RESPONSIVENESS SUMMARY

Total Maximum Daily Load (TMDL) Development for Northern and Central Indian River Lagoon and Banana River Lagoon Florida

Nutrients and Dissolved Oxygen

TMDL Commenters
TMDLs Proposed September 30, 2006

Commenters	
1	Troy Rice, Indian River Lagoon Program, 525 Community College Parkway, S.E., Palm Bay, FL 32909. October 31, 2006.
2	Scott Barber, City of Cocoa Beach, Water Reclamation Facility, 1600 Minutemen Causeway, Cocoa Beach, FL 32931. November 29, 2006.
3	Darby Blanchard, City of Cocoa Beach, Water Reclamation Facility, 1600 Minutemen Causeway, Cocoa Beach, FL 32931. November 10, 2006.
4	Michael McManus, The Nature Conservancy, 625 North Adams Street, Tallahassee, FL 32301. November 20, 2006.
5	Everett Wegerif, City of Cocoa Utilities Department, 600 School Street, Cocoa, FL 32922. November 29, 2006.
6	Jim Brawner, Florida Power and Light, Environmental Services Department, P.O. Box 14000, Juno Beach, FL 33408. November 30, 2006.
7	John Rodgers, City of Palm Bay, 5420 Babcock St. NE., Suite 300, Palm Bay, FL 32905. December 1, 2006.
8	Michael Wielenga, Marine Resources Council. 2006.

COMMENTER #1

1. Indian River Lagoon Program (Troy Rice):

Comment #1-1:

Following review of the proposed TMDLS for the Indian River Lagoon the Indian River Lagoon Program would like to offer the following comments. The proposed TMDLs call for a substantial reduction of pollutant loadings in many segments of the Indian River Lagoon. This reduction is largely based on the ecological requirements of the seagrass community, a primary habitat and an essential component of the Indian River Lagoon ecosystem.

Since the 1940s, much of the Indian River Lagoon has experienced significant losses of seagrass acreage. This loss is largely attributed to changes in water quality resulting from increased pollutant loadings from both point and non-point sources. The proposed TMDLs would reduce pollutant loadings to enhance water quality to a point conducive to restoring and maintaining a healthy and productive seagrass community in the Indian River Lagoon.

The Indian River Lagoon Program supports this emphasis on improved water quality with attendant benefits to the seagrass community as this is consistent with the goals and objectives of both the Indian River Lagoon National Estuary Program Comprehensive Conservation and Management Plan and the Indian River Lagoon Surface Water Improvement and Management Plan.

This opportunity to provide comments on the Draft TMDLs for the Indian River Lagoon is appreciated. Please contact this office at your convenience should you have questions.

Response #1-1:

EPA appreciates the commenter's interest in and support for improving the water quality of Indian River Lagoon.

COMMENTER #2

2. **City of Cocoa Beach, Florida** (Scott Barber, Operations Manager, Water Reclamation Facility):

Comment #2-1:

The City of Cocoa Beach Water Reclamation Department Staff has reviewed the USEPA document entitled; "Proposed Total Maximum Daily Loads for the Northern and Central Indian River Lagoon and Banana River Lagoon, Florida, Nutrients and Dissolved Oxygen" dated September 2006. The loadings proposed in the document represent over a 90% reduction in the current permitted nitrogen and phosphorus annual waste load allocation and over a 70% reduction in current annual loadings even taking into account limited discharges to surface waters this calendar year. This correspondence documents the City's concerns regarding the technological and economic feasibility of compliance with proposed TMDL limits.

Response #2-1:

As you have noted, the WLA assigned to the City of Cocoa Beach Waste Water Treatment Facility (WWTF) represents approximately 93 to 94% reduction from the currently permitted annual nitrogen and phosphorus loads. However, the current permitted loads (54,676 lb/yr TN and 18,226 lb/yr TP) for this one facility exceed the *entire* TMDL allocations (39,830 lb/yr TN and 7,879 lb/yr TP) for all point *and* nonpoint sources in lagoon segment BR3-5. Based on 2001-2005 discharge monitoring data reported by the City of Cocoa Beach WWTF, the reductions that would be required from actual annual loadings are 68% of the average annual TN load and 54% of the average annual TP load. We understand that these reductions are significant, but a TMDL must, by law, be calculated to achieve water quality standards and it will take large loading reductions to meet the target for this segment of Banana River Lagoon. Concerns over achievability must be raised with regard to setting water quality standards for the waterbody. EPA attempts to be as equitable as possible in the process of determining WLAs for point sources while ensuring that the total WLA in the TMDL will not cause or contribute to an impairment of water quality standards.

Comment #2-2:

In the mid 1980s Cocoa Beach was one of the few wastewater facilities in the state to take a proactive approach in the development of an extensive residential reclaimed water storage and distribution system. In 1994 in order to comply with the Indian River Lagoon Act the treatment facility process was modified from contact stabilization to a two stage nitrification/denitrification process for additional nitrogen removal with additional expansion of the reclaimed distribution system with a wet weather discharge limited to 91 days at an average daily flow of 6 MGD. From 1984 to present the city has expended in excess of 13 million dollars to reduce nutrient loadings to the Banana River through an extensive reclaimed distribution and storage system and plant process modifications. With the current proposed loadings for the Cocoa Beach Water Reclamation Facility of a WLA for TN of 4022 lbs/yr (Table 7) it is doubtful that conversion to Advanced Wastewater Treatment Technology (AWT) will achieve these reduced TN loading limits even though as referenced in Section 8.4 of the document that this is still 15% of the loading allocation for segment BR3-5 for point sources with the other 85% being allocated for nonpoint sources.

Response #2-2:

The City of Cocoa Beach is to be commended on their past and present efforts to reduce nutrient loading (both point and non-point) to Banana River Lagoon. We understand that water reclamation is essential to meeting the local demand for water while decreasing pressure on limited water supplies. It is also clear that water reclamation is the primary means of effluent disposal in Cocoa Beach, and reduces the need for direct discharges to Banana River Lagoon.

Even though nonpoint sources and MS4 areas were allocated 85% of the TMDL for segment BR3-5, the required percentage reductions for point and nonpoint sources in the segment are about equal. Modeling estimates for actual total average annual loading to segment BR3-5, based on 30-year average rainfalls and 2001-2005 discharge data, are 88,831 lb/yr total nitrogen (TN) and 19,827 lb/yr total phosphorus (TP). These loads would require reductions of approximately 55% and 60% to meet the TN and TP TMDL allocations, respectively (see Table 6 in the TMDL document for the TMDL and "current" load estimates). The Load Allocations assigned to nonpoint sources and Municipal Separate Storm Sewer System (MS4) permittees in segment BR3-5 require reductions of about 55% for TN, and 62% for TP, while the combined Waste Load Allocation assigned to the Cocoa Beach WWTP (FL0021105) and the Cape Canaveral WWTP (FL0020541), both of which discharge to BR3-5, requires reductions of 55% for TN and 49% for TP. There is no doubt that it will be challenging to reduce loads from the Cocoa Beach water treatment plant. However, it will also be challenging to reduce loads from nonpoint sources and MS4 (urban) areas, especially in times of increasing development.

Since the TMDLs and WLAs are expressed as loads, reductions in either concentration or flow, or both, could be used to meet the allocations. Given that the current (2001-2005) average total nitrogen and phosphorous concentrations are relatively high (6.70 mg/l and 1.30 mg/l, respectively), and other facilities are presently achieving much lower concentrations, it would appear that there is opportunity to improve the quality of the discharge. For example, the Cocoa J. Sellers facility achieved an annual average TP concentration of 0.57 mg/l for 2001-2005 (see Table 8 of TMDL), and three WWTPs addressed in the document achieved TN concentrations below 2 mg/l (see Table 7 of the TMDL). Implementing the TMDL Waste Load Allocations as future permit requirements is the responsibility of FDEP.

Comment #2-3:

Currently the City reclaims approximately 90% of its effluent and has extended reuse service throughout the City but it has been an unusually dry season with limited surface water discharges to the Banana River. During wet weather conditions or hurricane events being able to continually implement a program to reclaim virtually 100% of available effluent may not be feasible due to variable influent flows along with reduced reclaimed water usage. How this could be accomplished, or how much it may cost at this time is still unknown.

Additionally the proposed TMDL loads are shown as a maximum annual limit and do not address the enforcement of these limits during periods of wet weather where reuse demand would be reduced resulting in increased surface water discharges to the lagoon. Some relief from these limits would be needed during these periods.

Response #2-3:

Extreme weather events, such as hurricanes, may be addressed by the facilities' NPDES permits, as established by the permitting authority, the Florida Department of Environmental Protection (FDEP).

As you have noted, the WLAs for facilities are expressed as maximum annual limits. How these annual loads should be translated into permit limits will be determined by FDEP. It should be possible to provide some flexibility for weather conditions, while still meeting the annual limits.

Comment #2-4:

Also Cocoa Beach should receive credit for stormwater quality improvements made throughout the City. Improvements over the last years have reduced the amount of sediment and nutrients that the lagoon receives. In addition there is a proactive dredging program within the City that is removing muck and additional sediments that have been deposited over the years in the City's major canals which are the major conduits for stormwater runoff to the Banana River Lagoon. Previously during storm events the muck and additional solids were resuspended in the canals and redeposited in the lagoon. This program has been on-going for the last 10 years and will continue for the next 5 to 8 years before entering a maintenance mode. These efforts have been done voluntarily by Cocoa Beach. The report and subsequent loading recommendations gives no consideration for these efforts. Stormwater ponds are being developed with the most notable the Maritime Hammock Stormwater Pond that will treat a major area of the City's stormwater runoff. There should be some process incorporated so that there would be some credit issued for the positive impacts of these voluntary projects.

Response #2-4:

Credit should be given to local governments for stormwater retrofit projects like the Maritime Hammock Stormwater project you described. Such credit should be applied toward meeting the TMDL after the appropriate load allocation has been established. Florida's Basin Management Action Plan (BMAP) process, which identifies specific projects, schedules, and funding sources to achieve applicable TMDL allocations, generally allows credit toward the TMDL for watershed activities that have already been implemented.

The modeling estimates provided in the TMDL do not reflect any nonpoint-source load reduction projects the City or other local entity has implemented, since the St. Johns River Water Management District (SJRWMD) did not have sufficient information about them at the time of modeling. In order to receive credit, it will also be necessary to provide adequate documentation of the load reduction being achieved by a given project either through direct monitoring or by providing information on the system's size, design and

operation that is sufficient to estimate the annual load reduction expected for its given service area.

Comment #2-5:
The City is requesting additional information regarding implementation schedules for the proposed rule and public forums. Additionally the City of Cocoa Beach reserves the right to challenge proposed TMDL's pending further review and evaluation. Thank you for your attention to this matter.

Response #2-5:

EPA is proposing to establish a TMDL for the Indian River Lagoon, and is not proposing an implementation plan for that TMDL. A TMDL and a TMDL implementation plan are different. A TMDL sets the maximum amount of a particular pollutant that can be received in a given waterbody while still attaining applicable water quality standards. EPA's regulations define a TMDL as: "[t]he sum of the individual [wasteload allocations] for point sources and [load allocations] for non-point sources and natural background." See 40 C.F.R. § 130.2(i). An implementation plan describes how the level of that pollutant can and will be brought down to or kept under the TMDL. While TMDLs are a necessary step before any implementation plans can be formulated, the Clean Water Act and its implementing regulations place the responsibility for implementing TMDLs with the State. States implement TMDLs through the state continuing planning process, state NPDES permits, and state non-point source pollution controls.

The comments regarding further review and evaluation are noted.

COMMENTER #3

3. **City of Cocoa Beach, Florida** (Darby Blanchard, Utilities Director, Water Reclamation Facility):

Comment #3-1:
We have reviewed the USEPA document entitled, "Proposed Total Maximum Daily Loads for the Northern and Central Indian River Lagoon and Banana River Lagoon, Florida" dated September 2006. Proposed TMDL's for the Cocoa Beach WWTP represent greater than a 90% reduction in the currently permitted discharge limits for Total Nitrogen (TN) and Total Phosphorus (TP). This correspondence documents the City's concerns regarding the technological and economic feasibility of compliance with proposed TMDL limits.

Response #3-1:

This concern is very similar to Comment #2-1. Please see the response to that comment.

Comment #3-2:
At this time, the City of Cocoa Beach is limited to 91 days of "wet weather" discharge at a design flow of 6 mgd. Current TN concentrations are less than 7 mg/L, the monthly average permit limit is 12 mg/L. Under current conditions, the City can discharge approximately 54,000 pounds of TN annually. The proposed TN limit is 4,022 pounds. Proposed limits for TP are 1,063 pounds.

Response #3-2:

Please refer to the response to Comment #2-1 for a discussion of current permitted loads.

Comment #3-3:
Using Advanced Wastewater Treatment technology (AWT), TN levels may be reduced to 3 mg/L; however, reducing TN below that level is problematic. Assuming that AWT processes are implemented, corresponding TN discharge volumes will be approximately 13,500 pounds based on 91 days of wet weather discharge.

In order to meet the target TN allocation of 4,022 pounds, a 70% reduction of the City's permitted discharge would be required. The City already reclaims approximately 90% of its effluent and has extended reuse service throughout the City. Implementing a program to reclaim virtually 100% of available effluent may not be technologically feasible due to variable influent flows and reclaimed water usage patterns. It is unknown, at this time, how this could be accomplished, or how much it may cost. Any program of this nature would certainly represent a substantial cost and potentially be a financial hardship.

Response #3-3:

The responses to Comments #2-1, 2-2, and 2-3 address these concerns. Implementing the TMDL Waste Load Allocations as permit requirements is the responsibility of FDEP.

Comment #3-4:
The City is requesting additional information regarding implementation schedules for the proposed rule and public forums. The City of Cocoa Beach reserves the right to challenge proposed TMDL's pending further review and evaluation. Thank you for your attention to this matter.

Response #3-4:

Please refer to Response 2-5.

COMMENTER #4

4. **The Nature Conservancy** (Michael McManus, Senior Aquatic Ecologist):

Comment #4-1:

I have read both the Proposed Total Maximum Daily Loads for the Northern and Central Indian River Lagoon and Banana River Lagoon, Florida by the Environmental Protection Agency and the Pollution Load Reduction Goal Report by Messrs. Joel Steward and Whitney Green of the St. Johns River Water Management District. I appreciate the opportunity to comment on the proposed TMDLs, and I have discussed my comments and questions with Mr. Steward.

Response #4-1:

Thank you for taking the time to review the Indian River Lagoon reports.

Comment #4-2:

I am quite impressed by both reports in their marshalling of data and scientific literature to describe the complex relationships between seagrass, other primary producers, such as drift algae and attached macroalgae, and nutrient loads. I have several comments and questions. Specifically, I have three concerns with the regression analysis. My first concern is that there needs to be a logical consistency between the cause and effect relationship between nutrient loads and seagrass health and the regression analysis quantifying that effect. The regression analyses that were done had nutrient load as the response variable and percent departure from seagrass target depth as the independent variable. However, on page 15 of the proposed TMDL the mechanistic relationship between nutrient loads and seagrass health is ". . .based upon the principle that increased nutrient loads lead to both direct and indirect causes of light attenuation that limit the ability of seagrass to thrive." Based on that description, the regression analysis would have departure from seagrass target depth as the response variable and nutrient load as the independent variable. This proposed regression analysis is consistent with the mechanistic relationship between nutrient loads and seagrass health and still allows for an estimation of loading from percent departure from seagrass target depth.

Response #4-2:

The correct mathematical representation of the cause-and-effect relationship does indeed require that percent departure from the seagrass target be the response variable. But, following that, it should also be clear that the analysis requires the regression variables be switched in order to calculate a predicted load limit based on a pre-defined percent departure. In response to your comment, this explanation has been added to the description of the regression models.

Comment #4-3:

My second concern with the regression analysis is that only simple linear regression models are considered. If the proposed regression analysis with separate, simple linear

regressions of seagrass depth vs. nitrogen loading and seagrass depth vs. phosphorus loading can be done, then a multiple regression analysis could also be done with both nitrogen and phosphorus loadings included as independent variables in the same model. Such an analysis comparing regression models may' determine that a combination of the different loadings has more of an effect on seagrass depth than an analysis that uses only a single independent variable.

Response #4-3:

As you are aware, the regression analysis involves loadings (flow x concentration) and the loading parameters -- TN, TP, and TSS -- are highly correlated to one another. As such, their lack of independence make it more appropriate to develop the load vs. percent departure relationships as separate regression models. Nonetheless, the scientists at the SJRWMD did calculate multiple linear regressions. In every case, they found that there was no significant improvement in the prediction of seagrass depth beyond that provided by the strongest individual parameter.

Comment #4-4:

My third concern is based on the direct and indirect effects of nutrient loading described on page 15, the literature cited on page 20, and figure 3 on page 21. The description on those pages, along with the graph, suggests that another independent variable that should be considered in the monitoring of the TMDL implementation is drift algae biomass or drift algae cover. Based on the rationale given on those page, if TMDL implementation is successful then we would expect to see the percent departure from seagrass target depth decrease along with decreases in algae density.

Response #4-4:

Agreed. In fact, a few years ago SJRWMD implemented a lagoon-wide survey of drift algae abundance. Two annual surveys are now completed; the latter one was represented in that graph you referenced. The survey was justified based on the possible habitat value of drift algae, the fact that its biomass is up to 3 times that of seagrass in many IRL segments and thus a potential nutrient sink and source (die-off), and that drift algae may present a physical/shading constraint on seagrass depth distribution. The SJRWMD intends to make the drift algae monitoring project a permanent programmatic "fixture" along with seagrass mapping.

Comment #4-5:

Related to this discussion of response variable and independent variables, and the target depths in figure 4, I have some questions regarding the implementation of the TMDL. What is the timescale for achieving those target depths? What agency will be responsible for obtaining the data on seagrass depths, and what agency is responsible for obtaining the loading data?

Response #4-5:

These issues will be discussed and hopefully resolved during FDEP's B-MAP (Basin Management Action Plan) process in which the TMDLs are allocated among responsible jurisdictions, monitoring responsibilities are laid out, etc. The TMDL and PLRG reports you reviewed were not intended to address these issues. Questions regarding implementation should be directed to FDEP.

Comment #4-6:

A different concern I have is with the graphical presentation of the seagrass depth medians presented in Figure 4 on page 23. Those data should be presented as boxplots, which will show the median, so that the variation around those medians is displayed. Presenting that variation will convey to readers that yearly variation in seagrass depth may be affected by larger scale environmental factors, such as the effect of El Nino on seagrasses in Tampa Bay and Sarasota Bay (Dawes et al. 2004).

Response #4-6:

Medians are less influenced by yearly variation than other measures of central tendency, such as arithmetic means. While the variation around seagrass depth medians is useful information, there are several reasons why the charts in Figure 4 were presented as simple bar charts, rather than box plots as you suggest. First, the program used to generate the charts (Microsoft Excel) does not offer box plots as an optional chart type. Second, it is usually easier for the general public to understand a bar or column chart anyway, since those types of graphical presentations are more common than box plots. Third, the charts were intended to convey information comparing the median seagrass depths for various years against the respective target for each segment. As such, the charts are already presenting a large amount of information: up to eight years of seagrass depth medians, plus a target, for between 4 to 6 lagoon segments per chart. Adding information about the lower and upper quartile, and largest and smallest observation for each year would make the figures almost impossible to read. Since the change you are requesting would not affect the end result (i.e. TMDL loads) at this time, the figure has been left as is.

Figure 2 (p. 926) of Steward et al. (2005) displays coefficients of variation (CVs) for seagrass acreage in each segment. It also shows a relative measure of depth-limit stability for reference segments, i.e. those segments with good seagrass coverage and that have relatively low degrees of variability among mapping years. The data used to generate the plots of seagrass median depths is also included in the Administrative Record for the TMDLs.

Reference cited above:

Steward, J.S., R. W. Virnstein, L. J. Morris, and E. F. Lowe. 2005. Setting Seagrass Depth, Coverage, and Light Targets for the Indian River Lagoon System, Florida. *Estuaries* 26:923-935.

Comment #4-7:

I understand that developing a TMDL for the Indian River Lagoon is a new process and appreciate your willingness to discuss different analyses and data sets. By doing so I think a scientifically sound TMDL can be produced that supports a macrophyte-based aquatic ecosystem within the Indian River Lagoon. Please contact me if you have any questions regarding my comments.

Response #4-7:

Thank you for your support of the ultimate objective for both the Pollutant Load Reduction Goal (PLRG) study and the TMDL: to limit pollutants in order to preserve and protect natural populations of aquatic flora and fauna in the Indian River Lagoon ecosystem. Now that we have had the opportunity to answer your questions, we hope you agree that the TMDLs are scientifically sound and supportive of this goal.

COMMENTER #5

5. **City of Cocoa, Florida** (Everett Wegerif, Deputy Director of Utilities):

Comment #5-1:

The City of Cocoa ("Cocoa") Utilities Department Staff has reviewed the referenced document ("TMDL Proposal") and offers the following comments. In selecting only certain points upon which it offers these comments, Cocoa does not imply its acceptance of the validity of any other aspect of the TMDL Proposal and reserves its right to comment upon or contest the TMDL Proposal in whole or in part at any point in the future.

Response #5-1:

Comment noted.

Comment #5-2:

The nutrient loadings, specifically Total Nitrogen ("TN"), proposed in this document represent a decrease of over 85% from Cocoa's existing NPDES Total Nitrogen Waste Load Allocation. Cocoa has complied with the Indian River Lagoon Act and has spent much effort and expense over the last 15 years to develop a reclaimed water distribution system to prevent pollutants from entering the Indian River Lagoon. Given these efforts, as further detailed below, Cocoa respectfully urges the EPA to reconsider the proposed nutrient loading levels.

Response #5-2:

The City of Cocoa is to be commended for their ongoing efforts to reduce nutrient loading to Indian River Lagoon, including the development and operation of a reclaimed water distribution system. You are correct that the WLA reserved for total nitrogen (TN) from the Cocoa WWTP is 86% lower than the current permitted load. However, the current permitted load is over seven times greater than the actual average annual discharges released by the WWTP, based on 2001-2005 discharge monitoring data. The TN allocation assigned to the Cocoa J. Sellers WWTP is equivalent to this average annual load (2001-2005). Thus, the facility is assigned what it has been discharging over these five years. Implementing future NPDES permit requirements consistent with the TMDLs is the responsibility of FDEP.

Comment #5-3:

As an initial matter, Cocoa would note that the recent hurricanes of 2004 and 2005 have demonstrated the impacts that unusual weather patterns can have on the amount of nutrients entering the Indian River Lagoon. During the 12 month period preceding the 2004 hurricanes, Cocoa's TN loading was approximately 3,200 pounds; by contrast, the annual TN loading for the same facility peaked at 19,600 pounds in February 2006 following a wet fall and winter and compounded by the heavy rainfall produced by Hurricane Wilma in late 2005. Inasmuch as the proposed TMDL loads are shown only as an annual limit, they fail to address the extraordinary effects of these unusual wet weather periods. These recent meteorological events and their easily observed impacts on nutrient discharge loadings would seem to dictate that allowances must be given to account for the results of the increased nutrient loading resulting from these unusual weather episodes. To fail to do so imposes an unjustified burden on responsible utilities, such as Cocoa, which have taken all reasonable steps to reduce their nutrient discharges as far as practicable.

Response #5-3:

Please see Response #2-3 for a discussion of extreme/unusual weather events and also of maximum annual limits. The 2001-2005 time period chosen for the Waste Load Allocation calculations included both wet and dry years above and below the long-term rainfall average.

Comment #5-4:

Cocoa has discharged to the Indian River Lagoon since the construction of its collection system in 1925. Since completion of an Advanced Waste Treatment facility in 1989 and expansion of its reclaimed water distribution system, TN nutrient loadings to the lagoon have been decreased to just 5-10% of their historical values. Cocoa has also improved non-point water quality through construction of numerous stormwater treatment facilities. These improvements have resulted in the restoration of seagrass depths to, and beyond 1943 levels (Figure 4 IR segment 6-7). These on-going water quality

improvements are resulting in continual improvements in our river segment as demonstrated in Figure 4. As a consequence, further TN loading restrictions on our segment of the IRL do not appear to be justified, particularly in light of the flaws in the data analysis presented in the TMDL Proposal as outlined below.

Response #5-4:

The point and nonpoint source load reductions that have been achieved by the city of Cocoa and other municipalities have undoubtedly resulted in improvements in Indian River Lagoon water quality. In some segments, seagrass depth medians may meet or exceed 1943 levels. Since 1943 did not represent the furthest extent of seagrass coverage in many segments, the seagrass depth targets for the TMDL are based on a -10% departure from full-restoration conditions. Additional details about the development of these full-restoration targets are provided in the TMDL document.

Comment #5-5:

The following additional comments are offered by Cocoa staff for consideration:

1. *The Seagrass goals shown in Figure 4 and derived in Appendix C are based on analysis which is flawed. A benchmark point used in the study is a 1943 black and white aerial photograph. Without explanation, no other aerial photos or data points from 1943 until 1986 were used. Many assumptions were used in including the 1943 data, with no "ground truthing" to verify the edge of the grass beds and to differentiate areas of floating grass and algae from submerged aquatic vegetation. This verification should be a required quality control step to assure that the assumptions are valid, but was either not done or omitted from the TMDL Proposal. Instead, the basic quality control procedure was apparently performed on infra-red color photographs from 1986 on, but was obviously not done in 1943. Relying on data from a 60-year old black and white photograph without ground truthing raises many questions as to the accuracy of this assumed benchmark.*

Response #5-5:

The methodology used to determine the seagrass depth targets and corresponding nutrient load targets are based on years of research conducted by Joel Steward, Whit Green, and others at the St. Johns River Water Management District (SJRWMD).

The union coverage method was used to develop the depth-limit targets utilizing seven mapping years including 1943. The scientists at SJRWMD looked for, but did not find, *lagoon-wide* (Turnbull to Ft. Pierce) aerial photos for any years between 1943 and 1986. Furthermore, the method requires that both land cover (to develop load estimates) and seagrass coverage be developed from aerial photos taken preferably within the same year- or at least no more than two years apart. The only years or pairs of years that fit that requirement were 1943 (LC and seagrass), 1995 (LC) with

1996 (seagrass), 1999 & 2001(seagrass) with 2000 (LC). The data from these years were quite sufficient for this type of analysis because they represented a broad range of conditions (drought and above-average rainfall and low to high development conditions).

This union coverage method with the inclusion of 1943 mapped coverage was peer-reviewed and published (Steward et al., 2005). The 1943 coverage and the method by which it was mapped were also published in other papers (Virnstein 1999; Virnstein 2000; and Virnstein et al. in press). A black & white aerial photo does show seagrass coverage well and can distinguish floating from rooted plants. Black & white photos continue to be used by other seagrass programs like the one in Chesapeake Bay. However, SJRWMD uses color film in order to extract additional information from the photos (e.g., land and shoreline features, impounded marshes, etc.). Despite the absence of groundtruthing, the 1943 mapped coverages are deemed fairly accurate. For example, where there is good reason to believe that seagrass coverage has remained fairly stable (northern Banana R. Lagoon, southern Mosquito Lagoon, and northern IRL), the 1943 maps are, in fact, very similar to recent maps (1986 onward).

Even though the 1943 coverage can be considered a restoration benchmark, it does not serve as a full restoration target and was not the basis for determining the TMDLs. To reiterate, the union coverage method established the full restoration targets, and the TMDLs were based on a 10% departure from these full restoration targets. The 1943 coverage did not singularly have a large degree of influence on the union coverage deep-edge boundary and full restoration target. For example, in segments BR3-5 (Cocoa Beach) and IR6-7 (Cocoa), the 1943 coverage provided only 25% and 24% of the union coverage deep-edge points, respectively. For those two segments, most the union coverage deep-edge points were provided by the years 1996 and, especially, 1999.

References cited above:

Virnstein Robert W., 1999. Seagrass Meadows: Fish and wildlife factories. *Florida Naturalist* 72(2): 18-19

Virnstein Robert W., 2000. Seagrass management in Indian River Lagoon, Florida: dealing with issues of scale. *Pacific Conservation Biology* 5: 299-305.

Virnstein, Robert W., J.S. Steward, and L.J. Morris. In Press (2007). Seagrass coverage trends in the Indian River Lagoon system. *Florida Scientist.*

Comment #5-6:

2. *Setting TN loads based on seagrass depth goals relies on a process that has not been used anywhere else to set TMDLs to our knowledge. This is a very experimental process involving a myriad of assumptions. Indeed, using seagrass depths instead of seagrass coverage area adds uncertainties. One of these uncertainties is the assumption that the bottom contours of the lagoon have remained the same from 1943 to the present. Available information not included in the TMDL Proposal would show that this is not a valid assumption.*

Response #5-6:

The TMDL approach is not "experimental"; it is based on years of research on seagrass ecosystems and is consistent with Florida's narrative water quality standards which protect waters from anthropogenic nutrient enrichment and concentrations that cause an imbalance in natural populations of aquatic flora or fauna. It is widely accepted in the scientific community that the health of submerged aquatic vegetation (seagrasses) is an important indicator of the ecological condition of estuaries. This is supported by many programs that have been established to monitor seagrass health and distribution in U.S. estuaries, including Long Island Sound, Chesapeake Bay, Albemarle-Pamlico Estuarine System, etc, and in estuaries around the world. Light attenuation and/or seagrass distributions are the focus of estuarine restoration/management plans in Florida, e.g., Charlotte Harbor, Lemon Bay and Tampa Bay. There are also established nutrient TMDLs for Tampa Bay that target seagrass preservation and recovery through improvements in water clarity (i.e. reductions in light attenuation). Specifically, the TMDLs related nitrogen levels to chlorophyll-a concentrations in bay segments.

Assumptions are a necessary part of any modeling endeavor. With respect to bottom contours or elevations, it has not been stated that bottom elevations remained unchanged since 1943. What has been asserted is that bottom elevation has kept pace with sea level rise since 1943 due to the rate of sedimentation. Therefore, recent bathymetry (1996 in this case) can be applied to the 1943 seagrass maps as well as to recent seagrass maps to obtain accurate seagrass depth-limit distributions. This point was addressed to the satisfaction of peer reviewers in a published paper on IRL seagrass targets (Steward et al., 2005). This paper can be sent to the commenter upon request.

Court decisions have held that while science continues to improve, EPA cannot simply defer action until all uncertainties are resolved. In a case regarding (Region 2) EPA's decision to approve TMDLs for phosphorous for eight New York reservoirs, the court ruled that: "As all the parties recognize, additional research oriented to the specific conditions of New York's reservoir would be optimal. In the meantime, EPA's hands are not tied just because it must act based on scientific knowledge that is incomplete or

disputed. "In the face of conflicting evidence at the frontiers of science, courts' deference to expert determinations should be at its greatest." Cellular Phone, 205 F.3d at 90. Therefore, EPA's determination that New York can formulate its TMDL for phosphorus using an aesthetic criterion is not arbitrary and capricious at this point in time." (NRDC v. Muszynski, 268 F.3d 91 (2nd Cir. 2001)).

Comment #5-7:

3. There appears to be a fundamental problem in relating seagrass depths to seagrass coverage areas. A statement in the Introduction of Appendix C indicates that Banana River Segment 3-5 had greater seagrass coverage (area) in 1999 than in 1943; however, Table 4 shows the exact opposite with significantly lower (15%-20%) seagrass median depths in 1999 as compared to 1943. Using changes in seagrass depths instead of area coverage to set loadings in this segment shows clearly that this approach can produce erroneous results.

Response #5-7:

This is an insightful observation by the commenter, but it does not demonstrate any problem with using seagrass depth limits in the analyses.

There are approximately 400 acres of relatively shallow areas mid-lagoon in BR3-5 covered with seagrass in 1999, but in 1943, that coverage is not apparent. This is a rare situation or phenomenon in which recent coverage (acreage) can be greater than 1943 coverage but recent depth-limit distribution can be shallower than in 1943.

The same phenomenon occurred in segments IR4 and IR5. Shallow areas that were covered in seagrass in 1986 (IR4) and 1999 (IR5) were not apparent in the 1943 imagery. Consequently, the acreages of seagrass in the contemporary years were higher (slightly) than in 1943, but the median *depth* extent of seagrass actually decreased.

These examples highlight the fact that changes in seagrass acreage and seagrass depth distribution are not covariant, and that seagrass *acreage* changes do not necessarily indicate changes in water quality (transparency). The choice of *depth limit,* rather than area, in the regression analysis more appropriately places the emphasis upon water quality and pollutant loads, the primary determinants in how *deep* seagrass will expand.

Comment #5-8:

4. Seagrass depths were also used to extrapolate nutrient loadings through regression analysis. These regression relationships show poor correlation in many segments, especially in the Northern Indian River Lagoon, which includes the Cocoa segment, IR6-7. A different calculation was used in the Northern IRL segment to set phosphorus loadings because of the poor data fit. In fact, regression plots referred

to in section 8.5.1 that would show this poor fit were completely omitted from the published report and its supporting document (PLRG study appendix C, and its appendices A and B) posted on the EPA website. This poor correlation points to factors other than nutrients that control seagrass growth in these areas and further indicates additional flaws in this approach.

Response #5-8:

Estuaries are complex systems and there are certainly factors other than nutrients that effect seagrass growth (e.g., salinity, suspended matter concentration and color). The commenter does not define or quantify the term "poor correlation". A comparison of the coefficient of determination in regression analyses using the HSPF model loads and the PLSM model loads reveals R^2 of 0.473 and 0.432, respectively, for total phosphorus in the North IRL. Although this shows some amount of unexplained variability in the regression, the strength of the relationships are significant as reflected by their p-values (0.003 and 0.006). (The correlation coefficients (r) for those same two regression analyses above are good: 0.69 and 0.66, respectively.)

The statement implying that a different calculation was used to determine the phosphorus loadings in the North IRL because of a poor data fit is misleading. The HSPF estimates of total phosphorus were chosen over those of PLSM because of the slightly stronger fit represented by the statistics above. The deliberate choice of using either HSPF or PLSM loads in the regression analyses was explained in the methods section of Appendix C and is a valid approach.

Comment #5-9:

5. *In addition, data points were left out of the regression analysis with no explanation. Only three data points were used in table 2 in appendix C to set nutrient loadings for each sub-lagoon. However, there were other data points available that were not used For example, data for 2001 was not used in the North IRL and Banana River Lagoon segments, and 1943 data was not used in the Central IRL Basin. The reader is left to guess how the results would change if all data sets were used.*

Response #5-9:

It is unclear what the commenter means by "data points"; but, if this is a reference to 'n' (the number of datapoints), please note that 'n' ranged from 11 (Banana River) to 16 (North IRL) in the regression analyses. The fact that only 3 or 4 years are represented in the regression model is not a problem given the fact that those years represent a fairly wide range of rainfall, land cover, and loading conditions. Capturing wide variability is more important in modeling than capturing a minimum number of years. The TMDL document and Appendix C explain that there were no seagrass maps for North IRL or Banana River in 2001. As a result, it was impossible to include that year in the regressions for either sub-lagoon. The explanation

for not including 1943 data in the Central IRL model—the probable impact of Sebastian Inlet's closure—is also provided in Appendix C (PLRG report).

Comment #5-10:

6. *Seagrass depths in the TMDL study are related to seagrass coverage areas for all years through a single bathymetric data set collected in 1996. Using this same data set for 1943 data point appears to ignore impacts of the 1953-1961 dredging activity related to the Atlantic Intercoastal Waterway, the associated creation of spoil islands, and other numerous dredge and fill projects between 1943 and 1996.*

Response #5-10:

Seagrass depth-limits were estimated from the union of mapped seagrass coverages for 1943, 1986, 1989, 1992, 1994, 1996 and 1999 (not just the 1943 coverage). Dredge features were not ignored in the union coverage analysis. Any depth points that were in or near dredge features were removed in order to eliminate that influence or potential bias in the determination of seagrass depth limits. The rules for eliminating depth points from the analysis (associated with dredge features and other features in the lagoon) are described in detail in Steward et al. (2005).

Comment #5-11:

7. *Mosquito Lagoon, which has very little impact from development and human activities, was not included in this report, even though it is part of the IRL system; most likely because it would show extremely poor correlation if the same analysis methods were used. Seagrasses do not grow at great depth in Mosquito Lagoon, even with low nutrient loadings. This reinforces the fact that there are many factors other than nutrient loading that impact seagrass growth. Data exists for Mosquito Lagoon, but it was not evaluated, again without explanation for its omission. These data should be included so that a reasonable evaluation of the selected methodology applied elsewhere in the IRL can be made.*

Response #5-11:

Mosquito Lagoon was not included because TMDLs are not required for that region at this time. If in the future TMDLs for Mosquito Lagoon become necessary, the unique characteristics of the waterbody will be considered when evaluating potential approaches to TMDL development. Unlike Indian River and Banana River Lagoon, there has been little variation in seagrass depth and external nutrient loadings to Mosquito Lagoon over time. This point has no direct bearing on the validity of the models used for Indian River and Banana River Lagoons.

Comment #5-12:

8. Conversations with Joel Steward, the author of the PLRG study, Appendix C, confirmed that there have been impacts other than nutrient loading that could prevent seagrass growth from reaching goals. These include changed bottom contours due to dredging from 1943 until now, organic sediment build-up over the years, and sediment re-suspension from wind-driven waves and boat wakes. Additional impacts to seagrass recovery include intensive manatee grazing near power plant thermal outfalls in the IR 6-7 segment and shellfish harvesting activities near seagrass bed edges. No amount of improvements in point source nutrient load reduction will allow the proposed seagrass goals to be met in the IR 6-7 segment because of these extraneous influences on seagrass growth.

Response #5-12:

While it is true that other "non-light" factors can play a role in determining seagrass depth limits, the overwhelming factor is the amount of downwelling light, which is controlled by water quality (transparency) and pollution load reductions. Dredging (contour changes) does not necessarily change the depth distribution of seagrasses, but it can change their acreage cover. We are not aware of any documentation that would support the commenter's claims about significant seagrass losses due to manatee grazing or shellfish harvesting. Moreover, for those two activities to appreciably impact seagrass depth limits (which is what the approach is based on), grazing and harvesting would need to be fairly substantial or widespread along the deep-edge margins of grassbeds. According to SJRWMD, this has not been observed.

Comment #5-13:

9. The Proposed TMDL loadings for the Sellers WRF are proposed as Maximum Annual Loads. These loads should not be imposed on a calendar year basis because to do so would fail to take into account excursions in nutrient discharges and could unfairly penalize the utility for events out of its control. Excursions are more fairly accounted for using a multi-year (5-7 years) rolling average with exceptions for periods with unusually high rainfall. The validity of this methodology and the intent of the report was verbally conveyed by Joel Steward, the author of the PLRG study, Appendix C. He indicated that seagrasses are resilient, and that poor conditions in one year will not cause significant loss of seagrass. He said that recent data collected after the two hurricane years of 2004 and 2005 did not reflect serious negative impacts to seagrass. These were years with not only higher than normal point nutrient loads, but higher nutrient loads from non-point sources. The ability to average loadings over several years and to make allowances for extreme rainfall years should be addressed by EPA.

Response #5-13:

Please see Response #2-3 for a discussion of permitting for extreme/unusual weather events and also of maximum annual limits. The waste load allocations (WLA), which were agreed upon by EPA, DEP and SJRWMD,

were derived from monthly operating reports for the years 2001 through 2005, a period that included both wetter and drier than normal years. The Cocoa J. Sellers facility was allotted an annual TP WLA equivalent to the 95th percentile load of TP discharged over that five-year period. In other words, 95% of the time the facility did not exceed this annual load of TP, a condition that should be achievable in future years. The average annual load of TN for the same five-year period was used, due to the relatively high load and high concentration in the discharge.

The need for load reductions in IR6-7, and other lagoon segments, is discussed at length in the TMDL document and PLRG report. For all sources (point and nonpoint) in segment IR6-7, these reductions are 33% and 46% for TN and TP, respectively. The Load Allocation (LA) requires that nonpoint sources and MS4 urban areas reduce their current loadings of TN by 36% and of TP by 53%. In contrast, no reductions are being required of the Cape Canaveral Power Plant, one of the two dischargers to IR6-7, as it was assigned an allocation equal to its currently permitted nutrient loads. Nutrient allocations for Cocoa J. Sellers WWTP, the other point source discharge to segment IR6-7, were described in the paragraph above. The nonpoint sources and MS4 urban areas in IR6-7 are required to reduce their loadings as much or more than facilities such as the Cocoa J. Sellers WWTP, whether these reductions are considered as an annual load (lbs/yr) or as a percentage of the current load.

Comment #5-14:

10. Cocoa (and other MS4 permittees) has not received any "credit" for stormwater quality improvement in the TMDL Proposal. Due to these improvements, a majority of stormwater that flows from Cocoa to the lagoon receives some level of treatment to remove nutrients and/or suspended materials. These efforts were done voluntarily by Cocoa at a great cost over the last 10 - 15 years; yet the analysis gives no consideration to the reduction in nutrient loading from these efforts. Stormwater ponds developed in existing slough areas (Bracco Stormwater Pond) would appear to add nutrients and suspended solids in the TMDL calculations, when in reality they remove nutrients and suspended solids. Due regard needs to be given to these voluntary projects when final discharge limitations are set.

Response #5-14:

Please see Response #2-4 for a discussion of crediting stormwater quality improvement projects.

Comment #5-15:

11. The same Event Mean Concentrations of Nutrient Loadings presented in Table 12 were used for all years of analysis. Applying the same assumed loadings to 1943 development and to 2001 development is not accurate. Many streets in 1943 were

unpaved and stormwater treatment was unheard of. Conversely, development since the early 1980's incorporates Best Management Practices in stormwater treatment. Using the same value for both developments cannot be accurate and does not give any credit for water quality improvements resulting from modern stormwater treatment facilities. On a larger scale, it is also not clear if recent efforts to reduce or eliminate discharges at C-1 have been included in the analysis.

Response #5-15:

Loading from development occurring after 1989 aerial photography was reduced based upon the assumption that stormwater was being treated according to state rule criteria. This was noted in the "PLSM Calibration" section of the TMDL document.

To our knowledge, the C-1 re-diversion project has not been implemented; therefore, no reductions of C-1 discharges have occurred.

Comment #5-16:

12. *Atmospheric deposition of nitrogen has not been adequately addressed in the analysis. Appendix C indicates that atmospheric loadings do not "provide any significant contribution to the regression analysis at a confidence level, a=0.15". USGS data indicates that estimated annual atmospheric deposition of nitrogen in this area is between 0.9 and 1.3 tons per square mile. This corresponds to TN loadings between 2.81 and 4.06 lb/ac/yr. This is not insignificant when compared to the proposed TN loadings of 2.18-2.89 lb/ac/yr shown in Table 4. Additional USGS studies in South Texas (USGS Fact Sheet FS-146-99) confirm this TN loading. In that study TN loading varied between 1.57-3.79 lb/ac/yr. with an average value of 2.76 lb/ac/yr. Because nutrient loading data has been log-transformed, linear regression models would not show accurate results with such a significant omission.*

Response #5-16:

Applying atmospheric deposition estimates to the entire drainage basin will overestimate the contribution of atmospheric deposition. Atmospheric deposition over land is included in the watershed runoff loads. The portion that falls directly upon the open waters of the IRL was analyzed and found to provide no independent contribution to the relationship between seagrass depth and watershed loads (the year-to-year variance in atmospheric TN loading is mainly a function of rainfall volume, not change in concentration). So, statistically, atmospheric loading was not significant. This result was unchanged whether the loading data were log-transformed or not. Regardless, the contribution from the atmosphere to the IRL's total load cannot be addressed or remedied through the TMDL process (it would require regulation of air emissions). Moreover, in this particular situation, if a portion of the TMDL were allocated to atmospheric deposition, then the allocations to other sources would have to be further reduced.

Comment #5-17:

13. *Was the TMDL document or Appendix C on which it was based, reviewed by an outside agency or consultant? Neither Peer Review nor QA/QC procedures were referenced in the TMDL Proposal. Cocoa staff would appreciate the opportunity to review any comments provided through any peer review or QA/QC reviews that were undertaken.*

Response #5-17:

The subject matter of Appendix C (PLRG report) has already gone through considerable review among impartial peers from different sections of the SJRWMD, EPA, and FDEP. Portions of the document dealing with seagrass targets have already been peer-reviewed and published in the journal *Estuaries*. Further, the PLRG document (Appendix C) is currently under review by that same journal (now re-named *Estuaries and Coasts*). The SJRWMD has offered to send this information to commenter.

COMMENTER #6

14. **Florida Power and Light Company** (Jim Brawner, Senior Environmental Specialist, Environmental Services Department):

Comment #6-1:

Florida Power & Light Company (FPL) appreciates the opportunity afforded by the EPA to provide comments on the draft TMDL for segment 2963D regarding the Indian River Lagoon in Florida. FPL operates its Cape Canaveral Power Plant located on IRL segment 1R6-7 on the Indian River. FPL is identified as one of the point sources in the proposed TMDL operating under Facility ID FL0001473. FPL has reviewed EPA's proposed TMDL for this segment and offers the following comments:

(1) The PLRG study (attached as Appendix C to the TMDL) upon, which EPA appears to heavily rely, is only a draft report; and apparently has not been made final This draft study, as such, does not appear to have undergone peer review. We are concerned that EPA is making potentially costly TMDL determinations based on a single "on-going effort" without obtaining a more complete scientific picture of the water body's behavior.

Response #6-1:

Please see Response #5-17 regarding peer review of the PLRG research and Response #5-6 regarding EPA decision-making in the context of ever-evolving science. According to Joel Steward of the SFWMD, the District anticipates issuing the PLRG report shortly as a District publication. The PLRG report has already been through both internal and external technical review, so no further technical changes are planned. It has also been submitted as a journal article to "Estuaries and Coasts". It is not uncommon for a draft PLRG to be incorporated into SWIM plan updates

and implementation projects. EPA has had opportunity to review the PLRG, and considers it a satisfactory basis for the TMDLs.

Comment #6-2:

(2) We are concerned that lagoon segments used in the TMDL and PLRG study were drawn somewhat arbitrarily, and without regard to the water body's actual behavior or the impact that such segmentation would have on a fair TMDL allocation.

Response #6-2:

The process of creating lagoon seagrass segments was as objective and statistically valid as possible. Most of the lagoon segments are bounded by causeway bridges, which induce some limited circulatory constriction. Data collected from physical monitoring of seagrass beds, water quality and runoff metrics were used in multivariate statistical analyses to differentiate or cluster distinct seagrass/water quality segments. The segmentation method is explained in Section 8.3 of the TMDL document. A more detailed description of the segmentation process may be found in Sigua et al. (1996), and is also briefly explained in Steward, et al. (2003) and Steward et al. (2005).

References cited above:

Sigua, G., J.S. Steward and W.A. Tweedale. 1996. Indian River Lagoon water quality monitoring network: Proposed modifications. Technical memorandum 12, St. Johns River Water Management District, Palatka, FL.

Steward, J.S., R. Brockmeyer, R. Virnstein, P. Gostel, P. Sime and J. VanArman. 2003. Indian River Lagoon Surface Water Improvement & Management Plan, 2002 Update. St. Johns River Water Management District, Palatka, Florida, and South Florida Water Management District, West Palm Beach, Florida.

Steward, J.S., R. Virnstein, L. Morris, E. Lowe. 2005. Setting seagrass depth, coverage, light targets for the Indian River Lagoon system, Florida. *Estuaries* 28:923-935.

Comment #6-3:

(3) FPL is concerned that an allocation comprised solely of its existing permitted load significantly impacts the Cape Canaveral facility's ability to comply with a condition in the site's Consumptive Use Permit, requiring the site to utilize reclaimed water provided by the Bravard County's Port St John Waste Water Treatment Plant.

Response #6-3:

According to the March 15, 2005 Amendment to the Fact Sheet for Cape Canaveral Permit No. FL0001473, the use of treated effluent from the Port St. Johns facility, in lieu of a groundwater source, was taken into account when increasing the permitted nutrient load limits to their current levels. As such, holding the facility at its existing permitted loads should not impact its ability to comply with the conditions of the Consumptive Use Permit. Furthermore, increases in the nutrient load limits for any facility are extremely hard to justify when the receiving water is impaired and pollutant reductions are required. Permitting and TMDL implementation concerns should be addressed by FDEP.

Comment #6-4:

(4) The TMDL states that "Section 303(d) of the Clean Water Act requires each state to list those waters within its boundaries for which technology based effluent limitations are not stringent enough to protect any water quality standard applicable to such waters" We agree, however, technology-based effluent limitations for the nutrient loads that are the subject of the TMDL have never been implemented in this part of Florida, thus it appears that imposition of a TMDL by EPA would be premature.

FPL greatly appreciates EPA's efforts and attention in addressing these comments Should EPA have any questions, please do not hesitate to contact me directly at 561 691-7051.

Response #6-4:

A TMDL is a determination of the maximum amount of a pollutant (e.g. nitrogen and phosphorus) that a waterbody can receive and still meet water quality standards. The sentence quoted is meant to convey the idea that a TMDL is needed where any controls that are currently in place have not been sufficient to prevent impairment of a waterbody. There do not need to be effluent guidelines for a particular pollutant- or even a point source discharger, because TMDLs are calculated based on water quality standards, not technology standards. It is clear that the effluent limitations for many of the facilities discharging to Indian River Lagoon do not reflect the current state of technology, because they are much higher- in some cases, orders of magnitude greater- than actual discharges. Also see the response to comment #2-5.

COMMENTER #7

15. **City of Palm Bay** (John Rodgers, Deputy Director, Growth Management/ City Engineer):

Comment #7-1:

The City of Palm Bay (City) is happy to take the offered opportunity to comment of the Subject proposed Total Maximum Daily Load (TMDLs) at this time. The City joins with the Environmental Protection Agency (EPA), Florida Department of Environmental Protection (FDEP), and the St. Johns River Water Management District (SJRWMI)) in the goal to protect this priceless resource which is the Indian River lagoon (IRL). There are two Water Body Identifications (WBIDs) of particular interest to the City, specifically 2963A, Indian River Above Sebastian Inlet and 3098, Turkey Creek. My comments will be concentrated on these two WBIDs, even though they may have application to the other WBIDs in the IRL.

Response #7-1:

Indian River Lagoon is considered an Estuary of National Significance due to its high species diversity and importance as a natural resource. We appreciate your support for its protection.

Comment #7-2:

The subject document has been prepared and issued in response to the 1998 Consent Decree in the Florida TMDL lawsuit (Florida Wild1ife Federation, et al. V. Carol Browner, et al., Civil Action No. 4: 98CV356-WS, 1998). The stated purpose is to establish TMDLs for parameters (Nutrients and Dissolved Oxygen) in the water bodies included on the FDEP 1998 303(d) list. It is stated explicitly that since the most up to date water quality data indicates, these waters are impaired and therefore EPA must establish TMDLs.

This is an incorrect statement based on the Draft TMDLs developed by FDEP this past summer. Attachment A is a copy of the documents issued July2006. FDEP performed two rounds of analysis. The first was designated the Planning Period (PP) and was to determine if a WBID was potentially impaired. The second was the Verified Period (VP) wherein additional data was collected and analyzed to determine if an impairment existed. Based on these analysis episodes, two proposed lists were developed: Indian River Lagoon Group 5 Basin/Central District - Delist-list (Delist) and Verified List (Verified). The Delist, on sheet 2 in 8 states that WBID 2963A is not impaired for either Dissolved Oxygen (DO) or Nutrients. During the PP, both of these parameters were considered POTENTIALLY IMPAIRED however, analysis of data during the VP showed no impairment. On sheet 4 in 8, WBID 3098 is not impaired for Nutrients. For this WBID, it was determined during the PP, no annual mean chi a value exceeded the limit and therefore the no impairment for nutrients existed. (This data is readily available from FDEP for review.) WBID 2963A is recommended for delisting for both nutrients and DO. WBID 3098 is recommended for delisting for nutrients.

Response #7-2:

EPA is aware of FDEP's draft Verified and Delist lists from July 2006. Part of EPA's responsibilities is to review these lists to see if we concur with their assessment of the attainment status of each waterbody. The state of Florida typically uses chlorophyll-*a* as the primary indicator of nutrient enrichment.

EPA used several parameters to determine nutrient impairment status, including concentrations of nitrogen, phosphorus, and dissolved oxygen, and also considered whether or not the segment was meeting its target seagrass depth limits. This is described in the Water Quality Assessment section of the TMDL document (Table 1). The data indicate that most of the Indian River Lagoon segments receive excess nutrient loadings and do not meet their depth limit target for seagrasses.

As you are probably aware, FDEP submitted the draft verified list of impaired waters for public comment. They received comments expressing concerns about the completeness of the database used, the period of record, the methodology (particularly the chlorophyll-*a* threshold and the lack of consideration of other information), and the segmentation, as well as other issues. In response to these comments, FDEP has revised the verified and delist lists for Group 5 Basins.

FDEP informed the St. Johns River Water Management District (SJRWMD) by a letter dated 10/02/06 that WBID #2963A, along with 12 other WBIDs in the IRL system, are now added to the updated Verified List for nutrient impairment. The WBIDs were added to the list because of information provided by SJRWMD that indicates "an imbalance of flora or fauna" (which is part of the narrative nutrient standard); i.e. that historical losses of seagrass and the current instability of seagrass coverage can be used to indicate an imbalance. The City is correct with respect to WBID #3098 (a tributary to Turkey Creek) in that FDEP still considers it impaired for DO but not for nutrients and will not be recommending that this WBID be placed on the verified list for nutrients. However, given that WBID 3098 has elevated total nitrogen concentrations and that it is located well within the contributing area to lagoon segment IR12, which is not meeting its seagrass depth goal, we (EPA) have provided a TMDL for it. Other WBIDs contributing to IR12 are on the Verified List.

Please note that the TMDL presented current and allowable loads for the Indian River Lagoon based on the SWIM delineation scheme. Load estimates for these lagoon segments represent the total contribution of nutrient loads to that portion of the lagoon from that segment's entire contributing watershed, which may overlap with several WBIDs.

Comment #7-3:

The Verified List states that WBID 3098 has a lack of DO and is therefore impaired. The City has contended this determination. Turkey Creek is a natural freshwater tributary to the IRL. The main channel flows over 9,000 feet from the C- 1 Drainage Structure to the IRL. The majority of the land along the banks of the Creek has been preserved in a natural condition with extensive tree canopies. A significant portion of the land is under public ownership with a primary goal of preservation. This Creek is "blackwater"; it has

a high concentration of tannic acid as a result of the vegetation that lines the banks. As a result, like most other "blackwater" water bodies, it is seasonably oxygen deficient. This is a naturally occurring phenomenon, and, as such, should not be subject to a TMDL. A review of the raw data contained in the 2004 IWR raw Data Report will show that from July through October annually, the Creek has a deficiency of DO throughout its reach. We have requested that a further analysis of the available data be performed.

Based on the work performed by FDEP and the contention raised by the City; WBIDs 2963A and 3098 should not be subject to the proposed TMDLs. The goal of solving the impairment has been met and no further regulatory controls are necessary.

Response #7-3:

The data for WBID 3098 show that D.O. is below the applicable standard more than 10% of the time. While these D.O. excursions may be seasonal, water quality standards and TMDLs are meant to protect waterbodies during all times of the year. As the standard states: "Normal daily and *seasonal fluctuations above* these levels shall be maintained." (*italic* emphasis added; [FAC 62-302.530 (31)]). It is possible that some streams- especially blackwater streams- may not meet their applicable D.O. standard due to a natural condition. In these cases, site-specific standards are needed. The state of Florida must adopt such changes to its water quality standards; EPA cannot do it.

Regardless of the impairment status for D.O. and whether any site-specific standards for D.O. are developed in the future, nutrient load reductions are necessary to address nutrient impairment (i.e. promote seagrass restoration). Implementation of the nutrient TMDLs (and associated PLRGs) is expected to promote a natural dissolved oxygen regime in Indian River Lagoon and its tributaries.

Comment #7-4:

The rest of the subject document goes on to make a connection between seagrass health and nutrient TMDLs. This is purportedly based on the SJRWMD 2002 Update to the IRL SWIM Plan. However, the information is not in complete agreement with the SWIM Plan. Attachment B is a copy of Chapter 5: North and Central Indian River Lagoon. As stated in the EPA subject document, SJRWMD divided the WBIDs into segments (IRx) based on what they felt was a logical method. IR12, 13A, 13B, 14, and 15 cover WBID 2963A. WBID 3098 is included in IR13. Using this system, the sections of the IRL of interest to the City are IR13A, and 13B. The SWIM has a primary goal of re-establishing seagrass coverage throughout the IRL. As can be seen from Table 5-1, IR13A and 13B are classified as fair to good for seagrass. These two segments have basically met the goal of the SWIM plan and therefore there is not a need for a TMDL in the segments of the IRL around the City.

Response #7-4:

The segments to which the City's watershed directly drains are IR12 and IR13A (not 13A and 13B as stated), which were merged as one to create the enlarged segment IR12 used in the regression analyses for the Central IRL.

Using the 2002 Update of the IRL SWIM Plan as justification that no nutrient TMDLs are needed is a misinterpretation of the seagrass assessment. The assessment provides a general status and trend of seagrass and related water quality from 1990 through 1999. In part, the assessment includes a spatial (segments) description of seagrass condition and of the water quality change that may have led to that condition. A good or improved condition does not mean *per se* that the seagrass resource fully recovered or that pollutant reduction targets were met; it only means that some improvement was observed over some period of time.

Although some segments showed a degree of improvement over the last couple years during the 1990 - 1999 period, many were rated poor or fair, including segments 12 and 13A that are associated with the City of Palm Bay's watershed. No segments at this time have met the seagrass depth-limit targets or the attendant load limits on a consistent basis, which would be indicative of recovery or restoration.

Comment #7-5:

Additional analysis was performed in June 2006 by two SJRWMD employees to further justify the use of seagrass as the only indicator of the health of the IRL. This analysis is included in the Subject EPA document as Appendix C. The result of their analysis was that if limits were placed on TN, TP, an TSS, then the seagrass could be expected to match it's greatest coverage. Note that the analysis included three parameters, IN, TP, and TSS. The proposed TMDLs only include TN and TP. It should be apparent that, without the limits on TSS, the stated seagrass recovery will not happen (based on this analysis). Additionally, little attention is paid to the other factors that influence seagrass growth as contained in the SWIM Plan. No mention is made of salinity, color, turbidity, or chl a yet the SWIM Plan clearly states that these are major influences to be considered. On page 5-12 of the SWIM Plan Update, it is stated that the main factors influencing seagrass health are color and salinity.

Response #7-5:

The last sentence, quoting page 5-12 of the SWIM Plan Update, is out of context with respect to the full discussion on pages 5-11 and 5-12. On page 5-12, the following is stated: "...what appears to set apart the good and poor segments [in the Central IRL] are color and salinity." The assessment discussion on pages 5-11 and 5-12 also states that TSS and nutrients are still a problem throughout the Central IRL; that both N and P loads need to be targeted for reduction; that some gains in seagrass coverage by 1999 in the poor segments may have been due to a reduction in nutrient loads and a

consequential lowering of chlorophyll *a* levels. It is true that there are a number of factors that can affect seagrass coverage, but the nutrients and TSS (both of which affect turbidity) are the key water quality factors.

It is true that TMDLs for Total Suspended Solids (TSS) have not been included in this TMDL report, but that fact in no way precludes the establishment of Pollutant Load Reduction Goals and/or TMDLs for TSS as well. As a practical matter, TSS loads would be reduced as a secondary effect of reducing nutrient loads from surface water runoff (as explained in the Analytical Approach section of the TMDL document).

Comment #7-6:

Based on the analysis published by FDEP this past summer, WBIDs 2963A and 3098 are not impaired and therefore no TMDLs are required. Based on the health of the seagrasses in IR13A and 13B as detailed in the SWIM Plan, again there should not be a need for TMDLs.

I sincerely hope the information provided at the very least convinces EPA to reconsider the need to establish TMDLs in the IRL in the area of Palm Bay. If I can be of further service, please feel free to contact me at (321) 733-3042. My e-mail address is rodgejpa1mbayflorida.org.

Response #7-6:

These comments are addressed in Responses 7-2 through 7-5.

COMMENTER #8

16. **Marine Resources Council** (Michael Wielenga):

Comment #8-1:

This is Michael at the Marine Resources Council. I skimmed through the proposed TMDL's for the Northern and Central Indian River Lagoon and Banana River Lagoon I had a couple quick questions/concerns. The page 18 map shows only a proposed TMDL for BA-7 (southern Banana River) and none for the BA 1-6 segments. However on page 44 table 6, it seems that all of the Banana River (BA1-7) should have proposed TMDL's. Is this just an error on the map or are there no TMDL's proposed for the northern and central sections. It seems from table 6 that all of the Banana River should have TMDL's especially since the proposed reduction in nutrients exceeds that of the north and central Indian River Lagoon.

Response #8-1:

TMDL allocations were provided for each segment of the Banana River Sub-lagoon in Table 6. The map in Figure 2 shows how these four lagoon segments (as well as the other segments) correspond to the Indian River Lagoon WBIDs. Figure 2 and Table 1 show that lagoon segment BR3-5 overlaps with WBIDs 3057A and 3057B, and segment BR7 overlaps with

WBID 3057A. The other two Banana River Lagoon segments, BR1-2 and BR6, do not directly overlap with a WBID from Table 1 and Figure 2. However, TMDL allocations were also proposed for those segments because they are adjacent to BR3-5 and/or BR7 and would also drain to the Banana River Sub-lagoon. The regression models used to determine the TMDLs were applied to each of three sub-lagoons areas. For Banana River, the regression models relate the combined nutrient loading from segments BR1-2, BR3-5, BR6 and BR7 to seagrass depth limits in that sub-lagoon. Sub-lagoon loads were then distributed among individual segments as described in the TMDL. In addition, the WBIDs that roughly correspond to segments BR1-2 (WBID 3057C) and BR6 (WBIDs 3044A and 3044B) were proposed to be impaired for D.O. and/or nutrients by the state of Florida, which included them on their 1998 303(d) list.

Comment #8-2:

One last thing, I don't know how critical it is but the rainfall data in table 5 page 42 seems to be inconsistent with what is posted on the NOAA site here in Melbourne. I realize that rainfall totals will vary sometimes greatly from year to year but was wondering how much that will distort the "worse case scenario" of the water quality conditions and the PLSM and HSPF models. I appreciate you time and Thank You.

Response #8-2:

The NOAA rainfall totals in Table 5 were calculated from April to the following March to correspond with the modeling and seagrass mapping year used by SJRWMD. The data were provided to note that the 2001-2005 time period used for the Waste Load Allocation calculations included both wet and dry years above and below the long-term average. Nonpoint loads were modeled for four time periods (1942-43, 1995-96, 1998-99, 2000-01) to relate seagrass depths and pollutant loading. The rainfall data used in the PLSM and HSPF modeling were obtained from National Weather Service stations, and supplemented with data from stations in the St. Johns Water Management District's network, for time periods prior to March 2000. After March 2000, rainfall data were determined from Doppler radar. PSLM was calibrated against measured loads in four catchments of the basin. The PLSM load estimates were determined to compare favorably to the results from three other models that had been calibrated in three catchments of the basin.