

Current Report

Methods

Continuous data were collected for the water quality parameters shown in Table 1. Each of the 15 monitoring stations collected continuous data for water temperature (WT), pH, dissolved oxygen (DO), surface-specific conductance (SpC), chlorophyll *a* fluorescence, and turbidity. Additionally, sensors were installed at the Antioch, Mallard Island, and Martinez stations in the 1990's to monitor bottom SpC. Along with river stage data measured at the Mallard Island and Martinez stations, these bottom SpC measurements determine compliance with the mandated salinity standard (also known as X2) set by the State Water Resources Control Board (SWRCB) in the 1995 Bay-Delta Plan. Except for bottom-specific conductance, all water samples were collected 1-meter below the water surface using a float-mounted YSI EXO2 multi-parameter water quality sonde. In contrast, bottom-specific conductance was measured at 1.5 meters above the channel bottom using a YSI EXO1 sonde. Water quality data was recorded at 15-minute intervals.

Parameter	Units	Frequency
Water Temperature	°C	15 minute instantaneous
Specific Conductance	µS/cm	15 minute instantaneous
DO	mg/L	15 minute instantaneous
pH	unitless	15 minute instantaneous
Turbidity	FNU	15 minute instantaneous
Fluorescence	µg/L	15 minute instantaneous

Table 1: Parameters sampled by Continuous EMP

QA Status

Quality assurance and control measures were applied according to CEMP's Quality Assurance Project Plan (QAPP) (available upon request). Only data validated as "Good Data" according to Section 22 of the QAPP were analyzed for this report.

Regions

The daily averages of the continuous 15-minute data collected for air and water temperature, pH, DO, surface and bottom SpC, chlorophyll a fluorescence, and turbidity for calendar year 2022 are shown in Figures 2 - 7. The range of monthly DO values at the Stockton station is shown below.

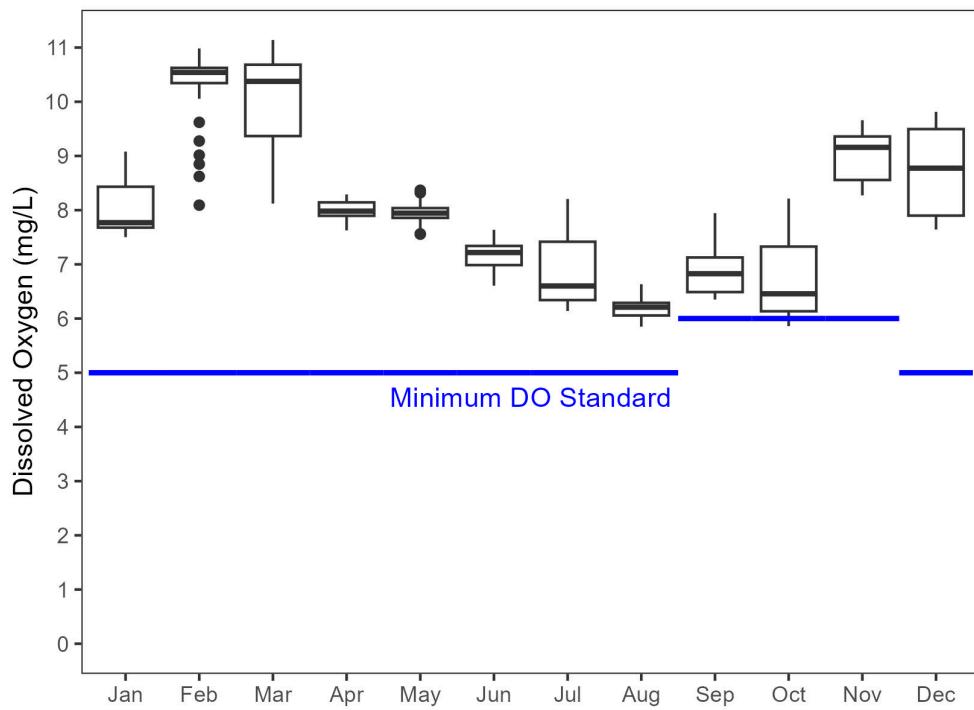


Figure 1: Range of daily dissolved oxygen Rough and Ready Isl. (P8)

Northern Interior Delta

The Northern Interior Delta stations had surface specific conductance values that ranged from 105 µS/cm (C3A in July) to 1509 µS/cm (D24A in November). Surface turbidity values ranged from 0.82 FNU (C3A in October) to 129.15 FNU (C3A in December). Surface water temperature values ranged from 7.71 ° C (C3A in January) to 24.94 ° C (C3A in June). Surface dissolved

oxygen values ranged from 7.5 mg/L (D24A in September) to 11.61 mg/L (C3A in February). Surface pH values ranged from 7.38 (C3A in December) to 8.13 (D24A in March). Surface fluorescence values ranged from 0.43 µg/L (D24A in October) to 10.07 µg/L (C3A in May).

Statistic	Dissolved Oxygen (Surface)	Fluorescence (Surface)	pH (Surface)	Specific Conductance (Surface)	Turbidity (Surface)	Water Temperature (Surface)
	mg/L	µg/L		µS/cm	FNU	° C
MIN	7.5	0.43	7.38	105	0.82	7.71
MAX	11.61	10.07	8.13	1509	129.15	24.94
AVERAGE	9.24	1.66	7.75	225	5.86	17.09

Table 2: Summary statistics for Northern Interior Delta

Southern Interior Delta

The Southern Interior Delta stations had surface specific conductance values that ranged from 73 µS/cm (C10A in October) to 832 µS/cm (P8A in February). Surface turbidity values ranged from 0.25 FNU (C7A in February) to 34.87 FNU (P8A in December). Surface water temperature values ranged from 7.73 ° C (C10A in December) to 28.55 ° C (C7A in September). Surface dissolved oxygen values ranged from 5.85 mg/L (P8A in August) to 11.41 mg/L (C7A in February). Surface pH values ranged from 6.9 (C10A in October) to 8.43 (C7A in August). Surface fluorescence values ranged from 0.34 µg/L (C7A in October) to 14.39 µg/L (C7A in September).

Statistic	Dissolved Oxygen (Surface)	Fluorescence (Surface)	pH (Surface)	Specific Conductance (Surface)	Turbidity (Surface)	Water Temperature (Surface)
	mg/L	µg/L		µS/cm	FNU	° C
MIN	5.85	0.34	6.90	73	0.25	7.73
MAX	11.41	14.39	8.43	832	34.87	28.55
AVERAGE	8.6	2.72	7.63	465	3.97	18.05

Table 3: Summary statistics for Southern Interior Delta

Central Interior Delta

The Central Interior Delta stations had surface specific conductance values that ranged from 255 µS/cm (D29 in May) to 2078 µS/cm (D16A in November). Surface turbidity values ranged from 0.15 FNU (D19A in September) to 27.58 FNU (D19A in February). Surface water temperature values ranged from 8.14 ° C (D19A in January) to 26.8 ° C (D19A in September). Surface dissolved oxygen values ranged from 7.37 mg/L (D29 in September) to 15.39 mg/L (D19A in September). Surface pH values ranged from 7.31 (D19A in January) to 10.3 (D19A in September). Surface fluorescence values ranged from 0.78 µg/L (D19A in September) to 23.17 µg/L (D19A in April).

Statistic	Dissolved Oxygen (Surface)	Fluorescence (Surface)	pH (Surface)	Specific Conductance (Surface)	Turbidity (Surface)	Water Temperature (Surface)
	mg/L	µg/L		µS/cm	FNU	° C
MIN	7.37	0.78	7.31	255	0.15	8.14
MAX	15.39	23.17	10.30	2078	27.58	26.8
AVERAGE	9.5	2.76	8.03	576	4.98	17.17

Table 4: Summary statistics for Central Interior Delta

Confluence

The Confluence stations had surface specific conductance values that ranged from 236 µS/cm (D22A in January) to 17901 µS/cm (D10A in November). Bottom specific conductance values ranged from 369 µS/cm (D12A in January) to 18323 µS/cm (D10A in November). Surface turbidity values ranged from 5.12 FNU (D12A in June) to 70.17 FNU (D10A in July). Surface water temperature values ranged from 8.14 ° C (D22A in January) to 23.65 ° C (D12A in September). Bottom water temperature values ranged from 8.49 ° C (D12A in January) to 23.51 ° C (D12A in September). Surface dissolved oxygen values ranged from 7.48 mg/L (D10A in July) to 10.98 mg/L (D22A in February). Surface pH values ranged from 7.49 (D12A in January) to 8.07 (D10A in June). Surface fluorescence values ranged from 0.57 µg/L (D10A in November) to 21.59 µg/L (D10A in July).

Statistic	Dissolved Oxygen (Surface)	Fluorescence (Surface)	pH (Surface)	Specific Conductance (Surface)	Specific Conductance (Bottom)	Turbidity (Surface)	Temp (S)
	mg/L	µg/L		µS/cm	µS/cm	FNU	
MIN	7.48	0.57	7.49	236	369	5.12	
MAX	10.98	21.59	8.07	17901	18323	70.17	
AVERAGE	9.12	2.58	7.83	5778	7585	14.02	

Table 5: Rating criteria for Confluence

Grizzly/Suisun Bay

The Grizzly/Suisun Bay stations had surface specific conductance values that ranged from 456 µS/cm (D9A in January) to 31901 µS/cm (D6A in September). Bottom specific conductance values ranged from 10879 µS/cm (D6A in January) to 34246 µS/cm (D6A in October). Surface turbidity values ranged from 4.6 FNU (D7A in September) to 142.74 FNU (D7A in July). Surface water temperature values ranged from 8.08 ° C (D7A in January) to 23.4 ° C (D7A in September). Bottom water temperature values ranged from 9.02 ° C (D6A in January) to 22.27 ° C (D6A in September). Surface dissolved oxygen values ranged from 6.58 mg/L (D6A in September) to 10.69 mg/L (D7A in January). Surface pH values ranged from 7.66 (D7A in January) to 8.24 (D6A in August). Surface fluorescence values ranged from 0.4 µg/L (D6A in December) to 12.9 µg/L (D7A in July).

Statistic	Dissolved Oxygen (Surface)	Fluorescence (Surface)	pH (Surface)	Specific Conductance (Surface)	Specific Conductance (Bottom)	Turbidity (Surface)	Temp (S)
	mg/L	µg/L		µS/cm	µS/cm	FNU	
MIN	6.58	0.4	7.66	456	10879	4.6	
MAX	10.69	12.9	8.24	31901	34246	142.74	
AVERAGE	8.83	3.01	7.92	17299	27585	31.62	

Table 6: Rating criteria for Grizzly/Suisun Bay

Parameters

Water Temperature

Average daily water temperatures in the estuary ranged from 7.71 ° C to 28.55 ° C (Figure 2), with fairly similar values across all regions. Temperatures were greater in the summer months and lowest in the winter.

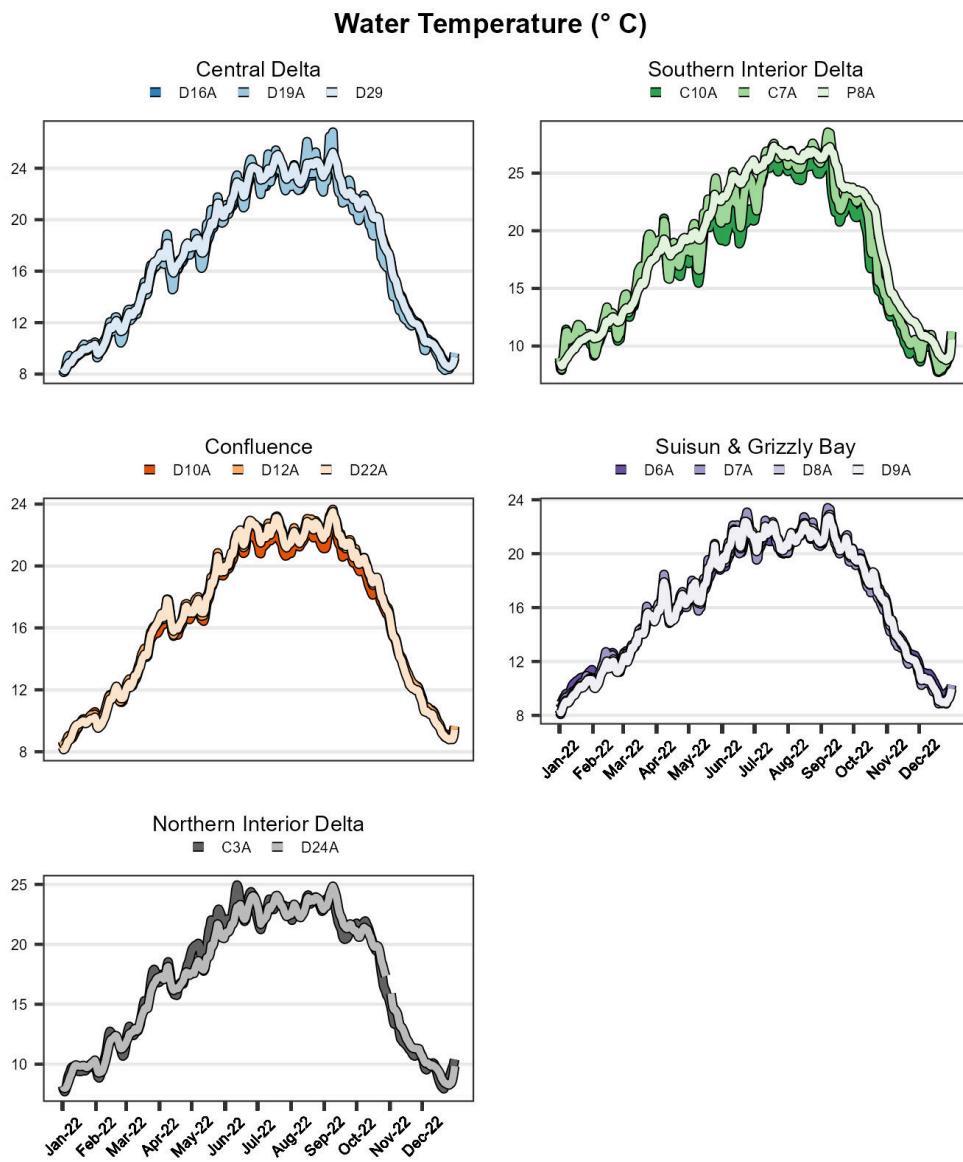


Figure 2: Average daily water temperature in the Delta

Specific Conductance

Average daily surface-specific conductance for the estuary ranged from 73 $\mu\text{S}/\text{cm}$ to 31901 $\mu\text{S}/\text{cm}$ (Figure 3). The lower values were observed at the Northern and Southern Interior Delta stations and the highest at the more tidally influenced Grizzly/Suisun Bay stations (Figure 3).

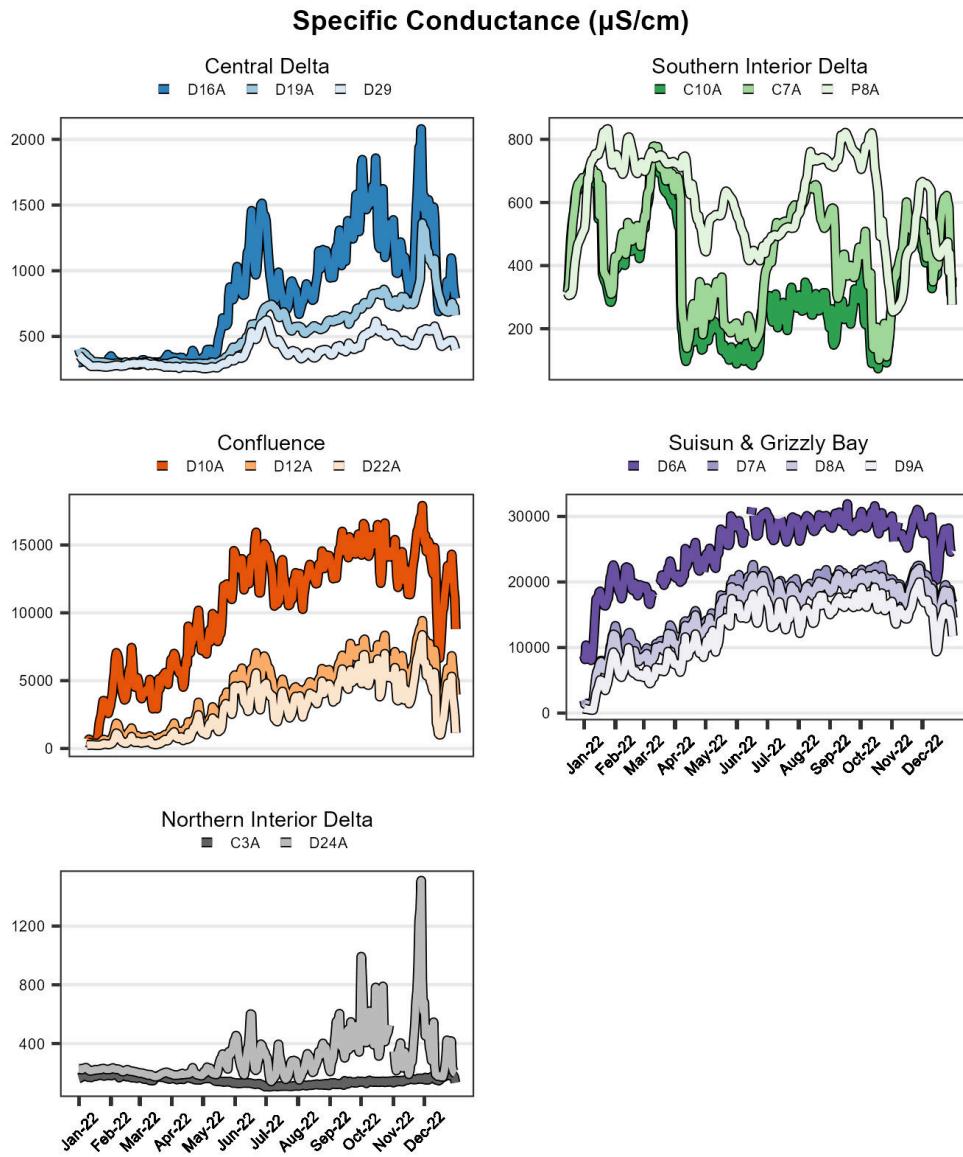


Figure 3: Average daily specific conductance in the Delta

Dissolved Oxygen

Average daily DO values in the estuary ranged from 5.85 mg/L to 15.39 mg/L (Figure 4). Recorded daily averages did not fall below the standard set by the CVRWQCB in the Basin Plan (CVRWQCB, 1998). The monthly average DO levels at the Stockton station did not fall below the 5.0 mg/L standard set by the CVRWQCB (1998). In addition, the monthly average DO levels

dropped below the 6.0 mg/L standard (SWRCB, 1995) for the passage of fall-run Chinook salmon through the ship channel in September and October for the September through November control period.

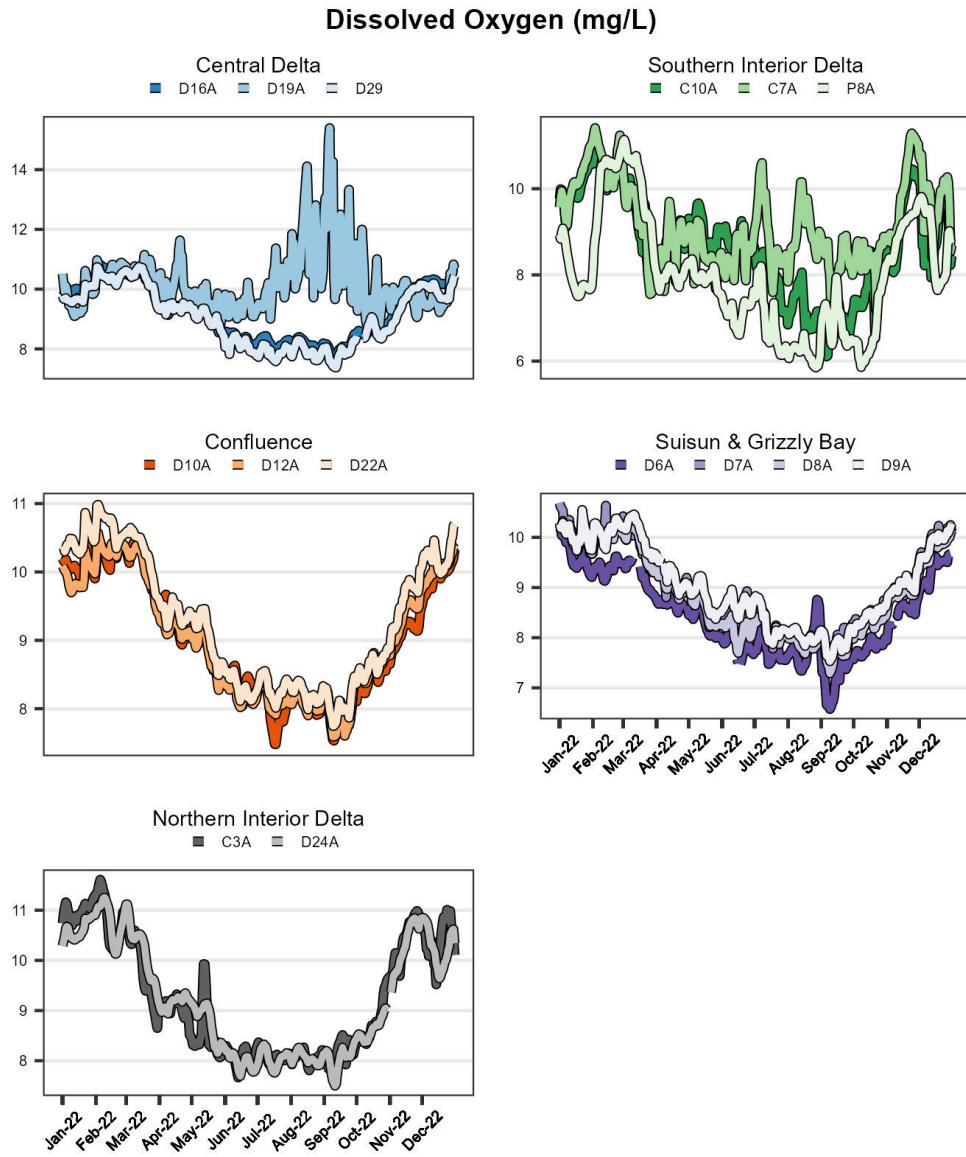


Figure 4: Average daily dissolved oxygen

pH

Average daily pH levels at all stations in the estuary ranged from 6.9 to 10.3 (Figure 5). The Central Delta station D19A showed an increase in pH values from June to October.

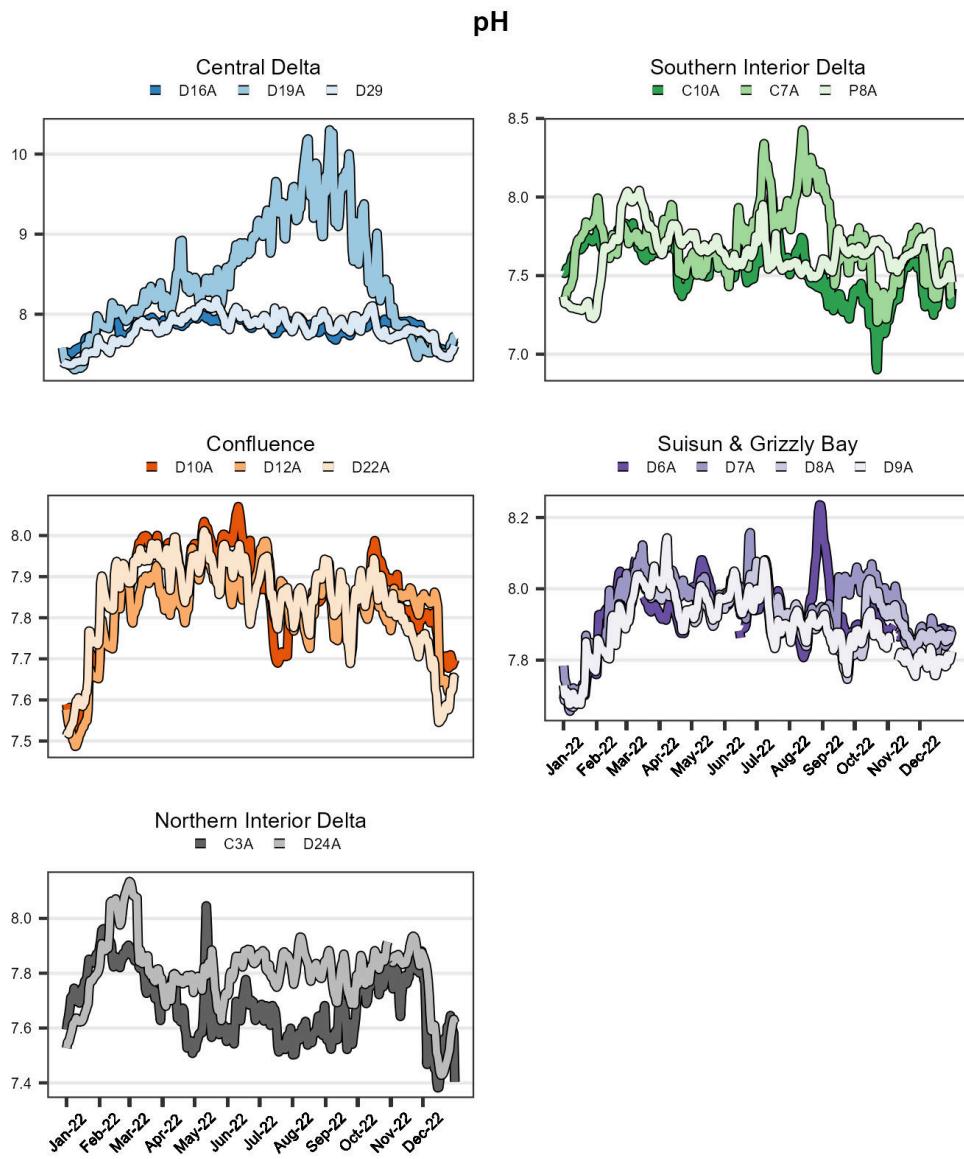


Figure 5: Average daily pH in the Delta

Turbidity

Average daily turbidity levels at all stations in the estuary ranged from 0.15 FNU to 142.74 FNU (Figure 6). The Southern Interior Delta stations showed a significant increase in turbidity in December. In addition, C3A showed a substantial spike in turbidity values in December. D10A in the Confluence experienced a spike in July.

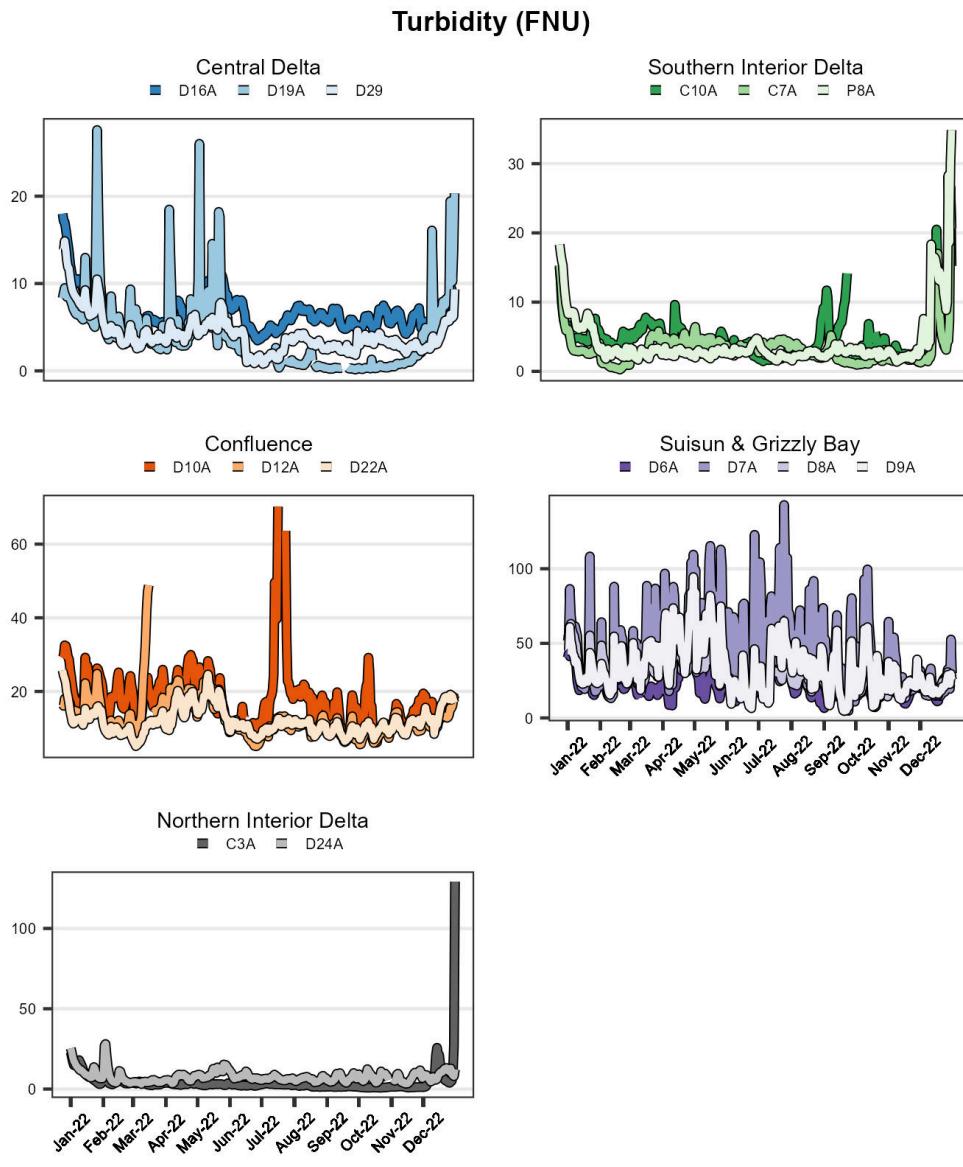


Figure 6: Average daily turbidity in the Delta

Chlorophyll a Fluorescence

Average daily chlorophyll a fluorescence recorded at all stations ranged from 0.34 µg/L to 23.17 µg/L (Figure 7). Values at D10A in the Confluence showed a significant increase in June. Values at D19A decreased in the summer months. C3A in the Northern Interior Delta spiked in May.

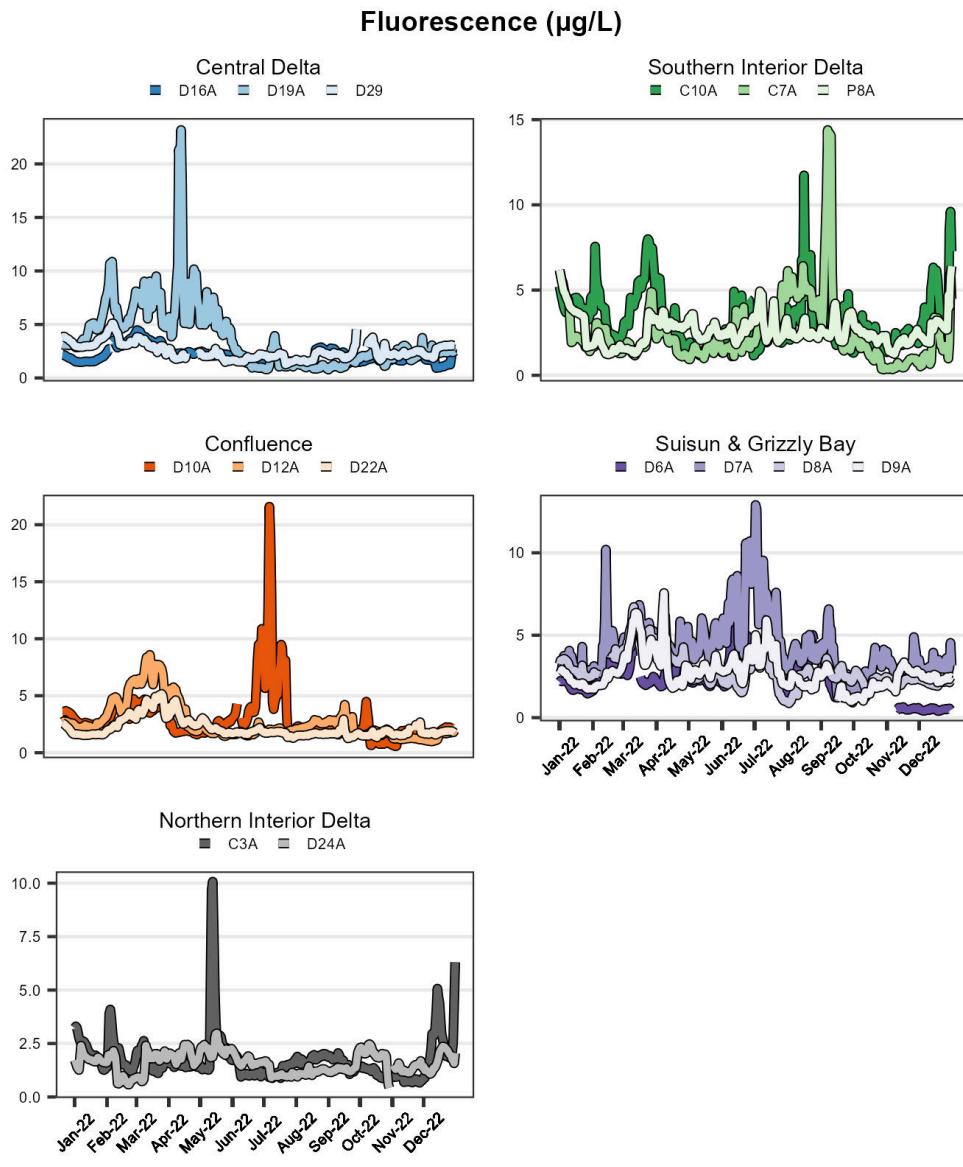


Figure 7: Average daily fluorescence in the Delta

References

[CVRWQCB] Central Valley Regional Water Quality Control Board. (1998). Water Quality Control Plan for the California Regional Water Quality Control Board Central Valley Region, the Sacramento River Basin, and San Joaquin River Basin [Basin Plan] (4th ed.).

[SWRCB] State Water Resources Control Board. (1995). Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Estuary [Bay-Delta Plan] (Adopted May 22, 1995, pursuant to Water Right Order 95-1). Sacramento, CA.

[SWRCB] State Water Resources Control Board. (1999). Water Rights Decision 1641 for the Sacramento-San Joaquin Delta and Suisun Marsh (Adopted December 29, 1999, Revised in Accordance with order WR2000-02 March 15, 2000). Sacramento, CA.

Archived Reports

Old EMP continuous water quality reports can be found [here](#).