

Incorporation of hydrologic normalization into Tampa Bay Nitrogen TMDLs

Action:

- a. Approve the incorporation of segment-specific hydrologic adjustments to normalize conditions to those observed during the TMDL baseline period (1992-1994) in the assessment of observed bay segment TN loads.
- b. Request concurrence from EPA and FDEP.

Background:

The federally-recognized 1998 Nitrogen TMDL for Tampa Bay is based on nitrogen loads estimated for the 1992-1994 period. These loads were adopted by the Tampa Bay Estuary Program as management targets associated with maintaining chlorophyll *a* concentrations necessary to support recovery of seagrass in Tampa Bay. The estimated TN loads observed in 1992-1994 were influenced by both TN concentration and hydrologic load to a bay segment. Therefore, the ratio of TN loads to hydrologic loads from the 1992-1994 baseline period should be appropriate to maintain chlorophyll concentrations at the desired levels.

Observations since the 1992-1994 TMDL period show that the bay segment-specific annual TN loads have exceeded the TMDL loads in a number of years (46% of the segment/year combinations; Figure 1), yet the chlorophyll *a* concentration targets in the bay segments have been met in most years since 1994 (81% of the segment/year combinations; Figure 2). By normalizing annual TN loads to the hydrologic load that was observed in 1992-1994, the apparent disconnect between TN loads and resulting chlorophyll *a* targets can be addressed.

The following method is proposed for assessing whether observed TN loads estimated in future RA updates are in compliance with the federally-recognized TMDL relative to the hydrologic conditions observed during the 1992-1994 and future assessment time periods.

1. In total, the ratio of 1992-1994 TN load to 1992-1994 hydrologic load for each bay segment is determined as the benchmark for compliance assessment. These bay segment-specific observed “N Delivery Ratios” are then applied to the range of observed hydrologic conditions for a particular bay segment (compliance line in Figure 3).
2. For any one year or series of years in future assessments, the observed bay segment TN load will be evaluated against the “N Delivery Ratio” compliance line established for each bay segment (Figure 3).
3. For direct comparison of the federally-recognized TMDL, the observed TN load can also be normalized using the ratio of hydrologic conditions observed during the assessment period to the 1992-1994 baseline period, as follows:

$$\text{Normalized TN Load} = \text{Observed TN load} \times \frac{\text{Baseline Hydrologic Load}}{\text{Observed Hydrologic Load}}$$

This bay segment normalized TN load will be used to assess compliance with the bay segment federally-recognized TMDL value. The Consortium is scheduled to make recommendations for compliance assessment of entities and individual facilities within the next several months.

A comparison of the annual observed TN loads to observed hydrologic loads for each bay segment between 1995 and 2007 is shown graphically in Figure 3. Points below the ratio line in each graphic would be in compliance with the federally-recognized TMDL after taking into account differences in hydrologic conditions between the assessment and 1992-1994 time periods.

Figure 1: Observed bay segment TN loads, 1985-2007. The solid horizontal line in each graphic depicts the average TN load for 1992-1994 (i.e., the TMDL load).

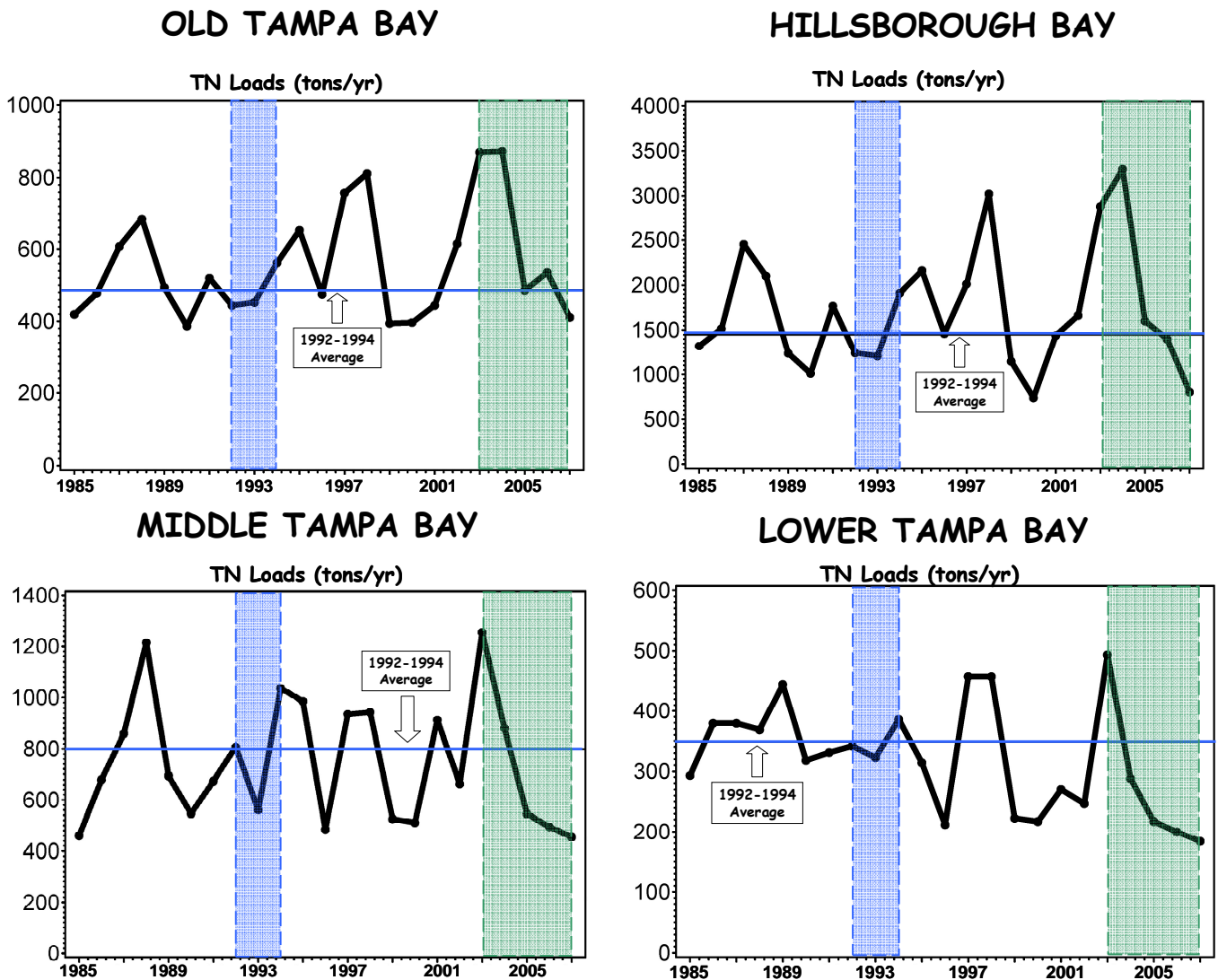


Figure 2. Compliance with FDEP recognized annual mean chlorophyll *a* concentration targets for the four major bay segments, 1974-2007. Green = annual chl-*a* concentration at or below target value; Red = annual chl-*a* concentration above target value.

Year	Hills. Bay	Old Tampa Bay	Mid. Tampa Bay	Lower Tampa Bay
1974	Red	Red	Red	Green
1975	Red	Red	Red	Green
1976	Red	Red	Red	Green
1977	Red	Red	Red	Red
1978	Red	Red	Red	Green
1979	Red	Red	Red	Red
1980	Red	Red	Red	Red
1981	Red	Red	Red	Red
1982	Red	Red	Red	Red
1983	Red	Red	Red	Red
1984	Green	Green	Red	Green
1985	Red	Red	Red	Green
1986	Red	Red	Green	Green
1987	Green	Red	Red	Green
1988	Green	Green	Green	Green
1989	Green	Red	Green	Green
1990	Green	Red	Green	Green
1991	Green	Green	Green	Green
1992	Green	Green	Green	Green
1993	Green	Green	Green	Green
1994	Red	Red	Red	Red
1995	Red	Red	Red	Green
1996	Green	Green	Green	Green
1997	Green	Green	Green	Green
1998	Red	Red	Red	Red
1999	Green	Green	Green	Green
2000	Green	Green	Green	Green
2001	Green	Green	Green	Green
2002	Green	Green	Green	Green
2003	Green	Red	Green	Green
2004	Green	Red	Green	Green
2005	Green	Green	Green	Red
2006	Green	Green	Green	Green
2007	Green	Green	Green	Green

FDEP Recognized Targets:

Hillsborough Bay - 15.0 ug/L

Old Tampa Bay - 9.3 ug/L

Middle Tampa Bay - 8.5 ug/L

Lower Tampa Bay - 5.1 ug/L

Figure 3. Observed annual TN loads compared to observed hydrologic loads, 1995- 2007. The straight line on each graphic depicts the 1992-1994 TN load:hydrologic load ratio, or benchmark “N Delivery Ratio.”

