

LAKE OKEECHOBEE'S TROPHIC "TEMPERATURE"

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Lake Okeechobee has undergone 12% reductions in surface area, depth by 30% and volume by 50%. Since 1972, Total phosphorus (TP) inloads have been ~ 3.5 X greater than total maximum daily loads [TMDL]. Water column TP levels have increased from ~ 40 mg/l (1940's) to 150 ug/l (2020). Lake trophic levels are proxies of Chlorophyll a (Chl), TP and Secchi depth (SD) for light penetration. Carlson, 1977 Trophic State Index (TSI) log transforms these parameters into TSI's from 0-100. Combining into a $\Sigma TSI = (TSI.Chla + TSI.TP + TSI.SD)/3$ calculates its trophic "temperature", a valuable numerical for public and managers. This work used DBHYDRO data set (www.sfwmf.gov) to calculate average concentrations of Chl, TP and SD, corresponding TSI's and corresponding time series. Annual changes ($p \leq 0.01$) were: TP +2.1 ug/l, Chl -0.16 ug/l and SD - 0.007 m over a maximum 48-yr. POR. Chl decreased inversely with TP but directly correlated with SD. This inverse may be a more general response in large surface area lakes of shallow and large fetch than previous findings. TSI's correlated positively with underlying chemical or water clarity. The larger the ΣTSI , the higher the potential metabolic activity [primary and secondary production]. Time series of ΣTSI "temperatures" vs. POR found 2 different pelagic station arrays with all pelagics stations > littoral/SAV > Caloosahatchee outflow ~ Kissimmee River inflow > marsh /EAV. Highest "temperatures" were lake waters compared to inflow / outflow indicating within lake top sediment overturn as a major factor in increasing pelagic TP water column levels that correlate with recent decadal blooms of *Microcystis aeruginosa* despite turbidity inhibition. This HAB has released human and nature toxins both within the lake and its regulated discharges to the Caloosahatchee and St. Lucie River ecosystems. Lake Okeechobee's trophic "temperature" has increased from ~ 41 to 75 [1981-2020].

PRESENTER BIO: Mr. Gilio has 40+ years in teaching at FL tech (at Jensen Beach), regional ecological planner at TCRPC and 25 years as founder and CEO of Wetlands Management, Inc. (WMI). At WMI, he planned, designed and installed over 500 retention lakes / wetland in multi-use projects that mimic nature.