



WEB SERVICES • GIS • VISUALIZATION



OpenNRM.ORG
OPEN RESOURCE MANAGEMENT FOUNDATION

Open and Collaborative
Natural Resource Management



OpenNRM
ENTERPRISE

OpenNRM unites each module
for a powerful management and
collaboration tool:



Map Maker and Map Manager



Document Library



Project Collaborator



RSS Engine



Real Time Monitoring



Geo-Spatial and Science Application



Simulation Engine

...or combine as many modules as
you want for a custom application.

Collaborative
resource
management
workspace and
project management
application for data
collection, analysis,
reporting and
visualization

Collaborative
Science Projects

Regional
Monitoring

Ecosystem
Restoration

Estuary
Management



Data
Visualizaztion

Publication
Management

Species
Observation

Operations
Management

OPENNRM Workspaces are used to build data stories using Spatial Data, Observations Data, and Site Content at various scales.
(Site Level, Regional Level and System Wide)

A COLLABORATIVE EFFORT

BAYDELTALIVE.COM

CAESTUARIES.OPENNRM.ORG

MY WATER QUALITY PORTALS

SAN JOAQUIN WATER QUALITY

SAN JOAQUIN REAL TIME MANAGEMENT

DWR 1641 INTERACTIVE

SACRAMENTO RIVER WATERSHED



SAN JOAQUIN RIVER
Regional Water Quality Monitoring

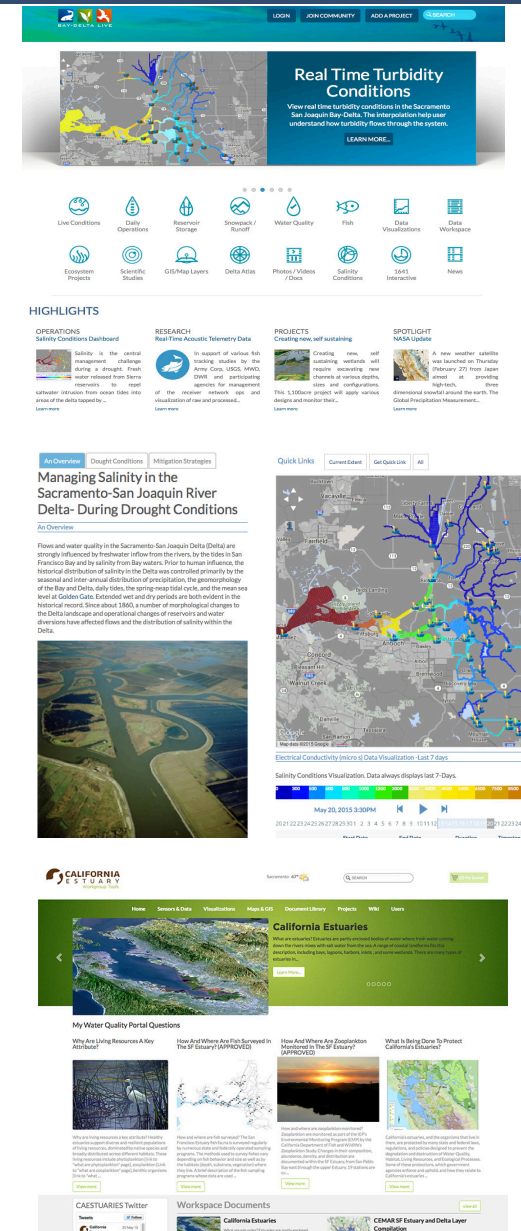


BUILDING ON EACH OTHER'S PROGRAMS

Each region's needs are different:

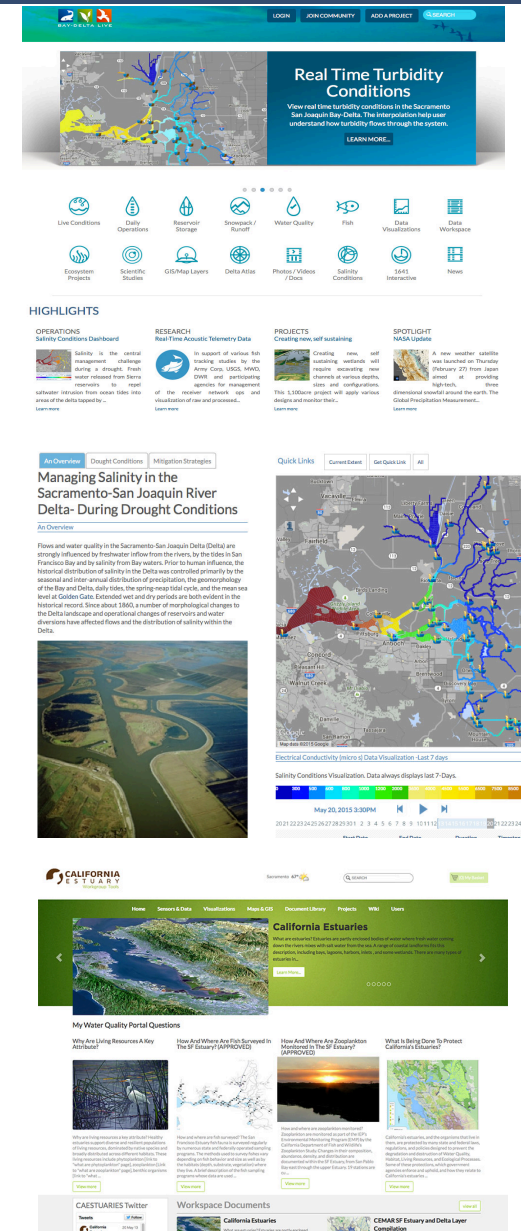
Various Stakeholder Requirements
Regional Data
Region Specific Data Analysis
Local Mapping and GIS
Regional Document Libraries
Stakeholder Specific Data Dashboards
Tool for Local Ecosystem Projects
Special Studies
Regulatory Reporting
Web Service Development

...Share data and products with other portal's for system wide view



BUILDING ON EACH OTHER'S PROGRAMS

- Benefit and learn from each other's regional monitoring programs and assessment efforts
- All investments are contributed back to the community: Content, GIS, data sets, mapping tools
- Data is managed at the regional level and shared with all stakeholders for larger watershed assessment and analysis



BENEFITS OF A COLLABORATIVE PROGRAM

- Benefit and learn from each other's regional monitoring programs and assessment efforts
- All investments are contributed back to the community: Content, GIS, data sets, mapping tools
- Data is managed at the regional level and shared with all stakeholders for larger watershed assessment and analysis
- Application updates

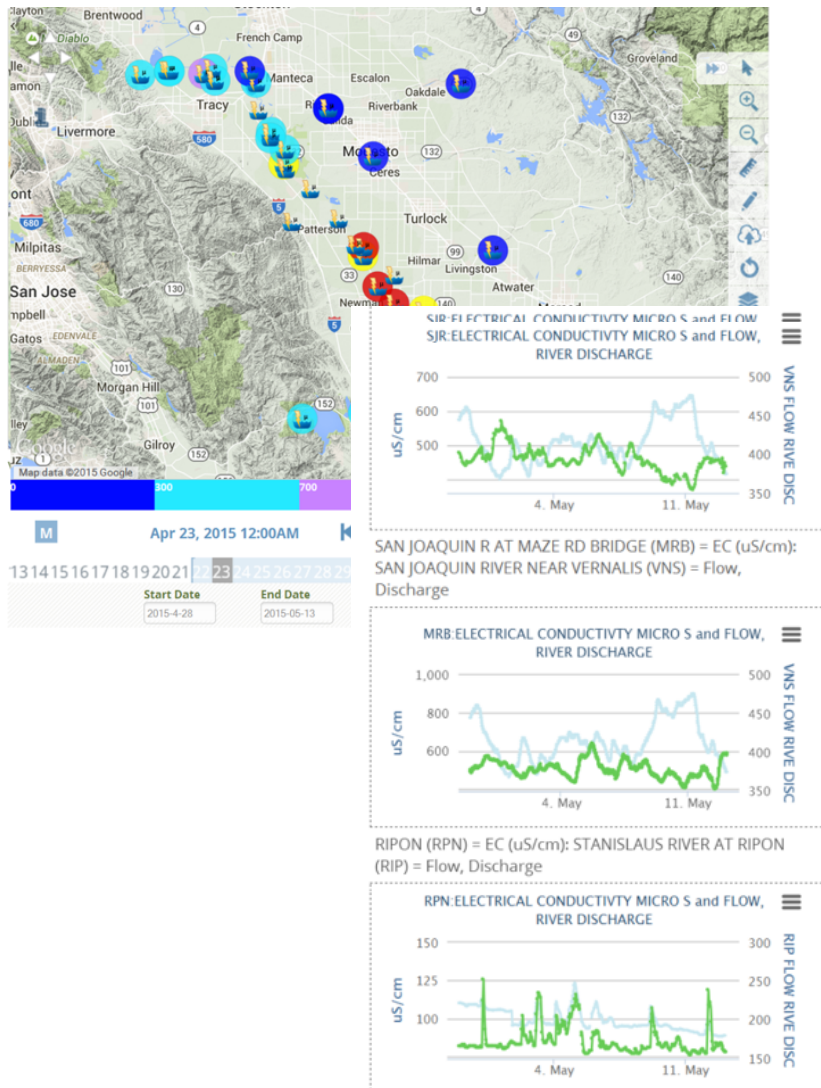


SJR REGIONAL MONITORING AND REAL TIME MANAGEMENT

- 50+ Datasets contributed for multi-stakeholder use and evaluation
- Real Time WQ Assessments for Temperature, Salinity, Nutrients, etc. available to the public
- Current phase SJR Real Time WQ Management
- View model results and data dashboards

The screenshot displays the homepage of the San Joaquin River Regional Water Quality Monitoring website. The header includes the organization's logo, name, and location (Stockton, 73°F), along with a search bar and a 'My Basket' icon. The main navigation bar features links for Home, Explore Data, Library, Explore the SJR, and Login. A large hero banner titled 'Does Water Temperature in the San Joaquin River and its Tributaries Support...' features an underwater image of salmon and a 'Learn More...' button. Below this, a section titled 'Water Quality Conditions in the San Joaquin River Basin' presents four articles with thumbnail images: 'Is Salt Affecting Beneficial Uses in the San Joaquin River Basin?', 'Does Water Temperature in the San Joaquin River and its Tributaries Support Chinook ...', 'Is it Safe to Swim in the San Joaquin River and its Tributaries', and 'Are excess nutrients a problem in the San Joaquin River?'. Each article includes a brief summary and a 'View more' link. The bottom section is divided into two columns: 'SJR WQ Twitter' on the left, showing recent tweets from @SJR WQ, and 'Management Activities' on the right, which includes a map of the river basin, a 'Management Activities' section with a description of the restoration program, a 'Regional Assessment: What we measure?' section, and a 'News' section with a link to 'About the San Joaquin River Basin'.

SAN JOAQUIN RMP COLLABORATORS



US Bureau of Reclamation

CURES

CV Salts

California Environmental Protection Agency

CA Department of Water Resources

State and Federal Water Contractors

CVRWQCB

AG Industry

Central Valley Irrigation Districts

Major Multi-Agency Effort

Regular Workgroup Meetings for Enhancements

Real Time Salinity Management

WARMF Model Online

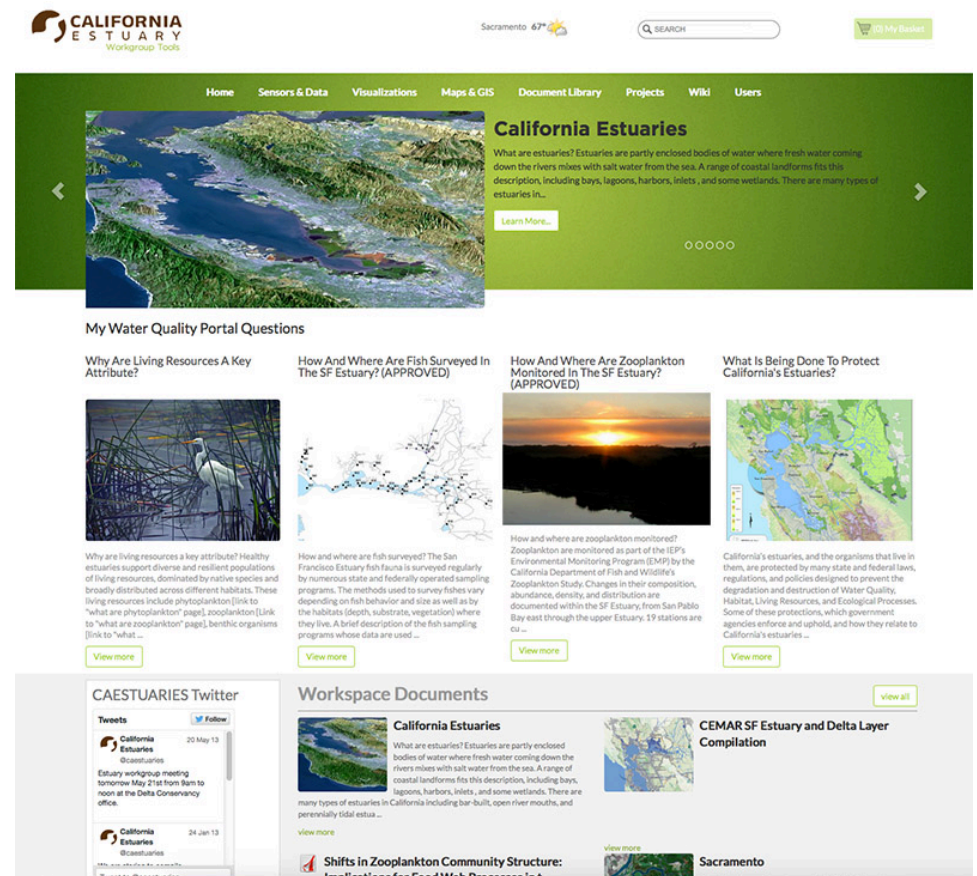
Question Driven

Stakeholder Specific Data Dashboards

Feed Libraries

CA ESTUARIES PORTAL

- Multi-Agency Workspace
- Source project for critical estuary data: EMP, Estuary GIS, 1641 and Trawl Data
- 50+ GIS files
- 85+ question driven WQ pages on mywaterquality.ca.gov
- Assessment
- TMDL Report Cards



CA ESTUARIES COLLABORATORS



US Bureau of Reclamation
US Department of Fish and Wildlife
NOAA
NMFS

US Geological Survey
CA Department of Water Resources
IEP

State and Federal Contractor
Water Education Foundation
SFEI
SWRCB
AG Industry

Major Multi-Agency Effort
Regular Workgroup Meetings for Enhancements
150+ Registered Agency Users
1000 + Images, Documents, Research Articles
Host for 85+ State Question Pages
50+ Downloadable Datasets
1641 Interactive
Home to All California Estuaries
Feed Libraries
Home to Trawl Data 2016

- Data central to the Delta
- Extensive libraries for Delta data, photos, reports
- Real time reporting dashboards: salinity, WQ
- Weekly survey results, fish tracking
- Relevant news
- Collaborator workspace
- Ecosystem projects
- Delta Community
- Post and view model results

The screenshot shows the BayDeltaLive.com website. At the top is a navigation bar with the Bay-Delta Live logo, a search bar, and buttons for LOGIN, JOIN COMMUNITY, and ADD A PROJECT. Below the navigation bar is a large banner for "Real Time Turbidity Conditions" featuring a map of the Sacramento-San Joaquin Bay-Delta and a text box explaining the interpolation tool. Underneath the banner is a grid of 18 icons representing various data categories: Live Conditions, Daily Operations, Reservoir Storage, Snowpack / Runoff, Water Quality, Fish, Data Visualizations, Data Workspace, Ecosystem Projects, Scientific Studies, GIS/Map Layers, Delta Atlas, Photos / Videos / Docs, Salinity Conditions, 1641 Interactive, and News. Below the grid is a "HIGHLIGHTS" section with four featured articles: "OPERATIONS Salinity Conditions Dashboard", "RESEARCH Real-Time Acoustic Telemetry Data", "PROJECTS Creating new, self sustaining", and "SPOTLIGHT NASA Update". At the bottom is a "WATER NEWS" section with five news items, each with a small image and a headline.

Real Time Turbidity Conditions
View real time turbidity conditions in the Sacramento San Joaquin Bay-Delta. The interpolation help user understand how turbidity flows through the system.
[LEARN MORE...](#)

HIGHLIGHTS

- OPERATIONS**
Salinity Conditions Dashboard
Salinity is the central management challenge during a drought. Fresh water released from Sierra reservoirs to repel saltwater intrusion from ocean tides into areas of the delta tapped by ...
[Learn more](#)
- RESEARCH**
Real-Time Acoustic Telemetry Data
In support of various fish tracking studies by the Army Corp, USCS, MWD, DWR and participating agencies for management of the receiver network ops and visualization of raw and processed...
[Learn more](#)
- PROJECTS**
Creating new, self sustaining
This 1,100acre project will apply various designs and monitor their...
[Learn more](#)
- SPOTLIGHT**
NASA Update
A new weather satellite was launched on Thursday (February 27) from Japan aimed at providing high-tech, three dimensional snowfall around the earth. The Global Precipitation Measurement...
[Learn more](#)

WATER NEWS

- Monday's Top of the Scroll: California water cut...
- New state rule could impact how Marin would build...
- Northern California water-bottling plant's crisis...
- Sacramento wants to grow; will drought say no?
- Walnut Creek faces competing mandates: OKs afford...

BDL WORKGROUP COLLABORATORS



*Directing
development and
new data
investments*

US Bureau of Reclamation
NOAA
NMFS
US Geological Survey
CA Department of Water Resources
Metropolitan Water District
State and Federal Contractor
US Fish and Wildlife
SWRCB
AG Industry

25,000 Unique Visits (Annual)
400+ Registered Users
1500 + Images, Documents, Research Articles
100+ Ecosystem Projects
250+ Downloadable Datasets
Feed Libraries



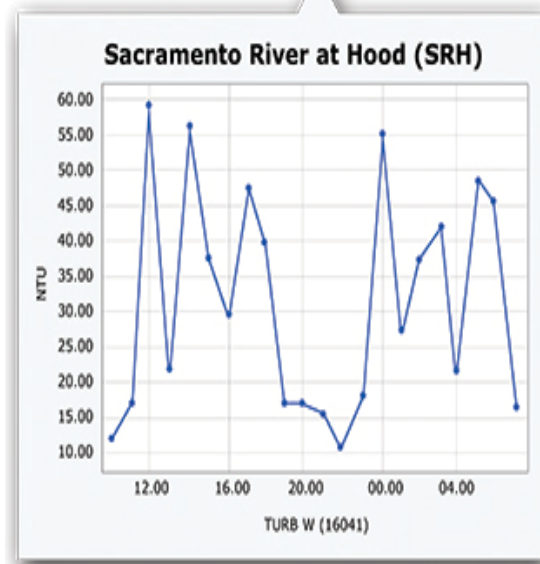
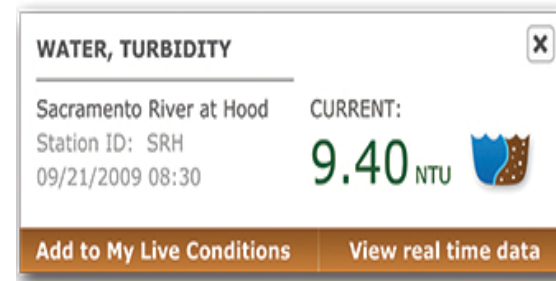
SWRP KEY FEATURES AND TOOLS

- Data Management Tools
 - Interactive GIS
 - Access to 120+ GIS Layers
 - Document Management (400+ Records)
 - Projects Management
 - Data Dashboards
 - Regulatory Reporting Templates
 - Question Templates
 - Data Story Templates
 - Real Time Management Tools
-



EXPLORE DATA & CATALOG

- California Data Exchange Center (CDEC)
- National Water Information System (NWIS)
- National Oceanic & Atmospheric Agency (NOAA)
- California Irrigation Management System (CIMIS)
- California Environmental Data Exchange Network (CEDEN)
- SWRP Data Catalog
- ...See Data Spreadsheet



Data Sets

Layers

Tools

Search Tools

Data Source

USGS (National Water Information S)

EXPLORE!

Start Date

2015-06-08

End Date

2015-06-15

Duration

7 Days

By Region

Current Map Extent

Sensor

Depth to water level, feet below land

Difference between observed and predicted

Direction of stream flow, magnetic azimuth

Discharge duration, minutes

Discharge velocity, meters per second

Discharge, cubic feet per day

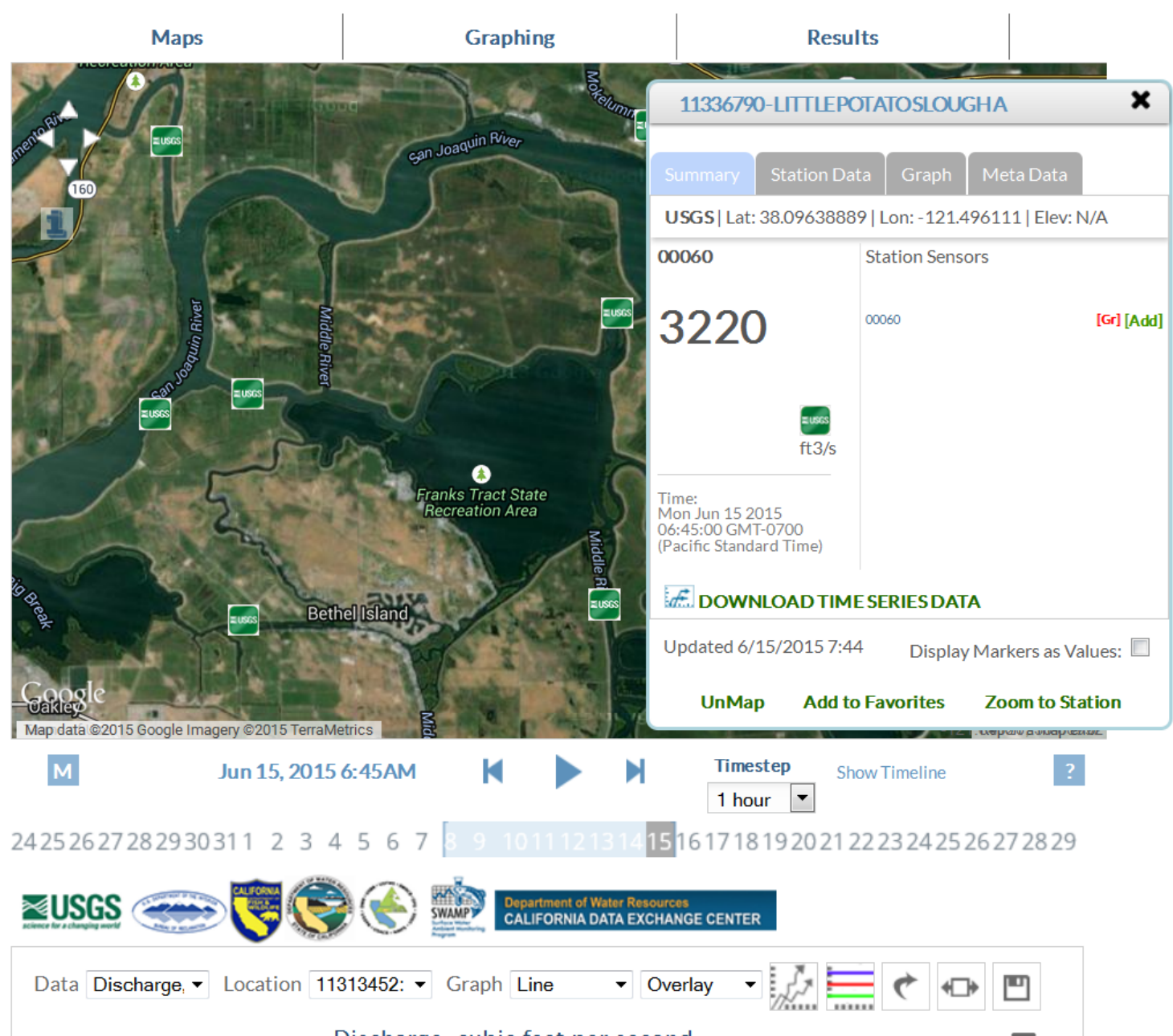
Discharge, cubic feet per second

Discharge, cubic meters per second

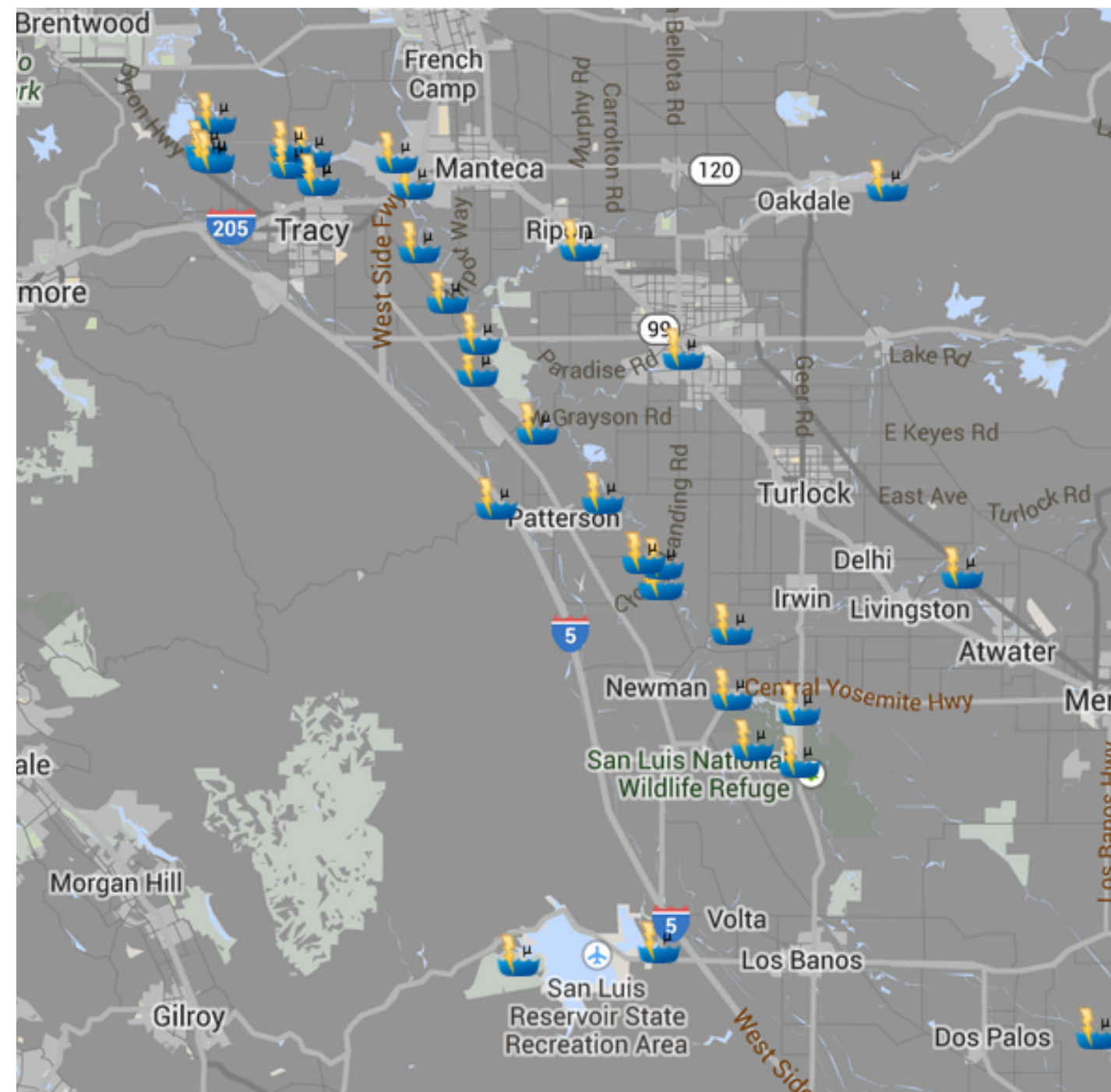
Discharge, cubic meters per second

Discharge, gallons per minute

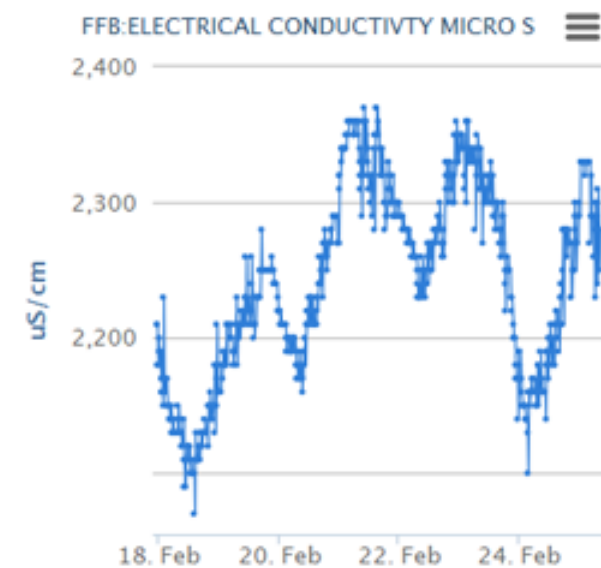
Discharge, instantaneous, cubic feet per second



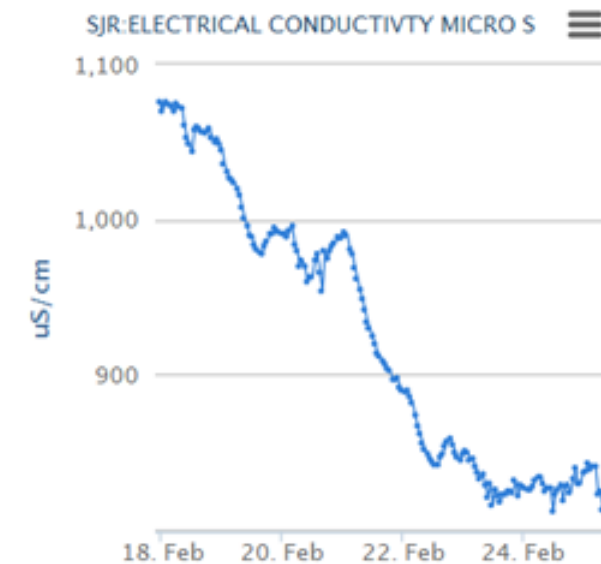
SENSOR NETWORKS



SAN JOAQUIN R AT FREMONT FORD BRID (FFB)

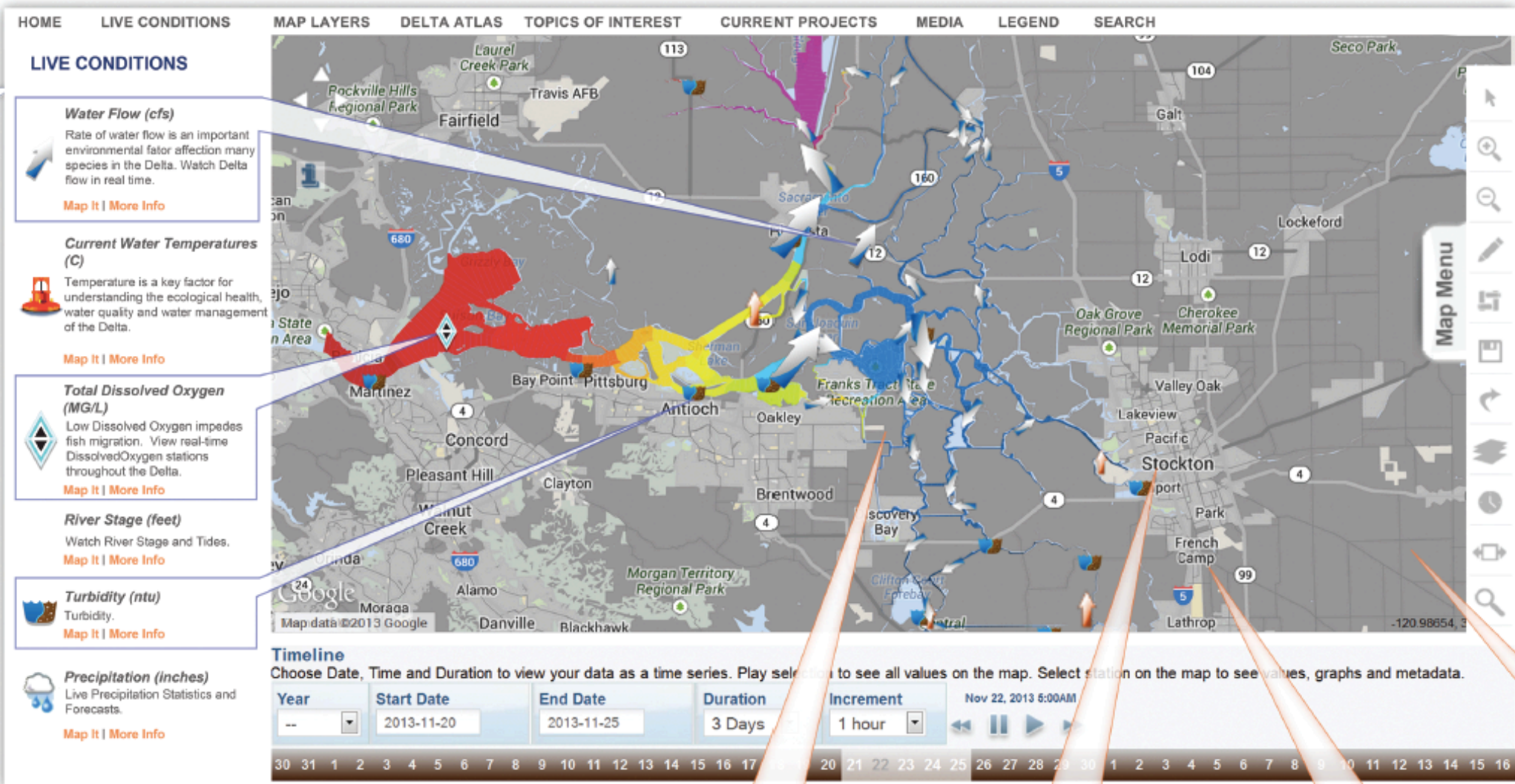


SAN JOAQUIN R MCCUNE STATION NR VE (SJR)



Ave 14 Madera -121

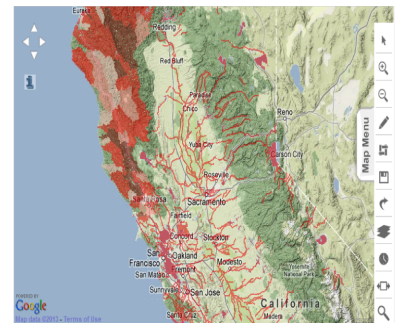
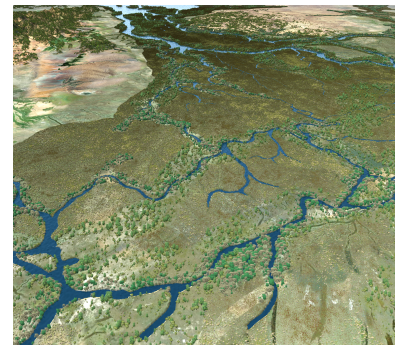
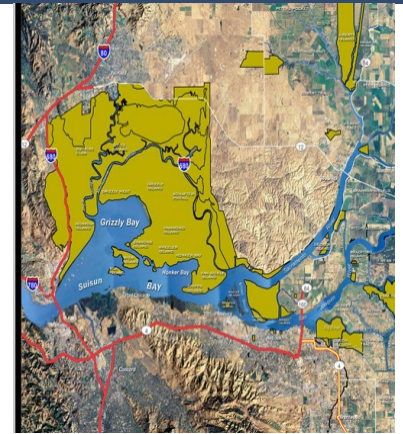
SENSOR NETWORKS



MULTI PARAMETER VISUALIZATIONS

MAPPING AND GIS

- Explore and analyze 120+ GIS
- Species
- Water Bodies
- Infrastructure
- Land Designation
- Transportation & Infrastructure
- Geopolitical
- Projects
- Live Conditions



[Explore Data](#)[Operations](#)[Projects](#)[Maps & GIS](#)[Photos, Videos, Docs](#)[Data Catalog](#)[Community](#)

DAVE OSTI



(0) MY BASKET

[JOIN COMMUNITY](#)[MY PROJECTS](#)[SEARCH](#)[New](#)[Maps](#)[View Layers](#)[Delta Atlas](#)[Add New](#)

Map Layers (Refresh Legend)

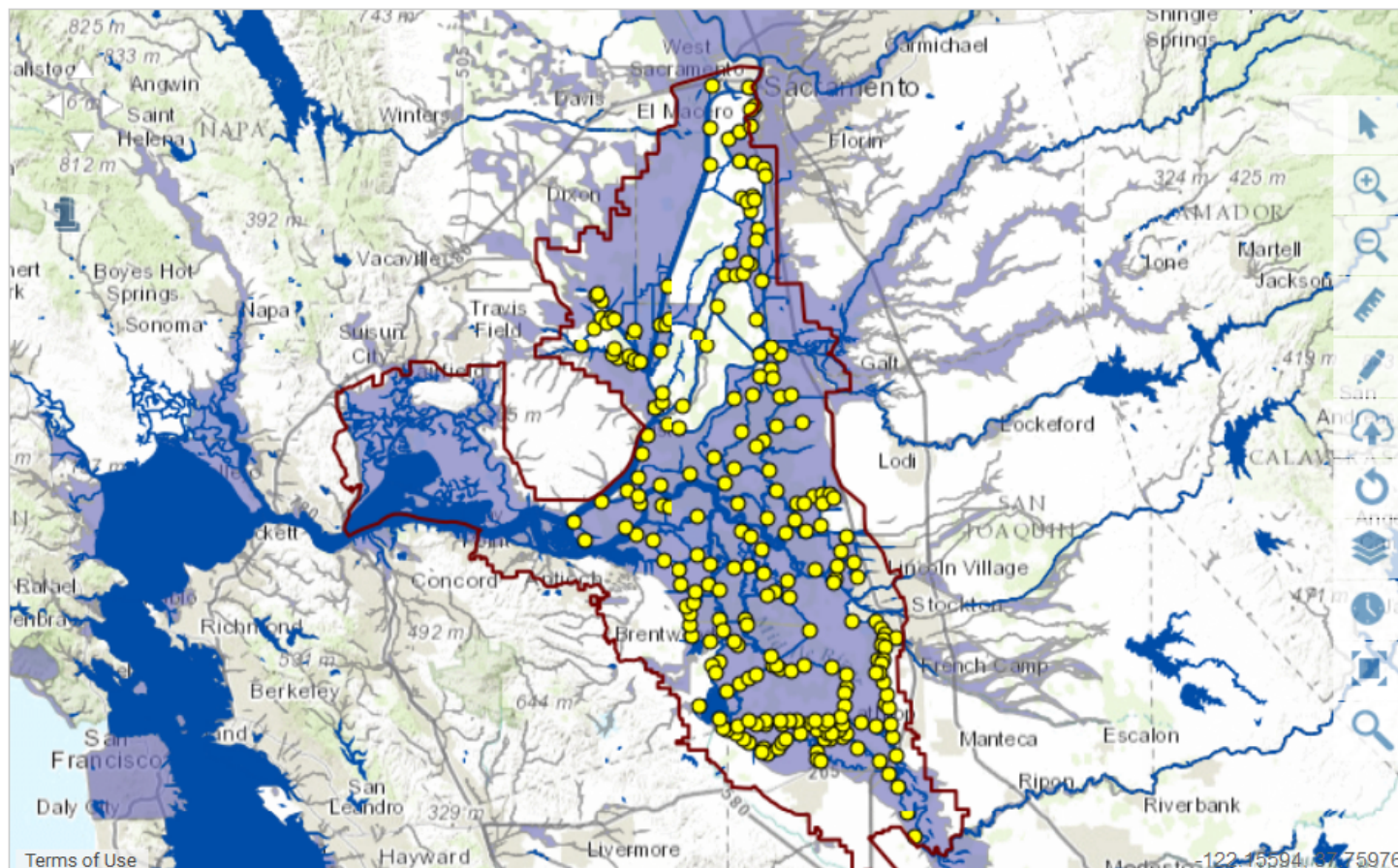
[All Layers](#)[Active](#)

Legal Delta and Suisun Boundary

[Manage](#)[Query](#)

<< 0.5 >> Opacity Order

- Metadata Zoom to Extent
- Layer URL Layer Properties
- Remove Layer

[+ Ag Drain Returns](#)[+ Rivers & Bodies of Water \(Polygon\)](#)[+ FEMA Flood Data](#)[M](#)

Jun 15, 2015 6:30AM

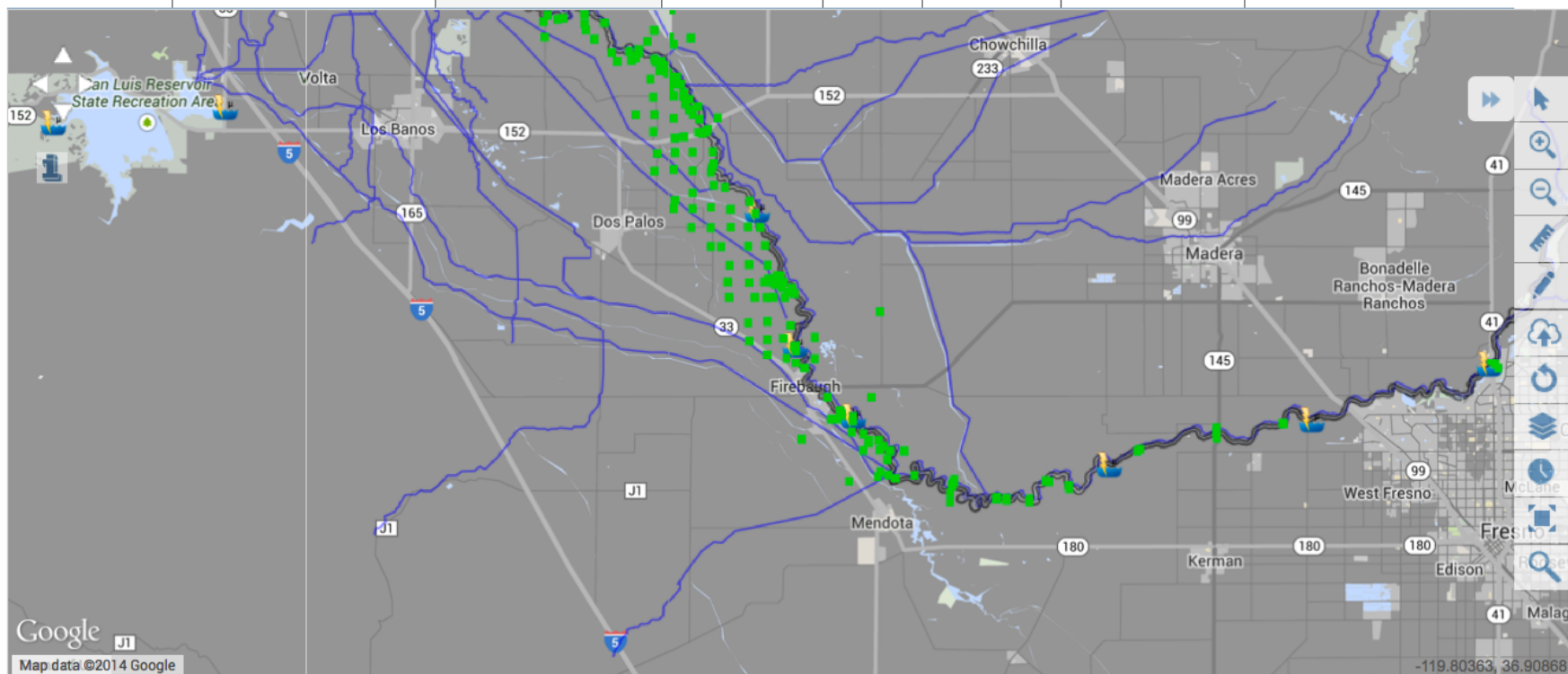


Timestep

4:00:00

[Show Timeline](#)

Maps



Data Sets

Layers

Tools

Map Layers (Refresh Legend)

All Layers

Active

- ☒ SJR_Groundwater_Monitoring_Sites
- ☒ CDEC Stations
- ☒ SJR_NHD_WM_Poly1
- ☒ SJ_WARMF_Rivers_012513_Web
- ☒ San Joaquin River
- ☒ SJR Canals
- ☒ Mist Styled

Maps

Graphing

Results

Data ELECTRICA

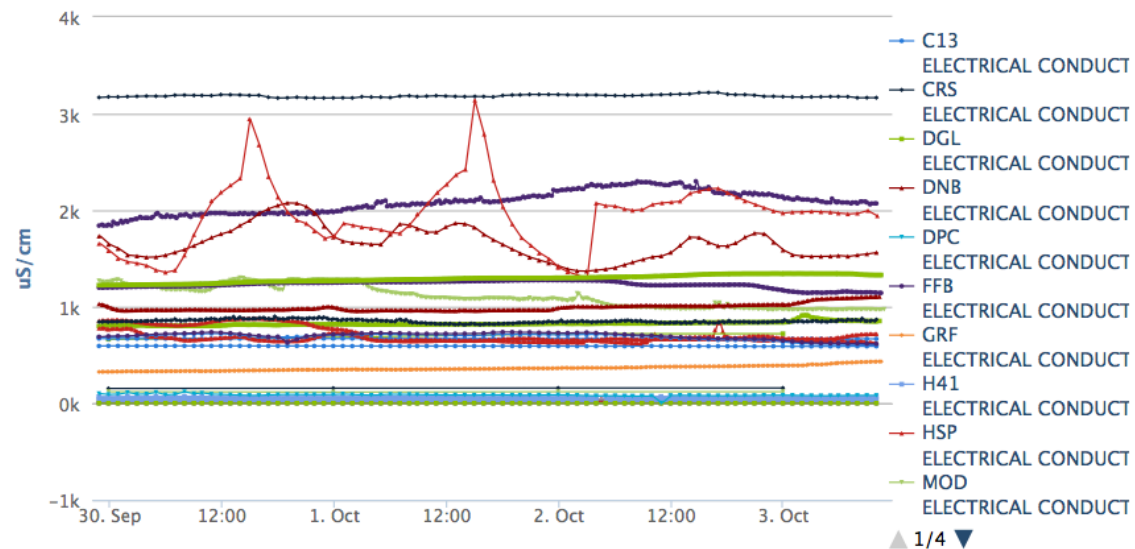
Location all

Graph Line

Overlay



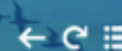
ELECTRICAL CONDUCTIVITY MICRO S



1/4

DOCUMENT MANAGEMENT

- Access to 394 SWIM Records
 - Geo-locate for Data Synthesis
 - Customizable Metadata
 - Add Images, Videos, Reports, Data
 - Easy portability for Use in Site
 - Support for Dashboards
 - Keep Private or Make Public
 - HTML Templates for Supporting Descriptions and Documentation
-

[Explore Data](#)[Operations](#)[Projects](#)[Maps & GIS](#)[Photos, Videos, Docs](#)[Data Catalog](#)[Community](#)[BDL ADMIN](#)[\(0\) MY BASKET](#)[JOIN COMMUNITY](#)[MY PROJECTS](#)[SEARCH](#)

Understanding Juvenile Salmon Entrainment and Survival in the South Sacramento/San Joaquin Delta Through the Use of Acoustic Telemetry and Hydrodynamic Measurements

[TOOLS](#)[RECENT ACTIVITY](#)[ARTICLE](#)[DOCUMENTS](#)[IMAGES/VIDEO](#)[FISH TRACKING DASHBOARD](#)

DESCRIPTION

[SHARE](#)[INVITE](#)

(16 members, 0 Following)

DESCRIPTION

The intent of the web application is to support USFWS, USBR, Army Corp, USGS, MWD, DWR and participating agencies with the management of the receiver network ops and visualization of raw and processed data from the receivers in order to support the goal of rigorous statistical management-decision telemetry data. The resulting web component will customize existing OpenNRM software components and reside on baydeltalive.com for management and public consumption of information. 34 North will also develop a receiver management dashboard for regular monitoring and maintenance of receiver instrumentation. The web based application features will provide decision support for the following: 1. Graphical representation of fish behavior in reaches. 2. Fish Tracks 3. Operations dashboard for viewing and understanding study results. 4. Support management decisions with relevant and rigor statistical data. 5. Begin phase 1 implementation of basic survival model for statistical analysis. 6. Ability to view and analyze antecedent and real time study conditions. 7. Present an operation dashboard to better understand entrainment probabilities. 8. Present an operation dashboard for instrumentation/receiver management.

COMMENTS

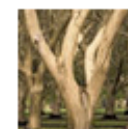
[Add comment +](#)

RECENT UPDATES

BDL ADMIN

Current project participants: Josh Israel, Barbara Byrne, Arnold Amman, Maria Rea, Jeff McLain, Sean Hayes, Ryan Reeves, Jacob McQuirk

[Apr 03, 2015 11:07 AM](#)

BDL ADMIN

Fish Tracking Dashboard is now available. Use the Dashboard tab above to for a quick link you can use the gear icon in the header. Link is called USBR Fish Tracking.

[Apr 03, 2015 11:04 AM](#)

[+MORE](#)

NEW UPLOADS



FISH RECEIVER DATA: DAILY SUM, 30 MIN. FILTER: 14 DAY DURATION TEMP/FLOW

[JUN 14, 2015](#)



USBR Fish Tracking Receiver Station Map

[Explore Data](#)
[Operations](#)
[Projects](#)
[Maps & GIS](#)
[Photos, Videos, Docs](#)
[Data Catalog](#)
[Community](#)

[BDL ADMIN](#)
{0} MY BASKET

[JOIN COMMUNITY](#)
[MY PROJECTS](#)

Understanding Juvenile Salmon Entrainment and Survival in the South Sacramento/San Joaquin Delta Through the Use of Acoustic Telemetry and Hydrodynamic Measurements

[TOOLS](#)
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[ARTICLE](#)
[DOCUMENTS](#)
[IMAGES/VIDEO](#)
[FISH TRACKING DASHBOARD](#)

[EDIT ARTICLE](#)

TELEMETRY STUDY BACKGROUND

The Sacramento-San Joaquin Delta (delta) is the hub of the California's water delivery system. Surface water supplies are in the north, demand in the south. Thus, water supply reliability in California critically depends on the amount of water that can be transferred from the north to the southern part of the state through the delta. For the past four decades, environmental regulations designed to protect endangered species, including salmon, and downstream estuarine habitats have constrained water supplies south of the delta.

The central conservation objective for salmon, the subject of this proposal, is to improve outmigrant survival through the delta. Salmon emigrate through the delta from three watersheds: (1) The Sacramento, (2) the San Joaquin and (3) the Mokelumne River systems. The outmigrants from each of these regions are in jeopardy and thus each controls water project operations to varying degrees by location, time of year and water year type. The major exporters of water from the delta – the US Bureau of Reclamation (USBR), California Department of Water Resources (DWR), and East Bay Municipal Water District (EBMUD) – are required, as a condition of their permits to remove water from the delta and various biological opinions, to conduct salmon outmigration studies to quantify the impacts of their operations and to develop management strategies that mitigate those impacts.

San Joaquin River outmigrants, the focus of this study, have a particularly challenging migratory pathway involving channels in the delta that are functionally canals and they must traverse a series of junctions whose channels lead directly to the export facilities. Salmonids in the San Joaquin River basin were once abundant and widely distributed, but currently face numerous limiting factors. The National Marine Fisheries Service (NMFS) Public Draft Central Valley Recovery Plan identified 'Very High' stressors for juvenile steelhead outmigration on the San Joaquin River including habitat availability, changes in hydrology, water temperature, reverse flow conditions, contaminants, habitat degradation, and entrainment. Many of these stressors can be studied using acoustic telemetry. For example, recent advances in acoustic technology have allowed investigators to evaluate the influence of behavior, species interactions, and physiology on reach-specific survival of salmonids in the Sacramento-San Joaquin river basins (Perry et al. 2010, Vogel et al. 2010).

This study will use the release-recapture information derived from the 2012 receiver array to populate a mark-recapture model based on a Cormack-Jolly-Seber model in combination with a route-specific survival model of Skalski et al. (2002) to derive maximum likelihood estimates and standard errors of reach specific survival and entrainment rates at important junctions, similar to what was used in the 2011 steelhead survival study and 2010 VAMP study (SJRG 2011).

In addition to the purely scientific objectives, we are experimenting with a variety of new field techniques and technologies. The overall goal of these hardware specific investigations is to expand the acoustic telemetry network in 2012, which is mostly focused on the South Delta, and is mostly autonomous, and will be deployed for a short duration (2 months), to a network that covers the entire delta, is run year-round and the data is telemetered in real-time. The implementation of past studies and our proposed 2012 study plan is incredibly man-power intensive, and, thus unduly expensive. The goal of the equipment development aspect of this investigation is develop the technologies that will allow us to reduce the manpower associated with these experiments by telemetering all of the acoustic receiver data from a delta-wide network in real-time. Telemetry of the data will save on manpower, increase the data return rate and quality of the data and will, most importantly, allow us to use acoustic telemetry data as a real-time management tool. Moreover, year-round, delta-wide operations will allow for the study of predators and other large fish, such as sturgeon, etc. with large tags that last multiple years. Finally, a delta-wide network will allow us to study all of the outmigrant groups – San Joaquin, Sacramento and Mokelumne river fish.

Understanding Juvenile Salmon Entrainment and Survival in the South Sacramento/San Joaquin Delta Through the Use of Acoustic Telemetry and Hydrodynamic Measurements

TOOLS

RECENT ACTIVITY

ARTICLE

DOCUMENTS

IMAGES/VIDEO

FISH TRACKING DASHBOARD

CHINOOK SALMON



DOWNLOAD

SHARE

Caption

Chinook salmon (*Oncorhynchus tshawytscha*)

Description

Chinook Salmon

Subtype

Image

Keywords

species

Added By: BDL Admin

Last Edited : Aug 06, 2011 04:26 PM

Public Syndicated



CHINOOK SALMON

Author: **Description:** Chinook Salmon

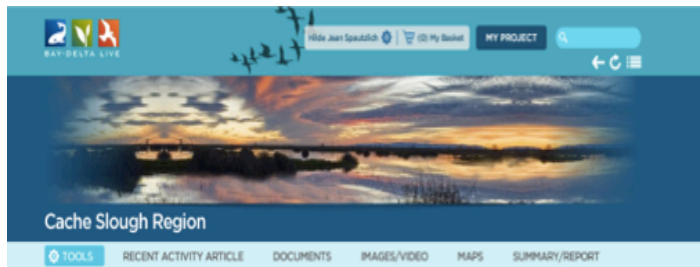
Select a picture here:





PROJECTS

- Customizable Metadata
 - Add Images, Videos, Reports, Data, Interactive maps
 - Community Features: Comments, Groups, Follow
 - Project Data Dashboards
 - Invite Members
 - Keep private or make public
 - Work in the Field: Sync with Mobile App
 - HTML Templates for project presentation
-



Cache Slough Region

TOOLS RECENT ACTIVITY ARTICLE DOCUMENTS IMAGES/VIDEO MAPS SUMMARY/REPORT

PROJECT DATA

DESCRIPTION

(7 members, 0 Following) Share Invite

Creating new, self-sustaining wetlands will require excavating new channels at various depths, sizes and configurations. This 1000-acre project will apply various designs and monitor their effectiveness in relation to tidal and storm pulses and the establishment of plants in the created wetlands. Ecologically, the goal is to provide important new sources of food and shelter for a variety of native fish species at the appropriate scale in strategic locations. Locally, the goal is a process with stakeholder input and ensuring continued or enhanced flood protection.

MORE INFO URL: <http://www.baydeltaalive.com/site/loweryolo>

CONTACT

The Lower Yolo Restoration Project is a cooperative effort with water districts receiving supplies via the Delta's State Water Project (SWP), Central Valley Project (CVP) and the Department of Water Resources (DWR). The WWD owns a portion of the project site. Additional financial support is provided by the State and Federal Contractors Water Agency (SFCWA) a joint powers authority representing members of the SWP and CVP. This agency will be the lead in developing the restoration project.

RECENT UPDATES

BDL Admin



Jun 20, 2015 10:04 AM

BDL Admin



Jun 20, 2015 10:04 AM

BDL Admin



Jun 20, 2015 10:04 AM

BDL Admin



Jun 20, 2015 10:04 AM

NEW UPLOADS

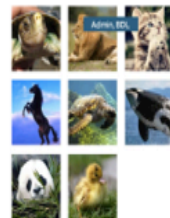
Salinity Conditions
MAR 13, 2014
↓ DOWNLOAD

Electrical Conductivity
Real Time Visualization
MAR 13, 2014
↓ DOWNLOAD

Public Water Agencies
Flow Workshop
MAR 13, 2014
↓ DOWNLOAD

Restored Ecosystem
Function
MAR 13, 2014
↓ DOWNLOAD

MEMBERS AND FOLLOWERS



COMMENTS

Add Comment +

Add your comments here

- Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown Lorem Ipsum simply dummy text of the printing and typesetting
Apr 01, 2014 10:03 PM
- Industry Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown Lorem Ipsum simply dummy text of the printing and typesetting
Apr 01, 2014 10:03 PM
- The printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown Lorem Ipsum simply dummy text
Apr 01, 2014 10:03 PM

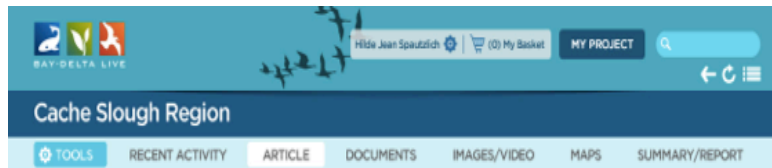
About Us

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularized in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like



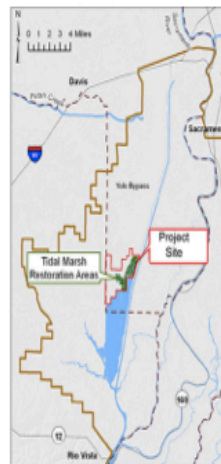
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Cache Slough Region

TOOLS RECENT ACTIVITY ARTICLE DOCUMENTS IMAGES/VIDEO MAPS SUMMARY/REPORT



LOWER YOLO RESTORATION PROJECT

Edit Article

The Lower Yolo Restoration Project represents an ideal location to restore tidal wetlands in the Sacramento-San Joaquin Delta. The project is an early action consistent with the Bay Delta Conservation Plan and will meet a portion of the state and federal requirement to restore 8,000 acres of wetland habitat in the Delta.

GOAL: DIVERSE HABITAT

Creating new, self-sustaining wetlands will require excavating new channels at various depths, sizes and configurations. This 1000-acre project will apply various designs and monitor their effectiveness in relation to tidal and storm pulses and the establishment of plants in the created wetlands. Ecologically, the goal is to provide important new sources of food and shelter for a variety of native fish species at the appropriate scale in strategic locations. Locally, the goal is a process with stakeholder input and ensuring continued or enhanced flood protection.

PROJECT SITE: YOLO RANCH

The project site includes the Yolo Ranch, also known as McCormack Ranch, which was purchased in 2007 by the Westlands Water District (WWD). The 3,400-acre ranch has historically been used for cattle grazing.

SMELT: A SPECIAL NEED

The two-inch delta smelt are an endangered species that live year-round in the estuary. A resident population has taken hold in the adjacent Liberty Island region, making the project site an ideal place to expand habitat as part of a broader smelt restoration strategy.

NEEDED: A MORE NATURAL TIDAL LANDSCAPE

The Bay Delta region, prior to levees, was a vast area of tidal marshland spanning about 700 square miles. The construction of more than 1,100 miles of levees has eliminated an estimated 95 percent of the region's original wetlands. Restoring wetlands in strategic locations, to provide important new sources of food and shelter for a variety of fish species, is part of a comprehensive approach to reversing the ecological decline of the Delta. The Lower Yolo wetlands restoration project is part of an adaptive management approach in the Delta to learn the relative benefits of different fish habitats, quantify the production and transport of food and understand how fish species take advantage of new habitat.

BAY DELTA CONSERVATION PLAN

The Bay Delta Conservation Plan (BDCP) is an effort by state and federal agencies, water districts, non-profit organizations and other stakeholder groups to promote the recovery of Delta fish species in ways that protect and restore water supplies consistent with endangered species laws. A draft plan is scheduled for release in late 2010. While BDOP is envisioned to be a 50-year plan of water system and ecosystem improvements, it is already taking into account existing mandates by state and federal wildlife agencies to restore 8,000 acres of tidal wetlands in order to maintain the operations of Delta water projects. BDOP has identified as a priority to maximize restoration on existing public lands including the Lower Yolo Restoration Project.

PROJECT PARTICIPANTS

The Lower Yolo Restoration Project is a cooperative effort with water districts receiving supplies via the Delta's State Water Project (SWP), Central Valley Project (CVP) and the Department of Water Resources (DWR). The WWD owns a portion of the project site. Additional financial support is provided by the State and Federal Contractors Water Agency (SFCWA) a joint powers authority representing members of the SWP and CVP. This agency will be the lead in developing the restoration project.

Edit Article

About Us

Lorem Ipsum is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also

PROJECTS

Understanding Juvenile Salmon Entrainment and Survival in the South Sacramento/San Joaquin Delta Through the Use of Acoustic Telemetry and Hydrodynamic Measurements

TOOLS

RECENT ACTIVITY

ARTICLE

DOCUMENTS

IMAGES/VIDEO

FISH TRACKING DASHBOARD

USFWS/USBR/USGS/DWR ACOUSTIC TELEMETRY STUDY

(This study is an interdisciplinary, interagency endeavor involving USBR, California Water Resources (DWR), US Fish and Wildlife Service (FWS) and the USGS. USBR is providing funding, the linkage to regulatory requirements, assistance on study design and coordination. DWR is adding receivers to the overall network and the FWS is participating in the fish handling and tagging efforts.)

Quick Links

All Stations

Release Site

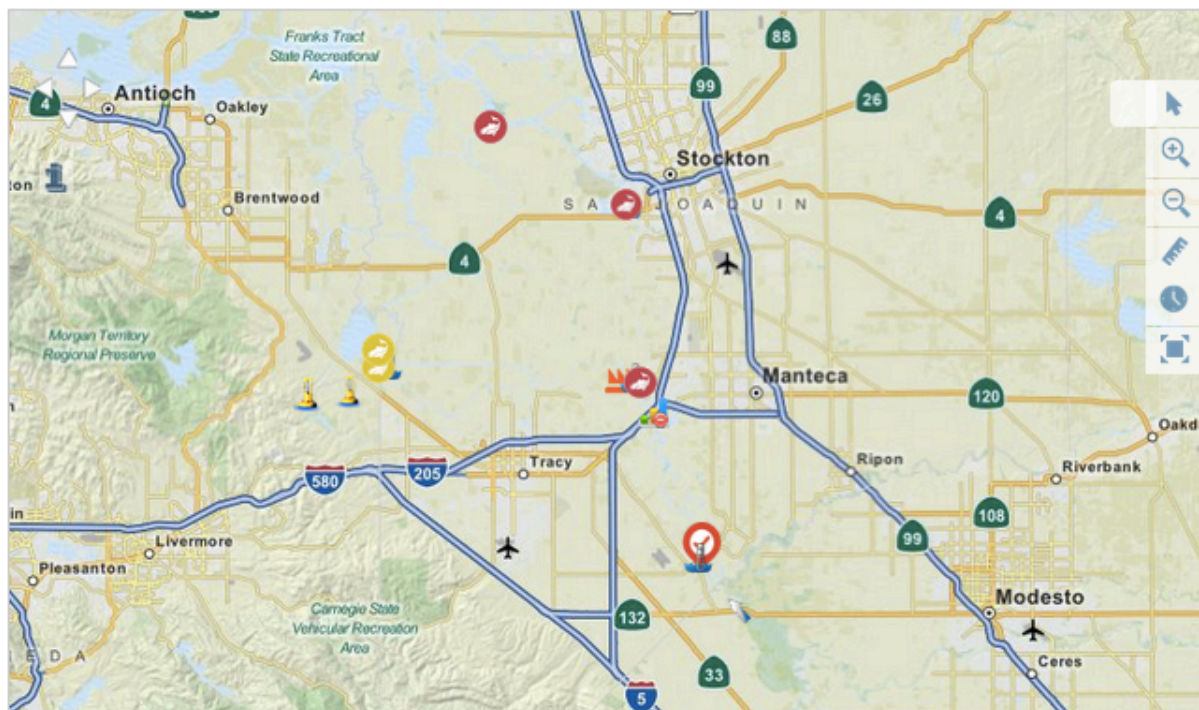
Head of Old River

Garwood Bridge

Turner Cut

Facilities

Current Extent

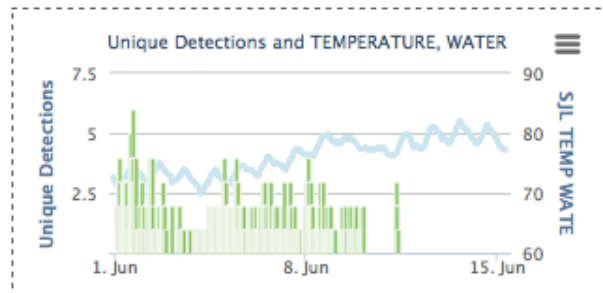


FISH RECEIVER DATA: 30 MIN. FILTER: 14 DAY DURATION TEMP/FLOW

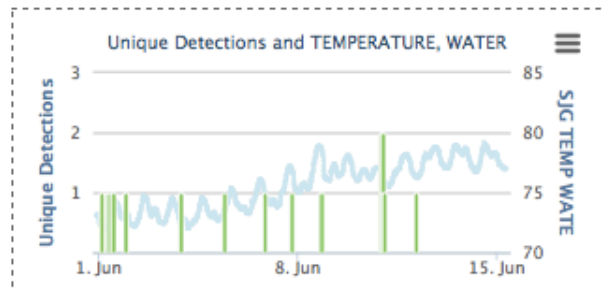
Roll over each icon on the map to see time series data and station description. Click on the Quick Links for area detail. Scroll down to build your own graphs with the aggregated data.

Tag Detection Data/Current Conditions

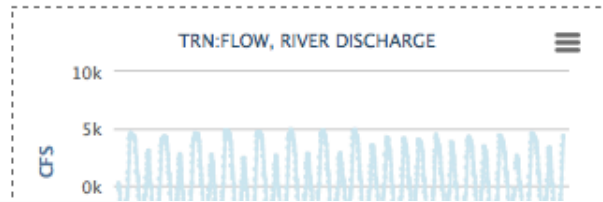
HORU - 14.5 Miles from Release Point



SJGU - 26.5 Miles from Release Point



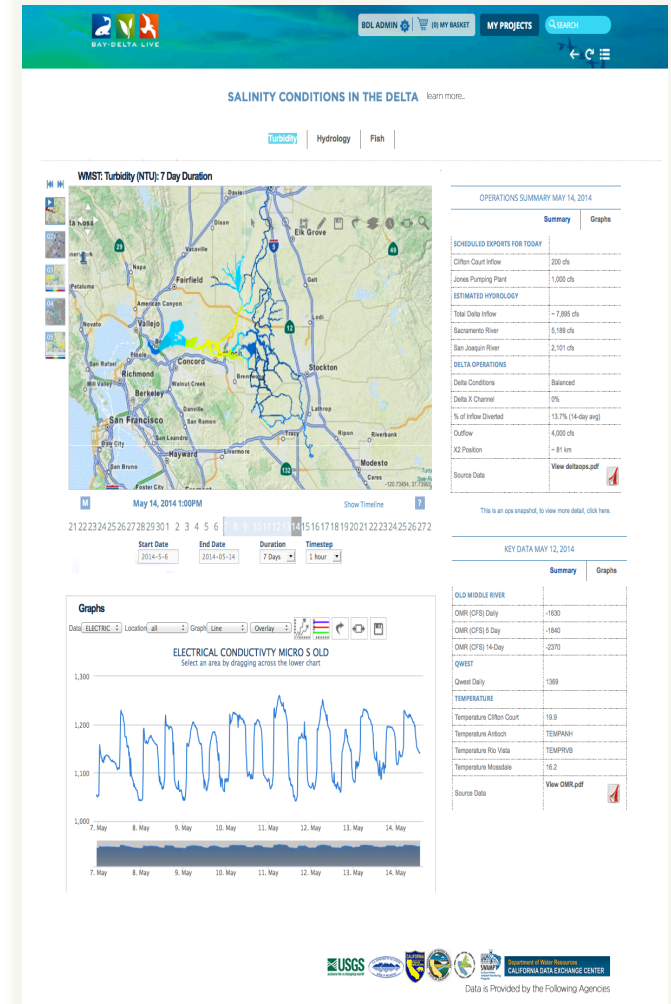
TCW - 36.4 Miles from Release Point



DATA DASHBOARDS

ONE VIEW DATA (Visualize, Map, Graph)

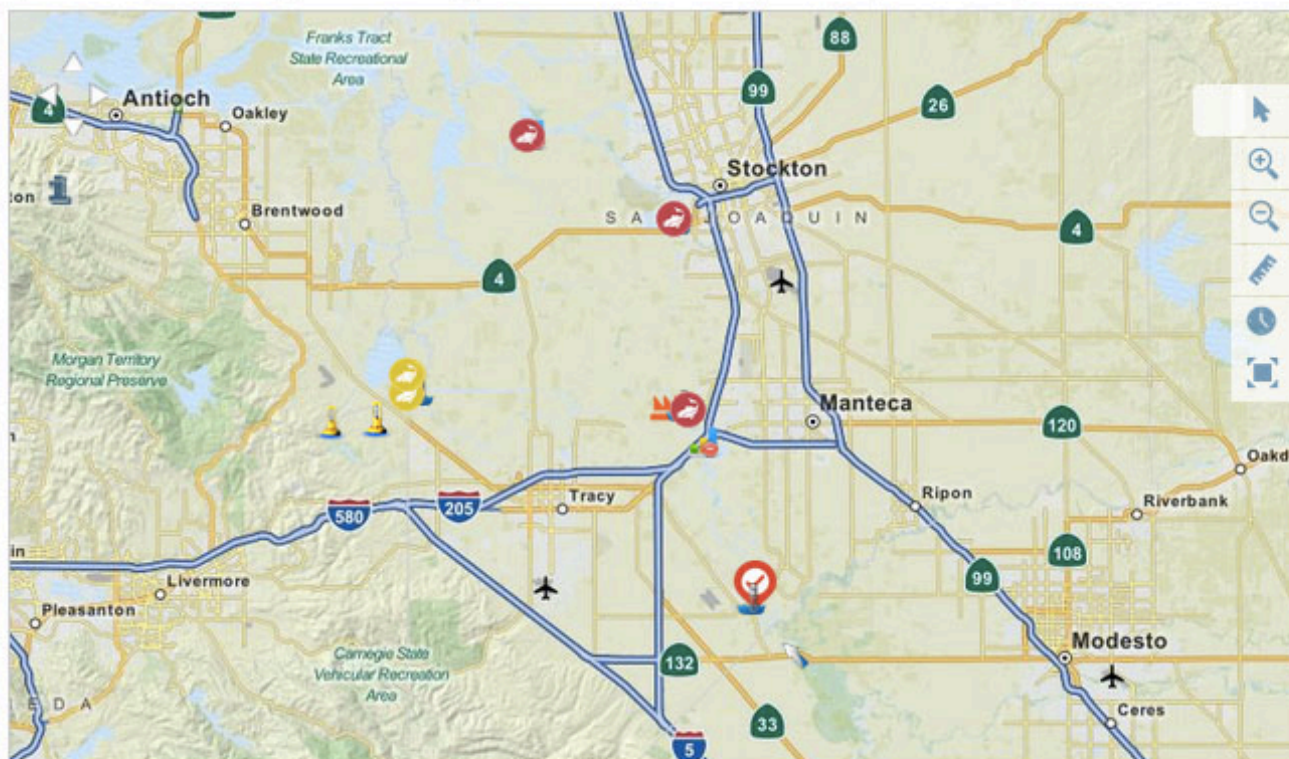
Custom view of data
compilations
Project management
dashboards



USBR/USGS FISH RELEASE 2015

Quick Links

[All Stations](#)
[Release Site](#)
[Head of Old River](#)
[Garwood Bridge](#)
[Turner Cut](#)
[Facilities](#)
[Current Extent](#)



FISH RECEIVER DATA: DAILY SUM, 30 MIN. FILTER: 14 DAY DURATION TEMP/FLOW

Roll over each icon on the map to see time series data and station description. Click on the Quick Links for area detail. Scroll down to build your own graphs with the aggregated data.

MORE

M

May 13, 2015 6:45AM



Show Timeline



15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Start Date

2015-4-28

End Date

2015-05-13

Duration

14 Day

Timestep

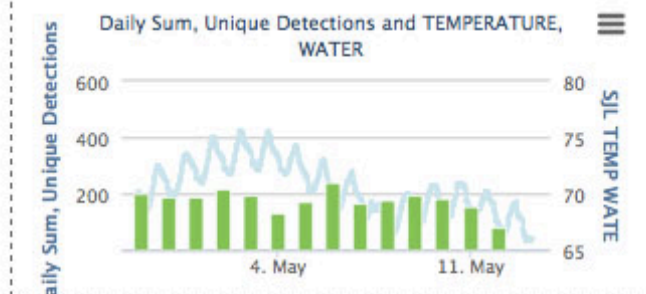
1 day



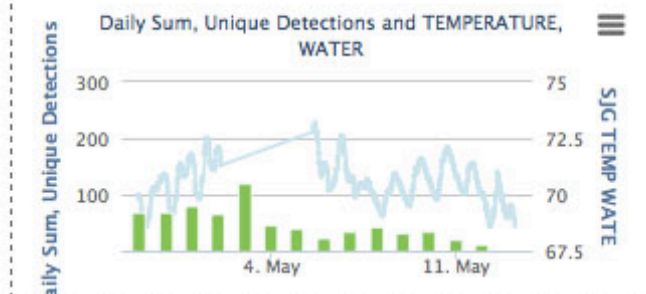
Department of Water Resources
CALIFORNIA DATA EXCHANGE CENTER

Tag Detection Data/Current Conditions

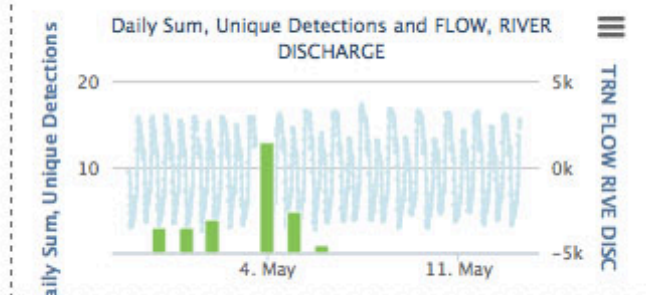
HORU - 14.5 Miles from Release Point



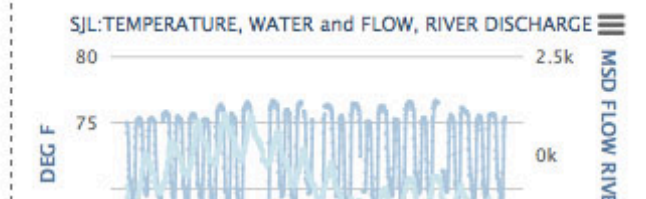
SJGU - 26.5 Miles from Release Point



TCW - 36.4 Miles from Release Point

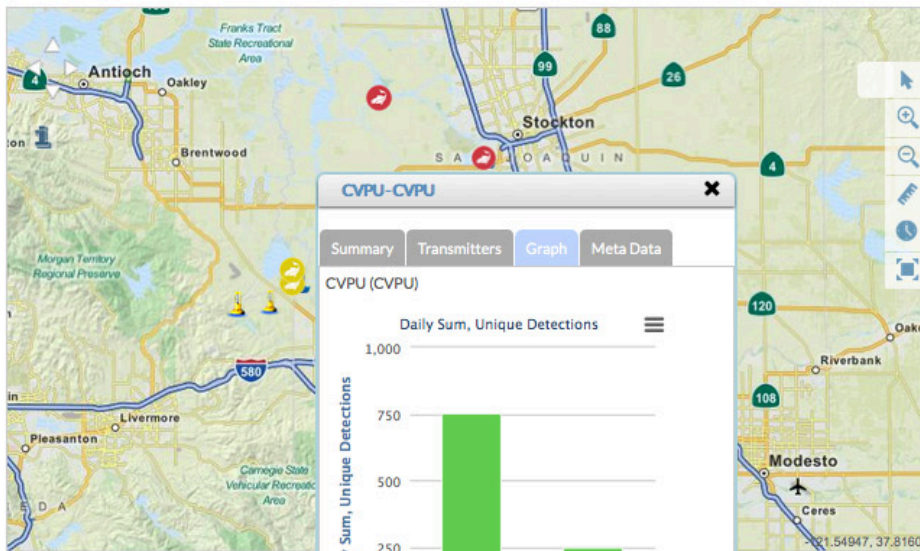


SJL Temp.&MSD Flow



Quick Links

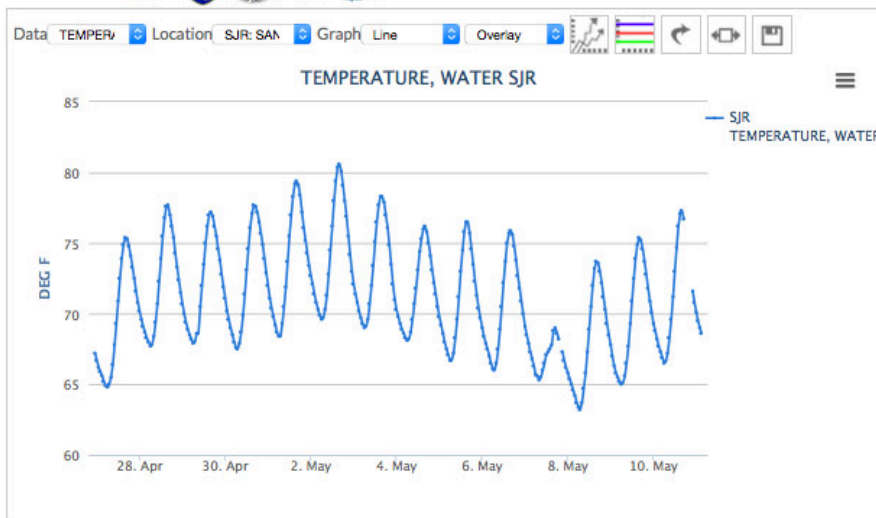
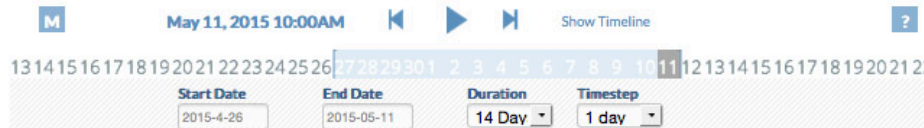
[All Stations](#)
[Release Site](#)
[Head of Old River](#)
[Garwood Bridge](#)
[Turner Cut](#)
[Facilities](#)
[Current Extent](#)



FISH RECEIVER DATA: DAILY SUM, 30 MIN

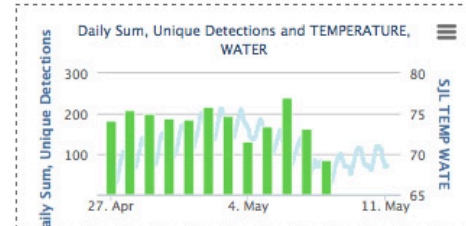
Roll over each icon on the map to see time series data. You can also build your own graphs with the aggregated data.

MORE

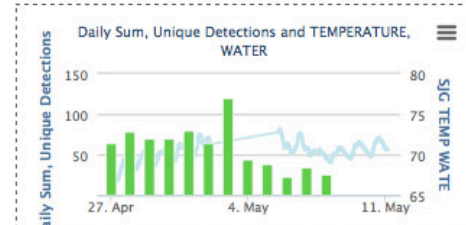


Tag Detection Data/Current Conditions

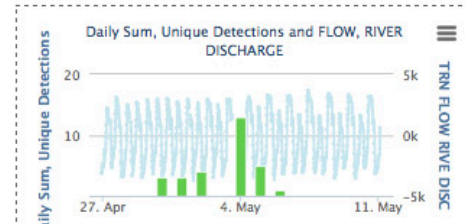
HORU - 14.5 Miles from Release Point



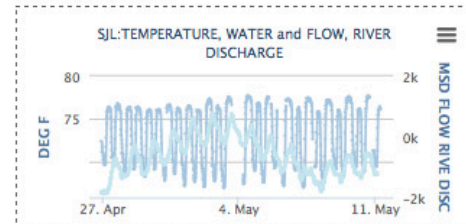
SJGU - 26.5 Miles from Release Point



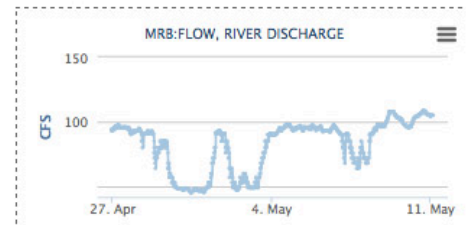
TCW - 36.4 Miles from Release Point



SJL Temp.&MSD Flow

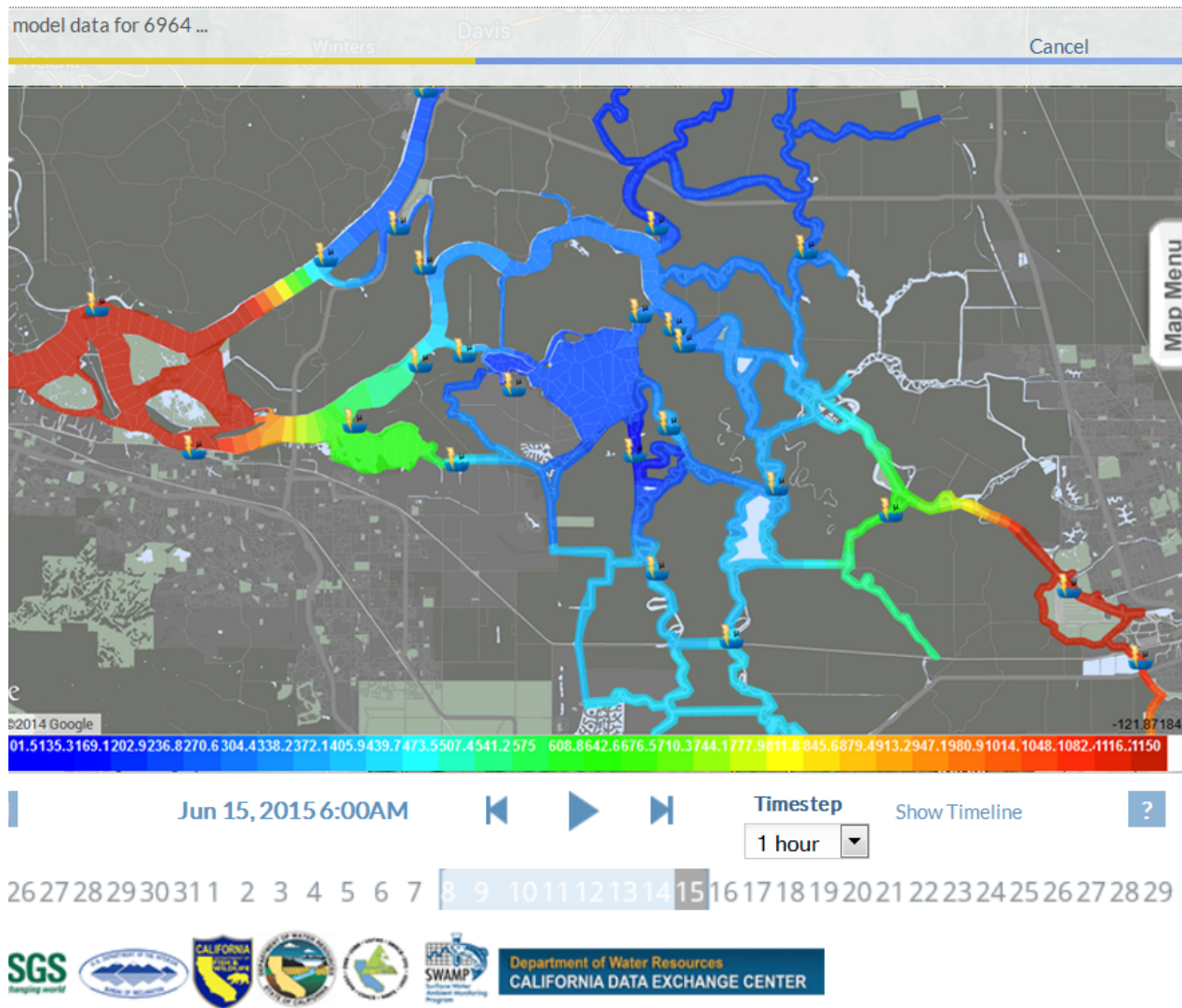


MRB Flow



Salinity Conditions in the Delta [read more](#)

Electrical Conductivity(micros) Data Visualization-Last 7 days



OPERATIONS SUMMARY JUN 14, 2015

Summary

Graphs

SCHEDULED EXPORTS for Today

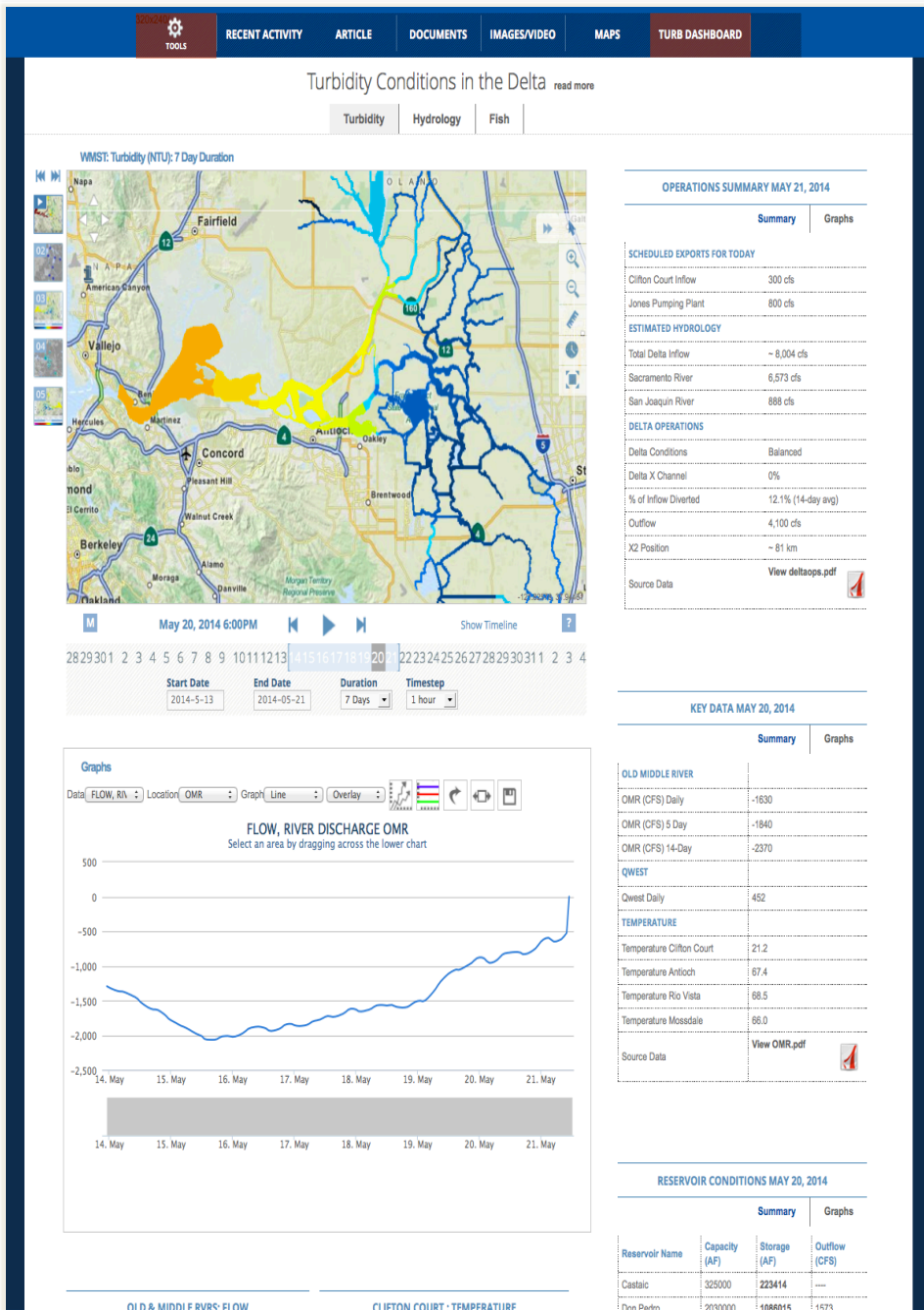
Clifton Court Inflow	500 cfs
Jones Pumping Plant	230 cfs

ESTIMATED HYDROLOGY

Total Delta Inflow	~ 8,526 cfs
Sacramento River	6,510 cfs
San Joaquin River	180 cfs

DELTA OPERATIONS

Delta Conditions	Balanced
Delta X Channel	0%
% of Inflow Diverted	7.7% (3-day avg)
Outflow	5,100 cfs
X2 Position	> 81 km
Source Data	View deltaops.pdf 



DASHBOARDS

REGULATORY REPORTING

Environmental Monitoring Program (EMP) water quality monitoring and special studies for:

- Hydrologic Conditions
- Water Quality
- Phytoplankton and Chlorophyll a
- Zooplankton
- Benthic
- Nutrients
- Special Studies

The screenshot shows the 'Water Quality Conditions' report page on the Bay-Delta Live website. The page has a blue header with the Bay-Delta Live logo and a search bar. Below the header, the title 'Water Quality Conditions' is displayed, followed by the subtitle 'in the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays.' A grid of eight icons represents different monitoring categories: Introduction, Hydrological Conditions, Water Quality, Phytoplankton & Chlorophyll a, Zooplankton, Benthic Monitoring, Explore Data, and Continuous Monitoring. Below the grid, a large orange banner highlights the 'Report to the State Water Resources Control Board in Accordance with Water Right Decision 1641'. The report text summarizes the results of water quality monitoring and special studies conducted by the Environmental Monitoring Program (EMP) within the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays (the estuary) during calendar year 2010. The report is mandated by Water Right Decision 1641 (D-1641) and is being submitted to fulfill the reporting requirements of that decision. The text continues with details about the EMP's monitoring protocol, including the number of sampling sites, parameters measured, and the results of the monitoring. It also mentions the collection of phytoplankton samples and the identification of various organisms.

Water Quality Conditions
in the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays.

Introduction
Information about this report and water quality monitoring results

Hydrological Conditions
Annual summary of net Delta outflow, runoff and water year indices

Water Quality
Water Temperature, Dissolved Oxygen, Specific Conductance, Secchi Disk Depth, Turbidity...

Phytoplankton & Chlorophyll a
Results of algal community composition & biomass

Zooplankton
Annual and seasonal abundance and distribution of major zooplankton taxa

Benthic Monitoring
Distribution, diversity and abundance of bottom dwelling organisms

Explore Data
Coming soon. View and compare all data from this report

Continuous Monitoring
Real time hourly and quarter hourly water quality & environmental data

Report to the State Water Resources Control Board in Accordance with Water Right Decision 1641

This report summarizes the results of water quality monitoring and special studies conducted by the Environmental Monitoring Program (EMP) within the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays (the estuary) during calendar year 2010. This monitoring is mandated by Water Right Decision 1641 (D-1641) and this report is being submitted to fulfill the reporting requirements of that decision.

The EMP monitors water quality using a protocol implemented in 1996. Under this monitoring protocol, 13 sampling sites—2 of which were added after 1996—representing 8 regions of the estuary were monitored for 15 physical and chemical water quality parameters. The results gathered from the sampling of these 15 parameters are described herein. Parameters such as water temperature, Secchi disk depth, dissolved oxygen (DO) concentration, specific conductance, dissolved inorganic nitrogen, orthophosphate, and volatile suspended solids were within their historical range. Measured parameters exhibited seasonal variation as well as changes in response to significant rainfall events and in flow rates. In addition to monitoring physical and chemical water quality parameters, biological sampling was conducted to monitor the productivity and composition of phytoplankton, zooplankton, and benthic communities.

Chlorophyll a samples were collected at 24 monitoring sites in the estuary. Chlorophyll a is the principal photosynthetic pigment, is common to all phytoplankton, and is thus used as a measure of phytoplankton biomass. Samples for chlorophyll a and phytoplankton were taken at 15 sampling sites in the estuary. Chlorophyll a concentrations for 2010 showed seasonal patterns and were generally below 10 µg/L and ranged between 0.38 µg/L and 59.20 µg/L throughout the estuary. Of the 156 samples taken in 2010, 94.2% (147 samples) had chlorophyll a levels below 10 µg/L. Phytoplankton samples were collected using a submersible pump from 1 m below the water's surface. All organisms collected in 2010 fell into 13 categories: centric diatoms, pennate diatoms, green algae, cryptomonad flagellates, cyanobacteria, haptophyte flagellates, dinoflagellates, euglenoid flagellates, ciliates, chrysophytes, little green algal balls, katablepharid flagellates, and silico-flagellates. Of the thirteen groups identified, centric diatoms, pennate diatoms, green algae, cryptomonad flagellates, and cyanobacteria constituted 99.2% of the organisms collected.

ABOUT THIS REPORT **CONTRIBUTORS** **ACKNOWLEDGMENTS** **WRD1641**

Privacy Policy User Agreement Terms of Service **ENR** Bay Delta Live - All rights reserved. © Copyright 2012-13

DATA STORIES

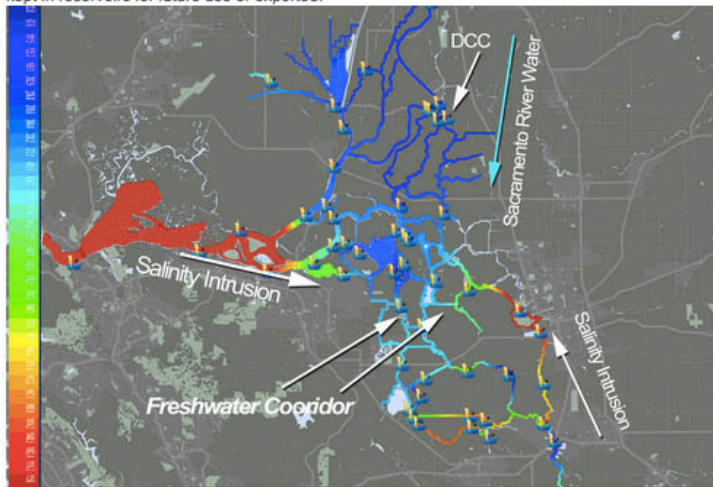
Managing Salinity in the Sacramento-San Joaquin River Delta- During Drought Conditions

An Overview

Flows and water quality in the Sacramento-San Joaquin Delta (Delta) are strongly influenced by freshwater inflow from the rivers, by the tides in San Francisco Bay and by salinity from Bay waters. Prior to human influence, the historical distribution of salinity in the Delta was controlled primarily by the seasonal and inter-annual distribution of precipitation, the geomorphology of the Bay and Delta, daily tides, the spring-neap tidal cycle, and the mean sea level at Golden Gate. Extended wet and dry periods are both evident in the historical record. Since about 1860, a number of morphological changes to the Delta landscape and operational changes of reservoirs and water diversions have affected flows and the distribution of salinity within the Delta.

Dought Conditions

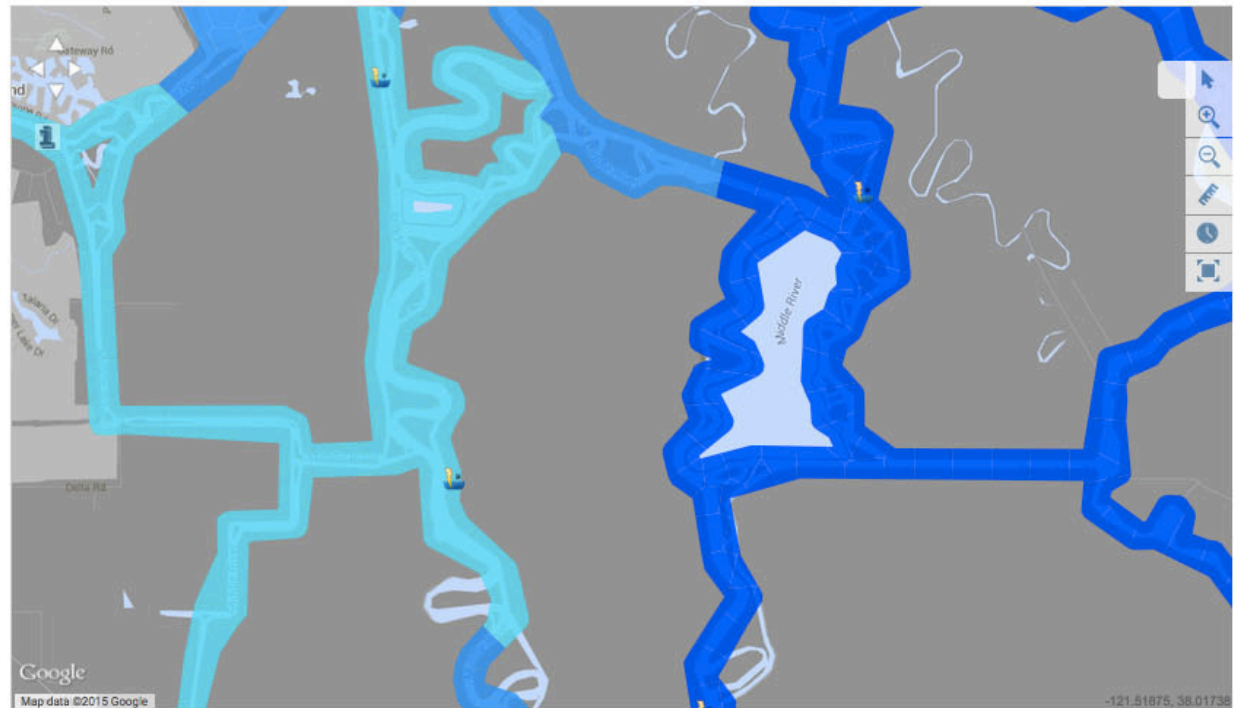
Salinity controls exports during droughts. As river flows entering the delta decrease, the water in the south delta will become so salty it will be unusable and exports from the delta will stop. This document outlines a number of alternatives for "controlling" the salt field in the central delta. These alternatives principally rely on strategically placed "temporary" barriers. In the absence of these barriers, a great deal of water will be used to repel salinity intrusion in the delta, rather than being kept in reservoirs for future use or exported.



Caption:Salinity Intrusion and the Fresh Water Corridor Illustrated

There number of drought mitigation strategies that will allow the water projects to reduce reservoir releases, minimize the impacts on the ecosystem of very low river flows and continue to deliver water to the greatest extent possible as water supplies dwindle. A variety of numerical models are being used to evaluate the response of the salt field to a sequence of mitigation measures, which involve export curtailments, reservoir releases, gate operations and temporary barriers. All of these strategies could help us minimize the amount of water needed to keep the "fresh water

Quick Links

[Current Extent](#)[Get Quick Link](#)[All](#)

Electrical Conductivity (micro s) Data Visualization - Last 7 days

Salinity Conditions Visualization. Data always displays last 7-Days.



May 13, 2015 7:30AM



13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 1 :

Start Date

2015-5-5

End Date

2015-05-13

Duration

7 Days

Timestep

1 hour

QUESTION TEMPLATES

Does water temperature support Chinook salmon migration in the San Joaquin River?

Next Question ➞

[Chinook Salmon and the SJR Basin](#)

[Current Conditions for Salmon](#)

[Fun Facts](#)

[Water Quality Objectives and Beneficial Uses](#)

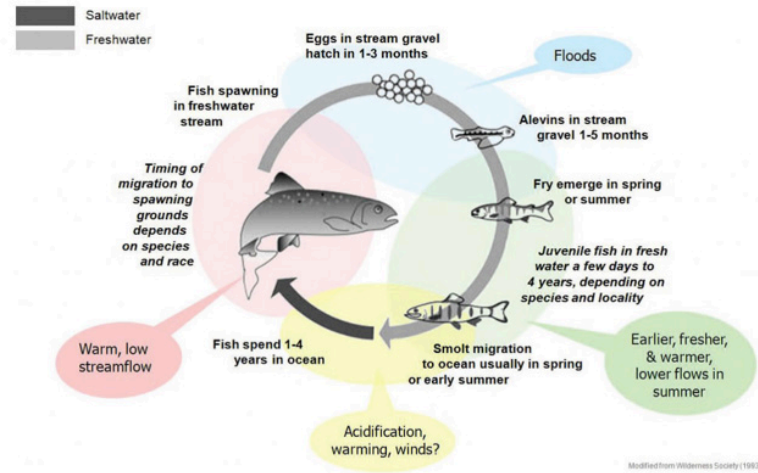
▶ Monitoring temperature in the San Joaquin River and its tributaries will help us better understand if conditions support migration and other life stages of Chinook salmon (*Oncorhynchus tshawytscha*). Two San Joaquin River runs (spring and fall) of Chinook salmon are currently struggling for survival. There are varying reasons for their decline and temperature is one important factor.



i About the Chinook salmon life-cycle

Chinook salmon are anadromous, which means they spawn in freshwater, but migrate to the ocean where they remain for their adult lives. After years of living in the open ocean, they return to their natal freshwater streams to reproduce. Females dig nests in gravel-bedded streams called redds where they deposit their eggs. After the male fertilizes the eggs, the female covers the redd with gravel. The embryos hatch into larval fish called alevin that remain in the gravel redd nourished by the yolk sac of the egg from which they were born. The alevin absorbs the yolk sac and grows, emerging from the gravel as fry (see life stage illustration below). The fry begin their migration downstream toward the ocean. As they grow, they develop scales and dark vertical bars on their sides called parr markings. At this stage they are called parr. Smoltification is a physiological change that enables the fish to adapt from living in freshwater to living in saltwater. At the completion of this process they are called smolt. Smolt typically remain in brackish water estuaries as juveniles before they move into the open ocean. Adults migrate throughout the North-east Pacific until returning to the freshwater streams to reproduce.

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The life cycle of a salmon takes it from rivers to the ocean and back again. At every steps, they face challenges of a changing world, shown in the shaded bubbles. Source: Washington State Recreation and Conservation Office

There are two distinct runs of Chinook salmon in the San Joaquin River. Runs are designated based on the timing that adults enter into freshwater from the ocean toward their natal spawning streams. Many factors, however, influence the precise timing of the runs such as water temperature, flow characteristics and maturation of the fish.

Fall-run Chinook salmon migrate upstream between September and December. They are sexually mature when they enter freshwater streams and spawn between October and December.

Spring-run Chinook salmon typically migrate upstream between February and May. They remain in cold freshwater habitats while they sexually mature and spawn between August and October.

[illegible]

Does water temperature support Chinook salmon migration in the San Joaquin River?

Next Question

[Chinook Salmon and the SJR Basin](#)

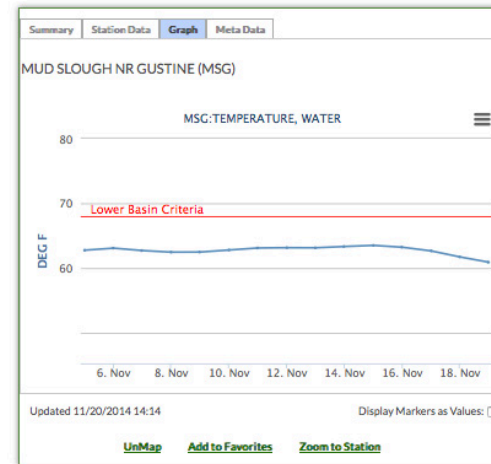
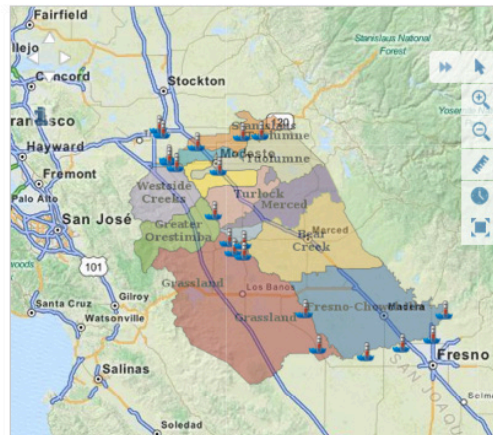
[Current Conditions for Salmon](#)

[Fun Facts](#)

[Water Quality Objectives and Beneficial Uses](#)

Currently, temperature is measured in many locations in the San Joaquin River watershed. Most stations are located on the main stem of the San Joaquin River (see interactive map with conditions below).

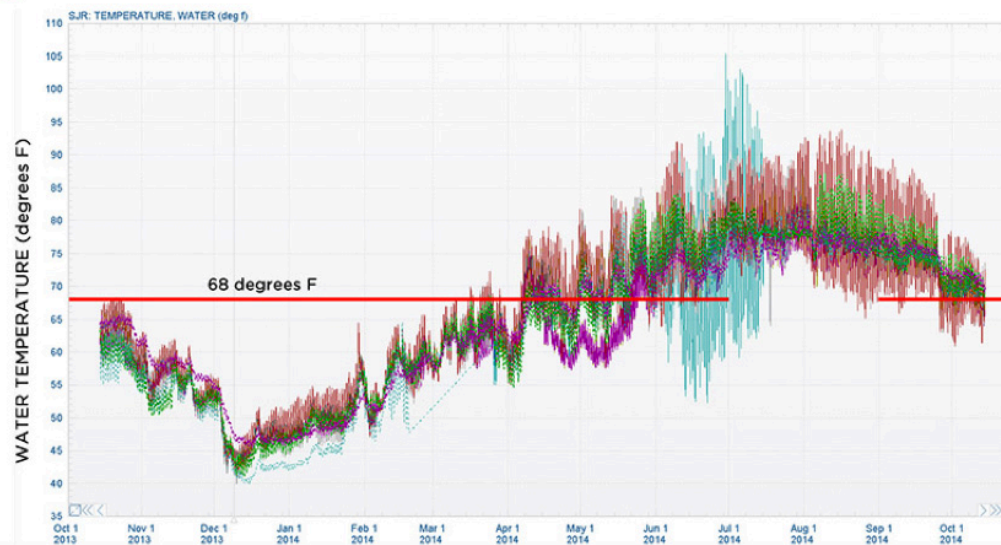
Current Temperature Conditions in the San Joaquin River and its Tributaries



Graph Mode (Toggles between graph and current value)

Click on the stations above to see real time temperature conditions. The graphs illustrate the temperature conditions over the last two weeks. The peak temperature experienced in any given day is averaged across 7 days to produce the 7-day average daily maximum value which is being displayed. For the Lower Basin stations the red line shows the 68 F (7-day average daily maximum) threshold to support migration. In the Upper Basin, the red line shows the 64 F (7-day average daily maximum) threshold to support migration. To allow for migration of both Spring and Fall-run Chinook the thresholds must be met September thru June.

San Joaquin River lower basin temperatures over the last year



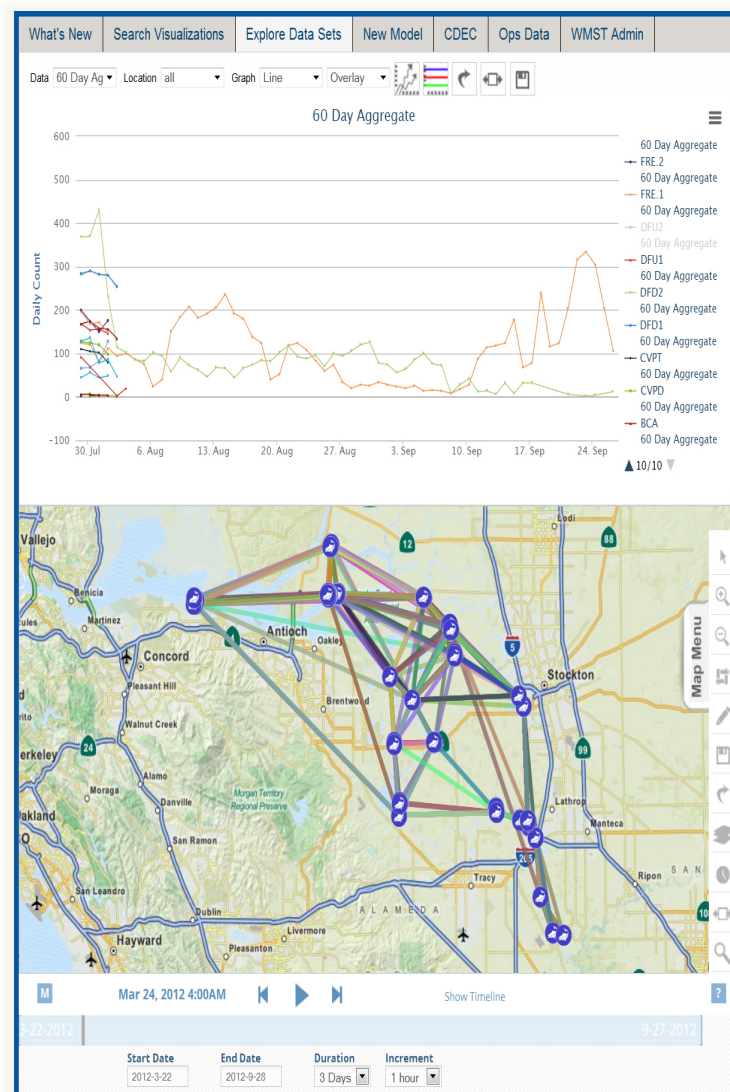
October 2013 to October 2014



SPECIAL STUDIES

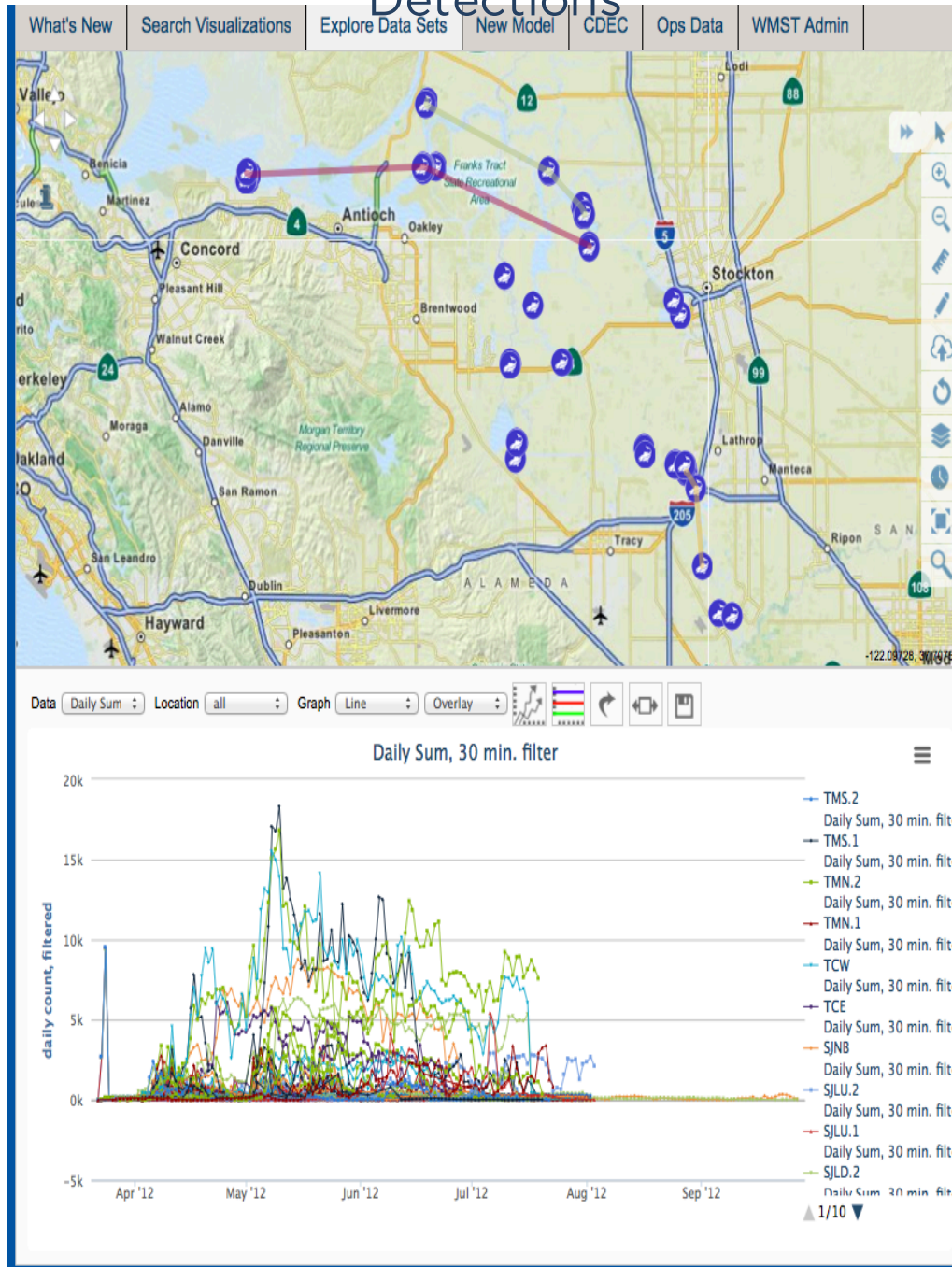
Tracking Fish

- 🔍 Analyze Fish Tracks
- 🔍 Integrate Real Time Conditions
- 🔍 Survival Rates
- 🔍 Tides
- 🔍 Flow
- 🔍 X2

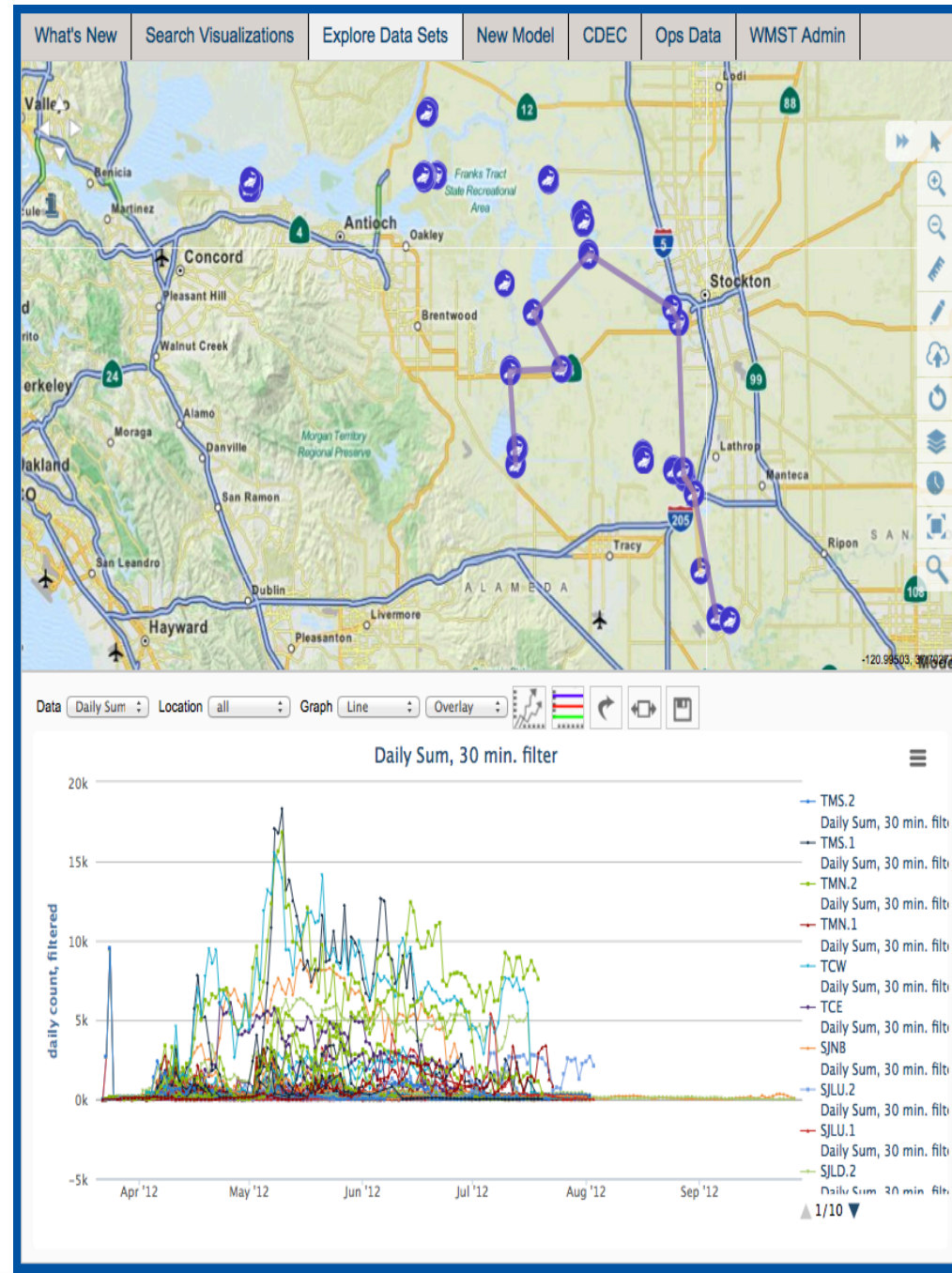


Department of Water Resources
CALIFORNIA DATA EXCHANGE CENTER

No Prior Detections



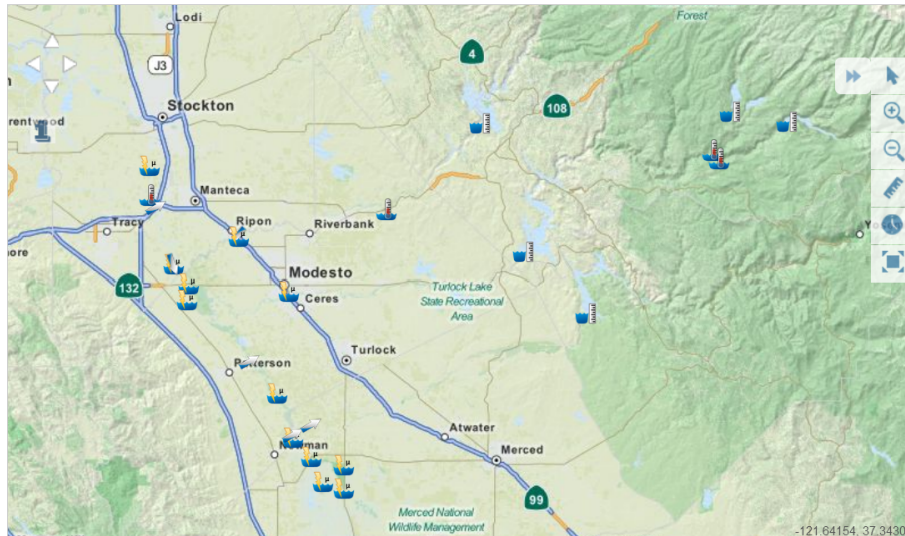
Fastest Way Out



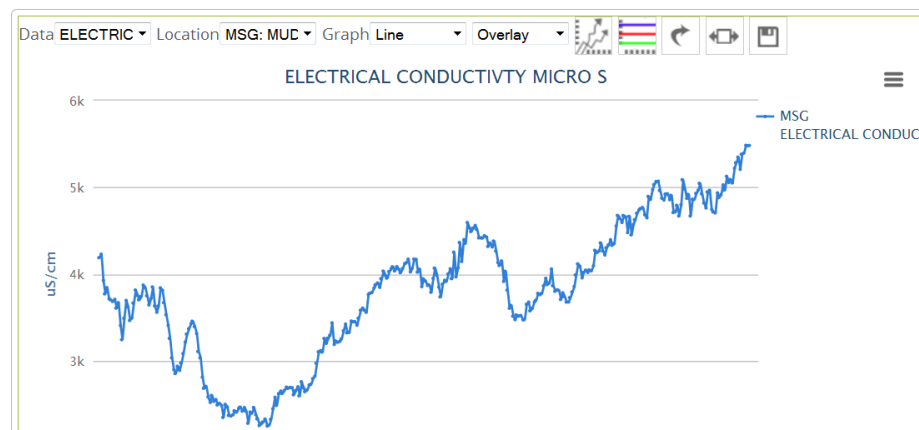
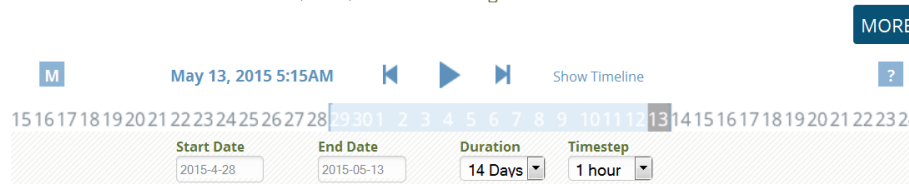
REAL TIME TMDL MANAGEMENT: SJRRTM

Quick Region Links

Vernalis Crows Landing Lower SJR Modesto Turlock San Slough Mud Slough Reservoirs Current Extens Station Finder

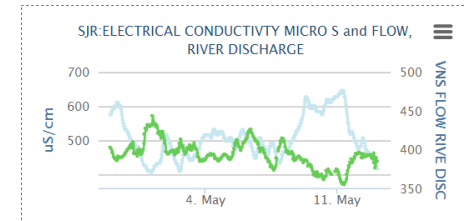


V5: Real Time Conditions View: EC, Flow, Reservoir Storage

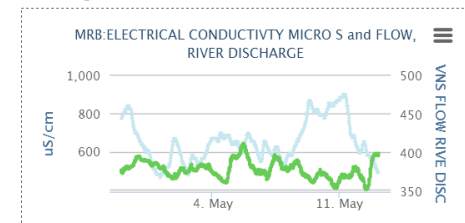


EC/FLOW

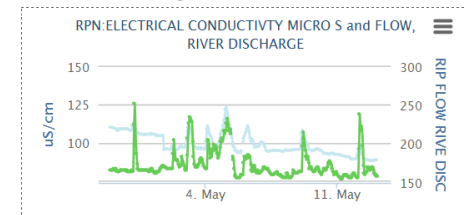
SAN JOAQUIN R MCCUNE STATION NR VE (SJR) = EC (uS/cm)
 SAN JOAQUIN RIVER NEAR VERNALIS (VNS) = Flow, Discharge



SAN JOAQUIN R AT MAZE RD BRIDGE (MRB) = EC (uS/cm):
 SAN JOAQUIN RIVER NEAR VERNALIS (VNS) = Flow, Discharge



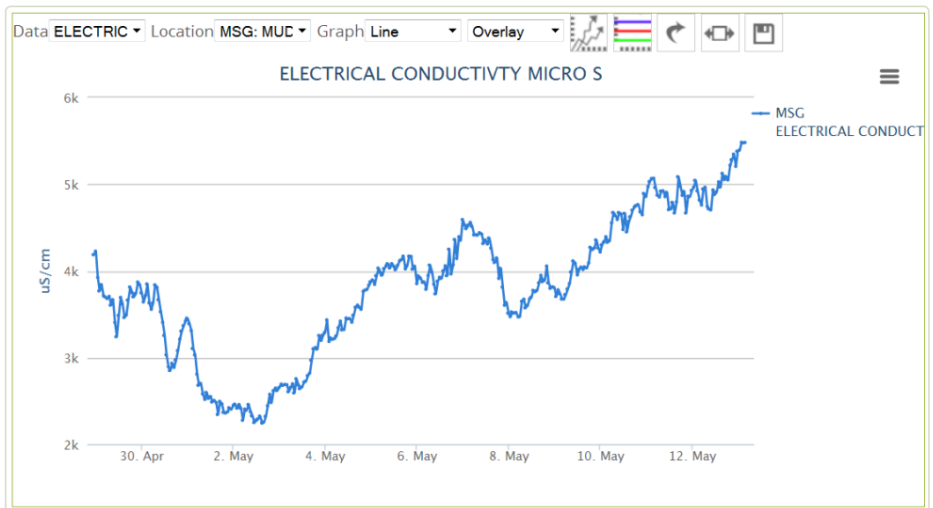
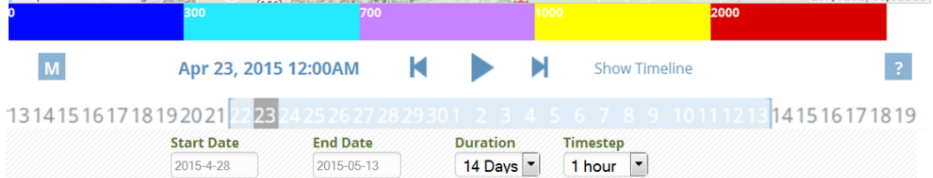
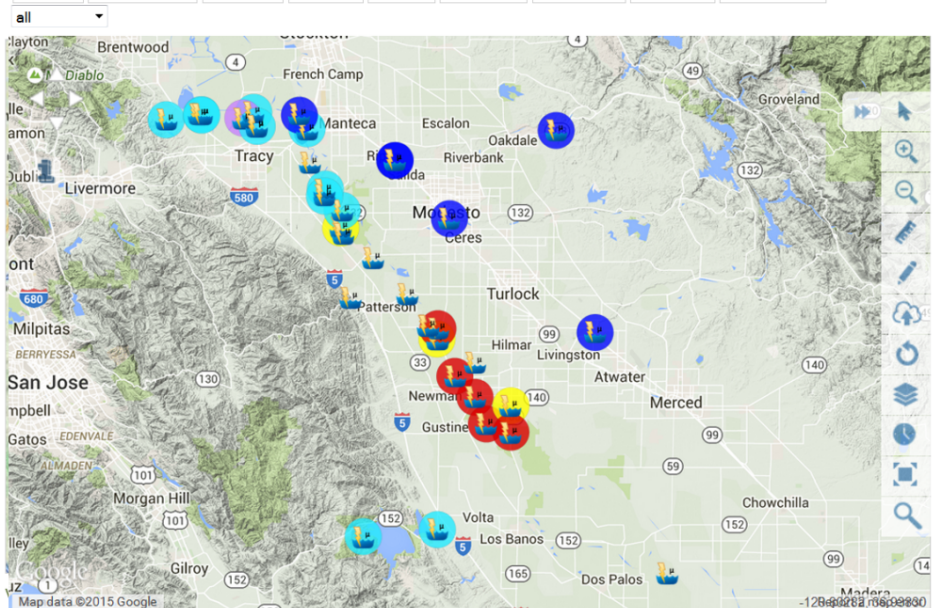
RIPON (RPN) = EC (uS/cm): STANISLAUS RIVER AT RIPON (RIP) = Flow, Discharge



USBR Realtime Monitoring

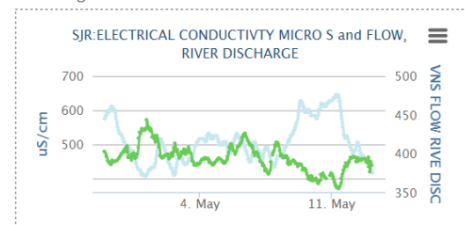
Quick Region Links

[Vernalis](#) |
 [Crows Landing](#) |
 [Lower SJR](#) |
 [Modesto](#) |
 [Turlock](#) |
 [Salt Slough](#) |
 [Mud Slough](#) |
 [Reservoirs](#) |
 [Current Extent](#) |
 Station Finder

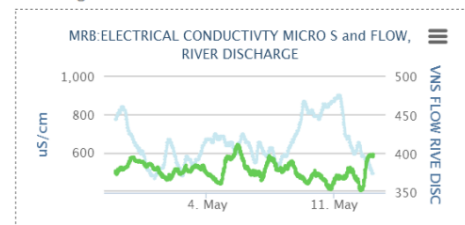


EC/FLOW

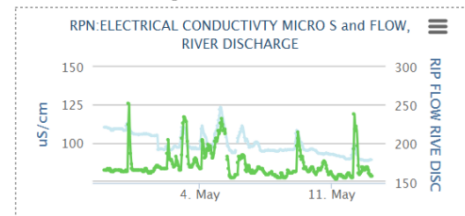
SAN JOAQUIN R MCCUNE STATION NR VE (SJR) = EC (uS/cm):
 SAN JOAQUIN RIVER NEAR VERNALIS (VNS) = Flow,
 Discharge



SAN JOAQUIN R AT MAZE RD BRIDGE (MRB) = EC (uS/cm):
 SAN JOAQUIN RIVER NEAR VERNALIS (VNS) = Flow,
 Discharge



RIPON (RPN) = EC (uS/cm): STANISLAUS RIVER AT RIPON
 (RIP) = Flow, Discharge



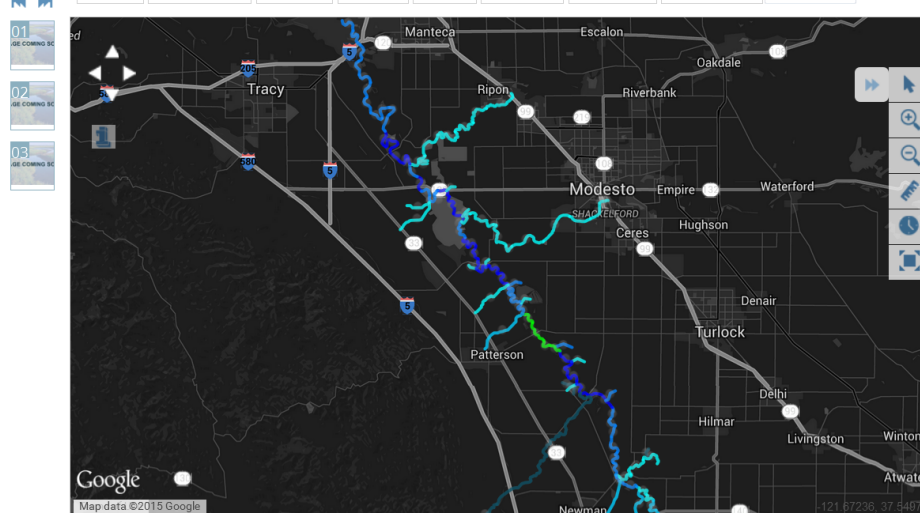
WARMF Visualization Overview: Visualize WARMF

A quick model load for visualizing the WARMF forecast on your desktop. The interactive map defaults the first visualization to the WARMF forecast* for Salt Load. Using the image carousel on the left side of the map, you can choose additional visualizations including Electrical Conductivity and Flow. Data graphs displayed on the right are filtered by region using the graph quick view buttons below. For a complete list of stations graph available, see the Station Finder.

*The time interval for the forecast is currently set at 14-day duration, the last 7 day archive forecast with current 7 day forecast.

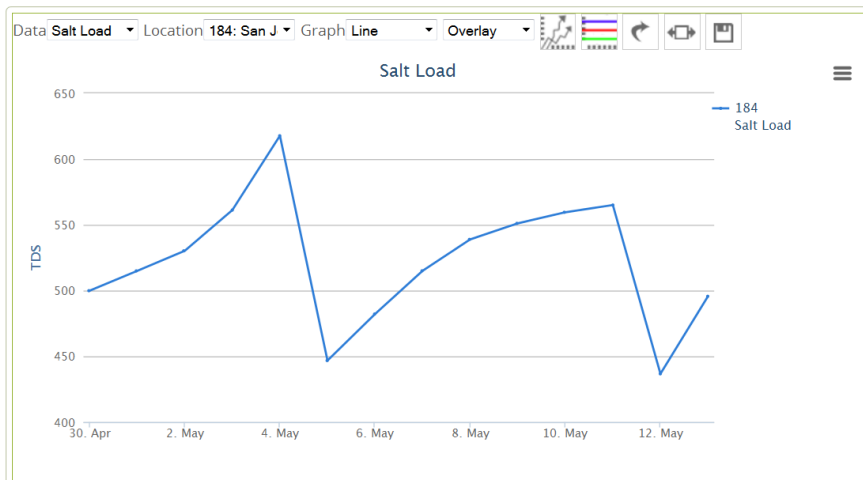
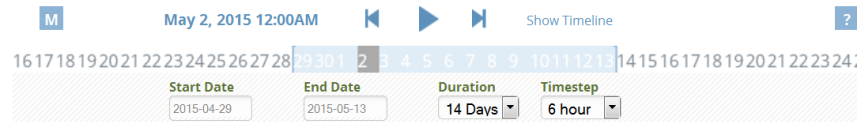
Quick Region Links

Vernalis | Crows Landing | Lower SJR | Modesto | Turlock | Salt Slough | Mud Slough | Current Extent | Station Finder



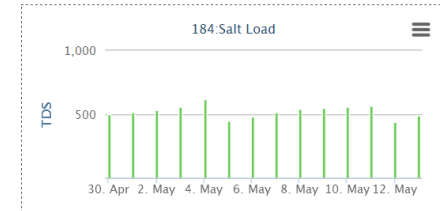
WARMF FORECAST (Reduced): Salt Load (TDS)- 14 Day Duration

Salt Load Forecast Visualization using a custom GIS grid with reference to the WARMF model station output. This model has been optimized using a reduce station count.

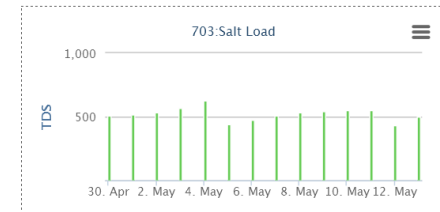


Salt Load

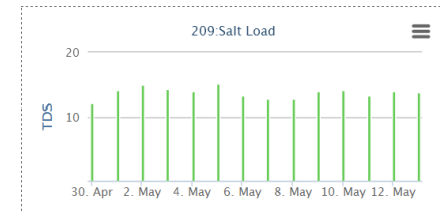
San Joaquin River at Vernalis (184)



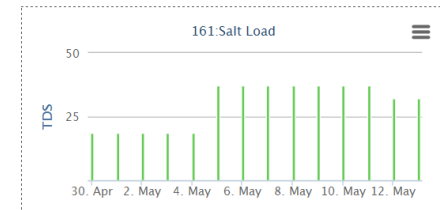
San Joaquin River at Maze Road (703)



MID Main Canal Spill (209)



Stanislaus River at Caswell S.P. (161)



Graph Mode (Toggles between graph and current value)



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