Indian River Lagoon
Basin Management Action Plan (BMAP)
Technical Meeting
Friday, December 11, 2009
9:00 AM – 12:00 PM
Brevard County Agricultural Center
3695 Lake Drive Cocoa, Florida 32926

MEETING SUMMARY

Participants

Carolina Alvarez, Brevard County	Colleen Lindler, Town of Melbourne Beach
Vanessa Arnal	Darren May, Cape Canaveral AFS
Tracey Askew, SpecPro, Inc.	Mike McBee, Brevard County Natural Resources
Tom Baker, City of Melbourne	Mike McCabe, City of Palm Bay
Virginia Barker, Brevard County, National Resources Management Division	Bach V. McClure, Brevard County
Jeff Beal, FL Fish and Wildlife Conservation Commission	Keith McCully, Stormwater Management/Indian River County
Robert Berish, Morton Salt	Bill Messersmith, City of Vero Beach
Robin Boughton	Keith Mills, City of West Melbourne
J.M. Boyer, Masteller & Moler, Inc.	Terry Mott, Viera
Richard Brewer, Bussen-Mayer Engineering Group, Inc.	Nicholas Murdock, Patrick AFB
Nidia Bullard, Mactec Eng.	Ken Poole, City of Rockledge
Amy Burch, SpecPro	Steve Peene, ATM
Tiffany Busby, Wildwood Consulting, Inc.	Allen Potter, City of Satellite Beach
Joe Carroll, Carroll & Associates/IRL Coalition/PIAS	Robert Potts, E-Sciences
Robert Day, SJRWMD/IRL National Estuary Program	Thomas Price, IHA/Kennedy Space Center
Mark Dixon, HS CES/CEAN/USAF	Jeff Ratliff, City of Cape Canaveral
Douglas Durham, NASA	Joanie Regan, City of Cocoa Beach Stormwater Utility
Steve Dyer, SpecPro	Troy Rice, SJRWMD/IRL National Estuary Program
Roger Dykes, Cocoa	Jo-Ann Rosario-Llantin, FL Tech/NOAA
Richard Earp, E-Sciences	John C. Royal, Brevard County
Rebecca Elliott, OAWP/FDACS	Douglas Scheidt, NASA/Kennedy Space Center/Dynamac
Gordon England, Stormwater Solutions Inc.	Charles Shinn, Florida Farm Bureau Federation
John Fergus, City of Satellite Beach	Judy Sloane, Volusia County
Chris Ferraro, FDEP	Larry Smith, USAF
Carla Garreau, IHA-NASA Kennedy Space Center	Robbyn Spratt, Brevard County Natural Resources
Xueqing Gao, FDEP	Ariane Staples, SpecPro
Patricia L. Gertenbach, E Sciences, Inc.	Suzanne Stempel, Brevard County Watershed
Lou Giacona, City of Indian Harbour Beach	Joel Steward, SJRWMD
Clark Giangarra, Algae Collection Technology, Inc.	Dani Straub, City of Melbourne

Ken Good, Carter Associates	Steve Szabo, Jones Edmunds & Associates
Whit Green, SJRWMD	Amy Tracy, FDEP
Vincent Greenwade, SpecPro	Patricia Tierney, Storm H2O, LLC.
Lorraine Guise, Titusville	Bob Ulevich, St. Johns/Sebastian River Improvement District
Tom Guyton, Citizen	Katie Vandeventer, Wildwood Consulting Inc.
Ben Hayner, City of Cocoa	Dan Vangenechten, SpecPro
Laura Herren, FDEP, Coastal and Aquatic Managed Areas	Marc Virgilio, FDEP
Roy Hoekstra, SES – CCAFS	Carl Warrabee, City of Cocoa
Dianne Hughes, FDEP	Kalina Warren, FDEP
Erlyn Hupfer, ISC Environmental Assurance	Harvey Wheeler, E&S Control Solutions, Inc.
Carol Johnson, FDACS	Kaylene Wheeler, City of Palm Bay
Ken Kniel, DRMP, Inc.	Diane Wilson, Indian River County Stormwater Division
Carl Larrabee, City of Cocoa	Kelly Young, Volusia County Environmental Management
Cynthia Lieberman, BOCC NRMO	Trovis Young, SpecPro

Meeting Purpose: To review and discuss three presentations on the scientific and models used for total maximum daily load (TMDL) development: Method for developing Loading Limits and Pollutant Load Reduction Goals (PLRGs); Watershed Loading Models; and Application of Method toward TMDL Development.

Action Items:

- Robert Potts requested that all stakeholders be sent the pie chart illustrating the breakdown of the percentages of external loads by source, lagoon-wide. (**Tiffany Busby, Amy Tracy**)
- Carol Johnson would like to receive the runoff coefficients from Whit Green's presentation**.** (**Tiffany Busby, Amy Tracy, Whit Green**)

Welcome and Opening Remarks

Amy Tracy introduced herself, Tiffany Busby, and the three speakers. Then, each of the attendees of the meeting introduced themselves one-by-one and informed the group as to which company or entity they represent**.**

Part 1. Method for Developing Loading Limits and PLRGs (Joel Steward, St. Johns River Water Management District [SJRWMD])

Joel Steward began his presentation by stating that the method for developing load limits is based on an empirical nutrient loading versus seagrass depth limit model. He explained that the seagrass beds are currently competing for available light, especially at depth in the Indian River Lagoon (IRL). Joel illustrated that watershed loadings lead to water quality issues (poor water transparency and excessive turbidity and nutrient availability) that leads to light extinction in the water column and limits light availability at the seagrass blade; both factors being responsible for restricting growth of seagrass beds at certain depths. He then used the transitive property of equality to infer that watershed loading leads to the destruction of seagrass at certain depths (i.e., *loading* →*seagrass depth limit*, and accounts for the more complex, sequential process of *loading* → *concentration* → light extinction → *seagrass depth limit*). Joel discussed the sub-lagoons and segments that served as a geographic basis for developing

seagrass depth limits (DLs) (targets per segment) and watershed loading estimates (total nitrogen [TN], total phosphorous [TP], and total suspended solids [TSS]) per segment. By showing Geographic Information Systems (GIS) mapping images of the IRL taken in 1943, 1986, 1989, 1992, 1994, 1996, and 1999 he illustrated the changes in seagrass DLs over time. It was the union of these seven mapping-year seagrass coverages that determined each segment's DL target. Following his explanation that different median DL targets were established per segment of the North IRL, the Central IRL, and the Banana River Lagoon (ranging from 1.18 to 1.81 meters), Joel used a pie chart to illustrate the proportion of external loads lagoon-wide. He concluded that approximately 70% to 80% of external nutrient loads (TN and TP) are conveyed by runoff, and that atmospheric, groundwater, and wastewater treatment plants (WWTPs) accounted for the other 20% to 30%. Thus, it is the runoff loadings that primarily influence seagrass depth limits. Joel stated that the runoff loading data generated by the Pollutant Load Screening Model (PLSM) generally provided a stronger regression with concurrent seagrass mapping-year DLs (1943, 1996, 1999, and 2001) than did the Hydrologic Simulation Program-Fortran (HSPF) model. He also mentioned that the four mapping years (1943, 1996, 1999, and 2001) used in the regression were good representations of different conditions in the IRL system including drought and wet years, El Niño, La Niña, land use changes, etc. Joel explained how a parent regression equation was transformed to back-predict load limits from pre-determined load limits. He compared load limits to areal loadings from minimally developed basins, and then compared the load limits to other estuaries with moderate to heavy development. He stated that these comparisons spoke to the plausibility/reasonability of the load limits indicated by the TN and TP regression models. With respect to the ecological credibility of the IRL TMDLs, Joel presented another regression plot, TN load limit versus hydraulic loading for several Florida estuaries. The regression line fitted through the plotted points represents "restored" or mesotrophic conditions for Florida estuaries. The TN load limits were either TMDLs set by FDEP or current loadings to estuaries that are considered by U.S. Environmental Protection Agency (EPA) as mesotrophic. The points representing the TN load limits (or TMDLs) established for the IRL sublagoons lay on or very close to the regression line demonstrating that the IRL load limits should achieve mesotrophy consistent with state water policy and the notion of an unimpaired system.

Joel Steward invited any questions:

Question (Robert Potts): Robert requested clarification on percentage of TN load coming from section IR 12, based on 2000 land use. He also requested the pie chart illustrating the percentage of load from each source type to be sent to the stakeholders.

Answer (Joel Steward): Joel clarified the percentages and agreed that he could provide the pie chart with the loading estimates by source.

Question (Carol Larrabee): Is the IRL TN or TP limited?

Answer (Joel Steward): The IRL is co-limited, meaning that it alternates between being limited by phosphorous and by nitrogen (according to one study, Banana River Lagoon even showed a one-time seasonal limitation by iron). It was determined that throughout the entire lagoon system that we should manage both phosphorous and nitrogen.

Question (Robert Potts): Robert asked if the lagoon itself had been considered as a contributor to increased nitrogen levels as a result of nitrogen fixation. Would it be possible for the IRL to asphyxiate itself with nitrogen, even without any human intervention?

Answer (Joel Steward): Joel responded that he has raised a valid question, but nitrogen fixation is not a "threat" to the IRL because in estuaries with average salinities of over 12 parts per thousand (ppt) nitrogen fixation generally does not occur (even when the estuaries are strongly nitrogen limited) because of sulfate inhibition (Howarth and Marino 2006, Limnol. Oceanogr. 51 [1, part 2] p. 371). The average IRL salinity is about 20 ppt so we would not expect nitrogen fixation to occur or be a significant factor.

Question (Virginia Barker): Virginia stated that seagrass recovery seems to be occurring in some years. Is there a trend in increasing seagrass coverage? Is it really best to choose to start in the worst year and work from there? Is it ideal to attempt to move forward from the least desirable point? Does it make more sense to pick the worst year as the baseline?
Answer (Joel Steward): The IRL has shown a recent seagrass recovery trend that is probably a consequence of a brief shift in climate, providing drier than normal years (1998 – 2001). This dry period provides a clue to what would happen if the established load limits or TMDLs were achieved. If the load limits that have been set can be achieved in average rainfall years, then the IRL will be in good shape, and in drought times the lagoon will be in great shape (with respect to water clarity and potential seagrass coverage); albeit during heavy-rain years it will fall back, but on average it should improve.

There have been some management actions that have brought about load reductions and improvements in the IRL. For example, wastewater treatment plant effluent was contributing about 25% of the total external nitrogen loading to the IRL by 1985, but this contribution dropped to about 2% by 1996/1997. One area that seemed to rebound quickly following removal of wastewater treatment facility effluent discharge was Newfound Harbor in Banana River Lagoon. Both water clarity and seagrass growth improved quickly there when those point-source loads were eliminated.

Finally, what to use as the baseline (e.g. some time period) is really a basin management action plan (BMAP) issue, not a model issue nor a TMDL determination issue.

Question (John Fergus): What can you tell us about the role of freshwater runoff? In 1943, there was no development in Satellite Beach and now it is 98% built out. John referred to the absence of hard clams and oysters, and asked how their apparent depletion was related to the amount of freshwater runoff resulting from the development of Satellite Beach. If we meet BMAP goals and the seagrass problem does not improve, can we attribute any of the problems to freshwater runoff?
Answer (Joel Steward): Yes, if the area does not respond, it may tell us something about freshwater runoff or some other factor(s) besides nutrient loading that can affect seagrass coverage and should be considered. Oysters do well with a bit of freshwater influence (slightly lower salinities) more so than hard clams. Therefore, the past presence of oysters in an area may suggest that there was a lower average salinity level that may not be deemed desirable within the main stem of the lagoon today for the sake of seagrasses and hard clams, both of which require fairly similar salinity ranges or average salinities greater than or equal to 20 ppt (but below 35 – 40 ppt). There are other IRL programs or projects (e.g. SJRWMD and IRL National Estuary Program [NEP]) that are currently underway that do address freshwater discharge and volume per se for the sake of maintaining desirable salinities for seagrasses and hard clams.

Part 2. Watershed Loading Methods (Whit Green, SJRWMD)
Whit Green introduced the pollutant load screening model (PLSM) as a GIS-based model that estimates annual nonpoint source loads generated by a watershed through the relationship between land use and soil type. Whit stated that PLSM is easy to use, portable and accurate, but that it does have some limitations with regard to model time step, simulating in-stream processes, and separate accounting of baseflow. Whit outlined the four inputs necessary for PLSM: Spatial data layers, runoff coefficients, runoff concentrations, and best management practice (BMP) treatment efficiencies. Whit also outlined the four calibration basins in which the PLSM was conducted: Crane Creek, C-1 Canal (Turkey Creek), Sebastian South Prong, and Briar Creek. Whit used a series of pie charts to illustrate primary and secondary land use in these four areas. He concluded that 95% of the total land use of the lagoon area occurs in these four watersheds (as of 2000). Whit then used several bar graphs to illustrate how the

accuracy of PLSM was determined. A standard table illustrated the rated results of PLSM cumulative loads compared to the measured data. Whit concluded that PLSM receives a "very good" rating when measuring TN, a "good" rating when measuring TP, and a "fair" rating when measuring TSS. When compared to the HSPF model (loads by sub-lagoon region for all modeling years), PLSM's results are very strongly correlated. Whit stated that the variance in loads between the two models is so small that no statistical difference exists between their predicted loads for either TN or TP; but there was a statistical difference between the models in their prediction of TSS loads. PLSM consistently predicted lower TSS loads than did HSPF.

Whit Green invited any questions:
Question (Carol Johnson): Carol asked if it would be possible for the stakeholders to be sent the information regarding the runoff coefficients that the model used.
Answer (Whit Green): Whit explained to Carol that the runoff coefficients are described in the TMDL document produced by U.S. Environmental Protection Agency (EPA). In summary the runoff coefficients were assigned based on land use and soil types. Whit provided his e-mail address (wgreen@sjrwmd.com). **Amy Tracy** added that the GIS shapefiles that were used in the modeling process, including the land use and soil types, are available on the FTP site listed at the bottom of the agenda.
Question (Gordon England): Gordon asked if the model is available for others to use.
Answer (Whit Green): The models are available, but keep in mind it runs by year on specific datasets. You have to input a dataset for a particular year to use it.
Question (Robin Boughton): Robin asked if the model includes the drainage areas of the C-1 canal that are part of the sea/land diversion project.
Answer (Whit Green): Whit responded that the early years of the model include the drainage areas of the C-1 canal that are part of the C-1 diversion project (Three-forks Marsh and Sawgrass Lakes Water Management Area), but that the later years do not, as appropriate for the status of the diversion.
Question (John Fergus): How did you assign the letters/categories to the soil-hydrologic groups?"
Answer (Whit Green): The Natural Resources Conservation Service (NRCS) determined those categories. We used their data, which is all available from the Natural Resources Conservation Service site. It is part of their Soil Survey Geographic Database.
Question (Carl Larrabee): Carl asked if there were any additional data used to verify the calibration.
Answer (Whit Green): We used all of the data we had in the calibration. Therefore, there were no data left with which to validate the initial calibration. The data were from the years between 1990 and 2003.
Question (Carl Larrabee): Carl asked what percentage of the total area the calibrations represented in the model.
Answer (Whit Green): The results were collected over an entire year in order to ensure that data were collected during dry and wet seasons. Whit stated that, based on land use, he thinks that the calibrated areas represent a very high percentage of the total lagoon area.
Question (Larry Smith): Larry asked if it is a problem that the regression model does not include years of big-boom growth such as 1999-2006. Larry then asked Whit if he and his team had considered any industrial pollutants such as oils and grease that would also affect runoff water quality. What about the barge canal?
Answer (Whit Green): Whit responded the years 1999 through 2003 were included in the calibration. He added that he and his team did not consider any industrial pollutants in this particular calibration. Whit also stated that he and his team did not analyze the data to compare industrial parks versus schools, etc. Although they did not specifically analyze the data for industrial contribution, he believes that the four basins used in the calibration have enough varied land uses that industrial lands had, in some way, played a role in the calibrations. For example, Crane Creek is very developed, while another

tested basin, Briar Creek, has barely any development, so a full range of development intensity was included in the analyses.
Question (Steve Peene): Steve noted that PLSM predicted lower flow than what was actually measured for the 1990-2000 calibration period. Steve asked if the model was better or worse from low flow to high flow conditions and whether there was conglomerated error.
Answer (Whit Greene): Whit informed Steve that the data tends to level out over the span of a year. The PLSM predicted lower flow consistently than actual conditions. There is a lot of variability in the data because storage changes so dramatically in very wet or very dry conditions. To account for these inter-annual differences, they included multipliers in PLSM to model excessively wet years and excessively dry years. The multiplier is the ratio of a particular year's annual rainfall to the 30-year average of the nearest National Oceanic and Atmospheric Administration (NOAA) site. As an example, the multiplier for a wet year might be 1.2 and 0.8 in a dry year.
Question (Virginia Barker): Would it have been better to obtain data from all three basins and not just the Central IRL Basin?
Answer (Whit Green): They would have preferred more data but this is a common limitation in calibration efforts. The areas from which the data were collected are really large drainage areas so they are good places to collect data. In addition, there were already projects in place, which made it easier and less expensive to access. Tidal concerns were also a contributing factor as to where the data were collected.
Answer (Joel Steward): Joel added that the predicted loads match well with the modeled loads and that gives confidence that the overall model does a good job and capturing flows and conditions.
Question (Virginia Barker): Virginia voiced her concern about errors occurring in other basins because the data are not going to be accurate and/or applicable to all areas of the IRL.
Answer (Whit Green): Whit responded that the error decreases when the area monitored increases. Whit assured Virginia that he believes that the data collected represents a variety of land uses, a consistency in soil types, and a variety of rainfall amounts.
Question (Ariane Staples): Does the PLSM have any advantage over other models for a smaller data set or data on a more limited time line?
Answer (Whit Green): Whit responded that there is a very strong correlation between PLSM and HSPF. It is hard to say if either one is better until it is tested and used.
Answer 2 (Xueqing Gao): Xueqing stated that they use different models for different reasons. The HSPF model is good for addressing the processes with daily time scale, such as the dynamics of dissolved oxygen, but it takes a lot of data. PLSM is better for use on an annual basis, such as nutrient impairment.
Question (Joanie Regan): Joanie asked the panel of speakers if they have determined a number of years of lag time between when a project is completed and the water quality response is measurable.
Answer (Joel Steward): We don't know the response time for individual projects. We expect the response to be phased since the BMAP requirements will be phased. Recovery in the lagoon will be incremental.

Part 3. Application of Method Toward TMDL Development (Dr. Xueqing Gao, FDEP)
Xueqing Gao explained the three questions that need to be answered when developing TMDLs: (1) What are the water quality targets?, (2) What are the target pollutant loads?, and (3) What are the percent reductions needed to achieve the target loads? Xueqing discussed the relevance of direct atmospheric deposition (AD) on TMDLs. He stated that although, using the step-regression analyses, SJRWMD did not find strong correlation between AD and seagrass depth limit, TMDLs – by definition – need to include loads from all sources. Xueqing explained a series of charts illustrating the method used to estimate the direct AD and percentage of direct atmospheric TN deposition and direct atmospheric

TP deposition loads in the total nonpoint source load. The fourth chart showed the calculations of needed percent reductions in TN with and without the inclusion of atmospheric deposition. Xueqing stated that he and his team calculated both sets of percentages for the sake of the official TMDL, but that they chose to use the percentages that did not include atmospheric deposition for their final suggested reduction numbers. The same could be said for the fifth chart that displayed the calculation of the needed percent reductions in TP with and without atmospheric deposition. Xueqing stated that atmospheric deposition was not within the TMDL program's legal ability to regulate; therefore it seemed like including the atmospheric deposition data would yield a false suggested percentage reduction for the responsible stakeholders. Xueqing briefly mentioned the difference between the lagoon segments used in developing the Pollutant Load Reduction Goal (PLRG) and TMDL waterbody identification numbers (WBIDs), and stated that, since TMDLs address the target loading into the water segments defined by the WBID boundaries, pollutant loads into the PLRG lagoon segments were aggregated and reported as the pollutant loads discharging into WBIDs, then concluded his presentation.

Xueqing Gao invited any questions:

Question (Larry Smith): Larry asked while the IRL main stem TMDLs address the impacts of nutrient loading to the seagrass distribution, whether the panel knows of oil, greases, and other pollutants that are affecting the waterways. He wanted to know how the TMDLs will address these problems. He asked if the program is being too limited by addressing nutrients only.

Answer (Xueqing Gao): Xueqing stated that the existing TMDL modeling only included nutrients because nutrients were the only verified impaired parameters. In addition, the modeling of the nutrient TMDLs focused on total nitrogen and total phosphorus. How nutrients of different inorganic and organic compositions may impact the aquatic communities could not be shown with the existing model. Considering the diversity of land use involved in the study, the data may reflect levels of pollutants, such as oil and grease, which may lead to future projects. However, addressing the nutrient levels in the water is the most plausible and legal aspect of pollution to fix right now.

Answer (Whit Green): Whit added that the lagoon is not impaired by oils and greases (as it is impaired by nutrients), so they are not legally allowed to adopt TMDLs for those pollutants.

Question (Patricia Tierney): Patricia asked for clarification as to whether or not the TMDLs will address the presence of oils and greases, as well as nutrients.

Answer (Xueqing Gao): Xueqing responded that many of the projects and programs to reduce nutrients in stormwater also decrease other pollutants such as oils and greases. We would expect some reductions in other pollutants through the activities designed to decrease nutrient inputs.

Question (Mark Dixon): Mark asked how regulators are planning to enforce the suggested percentage load reductions to golf courses and other similar institutions. How will regulators hold them responsible if they do not comply?

Answer (Amy Tracy): Amy told Mark that there is currently a golf course BMP manual that informs golf course owners and managers of their environmental responsibilities, but it is not enforceable.

Answer (Joanie Regan): Joanie added that municipal separate storm sewer systems (MS4s) can regulate pollutants entering their conveyance system, including golf courses, and can enforce the reduction of their loads via "good housekeeping laws," etc.

Question (John Fergus): John explained how he conducted his own GIS mapping of the lagoon. He came to the conclusion that at least two-thirds of Satellite Beach would need to be converted to forest in order to comply with the reductions for his area. He asked the panel if it is even possible for Satellite Beach to meet the TMDLs.

Answer (Amy Tracy): Amy asked John if he secured GIS information on the entire WBID during his analysis.

Clarification (John Fergus): John said that he was not sure that he captured the entire WBID, but regardless, he believed that even a conservative account of the data would show that at least half of Satellite Beach would need to be converted into forest in order for the city to comply with the TMDLs. He asked the panel to clarify how it would be possible to comply.
Answer (Amy Tracy): Amy responded that perhaps his calculations made it seem impossible to comply with the TMDLs because he did not assess the entire WBID and that when the area of the loading includes multiple entities with reduction responsibilities, it is more manageable. The project zone approach that will be used in the IRL will provide opportunities to achieve load reductions outside built-out areas and allow more area for projects to be conducted. Amy then stated that the methodology for determining the allocations and required reductions will be discussed further in the January - March 2010 BMAP meetings.
Answer (Xueqing Gao): A TMDL, by definition, defines the assimilative capacity of a given receiving water and, therefore, should be considered as an intrinsic characteristic of the receiving water. TMDLs address the assimilative capacity of receiving waters, and technically, do not answer the question how the pollutant loading from the drainage basin can meet the assimilative capacity of the receiving water. How to achieve the target pollutant loading should be a question answered by BMAP. If the background load does not achieve the target restoration condition, the target pollutant load will not be lower than the background load. As Joel mentioned in his presentation, the target per acre nutrient loads to achieve the target seagrass depth-limit in IRL for these TMDLs are significantly higher than the per acre nutrient loads from some undeveloped watersheds, suggesting that the target loading is not lower than the natural condition. Furthermore, the needed percent reduction defined in these TMDLs provides an adaptive target. If the seagrass depth-limit target is achieved before the load reduction target, the iterative TMDL process will allow review and adjustment of the TMDLs if needed.
Question (Bach McClure): Bach asked the panel if they noticed any air deposition rate changes based on wet years versus dry years.
Answer (Whit Green): Whit stated that during years with more rain there was a higher atmospheric load, but that the results evened out over time. Nitrogen data from the Kennedy Space Center from 1984 forward were reviewed for long term trends. There were slight increases (a few percent) over time and there was lots of variability in the dataset. There are no known seasonal trends in deposition. Prevailing winds were likely more responsible for the variations in the concentration.
Question (Bach McClure): Bach inferred that since atmospheric deposition also occurs on land, and land runs off into the water, would it not be possible for 100% of the nutrient loading to be coming from atmospheric deposition?
Answer (Xueqing Gao and Whit Green): Comparing the affects of atmospheric deposition on water with the atmospheric deposition on land is like comparing apples to oranges because when particles in the atmosphere fall on the land, the soil filters it and there are chemical and bacterial processes that occur that attenuate the amount that actually reaches surface waters. When atmospheric particles come to rest on the surface of the water they have a stronger affect because then they are direct sources.
Question (Virginia Barker): Virginia started by thanking the speakers for coming and sharing their information with the group. Then she referred to the chart that Xueqing used in his presentation to show the calculation of needed percentages in reduction of TN with and without atmospheric deposition. She pointed out that the percentages that Xueqing and his team used as the percentages that needed to be reduced (the ones that did not include the atmospheric deposition) appear to be higher, and therefore harder to achieve, than the percentages that would be required to reduce if the atmospheric deposition were included. Virginia asked the panel why the stakeholders have to work harder to reduce a greater percentage of nutrients when there are fewer nutrients to eliminate. She

wondered if it is because the FDEP Air Division and FDEP Water Division cannot work together to reduce the land and water based nutrient deposits as well as the atmospheric ones.
Answer (Xueqing Gao): Xueqing assured Virginia that it is the same number of pounds of nutrients from stormwater that need to be reduced either way. The lower percentage gives a false impression because it implies that the reducers have some sort of ability to control atmospheric deposition, which, for the most part, they do not – not legally anyway.
Question (Mark Dixon): Mark wanted to know how certain the panel members are that this project will be a complete success.
Answer (Joel Steward): The level of uncertainty right now is just a guess (but is shown statistically by the 80% confidence intervals on the TN and TP regression models). We will probably know by the 15-year mark or when the TMDLs are fully achieved whether or not the reductions are a success.
Answer (Xueqing Gao): Xueqing added that the target is adaptive and subject to change. We can adjust it if needed.
Answer (Joel Steward): Joel explained the margin of safety that is built into the percentage load reduction requirements. He said that the load limits are fairly ambitious, thus he is reasonably confident that they should be able to see the -10% departure from the DL target (which is the TMDL target) reached in many or most segments if the TMLDs are achieved. In areas where flushing is high, such as Sebastian Inlet, the chances improve that the seagrass target will be met.
Question (Steve Peene): Steve asked what the year 2000 hydrologic conditions were. How did the scientists choose that year as a base for their results?
Answer (Whit Green): Whit stated that they took the 30-year mean annual rainfall and applied that to the 2000 land use data.
Question (John Fergus): John asked the panel about monitoring and the five year BMAP cycle. How will monitoring work? Who is going to perform the monitoring?
Answer (Amy Tracy): Amy explained that the BMAP must include a monitoring plan. The monitoring plan will identify the data that are needed to measure trends as well as to answer specific questions that arise. Future refinements of the TMDL will be dependent on the data that are available. The existing monitoring efforts that include local governments, the water management districts, FDEP and other entities will be reviewed those data that are needed will be sought as part of the BMAP monitoring. Therefore, local monitoring programs have a very important role in the BMAP monitoring; it is not all conducted by the State. When we develop the monitoring plan we will review the existing stations, trend stations and the monitoring done for the TMDL process. We will use those existing resources as much as we can. After the BMAP is adopted, we will revisit the monitoring activities each year during the annual meeting and reporting process.
Question (Darren May): Darren acknowledged that the TMDLs address nitrogen issues, but wondered how the TMDLs will address water quantity issues, especially flooding.
Answer (Whit Green): Whit clarified that the TMDLs' purpose is to address water quality issues, not water quantity issues. He also pointed out that if the program were to result in cutting off too much flow of freshwater, they would notice the problem in the smaller tributaries first. It is very unlikely that the overall salinity of the lagoon would be affected.
Question (Steve Szabo): Steve noted that residence time is a key issue; Steve asked if a hydrodynamic model would be available for FDEP to test the results of proposed projects to see which would be the most effective.
Answer (Xueqing Gao): Xueqing explained that the CH3D model developed by Dr. Peter Sheng (University of Florida) for the IRL is well-calibrated for hydrology but has not been correlated to water quality. Xueqing noted that CDM and Dynamic Solution are currently completing hydrodynamic models for both hydrodynamics and water quality for the IRL tributaries and main stem IRL. These models may help build the relationship between the watershed nutrient loading and in-lagoon concentration.

However, seagrass acreage testing is not included as one of the hydrodynamic model's current capabilities.

Adjournment
Tiffany thanked the speakers for presenting information on the model. The meeting adjourned at 11:57 AM.

Meeting summary prepared for FDEP by Wildwood Consulting Inc. Please send corrections to Marcy Policastro at mpolicastro@wildwoodconsulting.net.