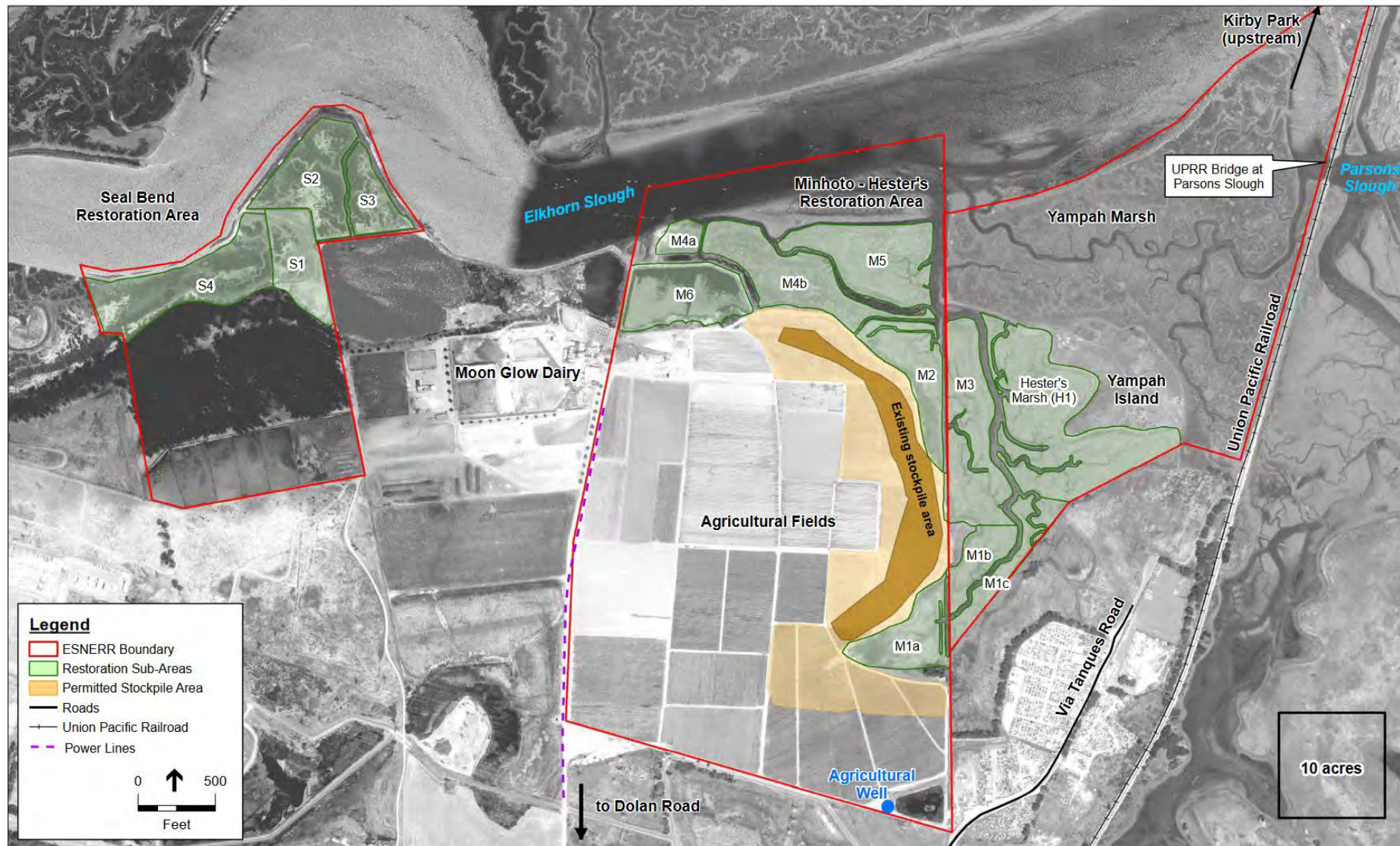


# ESNERR Research



Improving conservation and restoration  
through better understanding

# Recent Activity: Current Marsh restoration



# Recent Activity: Marsh Restoration in final Phase 3 of 3



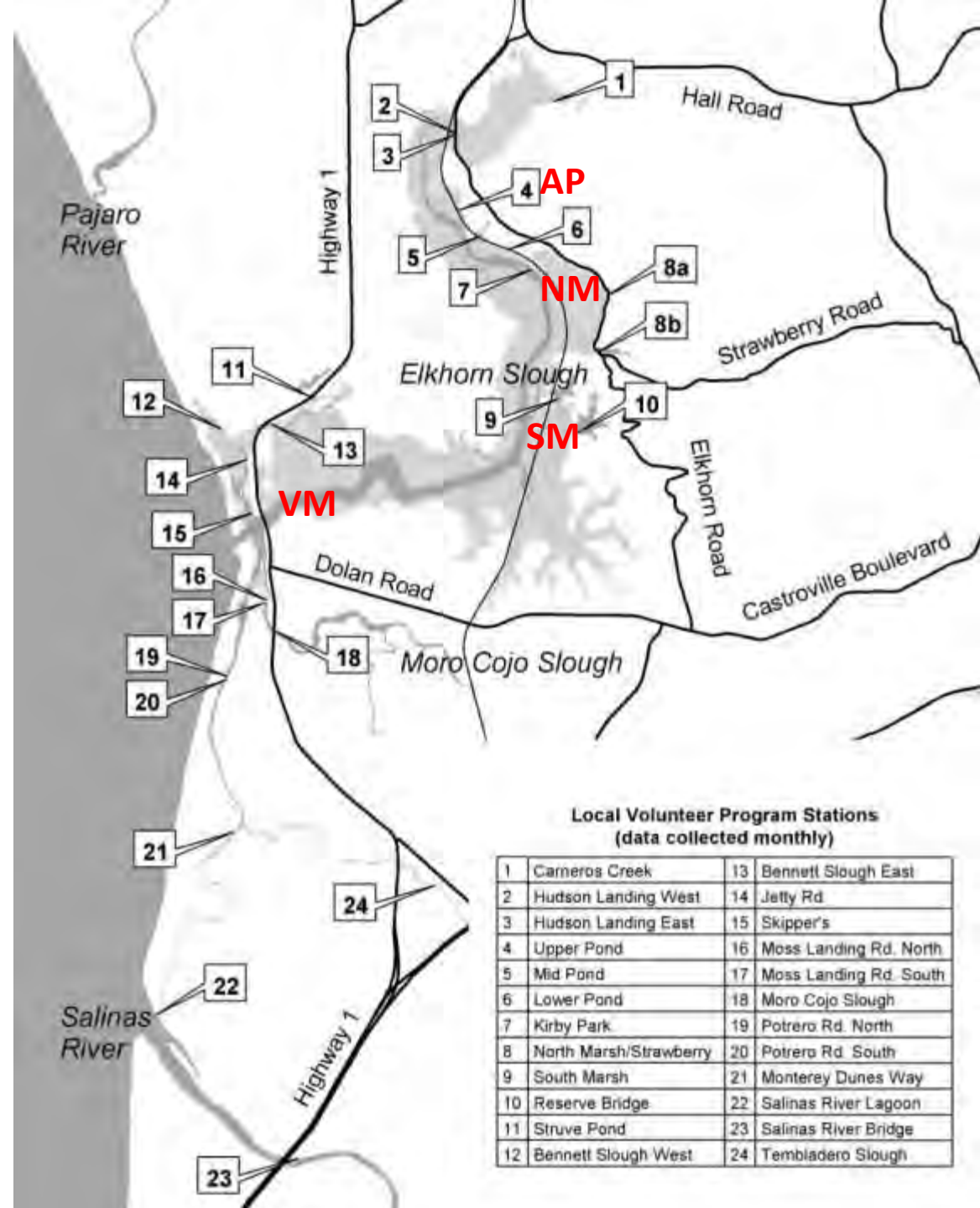
# ESNERR WQ Monitoring Programs

- Volunteer Program

- Great spatial coverage (24 stations)
- Monthly sampling
- Very long time series (since 1989)
- Physical Parameters and nutrients

- NERR Program

- Great temporal coverage (every 15 min!)
- 4 stations
- Since 1995



# NERR system-wide monitoring program

WQ data collected consistently at four stations at 28 NERR sites



[Home](#)[About CDMO](#)[About Data](#)[Get Data](#)[Web Services](#)[Science Collaborative](#)


1. Choose Reserve

✓ Elkhorn Slough

2. Choose Station

3. Choose Data

4. Get Data

	SWMP Status ▲	Station Code	Station Name	Active Dates	Data Type
	P	ELKAPWQ	Azevedo Pond	Jun 1995-	 Water Quality
	P	ELKCWMET	Caspian Weather Station	Jan 2001-	 Meteorological
	P	ELKNMWQ	North Marsh	Apr 1999-	 Water Quality
	P	ELKSMWQ	South Marsh	Jun 1995-	 Water Quality
	P	ELKVMWQ	Vierra Mouth	Mar 2001-	 Water Quality



# Quality Assurance and Quality Control (QAQC)

All NERR SWMP data incur primary data QAQC at the CDMO within one week of data retrieval as the provisional data are ingested into the CDMO database. The data are then emailed back to the Reserve where Reserve staff use tools provided by the CDMO, Microsoft Excel macros, to perform secondary QAQC on the data. Data that have been through secondary QAQC are submitted back to the CDMO quarterly and again annually; these data are posted as provisional plus. After annual submission to the CDMO is complete, the data undergo final tertiary QAQC by the CDMO. The data and its accompanying metadata documentation are checked for completeness before dissemination as authenticated historical data via the CDMO Online Data Information Server (<http://cdmo.baruch.sc.edu>).

## SWMP Status

SWMP stations have either primary or secondary status. Primary SWMP stations are the core monitoring stations required by the NERRS and undergo all levels of QAQC. Secondary SWMP stations are additional, optional stations which must follow all SWMP data collection, submission and QAQC protocols. However, with the exception of nutrient monitoring stations, secondary SWMP data do not go through tertiary review by the CDMO.

## QAQC Status

The values in the historical and provisional plus columns of the exported data indicate what stage of QAQC the data are in. The QAQC status is also shown on the charts when mousing over a value. There are three QAQC stages reported:

**Provisional data** have been through an automated flagging process (primary QAQC) only and have not been checked by the Reserve. The automated flagging process currently flags data that are out of sensor range or missing. Provisional data are indicated with a **value of 0 in the provisional plus column** of exported data files, and with a **QAQC: P in a chart mouse-over**.

**Provisional plus data** have been reviewed by the Reserve staff (secondary QAQC) using Excel macros to further QAQC the data. Provisional plus data are indicated with a **value of 1 in the provisional plus column** of exported data files, and with a **QAQC: PP in a chart mouse-over**.

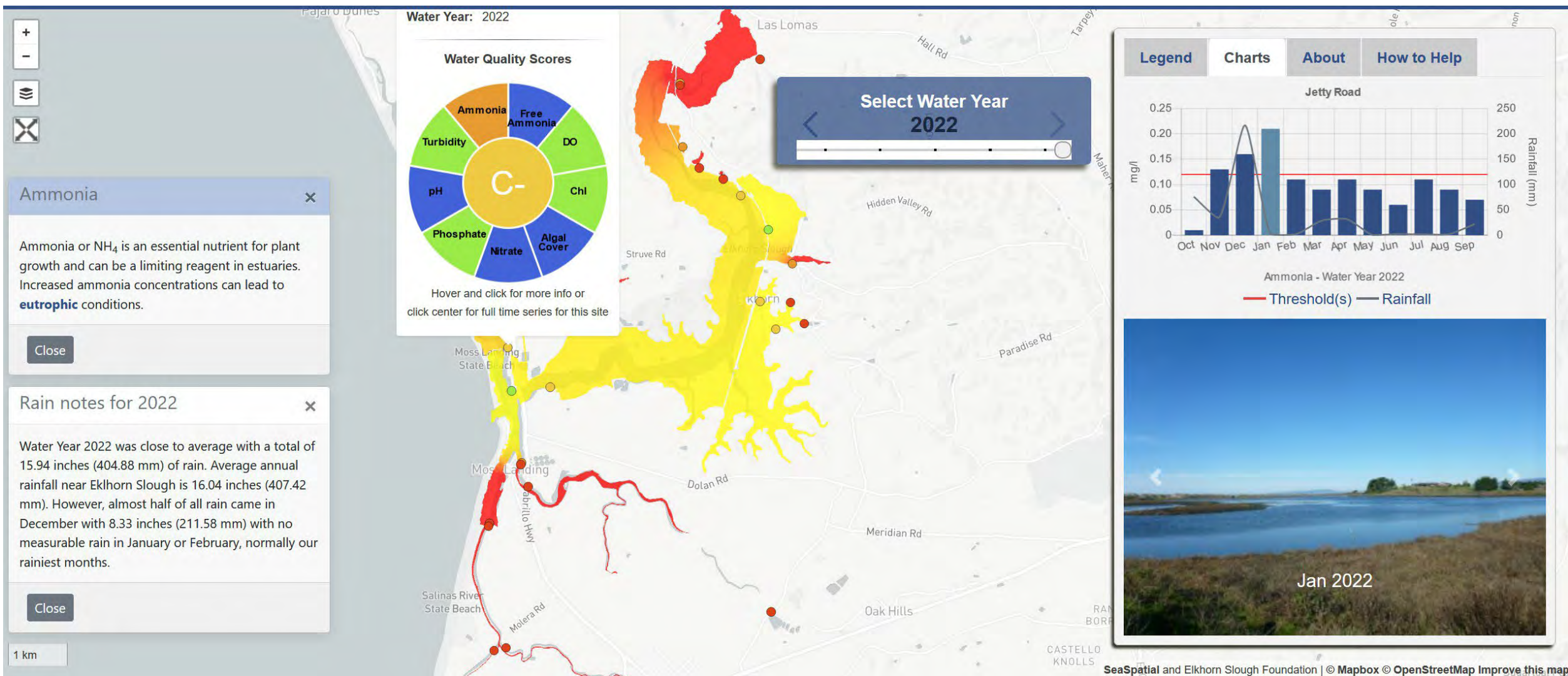
**Authenticated data** have been through final tertiary review at the CDMO and are posted as the final authoritative data. Authenticated data are indicated with a **value of 1 in the historical column** of exported data files, and with a **QAQC: A in a chart mouse-over**. A value of 0 in the historical column indicates that the data have not been through final QAQC by the CDMO, and could be either provisional or provisional plus data.

## QC Flags

Each parameter in the exported data file contains a flag column. The flag column, F\_param, contains a quality control (QC) flag and may contain additional QC codes. In a chart mouse-over, the QAQC flag and any codes are displayed behind the F\_param: designation. Refer to the list below for the available QC flags and their descriptions.

- 5 Outside high sensor range
- 4 Outside low sensor range
- 3 Data rejected due to QAQC
- 2 Missing data
- 1 Optional parameter not collected
- 0 Passed initial QAQC checks
- 1 Suspect data
- 2 Reserved for future use

# Widgets/data visualizations



# Widgets/data visualizations

## Monthly and annual summary of SWMP parameters

Created by Marcus W. Beck, [mbeck@tbep.org](mailto:mbeck@tbep.org) Todd O'Brien, [todd.obrien@noaa.gov](mailto:todd.obrien@noaa.gov)

This interactive widget provides graphical summaries of water quality, weather, and nutrient station data from the System Wide Monitoring Program of the National Estuarine Research Reserve System ([NERRS](#)). The drop down menus can be used to select the station, date range, and parameter for plotting. The raw data used for plotting include all SWMP records from the earliest date at each station after processing to remove QA/QC flags. The data include observations through December 2022 and are current as of May 23rd, 2023. Plots are based on daily averages for each parameter. Missing values can be filled using the long-term average across years for each month (select "monthly averages") or as a linear interpolation between missing values (select "linear interpolation"). The monthly average works well for long gaps, but may not be an accurate representation of long-term trends, i.e., real averages may differ early vs late in the time series if a trend exists. The linear interpolation option is preferred for small gaps. Cumulative precipitation data are based on the daily maximum. See the [GitHub repository](#) for source code.



# Widgets/data visualizations

## Aggregation of SWMP parameters within/between reserves

Created by Marcus W. Beck, [mbeck@tbep.org](mailto:mbeck@tbep.org) Todd O'Brien, [todd.obrien@noaa.gov](mailto:todd.obrien@noaa.gov)

This interactive widget can be used to compare time series of site data within and between reserves from the System Wide Monitoring Program of the National Estuarine Research Reserve System ([NERRS](#)). Data are based on monthly averages of raw observations through December 2022 and are current as of May 23rd, 2023. Two plots are shown for selected parameters and reserves that include time series of all sites at each location. The monthly averages are shown by default. Data can also be viewed as quarterly (every three months) or annual aggregations based on averages of the monthly summaries. Tabular data for each plot can be viewed on the tables tab and downloads of the plots and tables are available on the downloads tab. See the [GitHub repository](#) for source code or to post [issues](#) if problems occur.



# Potential Collaboration

- Collaboration ideas examples
  - Sediment transport estimate
  - Inundation calculator
  - Water Quality Index – report card
  - Current Calculator for local kayakers

