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Long-term chlorophyll trends in Florida lakes

DANIEL E. CANFIELD JR., ROGER W. BACHMANN, AND MARK V. HOYER* pp. 47-56

The State of Florida promulgated numeric nutrient criteria in 2013 because of a concern that nutrient enrichment had led to widespread increases in algal abundance and blooms. Chlorophyll was identified as a nutrient response variable and examination of historical chlorophyll trends was identified as one approach to help identify nutrient-impaired lakes. Examination of a 508-lake database with 10+ yr of data found that 371 (73%) lakes showed no statistically significant chlorophyll trends over time. Significant decreasing chlorophyll trends were identified at 67 (13%) lakes and 70 (14%) lakes had positive chlorophyll trends. For those lakes with significant trends, only 19 of the 67 lakes and 14 of the 70 lakes had R^2 values > 0.65 . There were also 153 lakes with more than 20 yr of data, but only 53 had significant trends in chlorophyll concentration. Of those lakes, 32 had positive trends, but only 3 of those had R^2 values > 0.65 . When the presence of an algal bloom was statistically defined as chlorophyll values exceeding two standard deviations of the individual lake's long-term average (geometric) chlorophyll or as a specific fixed chlorophyll value (> 20 , > 40 , > 80 , or > 100 $\mu\text{g/L}$), less than 5% of the lakes in the 153-lake database had increasing algal bloom trends. These lines of evidence suggest that there has not been widespread nutrient impairment of Florida lakes and that there is a frequent lack of nutrient limitation, suggesting why nonpoint nutrient control programs have yet to achieve management goals at some Florida lakes.

Key words: algal blooms, chlorophyll, clearing events, eutrophication, Florida lakes.