2012-2016 Phytoplankton, Chlorophyll *a*, and Pheophytin *a*

The EMP sampled 13 to 16 sites during the years 2012-2016. Some sites were added during the drought that occurred during these years to better monitor its potential effects on phytoplankton. Hence, values for chlorophyll *a*, pheophytin *a*, and organism counts are yearly averages because different regions have differing numbers of stations. 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

Average chlorophyll *a* and pheophytin *a* were highest in 2012, with slight decreases each following year (Figure 1). All values were low (below 4 micrograms per mL).

In 2012 and 2013, pennate and centric diatoms dominated the phytoplankton; starting in 2014, cyanobacteria became the dominant phytoplankton, with numbers high through 2015 and 2016 (Figure 2).

Southern Interior Delta

Average chlorophyll *a* was fairly high (above 10 micrograms per mL) in 2012 and 2013 (Figure 3). Chlorophyll *a* dropped in 2014 and 2015, with a slight increase in 2016. Average pheophytin *a* was low from 2012-2015, with a slight increase in 2016.

Centric diatoms and cyanobacteria dominated the phytoplankton in 2012 and 2013, with a sharp drop in numbers in 2014 for all phytoplankton except cyanobacteria (Figure 4). Cyanobacteria were the most common phytoplankton in 2015 and 2016 as well.

Central Delta

Average chlorophyll *a* was low (below 3 micrograms per mL) from 2012-2014, before increasing in 2015 and 2016 (Figure 5). Average pheophytin *a* was low (below 2 micrograms per mL) in all years.

There was a diverse community of pennate diatoms, centric diatoms, cyanobacteria, and cryptophytes in 2012 and 2013, with a sharp increase of centric diatoms in 2013 (Figure 6). Cyanobacteria dominated from 2014 to 2016, with some green algae appearing in 2015 and 2016.

Confluence

Average chlorophyll *a* decreased slightly each year from 2012 to 2015, with a large increase in 2016 (Figure 7). Average pheophytin *a* was low (below 2 micrograms per mL) in all years.

Centric diatoms dominated the phytoplankton in 2012, before decreasing sharply in 2013 (Figure 8). The remaining years were dominated by cyanobacteria, with very few other phytoplankton present.

Grizzly Bay/Suisun Bay

Average chlorophyll *a* decreased slightly from 2012 to 2014, before increasing again in 2015 and 2016 (Figure 9). Overall, values were low (below 3 micrograms per mL). Average pheophytin *a* showed a similar pattern.

Pennate and centric diatoms were most common in 2012; in 2013, all phytoplankton numbers were low (below 500 organisms per mL) (Figure 10). Phytoplankton began increasing in 2014 and 2015, with a diverse community of pennate diatoms, centric diatoms, cyanobacteria, and cryptophytes. All phytoplankton increased sharply in 2016, showing the same diverse community as in 2014 and 2015, but with a much larger contribution of green algae.

San Pablo Bay

Average chlorophyll *a* changed little from year to year, thought there was a slight increase in 2013 (Figure 11). Values were low (below 3 micrograms per mL). Average pheophytin *a* showed a similar pattern, with an increase in 2014 instead of 2013.

Pennate diatoms dominated the phytoplankton in 2012, but declined sharply in 2013, when numbers for all phytoplankton were low (Figure 12). Though other phytoplankton made small contributions from 2014 to 2016, the community was dominated by cyanobacteria.

Region	Stations
Northern Interior Delta	C3A, D24
Southern Interior Delta	C9, C10A, MD10A, P8
Central Delta	D16, D19, D26, D28A
Confluence	D4, D12, D22
Grizzly Bay/Suisun Bay	D7, D8
San Pablo Bay	D6, D41, D41A

Table 1. List of stations by region sampled during 2012-2016.

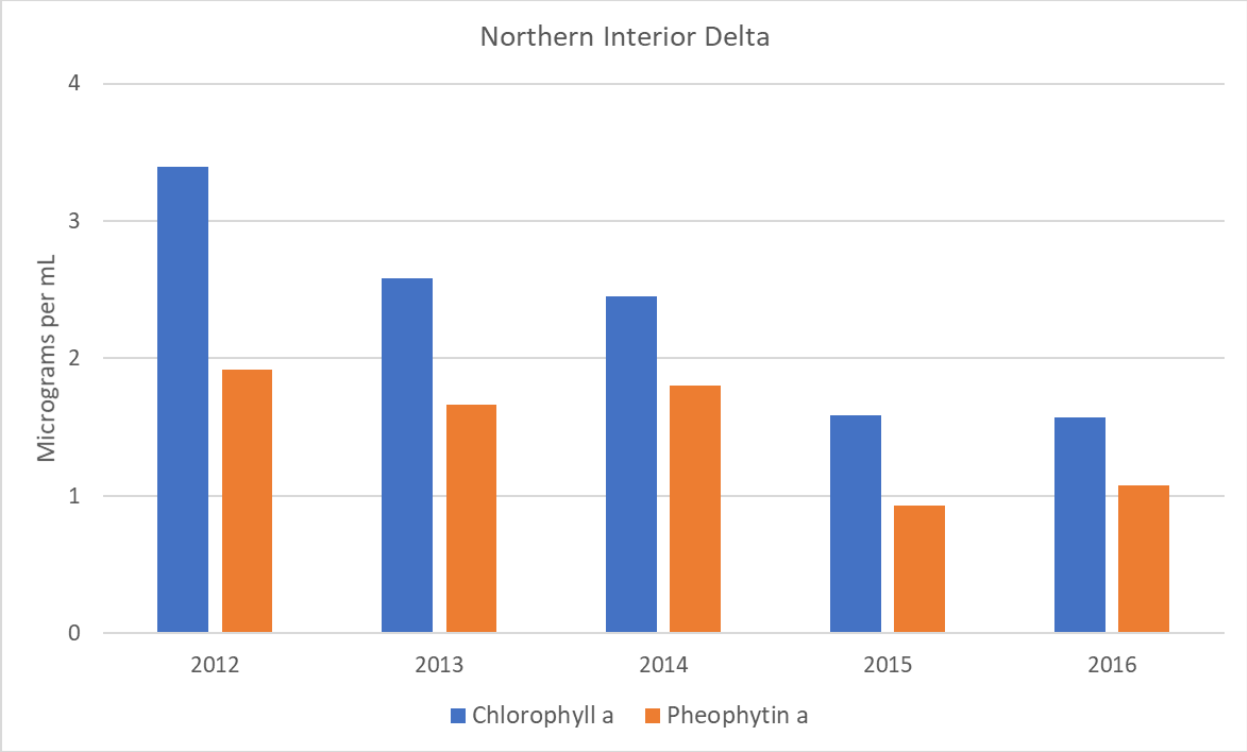

Figure 1. Annual average pigment concentrations in the Northern Interior Delta.

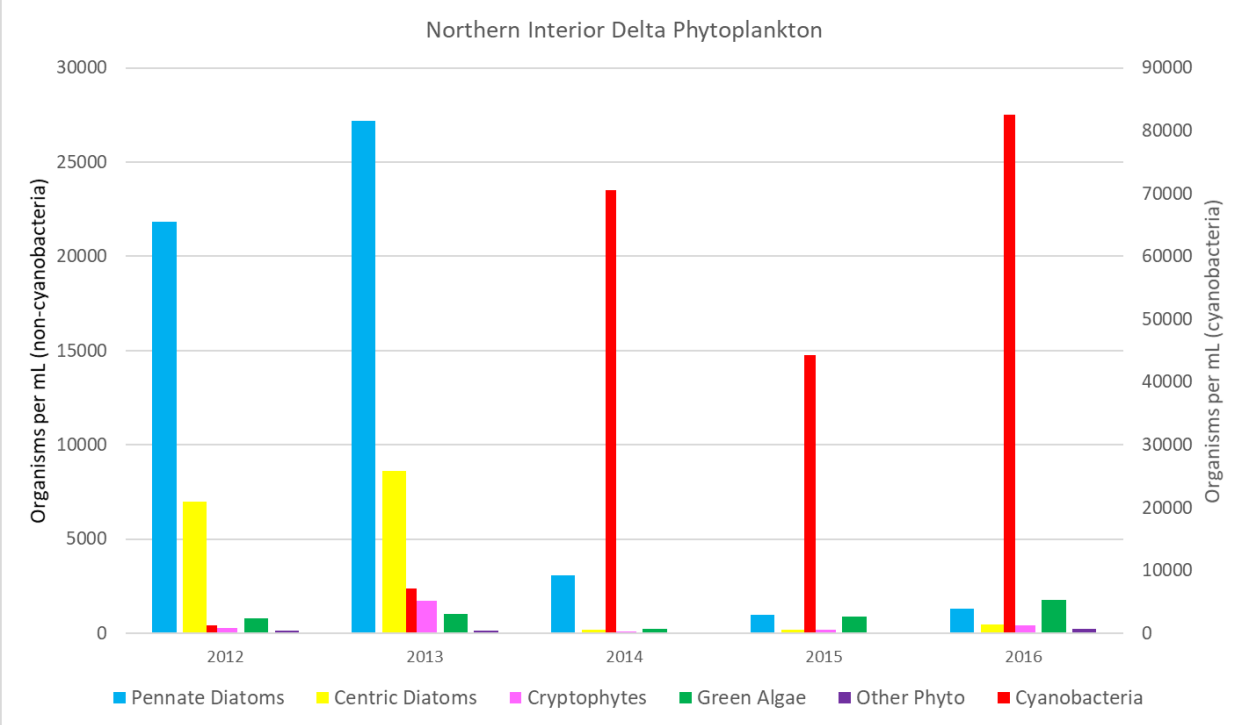

Figure 2. Annual averaged phytoplankton composition in the Northern Interior Delta. Note the secondary axis for cyanobacteria. Other Phyto are chrysophytes, dinoflagellates, and euglenoids.

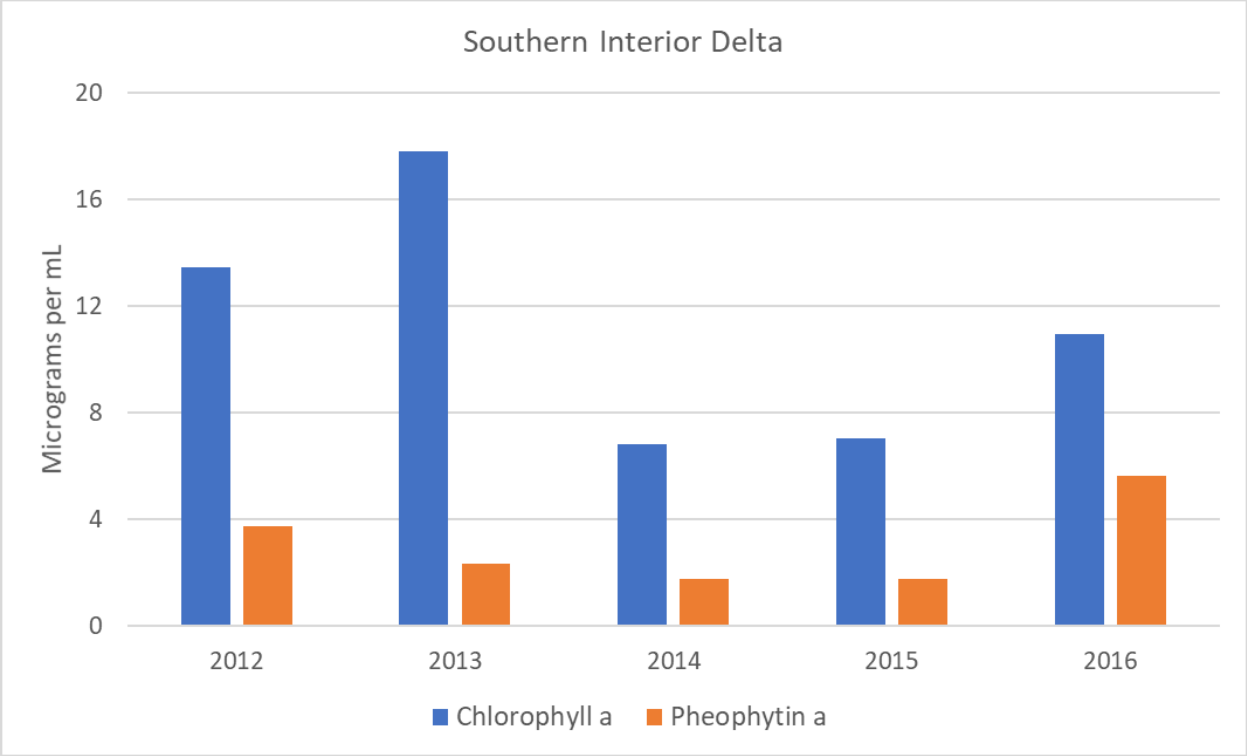

Figure 3. Annual average pigment concentrations in the Southern Interior Delta.

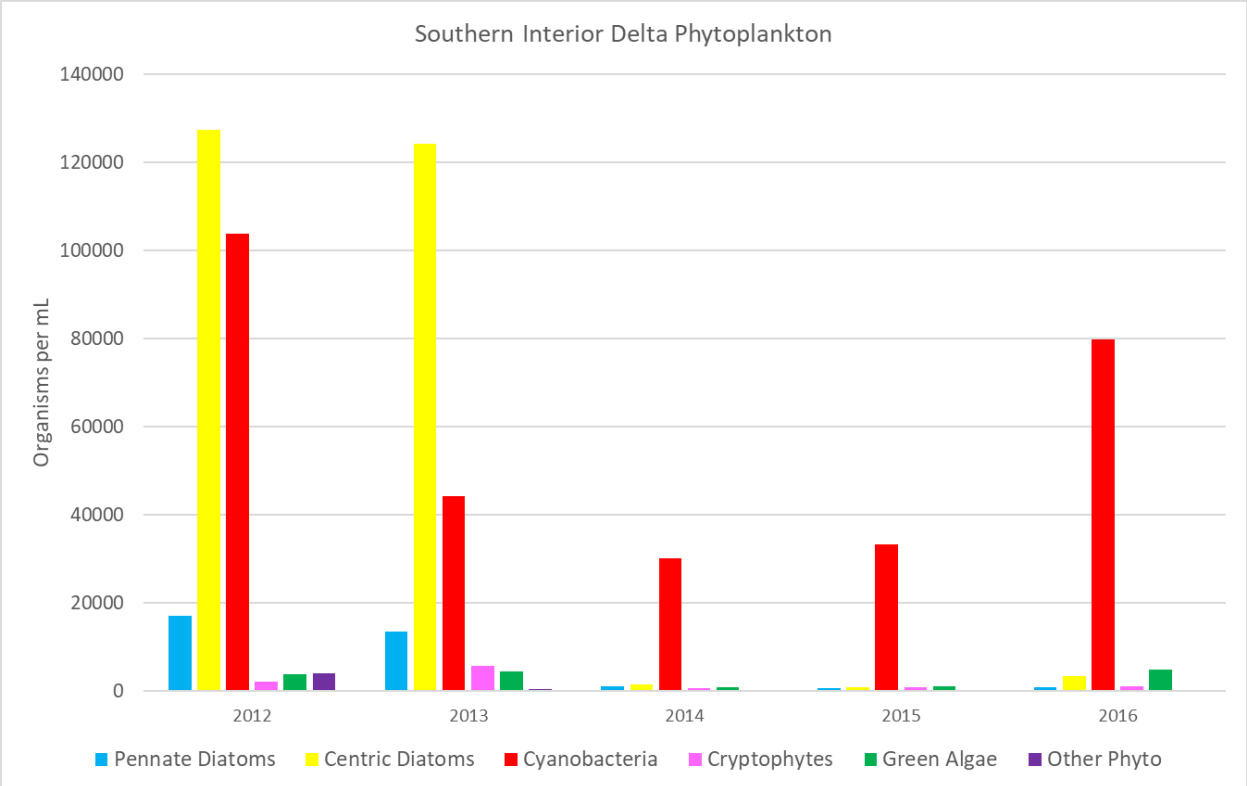

Figure 4. Annual averaged phytoplankton composition in the Southern Interior Delta. Other Phyto are chrysophytes, ciliates, dinoflagellates, euglenoids, raphidophytes, synurophytes, and xanthophytes.

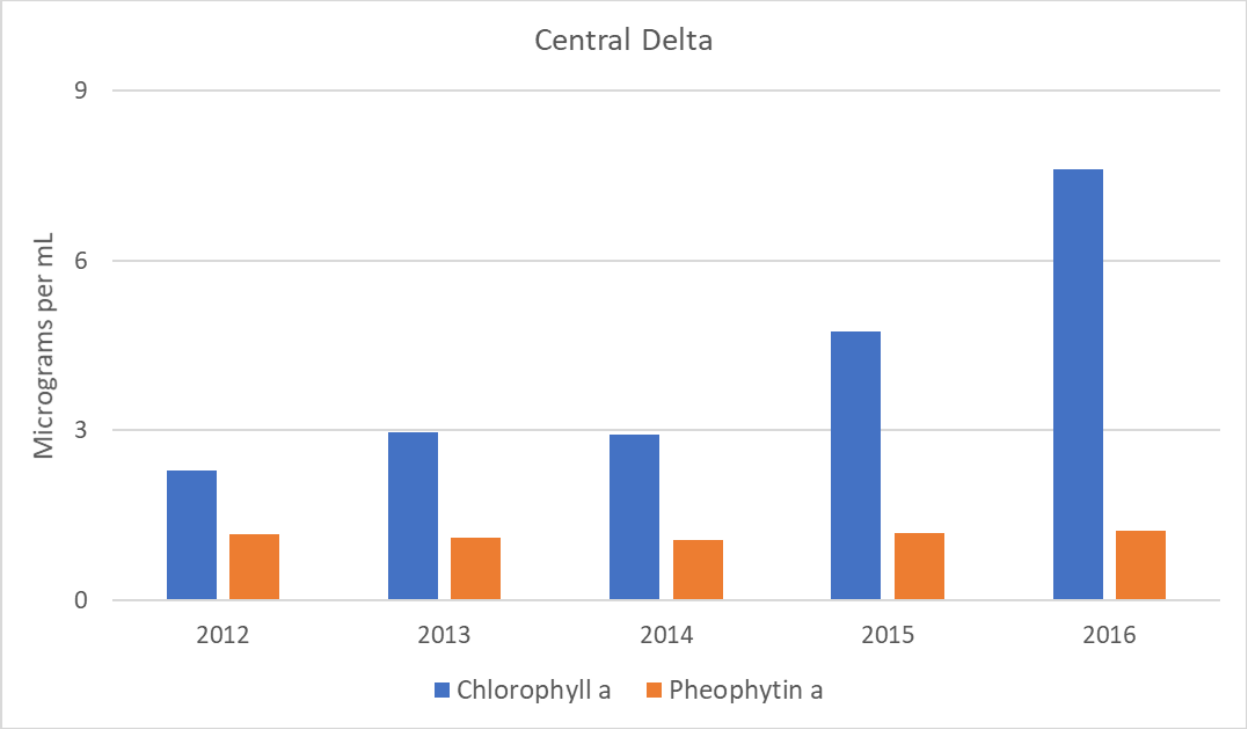

Figure 5. Annual average pigment concentrations in the Central Delta.

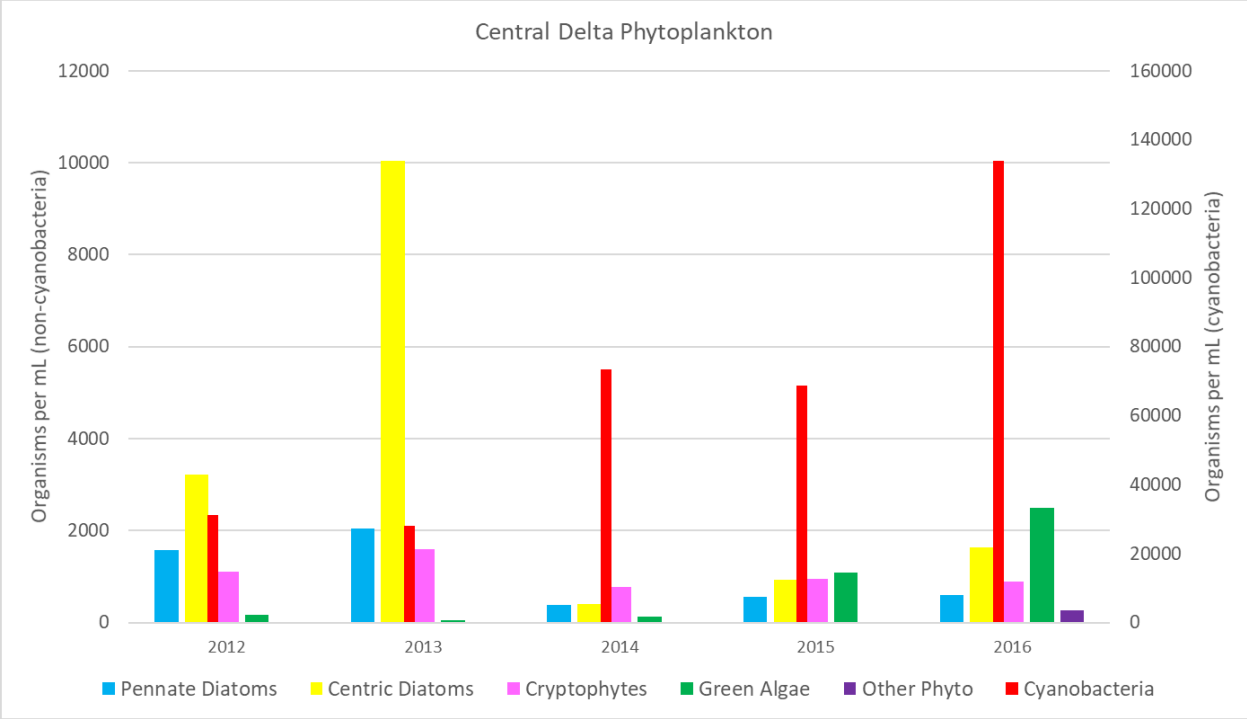

Figure 6. Annual averaged phytoplankton composition in the Central Delta. Note the secondary axis for cyanobacteria. Other Phyto are chrysophytes, ciliates, dinoflagellates, euglenoids, and xanthophytes.

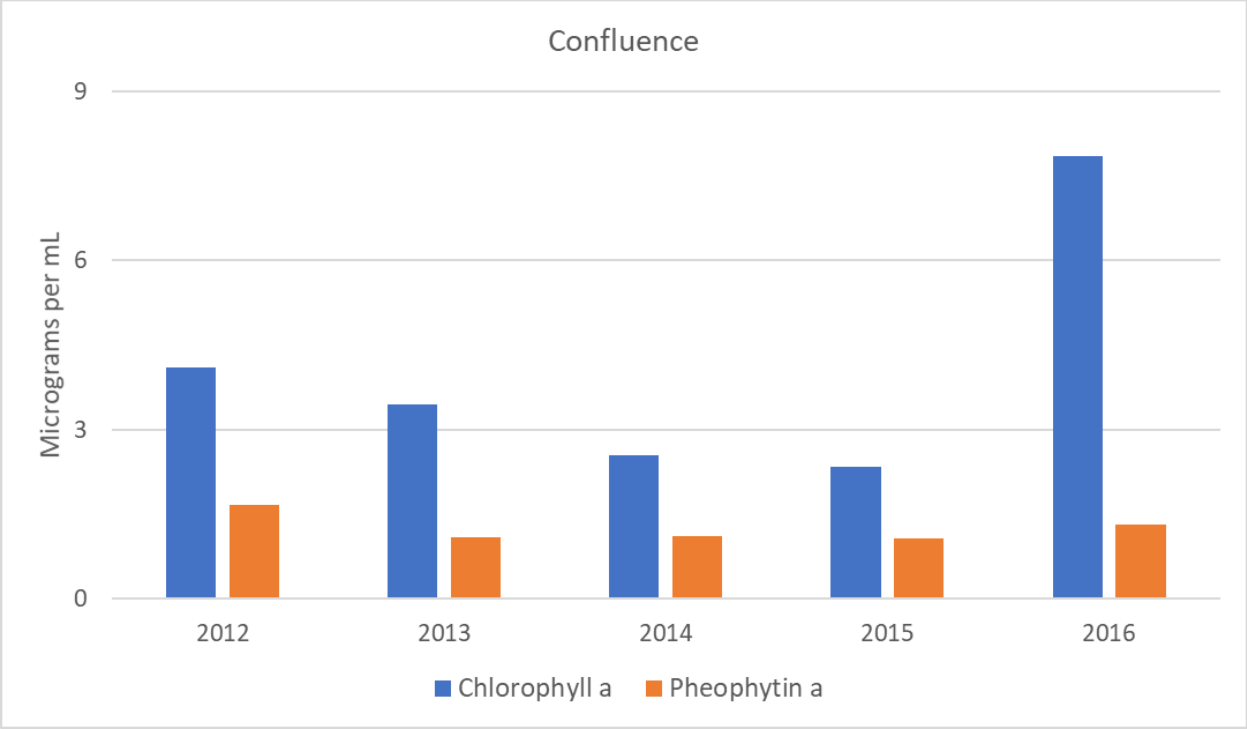

Figure 7. Annual average pigment concentrations in the Confluence.

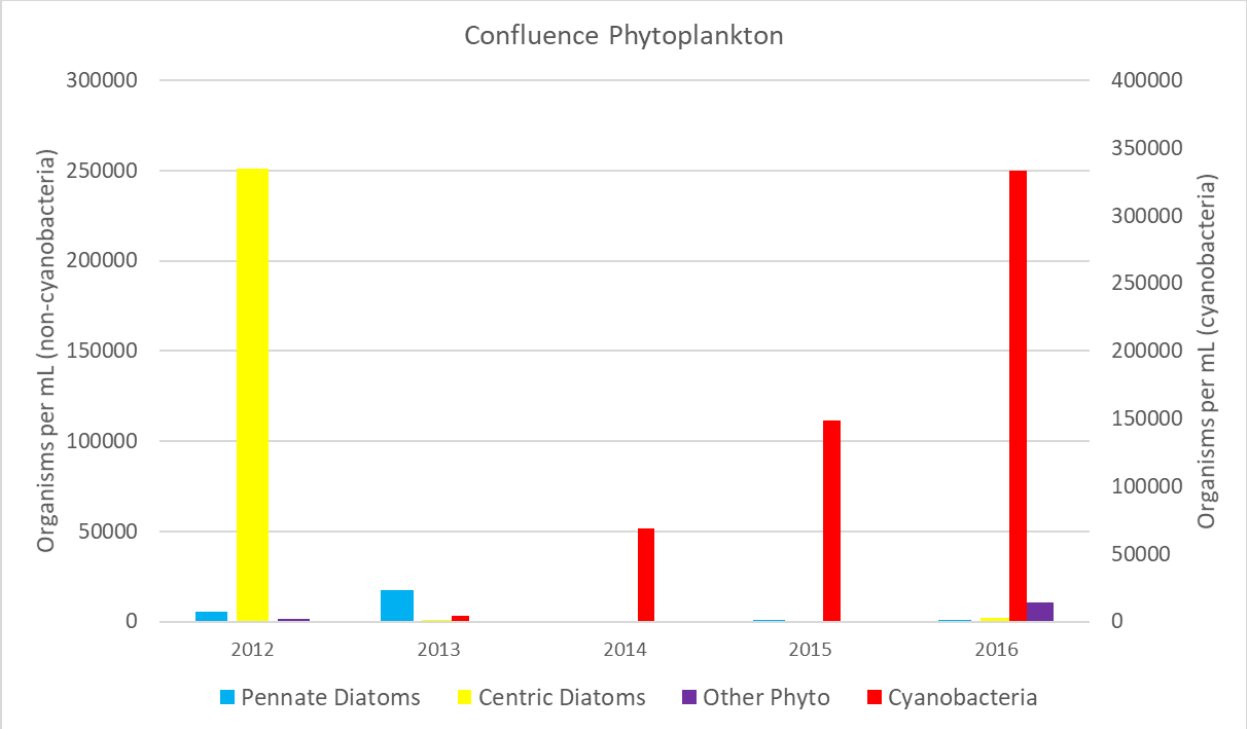

Figure 8. Annual averaged phytoplankton composition in the Confluence. Note the secondary axis for cyanobacteria. Other Phyto are chrysophytes, ciliates, cryptophytes, dinoflagellates, euglenoids, green algae, and raphidophytes.

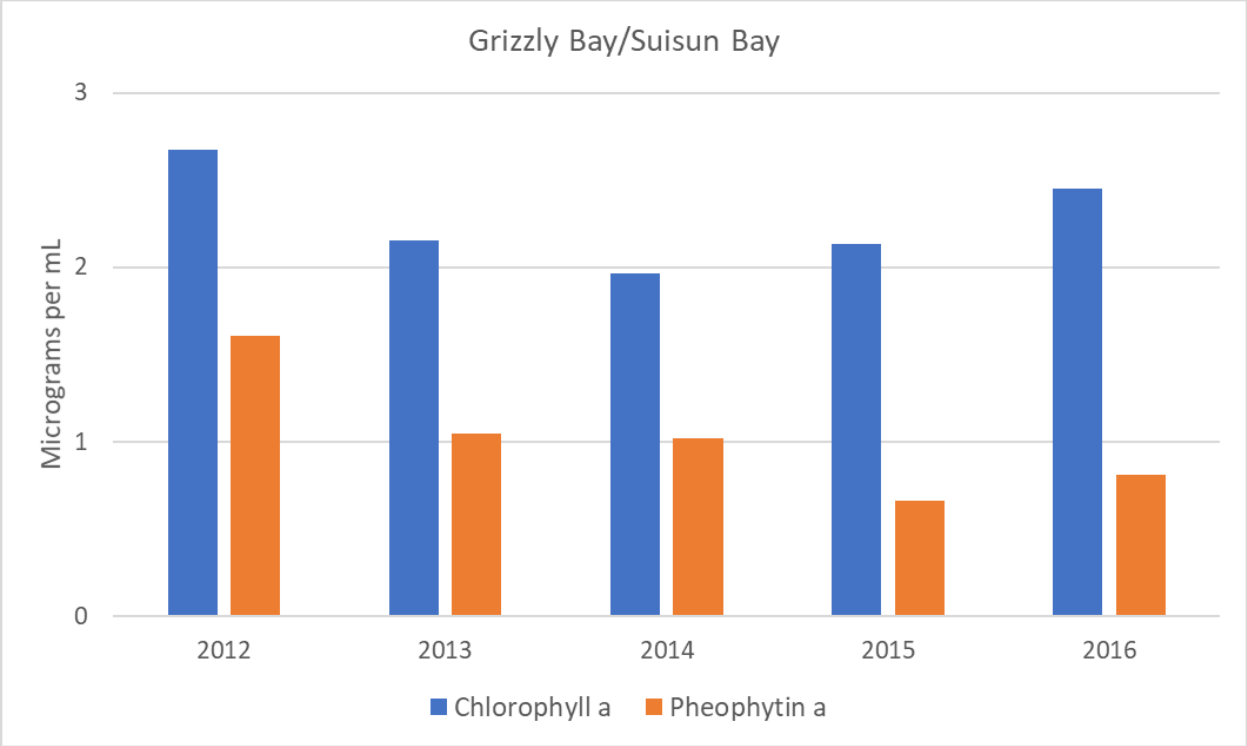

Figure 9. Annual average pigment concentrations in Grizzly and Suisun Bays.

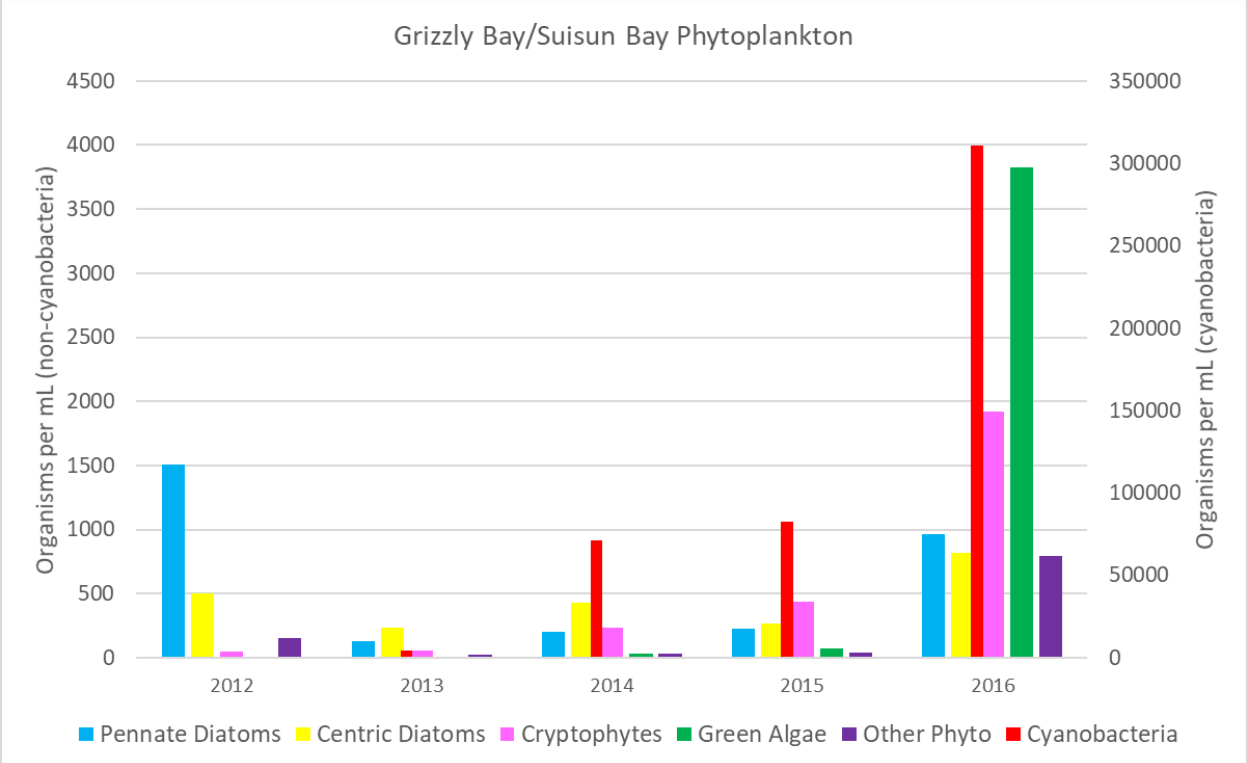

Figure 10. Annual averaged phytoplankton composition in Grizzly and Suisun Bays. Note the secondary axis for cyanobacteria. Other Phyto are chrysophytes, ciliates, dinoflagellates, euglenoids, haptophytes, synurophytes, and xanthophytes.

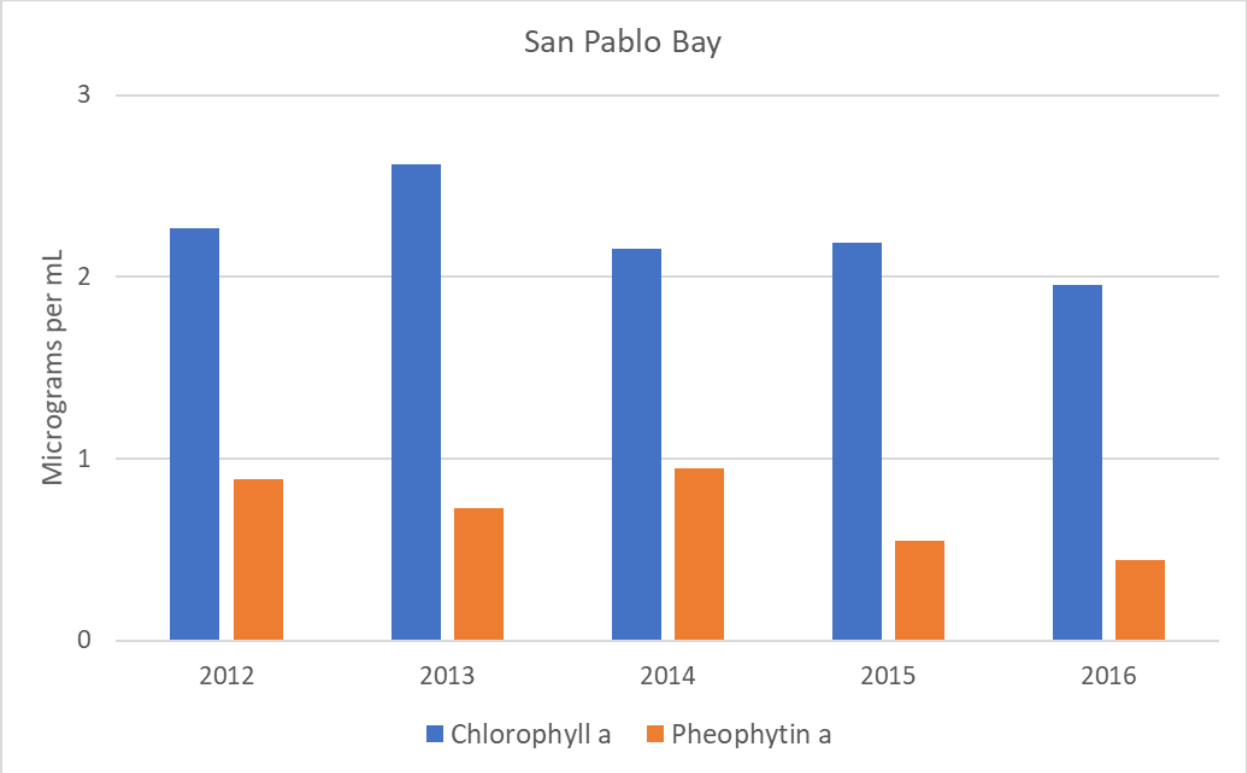

Figure 11. Annual average pigment concentrations in San Pablo Bay.

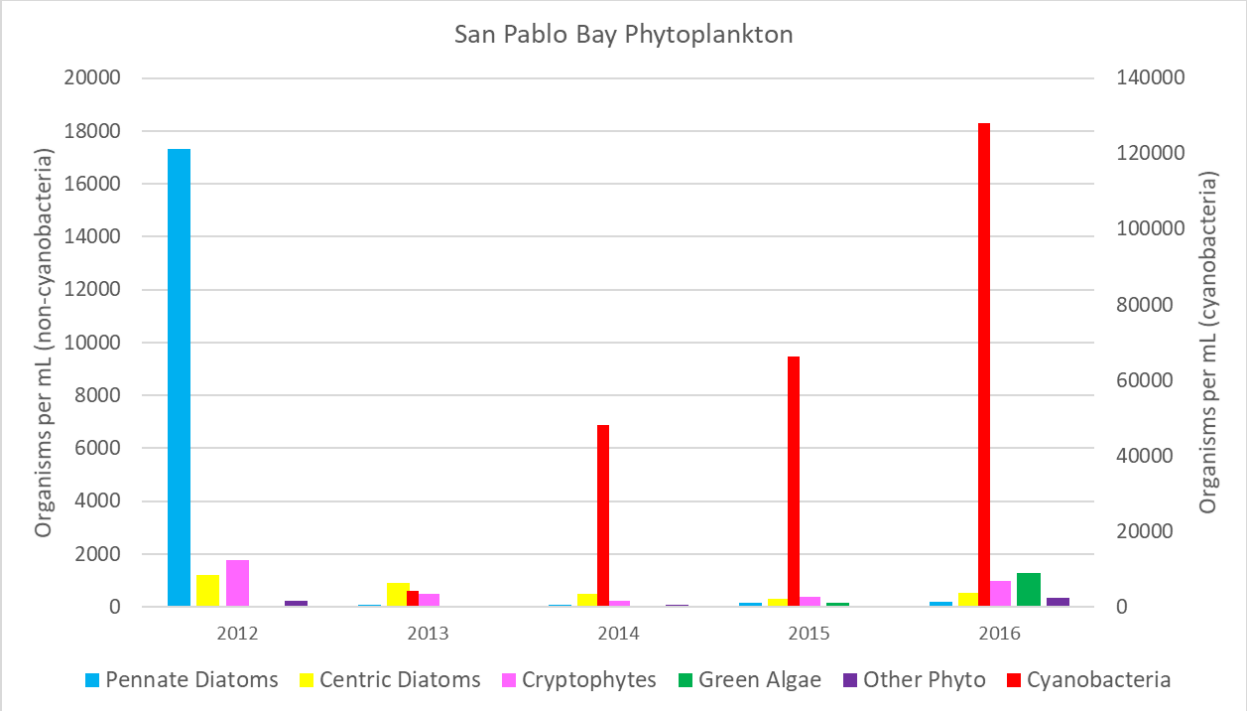

Figure 12. Annual averaged phytoplankton composition in San Pablo Bay. Note the secondary axis for cyanobacteria. Other phyto are chrysophytes, ciliates, coccolithophores, dinoflagellates, euglenoids, raphidophytes, silico-flagellates, synurophytes, and unknown phytoplankton.