

2017 EMP Discrete Water Quality Summary Report

Introduction:

To analyze discrete water quality trends from 2017, the EMP stations were grouped and averaged into six regions: San Pablo Bay, Grizzly and Suisun Bay, Confluence, Central Delta, Southern Interior Delta, and Northern Interior Delta. The averaged six regions from 2017 were then compared to the previous year's 2011-2016 data. Table 1 describes how the stations were grouped, including the associated parameters and enhancements added in 2017.

Specific Conductance (Figure 1):

Specific conductance varied greatly in 2017 across EMP sampling regions with the highest levels in the western regions (San Pablo Bay, Suisun Bay and Grizzly Bay and Confluence) where water from the Pacific Ocean has the strongest influence. Averaged specific conductance ranged from 1,461 (Confluence) to 20,683 (San Pablo Bay) $\mu\text{S}/\text{cm}$ in the western regions during 2017. In 2017, specific conductance was less varied across sites in the interior delta regions (Central Delta, Northern Interior Delta, and Southern Interior Delta) and ranged from 144 (Northern Interior Delta) to 238 (Southern Delta) $\mu\text{S}/\text{cm}$.

The year 2017 had lower specific conductance in most regions compared to previous years. Water year 2017, was classified as Wet in the Sacramento Valley and Wet in the San Joaquin Valley, similar to 2011. Lower specific conductance observed in 2011 and 2017 were likely due to more precipitation and runoff than compared to the years 2012-2015, which were classified as dry or critically dry during one of California's worst droughts.

Turbidity (Figure 2):

Turbidity values ranged from 2.5 NTU (Central Delta, November) to 75.8 NTU (Grizzly and Suisun Bays, February) during 2017. The year 2017 had the highest levels of turbidity occurring January through April, when rain and snowpack runoff occurred in the watershed. In contrast, the years 2012-2015 had the highest levels of turbidity values from November through March, more likely influenced by high flow, rain, and elevated winds.

Ammonia (Figure 3):

Dissolved ammonia levels in 2017 ranged from 0.02 mg/L (Southern Interior, May) to 0.45 mg/L (Northern Interior Delta, July). Dissolved ammonia levels are typically higher at C3A in Northern Interior Delta due to its location downstream of the effluent discharge from Sacramento Regional Sanitation District. The Northern Interior Delta experienced a period of lower dissolved ammonia concentrations February through May for both 2011 and 2017, compared to the years 2012-2016. Ammonia levels are typically lower throughout the Delta and Bays, likely due to dilution and nitrification.

Chlorophyll *a* (Figure 4):

Highest levels of chlorophyll *a* were observed during late spring or summer in most regions. In 2017, the western regions (San Pablo and Grizzly and Suisun Bays) experienced the highest levels of chlorophyll *a* during spring. The interior delta regions had elevated levels of chlorophyll *a* during July at the

Confluence (23.3 µg/L), Central Delta (16.1 µg/L), Southern Interior (8.2 µg/L) and Northern Interior (8.2 µg/L). More information about the phytoplankton genera is described in the phytoplankton section.

Nitrate+nitrite (Figure 5):

Nitrate and nitrite levels were lower during the wet years of 2011 and 2017 in all regions compared to 2012 through 2016. The Southern Interior Delta region had lower nitrate and nitrite concentrations during 2017 in comparison to previous years, but still had the highest levels compared to the rest of the Bay-Delta, likely due to runoff from nearby agricultural land use and wastewater treatment effluent. The Northern Interior Delta Region had the highest concentrations of nitrate and nitrite during August (0.73 mg/L) that coincided with a decrease in dissolved ammonia, indicating possible nitrification.

Total phosphorus (Figure 6):

The wet years of 2011 and 2017 had lower total phosphorous levels in all regions compared to 2012 through 2016. In 2017, total phosphorous levels ranged from 0.04 mg/L (Northern Interior) to 0.26 mg/L (Southern Interior). The Southern Interior typically has the highest levels of total phosphorous due to nearby agriculture, but in 2017 had lower levels likely due to dilution from increased flow.

Tables and Figures:

Table 1: Station grouping of the six regions and metadata.

	Lab Data	Field Data
Discrete Water Quality Stations	Dissolved Ammonia, Total Phosphorus, Dissolved Nitrate+ Nitrite	Specific Conductance, Turbidity, Chlorophyll <i>a</i>
Grizzly Bay/Suisun Bay		
D7	Yes	Yes
NZ032	February 2017 - December 2017	Yes
NZ042	February 2017 - December 2017	Yes
D8	Yes	Yes
Confluence		
D10	February 2017 - December 2017	Yes
D4	Yes	Yes
D12	June 2016 - December 2017	Yes
D22	June 2016 - December 2017	Yes
Central Delta		
D28A	Yes	Yes
D19	Yes	Yes
D16	Yes	Yes
D26	Yes	Yes
San Pablo Bay		
D41	Yes	Yes
D41A	Yes	Yes
D6	Yes	Yes
NZ002	February 2017 - December 2017	Yes
NZ004	February 2017 - December 2017	Yes
NZ325	February 2017 - December 2017	Yes
Southern Interior Delta		
P8	Yes	Yes
MD10A	Yes	Yes
C10A	Yes	Yes
C9	January 2017 - December 2017	January - December 2017
Northern Interior Delta		
C3A	Yes	Yes
D24*	January 2017 - April 2017	January - April 2017
NZ068*	May 2017 - December 2017	May - December 2017

*D24 and NZ068 are located near each other near Rio Vista. D24 was accessed by land but in May 2017 sampling took place via research vessel slightly downstream

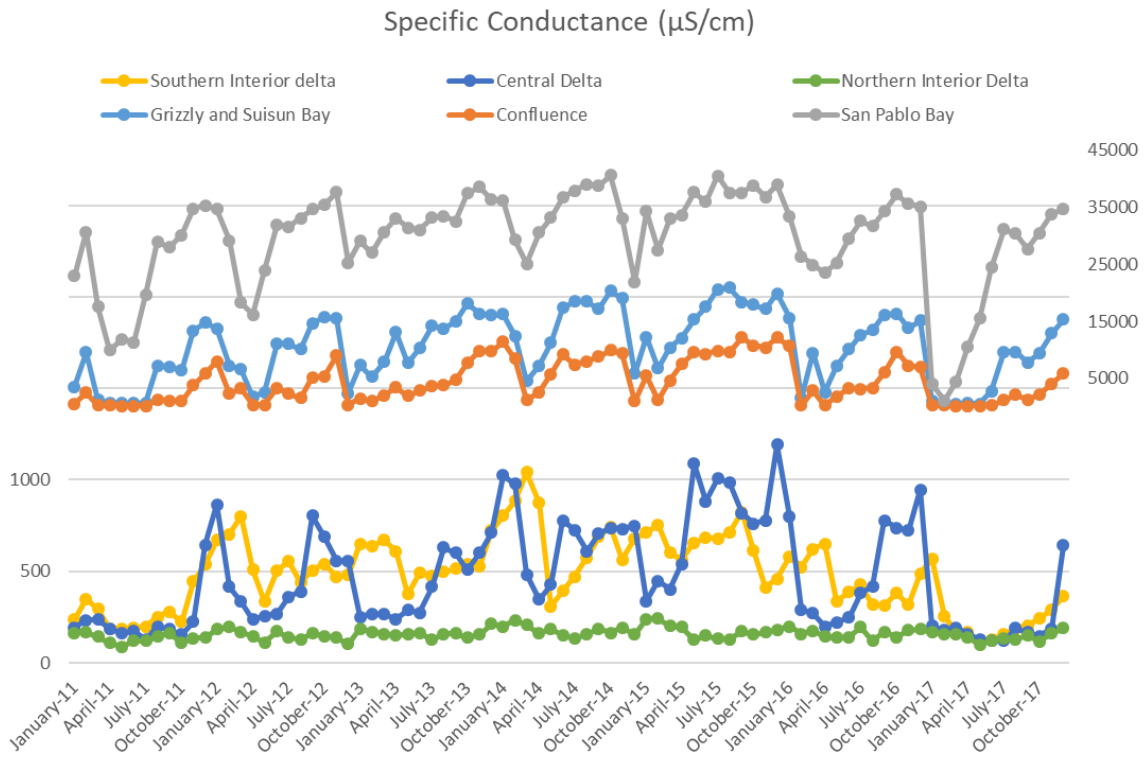


Figure 1: Average specific conductance at six regions during 2011-2017.

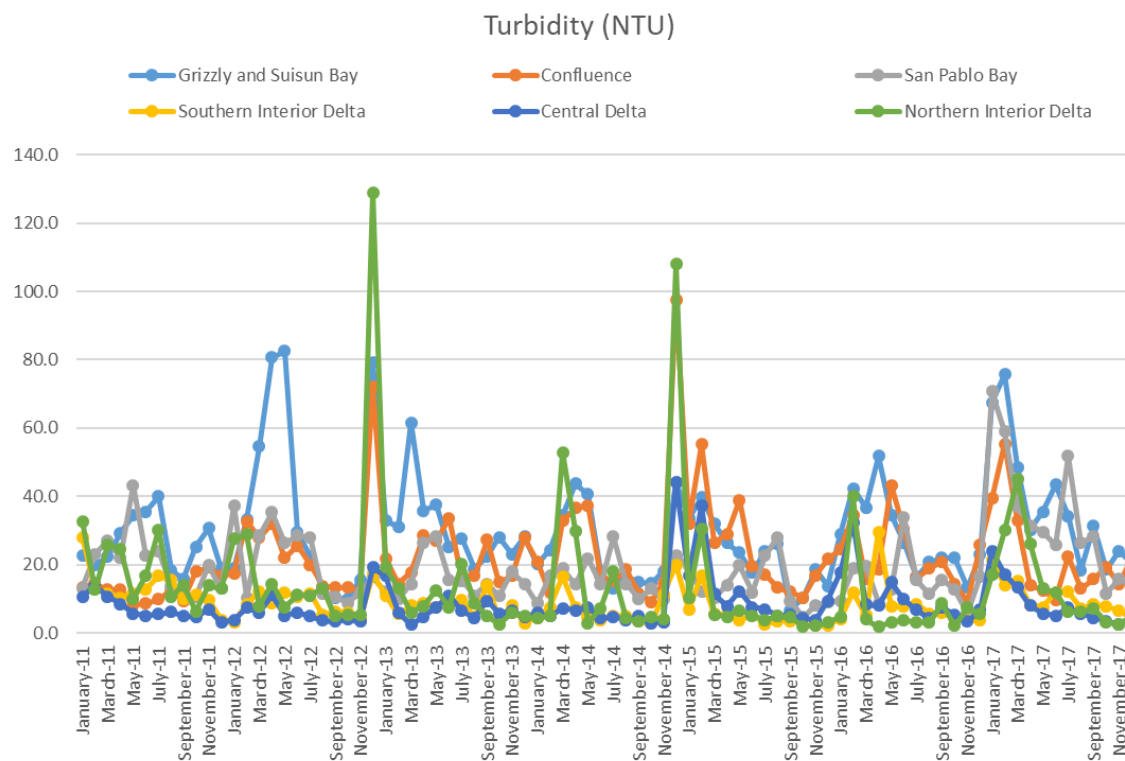


Figure 2: Average turbidity at six regions during 2011-2017.

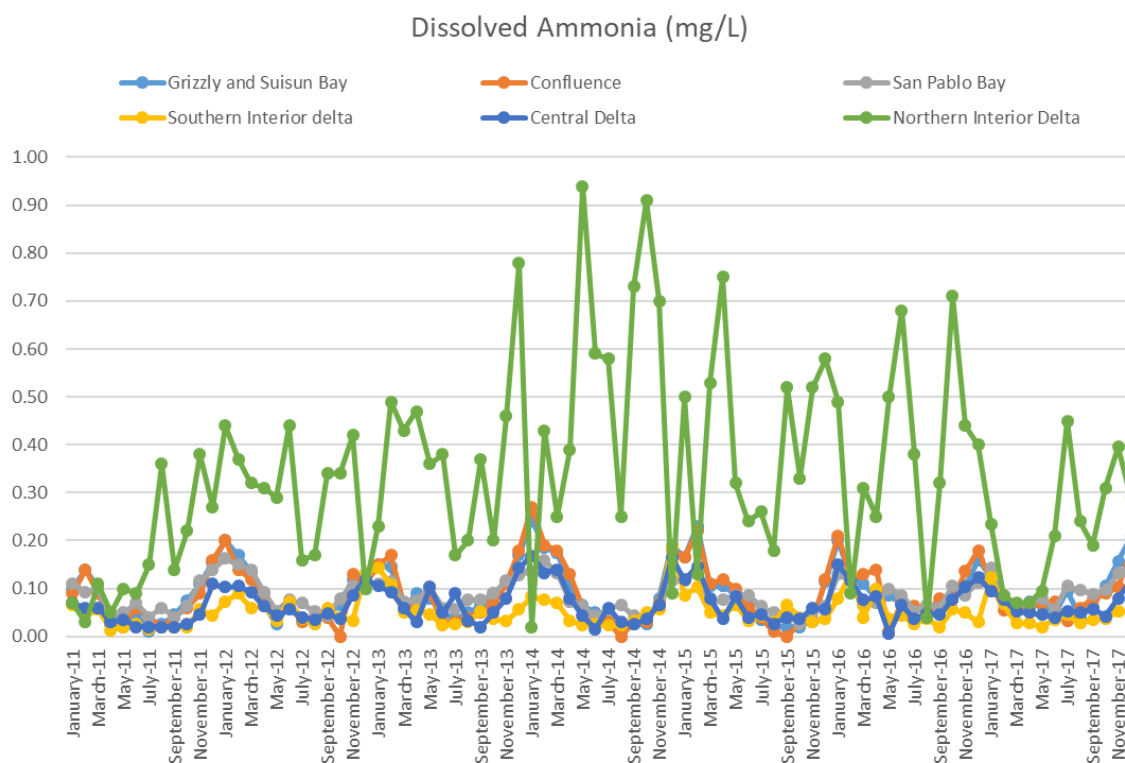


Figure 3: Average dissolved ammonia concentrations at six regions during 2011-2017.

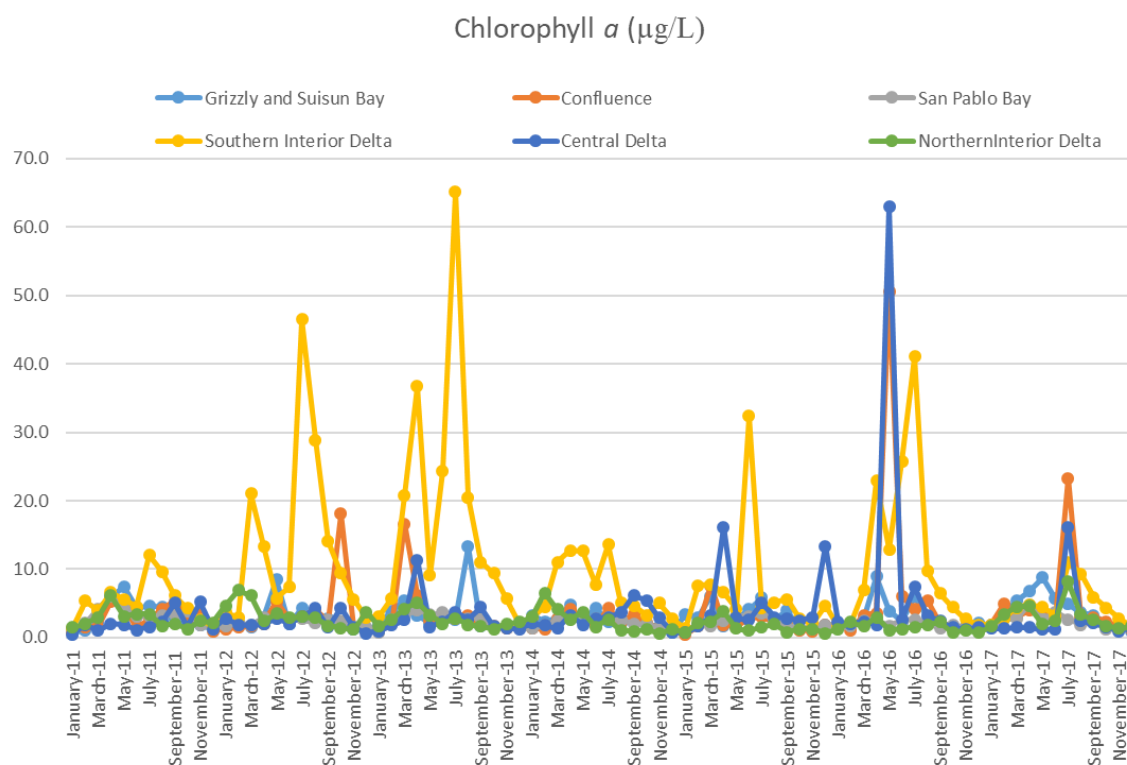


Figure 4: Average chlorophyll *a* concentrations at six regions during 2011-2017.

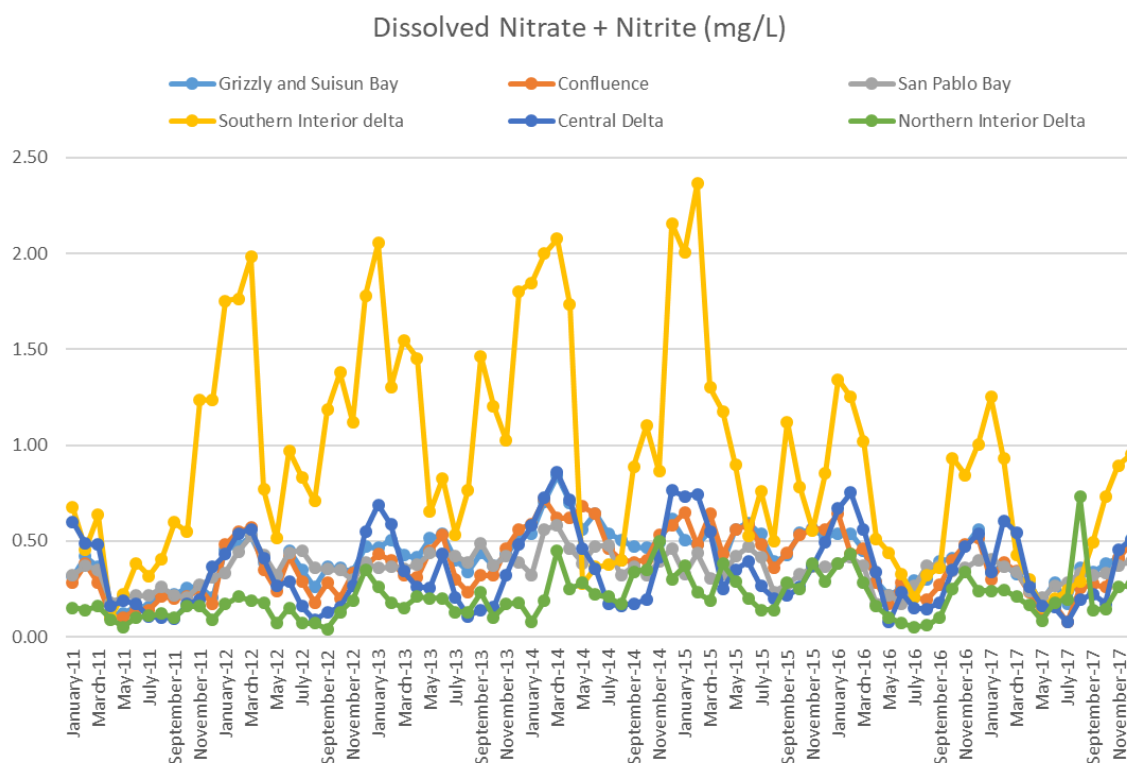


Figure 5: Average dissolved nitrate and nitrite concentrations at six regions during 2011-2017.

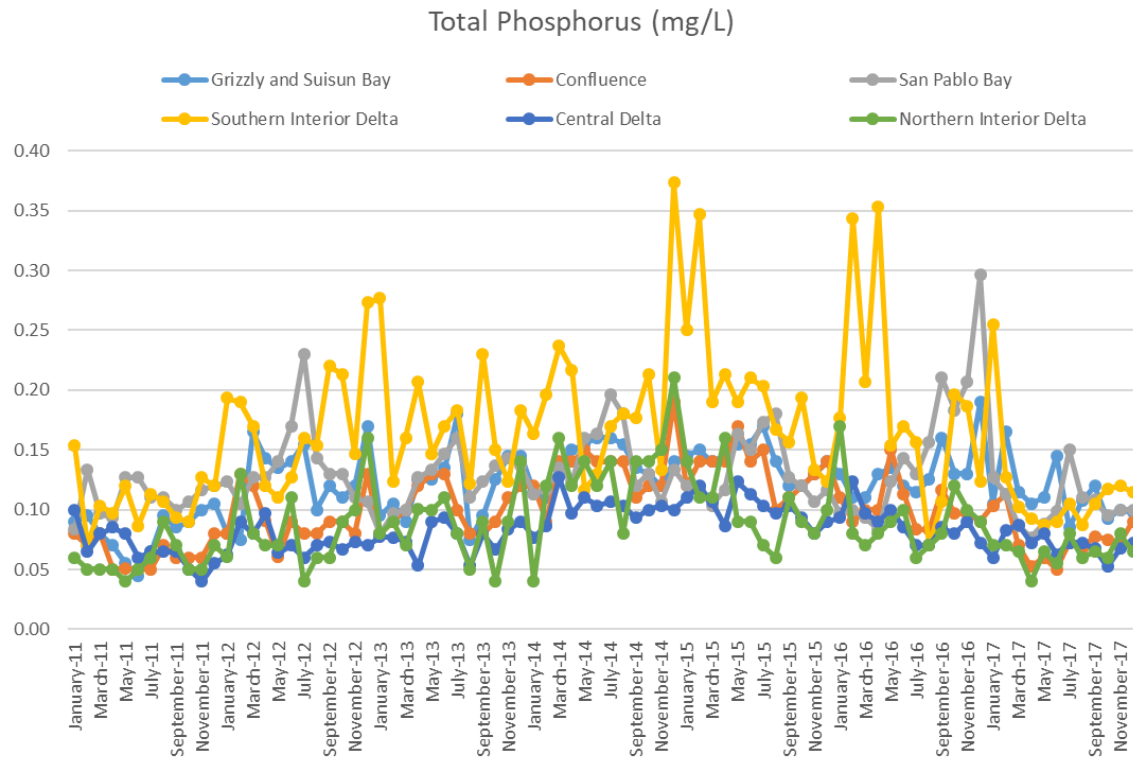


Figure 6: Average total phosphorous concentrations at six regions during 2011-2017.