Suisun Marsh Monitoring Program
Channel Water Salinity Report

Reporting Period: December 2015

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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 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

December 2015 was the 24th 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 December, 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 December was 15.5 mS/cm for stations Collinsville (C-2), National Steel (S-64), Beldon Landing (S-49), and the deficiency standard was also 15.6 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:

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

2.2 Delta Outflow

Outflow for December 2015 ranged between 4,000 cfs and 22,700 cfs. For the month, outflow began at 4,500 cfs and increased to 13,700 cfs on December 15th in response to a series of precipitation events. Outflow then decreased to 6,400 cfs on December 19th. Following a precipitation event that occurred between December 19-22, outflow rapidly increased to 22,700 cfs before decreasing to 4,000 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 December 2015 is listed below:

Month	Mean NDOI (cubic feet per second)
December	9,400

2.3 Precipitation

There were four precipitation events in December. Between December 3-4, a total of 0.29 inch of rain fell. Between December 9-11, 0.63 inch fell. On December 13th, 0.44 inch fell. During the period, December 19-22, 2.56 inches fell. December's historical average precipitation in Fairfield is 4.30 inches. The monthly total precipitation recorded at the Fairfield Water Treatment Plant is below:

Month	Total Precipitation (inches)
December	4.01

2.4 Suisun Marsh Salinity Control Gates Operations

Operations and flashboard/boat lock installations at the Suisun Marsh Salinity Control Gates (SMSCG) during December 2015 are summarized below:

Date	Gate Status	Flashboards Status	Boat Lock Status
December 1-2	3 Open	In	Partially Closed
December 3-31	3 Operational	In	Partially Closed

Due to high salinity concerns, the gates were set back in tidal operation mode on December 3rd.

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 December 2015, PDM salinity levels at the five compliance stations are shown in Figure 1. Salinity levels for December started in the range of 10.06 mS/cm to 18.54

mS/cm and ended the month in the range of 9.04 mS/cm to 13.90 mS/cm. Salinity at the compliance stations gradually decreased during the month.

PDM salinity levels at monitoring stations S-35 and S-97 are shown in Figure 2. Salinity at S-35 began the month at 19.47 mS/cm and gradually decreased during the month to end at 16.73 mS/cm. At station S-97, salinity started the month at 19.31 mS/cm and gradually decreased to 18.22 mS/cm. Between December 15-21, data at S-97 was determined to be out of quality control standards.

3.2.2 Comparison of Reporting Period Conditions with Previous Years

Monthly mean high tide SC at the compliance and monitoring stations for December 2015 were compared with means for those months during the previous nine years (Figure 4).

The average salinity for December 2015 at all compliance and monitoring stations ranked the third highest in salinity levels for the past 10 years. The highest salinity was in 2008 which was a critical water year followed by 2009 which was a dry water year.

Table 1: Monthly Mean High Tide Specific Conductance at Suisun Marsh Water Quality Compliance Stations December 2015

Station Identification	Specific Conductance (mS/cm)*	Normal Standard	Normal Standard Met?	Deficiency Standard	Deficiency Standard Met?
C-2**	9.62	15.5	Yes	N/A	N/A
S-64	9.04	15.5	Yes	N/A	N/A
S-49	11.77	15.5	Yes	N/A	N/A
S-42	12.91	N/A	N/A	15.6	Yes
S-21	13.90	N/A	N/A	15.6	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 December 2015

C-2, S-64, S-49 Standard = 15.5 mS/cm
S-21, S-42 Deficiency Standard = 15.6 mS/cm

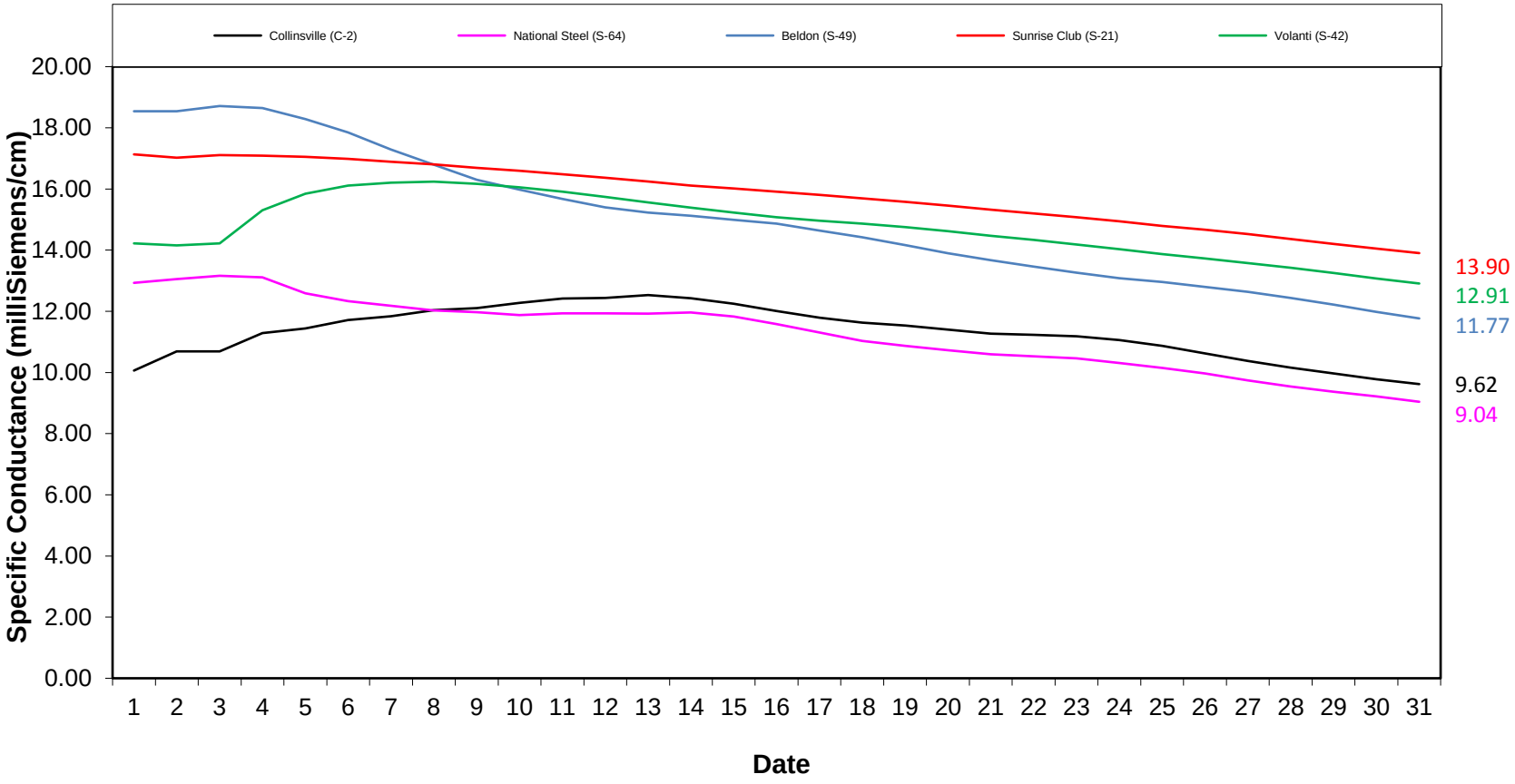
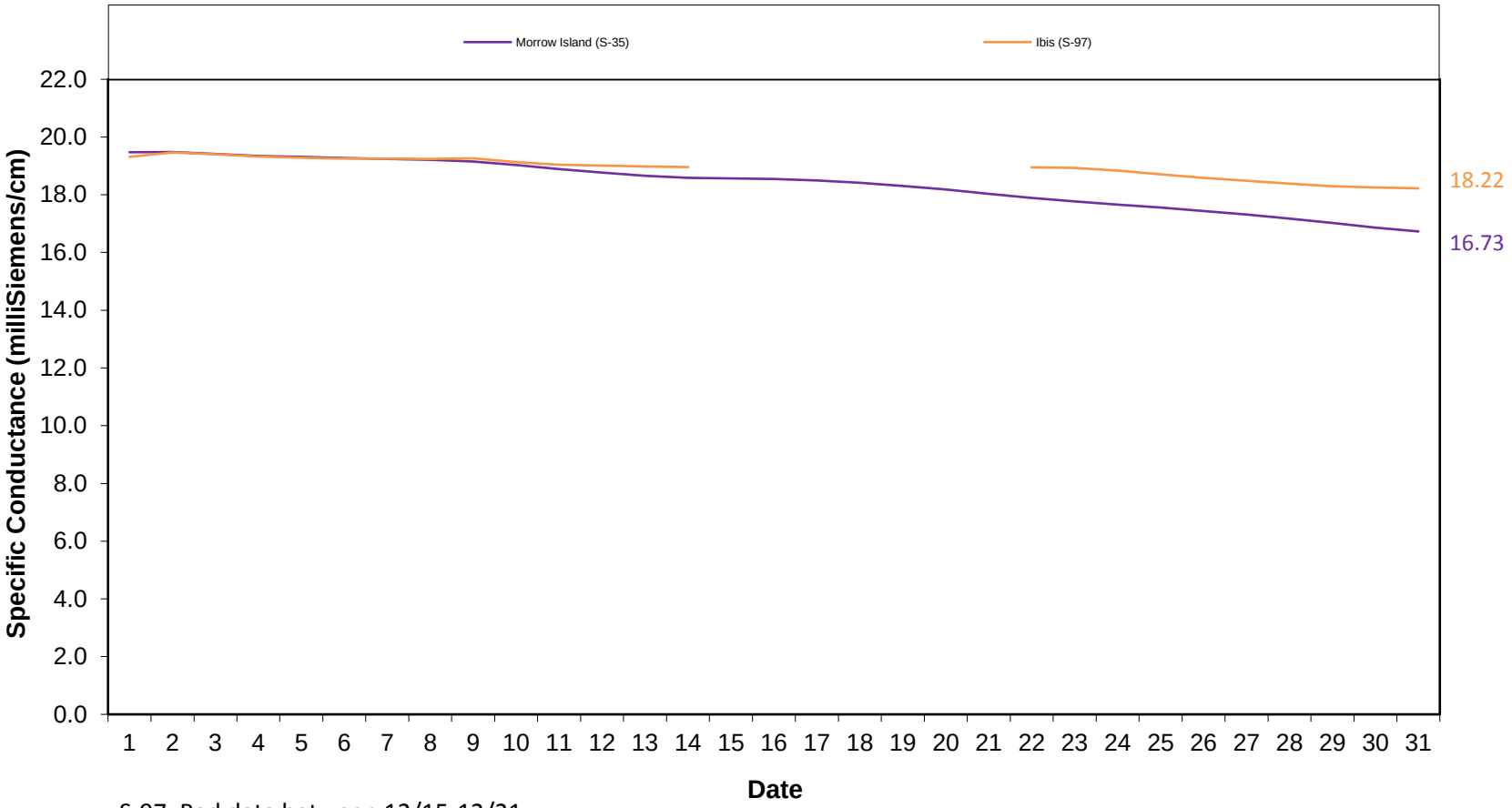


Figure 2: Suisun Marsh Progressive Daily Mean High Tide Specific Conductance for Monitoring Stations December 2015



S-97: Bad data between 12/15-12/21.

Figure 3: Daily Net Delta Outflow Index and Precipitation
December 2015

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

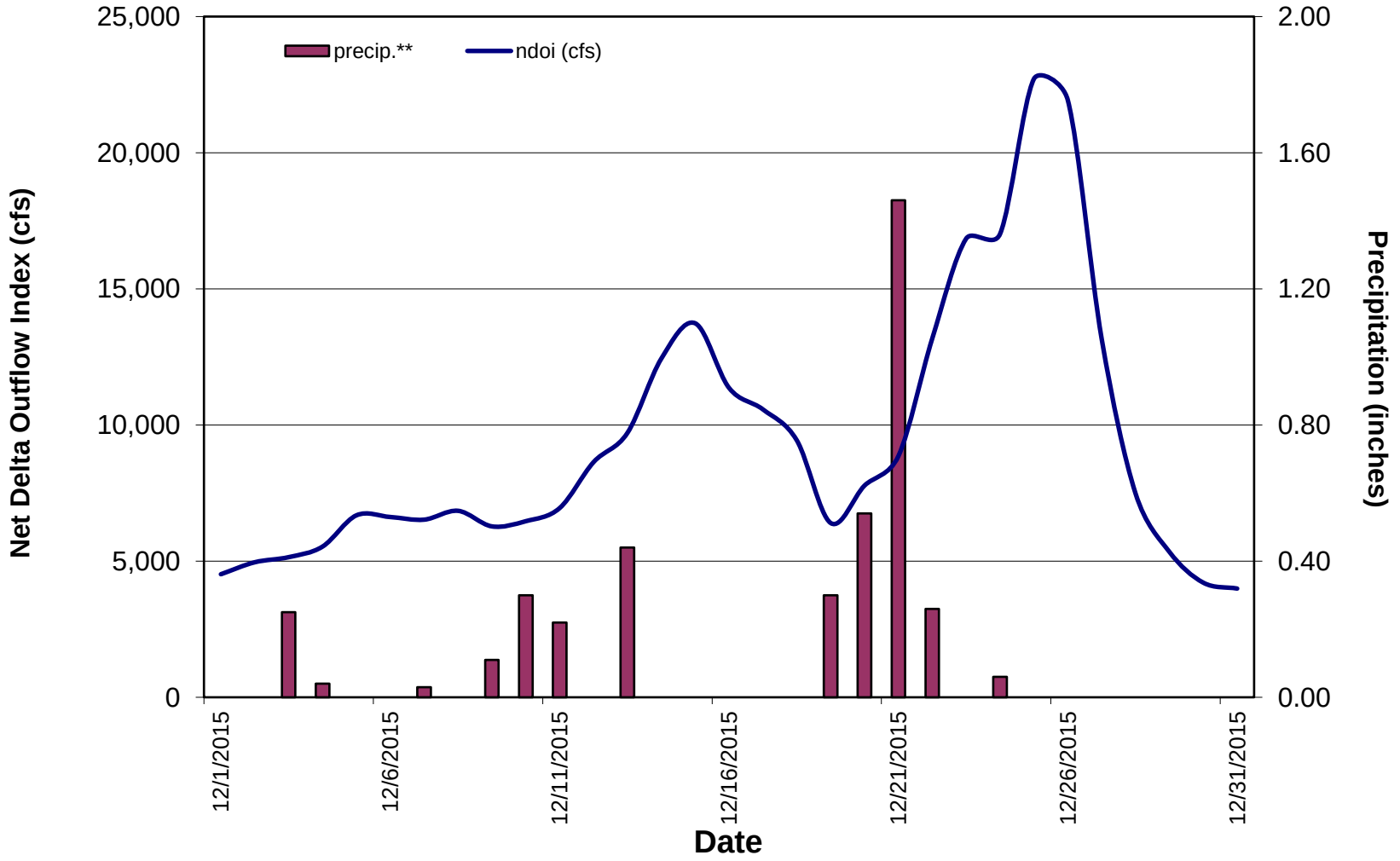
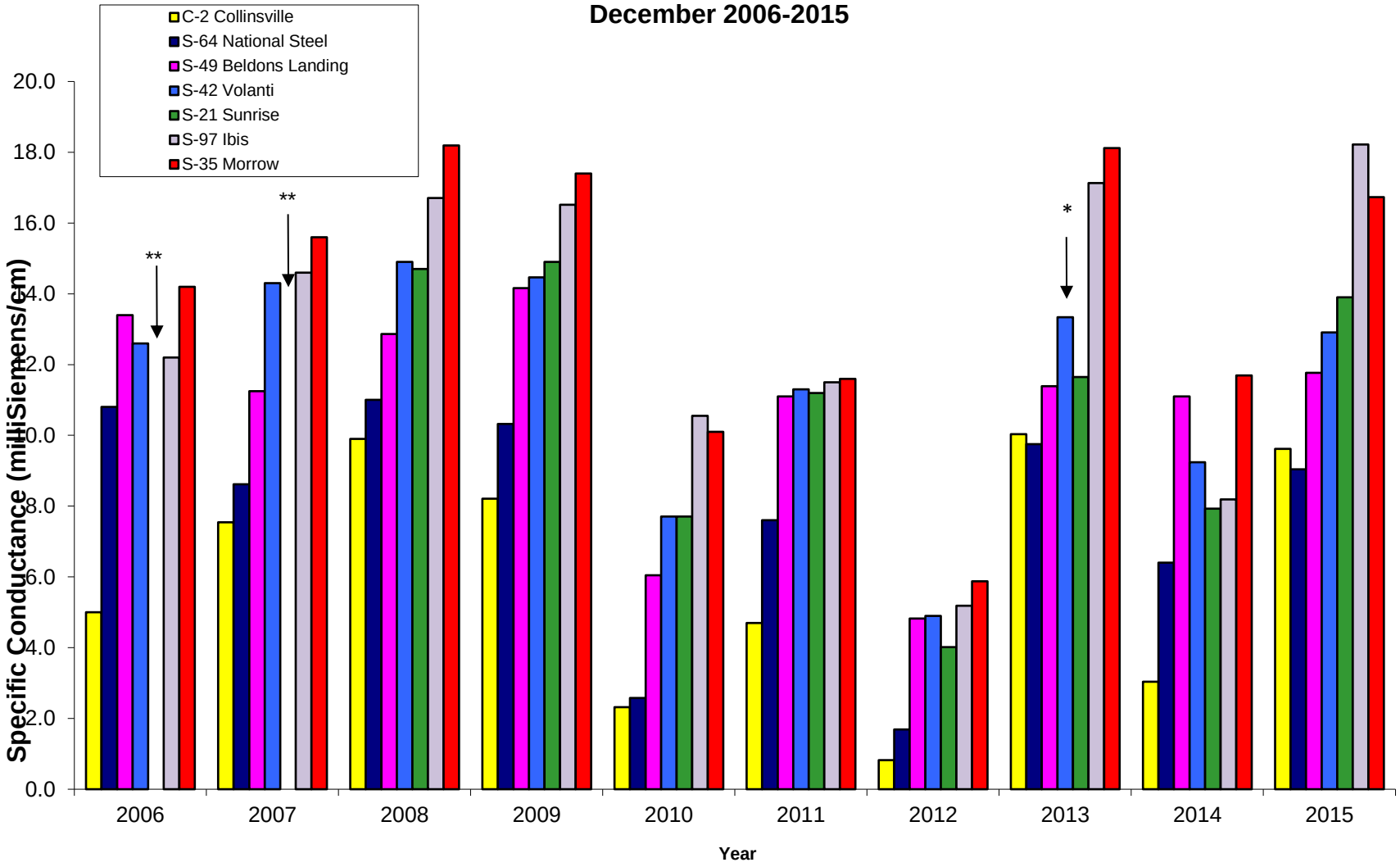


Figure 4. Monthly Mean Specific Conductance at High Tide: Comparison of Monthly Values for Selected Stations December 2006-2015



* Data reflects a partial month. Data collection was interrupted before the end of the month due to equipment failure.

** Data was not obtained due to equipment failure.

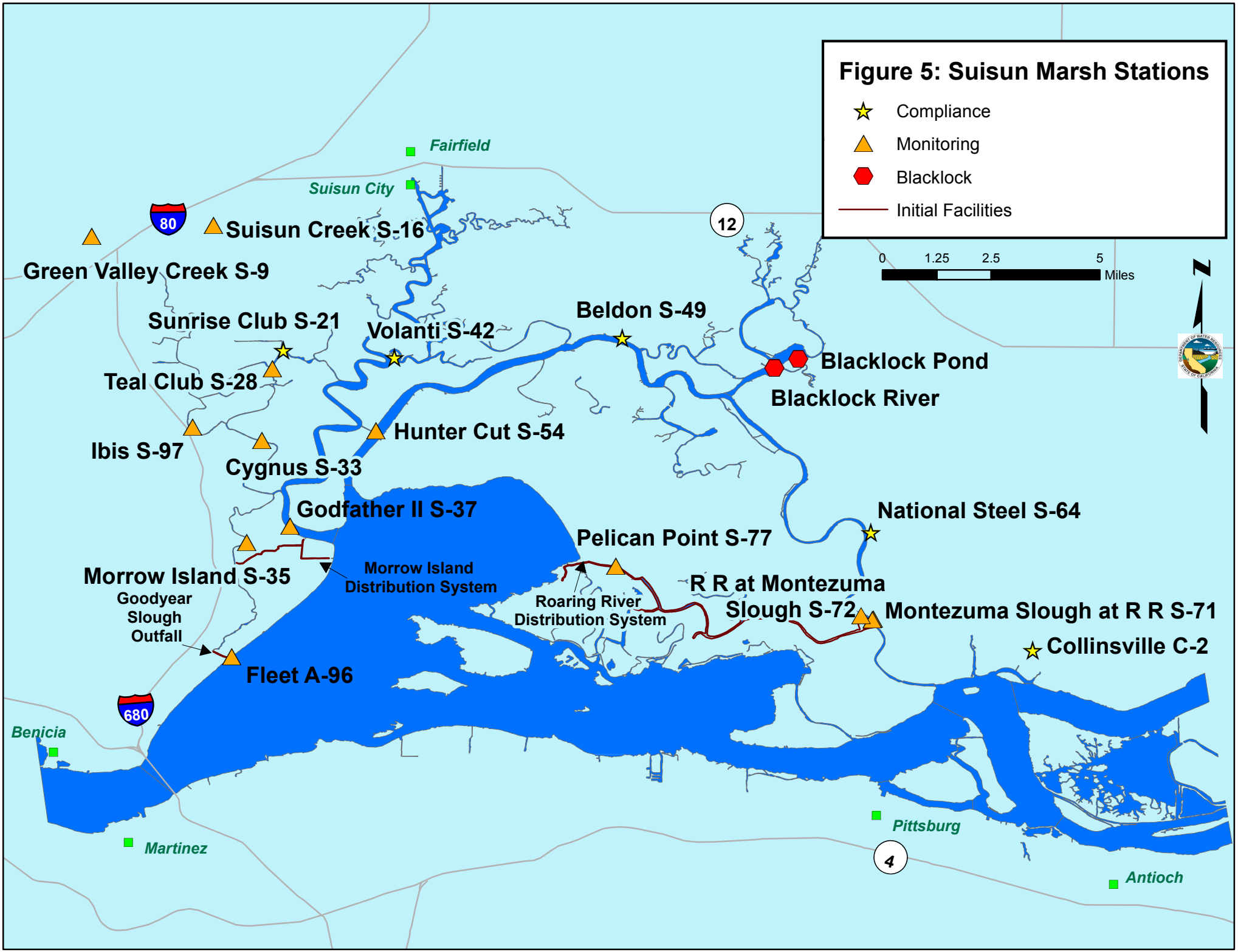


Figure 5: Suisun Marsh Stations
Compliance
Monitoring
Blacklock
Initial Facilities
0 1.25 2.5 5 Miles
N
Fairfield
Suisun City
80
12
Suisun Creek S-16
Green Valley Creek S-9
Sunrise Club S-21
Volanti S-42
Beldon S-49
Blacklock Pond
Blacklock River
Teal Club S-28
Hunter Cut S-54
Ibis S-97
Cygnus S-33
Godfather II S-37
National Steel S-64
Pelican Point S-77
Morrow Island S-35
Morrow Island Distribution System
Goodyear Slough Outfall
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