**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 two monitoring sites, the Sacramento River at Freeport and san Joaquin Rivers at Vernalis, these are the two main inputs of nitrogen and phosphorus to the Delta from the upstream watershed. Data from these two sites will be used 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. We will also use results from the newly developed 2012 SPARROW (SPAtially Referenced Regressions On Watershed attributes) to evaluate the specific sources, spatial distribution, and transport of nutrients to the Delta from the upstream portion of the watersheds. This will help identify the main sources of nutrients to the Delta. Previous evaluation of the 2002 SPARROW model indicated that effluent form the Regional San WWTP is responsible for 50% and 67% of TN and TP loads (respectively) to the Delta. This time period will capture transitions from wet years (1997) through drought years (2012-2014). Trend estimation will include total nitrogen (TN), 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**

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