

Comparison of Water Quality Parameters in Dunes Lake 4
Before and After Tide Gate Installed

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In October 2016, the City of Sanibel in cooperation with The Dunes Golf and Racket Club installed a tidal gate at the discharge weir in Lake #4. The gate was installed to prevent high tides from overtopping the weir and adding significant water to The Dunes stormwater pond system, resulting in decreased stormwater holding capacity. SCCF Marine Laboratory monitors water quality within Lake 4 quarterly – during dry and wet season. This analysis compares 9 sampling events previous to the gate installation to 9 sampling events after the installation. The time period spans 2014 to 2019. For the analysis, 6 dry season samples and 3 wet season samples were used for each comparison. Statistical comparisons were performed using the Kruskal-Wallis nonparametric test in Minitab 13®.

As expected, a decrease in salinity was found after the tide gate was installed ($p = 0.001$, Figure 1). Additionally, significant increases in CDOM, TN, and chlorophyll *a* were found (Figures 2-4). No significant changes were found in turbidity, pH, or TP (Figures 5-7).

Increases in TN, CDOM can be explained by decreased dilution associated with the periodic inflow of water from the estuary which has lower TN and CDOM values than this stormwater system. The increase in chlorophyll *a* can be explained by the more stable salinity conditions now found in Lake 4. A large increase in salinity would occur when estuarine water periodically overflowed the weir causing stress for existing phytoplankton communities. The estuarine water typically had lesser abundance of phytoplankton – further decreasing chlorophyll values within the stormwater system.

Though no significant changes were found for turbidity, pH or TP. With continued sampling effort (larger *n*) changes in these parameters may prove to be significant. Greater phytoplankton stock, and more photosynthesis, can increase pH during the daytime and the change is likely to become significant over time. Also with greater phytoplankton stocks, turbidity associated with phytoplankton may increase significantly. TP may also increase significantly due to less dilution from estuarine waters.

Figure 1. Median salinity before and after installation of the tide gate on the Lake 4 discharge weir.

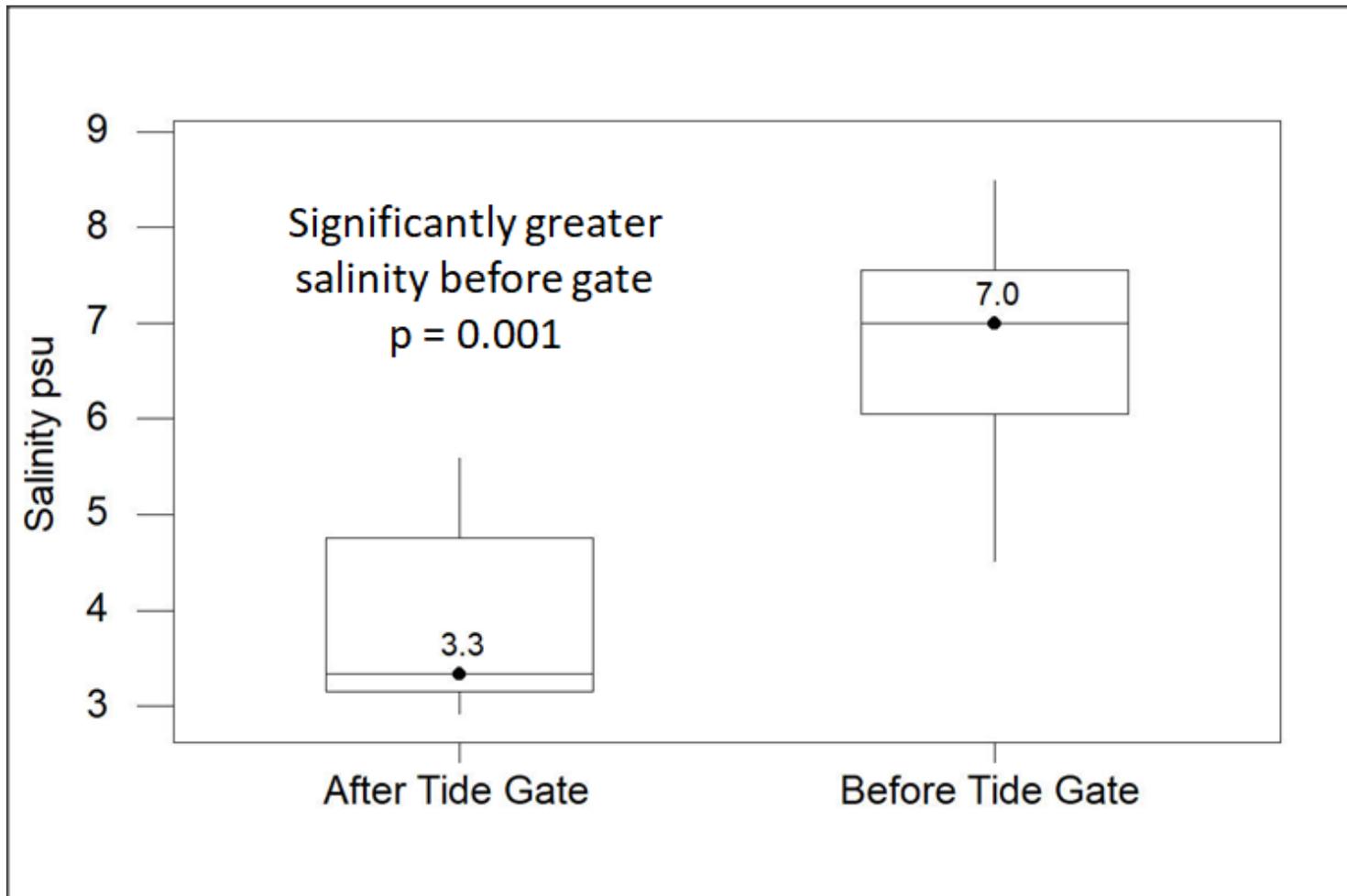


Figure 2. Median CDOM before and after installation of the tide gate on the Lake 4 discharge weir.

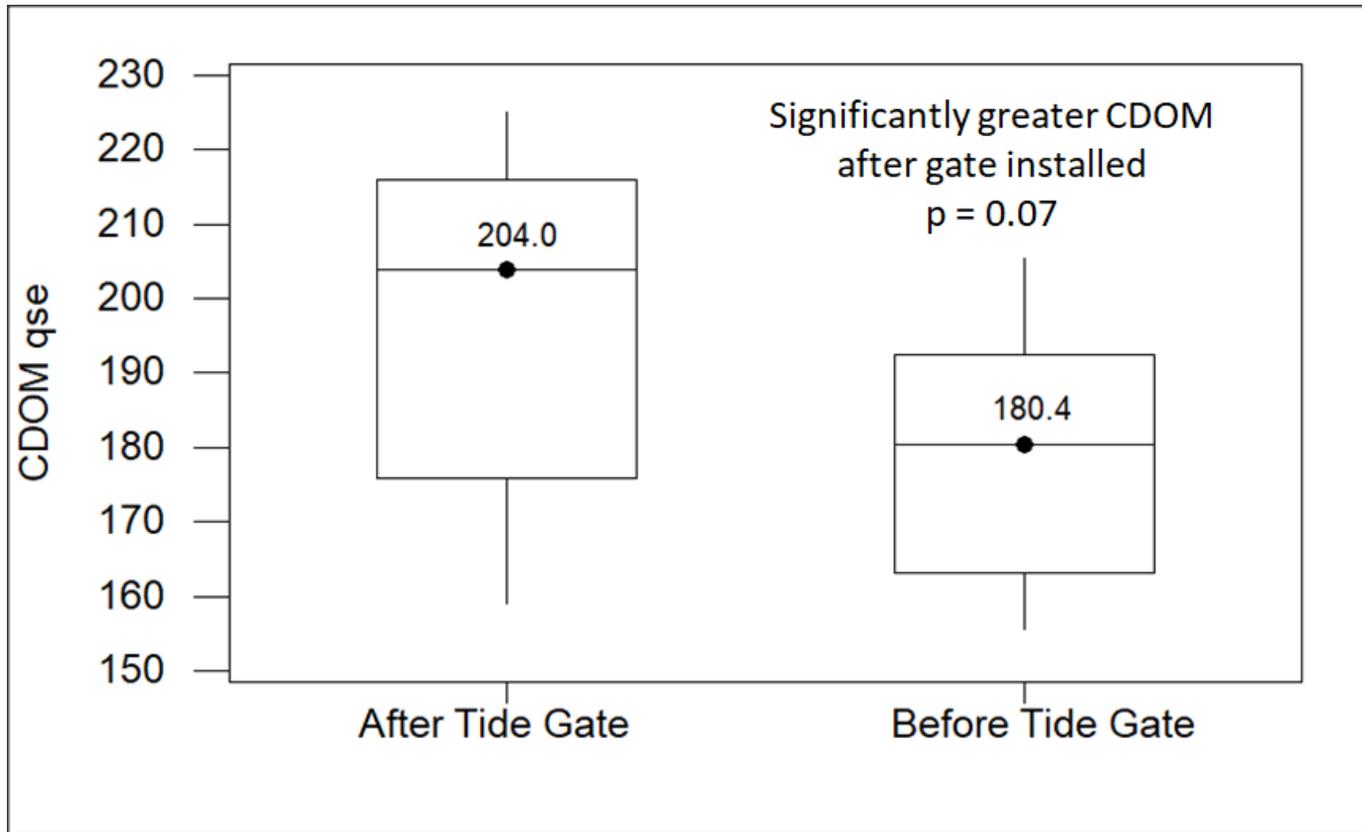


Figure 3. Median TN before and after installation of the tide gate on the Lake 4 discharge weir.

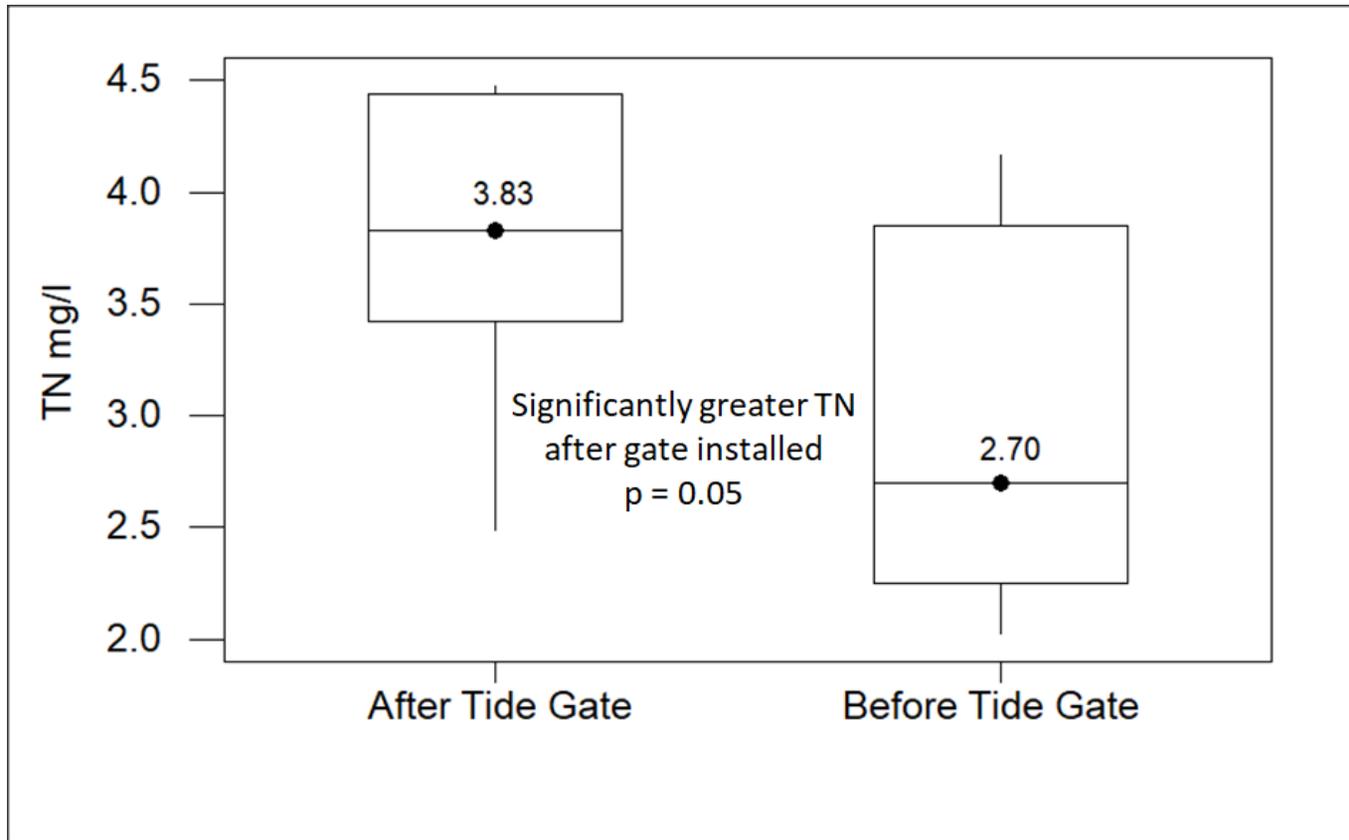


Figure 4. Median chlorophyll *a* before and after installation of the tide gate on the Lake 4 discharge weir.

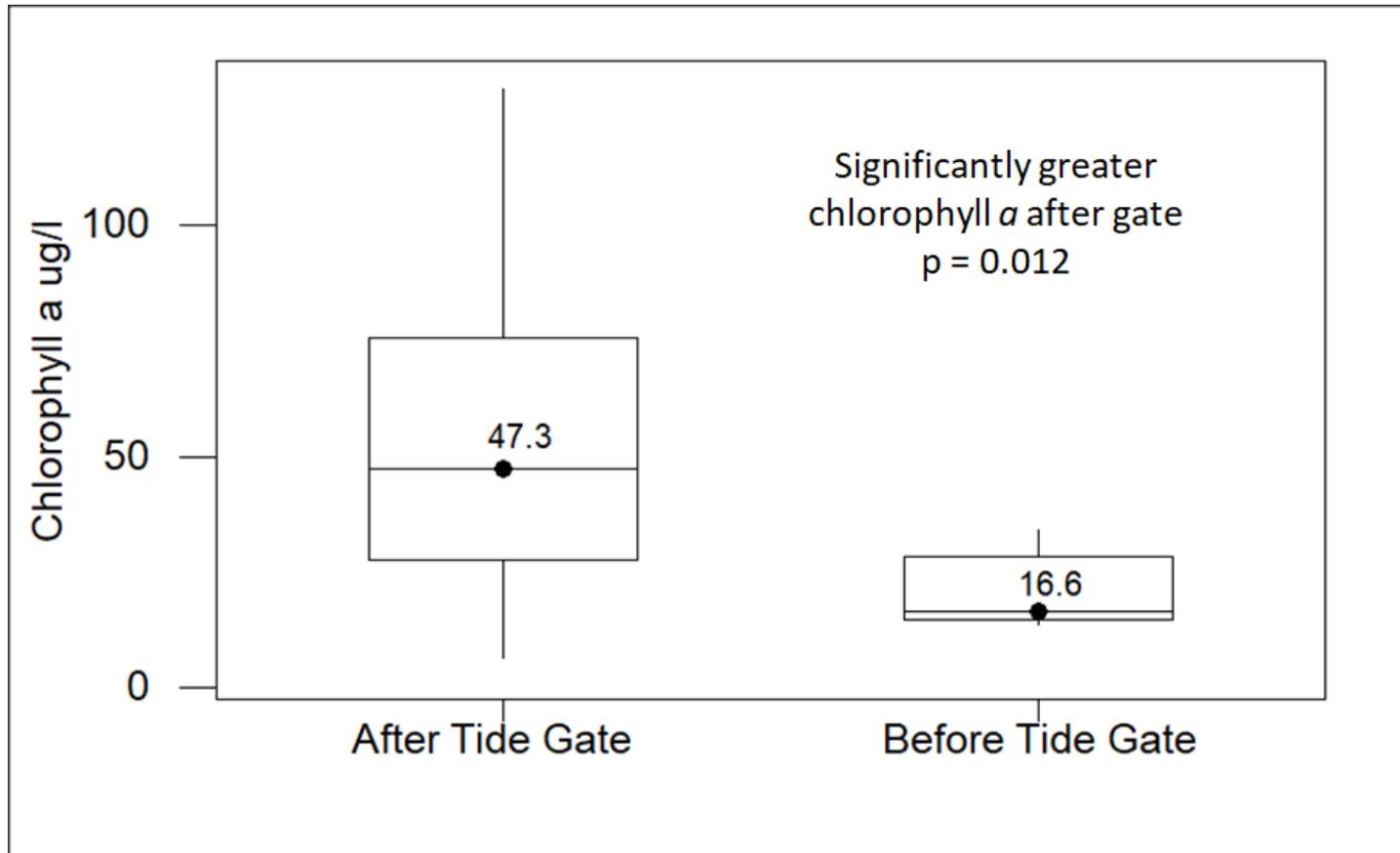


Figure 5. Median turbidity before and after installation of the tide gate on the Lake 4 discharge weir.

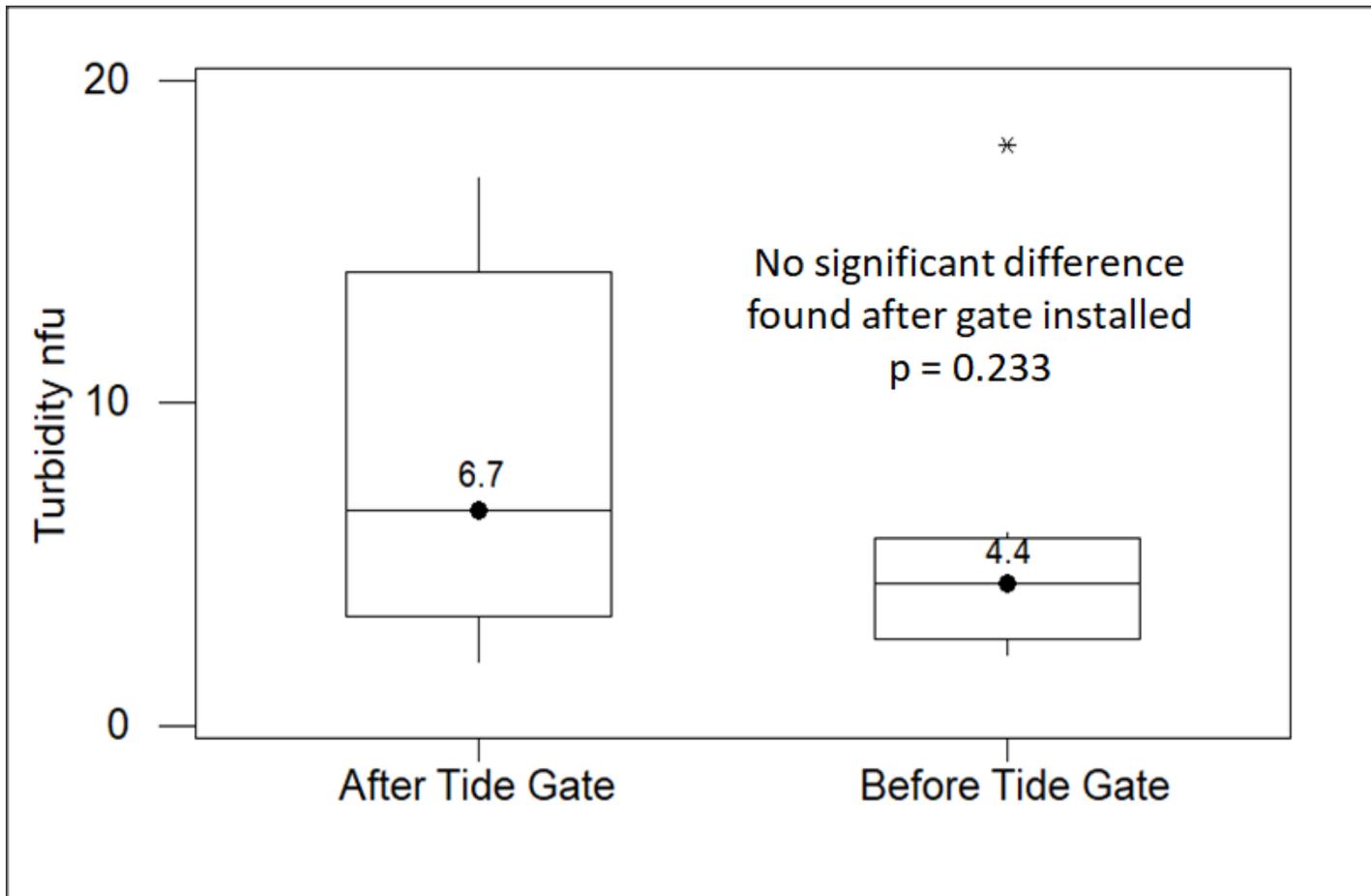


Figure 6. Median pH before and after installation of the tide gate on the Lake 4 discharge weir.

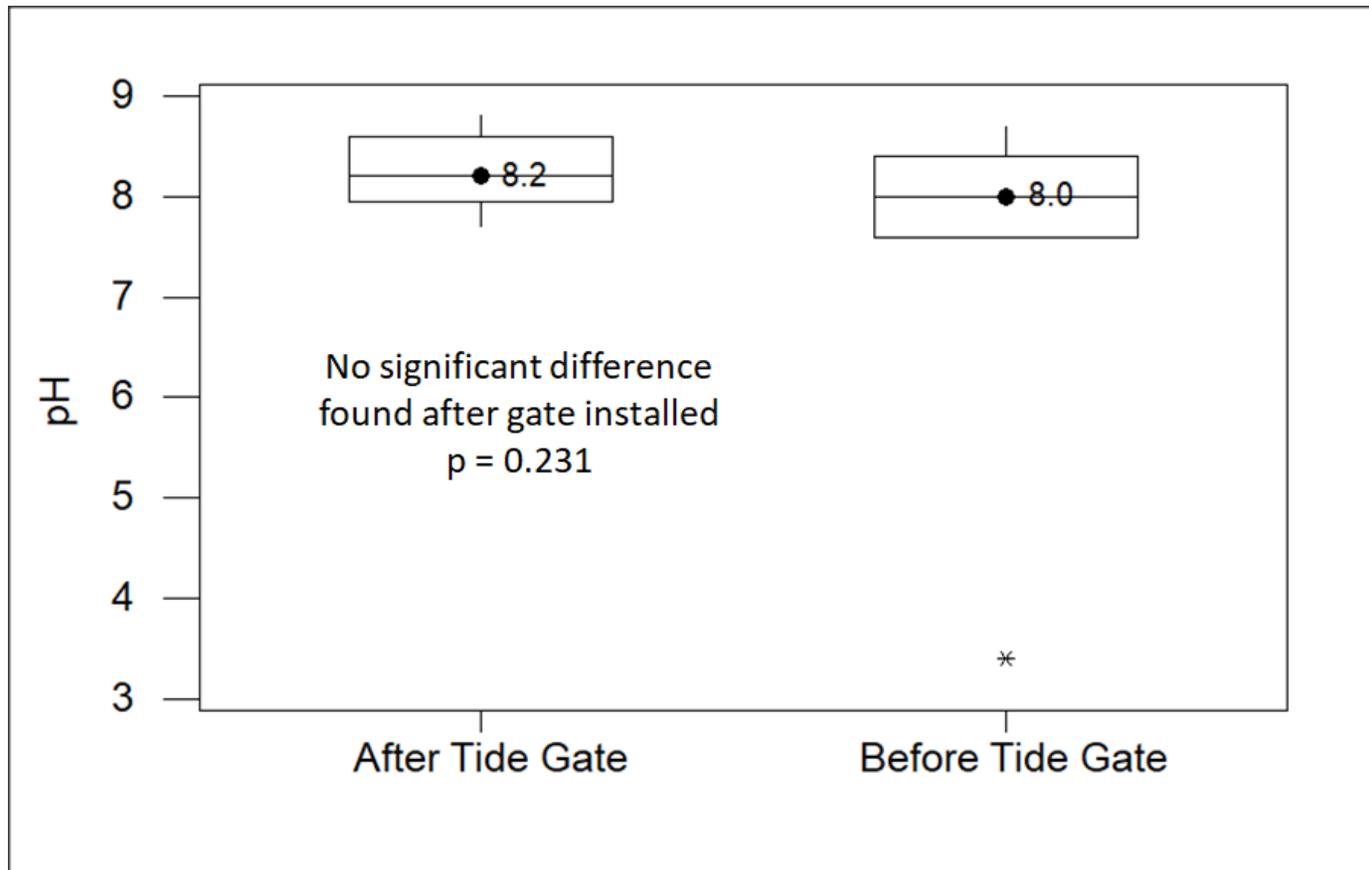


Figure 7. Median TP before and after installation of the tide gate on the Lake 4 discharge weir.

