

Caloosahatchee River Basin Public Meeting Summary
Tuesday, February 21, 2017
10:00 am – 12:05 pm

Participants

James Albright, DEP	Lisa Kreiger, Lee County
Terry Bengtsson, Johnson Engineering	Sam Lee, Lee County
Bob Burleson, ATM	Erin Lincoln, Tetra Tech
John Cassani, CRCA/WC	Linda McCarthy, Lykes Brothers
Sara Davis, DEP	Kelly McNab, Conservancy of Southwest FL
Greg DeAngelo, DEP	Stacey Ollis, SFWMD
James Evans, Sanibel	Roland Ottolini, Lee County
Marcy Frick, Tetra Tech	Harry Phillips, Cape Coral
Doug Gilbert, DEP	Ray Pribble, Janicki Environmental
Kathleen Greenwood, FDACS	Erin Rasnake, DEP
Katie Hallas, FDACS	Raulie Raulerson, FDACS
Ron Hamel, Gulf Citrus Grower	Gary Ritter, Florida Farm Bureau
Janet Hearn, ATM	Jonathan Sieg, Pavese Law Firm
Connie Jarvis, Cape Coral	Jeff Sumner, Federico & Associates
Anura Karuna-Muni, Lee County	Brian Watson, Tetra Tech
Kerry Kates, Florida Fruit and Vegetable Assoc.	Rae Ann Wessel, SCCF
Keith Kibbey, Lee County	

Introductions and Purpose of Meeting

Erin Rasnake welcomed everyone to the total maximum daily load (TMDL) public workshop on the Caloosahatchee River and Estuary and its tributaries. The participants introduced themselves and the entity they represent. Erin noted that the Florida Department of Environmental Protection has been working with the stakeholders for many years on the Caloosahatchee Basin modeling, and the current modeling process began just a little more than a year ago. This is the last meeting on the models set-up, calibration, and validation. The department is just beginning the TMDL process and identifying impaired waterbodies and the targets for restoration, and ultimately the new basin management action plan (BMAP) allocations.

Highlights/Overview Final Calibrated HSPF and EFDC Models

Marcy Frick provided a quick overview of the project tasks. Task 1 is the project “blueprint” and was discussed during the first stakeholder meeting. This task included a list of recommended changes to the Hydrologic Simulation Program – FORTRAN (HSPF) watershed model and Environmental Fluid Dynamics Code (EFDC) estuary model. The list of recommendations was based on stakeholder comments on the previous models, the department’s needs for TMDL and BMAP development, and items identified by Tetra Tech during model review. Task 2 was the setup and hydrology calibration of the HSPF model. Task 3 was the water quality calibration of the HSPF model, which was discussed during the last meeting. Task 4 was to convert the proprietary EFDC model into a public domain model so that the stakeholders could access the model. The light module from the original model was added to the public domain version of the model. Task 5 was the setup and hydrodynamic calibration of the EFDC model. Task 6 was the water quality calibration of the EFDC model, which was also discussed during the last meeting. Task 7, which will be reviewed during this meeting, was running the natural

background scenario with Lake Okeechobee at its TMDL. Task 8 is communications and meetings with the department and stakeholders, which has been occurring throughout the project. Task 9 was the final model report, which the stakeholders recently reviewed. Task 10 was the training of department staff on the models so that they can use the models to prepare the TMDLs. This training occurred in January.

Erin Lincoln stated that throughout the presentation, several models will be referenced. The 2009 Model was completed in 2009 and was used to develop the current nutrient TMDL for the Caloosahatchee estuary. The 2014 Model includes updates to the 2009 Model that the department made to address stakeholder comments, and included extending the model end date from 2005 to 2011. The 2017 Model is the Tetra Tech model that has been discussed at these meetings, and included updates to address additional stakeholder comments and to extend the model period through 2014. Erin noted that her presentation focuses on the main points that were presented in past meetings and in the final model report. Some of the calibration results are included in the presentation but the full results are included in the final report appendices.

The HSPF model updates included updating the subwatershed delineations to capture more water quality and flow stations, and to delineate to major pumps and weirs. The function tables (F-TABLES) were adjusted to better represent structures and how water is moved. Tetra Tech re-processed all of the rainfall data. The Next Generation Radar (NEXRAD) data were used because they offered the best spatial distribution across the entire watershed. The Page Field Airport station in Fort Myers was used for all the climate data except for evapotranspiration (ET). The Agricultural Field-Scale Irrigation Requirements Simulation (AFSIRS) model was used for ET because it included reference ET for crops.

The land use was updated to the 2008-2009 coverage. Tetra Tech compared this coverage to the previous coverage and the 2011 coverage and found minimal differences. The main difference between this coverage and the 2011 coverage is in the C-43 West Basin Storage Reservoir project area where orchards went fallow to allow for construction of the reservoir. Tetra Tech added a Florida Department of Transportation (FDOT) land use category and included more agricultural land use categories to allow for individual loading rates. The impervious area representation was updated using the 2011 National Land Cover Database (NLDC) coverage, and the Sutherland methodology. The formulas for this methodology are included in the model report. The agricultural irrigation setup was modified to include irrigation on four agricultural land uses, and not on pasture. The reuse and point source time series were updated, and Tetra Tech received comments that this process was not clear in the report. Erin stated that the language will be clarified but if measured data were available, that information was used to determine the concentrations at the facility for periods of time without data.

The model now includes non-failing septic systems. Tetra Tech and the department coordinated with the Florida Department of Health (FDOH) on the appropriate percolate concentrations, and with the stakeholders for the best information on known septic system locations. Atmospheric deposition was included in the model using measured data for nitrogen. The simulation of total nitrogen (TN) and total phosphorus (TP) from upland areas was modified to simulate nitrate + nitrite (NO_x), ammonia (NH₄), orthophosphate (PO₄), and organic matter. Once organic matter reaches the stream edge, it is divided up into organic nitrogen, organic phosphorus, organic carbon, and carbonaceous biochemical oxygen demand (CBOD) using the Redfield Ratio, as described in the model report. The upland simulation was revised so that organic matter and PO₄ were sediment sorbed.

The model report provides information on the hydrology calibration and parametrization. Tetra Tech compared the 2017 Model results to the 2014 Model results to ensure that there was a similar/better calibration. This comparison is not included in the final report but is provided in the Task 2 memo. For hydrology, the HSPF model was calibrated and validated to 21 U.S. Geological Survey (USGS) and department stations. The model parameterization was consistent across subwatersheds for each land use. Overall, the model performed very well for hydrology based on the calibration metrics evaluated. The water quality parameterization was also updated, and the calibration and validation used 50 stations at 33 unique locations. This is a lot more stations than previously to represent the different land uses across the entire watershed. The loading associated with each land use category was compared to Harvey Harper values for urban land uses and Soil and Water Engineering Technology (SWET) values for the agricultural land uses. In addition, FDOT provided information on their loading. The sediment, TN, and TP load model calibrations correspond closely with the literature values. Erin reviewed example calibration plots, and noted that statistics are included in the model report.

Anura Karuna-Muni asked for more details on how septic systems were incorporated into the HSPF model. Erin responded that both failing and non-failing systems are included, and the non-failing systems are included as a direct input in the model. FDOH provided information on the nutrient concentrations leaving the system, and a decay rate was applied. The loading was evaluated based on distance: less than 50 meters, between 50 and 200 meters, and greater than 200 meters from the nearest surface waterbody. This information was used to determine the total load entering the stream reach from septic systems, which was added to the model as a continuous time series. Anura asked how much load from septic systems is being added. Brian Watson responded that each septic system was evaluated separately, and then the load total was grouped by subwatershed so the load varies by area. Anura asked how a determination was made for which systems were failing. Erin responded that data from the FDOH repair permit database were used to determine the average number of failing septic systems.

Terry Bengtsson asked if the land use coverage was used for the entire model period or if it was changed over time. Erin responded that only the 2008-2009 coverage was used because it was the mid-point of the modeling period. Tetra Tech compared this coverage to the coverage before and after this period and there was not much of a change. The biggest difference compared to the 2011 coverage was in the C-43 reservoir project area but this land use change would be reflected as credit in the BMAP.

Keith Kibbey asked if the loads from septic systems in an area are just added together without accounting for saturation of soil. Erin responded that the model uses one value for the decay rate regardless of whether there is a single system or a cluster of systems in an area. Keith stated that more data are needed on how soil saturation affects the septic system loading because this is a large potential source of error. Erin responded that she does not believe that this is a large source of error because the septic system load is not a dominant load.

Steve Peene asked what drove the decision to use the measured flows at S-79 in the EFDC model instead of the modeled flows from the HSPF model. Erin responded that the HSPF modeled flows at S-79 were statistically very good. However, measured data were used because S-79 and S-78 are controlled and the model is not capable of simulating human decisions. To represent the actual discharge at the structures, the HSPF model would need to be broken up and flows forced over S-78 and S-79 which would cause run times to significantly increase because the model would need to be run multiple times for each scenario to generate the water quality boundary conditions. Therefore, Tetra Tech decided

to use the measured data. The measured flow is also being used in the background scenario. Steve noted that there is a difference in flow between the calibration and background scenarios because of the reduction in impervious area. It would make sense to proportion the flow in the background scenario using the HSPF model results. Brian responded that there was a lot of discussion early in the project about how to represent the background condition. The decision was made to not adjust the flows to provide a consistent point as the department moves forward with other scenarios. Erin added that this is the beginning of the TMDL process so the department will be evaluating other scenarios.

James Evans asked in the areas where septic systems were converted to central sewer, if the same decay rates were used. Erin responded that areas that were converted are no longer being represented in the model as having septic systems. Harvey Harper's values for residential land uses implicitly include some failing septic systems and legacy loads. John Cassani asked how the land use was represented using the 2011 data. Erin responded that the SFWMD 2008-2009 land use coverage was used in the model and the 2011 NLDC coverage was used for the impervious areas, since this coverage was the closest available. The NLDC coverage is a raster grid, which provides information on the percentage of impervious area and then the Sutherland formula is applied. John stated that the chlorophyll-*a* calibration values do not match well with measured data and this is an important parameter for nutrient impairments. He asked if there was a threshold used for the calibration. Erin responded that calibration criteria were established at the beginning of the modeling process. Overall, the modeled results match well with measured data, although there are areas where the modeled chlorophyll-*a* values are too high or too low due to the fact that universal parameterization was used in the model.

Keith stated that environmental professionals define septic system failure differently than homeowners so there will be more septic systems failing than those in the FDOH repair permit database. Erin asked if Lee County had data for this higher failure rate. Keith responded that they do not have data but the failure rate should be increased in the model to represent septic systems that are failing but have not been repaired yet. Erin responded that data are needed to support the values used in the model.

Bob Burleson asked if there are data for interflow and ground water. Erin responded that interflow and ground water were used as model calibration parameters, and this parameterization was compared to measured baseflow water quality concentrations in the model. Bob stated that for urban land use classifications, the interflow and ground water concentrations are at or below some of the natural lands so it seems that fertilization is not taken into account. Erin responded that this is due to the high amount of organic material in some of the natural area, especially wetlands. The distribution of organic material is important and is mostly in the natural areas. Steve stated that baseflow will govern during low rainfall periods and impacts chlorophyll-*a* concentrations. He noted that the baseflow concentration should be changed in the natural background scenario. Brian responded that Tetra Tech had to focus on calibrating to the entire simulation period and not focus on shorter periods of the dry seasons. Erin added that the baseflow was changed in the natural background scenario with the change in the land use.

Sam Lee stated that the same decay rate should not be used for septic systems all the time. During the dry months, many of the creeks do not have flow; therefore, for more than half of the year, the water is not reaching the river so there is no impact from septic systems. Erin responded that the model parametrization does not treat low flow and high flow periods differently. The focus is on the overall model calibration.

Erin provided an update on the EFDC model calibration. The model grid was updated to better represent how water flows through the system. The open boundary was also updated using the best available data including continuous data, which were available for several parameters for most of the model period. Six point sources were added, including the Florida Power & Light (FPL) facility, which withdraws water from the Caloosahatchee River and discharges it to the Orange River. FPL provided information on the temperature and nutrient delta loads for the model. The EFDC model was calibrated and validated to 21 stations for hydrodynamics and 39 stations for water quality. The model was calibrated to 2010-2014 data and validated to 1996-2009 data. Erin presented example hydrodynamic and water quality calibration plots. For the light extinction calibration, Tetra Tech updated the coefficients for total suspended solids (TSS), chlorophyll-*a*, dissolved organic carbon (DOC), and particulate organic carbon (POC) based on literature values. The Sanibel-Captiva Conservation Foundation data were used to calibrate the model for the 2011-2014 period. Impaired Waters Rule (IWR) data from 2000-2002 were also used to calibrate the model, and these data were used in previous model.

Steve stated that it was good to see the comparison of light attenuation in the model to actual light extinction data. However, it would also be good to see a comparison to the different constituents because he has a question about whether it is TSS or color driving the light extinction. The model currently has TSS as the driving factor but he thinks it may be color. Brian responded that Tetra Tech and the department would potentially investigate this issue. John stated that the current TMDL is based on the deep edge in San Carlos Bay. He asked where those areas used in the TMDL are located. Erin responded that Tetra Tech is using the same cells for evaluation as the TMDL model. Sam noted that the chlorophyll-*a* calibration at station 21FLEECOCES10SUR does not match well with measured data. With a model of this extent, he does not expect the model to match perfectly at all locations but stations such as this one should be looked at more closely. He asked if Tetra Tech looked at changing the land use coverage. Erin responded that one land use coverage was used for the entire model period because there was very little difference between the coverages. Sam noted that a project like this is very complex and may require some back and forth in which the data are matched as best as possible in the HSPF model then those results are used in the EFDC model and then changes in the HSPF model may be needed. Erin responded that this was the process used for the model calibration to figure out how to improve the overall calibration. Brian added that this is a complex system and even in past modeling efforts, the model did well in many areas and not well in a few areas. Tetra Tech did not want to sacrifice the larger calibration for the few smaller areas that were not well calibrated. Sam noted that the department should consider adjusting the simulated data in these areas when developing the TMDL.

Highlights/Overview Task 7 Natural Condition Modeling

Erin stated that the natural background scenario was created by removing all reuse and point source facilities, septic systems, and agricultural irrigation. The Lake Okeechobee TMDL is 0.04 mg/L TP. Tetra Tech evaluated what the corresponding TN concentration would be and calculated a TN concentration of 1.2 mg/L. The anthropogenic land uses were changed to wetlands or forest using Soil Survey Geographic Database (SSURGO) data. Tetra Tech also ran a background scenario with the Lake Okeechobee TN concentration at 1.4 and a third scenario where benthic oxygen demand was reduced by 40% to see how DO changed. Erin presented example plots for the natural background scenarios. Tetra Tech evaluated photosynthetically available radiation (PAR) in 45 selected cells, and there was an increase in light penetration between the calibration and natural background scenarios.

Erin stated that the next steps include reviewing stakeholder comments and finalizing the model report. Tetra Tech will also provide support to the department on scenario runs, as needed.

Keith stated that the model treats the estuary as a black box. Twice a year the estuary is killed by either too much freshwater or too much saltwater so the estuary is no longer functioning. The nutrient load reductions are not helpful until the estuary is functioning. Steve stated that there was a minimal change in light extinction between the existing and background conditions. He asked how Tetra Tech felt about this since light is the TMDL target. Brian responded that the results were surprising but were very similar to the previous modeling efforts. The 2017 Model has better representation of the basin with better datasets, and is a better model for the department and others to use moving forward. John stated that this is a good point because the relationship of watershed loading and light attenuation was the basis of the TMDL. It will be interesting to see how the TMDL changes at the end of this process. Bob asked if a scenario was run in which Lake Okeechobee meets its TMDL but everything else stays the same. Erin responded that this has not been run yet.

Nutrient Impaired Waters for TMDL Development

Erin Rasnake stated that the department's water quality restoration process monitors and assesses waterbodies to identify which have an impairment. For the impaired waterbodies, a TMDL is developed and the waterbody continues to follow the DEAR wheel for assessment, monitoring, standard setting and TMDL development. The TMDL is a restoration target set under section 303(d) of the Clean Water Act. A TMDL is pollutant-specific and scientifically derived using local information. There are 399 TMDLs adopted in the state, of which 43 are for springs. The majority of the adopted TMDLs are for nutrients and then bacteria and some for metals. The department's website includes an interactive map with TMDLs adopted and under development as well as BMAPs. In order to develop a TMDL, the department must identify the source of impairment. The Florida Watershed Restoration Act of 1999 sets the authority for developing TMDLs and putting them in rule. This act also authorizes the Florida Department of Agriculture and Consumer Services (FDACS) to implement agricultural best management practices (BMPs). Erin stated that the department would like stakeholder input on future TMDL documents, and for any local information to help with TMDL development. If any stakeholder is missing who should be participating in the process, please let Erin know.

Erin stated that the Watershed Information Network (WIN) will replace the Florida Storage and Retrieval (STORET) database in spring 2017. STORET will be open for uploads through December 2017. Stakeholders should work with their STORET coordinator on the transition.

Doug Gilbert stated that he presented the impairments in the basin about a year ago. Since that time, the department has updated the assessments using numeric nutrient criteria (NNC) and the new DO criteria. The DO criteria is based on percent saturation. For freshwaters, the criterion is no more than 10% of the daily average percent DO saturation values may be below 38%. For marine waters, the daily average percent DO saturation cannot be below 42% saturation in more than 10% of the time. The chlorophyll-*a* criterion has multiple parts based on macrophytes, stream condition index score, and nutrient concentrations. With these new criteria, several waterbodies in the Caloosahatchee Basin were delisted during the Cycle 3 evaluation including Cape Coral, Popash Creek, Jacks Branch, Cypress Branch, and the Caloosahatchee River between S-79 and S-78. There are several waterbodies identified for additional investigation including Deep Lagoon Canal, Billy Creek, Cypress Branch, and Long Hammock Creek. The model will be used to help determine if nutrients/BOD/Chla are responsible for the DO

impairments. The waterbodies still on the list for TMDL development include Townsend Canal, Ninemile Canal, S-4 Basin, C-19 Canal, and Lake Hicpochee.

TMDL Development Approach and Schedule

Doug stated that the department will look at the period of 2008-2014 (last seven years in the model) to calculate the percent DO saturation frequency of exceedance. The department will also use the natural scenario to evaluate whether DO changes and if it is sensitive to nutrients, BOD, or Chla. If DO is not sensitive to these constituents, then a TMDL would not be needed. If it is sensitive to nutrients/BOD/Chla, then a TMDL would be developed. If the background scenario meets the water quality criteria, then this will be target. If background does not meet criteria, then the target will be set at 0.1 mg/L below the DO concentration associated with background freshwaters or with an up to 10% deviation for marine waters as long as there is no adverse impact on flora and fauna. Doug noted that the department would appreciate feedback on this approach and any model scenarios that should be run to evaluate these waterbodies.

Doug stated that the estuary NNC are for different zones: upper, middle, and lower Caloosahatchee River, as well as San Carlos Bay, Pine Island Sound, and Matlacha Pass. The department will use these criteria throughout the model, and not just focus on light attenuation in San Carlos Bay. The department will evaluate the differences in loading between the 2009 Model and 2017 Model. In addition, a comparison between the watershed loading for the 2003-2005 period used in TMDL and the newer 2008-2014 period will be made. A similar comparison will be made for light extinction between the two models, as well as between the 2003-2005 and 2008-2014 periods. The department will determine if light extinction in San Carlos Bay is still a good target for the TMDL or whether a different target or location should be used. There are some additional model cells that the department has identified for evaluation using the 2017 Model.

Stakeholder/Public Comments

Steve asked if the department has evaluated how impaired the estuary is under the NNC. Doug responded that the department has not yet made this evaluation. Steve asked if the department is currently focused on light attenuation and looking for feedback on the approach. Doug responded that this is correct and there are some additional options for evaluation since the model now includes the entire watershed. John stated that Daughtrey Creek was not mentioned during the presentation. Erin Rasnake responded that it was impaired in Cycle 2 for DO and fecal coliform bacteria and that she would look into this further.

Rae Ann Wessel asked if anyone was looking at colored dissolved organic matter (CDOM) in relation to biology. In areas where there is no relationship with nutrients, it could be CDOM causing seagrass loss. She asked if there is a way to tease out where obstruction of light and loss of habitat is affecting the assimilative capacity. Doug responded that role of color in the system can be explored using the model. There is no impairment linked to color but it would be good to know the role color is playing. Rae Ann stated that she believes that CDOM is related to nutrients and is not being evaluated. The Caloosahatchee River and Estuary are in bad shape and the real issue had not been identified. Doug responded that these evaluations could be made using the EFDC model. Rae Ann asked if the role of reuse is being evaluated because it could have high nitrogen concentrations. Doug responded that reuse is included in the HSPF model and it could be turned off to evaluate the change in loading. There were limited data on where reuse is applied in the watershed so the data limitations may affect how sensitive

the model is to this parameter. Jennifer Hecker added that reuse is generated year round but is disposed of during wet season. It would be good to determine where the reuse water is disposed. Doug responded that permits allow for reuse supplement from stormwater and potable sources so it is difficult to tell exactly what is being applied.

Erin stated that Daughtrey Creek is no longer impaired because it is meeting NNC but it still has the bacteria impairment. It has been placed on the study list to gather biological data. John noted that the historical conditions that caused the impairment should also be evaluated. Rae Ann asked when a waterbody is delisted, if the department document what changed such as projects implemented or changes to hydrology. James Albright responded that the assessment list will describe how the water quality data changed but not what changes were made in the watershed. Kevin O'Donnell would be the best contact at the department for questions about the assessment list. Doug noted that data sufficiency changed with the NNC and there is a strategic monitoring plan in place to gather more data. Greg DeAngelo added that biological data will also be collected to help with evaluation of the waterbody. Rae Ann asked if Vallisneria could be used as the criteria. Erin responded that seagrass could be a target. John asked how close to the actual area do the seagrass need to be located to be used as the target. Erin responded that this would have to be evaluated.

Greg stated that the department will use the 2017 Model to determine if they are using the right targets in the right places. The model could also be a tool for local governments to help with restoration. Greg noted that he is excited to move forward using this refined tool.

Adjourn

The meeting was adjourned at 12:05 pm.