

2016 EMP Discrete Water Quality Summary Report

Introduction:

To analyze discrete water quality parameters trends from 2016, 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 2016 were then compared to the previous year's 2012-2015. A summary of station groupings and associated parameters is described in Table 1. Stations D12, D16, and D22 began collecting dissolved ammonia, total phosphorous, and dissolved nitrate and nitrate in June 2016. The entrapment zones stations are not included in these analyses.

Specific Conductance (Figure 1):

Salinity varied greatly across EMP sampling 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 salinity ranged from 230 (Confluence) to 37,268 (San Pablo Bay) $\mu\text{S}/\text{cm}$ in the western regions during 2016. Salinity was less varied in the interior delta regions (Central Delta, Northern Interior Delta, and Southern Interior Delta) ranged from 120 (Northern Interior Delta) to 947 (Central Delta) $\mu\text{S}/\text{cm}$.

The year 2016 had lower salinity in most regions compared to previous years. Water year 2016, was considered below normal in the Sacramento Valley, and Dry in the San Joaquin Valley like in 2012. Lower salinity in 2016 was likely due to more runoff compared to the year's 2013-2015 that were considered dry or critically dry during one of California's worst droughts.

Turbidity (Figure 2):

Turbidity values ranged from 1.8 NTU (Northern Interior) to 51.8 NTU (Grizzly and Suisun Bays) during 2016. The year 2016 had the highest levels of turbidity occurring February through June, when rain and snowpack runoff occurs in the watershed. In contrast, the years 2012-2015 had highest levels of turbidity values November through March, more likely influenced by high flow, rain, and elevated winds. The region in the Southern Interior Delta experienced highest monthly average (29.6 NTU) in April compared to the previous year's 2012-2015.

Ammonia (Figure 3):

Dissolved ammonia levels in 2016 ranged from 0.01 mg/L (Confluence and Central Delta) to 0.71 mg/L (Northern Interior Delta). Dissolved ammonia levels are typically higher at C3A in Northern Interior Delta because it is located downstream of the effluent discharge from Sacramento Regional Sanitation District. Ammonia levels were lower throughout the Delta and Bays, likely due to dilution and nitrification.

Chlorophyll *a* (Figure 4):

Highest levels of chlorophyll *a* were observed in 2016 during late spring and summer. A spring bloom led to the highest levels of chlorophyll *a* observed in May at the Confluence (50.5 $\mu\text{g}/\text{L}$) and in the Central Delta (62.9 $\mu\text{g}/\text{L}$). The Southern Interior also experienced a bloom that started in spring that peaked at

41.0 µg/L during July. More information about the phytoplankton genera is described in the phytoplankton section.

Nitrate+nitrite (Figure 5):

Nitrate and nitrite levels were lower in 2016 compared to previous years at all regions except for the Central Delta and Northern Interior. The Southern Interior Delta region still had the highest nitrate and nitrite levels compared to the rest of the Bay-Delta, likely due to runoff from nearby agriculture land use and wastewater treatment effluent. Nitrate and nitrite levels fluctuated with the seasons, with highest levels of nitrate and nitrite in the Late Fall and Winter and lowest levels during the Summer, presumably caused by increased nitrogen uptake by the phytoplankton and aquatic vegetation communities during the Summer.

Total phosphorus (Figure 6):

Total phosphorous levels ranged between 0.06 (Northern Interior) to 0.35 (Southern Interior) mg/L during 2016. Elevated total phosphorous levels in the Southern Interior are likely due from nearby agriculture runoff. Total phosphorous decreased in the Southern Interior during late fall early winter, when total phosphorous levels increased in regions downstream, presumably due to increased flow from storm water.

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	No	Yes
NZ042	No	Yes
D8	Yes	Yes
Confluence		
D10	No	Yes
D4	Yes	Yes
D12	June -December 2016	Yes
D22	June -December 2016	Yes
Central Delta		
D28A	Yes	Yes
D19	Yes	Yes
D16	June -December 2016	Yes
D26	Yes	Yes
San Pablo Bay		
D41	Yes	Yes
D41A	Yes	Yes
D6	Yes	Yes
NZ002	No	Yes
NZ004	No	Yes
NZ325	No	Yes
Southern Interior Delta		
P8	Yes	Yes
MD10A	Yes	Yes
C10A	Yes	Yes
Northern Interior Delta		
C3A	Yes	Yes

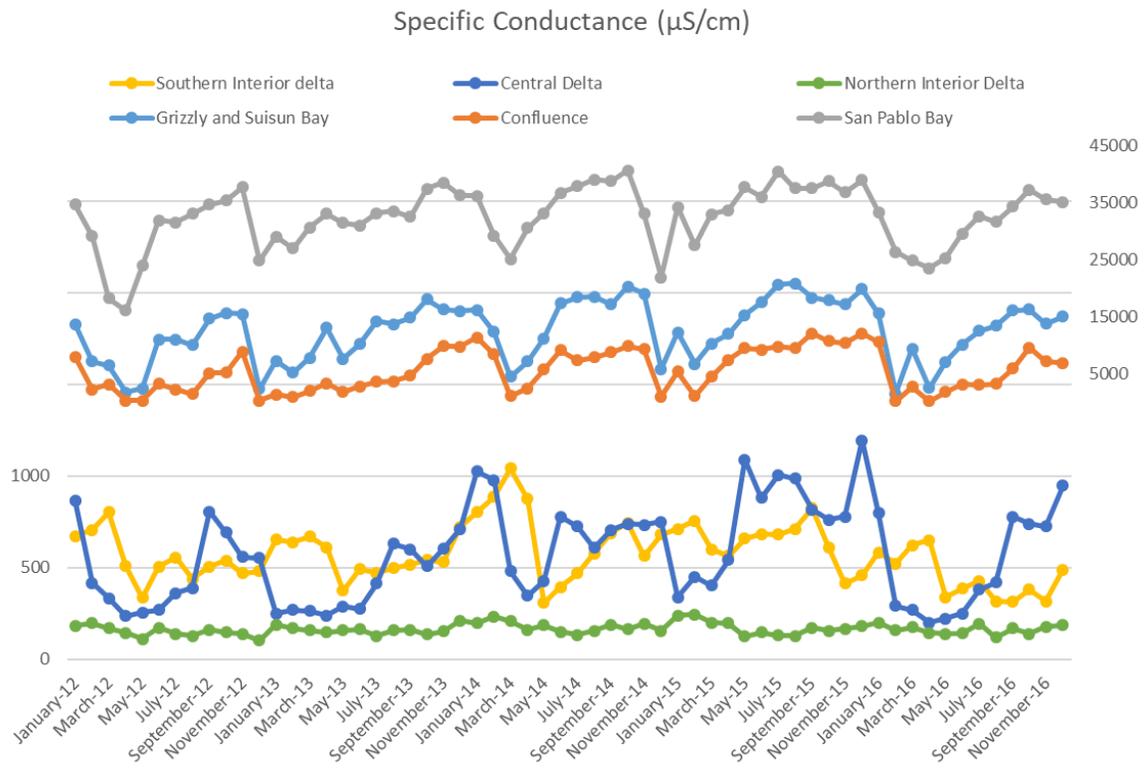


Figure 1: Average specific conductance at six regions during 2012-2016.

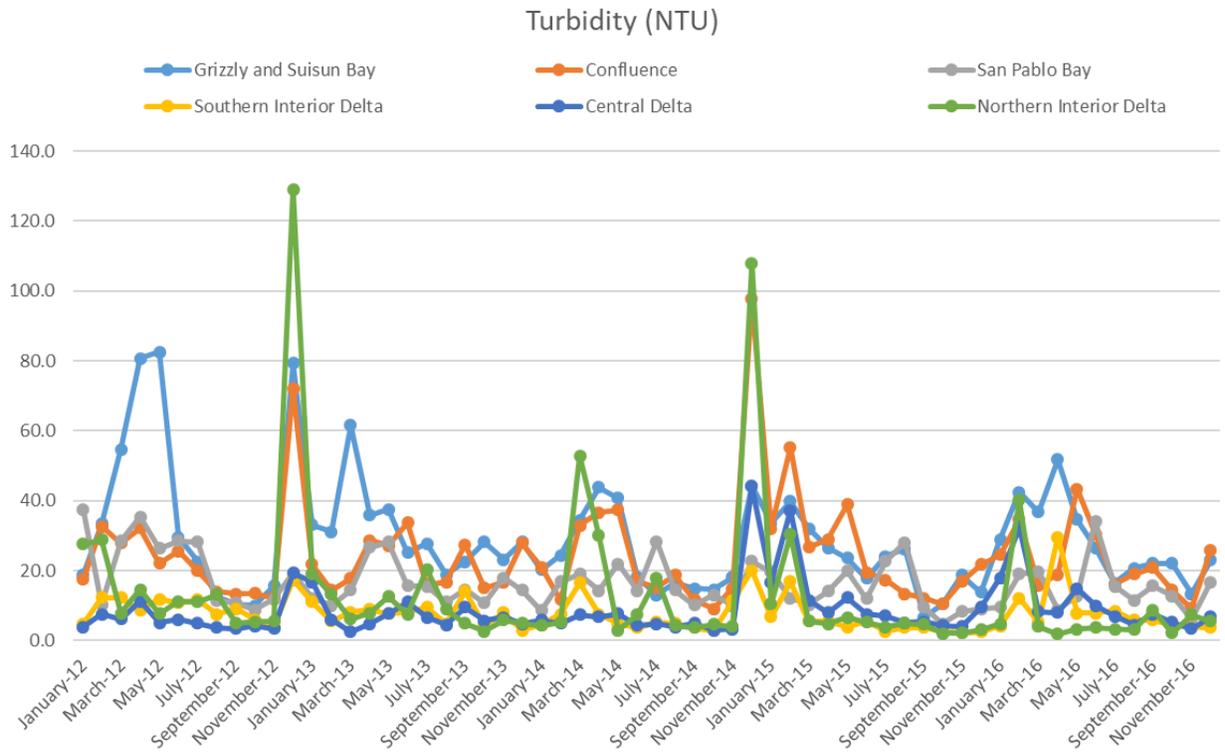


Figure 2: Average turbidity at six regions during 2012-2016.

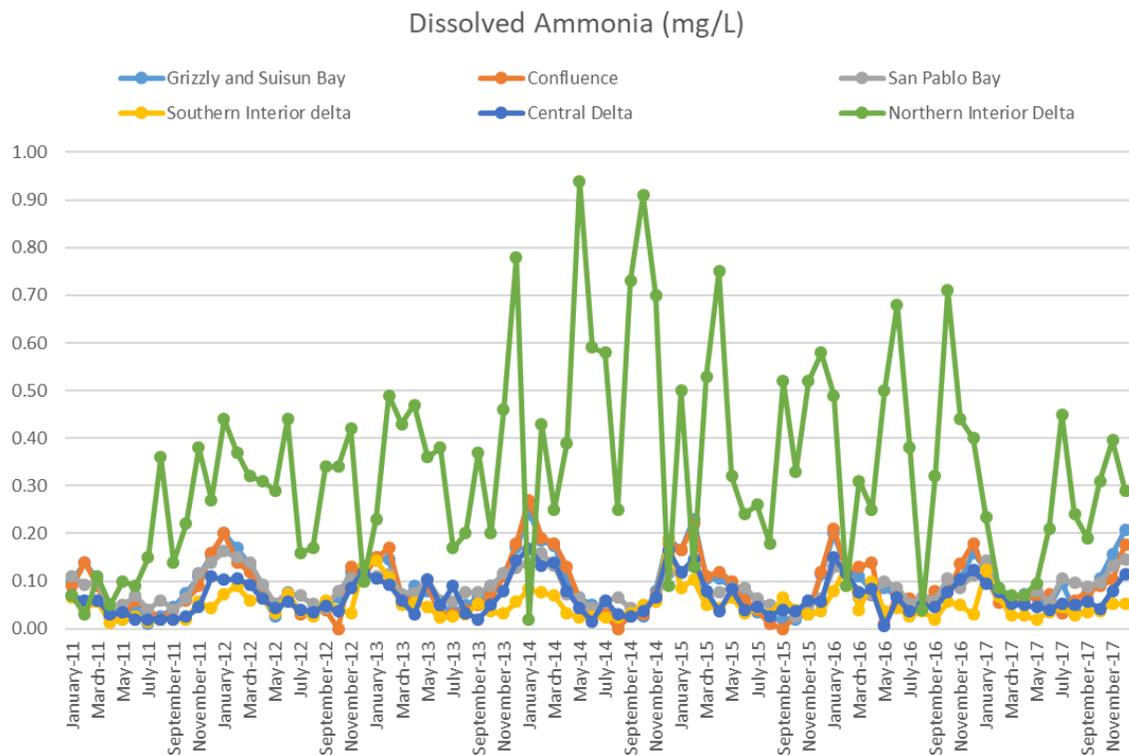


Figure 3: Average dissolved ammonia concentrations at six regions during 2012-2016.

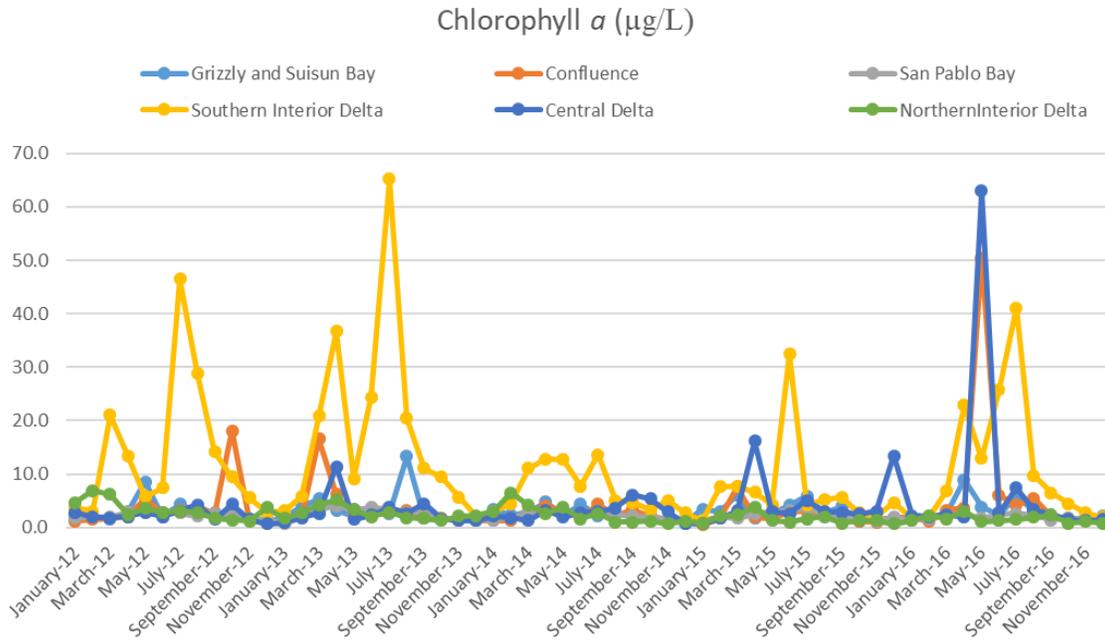


Figure 4: Average chlorophyll *a* concentrations at six regions during 2012-2016.

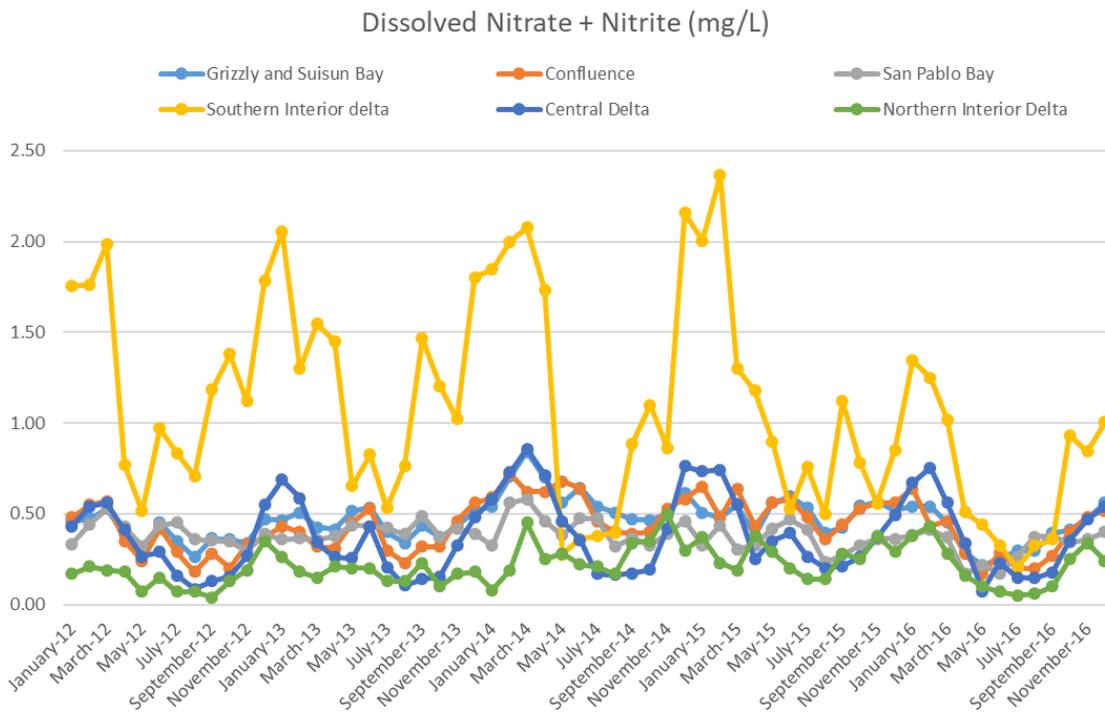


Figure 5: Average dissolved nitrate and nitrite concentrations at six regions during 2012-2016.

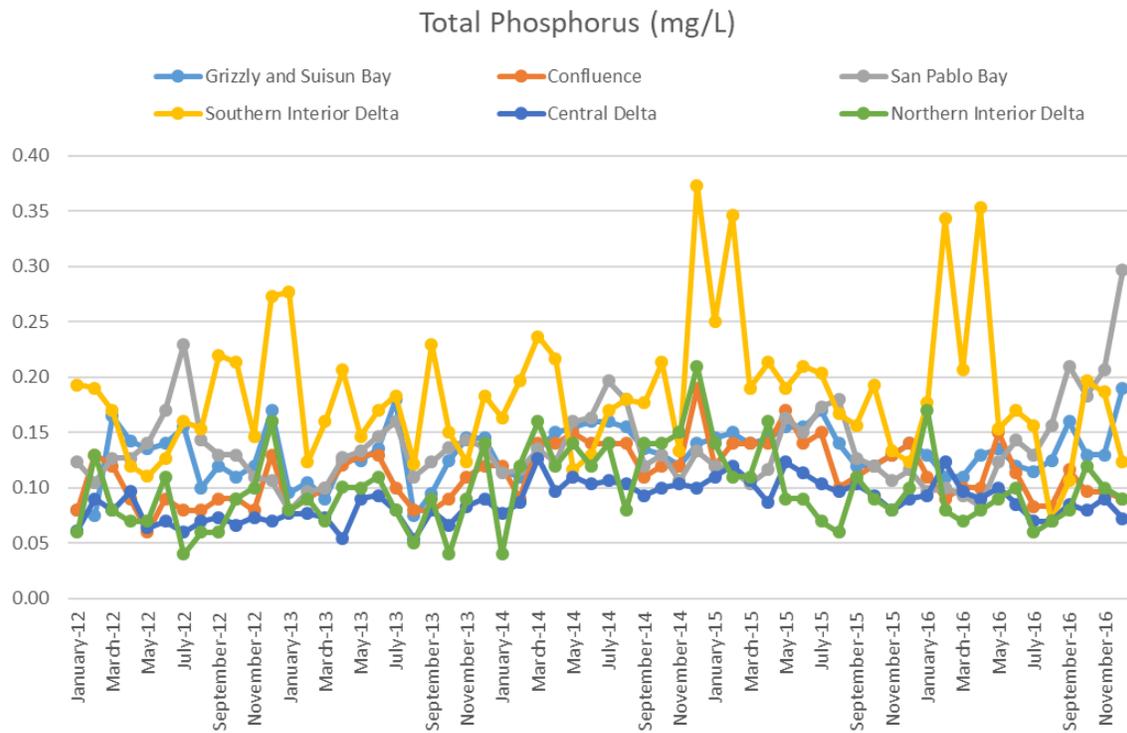


Figure 6: Average total phosphorous concentrations at six regions during 2012-2016.