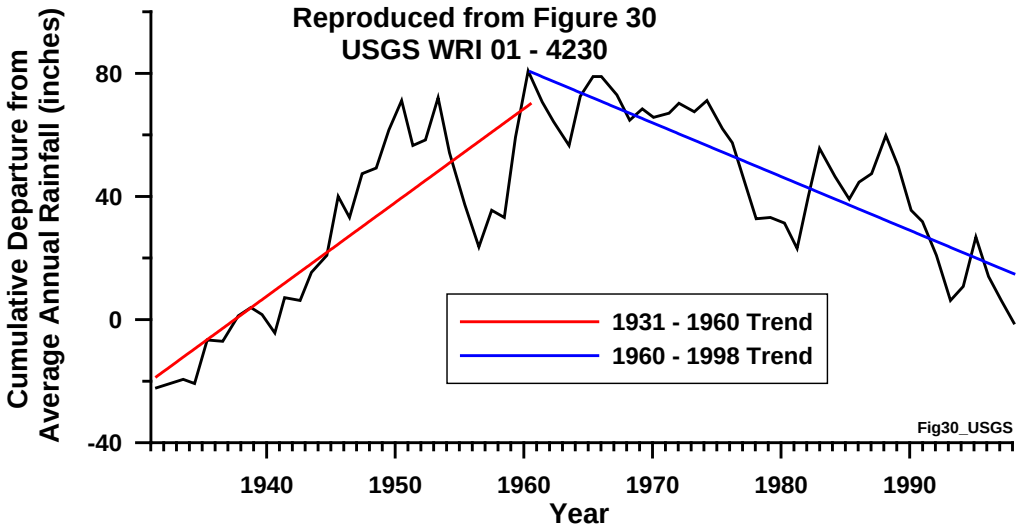


Figure 2. Trends associated with Chinsegut Hill rainfall.

If the flow of the Chassahowitzka River has declined significantly from its historic average and the annual rainfall in the springshed shows no "statistically significant long-term change" then something is obviously wrong with the hydrology model which SWFWMD has adopted for Chassahowitzka.

On page 20 of your report, you reference a memorandum from Ron Basso, P.G., which he addressed to you on December 1, 2008. That document is available online at http://www.swfwmd.state.fl.us/projects/mfl/reports/Chass_Appendices-section2.pdf. In that memorandum, Mr. Basso indicates he used SWFWMD's Northern District groundwater flow

model (NDM) to evaluate the impact of groundwater withdrawals on Chassahowitzka's flow. Mr. Basso also indicates that the NDM model has only been available since May 2008.

Based on SWFWMD's "Request for Proposal to calibrate the NDM" dated August 13, 2010 http://www.swfwmd.state.fl.us/files/database/demandstar/Specifications[5].pdf, the NDM domain appears to be a rectangle. The northern boundary of the NDM domain is near Gainesville, the southern boundary near New Port Richey, the eastern boundary near Clermont and the western boundary extends approximately five miles offshore into the Gulf of Mexico.

On page 9 of his memorandum, Mr. Basso indicates he used 2005 data to determine that 458,000,000 gallons of groundwater per day that were being pumped from the entire NDM domain and that extraction only reduced the flow of the Chassahowitzka River by 0.7 cfs. Realistically, what relevance does groundwater primarily pumped in areas so distant from Chassahowitzka's springshed have to do with the Chassahowitzka River's flow? Furthermore, how much relevance should be attached to results from a new mathematical flow model which has yet to be calibrated?

The active domain of the Northern District model (NDM) includes all of the Northern West-Central Florida Ground-Water Basin (NWCFGWB) of the Floridan aquifer. In addition, most of Lake County outside the NWCFGWB is also included in the model to assess water use near the SWFWMD eastern boundary. A groundwater basin has well-defined boundaries in a lateral direction with a definable bottom. Rainfall that falls within a groundwater basin provides recharge to the aquifer within that basin. Groundwater does not flow laterally between groundwater basins or outside of a basin. It is important to include all groundwater withdrawals within a basin to conservatively assess the total impact to a spring, stream, or aquifer level. District staff could have limited the modeling assessment to a smaller area of groundwater withdrawn near Chassahowitzka Springs but the predicted impact would have been smaller than the flow decline presented in the report.

The request for proposals recently advertised by the District was for the construction of a surface water model across the entire District. Recharge derived from the surface water model would be used to further calibrate the NDM with the anticipation that the groundwater model will be converted to a fully integrated surface water/groundwater model in the future. Regional models are frequently updated as new data is collected or more advanced modeling software becomes available. The NDM is a regional groundwater flow model that is calibrated under steady state and transient conditions. Chassahowitzka Main Spring modeled flow was within two percent of observed flow in the steady-state model. District staff uses the best information and modeling available at the time of minimum flow assessment to determine the level of existing impact to a water resource feature.

On page 9 of SWFWMD's "Request for Proposal to calibrate the NDM", it is noted that "During the 1990s, Hernando County was one of the fastest growing counties in west-central Florida." According to your representation of Chassahowitzka's springshed, the vast majority of the springshed is located in Hernando County. For clarity I have taken your representation of Chassahowitzka's springshed and placed it on a map which is attached to the end of this correspondence.

As seen on the attached map, there are four golf courses in Chassahowitzka's springshed within 5-1/2 miles Chassahowitzka's headwaters. A limestone mine which is indicated as

“Florida Mining and Materials / Cemex” on the map is located approximately 10 miles from Chassahowitzka’s headwaters.
On page 5 of Mr. Basso’s memorandum, he indicates 14,400,000 gpd of groundwater was withdrawn within a 10 mile radius of Chassahowitzka Main in 2005. Mr. Basso also indicates the limestone mine and associated processes withdrew approximately 9,000,000 of the 14,400,000 gpd. According to Mr. Basso, over 90 percent of the 9,000,000 gpd withdrawn for the limestone mining activities was not consumptively-used and was returned to the Upper Floridan aquifer through infiltration from holding ponds.
The basis for Mr. Basso’s groundwater withdrawal numbers is unknown. If they are correct this would leave approximately 6,300,000 gallons of consumptively-used groundwater which is being withdrawn each day within a 10 mile radius of Chassahowitzka Main.
For the period of interest, Mr. Basso indicates the USGS measured mean spring discharge was 60.1 cfs which would be 38,843,544 gpd. Therefore the consumptively-used groundwater within a 10 mile radius of Chassahowitzka Main would be approximately 16% of the daily flow. Given that the most remote area of Chassahowitzka’s springshed is over 20 miles from Chassahowitzka Main and ultimately includes the city of Brooksville, the cause for concern is obvious.

Groundwater withdrawal numbers are based on the SWFWMD estimated and metered water use for 2005. The District maintains an annual database of estimated and metered water use within our District. The estimate of consumptively used water from limestone mining and associated uses is described in a 2006 SWFWMD technical memorandum that is referenced in Section 2 of the Appendix.

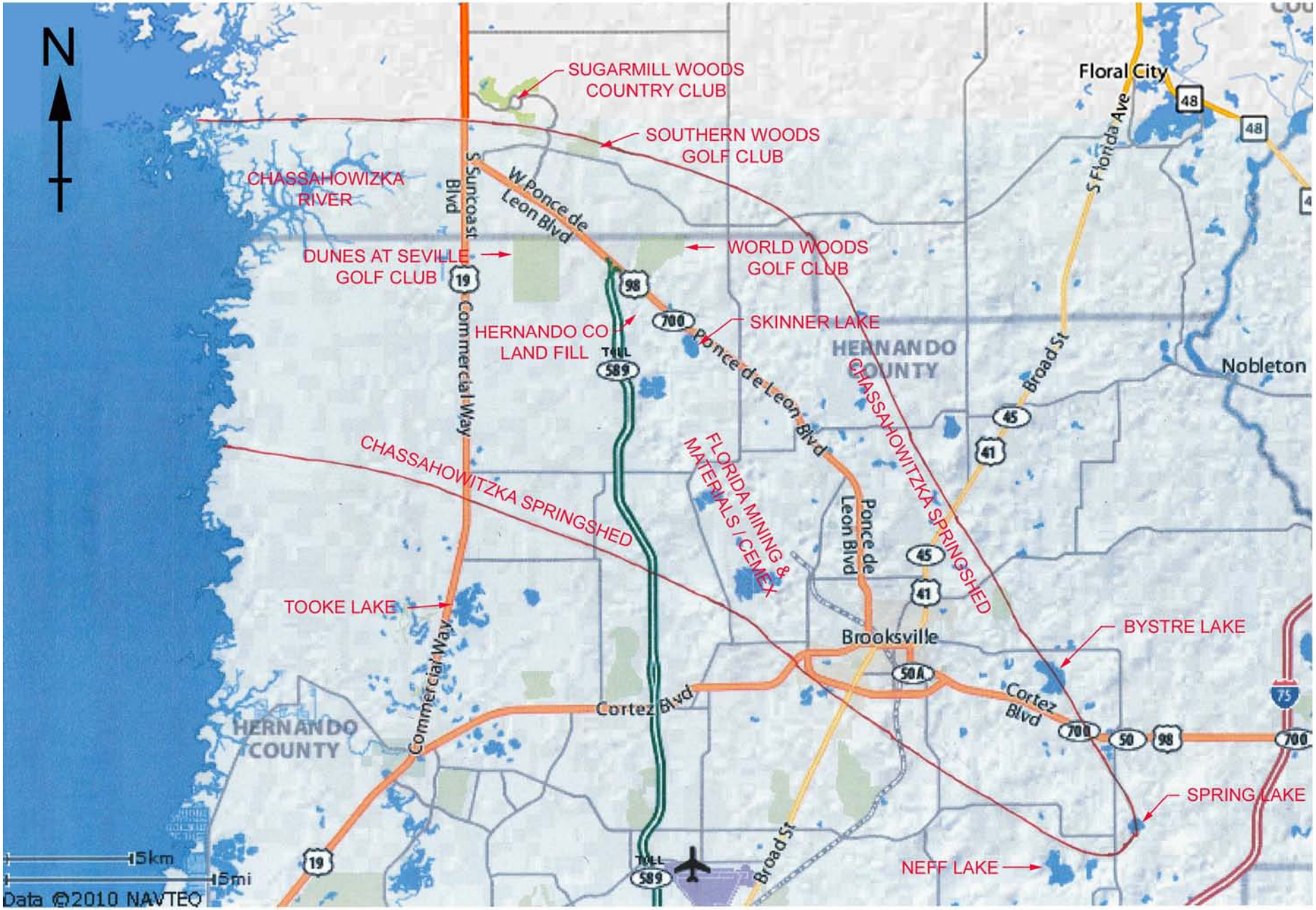
While it is correct to be concerned with water use in the immediate vicinity of the spring, all of the groundwater withdrawn within a ten mile radius of the spring cannot be assigned toward the same reduction in spring flow. Groundwater withdrawals lower water levels in the aquifer, which decreases storage, and reduces lateral groundwater outflow to the coast, surface water runoff, spring discharge, and evapotranspiration. Water that is removed from an aquifer is essentially offset by changes in aquifer storage, lateral outflow, runoff, spring discharge, and ET. The decline in storage (i.e. the lowering of the Upper Floridan aquifer water level) and changes in spring discharge are simulated by the groundwater flow model. The change in water levels due to withdrawals is largely predicated on the aquifers transmissive (permeable) properties, the magnitude of the aquifer storage coefficient, and the amount of recharge that reaches the aquifer. In this case, the predicted lowering in the Upper Floridan aquifer water level at the spring location was less than 0.1 feet due to all withdrawals in the model domain. This resulted in a predicted reduction in modeled spring discharge of one percent. The groundwater flow system in Citrus County is less vulnerable to the impacts of withdrawals because the Upper Floridan aquifer is mostly unconfined, has very high recharge rates, is very permeable, and groundwater withdrawals are relatively low in magnitude and dispersed.

On page 37 of your report, you note that the effects of sea-level rise and increasing salinity have been evaluated for hydric hammocks along the west coast of Florida. You also note that according to analyses conducted by Raabe *et al.* (2004), as cited by Williams *et al.* (2007), decline of hydric hammock vegetation along the Big Bend coastline of Florida since the mid-1800s has been less pronounced in areas with high freshwater discharge. However Williams et al (2007) caution that *“[g]ood quantification of the effect of freshwater discharge on the rates of forest canopy loss and coastal forest retreat requires further study”*.

Has SWFWMD or any other entity pursued the "further study" recommended by Williams et al? The decline of the hydric hammock along the Chassahowitzka River is obvious to anyone who knows the river. It has become much more pronounced in the last 5 years. The hydric hammock becomes much healthier as you move upriver or move up any of the spring-fed creeks where fresh water discharge is able to mitigate the effect of sea-level rise.
The District has not pursued further study on the effects of freshwater discharge on the forest canopy. To reiterate, the District's position is declines in freshwater flow are the result of changing climate and not withdrawals.

On page 83 of your report, Table 8-2 "Long term expected minimum flows corresponding to recommended MFL**"** presents four minimum flow values which average to approximately 50 cfs. However, throughout your report you indicate the MFL was established using a baseline flow of 63 cfs and the recommended MFL is an 11% reduction in the baseline. An 11% reduction of 63 cfs is 56 cfs. Please explain this discrepancy.
The baseline flow is the median daily flow for the period 1967 – 2007. In contrast, the four minimum flow values presented represent lowest five–year (or ten-year) moving annual average flows under the proposed MFL. Essentially the two numbers are different metrics for the same data set.
It should be noted that there are 37 five-year moving averages in the period 1967-2008, and all but one of those is expected to be greater (return interval of 37 years) than the five-year flow identified in Table 8-2 if the 1967-2007 climate repeats itself.
As stated in 373.042 F.S., "The minimum flow and minimum water level shall be calculated by the department and the governing board using the best information available." Given the historically data-poor nature of scientific information on the Chassahowitzka River system, it is impossible for SWFWMD to render an opinion on the MFL using existent scientific data within a reasonable degree of scientific certainty.
With the dearth of coherent historic scientific data on the Chassahowitzka River, the most likely source of best information available would be the residents of Chassahowitzka who have had an intimate knowledge of this river for generations. To my knowledge, SWFWMD has made no attempt to locate or interview anyone in Chassahowitzka who could provide relevant historic information on the River.
In the future, the Chassahowitzka River Restoration Committee would like to receive copies of any scientific studies relevant to the Chassahowitzka MFL when SWFWMD presents it to the Governing Board. Email the copies to BWR.CRRC@tampabay.rr.com. Please provide your written response to this correspondence by December 5, 2010.

Sincerely,
Brad W. Rimbey, P.E. For the Committee



CHASSAHOWITZKA SPRINGSHED BASED ON SWFWMD PRESENTATION ON OCTOBER 6, 2010

==========
From: Brad Rimbey [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Tuesday, November 16, 2010 7:33 PM
To: Dave Moore
Subject: Re: SWFWMD to Recommend an 11% Flow Reduction on the Chassahowitzka River November
16, 2010 in Brooksville

Dear Mr. Moore,

We are pleased to be of assistance. I note that you sent copies of the April 2010 draft of the Chassahowitzka MFL report to the Florida Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission for their review. Did you also send a copy of the April 2010 draft of the Chassahowitzka MFL report to the Chassahowitzka National Wildlife Refuge? I would be very interested in knowing what they think of SWFWMD's plan to destroy (AKA "significantly harm") 15% of the Refuge.

Brad W. Rimbey
for the Chassahowitzka River Restoration Committee
----- Original Message -----
==========
From: Mike Heyl
Sent: Friday, November 19, 2010 2:13 PM
To: 'Brad Rimbey'
Subject: Contact with Chassahowitzka National Wildlife Refuge staff regarding MFL.
Attachments: img-Y12161501-0001.pdf

Mr. Rimbey – I notified the refuge staff of the availability of the report on April 13, 2010 and offered to mail hard copies upon request. On April 20th I notified them of electronic availability on the District's web site and requested written comments by May 31. On August 12, I met with the staff at their office and reviewed the results of the Chassahowitzka MFL and requested written comments by September 5. Last Friday I received a very brief commentary letter (attached) from Mr. Blihovde, the Deputy Project Leader. I will be responding to Mr. Blihovde in the near future.

From: Brad Rimbey@CRRC [BWR.CRRC@tampabay.rr.com]
Sent: Friday, November 19, 2010 2:39 PM
To: Mike Heyl
Subject: Re: Contact with Chassahowitzka National Wildlife Refuge staff regarding MFL.

Thanks Mike. I am glad to hear you gave the Refuge staff fair notice. It is disturbing that the Refuge did not take this matter more seriously. When a State agency such as SWFWMD proposes to destroy 15% of a National Wildlife Refuge I would expect a more expedient response.

Brad W. Rimbey
for the Chassahowitzka River Restoration Committee

==========
[Email correspondence thread between B. Rimbey and D. Moore follows]
From: Dave Moore
To: Brad Rimbey
Cc: Lou Kavouras ; Bruce Wirth ; Mark Hammond ; Marty Kelly ; Mike Heyl ; Michael Molligan ; David
Rathke ; Cara S. Martin
Sent: Tuesday, November 16, 2010 6:57 AM
Subject: RE: SWFWMD to Recommend an 11% Flow Reduction on the Chassahowitzka River
November 16, 2010 in Brooksville

Mr. Rimbey – Excellent feedback – I am copying the appropriate staff on this email to ensure our public outreach is enhanced on this and other issues.
==========
From: Brad Rimbey [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Monday, November 15, 2010 6:29 PM
To: Dave Moore
Subject: Re: SWFWMD to Recommend an 11% Flow Reduction on the Chassahowitzka River November 16, 2010 in Brooksville

Dear Mr. Moore,

Mike Heyl sent me an email earlier today advising of the agenda change. Thank you for letting me know too. Please send me an email as soon as the proposed Chassahowitzka MFL rule is put back on the Governing Board's agenda so we can help keep the public informed. Also, please note that the agenda for tomorrow's meeting was not posted on SWFWMD's website until late last week. This is hardly enough time for even the most diligent web-surfing members of the public to know that matters of specific concern are scheduled to be discussed in the near future.

I hope you appreciate that not everyone visits SWFWMD's website on a daily basis. Many people, particularly in a rural community such as Chassahowitzka, do not even have internet access. I used to get emails from SWFWMD's Josie Gullen regarding the Citrus/Hernando Waterways Restoration Council. For whatever reason SWFWMD decided it was too much trouble to have Josie continue to send emails to keep the public informed.

If I recall correctly the Chassahowitzka MFL recommendation was originally due in 2007. After Josie quit sending emails, I continued to check SWFWMD's website for Chassahowitzka MFL information but never found anything and finally quit looking. I first heard about the April 2010 draft report being online from a friend when she called in early September.

If SWFWMD is truly concerned about keeping the public informed about major policy decisions, I would suggest posting signs in areas where the public will see them. This is common practice when property is scheduled for rezoning hearings. I see no reason why it should not be common practice when a government agency such as SWFWMD proposes to destroy (AKA "significantly harm") 15% of an environment such as the Chassahowitzka River, an Outstanding Florida Water.

SWFWMD owns the property where the public boat ramp is located in Chassahowitzka. This would seem to be an appropriate place for SWFWMD to have placed a sign to inform Chassahowitzka River users of SWFWMD's proposed changes to the River. A photo of a sign which was recently erected by the Chassahowitzka River Restoration Committee would have been sufficient to inform the public of SWFWMD's plans.

I truly believe that Democracy works best when the Government and the Citizens work together. We look forward to working with you.

Brad W. Rimbey
for the Chassahowitzka River Restoration Committee
==========
----- Original Message -----
From: Dave Moore
To: Brad Rimbey
Sent: Monday, November 15, 2010 2:14 PM
Subject: RE: SWFWMD to Recommend an 11% Flow Reduction on the Chassahowitzka River
November 16, 2010 in Brooksville

Dear Mr. Rimbey -

Thank you for your email dated November 12, 2010. I would like to address several of the issues that you raised, particularly with regard to the timeline. We have received a number of comments, some as late as this morning. As a result, we have decided to remove the item from tomorrow's agenda. We intend to further review and evaluate all comments prior to asking the Governing Board to take action.

The availability of the MFL report (Chassahowitzka River Recommended Minimum Flows and Levels – April 2010 Draft) was publically announced at the April 27, 2010 Governing Board meeting (agenda item number 39) and was submitted to a panel of peer reviewers in April 2010. It was posted for public access on the District's web site (http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php) and copies presented to the Florida Department of Environmental Protection and the Florida Fish and Wildlife Conservation Commission at that time for their review. The peer review panel report was posted on the District's website in July, 2010 when it was received and made available to Governing Board during the August 24, 2010 meeting (agenda item 30). The peer review panel report, agency comments and the District's responses were made available to the Chassahowitzka River Restoration Committee on October 7 following the October 6h public presentation. At the time of the presentation, the MFL report had not been updated to incorporate the suggestions contained in those three reviews.

The District is committed to a full and open review of science behind the establishment of a minimum flow and level and we appreciate public input.

We look forward to working with you.
==========
From: Brad Rimbey [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Friday, November 12, 2010 8:32 AM
To: Dave Moore

Subject: SWFWMD to Recommend an 11% Flow Reduction on the Chassahowitzka River November 16, 2010 in Brooksville

Dear Mr. Moore,

Attached is a PDF copy of a petition which was circulated in the community of Chassahowitzka regarding SWFWMD's MFL plan for the Chassahowitzka River. Over 400 opposition signatures were collected in the tiny community of Chassahowitzka in just two weeks. The vast majority of people who signed the petition said they were completely unaware of SWFWMD's flow reduction plan for the Chassahowitzka. They were livid. The following information has been distributed to various local news organizations in an attempt to inform the general public.

Brad W. Rimbey
for the Chassahowitzka River Restoration Committee

On November 16, 2010, as part of the Minimum Flows and Levels (MFL) mandate, SWFWMD staff intends to recommend to the SWFWMD Governing Board, an 11% reduction in flow as appropriate for the Chassahowitzka River, an Outstanding Florida Water.

The SWFWMD Governing Board meeting begins at 9:00 AM on Tuesday, November 16 at SWFWMD's District Headquarters in Brooksville. The agenda is now posted online at http://www.swfwmd.state.fl.us/calendar/agendas/govboard_11-16-10_agenda_1561.pdf "Minimum Flows for the Chassahowitzka River System" is item 8 on the agenda.

The Florida Fish and Wildlife Conservation Commission and the Florida Department of Environmental Protection have both expressed serious concerns regarding SWFWMD's methodology and conclusions for the Chassahowitzka MFL.

A draft of SWFWMD's MFL report for the Chassahowitzka which was dated April 2010 was first presented to the public on October 5, 2010. During the public presentation, there was no mention that, in July 2010, FWC and DEP (SWFWMD's parent agency) had already provided SWFWMD with numerous concerns and negative comments on the April 2010 draft.

During the October 5, 2010presentation, SWFWMD informed the public that all public comments on the April 2010 draft report were due by November 5, 2010.

OnNovember 2, 2010 (three days before public comment was due), SWFWMD posted its "November 2010 Final" MFL report for the Chassahowitzka on their website at http://www.swfwmd.state.fl.us/projects/mfl/reports/ChassMFL_2010_11_final.pdf . This report contained the FWC and DEP comments and SWFWMD's responses which were all omitted from the draft report which was presented to the public on October 5, 2010.

GivenSWFWMD's MFL report for the Chassahowitzka was not presented to the public (AKA the people who paid over 1/2 million dollars for the report) until October 5, 2010 and public comments were not due until November 5, 2010, SWFWMD's presentation of

a final recommendation to their Board on November 16, 2010 seems premature to say the least. More accurately it shows a total disregard for public input or opinion.

In the tiny community of Chassahowitzka, it took just two weeks to get over 400 signatures on a petition opposing SWFWMD's plan to reduce the Chassahowitzka's flow by 11%. The vast majority of people who signed the petition said they were completely unaware of SWFWMD's flow reduction plan for the Chassahowitzka.

The SWFWMD Governing Board Meeting is open to the public and public input will supposedly be taken during the meeting.

Brad W. Rimbey
for the Chassahowitzka River Restoration Committee
==========

From: Brad Rimbey@CRRC [BWR.CRRC@tampabay.rr.com]
Sent: Thursday, December 09, 2010 7:48 AM
To: Mike Heyl
Subject: Re: CRRC Additional Comments on SWFWMD's Recommended MFL for Chassahowitzka
Attachments: CRRC to Heyl 12-9-10.pdf

Dear Mr. Heyl,

Attached are my additional comments on behalf of the Chassahowitzka River Restoration Committee. Please acknowledge receipt of this email so that I do not have to send this via snail-mail.
I plan to be at the public workshop on December 16 so I will see you then.
Brad W. Rimbey, P.E.

Chassahowitzka River Restoration Committee

A Grass Roots Organization for the Protection of the Chassahowitzka River

December 9, 2010

Michael G. Heyl
Southwest Florida Water Management District
7601 Highway 301 North
Tampa, Florida 33637-6759

RE: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Heyl,

I have reviewed your responses to my October 25, 2010 correspondence and the District responses to various public comments which you emailed to me on November 22, 2010. Thank you for providing this information. Unfortunately, we still have numerous unresolved issues.

OUTSTANDING FLORIDA WATERS

I asked you "Is there a Department ruling that states contamination of an Outstanding Florida Waters' fresh water system with saltwater is not a degradation of water quality?" You replied "When a water body is designated an Outstanding Florida Water (OFW), the ambient water quality at the time of designation becomes the baseline and that water quality cannot be degraded with an increase in pollutants discharged into the water body. The primary purpose of rule 62-302.700(1) F.A.C. is to regulate the discharge into a water body. The rule is not intended to regulate withdrawals. Regulation of withdrawals is addressed in 40D F.A.C., principally 40D-2, F.A.C., and subject to the Minimum Flow and Levels specified in 40D-8.041."

As I read 40D, F.A.C. "Consumptive Use of Water", SWFWMD is only allowed to issue Water Use Permits if such permits "Will not cause quantity or quality changes that adversely impact the water resources, including both surface water and groundwater." 40D-2.301(b), F.A.C.

As I read 62-302.700(1), F.A.C., it is clear that the primary purpose is to maintain the ambient baseline water quality. It says nothing that would lead anyone to conclude that its primary purpose is simply to regulate pollutant discharges.

62-302.700(9)(b), F.A.C. designated the Waters within the Chassahowitzka Wildlife Refuge as Florida Outstanding Waters on (as mod.) 5-14-86 and 4-19-88.

62-302.700(9)(i), F.A.C. "Special Waters" designated the Chassahowitzka River System as Outstanding Florida Waters on 1-5-93.

62-302.700(1), F.A.C. states *"**It shall be the Department policy to afford the highest protection to Outstanding Florida Waters** and Outstanding National Resource Waters. **No degradation of water quality**, other than that allowed in subsections 62-4.242(2) and (3), F.A.C., is to be permitted in Outstanding Florida Waters and Outstanding National Resource Waters, respectively, notwithstanding any other Department rules that allow water quality lowering."*

62-4.242(2)(a), F.A.C. states *"**No Department permit** or water quality certification **shall be issued for any proposed activity** or discharge within an Outstanding Florida Waters, or **which significantly degrades, either alone or in combination with other stationary installations, any Outstanding Florida Waters**"*

62-4.242(3), F.A.C. has to do with Outstanding National Resource Waters and in not applicable to the Chassahowitzka MFL.

62-302.700(3), F.A.C. states *"**Each water body demonstrated to be of exceptional recreational or ecological significance may be designated as a Special Water.**"*

62-302.700(5), F.A.C. states *"**The Commission may designate a water of the State as a Special Water after making a finding that the waters are of exceptional recreational or ecological significance and a finding that the environmental, social, and economic benefits of the designation outweigh the environmental, social, and economic costs.**"*

62-302.700(8), F.A.C. states *"**For each Outstanding Florida Water listed under subsection 62-302.700(9), F.A.C., the last day of the baseline year for defining the existing ambient water quality (paragraph 62-4.242(2)(c), F.A.C.) is March 1, 1979, unless otherwise indicated. Where applicable, Outstanding Florida Water boundary expansions are indicated by date(s) following "as mod." under subsection 62-302.700(9) F.A.C. For each Outstanding Florida Water boundary which expanded subsequent to the original date of designation, the baseline year for the entire Outstanding Florida Water, including the expansion, remains March 1, 1979, unless otherwise indicated.**"*

Since the Chassahowitzka River System was listed as a "Special Water" and was designated as an "Outstanding Florida Water" on 1-5-93, its ambient water quality must be maintained at 1-5-93 levels. Since the waters of the Refuge were listed as Outstanding Florida Waters on 5-14-86 and 4-19-88, those ambient water qualities must be maintained at 4-19-88 levels as a minimum.

It is obvious that the ambient water quality in the Chasshowitzka has declined since 1992. It is also obvious that reduced freshwater flow in the Chassahowitzka will futher reduce ambient water quality. SWFWMD's argrument that the decline in ambient water quality is due climate change is irrelevant. The objective required by 62-302.700, F.A.C. is to maintain 1-5-93 levels. Period. SWFWMD's proposal to intentionally degrade the ambient water quality by reducing the freshwater flow is a clear violation of 62-302.700, F.A.C. I think you need to talk to an Administrative Law Judge about this.

SIGNIFICANT HARM

To establish the MFL for Chassahowitzka, SWFWMD adopted a "legal" definition of "significant harm" which was proferred by Gore et al. (2002) in their peer review of SWFWMD's MFL report for the Upper Peace River. Are you aware that, as of today, SWFWMD's website only has the August 25, 2002 draft report posted for the Upper Peace MFL? http://swfwmd.state.fl.us/projects/mfl/reports/upperpeacemfl1.pdf
I cannot tell whether the Peer Review Report by Gore et al is a draft or final but it can be found on SWFWMD's website at
http://swfwmd.state.fl.us/projects/mfl/reports/peace_river_review.pdf .

In any event, SWFWMD has adopted a "legal" definition of "significant harm" as a 15% loss of habitat or resource. So far as I can tell, SWFWMD is the only water management agency in Florida that has adopted this definition of "significant harm".

While it is easy to assign numbers to define "significant harm" to a resouce that can not speak for itself, perhaps defining "significant harm in human terms will provide some insight. The total loss of human life from Hurricane Katrina in Florida, Alabama, Georgia, Kentucky, Louisiana, Mississippi, and Ohio combined was 1,836. The pre-Katrina population of New Orleans was 484,674. The ratio of these two numbers indicates the total loss of human life in New Orleans due to Katrina was less than 1%. By SWFWMD's "legal" definition of "significant harm", Huricane Katrina was an extremely insignificant event for the people in New Orleans.

A geographic example of SWFWMD's "legal" definition of "significant harm" might also provide some insight. The total land area of the United States is 3,537,441 square miles. If Texas, California, Florida, and South Carolina were removed from the United States, the total land area loss to the United States would be less than 15 % and therefore be insignificant by SWFWMD's "legal"definition.

The Florida Supreme Court has held that words in a statute "must be construed according to their plain and ordinary meaning, or according to the meaning assigned to the terms by the class of persons within the purview of the statute." In 1995, an Administrative Law Judge ruled that SWFWMD is not empowered under Florida law to adopt uncommon defintions for common statutory terminology. The ALJ ruled that, in determining what is "significant harm" under section 373.042 F.S., societal interests must be taken into consideration rather than basing the determination on purely scientific levels; SWFWMD vs. Charlotte County; 774 So.2d 903 (2001). This case law can be found online at
http://scholar.google.com/scholar_case?case=11754693711888854868&q=774+So.2d+903+(2001).++&hl=en&as_sdt=40002 .

In establishing the Chassahowitzka MFL, SWFWMD clearly gave no consideration to the fact that the Chassahowitzka is an Outstanding Florida Water which is to be afforded the "highest protection" and have "no degradation of water quality". What societal interests did SWFWMD consider in establishing the Chassahowitzka MFL?

HISTORIC FLOWS AND THE NDM

During the October 6, 2010 public workshop, I believe you told us that you are a chemist. As a scientist, I hope you will agree that discarding or ignoring real measured data while attempting to model a dynamic system is generally frowned upon in the scientific community. Nonetheless, SWFWMD has discarded or ignored all USGS flow measurements for the Chassahowitzka from 1931-1996.

In your response to my October 25, 2010 comments, you stated "Total flow in the Chassahowitzka will likely never be known and Crab Creek is only one of several ungaged sources of water in the Chassahowitzka River. Most will never be routinely measured. However, flow estimated at a single location can serve as a representation of the total flow, provided the relationship(s) to the unknown flow remains relatively constant." I agree.

I hope you agree that, when establishing historic spring flows, it would be preferable to use measured flow data from springs located within 1/10 mile of each other rather than using extapolated data from a well located 15 miles away (Weeki Wachee).

I am aware that the USGS gaging station for the Chassahowitzka was apparently moved upriver sometime between 06/04/97 and 11/05/97 to exclude Crab Creek's flow. I am also aware that the Northern District Model (NDM) predicted flows presented in Figure 2-6 of your report do not include Crab Creek's flow. That is why I suggested measuring the present flow of Crab Creek alone to develop a correction factor for the older flow data that included Crab Creek. The data in Appendix B of USGS WRI 01-4230 accomplishes exactly what I was proposing. Thank you for directing me to this data. http://fl.water.usgs.gov/PDF_files/wri01_4230_knochenmus.pdf.

From 11/05/97 to 10/28/98, USGS measured flow at both the old and current gage locations. Based on that data, Crab Creek contributed approximately 40% of the average measured flow at the old gage location. Using the 40% Crab Creek correction factor and comparing the corrected historic measured flows with the NDM predicted flows we get the following results.

For 1969, the USGS measured the total flow 9 times and the mean average flow was 155.8 cfs so the corrected measured flow excluding Crab Creek would be 93.5 cfs.
The NDM predicted 68 cfs for 1967, a 27% error.

For 1971, the USGS measured the flow 8 times and the mean average flow was 134.5 cfs so the corrected measured flow excluding Crab Creek would be 80.7 cfs.
The NDM predicted 67 cfs for 1971, a 16% error.

For 1972, the USGS measured the flow 7 times and the mean average flow was 119.6 cfs so the corrected measured flow excluding Crab Creek would be 71.8 cfs.
The NDM predicted 63 cfs for 1972, a 12% error.

For 1975, the USGS measured the total flow 6 times and the mean average flow was 86 cfs so the corrected measured flow excluding Crab Creek would be 51.6 cfs.
The NDM predicted 65 cfs for 1967, a 26% error.

For 1981, the USGS measured the flow 2 times and the mean average flow was 133.5 cfs so the corrected measured flow excluding Crab Creek would be 80.1 cfs.
The NDM predicted 56 cfs for 1971, a 30% error.

For 1985, the USGS measured the flow 19 times and the mean average flow was 121.1 cfs so the corrected measured flow excluding Crab Creek would be 72.7 cfs.
The NDM predicted 88 cfs for 1972, a 21% error.

I do not know what level of accuracy SWFWMD attributes to the NDM but I think you can see why I am skeptical of any conclusions based on the NDM. As per my October 25, 2010 comments, I am aware the SWFWMD is seeking calibration data for the NDM. Obviously SWFWMD would not need calibration data for the NDM if the NDM was already calibrated. What is the stated or assumed accuracy of the NDM?

On a somewhat related topic, I noticed Dave Moore's November 18, 2010 response to Richard Bryant included some misinformation. Mr. Moore indicted the discharge from Crab Creek averaged 48.7 cfs for the period 1932-1970 based on Table 2.3 in your report. That average discharge of 48.7 cfs for Crab Creek is for 1988-1989. I suggest you replace Table 2.3 with the original table from page 65 of Champion and Starks (2001) so others are not confused.

During the October 6, 2010 public workshop, you suggested that we read SWFWMD's 2010 Regional Water Supply Plan for the Northern Planning Region. I found the April 20, 2010 draft of this document is located at
http://www.swfwmd.state.fl.us/documents/plans/RWSP/drafts/NPR-Public-Draft-4_20_10.pdf .

On page 84, SWFWMD in proposing a 7,500,000 gallon per day wellfield in southern Citrus County to supply the future consumption of Sugarmill Woods, Hernando County Utilities, and the City of Brooksville. Has SWFWMD run the NDM to predict the flow reduction to the Chassahowitzka if such a wellfield was permitted? Just curious.

I will be discussing the NDM with a hydrologist in the near future and I may have more comments on this topic after that meeting.

Brad W. Rimbey, P.E.
For the Committee

==========

From: Mike Heyl
Sent: Tuesday, January 04, 2011 11:07 AM
To: 'Brad Rimbey@CRRC'
Subject: RE: CRRC Additional Comments on SWFWMD's Recommended MFL for Chassahowitzka
Attachments: CRRC_2_response.pdf

Mr. Rimbey – Attached, please find a response to your December 9 comments on the proposed MFL for the Chassahowitzka River. Thank you for your continued interest in this matter. Your comments, along with all others received and the Districts responses will be incorporated into the next draft of the report.

MGH

==========
Michael G. Heyl - Chief Environmental Scientist
Mike.Heyl@SWFWMD.state.fl.us or Mike.Heyl@WaterMatters.org
==========

[Response begins on next page]

January 3, 2011

TO : Chassahowitzka River Restoration Committee c/o Mr. Brad Rimbey

FROM : Michael G. Heyl, Chief Environmental Scientist
Southwest Florida Water Management District

SUBJECT : Electronic Correspondence dated December 9, 2010 regarding proposed Minimum Flow and Level for Chassahowitzka River

Thank you for your comments dated December 9, 2010. With regard to the two legal issues that you raised (Outstanding Florida Water/ 62-302.700(1) F.A.C. and the statutory definition of "significant harm"), I have shared your additional comments with our legal staff who have advised me that the District is proceeding in accordance with the applicable law.

The District understands your point about using measured flow from nearby springs instead of water levels from wells, but other than sporadic measurements taken over decades and under variable climate conditions, measured daily discharge data simply does not exist. Even for those few days when we have concurrent manual measurements, the variation in flow from nearby

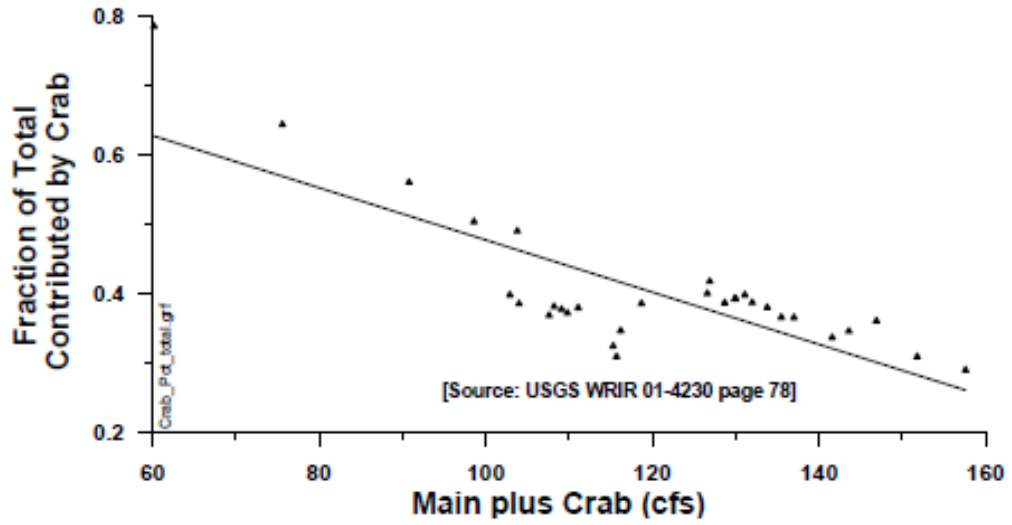


Figure 1. Fraction of flow contributed by Crab Creek to Main plus Crab Creek

springs can be significant. As you noted, there is a limited data set of overlapping Crab Creek flows and Crab plus Main flows, which suggests that on average, Crab constitutes about 40% of the combined flow. However, the range is rather large. Using the concurrent data available in Appendix B of WRIR 01-4230, Crab Creek flow ranges from 29-78% of the combined flow of Main plus Crab springs. As suggested, a constant percentage could have been estimated, but the percentage does not appear to be a constant as shown in Figure 1, which plots the

percentage of total flow (Crab plus Main) against flow from the Main spring. It should be noted that this amount of variation occurs within only four days of monitoring.

With regard to Figure 2-6 in the MFL report, these results were not generated by the Northern District Model (NDM), but rather were generated by hind casting from a regression developed from the flows that the USGS reported for the Main spring from 1997 – 2007. The regression is based on 3,260 values reported by the USGS and is included on page 18 of the November draft. (The basis of this approach is detailed in Appendix 10-1.). This regression was used to hind cast daily flows back to the beginning of the reported water levels in the Weeki Wachee well. The daily values were summarized to monthly values for Figure 2-5 and annual values for Figure 2-6. The purpose of this hind casting exercise was to develop a long-term median daily flow (63 cfs) and to provide estimates of discharge on days prior to 1997 when Mote Marine Laboratory was measuring salinity in the river. Once the median value was established and the salinity regression established, this historic flow record was not used to establish the MFL. However, it was used to establish a table of expected average five and ten-year low flows (Table 8-2) with the MFL fully used.

From a pragmatic standpoint, the salinity regression would produce the same results if Crab Creek were included, because the new regression would have coefficients reflecting the change in flow. The salinity regression used for evaluation of the biological components of the MFL was based on 493 individual measurements of salinity, coupled with river location and the daily average flow from Chassahowitzka Main. Those results are provided in line A in Table 1 below. To illustrate the point, I then added 48.7 cfs representing Crab Creek to each of the 463 Main flow readings and re-calculated the regression coefficients as indicated in row B. Note that the intercept term increased, but the coefficients for the flow term and the location term remain unchanged.

Finally, I proportionally increased the Main spring flow by 0.67 to reflect the assumption that Crab Creek represents 40% of the combined flow. In this example (Row C), the flow slope decreases proportionately. I then estimated the salinity at river kilometer 5 using each of the three forms. As you can see, the predicted salinity is the same for all three flows evaluated.

Table 1. Salinity regressions using Main spring flow, Main + 48.7 cfs and Main * 1.67

	Equation Description	bo	b1	b2	Q_{main}	Q used	R_{KM}	Salinity
A	November Report, page 41	29.375	-0.2838	-1.3678	63 =>	63	5	4.66
B	Q_{main} + 48.7 cfs	43.195	-0.2838	-1.3678	63 =>	111.7	5	4.66
C	Q_{main} * 1.67	29.375	-0.1699	-1.3678	63 =>	105.21	5	4.66
	Where Salinity = bo + b1*Flow + b2*River kilometer							

I would also like to point out that all of the fish regressions of abundance to flow developed by the Florida Fish and Wildlife Conservation Commission (FWC) for the MFL were based on the discharge from the Main spring as reported by USGS. (For details on the development of these response curves, please see Chapter 10.10 in the appendices.) Crab Creek flows were not included in the analysis by FWC because daily flows for Crab Creek are not available.

Numerical models are always refined as more data becomes available through time. There is currently sufficient information to properly conceptualize and simulate the groundwater system in Hernando and Citrus Counties in the groundwater flow model even as more information is added to the model in the future.

To clarify, a hydrodynamic model was used to establish the habitat (salinity and temperature) MFL metrics. The model used is supported by the United States Environmental Protection Agency (USEPA) and is a three-dimensional model named Environmental Fluid Dynamics Code, or EFDC for short. The model contains 6,556 volumetric cells and runs on a 5-second time step. USGS reported salinity, temperature and stage at 15 minute intervals, and daily discharge from the Main spring is input to the model along with constant discharge from the literature are input for Crab Creek (48.7 cfs), Baird (5.7 cfs), Potter (18.6 cfs), Beteejay(6.4 cfs) and Blue Run springs (6.6 cfs) (See Appendix 10.13 for additional details). The acute thermal refuge determined with the EFDC model was the most sensitive metric evaluated and is the basis for the proposed MFL.

With regard to your inquiry about the dates reported in Table 2.3, you are correct. Thank you for pointing this out. The table will be corrected in the final report.

As you pointed out, the District's 2010 Regional Water Supply Plan does identify a 7.5 mgd wellfield in southern Citrus County. The Withlacoochee Regional Water Supply Authority is considering a wellfield in southern Citrus County in the next 20 years. The planned wellfield in Citrus County is described in the "Withlacoochee Regional Water Supply Authority Phase II – Detailed Water Supply Feasibility Analyses" which was completed by Water Resource Associates, Inc. in 2010 for the Withlacoochee Regional Water Supply Authority. A water resource impact evaluation of this facility was completed by the consultant for the Authority and is included in the feasibility analyses report. As a reminder, any new use of groundwater that meets the Chapter 40D-2 F.A.C. thresholds requires a water use permit from the SWFWMD. The rules of issuance for water use permits must be met before approval of this facility can move forward.

assess
cfs.

al

River

ent

rence

r flow
tions.
ady-
ab
reda,
re
um flow

assessment to determine the level of existing impact to a water resource feature.

The NDM was calibrated by matching water levels from 295 wells within the model domain. Baseflow from major rivers and spring flow from 93 springs were also matched during the calibration process. The recharge applied in the NDM was also derived based on radar estimated rainfall, land use, soils, and depth to water table information. The NDM calibration report contains additional detailed information on the model calibration (Hydrogeologic, Inc., 2008).

[1] Sepulveda, N. 2002. Simulation of Ground-Water Flow in the Intermediate and Floridan Aquifer Systems in Peninsular Florida, U.S. Geological Survey WRI Report 02-4009, 130 p.

==========
From: Mike Heyl
Sent: Tuesday, December 14, 2010 2:00 PM
To: 'Brad Rimbey@CRRC'
Cc: Marty Kelly
Subject: NDM comparisons - 12/9/2010 Correspondence

Mr. Rimbey – I am working on a response to your recent correspondence in which you quote annual average Chassahowitzka Main + Crab Creek flows for the years 1969, 1971, 1972, 1975, 1981 and 1985. Could you identify the source of those observations? I have identified some instantaneous measurements (not corrected for full tide cycle) in the USGS water quality database and in the USGS field measurements database, but the average values do not match the ones you cited and in other cases the number of observations differs from your source.

Along the same lines, what is the source of the NDM predictions that you cited? I am unaware of any NDM model results for those earlier years.

Thanks in advance.
MGH

==========
From: Brad Rimbey@CRRC [BWR.CRRC@tampabay.rr.com]
Sent: Tuesday, December 14, 2010 2:59 PM
To: Mike Heyl
Subject: Re: NDM comparisons - 12/9/2010 Correspondence
Attachments: 1981 WRD.pdf; 1969 WRD.pdf; 1971 WRD.pdf; 1972 WRD.pdf; 1975 WRD.pdf;
1985 - 1998 USGS WRI 01-4232.pdf

Mike,

Attached are the flow measurements I referenced. I realize they are sampling data and not tide cycle corrected. However, assuming they were taken randomly (i.e. with no attempt to measure at a particular tidal stage), applying Monte Carlo technique should result in a non-tidally influenced result.

As stated in my correspondence, I am using Figure 2-6 from your report for the NDM predictions from 1967 - 2007.

Let me know if you need anything else.

See you Thursday at the workshop.

Brad Rimbey

==========
From: Mike Heyl
Sent: Wednesday, December 15, 2010 9:18 AM
To: 'Brad Rimbey@CRRC'

Subject: RE: NDM comparisons - 12/9/2010 Correspondence

Mr. Rimbey – Thanks so much for the quick response. I will respond more fully in writing to your latest inquiry, but I did want to point out that Figure 2-6 in the report is unrelated to the NDM. It is simply an application of the regression equation described on page 18 (November draft) to hind cast discharge from the Main spring. The details of development are included in Appendix 1 of the report, but in summary since I did not have historic stage, I could not use equation 7 in Table 1 of WRIR 01-4230 to predict discharge prior to 1997. What I did have in the way of data was 3,260 daily discharge values reported by USGS downstream of the Main spring. I used that data to develop the regression listed on page 18. I should point out that the only MLF application of this baseline flow record was to develop a median flow for the period. The median flow value was then used to assess changes in fish/invertebrates, benthos, mollusc and submerged vegetation. Salinity and thermal habitat were assessed using a hydrodynamic model. The NDM results were use for the sole purpose of establishing the discharge impact due to current withdrawals.

Lack of historic stage is also the reason I could not hind cast Crab Creek discharge from equation 8. Note that the USGS equation incorporates not just an instantaneous stage, but also a rate of change. The later would require not just a single measurement of stage, but also multiple measurements within each day from which a corresponding rate of change could be developed.

Look forward to seeing you tomorrow.

MGH

==========

From: Brad Rimbey@CRRC [BWR.CRRC@tampabay.rr.com]
Sent: Wednesday, December 15, 2010 11:45 AM
To: Mike Heyl
Subject: Re: NDM comparisons - 12/9/2010 Correspondence

Mike,

Thanks for the clarification on the source of data depicted in Figure 2-6. However, this begs the obvious question - why did you not use the NDM to predict the historic flows of the Chassahowitzka?
As I understand it, SWFWMD believes the NDM provides "the best information available" to predict the historic and future flows on the Chassahowitzka. If Ron Basso is able to use the NDM to conclude that all groundwater pumping has resulted in a flow reduction of less than 1% of the historic flow of the Chassahowitzka, the NDM must be capable of predicting the historic flow of the Chassahowitzka.

Brad Rimbey
for the Chassahowitzka River Restoration Committee.

==========

From: Brad Rimbey [mailto:brimbey3@gmail.com]
Sent: Tuesday, March 08, 2011 10:23 AM

To: Marty Kelly
Subject: SWFWMD Modeling of Sea Level Rise Effects on Coastal River Salinity

Dear Dr. Kelly,

Yesterday I attended SWFWMD's Environmental Advisory Committee meeting in Tampa and heard your presentation on Modeling Used in Assessing MFL's. I found your comment that SWFWMD is currently assessing the effect of anticipated future sea level rise on the salinity of our coastal rivers particularly interesting. Given the District's policy of establishing MFL's based solely on human impact to the resource while ignoring the negative effects of past sea level rise, why is the District now concerned with anticipated future sea level rise?

I suggest the District should also model the effect of past sea level rise to see if the modeling accurately predicts the salinity increases which have already occurred in our rivers. Historic salinity levels should be attainable indirectly by observing where oysters and barnacles have been found in years past versus present. Also, observing where the hydric hammock was alive and healthy just 6 years ago versus where the hydric hammock is now dead should provide useful historic information for your modeling.

I look forward to hearing from you.

Brad W. Rimbey, P.E.
for the Chassahowitzka River Restoration Committee

==========
From: Marty Kelly
Sent: Wednesday, March 09, 2011 8:06 AM
To: Brad Rimbey
Cc: Mike Heyl; Doug Leeper
Subject: RE: SWFWMD Modeling of Sea Level Rise Effects on Coastal River Salinity

Brad,

Thanks for your interest in the presentation and the sea level rise discussion. As I noted in the meeting, we are interested in the potential changes that might occur to some of our coastal rivers as sea level continues to rise. While there is a lot of uncertainty at the rate of increase as I showed in one of the slides, it should be possible with the existing hydrodynamics models we have on a number of our coastal rivers to at least get a sense of the salinity changes that might occur as sea levels increase.
Since we are currently working on the Chassahowitzka, Homosassa, and lower Withlacoochee Rivers, we think it would be informative to investigate a few scenarios. Right now we have asked our consultants to give us an estimate of the costs for making some additional model runs. Tentatively, we're considering modeling 2", 6" and 12" increase scenarios. At the current rate of sea level rise (approximately 2 mm per year), we might expect to see a 0.8 inch increase in sea level over the next ten years. If the rate of increase stays relatively constant, the 2,6 and 12 inch scenarios would represent an approx. 25, 75 and 125 year projection. If the rate doubles then the projections would be more on the order 10 to 60 years.
We anticipate running the models as currently calibrated, with the existing flows as discussed in each river's MFL report for the Homosassa and Chassahowitzka, and for the period 1995-1999 on the lower Withlacoochee. Since these models are already in

place, we essentially have a 0 inch increase in sea level for the modeled periods. Since you brought up the issue of historic sea level, it would probably be possible to run, for example, a negative 2 inch (-2 inch) scenario, and thus get a sense of salinity when sea level was 2 inches lower (approximately 25 years ago) assuming flows from the spring were similar to existing conditions.

I appreciate your interest, and would be happy to discuss with you further. My contact information including telephone number are listed below.

Thanks,
Marty
Martin H. Kelly, Ph.D.
Minimum Flows and Levels Program Director
Resource Projects Department
Phone: (352) 796-7211 Ext. 4235
==========
From: Brad Rimbey [mailto:brimbey3@gmail.com]
Sent: Wednesday, March 09, 2011 11:39 AM
To: Marty Kelly
Cc: Doug Leeper; Mike Heyl
Subject: Re: SWFWMD Modeling of Sea Level Rise Effects on Coastal River Salinity

Marty - Thanks for your prompt response. I appreciate the need for modeling sea level rise and its effect on the salinity of our rivers and I appreciate the District's willingness to do some predictive modeling on this important issue. What I was hoping to have answered is why the District is doing this study. Is it part of the MFL program or is it just for increasing the general knowledge of the anticipated effects of climate change?

As Mike Heyl can attest, I question whether the models for the Chassahowitzka are, in fact, currently calibrated. I was recently copied on an email from Mike Heyl to Michael Czerwinski regarding the movement of the 5 ppt isohale on the Chassahowitzka under the proposed MFL 11% reduction. The modeling predicted the 5 ppt isohale would only move upriver 0.2 km (660 feet) with an 11% freshwater flow reduction. Without "laying pencil to paper", this simply does not sound right.

As represented in the attached slide from Mike Heyl's public workshop(s), the location of the Chassahowitzka 5 ppt isohale is downriver (west) from the western-most cabins which are located just east of the Refuge's eastern boundary on the river. However, oysters are now thriving on the dock pilings of these cabins upriver. I am not a crustacean expert but a quick Internet search indicates the lower salinity tolerance for oysters is 5 ppt. Based on this biological observation, it appears the 5 ppt isohale is already more than 660 feet upriver from where it is shown on the attached slide.

I am currently out-of-state for several weeks. Perhaps we can discuss this more when I return. In the meantime, could you please email the answer to my question regarding why the District is doing the sea level rise modeling?

Thanks,

Brad Rimbey

==========
From: Marty Kelly

Sent: Thursday, March 10, 2011 8:58 AM
To: Brad Rimbey
Cc: Doug Leeper; Mike Heyl
Subject: RE: SWFWMD Modeling of Sea Level Rise Effects on Coastal River Salinity

Brad,

In response to your question, I view the modeling as a logical extension of our MFL work. Since salinity in the MFL study areas is literally a function of the mixing of saline and freshwater, the relative increase and/or decrease of either will affect the end salinity. Although MFLs are derived based on changes in the current baseline condition due to withdrawals, if the future baseline changes then the impact of any future withdrawals will be a affected by the changed baseline. Since the tools are in place (i.e., the hydrodynamic models), it seems reasonable to investigate how sea level rise may influence baseline conditions. While it would increase the general knowledge of the anticipated effects of sea level rise in particular (acknowledging all the uncertainty that goes along with it), I think it is a relevant MFL question to anticipate. Please don't hesitate to call when you get back in town.

Marty

==========

From: Brad Rimbey@CRRC [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Monday, May 09, 2011 2:34 PM
To: Dave Moore; Mitchell A. Newberger; Marty Kelly; Mark Hammond; Bruce Wirth; Cara S. Martin
Subject: Re: Misdirected letter

Mr. Moore,

All general correspondence which is intended for the current Chassahowitzka River Restoration Committee should be emailed to BWR.CRRC@tampabay.rr.com or mailed to my attention at 10028 S. Riviera Pt., Homosassa, FL 34448-5311. The street address given by Mr. Newberger is incorrect.

You may recall that on November 12, 2010, I emailed you a PDF copy of a petition with over 400 signatures opposing SWFWMD's MFL plan for the Chassahowitzka River. Attached is a PDF copy of the same petition with 165 additional opposition signatures.

Brad W. Rimbey, PE
for the Chassahowitzka River Restoration Committee

==========

From: Brad Rimbey@CRRC [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Wednesday, May 25, 2011 3:44 PM
To: Dave Moore
Subject: Public Records Request for Chassahowitzka Propsed MFL Documents

Dear Mr. Moore,

Attached is a public records request pertaining to SWFWMD's proposed MFL for the Chassahowitzka River. Please acknowledge receipt of this email and its attachment so that I do not have to snail mail you a copy. Thank you in advance for your assistance.

Brad W. Rimbey, PE

for the Chassahowitzka River Restoration Committee
IMPORTANT NOTICE: All E-mail sent to or from this address are public record and archived. The Southwest Florida Water Management District does not allow use of District equipment and E-mail facilities for non-District business purposes.

==========

----- Original Message -----
From: Dave Moore
To: Brad Rimbey@CRRC
Cc: Bill Bilenky ; Pam Gifford
Sent: Wednesday, May 25, 2011 3:49 PM
Subject: RE: Public Records Request for Chassahowitzka Propsed MFL Documents

Mr. Rimbey – I have received your request and forwarded to our General Counsel to ensure the appropriate staff are responsive to your request.

==========

From: Brad Rimbey@CRRC [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Wednesday, June 15, 2011 3:28 PM
To: Ron Basso
Cc: Bill Bilenky
Subject: Chass Springshed Groundwater Withdrawals and Well Permits

Ron,

It was a pleasure speaking with you after last week's Springs Coast MFL Workshop.

Attached is a pdf of a slide which you presented during the second Chassahowitzka MFL public workshop on December 16, 2010. I would like to receive tabular data related to the attached graphic. Specifically, I would like to know

1) What was the actual daily average groundwater withdrawal rate (in MGD) from each of the wells (dots) represented on the attached slide?
2) What was the maximum daily average of ground water (in MGD) which was permitted from each well (dot) represented on the attached slide?
3) What was the permit number for each well (dot) represented on the attached slide? (please identify each dot by permit number on a similar graphic)
4) What was the project site name for each well (dot) represented on the attached slide?
5) What the owner's name and who was the permittee for each well permit (dot) represented on the attached slide?
6) What was the issue date and what was the expiration date of each well permit (dot) represented on the attached slide?
7) What was the water use designation of each well permit (dot) represented on the attached slide?
8) What is the drought quantity, max quantity, and peak quantity, for each well permit (dot) on the attached slide?

Since the data on the attached slide was approximately 5 years old when it was presented to the public on December 16, 2010, I would like to see an updated version which reflects all of the requested information as of today's date (June 15, 2011). Please provide this information well in advance of your presentation at the next Springs Coast MFL workshop in late July.

Thank you.

Brad W. Rimbey, PE
Springs Coast MFL Panel Member representing the Chassahowitzka River Restoration Committee

==========

From: Ron Basso
To: Brad Rimbey@CRRC
Cc: Bill Bilenky ; Mike Kelley ; Pam Gifford ; Mark Barcelo ; Brent Whitley
Sent: Friday, June 17, 2011 10:03 AM
Subject: RE: Chass Springshed Groundwater Withdrawals and Well Permits

Brad:

We import an Arcmap GIS shapefile from a database of water use permitted wells into the GWVs model software. I've included the shapefile in the attached zip file. Since I doubt you have ESRI GIS software, you can open the *.dbf file in MS Excel. Once you do, you'll find our estimated and metered data (by well) for the WUPs. Most of the fields are self-explanatory except for the withdrawal point. Here is how that is deciphered:

For Example: SW0022240070005 Withdrawal Point (WUP Well)

'SW' 002224 = WATER USE PERMIT #; 007 = REVISION #; 0005 = WITHDRAWAL #

Here are some other field definitions:

N	line number
LONG	longitude, negative decimal degrees, NAD_1983_HARN_UTM_Zone_17N
LAT	latitude, decimal degrees, NAD_1983_HARN_UTM_Zone_17N
ID	concatenation of 'SW', Permit# (6 spaces) Revision# (3 spaces) and Withdrawal# (4 spaces)
W_TYPE	withdrawal type (G ground water or S surface water)
DIAMETER	diameter of withdrawal pipe in inches
CS_DEPTH	depth of well casing in feet below land surface elevation (~40% are estimated)
DEPTH	depth of well in feet below land surface elevation (~5% are estimated)
M_E	metered (M) or estimated (E) pumping rates
USETYPE	general use type (A agricultural, IC industrial/commercial, MD mining/dewatering, P public supply, R recreation)
USE_CODE	specific use types (a list of the 165 codes is available)
AVG_CFD	2006 permitted maximum average pumping for the withdrawal (annual) in cubic feet per day (CFD)
TOT_CFD	2006 permitted maximum average pumping for the permit (annual, all withdrawals) CFD
MAX_CFD	2006 permitted maximum pumping for the withdrawal (one day) CFD
Q92CFD-Q06CFD	average annual estimated/metered pumping, 1992-2006, negative indicates a withdrawal (CFD)
Q06MGD	2006 average annual estimated/metered pumping in MGD (for mapping)
NAME	permittee or project name
BUFF95	extraneous buffering column for map graphics

In response to an earlier request, I'm also sending you our internal memorandum on mining consumptive use and how these quantities were reduced in the model to account for consumptive use. In addition, I pulled the present day WUP information (by permit) for the Chassahowitzka springshed late last year for Mickey Newberger, which is included. Once you have the permit

number, you can query our WMIS on our internet site for specific information regarding each permit.

Finally, I pulled the major public supply metered data in Citrus and Hernando Counties so that you can see the history of withdrawals and how they've changed since 2005. You'll see that these withdrawals are generally lower now in 2010 than they were in 2005.

Ron Basso, P.G.
Senior Professional Geologist

==========
From: Brad Rimbey@CRRC [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Friday, June 17, 2011 5:28 PM
To: Ron Basso
Subject: Re: Chass Springshed Groundwater Withdrawals and Well Permits

Thanks Ron. Between what you supplied and WMIS, I should be able to find the information I requested.

I have one other request. As we discussed after the Springs Coast MFL workshop, I would like to know what the NDM presently predicts as the flow rate for each of the springs in the Chassahowitzka Springs Group (Chass Main, Chass #1, Chass #2, Crab, Lettuce, Baird, Snapper Hole, Salt, Potter, Ruth, Johnson, Betty Jay, Rita Marie, Blue Run, Ryle, and Blind). I would prefer to get the data as a pdf file. I think this is a simple request. Let me know if you believe otherwise.

Brad Rimbey
(813) 417-9453

==========
From: Ron Basso
To: Brad Rimbey@CRRC
Sent: Monday, June 20, 2011 8:35 AM
Subject: RE: Chass Springshed Groundwater Withdrawals and Well Permits

Brad:

We actively simulate the Chassahowitzka Springs Group using drain cells for Chassahowitzka, Potter (which includes Ruth), and Crab springs. Attached are the calibration statistics for 1995 average annual flows from Version 2 of the NDM.

Ron Basso, P.G.
Senior Professional Geologist

==========
From: Brad Rimbey [mailto:brimbey3@gmail.com]
Sent: Monday, June 20, 2011 3:06 PM
To: Ron Basso
Subject: Re: Chass Springshed Groundwater Withdrawals and Well Permits

Thanks Ron but the table you attached is not really what I asked for. Can you generate a table which shows the present NDM simulated spring discharges from all the springs I listed in the Chassahowitzka Springs Group? Attached is a page from Mike Heyl's MFL report for the

Chassahowitzka which shows most of the springs in the Chassahowitzka Group. Blind Spring and Snapper Hole are not shown but should be included in the Group.
I do not believe I have previously seen the table which you attached. Could you give me the name of the document that this table came from? Did you include this document in the material which you provided in response to my recent public records request? Is this document available online?
Brad Rimbey

==========

From: Ron Basso
To: Brad Rimbey
Sent: Monday, June 20, 2011 3:36 PM
Subject: RE: Chass Springshed Groundwater Withdrawals and Well Permits

Brad:

I'm not sure we're communicating here. Why don't you call me and let's discuss. The NDM is calibrated to 1995 conditions (i.e. this is the table I sent you today from the ND Version 2.0 report). I sent you both version 1 and 2 reports (as pdf documents) in your public records request so you can access that table and the version 1 table which shows how well we matched the 1995 data. We don't simulate all the spring discharges in the NDM other than the ones I listed previously (Crab, Chassahowitzka Main, and Potter/Ruth) so there is no data for many of the small springs. I'm not sure what you mean when you say model the discharges presently. We have a transient simulation that we just updated through 2006 which runs on a monthly basis from 1996 through 2006. I have attached a figure showing you how the model performs matching historical data from Chassahowitzka main spring from 1996 – 2006 using the latest version (No. 3) of the model (report not finalized yet).

Ron Basso, P.G.
Senior Professional Geologist

==========

From: Brad Rimbey
To: Ron.Basso@swfwmd.state.fl.us
Sent: Friday, June 24, 2011 11:09 AM
Subject: Fw: Chass Springshed Groundwater Withdrawals and Well Permits

Ron,

I found the NDM Version 2 report on a DVD-R that Pam Gifford gave me. Thanks for providing it.

I looked up the source for the "Observed Flow" data in Table 4.7 which you provided via email. Are you aware that all of the 1993-1994 "observed" flows in Table 4.7 are actually 1993-1994 flow estimates for Chassahowitzka? The 1993-1994 flow estimates for Chassahowitzka were proffered in Table 12 and Appendix C of USGS WRI 02-4009 by Nicasio Sepulveda. The estimated flows for Chassahowitzka were supposedly 70% of the average measured flows reported in USGS WRI 92-4069 by Dan Yobbi. However, some of the estimated flows for Chassahowitzka are not 70% of Yobbi's 1988-1989 average measured flows. Sepulveda does not explain the rationale for estimating the 1993-1994 flows as 70% of Yobbi's 1988-1989 flow measurements.

Table 4.7 of the NDM Version 2 report takes the data which Sepulveda represents as "Measured or Estimated Flow" and misrepresents it as "Observed Flow". Table 4.7 then shows only a 1% to

3% error between "observed flows" and "simulated flows" for Chassahowitzka. In reality, Table 4.7 is showing a 1% to 3% error between estimated flows and simulated flows in Chassahowitzka. From my perspective, this is meaningless.

The sparse spring flow measurements which Yobbi made in Chassahowitzka are now over 22 years old. They need to be updated. As we discussed after the June 8 workshop, I would be willing to volunteer my time to make periodic flow and conductivity measurements at Chassahowitzka's many springs. I recognize the need for accuracy in the NDM simulations and the NDM cannot be considered accurate without current and accurate data.

In 1992, Dan Yobbi succinctly stated "The coastal-springs area is a small but important segment of a large ground-water flow system. Results out of this study demonstrate that the chemical quality and flow rate of springs depend on the head in the Upper Floridan aquifer. Continued development of ground-water resources within the coastal-springs ground-water basin will modify flow and chemical characteristics of springs and downstream estuaries. Long-term monitoring at selected springs is needed to assess the long term effects of human activities."

I have attached a table which shows the average of flow measurements made by Yobbi in 1988-1989 and the estimated average flows which were represented as observed flows in the NDM Version 2 report. I'll call later today to discuss.

Brad W. Rimbey, PE

==========

From: Brad Rimbey [mailto:brimbey3@tampabay.rr.com]
Sent: Friday, July 01, 2011 8:33 AM
To: Ron Basso
Cc: Marty Kelly
Subject: Fw: Chass Springshed Groundwater Withdrawals and Well Permits

Ron,

Thanks for talking to me on Monday. I now have a much better understanding of the NDM and its limitations.

Wednesday I made a boat trip to the head spring of Blind Creek. This was my first trip to this remote spring. As you know, Blind Creek is included in the Chassahowitzka MFL. What I observed was, by all appearances, a dead spring. The water was turbid and saline. There was no discernable temperature difference between the surface water at the spring and the surface water 1/2 mile downstream in Blind Creek. The maximum depth reading at the spring was 56 feet. Clearly, this was once a large spring.

As indicated in the table I emailed to you last Friday (Flow Measurements in the Chassahowitzka Spring Group), the flow from Blind Spring was measured by USGS in 1961 at 50.3 cfs. Sepulveda estimated the 1993-1994 flow from Blind Spring at 42.7 cfs (USGS WRI 02-4009). Table 4.7 of the NDM Version 2 report indicates a 0% error between the "observed" and NDM simulated flows for Blind Spring. According to Table 4.7, Blind Spring was the second largest spring in the Chassahowitzka Spring Group in 1993-1994.

Based on Table 4.7, the combined "Observed Flow" for the listed springs in the Chassahowitzka Spring Group was 180.4 cfs. Therefore, Blind Spring contributed over 23% of the "Observed Flow" used in the NDM version 2 calibration for the Chassahowitzka Spring Group. However, Blind Spring is not included in the spring flows which you simulate with the NDM. I do not understand how can you claim the NDM is accurate within 2% when you do not simulate a spring

which contributed 23% of the "Observed Flow" used in the calibration of the NDM for the Chassahowitzka Spring Group.

I understand the NDM was used in the Chassahowitzka MFL process solely to evaluate human impact on spring flows. I also understand that the NDM predicts approximately a 1% flow reduction due to human impact on Chass Main, Crab, and Potter/Ruth springs. What would be the total human impact on the Chassahowitzka Spring Group if you included the collapse of Blind Spring? Do you have any reason to believe the collapse of Blind Spring was due to anything other than human impact from groundwater withdrawals?

Most people think the loss of a 2nd magnitude spring is a pretty big deal. The loss of Kissengen Spring in Polk County and White Sulphur Spring in Hamilton County certainly got allot of attention. Perhaps the loss of Blind Spring would receive more attention if we too were left with a hole in the ground instead of a spring pool filled with saltwater. However, this is nature of demise in our spring-fed coastal rivers.

If you have not seen it, Cynthia Barnett's recent article in the St. Pete Times on White Sulphur Springs is worth reading http://www.tampabay.com/blogs/alleyes/content/suwannee-river-drought .

I am copying Marty Kelly on this because it seems fundamental to the way the NDM was used in establishing the Chassahowitzka MFL. Thanks again for your time.

Brad W. Rimbey, PE

==========

From: Brad Rimbey@CRRC
To: Ron.Basso@swfwmd.state.fl.us
Cc: Brent Whitley ; Mickey Newberger ; Ron Miller ; Martyn Johnson ; Norman Hopkins ; Dan Hilliard ; Al Grubman ; Todd Kincaid ; BKnight@FloridaSpringsInstitute.org
Sent: Thursday, January 26, 2012 12:57 PM
Subject: Springs Coast MFL Question

Hi Ron,

On July 8, 2011, Ron Miller emailed a list of questions to you regarding the Homosassa MFL. On July 13, 2011, you replied to Mr. Miller's email with the attached M$ Word document. In response to Mr. Miller's question "What happens to the Homosassa Springs when the Chassahowitzka is drawn down by 11%?", you replied "Since the allowable flow has been proposed at five percent for Homosassa Spring it is likely that this will limit groundwater withdrawals in the area so impacts to the Chassahowitzka will never reach 11%."

I understood your response to be an acknowledgment of the interconnection between the Homosassa and Chassahowitzka springsheds and that drawing down Chassahowitzka by 11% would result in greater than a 5% draw down of Homosassa. Please correct me if I am mistaken. Since the USGS Weeki Wachee well level is being used in the USGS regression equations to calculate flow for both Chassahowitzka and Homosassa, both rivers are obviously connected to Weeki Wachee's springshed too.

The Weeki Wachee MFL has already been adopted at 90% of the natural flow. SWFWMD's baseline flow for the Weeki Wachee MFL evaluation was 162 cfs. The Scientific Peer Review of the Proposed Minimum Flows and Levels for the Weeki Wachee River System dated July 31, 2008 indicates that existing human usage is presently at or near the 10%

recommended limit so little or no additional flow reductions should be allowed from groundwater use http://www.swfwmd.state.fl.us/projects/mfl/reports/weeki_wachee_mfl_with_peer_review.pdf .

As you know, Weeki Wachee's springshed is directly adjacent and to and south of Chassahowitzka's springshed. As Weeki Wachee's groundwater supply is reduced, it seems that some of Chassahowitzka's historic groundwater supply would flow south until a state of quasi-equilibrium is reached. Assuming you agree, do you know how long it would take for a state of quasi-equilibrium to be achieved between the Weeki Wachee and Chassahowitzka springsheds?

In your Technical Memorandum dated December 1, 2008 http://www.swfwmd.state.fl.us/projects/mfl/reports/Chass_Appendices-section2.pdf , you indicated the NDM "projected reduction to Chassahowitzka Springs discharge due to current groundwater withdrawals of 0.7 cfs or about one percent of mean annual spring flow." SWFWMD's baseline flow for the Chassahowitzka MFL evaluation was 63 cfs. If groundwater use has already reduced Weeki Wachee's 162 cfs baseline flow by nearly 10%, how can Chassahowitzka's 63 cfs baseline flow have been reduced by less than 1%? Even if we ignore the impact of groundwater pumping within Chassahowitzka's springshed, it seems that feeding the sizeable deficit created by groundwater pumping in Weeki Wachee's springshed would account for more than a 1% flow reduction in the relatively tiny Chassahowitzka.

As always, I look forward to your response.

Brad W. Rimbey, P.E.

11.18.9 Dame, Douglas

From: Douglas Dame [mailto:doug_dame@yahoo.com]
Sent: Monday, May 09, 2011 2:47 PM
To: Doug Leeper
Subject: Re: Springs Coast Minimum Flows Workshops - Mailing Address Request

Mr. Leeper:

Keep up the good work !

I wish the District was putting even more resources into this important science to inform policy-making, but under the circumstances very happy that you all are able to keep going.

Douglas Dame
5718 Riverside Dr
Yankeetown, FL 34498

I have a Q, which you can skip if the answer is very complicated or long .... Do/will the plans for studies of these coastal spring-fed systems include much evaluation of the impact ofthese freshwater flows on the super productive near-shore marine nursery areas, etc ?

(Background for the question: The impression I got from a workshop on the Chas was that the
working assumption, more or less, was that that the size&volume of the "brackish transition zone" (so to speak) in the Chas would be be relatively stable, it'd just move upstream or downstream in the river channel based on changing conditions. This makes sense to me if I think of the river as an irregular tube connecting a source of 0ppm water to a source of 28-35ppm salt water ... the mixing options are limited and constrained. But as a total amateur, I'm not sure that also going to be true in more open estuarine areas, where the mixing options are much more complex. Reductions in the volume of outflowing fresh water could ... arguably ... significantly affect the volume and area of low-salinity regimes on a wide-spread basis, with a resulting impact on the productivity of the near-shore areas ... areas that are very important biologically, for recreation, economically, and for quality of life.)

And a suggestion for future public workshops: stress the limitations of your authority. At the workshops I have attended, the public has done much gnashing of teeth about environmental concerns, which are legitimate, but outside of the scope of what you can do, per my understanding. You could even have a second slide show running all the time during a public workshop, flipping between slides of "What the District is Empowered to Do" and "What the District is NOT empowered to do."

regards

Doug Dame
until recently, Councilman, Town of Yankeetown

From: Doug Leeper
To: "Douglas Dame"
Bcc: Marty Kelly; Sid Flannery; Mike Heyl
Subject: RE: Springs Coast Minimum Flows Workshops - Mailing Address Request
Date: Wednesday, May 11, 2011 1:02:47 PM

Mr. Dame:

Thanks for providing your mailing address, your words of encouragement, and suggestions for future public workshops.

In response to your question about near-shore regions of the Springs Coast, I would note that modeling of salinity changes in the marsh and sea grass habitats adjacent to the mouths of coastal rivers of the Springs Coast has not, for the most part, been included in the analyses supporting minimum flows development for the spring-flow dominated rivers of the area. Our salinity-habitat modeling has focused primarily on the lower salinity zones in the river channels that we know are directly related and sensitive to changes in spring discharge. By protecting these most sensitive habitats, we believe that the downstream habitats that are more influenced by the Gulf and localized circulation patterns should experience even less change. I should note, however, that our analyses have included evaluations of the potential effects of flow reductions on fish and invertebrate species that are resident in the river systems and those that use the systems and near-shore areas for spawning and feeding. I should also note that we agree that additional investigation of potential impacts of flow reductions on near-shore areas of the Springs Coast is a subject that may warrant further consideration in the future.

Thanks again for your support.

Douglas A. Leeper, Chief Environmental Scientist
Resource Projects Department, Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604-6899
Telephone: 1-800-423-1476, ext. 4272 (FL only) or 352-796-7211, ext. 4272
Fax: 352-754-6885
E-Mail: doug.leeper@watermatters.org
Web Site: watermatters.org

11.18.10 Gourlie, Jessie

From: Mike Heyl
Sent: Tuesday, May 04, 2010 7:59 AM
To: 'gourliej@thirdplanetwindpower.com'
Cc: Sid Flannery
Subject: FW: Hello! (Chassahowitzka)

Jessie – As you can see from the thread, Sid Flannery forwarded your inquiry to me. I am the
project manager for the Chassahowitzka minimum flow and level project and we just completed a draft of a report on the same subject. You may download a copy from our website at: http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.html

Your observations about flow are correct – the flow in the Chassahowitzka has declined but it appears to be due to climate changes and not groundwater pumpage. As part of the study, the District evaluated the impact of current pumpage using a surface/groundwater model and concluded that the loss attributable to pumpage is on the order of 0.7 cfs.

Doug Leeper (a coworker of Sid and I) attempted to quantify the tree mortality using the District's GIS coverage, but the resolution was insufficient. Nevertheless, tree die-off has been documented throughout the Gulf and elsewhere. I am not conversant with that literature, but as I understand it there is no single factor that accounts for all of the observed mortality. But do keep in mind that the west central Florida has experienced some severe droughts during the last two decades and it is likely that this has contributed.

I hope this helps to answer your questions.

MGH

==========
From: Jessie Gourlie [mailto:gourliej@thirdplanetwindpower.com]
Sent: Friday, March 12, 2010 1:09 PM
To: Sid Flannery
Subject: Hello!

Hi Sid!

This is a blast from the past !! (I'm formerly known as Nancy Gourlie!) – do you remember from grad school? I now live in CO but am visiting my sis on Chassahowitzka (I become a snow bird in March!).

Anyway, I saw that you gave a presentation last night in Homosassa relative to a flow report. The very brief article I read indicated the Homosassa springs flow has dropped from 101.1 cfs to 75 cfs since 1996. I've been wondering about the same information for

the Chass main spring – is USGS or SWFWMD monitoring flows and water quality here? Is there a report you could direct me to? It seems that flows have dropped and water clarity is reduced over the past several years. I was hoping the new required sewer system would help with water quality but that's not visibly obvious yet.
Also, it seems possible that there may be increased salinity in what were previously fresher water systems (which would make sense if spring flows have dropped). I noticed last spring that many trees along the river shoreline and up spring fed creeks near the river mouth were dead or dying, and we've been seeing more salt water fish species up river that I have not seen before (snook, ladyfish, etc). Is salinity increasing in the river?
Finally, you probably heard about the college student who drowned in a spring cave last Saturday nite. This is the 2nd such death. One of the main problems is that people are able to directly access the river very near these caves by walking down a road and crossing over SWFWMD land. It seems that a fence at the end of the road leading to SWFWMD land could curtail such easy access to a dangerous area.
Glad to see you're still doing great things for Florida! I'm really enjoying developing wind projects in the west. Hope all is well!

Thanks,
Jessie Gourlie

Best Regards,
Jessie Gourlie
Manager, Environmental Services
Project Developer

Littleton, CO 80127
303.903.7133 (cell)
gourliej@thirdplanetwindpower.com

11.18.11 Howie, Janice

November 8, 2011

To the Governing Board of the South West Florida Water Management District:

Re: MFL proposals for the Chassahowitzka and Homosassa Rivers

We the undersigned urge you to **not accept** the Minimum Flow Level (MFL) proposals that the South West Florida Water Management District (SWFWMD) staff will recommend for your approval. While we recognize that a great deal of work and expense went into determining these proposals, we feel that these will do serious damage to the Chassahowitzka and Homosassa Rivers. These rivers and the springs that feed them are unique Florida treasures that have important economic and recreational significance for their communities.

- The current proposal to withdraw 11% of the flow from the Chassahowitzka and 5% of the flow from the Homosassa would by SWFWMD's determination, degrade these rivers and their environments up to 15%, causing "significant harm" to them. This 15% figure is not a scientific one, and is not acceptable.
- Both the Chassahowitzka and the Homosassa been given "Outstanding Florida Waterways" status by the state of Florida, and as such are entitled to special protections by the Florida Statute and Administrative Code. The proposed MFLs are in conflict with that protection.
- The research that was done in determining the MFLs was not adequate in that it did not determine how these withdrawals will affect the perimeters of the springsheds, including smaller springs, swallets and caves, nor was the gross primary productivity determined. The latter is necessary to accurately measure the effects of lower flow on the life in the rivers.

Since these studies would be costly in a time of shrinking budgets, we urge you to keep the MFLs at their current levels and revisited this issue in the future.

cc. to Blake Guillory, Executive Director and Doug Leeper, Chief Environmental Scientist.

	NAME	CITY and COUNTY	E-MAIL or PHONE
1.	John L Howie	New Port Richey	johnhowie2@aol.com
2.	Janice L Howie	New Port Richey	janicehowie@aol.c
3.	Gogen O'Connor	# Hudson	
4.	Michael ANDERSON	Dade City	(352) 521-3183
5.	Joan Anderson	Bayonet Point	(727) 868-3297
6.	Anna DeGrandchamp	Hudson (Pasco)	(727) 389-8810
7.	Jerry DeGrandchamp	Hudson (Pasco)	(727) 808-1528
8.	Richard STAUFFER	ARIPEA (PASCO)	352-584-7116
9.	CJ Taylor	Inverness	sjctaylor@wildblue.net
10.	BARBARA BOWEN	NEW PORT RICHEY, FL	bbowen32@VERIZON.NET
11.	Anne-Marie Rodzynek	Port Richey (Pasco)	(727) 847-2310
12.	BOB + ANN SCHMIDT	NPR - PASCO	USCHMIDTNME@YAHOO.COM
13.	Kathryn PIERSON	Spring Hill-Hernando	352-666-8701
14.	BARBARA DeBIK	" "	(352) 556-3940
15.	Rita GRANT	Brooksville HERNANDO	727 365 4147
16.	Linda Gibbons	NPR PASCO	727 845-1497

To the Governing Board of SWFWMD:

	NAME	CITY and COUNTTY	PHONE or E-MAIL
17.	Mary Goodenough	Port Richey	(727) 264-7560.
18.	[illegible]	Land O Lakes	813 996 7697
19.	Patricia J Watson	LOL	(813) 996-7692
20.	Walter Simpson	Amherst NY	(716) 839-0062
21.	Nan Simpson	Amherst, NY	(716) 839-0062
22.	Wm V Branan	Crystal River FL	352 228 0910
23.	Marcie Clutter	Inverness FL	352 419-2461
24.	Doris Boreiss	Pasco County New Port Richey	727-842-3133
25.	Reita Diggory	Lephyshills, Fl	813-788-8393
26.	Danielle Schuck	NPR, FL PASCO	(937) 241-7760
27.	Susan Beard Vaughn	Bayonet Pt, Fl-PASCO	727-863-0531
28.	Sharon Holding	New Port Richey FL	727-843-9771
29.	Peggy Hatcher	Wesley Chapel, Pasco	813-991-4812
30.	Kathy Sanborn	Wesley Chapel Pasco	813-991-7956
31.	Maria Valentin	NewPort Richey, Pasco	727-379-6227
32.	Gail Parsons	Odessa	813-920-2730
33.	Jack Kussro	Port Richey, FL	727-868-3069
34.	[illegible]	Land O Lakes FL	813-996-1597
35.	[illegible]	NEW PORT RICHEY PASCO COUNTY	727 848 1318
36.	Jerry Donovan	LAND O'LAKES PASCO COUNTY	813-949-6659
	Corrine Goodson	LUTZ PASCO COUNTY	8139498924
	Julie Wert	Aripeka Fl Pasco	727-863-1363

From: Doug Leeper
Sent: Tuesday, November 15, 2011 1:06 PM
To: janicehowie@aol.com
Cc: albert@conservationfoundation.com; bkbeswick@aol.com; carlosb@medallionhome.com; dtharp@embarqmail.com; jadams@abbeyadams.com; judyw1@tampabay.rr.com; michael@2riversranch.net; neilcombee@yahoo.com; senft1hp2u@aol.com; todd@pressmaninc.com; hgramling@tbwg.org; jclosshe@tampabay.rr.com; rmaggard@tampabay.rr.com; Blake Guillory
Subject: Petition Concerning Chassahowitzka and Homosassa MFLs
Attachments: Petition from JHowie and Others 08nov2011.pdf

Ms. Howie:

Thank you for your recent submission regarding the currently proposed minimum flows and levels for the Chassahowitzka and Homosassa River systems. The Southwest Florida Water Management District received the petition you sent via the U.S. Mail and appreciates your concern and that of the other 37 individuals who signed the document.

A scanned copy of the petition is attached to this e-mail and will be included, along with other public input we have received on the proposed minimum flows and levels, in the appendices of revised minimum flows and levels reports that the District is preparing for the two river systems. The specific comments outlined in the petition will be reviewed by staff as we develop final recommendations regarding minimum flow rule amendments that will be presented to the District Governing Board. Please note that all public input, including the petition you submitted, will be available for review by Governing Board members.

Please feel free to contact me if you have additional comments or questions related to the development of minimum flows and levels or other water management issues.

Douglas A. Leeper
Chief Environmental Scientist

11.18.12 Johnson, Martyn

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, August 28, 2011 9:01 AM
To: Mike Heyl
Cc: Doug Leeper; brentwhitley@sierra-properties.com
Subject: Chassahowitzka Discharge Equation

Mike,
Following correspondence with Brent Whitley I looked at some data for the Chassahowitzka discharge and found that the equation (Chassahowitzka discharge calculation per Table 1 in the Report No. 01-4230) was close but did not match with actual current data as reported by USGS.
While trying to confirm the equation in use the closest reference I found was your March 19, 2010 Memorandum on the sections part of the MFL reports for the Chassahowitzka.

Can you confirm the equation currently in use?

This is a direct copy from the 2001 report 01-4230:
Q=(6.06* wlwww)-(stgchz*7.81)-
(□stg*825.22)+7.17

Do not understand why coping delta from a pdf file gives a ? stg, but not to worry.

Let me enlarge to be sure;

Q = (6.06 * wlwww) - (stgchz * 7.81) - (∆stg * 825.22) + 7.17
As I read this
wlwww = max level at Weeki Wachee for the day of calculation
stgchz = stage height at the gage site for the time of the calculation
∆stg = stage height change over the last 15 minutes

When I tried this equation with some actual data it is close, but it is not an exact match. The equation gives cfs values about 10 cfs higher than reported.
I double checked my spreadsheet and could not find any errors. Then I though may be some numbers in the equation were transposed when the 2001 report went to print. I tried a few but no luck.

Mike,
I sent this directly to you as you appear to have looked at this in detail. I have copied Doug in order this can be redirected if necessary.
Sorry to trouble you if this is out of order.

Thanks,
Martyn

For reference this is some of the check I did.

==========
From: Mike.Heyl@swfwmd.state.fl.us
To: martynellijay@hotmail.com
CC: Doug.Leeper@swfwmd.state.fl.us; brentwhitley@sierra-properties.com; Marty.Kelly@swfwmd.state.fl.us
Date: Mon, 29 Aug 2011 07:11:30 -0400
Subject: RE: Chassahowitzka Discharge Equation
Martyn – That looks like the USGS equation from the 2001 report. You will need to contact them for an answer. Sorry, I don't know the answer.

MGH

==========
From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, January 12, 2012 12:33 PM
To: Doug Leeper; Marty Kelly; Ron Basso; Ron Miller; Al Grubman; Brad Rimbey; Norman Hopkins; Brent Whitley; Dana Bryan; Kevin J Grimsley; rkane; R Rodriguez; J Weaver; robert.knight@bocc.citrus.fl.us; rebecca.bays@bocc.citrus.fl.us
Subject: Chassahowitzka Discharge Jan 2010 thru Dec 2011

A few days ago I shared some data regarding discharge for the Homosassa River system.

Although I have not been as involved with the Chassahowitzka I took the time to look at the last two years data for Chassahowitzka in the same way.

The Executive Summary of the Chassahowitzka November 2010 Draft Report states:

- The median flow of the Chassahowitzka River based on estimated and measured flows for the baseline period (1967-2007) used for determination of the minimum flows recommended in this report was 63 cubic feet per second (cfs).

- Therefore, it is recommended that the minimum flow for the Chassahowitzka River system (including all contributing springs and associated creeks) be maintained at 89 percent of the baseline flow.

The attached spreadsheet shows the daily mean discharge data as reported by USGS for the Chassahowitzka Gage Site 02310650 from Jan 1, 2010 thru Dec 31, 2011. For days on which mean discharge is reported (712 days) 46% of the days were at or below the recommended MFL and only 10% of the days was flow above the baseline.

When reviewing this data I recalled a question I asked late August 2011 about the equation used to calculate the discharge for the Chass as the equation in the Yobbi and Knochenmus Report did not match the reported results.
I was told the USGS does not share the equations.

In the spreadsheet you will note for 08/13/2011 thru 08/18/2011 the entries are $^{P\ Eqp}$.

Although in no way conclusive, it is possible that someone made a change in the equation used to calculate discharge in mid August 2011.

So, I compared reported data before and after 08/13/2011. The data is in the spreadsheet; before 52% of the days discharge was at/below the recommended MFL after it was 16%. Similarly, for days discharge was at/above the base line 7% before and 28% after.

A part of these higher calculated discharges are due to levels in the Weeki Wachee well being slightly higher during the latter months of 2011; particularly October 2011. This is also evident in the Homosassa data shared the other day, but the figures for the Chassahowitzka are much more than appears to be related to Weeki Wachee well levels alone.

This deserves comment/explanation from SWFWMD/USGS.

The point of this e-mail is to draw attention to the fact the calculated discharge into the Chassahowitzka has frequently been below the recommended MFL during the last two years. The data source is the same as used to develop the recommended minimum flow which results in significant harm.

As always comments and corrections welcome.

Martyn

==========

From: Kevin J Grimsley [mailto:kjgrims@usgs.gov]
Sent: Thursday, January 12, 2012 1:57 PM
To: Alan Martyn Johnson
Cc: Brent Whitley; Brad Rimbey; Dana Bryan; Doug Leeper; Al Grubman; J Weaver; Marty Kelly; Norman Hopkins; rebecca.bays@bocc.citrus.fl.us; rkane; Ron Miller; robert.knight@bocc.citrus.fl.us; Ron Basso; R Rodriguez
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011

The equation used to calculate discharge at station 02310650 was not changed in August 2011 or at any other time over the past several years.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS, Florida Water Science Center
10500 University Center Drive, Suite 215
Tampa, FL 33612
kjgrims@usgs.gov
813-498-5064

==========

From: Brad Rimbey@CRRC [mailto:BWR.CRRC@tampabay.rr.com]
Sent: Thursday, January 12, 2012 5:31 PM
To: Alan Martyn Johnson; Kevin J Grimsley
Cc: Brent Whitley; Dana Bryan; Doug Leeper; Al Grubman; J Weaver; Marty Kelly; Norman Hopkins; rebecca.bays@bocc.citrus.fl.us; rkane; Ron Miller; robert.knight@bocc.citrus.fl.us; Ron Basso; R Rodriguez
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Hi Kevin,

Could you please provide the equation used to calculate the discharge at station 02310650 along with an explanation of any variables (and their source) used in the equation?

Also, I was at Howard Bryant's dock yestersday on the Chaz. USGS has been maintaining a gauge station on that dock for several years. It appears that USGS is doing this under contract for SWFWMD. The SWFWMD SID is 20025 (survey control FLO 2761). The gauge station appears to have full telemetry but none of the data is available on the USGS real-time website http://waterdata.usgs.gov/fl/nwis/rt. Could you please provide a link to that data?

Thanks,

Brad W. Rimbey, P.E.

==========

From: Kevin J Grimsley [mailto:kjgrims@usgs.gov]
Sent: Friday, January 13, 2012 3:16 PM
To: Brad Rimbey@CRRC
Cc: Brent Whitley; Dana Bryan; Doug Leeper; Al Grubman; Alan Martyn Johnson; Marty Kelly; Norman Hopkins; rebecca.bays@bocc.citrus.fl.us; rkane; Ron Miller; robert.knight@bocc.citrus.fl.us; Ron Basso
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Hi Brad,

Unfortunately, it is our long standing policy that we do not release our discharge regression equations to the public.

The gage at Howard's dock has always been on NWISWeb, station number 02310663. Here's the link - http://waterdata.usgs.gov/fl/nwis/uv/?site_no=02310663&PARAmeter_cd=00065,00060

Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS, Florida Water Science Center

==========

From: Kevin J Grimsley
To: Brad Rimbey@CRRC
Cc: Martyn Johnson
Sent: Monday, January 16, 2012 3:01 PM
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Hi Brad,

There are several reasons why we don't normally release discharge regression equations such as the one at Chassahowitzka. In my opinion, the biggest reason is that (as you've noted) the equations are subject to change at any time. We've had past problems where people have reported discharge values as supplied by the USGS while

using an outdated equation. This can potentially lead to a lot of confusion and misinformation.

As you know, we're always making new measurements and evaluating our discharge equations. Whenever we feel like we can make a significant improvement in calculating the discharge, we'll update the equation.

We're not trying to be secretive, and if you'd like to make a formal FOIA request you're certainly entitled to that. We're simply trying to avoid confusion from outdated and multiple equations.
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS, Florida Water Science Center

==========

From: BWR.CRRC@tampabay.rr.com
To: kjgrims@usgs.gov
CC: martynellijay@hotmail.com
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011
Date: Tue, 17 Jan 2012 10:05:03 -0500
Hi Kevin,

Thanks for the quick response. I am aware that the USGS stage-based regression equations for spring flow are empirical in basis and would therefore only be applicable to a specific data set. I am also aware that USGS periodically sends a tech to gather field flow measurements to validate the stage-based regression equations. I will send a formal request USGS FOIA Officer if that is what you prefer.

I recently looked at the USGS pressure, temperature, and conductivity gages for Chaz Main (USGS 02310650). Are you aware that these gages are not rigidly affixed to anything? They are simply laying in the mud at the base of a cypress tree near the Chaz public boat ramp. Considering the sensitivity of the regression equations to tidal stage, it would seem that a rigid mount would be required on at least the pressure gage.

Do you have any information regarding when the ADV meter data will be available from the SE Fork of the Homosassa? I think the ADV meter was installed in September. It seems "provisional" data (as a minimum) should be available to the public by now.

Do you have any idea what it would take to get an ADV meter installed at Chaz Main? The Chaz Main spring pool is currently scheduled to be "dredged" (de-mucked) in April. This project will hopefully have a positive affect on the flow from Chaz Main. I think it would be interesting to get some direct velocity measurements from an ADV meter before and after spring cleanout project. Can you help make this happen?

Brad W. Rimbey, P.E.

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Tuesday, January 17, 2012 12:54 PM
To: bwr.crrc@tampabay.rr.com; Kevin J Grimsley; R Rodriguez
Cc: Doug Leeper; Marty Kelly; J Weaver
Subject: RE: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Brad, Kevin and Mr. Rodriguez,

Brad and Kevin,
Thanks for sharing the various recent e-mails. I only got home late yesterday afternoon and back to the e-mail world.
A few points quickly.

1. I fully share Brad's concerns regarding installation of the gauges at the Chass station. I was with Brad when we viewed these last Saturday. I was amazed to see the units laying on the bottom (in mud/on tree roots) particularly the stage gauges are not secured to a fixed datum point. I did take some photographs but these are difficult to interpret given that it was fairly windy that day. While no expert I think this requires serious on-site review; just maybe some movement of the stage sensor or switching from one to the other gave the 'apparent change' in the data I commented about. What did the PEqup mean in the data set?

   I have some other observations about the reverse flow at the site, but will address those later.
2. Regarding USGS policy not to share the equation for the Chass that you stated has not been changed. Such a positioning does not fall in line with the attempts to have a Working Group to look at these critical spring flows. Where is the spirit of cooperation? It does not make sense that this can be shared with a formal FOIA request but not between members of the Working Group. Kevin, I realize you have to follow policy.
   Mr. Rodriguez: Please share the USGS policy regarding this position.
3. Regarding the acoustic velocity meter in the SE Fork. As I said in an earlier e-mail with over 2500 readings surely some preliminary interpretation/comparison to the calculated flows is possible.
   I note on 10/19 and 10/20 data collection appears to have been turned Off while conducting field measurements. The results comparing calculated flows with measured flows were interesting;

Meas. Number	Date	Time	Measuring Agency	Stream flow (ft^3/s)	Gage Height (ft)	Calc Flow (ft^3/s)	Calc Flow Time	
183	2011-10-20	05:51	USGS	76.2	1.80	64	6:00	119%
182	2011-10-20	05:24	USGS	75.4	1.85	59	5:30	128%
181	2011-10-19	14:46:30	USGS	68.2	2.64	51	14:45	134%
180	2011-10-19	14:18:30	USGS	59.0	2.69	51	14:15	116%
179	2011-10-19	13:46	USGS	59.8	2.73	55	13:45	109%
178	2011-10-19	13:25	USGS	55.8	2.76	46	13:30	121%
177	2011-10-19	12:54:30	USGS	50.6	2.78	50	13:00	101%
176	2011-10-19	12:26:30	USGS	55.8	2.82	49	12:30	114%
175	2011-10-19	11:59	USGS	52.9	2.84	45	12:00	118%

174	2011-10-19	11:25:30	USGS	49.8	2.88	49	11:30	102%
173	2011-10-19	10:51	USGS	43.8	2.92	44	11:00	100%
172	2011-10-19	10:24	USGS	45.2	2.96	52	10:30	87%
171	2011-10-05	11:46:30	USGS	48.8	0.70	63	11:45	77%
170	2011-10-05	11:42:30	USGS	52.6	0.70	63	11:45	83%
169	2011-10-05	11:40	USGS	53.6	0.70	63	11:45	85%
168	2011-10-05	11:36:30	USGS	54.1	0.70	51	11:30	106%

Calculated Flows taken from USGS Real Time Data.

No comments were received about the calculated negative flows and the association with the dS/dt factor in the SE Fork equation being for 30 minutes rather than 15 minutes for the :30 minute data.

Martyn

==========

To: BWR.CRRC@tampabay.rr.com
Date: Tue, 17 Jan 2012 21:50:29 -0500
From: kjgrims@usgs.gov
Subject: Re: Chassahowitzka Discharge Jan 2010 thru Dec 2011
CC: martynellijay@hotmail.com
Hi Brad and Martyn,

If the pressure and conductance probes at the Chaz gage are out "laying in the mud" as you've described, then someone (probably a curious bypasser) has removed them from their proper housing and not put them back correctly. This happened a few months ago as well so I wouldn't be surprised if it happened again.

The velocity meter at SE Fork is working fine, but the data won't be meaningful until we've collected a series of corresponding discharge measurements over a full range of conditions. As we've explained at the workshop meetings, that process is likely to take a year and could be more. As soon as we have enough velocity AND corresponding discharge data to develop a relationship, we will make that data available.

We installed a velocity meter at Chaz main several years ago, but there was too much vegetation for it to work correctly. However, several people have noted that the vegetation is far less than it used to be so it might be worth another try. We could provide partial funding for adding a velocity meter at Chaz, but the rest of the funding would have to come from another federal, state, or local government entity.
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, January 18, 2012 8:18 AM
To: Kevin J Grimsley; Brad Rimley
Cc: Doug Leeper; Marty Kelly; Ron Basso; R Rodriguez
Subject: RE: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Kevin,
Chass Gage Site
From the way the cables were routed to the probes it did not appear that the probes had an intended location (fixed supports/housings as SE Fork installation). The probes are not close to the station as shown in the photograph Chass Draft Report by SWFWMD.

SE Fork
Regarding the SE Fork velocity meter, I thought this needed a stage area to be determined and given the bridge supports are practically vertical the stage area should be easily adjusted for stage height.

I will agree the velocity profile across the stream under the Fishbowl Drive bridge does vary considerably with higher velocity on the left bank than the shallower right bank and influenced strongly by the flow changing direction at that point in the river. About a year ago I did some rudimentary checks myself developing a stage area and using a orange/stopwatch to check the velocity and calculate discharge. Crude, old school but effective at demonstrating to me the equation had problems. And yes I did time the orange numerous times and different stage heights.

Presumably the positioning of the velocity meter was to maximize its location relative to the mean velocity location across the stream. I would have thought Doug would appreciate some preliminary feedback as SWFWMD helped fud this installation and are about to issue a new report.

Interesting Observations

1. Recently (last 10 days) the vent just upstream of the bridge (right bank about 10 feet from the bank and 30-40 feet from the bridge) has been discharging strongly at lower stage/tide levels. I sampled water directly from the vent and it has Specific Conductance 5200-5400 on the two occasions I measured it (similar to the higher salinity vents in the main springs). This water stays on the right bank and significantly increases the specific conductance to about 1000 more than the main flow mid stream to left bank. I also have a much better understanding of how the gauge sees higher specific conductance water. Kids bath tub Dots by Cranola make a good alternative to those fancy dye cakes you are no doubt familiar with. Water from the SE Fork flows over the water in the Blue Water area as the stage increases; quite easy to see in the afternoon as the divers/swimmers/manatee have churned up the Blue Water and you can see how it mixes with the clear water from the SE Fork, the dye simply confirmed.
2. The unnamed vent about 15 feet from the right bank directly opposite the McClain residence. The river bed closer to the center of the river from this spring has dropped (collapsed) at least 2 feet in the last couple of months and the flow has decreased to the point that it is now hard to see the 'boil' even at low water. This vent discharges water 1100-1200 microsms as sampled from the vent.

Just thought some people may be interested.

Martyn

==========
From: Mike Heyl
Sent: Thursday, January 19, 2012 12:41 PM
To: Martyn Johnson (martynellijay@hotmail.com)
Cc: Doug Leeper; Ron Basso; Al Grubman (grubman1@gmail.com); Brad Rimbey (BWR.CRRC@tampabay.rr.com); Norman Hopkins (norman@amyhrf.org); Brent Whitley; Dana Bryan (Dana.Bryan@dep.state.fl.us); Robert.Knight@bocc.citrus.fl.us; Rebecca Bays (rebecca.bays@bocc.citrus.us); 'Kevin J Grimsley'; Cara S. Martin
Subject: RE: Chassahowitzka Discharge Jan 2010 thru Dec 2011

Mr. Johnson –

Doug Leeper asked that I respond to your January 12 inquiry (appended) regarding the proposed Chassahowitzka MFL and the 2010-2011 flows. My response is attached.

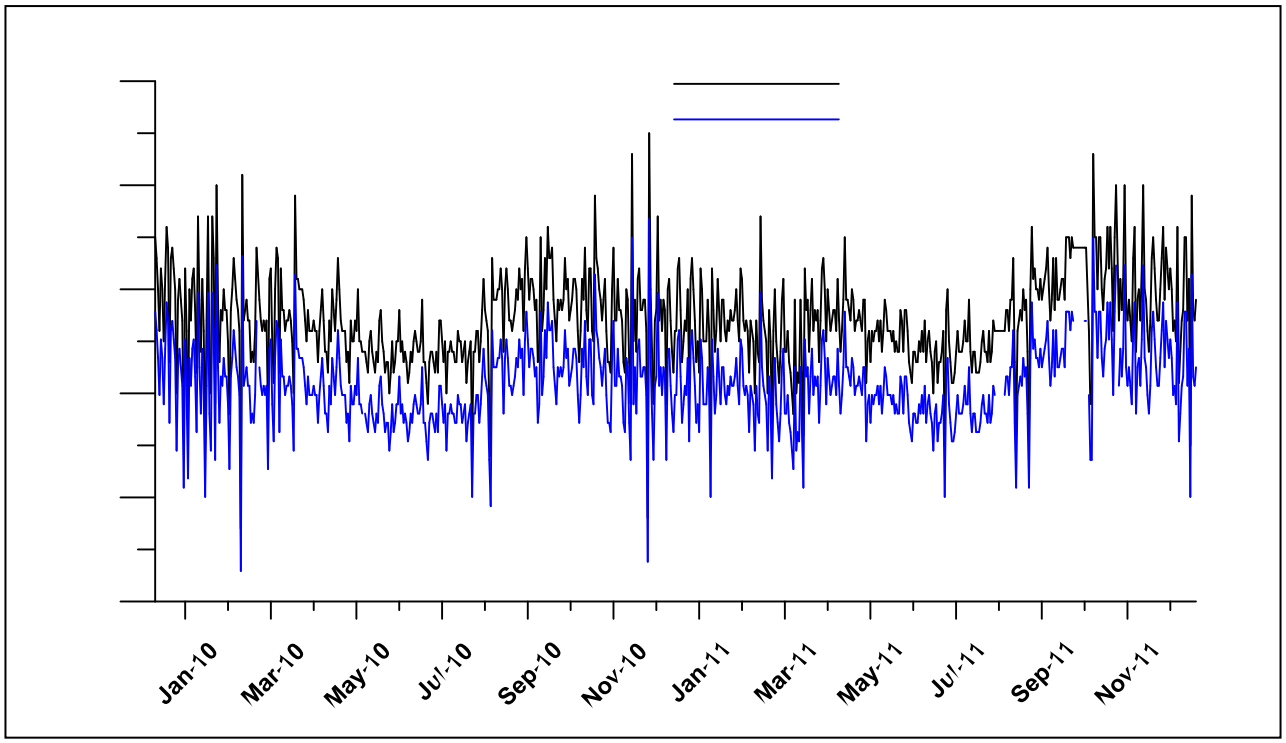
MGH

Remainder of page intentionally left blank.

Dear Mr. Johnson –

Doug Leeper has asked that I respond to your recent comments (January 12, 2012 e-mail) about flows in the Chassahowitzka River and the application of the proposed minimum flows and levels (MFL) for the river system. The proposed Chassahowitzka MFL is a percentage of flow, not a fixed number and is not directly related to a long-term median. The MFL is a percent of flow and the actual withdrawal varies with the flow, not a historic median. As discussed later, the 63 cfs flow rate is not an MFL criterion.
The percent of flow approach is easier to understand where there is a surface water withdrawal. A draft 2010 MFL rule for the system read in part (emphasis added):
"40D-8.041 Minimum Flows
(1) – (15) No change.
(16) Minimum Flows for the Chassahowitzka River System.
(b) Minimum Flow for the Chassahowitzka River System is 89% of the natural flow as measured at the United States Geological Survey (USGS) Gage Chassahowitzka River near Homosassa (Gage No. 02310650). The minimum flow at any point below this Gage is based on the previous day's natural flow at that point minus 11 percent."

If this rule were applied to a surface water withdrawal over the 2010 and 2011 flows that you evaluated, the results would appear as below. Each day is multiplied by 89% to determine how much flow must remain. The 63 cfs is not identified in the proposed 2010 rule and, is not a recommended MFL, nor does it figure into the application of the MFL rule.



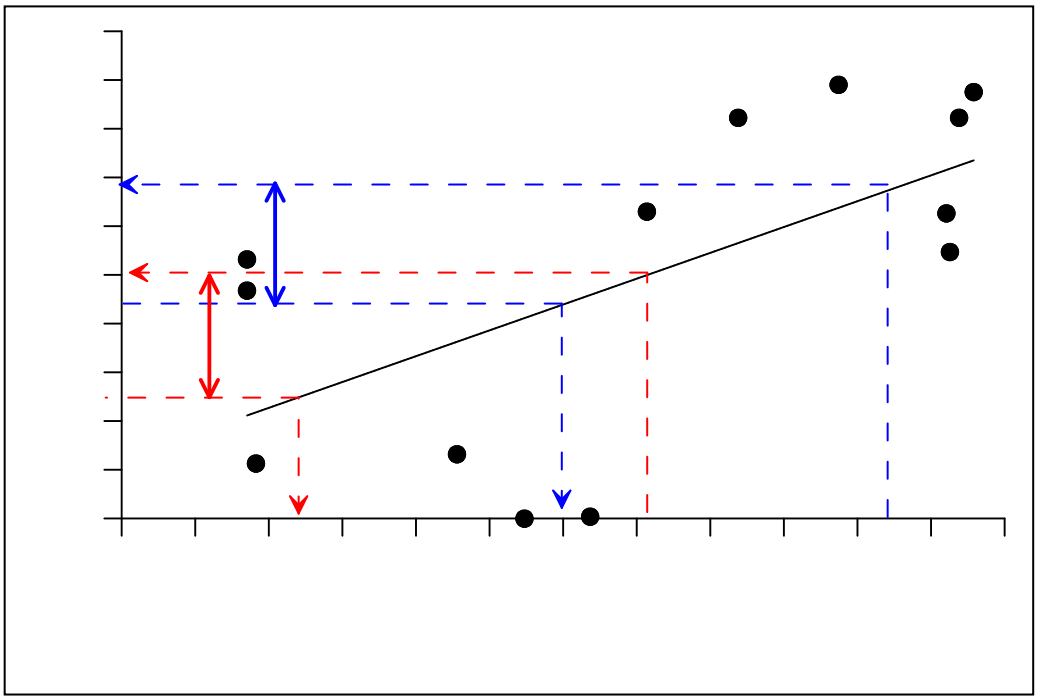
In light of your comments and in rereading the Executive Summary of the November 2010 draft report on proposed MFL for the Chassahowitzka River system, I do agree that the meaning of the word “baseline” should be improved and clarified. I will endeavor to do so in final report.

Some discussion about the origin and application of the 63 cfs in evaluating the Chassahowitzka MFL is warranted. This value represents the median of daily flows from 1/1/1967 through 11/29/2007. Development of this data set is documented in Chapter 10.1 of the November draft report. The data set reflects measured and estimated flows slightly downstream of the Main spring at the present location of the USGS gage 02310650. These flows do not include contributions from Crab Creek and other sources further downstream.

By definition, half of the daily values are greater than the median value and half are less than the median. In this case, the record exhibits a statistically significant declining trend that is described in section 2.4 of the November draft report, so it should come as no surprise that the majority of the flow values below the median have occurred in the more recent years. The median flow is simply the “middle point” of a collection of flows, and was simply chosen to represent typical flows in the Chassahowitzka.

It should be noted that ,provided the flow used in the MFL evaluation is within the range of observed flows, linear responses to flow are unaffected by the initial choice of flow as shown in the following illustration of hypothetical response. In the case of the proposed Chassahowitzka MFL, the following metrics exhibited linear response to flow or salinity and thus are independent of the initial flow value chosen for evaluation:

- Benthic diversity
- All of the plankton tow fish and invertebrate abundance (13 pseudo taxa)
- Seine and trawl abundance responses (8 pseudo taxa)
- Salinity (as function of flow and location)



The remaining biological responses (mollusc, submersed aquatic vegetation, and remaining fish/invertebrates) that were evaluated were non-linear with respect to flow and were assessed using 63 cfs as the initial flow condition for the system.

It should also be noted that the following metrics were not evaluated using the 63 cfs median flow. These metrics were developed using the hydrodynamic model and actual recent daily flows reported by the USGS:

Acute thermal refuge (using 2001– 2002 flows) for
- Area
- Volume

Chronic thermal refuge (using 2001 flows) for
- Area
- Volume

Salinity habitat (using 2004 through 2006 flows)
- Area for 2, 5, 10, and 15 ppt salinity
- Volume for 2, 5, 10, and 15 ppt salinity
- Shoreline length for 2, 5, 10, and 15 ppt salinity

Reviewing Table 8-1 for the flow term used in the individual determinations, the three most conservative are:

1. Acute thermal refuge (area) – Based on actual 2001 – 2002 flows.
2. Fish/Invertebrates - 63 cfs initial flow.
    a. 3 of 8 responses incorporated into the MFL are linear relationships and independent of initial flow conditions.
3. 5 ppt salinity habitat (volume and shoreline) – Based on actual 2004 – 2006 flows.

Thanks for your continued interest in the development of minimum flows for the Chassahowitzka River and other Springs Coast systems. Please let me know if you have any questions regarding the information I've provided.

==========
From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, January 19, 2012 9:50 AM
To: R Rodriguez; J Weaver
Cc: Doug Leeper; Ron Basso; Marty Kelly; Mark Hammond; Mike Heyl; Kevin J Grimsley; Brad Rimley; Al Grubman; Ron Miller; Norman Hopkins; Brent Whitley
Subject: Discharge Chassahowitzka

Mr. Rodriguez,
Please share the policy document which precludes USGS sharing the equation used to calculate Discharge at Chassahowitzka Station 02310650, as requested in an earlier e-mail from myself and from Brad Rimley as a member of the working group.

The ecological future of the Homosassa River, Crystal River and Chassahowitzka River depend heavily on data from USGS/SWFWMD gage sites and on open and honest dialogue about the accuracy of the generated data. To that end I would like to draw your attention to some Chassahowitzka data that appears to fall short of logical explanation.

The data is from USGS web site for the Chassahowitzka Gage Site 02310650.

As you will see in the attached spreadsheet I have highlighted the apparent disconnect between the calculated discharge measurements and the specific conductance measurement.

A section of the spreadsheet covering Jan 5/6 is show below and I will walk you thru my interpretation.

21:45 negative flow is calculated, water that past the gages earlier may be returning at the same temperature and specific conductance.
22:30 the water passing the gages is clearly mixed with water of higher temperature and higher specific conductance.
23:45 positive flow is calculated. I have added cumulative volume past the gage site (it is shown as cfs for ease of understanding but could be multiplied by time to represent volume).
23:45 thru 01:45 Specific conductance continues to increase, note the temperature remains at 22.3/22.4.
01:00/01:15 high stage is reached and calculated flow has increased to 36 and 54 cfs. Positive flows calculated for hour and half while stage continues to increase.
01:30 thru 02:45 temperature an specific conductance indicate this is water which passed the gages under negative flow conditions yet the cumulative positive flow has been more than five times the highest cumulative negative flow.
03:45 temperature and specific conductance are back close to representative of spring water. Going to the spreadsheet this is fully achieved about an hour later.

Time	Stage Ht	Discharge	Temp	SpecCond	15 min Discharge	Cumulative Discharge
01/05/2012 21:00 EST	0.70[P]	33[P]	21.2[P]	1,990[P]		
01/05/2012 21:15 EST	0.75[P]	15[P]	21.1[P]	1,980[P]		
01/05/2012 21:30 EST	0.81[P]	5.2[P]	21.1[P]	1,980[P]	5.2	5.2
01/05/2012 21:45 EST	0.88[P]	-4.3[P]	21.2[P]	1,970[P]	-4.3	0.9
01/05/2012 22:00 EST	0.96[P]	-14[P]	21.2[P]	1,970[P]	-14	-13.1
01/05/2012 22:15 EST	1.04[P]	-14[P]	21.2[P]	1,970[P]	-14	-27.1
01/05/2012 22:30 EST	1.12[P]	-15[P]	21.8[P]	3,770[P]	-15	-42.1
01/05/2012 22:45 EST	1.20[P]	-15[P]	22.0[P]	4,970[P]	-15	-57.1
01/05/2012 23:00 EST	1.28[P]	-16[P]	22.0[P]	5,270[P]	-16	-73.1
01/05/2012 23:15 EST	1.35[P]	-7.2[P]	22.2[P]	5,560[P]	-7.2	-80.3
01/05/2012 23:30 EST	1.42[P]	-7.6[P]	22.3[P]	5,800[P]	-7.6	-87.9
01/05/2012 23:45 EST	1.48[P]	1.1[P]	22.3[P]	5,950[P]	1.1	-86.8

01/06/2012 00:00 EST	1.54[P]	0.72[P]	22.3[P]	6,040[P]	0.72	-86.08
01/06/2012 00:15 EST	1.59[P]	9.5[P]	22.3[P]	6,120[P]	9.5	-76.58
01/06/2012 00:30 EST	1.64[P]	9.2[P]	22.3[P]	6,160[P]	9.2	-67.38
01/06/2012 00:45 EST	1.68[P]	18[P]	22.3[P]	6,230[P]	18	-49.38
01/06/2012 01:00 EST	1.70[P]	36[P]	22.4[P]	6,300[P]	36	-13.38
01/06/2012 01:15 EST	1.70[P]	54[P]	22.4[P]	6,420[P]	54	40.62
01/06/2012 01:30 EST	1.68[P]	72[P]	22.4[P]	6,580[P]	72	112.62
01/06/2012 01:45 EST	1.65[P]	82[P]	22.4[P]	6,620[P]	82	194.62
01/06/2012 02:00 EST	1.62[P]	82[P]	22.3[P]	6,570[P]	82	276.62
01/06/2012 02:15 EST	1.58[P]	91[P]	22.3[P]	6,080[P]	91	367.62
01/06/2012 02:30 EST	1.54[P]	91[P]	22.2[P]	5,500[P]	91	458.62
01/06/2012 02:45 EST	1.50[P]	91[P]	22.0[P]	4,760[P]	91	549.62
01/06/2012 03:00 EST	1.46[P]	92[P]	21.4[P]	3,740[P]	92	641.62
01/06/2012 03:15 EST	1.42[P]	92[P]	21.4[P]	3,120[P]		
01/06/2012 03:30 EST	1.37[P]	101[P]	21.5[P]	2,800[P]		
01/06/2012 03:45 EST	1.32[P]	102[P]	21.4[P]	2,550[P]		

How is it possible the specific conductance can continue to increase when the flow becomes positive?
Agreed water of high specific conductance that passes the gauge/sensor under negative flow must elute from the upstream areas before the spring water shows at the gauge/sensor. But, I have great difficulty understanding how specific conductance continues to increase after the discharge (calculated) becomes positive. As you can see in the spreadsheet this is not a one time occurrence it is the norm. The highlighted temperature records appear to correlate more with the specific conductance data than the calculated discharge data.

An explanation would be appreciated, preferably not a one liner. I am always willing to learn.

If this is in anyway unclear please do not hesitate to ask for a more thorough explanation of my concern.

Martyn

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Thursday, January 19, 2012 7:39 PM
To: Doug Leeper; Al Grubman (grubman1@gmail.com); Bill Geiger (bgeiger@cityofbrooksville.us); Bill Pouder (bill.pouder@myfwc.com); Boyd Blihovde (Boyd_Blihovde@fws.gov); Brad Rimbey (BWR.CRRC@tampabay.rr.com); Brent Whitley (brentwhitley@sierra-properties.com); Brockway, Alys (abrockway@co.hernando.fl.us); Dennis D. Dutcher (Dennis3ds@aol.com); Frank DiGiovanni (administration@inverness-fl.gov); Greenwood, Kathleen (Kathleen.Greenwood@dep.state.fl.us); Helen Spive; Hilliard, Dan (2buntings@comcast.net); Hoehn, Ted; Hope Corona (hopecorona@tampabay.rr.com); Jim Farley (jfarley682@aol.com); Katie Tripp (ktripp@savethemanatee.org); Norman Hopkins (norman@amyhrf.org); Rebecca Bays (rebecca.bays@bocc.citrus.fl.us); Richard Kane (rkane@usgs.gov); Richard Radacky (rradacky@cityofbrooksville.us); Ron Miller (rmille76@tampabay.rr.com); Sarah Tenison (cityofweekiwachee@yahoo.com); Sulllivan, Jack (jsullivan@carltonfields.com); Voyles, Carolyn (Carolyn.Voyles@dep.state.fl.us); Whitey Markle (whmarkle@gmail.com); (janicehowie@aol.com); Abdon Sidibie (asidibie@chronicle.online.com); Alex McPherson (aamcpherson@msn.com); Ann - 2 Hodgson (ahodgson@gmail.com); Ann Hodgson (ahodgson@audubon.org); Bernard Berauer (bfberauer@aol.com); Beverly Overa (boverly@tampabay.rr.com); Bill Garvin (wgarvin@tampabay.rr.com); Bob Caldwell (Bobcaldwell51@yahoo.com); Brack Barker (brack154@msn.com); Carl Mattthai (thebabesmimi@gmail.com); Casey, Emily (fcnwr@atlantic.net); Charles Dean (dean.charles.web@flsenate.gov); Charles Stonerock (katcha.stonerock3@gmail.com); Chris Safos (chrissafos@embarqmail.com); Czerwinski, Mike (mczerwin@tampabay.rr.com); Darlene Herth (2cetechnology21@gmail.com); Darrell Snedecor (president@citruscountyaudubon.com); Don Hiers (dhiers3@gmail.com); Douglas Dame (doug_dame@yahoo.com); Elaine Luther (barneyandcap@hotmail.com); Emily Casey (ecasey21@hotmail.com); Emma Knight (eknight@wetlandsolutionsinc.com); George Harbin (gharbin@tampabay.rr.com); George McClog (classof47@gmail.com); Gorgon O'Connor (gorgon_o@yahoo.com); Harry Steiner (harry109@aol.com); Jack Calbeck (calbeckj@citrus.k12.fl.us); jane Perrin (jcsperrinmd@sbcglobal.net); Jerry Morton (JerrMorton@aol.com); Jessie Gourlie (gourliej@thirdplanetwind.com); Jim Collins (jimmiekey22@yahoo.com); Jimmie Smith (Jimmie.Smith@myfloridahouse.gov); Joe Calamari; John Lord (jclord109@yahoo.com); John Mayo (freedomway1@gmail.com); Karen Johnstone (kjohns213@sbcglobal.net); Kim Caldwell (caldwell.kimberly@yahoo.com); Kim Dinkins (kim.dinkins@marioncountyfl.org); Linda Pierce (tpierce35@tampabay.rr.com); Linda Vanderveen (hernandoaudubon@yahoo.com); Mary Anne Lynn (mlynn1978@tampabay.rr.com); Matthew Corona (mcorona1@tampabay.rr.com); Max Rhinesmith (rhinesmith@webtv.net); Amber Breland; Andy Houston (ahouston@crystalriverfl.org); Art Yerian (Al.Yerian@dep.state.fl.us); Ben Weiss; Beth Hovinde; Brad Thorpe (brad.thorpe@bocc.citrus.fl.us); Courtney Edwards (cedwards@savethemanatee.org); Dale Jones (Jones@MyFWC.com); Dana Bryan

(dana.bryan@dep.state.fl.us); Darrell Snedecor; David Hamilton (countyadministrator@hernandocounty.us); David Hankla (david_hankla@fws.gov); Don Wright (wright@sura.org); Dusty McDevitt (mcdevitt@usgs.gov); Ed Call (marvin.call@MyFWC.com); Eric Nagid (eric.nagid@MyFWC.com); FFWCC MFLs Review E-Mail Address (fwcconservationplanningservices@myfwc.com); J. J. Kenney (jj.kenney@bocc.citrus.fl.us); Jennene Norman-Vacha (jnvacha@ci.brooksville.fl.us); Joyce_Kleen@fws.gov; Kandi Harper (kandi.harper@bocc.citrus.fl.us); Keith Ramos (Keith.Ramos@fws.gov); Kent Smith (kent.smith2@myfwc.com); Kevin Grimsley (kjgrims@usgs.gov); Michael Lusk (Michael_Lusk@fws.gov); Mitchell Newberger (mnewberger@verizon.net); Nick Robbins (Nick.Robbins@dep.state.fl.us); Nicole Adimey (Nicole_Adimey@fws.gov); Paul Thomas (paulw.thomas@MyFWC.com); Ron Mezich (ron.mezich@MyFWC.com); Shelly Yaun (shelly.yaun@dep.state.fl.us); Toby Brewer (Toby.Brewer@dep.state.fl.us); Tracy Colson; Wallace, Traci; Adkins, Jim; Bitter, Jim; Bryant, Richard; Cantero, Vince; Carpenter, Paul; Daniels, Chase; Dueker, Duane; Gramling, Hugh; Harrelson, Cathy; Hubbell, Pete; Johnson, Eric; Keim, Robert; Kincaid, Todd; Kline, Allen; Knight, Bob; Knight, Robert; Knudson, Ross; Overa, Tom; Owen, Rick; Parrow, Liz; Rolf Auermann (rauerman@tampabay.rr.com); Rusnak, Teddi; Tarochinoe, Joseph; Watkins, Priscilla; Watrous, Russell; Wilson, Roger
Cc: Amy K. Harroun; Barbara Matrone; Cara S. Martin; Chris Zajac; Darcy A. Brune; Dave Dewitt; Gary E. Williams; Jay Yingling; Karen Lloyd; Ken Weber; Kenneth R. Herd; Laura Donaldson; Lou Kavouras; Mark Barcelo; Mark Hammond; Mike Heyl; Paul Williams; Robyn O. Felix; Ron Basso; Sid Flannery; Veronica Craw; Xinjian Chen; Yassert Gonzalez

Subject: RE: Update - Chassahowitzka and Homosassa Minimum Flows READ THE WORDS CAREFULLY THIS IS ABOUT RULE CHANGES

Please note the words in Doug's e-mail I have made red lettering and yellow highlight.

If you are concerned about the future of Homosassa, Chassahowitzka, Crystal or any other spring fed river in the SWFWMD this is ESSENTIAL READING.

Baseline flows will be no more if a draft rule is approved, at least as I read this response from SWFWMD (key part copied into this message).

The gap in the quote is a graph which does not copy into the e-mail text so go to the attachment for the complete response.

Yellow hightlight added.

QUOTE
Dear Mr. Johnson –
Doug Leeper has asked that I respond to your recent comments (January 12, 2012 e-mail)
about flows in the Chassahowitzka River and the application of the proposed minimum flows
and levels (MFL) for the river system. The proposed Chassahowitzka MFL is a percentage of

flow, not a fixed number and is not directly related to a long-term median. The MFL is a percent
of flow and the actual withdrawal varies with the flow, not a historic median. As discussed later,
the 63 cfs flow rate is not an MFL criterion.
The percent of flow approach is easier to understand where there is a surface water withdrawal.
A draft 2010 MFL rule for the system read in part (emphasis added):
"40D-8.041 Minimum Flows
(1) – (15) No change.
(16) Minimum Flows for the Chassahowitzka River System.
(b) Minimum Flow for the Chassahowitzka River System is 89% of the natural flow as measured at the United States Geological Survey (USGS) Gage Chassahowitzka River near Homosassa (Gage No. 02310650). The minimum flow at any point below this Gage is based on the previous day's natural flow at that point minus 11 percent."
If this rule were applied to a surface water withdrawal over the 2010 and 2011 flows that you
evaluated, the results would appear as below. Each day is multiplied by 89% to determine how
much flow must remain. The 63 cfs is not identified in the proposed 2010 rule and, is not a
recommended MFL, nor does it figure into the application of the MFL rule.

GRAPH GAP

In light of your comments and in rereading the Executive Summary of the November 2010 draft
report on proposed MFL for the Chassahowitzka River system, I do agree that the meaning of
the word "baseline" should be improved and clarified. I will endeavor to do so in final report.
Some discussion about the origin and application of the 63 cfs in evaluating the Chassahowitzka MFL is warranted.

This value represents the median of daily flows from
1/1/1967 through 11/29/2007. Development of this data set is documented in Chapter 10.1 of
the November draft report. The data set reflects measured and estimated flows slightly downstream of the Main spring at the present location of the USGS gage 02310650. These
flows do not include contributions from Crab Creek and other sources further downstream.

By definition, half of the daily values are greater than the median value and half are less than
the median. In this case, the record exhibits a statistically significant declining trend that is
described in section 2.4 of the November draft report, so it should come as no surprise that the

majority of the flow values below the median have occurred in the more recent years. The
median flow is simply the “middle point” of a collection of flows, and was simply chosen to
represent typical flows in the Chassahowitzka.
It should be noted that ,provided the flow used in the MFL evaluation is within the range of
observed flows, linear responses to flow are unaffected by the initial choice of flow as shown in
the following illustration of hypothetical response. In the case of the proposed Chassahowitzka
MFL, the following metrics exhibited linear response to flow or salinity and thus are independent
of the initial flow value chosen for evaluation:
UNQUOTE

This response was to an e-mail I sent indicating 46% of the days in the last two year flows into the Chassahowitzka were below the minimum flows set in the draft report. A similar e-mail sent a couple of days earlier indicated on 84% of the days in the last two years flows into the Homosassa were below the minimum flows set in the corresponding draft report.

It is worrying to contemplate the agenda are these ideas to confuse us by;

- semantics eg *(From above) If this rule were applied to a surface water withdrawal over the 2010 and 2011 flows that you*

evaluated, the results would appear as below...Chass is a spring fed river, or

- legal jargon about amending a legal definitions by rule changes.

Is it to just keep on pumping the aquifer?

The hypothetical fish reduction graph, if you read the attachment, is…….

Some serious common sense questions need to be answered. What is the minimum flow and what criteria say it has been reached; day, week, month? What are the recovery plans for these rivers (Chassahowitzka and SE Fork of Homosassa are on the Impaired Waters list by Department of Environmental Protection)?

Martyn
I guess this will upset a lot of people, but this needs nipping in the bud. I trust there will be a rethink of this matter and a fast correction made. I could have posted this on the working group web site but how many would have read it.

==========

From: Mike Heyl
Sent: Tuesday, February 07, 2012 12:47 PM
To: 'Alan Martyn Johnson'

[Editor Note – The following response was copied to Mr. Johnson's January 19 distribution list]
Subject: RE: Update - Chassahowitzka and Homosassa Minimum Flows READ THE WORDS CAREFULLY THIS IS ABOUT RULE CHANGES

Mr. Johnson - Regarding your email of January 19, I'd like to clarify a few points for you and those on your distribution list and I have appended your email for continuity. The proposed language to amend F.A.C. 40D-8 that was cited in the District's January 19 response is over 14 months old. As stated, it was the proposed rule amendment in November 2010 and can be found on page 34 of the Governing Board Agenda package for the November 2010 meeting. (It can be found at this url http://www.swfwmd.state.fl.us /calendar/2011/11/.) I am not aware of the exact date, but the agenda package was made public and posted on the District's web site in mid-November 2010. The language establishing the minimum flows and levels (MFLs) as a percent of the previous day's flow that was in the draft rule amendment for the Chassahowitzka River system is not new and is included in many of the District's adopted MFLs rules (See F.A.C. 40D – 8), including Upper Hillsborough, Upper Peace, Middle Peace, Lower Peace, Myakka, Braden (freshwater), Upper Alafia, Lower Alafia, Weeki Wachee and the Anclote rivers. I would further add that the District is in the process of evaluating minimum flow recommendations for the Chassahowitzka River system, and proposed rule amendments for the system are similarly being reviewed.

Contrary to the suppositions advanced in your e-mail, it is not the District's intent to confuse stakeholders through semantics or "*legal jargon about amending a legal definitions by rule changes"* and the motivation to establish MFLs is not to "*just keep on pumping the aquifer*." We are developing MFLs for the Chassahowitzka River system and other priority water bodies to prevent significant harm associated with further withdrawals and are endeavoring to do so in as clear a manner as possible.

In your email, you noted that the Chassahowitzka is a spring-fed river and compared that to the surface water withdrawal example that I provided. I think it may be possible that you are confusing the source of water (spring-fed vs. surface runoff systems) with the mechanism of withdrawing water. In a runoff-dominated system without a significant input from groundwater, the only mechanism for removing water is by pumping directly from the surface water. In a ground-water dominated system, water can be removed by pumping the groundwater or by pumping directly from the surface water. Examples of a surface water withdrawal from a spring-fed system are the permit held by City of Tampa to withdraw water from Sulphur Springs and a permit held by Crystal Springs Preserve LLC to withdraw water from Crystal Springs. Note that the District does not anticipate the issuance of surface water withdrawals from the Chassahowitzka River system.

We will continue to evaluate compliance with the proposed MFLs for the Chassahowitzka and Homosassa River systems by determining groundwater withdrawal impacts to springflow through the use of groundwater flow modeling and other statistical analyses. While not anticipated at this time, we would evaluate any future direct surface water withdrawal in conjunction with existing groundwater impacts to ensure compliance with the proposed MFLs once adopted. In other words, staff would evaluate the effect on springflow from a combination of a direct surface water withdrawal along with existing groundwater use so that the total impact does not exceed the allowable percentages. Compliance with minimum flows that are established for the Chassahowitzka River system will be evaluated at a minimum on an annual basis through use of the Northern

District Groundwater flow model and evaluation of rainfall-flow relationships. Compliance with the minimum flows may be also be evaluated whenever a permit application that may be expected to influence flows in the system is submitted to the District.

You also mentioned “recovery plans” and “Impaired Waters list” in your email. Please note that a flow recovery plan is different from a water quality recovery plan. Neither the Chassahowitzka nor the Homosassa system are in flow recovery as defined in 373.0421 F.S., and thus no recovery plan is needed for flow. Statute 373.0421-3.(2) reads in part:

‘(*2) If the existing flow or level in a water body is below, or is projected to fall within 20 years below, the applicable minimum flow or level established pursuant to s. 373.042, the department or governing board, as part of the regional water supply plan described in s. 373.0361, shall expeditiously implement a recovery or prevention strategy, which includes the development of additional water supplies or other actions, consistent with the authority granted by this chapter to:*
(a) Achieve recovery to the established minimum flow or level as soon as practicable; or
(b) Prevent the existing flow or level from falling below the established minimum flow or level.‘

The state list of Impaired Waters relates to water quality and as you have correctly identified, the Florida Department of Environmental Protection (FDEP) has the statutory authority to regulate pollutant discharges and water quality. If necessary, FDEP will establish a Total Maximum Daily Limit for each system followed by development of a Basin Management Action Plan, which is a recovery plan for water quality analogous to a flow recovery plan.

MGH

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, January 22, 2012 11:08 AM
To: R Rodriguez; J Weaver; Doug Leeper; Marty Kelly; Mark Hammond; Mike Heyl; Kevin J Grimsley; rkane
Cc: Al Grubman; Ron Miller; Brad Rimley; Brent Whitley; Ron Basso; Dana Bryan
Subject: Follow up to Jan 19 Chassahowitzka

I know some of you think I am crazy. But, the fact is I keep thinking and trying to understand what is happening in these Outstanding Florida Waters.
The more we understand these data the more we understand the springs.

January 19 I shared some discharge and specific conductance data for the Chassahowitzka that did not appear to make logical sense.

Well I have been looking further for an explanation.

In the attached spreadsheet the difference in stream level at the Chassahowitzka Main Spring 02310650 and the Chassahowitzka River 02310663 are compared. Chass Main is considerably higher most of the time. There are occasions when the Specific Conductivity readings are high when no reverse flow due to the stream levels appears possible; Jan 13,14 and 15.

A thought that crossed my mind is the higher Specific Conductance Water could be discharging from one or some of the springs and is not due to reverse flow but from seawater ingress into the aquifer. The times when the higher specific conductance is seen coincides with high water times at the Chass River Station. The higher the water level the longer the higher specific conductance is detected.

I have highlighted high water levels in turquoise, specific conductance over 3000 in yellow and the time Chass Main is higher stream level in green for ease of reference.

Kevin and Richard will recall the changes in the specific conductance seen in the data for the Homosassa Main Spring for which I suggested monitoring Specific Conductance at the spring (as opposed to the gage station…even volunteered my time to help) we still have not improved our understanding of that situation months later.

Next time I am in Homosassa I will find a nice day when the tides are right to take my kayak to the Chass and monitor specific conductance over an extended period.
For Homosassa Springs 'they' do not let me kayak in the Homosassa Park, but my offer of time to help with that investigation stands.

In the meantime, any thoughts about this possible explanation for the Chass data is welcome.

Martyn

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Sunday, January 29, 2012 10:11 AM
To: R Rodriguez; Mike Heyl
Cc: Doug Leeper; Kevin J Grimsley; Brad Rimley; Al Grubman; Ron Miller; Norman Hopkins; Brent Whitley; rkane
Subject:

Last week I shared some observations regarding the discharge data from the Chass Main Springs Gage Station, trying to understand what is happening as regards discharge and specific conductance. The apparent disconnects sparked my interest in what is happening downstream at the Chass River Gage Station 02310663. The attached spreadsheet shows the data.

May be someone has an explanation for these apparently low discharge numbers and/or can share the calculation method.

I have highlighted the specific conductance of less than 8000 in yellow, the high tide in red and low tide in green. The inflection point of calculated flow changing from outflow to inflow is blue.

It is clearly evident that spring origin water passes this station for extended periods at low tides. Jan 14-15 shows spring water running for 16 hours.

The part that is difficult to understand is the discharge cfs. You will see the averages for the two time periods is 16 cfs and 30 cfs. Considering the river thru to this point appears to confine the spring waters (no significant other outlet), these discharge numbers appear low.

The high and low tides match reasonably well with the inflection points, but there appears to be some factor in the calculation of discharge cfs that bias the inflow versus the outflow. Some of you may recall I questioned a similar bias in the data Homosassa River (Macrea's).

As noted on the USGS web site, daily mean discharge for the Chass is for a 24 hour period not the tidal cycle of 24.84 hours.

Just another gap in my or our understanding?

Martyn

From: Alan Martyn Johnson
To: Doug Leeper; Marty Kelly; Ron Basso; Ron Miller; Al Grubman; Brad Rimbey; Norman Hopkins; Brent Whitley;;Dana Bryan; Kevin J Grimsley; rkane; R Rodriguez; J Weaver; robert.knight@bocc.citrus.fl.us; rebecca.bays@bocc.citrus.fl.us
Date: Friday, January 06, 2012 12:55:29 PM
Attachments: Combined Discharge H Springs and SEF Jan2010-Dec2011.xlsx

Further to my comments about a five year moratorium on new groundwater withdrawals made at the Working Group meetings; there was a basis for my comment.

It is often difficult to clearly understand the bottom line. So let me try to put this simply to get Yes or No responses.

1. Is baseline for establishing Minimum Flow for the Homosassa River 152 cubic feet per second combined flows from the USGS gage sites Homosassa Main Spring and SE Fork of Homosassa River (Executive Summary, Draft Peer Review July 2010).
YES
NO

2. Is it correct the position taken by SWFWMD is "available data are sufficient for establishing scientifically defensible minimum flows for the…….. Homosassa River…." Available data being from United States Geological Survey (USGS) gages

in the Homosassa Main Spring run and the Southeast Fork of the Homosassa River (December 13, 2011 Memo and Peer Review October 2010).
YES
NO

3. Is the recommended minimum flows for the Homosassa River system defined as a five percent reduction from baseline flows of 152 cfs which is minimum flow 144 cfs.
YES
NO

4. Are criteria set to define when the minimum flow has been reached e.g one day below, one week below, one month below (Peer Review Oct 2010 noted agreement 'minimum flow do not need to be evaluated seasonally').
YES
NO

5. If the USGS daily data for combined flows Homosassa Main Spring run and the Southeast Fork of the Homosassa River for the period January 2010 thru December 2011 shows FLOW IS BELOW THE MINIMUM 144 cfs on 84% of the days for which data is available (daily data available 697 days), would you be surprised.
YES
NO

Just may be you should take a look at the data in the attached spreadsheet.

As always commentary and corrections welcome.
Martyn

Notes:
· Point 5. Additionally, for 25% of the days flow was below 20% reduction from the baseline. Less than 10% of days was discharge above the baseline of 152 cfs.
· Point 2 above, although SWFWMD may consider the calculated discharge data from the gage sites 'scientifically defensible' please note;
- USGS in Atlanta have agreed tois conduct a top level review of this data
- feedback from acoustic doppler unit installed SE Fork September still awaited

==========

From: Doug Leeper
Sent: Tuesday, February 07, 2012 9:23 AM
To: Martyn Johnson (martynellijay@hotmail.com)
Subject: Response to Jan 6 E-mail to SWFWMD & Others

Martyn:

With this e-mail, I'd like to address the questions included in the e-mail you sent to me and several others on January 6, 2012. In this attempt to address your concerns, I have reproduced text from your e-mail below in italics and blue font and followed the excerpts with responses. Note that your full, original e-mail is reproduced at the bottom of this e-mail.

You wrote: "1. Is baseline for establishing Minimum Flow for the Homosassa River 152 cubic feet per second combined flows from the USGS gage sites Homosassa Main Spring and SE Fork of Homosassa River (Executive Summary, Draft Peer Review July 2010).
YES
NO"

Response: No – As used for development of the proposed minimum flows, 'baseline' simply refers to a statistical metric (typically median) characterizing conditions associated with a specific period of flow (benchmark period). For the Homosassa system, two benchmark periods, calendar year 2007 and October 18, 1995 through May 13, 2009, were used to develop minimum flow recommendations. Combined flow records for the USGS Homosassa Main Spring and SE Fork Homosassa River for each benchmark period were used to characterize baseline conditions such as the volume of salinity-based habitat associated where salinities were less than or equal to 5. The baseline conditions evaluated for each benchmark period were associated with the respective median flows, *i.e*., 130 cfs for the 2007 benchmark period and 150 cfs for the 1995-2009 benchmark period. Because median benchmark flows were used for the analyses, it may be expected that one-half of the flow values during each benchmark period were lower than the median values. Finally, it should be noted that the 152 cfs average flow value included in the Executive Summary of the draft minimum flows report represents the average or mean combined flow for the longer benchmark period, rather than a median value.

You wrote: "2. Is it correct the position taken by SWFWMD is "available data are sufficient for establishing scientifically defensible minimum flows for the……. Homosassa River…." Available data being from United States Geological Survey (USGS) gages in the Homosassa Main Spring run and the Southeast Fork of the Homosassa River (December 13, 2011 Memo and Peer Review October 2010).
YES
NO"

Response: Yes

You wrote: "3. Is the recommended minimum flows for the Homosassa River system defined as a five percent reduction from baseline flows of 152 cfs which is minimum flow 144 cfs.
YES
NO"

Response: No -- The recommended minimum flows for the Homosassa River system are an allowable percentage of flow reduction from the natural flow condition, which is defined as the flows that would exist in the absence of water withdrawals.

You wrote: "4. Are criteria set to define when the minimum flow has been reached e.g one day below, one week below, one month below (Peer Review Oct 2010 noted agreement 'minimum flow do not need to be evaluated seasonally').
YES
NO"

Response: Yes -- Compliance with minimum flows that are established for the Homosassa River system will be evaluated at a minimum on an annual basis through use of the Northern District Groundwater flow model and evaluation of rainfall-flow relationships. Compliance with the minimum flows may be evaluated more frequently, based on requests for issuance of a water use permit or permits that may be expected to influence flows in the system

You wrote: "5. If the USGS daily data for combined flows Homosassa Main Spring run and the Southeast Fork of the Homosassa River for the period January 2010 thru December 2011 shows FLOW IS BELOW THE MINIMUM 144 cfs on 84% of the days for
which data is available (daily data available 697 days), would you be surprised.
YES
NO"

Response: No

Thanks again for your inquiries and comments regarding development of minimum flows for the Springs Coast.

Douglas A. Leeper

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, February 08, 2012 8:08 AM
To: Doug Leeper; Mike Heyl
Subject: Homosassa Chassahowitzka MFL's you Feb 6, 2012 e-mails

Doug and Mike,
Thank you both for taking the time yesterday to respond to my e-mails of January 6 and 19.

To be fair I probably should take some time to digest, but there are some fundamental points that cross my mind immediately.

1. To determine Significant Harm do we not need a baseline?
   I thought the basis of setting minimum flows was to identify what reduction in inflow spring water would result in the river system deteriorating to a point that significant harm (change) has occurred. By some convention it has been accepted this is, condition X deteriorates to X – 15%. The condition X using a logical approach needs to be set; it can not be a variable. Considering, salinity, the volumes of various ranges of salinity in the river system are set at some point in time. I thought that is what all those studies were for; to determine the salinity profile (at that time). Then by determining, to the best scientific ability, what flow reduction of 'good quality' spring water inflow would result in the profile deteriorating by 15% volume, area or other appropriate measure. If the inflow reduces below that point I do not think Mother Nature has a control line in her program that says spring water inflow has dropped so invoke seawater inflow control. Seawater inflow will replace the loss of spring water inflow in both the Homosassa and Chassahowitzka.
There has to be a baseline. Some would argue the baseline was when "Outstanding

Florida Water" was pronounced.

2. I have looked at the Rule 40D-8.041 for Weeki Wachee and it (at least the version I looked at and commented on in a recent e-mail) references flows to a specific gage site, not the Northern District Model. Just quickly looked at Hillsborough, it references Morris Bridge gage and appears to be a strongly tidally influenced site…but that was a quick look.
   So this latest concept/wording, using NDM, looks like an attempt to avoid the baseline concept because there is already knocking at that door.

3. Think you have clarified that 'natural flow' is; pumpage plus the flow/discharge from the spring as measured by USGS. This 'natural flow' can be related to the 'baseline' in 1 above. In both the Homosassa and Chassahowitzka pumpage/groundwater withdrawals/human impact were considered as insignificant in assessing the MFL in the draft reports.
   I am pleased that it has been seen fit to focus more on how much is being sucked out of the aquifer. This will help us realize it is a significant factor. But, I am curious how pumpage will be used to assess each of the rivers individually. How is pumpage (will have to add that word to my dictionary) in one basin related to pumpage in an adjacent basin. Will pumpage be combined between basins? That can of worms needs opening, can't have it both ways. The level in Weeki Wachee Well is used as the major predictor of calculated discharge into each of the rivers in the area. Groundwater withdrawals for WWachee (about 10% of discharge, as I recall, based on 2006 data in the 2008 report) surely influenced WW Well levels and consequentially Homosassa and Chass discharge. It was the flow into these rivers at the time the studies were done that created the conditions found during the studies. And the inflow reductions MFL's, for 15% deterioration to cause significant harm, were based on those inflows.

4. Groundwater withdrawals can not be changed with change of rainfall.
   The continued increase in groundwater withdrawals needs to be a focus now. It is political thin ice to revoke water use permits. Yes, I know they have to be renewed every five or ten years, but the politics of not renewing are enormous. The politics of water savings/use reduction plans are fragile and these are often voluntary programs to avoid the politics of enforcement. If I recall correctly in one of the draft reports it mentioned that MFL's are as much political as scientific (my words from memory). How true that is, and the legal jargon plays well with that tune.

5. Given the method of assessment you suggest, use of the Northern District Model; is it not already used to 'model' the future? It has been quoted as predicting flows for future scenarios, those pumping versus no pumping discharge changes. Does it not already include rainfall modeling? No doubt it can be refined by adding actual data each year, but is it not a predictive tool rather than a record book?
   Just worries me the assumptions the NDM uses. A number of times I have questioned the assumptions. The one that comes to mind immediately is, Table 2-4 (if memory serves) in the Homosassa draft report, where the various springs SEFork all have the same discharge, but not supported by a shred of empirical data.

Just some initial comments, I will take the time to digest your responses further.

While I am on the issue of model validity, I will try to pull together my notes/comments about the Chassahowitzka hydrodynamic model that I have recently been looking at.

And, from a tax payer concerned about the future of these and other rivers, SWFWMD and DEP need to start working together on the basis that;
Prevention Is Better Than Cure.

I appreciate that the science of understanding these rivers and spring flows is complex, breakpoints thresholds guaranteed numbers are not Mother Natures forte, and that your task is a difficult one. Hope my outside critic helps you focus and is not a distraction from your efforts to protect Florida's Outstanding Waters while trying to meet the water requirements of the population and industry.

Martyn

==========
From: Doug Leeper
Sent: Monday, February 13, 2012 1:40 PM
To: Alan Martyn Johnson
Cc: Mike Heyl
Subject: RE: Homosassa Chassahowitzka MFL's you Feb 6, 2012 e-mails

Martyn:

Attached are responses to questions raised in the first of the e-mails you sent to Mike Heyl and me on February 8, 2012. I've reproduced portions of your e-mail below and provided responses. Your full e-mail is also incorporated in this e-mail.

You wrote:

1. To determine Significant Harm do we not need a baseline?

I thought the basis of setting minimum flows was to identify what reduction in inflow spring water would result in the river system deteriorating to a point that significant harm (change) has occurred. By some convention it has been accepted this is, condition X deteriorates to X – 15%. The condition X using a logical approach needs to be set; it can not be a variable. Considering, salinity, the volumes of various ranges of salinity in the river system are set at some point in time. I thought that is what all those studies were for; to determine the salinity profile (at that time). Then by determining, to the best scientific ability, what flow reduction of 'good quality' spring water inflow would result in the profile deteriorating by 15% volume, area or other appropriate measure. If the inflow reduces below that point I do not think Mother Nature has a control line in her program that says spring water inflow has dropped so invoke seawater inflow control. Seawater inflow will replace the loss of spring water inflow in both the Homosassa and Chassahowitzka.
There has to be a baseline. Some would argue the baseline was when "Outstanding Florida Water" was pronounced.

Response: Staff believes that baseline conditions have been identified in the draft reports the District has prepared concerning minimum flows development for the Chassahowitzka and Homosassa River systems. Further, we hope that the explanations concerning baseline conditions that Mike Heyl and I have included in recent e-mails have helped clarify this issue. Our intent was to communicate that for minimum flows development, baseline conditions are a standardized reference point from which flow reductions may be evaluated for a wide variety of habitat and ecological metrics, and to also note that baseline conditions are not a minimum flows criterion.
You wrote:

2. I have looked at the Rule 40D-8.041 for Weeki Wachee and it (at least the version I looked at and commented on in a recent e-mail) references flows to a specific gage site, not the Northern District Model. Just quickly looked at Hillsborough, it references Morris Bridge gage and appears to be a strongly tidally influenced site…but that was a quick look.
   So this latest concept/wording, using NDM, looks like an attempt to avoid the baseline concept because there is already knocking at that door.

Response: The District always identifies a baseline condition when developing minimum flows and levels on priority water bodies, and has done so for the work supporting minimum flows development for the Chassahowitzka and Homosassa River systems. With regard to the rule you cited concerning minimum flows for the upper Hillsborough River, please note that there are no tidal effects on the upper portion of the river, as the river has, for the most part, been impounded since the late 1800s (there were a few periods during the past 100-plus years when the river was free-flowing following collapse or destruction of then-existing dams). Minimum flows for the highly altered lower river, which is tidally influenced, have also been incorporated into District rules. The minimum flows for the lower river are associated with measured flows at a gage in the upper portion of the river. This association is used to determine minimum flow requirements downstream from the City of Tampa Dam, based on flows that are delivered to the impounded river segment. I would also add that numerical models and other statistical analyses are always used to determine withdrawal impacts to systems prior to the setting of minimum flows and also afterward to evaluate compliance with the adopted rule.
You wrote:

3. Think you have clarified that ‘natural flow’ is; pumpage plus the flow/discharge from the spring as measured by USGS. This 'natural flow' can be related to the 'baseline' in 1 above. In both the Homosassa and Chassahowitzka pumpage/groundwater withdrawals/human impact were considered as insignificant in assessing the MFL in the draft reports.
   I am pleased that it has been seen fit to focus more on how much is being sucked out of the aquifer. This will help us realize it is a significant factor. But, I am curious how pumpage will be used to assess each of the rivers individually. How is pumpage (will have to add that word to my dictionary) in one basin related to pumpage in an adjacent basin. Will pumpage be combined between basins? That can of worms needs opening, can’t have it both ways. The level in Weeki Wachee Well is used as the major predictor of calculated discharge into each of the rivers in the area. Groundwater withdrawals for WWachee (about 10% of discharge, as I recall, based on 2006 data in the 2008 report) surely influenced WW Well levels and consequentially Homosassa and Chass discharge. It was the flow into these rivers at the time the studies were done that created the

conditions found during the studies. And the inflow reductions MFL's, for 15% deterioration to cause significant harm, were based on those inflows.

Response: Evaluations of existing and future water withdrawal impacts using the Northern District groundwater flow model are conducted to evaluate potential withdrawal-related impacts to all spring/river systems within the model domain. Withdrawals are modeled in a cumulative manner. That is to say, all withdrawals throughout the model domain are used to assess the impact at each spring . The model predicts that withdrawals cause a larger impact at Weeki Wachee spring because of the location of two major public supply wellfields in close proximity to the spring (see Ron Basso's email dated January 26th to Brad Rimbey and copied to you for a more detailed explanation).

You wrote:

4. Groundwater withdrawals can not be changed with change of rainfall. The continued increase in groundwater withdrawals needs to be a focus now. It is political thin ice to revoke water use permits. Yes, I know they have to be renewed every five or ten years, but the politics of not renewing are enormous. The politics of water savings/use reduction plans are fragile and these are often voluntary programs to avoid the politics of enforcement. If I recall correctly in one of the draft reports it mentioned that MFL's are as much political as scientific (my words from memory). How true that is, and the legal jargon plays well with that tune.

Response: Development of minimum flows and levels is a science-based process with a significant policy component. District staff develops minimum flow and level recommendations using the best information available. The flow or level recommendations are subjected to independent, scientific review by a panel of scientists, and the findings of the peer-review panel are to be given significant weight by the District Governing Board when the Board considers establishing minimum flows or levels. Exclusions and considerations relevant to the establishment of minimum flows and levels that are to be considered by the Board are provided in State Law pertaining to minimum flows and levels, and address things such as existing structural alterations that affect the hydrology of the water body under consideration for minimum flow or level development, and indicate that recovery of some water bodies may not be economically or technically feasible.

I would like to take this opportunity to emphasize that development of minimum flows and levels is only one of the tools used to evaluate groundwater withdrawal impacts to natural systems. The District implements a number of environmental rules included in Chapter 40D-2. F.A.C. when evaluating the issuance or renewal of water use permits. The District also evaluates future water demand and the sources to meet that demand every five years as part of the state-mandated regional water supply planning process. We also fund non-regulatory projects such as developing water conservation plans for public supply utilities and expanding the use of reclaimed water for irrigation throughout the District. With regard to water conservation, all public supply utilities are required to meet a per capita rate of 150 gallons per day per person for their service area by 2018 in the Northern District region.

You wrote:

5. Given the method of assessment you suggest, use of the Northern District Model; is it not already used to 'model' the future? It has been quoted as predicting flows for future scenarios, those pumping versus no pumping discharge changes. Does it not already include rainfall modeling? No doubt it

can be refined by adding actual data each year, but is it not a predictive tool rather than a record book?
Just worries me the assumptions the NDM uses. A number of times I have questioned the assumptions. The one that comes to mind immediately is, Table 2-4 (if memory serves) in the Homosassa draft report, where the various springs SEFork all have the same discharge, but not supported by a shred of empirical data.

Response: The Northern District model can be used in a predictive or retrospective manner by including current, past, and future withdrawal values. Statistical models that relate historical spring discharge to, for example, historical rainfall, can be used for evaluating current expectations for discharge based on local rainfall conditions. Expected discharge values can be compared to measured discharge to determine whether existing flows correspond with expectations associated with current rainfall. With regard to assumptions used for development of the Northern District model (and all other models) we continue to make the best possible judgments given current limitations of data. During model calibration period for the Northern District model, many of the observed values of discharge for the smaller springs simulated in the model are estimates based on a 2002 United States Geological Survey report entitled *Simulation of Ground-Water Flow in the Intermediate and Floridan Aquifer Systems in Peninsular Florida* that was authored by Nicasio Sepulveda. Unfortunately, many of these smaller springs are not gauged and therefore have no measured flow record available. While recognizing the difficulties this presents, we do the best we can with the data available. We feel it's best to simulate them in the model rather than excluding them altogether.

Thanks for your input. As you know, your comments and all other public input on the minimum flows and levels development process will be reviewed by staff and made available for consideration by the Governing Board and other persons interested in the Homosassa River system.

Douglas A. Leeper

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, February 08, 2012 8:08 AM
To: Doug Leeper; Mike Heyl
Subject: Homosassa Chassahowitzka MFL's you Feb 6, 2012 e-mails

Doug and Mike,
Thank you both for taking the time yesterday to respond to my e-mails of January 6 and 19.

To be fair I probably should take some time to digest, but there are some fundamental points that cross my mind immediately.

1. To determine Significant Harm do we not need a baseline?
I thought the basis of setting minimum flows was to identify what reduction in inflow spring water would result in the river system deteriorating to a point that significant harm (change) has occurred. By some convention it has been accepted this is, condition X deteriorates to X – 15%. The condition X using a logical

approach needs to be set; it can not be a variable. Considering, salinity, the volumes of various ranges of salinity in the river system are set at some point in time. I thought that is what all those studies were for; to determine the salinity profile (at that time). Then by determining, to the best scientific ability, what flow reduction of 'good quality' spring water inflow would result in the profile deteriorating by 15% volume, area or other appropriate measure. If the inflow reduces below that point I do not think Mother Nature has a control line in her program that says spring water inflow has dropped so invoke seawater inflow control. Seawater inflow will replace the loss of spring water inflow in both the Homosassa and Chassahowitzka.
There has to be a baseline. Some would argue the baseline was when "Outstanding Florida Water" was pronounced.

2. I have looked at the Rule 40D-8.041 for Weeki Wachee and it (at least the version I looked at and commented on in a recent e-mail) references flows to a specific gage site, not the Northern District Model. Just quickly looked at Hillsborough, it references Morris Bridge gage and appears to be a strongly tidally influenced site…but that was a quick look.
   So this latest concept/wording, using NDM, looks like an attempt to avoid the baseline concept because there is already knocking at that door.

3. Think you have clarified that 'natural flow' is; pumpage plus the flow/discharge from the spring as measured by USGS. This 'natural flow' can be related to the 'baseline' in 1 above. In both the Homosassa and Chassahowitzka pumpage/groundwater withdrawals/human impact were considered as insignificant in assessing the MFL in the draft reports.
   I am pleased that it has been seen fit to focus more on how much is being sucked out of the aquifer. This will help us realize it is a significant factor. But, I am curious how pumpage will be used to assess each of the rivers individually. How is pumpage (will have to add that word to my dictionary) in one basin related to pumpage in an adjacent basin. Will pumpage be combined between basins? That can of worms needs opening, can't have it both ways. The level in Weeki Wachee Well is used as the major predictor of calculated discharge into each of the rivers in the area. Groundwater withdrawals for WWachee (about 10% of discharge, as I recall, based on 2006 data in the 2008 report) surely influenced WW Well levels and consequentially Homosassa and Chass discharge. It was the flow into these rivers at the time the studies were done that created the conditions found during the studies. And the inflow reductions MFL's, for 15% deterioration to cause significant harm, were based on those inflows.

4. Groundwater withdrawals can not be changed with change of rainfall.
   The continued increase in groundwater withdrawals needs to be a focus now. It is political thin ice to revoke water use permits. Yes, I know they have to be renewed every five or ten years, but the politics of not renewing are enormous. The politics of water savings/use reduction plans are fragile and these are often voluntary programs to avoid the politics of enforcement. If I recall correctly in one of the draft reports it mentioned that MFL's are as much political as scientific (my words from memory). How true that is, and the legal jargon plays well with that tune.

5. Given the method of assessment you suggest, use of the Northern District Model; is it not already used to 'model' the future? It has been quoted as

predicting flows for future scenarios, those pumping versus no pumping discharge changes. Does it not already include rainfall modeling? No doubt it can be refined by adding actual data each year, but is it not a predictive tool rather than a record book?
Just worries me the assumptions the NDM uses. A number of times I have questioned the assumptions. The one that comes to mind immediately is, Table 2-4 (if memory serves) in the Homosassa draft report, where the various springs SEFork all have the same discharge, but not supported by a shred of empirical data.

Just some initial comments, I will take the time to digest your responses further.

While I am on the issue of model validity, I will try to pull together my notes/comments about the Chassahowitzka hydrodynamic model that I have recently been looking at.

And, from a tax payer concerned about the future of these and other rivers, SWFWMD and DEP need to start working together on the basis that;
Prevention Is Better Than Cure.

I appreciate that the science of understanding these rivers and spring flows is complex, breakpoints thresholds guaranteed numbers are not Mother Natures forte, and that your task is a difficult one. Hope my outside critic helps you focus and is not a distraction from your efforts to protect Florida's Outstanding Waters while trying to meet the water requirements of the population and industry.

Martyn

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 03, 2012 7:47 AM
To: Mike Heyl; Doug Leeper
Cc: Kevin J Grimsley; R Rodriguez; Al Grubman; Ron Miller; Brad Rimley; Norman Hopkins; Ron Basso; Brent Whitley
Subject: Rule 40D-8.041

According to the Proposed Rule 40D-8.041 for the Weeki Wachee River, the discharge at Gage Site 02310525on January 31 was 113 cfs.

The USGS web site reports for this siteis 137 cfs.

Confusing?

If you read the attached note to Mike Heyl you will probably understand what lead me to this. Mike comment, in his Jan 19 e-mail attachment, about Rule 40D-8.041 regarding the Chassahowitzka; so I started looking into this.

Possibly someone can clarify this mismatch for me, and some others who may find this confusing.

Martyn
P.S. I am still trying to understand if 'natural flow' for the Weeki Wachee Riverincludes, or does not include, the anthropogenic impact, about 17 cfs or about 10% . To be clear that is 'pumpage', or put another way the amount of water mankind is sucking out of the aquifer near Weeki Wachee.

==========

From: Mike Heyl
Sent: Thursday, February 09, 2012 11:44 AM
To: 'Alan Martyn Johnson'
Cc: Kevin J Grimsley; Al Grubman; Ron Miller; Brad Rimley; Norman Hopkins; Ron Basso; Brent Whitley; Doug Leeper
Subject: RE: Rule 40D-8.041

Mr. Johnson –
In response to your Feb 3 inquiry :

As in the case of the Chassahowitzka evaluation, we wanted a consistent long-term estimate of daily flow for the MFL evaluation of the Weeki Wachee River system. The USGS reported daily discharge from 1964 – 1966 at a site approximately 1.6 km upstream of the current site that you cited. Daily discharge records at the 02310525 site began in 1993, leaving a lengthy gap between 1966 and 1999. In order to hind-cast flows, a series regressions were developed using five year blocks of manual USGS measurements reported by Knochenmus and Yobbi (USGS Water Resources Investigation Report 01-04230). The reason for evaluating five-year blocks was to make certain that no major changes in the slope of the relationships between discharge and well water level had occurred over the period of evaluations. In karst systems, it is possible to have underground conduits collapse, open, or expand resulting in changes in spring discharge without commensurate change in climate or withdrawals and it was necessary to verify a consistent relationship between river flows and water levels in the Weeki Wachee well. As you cited in your attached commentary, the USGS equation 3 found in Table 1 of Knochenmus and Yobbi (2001) using 1966 – 1998 results would produce a different answer for flow than the USGS equation 4 derived from 1997-1998 results. For example, if water level in the Weeki Wachee Well were 16 feet, equation 3 would predict a flow of 150.7 cfs, while the USGS equation 4 would predict 159.4 cfs. (For comparison, the equation derived for the MFL evaluation would predict a discharge of 150.6 cfs and is essentially USGS equation number 3 derived from 205 observations instead of 207 observations. Two of the observations were flagged as ‘outliers’ by the statistical software I was using at the time.)

No pattern in the slopes was apparent for the regressions developed using the five-year blocks, and a single regression using all but two observations was ultimately chosen to represent the entire period. As you noted in your attachment, details of the derivation are described in section 2.3.1 of the October 2008 Weeki Wachee River System Recommended Minimum Flows and Levels report that can be found on the District’s website. Estimates of anthropogenic impacts and flow corrections are described in section 2.5 and subsections. All of the subsequent analyses incorporated an adjustment for anthropogenic impacts as described in the report. Since impacts were greater in the recent record than in the early data, the adjustment was derived from the more recent data and the ‘baseline’ chosen represented the 1984 – 2004 flows, with the pumpage

impacts added back into the record (See Figure 2-17 and discussion in section 2.5.4 of the Weeki Wachee minimum flows report).

I do not know what discharge regression USGS is currently using, but, as you pointed out, it does not agree with the discharge calculated for the Weeki Wachee MFL determination. This is simply because the USGS is using a different (and most likely an updated) equation. Recognizing the difference and the potential for confusion, it became necessary to include the equation used for the MFL determination in the rule. However, the rule references the USGS gage as a location, but does not state that the measured flow at that location agree with the flow estimate by the MFL flow regression. The MFL flow regression was used to establish a historical flow record, which was then statistically analyzed to obtain the expected flow values give in Table 8-18 in the rule.

Staff recognizes the potential for confusion concerning the MFL rule for the Weeki Wachee River system and intends to address this issue again when the MFL is re-evaluated.

With regard to your question concerning the term “natural flow” in the MFL rule for the Weeki Wachee River system, ‘natural’ flow is the flow that would exist in the absence of water withdrawals. I would also add, as a point of clarification, the Weeki Wachee MFL language and all other language found in 40D-8 F.A.C. are adopted rules and are no longer ‘proposed’.

As described in prior correspondence, the median flow of the baseline period is not a criterion of the MFL. The MFL is based on a percentage of natural flow. Within the Weeki Wachee MFL document, the word ‘baseline’ is used 27 times in the context of flows, (plural), conditions (plural) or when referencing a period of time encompassing multiple days of flow. The term ‘baseline’ is not, nor was it ever intended to be fixed threshold of flow representing the Weeki Wachee minimum flow.

MGH

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Friday, February 10, 2012 7:44 AM
To: Mike Heyl
Cc: Kevin J Grimsley; Brad Rimbey; Norman Hopkins; Ron Basso; Brent Whitley; Doug Leeper; Al Grubman; Ron Miller
Subject: RE: Rule 40D-8.041

Mike,
Thanks for your response to my February 3 e-mail.

You spent along time clarifying that your regression analysis and Knochenmus and Yobbi’s regression analysis of the 207 field measurements yielded essentially the same equation. Great, I am pleased to know that mathematics still holds true and statistical analysis pulled two out layers. The table in my e-mail essentially confirmed this agreement.

When hind casting Field Measurements after 10/29/1998, potentially at least 50 data points, were not regressed to determine any possible changes due to all the valid reasons you mention for change in flow/discharge not directly related to Weeki Wachee Well level.

Y & K used data 8/15/1966 thru 10/29/1998; I can only assume they used that 1966 cut off date was to assure consistency/eliminate any influence re the earlier location 1.6 km upstream. Field Measurements, about 300 of them before 1966, date back to 1917.

But, when considering the tables in my e-mail you appear to miss the point that the relationship between more recent field measurements and the presently used USGS 'equation' (which SWFWMD are not appraised of is) favors the accuracy of the unknown USGS equation.

That to me is troubling;
1. In that you guys are operating in separate bunkers, and
2. In that SWFWMD equation (Rule 40D) does not match as well as the USGS presently used equation, with field measurements. AND YOU SAY "This is simply because the USGS is using a different (and most likely an updated) equation.

Speechless.

As I have other things to do today let me quickly move on to 'natural flow'.

You say "The MFL is based on a percentage of natural flow."

Assume the 'natural flow' to be 200 cfs and the anthropogenic impact is 10% or 20cfs. The discharge into the river 'controlling' the ecological conditions (temp, salinity etc) is 180 cfs a drop of 10%. If, anthropogenic impacts increase to 20% or 40 cfs, the discharge into the river is 160 cfs. The natural flow has not changed, but a further 10+% of the discharge controlling the ecology of the river has been lost.

Table 8-18 may be a way to attempt to address this, but it is derived, I think, from the hind cast natural flow data.

Finally, I stand by my point about semantics. Baseline sometimes means baseline(the word) is X and sometimes baseline(the term) is Y.
Martyn

==========

From: Alan Martyn Johnson [mailto:martynellijay@hotmail.com]
Sent: Wednesday, February 08, 2012 9:25 AM
To: Mike Heyl; Doug Leeper
Cc: Brad Rimley; Al Grubman; Ron Miller; Brent Whitley; Norman Hopkins
Subject: Chassahowitzka Hydrodynamic Modelling Accuracy

Mike/Doug,

Those teasers on the radio/tv that keep you waiting are annoying. I did not want to be accused of the same so here is the concern with the Chassahowitzka model I mentioned earlier. I will address this to Mike as I believe he was more involved with his project.

Mike,
You will recall the spreadsheet attachment to my January 12 e-mail. It shows the Chassahowitzka daily discharges for 2010 and 2011.

Brad Rimley added to the spreadsheet to see how the equation shown in the Chass draft report, for filling the data gaps in the 1999-2006 USGS data set, compares to USGS data. The results show equation;
Q = 23.672 + 2.765 * wwwl – 3.813* GHmax
gives calculated discharge, during the 2010-2011 period, about 5% lower than the USGS figures. Differences range from 33% lower to 31% higher; these did coincide with unusual USGS figures that may be the result of the 24.84 hour tidal cycle effect in the daily data.

Following up on this I have noticed that the data set (November 2006 thru February 2007) used to calibrate the Chassahowitzka hydrodynamic model (Dynamic Solutions April 17, 2009) contains about 80% 'in-fill' data for main spring inflow.

Using calibration data that exhibits spring discharge lower than 'actual' (USGS calculated discharge) would appear to have an effect on the accuracy of the model outputs. Additionally, the analysis period selected, 2004 / 2005 / 2006, contains over 15% fill-in data both calculated and interpolated (second half 2006).

Would appreciate any thoughts and comments you may have regarding this.

Martyn

To help you understand how I arrived at this point my notes below may be useful. They are notes and if something is not clear please ask.

In the Draft Report/Appendices the equation was used to fill the 157 data gaps in the 1999-November 2007 USGS discharge records (March 19, 2010 memo). Checked the USGS record to find where all these gaps were (4% did not seem like a lot, but I looked). Found one rather large gap that caught my attention, June 16, 2006 thru Feb 14, 2007 (thanks to hurricane Alberto, a 240 day gap some days no gage height max would be interpolated, gage height recording resumed October)). Recalling that the calibration period for the modeling was Nov 2006 thru Feb 2007, focused on this timeframe. Just over 90 days were lacking reported daily discharge data in the calibration period.

It appears that the calibration of the hydrodynamic model has been done with a data set that included a lot of 'fill-in data' (94 of the 120 day period are 'fill-in data' and it may be

all but 14 days are… the USGS data contains some single day results randomly scattered thru the period which may have been considered invalid).

Page 22 of the Draft report it states;
"The selected model simulation period was from November 1, 2006 to February 28, 2007. During this 4-month period there existed the best available overlap of the flow, temperature, salinity and meteorology data for both boundary conditions and for calibration comparison data. This period corresponded to a relatively low spring discharge period."

On page 40 of the Dynamic Solutions April 17, 2009 report it states;
"The average flow for the entire calibration period was 52.6 cfs (1.49 m3/s) compared to an average of the average monthly flows of 64.3 cfs (1.82 m3/s) for the same four months from the long term record."

This difference, almost 20%, appears more than due to equation. 64.3 cfs results from Weeki Wachee level having historic levels up to 22-23 ft.. Have not seen above at 16 feet since March 2006. Nov 06 – Feb 07 WWlevel 14.56 to 12.85 ft.. Checked differences with available USGS discharges before and after the June '06-Feb '07 gap above; differences averaged about 8% due to the use of the equation.

That led to question the validity of the hydrodynamic models calibration.
Salinity
In the Dynamic Solutions report page 29;
"4.4.2 Salinity Calibration
Figures 4-9 through 4-11 show the salinity calibration results for Stations 02310673 and 02310663."

Nowhere in that section of the report does it mention how spring inflow water factors into the calibration. May be it is just an omission in writing the report. Was it daily high, daily low (there is no daily mean reported for the Chass Main 02310650, at least on the web site)? Crab, Potter etc in Table 3-3 combined flow of 86 cfs (from 1988-1989 when Weeki Wachee was 4+ feet higher than Nov '06 – Feb '07). The 86 cfs appears to have been used from the reference to Table3-3 on page 24.

In Figure 7-4 the low discharge figures for second half of 2006 (calculated from equation/interpolation) may be partly responsible for the apparent loss of volume of 0-2 ppt water. I say partly because we know that the daily high specific conductance of the inflow water at the main spring rose noticeably in 2006 from those reported in 2005. Comes back to which specific conductance data for main spring was converted to ppt as no daily mean reported by USGS.

Temperature
Main spring temperature gets early mention in Figure 4.4 as part of the boundary description, but is not mentioned in calibration page 31:
"***4.4.3 Water Temperature Calibration***
Figures 4-12 through 4-14 show the temperature results for calibration Stations 02310673 and 02310663. The temperature calibration reproduced the cycles of cold fronts moving through the area, producing cooling followed by warming trends."

Same point as with salinity for Crab, Potter etc, no mention of temperature used.

Calibration statistics only go downstream of Gage Site 02310663.
Upstream is shown in Figure 6-4 (Jan 7, 2007), 6-5 (Jan 7, 2002) and 6-8 (Jan 8, 2002). These do not defining manatee refuge volume with decreasing inflow of spring water. Given the conclusion that Chassahowitzka River is not a good manatee refuge because of depth, possibly the temperature issue became mute for the report other than page 84; "However, from a review of the data it appears that there may be narrow deep channels that are not well resolved in the data and in the model in the upper reaches of the Chassahowitzka."

Flow

"5.3 Flow
For the flow component, the Chassahowitzka Main gage (USGS 02310650) was used. A relationship between the daily flows (Flow_02310650 in cfs) and the water levels in the Weeki Wachee well (WW_WL in feet) (see Fig 1-1 for the well's location) was conducted. Figure 5-7 shows the data and the regression. The resulting predictor equation was:
Flow_02310650=12.4276+2.92446*WW_WL."

More regression analysis producing more synthesized data, resulting in discharge back to 1966 Figure 5.8, and in Section 7.2 as determinate there is no seasonal salinity impact allowing the salinity impact analysis to be done on entire years 2004, 2005 and 2006. Over half of 2006 was that low cfs calculated data (see date range above). Crab, Potter, Baird, Beteejay Blue in Table 3.3 total 86 cfs presumed to be used as constant in calibration. Earlier note about date of these discharge in salinity.

On page 1;
"With an average spring discharge of about 106 ft3/s (3 m3/s) (see Section 5.3), the daily inflows only makes up about 8% of the Chassahowitzka's volume."

Do not find 106 cfs in Section 5.3 which is regression analysis back tracking to 1966. Origin of the 106 cfs not found.

Section 4.5 it is not clear what freshwater flow is (half and double freshwater flow); Is it just Chass main or also Crab, Potter etc?

Table 4-6 every one of the Min and Max occurrence dates are calculated numbers from the fill-in equation, or the back to 1966 equation.

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Wednesday, February 15, 2012 7:51 AM
To: Brad Rimbey
Cc: Al Grubman; Ron Miller; Norman Hopkins; Brent Whitley; Dan Hillard; Dana Bryan; Doug Leeper; Mike Heyl; Kevin J Grimsley; R Rodriguez
Subject: RE: Freedom of Information Act Public Records Request

Brad,
Thanks for sharing.

I have looked over the FOIA response and cross checked equations for the major gage sites with USGS current discharge data;

All the Homosassa equations match the ones in the MFL report appendices.

Weeki Wachee agrees with current discharge data. I note this equation has been in use since 2004. In the table I shared in an e-mail to Mike Heyl there was an indication that a different equation was used in 2002.

Chassahowitzka main spring 02310650 agrees with current discharge data. I note use of this equation started in October 2002. This indicates that data used in the Chass studies (discharge data 1997-2007) had a different basis for the first five years of data to the second five years. The significance is unclear, but looking at the Figure 2-6 in the Chass MFL draft report there is a noticeable increase. You may recall I used the Knochenmus and Yobbi equation which gave discharge about 20% lower than reported discharge when I first raised the question last year.

Chassahowitzka River 02310663. The equation provided does not match the current data. I have attached a spreadsheet that lead me to this point. Please feel free to double check it. The cross section equation appears to make logical sense with channel width of 329.75 ft and a stage area (if I got my terminology correct) at zero gage height of 1428.6 sq ft (this translates to an average depth at GH 0 of just over 4 ft.). The 6.1219*GH*GH results in a positive addition when the GH is negative, this is such a small factor it is not the reason for the difference I think I have identified between equation in the response and the current data.

I have not checked the other equations (I will check Crystal River Bagley Cove later), just focused on the main ones for now.

Martyn

==========
From: BWR.CRRC@tampabay.rr.com
To: pastoralfarm@netsignia.net; rmille76@tampabay.rr.com; Mike.Heyl@swfwmd.state.fl.us; martynellijay@hotmail.com; mnewberger@verizon.net; Doug.Leeper@swfwmd.state.fl.us; Ron.Basso@swfwmd.state.fl.us;

grubman1@gmail.com; norman@amyhrf.org; BrentWhitley@Sierra-Properties.com; Dana.Bryan@dep.state.fl.us; Rebecca.Bays@bocc.citrus.fl.us; kjgrims@usgs.gov; Cara.Martin@swfwmd.state.fl.us; 2buntings@comcast.net
Subject: Re: Freedom of Information Act Public Records Request
Date: Mon, 13 Feb 2012 21:31:05 -0500

It appears the Freedom of Information Act is still alive and well. It also appears that USGS does not change these equations very often. So long as there are no major changes in the karst geology which feeds our Springs Coast rivers, this is expected. See the attached response from USGS. Brad
----- Original Message -----
From: Brad Rimbey@CRRC
To: djnewman@usgs.gov
Cc: Dan Hilliard ; Cara S. Martin ; Kevin J Grimsley ; Rebecca.Bays@bocc.citrus.fl.us ; Dana.Bryan@dep.state.fl.us ; Brent Whitley ; Norman Hopkins ; Al Grubman ; Ron Basso ; Doug Leeper ; Mickey Newberger ; Martyn Johnson ; Mike.Heyl@swfwmd.state.fl.us
Sent: Thursday, January 19, 2012 4:35 PM
Subject: Freedom of Information Act Public Records Request
David J. Newman
USGS FOIA Officer
12201 Sunrise Valley Drive
Mail Stop 807
Reston, VA 20192
RE: Freedom of Information Act - Public Records Request
Dear Mr. Newman,
Pursuant to the Federal Freedom of Information Act and Florida Public Records Statute (Chapter 119 F.S.), please provide me with following public records or information.
1) The USGS regression equations which are currently (as of January 19, 2012) being used to predict the discharge at the following USGS stations
a) USGS 02310525 WEEKI WACHEE RIVER NEAR BROOKSVILLE FL
b) USGS 02310545 WEEKI WACHEE RIVER NR WEEKI WACHEE SPRINGS FL
c) USGS 02310650 CHASSAHOWITZKA RIVER NEAR HOMOSASSA FL
d) USGS 02310663 CHASSAHOWITZKA RIVER NEAR CHASSAHOWITZKA FL
e) USGS 02310673 CHASSAHOWITZKA R AT DOG ISL NR
f) USGS 02310674 CHASSAHOWITZKA R AT MOUTH NR CHASSAHOWITZKA FL
g) USGS 02310675 HIDDEN RIVER NEAR HOMOSASSA FL
h) USGS 02310678 HOMOSASSA SPRINGS AT HOMOSASSA SPRINGS FL
i) USGS 02310688 SE FORK HOMOSASSA SPRING AT HOMOSASSA SPRINGS FL
j) USGS 02310700 HOMOSASSA R AT HOMOSASSA FL
k) USGS 02310742 CRYSTAL RIVER AT MOUTH OF KINGS BAY FL
l) USGS 02310747 CRYSTAL RIVER AT BAGLEY COVE NEAR CRYSTAL RIVER FL
m) USGS 02310752 SALT RIVER NEAR CRYSTAL RIVER FL
2) The data range to which each of these equations is applicable (i.e. the beginning and ending date for the applicable data set from each USGS station)
3) A brief description of the variables used in each of the requested regression equations.
Please note that the Florida Public Records statute was referenced in this request because the monitoring for all of the recorded data in this request was cooperatively funded by a Florida state agency (SWFWMD).

Thank you in advance for assistance.
Brad W. Rimbey, P.E.

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Thursday, February 16, 2012 8:26 AM
To: Al Grubman; Ron Miller; Norman Hopkins; Brent Whitley; Dan Hillard; Dana Bryan; Doug Leeper; Mike Heyl; Kevin J Grimsley; R Rodriguez
Subject: Follow up FOIA Equations response

Following up on yesterdays e-mail regarding the equations. Brad made a good point about not looking at data after the date of his request in case there is a change. To that end I have added the data (blue) from October 18, 2011 on the spreadsheet I shared yesterday. I did download the whole 120 days data, but thought that was a little much to share yesterday to make the point.

For Chassahowitzka main spring I had plugged the equation into August 25, 2011 which is what resulted in the original question. The equation matches the calculated discharge on USGS web site.

As promised I have looked at Bagley Cove Crystal River. Even looking at the equation yesterday I had concerns, sure enough it does not match. I even tried using the stream level instead of gage height. The stage area may well be the 1895.9 sq.ft. and the 527.2ft. may be the channel width, but with gage heights typically around 12 ft something is not right in this equation.

Yesterday one of my readers asked if I was now agreeing that the discharge data is correct.

Let me be clear in case my wording yesterday was not. The equations for the three Homosassa sites and Chassahowitzka main spring are the equations USGS uses to calculate the discharge. That does not mean these calculated discharges are TRUE.

Let me first take the SE Fork; the calculated discharge when considered over a tidal cycle indicates much larger changes of level in the roughly 3 acre pool upstream of the gage site than actually occur. My speculation is that the discharge as cfs is much more consistent than the calculated discharge data implies. To support this speculation, I have measured stream velocities many times, using oranges passing under the Fishbowl Bridge . The whole purpose of the velocity meter at this location is to better understand this. I have recently had conversations with manufacturers of acoustic velocity meters in order to better understand why after over 5 months we still await even preliminary data.

Homosassa River Macrae's; I still have major concerns that the squaring of negative velocity reading (0.121382*Ivel*Ivel) in the equation results in a bias in the calculation of inflow versus outflow.

Homosassa Main Springs; in my opinion this is closest to the truth, , but there are still occasions when the field measurements differ by more than 10%.

Chassahowitzka main spring; I have some concern that the large multiplier applied to the stage change, the 905.3087, the factor resulting in negative flow is rather high. Brad Rimbey and myself have been trying to determine the open water area upstream of the gage site to do a similar calculation to what I did for SE Fork. The canals are reasonably easy to estimate, the problem is trying to get a number for the area 'upstream' of Bubba/Seven Sisters Springs. I intend in the next few weeks to get a better handle on whether or not there are any upstream flows i.e. past Bubba Spring.

Let me be clear, none of this is easy simple science. USGS and SWFWMD are trying to understand these springs, but sometimes it is necessary to step back from the computers, regression analyses and models and ask the folks what they see. Those folks that have seen the Homosassa and Chassahowitzka Rivers deteriorate, they are the test of whether or not the computer simulation is meaningful. My timing of floating oranges may not be as accurate as an acoustic velocity meter, if it is located correctly and the equations used to translate what it sees as stream velocity to cfs are correct, but the oranges have no way to go other than with the flow!!.

Have a great day.

Martyn.

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Friday, February 17, 2012 7:56 AM
To: Al Grubman; Ron Miller; Norman Hopkins; Brent Whitley; Dan Hillard; Dana Bryan; Brad Rimbey
Cc: Doug Leeper; Mike Heyl; Kevin J Grimsley
Subject: Follow up to another question

Yesterday I had another reader ask if I could further explain the point about the 905.3087 factor, as it was not clear.Let me try and I have copied others who may be interested, or can correct me.

The 905.3087 is applied to the change in stage height over a 15 minute interval eg if the stage height is 1.00 ft and 15 minutes later the stage height is 1.05 ft. the change is 0.05. The 0.05 multiplied by 905.3087 is 45.3. This 45.3 is subtracted from the other components of the equation to get cfs.
If the stage had changed from 1.00 ft to 0.95 ft the change would be -0.05 and in the same way the -45.3 would be added (- -45.3 is +) to the other components of the equation.
In the attached spreadsheet (Stage Change Factor) I have some additional figures that help show this for various stage height changes and two different levels for Weeki Wachee Well.
Additionally, I have included a sheet January 17-Feb 14 which shows the negative flow intervals (highlighted yellow) and the high tide at both gage sites in red font. The really interesting part of the data set is how the specific conductance peaks after flow becomes positive (calculated flow that is). I had looked at this data before, but can not find my

original spreadsheet (thought was August last year). Anyway, this was the basis of my suggesting that the high specific conductance possibly is indicative of seawater ingress into the aquifer rather than true reverse flow in the river. The changes are very fast increase in spec cond and I still can't see where all that reverse flow water goes…the springs do not just stop flowing.
Over the next couple of weeks I hope to be out in my kayak enjoying the nature and doing a little testing of my own.
Questions and comments always welcome…as are other interpretations of the data.
Martyn

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Friday, February 17, 2012 8:23 AM
To: Doug Leeper; Mike Heyl
Cc: Al Grubman; Ron Miller; Brad Rimbey; Brent Whitley; Norman Hopkins; Dana Bryan
Subject:
Doug and Mike,

As I have said before I appreciate the time you have both taken to answer my questions. The trouble is I, and others, are having difficulty understanding your answers. So let me try to take it in small steps starting with the Homosassa.

Trust you do not find my use of colors too much; it is a means of clarifying source differences and connecting a common theme.
Homosassa River.
I asked if the baseline flow is 152 cfs.
Your answer was NO.
From your February 7 e-mail;
"Response: No – As used for development of the proposed minimum flows, 'baseline' simply refers to a statistical metric (typically median) characterizing conditions associated with a specific period of flow (benchmark period)."

The Homosassa Draft Report stated in the Executive Summary;
"…has averaged 152 cubic feet per second (cfs) for the period from 1995 through 2009."

Our difficulty with this answer is, you never stated the flow (cfs) the five percent reduction is applied to in order to define a minimum flow (cfs).

Again from the Executive Summary;
"Based on review of resource and habitat-based criteria, the recommended minimum flows for the Homosassa River system are defined as a five percent reduction from baseline flows."

So, what is the flow from which the five percent reduction is the minimum flow?

The Executive Summary in the draft report clearly states the withdrawals are "insignificant" and "minimal", so let's not go there until we clearly define the flow. This references the response to my question/your response;

3. Is the recommended minimum flows for the Homosassa River system defined as a five percent reduction from baseline flows of 152 cfs which is minimum flow 144 cfs. "Response: No -- The recommended minimum flows for the Homosassa River system are an allowable percentage of flow reduction from the natural flow condition, which is defined as the flows that would exist in the absence of water withdrawals."

My purpose in highlighting yellow and green is to recognize that you talk about flows. Is this just a language style to combine the 'main springs flow' and the 'SE Fork flow', or is there more than one figure from which the five percent reduction is applied to in order to define the minimum flow? It may also be language style because you deal with many of the other rivers such as those Mike listed in his e-mail, where there are different flows for different seasons.

I trust this helps us get numerical answers to what many of us consider a simple and basic question.

What is the minimum flow, in cfs, for the Homosassa River?

Martyn
P.S.
From the Peer Review October 17, 2010 page 8;
"Question 5 - Was the data collection approach adequate to determine the past and present natural resources on the river system? **Yes**, with respect to flow, this approach is quite adequate to conclude that present-day spring and river discharges can be considered baseline or natural flows [also, please see response to the next question concerning water quality]. The approach assumed that present-day flow records were representative of past, or baseline, conditions based largely on the determination using a numerical groundwater flow (Basso 2010) that groundwater pumping in the Northern District of SWFWMD has reduced historical spring flows in the Homosassa River system by an insignificant amount (approximately 1 percent)."

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Tuesday, March 20, 2012 8:03 AM
To: Kevin J Grimsley
Cc: Brad Rimbey; Doug Leeper; Ron Miller; Al Grubman; Mike Heyl
Subject: RE: Freedom of Information Act Public Records Request

Kevin,
Sorry for the slow response, we stayed in Homosassa longer than planned and did not visit the library (for internet) more than absolutely essential.

Regarding the velocity meter readings and the mean channel velocity, it will take me a lot of thought/follow up to understand how one velocity meter shows 20% more than the mean velocity and at another location shows 20% less. Must be like real estate....location, location, location.

I am pleased that we now agree the data from the Gage Site at the Homosassa Springs does accurately represent the Specific Conductance of water discharging from the spring. I have looked at the data over the time period it has been collected, I will share the details as I get time, but the analysis I did shows a continuing increase in what must primarily be seawater ingress into the spring (both the higher and lower specific conductance in the cycle). I had pointed out the increase in the lower results (daily lows) when I first commented on this to Doug. Some of the recent highs are very troubling...SWFWMD job to analyze the data.

At our meeting following one of the workshops my summary included the following:

I tried hard to comprehend the logic of the lag explanation for this cyclic specific conductance (although not discussed as such I assume the measurements done across the channel have resulted in discounting the stratification thought). I would certainly be interest if you can share the results of the cross channel measurements that Kevin mentioned.

The response was:

I need to ask again that you send any data requests (such as #3 below) through our official request website at http://waterdata.usgs.gov/fl/nwis/feedback/?to=Florida Water Data Inquiries. Thanks.
Hence my interest in doing the testing. But, it is good that we have a common understanding at the end of the process. Hopefully we will get to that point with the discharge data at some time. I did time a few oranges passing under Fishbowl Bridge and still find the calculated discharge data to be questionable; as you must also be following USGS recently gathered Field Measurements. These measurements did not cover some of the more critical stage/tidal cycle times; no doubt you have others planned (agree there are only so many daylight hours in one day).
Regarding the Chassahowitzka.
I made four kayak trips to monitor specific conductance and observe flows. The times I monitored the reversal of flow at the Gage Site, the calculated results have the flow reversing from outflow to inflow about two hours before this in fact happens. See also the specific conductance data that I commented on a few weeks ago.
The higher specific conductance water is, from my measurements, primarily on the bottom and originates from water out flowing from Crab Creek (a flow that remained positive at all the stage heights (high tides) that I observed. Discharge from Bubba Spring (Chassahowitzka 1 and 2..unnamed tributary) is the first source of water filling the canal system as the stage rises (split between upstream flow to the canal system and downstream flow past the main spring). As stage continues to increase the main spring flow 'splits' adding to the upstream into the canals. At high high stage there is reverse flow past the Gage Site, but it is slow and, from my measurements stratified (surface specific conductance significantly lower than bottom).
Details to follow.
Martyn

To: martynellijay@hotmail.com
CC: bwr.crrc@tampabay.rr.com

Subject: RE: Freedom of Information Act Public Records Request
From: kjgrims@usgs.gov
Date: Thu, 1 Mar 2012 15:25:32 -0500

The difference in multipliers is due to the site-specific relationship between where each meter is placed in the channel and how that relates to the mean velocity.

If you recall our meeting after one of the workgroup sessions, I explained that our testing had shown that there was no stratification at the Homosassa main spring as well. We confirmed that our sensors are accurately representing the conditions in the spring run. We believe the observed lag between the tidal changes in water level vs the tidal changes in conductance is due to the differences in how the tides affect the surface water in the river vs how it affects the groundwater being discharged from the spring.

****
Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS, Florida Water Science Center
10500 University Center Drive, Suite 215
Tampa, FL 33612
kjgrims@usgs.gov
813-498-5064
****

From: Alan Martyn Johnson <martynellijay@hotmail.com>
To: Kevin J Grimsley <kjgrims@usgs.gov>
Cc: Brad Rimbey <bwr.crrc@tampabay.rr.com>
Date: 03/01/2012 02:37 PM
Subject: RE: Freedom of Information Act Public Records Request

---

Kevin,
Thanks for clarifying what the stream velocity is as reported.

Given the differences in how the readings from the velocity meters (Ivel) are converted to get mean velocity (Chass is multiplied by 0.81 and Bagley by 1.21) is this because the type of instrument used is different. Just seems like a 20% plus verses a 20% minus must have some reason.

I have been testing specific conductance for Homosassa Main Spring directly from the spring and at the gage site. As far as my testing shows the data from the gage site is representative of the water rising in the springs and is not subject to stratification, backflow or any other influence. I will share the data when I can get a direct connection to my computer.

Martyn

==========
To: martynellijay@hotmail.com
Date: Sat, 25 Feb 2012 19:46:13 -0500
From: kjgrims@usgs.gov
Subject: Re: Freedom of Information Act Public Records Request
CC: bwr.crrc@tampabay.rr.com

Martyn,

The equations and tables provided are correct. For Bagley Cove, the parentheses shown in equation A are the correct grouping.

I believe your confusion is stemming from the velocities provided on NWISWeb. The velocities shown on the web have already been through the rating equations we've provided. All you have to do is multiply the velocity from the web by your computed area to get your discharge value.

Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa
USGS, Florida Water Science Center
10500 University Center Drive, Suite 215
Tampa, FL 33612
kjgrims@usgs.gov
813-498-5064

On Feb 25, 2012, at 12:10 PM, "Alan Martyn Johnson" <martynellijay@hotmail.com> wrote:

Kevin,
Thanks for the look up tables.
For Chassahowitzka the table provides the same result as the equation, bar the rounding differences between the tabled increments. The equation, provided to Brad, does not match the reported cfs discharge as previously presented in a spreadsheet.

For Bagley Cove, looking at data from 12/20/2011
There are two ways of interpreting the velocity from the equation in the Feb 13 letter to Brad.
A. Velocity = (1.2104 * Vel Index) + 0.1562 ,or
B. Velocity = 1.2104 * (Vel Index +0.1562)

Time	Gage Ht.	Stream Velocity	Reported Discharge cfs	From Look Up Table	From A Velocity	A cfs	From B Velocity	B cfs
00:0	13.41	0.96	5040	5270	1.318	6947	1.351	7120

0								
06:15	11.00	0.35	1390	3970	0.580	2302	0.613	2432
10:00	12.50	-1.18	-5620	4780	-1.272	-6081	-1.239	-5923
11:15	13.01	-0.07	-3560	5060	0.072	361	0.104	527

As you can see neither A nor B match the reported cfs.
I have done all this at the library and trust I have not made any errors copy/paste.
Martyn

==========

From: BWR.CRRC@tampabay.rr.com
To: kjgrims@usgs.gov
CC: martynellijay@hotmail.com
Subject: Re: Fw: Freedom of Information Act Public Records Request
Date: Fri, 17 Feb 2012 17:19:35 -0500

No problem Kevin. I appreciated how thorough your response was. Thanks again. Brad
----- Original Message -----
From: Kevin J Grimsley
To: Brad Rimbey@CRRC
Cc: Martyn Johnson
Sent: Friday, February 17, 2012 4:48 PM
Subject: Re: Fw: Freedom of Information Act Public Records Request

Hi Brad,

I apologize, but with all the different equations to gather I grabbed the wrong one for this station. The correct stage-area relationship is best described in a lookup table since that's what our database actually uses. Here is the lookup table for station 02310663. The velocity equation provided is correct.

<M2.gif>

Martyn had also mentioned having issues with the equation at Bagley Cove. The equation provided is correct, but it's possible to have small differences due to rounding errors from the lookup table. Here is the lookup table for the Bagley Cove gage as well.

<M3.gif>

Kevin Grimsley, P.E.
Hydrologic Data Chief, Tampa

USGS, Florida Water Science Center
10500 University Center Drive, Suite 215
Tampa, FL 33612
kjgrims@usgs.gov
813-498-5064

From: "Brad Rimbey@CRRC" <BWR.CRRC@tampabay.rr.com>
To: <kjgrims@usgs.gov>
Cc: "Martyn Johnson" <martynellijay@hotmail.com>
Date: 02/15/2012 10:47 AM
Subject: Fw: Freedom of Information Act Public Records Request

---

Hi Kevin,

Could you please check the equation for USGS 02310663? I checked Martyn's math and it looks OK. I also reminded Martyn not to use the equations outside the data set (i.e. not newer than January 19, 2012). Attached is the FOIA response I received from Ken Skipper in case you have not seen it. Please let me know if I should direct this to Ken instead of you. Thanks.

Brad

----- Original Message -----
From: Alan Martyn Johnson
To: Brad Rimbey
Cc: Al Grubman ; Ron Miller ; Norman Hopkins ; Brent Whitley ; Dan Hillard ; Dana Bryan ; Doug Leeper ; Mike Heyl ; Kevin J Grimsley ; R Rodriguez
Sent: Wednesday, February 15, 2012 7:51 AM
Subject: RE: Freedom of Information Act Public Records Request

Brad,
Thanks for sharing.

I have looked over the FOIA response and cross checked equations for the major gage sites with USGS current discharge data;

All the Homosassa equations match the ones in the MFL report appendices.

Weeki Wachee agrees with current discharge data. I note this equation has been in use since 2004. In the table I shared in an e-mail to Mike Heyl there was an indication that a different equation was used in 2002.

Chassahowitzka main spring 02310650 agrees with current discharge data. I note use of this equation started in October 2002. This indicates that data used in the Chass studies (discharge data 1997-2007) had a different basis for the first five years of data to the

second five years. The significance is unclear, but looking at the Figure 2-6 in the Chass MFL draft report there is a noticeable increase. You may recall I used the Knochenmus and Yobbi equation which gave discharge about 20% lower than reported discharge when I first raised the question last year.

Chassahowitzka River 02310663. The equation provided does not match the current data. I have attached a spreadsheet that lead me to this point. Please feel free to double check it. The cross section equation appears to make logical sense with channel width of 329.75 ft and a stage area (if I got my terminology correct) at zero gage height of 1428.6 sq ft (this translates to an average depth at GH 0 of just over 4 ft.). The 6.1219*GH*GH results in a positive addition when the GH is negative, this is such a small factor it is not the reason for the difference I think I have identified between equation in the response and the current data.

I have not checked the other equations (I will check Crystal River Bagley Cove later), just focused on the main ones for now.

Martyn

==========

From: Alan Martyn Johnson [martynellijay@hotmail.com]
Sent: Sunday, May 13, 2012 4:34 PM
To: Al Grubman; Brad Rimbey; Brent Whitley; manatees2@gmail.com; Dan Hillard; ktripp@savethemanatee.org; Norman Hopkins; rebecca.bays@bocc.citrus.fl.us; Ron Miller; Bill Garvin; al.yerian@dep.state.fl.us; cedwards@savethemanatee.org; jones@myfwc.com; Dana Bryan; Jim Bitter; bknight@wetlandsolutionsinc.com; robert.knight@bocc.citrus.fl.us
Cc: Doug Leeper; Mark Hammond; Sid Flannery; J Weaver; R Rodriguez; Kevin J Grimsley; Ron Basso; Mike Heyl
Subject: Chassahowitzka and Homosassa MFL's

Are you like myself curious as to why it is taking SWFWMD so long to rewrite the MFL Draft Reports for the Homosassa and Chassahowitzka?
May be they are doing some additional studies;
May be they are having confidence concerns re studies/data in the first draft reports;
May be they are having difficulty finding the right words to make the argument supporting continued increases in the amount of water being sucked out of the aquifer.
May be delays have political considerations regarding compliance.
May be they have realized Significant Harm has already occurred.
That is a lot of may be(s).
Let me share some points/indicators which should give cause for concern about the future of these two rivers/spring systems; Outstanding Florida Waters. And provide a backdrop for your reading the reports.

Homosassa

SE Fork

Some of you may know that I take regular samples of water emanating from the springs in the SE Fork and conduct my own flow monitoring using a floating orange/stage area under Fishbowl Bridge (yes old fashioned but no need for regression uncertainties).

1. Flows at the Fishbowl Bridge are very significantly less than in January.
2. Flows from Abdoney and Belcher Springs are now virtually zero at high stage.
3. Specific Conductance at all the springs has increase almost 50% since January.

4. USGS Field Measurements February 8-9, 2012 show results approx 10% less than calculated flows.
5. Still no word on hourly data from the velocity meter installed last September.

Main Spring

1. Specific Conductance of water emanating the main spring continues to increase (salt water ingress) and shows significant increase at high stage; indications are flow of better quality water from the aquifer is reducing.
2. Only two spot check Field Measurements are reported for flow Feb 3 and April 10

Chassahowitzka

1. Early in the year I shared e-mails from SWFWMD regarding MFL's Rule 40D.8.041 and reference to previous days flow. The draft rule was withdrawn from the November 2010 meeting agenda; possibly someone realized Crab Creek adds to the flow only a couple of hundred feet downstream from the gage site 02310650. Keep your eyes open for the new wording.
2. It was pointed out USGS Specific Conductance data at the Gage Site show continued increase during times the calculated flow from the springs is reported as changing from reverse to positive. No explanation or follow up to better understand, o*ther than four extended kayak trips by myself*.
3. It was pointed out Hydrodynamic Model referenced in the Draft Report was calibrated using reconstructed data which differs on average 5% to USGS data. No comments/explanation offered.
4. From personal observation the flow does not reverse until over an hour after the calculated results indicate. Is the discharge cfs equation erroneous?
5. At high stage the salt water ingress into the main vent significantly increases. The specific conductance of water emanating from the main spring at high stage is now almost equivalent to the water from Crab Creek Spring.

Weeki Wachee Well

1. Since January Weeki Wachee Well level has dropped faster than any corresponding period in history. Without Mother Nature providing some long term steady rainfall historic lows may be reached. Historic low was May 13, 2009 at 10.67 feet dropping from 13.10 feet Jan 1, 2009. Today level is 11.08 feet having dropped from 13.72 feet on Jan 1, 2012. Do the math.
2. The well level has not been above 16 feet since March 5, 2006; historically levels reached close to 20 feet on a regular basis.
3. Level in the aquifer is a major factor driving spring flow (Weeki Wachee considered a primary indicator), hence it is clear that the spring flows could be historically and possibly critically low.

USGS Investigation

A USGS head office review of spring flow data collection/calculation was conducted January 22-24. The review as reported was lacking specific details, but commented; *"found no major problems with the operation of gages or the calculation of streamflow records*."

Comment: The future of Chazz and Homosassa is critical on small changes of flow 5%.

And

"Accurately documenting any flow asymmetry likely will require collecting measurements over the duration of at least one full tidal cycle."

Comment: Report does not list locations, but for SE Fork no record of Field Measurements over a full tidal cycle; Feb 8-9 was 11 hours on 8th plus 3 hours on 9th .

And

"*While measurements were seen to generally compare well to the rating curve, we recommend*

that the equations be updated.
Comment: Compare well, but recommend update?
And
"While Knochenmus and Yobbi's original equations were documented in report WRIR 2001-4230, the newer regression equations that are currently in use are not as well documented.

SWFWMD Clarity Re MFL

Specific questions have been asked about what the Minimum Flow is, SWFWMD replies appear elusive, such as;
You wrote: "1. Is baseline for establishing Minimum Flow for the Homosassa River 152 cubic feet per second combined flows from the USGS gage sites Homosassa Main Spring and SE Fork of Homosassa River (Executive Summary, Draft Peer Review July 2010).
YES
NO"
Response: No – As used for development of the proposed minimum flows, 'baseline' simply refers to a statistical metric (typically median) characterizing conditions associated with a specific period of flow (benchmark period). For the Homosassa system, two benchmark periods, calendar year 2007 and October 18, 1995 through May 13, 2009, were used to develop minimum flow recommendations. Combined flow records for the USGS Homosassa Main Spring and SE Fork Homosassa River for each benchmark period were used to characterize baseline conditions such as the volume of salinity-based habitat associated where salinities were less than or equal to 5. The baseline conditions evaluated for each benchmark period were associated with the respective median flows, *i.e*., 130 cfs for the 2007 benchmark period and 150 cfs for the 1995-2009 benchmark period. Because median benchmark flows were used for the analyses, it may be expected that one-half of the flow values during each benchmark period were lower than the median values. Finally, it should be noted that the 152 cfs average flow value included in the Executive Summary of the draft minimum flows report represents the average or mean combined flow for the longer benchmark period, rather than a median value.
You wrote: "3. Is the recommended minimum flows for the Homosassa River system defined as a five percent reduction from baseline flows of 152 cfs which is minimum flow 144 cfs.
YES
NO"
Response: No -- The recommended minimum flows for the Homosassa River system are an allowable percentage of flow reduction from the natural flow condition, which is defined as the flows that would exist in the absence of water withdrawals.
And for Chazz
"The proposed Chassahowitzka MFL is a percentage o flow, not a fixed number and is not directly related to a long-term median. The MFL is a percent of flow and the actual withdrawal varies with the flow, not a historic median. As discussed later, the 63 cfs flow rate is not an MFL criterion."

No doubt we will all read the revised draft MFL reports in detail once issued, but lets hope the comments made and the concerns expressed about the HARM which has already occurred in these rivers was recognized by SWFWMD.

Martyn

11.18.13 Luther, Elaine

From: Mike Heyl
Sent: Thursday, June 09, 2011 7:37 AM
To: Elaine Luther (barneyandcap@hotmail.com)
Cc: Doug Leeper
Subject: Chassahowitzka Model - Canals ?
Attachments: Model_Boundary.pdf

Ms. Luther – My colleague Doug Leeper indicated that you spoke with him about the salinity model used in the Chassahowitzka MFL determination. I have attached two drawings which illustrate the upstream extent of the model. It did include the major tributaries and creeks, but it did not extend into the canal system upstream of Chassahowitzka #1 and #2.

I hope this addresses your question. If you have other questions, please do not hesitate to contact me.
MGH
==========
From: Mike Heyl
Sent: Thursday, June 09, 2011 12:10 PM
To: Elaine Luther (barneyandcap@hotmail.com)
Attachments: 40D-8_Weeki.pdf; Chass_MFL_FAQ.pdf

Ms. Luther – The link below should take you to the District's website for the Chassahowitzka MFL report :
http://www.swfwmd.state.fl.us/projects/mfl/reports/ChassMFL_2010_11_draft.pdf
If you are interested in the appendices, the peer review report or other District MFL reports use this link : http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php

As we discussed, I have attached the Weeki Wachee MFL rule. In addition I have attached a draft of the Chassahowitzka MFL Frequently Asked Questions. This document may change before we distributed it widely, so consider it work-in-progress.

Do not hesitate to email or call if you have additional questions.
MGH

11.18.14 Morton, J.

From: Jerrmorton@aol.com

Mike Heyl

From: Mike Heyl
Sent: Thursday, March 03, 2011 12:58 PM
To: Jerry Morton (JerrMorton@aol.com)
Subject: Chassahowitzka

Jerry – Nice talking with you this morning. I looked up the decline in water level that would occur if flows declined 11 percent. The average water level at the boat ramp would decline 0.0105 feet (0.126 inches) at an 11 percent reduction. Using our water use and population projections, the estimated future impact of withdrawals in 2030 will be around 2 percent.)

I also verified the movement of low salinity water (5 parts per thousand salt). Currently the average location is 4.69 kilometers from the mouth (about 2.9 miles). If flows declined 11 percent, the location would move inland about 220 yards.

Hope this helps to put it in perspective. There report, reviews and appendices can be found on the District's website at: http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php (Note – the appendix is very large, so the sections can be downloaded individually).

If you could just hit "Reply", I will know that I have your email address correctly included in my notification list.
Thanks in advance.

MGH

Sent: Thursday, March 03, 2011 6:31 PM
To: Mike Heyl
Subject: Re: Chassahowitzka

Thank you very much for all the good information!

Jerry Morton
4412 Sugartree Drive East
Lakeland, FL 33813

ps. My inlaws have 3 properties on the canals on Peacock Drive; near Miss Maggie drive. We are all lovers of nature and have a great respect for 'The Chas'.

Jerry

==========

From: Jerrmorton@aol.com
Sent: Tuesday, March 08, 2011 2:51 PM
To: Mike Heyl
Subject: SWFWMD plans to divert 11% of the spring headwaters of the Chassahowitzka River

(Mike, these are my concerns about the planned diversion. If you could suggest other contacts it would be much appreciated.)

Concern: SWFWMD plans to divert 11% of the spring headwaters of the Chassahowitzka River for 'inland wells'.

I am very concerned about the proposed diversion of spring-headwaters of the Chassahowitzka River for 2 reasons; the river is very shallow even in non-drought years AND the river is just beginning to reap the benefits of septic tank removal in all the surrounding homes near the river over the past 2 years.

The Chaz is shallow in the best of times The Chassahowitzka River is one of the most beautiful and scenic rivers in Florida; if you have ever kayaked or pontooned the river you also know it is one of the shallowest rivers in Florida.

Even in years with normal rainfall this river is a challenge to navigate with powered boats; in the drought years of the past decade getting 'stuck on the Chaz' is a common event. Since my inlaws bought a home on one of the feeder canals a decade ago we have had numerous trips down the river that required polling our way back in the more shallow, rocky areas when the tide tricked us OR more often the NE wind blew the navigable water back to the mouth of the river.

To divert ANY amount of spring-headwaters from this shallow river would make access by the public even more challenging; and for the MANY fisherman who make their living on the river and the marshes leading to the Gulf it could be devastating.

The Chaz is becoming 'spring water' clean for the first time in decades.

Over the past couple of years all of the surrounding home-owners have converted their septic tanks to 'city sewage' type removal systems; this conversion has cost hundreds of home-owners a great deal of money during a very difficult economy.

These home-owners accepted these major one-time and monthly continuing sewage removal expenses with one primary goal in mind; to clean up The Chaz...the river they all respect and love.

To divert ANY amount of spring-headwaters from this river would impede the recovery that these expensive septic tank conversions has started; to take away 11% of the most pristine water that feeds the river after these home-owners have invested heavily in the restoration of The Chaz would be an injustice.

Jerry Morton

ps. Related links.
'Chaz' River description:
http://www.swfwmd.state.fl.us/education/interactive/springscoast/3.shtml

SWFWMD diversion proposal ('Click' Chassahowitzka River PDF entries):
http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php

==========

From: Mike Heyl
Sent: Thursday, March 10, 2011 2:58 PM
To: 'Jerrmorton@aol.com'
Subject: RE: SWFWMD plans to divert 11% of the spring headwaters of the Chassahowitzka River

Jerry – Thank you for your comments. In response to your first comment, I want to clarify that there is no proposal to divert waters to inland wells from the spring or the river, but groundwater withdrawals will reduce the springflow to a greater or lesser extent depending upon the distance and the geologic zone of the withdrawal. The withdrawals are expected to be very widely distributed (see section 10.2 in report appendix), but also include private wells located at residences in close proximity to the River. Groundwater withdrawals in 2005 reduced the spring flow an estimated 1 percent and projected withdrawals in 2030 will increase that reduction to 2 percent, or a rate of approximately 1 percent every 25 years.

As I stated in my March 3 email, even if/when an 11 percent reduction in flow is realized, the depth of water at the boat ramp will be reduced 0.13 inches. Navigation is not expected to be effected even at the proposed MFL of 11 percent. It should also be noted that sea level in the Chassahowitzka is rising at a rate of approximately 0.08 inches per year.

With regard to the expected improvement in water quality due to the septic-tank removal program, the reduction in flow is expected to occur over many decades, providing ample time for the system to respond to the removal of the septic tanks. Again, note that the decline is only expected to increase 1 percent from the 2005 value over the next 25 years.

I am sorry, but I did not understand your comment about ‘other contacts’. I am the project manager and primary author of the report you listed in your ‘Related Links’. Were you inquiring about other District staff knowledgeable about the MFL that you also wished to contact?

All comments received will be included in the final report as Chapter 11 and will be made available to the members of the Governing Board and the public.

MGH
==========
From: Jerrmorton@aol.com
Sent: Thursday, March 10, 2011 4:00 PM
To: Mike Heyl
Subject: Re: SWFWMD plans to divert 11% of the spring headwaters of the Chassahowitzka...

Sorry for the double send; this HP550 is possessed!

As I was saying below, the 11% figure stuck in my mind from the first time I saw a public meeting sign at The Chas boat ramp a couple of weeks ago.

But in my mind, any reduction of the flow into that river would be a real problem for the reasons I mentioned. Most importantly, it is rare when you get the public to support a natural resource cleanup with their own money.

These people are, on average, not an affluent group; they genuinely love the river and wanted to help restore it up by digging very deep into shallow pockets to replace the septic tanks.

Regarding contacts I was looking for any other agencies that might support my point of view. I realize as the Chief Environmental Scientist you are my main contact at SWFWMD.

And I wanted to say, it is very obvious yall exercised due diligence in the scientific research regarding this plan; the review documents at that link you gave me were very informative, easy to understand, and clear that the environmental impact would be minimal.

Jerry

11.18.15 Rugnetta, Bob

-----Original Message-----
From: rug68@buffalo.com [mailto:rug68@buffalo.com]
Sent: Thursday, March 03, 2011 11:27 AM
To: Mike Heyl
Subject: Chass

Mike; Re the photo in the Hernando times 3/3/11.My wife and I were there yesterday also, see pic. Perhaps that was you, we passed in the airboat around noon. We have a Hobie pedal kayak and noticed a marked difference in the water level from our last trip, over a year ago. We were hung up in low water more so than any other time in the past six years, even though we were near the approx high tide of 1:30. At the mouth, where the cottages are... seemed to be covered in sea weed , I don't recall it being like that before. Just last week someone on television remarked that the bass fishing has declined significantly there! Bob Rugnetta, Spring Hill

==========
From: Mike Heyl
Sent: Thursday, March 03, 2011 12:24 PM
To: 'rug68@buffalo.com'
Cc: Marty Kelly
Subject: RE: Chass

Mr. Rugnetta - Thanks for your comments. Unfortunately, I had to work in the office yesterday, so I was not on the river.
I would like to point out that all of the District's vessels have very large identifying logos or letters. To the best of my knowledge, all of our airboats have blue hulls.

As for the low water, I don't know if this is what you experienced, but there is an annual cycle of water level in the eastern Gulf of Mexico and water levels are lower in February than at any other time of the year. This is an annual cycle and should not be confused with sea level rise. I have included NOAA links to annual sea level variation at St. Petersburg and at Cedar Key, Florida

http://tidesandcurrents.noaa.gov/sltrends/seasonal.shtml?stnid=8727520&name=Cedar%20Key&state=Florida

http://tidesandcurrents.noaa.gov/sltrends/seasonal.shtml?stnid=8726520&name=St.+Petersburg&state=Florida

MGH

11.18.16 Sierra Club, Suwannee-St. Johns Group

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

February 8, 2011

Mr. Whitey Markle
Conservation Committee Chair
Suwannee-St. Johns Group
Sierra Club
P.O. Box 13951
Gainesville, Florida 32604

Subject: Minimum Flows and Levels for the Lower Homosassa and Chassahowitzka Rivers

Dear Mr. Markle:

The District would like to acknowledge receipt of your letter to Dave Moore, Executive Director of the Southwest Florida Water Management District, dated January 20, 2011, regarding concerns expressed for the proposed Minimum Flows and Levels (MFLs) for the Homosassa and Chassahowitzka River systems. We appreciate your interest in these spring dominated systems, and would like to address a few of the comments contained in your letter.

With respect to your request *"for a moratorium on the reduction of Minimum Flows and Levels for the Lower Homosassa River the lower Chassahowtizka River"*, action has been delayed to allow additional time for public review and comment. The District has pursued a priority list and schedule for the adoption of MFLs on waterbodies as required by state law (F.S. 373.042), and included all first magnitude springs on this priority list as required (F.S. 372.042(2)). Both these systems have been on the Governing Board's approved list for several years with the intended date of rule development established for 2010. To that end, staff prepared reports detailing the science done in support of the recommended MFLs, and has submitted each of these to independent scientific peer review. Both the technical reports and the resultant peer review reports have been posted on the District's website (http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php). In addition, the District has held two public meetings on each waterbody, presenting the results of the MFL determinations and inviting public comment. Comments on the proposed MFLs for these waterbodies are still being received, and staff will include all public input received (including your letter) and staff's response in the final MFL document that will be presented to the Governing Board at the time of proposed rule adoption. Following additional time for public review and comment, this item will be scheduled for Board action, and you will be notified.

In your correspondence, you stated that, *"[f]low levels from 1950 to present indicate a 30 reduction. It should be apparent that any reduction in MFL's will indeed be of significant harm to the ecosystem."* The legislation addressing MFLs explicitly states that, "[t]he minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." When developing MFLs on flowing water systems, staff makes every attempt to consider impacts due to withdrawals in their analyses. On both systems under discussion, staff determined that withdrawal impacts are minimal and have led to flow reductions of approximately one percent as compared to non-withdrawal conditions. Further, based on 2030 demand projections, staff expects that impacts due to ground water withdrawals will lead to no more than a three percent reduction in flows from either system. It should be appreciated that natural variation in rainfall can have large effects on recharge and spring flows. As an example, analysis of the average of three long term National Oceanic and Atmospheric Administration rainfall gages in the area shows that total annual rainfall averages 54.1 inches over the period of record (1900 to 2009); however, the annual average over the wettest 10-year period (1957-1966) was 59.74, while the annual average over the driest 10-year period (1992-2001) was 48.68 inches. This large difference in decadal rainfall, exceeding more than 10 inches, would be sufficient to cause a rather large decline in natural flows for the Chassahowitzka, Homosassa and other area systems.

Regarding your concern that "alternative" water sources should not include surface water, please note that Florida Statute 373.019 defines alternative sources.

> **373.019 Definitions.** — When appearing in this chapter or in any rule, regulation, or order adopted pursuant thereto, the term:
>
> (1) "Alternative water supplies" means salt water; brackish surface and groundwater; surface water captured predominately during wet-weather flows; sources made available through the addition of new storage capacity for surface or groundwater, water that has been reclaimed after one or more public supply, municipal, industrial, commercial, or agricultural uses; the downstream augmentation of water bodies with reclaimed water; stormwater; and any other water supply source that is designated as nontraditional for a water supply planning region in the applicable regional water supply plan. [please note: underlining added for reference]

Should you have any further questions or comments, I would be happy to try and address these, and again, thank you for your interest in these important water resources. Please feel free to contact me at any time with respect to MFL development within the Southwest Florida Water Management District.

Sincerely,

Martin H. Kelly, Ph.D.
Program Director, Minimum Flows and Levels
Ecologic Evaluation Section

MHK/brm
cc: Dave Moore, Bruce Wirth, Mark Hammond, Lou Kavouras, Richard Owen, Bill Bilenky, Kurt Fritsch, Log #24983-11

11.18.17 Newberger, MItchell

MITCHELL A. NEWBERGER
820 Newberger Road
Lutz, Florida 33549
Phone: (813) 310-4147

October 16, 2010

Southwest Water Management Board
2379 Broad Street
Brooksville, Florida 34604

Dear Board Member:

On November 6, 2010, the SWFMD Board is considering amending rule 40D-8.041 (minimum flows) of the Florida Administrative Code to allow a drawdown of the Chassahowitzka Spring by as much as 11%. Such an action is cause for serious concern due to the impact on the ecology of the river and hardwood swamps in your district.

During the last two years the coastal hardwood swamp at the timberline of the river has virtually all died, while barnacles, oysters, and mangroves are thriving inside the coastal tree line where I have never seen them in my 60 years on the river. My cabin and others that were once hidden in green coastal hardwoods are now surrounded by dead trees. Only cabbage palms are still surviving and they are showing stress also. (See photos enclosed)

The proposed action by SWMFD is contrary to the conclusions made by the Department of Environmental Protection, the controlling agency, and as published in D.E.P. bulletin 69 regarding the Chassahowitzka Spring flow (2009).

The economic engines of Citrus, Hernando, and other coastal counties in your district depend on the ecology of the hardwood swamp for fishing, boating, wildlife and healthy rivers to survive. It is disconcerting to find that a water management board which is subordinate to the Department is simply ignoring the onsite danger signs, the law, and the Department's 2009 conclusions in Bulletin 69.

SWMFD's decision to drawdown the Chassahowitzka Spring is in conflict with the following data:
1. F.S. 373.042

(a) The minimum flow for a given watercourse shall be the limit at which further withdrawals would be significantly harmful to water resources or ecology of the area.

(b)The minimum water level shall be the level of groundwater in an aquifer and the level of surface water at which further withdrawals would be significantly harmful to the water resources of the area.

2. The Department of Environmental Protection in conjunction with The Florida Geological Society and Lands and Recreation Division published Bulletin 69 in 2009 regarding regional and statewide trends in Florida springs and well groundwater quality.

(a) The Executive Summary clearly states:

Over the past several decades it has been observed the flows in Florida's spring are declining.

(b) Page 99 of Bulletin 69 (Table 26) states unequivocally that the spring flow in both Chassahowitzka stations are down.

The enclosed photos clearly show the life of the hardwood swamp at the timberline where SWMFD and Federal properties join and the death of the hardwood swamp at the same location. Some may want to argue sea level rise which is doubtful, but we know spring flow is down and in either case to withdraw from the Chassahowitzka spring will simply escalate the destruction of the hardwood swamps and decrease the lens of water protecting the hardwood swamp. Virtually all bass, shellcrackers and other fresh water species that were abundant in the photo area are gone. The Chassahowitzka Spring needs a recovery strategy and not a withdrawal.

Thank you for your consideration in this matter of mutual interest. I would happy to meet with you, have you join me for an on-site inspection or assist in any manner you see fit.

Sincerely,

Mitchell A. (Mickey) Newberger

Enclosures

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at *WaterMatters.org*

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

November 4, 2010

Mr. Mitchell Newberger
820 Newberger Road
Lutz, Florida 33549

Subject: Correspondence Dated October 16, 2010 to Members of the Southwest Florida Water Management District Governing Board

Dear Mr. Newberger:

Thank you for your correspondence regarding the establishment of minimum flows for the Chassahowitzka River system by the Southwest Florida Water Management District (District). As the project manager for the District's efforts related to developing minimum flows for the river system, I have been asked to address your concerns raised in your October 16, 2010 letter to members of the District Governing Board. In addition, I would like to inform you that the Governing Board will be considering rule amendments for establishing minimum flows for the Chassahowitzka River system on November 16, 2010, not November 6, 2010 as noted in your letter.

The District concurs with the statement in Florida Geological Society Bulletin 69 that flows in many of our coastal springs, including the Chassahowitzka River area, have been declining. However, the District believes that flow declines since the 1960's are predominately related to climatic variation and are, for the most part, unrelated to groundwater withdrawals.

Additional text in Bulletin 69 supports the District's position. The drought of 1998 – 2003 was described as "one of the worst historical droughts to affect Florida". On page xvii of Bulletin 69, the authors stated:

> "Except for south Florida, during the drought the deficit rainfall ranged from about 10 (inches) in southwest Florida to almost 40 in northwest Florida"

Therefore, the vast majority of drought impact is related to the decrease in rainfall. Additionally, the District developed a regional saltwater intrusion model that predicted little to no saltwater intrusion over the northern portion of the SWFWMD due to increasing groundwater withdrawals out to 2050 (Hydrogeologic, 2008).

Available information suggests that the observed trends in discharge are largely the result of reduced rainfall, coupled with a rise in sea level. A decrease in rainfall results in reduced recharge to the Upper Floridan aquifer (UFA) which is the source of spring discharge, and this in turn manifests itself as a lower water level in the UFA and a

Mr. Mitchell Newberger

A convenient technique to assess drought intensity and duration is called a cumulative departure from average. In practice, a long-term average annual rainfall is subtracted from each year and these annual differences are accumulated through time. For example, the average annual rainfall at Brooksville from 1931 through 1998 is 55.4 inches/year. In 1931, the annual rainfall was 43.2 inches resulting in a departure from average of negative 12.2 inches. In 1932, the annual rainfall was 45.2 inches, or a departure of negative10.2 inches. The cumulative departure for these two years is the sum of the annual departure values, or negative 22.4 inches.

Figure 2 illustrates the cumulative departure from normal for the Brooksville site for 1931-1998. From 1931 until 1960, there was higher than average rainfall, resulting in the red trend line. After

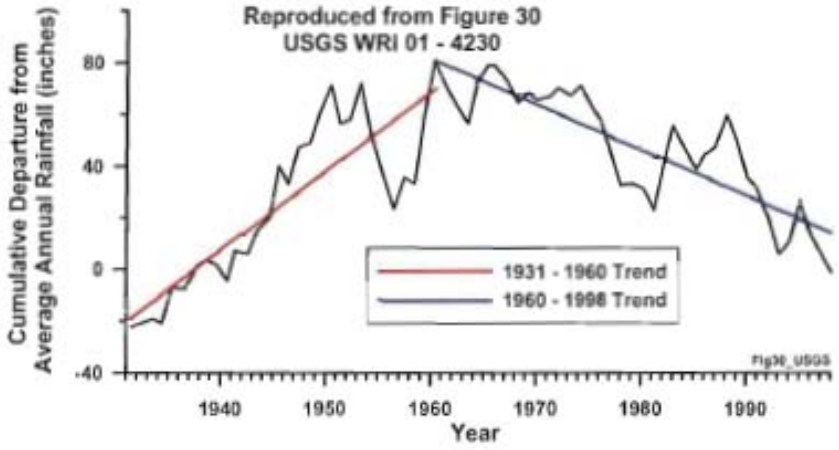


Figure 2. Cumulative annual rainfall departure from average – Brooksville, Florida

1960, rainfall totals began to decline resulting in the blue trend line. Both trend lines represent statistically significant trends in cumulative rainfall departure from long-term average values.

Regional rainfall patterns using combined data from Brooksville, Inverness and Ocala are illustrated in Figure 3. During the 1998-2003 drought cited in Bulletin 69, the cumulative departure from the 1931-2009 average record was negative 29.6 inches.

Discharge from Weeki Wachee spring for the same period is provided in Figure 4. As was observed for the evaluation of cumulative rainfall departure, the period from 1931 until the 1960's was a period of increasing discharge as shown by the red trend line. The blue trend line indicates declining discharge from the 1960s. The red increasing trend line and the blue decreasing trend line are statistically significant. In contrast, the black dotted line is the trend for the entire 1931-1998 period. There is no obvious or statistically significant trend in this line, indicating the importance of matching statements such as 'there is no trend" with the period of reference.

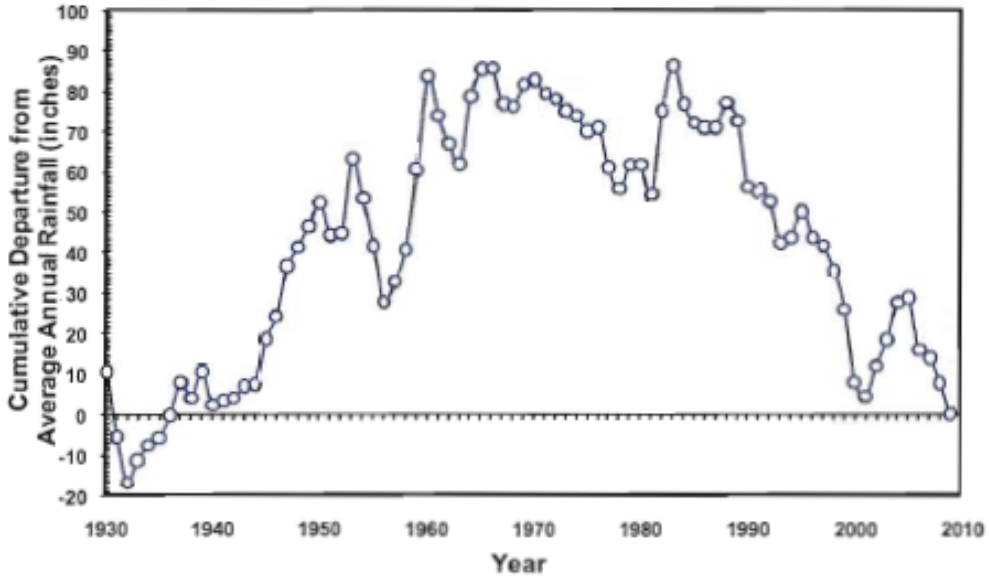


Figure 3. Cumulative annual rainfall departure from Brooksville, Inverness and Ocala average.

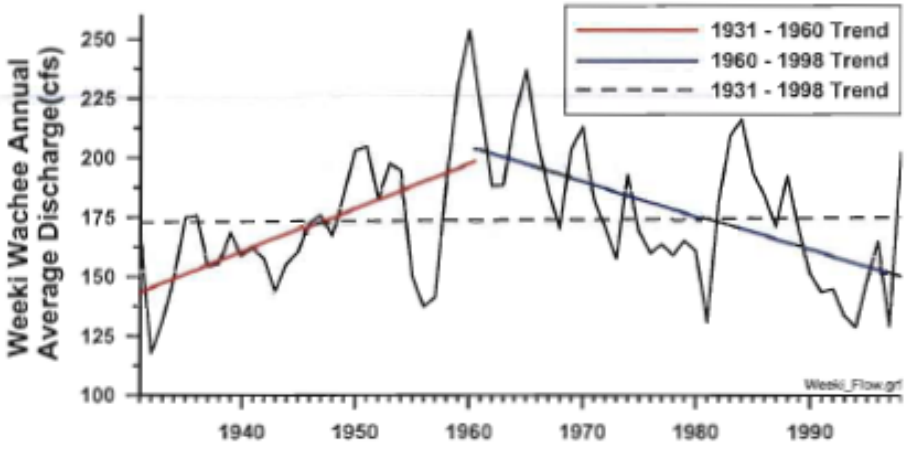


Figure 4. Weeki Wachee discharge – 1931 – 1998.

In addition to the drought conditions, sea level is rising. Figure 5 Illustrates rise in sea level at St. Petersburg (upper panel) and at Cedar Key (lower panel) based on information summarized by the National Oceanic and Atmospheric Administration. The rate of rise at Chassahowitzka has not been measured, but it is reasonable to assume that it will be within the range observed of the bordering stations. Between 1931 and 2010, sea level at Chassahowitzka has probably risen between 5.7 inches and 7.4 inches.

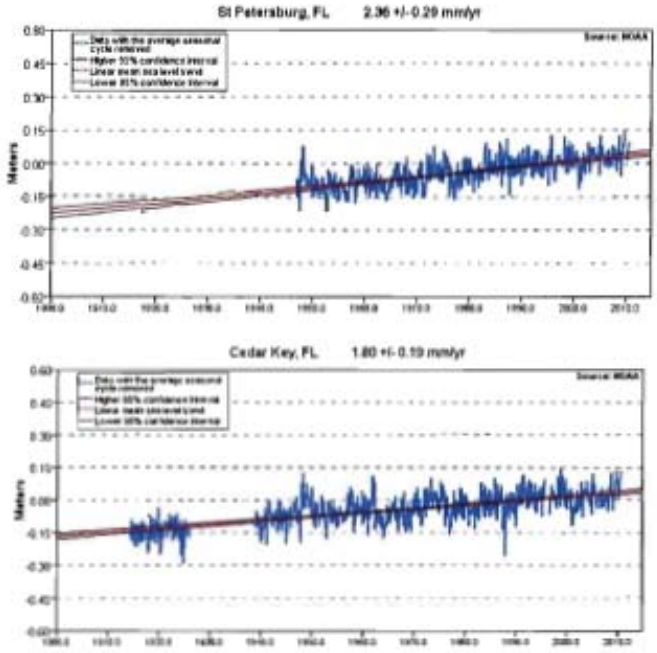


Figure 5. Sea level rise at St. Petersburg and Cedar Key, Florida.

In conclusion, the District agrees that spring discharge in the Chassahowitzka River system has declined since the 1960s and that area ecology is changing. The District considers these changes to be related primarily to climatic variation and for the most part unrelated to groundwater pumpage. Climate change and sea level change are cyclic and have occurred often in the past. These cycles will likely continue to repeat in the future.

Again, I thank you for your comments regarding establishment of minimum flows for the Chassahowitzka River system.

Sincerely,

Michael G. Heyl
Chief Environmental Scientist
Ecologic Evaluation Section

MGH/brm
cc: Chassahowitzka River Restoration Committee, Governing Board Members, Dave Moore, Bruce Wirth, Mark Hammond, Gene Schiller, Lou Kavouras, Richard Owen, Bill Bilenky, Karen Lloyd, Log #24903-10

Newberger & Associates
820 NEWBERGER ROAD
LUTZ, FLORIDA 33549

To: SWFMD Chairman and board members

Subject: November 16, 2010 Hearing on MFL Chassahowitzka River

Date: November 5, 2010

From: Mitchell A. Newberger

In view of the time constraints faced during a hearing I would like to take this opportunity to familiarize the board with a number of very troubling issues brought forth by staff in their recommendation to adopt an 11% reduction of flow of the Chassahowitzka River Springs.

In that over 1600 pages are involved in D.E.P. Bulletin 69 and an unknown amount in the SWMFD staff report based on Fla. Statutes 373.042 amounting in the hundreds, it is impossible to cover all facets, however, it is very clear that staff has not been forthright with the board by tailoring their report to conclude an 11% drawdown is insignificant while leaving out critical information and giving no attention to why the board should not approve draw down.

I would hope that the enclosed information prompts the board to ask hard questions as to **why these conclusions were reached; why in some cases are contrary to other scientific data within their own report.**

The Board is at a critical point in determining if an effort is going to be made to save the remaining coastal forested wetland that is the economic engine of Citrus, Hernando and other counties in the district or reduce the flow thus increasing the

saline pressure from surface and groundwater albeit estimated to be small by staff is simply an unknown result.

I urge the Board to reject the staff recommendation and to err on the side of caution based on but not limited to the following information

Staff totally ignored D.E.P Bulletin 69 that consisted of 1600 pages published in 2009 at a cost of over $500,000.

Bulletin 69 states in the Executive Summary

1. Over the past several decades it has been observed that the flows in Florida's springs are declining and water quality is degrading.
2. The main purpose of this document is to determine trends where trends are available.
3. Through out this report the term significant refers to statistical significance, if during our analyses a trend was discovered it was based **ON STATISTICAL SIGNIFICANCE; that is within a defined probability we do not expect the trend to occur randomly.**
3. **Under Results and Conclusions** "as will be summarized **springs** are apparently much better at indicating over all change in groundwater flow system than **wells.**
    A. **AS SPRING FLOW DECREASED SALINE INCREASED**
4. **Encroachment** is defined here as no distinction between natural and manmade causes while **intrusion** is man induced process
5. **INTRUSION SHOULD BE A CONCERN**

BULLETIN 69 RECOMMENDATIONS

One of the most surprising and significant observations of this study was that rock matrix and saline analytes were increasing almost everywhere in Florida's springs. **Saltwater encroachment is a hugely significant issue**

BULLETIN 69 INTRODUCTION

This document reports the findings of analyses for trends in springs;

Page 86; district wide spring trends in SWFMD district;

Table 26 indicates Chassahowitzka, Homosassa and Crystal River trend down based on **statistical significance.**

OVERVIEW SWMFD STAFF REPORT

Controlled by F.S.373.042

Cost Of $509,000 not including district costs

1. **Bulletin 69 published 2009 by D.E.P. Fla. Geological and Bureau of Land Management consisting of 1600 pages on spring trends in Florida was totally omitted.**
2. **SWMFD staff was aware of death of forested wetlands at 2.9 to 3.1 mile mark but did not include in report to board.**
3. **SWFMD staff on Nov.4 2010 took position that death of forested wetlands was sea level rise. Why did staff fail to include this information along with photos, etc, at the 2.9 to 3.1 mile mark?**

4. **SWFMD staff states that "significant harm" is not defined but to the contrary is defined as set forth in SWMFD v. Charlotte Cty.774 s. 2nd 903 Fla. 2nd Dist. Court of Appeals.**

5. **SWFMD staff used the Weekiwachee well where D.E.P. bulletin 69 stated; UNDER RESULTS AND CONCLUSIONS "as will be summarized springs are apparently much better at indicating over all change in groundwater flow system than wells". Page XIII**

6. **SWFMD staff states in 1.4.1. (Page 5) Little guidance concerning identification of generally applicable thresholds associated with changes in flows or levels is found in the primary or secondary scientific and resource management literature and the definition of "significant harm" often becomes a policy decision rather than a technical decision.**

7. **SWFMD staff justifies the low main spring flow by stating: "Chassahowitzka is listed frequently as a first magnitude spring of 100 cfs however that statement probably includes flow from spring 1 main and crab ". This is not only total speculation, but the exercise of unbridled discretion totally contrary to published reports that allows staffs to avoid the mandate to put the main spring under Recovery as required by F.S.317.0421. Page 11 of 94.**

8. **SWFMD staff estimated main spring at 60 cfs just 60 % of the published flow cited by (Scott et al. 2002. Wolfe 1990 and others)**

9. **D.E.P. Bulletin 69 identifies the Chassahowitzka Main as a 1st magnitude spring page 11**

In conclusion I submit to the board that the best information available was either omitted or tailored and that staff has made specious arguments. To adopt this rule would not be in any ones best interest, including the environment, and would appear to me to come dangerously close to if not in violation of F.A.C. 120.52(8) Invalid Delegation of Legislative Authority. The property owners at the 2.9 to 3.1 mile have suffered not only significant harm but irreparable harm.

MITCHELL A. NEWBERGER
820 Newberger Road
Lutz, Florida 33549
Phone: (813) 310-4147

November 30, 2010

David Moore, Director
Southwest Florida Water Management District
Brooksville, Florida

Re: Chassahowitzka Minimum Flows and Levels

Dear Mr. Moore:

The decision to abruptly remove the agenda item above captioned from the November 16, 2010 Board meeting on the grounds of more public input raises serious questions regarding the motives of SWFWMD staff in their decision making process.
Well over one million dollars of taxpayer money was put into compiling a recommendation to allow for a reduction of 11% in the baseline flow of the Chassahowitzka Spring that failed to present the best information available and in fact, ignored all information that would have allowed the Board to reach a totally different conclusion.

In that you are the Director as provided by F.S. 373.073 these failures are ultimately your responsibility.

The citizens of your district do not wake up or go to bed with their computer on your web site, and only a minority, in the specific area of concern, have computers. If you had the best interest of the public in mind you would have posted the meeting in a fashion similar to that of a public hearing i.e.:

Signage on Maggie Blvd. going into Chassahowitzka at U.S 19
Or;
Signage at the boat ramp ECT;

Then it would not have been necessary to cancel the item on the Board meeting agenda at inconvenience and cost to everyone, if in fact public input was really the true reason.

8. Why was no information included by staff regarding the reasons not to drawdown the spring thus denying the board the opportunity to evaluate both sides of the issue?

9. Why did staff on page 11 of their recommendation state: Chassahowitzka is listed frequently as a 1st magnitude spring however that statement PROBABLY includes flow from spring 1 main and crab when in fact numerous studies classify Chassahowitzka Main as 1st magnitude including D.E.P. Bulletin 69 ?

10. Based on the best information available Chassahowitzka is a 1st magnitude spring that historically generates 100 cfs or more but is down to 63 cfs according to staff. Why are you not initiating Recovery in lieu of recommending an 11% drawdown?

11. Why did staff inform me on Nov. 4, 2010 that they were aware of the death of the forested wetlands at the 2.9 to 3.1 mile mark and that the cause was encroachment when there is no proof it is not intrusion and both terms were virtually omitted from staff recommendation to the board?

12. By what authority do you withdraw water from a spring whose flow is down 40% of documented levels if the reason for the condition is caused by drought or climate conditions?

13. Why was the November 2010 version of the Chassahowitzka MFL listed on line as FINAL and then changed to DRAFT when the hearing was cancelled?

14. Why would staff use the word suspected when The USF study of the Chassahowitzka concludes without any doubt that septic tanks are the cause of historical nutrient and bacterial contamination (Callahan et al.)(Page 12 staff recommendation) The study area is nearly devoid of urbanization. There is little development along the Chassahowitzka River See Figure 2-5 in section 2.3.1. The town of Chassahowitzka (a small residential community and fish camp) surrounds canals above spring #1 which have been dredged for residences. Faulty septic tanks are suspected of causing historical nutrient and bacterial contamination in the residential canal.) THIS IS BLATANTLY MISLEADING!

15. Why did the SWFWMD withdraw the rule in SWFMD V. Charlotte Co. 774 So. 2nd 903-Fla.Dist. Court of Appeals,2nd Dist.(2001) that involved the determination of what is "significant harm" which mandates societal interests be taken into consideration rather than basing the determination on purely scientific levels.

16. What new rules were promulgated as a result of the discussions with The Environmental Confederation of Southwest Florida regarding question 15 (significant harm) as indicated in SWFMD V. CHARLOTTE CO.?

17. The ALJ in the above case found that there has been 1 to 2 miles of saltwater intrusion in the Upper Floridan Aquifer System from predevelopment time to present .To what degree has the saltwater intruded in the Chassahowitzka area along the coast in that all springs issue from the Upper Florida Aquifer? I have personally knowledge of

shallow wells in the Crystal River Plantation area being abandoned due to salt, and barnacles growing on docks in Kings Bay.

18. How many WUP's have been issued in the Chassahowitzka springshed and what is the volume of those permits used and unused?

How can you in good conscience review a report if in fact you did so and conclude an 11% drawdown will not produce" significant harm" while failing to present to the board the other side of the story that supports 0% drawdown or that recovery should be initiated?

To allow staff to develop a recommendation that allows an 11% drawdown then state that the recommendation is virtually without guidance as to what "significant harm" means and therefore may become a policy decision while at the same time omits in their report information that is at least as good if not better that concludes the withdrawal should be 0% and Recovery should be initiated is nothing less than Unbridled Discretion.

To submit such a discretionary recommendation to the Board if adapted would be subjecting the Board to a violation of F.S. 120.56)2) Invalid Exercise of Legislative Discretion.

Over eight million dollars has just been expended for sewer and water in Chassahowitzka and we are still waiting for main spring pool restoration that you told me face to face in 2003 would be done in 2004. This is almost 2011! Would it not be prudent to allow results of these efforts to be analyzed prior to allowing further reduction in flow and up to 15% environmental harm?

I would suggest you restore the spring pool that is six years overdue, wait five years and re-evaluate, present both sides to the Board, then decide if any withdrawal is practical.

In closing, I would say that this report is the most staff driven, developer oriented document I have ever seen with total disregard of the statutory elements that are required to reach a recommendation, thus preventing the board from having the best information available to make a competent decision.

The process thus far is not inclusive of the best information available, the science is not defensible and therefore the report is not conclusive as required by Florida statutes.

Thank you and I look forward to your timely response.

Sincerely,

Mitchell A. Newberger

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

December 28, 2010

Mr. Mitchell Newberger
820 Newberger Road
Lutz, Florida 33549

Subject: Correspondence Dated November 5, 2010, to Members of the Southwest Florida Water Management District Governing Board and November 30, 2010, to Mr. Dave Moore, Executive Director

Dear Mr. Newberger:

Thank you for your correspondence regarding the establishment of minimum flows for the Chassahowitzka River system by the Southwest Florida Water Management District (District). As the project manager for the District's efforts related to developing minimum flows for the river system, I have been asked to address concerns raised in your November 5 letter to members of the District Governing Board and your November 30 letter to Mr. David Moore. Several of the comments in your recent correspondence were addressed in the District's November 4 response to your earlier correspondence.

With regard to your comments regarding Florida Geological Survey (FGS) Bulletin 69, I wish to re-iterate that the District concurs with the statements that springflow has declined, and salinity increased as flow declined. District staff contributed to Bulletin 69 (six are mentioned in the acknowledgments), including Mr. Basso who developed the groundwater impact analysis for the Chassahowitzka River (included in the MFL report as Appendix 11.2), but the decline is predominantly related to drought.

The District agrees with the FGS statement in Bulletin 69, that *Saltwater encroachment is a hugely significant issue* and that *saline analytes are increasing almost everywhere in Florida's springs*. The District also believes that the FGS is correct to link these increases to the on-going drought and global climate changes.

You noted the following statement in Bulletin 69, ". . . *as will be summarized springs are apparently much better at indicating over all change in groundwater flow system than wells.*" It should be noted that the change in groundwater flow in many of the springs is calculated by the USGS from the Upper Floridan aquifer (UFA) water level in the well(s).

As you stated, staff were aware of the tree die-off in the Chassahowitzka (as well as in the Weeki Wachee, and Withlacoochee). The text in section 3.4 (Tidal Wetlands and Riparian Habitats) of the MFL report discusses tree die-off, citing studies in the Waccasassa, Mississippi River delta, south Florida, and the Loxahatchee River in southeast Florida. The April draft MFL report states on page 37:

> *The effects of sea-level rise and increasing salinity have also been evaluated for hydric hammocks, a common forested wetland type extending along the west coast of Florida from the southern Hernando County line north to the vicinity of the St. Marks River. Reductions in the aerial coverage of hydric hammocks . . . has been extensive during the past century (see review by Williams et al. 2007).*
>
> *DeSantis et al. (2007) attributed recent declines in populations of cabbage palm and southern red cedar at Waccasassa Bay State Preserve to sea-level increase and drought, noting that recent rates of decline have exceeded predictions derived from previous studies of the area. Castanena and Putz (2007) documented more than a 17 percent decline in coastal forest in the Waccasassa Bay State Preserve between 1973 and 2003 as a result of forest replacement with salt marsh species. Modeled wetland changes associated with various sea level increase scenarios for the St. Marks National Wildlife Refuge area also demonstrate potential increases in salt marsh habitat and losses in forested habitat with increased sea levels (Doyle et al. 2003).*

In essence, the report openly acknowledges and cites several examples of tree die-off in Florida and elsewhere in the coastal United States. In order to emphasize the local impact of drought and sea level rise, photographic evidence of local die-off will be included in the final report. With your permission, staff would like to use the two photographs that you provided with your October 16 letter.

With regard to the definition of 'significant harm', the appellate case cited was brought by Pinellas County to challenge the Hearing Officer's order in the Division of Administrative Hearings case challenging the proposed SWUCA I rules, but there is no definition of significant harm in that case. The District's legal staff indicated that there is no statutory or case law definition of "significant harm."

However, there is a distinction between a statute and a rule. The court said one may use the dictionary for terms in a rule that are not defined and therefore impossible to know what they mean. However, the term "significant harm" is a statutory term, not rule, and the District is defining significant harm for water bodies through rule making.

The District is proceeding in accordance with applicable law, including the SWUCA administrative, appellate and Supreme Court decisions, to establish the minimum flow for the Chassahowitzka River.

With regard to Chassahowitzka flow, prior to 1997 the flow reported by the USGS included flow from Crab Creek. Combined with flow from Chassahowitzka Main and Chassahowitzka #1 and #2, the flow exceeded the threshold (100 cfs) for classification as a first magnitude spring. In 1997, the USGS stopped including the Crab Creek contribution when it reports flow for the river.

The reference to 'first magnitude' is entrenched in the older literature which is frequently cited in more recent reports with identifying which springs are included, but technically, it should refer to the Chassahowitzka 'complex' of springs and not just the Main Spring. The USGS reported a discharge for the Chassahowitzka on November 21, 2010, of 61 cfs, which may be verified at the following url:
http://waterdata.usgs.gov/nwis/dv/?site_no=02310650&agency_cd=USGS&referred_module=sw)

The USGS change in reporting may be confirmed by inspecting the discharge measurements reported by the USGS on page 78 of the USGS report titled "Hydrology of the Coastal Springs Ground-Water Basin and Adjacent Parts of Pasco, Hernando, and Citrus Counties, Florida" (USGS WRIR 01-4230). This publication lists the measured values for station 02310650. Note, that on page 78 beginning in 1997, the USGS quotes two discharge measurements for each day of observation. The one listing in column "Q" includes Crab Creek, while the results in column "Q*" are for the Main Spring and above. In addition, the site description found in "USGS Water Resources Data Florida Water Year 2001" (Water-Data Report FL-01-3A) states the following:

> *REMARKS '. . . Discharge measurements made about 200 ft downstream from head of springs; measurements made prior to November 1997 include flow from Crab Creek. Discharge computed from relation between artesian pressure at Weeki Wachee Well near Weeki Wachee, elevation, and discharge measured at measuring site. See WRIR 01-4230 for computation techniques.*

During our meeting on December 6, you cited several reports as evidence that Chassahowitzka Main is a first magnitude spring. In particular, you mentioned two recent studies commissioned by the District. Both of those studies make statements or implications in the introductory pages that the flow from Chassahowitzka main spring is over 100 cfs (first magnitude). Neither of these studies included new discharge measurements and both relied on the data published by the USGS. Both of these studies cited other reports and both took some liberty in paraphrasing the primary citation. Nevertheless, the District should have noted the discrepancies prior to finalizing the studies and will put a greater effort into clarifying which spring, or springs, are included when describing the magnitude of spring flow.

There is ample evidence that discharge reported for the Chassahowitzka River prior to 1997 included flow from Crab Creek and all sources upstream. After 1997, the discharges reported do not include the flow from Crab Creek. From 2/20/1997 when the USGS began reporting daily flows for Chassahowitzka River through 12/7/2010, the flow from the Main Spring and springs upstream has averaged 59 cfs with a maximum discharge of 87 cfs and a minimum discharge of 25 cfs.

The decision to remove the Chassahowitzka MFL from the November Governing Board agenda was to allow additional time for public input. In order to ensure public awareness, a second public meeting was held December 16 and the following activities were undertaken by the District to maximize public awareness:

- A notice was posted on the District's website on or shortly after November 26.
- A District funded advertisement ran in the Citrus County Chronicle on December 10.
- An announcement was published in the Florida Administrative Weekly on December 10.

- A press release was issued on December 6 to the following media contacts:
  Barbara Behrendt, St. Petersburg Times
  Chris Van Ormer, Citrus County Chronicle
  Ferdinand Zogbaum, Bay News 9
  Jack Dambach, Bay News 9
  Mike Eastman, The Specifier
  Mike Wright, Citrus County Chronicle
  News Desk, Citrus County Chronicle
  Amanda Mims, Citrus County Chronicle
  Sandra Frederick, Citrus County Chronicle
  TJ Hart, WSKY-FM 97.3
- Approximately eighty elected individuals, utility staff and interested individuals were notified via email by the Northern District Community Affairs Manager.
- Signs were posted at the boat ramp and several other locations on December 8.

Regarding your comments about septic tank and historical contamination, this discussion was included in the MFL report for background only and was not used to establish the MFL. The word choice used in the District's MFL report (*Faulty septic tanks are **'suspected'** of causing historical nutrient and bacterial contamination. . .*) was deliberate because of the USF authors (Callahan et al. 2001) stopped short of declaring a 'cause and effect'. The USF authors wrote, *Both the HSIC and PRD1 phage were isolated from the environment within 4 days of being introduced into septic tanks in the study area, thus**, implicating** septic tanks as a source of. .* The final MFL report will be re-written to include the quote from the USF authors in lieu of the word 'suspected'.

In response to your question about designating the November MFL report as "FINAL", this is a procedural matter. As is standard protocol, when a proposed MFL rule is presented to the Governing Board, action is requested to accept the final MFL report and to authorize initiation of the rule making process. In accordance with the established protocol, the report was marked "FINAL" until the agenda item was withdrawn. An updated version, which includes all written comments and staff responses since September 1, will be posted in the near future. Sometime after the closing date for new comments (tentatively December 31, 2010) a final revision to the MFL will be posted on the District's web site.

With regard to your inquiry about additional costs expended in development of the proposed MFL, in addition to the $509,380 for studies as outlined in the report, an estimated $51,650 was spent for staff time for water quality sampling, data analysis, project management and report preparation.

You asked about the number and volume of permitted water use permits within the Chassahowitzka springshed. There are 36 water use permits within the Chassahowitzka springshed as of December 2010.

Total average daily permitted quantities for groundwater use is 34.32 mgd. They break down as follows:

WUP Type	(mgd)
Agriculture	1.32
Industrial/Commercial	20.25
Mining	0.09
Public Supply	10.86
Recreation	1.80

Estimated and metered water use in the springshed for 2005 and 2006, respectively, was 23.4 and 23.5 mgd. Over 90 percent of water use permitted withdrawals are metered.

Again, I thank you for your comments regarding establishment of minimum flows for the Chassahowitzka River system.

Sincerely,

Michael G. Heyl
Chief Environmental Scientist
Ecologic Evaluation Section

MGH/brm
cc: Chassahowitzka River Restoration Committee
Governing Board Members
Dave Moore
Bruce Wirth
Mark Hammond
Gene Schiller
Lou Kavouras
Richard Owen
Bill Bilenky
Karen Lloyd
Log #24926-10
Log #24945-10

MITCHELL A. NEWBERGER
820 Newberger Road
Lutz, Florida 33549
Phone: (813) 310-4147

February 7, 2010

David Moore, Director
2379 Broad Street
Brooksville, Florida 34604

Dear Mr. Moore:
Thank you for having Mr. Heyl respond to my letters of November 5, 2010 and November 30, 2010. I received the letter on December 28, 2010. These letters were directed to you as the Executive Director. I certainly hope you are reviewing these written communications in that you are ultimately responsible. I would appreciate it if you can find the time to affix your signature to matters of this magnitude.
I find no reason to apply any correction to my letters except I was not aware that .7% was already being withdrawn from the springshed with SWFWMD approval. The present withdrawal of .7% or approximately 750,000 gallons per day is a contributing factor to the irreparable damage incurred on my property and those at the 2.9 mile mark on the river. Further withdrawals according to permits issued will exceed 33,000,000 gallons per day. This will only increase the salinity and SWFWMD'S liability, regardless of your argument on sea level rise. I am also familiar with your limits of liability and the Claims Bill Process.
I have reviewed the exchange of some letters between your staff supporting the 15% kill of the river and those opposed to such an end result. It becomes more evident that MFL'S and science, as you are using it, reveal your efforts to utilize Florida Water Law to circumvent the Federal Clean Water Act. SWFWMD has clearly documented that they are going to conduct withdrawals from the Chassahowitzka River Springshed and that such Activity will partially Degrade the river 15%.
On your proposed MFL dated Nov 2010, you have admitted clearly that the science on which you conclude the 15% harm as "not significant" is inadequate and

discretionary. You make no attempt to provide the board with the best information available which clearly would not be just science, but would include options if it became a policy decision. You have given the board no option but to adopt a rule that is by your own admission flawed. Furthermore, you established the MFL based on readings taken during a 4-5 year historic drought, not the 81 historic readings, since 1930, that are available.

As per Sea Grant Law and Policy Journal Vol.2 No.2 (winter 2009/2010), it is pointed out that D.E.P. counsel indicates that in some permit programs the term measurable is used to determine the meaning of the term "significant". I would submit to you that 15% is measurable and that you have quantified same thus it is significant. Nov. 2010 MFL recommends that the board adopt an amount that, by your own admission, is measurable. You are using 15% as a quantified number to justify activities that result in a reduction in stream flow on the Chassahowitzka River. The bottom line is similar to what I encountered with Citrus County over the Sewer issue and that is whether SWFMWD is consistent with the Federal Clean Water Act. (CWA)

The following are the primary issues:

The Federal Clean Water Act (CWA) 33U.S.C.

1987 Anti –Degradation CWA amendment

1993 OFW designation of the Chassahowitzka River and established Water Quality.

Florida Statute 403.061(7) any rule adopted pursuant to this act shall be consistent with the provisions of Federal law.

Article II Section 7 of the Florida Constitution requires abatement of water pollution not augmentation that will result in degradation and a 15% reduction of flow by WUP activities.

F.A.C 62-302-300 Findings, Intent and antidegredation policy for surface waters (14) states: Existing uses and level of water quality necessary to protect the existing uses shall be fully maintained and protected. Such uses may be different or more extensive than the designated use.(15) Pollution which causes or contributes to new violations of water quality standards or to continuation of existing violations is harmful to the waters of this state and shall not be allowed.

1994 U.S. Supreme Court Decision (511 U.S. 700) (128 L.ED. 2nd 716) (14) including but not limited to the following:

A. Stream flow reduction can constitute pollution
B. Pollution is man-made man induced alteration of the chemical, physical, biological and radiological integrity of water and encompasses the effects of reduced water quantity.
C. Activities not merely discharges must comply with state water quality standards.

D. No activity is allowable under EPA Anti-degradation regulation which could partially or completely eliminate any existing use.CFR 131.12(4.4.2) (511 U.S. 717(12)

1987 U.S. Supreme Court 479 U.S. 481,494 "A state law is pre-empted if it interferes with the methods by which the federal statute was designed to reach that goal."
1993 U.S. Supreme Court 507 U.S. 658,663 "Thus where a state conflicts with, or frustrates federal law the former must give way".
1941 U.S. Supreme Court Decision; Conflict can be found when the state law "stands as an obstacle to the accomplishment and execution of the full purposes and objectives of Congress".
The U.S. Congress made clear that the broad purpose in enacting the Clean Water Act was to "Restore and maintain the chemical, physical and biological integrity of the Nation's waters".
The District's proposed activity will blatantly interfere with, frustrate and conflict with the full purpose and objectives of Congress by degrading not restoring the Chassahowitzka River.

The Districts plan is to withdraw 15% of the water from the Chassahowitzka springshed resulting in a reduced flow emitting from the Chassahowitzka springs. Dr. Dale Griffin, PHD.MSPH with USGS was the lead scientist with Dr. Joan Rose on the Chassahowitzka River septic tank study. E-mails from Dr. Griffin dated 11-30-10; 12-03-10 and 12-15-10 indicated the result will be reduced water quality with serious impact upon the ecology of the river. This will include migration of the saltwater interface inland and that the microbial ecology (base of the food chain) would be effected to include how a reduction in flow may facilitate the spread of aquatic microbial pathogens (fish bird, blue crab, pathogens etc.).
Dr. Griffin's statement raises serious questions regarding the endangered whooping crane and the reduction of stream flow impacting their primary food source, the blue crab.
Dr. Griffin took issue with the peer review by stating in an E-mail dated November 30, 2010 that the papers used for peer review are agency reports not peer-reviewed publications and are dated and the section justifying the reduction is fatally flawed. He further stated that it looks like someone is just using these papers as an excuse to set min. flow and these references are a weak argument.
Tom Green laugh, P.G. of the Florida Geological Survey D.E.P. Hydrogeology section, Tallahassee, FL, in an e-mail dated December 22, 2010, says that 15% is significant.

The CWA and CFR 131.12 (4.3) REQIIRE THE STATE ANTIDEGREDATION policy and implementation are consistent with the components detailed in 40 CFR

131.12.and it should go without saying that state anti-degradation policy must be consistent with Federal case law.
Water quality standards are applicable to all waters and in all situations, regardless of Activity or source of Degradation. CFR131.12 (4.6)

The failure of the states to comply with the spirit, intent and goals of the act especially the clause—"restore and maintain the chemical, physical and biological integrity of the nation's waters" and the provision of 303, prompted Congress to incorporate the 1987 anti-degradation amendment into the act.
The intent of the 1987 amendment was and is to protect existing uses and to provide for a means to assess activities that may lower water quality in high quality waters. SWFWMD appears to be attempting to accomplish what the 1987 amendment was designed to prevent.
There are thousands of pages online and in libraries involving Florida springs initiatives, studies and other papers that cost the taxpayers millions of dollars, none of which talk of further degradation but only of restoration, recovery and maintaining.
The bottom line here is that SWFMWD is considering adopting a rule that will reduce the flow of the Chassahowitzka River which is a man induced activity that will cause pollution of the river thus is not consistent with the Federal Clean Water Act, including but not limited to the following reasons:

1. Reduce quantity of water flowing from the springs that will partially reduce stream flow by15%, which is significant
2. Reduce Water Quality from 1993 OFW level by the activity of withdrawal
3. Introduce microbial pathogens into the Chassahowitzka River by lowering stream flow
4. Jeopardize and modify the Whooping Crane habitat and food supply i.e.; blue crabs
5. Will degrade not restore the river as required the CWA
6. Will totally destroy the fresh water fishery by escalating salt water intrusion.
7. Will eliminate 15% of fish, habitat, the eco system and the environment at a minimum.
8. Will not restore and maintain the chemical, physical and biological integrity of the nation's waters as required by law but will degrade and damage same.
9. Will frustrate the overall goals of the Federal Clean Water Act
10. Will escalate the destruction of Florida's only coastal hardwood swamp whether present damage is encroachment or intrusion.

On January 20, 2011, I met with your legal counsel Ms. Karen Lloyd and submitted an e-mail for confirmation of our discussion in a timely manner.
On February 3, which was eleven days later I received an e-mail from Ms. Lloyd in which she refused to confirm the points upon which we disagree. I am sure the e-

mails are available for your review and would urge that you do so. Failure to respond is clearly a violation of Public Trust.

Based on her failure to confirm our disagreements I can only conclude that you have no statutory or case law to show that SWFWMD is exempt from the CWA to conduct the proposed Activity (withdrawals) in the springshed of the Chassahowitzka River. This activity will result in a 15% kill and Partial Degradation of the river system and therefore be inconsistent with the CWA.

SWFMD will be knowingly and willfully controlling these activities.

I will restate the questions and again request a proper response:

1. SWFWMD can issue WUP's to conduct activities that result in the withdrawal of water from what SWFWMD has identified as the Chassahowitzka Springshed. This activity will knowingly reduce the flow of the Chassahowitzka River 15% over an unknown period of time resulting in an estimated 15% destruction of the river.
2. SWFWMD has also adopted a discretionary policy that a kill of 15% or below, i.e. 11% is not "significant harm" and that such policy is not supported by case law or EPA approval.
3. That you take the position that salt is not pollution or a pollutant.
4. That the Federal Clean Water Act is not applicable to the above stated activities.

I respectfully request that you and/or SWFWMD inform me if the above is not your position and if so clarify before I move forward.

It is my position that the Federal Clean Water Act provides the statutory basis for state water quality standards and is governed by 40 CFR 131. Please quote me the authority under which SWFWMD is exempted from the Federal Clean Water which includes the 1987 Antidegredation Amendment in relation to the above discussed issues; and the authority that allows "significant harm" to be set at 15%).

In the end, if I am wrong it becomes a concerned citizen error. If you are wrong on an issue of this gravity, the fallout will be much greater. If you are, in fact correct, SWFWMD clearly has an unbridled authority to destroy the spring fed rivers of the Suncoast, leaving the Federal Clean Water Act, along with the Congress of the United States a toothless tiger.

Sincerely,

Mitchell A. Newberger

==========
From: Mitchell A. Newberger [mailto:mnewberger@verizon.net]
Sent: Sunday, January 23, 2011 3:59 PM
To: Karen Lloyd
Cc: dgriffin@usgs.gov; Brad Rimbey; Brent Whitley; Dewitt@sptimes.com; George McElvy; Hugh Gramling;
Jerry Stanley; Pete Walker; Peter Hubbell; Tom
Subject: Meeting on Thursday 1/20/11 ref; MFL-WUP-CWA ect.

Ms Lloyd,

Thank you for taking the time to discuss the issue of MFL's, withdrawals, WUP's , stream flow
reduction etc; as it effects the Chassahowitzka River .
As I understand your position:

1. SWFWMD can issue WUP's to conduct activities that result in the withdrawal of water from what SWFWMD has identified as the Chassahowitzka Springshed . This activity will knowingly reduce the flow of the Chassahowitzka River 11% over an unknown period of time resulting in an estimated 11% destruction of the river.

2. SWFWMD has also adopted a discretionary policy that a kill of 15% or below, i.e. 11% is not "significant harm" and that such policy is not supported by case law or EPA approval.

3. That you take the position that salt is not pollution or a pollutant.

4. That the Federal Clean Water Act is not applicable to the above stated activities.

I respectfully request that you and/or SWFWMD inform me if the above is not your position and if so clarify before I move forward.

It is my position that the Federal Clean Water Act provides the statutory basis for state water quality standards and are governed by 40 CFR 131. Please quote me the authority under which SWFWMD is exempted from the Federal Clean Water which includes the 1987 Antidegredation Amendment in relation to the above discussed issues; and the authority that allows "significant harm" to be set at 15%).

Mitchell A. Newberger
820 Newberger Road
Lutz, Florida 33549
Phone: (813) 949-1078
Cell: (813) 310-4147

==========
From: Karen Lloyd
Sent: Thursday, February 03, 2011 11:15 AM
To: Mitchell A. Newberger

Cc: dgriffin@usgs.gov; Brad Rimbey; Brent Whitley; Dewitt@sptimes.com; George McElvy; Hugh Gramling; Jerry Stanley; Pete Walker; Peter Hubbell; Tom; Bruce Wirth; Marty Kelly; Mike Heyl; Bill Bilenky
Subject: RE: Meeting on Thursday 1/20/11 ref; MFL-WUP-CWA ect.

Mr. Newberger,

I'm glad that we were able to meet to discuss the proposed minimum flows for the Chassahowitzka River. It gave me a chance to hear your views of the law and your concerns about the River. We thoroughly discussed the issues that you have set forth below. At our meeting I explained the Clean Water Act to you and I also clearly described my interpretation of the applicable law. You completely disagreed with most everything I said. You have a different perspective from the District of the District's activities and you have your own interpretation of the law that is unchanged by our meeting. Continued debate on the issues and how you choose to frame them will not change your perspective or interpretations. I appreciate your concern for the Chassahowitzka River and your desire to protect it from any further changes or use and your intent to use the Clean Water Act as the vehicle to do that. However, after giving careful thought to this, continuing the debate on these issues and how you choose to frame them will not change your perspective or interpretations and there are avenues available to you to test your interpretations of applicable law. So, as you and I agreed at the meeting, we will have to disagree on these issues.

_____

Karen A. Lloyd
Assistant General Counsel
Southwest Florida Water Management District
2379 Broad Street, Brooksville, FL 34604-6899
800-423-1976, ext. 4651 or 352-796-7211, ext. 4651

==========

Southwest Florida Water Management District March 3,2011
2379 Broad st.
Brooksville, FL

PUBLIC RECORDS REQUEST E-MAIL

To whom it may Concern;
Pursuant to Article 1,section 24 of the Florida Constitution; Chapter 119 of the Florida Statutes and any ensuing applicable case law , I am requesting review of the following public records:

1. Any records ,legal memoranda ,written or printed authority or other as set forth in the above cited authority that is specifically germane to the authority or lack of authority exempting the Southwest Florida Water Management District from the Federal Clean Water Act Water Quality Standards while conducting the activity of water withdrawal from the Chassahowitzka River Springshed thru issuing water use permits that result in a partial degredation of the Chassahowitzka River system and the Chassahowitzka National Wildlife Refuge of up to an estimated 15%.

Should you deny my request, or any part of the request please state in writing the basis for the denial and specific authority as required by F.S. 119.07(1).
I will contact your office within 24 hours to discuss when I may expect fulfillment of my request and the fees if any associated with this request as prescribed by statute.
You may contact me at 813-310-4147 if you have any questions.

Sincerely,

Mitchell A. Newberger VIA E-MAIL

[Remainder of this page intentionally left blank.]

Southwest Florida
Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

March 1, 2011

Mr. Mitchell A. Newberger
820 Newberger Road
Lutz, Florida 33549

Subject: Minimum Flow Levels for the Chassahowitzka River

Dear Mr. Newberger:

In your February 7 letter inadvertently dated 2010, you wrote to me to indicate your disagreement with the legal staff's interpretation of the applicability of the Clean Water Act to the setting of minimum flows for the Chassahowitzka River. Your letter is a continuation of your interest in the establishment of minimum flows for the Chassahowitzka River. It is noted that you have attended one or more public workshops, have had two meetings with staff, and a telephone call with a staff member who have collectively responded to your three previous letters. You have asked scientific and legal questions that staff has carefully researched and then provided you with thoughtful answers. Additionally, you have had extensive discussions with Governing Board Member Hugh Gramling, who has extensive interest and understanding of this issue.

Regarding your February 7 letter, I asked the District's legal staff to review your letter and discuss it with me. Staff explained to me, as it did to you, the District's position about the law applicable to setting a minimum flow for the River. It is apparent that you and legal staff disagree on the law. The District's General Counsel agrees with Ms. Lloyd's explanation to you of the inapplicability of the Clean Water Act to the establishment of minimum flows. However, if you think it would be beneficial, I would encourage you to discuss the matter directly with the District's General Counsel Bill Bilenky. You can contact Bill directly at 352-796-7211, extension 4661.

Your interest in protecting Florida's natural systems is greatly appreciated and we value your input as the establishment process continues.

Sincerely,

David L. Moore

David L. Moore
Executive Director

DLM:jlk
cc: Hugh M. Gramling, Vice Chair, Governing Board
Bill Bilenky, General Counsel
Bruce Wirth, Deputy Executive Director

11.18.18 Save the Manatee Club, Katie Tripp, Ph.D.

From: Katie Tripp [ktripp@savethemanatee.org]
Sent: Friday, December 17, 2010 2:05 PM
To: Mike Heyl
Cc: ktripp@savethemanatee.org
Subject: Comments for Chassahowitzka MFL
Attachments: Chassahowitzka MFL Comment Letter from SMC 12 17 10.pdf

Dear Mr. Heyl,
Attached, please find a comment letter from Save the Manatee Club.
Thank you,
Katie

Katie Tripp, Ph.D.
Director of Science and Conservation
Save the Manatee Club
500 N. Maitland Ave.
Maitland, FL 32751
Office:407-539-0990
e-mail: ktripp@savethemanatee.org

[Note – Numbers added to original comment letter by M. Heyl to facilitate review.]

used here do not take any possible natural variations into account, which, if considered, could result in further limiting the levels of proposed future withdrawals.

4.) The introduction of the manatee analyses (5.4.1) identifies watercraft and red tide as threats to the species, but fails to immediately mention the significant mortality that can result from exposure to suboptimal water temperature, and the fact that protection of warm water habitat is among the most important management strategies for recovering this endangered marine mammal. The FWC also expressed this in their comment letter to the District, stating, "Warm-water habitat is considered the limiting factor for the manatee population in Florida. Warm-water habitat for manatees provided by natural spring systems is therefore critical to the recovery of this species into the future, and FWC therefore does not support a loss of warm-water habitat."

5.) The description of both the statewide manatee population and the number of manatees that utilize the spring network in Citrus County needs to be updated, as discussed in the USFWS letter from Mr. Blihovde to the District. The duration of cold weather experienced during the winter of 2010 provided new data with regard to the estimated minimum manatee population for Citrus County and the state. These updated figures are among the data improvements that should be included in the next version of this report. In addition, the record-breaking levels of cold-related manatee mortality that were observed last winter further highlight the critical importance of manatee winter habitat, including Chassahowitzka.

6.) In assessing the level of manatee use of the Chassahowitzka system, the District claims to have used the best available science, but all that is documented within the report is spotty survey data for the River, conducted by the USFWS. While the USFWS has a long-running aerial survey program that has provided ample data regarding the manatee population to the north in Homosassa and Crystal River, as the MFL report acknowledges, "the Chassahowitzka River is infrequently included in those surveys." Despite the much lower survey effort (4 vs. 23 / year), and the fact that no data are available for the months of September through December (1/3 of the year), the District still relied on the "low" counts of manatees in the River to support an 11% reduction of flow. I am curious whether the District approached the USFWS about increasing their survey effort in Chassahowitzka in anticipation of the need to set an MFL for the River. Furthermore, the District appears to have relied solely on these aerial survey data to inform their decision-making process although there are a number of manatees that have been documented in the River as part of GPS tagging, rehabilitation monitoring, and Photo ID studies over the years. Data on these manatees is available from FWC, USGS Sirenia Project, and Sea to Shore Alliance and would have greatly informed the decision-making process for the District.

7.) The Statute requiring the District to establish MFLs requires that the "best available information" be used to do this. In the case of the manatee, the best available information does not appear to have been utilized, but should be before moving forward with this plan. Another example was raised by FWC in their comments, with regard to salinity profiles. The District used data published in 1989, but FWC has data available from 2005-2007 that are more current, and thus would have been more representative of the "best available information" and more appropriate to use in this case.

8.) Recovery of the manatee will be in large part contingent on the ability to safeguard and enhance natural warm water habitat like the springs at Chassahowitzka. None of these necessary safeguards have been employed at Chassahowitzka and FWC describes the warm water habitat here as "marginal." Therefore, the District cannot fairly compare these springs with those of Crystal River and draw the conclusion that these springs are less important or valuable to the manatee population. For example, manatees in Chassahowitzka lack sanctuaries and are subject to harassment at all times of the year.

Manatees being fed by kayakers is well-documented and even appears on You Tube videos posted on the internet. In the St. Johns Region, manatees are known to make greater use of sites that are protected from human activity than those that are not. It is quite possible that the same is true at Chassahowitzka. Furthermore, Kings Bay is protected by manatee speed zones in the winter months, while Chassahowitzka is not. Even in the summer, Chassahowitzka is not blanketed by speed zones, which could limit manatee usage of the area during these other times of year as well. In addition, manatee access to certain springs here is limited by tide to the extent that manatees can be trapped outside the spring and unable to fully benefit from the warm water, or they can get trapped once they are inside the spring and must wait for a favorable rise in tide in order to leave. At other sites, sediment removal has improved manatee access to springs, a management action that could certainly be undertaken at Chassahowitzka to increase manatee access and encourage increased use. Differences in habitat quality and protection do affect manatee use of various springs, a factor that does not appear to have been considered by the District.

With regard to manatee food selection and the importance of abundant and readily available SAV, the District appears to have once again relied on a single and outdated report instead of consulting with manatee experts for more recent information. During briefer, more mild cold fronts, manatees may forage further away from warm water sites if they believe they can do so with risking over-exposure to cold water. However, during colder periods, manatees will not wander nearly as far from the warm water site, choosing instead to forage as nearby as possible, even eating grass off of the bank as was evidenced last winter in canals in Brevard County that serve as secondary warm water refuges. The presence of abundant SAV in close proximity to warm water sites is of definite benefit to manatees and any changes in the ecosystem that made this SAV less readily available would be considered a detriment to the local population. It is for these reasons that areas including the St. Johns River and
9.) Crystal River have developed summer-winter aquatic plant management plans that restrict spraying of vegetation in areas of manatee aggregations during the winter months- in order to protect forage near the springs. Chassahowitzka has no such plan, and the County recently placed notice in the local paper that herbiciding of hydrilla on the Chassahowitzka River would occur during the week beginning 12/6/10. Once again, the management here is very different than it is to the north in Homosassa and Crystal River, which helps explain why manatees appear to use the Chassahowitzka River differently.

It is unclear how the District determined that any flow reductions were acceptable given that a documented cold event from 2002, when input to the model, generated results showing no habitat would be available to meet the chronic criteria for manatee thermal refuge. If data from the coldest
10.) periods of 2010 were modeled, the failure of the habitat would be even more significant as these conditions surpassed the "worst case" that was previously modeled. Therefore, I do not see how any allowable decrease in thermal refuge could be permitted, let alone a 15% loss of volume.

Knowing the value of spring habitat for the recovery of the manatee population, we do not support any reduction in the volume or area of the spring flow at Chassahowitzka and believe that
11.) management initiatives should be taken by other agencies (FWC, USFWS) to improve the quality of habitat here for manatees.

I am uncertain how the return interval factors into the District's calculations for the manatee thermal refuge, but while it is true that the natural manatee lifespan can exceed 60 years, data collected in the 1990s, which is unfortunately among the best available data, found that manatees were dying at the average age of 7.7 years. The USGS Sirenia Project, with their mark-recapture and survival rate
12.) work, might also be able to shed light on this issue and help ensure that the best data are incorporated into the model with regard to current typical manatee life expectancy.

13.) Also of concern is the manner in which the plankton tow fish/invertebrate abundance data were dismissed and assumed to be hypersensitive. I have read the similar concerns expressed by FWC and DEP in their comments. While the District has tried to justify that these particular results are unreasonable and do not represent likely real-world outcomes of the proposed flow reduction, the questionable nature of these results leads me to question other modeling data that were used to direct decision-making. For example, if certain modeled outcomes were hypersensitive, could others have been hyposensitive? And what if there is a true impact on fish/invertebrates that was then ignored by the District because the model somehow overstated that impact? The report gives the impression that the District cherry picked the use of modeling results that supported their desired outcome. In addition, the Peer Review Panel has questioned: the short calibration period for the model and whether the validation requirements have been satisfied; the time step used in the EFDC model; the exclusion of the estuarine marsh from the model simulations; boundary conditions; temperature calibration; the absence of quantitative uncertainty analyses on the models used for flow recommendations; and the inability of the regression equation to address the contribution of saline spring discharges to the river, which unfortunately leaves readers such as myself to question the validity of any of the data or recommendations that are set forth in this report.

14.) Of similar concern were the modeled results for *Vallisneria*, a preferred food for manatees, but the District did not trust the model results claiming "the curve is too restrictive to rely on the results" and stating that the response does not seem reasonable. I'm certain the residents of Kings Bay, to the north, would also have said that the "No Name Storm" of 1993, which brought salt water into the Bay, and ravaged the *Vallisneria* beds, which have still not recovered, and may never recover, may have thought that the possibility of such an event would "not seem reasonable." Residents along canals of the Bay who have increasing numbers of barnacles growing on their dock pilings and who see stingrays swim pas their docks might also have once thought such scenarios "unreasonable." DEP also raised concerns for *Vallisneria* in their comments, which were dismissed by the District. Even if the District can show that reduced flows are not likely to affect *Vallisneria*, can they speak to changing salinities or increased nitrate pollution and their effects? Related to these concerns is an issue that was also raised by DEP in their comments- the potential for increased algal growth in the system if flows were reduced. The District did not have an answer, which is concerning. Species like *Lyngbya* appear to thrive in disturbed aquatic ecosystems and prevent growth of desired SAV like *Vallisneria*. The District really should have a better understanding of what their proposed withdrawals could mean with regard to possible expansion of problematic algae. If we attempt to oversimplify these very complex systems which are influenced by multiple factors, we are very likely to underestimate the potential impacts of our actions when considered in concert with natural events such as storm surge, sea level rise, and the interconnectivity of the aquifer, which are beyond our control. What is within our control is the additional stress we place on the river through allowable withdrawals, and I believe that an 11% flow reduction is beyond what is reasonable and prudent for this system.

Even if the District lowers its proposed percentage of flow reduction for the Chassahowitzka, which I believe it should, the many influences on this system, which are mentioned in the Peer Review Report, stress that managing simply to a cfs target will be inadequate. I would like to reiterate what was stated in the Review Report,

15.) "the lack of detailed knowledge about the hydrogeology of the contributing springs, which seem to behave differently from each other and vary in water quality, would suggest that any MFL expressed in cfs alone may be somewhat inadequate, or at least requires careful monitoring during implementation. Especially if groundwater withdrawals on the inland side of the aquifer,

seawater intrusion into the artesian formation on the Gulf side, or other potential impacts (e.g., increased nitrogen and other pollutants) can affect the water quality of the Chassahowitzka ecosystem in the future, weakening the value and accuracy of the MFL as the District goes forward with water management in this area."

16.) The Peer Review Panel also notes that each individual first or second magnitude spring, in addition to the River and estuary may require separate MFLs to improve management. This detailed approach might better serve the District in protecting the aquatic resources in this system and should be investigated. DEP expressed concern for how each the creeks and springs would be monitored to ensure their continued health in the absence of individual MFLs, but unfortunately, the District only plans to examine discharge from Main #1 and #2 to assess compliance, assuming the results here will be representative of the rest of the system. The District has stated that it will revisit the MFLs in the future and incorporate new data, but has made to commitment to better understanding and documenting the conditions within the individual components of the Chassahowitzka system, which will greatly limit the effectiveness of any monitoring plan.

Thank you for the opportunity to provide comment. I look forward to seeing how these remarks are incorporated into the District's revised report.

Sincerely,

Katie Tripp

Katie Tripp, Ph.D.

Director of Science and Conservation

==========

From: Mike Heyl
Sent: Friday, October 21, 2011 12:21 PM
To: Katie Tripp Ph. D. (ktripp@savethemanatee.org)
Subject: Chassahowitzka Comments
Attachments: District_Response_SMC.pdf; SMC_Tripp.pdf

Katie – Attached, please find your original inquiry and the District's response. Again, I apologize for the lengthy delay.

MGH

October 21, 2011

Dr. Tripp,

Thank you for your comments regarding the proposed minimum flow and level and I apologize for the lengthy delay in responding. To facilitate the response, I have numbered the paragraphs in your correspondence (see attached).

1. When the legislature enacted the minimum flow and level (MFL) statute (section 373.042 F.S.), they did not define 'significant harm'. Presently the Southwest Florida Water Management District's approach to significant harm is loss of 15 percent of habitat (volume, bottom area, shoreline length in contact with specified salinity, acute or thermal refuge), or biological resource (abundance of fish/invertebrates, mollusks, benthic diversity, submersed aquatic vegetation density, etc.). The value was originally proposed by the upper Peace River peer review panel (Gore *et al.* 2002). All seventeen subsequent peer review panels have accepted it and most have been supportive. None has proposed a different metric or value, although the peer review panel for the upper Hillsborough River (Cichra *et al.* 2007) recommended that the District undertake a study to validate its continued use. In response, the District has contracted with the University of Florida and a private consulting firm to search the literature (peer-reviewed and grey) for studies that have quantified the impact of flow diversion on ecologic resources. In addition to the literature study, the District has initiated a long-term controlled diversion study. While there does not appear to be a universally recognized threshold representing 'significant harm' in the peer-reviewed literature and much of the literature on environmental flows is taken from systems (e.g., Murray-Darling in Australia, San Francisco Bay, Caspian Sea in Russia) that have withdrawals in excess of 50 percent, impoundments or both. Exceptions include recommendations for limiting diversion to 20 percent (Dunbar *et al.* 1998) based on habitat loss, 30 percent habitat loss based on historical low flows (Jowett 1993) or 20 percent reduction in historical commercial harvest (Powell *et al.* 2002). More recently, the Nature Conservancy (Richter *et al.* 2011) proposed a presumptive standard of 10 percent reduction over natural flows for 'high level' protection and up to a 20 percent reduction for 'moderate level' of protection.

2. Comment noted.

3. The District agrees that a reduction in flow has occurred and that it is largely due to changes in rainfall. The District also agrees that nitrate concentrations are increasing, but the MFL statute requires that the MFL be established based on the impact of withdrawals and there is no evidence that nitrate concentration is related to flow. The comment about 'the models used here do not take any possible natural variations in account' is not understood. The groundwater model used to assess the impact of withdrawals explicitly includes changes in the form of variable rainfall.

4. The report will be edited to emphasize the importance of warm water habitat.

5. The discussion on manatee population has been re-written to incorporate Mr. Blilhovde comments. The United States Fish and Wildlife Service (USFWS) aerial survey results have been updated through the 2010 annual survey.

6. There is clearly a disagreement about how well the USFWS aerial surveys represent manatee usage of the Chassahowitzka and the report has been edited to reflect this disagreement. However, the more important facets of the thermal refuge MFL is that a) it is independent of the number of animals using the Chassahowitzka and b) it is limited to an evaluation of critically cold conditions. The District did not set a 'minimum usage' threshold before including a thermal refuge MFL in the mix and the District made no attempt to model the number of animals using the Chassahowitzka during the summer or winter. The thermal refuge evaluation could have been done with no knowledge of the manatee usage and the information presented was intended to be qualitative in nature. In essence, there was nothing to be gained by requesting the USFWS to perform more

aerial surveys and the modeling results indicate that even with a 15% reduction, there is ample acute thermal refuge in the Chassahowitzka.

7. See prior comment regarding the use of 'best available information' for setting the thermal refuge MFL. With regard to salinity, some clarification about which data sets were used for which MFL components is warranted. The salinity and thermal habitat MFLs were modeled using hourly salinity reported by the United States Geological Survey (USGS) for the headspring complex of Main and all contributions upstream (but excluding flows from Crab Creek). This is the only location of continuous discharge or conductivity (from which salinity can be calculated) measurements.

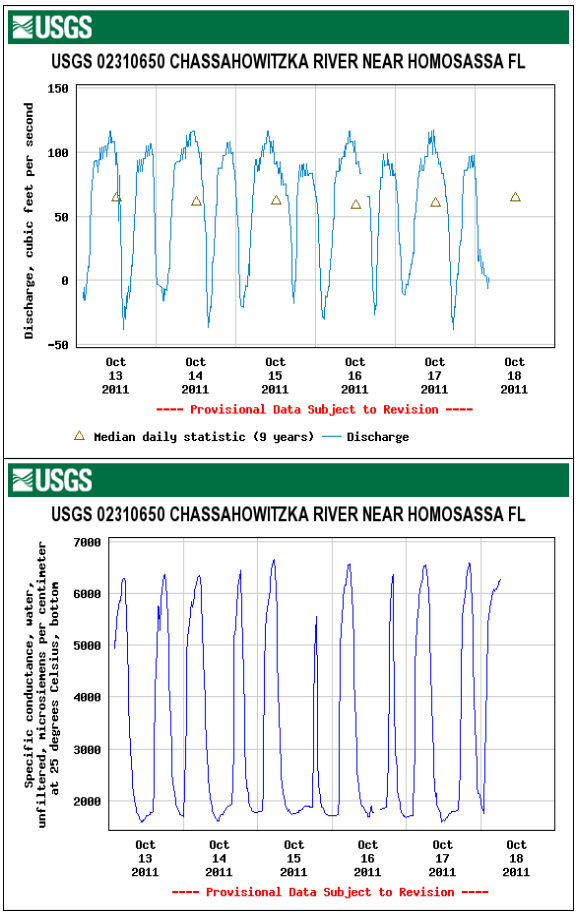


Figure 1. Chassahowitzka head springs discharge and conductivity.

In order to represent the entire system in the model, average values of salinity and discharge for Crab Creek, Potter Creek, Baird, Blue Run and Beteejay Spring were input to the hydrodynamic model at the appropriate node. Some of the data was from 1989 when the USGS completed an extensive evaluation of the Chassahowitzka system (Yobbi and Knochenmus 1989). All of these discharges are tidally influenced and both the salinity and the discharge vary with tide stage. It is necessary to average the results in order to obtain a representative value. Figure 1 illustrates this fact. If you were to sample at high tide on October 15, 2011, you might obtain a conductivity of 6,500 umho/cm and a positive (downstream) discharge of 115 cfs. However, if you sampled later in the day on a low tide you might observe a negative (upstream) discharge of 25 cfs and a conductivity of 1,800 umho/cm. While the District has more recent salinity results for several of these springs, we do not have recent concurrent discharge measurements and the District felt that the appropriate way to represent these springs was to use the average historical values published by the USGS.

8. and 9. Comments noted. The District agrees that the issues raised are important, but not related to 'significant harm' resulting from additional withdrawals.

10. The fact that some systems do not naturally provide suitable thermal refugia is undeniable, and under the conditions simulated, a refuge from chronic cold conditions was not identified in the Chassahowitzka. However, the fact that something is naturally absent in a particular system is not sufficient reason for not establishing an MFL in accordance with the dictates of the MFL statute.

11. Comments noted. In addition, it should be noted that the District supports management activities for improving manatee habitat quality by other agencies.

12. The District does not support using an assumed manatee life expectancy less than 50 years, even if the lower expectancy is considered the best estimate. Maintaining the joint probability approach used to establish the worst conditions in 50 years based on climate and hydrology is far, far more protective than reducing the return interval to eight years. An analogy would be to build stormwater system to an eight-year return interval. On average, the system would flood once every nine years. In contrast, a system designed and built to a 50-yr return interval would only flood once every 50 years, offering far more protection than the lesser system.

13. The District did not have a 'desired outcome' for the evaluation of the Chassahowitzka MFL. The fish/invertebrate section of the report has been re-written to address an over-sight (explained below), but the conclusions have not changed. The following clarification/explanation is taken from the District's response (in blue text) to the Florida Fish and Wildlife Concervation Commission (FWC) comments about the peer review draft of the MFL report.

This comment is in reference to the discussion contained in Section 7.1 of the peer review draft. This section and Table 7-1 will be re-written in the final report to correct a number of errors. First of all, the response for F. grandis was erroneously omitted from the final analysis. Second, the consultants (USF and FWC) treated flow data differently in developing their response regression. FWC added a one to the flow, while USF did not. In the initial draft that was circulated internal to the District, flow was erroneously transformed for both the plankton tow and the fish/invertebrate seine and trawl. The text and Table contained in this section unfortunately reflects a mix of correct (seine and trawl) and incorrect (plankton tow) transformations of flow. The Table that follows includes all taxa from Tables 5-5 and 5-6 that met the original criteria and were promoted to evaluation, plus the sub-set selected for the MFL determination. Table 7-1 will be corrected in the final report.

If all taxa identified in Tables 5-5 and 5-6 are retained, the resource median is 11.1 percent flow reduction, but for reasons described in the discussion beginning on paragraph 4 of page 73 and extending onto page 74, the District feels that the hypersensitive responses based on seasonal results should not be included in the establishment of a non-seasonal MFL determination (See response to FDEP comment 20). Excluding these taxa results in a median resource reduction of 11.5 percent. However, the recommended MFL will not be changed in the final report because the most conservative MFL then becomes is 11 percent for the acute thermal refuge for the manatees.

Taxa	Type of Regression	Flow Reduction (%)		
		As Presented in Peer Draft	All Taxa (corrected)	As Presented In Final Report
Plankton Net				
Anchoa mitchilli juveniles	Linear	1.0	2.6	2.6
Hargeria rapax	Linear	1.9	3.5	3.5
Dipterans, chironomid larvae	Linear	2.3	3.9	3.9
Seine and Trawl				
Farfantepenaeus duorarum (S)	Quadratic	17.2	17.2	17.2
Farfantepenaeus duorarum (T)	Quadratic	15.2	15.2	15.2
Fundulus grandis	Quadratic		11.9	11.9
Lucania parva	Quadratic	11.1	11.1	11.1
Lucania goodei	Linear		0.9	
Poecilia latipinna	Quadratic	13.3	13.3	13.3
Lepomis punctatus	Linear		1.6	
Lagodon rhomboides	Quadratic		17.9	
Median for resource		**11.1**	**11.1**	**11.5**

The peer review panel (Panel) included comments about the model calibration and the District will give weight to those comments in future MFL modeling evaluations including the re-evaluation of the Chassahowitzka MFL. However, the Panel determined that the modeling was adequate as evidenced by their concluding comment from page 21 of their peer-review report: *As a result, the Panel concludes that the application of the calibrated model to evaluate thermal and salinity habitats is appropriate and can be used to help determine a MFL for the Chassahowitzka River System*.

Other supportive Panel comments from the report include:
The panel finds that the EFDC is an adequate hydrodynamic model code to apply to the Chassahowitzka River to address the issues of interest here. (Page 12). The data along with bathymetric data for the Chassahowitzka Bay obtained from NOAA resulted in the development of a good physical representation of the modeled length, area and volume of the system. (Page 13). The panel believes that there were sufficient data available to calibrate the model . . . (page 13). '. . . the Panel agrees that the modeling study utilized all the data available, generated adequate regressions to fill in missing data, and the data were adequate for concluding the modeling study, including the synthesized time series data used for determining critical three-day cold events for Manatee during 1967-2007 baseline period. (Page 13). The Panel finds that the assumptions made in setting the boundary conditions and the data employed are appropriate for this simulation effort. (Page 17). The Panel finds that the data utilized for setting boundary conditions and assessing the impact of flow reductions are appropriate and best available. (Page 17). ' . . . . the Panel concludes that the salinity calibration is adequate for estimating relative differences due to reduced freshwater inflows. (Page 19). The Panel finds that the model does reproduce the cooling and warming trends very well and, thus, the temperature calibration is considered to be adequate. (Page 20).

14. The District acknowledges the impact that acute events such as the 'No Name Storm' and chronic events – such as sea level rise and extended droughts can have on estuarine flora and fauna. The District also acknowledges the inland migration of barnacles throughout the Springs Coast and an increase in nitrate concentration in many

of the area spring systems. However, the District believes that these changes and historical changes in *Vallisneria americana* coverage are largely unrelated to withdrawals. The relationship found between salinity and the density of *V. americana* predicts a 15% decrease in density with a 0.2 ppt increase in salinity. The same regression also predicts the near extirpation (95% loss) of this taxa when the salinity is increased from 3.1 ppt to 5.2 ppt., but *V. americana* is generally accepted to be tolerant of salinity up to 10 ppt. and healthy plants have been observed in salinity as high as 20 ppt in the Caloosahatchee River. The South Florida Water Management District Caloosahatchee minimum flow and level (Chapter 40E-8. F.A.C.) is based on maintaining *V. americana* in the river as evidenced by the salinity limits imposed:

40E-8.221 Minimum Flows and Levels: Surface Waters.
The MFLs contained in this Part identify the point at which further withdrawals would cause significant harm to the water resources, or ecology, of the area as applicable, pursuant to Sections 373.042 and 373.0421, F.S. It is the District's intent to correct or prevent the violation of these MFLs through management of the water resources and implementation of a recovery strategy.
(2) Caloosahatchee River. A minimum mean monthly flow of 300 CFS is necessary to maintain sufficient salinities at S-79 in order to prevent a MFL exceedance. A MFL exceedance occurs during a 365 day period, when:
(a) A 30-day average salinity concentration exceeds 10 parts per thousand at the Ft. Myers salinity station (measured at 20% of the total river depth from the water surface at a location of latitude 263907.260, longitude 815209.296; or
(b) A single, daily average salinity exceeds a concentration of 20 parts per thousand at the Ft. Myers salinity station. Exceedance of either paragraph (a) or (b), for two consecutive years is a violation of the MFL.

Given the documented salinity tolerance of *Vallisneria*, it would be reasonable to expect more widespread occurrence in the Chassahowitzka system than currently exists. It appears that other stressors are affecting the distribution of this plant in the river . The District feels that establishing the MFL based on observed *V. americana* salinity/density relationships ignores the literature that implies the response is inadequately characterized by salinity alone.

Regarding your inquiry about *Lyngbya*, work conducted by Stevenson *et al.* (2007) indicates that the abundance of *Lyngbya wollei* does not relate well to either the water column nitrogen or phosphorus concentrations in the Florida springs surveyed (29 first and second magnitude springs), but as you suggested, it does appear to be related to human activities (and sediment phosphorus concentrations). While an abundance/nutrient relationship was not found in the field observations, Stevenson goes on to report that laboratory algal assays resulted in increased growth rates when nitrogen concentrations were increased. The study concluded:
13. In many springs, nitrogen reductions may be the only practical restoration strategy because natural phosphorus concentrations may be higher than the concentrations that constrain algal growth. (Page 6)
As previously stated, management of nutrients, especially of anthropogenic origin, is not an MFL function. The District agrees that nitrogen concentration of Chassahowitzka spring water is increasing, but it does not appear to be related to flow (See section 4.3 in the MFL report).

15. The District agrees with the Peer Review Panel's report that much is unknown about the karst connections and the source of waters discharged from the various springs in the Chassahowitzka system. While the Panel's suggestion is valid, it is unclear how it should be implemented. Presumably, it would require both discharge and water quality measurements on the contributing springs. From 1992 until 10/2011, the District monitored the water quality of Chassahowitzka Main, Ruth Spring, Potter's Creek Spring, Crab Spring, Chassahowitzka #1, Baird Spring, Blue Run and Betee Jay Spring quarterly. Except for the gage just downstream from the Chassahowitzka Main spring, the remaining springs are not monitored for discharge. Also, because all are tidally affected, traditional stage/discharge techniques cannot be used. It is conservatively estimated that it would cost $1.2M to establish and maintain discharge measurements for five years at seven new locations within the river system, and this amount may be considered cost-prohibitive.
16. See prior comment. You are correct that compliance will be assessed based on discharge from Main Spring and upstream contributions, as this is the only location in the river where discharge is measured. However, the elements and analytical techniques used in the re-evaluation have not been identified at this time. As you are aware, the District conducted a series of stakeholder meetings earlier this year to solicit suggestions on how to better use the existing data, or new methods to include in a re-evaluation.

Thank you again for your input, participation in the stakeholder's meeting and continued interest in the development of the Chassahowitzka MFL.

Literature Cited.

Gore, J. A., Dahm, C. and Klimas, C. 2002. A review of "Upper Peace River: an analysis of minimum flows and levels" August 25, 2002 draft. Published by the Southwest Florida Water Management District. Brooksville, Florida.

Cichra, C.E., Dahm, C.N., Loche, A., Shaw, D.T. and Stewart, M. 2007. A review of "Proposed minimum flows and levels for the upper segment of the Hillsborough River, from Crystal Springs to Morris Bridge, and Crystal Springs." Prepared for the Southwest Florida Water Management District. Brooksville, Florida.

Dunbar, M.J., Gustard. A., Acreman, M.C. and Elliot, C. R. 1998. Overseas approaches to setting river flow objectives. Institute of Hydrology. R&D Technical Report W6-61. Oxon, England.

Jowette, I.G. 1993. Minimum flow requirements for instream habitat in Wellington rivers. NZ Freshwater Miscellaneous Report No. 63. National Institute of Water and Atmospheric Research. Christchurch, New Zealand.

Powell, G. L., Matsumoto, J. and Brock, D.A. 2002. Methods for determining minimum freshwater inflow needs of Texas bays and estuaries. Estuaries. 25: 1262-1274.

Stevenson, R.J., A. Pinowska, A. Albertin and J.O. Sickman. 2007. Ecological condition of algae and nutrients in Florida springs: The Synthesis Report. Prepared for Florida Department of Environmental Protection.

Richter, B.D., M.M. Davis, C. Apse and C. Konrad. 2011. A presumptive standard for environmental flow protection. River Res. Applic. (2011)

==========

From: Katie Tripp [ktripp@savethemanatee.org]
Sent: Monday, October 24, 2011 9:01 AM
To: Mike Heyl
Cc: ktripp@savethemanatee.org
Subject: FW: Chassahowitzka Comments
Attachments: District_Response_SMC.pdf; SMC_Tripp.pdf

Thank you for your responses, Mike. I wanted to follow up on a few points:

Response #3, states that the District agrees that flow reduction has occurred, and that nitrate concentrations are increasing, "but the MFL statute requires that the MFL be established based on the impact of withdrawals and there is no evidence that nitrate concentration is related to flow." Are there other programs within the District that look more holistically at these systems and consider the cumulative impacts of multiple factors and multiple decisions that are being made? Is there a consideration that while reduced flows may not be the cause of increased nitrate concentrations, that reduced flows + increased nitrate concentrations + other stressors (i.e. sea level rise) cumulatively result in negative environmental consequences? If not, and if all of the departments are working independently, the likelihood of resultant environmental harm increases.

I am surprised at your #6 response that "The thermal refuge evaluation could have been done with no knowledge of the manatee usage…" Gathering all available aerial survey, telemetry, photo ID, and other relevant manatee data ARE needed. The District cannot calculate packing density without understanding how manatees use this habitat. You need real world data that show where manatees are (or where they are not) to determine the size of available habitat here. Not all segments of the river are created equal- manatees have habitat preferences.

Your response to #10 is puzzling. As I understand the original MFL report, manatees were one of the species whose habitat needs were examined to determine appropriate levels of flow reduction in the Chassahowitzka system. However, when your modeling showed that the river provided no refuge from chronic cold conditions, your response was, "the fact that something is naturally absent from a particular system is not sufficient reason for not establishing an MFL." I was not arguing that you should not set an MFL, I was stating that the data presented by the District show that the currently proposed MFL is insufficient. This is also a case where actual manatee data should have been consulted to determine if the model was accurately depicting the habitat. Were there any manatees sighted in the system during the period of 2002 that was modeled? Were there any sightings in 2009 or 2010 when even colder conditions were experienced? The reality is that some manatees appear to use Chassahowitzka, even during critically cold periods. By ignoring that, and relying on a model to tell you that there is no chronic cold habitat here, therefore flows can be reduced without consequences to manatees (because our model tells us they shouldn't be here) is flawed, and could result in take of this endangered species, in violation of both the federal Endangered Species Act and Marine Mammal Protection Act.

Your response to #15 is also concerning, acknowledging that much is unknown about karst connections and the source of waters discharged from the Chassahowitzka springs, but stating that the District doesn't know how to implement the Peer Review Panels' suggestion to define the MFL with factors beyond just a single cfs measurement. A cost of $1.2 million to establish and maintain discharge measurements for 5 years at 7 new locations is described as "cost-prohibitive." If the District cannot afford to monitor

the environmental impacts of their actions, it should not be allowed to tamper with this system by reducing flows.

Thanks again for your reply.

Katie Tripp, Ph.D.
Director of Science and Conservation
Save the Manatee Club
500 N. Maitland Ave.
Maitland, FL 32751
Office:407-539-0990
e-mail: ktripp@savethemanatee.org
==========

From: Mike Heyl
Sent: Thursday, September 08, 2011 9:29 AM
To: 'ktripp@savethemanatee.org'
Subject: Chassahowitzka Presentation 9/6

Katie – Once more – thanks for making the trek across the State to present at the stakeholder's work shop. We appreciate your input.

I wanted to make a few points and ask a few questions about our evaluation of manatees in establishing a proposed MFL for the Chassahowitzka. . We agree that during non-critical periods manatees will use water less than 3.8 feet in depth, and there is significantly more habitat available. However, our estimation of suitable habitat was limited to critically cold conditions and I question whether shallower water will provide enough of a heat sink to support the animals during near-freezing conditions. We only calculated habitat during critically cold conditions and we went to extra effort to identify those area that were greater than or equal to 3.8 feet at low tide. We included 'pockets' meeting these criteria if the ingress/egress at high tide was greater than or equal to 3.8 feet. In other words, if the animal could swim into the pocket during high tide, and if the pocket remained at least 3.8 feet deep for the duration of the 3-day cold period, we counted it as 'potential' habitat representing the 'access' component of the evaluation. We then summed the subset of accessible habitat that remained greater than or equal to 20 degrees and that became our 'baseline' thermal habitat in the absence of additional withdrawals.

In the comment period, someone mentioned observing manatees crawling out of the water to feed on shoreline vegetation. I, too have witnessed this, but only during warm weather conditions. Can manatees tolerate direct exposure to the atmosphere during critically cold conditions and if so, what is the minimum useable depth of submerged thermal habitat?

When we conducted our evaluation, we attempted to define the worst possible combination of a) cold weather, b) low discharge of warm water and c) highest tide pushing cold water into the refuge. We wanted to identify the worst possible combination of these factors with a return interval of 50 years and thus needed at least 50 years of record. Local water level and water temperature measurements at the mouth began in 2005. Thus, it became necessary to extend the water temperature and water level records. We chose to use St. Petersburg and Cedar Key records because we could not

identify other sources of sufficient duration and quality, but if we have overlooked alternative sources, please advise.

One of your slides indicated that the documented use of Blue Spring surpassed the modeled use. I was under the impression that the Blue Springs ‘modeled use’ was based on the same 3.8’ x 3.8’ x 7.5’ manatee packing density used in the Chassahowitzka evaluation. Is this the same ‘modeled’ use that you were referring to in your slide, or was another model developed for Blue Springs?

On one slide you mentioned “old” flow (1988-89) and salinity (1993 – 1997) data. Were you referring to data for Snapper Cove, or the whole river? In our evaluation of the whole river, the salinity data used was basically everything we could obtain and it spanned the period 1996 through 2008. In addition, we used all of the daily USGS flow record available and extended it back to 1967. I am unaware of any data specific to Snapper Hole, but in the hydrodynamic model, we did include the average flow and salinity reported by USGS for Crab Creek, Potter Creek, Baird, Beteejay and Blue Run. These of course are the average of sporadic measurements (one to six) over an extended period of time.

Look forward to hearing from you.

MGH

From: ktripp@savethemanatee.org
Sent: Tuesday, September 13, 2011 11:25 AM
To: Mike Heyl
Cc: ktripp@savethemanatee.org
Subject: Re: Chassahowitzka Presentation 9/6

Hi Mike,
Thanks for your message and for the opportunity to address the group. I've attempted to answer your questions below. Please don't hesitate to contact me if you'd like to discuss any of these things further. My cell phone is the best number: 727-504-4740. I am headed out of town within the next day or so- my childhood home was affected by recent flooding in the northeast (not too badly, I don't think, but I still need to have a look at it and do some cleanup). I should be back within 2 weeks time (hopefully sooner).
1. There is no magic number for the depth manatees need in critically cold periods, as the environmental conditions vary from site to site. At Three Sisters, for example, last winter I observed manatees resting in the very shallow edges of the first boil on very cold mornings. On those same mornings, there were manatees out in the sanctuary, and also utilizing other areas of the spring- so individual animals have different preferences and/or needs (perhaps based on such factors as body size and when the last time was they had a meal- eating is very important to keep their GI tract functioning and producing heat- it's like an internal oven). In many cases, it seemed to be mothers and calves using the shallowest spots- since calves need to surface to breathe more frequently- resting at depth and making these frequently repeated trips to the surface would use extra energy – as might fighting the mosh pit out in the roped off sanctuary, which can be absolutely packed with manatees. On a very cold, but sunny day, shallow waters may be more preferable because manatees utilize the solar gain- both in the water and on their dark skin- they will actually rest with their backs exposed- purposefully. In other instances, like darker, turbid, and/or deeper water, with a muddy bottom, manatees will wallow in the mud to help insulate themselves- in the absence of warmer, clear, and shallow areas.
2. Manatees often alter their feeding routine during critically cold weather. However, this may make them more likely to shimmy into a nearby shallow area to munch on shoreline vegetation versus making a run down the cold river to access a seagrass bed. In these cases, acute exposure to the atmosphere, in the vicinity of their warm water habitat, is much smarter than risking a 1 mile (or more/less) trip down the cold river. Cold stress is typically a progressive syndrome wherein immune compromise progresses if the animals cannot feed and have no respite from the cold water and air temperatures. As you can imagine, smaller manatees are more susceptible to this- because they have less body mass and fat stores. With the winter of 2010, we saw the first documented cases of cold shock- a previously undocumented phenomenon, where large, robust manatees succumbed to the cold in very short order- the conditions were just so severe. I mention this as an insight into their behavior- what a manatee will do during the first day of the first cold snap of the season may be very different than his behavior 2 weeks into a more prolonged cold event.
3. I understand that the St. Petersburg and Cedar Key records were used because they were the closest sites with a complete record. My point was simply that Chassahowitzka is not St. Pete or Cedar Key- it's colder at Chazz than it is in St. Pete, for example, since it is further north. Any time the modeled data have to come from somewhere else, that's creates a limitation.
4. To my knowledge, the same model was used for Blue Spring and Chazz. With the conditions in recent winters, the projected manatee use at Blue Spring has been

surpassed by the actual numbers of manatees counted there. This has resulted in a review and possibly a re-run of the model, based upon the updated manatee numbers. Sonny Hall with SJRWMD would know the most about this effort. I participated in at least one teleconference and one in-person meeting related to the MFR and I know the issue was raised that there are more manatees than were expected and there was also push back from local governments that wanted the WMD to reduce the MFR- allowing for more groundwater to be withdrawn- which would be in direct conflict with what the data are showing.

5. One of the reports I read stated that flow data from 88-89 were used along with salinity data from 1993-1997. This is the link: http://www.swfwmd.state.fl.us/projects/mfl/reports/Chass_Appendices-section13.pdf. This was not for Snapper, but the whole system. The text states, "Table 3-3 summarizes the average flows from these springs during a period from 1988 to 1989 and average salinity of a number of samplings between 1993 and 1997." Perhaps I misinterpreted how these data were applied?

Katie Tripp, Ph.D.
Director of Science and Conservation
Save the Manatee Club
500 N. Maitland Ave.
Maitland, FL 32751
Phone: 407-539-0990
Fax: 407-539-0871
E-mail: ktripp@savethemanatee.org

==========

From: Mike Heyl
Sent: Thursday, September 29, 2011 2:50 PM
To: 'ktripp@savethemanatee.org'
Cc: Doug Leeper
Subject: RE: Chassahowitzka Presentation 9/6
Attachments: Table3_3_history.pdf

Katie – Sorry I've taken so long to respond, but I'd like to elaborate/clarify items 3 and 4.

I agree that winter air temperature in Chassahowitzka is cooler than St. Petersburg, but the regression of St. Petersburg air temperature to Chassahowitzka water temperature mitigates some of this. The joint probability (temperature, discharge and tide stage) was prepared using the Chassahowitzka water temperatures predicted from St. Pete air temperatures and not St. Petersburg air temperatures. Only days with estimated water temperature < 68 F were included as candidates for the 1:50 year joint probability. I agree that having a 50+ year record of water temperature at the mouth of the Chassahowitzka would have been better, but I think the legislative intent of the MFL statute to set the MFL 'using the best information available.' was met with the approach that we took.

With regard to item 5, first I want to clarify the major inputs to the hydrodynamic model. For the

salinity evaluation, hourly measurements of stage, temperature and salinity at headsprings (USGS 02310650) was used to drive the model for 2004-2006. (For reasons described in the report, a different period was used for the thermal evaluation.) Daily discharge values for the same time period were used for this upstream boundary condition. Daily discharge values do not exist for Crab Creek, Potter Creek, Baird, Beteejay or Blue Run. As a result, the average discharge and salinity values found in the literature were used as inputs to the model at the appropriate locations. The values used are the ones you cited from Table 3-3 of the Dynamic Solutions LLC (DSL) report. I would like to point out that the flow reduction scenarios included reductions in these sources as well as the headsprings.

Having said that, I attempted to re-create the data in Table 3.3 from original the literature. I have included the 'original' literature sources that I could locate and it appears that a lot of re-cycling has occurred. In all cases, the discharge references are from Yobbi and Knochenmus, 1992. But the salinity values, while very similar, appear to be a mix from several sources. (Where conductivity was available, but salinity was not I converted conductivity data to equivalent salinity.) Excerpts of the original literature and a summary comparison is attached. Subsequently, I developed averages for 2000 – present from the same source that Jones *et al.* used to see if values have changed significantly since Yobbi's 1988-89 observations. There is a slight increase at several sites, but I don't see major differences that would be troublesome. The 'recent' results are :

2000 – present :
Crab 4.5 ppt
Baird 7.2 ppt
Beetejay < 1 ppt
Blue Run 6.0 ppt

Hope this helps to clarify some of the issues.
(Please ignore the highlight on Yobbi's paper. I added those to my only hard copy when I was doing the Weeki Wachee MFL.)

MGH

==========

11.18.19 Schneider, K. via Senator Fasano

THE FLORIDA SENATE

Tallahassee, Florida 32399-1100

COMMITTEES:
Budget - Subcommittee on Criminal and Civil Justice
Appropriations, Chair
Banking and Insurance
Communications, Energy, and Public Utilities
Governmental Oversight and Accountability
Health Regulation
Reapportionment

SENATOR MIKE FASANO
11th District

February 2, 2011

David Moore, Executive Director
Southwest Florida Water Management District
2379 Broad Street
Brooksville, FL 34604-6899

Dear Mr. Moore David,

Attached is a letter I received from many of my constituents regarding recent action taken by the Southwest Florida Water Management District on the Chassahowitzka River. They are concerned with the reduction in stream flow.

If someone in your office could reach out to Mrs. Kathleen Schneider and her neighbors regarding these issues, we would be greatly appreciative.

Thank you for your assistance. Please let me know if I can ever be of assistance to you.

Sincerely,

Mike Fasano
State Senator, District 11

MF/mbv

Cc: Kathleen Schneider
8416 W. Milo Ct.
Homosassa, FL 34448

REPLY TO:
8217 Massachusetts Avenue, New Port Richey, Florida 34653-3111 (727) 848-5885
406 Senate Office Building, 404 South Monroe Street, Tallahassee, Florida 32399-1100 (850) 487-5062

Senate's Website: www.flsenate.gov

MIKE HARIDOPOLOS
President of the Senate

MICHAEL S. "MIKE" BENNETT
President Pro Tempore

To whom it may concern;

We are a group of very concerned Chassahowitzka residents, writting to have our feelings known concerning the proposed SWFMD allowance of a 15% reduction in stream flow in the Chassahowitzka River.

We were recently forced by our county commissioners to install a very expensive water and wastewater system in order to improve water quality in the canals and river, though DEP sampling could never show a cause and effect from our existing system. Now we are told that reducing the flow in our stream will not effect water quality. We maintain that lack of dilution will concentrate nutrients and allow further salt water intrusion into the aquifer.

The water level in the canals and main stream are already critically low in winter, due to prevailing easterly winds and lower low tides. While this makes navigation difficult in winter, the current drought conditions has not allowed our access to the Gulf the entire month of January. There is less than one foot of depth in many places. A further redution of 15% in flow will likely result in our not being able to utilize the very resource that we are paying so dearly to protect for extended winter periods.

Also, the determination that the Chassahowitzka River is not winter manatee habitat is completely in error. There are four manatee at the main spring this week. It is normal to see three to seven manatee on any given winter day. Reducing the stream flow further will greatly endanger these creatures, especially since there is a public boat ramp at the main spring. We feel that the official manatee count should extend to the Chassahowitzka River, and the sanctuary, as noted by official signage, should be honored.

Mr. & Mrs. TJ Salter
Mr. & Mrs. James Bennett
Mr. & Mrs. Don Therrien
Mrs. K. Schnieder
Mr. R. Rodgers
Mr. R. Pharr
Ms. P. Rogers

8416 W. Mills St.
Homosassa Fl
34448

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

March 4, 2011

Mrs. Kathleen Schnieder
8416 W. Milo Court
Homosassa, Florida 34448

Subject: Minimum Flows and Levels for Chassahowitzka River

Dear Mrs. Schnieder:

This letter is in response to the correspondence dated February 2, 2011 from Senator Mike Fasano to David Moore, Executive Director regarding the proposed minimum flow and level (MFL) for the Chassahowitzka. The District appreciates your concern for this waterbody. Let me begin by explaining why the District is setting an MFL on the river. The Florida Water Management Districts are required by Florida Statute 373.042 to establish MFLs on priority water bodies. The Chassahowitzka is deemed a priority water body in our District. The MFL is defined by Statute as the "limit at which further withdrawals would be significantly harmful to the water resources or ecology of the area." An MFL is not a permit to withdraw water, but rather establishes the maximum amount of water that can be removed without significantly harming the resources. In the case of the Chassahowitzka, the proposed MFL requires that 89 percent of the natural flow be maintained, allowing an 11 percent reduction.

In the case of the Chassahowitzka, future withdrawals will most likely be groundwater withdrawals instead of direct surface water withdrawals. Regardless, surface and groundwater withdrawals alike will be limited to a cumulative 11 percent reduction, if the proposed MFL is adopted by the Governing Board. You may be interested to know that current population and water use projections indicate that in twenty years (2030), cumulative withdrawals will result in a 2 percent reduction in spring flow. While staff acknowledges that flow reductions will lead to some increase in salinity as documented in the District's MFL report, nutrient loading should not increase as a result of groundwater withdrawals.

The low water conditions that you described are typical for winter conditions along the west coast of Florida and are related to both astronomical and meteorological conditions, but probably not to drought or withdrawals because the Chassahowitzka is tidally influenced well past the Main spring. Since there is a direct connection to the

11.18.20 United States Fish and Wildlife Service

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chassahowitzka National Wildlife Refuge Complex
Chassahowitzka, Crystal River, Egmont Key,
Passage Key, and Pinellas National Wildlife Refuges
1502 S.E. Kings Bay Drive
Crystal River, Florida 34429-4661
Phone: (352) 563-2088 - Fax: (352) 795-7961

Received 11/15/2010

Michael G. Heyl, Chief Environmental Scientist
Southwest Florida Water Management District
7601 US 301 North
Tampa, FL 33637-6759

Re: Proposed Minimum Flow for the Chassahowitzka River, Comments

Dear Mr. Heyl:

The US Fish and Wildlife Service's (Service) Chassahowitzka National Wildlife Refuges Complex has reviewed the Southwest Florida Water Management District's (SWFWMD or District) April 2010 *Draft Chassahowitzka River Recommended Minimum Flows and Levels* and offers the following comments.

The Service owns and manages the Chassahowitzka National Wildlife Refuge (NWR or Refuge), a 31,000 acre parcel that includes the lower half of the Chassahowitzka River. This NWR was established in 1941 primarily to protect waterfowl habitat and is "an inviolate sanctuary for migratory birds." 16 U.S.C. §715d (Migratory Bird Conservation Act). The Refuge is also used for the development, advancement, management, conservation, and protection of fish and wildlife resources 16 U.S.C. §742 f(b)(1) (Fish and Wildlife Act of 1956) and includes a wilderness area 16 U.S.C. §1131 (Wilderness Act). See enclosed map.

Chassahowitzka NWR is home to over 250 species of birds, over 50 species of reptiles and amphibians, and at least 25 different species of mammals, including the endangered West Indian manatee. The Service manages this refuge primarily for the conservation of wildlife and wildlife habitat, with a special focus on migratory and breeding birds and threatened and endangered species. The Refuge is also managed to support recreational activities including many wildlife-dependent uses that includes but is not limited to wildlife observation, wildlife photography, and fishing. Kayaking, boating, and fishing (including scalloping and crabbing) are significant recreational uses that occur on the Refuge.

Given the Service's stewardship and management responsibilities for this area, the adoption of measures affecting freshwater inputs into the Refuge and their effects on refuge resources and activities is a significant concern for the Service. It is difficult to fully appreciate the effect of

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chassahowitzka National Wildlife Refuge Complex
Chassahowitzka, Crystal River, Egmont Key,
Passage Key, and Pinellas National Wildlife Refuges
1502 S.E. Kings Bay Drive
Crystal River, Florida 34429-4661
Phone: (352) 563-2088 - Fax: (352) 795-7961

the District's recommendation that flows in the Chassahowitzka River be kept at 89% of the current baseline flow (the proposed minimum flow or MF), consistent with "a criterion of no more than a 15% loss of habitat or other resources, as compared to the estuary's baseline condition."

As noted in the Draft, a "default" MF was selected due to an absence of identifiable thresholds or breakpoints identified in field studies and historical information conducted and reviewed in support of this effort. While both the District and peer reviewers deem the proposed MF as a conservative value, the District would do well to better explain and justify this determination. If this value is adopted as an initial conservation measure until consequent field studies and complete reviews of historical information are completed, will the proposed MF be adequate to conserve freshwater flows until this time?

In our review of the 2010 *Draft Chassahowitzka River Recommended Minimum Flows and Level* we found the following inadequacies:

- Information used to evaluate impacts to manatees is dated and incomplete. The latest minimum count of manatees in Florida includes 5,076 manatees. See http://research.myfwc.com/features/view_article.asp?id=15246 . Recent information regarding manatees in northwest Florida can be found in the Service's 5-year Status Review. See: http://www.fws.gov/northflorida/Manatee/2007%205-yr%20Review/2007-Manatee-5-Year-Review-Final-color-signed.pdf
- A better review of existing information regarding manatee use of the Chassahowitzka River is also warranted. While there is some use of the Chassahowitzka River springs by manatees during the winter, the river is used extensively during the warmer months as a foraging area. Impacts to manatee preferred SAV should be considered in the identification of the MF.
- Field studies and reviews of local invertebrate populations and their responses to changing salinities were comprehensive yet inconclusive. As such, it is difficult to assess how the MF may affect invertebrate resources targeted by refuge fishers.
- There was no review of the effect of climate change or sea level rise on the MFs proposed.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chassahowitzka National Wildlife Refuge Complex
Chassahowitzka, Crystal River, Egmont Key,
Passage Key, and Pinellas National Wildlife Refuges
1502 S.E. Kings Bay Drive
Crystal River, Florida 34429-4661
Phone: (352) 563-2088 - Fax: (352) 795-7961

- Waterfowl populations have been declining at Chassahowitzka NWR for years, yet no mention was made of the important habitat found on the Refuge or the effect the MFs would have on aquatic vegetation there.

Please feel free to call if you have any questions (352-302-2301).

Sincerely,

Boyd Blihovde
Deputy Project Leader

TAKE PRIDE IN AMERICA

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

December 13, 2010 Via Email

Boyd Blihovde
Deputy Project Leader
US Fish and Wildlife Service
1502 S.E. Kings Bay Drive
Crystal River, Florida 34429-4661

RE: Proposed Minimum Flows and Levels for the Chassahowitzka River.

Dear Mr. Blihovde –

Thank you for your November 15 correspondence regarding the minimum flow and level proposed for the Chassahowitzka. I would like to respond to several of the issues that you raised.

The District acknowledges the comment regarding the use of 15% as a threshold of 'significant harm'. However, the legislature did not define 'significantly harmful' when promulgating the MFL statute and several peer review panels have commented on the District's use of 15 percent loss of habitat or resource. The majority of those comments have been supportive, but there does not appear to be extensive primary literature supporting a quantitative acceptable value. For the past two years, the District has had an on-going contract with University of Florida to identify peer-reviewed documentation identifying a threshold for 'significantly harmful' loss. In the absence of such literature, the District is developing a ten-year stream-diversion experiment to evaluate the effect of reduced stream flow. If a quantifiable and defensible definition of 'significantly harmful' is identified, the District will reconsider the 15 percent value during the next re-evaluation of the Chassahowitzka MFL.

The manatee count data and graphics in the final report will reflect information through May 2010 that we received from your staff (Joyce Kleen). A number of local residents have indicated that the aerial counts underestimate the use of the Chassahowitzka significantly. As for the total number of manatees in Florida, the final report will include reference to the 2010 total of 5,076 and references to 'subpopulations' will be replaced with the term 'management units'. However, it should be noted that the discussion about the manatee population is included in the report as background information and in practice, establishing the thermal

refuge MFL is independent of the number of animals using the refuge. Nevertheless, the area of the acute thermal refuge has been identified as 11 hectares. Applying the typical dimensions (28.5 ft^2) of an adult manatee established for the Blue Sink MFL (Rouhani et al. 2006[1]), eighty-five percent of the acute thermal refuge could sustain many thousands of manatee.

The subject of foraging and preferred SAV has been raised by others as well. However, in order to make the linkage suggested, a defensible and quantifiable relationship between reduced flow and SAV density would be required. A separate quantifiable demonstration that the loss of a preferred SAV in the Chassahowitzka constitutes a 'significant harm' to the West Indian Manatee would also be required. The District has attempted on several occasions (e.g. Chassahowitzka MFL and Weeki Wachee MFL) to quantify the effects of reduced flow on SAV and seagrass without success. (See section 7.2). Furthermore, there is evidence that manatees have nutrient preferences that can influence foraging patterns during the winter. Rathburn et al. (1990)[2] states ". . .as a result of our radio-tracking studies, we learned that manatees in both the Homosassa and Crystal Rivers frequently left the warm headwaters during the coldest months to feed on *Ruppia maritima* and *Potamogeton pectinatus* downriver, despite the abundance of other plants near or in the warm water" (cited in Warm-Water Task Force, 2004). Such behavior is unrelated to reduced flows, and would complicate the relationship(s) needed to make this a quantifiable MFL metric. Since a defensible relationship between flow and SAV density in the Chassahowitzka has not been identified, it would be impossible to quantify the effect of reduced flow on the manatee foraging preferences in the Chassahowitzka.

The District agrees that the investigation of invertebrate population and their responses to changing salinity were comprehensive, but inconclusive. The District's approach to setting estuarine MFLs includes evaluating a wide spectrum of biological resources and as noted, often a defensible relationship with flow (or salinity) cannot be identified.

Climate and sea level rise was not explicitly evaluated, but all of the evaluations undertaken implicitly include the impact of recent climate and sea level stand, as will each future re-evaluation. For example, the next time the hydrodynamic model is calibrated with field observations, the impact of sea level rise and climate will be manifested in those field observations. However, the statutory MFL requirement is directed at identifying impacts due to withdrawals. From the perspective of establishing an MFL, variations in climate and sea level, and the subsequent changes that they collectively cause on the ecology is accepted as the natural, but changing baseline conditions.

The subject of declining waterfowl populations was raised by your staff when we presented the Chassahowitzka MFL results to them in September. After that meeting, an internet search revealed that the number of migrating waterfowl has declined globally. Fragmentation and loss of nesting habitat is commonly cited as the reason for population declines, which would result in fewer numbers of waterfowl visiting the Refuge. It is difficult to envision a plan of study that could quantitatively relate changes in flow with waterfowl population, while at the same time eliminating the impact of lost nesting habitat thousands of miles away. If a study that isolates the

---

[1] Rouhani, S., P. Sucsy, G. Hall, W. Osbourn and M. Wild. 2006. Analysis of Blue Spring Discharge Data to Determine a Minimum Flow Regime. Prepared by Newfields Companies for St. Johns River Water Management District.

[2] Rathbun, G. B., J. P. Reid, and G. Carowan. 1990, Distribution and movement patterns of manatees (*Trichechus manatus*) in northwestern peninsular Florida. Florida Marine Research Institute Publication Number 48: 1-33.

could quantitatively relate changes in flow with waterfowl population, while at the same time eliminating the impact of lost nesting habitat thousands of miles away. If a study that isolates the impact of changing flow on the number of migratory waterfowl could be designed, the District would entertain implementing the study.

Thank you for your continued interest in the Chassahowitzka MFL. For your information, a second public workshop will be held on December 16 at the Government Building in LeCanto. The meeting is scheduled to begin at 6:00 pm at 3600 W. Sovereign Path.

Sincerely,

Michael G. Heyl
Chief Environmental Scientist
Southwest Florida Water Management District

D:\Chassahowitzka\Public_Comments\USFWS\USFWS_District_Response.doc

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Chassahowitzka National Wildlife Refuge Complex
Chassahowitzka, Crystal River, Egmont Key, Passage Key,
and Pinellas National Wildlife Refuges
1502 S.E. Kings Bay Drive
Crystal River, Florida 34429
Phone: (352) 563-2088 Fax: (352) 795-7961

Michael G Heyl
SWFWMD/Ecologic Evaluation
7601 U.S. Highway 301
Tampa, Fl. 33637-6759

Dear Mr. Heyl,

On 12/13/2010 the Chassahowitzka NWR Complex office received your email reply to the Refuge's "Minimum Flow Level" comments. Given that the Chassahowitzka River flows into the National Wildlife Refuge, we would like to explore with you the possibility of greater input into the planning process. We do plan to attend future meetings that the WMD conducts, however we would like to also request the following:

1. Due to the upcoming holiday season, postpone the MFL proposal for 60 days to allow US Fish and Wildlife Service experts to review the WMDs plan.
2. Arrange a face-to-face meeting between local Refuge staff (including biologists) and WMD staff to better understand the specifics of this proposal.

The Chassahowitzka NWR Complex is proud of the partnerships we have maintained for over 60 years with the state of Florida and we hope we can work with you and the WMD on this complex issue.

If you have any questions please contact myself (352- 586-9358) or Boyd Blihovde (352-302-2301).

Sincerely,

Michael Lusk
Project Leader
Chassahowitzka NWR Complex

From: Doug Leeper
Sent: Thursday, February 03, 2011 9:59 AM
To: Joyce_Kleen@fws.gov
Cc: Mike Heyl; Marty Kelly
Subject: Follow-Up on Data Discussion from our Jan 5 Meeting

Hi Joyce:
Mike Heyl checked with me today to see whether we have provided the information that you requested during our Jan 5 meeting in Brooksville. Some scribbles I made on my calendar indicate that I sent you the following reports on the afternoon of the 5th, right after our meeting ended.

- Homosassa, Kings Bay, Withlacoochee barnacle report by Culter (Mote Marine Laboratory) (I also sent a revised version of the report on Jan 14)
- Kings Bay vent location report by VHB, Inc.
- Kings Bay vent discharge report by VHB, Inc.
Crystal River/Kings Bay benthos report by Water and Air Research, Inc.
- Crystal River/Kings Bay bathymetry report by Wang
- Crystal River/Kings Bay literature review by Frazer and others

Mike recalls that you requested a copy of the slides he and I showed during the meeting and also were interested in discharge data obtained by VHB, Inc. and any vegetation data that we may have for Kings Bay, Crystal River and the Chassahowitzka River System. I think we're covered with regard to the discharge data, as that information is included in the Kings Bay vent discharge report by VHB, but I will send some additional data files anyway.
You can look forward to soon receiving a CD (or two – not sure the file will fit on one disc) with the following information.
- Slides that I showed at our meeting on January fifth
- Slides that Mike showed at the meeting
- A 2010 report and associated data on vegetation in Crystal River/Kings Bay that was prepared by Avineon, Inc.
(I think I already sent you the Avineon report and data, but I'm not sure)
- A 2002 report by Clewell and others concerning vegetation in the Crystal River system and several other west-central FL tidal rivers
- A 1997 report and associated data on vegetation in Crystal River/Kings Bay and four other tidal river system that was prepared by the Florida Marine Research Institute
- Reports dated 2005, 2006, 2007 and 2010 and associated data on submersed aquatic vegetation in Kings Bay that were prepared by Frazer, Jacoby and others with the University of Florida
- A 2006 report and associated data on the bathymetry of the Chassahowitzka River system that was prepared by Ping Wang with the University of South Florida
- A 2008 report and associated data on the bathymetry of the Crystal River/Kings Bay system that was prepared by Ping Wang with the University of South Florida
- A 2009 report and associated data (pictures) on the location of spring vents in Kings Bay that was prepared by Vanesse Hangen Brustlin, Inc.
- A 2010 report and associated data on flows from spring vents in Kings Bay that was prepared by Vanesse Hangen Brustlin, Inc.

Let me know if you have any questions about the files/data once you get the CD(s).
See you sometime soon, I'm sure.

Douglas A. Leeper, Chief Environmental Scientist

11.18.21 United Waterfowlers-Florida

From: Dennis3ds@aol.com
Sent: Thursday, November 04, 2010 9:47 PM
To: Mike Heyl; Mike Heyl
Cc: Hitchco@bellsouth.net
Subject: From: United Waterfowlers-Florida, Inc. RE: Comments Chassahowitzka MFL's
Attachments: CommentReChassahowitzkaMinimumFlowsfinal.pdf

Mr. Heyl,
Please refer to the attached file for comments regarding SWFWMD's proposed reduction of MFL's in the Chassahowitzka River.

Thank you,

Dennis

Dennis D. Dutcher
United Waterfowlers - Florida, Inc.
South West Region Director / Board Member
863.667.1833 / 863.602.0113
www.unitedwaterfowlersfl.org

[The remainder of this page intentionally left blank]

November 4th, 2010

Michael G. Heyl
Southwest Florida Water Management District
7601 Highway 301 North
Tampa, Florida 33637-6759

RE: Chassahowitzka River Recommended Minimum Flows and Levels

Dear Mr. Heyl,

Chassahowitzka National Wildlife Refuge once thrived in winter months with over wintering migratory waterfowl. If you were to research this you would find that the area was originally set aside by Congress as a *waterfowl* area - 6 days after the attack on Pearl Harbor. Waterfowl have specific habitat needs including clean fresh water to drink and brackish water for the SAV that feeds them. The refuge use to contain much more of each than it does now. In the 70's the refuge held more than 25,000 migrating ducks and 30,000 coots then the waterfowl mysteriously declined until there were only about 3700 ducks using the area and no coots by the mid 80's according to the refuge staff. Those numbers now are so low that the refuge staff members no longer spend much time searching for ducks that over-winter on the refuge. Waterfowl do still move thru the area but no longer winter in the refuge or much along the Nature Coast. You may wonder why when the topic is MFL's came up, that I banter on about the ducks. Waterfowl are like the "canary in the coal mine" at the Chassahowitzka NWR.

The Chassahowitzka River, designated as an "Out Standing Waterway" the fresh water flowing from the 1st magnitude springs is the life blood of the refuge, its declining flow from the parched aquifer is now understood to be the reason for the loss of overwintering waterfowl at the refuge. The time line of the decline of ducks on the refuge follows *exactly* the increase of ground water withdrawals from the Pasco, Hernando, and Citrus County

region. Within the USGS Water Sources Investigations Report 01-4230 : Hydrology of the Coastal Springs Ground Water Basin and Adjacent Parts of Pasco, Hernando, and Citrus Counties, Florida on page 33 the Combined Ground Water Withdrawals graph clearly show as the trend line rose the duck numbers using the refuge declined exponentially. Clearly proving the withdrawals were too high by the mid 80's and has been detrimental to the ecology of the refuge and surrounding coastal wetlands.

Many now believe that these withdrawals not only have resulted in a decreased flow from the river but also have affected the upwelling of springs in the near shore of the Chassahowitzka bay; fresh water that use to waft up in the estuary and provided additional fresh water to the barrier regions in the refuge. These zones with their fresh and brackish water created a unique environment and maintain the balance in the estuary that was the attraction for ducks and many shorebirds, snipe, and species of rail. In order for this estuary to function as it did naturally requires that it receive fresh water from a fully saturated aquifer; its seepage and flows from the river providing the brackish "edge" necessary for the proper aquatic vegetation the ducks need to flourish and have a successful migration. Any additional losses of fresh water would make recovery of the native ecology even more difficult.

To conclude my comments; additional reductions in the MFL's for the Chassahowitzka River would cause great and irreparable harm to the ecology of the river's coastal wetlands and further degrade the boundary regions of the area. Water with higher salinity will fill in further degrading the boundary regions of the estuary and the river quality as well.

Please consider United Waterfowlers-Florida's comments against lowering the MFL's of the Chassahowitzka River.

Highest Regards,

Dennis Dutcher
Board Member
United Waterfowlers-Florida, Inc.
137 John Carroll Road East
Lakeland, Fl 33801

Cc: John Hitchcock
President United Waterfowlers-Florida

==========
From: Mike Heyl
Sent: Monday, November 08, 2010 7:16 AM
To: 'Dennis3ds@aol.com'
Cc: Marty Kelly; Mark Barcelo; Ron Basso; Cara S. Martin
Subject: RE: From: United Waterfowlers-Florida, Inc. RE: Comments Chassahowitzka MFL's

Mr. Dutcher:

Thank you for submitting comments concerning the District's minimum flows recommendation for the Chassahowitzka River system. Staff will consider all comment on the proposed minimum flows prior to making a final recommendation to the District Governing Board on November 16 concerning rule amendments associated with the minimum flows.

Your letter will be included in the final, revised version of the Chassahowitzka River Minimum Flows and Levels. Chapter 11 of that document will include written comments received from the expert peer review panel, Florida Department of Environmental Protection, Florida Fish and Wildlife Conservation Commission and interested parties such as WaterFowl Unlimited.

MGH

11.18.22 Whitley, Brent

From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Monday, November 15, 2010 3:18 PM
To: Marty Kelly
Subject: chazz

As I understand it there is a workshop tomorrow morning regarding the draft report on MFL for
Chassahowitzka. Is that correct and what is the time and location of the meeting?

Brent Whitley
Office Tel: (813) 549-7716
Cell: (813) 484-2288
Fax: (813) 969-0128
www.Sierra-Properties.com

==========
From: Marty Kelly [mailto:Marty.Kelly@swfwmd.state.fl.us]
Sent: Monday, November 15, 2010 3:30 PM
To: Brent Whitley
Cc: Mike Heyl
Subject: RE: chazz

Mr. Whitley,

The District is still receiving comments regarding the proposed Chassahowitzka River MFL rule. Consequently, the item has been deleted from tomorrow's agenda. The earliest that it will be taken up again is the December Governing Board meeting (12/14). We will keep you advised as to when it may be re-scheduled. Thank you for your inquiry, if you need further information please contact myself or Mr. Mike Heyl. Thanks,
Marty

==========
From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Monday, November 15, 2010 3:35 PM
To: Marty Kelly
Subject: RE: chazz

Thanks, I presume that if some of the residents and commercial fisherman on the river want to hire a consultant to speak at the meeting regarding his/her opinion of the report, that would be within the public rights for comment at the Governing Board meeting. Is that correct? Also, by receiving comments, are you referring to public comments on the report?

Thanks,

Brent

==========
From: Marty Kelly
Sent: Monday, November 15, 2010 3:41 PM
To: Brent Whitley
Cc: Mike Heyl
Subject: RE: chazz

Brent,
Yes, that is correct; however, the item will not be on the agenda tomorrow, and it will be moved to December at the earliest. Yes, I was speaking of public comments. We conducted a formal peer review and those comments are on the District's web-site, along with comments from DEP and FFWCC. We prepare written responses to all comments received and intent to include these in our final report to the Board. I will ask Mike to forward a link to the District's web-site and the report.
Marty

==========
From: Mike Heyl
Sent: Tuesday, November 16, 2010 7:21 AM
To: Brent Whitley
Cc: Marty Kelly; Cara S. Martin
Subject: RE: chazz
Attachments: Chass_Chptr11_draft.pdf

Brent,

Comments received from the peer review panel, Florida Department of Environmental Protection and Florida Fish and Wildlife Conservation Commission through September 30 are included as Chapter 11 of the report. Numerous other comments have been received since that time, but are not presently included in that chapter. I have attached a copy of that chapter. If you would like to receive copies of comments/responses since September 30, please advise. The report and the appendices can be accessed at http://www.swfwmd.state.fl.us/projects/mfl/mfl_reports.php

If you, or your consultant, wish to submit comments prior to the Governing Board meeting, you may submit those to me as email or hard copy. My addresses follow.
MGH
==========
From: Brent Whitley [BrentWhitley@Sierra-Properties.com]
Sent: Monday, November 22, 2010 11:11 AM
To: Mike Heyl
Cc: phubbell@wraconsultants.com
Subject: RE: chazz

Mike,

If it would not be too much trouble, I would like to get copies of the comments and responses. I think we are going to be meeting soon with Pete Hubbell and I would like to be fully advised on the comments regarding issues as you are.

Thanks,

Brent

==========
From: Mike Heyl
Sent: Monday, November 22, 2010 12:48 PM
To: 'Brent Whitley'
Cc: phubbell@wraconsultants.com; Marty Kelly
Subject: RE: chazz
Attachments: CRRC to Heyl_District_Response.pdf; Mitchell Newberger letter_Log #24903-10.pdf; 24903-10_Newberger_letter.pdf; Chass MFL Response to R Bryant 11-18-2010.pdf; Bryant.pdf; Corona_Heyl_2010_10_28_and_11_08.pdf; CommentReChassahowitzkaMinimumFlowsfinal.pdf; 24926-10.pdf; img-Y12161501-0001_dated.pdf

Mr. Whitley – Attached are the comments received since the October 6 public meeting. I am still working on some responses. I have included the District's response where available.

MGH

==========
From: Brent Whitley [BrentWhitley@Sierra-Properties.com]
Sent: Friday, December 10, 2010 11:18 AM
To: Mike Heyl
Cc: Marty Kelly; phubbell@wraconsultants.com

Subject: marine vegetation

Mike,

Thanks for the presentation on Monday. I look forward to the workshop and I am sure it will be lively.

The link below is to the marine vegetation that I was referencing in our meeting. This plant attaches to the bottom and the density of it in the creeks and on the flats has increased tremendously in the last 12 months. I do not know what to attribute it to but until this year it has been declining steadily for the last decade (or maybe longer). The caption to the photo names it sargassum, so maybe I mispronounced it in the meeting, but this is most certainly the vegetation that is there.

http://fineartamerica.com/images-medium/sargassum-seaweed-kenneth-albin.jpg

Thanks.

Brent Whitley
Office Tel: (813) 549-7716
Cell: (813) 484-2288
Fax: (813) 969-0128
www.Sierra-Properties.com

==========
From: Mike Heyl
Sent: Monday, December 13, 2010 11:40 AM
To: 'Brent Whitley'
Cc: Marty Kelly; phubbell@wraconsultants.com
Subject: RE: marine vegetation

Thanks Brent. Yes, that species was noted in the Mote Marine study (1998) of the Chassahowitzka, but curiously not in the University of Florida studies (2004, 2006).

You have mentioned a number of observations that may all be related to increasing salinity.
Lyngbya does not tolerate salt water very well, so it may be dying back and the sargassum that you noted is a marine species so it could be increasing in response to higher salinities. You also noted that the sea grass further out is increasing. Along the coast in drought years, the sea grass thrives because the transparency of the water remains higher in summer when there is less runoff. I can't say for sure that these three observations are related, but drought and/or sea-level are candidate explanations.

MGH

==========
From: Brent Whitley [BrentWhitley@Sierra-Properties.com]
Sent: Monday, December 13, 2010 11:49 AM
To: Mike Heyl
Cc: Marty Kelly; phubbell@wraconsultants.com; mnewberger@verizon.net; Mark Hammond

Subject: RE: marine vegetation

Mike,

Thanks and not to be too presumptuous, but it seems a little too coincidental that the Lyngbya would only begin disappearing the very year that the septic tanks were pumped out and the drainfields filled in. Also, the location I am referring to of the increase in the sargassum is well out in the flats in a full saline environment and again, it has increased DRAMATICALLY in the last 12 months in the bay. I do not doubt for a moment that the salinity levels have increasing impacts upon the coastal systems, but I continue to be bewildered by the sudden events of the last 24 months that have so desecrated this environment.

==========

From: Brent Whitley
Sent: Monday, December 20, 2010 11:20 AM
To: Marty Kelly (Marty.Kelly@swfwmd.state.fl.us); Marty Kelly (Marty.Kelly@swfwmd.state.fl.us); Ron.brasso@swfwmd.state.fl.us
Cc: Mark.Hammond@swfwmd.state.fl.us; phubbell@wraconsultants.com; dave.moore@swfwmd.state.fl.us; mnewberger@verizon.net
Subject: Chassahowitzka workshop

To all,

As you know I attended the workshop last Thursday and I appreciate the time and effort on your part to present your "case (if you will)" to the residents of the Chassahowitzka community. Thank you all for your patience and professionalism in the face of some rather controversial comments. Emotions are running high in the neighborhood.

While I may not agree with the data, as I told you in our meeting at the District office with Pete Hubbell and Mickey Newberger, I am not qualified to properly evaluate the science involved, only to take a common sense practical approach to an understanding. I also want to reiterate that I support the MFL effort everywhere and the work the District has done in that regard is going to protect our resource now and in the future, particularly as it is refined with more data and reporting. However, I continue to be alarmed by the collapse of the ecology at the Chazz, not so much that it is changing with drought conditions and sea level rise, but as previously stated to you, the rapid rate that we have seen the decline in the last 24-36 months. I firmly believe that all of you do not want the River, which you own, to suffer further as a result of GWP or other factors, both natural and causal.

In the next few days, I am going to send you some thoughts about the MFL report, the possibility of some monitoring in addition to what is normally done, and some ideas about how the District, as a partner in this community and in addition to what has already been done, might work together with the residents and fisherman to begin a process to help the river recover.

Thanks again for your time and patience in dealing with "untrained folk"!

Brent Whitley

Brent Whitley
27420 Hickory Hill Road
Brooksville, FL 34602
Office: (813) 549-7716 – Email: brentwhitley@sierra-properties.com

March 29, 2011

Mr. David L. Moore, Executive Director
Southwest Florida Water Management District
2379 S. Broad Street
Brooksville, FL 34601

Re: Chassahowitzka River

Dear Dave:

I have not spoken to you in quite some time. I trust this letter finds you in good health and eagerly charting your way through these interesting times. It is in times of change where sound leadership will prevail.

As you may know, I own a residence on a piece of property within the Chassahowitzka Riverine Swamp Sanctuary. It borders the Federal lands of the Chassahowitzka National Wildlife Refuge as well as a portion of the River owned by SWFWMD. I have become involved with interest and concern about the proposed Minimum Flow and Level (MFL) being established for the Chassahowitzka Spring System. I am not writing to you with the intent to complain per se about staff or their responses to me and other residents of the community, but rather to ask some questions and offer some alternatives that, to me, seem worthy of consideration. I also want to go on record as saying that "I support the MFL program," but I believe, as I read it, the ordinance grants the District tremendous latitude in how it treats each system or water body. Legal interpretations appear to support this opinion.

In December I met with Marty Kelly, Mike Heyl, Doug Leppers, Ron Basso, and Mark Hammond to discuss their draft report. I was accompanied by Pete Hubbell and Mickey Newberger, who I know you have corresponded with. Your staff made a presentation explaining the science and methodology behind their calculations. Subsequently, following my attendance of a public workshop held at the Government Center in Lecanto that allowed for public input and comments, I sent Marty and Mike an email indicating that I had a greater understanding of the MFL draft document for the Chassahowitzka River and would shortly be sending a letter expressing my thoughts about the matter. I realize they have been bombarded with questions, comments, and concerns from citizens with only layman's knowledge and anecdotal evidence suggesting that the MFL chosen goes too far for the good of the River. I wish I could tell you that this letter is more and

offers some concrete scientific fact that disputes your staff's recommendation of an allowable 11% drawdown of the "mean average flow." I clearly understand that you and your staff dispute the contentions of many regarding the calculation of the "100 year average" and they stand behind their extrapolations and comparisons to rainfall, monitoring wells, and recent measured flows. However, from what I have recently gleaned regarding the ecology of the River and the science involved, the issue of volume is irrelevant. I respectfully offer an educated layman's opinion of the matter from a different perspective.

As someone who has been enjoying the "Chazz" for over 30 years and has owned a house 3 miles down the River for over 20 years, I could fill this letter with more of the same anecdotal "evidence" of the disappearing freshwater species and the vanishing coastal forests. As one whose specific job discipline is to permit and entitle land developments and garner water use rights, I feel I am at least qualified to comment on the matter at hand. I am not an environmental scientist, biologist, or hydro-geologist, but I am aware of the methodologies involved. Following the meetings referenced above, I chose to do some digging and spent some time corresponding and meeting with professionals in the environmental field, all of whom ARE environmental scientists, biologists, and /or hydro-geologists who can offer more than just the simplistic points of view that may come from those of us on the River. The following is a list of some of those folks and organizations I have spoken with. I am not including any of the current employees of the District who are involved in springsheds and land management that I also corresponded with.

Florida Springs Institute – Bob Knight, PhD.
Nature Conservancy – Gene Kelly (Author - Chassahowitzka Land Management Plan)
Pete Hubbell – Former Executive Director of SWFWMD
Sonny Vergara – Former Executive Director of SWFWMD and the St. John's WMD
(Pete and Sonny have spent much time on the River with me.)
Fritz Musselman – Former Director of the Land Resources Department of SWFWMD
Chuck Courtney – Marine Biologist, Former Head of the Wetlands Division of Hillsborough County Environmental Protection Commission

In addition to what I have learned from this group of individuals, I have read countless pages of documents that include your Staff's draft report on the MFL, its Peer Review analysis, and other documents recommended to me by those above as well as the information they provided in our discussions.

Now that I have laid the groundwork for what I hope gives you food for thought and reason for pause, before I give you some specifics to consider, I must tell you that NOT ONE of those mentioned above, after reading the draft MFL Report, supports the Report's findings, recommendations, methodologies, and proposed allowance for contributing 15% Significant Harm to the River. Furthermore, I cannot find any document other than your own Report that would support this proposal as well, including the Peer Review which suggests setting the level at 11% drawdown and recommends very close monitoring of the ecology. In fact, the District's own Management Plan for the River, the Clean Water Act, designation of the Chassahowitzka as an Outstanding Florida Water, and SWFWMD's own designation as a Water Body of Regional

Significance all stand in opposition to the findings of this Report. With all of that said and mounting evidence NOT in support of the MFL recommendation, I want you to consider another line of thought.

What I have learned and what even SWFWMD documents espouse is that the Nature Coast Springs Systems are very unique ecologies, as your staff knows and discusses, that have flows which are dominated by groundwater flow. There is little stormwater runoff beyond an initial event that contributes to the freshwater flows of the rivers. Every piece of information that I have read indicates that these systems are delicate and very slight changes in ecosystem can have significant and unpredictable effects on the brackish environment and beyond. The one piece of anecdotal evidence I will offer (I know staff says they are aware of this, but have you or they physically seen it?) is that the ecology and habitat of the "Chazz," both in the River bottom and on the shoreline at the coastal edge have suffered tremendous setbacks in the last few years. Millions of trees have died and every creek, if not completely devoid of grasses that used to dominate the River and creek bottoms, has only smatterings of miscellaneous vegetation or simply just mud! **JUST MUD!** This has happened quickly, although some would say gradually, and the degradation exploded in the last 2-3 years. We can point to sea level rise, storm surges, etc., but in the end it is not the cause that matters. My point is **HOW FAST IT HAPPENED** and before we (and that includes you at SWFWMD) realized it was happening!

All of this is not what scares me the most. Of course, I like most, am selfish and more concerned about the "Chazz" than I am Homosassa or Weeki Wachee, but the real fear is that these systems and the health of their ecology have tremendous impacts on the health of the entire Eastern Gulf of Mexico. I do not need to go into the details of this. These are facts I am quite sure as professionals your Staff knows or certainly should know. Bob Knight of the Florida Springs Institute suggested to me that the methodology being employed in the MFL Report does not take into account a more holistic viewpoint that may take the measure of 15% significant harm to a whole new dimension. For example, as Gene Kelly, your former staff member, laughingly said, "can they tell you what 15% harm to those systems is going to do in terms of harm to the Gulf and just how fast do they think they can determine that?" **Well, just how fast can they determine that?** At the Chassahowitzka I can tell you that near destruction of the River bottom and creek beds has occurred, albeit by apparent natural causes, in less than the 5 years Staff suggested they would review the MFL! Your treatment of these systems in the same manner and methodology as they suggested to us that they reviewed the upper Peace River puts an entire Coastal ecology and I dare say a significant part of a Coastal economy at risk. Dave, this is not my opinion, I am simply telling you what the professionals are telling me.

So what we are faced with is special springshed systems that are delicate and can change so quickly you do not realize it before it is too late and they may never recover. (Although one could argue that Tampa Bay is a tremendous success story.) They deserve special treatment, not the carte blanche "methodology" as we were told by your legal department and a Governing Board member is "defensible." This goes for that entire set

3. **Lower MFL allowable drawdown** - According to Ron Basso's presentation at the workshop, the 2030 BEBR projections would in effect create a 2.3% drawdown. Why not set the MFL at that 2.3% and review it every 5 years to see what affect this has on the ecology as the drawdown increases from the current .7% caused by groundwater pumping? That would build a 20 year data set. You would think we might learn something about these unique systems in that timeframe.
4. **Reserving Supply** – One suggestion was made to me that the Governing Board has the authority to "Reserve" the supply to protect an environmentally significant resource. Why would this not apply in this case?
5. **Monitoring** - Create a specific comprehensive monitoring program that goes far further than Mike Heyl suggested, which was a plan to continue to monitor flow, salinity etc., but not biological. Use a system of aerial photographs like being required of the Desalination Plant in Tampa Bay to assess the sea and river grass habitats. While I realize these monitoring programs are costly when it comes to biological counts etc., just how much is this worth to the entire Coastal economy?
6. **Economic Assessment** - Consider an economic impacts assessment of what the continued decline of these spring systems is likely to do to the local economies, many of which depend on the health of the fisheries and clear water springs. You may find there is a greater than 15% significant harm to humans. How do we treat that?
7. **Eastern Gulf Coast** - Study what a 15% significant harm to the ecology would do to the Eastern Gulf fishery. I am sure Coastal Conservation Association and Nature Conservancy would love to comment on that.
8. **Partnership with the Community** - Take ownership of the River as part of the refuge since you actually **OWN** most of it. Become a partner with the Chassahowitzka Restoration Committee and initiate a recovery of sorts along with the upcoming effort to clean and dredge the headwater systems to restore the quality of the water body. Genuinely work with the Port Authority and the FWC to stop innocent and destructive prop-scarring of the River bottom by those untrained on the River. The management plan suggested 20 years ago to put in some simple non-invasive channel markers. This is still not done and the destruction by prop scarring continues. The community would provide support and labor to this effort.
9. **Alternative Water Supply Plan** - Simply put, work to develop a water supply plan for the region that does not rely on groundwater, thus allowing the drawdown of these systems, and in effect, create a **Bank** of water supply for the District to issue **Water Use Permits** (bet you never thought you would hear that from a developer).

The natives are really getting restless and mounting all sorts of political and legal plans. If you truly feel the MFL at an allowable 11% drawdown and the 15% Significant Harm are defensible levels, I hope you can back that up. Our information tells us differently and I truly think there are better ways to chart the way forward. Wouldn't it be better to find a way to actually do something better for the Chassahowitzka River and its environment together with the Community, rather than spend the energy and dollars

disagreeing? We are both interested in the same thing, the protection of these fragile spring systems, why not partner together to get this done?

As a public servant, I trust you will consider these items and be open-minded about protecting our Refuge.

With regards,

Brent Whitley

cc: Marty Kelly
Mike Heyl
Mark Hammond
Pete Hubbell, Water Resource Associates
Bob Knight, Florida Springs Institute
Chassahowitzka Restoration Committee
Representative Robert Schenck, District 44
Representative Jimmy Smith, District 43
Commissioner Rebecca Bays
Commissioner Dennis Damato
Commissioner John "JJ" Kenney
Commissioner Joe Meek
Commissioner Winn Webb
Eric Shaw, FDEP

Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
TDD only: 1-800-231-6103 (FL only)
On the Internet at WaterMatters.org

An Equal Opportunity Employer

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)

May 6, 2011

Mr. Brent Whitley
27420 Hickory Hill Road
Brooksville, Florida 34602

Subject: Chassahowitzka River

Dear Mr. Whitley: Brent

Thank you for your correspondence of March 29 regarding the establishment of minimum flows for the Chassahowitzka River system by the Southwest Florida Water Management District (District). I appreciate your thoughtful comments and note that your suggestion for more public input is timely. After consideration of the large volume of public comment we have received regarding proposed minimum flows for the Chassahowitzka and Homosassa River systems, the District has committed to holding additional public workshops to allow interested parties and environmental professionals to provide input into the final recommendations. The purpose of these meetings is to assess issues regarding minimum flows development for spring-dominated tidal rivers of the Springs Coast. We believe this forum will provide the appropriate avenue for addressing a number of observations and suggestions made in your recent correspondence. As envisioned, these meetings will take place over the next several months, and will address the following technical issues:

- Existing data, minimum flow methodologies, and opportunities for alternative analyses supporting minimum flows development for Springs Coast systems.
- New studies and/or other data collection/analysis efforts that could be implemented to enhance minimum flows development or reevaluations.
- Development of monitoring/analytical strategies and time-lines for minimum flows compliance evaluations and environmental protection.

The major systems to be addressed will include the Weeki Wachee, Chassahowitzka, Crystal and Homosassa rivers. The focus for Weeki Wachee will be on establishing the appropriate period and techniques for reevaluation of the minimum flows that have been established for the system. For the Chassahowitzka, Crystal and Homosassa systems, it is anticipated that this venue will provide the opportunity to identify the steps and processes necessary to move forward in establishing scientifically defensible minimum flows on these important coastal spring systems.

Again, I thank you for your comments regarding establishment of minimum flows for the Chassahowitzka River system.

Sincerely,

David L. Moore
Executive Director
Southwest Florida Water Management District.

DLM/MGH/brm
cc: Governing Board Members
Chassahowitzka River Restoration Committee
Representative Robert Schenck, District 44
Representative Jimmy Smith, District 43
Commissioner Rebecca Bays
Commissioner Dennis Damato
Commissioner John "JJ" Kenney
Commissioner Joe Meek
Commissioner Winn Webb
Eric Shaw, FDEP
Pete Hubbell, Water Resource Associates
Bob Knight, Florida Springs Institute
Bruce Wirth
Lou Kavouras
Richard Owen
Bill Bilenky
Mark Hammond
Karen Lloyd
Marty Kelly
Log #25033-11

==========
From: Doug Leeper [mailto:Doug.Leeper@swfwmd.state.fl.us]
Sent: Monday, July 25, 2011 1:52 PM
To: Brent Whitley; 10-00652
Cc: Cara S. Martin; Marty Kelly; Barbara Matrone
Subject: SWFWMD Spring MFLs Info Request

Brent:

Thanks for your call this morning. In response to your inquiry about a recent meeting between folks from our office and the staff of some of our elected representatives, Cara Martin asked that I forward the e-mail below to you -- hope that her comments adequately address your questions about this issue.

On another note, we were able to transfer the audio recording for the July 18th workshop onto a CD (or two). I'll mail the disc (or discs) to you at the following address:

27420 Hickory Hill Road
Brooksville, FL 34602

Please let Cara or me know if you have any further questions about the June 13th meeting or the July 18th workshop recording.

Douglas A. Leeper, Chief Environmental Scientist

==========
From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Wednesday, July 27, 2011 9:52 AM
To: Doug Leeper
Subject: RE: SWFWMD Spring MFLs Info Request

Thanks, Doug.

I do not expect you to answer this now unless it is simple, but I am interested to see how the sea level rise fits into the equation as to what the MFL will be proposed at. It seemed to me that the acceptable level of significant harm you are sticking to is 15% whether by withdrawal or sea level rise. Is that accurate?

Brent

==========
From: Doug Leeper
Sent: Wednesday, July 27, 2011 2:28 PM
To: Brent Whitley
Cc: Marty Kelly; Mike Heyl; Ron Basso
Subject: RE: SWFWMD Spring MFLs Info Request

Brent:
Thanks for your inquiry. I can't specifically answer how sea level rise evaluations will factor into our minimum flow recommendations for the Springs Coast river systems, as we have not yet completed the modeling efforts that address various sea level rise

scenarios. That "said", and even though I'm not quite sure that I understand your question about our proposed use of significant harm thresholds, I believe the answer to your inquiry is no. Perhaps a little explanatory text will help clarify this point and also help determine whether my answer is appropriate for the question you've asked.

We do plan to continue using a 15% change in habitat criterion for identification of significant harm thresholds for the Springs Coast systems. The allowable changes in habitat to be assessed will be relative to baseline conditions that are associated with current and future (year 2030) sea level conditions. Evaluation of changes from these two baseline conditions will yield two sets of flow reductions associated with no more than a 15% change in various salinity-based habitats (area where salinities are <=3; shoreline length where salinities are <=5, etc.). We may then choose the most restrictive (i.e., lowest) flow reduction for our minimum flow recommendation. For this approach, we will not be equating environmental change associated with sea level rise with that associated with withdrawals. We will simply be accounting for environmental change caused by future sea level rise and determining whether flow reductions associated with allowable changes in habitat from this future condition may be less than those that would be allowable given current sea level conditions.

Clear as mud?

Douglas A. Leeper, Chief Environmental Scientist

==========

From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Thursday, July 28, 2011 10:28 AM
To: Doug Leeper
Cc: Marty Kelly; Mike Heyl; Ron Basso
Subject: RE: SWFWMD Spring MFLs Info Request

Doug,

Thanks for the input and yes, it is as clear as need be, but mud is a good description. I will be interested to see how the results look.

I would add one comment that I am surprised about. Given the sensitivity of the natural springs systems statewide, and the confluence of factors affecting a tidal springs system, I am still surprised that your team continues to support the 15% of significant harm to these systems as acceptable (or "defensible" as Hugh Gramling said to me in an outrageous statement). I just cannot get past the mindset to hold these bodies of water to the same standards as the upper Peace River for example.

I look forward to the next meeting. Do you anticipate that the agenda will include any discussion of the District's position on the legal questions posed by many citizens?

Brent

==========

From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Tuesday, September 27, 2011 3:04 PM
To: Marty Kelly
Cc: Mike Heyl; Ron Basso; Peter Hubbell
Subject: simple question

Marty,

I know all of you have bent over backwards to answer questions about Chass but I have two simple ones that stick in my mind that I want to be able to accurately answer when asked.

I have attached a few pages from the MFL Report and one from Ron's presentation in July. I have been looking over these reports and the Peer review, just being clear to the best of my limited ability. Here you go:

Ron presented a rainfall graph showing the period peaking in the late 50's and 60's yet the "reference" period for establishing the MFL starts in 1967 as the long term drought began. This is qualified by the "not enough information prior" statement to go back further in time. It appears that the other graphs I attached from the report show a gradually decreasing flow rate. Doesn't this late period and "reference" period rainfall decline call into question that you have "cherry picked" the years. Why not start in 1957 or 1947? I thought I recalled that the Weeki Wachee well began providing data in the 1930's and isn't this the data you are using from 1967 until 1997?
Part and parcel to this line of thinking is that once established, what happens to the moving averages if rainfall increases for 5-10 years or more (or declines for that matter!)?

The point of the questions is that in large part you are pointing to the long term drought as the cause of reduced flows and I do not doubt that, but as the Peer Review suggests this MFL should be reviewed again for quantity and quality as data is refined. There is a fear among many (me included) that once the MFL is set withdrawals will always be approved as long as the MFL is not tripped even if flow rates increase due to recharge from increased annual rainfall. This dooms the river to its ecological condition once the full drawdown is reached regardless of rainfall increase which could return the fresh water regimen somewhat in the face of sea level rise.

Please do not go into too much detail with a response because as I said I so much respect how you have pandered to us, the unknowing public.

Thanks,

Brent

==========

From: Mike Heyl
Sent: Thursday, September 29, 2011 7:50 AM

To: 'Brent Whitley'
Cc: Marty Kelly; Ron Basso; Peter Hubbell; Doug Leeper
Subject: RE: simple question

Brent – I hope this answers your questions. It is a composite of input from Ron, Marty and myself. If this doesn't suffice, give one of us a call.

Ron presented a rainfall graph showing the period peaking in the late 50's and 60's yet the "reference" period for establishing the MFL starts in 1967 as the long term drought began. This is qualified by the "not enough information prior" statement to go back further in time. It appears that the other graphs I attached from the report show a gradually decreasing flow rate. Doesn't this late period and "reference" period rainfall decline call into question that you have "cherry picked" the years. Why not start in 1957 or 1947? I thought I recalled that the Weeki Wachee well began providing data in the 1930's and isn't this the data you are using from 1967 until 1997?

There is a difference between the well and the spring. There are regular discharge measurements for the Weeki Wachee spring that extend back to the 1930s, but apparently the Weeki Wachee Deep well was not constructed until 1965 and the water level measurements began in June 1966. As you are aware, the Upper Floridan aquifer water levels from this well are used to calculate discharge for a number of coastal springs along the nature coast based on a mathematical formula between the well water level and individually measured spring flow rates. There are infrequent measurements of discharge at a number of springs prior to the well record, but they are not continuous, are not at the frequency of discharge afforded by using the Weeki Wachee Deep well, and thus were not used in the baseline MFL evaluation period for the springs.

While we cannot estimate discharge in Chassahowitzka springs prior to construction of the Weeki Wachee well, the discharge record for Weeki Wachee spring gives us some insight into the impact of using the 1967 to present record to establish baseline for the MFL. Figure 1 illustrates the historical discharge from the Weeki Wachee spring. While the absolute Chassahowitzka discharge will differ from the Weeki Wachee, we expect the pattern to be similar for the Chassahowitzka system. For the Weeki Wachee, the median flow for 1931 through 2004 was 171 cfs. The lowest Weeki Wachee annual average discharge on record occurred in 1932. In contrast, the median flow for 1967 through 2004 is 169 cfs, or a difference of about 1%.

There were several reasons for developing a long-term record. First, there is some high-quality salinity data that was collected before the USGS started daily discharge measurements in 1997. In order to include the salinity data in the evaluation, it was necessary to relate it to the flow on the day that it was collected. The second reason to develop a long-term record was to determine a representative reference flow for evaluating the biological responses. We chose to use a median daily value. The median represents the 'mid-point' of the data with half of the observations higher and the other half of the observations lower than the median. The median daily discharge from 1967 through 2007 is 63 cfs, or about 41 million gallons per day. The third reason for establishing a long-term record was to develop the 'expected' flow results (See later discussion regarding Table 8-2.) if the proposed 11% reduction is fully implemented. In

order to do this, it was necessary to have an evaluation period that spans both drought and high-flow conditions.

Part and parcel to this line of thinking is that once established, what happens to the moving averages if rainfall increases for 5-10 years or more (or declines for that matter!)?

It won't be an issue. The rainfall effect on springflow is filtered out of the allowable impacts due to withdrawals, whether it leads to higher or lower than average flow conditions. As you are aware, we use a groundwater flow model to determine impacts strictly due to withdrawals. We will continue to use this model and a statistical analysis that predicts springflow variation due to rainfall to directly assess pumping impacts to flow in the future.

Table 8-2 was developed by multiplying each of the daily flows from 1967 – 2004 by 0.89 and then calculating the values in the table from the reduced flow. The purpose of including Table 8-2 in the Chassahowitzka MFL report is to provide a back up to the model results by establishing flow thresholds that are expected, if the climatological history remains similar to the reference period and in the presence of a modeled 11% reduction due to withdrawals. If the future observed 5-year (or 10-year) flows fall below these expected values, the District will evaluate the reason for the discrepancy. If the reason for the departure is related to changes in climate, the District would likely take no action. If the discrepancy cannot be explained by climate change, the District would undertake a more thorough examination of observed water levels and permitted withdrawals.

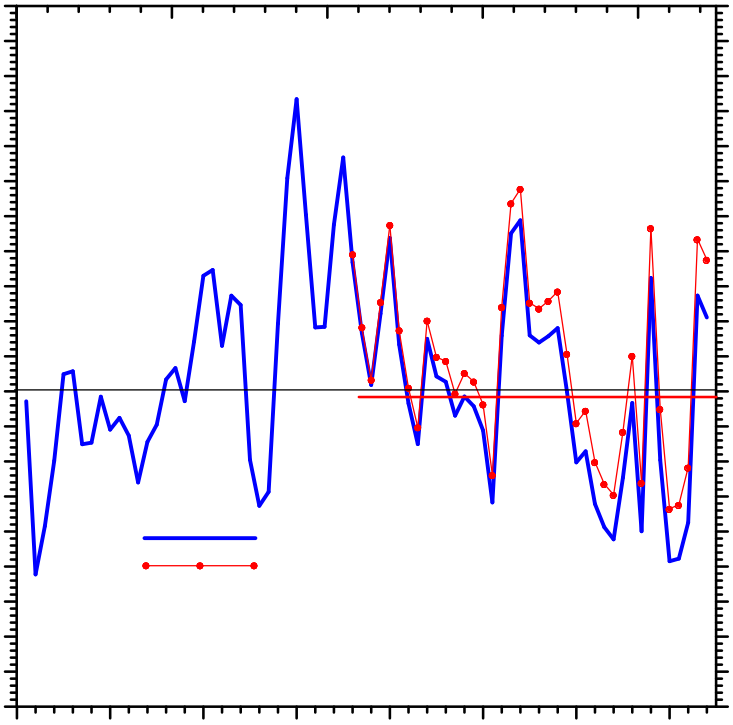


Figure 1. Annual average discharge at Weeki Wachee Spring.

MGH

==========

From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Thursday, December 01, 2011 4:56 PM
To: Marty Kelly; Mike Heyl; Doug Leeper; Ron Basso
Cc: martynellijay@hotmail.com; grubman1@gmail.com; BWR.CRRC@tampabay.rr.com; 2buntings@comcast.net; cathyharrelson@gmail.com; rmille76@tampabay.rr.com; whmarkle@gmail.com; bknight@floridaspringsinstitute.org; Peter Hubbell; sonnyvergara@bellsouth.net; Mark Hammond; mnewberger@verizon.net; eprgroupqueen@mac.com; ekelly@tnc.org; senft1hp2u@aol.com; hgramling@tbwg.org; dtharp@embarqmail.com; Albert@sarasoaconservation.org; neilcombee@yahoo.com; todd@pressmaninc.com; rasjudy@tampabay.rr.com; jadams@abbeyadams.com; CarlosB@Medallionhome.com; michael@2riversranch.net; jclosshe@tampabay.rr.com; Eric.Shaw@dep.state.fl.us; johnncms@tampabay.rr.com; blogan@atlantic.net; Bobby Lue; Blake Guillory; fritzlandwater@tampabay.rr.com; Rebecca.Bays@bocc.citrus.fl.us; abrockway@co.hernando.fl.us; bev.chuck2@verizon.net; dmanson@floridah2olaw.com; Herschel.Vinyard@dep.state.fl.us; gwkuhl@gmail.com; tforsgren@ccaflorida.org; jbitter@tampabay.rr.com; JJ.Kenney@bocc.citrus.fl.us; Joe.Meek@bocc.citrus.fl.us; Julie.Espy@dep.state.fl.us; jvarn@fowlerwhite.com; mcorona1@tampabay.rr.com; mczerwinski@mgcenvironmental.com; bgeiger@cityofbrooksville.us; Boyd_Blihovde@fws.gov; Dennis3ds@aol.com; ted.hoehn@MyFWC.com; jfarley682@aol.com; ktripp@savethemanatee.org; norman@amyhrf.org; rkane@usgs.gov;

Carolyn.Voyles@dep.state.fl.us; Clark Hull; danmorgan@tampabay.rr.com; Dana Gaydos; Cliff Manuel; greg.holder@myFWC.com; ladyfishlori@yahoo.com; Dave.Mulholland@MyFWC.com; masonwilliam@bellsouth.net; Paul Williams; RGehring@pascocountyfl.net; rschenck@vzw.blackberry.net; jnvacha@ci.brooksville.fl.us
Subject: Springs Coast MFLs must be conservative

Marty, Mike, Ron, and Doug,

Thanks to each of you for working with the Stakeholders for the Springs Coast Working Group in assisting in the coordination of the October 26th workshop in Lecanto. I realize this has been a long and tedious process for each of you and that we as a group have garnered much of your time in seeking information, data and responses to our questions as to the basis for the upcoming proposal for the MFL's for the four Springs Systems on the Nature Coast. However, given the sensitivity of the ecology of these systems, the desire on the part of the Stakeholders to be fully informed as they review your efforts, and the potential for immeasurable negative impact to the economy of the Nature Coast if the springs systems collapse, makes it imperative that we work together to be certain that we do not go down an irreversible path.

I trust that you each listened with interest to the presentations by Dr. Kincaid and Dr. Knight at the October Workshop. I thought it interesting that when it was decided that the Stakeholders would have the opportunity to present expert witness testimony that we would be so fortunate to get these two respected gentleman to voluntarily make presentations that were so insightful and objective. I think it is safe to say that they are experts and offered some very meaningful food for thought as you analyze your data in preparing the recommended proposals for the MFLs. With that said, I do not want you to think in any way I am belittling your expertise and/or your ability to analyze the "best information available" because I have been assured by many outside the District that you are all imminently qualified as scientists and biologists. Nevertheless, I am concerned that your efforts to utilize this "best information available" to construct a model for the purpose of developing another MFL, has led you down a narrow minded path that ignores some fundamental facts and common sense issues. Therefore, I want you to strongly consider the following.

I do not think we, as members of the Springs Coast Working Group and stakeholders, are calling into question your science that has made the determination that a proposed MFL is going to cause 15% Significant Harm to the ecology of the systems. Yes, quite frankly, I think we all believe that this proposed drawdown is going to cause **at least** 15% Significant Harm or "DESTRUCTION to the River", as Mickey Newberger phrases it. We do question your support that this level of harm is OK and that by referencing decisions from other jurisdictions and even other, unrelated scientific analyses which have recognized that this level of harm is acceptable somehow provides justification to your proposal. Both Dr. Kincaid and Dr. Knight suggest that an **MFL SHOULD** be set; better to do something than nothing and then let rampant withdrawals in the spring sheds continue. However, what I implore you to do and trust that you will do, is be cautious and conservative as both the good Doctors recommended. Both stated that there is NOT enough data to know with certainty that these proposed MFLs will only cause 15% Significant Harm to the habitat and that likely there will not be sufficient monitoring to insure that we do not tip the scales beyond that. Once we go too far, recovery may never bring us back. Why would you want to intentionally inflict this much harm? Both experts feel there is sufficient data based on the failing ecologies of other

springs systems to support that the Springs Coast systems are RAPIDLY DETERIORATING, and piling on more harm is an unreasonable approach to protecting these unique natural resources.

Below are some bullet points from a letter I sent Dave Moore in March of this year suggesting just such a conservative approach in regards to the Chassahowitzka proposed MFL. I have highlighted the specific reference. Sorry to bore you with this again but I am sending this email to others who may not have seen that first letter and I still feel there is merit to this content that is worth revisiting.

Lower MFL allowable drawdown - According to Ron Brasso's presentation at the workshop, the water needs for the 2030 BEBR projections would in effect create a 2.3% drawdown of the natural flow. Why not set the MFL at that 2.3% and review it every 5 years to see what affect this has on the ecology as the drawdown increases from the current .7% caused by groundwater pumpage. That would build a 20 year data set. You would think we might learn something about these unique systems in that time frame.
Monitoring - Create a specific comprehensive monitoring program that goes far further than Mike Heyl suggested was the plan that is to continue to monitor flow, salinity etc., but not biological. Use a system of aerial photographs like being required of the Desalination Plant in Tampa Bay to assess the sea and river grass habitats. While I realize these monitoring programs are costly when it comes to biological counts, etc, just how much is this worth to the entire Coastal economy?
Economic Assessment - Consider an economic assessment of what the continued decline of these spring systems is likely to do to the local economies, many of which depend on the health of the fisheries and clear water springs. You may find there is a greater than 15% significant harm to humans. How do we treat that?
Partnership with the community - Take ownership of the River as part of the refuge since you actually **OWN** most of it. Become a partner with the Chassahowitzka Restoration Committee and initiate a recovery of sorts along with the upcoming effort to clean and dredge the headwater systems to restore the quality of the water body. Genuinely work with the Port Authority and the FWC to stop innocent but destructive prop-scarring of the River bottom by those untrained on the River. The management plan suggested 20 years ago to put in some simple non-invasive channel markers. This is still not done and the destruction by prop scarring continues. The community would provide support and labor to this effort.
Alternative Water Supply Plan - Simply put, work to develop a water supply plan for the region that does not rely on groundwater thus allowing the drawdown of these systems and in effect, create a **Bank** of water supply for the District to issue **Water Use Permits** (bet you never thought you would hear that from a developer).

Finally, and to coin a phrase from the latest political agenda of right-sizing the Water Management Districts – "We want to get the Districts back to their core responsibilities." I thought that is an interesting way to assess and focus the direction of water management. I wondered what those core responsibilities are, so I looked into it. You might recognize this:

Mission Statement

The mission of the Southwest Florida Water Management District (SWFWMD) is to manage water and related natural resources to ensure their continued availability while maximizing environmental, economic and recreational

benefits. To identify the critical programmatic areas necessary to fulfill our crucial mission, the SWFWMD created a strategic planning program intended to provide information to our stakeholders and guidance to our staff regarding our pathway toward superior stewardship of our water resources.
So I ask you gentleman, as you plan to propose the willing destruction of 15% of the ecology and habitat of the Chassahowitzka River and the other Springs Coast Systems, all Outstanding Florida Waters I might add, does that fall within the guidance of the Mission Statement and returning to your core values? While I realize you have a responsibility to develop potential water resources to ensure their continued availability, I do not think I stand alone when I say that **maximizing environmental, economic and recreational benefits should at least carry equal weight to your scientific analysis when you prepare your recommendations for MFLs of systems that provide these exact societal benefits for the citizens of this District** and that if the **habitats** of these rivers could speak for themselves they would be screaming for protections. Actually, and now that I think about it as I ride the Chassahowitzka, I realize the habitat is already screaming.
Take heed, Gentlemen and may you recommend wisely with an eye toward the future for our children and theirs.
With regards,
Brent Whitley
==========
From: Brent Whitley [mailto:BrentWhitley@Sierra-Properties.com]
Sent: Thursday, May 17, 2012 3:58 PM
To: Mike Heyl
Subject: quick question

Mike,

I hope things are well with you and your team. I know the heat is turning up.

I have a quick question about the "natural flow". If the MFL at Chassahowitzka is set at 10% (round number) of the natural flow, then if the flow is 60 CFS it could be reduced to 54 CFS. If because of rainfall increase, it began to discharge in the future at 80 CFS the flow could be reduced by 8 CFS which would allow for more pumping than the earlier example, i.e. more permits could be issued. What happens in the event of reduced rainfall and it drops BACK to 60 CFS and now we have permitted to allow for 8 CFS drawdown? How is that reconciled to match the mandated MFL you established initially of 10% drawdown?

You do not need to go into any great detail and if you want to just say the answer is in the coming report that is OK. I do not want to bog you down any further.

Thanks,

Brent

==========
From: Mike Heyl
Sent: Monday, May 21, 2012 7:58 AM
To: 'Brent Whitley'
Cc: Ron Basso; Doug Leeper
Subject: RE: quick question

Brent – We don't permit surface water withdrawals in terms of absolute quantities, so we wouldn't permit "8 cfs" or "6 cfs". We might say applicant one can have 4% of the daily flow and applicant two can have 6%. On the first day of your example when the flow is 60 cfs, applicant one could take 2.4 cfs and applicant two could take 3.6 cfs. On the second day when the flow is 54 cfs the respective takes could be 3.2 cfs and 4.0 cfs. If the flow rose to 70 cfs on the third day, the takes would be 2.8 and 4.2 cfs. That's the way we would handle a surface water withdrawal.

Groundwater permitting would be different and I've cc'd Ron Basso on this response. He indicated that he would comment on how the groundwater permitting works.

Hope this helps.

MGH

==========

From: Ron Basso
Sent: Monday, May 21, 2012 9:08 AM
To: Brent Whitley
Cc: Doug Leeper; Mike Heyl; Jerry Mallams
Subject: RE: quick question

Brent:

I don't know if your concern was surface water or groundwater withdrawals. First off, I think it's extremely unlikely that there would ever be direct surface water withdrawn from this spring or river. Mike Heyl has given you a nice description of how typical surface water withdrawals are regulated based on other rivers in the District. On the groundwater side, it's basic. We model the cumulative impacts of all withdrawals under average recharge (rainfall conditions). The model simulates a percentage of flow decline due only to withdrawals. This is independent of what the actual flow on the river or spring is on any given day.

We will often put statistical benchmarks in the rule such as a 5 or 10-year moving median and mean of flow – but these are used as triggers for additional investigation if not met. These triggers can be exceeded if there are unusually dry climatic conditions not related to withdrawals. We model all groundwater withdrawals under current and 2030 conditions. If the minimum flow is not projected to be exceeded in the next 20 years that gives us some confidence to continue to allow permitting of groundwater withdrawals (in relation to this one minimum flow set at Chassahowitzka). Of course, there are other Chapter 40D-2 F.A.C. rules that apply to individual permits plus other minimum flows that have to be met in addition to the Chassahowitzka River. We will also periodically reassess compliance with this minimum flow in the future as conditions change.

The percentage of flow decline attributable to groundwater withdrawals is based on long-term average flow conditions. This is consistent with the way SJRWMD does there minimum flows for springs. When wet weather returns, it also means that because we

analyze this on an average basis, we wouldn't allow more groundwater withdrawals just because the river or spring is flowing at high rates. Hope this answers your question. Please free feel to discuss with me if you have any other questions or concerns.

Ron Basso, P.G.

[Remainder of this page intentionally left blank.]