

## Comments on SAB comments for Numeric Nutrient Criteria for Florida Coastal Waters

Carlson, Paul

to:

Stephanie Sanzone

01/28/2011 04:50 PM

Cc:

"Shaw, Eric", "esherwood@tbep.org", Holly Greening, "kheck@disl.org"

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Dear Ms. Sanzone:

Please consider the comments below in your revisions of the SAB report on Florida numeric nutrient criteria. Please call or email if any of my comments are unclear. Thanks, PC.

Comments on SAB comments on Draft Nutrient Criteria for Florida prepared by Paul Carlson (paul.carlson@myfwc.com), Florida Fish and Wildlife Conservation Commission January 28, 2011

1. The SAB committee members are all excellent scientists. However, it is likely that, with a limited timeline, the committee was unable to digest a considerable body of knowledge based on research on optical water quality, nutrients, and seagrass dynamics in Florida estuaries which has occurred over the last decade. The FDEP TMDL program has assembled a large bibliography of these publications and has made a very credible effort to synthesize that information for each estuary in their TMDL reports. I strongly suggest that the SAB committee read the TMDL reports or ask FDEP staff to make a series of presentations to the SAB.
2. One specific reference that is missing from the report is Carlson, P.R. and K. Madley. 2007. Florida State Summary pp. 99-114 in Handley et al, eds. Seagrass Status and Trends in the Northern Gulf of Mexico. USGS SIR 06-5287. The text in the SAB report located on p. 10, line 43 through p. 11, line 6 is taken almost verbatim from this chapter.
3. Page 15- please correct the discussion of Florida state waters that refer to a 3-mile limit. Jurisdictional water of the State of Florida extend 3 nautical miles on the east coast AND 9 NAUTICAL MILES on Florida's west coast.
4. Section 3.3.1 on pages 15-18 places undue confidence on the use of remotely-sensed estimates of chlorophyll in Florida coastal waters. There are several reasons why satellite estimates of chlorophyll, turbidity, and CDOM cannot be used in Florida coast waters at the present time, and I would suggest removing this section of the report entirely.
  1. While the technology, accuracy, and precision of remotely-sensed optical water quality parameters is constantly improving, the spatial resolution of Seawifs (1 km) and Modis (0.25-0.5 km), coupled with positional accuracy issues and contamination of water pixels by adjacent land pixels, limits the utility and applicability of remotely sensed estimates of chlorophyll, turbidity, and CDOM (RSOWQ) in estuarine and nearshore waters (precisely where these data are most needed!).
  2. The spatial resolution of Seawifs and Modis is coarse because they are global sensors. Other satellites have multispectral capabilities with a spatial resolution of 2 meters! However, Worldview-2 must be tasked to particular areas, and the acquisition cost is currently \$30-\$50 per square kilometer. This cost might be feasible on an occasional basis but not routinely.
  3. Furthermore, estuarine and nearshore waters are optically complex, varying from optically deep on one day to optically shallow the next day with the passage of a cold front. As a

result, estuarine and nearshore RSOWQ parameter estimates are unreliable. The RSOWQ parameter estimates reported by Stumpf for Florida Bay used an heuristic correction for benthic community signatures, and the results were highly variable.

4. For the reasons listed above, it is inappropriate to use remotely sensed estimates of chlorophyll, turbidity, and CDOM on the continental shelf to drive regressions to calibrate RSOWQ measurements. Optically speaking, shelf waters are much less complex than inshore waters.
5. Even in cases where nearshore waters are uniformly optically deep, the error associated with RSOWQ measurements is typically +/- 50%.
5. Seagrasses are an excellent management endpoint because Florida estuaries are richly blessed with seagrasses and because decades of work in Tampa Bay have shown that they are responsive to both water quality degradation and improvement . For the rest of the State of Florida, the Seagrass Integrated Mapping and Monitoring (SIMM) program operated by the Florida Fish and Wildlife Research Institute has summarized information on seagrass status and trends for the entire state. The draft report is available on our ftp site: <ftp.floridamarine.org/users/har/draft%seagrass%report>
6. The use of seagrasses as a management endpoint raises the exciting prospect of using seagrasses, where they occur or have occurred in the past, as the METRIC or NUMERIC CRITERION for adaptive management of nutrients. Because seagrasses monitor optical water quality and other perturbations continuously, they are more reliable than chemical measurements made monthly or less frequently. I know that the numeric nutrient criterion effort has advanced too far too change directions and incorporate biological management endpoints as the numeric criteria, but I feel that, if we did use our desired biological endpoints as our metrics, in the specific case of seagrass it would be easier, probably less costly, and more powerful. Consider the following:
  6. In systems where seagrasses are mapped every two years or more frequently AND results of the last two mapping efforts show gains or stable seagrass cover, the assimilative capacity of that system is adequate to process nutrient loads at their current level.
  7. In systems where seagrasses are mapped every two years or more frequently AND results of the last two mapping efforts show losses in seagrass cover, nutrient loads might need to be adjusted downward.
7. In systems where seagrasses are present AND human nutrients cause phytoplankton blooms which cause light stress in seagrass, they can be powerful metrics for adaptive management of nutrient loads. However, salinity fluctuations, physical perturbations, episodic storms, light absorption by CDOM, grazers, and epiphytes also affect seagrass survival, species composition, and density, so nutrient management efforts must also be estuary-specific and cognizant of factors other than nutrients.

Thank you for considering these comments, PC.

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