Suisun Marsh Monitoring Program
Channel Water Salinity Report

Reporting Period: November 2014

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TABLE OF CONTENT

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

November 2014 was the eleventh 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 November, salinity conditions at four of the five compliance stations were in compliance with channel water salinity standards (Table 1). The salinity standard at Beldon Landing (S-49) was exceeded. 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 November was 15.5 mS/cm for stations Collinsville (C-2), National Steel (S-64), Beldon Landing (S-49), and the deficiency standard was 16.5 mS/cm for stations Sunrise Club (S-21) and Volanti (S-42). The November PDM at S-49 was 16.32 mS/cm which exceeded the standard by 0.82 mS/cm. The exceedance was due to an electrical control systems failure at the Suisun Marsh Salinity Control Gates (SMSCG) during the last half of the month along with dry hydrological conditions and low Delta outflow.

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 November 2014 ranged between 2,900 cfs and 7,500 cfs (Figure 3). For the month, outflow began at 6,600 cfs and peaked at 7,500 cfs on November 4th before gradually decreasing during the month and ending at 3,300 cfs. Outflow did respond to the storm events that occurred on November 13th, November 19th, November 22nd, and November 29th. 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 November 2014 is listed below:

Month	Mean NDOI (cubic feet per second)
November	5,200

2.3 Precipitation

There were four precipitation events in November 2014. The first occurred on November 13th and produced 0.21 inch of rain. The second occurred on November 19-20 with 0.38 inch of rain falling. The third event took place on November 22nd when 0.85 inch of rain fell and the last event ended the month on November 29-30 when another 0.85 inch of precipitation fell. November's historical average precipitation in Fairfield is 2.75 inches. The monthly total precipitation recorded at the Fairfield Water Treatment Plant is below:

Month	Total Precipitation (inches)
November	2.29

2.4 Suisun Marsh Salinity Control Gates Operations

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

Date	Gate Status	Flashboards Status	Boat Lock Status
Nov. 1-18	3 Operational	In	Partially Closed
Nov. 19-30	3 Open	In	Partially Closed

Due to an electrical control systems failure on November 18th, the SMSCG were not tidally operated between November 19-30. The gates were set in the open position while repairs to the systems were being conducted. This outage lead to higher salinity values in Suisun Marsh. Salinity values at the compliance stations were in the range of 9.81-16.42 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 November 2014, PDM salinity levels at the five compliance stations are shown in Figure 1. Salinity levels for November started in the range of 11.67 mS/cm to 15.66 mS/cm and ended the month in the range of 9.81 mS/cm to 16.42 mS/cm. At compliance stations S-64, S-49, S-21 and S-42, salinity values gradually increased during the month while salinity gradually decreased at C-2. The salinity standard at S-49 was exceeded in November. The PDM on November 30th was 16.32 mS/cm and the monthly standard is 15.5 mS/cm. The exceedance was due to the electrical control systems failure at the SMSCG combined with dry hydrological conditions and low Delta outflow.

Salinity levels at monitoring stations S-35 and S-97 are shown in Figure 2. Salinity gradually increased at station S-35. Salinity began the month at 18.73 mS/cm and ended the month at 19.28 mS/cm. At station S-97, salinity began the month at 20.41 mS/cm and gradually decreased to 19.32 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 November 2014 were compared with means for those months during the previous nine years (Figure 4).

November 2014 mean salinity pattern for all compliance and monitoring stations ranked the highest in salinity levels for the past 10 years. Salinity values in 2014 were higher than values in 2008 with the exception of S-21 and S-42. 2008 was a critical water year. Following close behind 2014, were 2007 and 2010. 2007 was a dry year and 2010 was a below normal water year. As expected, the salinity levels gradually increased from east to west.

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

Station Identification	Specific Conductance (mS/cm)*	Normal Standard	Normal Standard Met?	Deficiency Standard	Deficiency Standard Met?
C-2**	9.81	15.5	Yes	N/A	N/A
S-64	13.59	15.5	Yes	N/A	N/A
S-49	16.32	15.5	No	N/A	N/A
S-42	16.42	N/A	N/A	16.5	Yes
S-21	15.29	N/A	N/A	16.5	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 November 2014

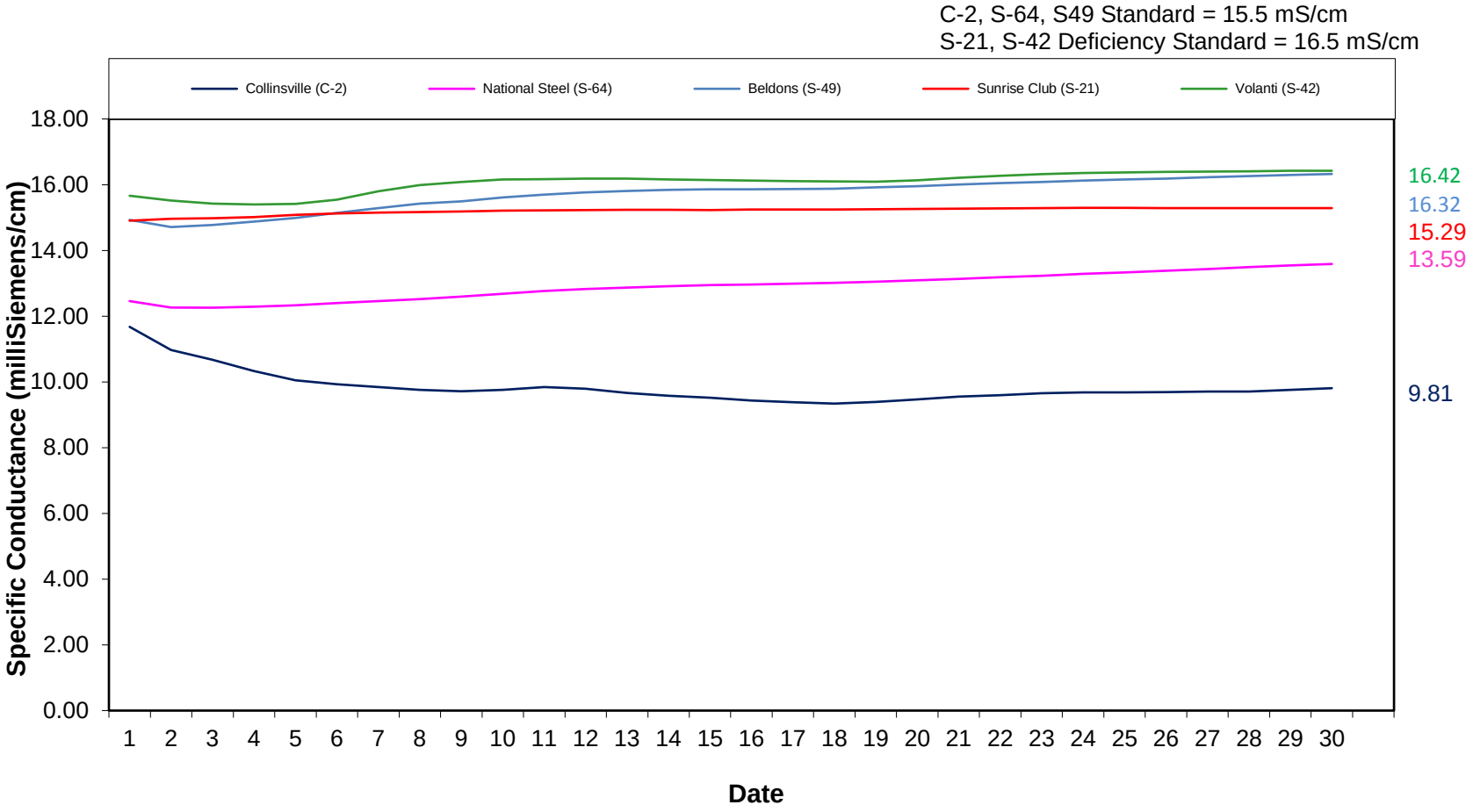


Figure 2: Suisun Marsh Progressive Daily Mean High Tide Specific Conductance for Monitoring Stations November 2014

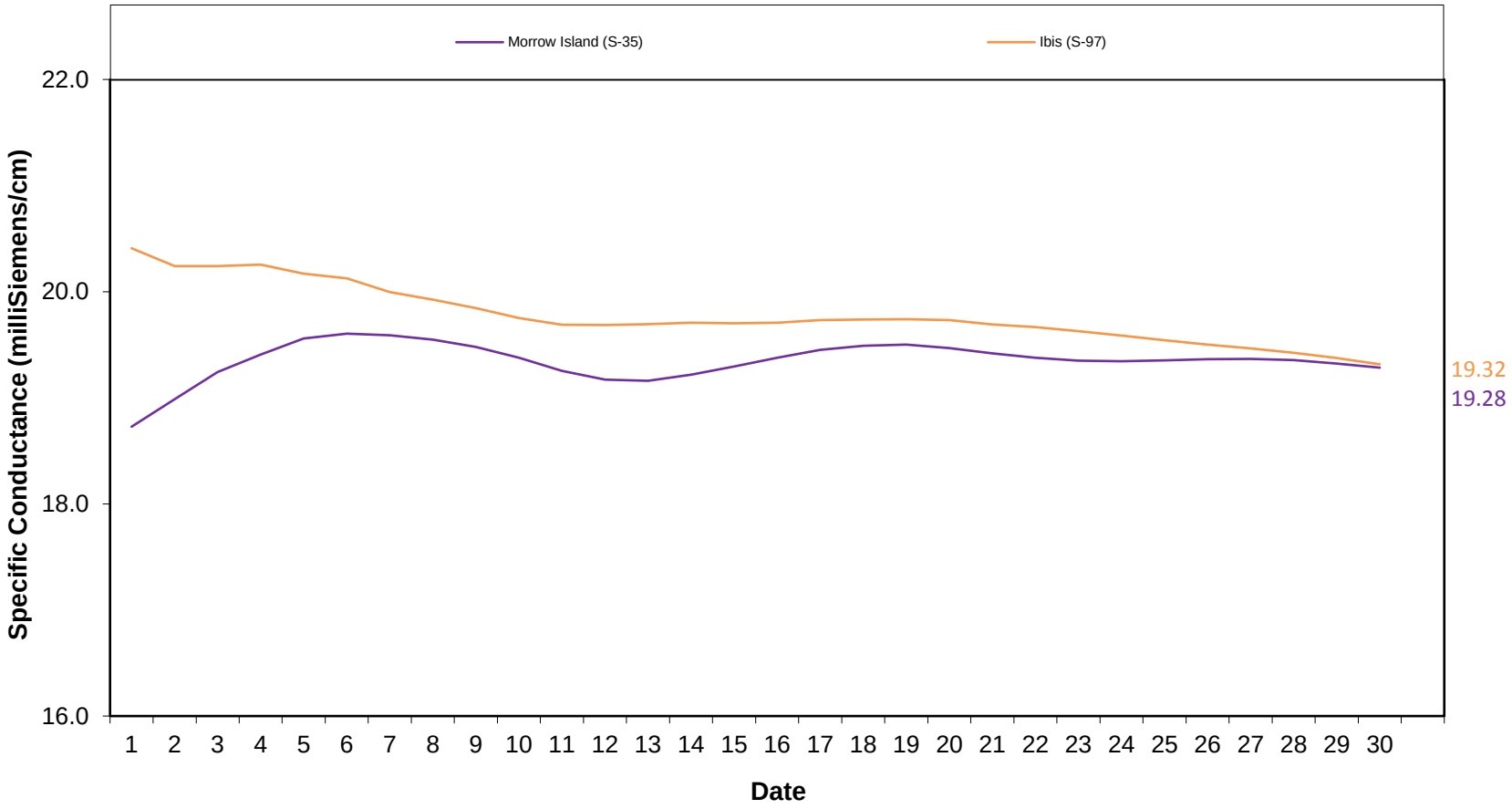


Figure 3: Daily Net Delta Outflow Index and Precipitation
November 2014

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

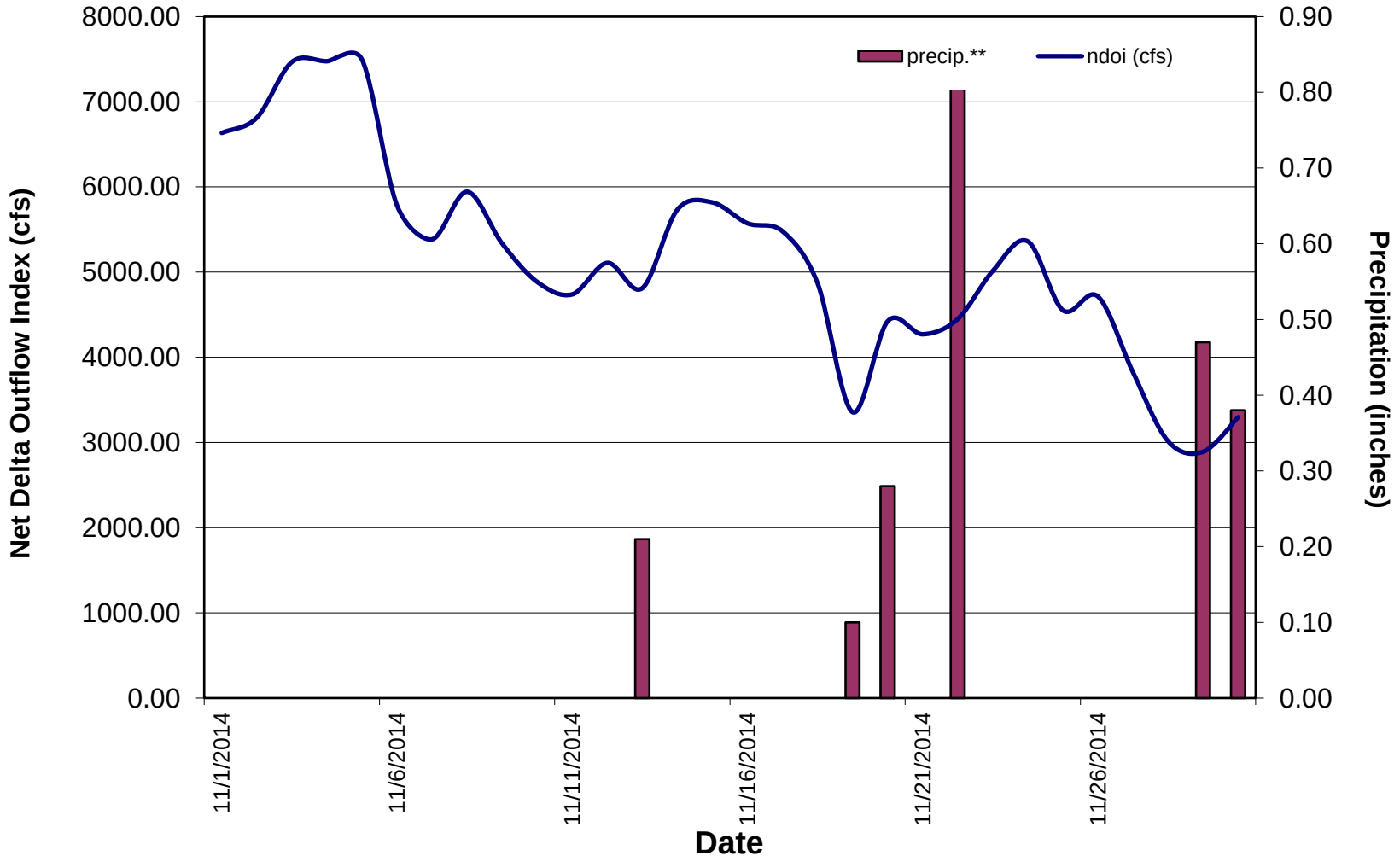
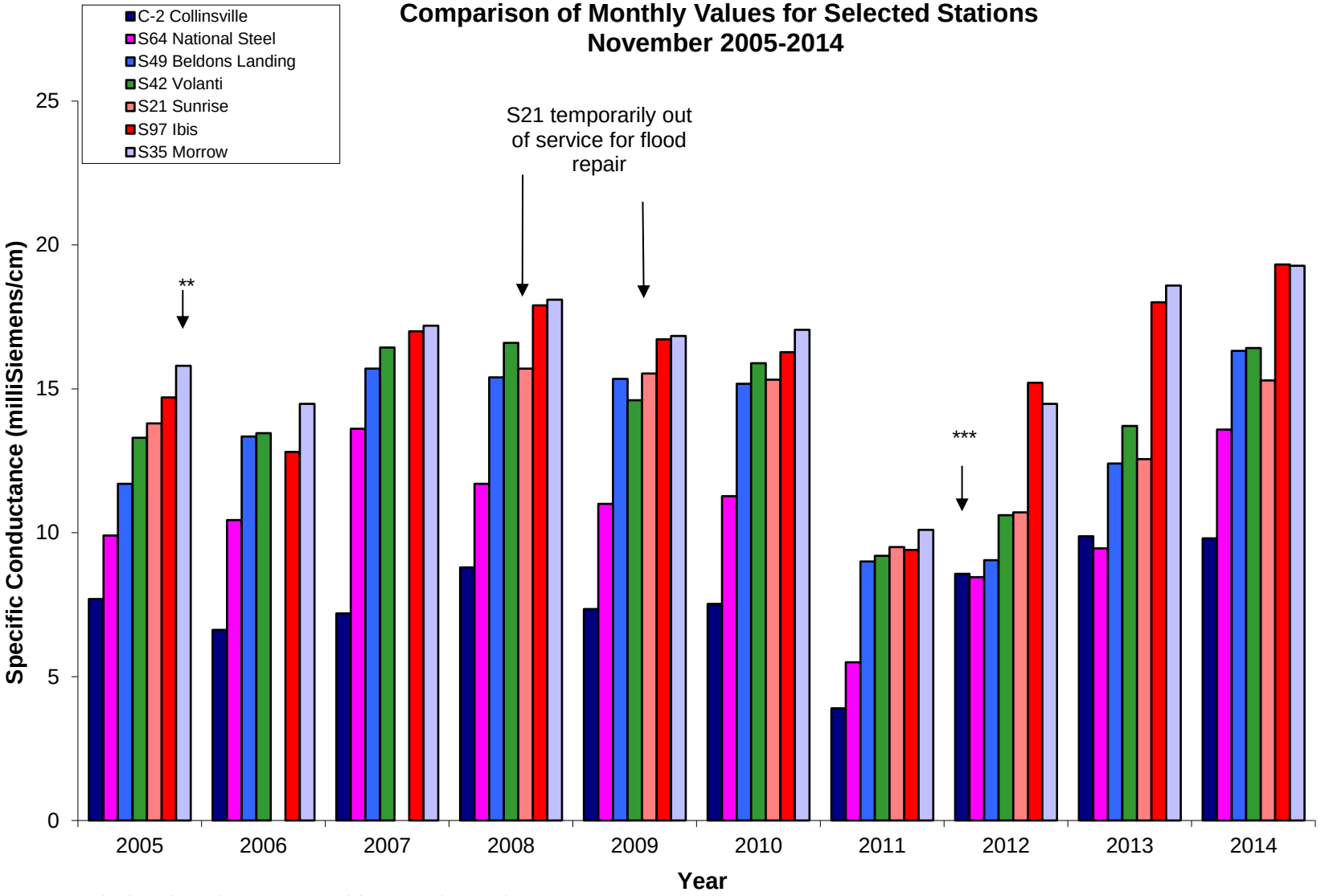


Figure 4. Monthly Mean Specific Conductance at High Tide: Comparison of Monthly Values for Selected Stations November 2005-2014



** Missing data due power problems at the station
*** Missing data due to equipment malfunction

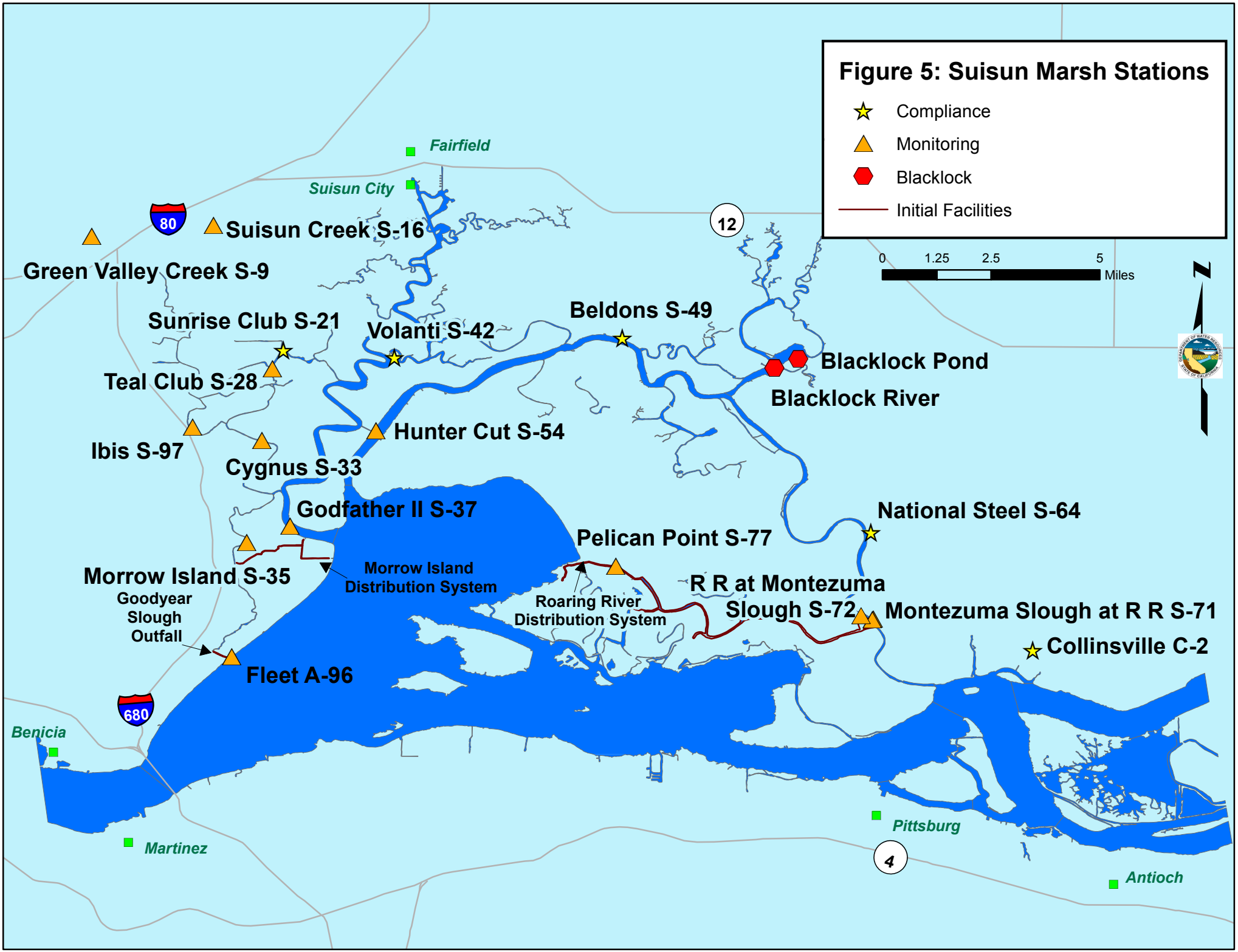


Figure 5: Suisun Marsh Stations
Compliance
Monitoring
Blacklock
Initial Facilities
0 1.25 2.5 5 Miles
N
Fairfield
Suisun City
80
12
Suisun Creek S-16
Green Valley Creek S-9
Sunrise Club S-21
Volanti S-42
Beldons S-49
Blacklock Pond
Blacklock River
Teal Club S-28
Ibis S-97
Hunter Cut S-54
Cygnus S-33
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