

Comparison of Class III Phosphorus Concentrations with the Long-term Levels for the Refuge

Technical Oversight Committee

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Objective

- The Everglades Consent Decree requires that the TOC make a determination of whether the Florida “Class III total phosphorus concentration levels are lower than the long term total phosphorus concentration levels” (Appendix B page B-4)
- To assist the TOC with this determination, calculations of the long-term total phosphorus (TP) levels given in Appendix B were compared to the Class III phosphorus water quality standard for the Everglades Protection Area (Rule 62-302.540, F.A.C.) for Water Years 1999-2006.

Method

(Revised consistent with DEP method of calculating means) (page 1 of 2)

1. Daily stages for 1-7, 1-8C and 1-9 were obtained from DBHydro.
2. The stage data were averaged and evaluated against minimum (15.42 ft NGVD) and maximum (17.14 ft NGVD) thresholds as described in App. B.
 1. Days with the 3-gage average of less than 15.42 ft NGVD were eliminated
 2. Averages greater than 17.14 ft were assigned a value of 17.14 ft
3. Daily estimates of the long-term TP level were calculated using equation in Appendix B.
4. Monthly average TP levels were computed by taking geometric mean of daily values. Resulted in lower values than taking arithmetic average of daily values.

Method (page 2 of 2)

5. Annual geometric mean TP concentrations were then calculated by computing the arithmetic mean of the 12 monthly average TP levels, *consistent with DEP method.*

6. Since the Class III standard contains a 5-year geometric mean test, a 5-year geometric mean TP concentration was then calculated by computing the arithmetic mean of the 5 annual TP levels within the 5-year period, *consistent with DEP method.*
 - a. Results were rounded off to the nearest ppb, *consistent with DEP method.*

7. The resulting long-term annual and 5-year geometric mean TP concentrations were compared to Florida's Phosphorus Water Quality Standard for the Everglades.

Class III Phosphorus Standard

➤ **Florida's Everglades Phosphorus WQ standard has 4-part assessment:**

Part 1: 5-year geometric mean of 10 ppb or less

Part 2: Annual geometric mean of 11 ppb or less

Part 3: Annual geometric mean of 10 ppb or less in 3 of 5 years

Part 4: Individual station annual geometric mean of 15 ppb or less

Compliance if all 4 parts are met

Results of Long-Term Level Calculations

Water Year*	Consent Decree Long-Term Levels based on measured daily stage from WY1999 - WY2006	
	Annual Arithmetic Mean of Monthly Levels (1)	5-year Arithmetic Mean of Monthly Levels (2)
WY1999	11	
WY2000	10	
WY2001	12	
WY2002	10	
WY2003	10	11
WY2004	10	10
WY2005	12	11
WY2006	11	11

* Water Year = May 1 - April 30

Phosphorus concentrations expressed in parts per billion (ppb)

Influence of Averaging Method

- June 2006 values used geometric means for annual and 5-year averages
- November 2006 used arithmetic averages consistent with DEP proposed method (DEP July 2006)
- Arithmetic averages yielded higher 5-year values
 - 0.07 – 0.34 ppb; arithmetic average of 0.24 ppb
- November 2006 5-year means higher than June 2006 values
- *Same result: Class III levels are lower than App. B equation levels*

Comparison of Class III with Long-Term Levels for the Refuge

Comparison of Consent Decree with Class III Water Quality Standard (1999-2006 Data)

Component of 4-Part Test	Consent Decree	Class III Standard	Lower/More Protective
Part 1: 5-year geometric mean of 10 ppb or less	10-11 ppb	10 ppb	Class III Standard
Part 2: Annual geometric mean of 11 ppb or less	10-12 ppb (two years above the 11 ppb Class III Maximum)	11 ppb limit (Part 2) and 3/5 years below 10 ppb (Part 3)	
Part 3: Annual geometric mean of 10 ppb or less in 3 of 5 years			
Part 4: Individual station annual geometric mean of 15 ppb or less	Consent Decree does not assess individual sites.	Class III standard specifies a 15 ppb limit for individual sites.	

Other Factors to Consider

Compliance with the Consent Decree algorithm is evaluated using a 14 site network. Compliance with the Class III standard is evaluated using 17 sites (14 Consent Decree sites + 3 additional sites near transitional areas) in the unimpacted area and 7 sites in the impacted area, with impacted and unimpacted sites to be evaluated separately.

Class III standard derived based on biological response not dependent on water level management. Under the WY1999-WY2006 stage conditions in the Refuge, the algorithm of the Consent Decree allows 5-year geometric means above 10 ppb during each period.

Results

- Analysis indicates that the Class III total phosphorus concentration levels are lower than the long-term total phosphorus concentration levels of Appendix B.