# Suisun Marsh Monitoring Program
# Channel Water Salinity Report

Reporting Period: October 2014

Questions regarding this report should be directed to:

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## 1. SUISUN MARSH MONITORING STATIONS AND REPORTING REQUIREMENT

As per the State Water Resources Control Board (SWRCB) Water Rights Decision 1641 (D-1641), dated December 29, 1999, and previous SWRCB decisions, the California Department of Water Resources (DWR) is required to provide monthly channel water salinity compliance reports for the Suisun Marsh to the SWRCB. Conditions of channel water salinity in the Suisun Marsh are determined by monitoring specific electrical conductivity, which is referred as "specific conductance" (SC). The locations of all listed stations are shown in Figure 5.

The monthly reports are submitted for October through May each year in accordance with SWRCB requirements. The reports are required to include salinity data from the stations listed below to ensure salinity standards are met to protect habitat for waterfowl in managed wetlands:

| **COMPLIANCE STATIONS:** | | |
|---|---|---|
| Station Identification | Station Name | General Location |
| C-2* | Collinsville | Western Delta |
| S-64 | National Steel | Eastern Suisun Marsh |
| S-49 | Beldon's Landing | North-Central Suisun Marsh |
| S-42 | Volanti | North-Western Suisun Marsh |
| S-21 | Sunrise | North-Western Suisun Marsh |

Data from the stations listed below are included in the monthly reports to provide information on salinity conditions in the western Suisun Marsh:

| **MONITORING STATIONS:** | | |
|---|---|---|
| Station Identification | Station Name | General Location |
| S-97 | Ibis | Western Suisun Marsh |
| S-35 | Morrow Island | South-Western Suisun Marsh |

* Throughout the report, the representative data from nearby USBR station is used in lieu of data from station C-2.

Information on Delta outflow, area rainfall, and operation of the Suisun Marsh Salinity Control Gates are also included in the monthly reports to provide information on conditions that may affect channel water salinity in the Marsh.

## 2. MONITORING RESULTS

### 2.1 Channel Water Salinity Compliance

October 2014 starts the beginning of a new water year. The previous water year was forecasted as a Critical Water Year Type based on the California Cooperative Snow Surveys Forecast of May 1, 2014. October 2014 was the tenth month in the deficiency period that started January 2014. A deficiency period is defined by D-1641 Table 3 footnote 6. During the month of October, salinity conditions at all five compliance stations were in compliance with channel water salinity standards (Table 1). Compliance with standards for the month was determined for each compliance station by comparing the progressive daily mean (PDM) of high tide SC with respective standards. The standard for October was 19.0 mS/cm for stations Collinsville (C-2), National Steel (S-64), Beldon's Landing (S-49), and the deficiency standard was also 19.0 mS/cm for stations Sunrise Club (S-21) and Volanti (S-42). The progressive daily mean is the monthly average of both daily high tide SC values. The mathematical equation is shown below:

$$\text{PDM} = \frac{\sum \text{daily average of high tide SC}}{\text{\# days in the month}}$$

### 2.2 Delta Outflow

Outflow for October 2014 ranged between 3,100 cfs and 6,000 cfs (Figure 3). For the month, outflow began at 3,300 cfs and fluctuated between 3,000 cfs and 4,500 cfs before responding to a precipitation event on October 25th. Outflow peaked at 6,000 cfs before ending the month at 5,400 cfs. The monthly Delta outflow is represented by the mean Net Delta Outflow Index (NDOI). The NDOI is the estimated daily average of Delta outflow. Mean NDOI for October 2014 is listed below:

| Month | Mean NDOI (cubic feet per second) |
|---|---|
| October | 4,200 |

## 2.3 Precipitation

There were three precipitation events in October 2014. The first occurred on October 15th and produced 0.12 inch of rain. The second occurred on October 25th with 0.27 inch of rain falling and the last event ended the month on October 31st when 0.39 inch of precipitation fell. October's historical average precipitation in Fairfield is 1.30 inches. The monthly total precipitation recorded at the Fairfield Water Treatment Plant is below:

| Month | Total Precipitation (inches) |
|---|---|
| October | 0.78 |

## 2.4 Suisun Marsh Salinity Control Gates Operations

Operations and flashboard/boat lock installations at the Suisun Marsh Salinity Control Gates (SMSCG) during October 2014 are summarized below:

| Date | Gate Status | Flashboards Status | Boat Lock Status |
|---|---|---|---|
| Oct 1-6 | 3 Operational | In | Partially Closed |
| Oct 7-21 | 3 Open | In | Partially Closed |
| Oct 22-31 | 3 Operational | In | Partially Closed |

Due to salinity concerns in the interior Delta, specifically at Jersey Point, and relatively low salinity values at the compliance stations (in the range of 10.72-15.97 mS/cm), SMSCG operations were suspended on October 7th. Gate operations resumed on October 22nd due to increasing salinity values in Suisun Marsh. Salinity values at the compliance stations were in the range of 13.02-19.03 mS/cm.

# 3. DISCUSSION

## 3.1 Factors Affecting Channel Water Salinity in the Suisun Marsh

Factors that affect channel water salinity levels in the Suisun Marsh include:

- Delta outflow;
- tidal exchange;
- rainfall and local creek inflow;
- managed wetland operations; and,
- operations of the SMSCG and flashboard configurations.

## 3.2 Observations and Trends

### 3.2.1 Conditions During the Reporting Period

For October 2014, PDM salinity levels at compliance stations C-2, S-64, S-49, S-21 and S-42 are shown in Figure 1. Salinity levels for October started in the range of 10.08 mS/cm to 13.79 mS/cm and ended the month in the range of 11.90 mS/cm to 16.96 mS/cm. Salinity values gradually increased during the month. There was a period of missing data at C-2 for the period October 13-14 and missing data for S-64 between October 17-20. Equipment failure was the cause of the outage.

Salinity levels at monitoring stations S-35 and S-97 are shown in Figure 2. As with the compliance stations, salinity gradually increased during the month. S-35 began at 15.82 mS/cm and ended the month at 19.07 mS/cm. S-97 began at 16.73 mS/cm and ended at 20.09 mS/cm.

### 3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high tide SC at the compliance and monitoring stations for October 2014 were compared with means for those months during the previous nine years (Figure 4).

October 2014 mean salinity pattern for all compliance and monitoring stations ranked the highest in salinity levels for the past 10 years with 2008 and 2013 following close behind. 2008 was a critical water year type and 2013 was a dry water year type. As expected, the salinity levels gradually increased from east to west (Figure 1).

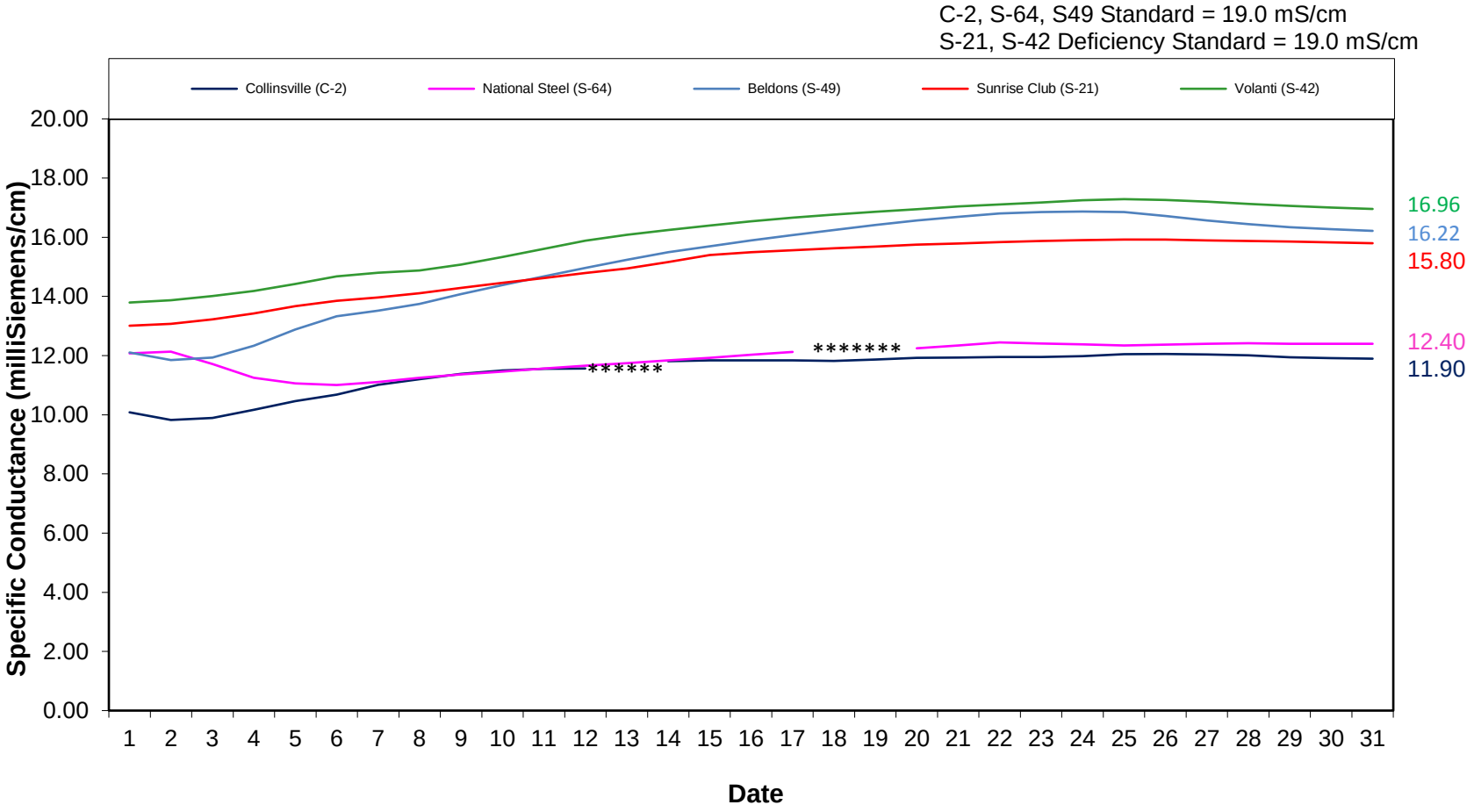
**Table 1: Monthly Mean High Tide Specific Conductance at Suisun Marsh Water Quality Compliance Stations October 2014**

| Station Identification | Specific Conductance (mS/cm)* | Normal Standard | Normal Standard Met? | Deficiency Standard | Deficiency Standard Met? |
|---|---|---|---|---|---|
| C-2** | 11.90 | 19.0 | Yes | N/A | N/A |
| S-64 | 12.40 | 19.0 | Yes | N/A | N/A |
| S-49 | 16.22 | 19.0 | Yes | N/A | N/A |
| S-42 | 16.96 | N/A | N/A | 19.0 | Yes |
| S-21 | 15.80 | N/A | N/A | 19.0 | Yes |

*milliSiemens per centimeter

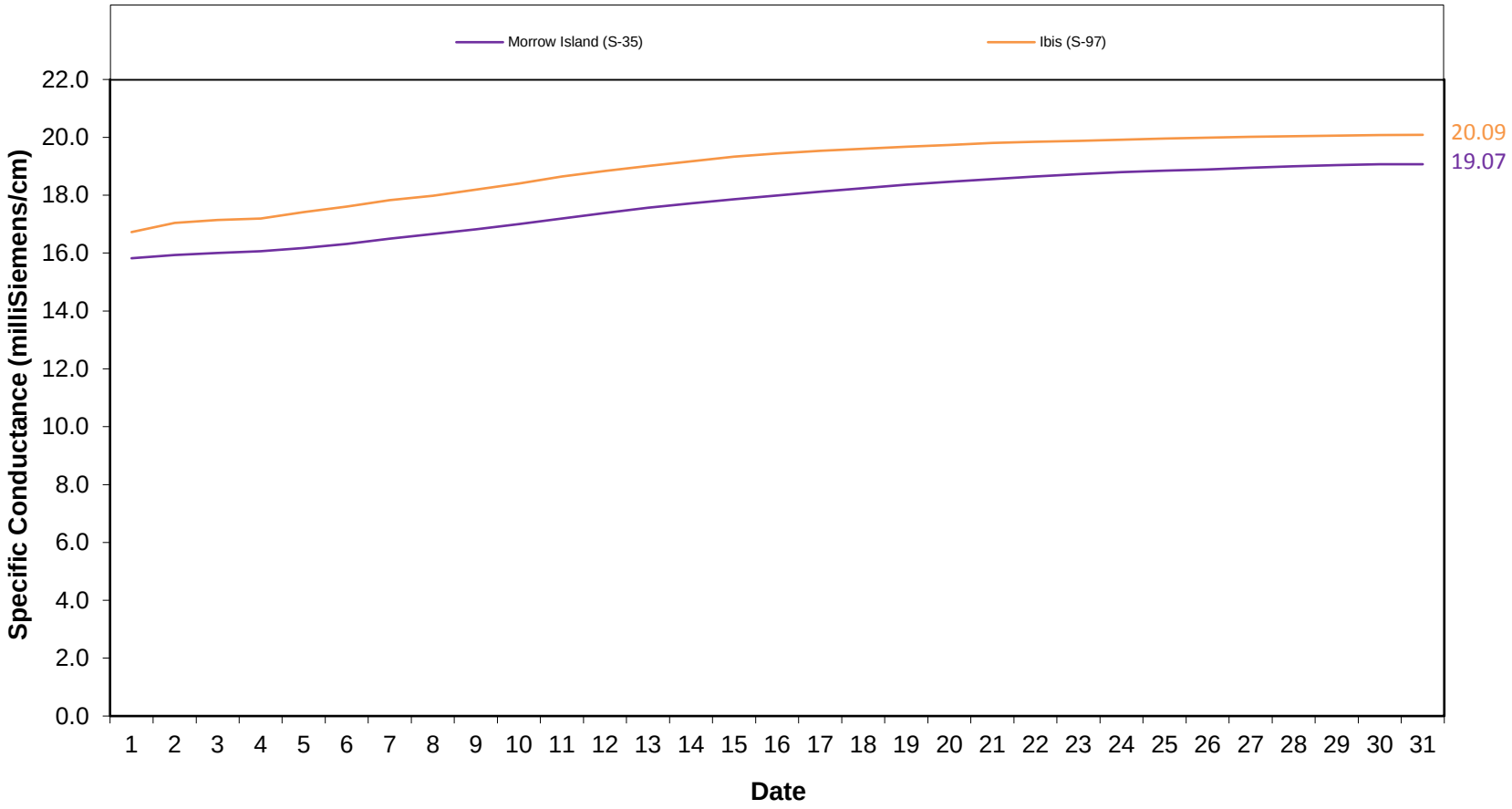
**The representative data from nearby USBR station is used in lieu of data from station C-2.

**Figure 1: Suisun Marsh Progressive Daily Mean High Tide Specific Conductance for Compliance Stations October 2014**




*** Equipment failure at C-2 from 10/13-10/14 and S-64 from 10/17-10/20.

**Figure 2: Suisun Marsh Progressive Daily Mean High Tide Specific Conductance for Monitoring Stations October 2014**



## Figure 3: Daily Net Delta Outflow Index and Precipitation
## October 2014

*Preliminary DWR, O&M data
**Precipitation data from Fairfield Water Treatment Plant

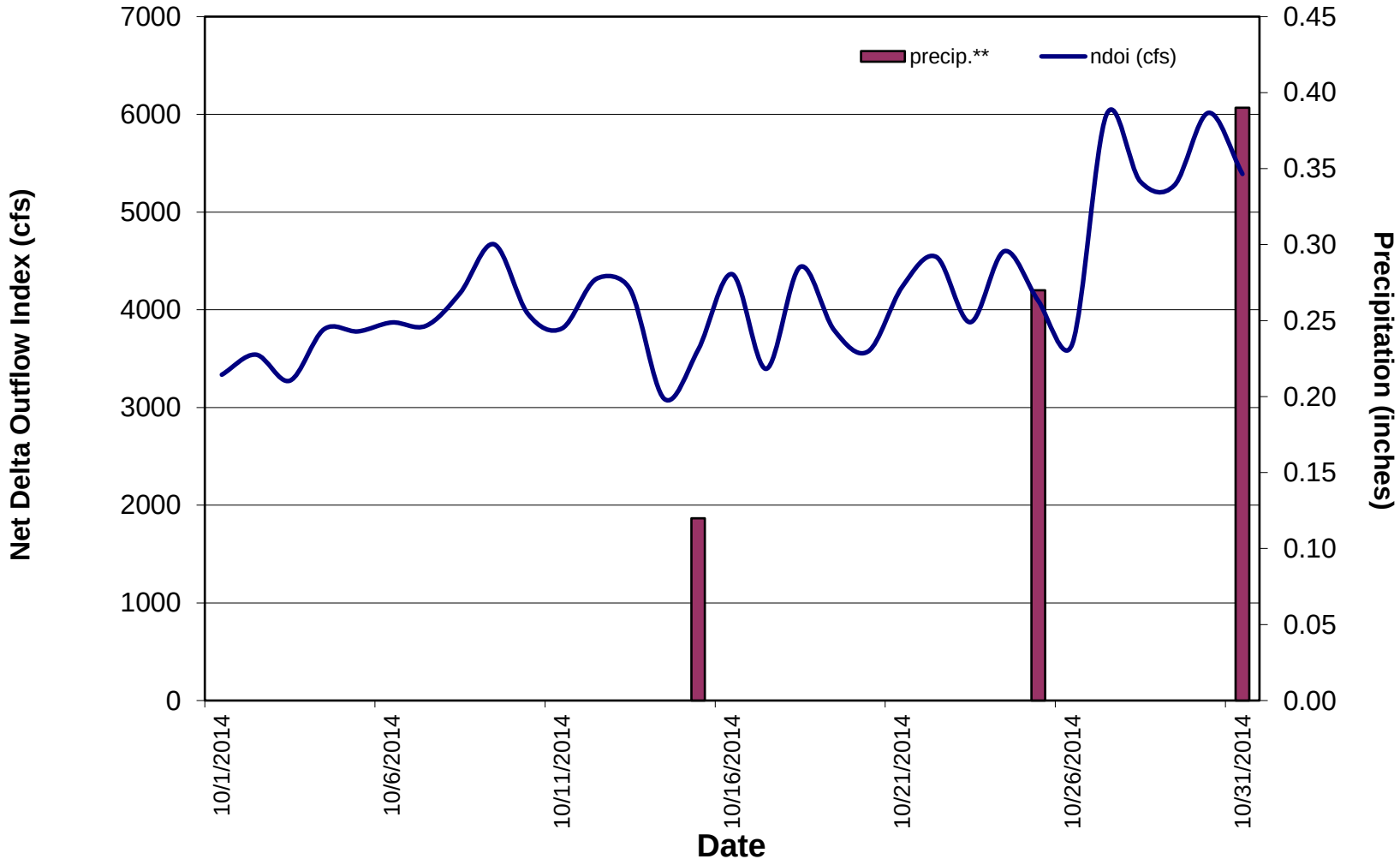
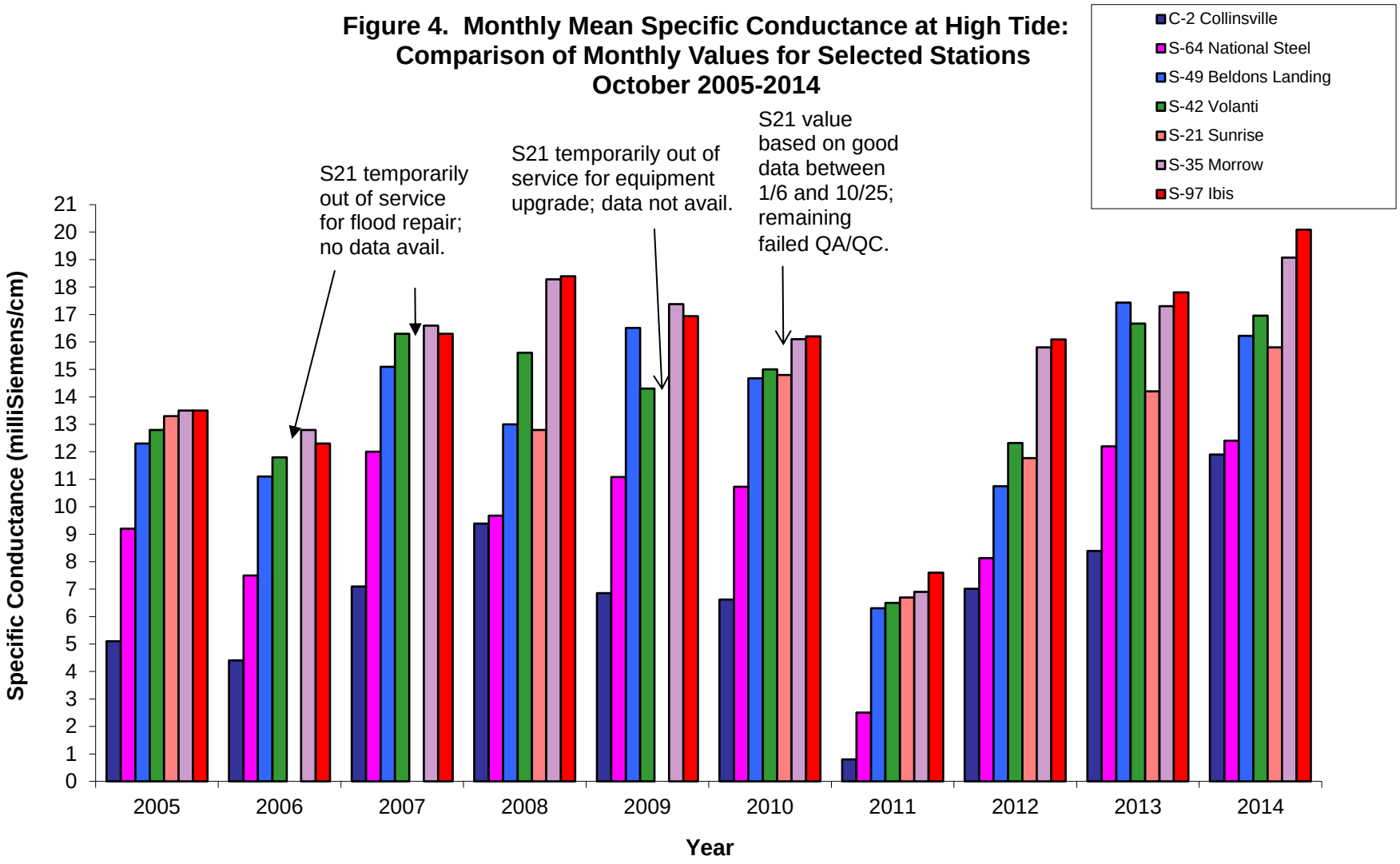


**Figure 4. Monthly Mean Specific Conductance at High Tide: Comparison of Monthly Values for Selected Stations October 2005-2014**



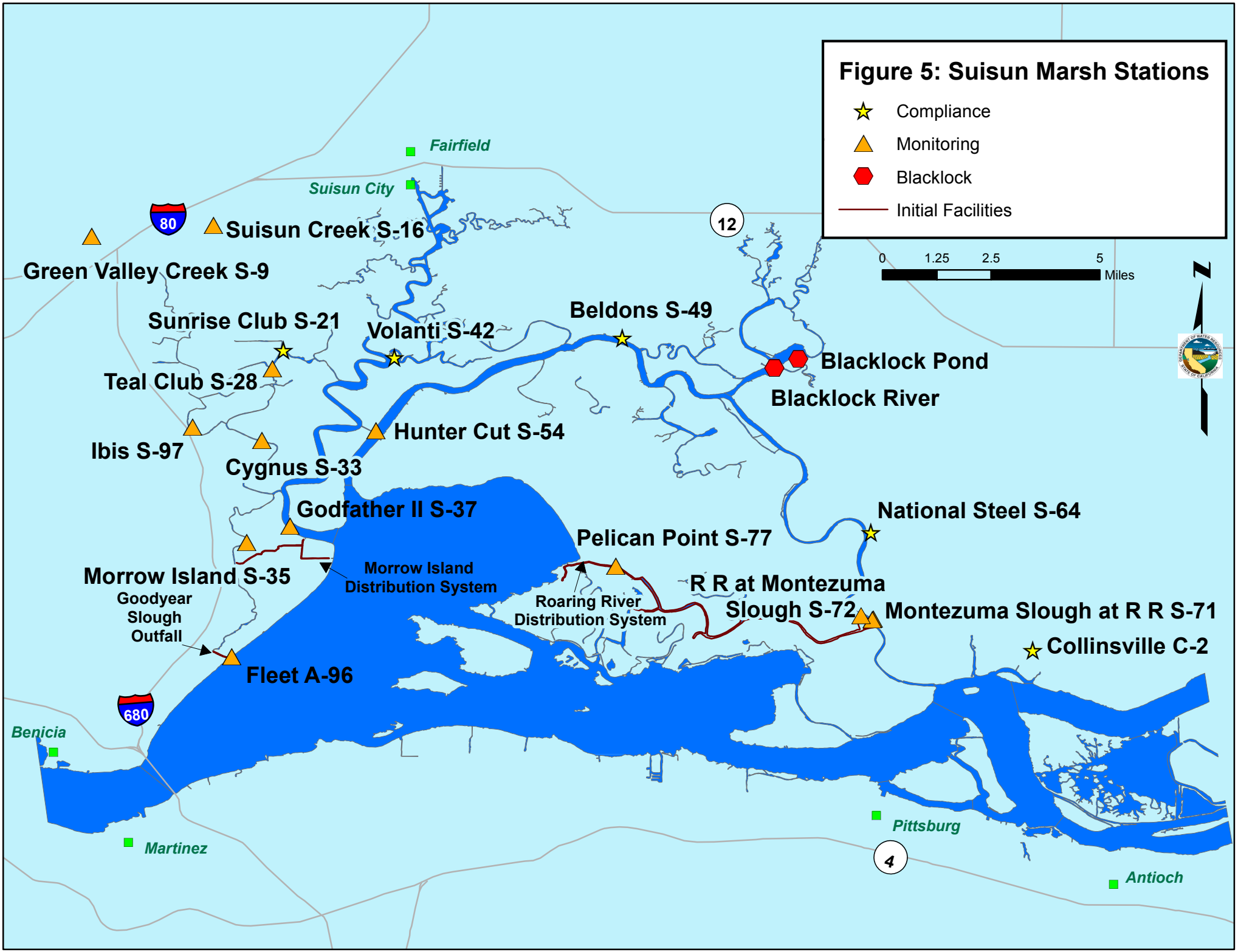


Figure 5: Suisun Marsh Stations
Compliance
Monitoring
Blacklock
Initial Facilities
0 1.25 2.5 5 Miles
N
Fairfield
Suisun City
80
12
Suisun Creek S-16
Green Valley Creek S-9
Sunrise Club S-21
Volanti S-42
Beldons S-49
Blacklock Pond
Blacklock River
Teal Club S-28
Ibis S-97
Hunter Cut S-54
Cygnus S-33
Godfather II S-37
National Steel S-64
Pelican Point S-77
Morrow Island S-35
Goodyear Slough Outfall
Morrow Island Distribution System
Roaring River Distribution System
R R at Montezuma Slough S-72
Montezuma Slough at R R S-71
Collinsville C-2
Fleet A-96
680
Benicia
Martinez
Pittsburg
4
Antioch