

Discrete Water Quality Monitoring Report for Water Year 2024

Authors: Julianna Manning, S. Perry, Craig Stuart, and Ted Flynn*
Division of Integrated Science & Engineering
California Department of Water Resources
West Sacramento, CA

Date: 10/27/2025

Pursuant to Condition 11c of Water Right Decision 1641, State Water Resources Control Board, State of California, March 15, 2000.

Reporting Period: October 1, 2023 – September 30, 2024

*Address correspondence to ted.flynn@water.ca.gov



ENVIRONMENTAL MONITORING PROGRAM

Introduction

The Department of Water Resources (DWR) and the US Bureau of Reclamation (USBR) are required by Water Right Decision 1641 (D-1641) to collect discrete water chemistry data to monitor the water quality at select sites in the upper San Francisco Estuary (Estuary). This report describes the results of these monitoring efforts for water year 2024 (October 1st 2023 through September 30th 2024) which was classified as above normal in the Sacramento and San Joaquin Valleys ([source](#)). Results are compared to the previous water year, which was classified as wet in both valleys.

Methods

Discrete water quality samples were collected monthly at 24 monitoring sites throughout the Upper Estuary and were grouped into regions based on their geographic location (Figure 1; Table 1). These sites represent a variety of aquatic habitats, from narrow, freshwater channels to broad, estuarine bays.

EMP collects data for six different field parameters and 18 different laboratory constituents. The analytes highlighted in this report are:

- Specific Conductance (S/cm)
- Turbidity (FNU)
- Dissolved Ammonia (mg/L)
- Chlorophyll *a* (g/cm)
- Dissolved Nitrate+Nitrite (mg/L)
- Total Phosphorus (mg/L)

Regional facet graphs were created for each parameter. The average, minimum and maximum values were determined for each analyte. Non-detect values were represented graphically via a vertical dashed line capped at the reporting limit. Average summary statistics are reported as the median (M) \pm the median average deviation.

For more in-depth methodology, see [here](#).

Results

Specific Conductance

The average specific conductance value was $674 \pm 527 \mu\text{S}/\text{cm}$; for comparison, the previous year average was $538 \pm 417 \mu\text{S}/\text{cm}$. Values ranged from $108 \mu\text{S}/\text{cm}$ to $44700 \mu\text{S}/\text{cm}$. Per region average, minimum, and maximum values are shown in Table 2; time series plots are shown in Figure 2.

Turbidity

The average turbidity value was 9.15 ± 4.85 FNU; for comparison, the previous year average was 11.10 ± 6.00 FNU. Values ranged from 0.40 FNU to 72.20 FNU. Per region average, minimum, and maximum values are shown in Table 3; time series plots are shown in Figure 3.

Dissolved Ammonia

The average dissolved ammonia value was 0.05 ± 0.00 mg/L; for comparison, the previous year average was 0.05 ± 0.00 mg/L. Values ranged from < 0.05 mg/L to 0.62 mg/L. 58.27% of samples were below the reporting limit. Per region average, minimum, and maximum values are shown in Table 4; time series plots are shown in Figure 4.

Chlorophyll a

The average chlorophyll a value was 1.96 ± 0.66 μ g/L; for comparison, the previous year average was 2.20 ± 0.99 μ g/L. Values ranged from 0.59 μ g/L to 53.10 μ g/L. Per region average, minimum, and maximum values are shown in Table 5; time series plots are shown in Figure 5.

Dissolved Nitrate + Nitrite

The average dissolved nitrate+nitrite value was 0.21 ± 0.08 mg/L; for comparison, the previous year average was 0.22 ± 0.11 mg/L. Values ranged from < 0.05 mg/L to 2.66 mg/L. 5.04% of samples were below the reporting limit. Per region average, minimum, and maximum values are shown in Table 6; time series plots are shown in Figure 6.

Total Phosphorus

The average total phosphorus value was 0.08 ± 0.02 mg/L; for comparison, the previous year average was 0.10 ± 0.02 mg/L. Values ranged from < 0.01 mg/L to 0.22 mg/L. 0.36% of samples were below the reporting limit. Per region average, minimum, and maximum values are shown in Table 7; time series plots are shown in Figure 7.

Interpretations

Water year 2024 in the Sacramento and San Joaquin Valleys was classified as above normal. Northern California experienced more atmospheric rivers than

the previous year, but they were weaker storms. The majority of those atmospheric rivers made landfall January through March. Then near-record summer air temperatures dried out a lot of California toward the end of the water year.

The average specific conductance in water year 2024 was a little higher than the previous year. All regions had a notable drop after January due to the influx of freshwater. Most regions then had an increase during the summer months due to the high air temperatures. The Carquinez, San Pablo Bay, and Suisun and Grizzly Bay regions typically have higher values due to the strong marine influence from the Pacific Ocean.

The average turbidity in water year 2024 was a little lower than the previous year. Most regions had a spike in February due to sediment re-suspension caused by the high flows after storms. All regions downstream of the Confluence had another spike in May/June after a storm in that area. The Suisun Marsh had the highest values overall.

The average chlorophyll *a* in water year 2024 was a little lower than the previous year. The average and minimum values were similar in all regions. C10A in the South Delta had a large spike in July, due to aquatic vegetation that accumulated around the station. It is typically shallow during dry parts of the year.

The average dissolved ammonia, dissolved nitrate + nitrite, and total phosphorus in water year 2024 was similar to the previous year. All three nutrients had a slightly higher percentage of samples below the reporting limit than the previous year. Most regions had a spike in January due to increased runoff of organic matter and pollutants after storms. The South Delta region had some of the highest values of all three nutrients, due to nearby agricultural land use.

Archived Reports

Previous EMP discrete water quality reports can be found [here](#).

Figures

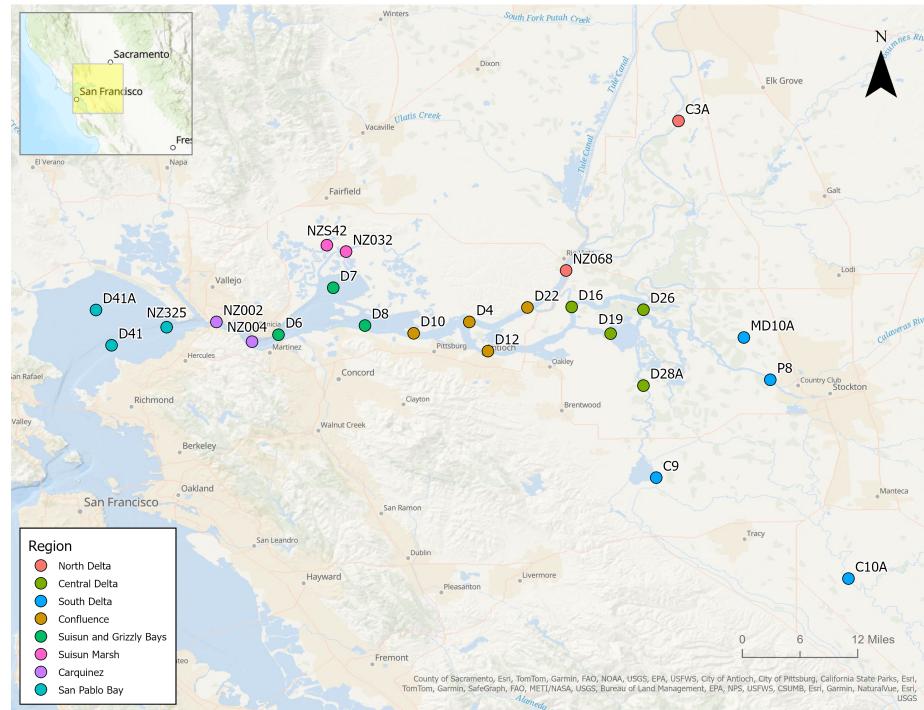


Figure 1: Map of EMP's discrete WQ field sites

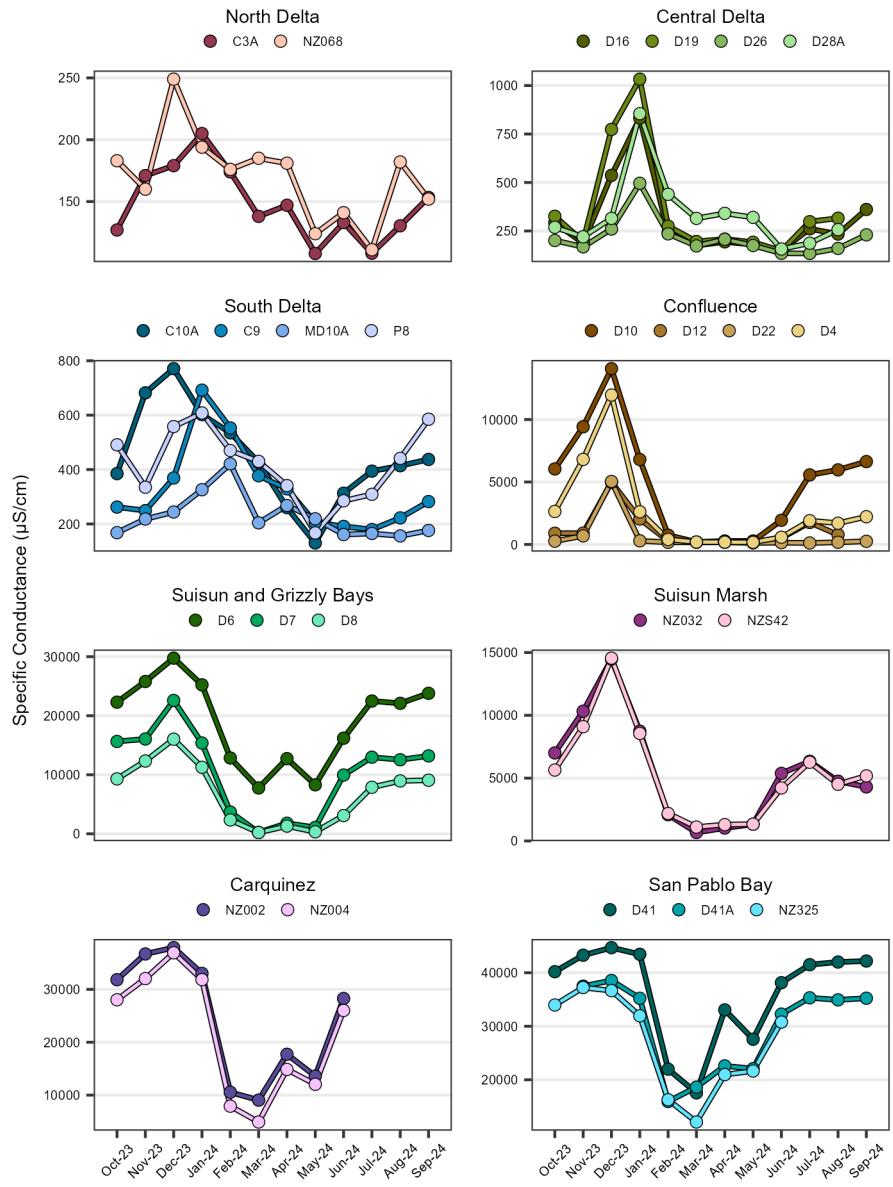


Figure 2: Specific conductance by region in the San Francisco Bay-Delta estuary.

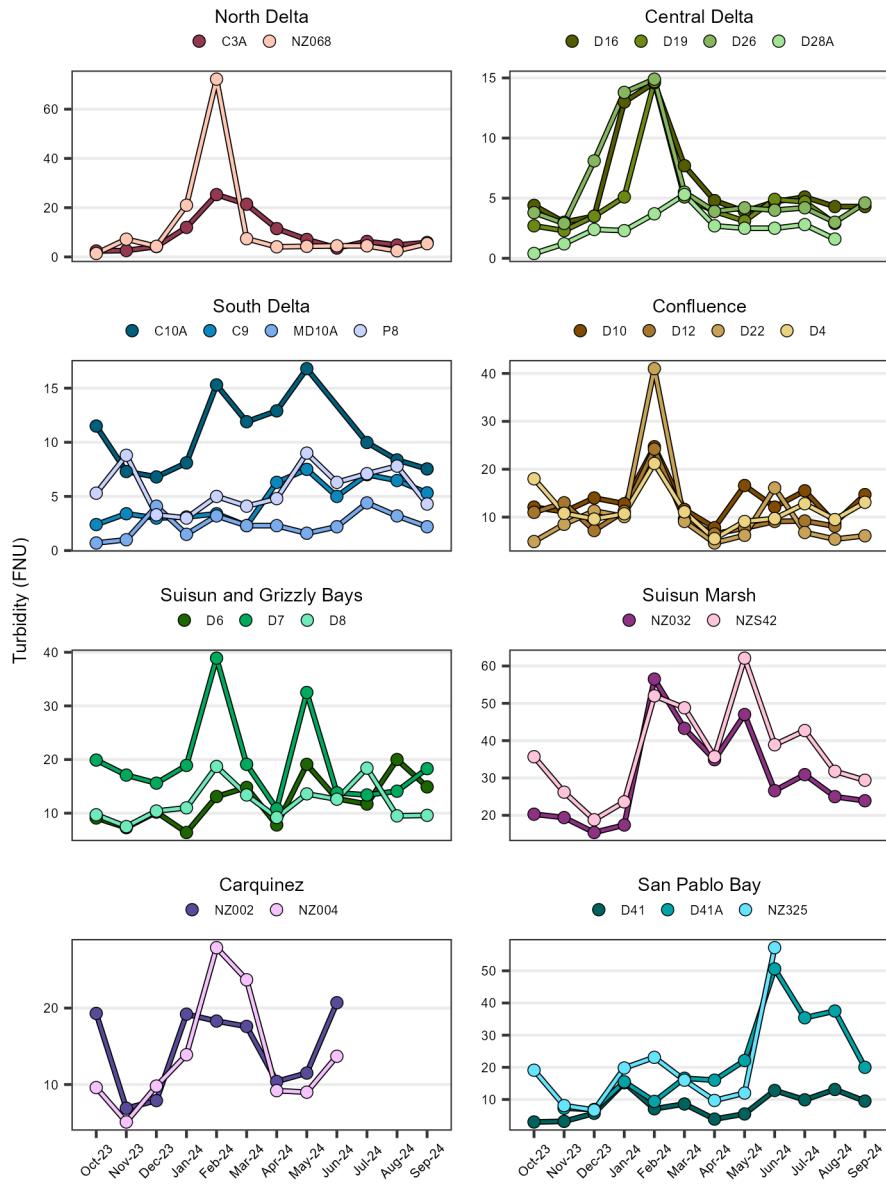


Figure 3: Turbidity by region in the San Francisco Bay-Delta estuary.

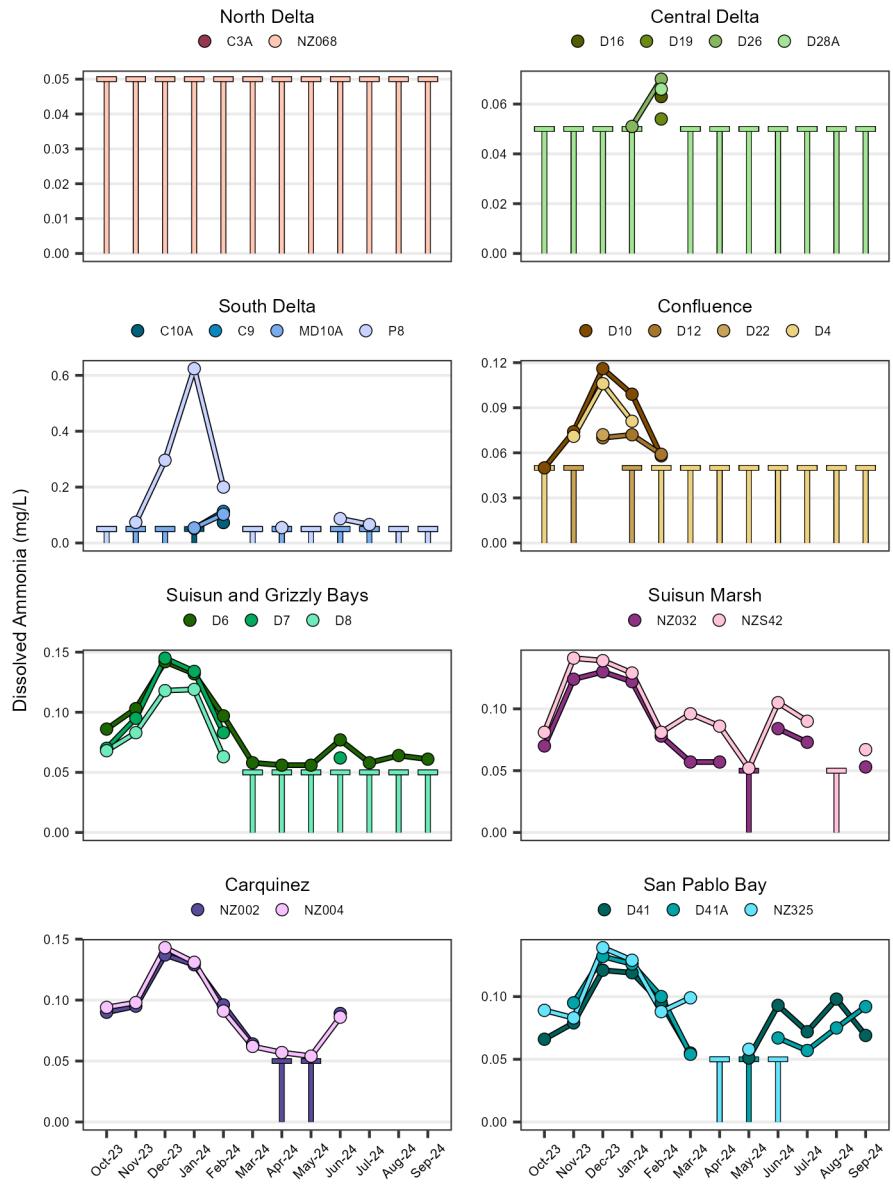


Figure 4: Dissolved ammonia by region in the San Francisco Bay-Delta estuary.

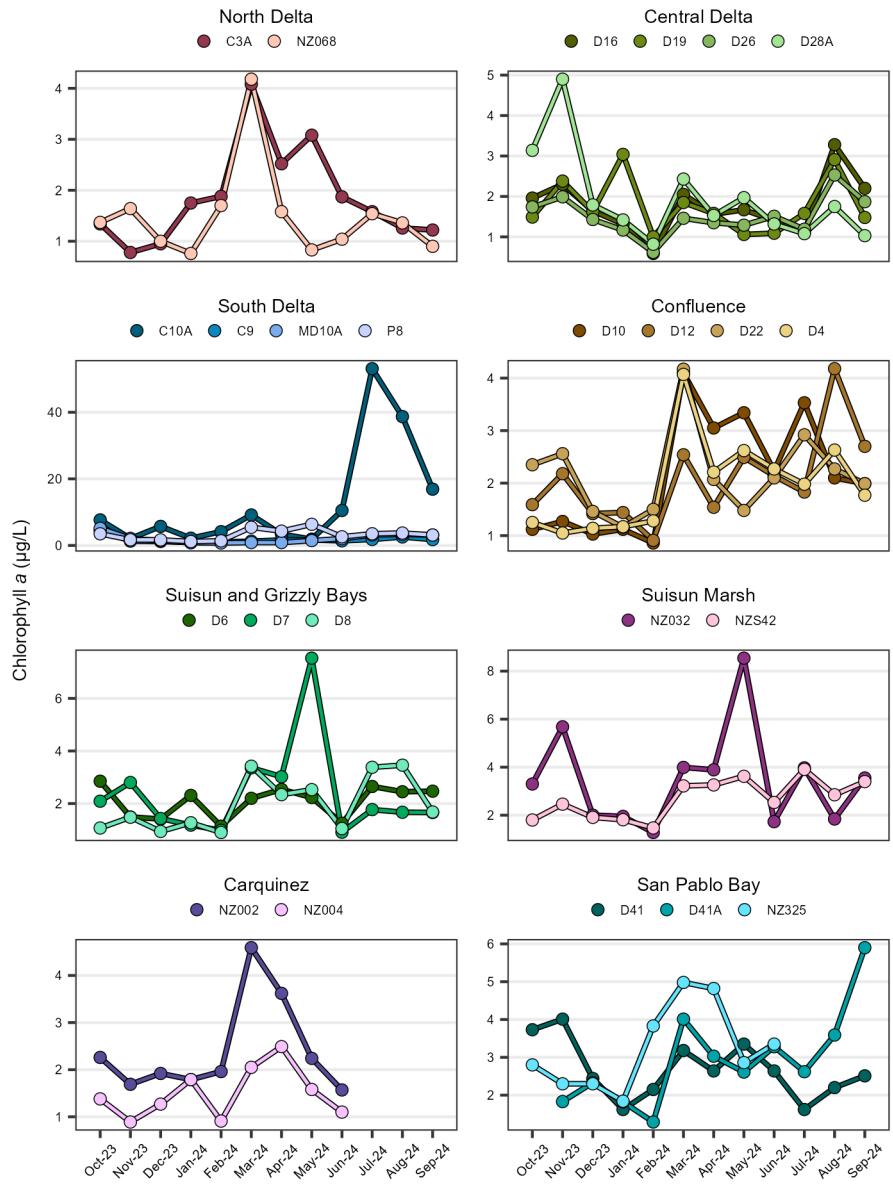


Figure 5: Chlorophyll a by region in the San Francisco Bay-Delta estuary.

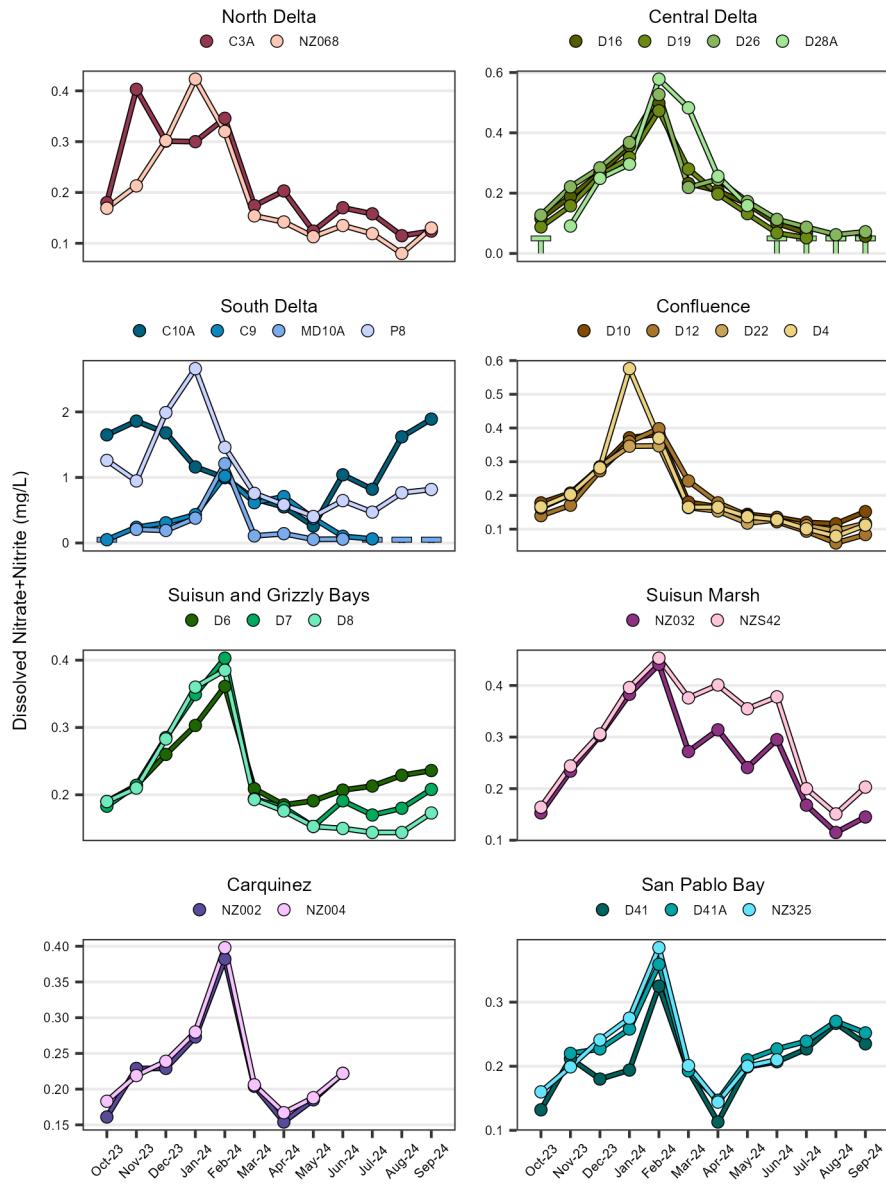


Figure 6: Dissolved nitrate nitrite by region in the San Francisco Bay-Delta estuary.

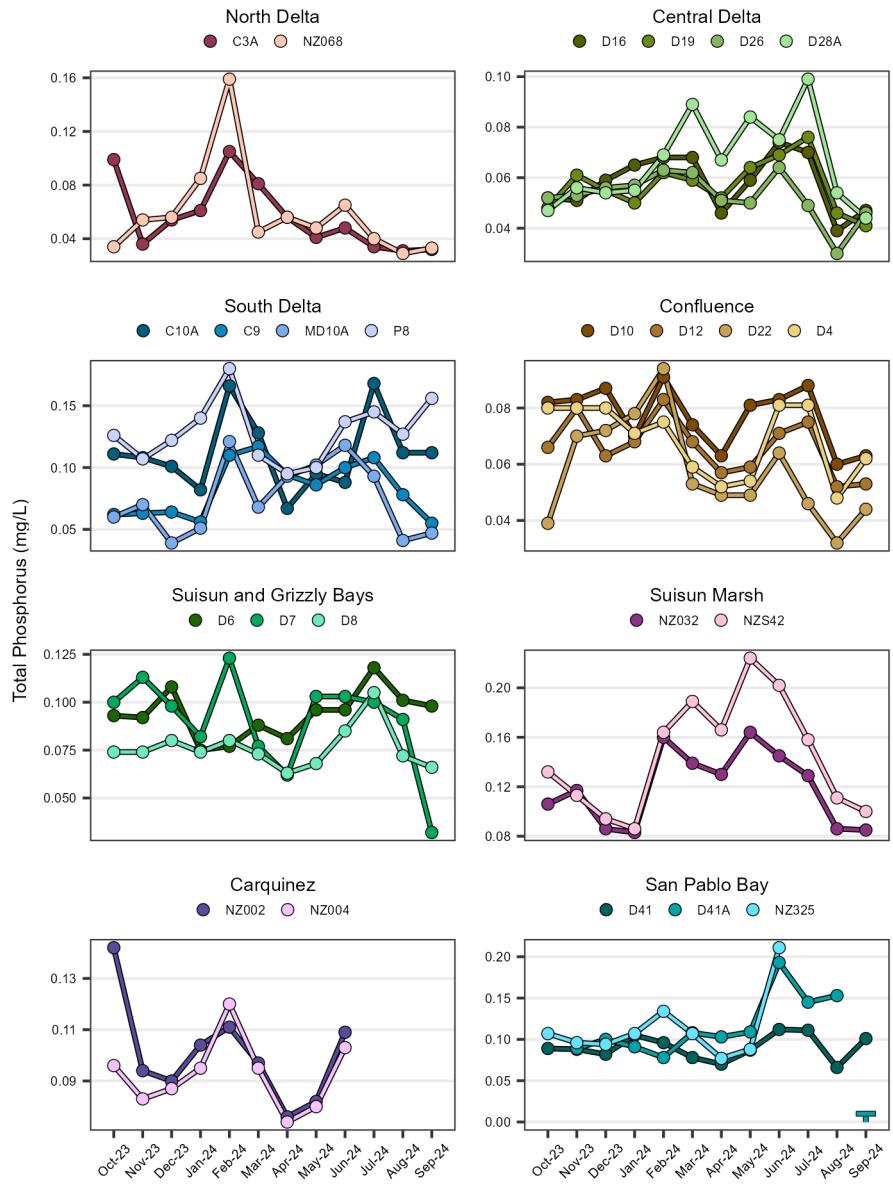


Figure 7: Total phosphorus by region in the San Francisco Bay-Delta estuary.

Table 1: Discrete WQ stations included within each region of the Delta

Region	WY Index	Stations
Carquinez	Sacramento	NZ002, NZ004
Central Delta	San Joaquin	D16, D19, D26, D28A
Confluence	Sacramento	D4, D10, D12, D22
North Delta	Sacramento	C3A, NZ068
San Pablo Bay	Sacramento	D41, D41A, NZ325
South Delta	San Joaquin	C9, C10A, MD10A, P8
Suisun and Grizzly Bays	Sacramento	D6, D7, D8
Suisun Marsh	Sacramento	NZ032, NZS42

Table 2: Summary statistics for specific conductance by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Conflu-ence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	27000	234	684	157	34500	328	12400	4970
Min	4920	134	118	108	12100	130	222	674
Max	37900	1030	14100	249	44700	771	29800	14500

Tables

Table 3: Summary statistics for turbidity by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Conflu-ence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	12.60	3.95	10.70	5.12	12.40	5.00	13.40	31.40
Min	5.10	0.40	4.60	1.40	3.00	0.70	6.40	15.40
Max	27.90	14.90	41.00	72.20	57.20	16.80	38.90	62.10

Table 4: Summary statistics for dissolved ammonia by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Confluence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	0.0905	0.05*	0.05*	0.05*	0.081	0.05*	0.0615	0.081
Min	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*	0.05*
Max	0.143	0.07	0.116	0.05*	0.139	0.624	0.145	0.141

* value is RL

Table 5: Summary statistics for chlorophyll a by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Confluence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	1.79	1.57	2.03	1.46	2.64	2.13	1.93	3.04
Min	0.89	0.59	0.86	0.76	1.29	0.74	0.90	1.28
Max	4.59	4.90	4.18	4.18	5.90	53.10	7.53	8.54

Table 6: Summary statistics for dissolved nitrate nitrite by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Confluence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	0.22	0.1615	0.16	0.17	0.21	0.567	0.20	0.28
Min	0.15	0.05*	0.06	0.08	0.11	0.05*	0.14	0.12
Max	0.40	0.578	0.58	0.42	0.38	2.66	0.40	0.45

* value is RL

Table 7: Summary statistics for total phosphorus by region in the San Francisco Bay-Delta estuary.

Statistic	Car-quinez	Central Delta	Confluence	North Delta	San Pablo Bay	South Delta	Suisun and Grizzly Bays	Suisun Marsh
Average	0.10	0.06	0.07	0.05	0.098	0.10	0.09	0.13
Min	0.07	0.03	0.03	0.03	0.01*	0.04	0.03	0.08
Max	0.14	0.10	0.09	0.16	0.211	0.18	0.12	0.22

* value is RL