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ABSTRACT

Contemporary basin trophic state classification is based largely on indicators of production, including water transparency, nutrient concentrations and chlorophyll a. These indicators support classification of most intermittently exposed prairie pothole basins in eastern South Dakota as hypereutrophic. However, few studies of basin productivity are available to validate trophic class assignment. The objective of this effort was to generate whole-basin productivity estimates for an intermittently exposed prairie pothole throughout the growing season and compare actual estimates of production with the assigned trophic state class. Diel estimates of production were generated from Oak Lake, Brookings County, SD in June, July, August and September 2010. Hourly measurements of dissolved oxygen were made over several days using a Hydrolab MS5 multiparameter sonde and resulting diel curves were used to estimate gross primary production, net primary production and community respiration. Gross primary production ranged from 2125 to 19210 mg C m^{-2} d^{-1} and 24 hour community respiration ranged from 1105 to 15385 mg C m^{-2} d^{-1}. Ratios of gross primary production to 24 hour community respiration were greater than 1.0 throughout the growing season While high daily production was observed during the growing season, considerable variation was observed from day to day and throughout the season. These growing season estimates support trophic state indicator classification of this basin as hypereutrophic. Similar estimates of production might be generated regionally to validate indicator-based trophic state classes.