December 15, 2021

Natalie Barfield
Florida Department of Environmental Protection
3900 Commonwealth Boulevard M.S. 49
Tallahassee, FL 32399

Letter submitted electronically via: Natalie.Barfield@FloridaDEP.gov

Re: Comments regarding Picayune Strand Restoration Project Southwest Protection Feature Conveyance Features (File No. 0288313-013) permit modification.

Summary:

The Conservancy of Southwest Florida and Sanibel Captive Conservation Foundation continues to participate in the evaluation of Picayune Strand Restoration Project, regarding probable impacts of current designs associated with the Southwest Protection Feature to Collier-Seminole State Park, an Outstanding Florida Water (OFW). Our concerns range from water quality including point source discharge and degradation or even ultimate mortality of historic upland habitat features that support threatened and endangered species including gopher tortoises and red-cockaded woodpeckers. Additionally, we have concerns regarding the application of the hydrologic model, the assumptions of the water quality analysis, and therefore any decisions that were drawn based upon the modeling

For example, the AltPC2 condition assumes that restoration water will "dilute" existing water quality concentrations sufficiently to reduce potential impacts associated with high nutrient water entering the downstream OFWs. However, review of the model results suggests that even during the fully realized restoration of Picayune Strand State Forest, restoration flows have a very small contribution to the overall discharge of the new infrastructure associated with the South West Protection Feature (i.e. "New Opening" culverts under US-41). Therefore, the presumed dilution to the agricultural and urban flow contributions by restoration flows may not be sufficient to ensure acceptable water quality conditions, nor does it address pollutant loads.

Regardless of our assertion on fundamental flaws in the modeling, this project will potentially add an average 552 ± 125 kg phosphorus (mean ± standard deviation) and 2,733 ± 559 kg nitrogen (SFWMD 2020) via the New Opening (i.e. culverts under US41) into Collier Seminole State Park an OFW. Moreover, this additional load and the associated total phosphorus concentrations have a high probability of exceeding the established OFW baseline. In addition, very few reasonable assurances have been provided that demonstrate that this additional water discharged into the OFW will not degrade flora and fauna and lead to violations of downstream water quality standards.

The Conservancy and SCCF do not support the discharge of water into Collier Seminole State Park that violates the OFW water quality baseline concentration and is being released as a point source that will potentially degrade flora and fauna ultimately adversely affect historic upland habitats and endanger native wildlife. We bring this issue to your attention in the hope that additional modifications or remedies to the project will be made. Below is a more comprehensive discussion of our evaluation and critique of the current models.

Sincerely,

Dr. Paul Julian, Ph.D., Hydrological Modeler
Sanibel-Captiva Conservation Foundation & Conservancy of Southwest Florida

CC:

Shawn Hamilton, Florida Department of Environmental Protection, Shawn.Hamilton@FloridaDEP.gov
Edward C Smith, Florida Department of Environmental Protection, Edward.C.Smith@FloridaDEP.gov
Jordan Tedio, Florida Department of Environmental Protection, Jordan.Tedio@FloridaDEP.gov
Kristyn McClure, Florida Department of Environmental Protection, Kristyn.McClure@FloridaDEP.gov
Angela E Dunn, U.S. Army Corps of Engineers, Angela.E.Dunn@usace.army.mil
James K Bradshaw, U.S. Army Corps of Engineers, James.K.Bradshaw@usace.army.mil
Drew Barlett, South Florida Water Management District, dbartlett@sfwmd.gov
Jennifer Leeds, South Florida Water Management District, jleeds@sfwmd.gov
Kim Dryden, U.S. Fish and Wildlife Service, kim_dryden@fws.gov
Lori Miller, U.S. Fish and Wildlife Service, lori_miller@fws.gov
Timothy Breen, U.S. Fish and Wildlife Service, timothy_breen@fws.gov
Kathy Worley, Conservancy of Southwest Florida, kathyw@conservancy.org
Nicole Johnson, Conservancy of Southwest Florida, nicolej@conservancy.org
James Evans, Sanibel-Captiva Conservation Foundation, james.evans@sccf.org

Background:

The "Picayune Strand Restoration Project (PSRP) Water Quality Projections With "Western Protective Levee" Feature" report (SFWMD 2020) prepared by the South Florida Water Management District (SFWMD or District) to support the U.S. Army Corps of Engineers permit application provides an analysis of flow distribution, quantifies the discharge and nutrient load associated with the Southwest Protection Feature (SWPF). The different modeled scenarios include phased implementation of the infrastructure associated with the SWPF project including a levee, the "New Out" structure and the completely restored PSRP. The analysis uses the direct proportionality principle to allocate discharge across the selected structures in the project area. However, an assumption of the direct proportionality principle states that all sources must be accounted for. As outlined in the Districts report, the "PSRP Existing Inflow" calculation is based on the difference in discharge from the structures along US-41 (outflow) and discharge through Levee Culverts and TAMTOM (Inflow). Based on this method, the estimated "PSRP Existing Inflow" volume has a high degree of uncertainty and inaccurately represent actual existing flow conditions given that all outflow (i.e. discharges to the east via US41 Canal and/or discharges from other drainages along US41) are not quantified in the analysis. In the AltPC2 (restored) condition approximately 80% of the outflow discharges are not accounted for in the basic water balance represented below (Figure 1; assuming that rainfall inputs equal evapotranspiration outputs). Moreover, in the SWPF+ condition (i.e. Levee and New Opening) the water balance is still not closed since other discharges are not represented.

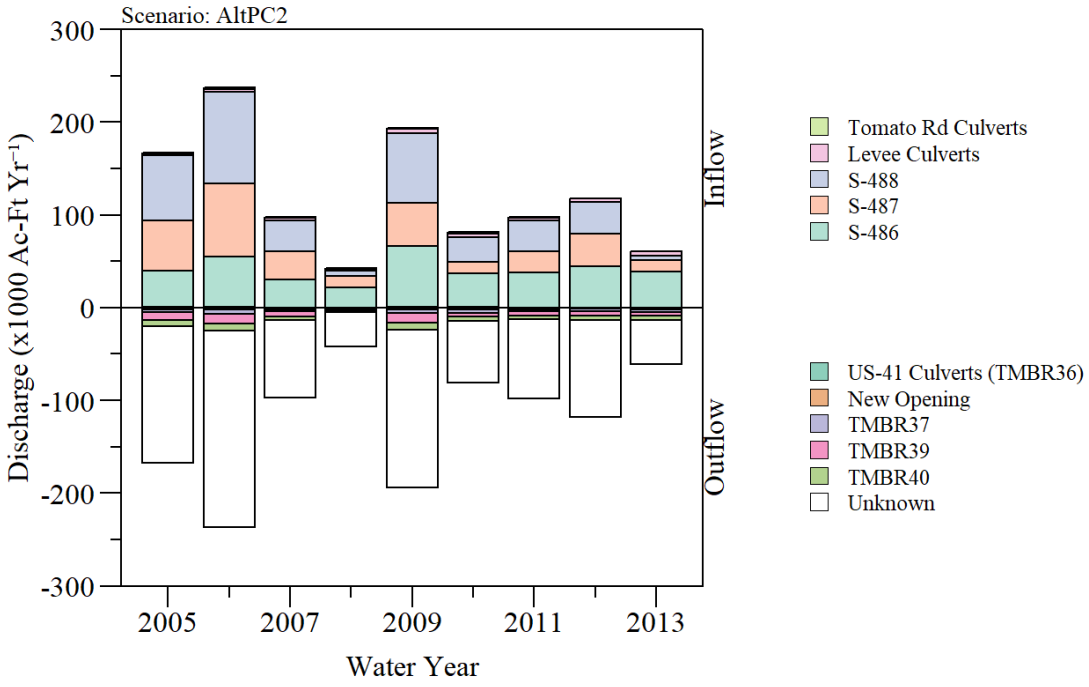

Figure 1. Picayune Strand Restoration Project annual inflow and outflow discharge volumes for the AltPC2 condition. Discharges based on the Gridded Surface Subsurface Hydrologic Analysis (GSSHA) model provided by USACE.

The AltPC2 condition assumes that restoration water will "dilute" existing water quality concentrations sufficiently to reduce potential impacts associated with high nutrient water entering the downstream Outstanding Florida Waters (OFWs). However, a comparison of the provided average hydroperiod maps

(and difference comparisons), recreated below (Figure 2) indicates very little change in the immediate area of the SWPF across the different scenarios. Moreover, the hydroperiod maps highlight the potential impact of the SWPF and "Levee Culvert" by reducing hydroperiods in some areas (east of proposed levee) and increasing in others (slough downstream of Levee Culverts).

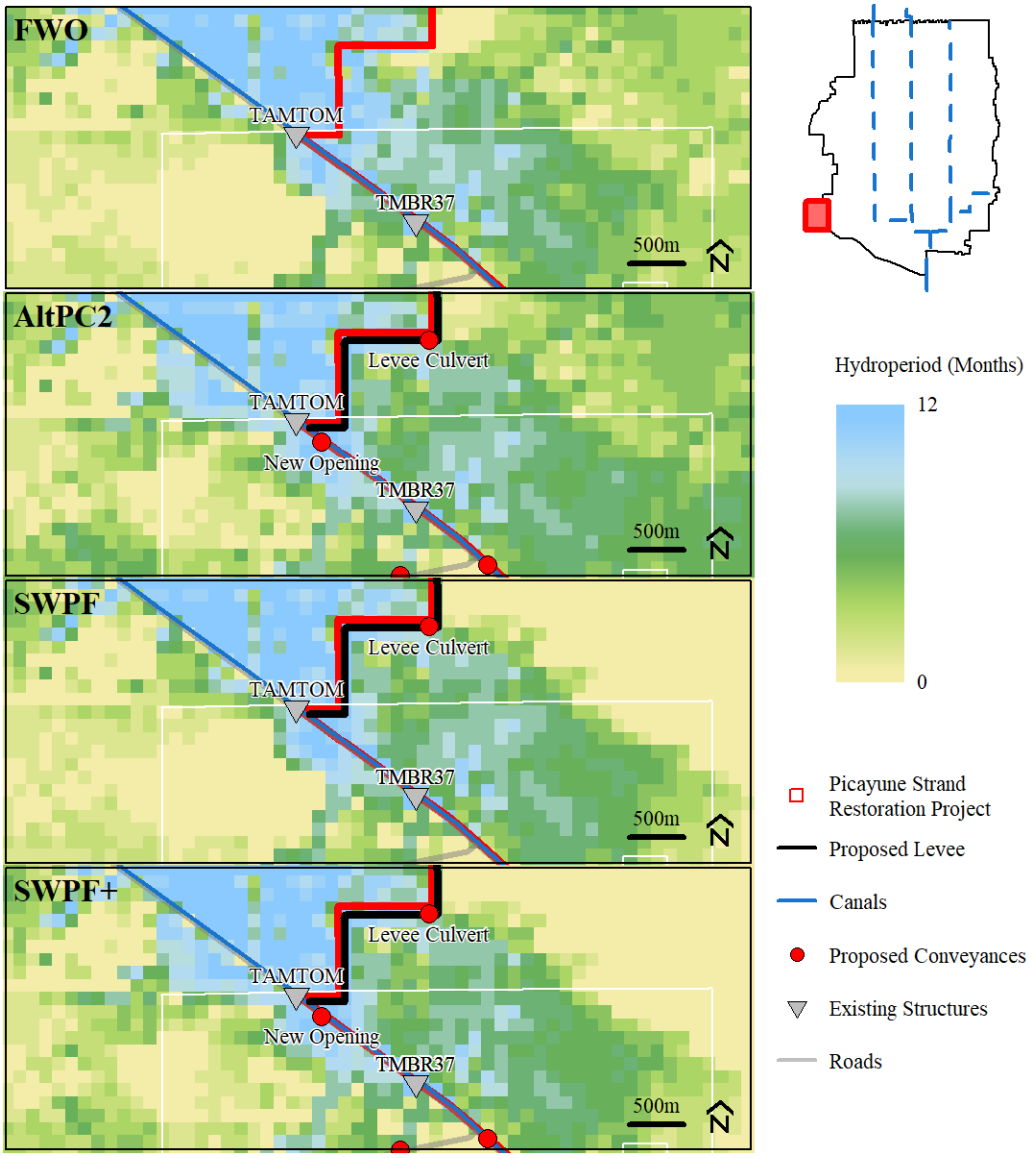

Figure 2. Average hydroperiod across the simulated period during the FWO, AltPC2, SWPF, and SWPF+ condition within the Picayune Strand Restoration Project in the vicinity of the Southwestern Protection Feature.

Across the project area at downstream locations along the US-41 canal, discharge volumes vary between the AltPC2 and SWPF+ alternatives (Fig 3). Discharges through Levee Culvert do not deviate much between AltPC2 and SWPF+ alternatives with an average percent change of 7%, which could be attributed to increased seepage in the AltPC2 condition. Based on the comparison of annual discharge volume at US-41 Culverts and New Opening between AltPC2 and SWPF+ alternatives, the amount of discharge attributed

to restoration flows is minimal. For New Opening, percent restoration flows range from 0.1% to 9.8% while US-41 Culverts range from -10.6% to 7.6% suggesting that in some years discharge in the SWPF+ scenarios are greater than that of AltPC2 (Figure 4). Moreover, percent restoration flows gradually increase moving west to east with TMBR39 experiencing the greatest average percent restoration flows (33.2%; Figure 4). These results suggest that even during the fully realized restoration of PSRP, restoration flows have a very small contribution to the overall discharge of the US-41 Culverts in the immediate area of the SWPF including the New Opening therefore the presumed dilution of existing water quality may not be sufficient to ensure acceptable water quality conditions.

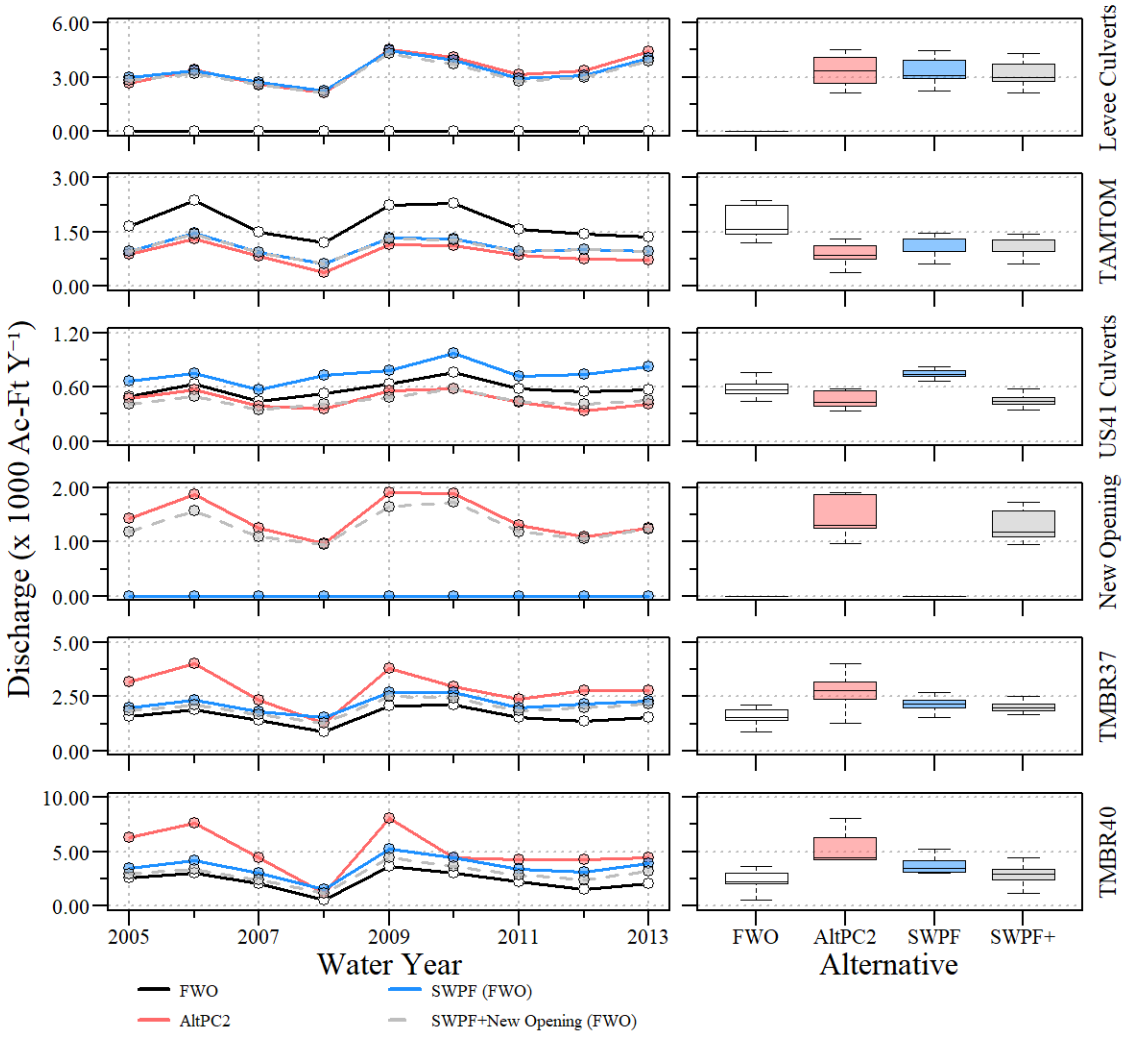

Figure 3. Modeled total annual discharge volumes time-series (left) and period of record boxplot summary (right) for Levee Culverts, TAMTOM, US41 Culverts, New Opening, TMBR37, and TMBR40 for the four modeling scenarios. Levee Culvert and New Opening have zero discharge for the FWO condition and New Opening has zero discharge for SWPF as these structures are not represented in these scenarios.

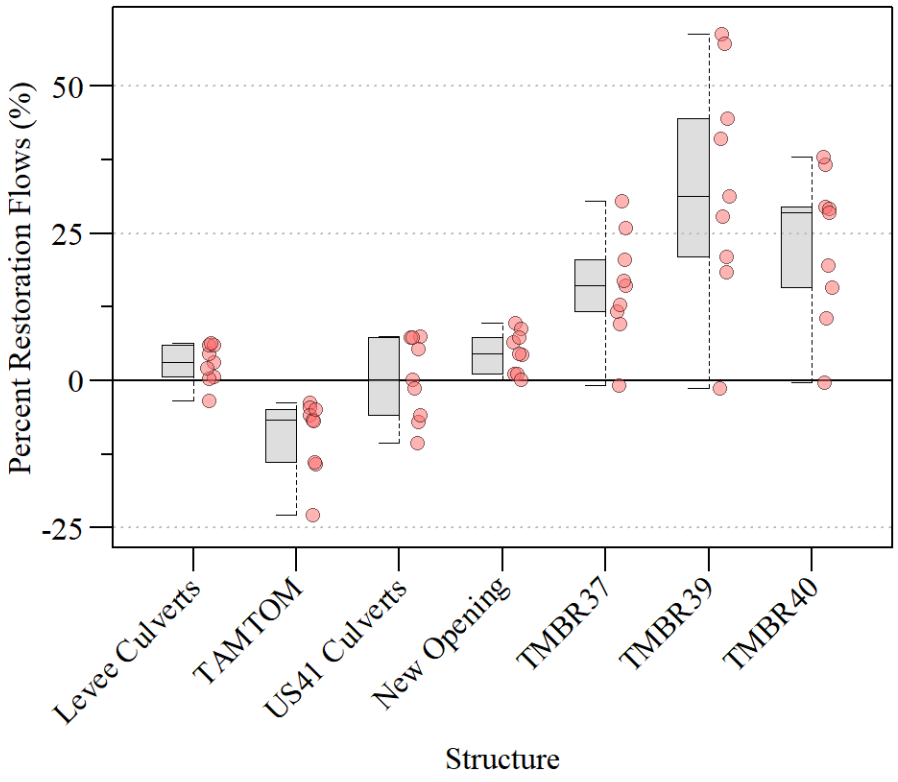

Figure 4. Hybrid boxplot of percent restoration flows based on annual flow volume for each structure using AltPC2 and SWPF+ modeling alternatives between water years 2005 and 2013. Boxplots are presented using the Tukey method of box-and-whisker plots with whiskers representing ± 1.5 inter-quantile range and box representing the 25th, 50th (median), and 75th quantiles. Points beside each boxplot are the respective annual values.

To quantify the potential changes to water quality concentration and loads across the different alternatives the District used existing data to be representative of agricultural, existing and restored flows. Data from monitoring locations TAMTOM and TMBR37 were used to represent agricultural flow water quality. Meanwhile, TMBR49 and FAKA were used to represent both existing and restored flows. While the water quality at TAMTOM can justifiably be assumed to be from agricultural sources (High TP and TN; Figure 4), the water quality at TMBR37 is a mixture of flows from TAMTOM and that of existing run-off from PSRP. Moreover, at its essence water quality at FAKA is a mix of sources including shallow groundwater, estuarine waters, and possibly contributions by nearby residential areas (i.e. Port of the Isles) and less indicative of restored conditions but rather existing impacted drainage conditions.

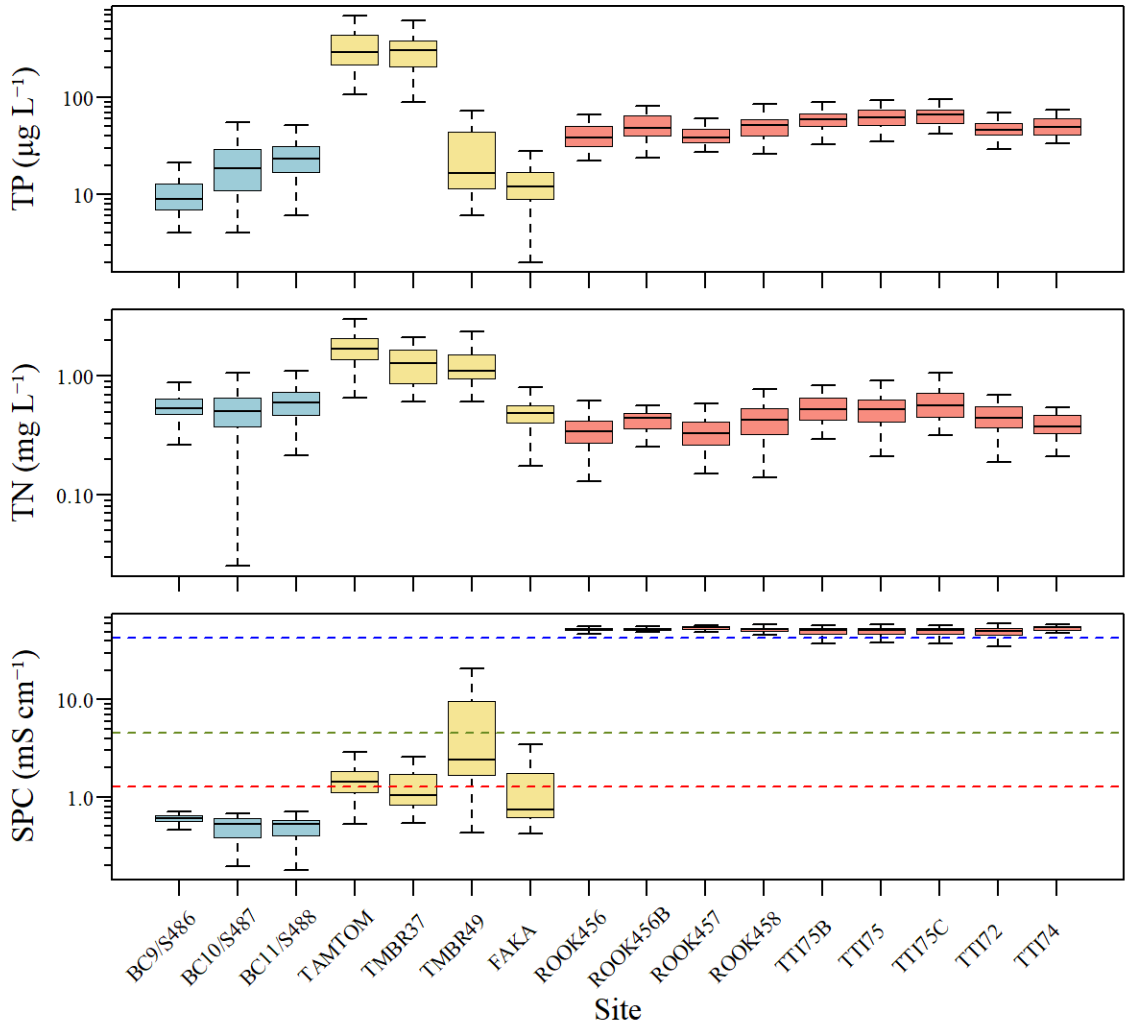

Figure 5. Boxplot summary of monitoring data across the network for total phosphorus (TP; top), total nitrogen (TN; middle), and specific conductivity (SPC; bottom) between May 2004 and May 2019. Red, Green, and Blue dashed lines indicated Class III freshwater specific conductivity water quality standards (1.275 mS cm^{-1}), Freshwater-Marine Threshold (4.580 mS cm^{-1} 62.302.200(29) FAC), and reference seawater specific conductivity (42.9 mS cm^{-1}) used to calculate salinity. Boxes are colored based on location, light blue indicates project inflow locations (pump station/canal inputs), yellow indicate downstream monitoring locations along Tamiami Canal and red indicate downstream estuary monitoring locations within the Rookery Bay/Marco Island and Blackwater River numeric nutrient criteria segments. Boxplots are presented using the Tukey method of box-and-whisker plots with whiskers representing ± 1.5 inter-quantile range and box representing the 25th, 50th (median), and 75th quantiles.

Regardless of fundamental flaws in the water quality analysis and partitioning of flows, the Districts analysis projects this project will add an average 552 ± 125 kg P (mean ± standard deviation) and 2,733 ± 559 kg N (SFWMD 2020) via the "New Opening" (i.e. culverts under US41) into Collier Seminole State Park, an OFW. The Districts analysis (SFWMD 2020) concluded that water quality under the AltPC2 will be lower than the established OFW baseline concentrations based on long-term flow-weighted mean

concentration despite an annual TP exceedance rate of 44% (4 exceedances out of 9 modeled years). This analysis assumes that a flow-weight mean to geometric mean concentration (OFW baseline values estimated as geometric mean concentration) conversion was one-to-one, however, based on prior work (i.e. Restoration Strategies, Technical Oversight Committee Appendix A Subteam, Western Everglades Restoration Planning Project) these conversion values can vary dramatically. Even a small deviation (~2%) from the current 1:1 conversion factor could result in long-term average concentrations above that of baseline concentration (for TP). Furthermore, a Monte Carlo Analysis similar to the one used in the estuarine numeric nutrient criteria development (FDEP 2012), was used to evaluate the modeled data for the New Opening structure under the AltPC2 alternative presented by the District. Given the variability of the data, this analysis demonstrates that water quality at the New Opening structure has a probability of exceeding the TP OFW baseline concentration of 310 µg/L approximately 50% of the time (Figure 6). Given this exceedance probability, discharges through the New Opening (i.e. waters being discharged into CSSP, an OFW) will most likely exceed the OFW baseline concentration thereby degrading the OFW condition and potentially impacting flora and fauna.

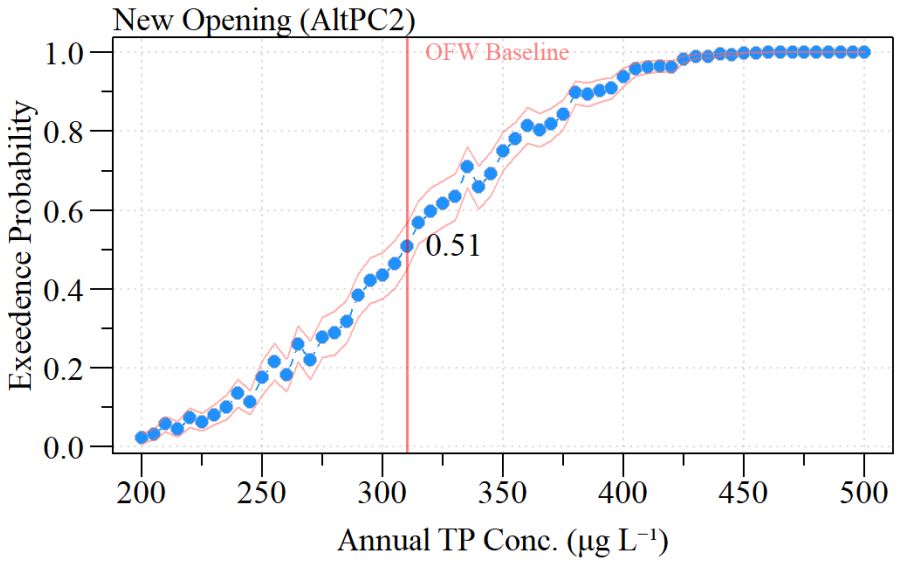

Figure 6. Mean (± 95% confidence interval) probability of exceeding an annual TP concentration of 310 µg/L at New Opening in the AltPC2 alternative. Probabilities were generated using a Monte Carlo simulation (100 iterations of a 50-year time series) assuming variance components equivalent to modeled New Opening TP concentration within the AltPC2 alternative.

Given the uncertainty associated with several aspects of this analysis, very few reasonable assurances have been provided that demonstrate that this new water discharged into an OFW will not degrade flora and fauna and lead to violations of downstream water quality standards. Additionally, no demonstration of the current OFW baseline concentration of 310 µg/L of TP and 2.18 mg/L of TN (FDEP 2020) is protective of the OFW (i.e. 62-4.242(2)(a) "No Department permit or water quality certification shall be issued for any proposed activity or discharge within an Outstanding Florida Waters, or which significantly degrades, either alone or in combination with other stationary installations…"), the existing narrative criteria within freshwater portions of Collier Seminole State Park, or the existing downstream numeric nutrient criteria.

References

FDEP. 2012. *Overview of Approaches for Numeric Nutrient Criteria Development in Marine Waters.* Tallahassee, FL: Florida Department of Environmental Protection.

FDEP. 2020. Picayune Strand Restoration Project Southwest Protection Feature Naples, FL.

SFWMD. 2020. *Picayune Strand Restoration Project (PSRP) Water Quality Projections With "Western Protective Levee" Feature*. West Palm Beach, FL: South Florida Water Management District.