2018 Phytoplankton, Chlorophyll a, and Pheophytin a

The EMP sampled 24 sites during calendar year 2018. Graphed values for chlorophyll *a*, pheophytin *a*, and organism counts are monthly averages because different regions have differing numbers of stations. However, means, medians, minimums, and maximums were calculated on the full dataset for each region. Table 1 lists each region and the stations in that region. Freshwater regions are the Northern Interior Delta, Southern Interior Delta, and Central Delta. The Confluence region runs from fresh to brackish water depending on outflow. The Grizzly Bay/Suisun Bay region is typically brackish water, while the San Pablo Bay region is more marine.

Northern Interior Delta

Chlorophyll *a* average concentrations were higher in early spring and mid-summer (Figure 1). The highest concentration was recorded at C3A in May (5.59 μ g/L) and the lowest was recorded at NZ068 in December (0.55 μ g/L). The mean and median values were 2.15 μ g/L and 1.71 μ g/L, respectively.

Pheophytin *a* average concentrations were highest in the winter and spring; values were low compared to chlorophyll *a* (Figure 1). The maximum (3.16 μ g/L) was recorded at C3A in July and the minimum (0.50 μ g/L) was recorded at NZ068 in July, although October and November included concentrations below the detection limit. The mean and median were 1.23 μ g/L and 1.02 μ g/L, respectively.

Phytoplankton average concentrations were highest in February-April, with cyanobacteria dominating throughout the year (Figure 2; "other" encompasses chrysophytes and euglenoids). Green algae concentrations were relatively high in February and March.

Southern Interior Delta

Chlorophyll *a* average concentrations were highest in the summer (Figure 3). The maximum recorded in at C10A in July (71.87 μ g/L); the minimum was at P8 in December (0.76 μ g/L). The mean and median were 7.82 μ g/L and 3.06 μ g/L, respectively.

Pheophytin *a* average concentrations were fairly constant throughout the year, with slight spikes in the summer months (Figure 3). The maximum pheophytin *a* value was recorded at C10A in September (12.12 μ g/L); the minimum occurred at C9 in February (0.61 μ g/L). The mean and median values were 2.39 μ g/L and 1.41 μ g/L, respectively.

Phytoplankton average concentrations were highest in the spring and summer months, with the highest concentrations occurring in April (Figure 4; "other" encompasses chrysophytes, dinoflagellates, and euglenoids). Cyanobacteria dominating throughout the year and centric diatom concentrations were relatively high in the summer months.

Central Delta

Chlorophyll *a* average concentrations were highest in the spring and summer months, excluding the slightly lower concentrations in May (Figure 5). The highest chlorophyll *a* concentration for this region at occurred at D26 in August (13.80 μ g/L); the minimum occurred at D26 in December (0.65 μ g/L). The mean and median values were 2.47 μ g/L and 1.92 μ g/L, respectively.

Pheophytin *a* average concentrations were relatively consistent throughout the year excluding a large spike in November (Figure 5), when the highest concentration in the region was recorded (15.40 μ g/L,

station D19). The minimum occurred at D19 in October (0.50 μ g/L). The mean and median values were 1.28 μ g/L and 0.90 μ g/L, respectively.

Phytoplankton average concentrations were highest in the spring and summer months (Figure 6; "other" encompasses chrysophytes and haptophytes). Average concentrations were lower compared to other regions. The highest concentrations were seen in April, and cyanobacteria dominated throughout the year. Higher concentrations of green algae were seen in January-March.

Confluence

Chlorophyll *a* average concentrations were highest during the late-spring and summer (Figure 7). The highest concentration occurred at D10 in May (13.00 μ g/L); the minimum was recorded at D10 in December (0.68 μ g/L). The mean and median values were 2.55 μ g/L and 2.05 μ g/L, respectively.

Pheophytin *a* average concentrations were relatively consistent throughout the year. The maximum concentration was recorded at D22 in August (2.99 μ g/L) and the minimum at D22 in November (0.51 μ g/L) (Figure 7). The mean and median for this region were 1.17 μ g/L and 1.04 μ g/L, respectively.

Phytoplankton average concentrations were relatively consistent throughout the year, excluding October and November (Figure 8; "other" encompasses chrysophytes). The highest concentrations were seen in April, although average concentrations were lower compared to other regions. Cyanobacteria dominated throughout the year, and green algae concentrations spiked in January-March.

Grizzly Bay and Suisun Bay

Chlorophyll *a* average concentrations in this region was relatively consistent, excluding a large spike in May (Figure 9), which included the maximum value recorded that year (19.10 μ g/L, at NZ032); the minimum was recorded at D8 in January (0.85 μ g/L). The mean and median were 3.08 μ g/L and 2.27 μ g/L, respectively.

Pheophytin *a* average concentrations were slightly higher in February-May (Figure 9). The maximum concentration was recorded in at NZS42 March (4.31 μ g/L) and the minimum at D8 in November (0.56 μ g/L). The mean and median were 1.39 μ g/L and 1.00 μ g/L, respectively.

Phytoplankton average concentrations were relatively consistent in the late winter through early summer months, with lower values in the late fall (Figure 10; "other" encompasses chrysophytes and dinoflagellates). Cyanobacteria was the dominate algal group throughout the year, and green algae concentrations spiked in January-March.

San Pablo Bay

Chlorophyll *a* average concentrations were relatively consistent throughout the year, excluding a large peak in April (Figure 11), where the maximum value for the region was recorded (26.90 μ g/L, at NZ002); the minimum concentration was recorded at D6 in January (0.87 μ g/L). The mean and median were 2.67 μ g/L and 2.10 μ g/L, respectively.

Pheophytin *a* average concentrations were relatively consistent and low (Figure 11). The maximum was recorded at NZ002 in April (2.33 μ g/L) and the minimum at NZ325 in December (0.50 μ g/L), although

November's concentrations were below the reporting limit. The mean and median were 0.89 μ g/L and 0.73 μ g/L, respectively.

Phytoplankton average concentrations were relatively consistent throughout the year, excluding a large spike in cyanobacteria in April (Figure 12; "other" encompasses chrysophytes, ciliates, dinoflagellates, and euglenoids). Green algae concentrations were highest in January-April.

Region	Stations
Northern Interior Delta	C3A and NZ068
Southern Interior Delta	C9, C10A, M10A and P8
Central Delta	D16, D19, D26 and D28A
The Confluence	D4, D10, D12 and D22
Grizzly and Suisun Bay	D7, D8, NZ032 and NZS42
San Pablo Bay	D6, D41, D41A, NZ002, NZ004 and NZ325

Table 1. Stations included within each region of the Delta.



Figure 1. Average chlorophyll *a* and pheophytin *a* concentrations in the Northern Interior Delta.



Figure 2. Average organism density in the Northern Interior Delta; note second axis for cyanobacteria.



Figure 3. Average chlorophyll *a* and pheophytin *a* concentrations in the Southern Interior Delta.



Figure 4. Average organism density in the Southern Interior Delta; note second axis for cyanobacteria.



Figure 5. Average chlorophyll *a* and pheophytin *a* concentrations in the Central Delta.



Figure 6. Average organism density in the Central Delta; note second axis for cyanobacteria.



Figure 7. Average chlorophyll *a* and pheophytin *a* concentrations in the Confluence.



Figure 8. Average organism density in the Confluence; note second axis for cyanobacteria.



Figure 9. Average chlorophyll *a* and pheophytin *a* concentrations in the Grizzly and Suisun Bays.



Figure 10. Average organism density in the Grizzly and Suisun Bays; note second axis for cyanobacteria.



Figure 11. Average chlorophyll *a* and pheophytin *a* concentrations in the San Pablo Bay.



Figure 12. Average organism density in the San Pablo Bay; note second axis for cyanobacteria.