**Updated Evaluation of Nutrient Loads and Trends to the Bay Delta from Upstream the Sacramento and San Joaquin River Watersheds**

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**Proposed work:** Statistical analyses and water quality modeling identified treated wastewater effluent from the Sacramento Regional County Sanitation (Regional San) District's Wastewater Treatment Plant (WWTP) as one of the main sources of total nitrogen (TN) and phosphorus (TP) to the Sacramento San Joaquin Delta (Saleh and Domagalski 2015, Domagalski and Saleh, 2015, Jassby and others, 2002, and Novick and others 2015). Ongoing treatment plant improvements at the Regional San WWTP is expected to decrease Total Nitrogen (TN) loads in the Delta in the future (Krich-Brinton and others 2012). It is important to understand how the loads and concentrations of various forms of nitrogen and phosphorus will change as these upgrades come on line. For this study we are proposing using data from twelve monitoring sites in the Sacramento and san Joaquin Rivers watershed (four in the Sacramento Basin and eight in the San Joaquin Basin) to evaluate nutrient concentrations, loads, and trends using the Weighted Regressions on Time, Discharge, and Season (WRTDS) model developed by Hirsch et al. (2010) for the 1975 to 2019 period. Wwill alsospecific from the upstream portion of the watershedss nutrientsaThis time period will capture transitions from wet years (1997) through drought years (2012-2014). Trend estimation will include total nitrogen, nitrate (NO3), ammonia (NH3), orthophosphate (PO4) and total phosphorus (TP) allowing managers to understand the watershed contribution to various forms of bioavailable nutrients. Concentration and discharge data for the sites for the time period of the study are available from U.S. Geological Survey National Water Inventory System (NWIS) and other sources. These trend estimations will provide a baseline understanding of nutrient inputs in the Delta from the watersheds and can be compared to future estimation after the upgrades to the Regional San WWTP have been implemented. In this study

**Products:** USGS Open-File report describing major finding completed by September 30, 2019.

**Affirmation:** It is understood that award funds will need to be expended within FY ’19, all products will be completed by the end of FY ’19, no additional PES funds are assumed, and funds awarded cannot carried be carried over to FY’20.

**Funding Request:** to complete this work I am requesting $40,000 for 300 hours of Dina Saleh’s time be expended within FY ’19.

**REFERENCES**

Domagalski, Joseph and Dina Saleh, 2015. Sources and Transport of Phosphorus to Rivers in California and Adjacent States, U.S., as Determined by SPARROW Modeling. Journal of the American Water Resources Association (JAWRA) 1-24. DOI: 10.1111/1752-1688.12326

Jassby, A.D., J.E. Cloern, and B.E. Cole, 2002. Annual Primary Production: Patterns and Mechanisms of Change in a Nutrient-Rich Tidal Ecosystem. Limnology and Oceanography 47(3):698-712.

Krich-Brinton, A., J. Sager, M. Trouchon, and R. Warren, 2012. Technical Evaluation of a VariancePolicy and Interim Salinity Program for the Central Valley Region. Larry Walker Associates, Memorandum. <https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/variances/variance_LWA_2012.pdf>

Novick, E., R. Holleman, T. Jabusch, J. Sun, P. Trowbridge, D. Senn, M. Guerin, C. Kendall, M. Young, and S. Peek, 2015, Characterizing and Quanitfying Nutrient Sources, Sinks and Transformations in the Delta: Synthesis, Modeling and Recommendations for Monitoring, December 2015

Saleh, Dina and Joseph Domagalski, 2015. SPARROW Modeling of Nitrogen Sources and Transport in Rivers and Streams of California and Adjacent States, U.S. Journal of the American Water Resources Association (JAWRA) 1-21. DOI: 10.1111/1752-1688.12325