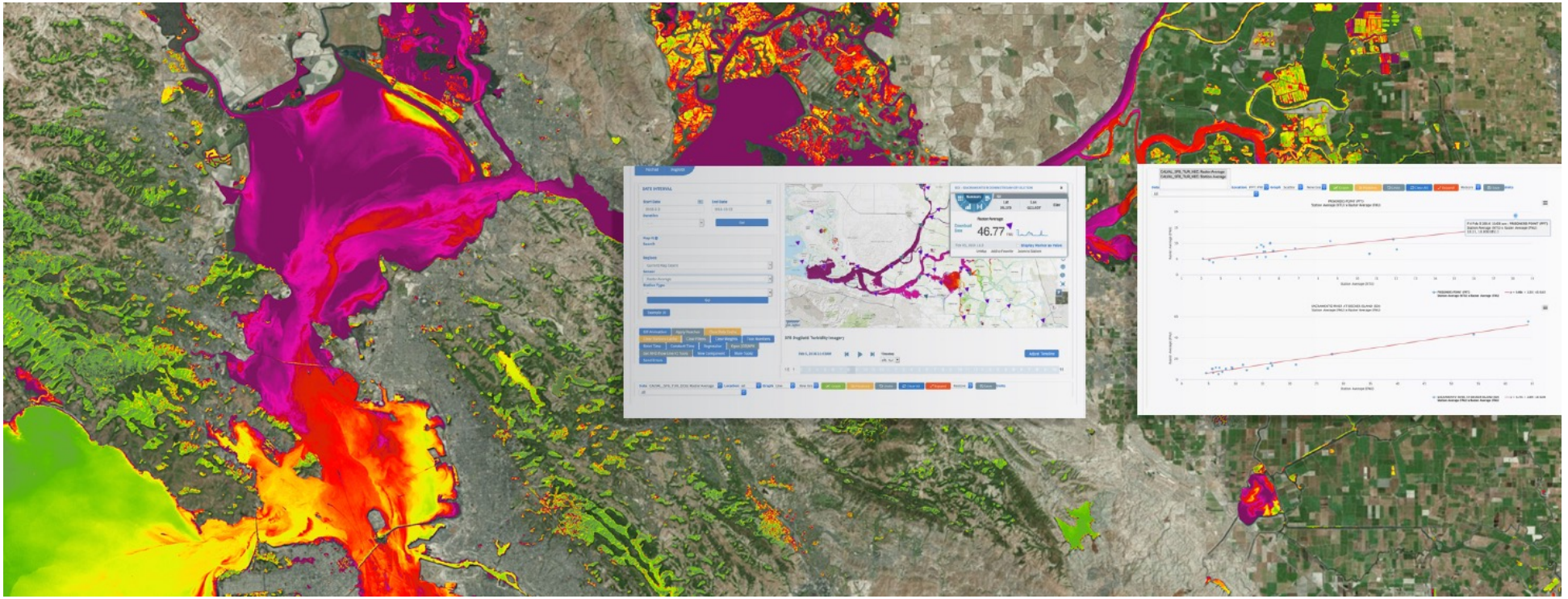


Bay Delta Live
Data Management Portal

DWR

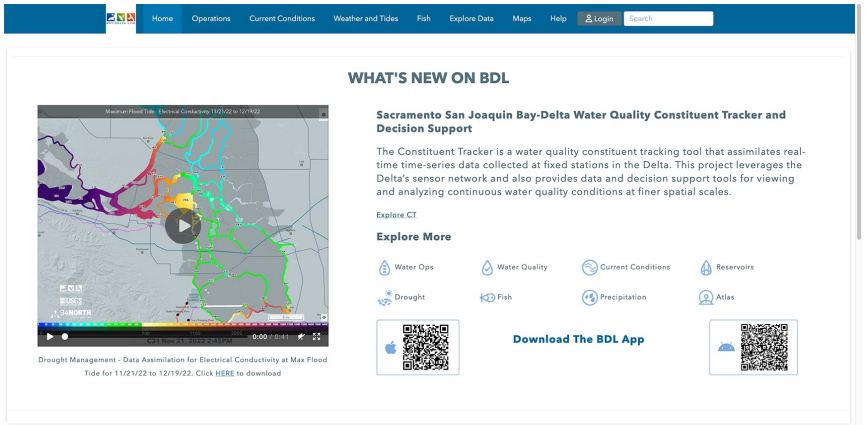
12/22/23

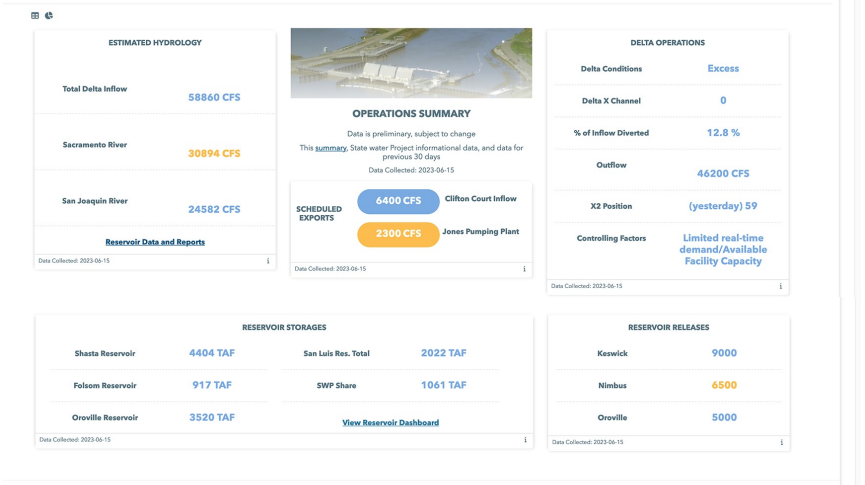
34 North

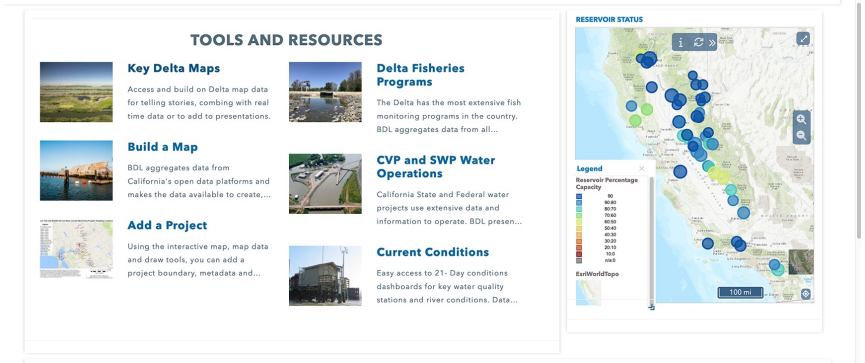
www.baydeltalive.com (BDL)

Presentation Overview

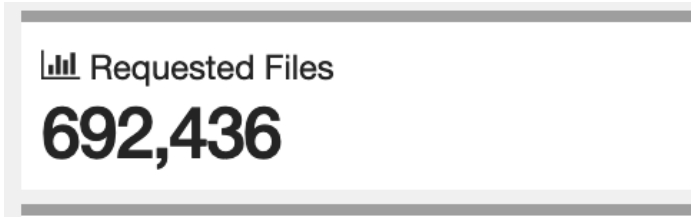
- ✓ User Community 2022-23
- ✓ BDL Overview
- ✓ Funding Partners and Investments
- ✓ What is BDL?
- ✓ Data Federation
- ✓ Content Management and Curation
- ✓ Project Examples

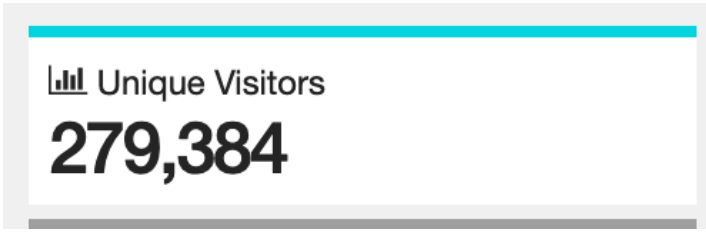


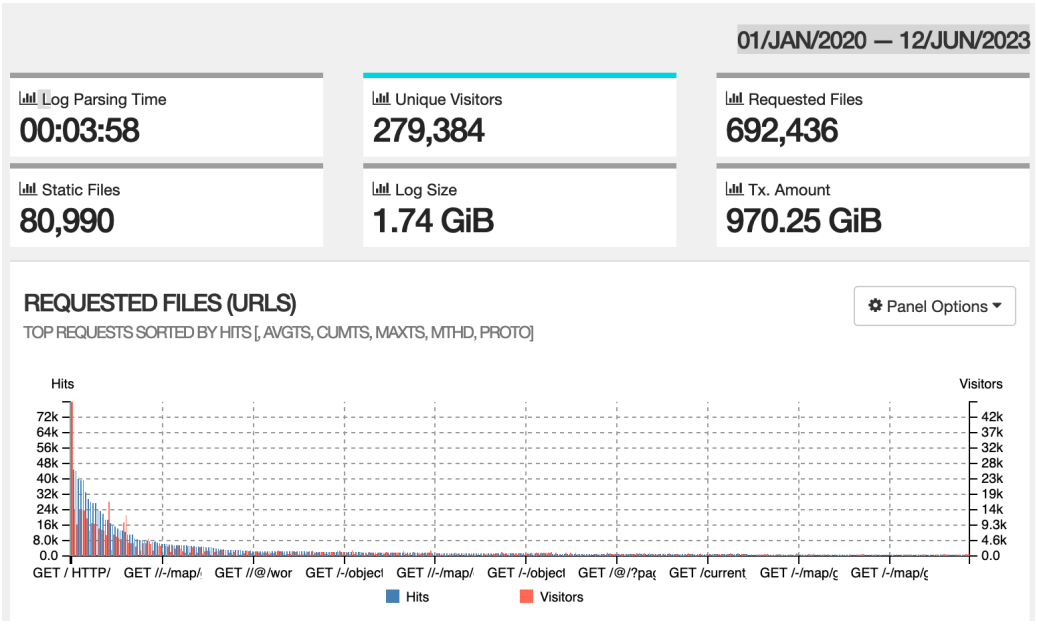


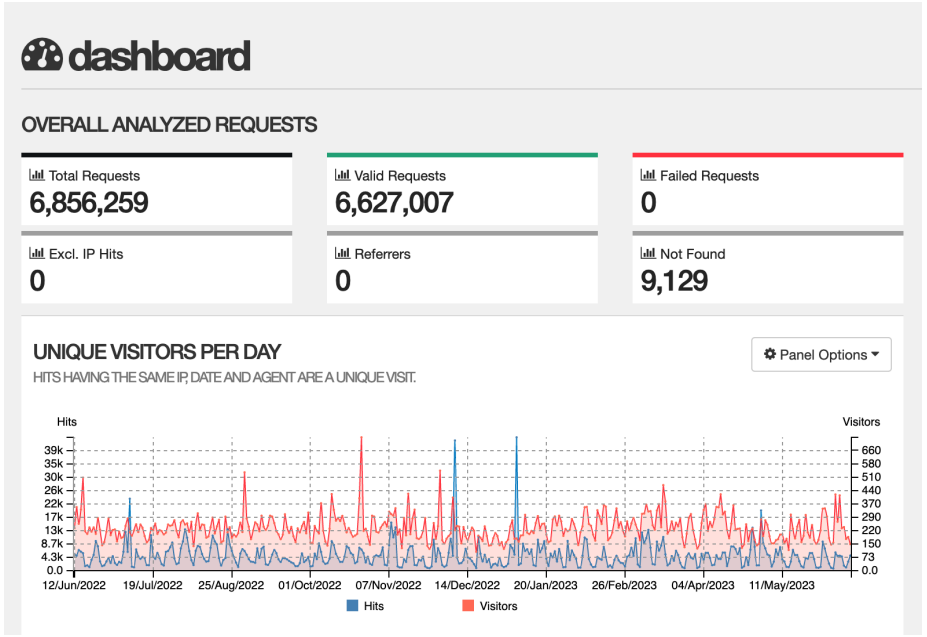


User Community 2020-2023









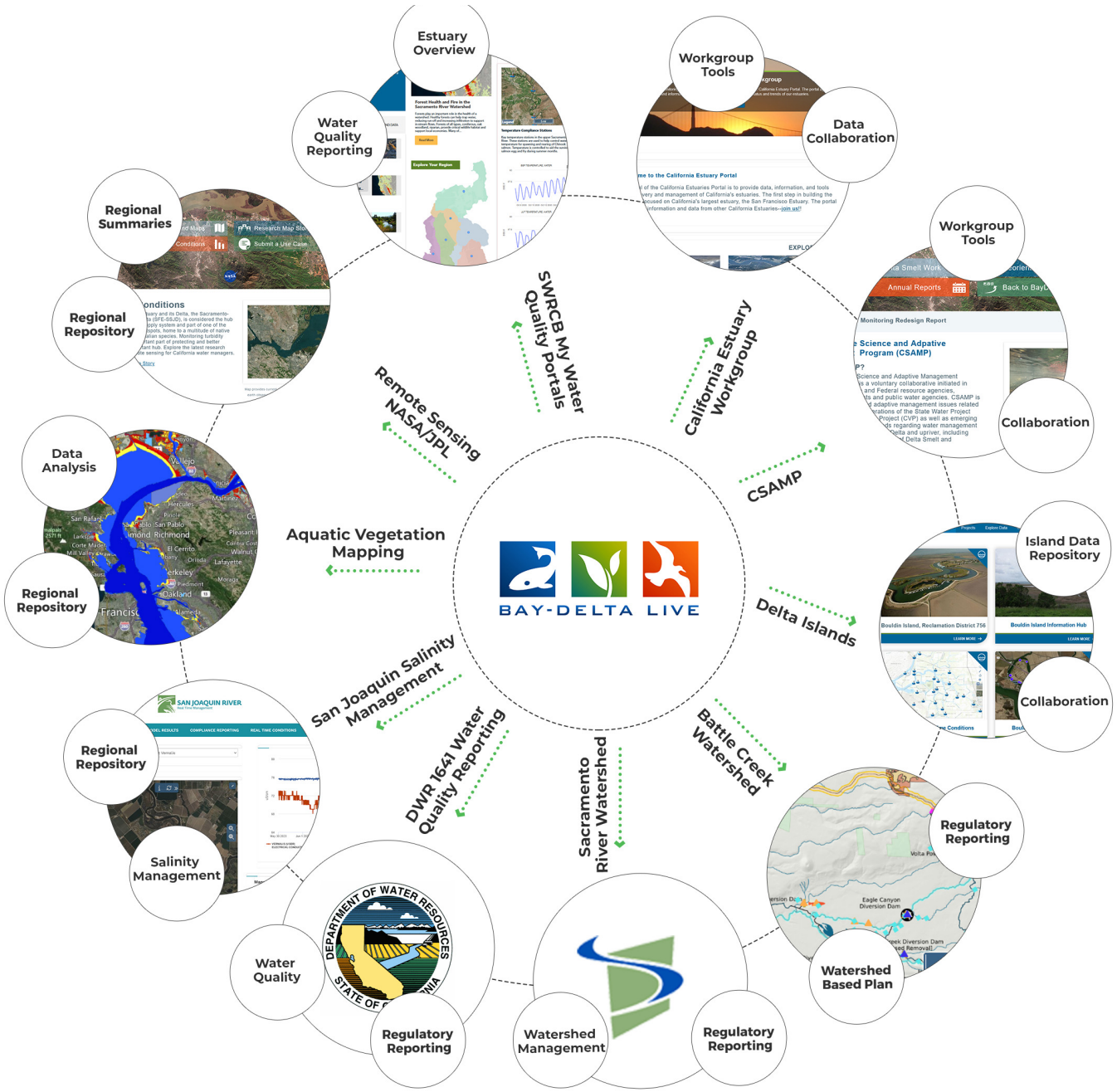
https://www.baydeltalive.com/site/report.live.2020-2023.nosearch.nostations.nobot.nospider.no605.html

Include Mobile Apps

Funding Partners & Regional Programs

Community Investi

- ✓ SFCWA - $477k
- ✓ USBR - $100k
- ✓ DWR EMP - $360k
- ✓ SWC -$330k
- ✓ MWD - $500k
- ✓ JPL/NASA – $130k
- ✓ CalFire - $300k
- ✓ SNC-$400K
- ✓ Battle Creek- $140k
- ✓ SWRCB- $150k
- ✓ RCDs & FSCs - $500K
- ✓ DSC-$45K



What is BDL?

- ✓ **Open Data Access Platform**
- ✓ **Data Federation that aggregates data from hundreds of sources. NWIS, CDEC, NOAA, DWR, USBR, USFWS, CADFWS, Academia, NGOs, NASA, OpenET, AGOL**
- ✓ **API Consumer**
- ✓ **Web application provides tools use federated data through custom templates, dashboards, maps**
- ✓ **Sensor network observations. View many monitoring programs in one location**
- ✓ **Map based data analytics**
- ✓ **Provides collaborative and special project workspaces (CSAMP, Sutter, Islands, Estuary Workgroup, Remote Sensing)**

Data Federation Tools

✓Geospatial

- ✓OGC/AGOL Services Consumer
- ✓USGS/NASA Machine to Machine
- ✓Uploader (many formats)
- ✓Get Data Request Tools

✓Delta Data

- ✓Sensor Networks: CDEC, NWIS, NOAA, Streamstats, NWS, Sentinel, Landsat
- ✓Geoprocessing
- ✓Raster and Vector Analysis Tool Builder
- ✓Modeling

OPERATIONS DATA

Water Quality
Operations Summary
Storage Data
Snow Surveys
Water Supply Summaries
Critical Infrastructure
Weather
USBR

GIS & WEB SERVICES

Imagery (Lidar/Bathymetry)
Base Maps
Project and Documentation
Water & Infrastructure
Delta Features & County Data
Species & Environment
Weather & Tides
Monitoring Stations
ESRI Rest Services
NOAA/USGS Web Services
Remote Sensing

DATA & DATASETS

CDEC Station Data
USGS NWIS Station Data
CADFG 20 MM Trawl Data
CADFG SKT Trawl Data
Water Quality
Species Data
Custom Datasets
Salvage Data
Zooplankton
Aquatic Vegetation

DOCUMENTATION

Images
Reports
Presentations
Videos
News
Science Journals
Maps
Meeting Materials

Content Management and Curation Tools

✓Workspace/Dashboard Builder

- ✓Templates: Existing Library and Custom
- ✓Media Agnostic: Embed Maps, PDFs, HTML, Charts
- ✓Map Story Builder

✓Content Management

- ✓Catalog
- ✓Editor

✓Mapping

- ✓300+ Data Layers
- ✓Styler
- ✓Geoprocessing
- ✓Raster and Vector Analysis Tool Builder
- ✓Time Series
- ✓Modeling

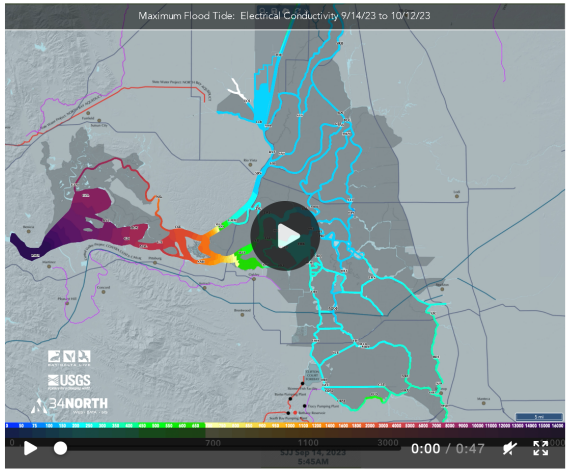
✓Data Visualizations

- ✓Graphing Library
- ✓Spatial Interpolation Engine
- ✓Model Support

BDL Project Examples

Home | Operations | Current Conditions | Weather and Tides | Fish | Explore Data | Maps | Docs | Help

WHAT'S NEW ON BDL



Drought Management - Data Assimilation for Electrical Conductivity at Max Flood Tide for 9/14/23 to 10/12/23. Click HERE to download

Sacramento San Joaquin Bay-Delta Water Quality Constituent Tracker and Decision Support

The Constituent Tracker is a water quality constituent tracking tool that assimilates real-time time-series data collected at fixed stations in the Delta. This project leverages the Delta's sensor network and also provides data and decision support tools for viewing and analyzing continuous water quality conditions at finer spatial scales.

Explore CT

Explore More

Water Ops | Water Quality | Current Conditions | Reservoirs

Drought | Fish | Precipitation | Atlas

Download The BDL App

DWR DAILY OPERATIONS SUMMARY

ESTIMATED HYDROLOGY

Total Delta Inflow	10165 CFS
Sacramento River	8082 CFS

OPERATIONS SUMMARY

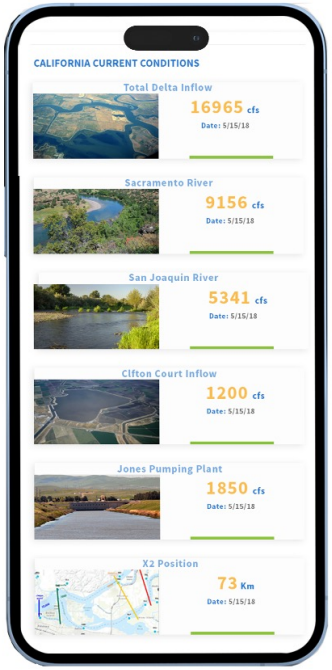
Data is preliminary, subject to change

This summary, State water Project informational data, and data for previous 30 days

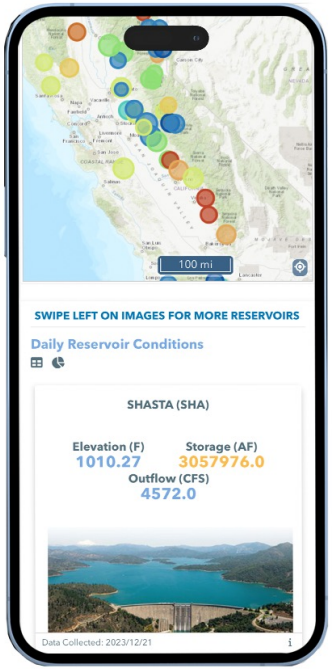
Data Collected: 2023-11-14

1600 CFS Clifton Court Inflow

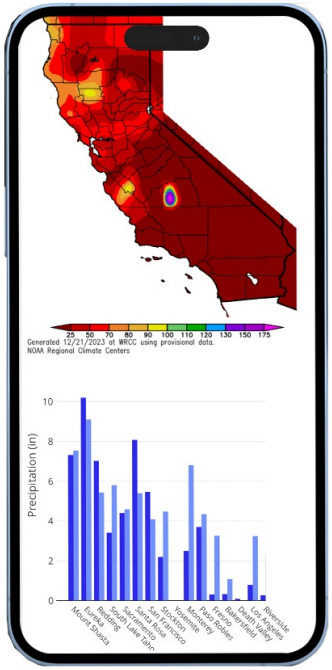
CURRENT CONDITIONS



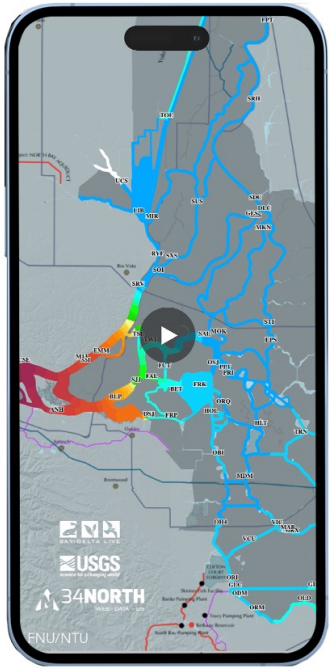
RESERVOIRS



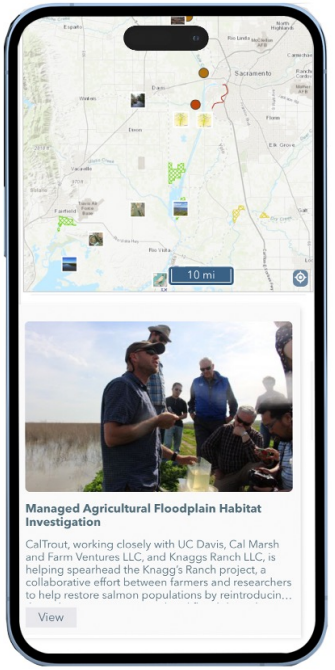
PRECIPITATION



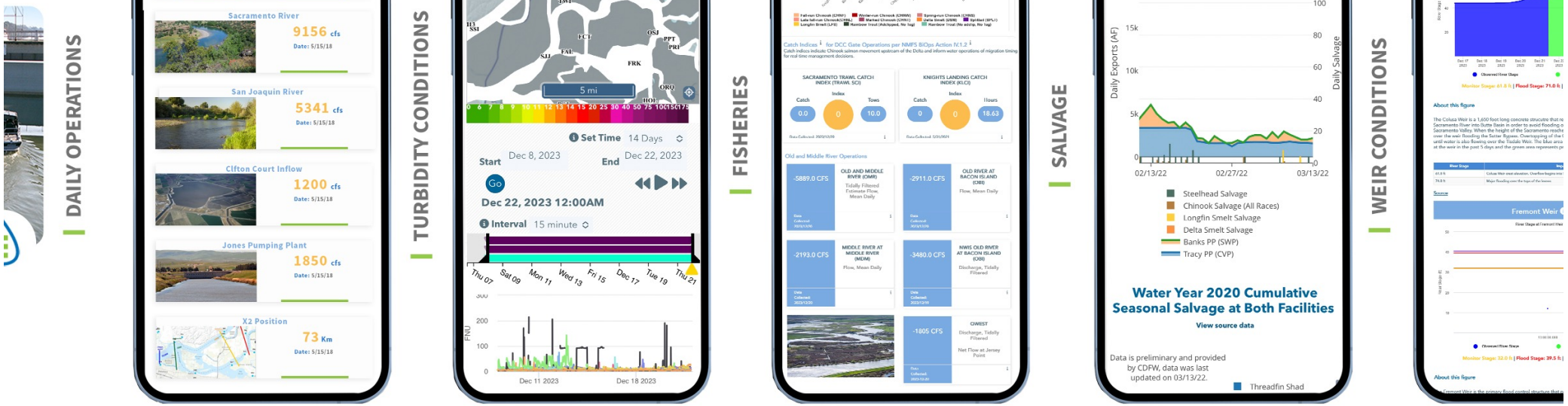
SALINITY CONDITIONS



PROJECTS

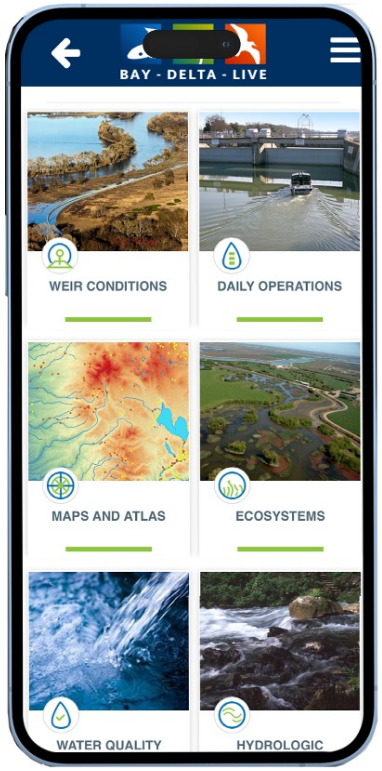


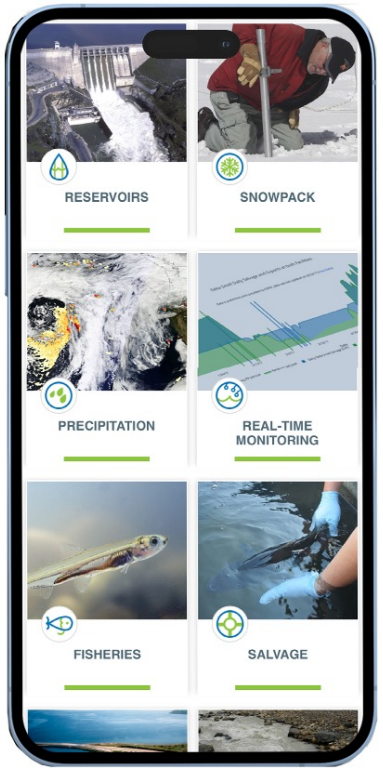
he BDL App brings users important data and information from the www.baydeltalive.com Sacramento-San Joaquin Bay Delta regional data portal in an easy to use interface. Managers, scientists, staff and Delta stakeholders can access the most current weather, fisheries, water operations, ecosystem projects, data and research available.

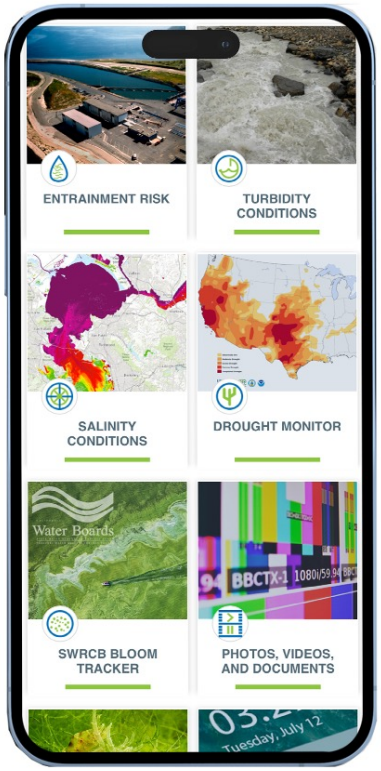


Daily reporting of California water operations activity and conditions.
Reservoir operations, Sacramento and San Joaquin River inflows and outflows, X2, pumping, weir conditions and more. All current and up to date.

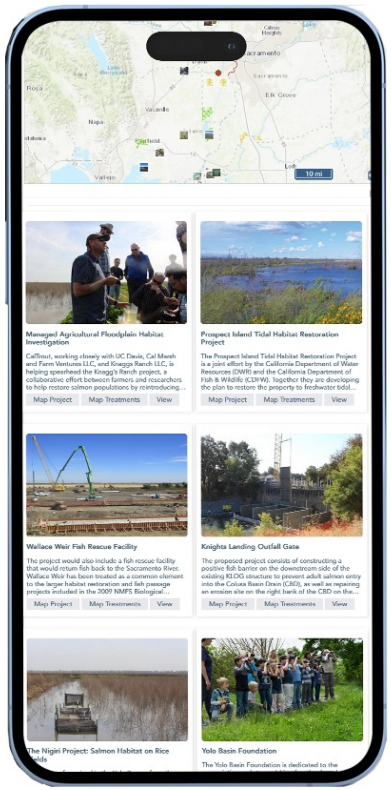
BDL APP HOMEPAGE

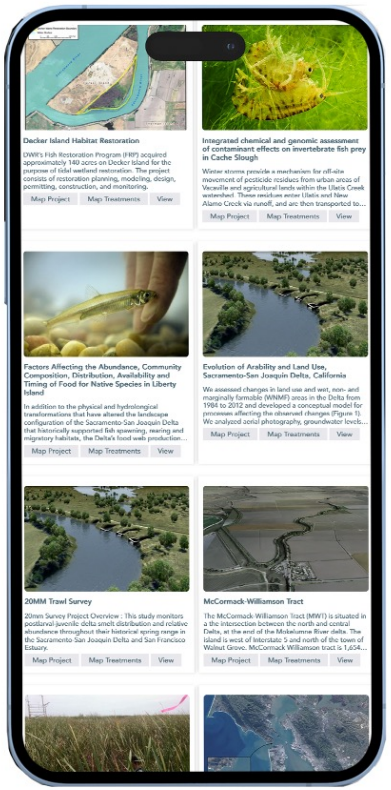


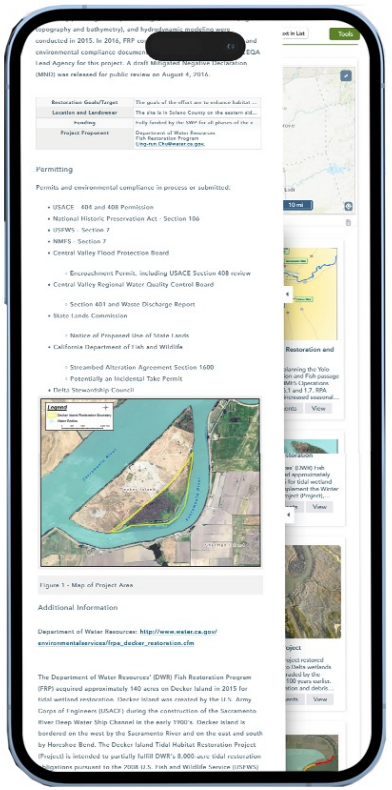


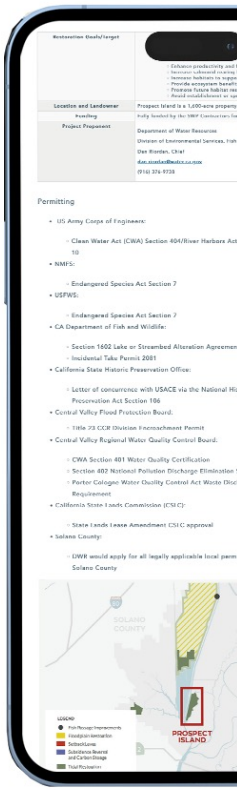


PROJECTS

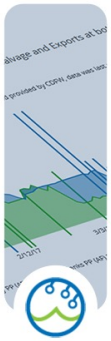




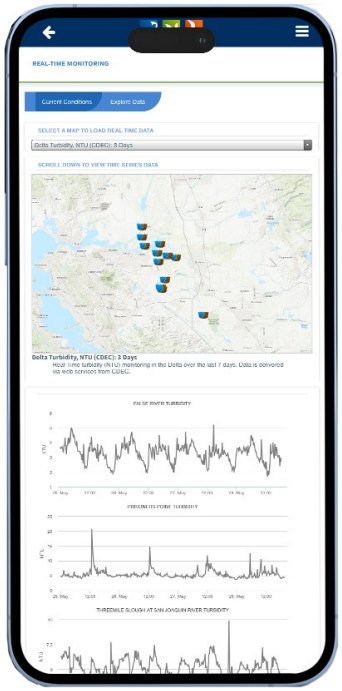


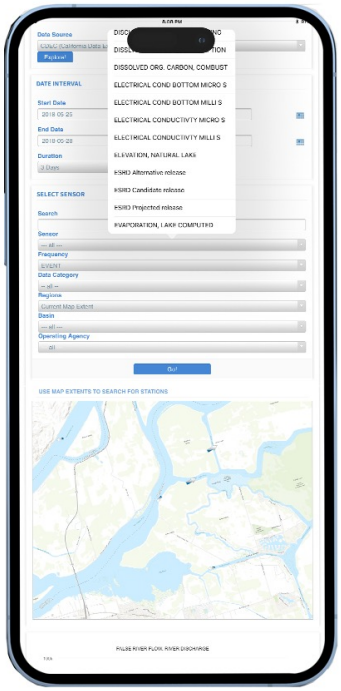


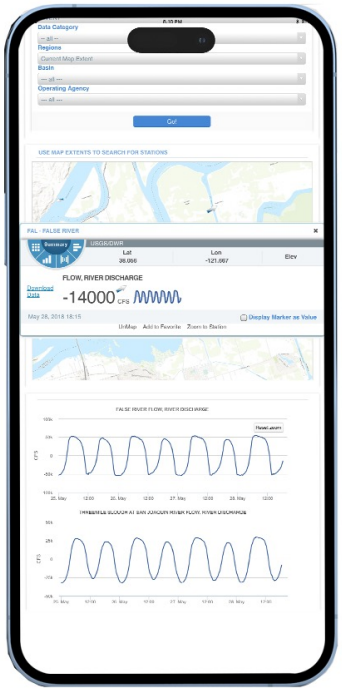
State and federal agencies have been asked to advance the restoration of at least 30,000 acres of Sacramento-San Joaquin Delta (D
habitat by 2020. Track projects in planning or underway that are driven by world-class science and guided by adaptive manageme

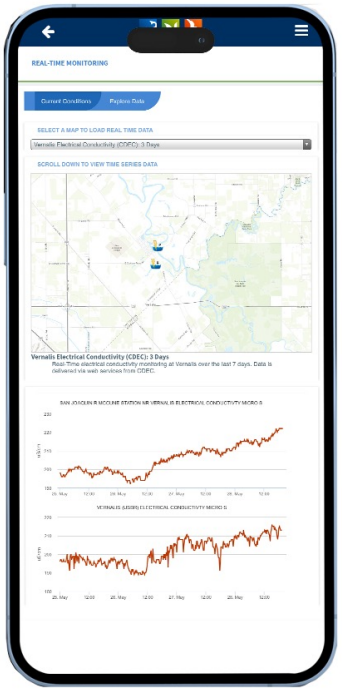


REAL-TIME MONITORING







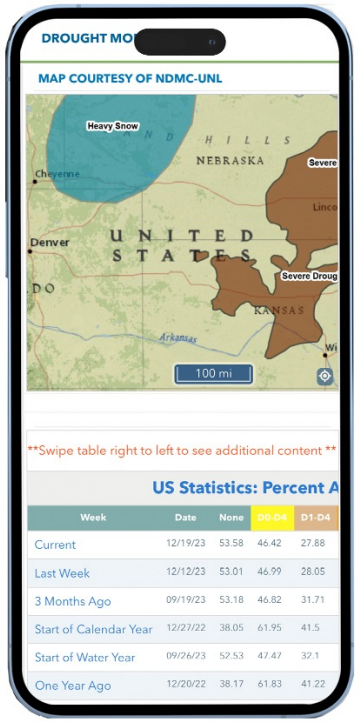


BDL data dashboards and tools for visualizing real-time conditions are better than ever.

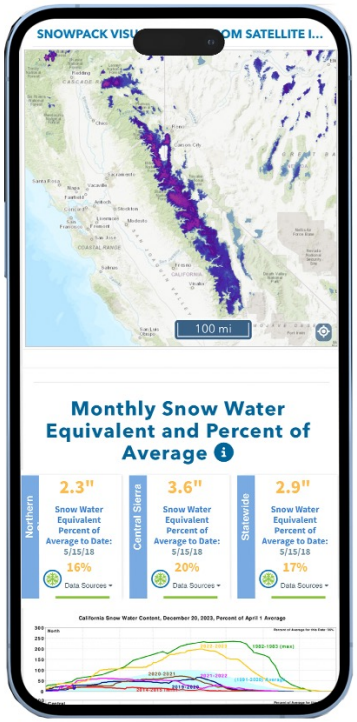
BDL brings together more than 50 disparate dataset from state and federal agencies to view current conditions for weather, fisheries, water operations, projects and

WEATHER AND CLIMATE

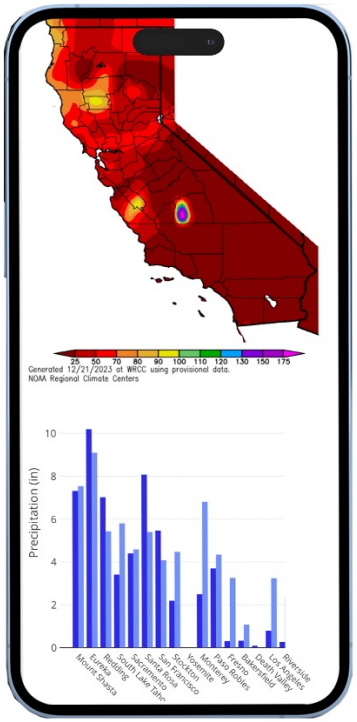
DROUGHT MONITOR



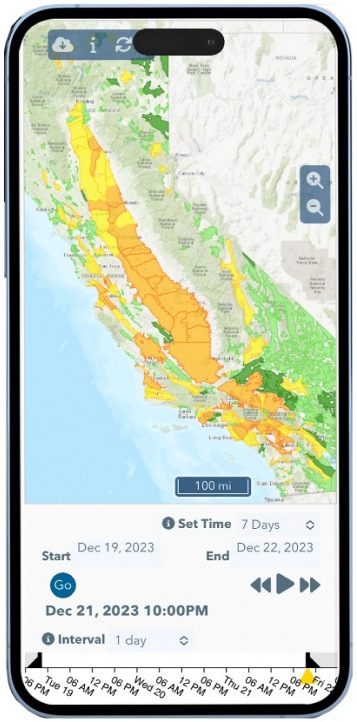
SNOWPACK



PRECIPITATION

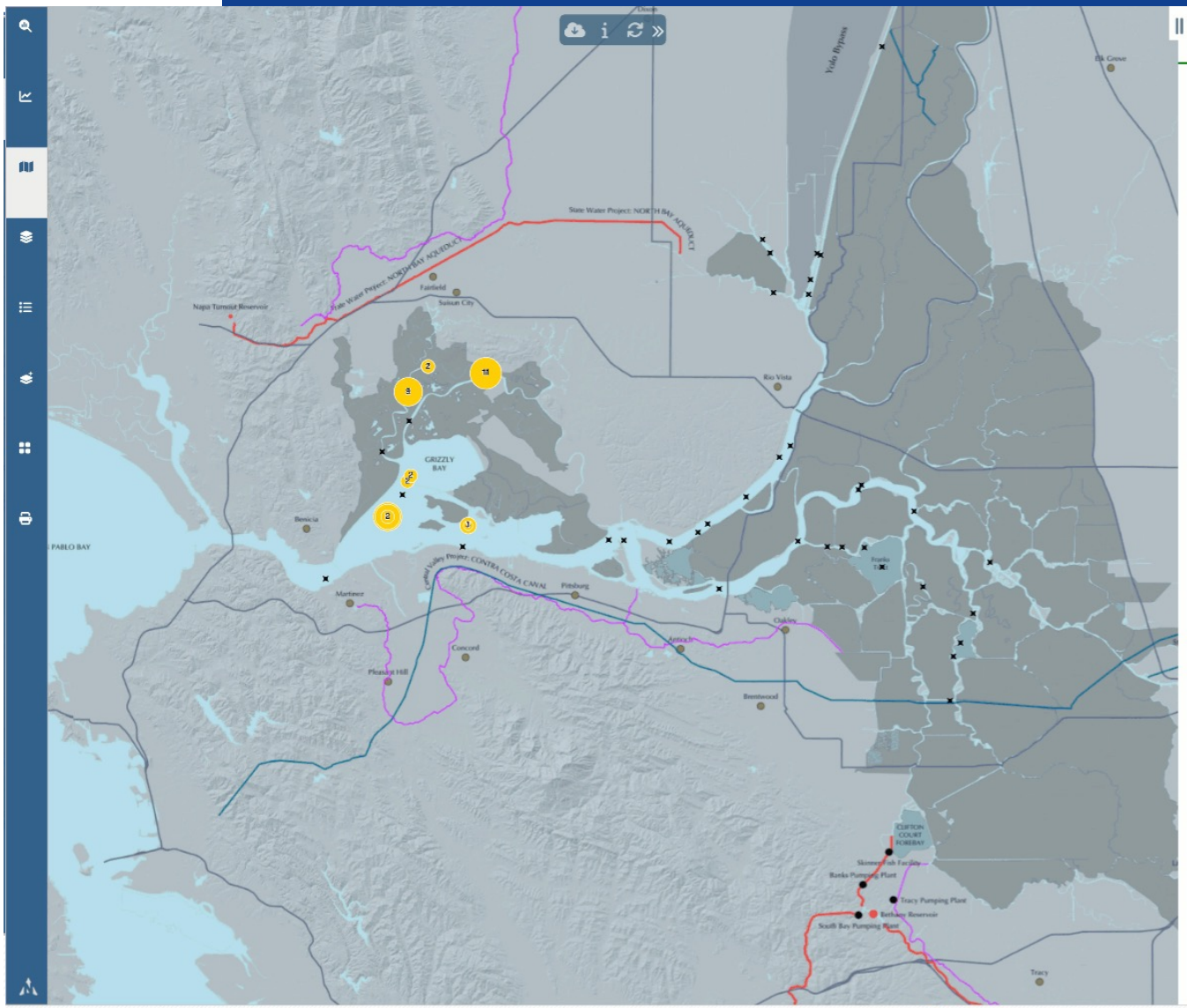


MAPS



Daily Weather and Climate Reporting for the State of California. Data includes: National Drought Monitor, Accumulated Snow Pack, State-Wide Precipitation, and Interactive Maps.

Fisheries Reporting and Delta Operations



EDSM Weekly Summary

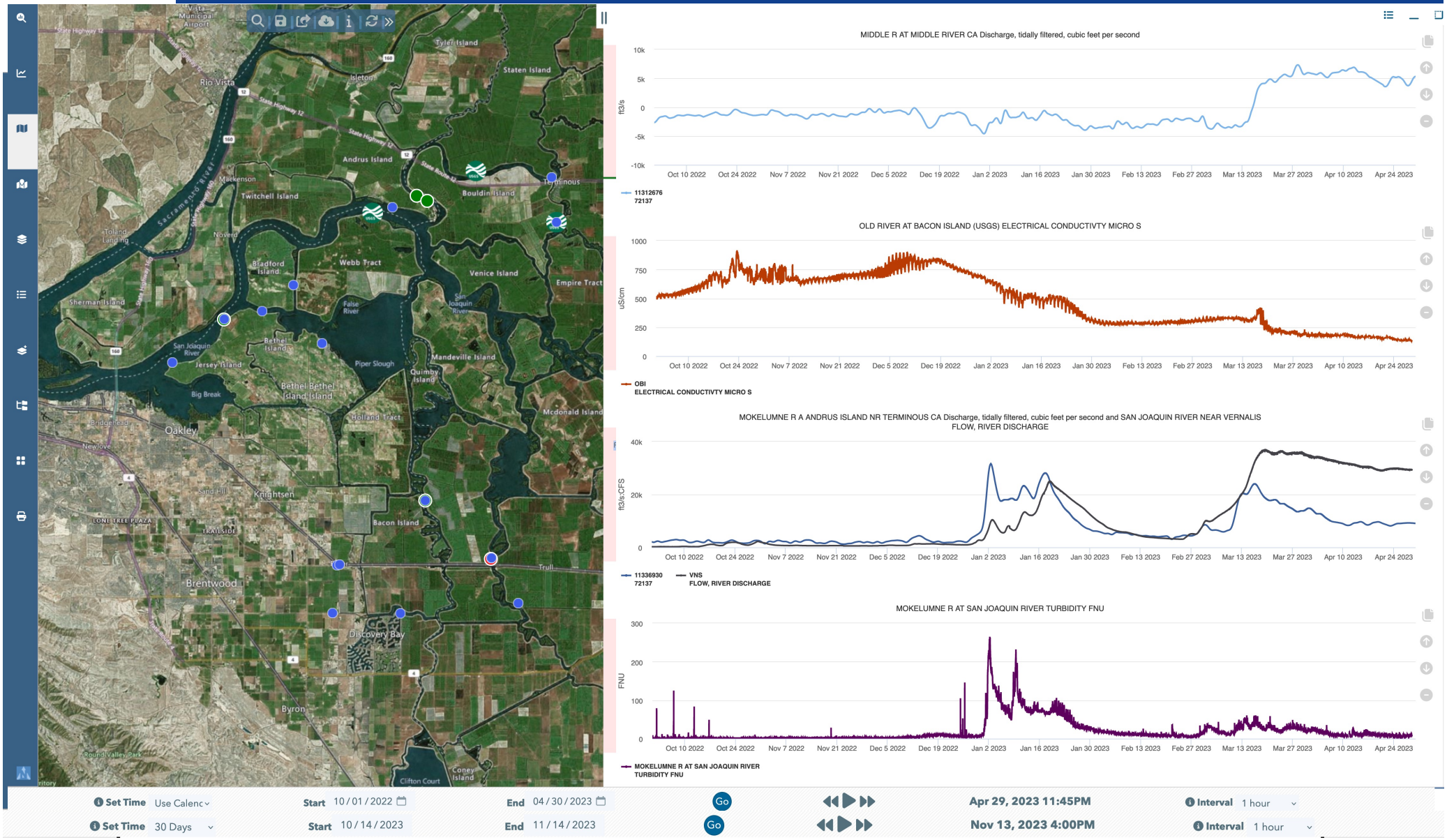
Filter by Text | Row Count 100 | Page 1 of 1

fid	Stratum	Station	Region	SubRegion	AvgEC	A
	Lower San Joaquin	23-21-LSJ05	South	San Joaquin River at Prisoners Pt	371.7750015258789	
	Southern Delta	23-21-SD06	South	Mildred Island West		
	Southern Delta	23-21-SD08	South	Middle River West	544.2	1.7999
	Southern Delta	23-21-SD09	South	Holland Cut	635.75	1.3725
	Southern Delta	23-21-SD04	South	Mildred Island West	523.5	1.7999
	Southern Delta	23-21-SD03	South	Mildred Island West	432.1999969482422	1.7999
	Lower San Joaquin	23-21-LSJ01	South	San Joaquin River at Prisoners Pt	402.8000030517578	1.2700
	Cache Slough Ll	23-21-CS05	North	Cache Slough and Liberty Island	192.0500030517578	1.2250
	Sac Deep Water	23-21-SSC03	North	Lower Sac River Ship Channel	225.1500015258789	0.6000
	Cache Slough Ll	23-21-CS02	North	Cache Slough and Liberty Island		
	Cache Slough Ll	23-21-CS03	North	Cache Slough and Liberty Island	192.42499923706055	0.7725
	Cache Slough Ll	23-21-CS06	North	Cache Slough and Liberty Island	184.4749984741211	0.7600
	Sac Deep Water	23-21-SSC01	North	Lower Sac River Ship Channel	525.5	0.2475
	Cache Slough Ll	23-21-CS01	North	Cache Slough and Liberty Island		
	Sac Deep Water	23-21-SSC02	North	Upper Sac River Ship Channel	959.75	1.2924
	Lower Sacramento	23-21-LSR01	West	Lower Sacramento River	3181.75	0.5424
	Lower Sacramento	23-21-LSR05	West	Lower Sacramento River	4135.25	0.3949
	Lower Sacramento	23-21-LSR04	North	Sacramento River near Rio Vista	656.75	0.5349
	Lower San Joaquin	23-21-LSJ06	South	San Joaquin River near Twitchell Island	488.1749954223633	1.0349
	Cache Slough Ll	23-21-CS04	North	Cache Slough and Liberty Island		
	Lower San Joaquin	23-21-LSJ02	South	San Joaquin River near Twitchell Island	474.125	1.1650
	Lower Sacramento	23-21-LSR06	North	Sacramento River near Rio Vista	639.5	
	Lower Sacramento	23-21-LSR03	North	Sacramento River near Rio Vista	163.45000076293942	0.8575
	Lower San Joaquin	23-21-LSJ03	West	Lower San Joaquin	2012.5	0.6724
	Southern Delta	23-21-SD02	South	Franks Tract		
	Southern Delta	23-21-SD05	South	Franks Tract		
	Southern Delta	23-21-SD01	South	Franks Tract	772.5	1.047
	Southern Delta	23-21-SD07	South	Franks Tract	769	1.0649
	Lower Sacramento	23-21-LSR02	West	Lower Sacramento River	4401	0.4525
	Lower San Joaquin	23-21-LSJ04	South	San Joaquin River near Twitchell Island	912.75	0.8349
	Suisun Bay	23-21-SB07	West	Confluence	11919.75	0.4374
	Suisun Marsh	23-21-SM06	West	Suisun Marsh	14581.25	0.2850
	Suisun Marsh	23-21-SM06	West	Suisun Marsh	14581.25	0.2850
	Suisun Marsh	23-21-SM06	West	Suisun Marsh	14581.25	0.2850
	Suisun Marsh	23-21-SM03	West	Suisun Marsh	11725.5	0.2450
	Suisun Marsh	23-21-SM03	West	Suisun Marsh	11725.5	0.2450
	Suisun Marsh	23-21-SM04	West	Suisun Marsh	9385.5	0.17750
	Suisun Marsh	23-21-SM04	West	Suisun Marsh	9385.5	0.17750
	Suisun Marsh	23-21-SM04	West	Suisun Marsh	9385.5	0.17750
	Suisun Bay	23-21-SB03	West	Mid Suisun Bay	20272.25	0.5049
	Suisun Marsh	23-21-SM01	West	Grizzly Bay	19464.5	0.4349
	Suisun Marsh	23-21-SM01	West	Grizzly Bay	19464.5	0.4349

Set Time | Use Calenc | Start 12 / 25 / 2022 | End 03 / 10 / 2023 | Go | Dec 25, 2022 6:16AM | Interval 1 week

Dec 18 | Dec 25 | 2023 | Jan 08 | Jan 15 | Jan 22 | Jan 29 | Feb 05 | Feb 12 | Feb 19 | Feb 26 | Mar 05 | Mar 12

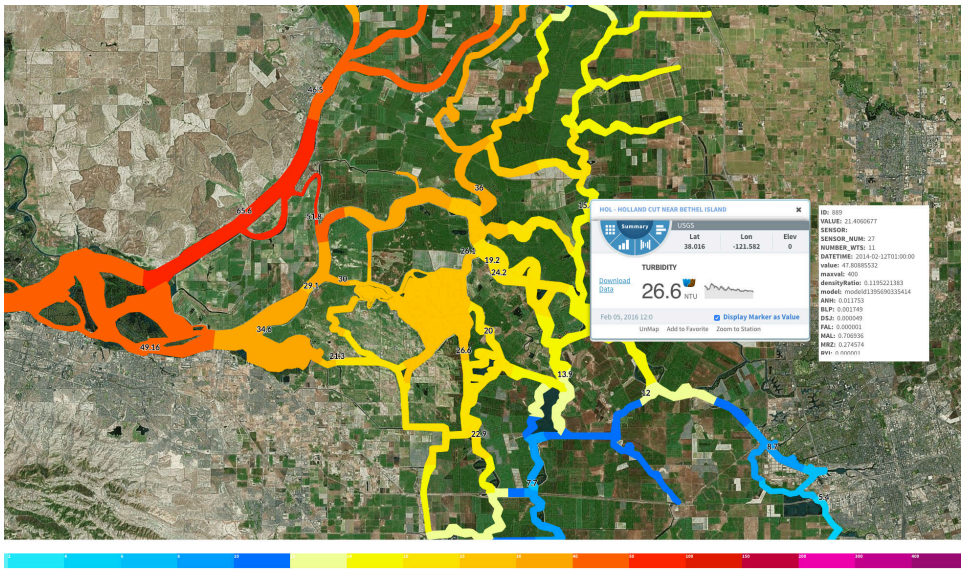
Explore Data: explore.baydeltalive.com



Constituent Tracker – Drought Monitoring and First Flush

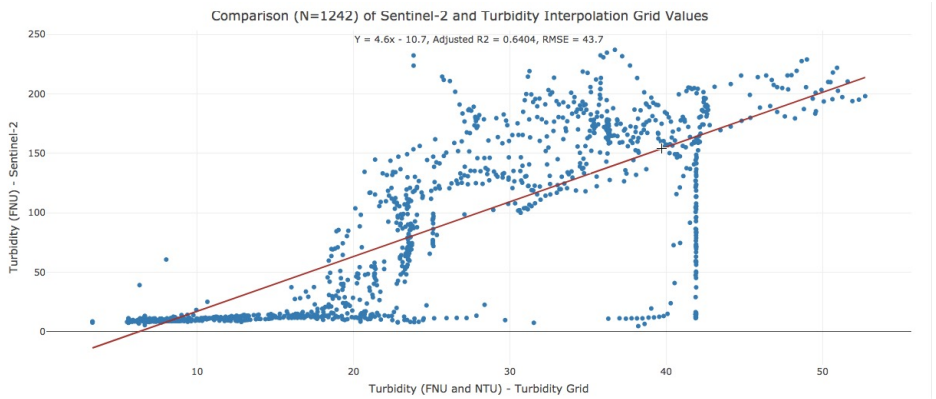
What Does it Do?

- ✓ **Data Assimilation Model**
- ✓ **Animated Spatial Maps for Real Time Constituent Tracking**
- ✓ **View Data at both 15-minute intervals or a Constant Point in Tide**
- ✓ **Advance data modeling algorithms**
- ✓ **Collaboration with USGS**

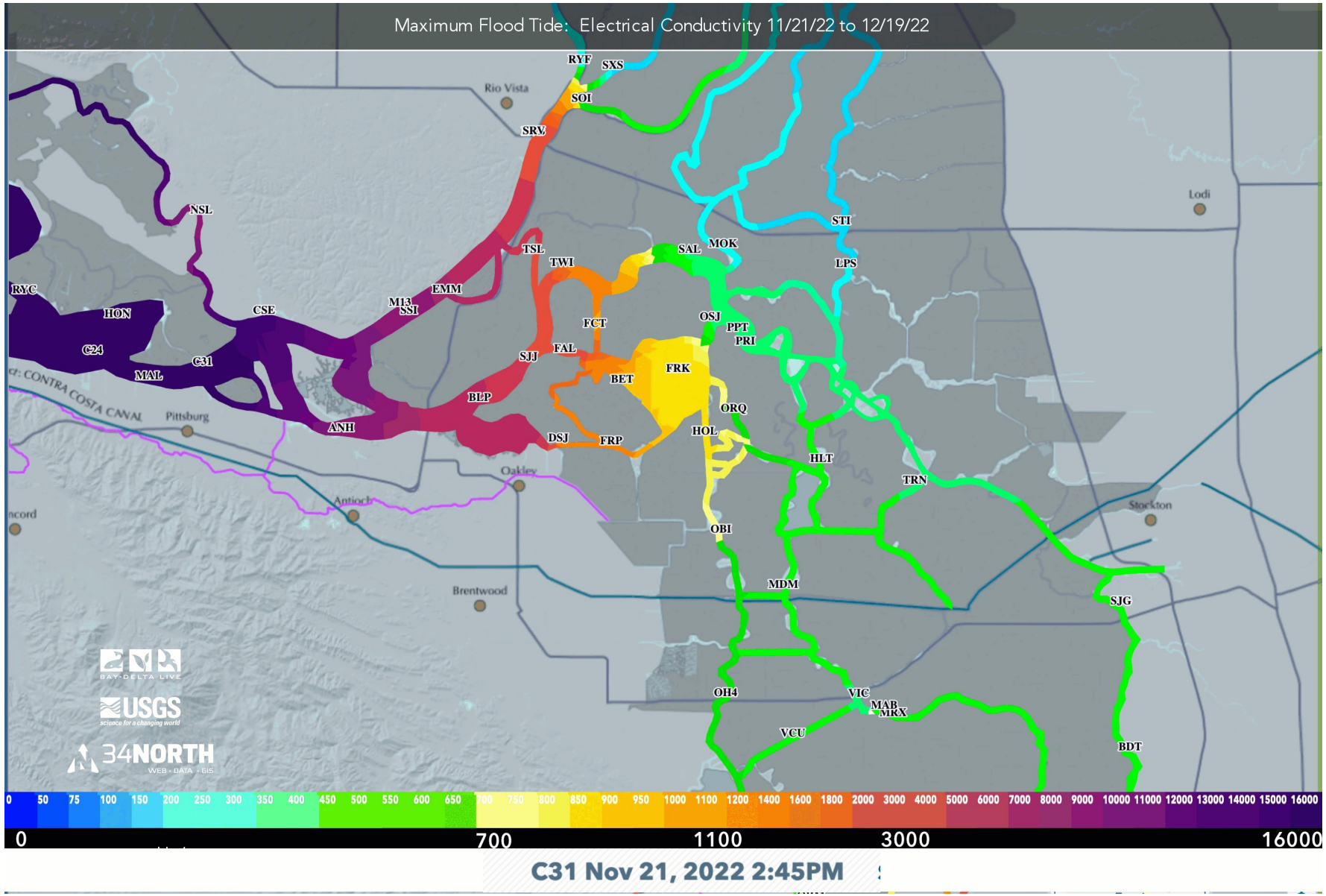


Who is Using it?

- ✓ **Drought Monitoring**
- ✓ **Trawl Managers**
- ✓ **Science Community**
- ✓ **Water Ops**



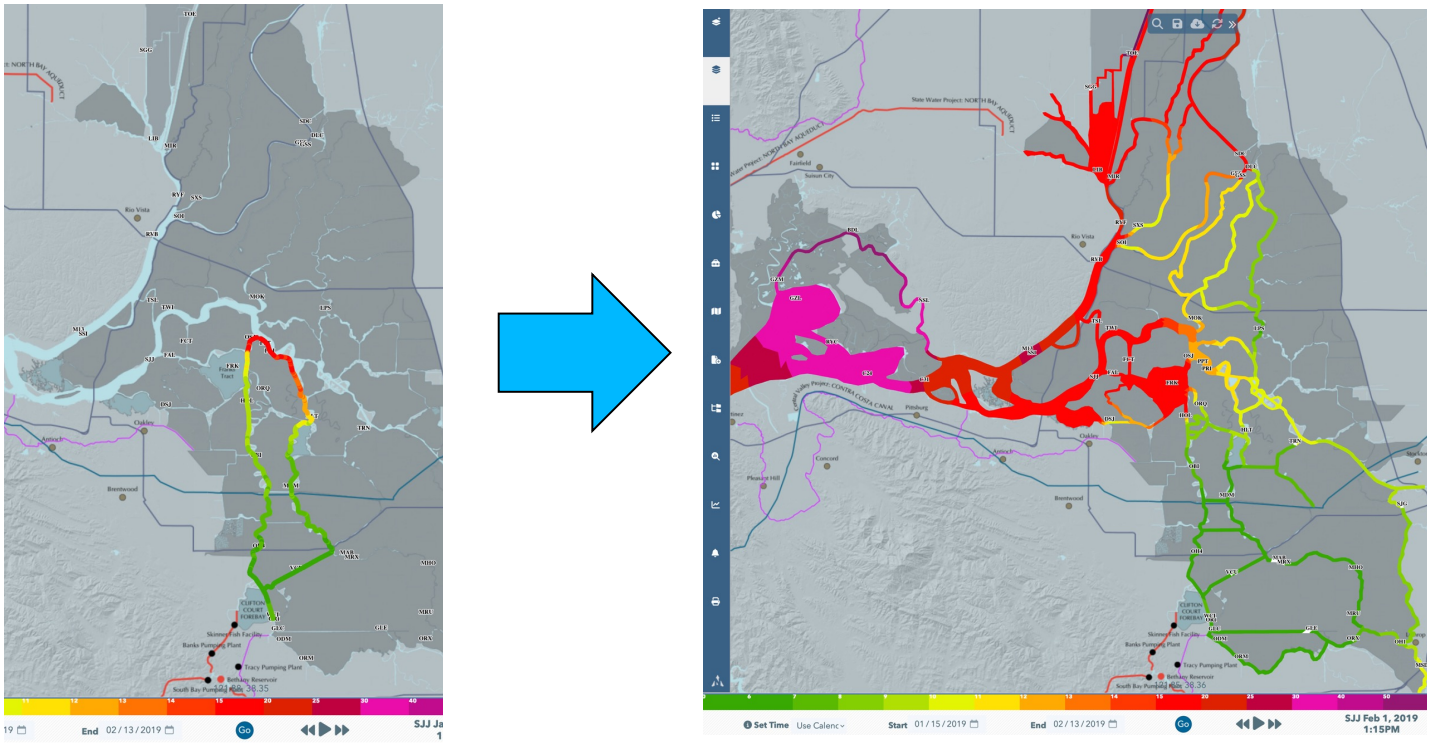
Constituent Tracker Drought Monitoring Oct. – Dec. 2022



Constituent Tracker – Replaced the DWR Turbidity Transects

What Does it Do?

- ✓ **Monitor First Flush Conditions**
- ✓ **Enhanced Accuracy of Turbidity Conditions will Improve Water Management Strategies**
- ✓ **Help Decrease Delta Smelt Entrainment and Improve Continuity of Pumping Operations**
- ✓ **Using multiple data inputs to increase certainty of environmental conditions**



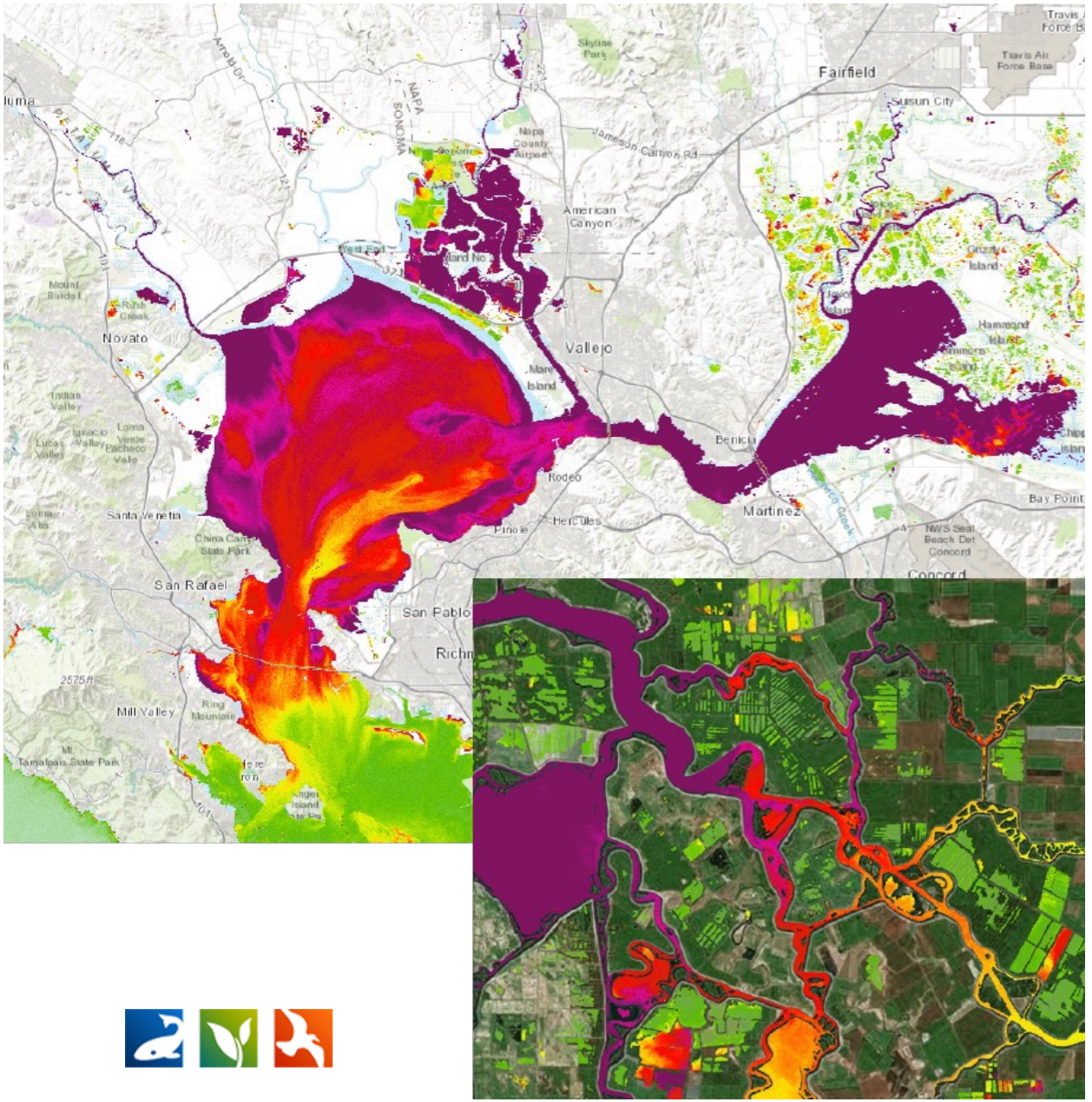
Remote Sensing –NASA/JPL Collaboration

What Does it Do?

- ✓ **Provides data and decision support tools to view and analyze current research in the remote sensing space**
- ✓ **Repository for Remote Sensing Data for and by the science community**

Who is Using it?

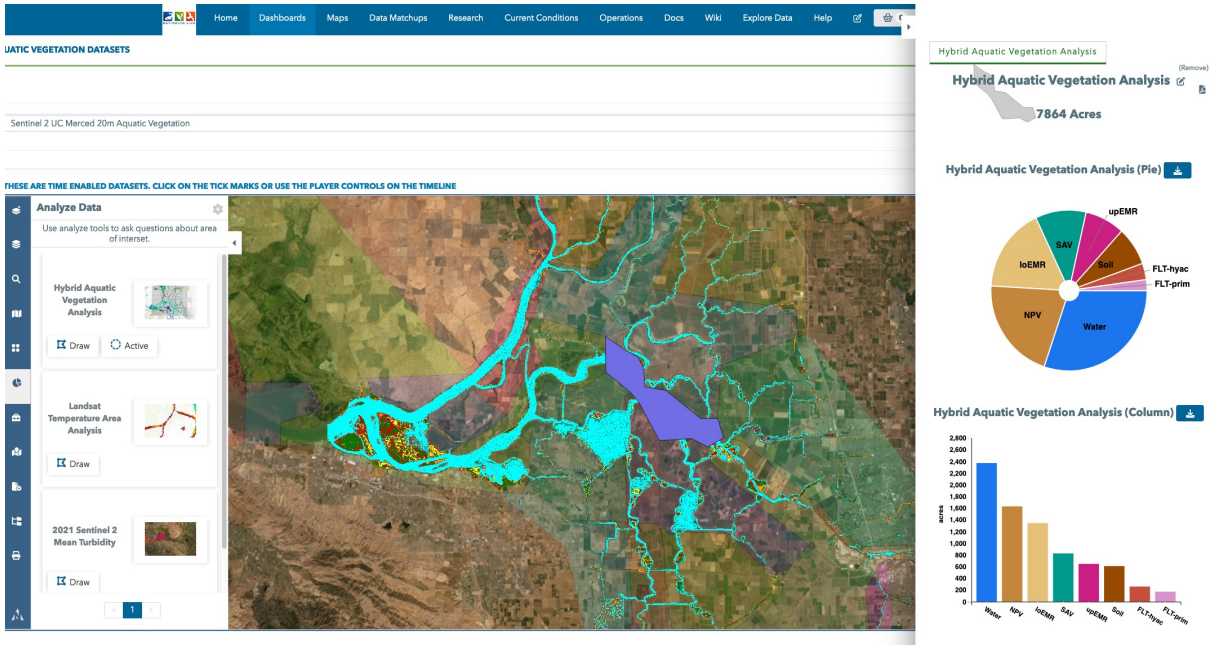
- ✓ **Managers**
- ✓ **Science Community**
- ✓ **Water Ops**



Aquatic Vegetation Mapping and Monitoring

What Does it Do?

- ✓ **Provides platform to share current research**
- ✓ **Time series visualizations**
- ✓ **Analysis Tools**
- ✓ **Repository for Remote Sensing Data**
- ✓ **Download of images cropped to selected area**
- ✓ **Synthesize with datasets on BDL**



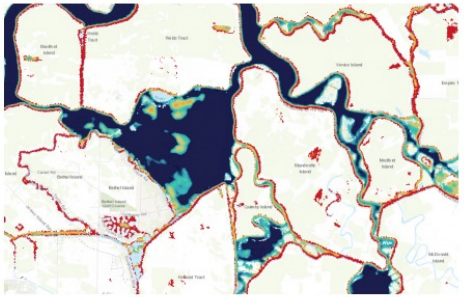
Aquatic Vegetation Mapping products available Fall 2023

Who is Using it?

- ✓ **Research Community**
- ✓ **Remote Sensing Workgroup**

Project Investigators: Erin Hestir and Christiana Ade UC Merced and Shruti Khanna, UC Davis

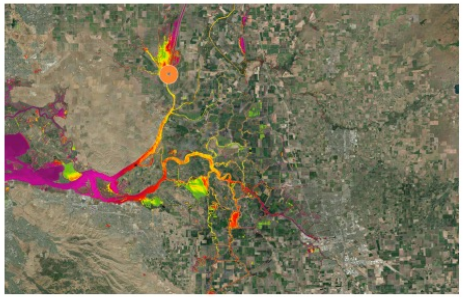
Geospatial Resources from Open Data Portals



San Francisco Bay Landsat Temperature & EDSM Fisheries...

Water surface temperature maps were derived from the Land 8 sat Level 2 Collection 2 dataset and validated using thermal radiometer data collected from 2008-2019 from a validation site on a platform in the Salton Sea (RMSE = 0.78, r...

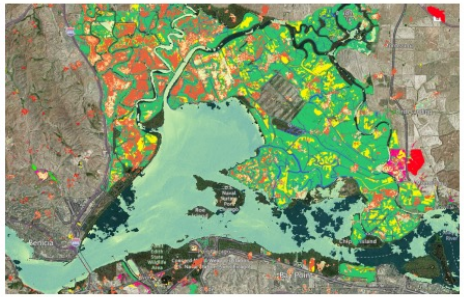
View



EDSM and L8 Nechad Turbidity

San Francisco Bay L8 Nechad Turbidty paired with Enhanced Delta Smelt Monitoring program catch data for all species of concern. EDSM set to monthly summaries.

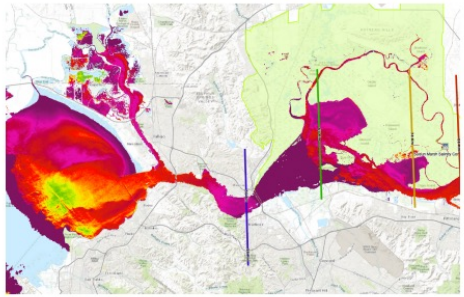
View



San Francisco Bay Mishra Chlorophyll 2016-2021

Sentinel 2 Chlorophyll Data Products using Mishra algorithm combined with the Bay Area Aquatic Resource Inventory for Wetlands (2015) used to explore the area for potential habitat types required for species restoration.

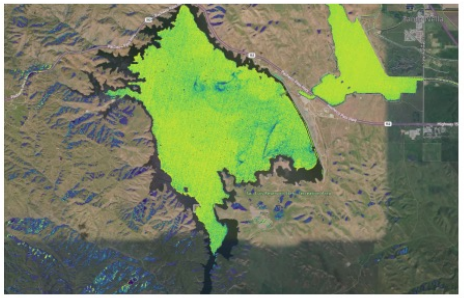
View



Suisun Marsh Turbidity During 2018 Gate Actions

This map displays turbidity in the Suisun Marsh during the 2018 Suisun Marsh Salinity Control Gates Actions. For all seven acquisitions considered from June 29 to September 27, 2018, turbidity conditions in Bays and Sloughs sub-regions were consistently higher (and...

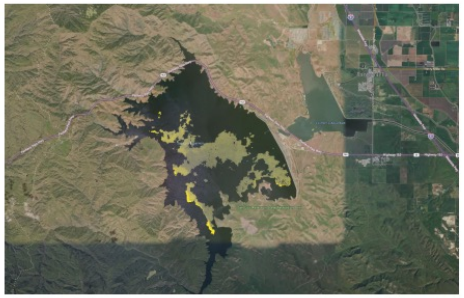
View



San Luis Reservoir Mishra Chlorophyll Map

This map displays chlorophyll-a concentrations in San Luis Reservoir derived from Sentinel 2 Imagery. The imagery was processed using the Mishra algorithm. Imagery is time enabled and can be explored using the timeline.

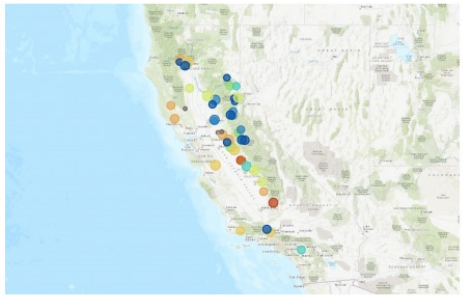
View



San Luis Reservoir L8 OC3 Chlorophyll Map

This map displays chlorophyll-a concentrations in San Luis Reservoir derived from Landsat 8 Imagery. The imagery was processed using the OC3 algorithm. Imagery is time enabled and can be explored using the timeline.

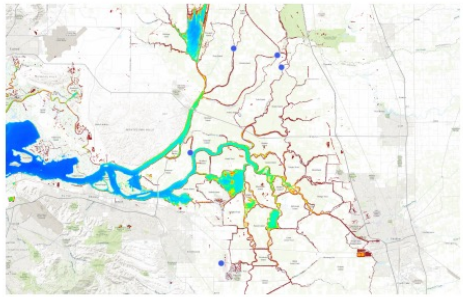
View



Reservoir Summary Conditions Map

This map shows near real time reservoir capacity at the major reservoirs across the state. Data retrieved daily from the California Data Exchange Center.

View

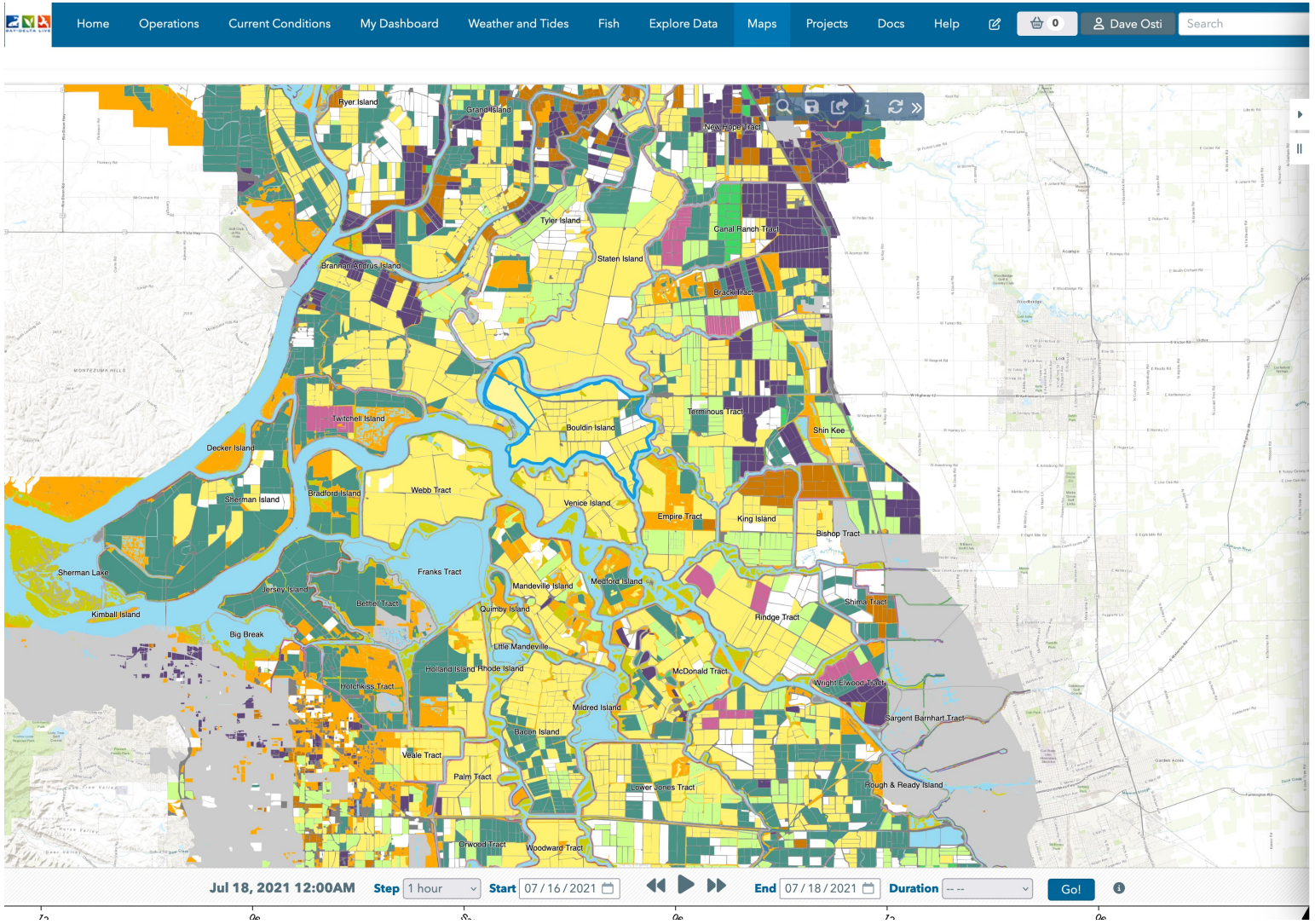


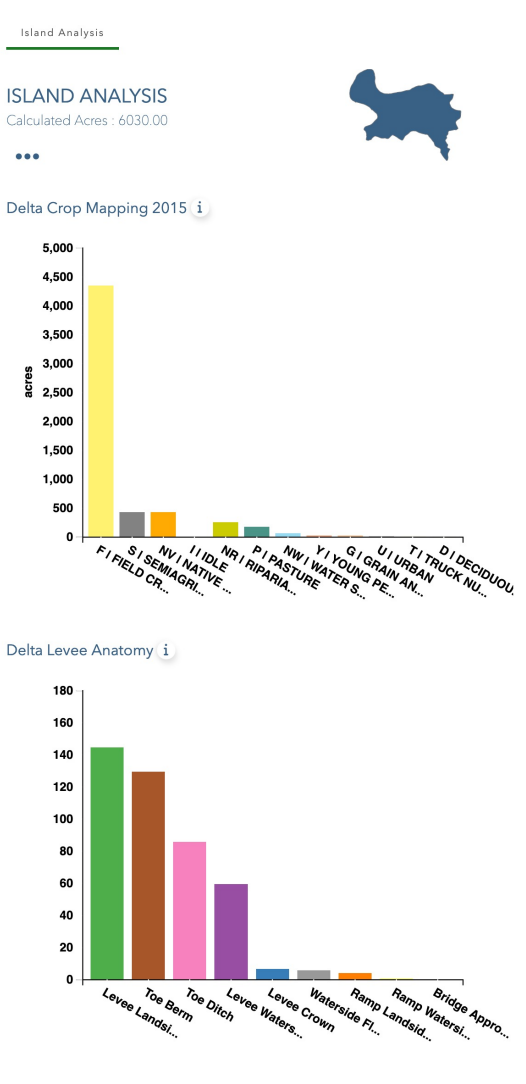
Landsat and CDEC stations for Water Temperature Spring...

Landsat Temperature data paired with 5 Celsius real time stations in the Sacramento San Joaquin Bay Delta. Color scale ranges from 10-28.6 Degree Celsius.

View

Geospatial Resources – GIS Reporting

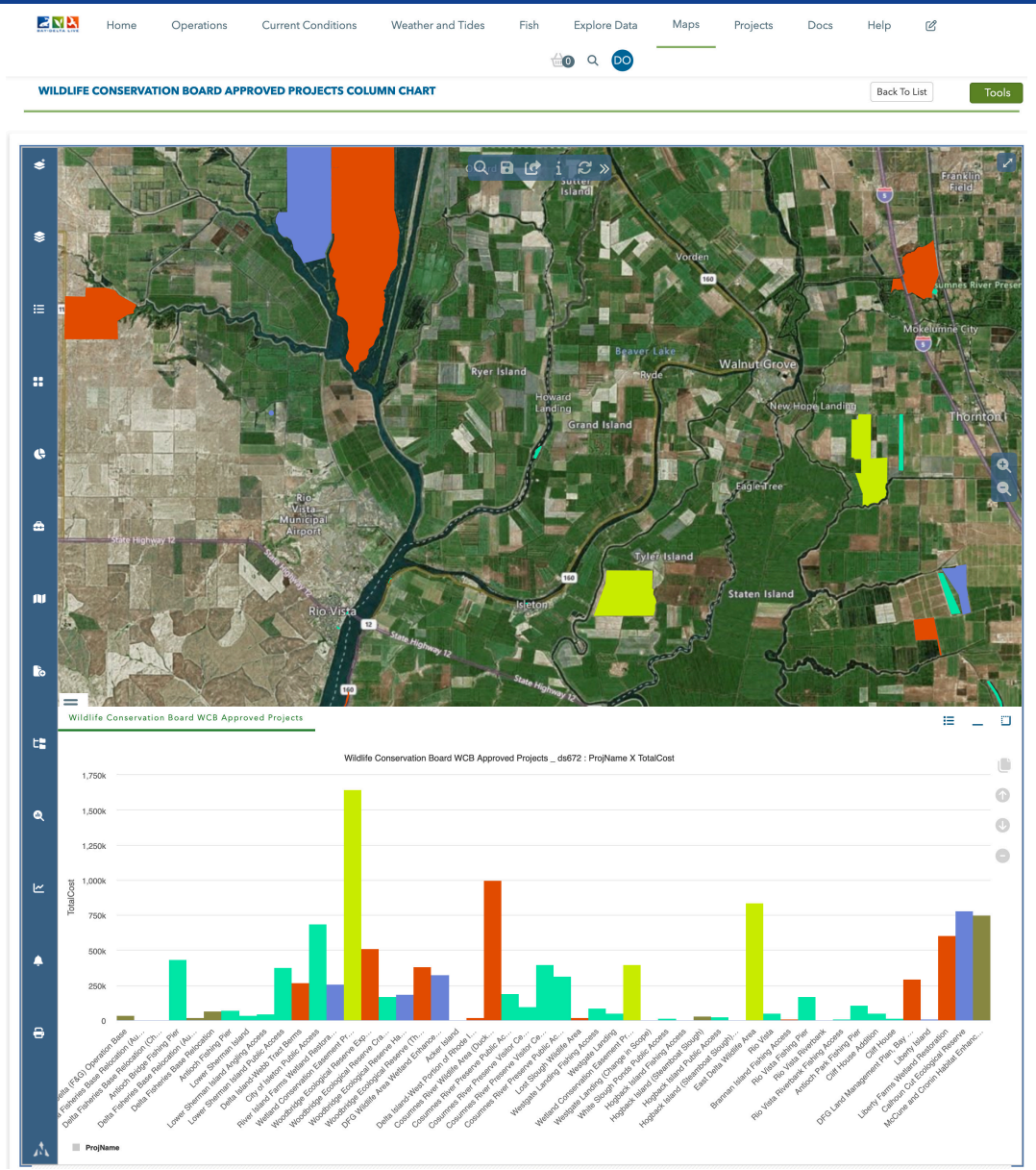




Geospatial Resources – GIS Analytics

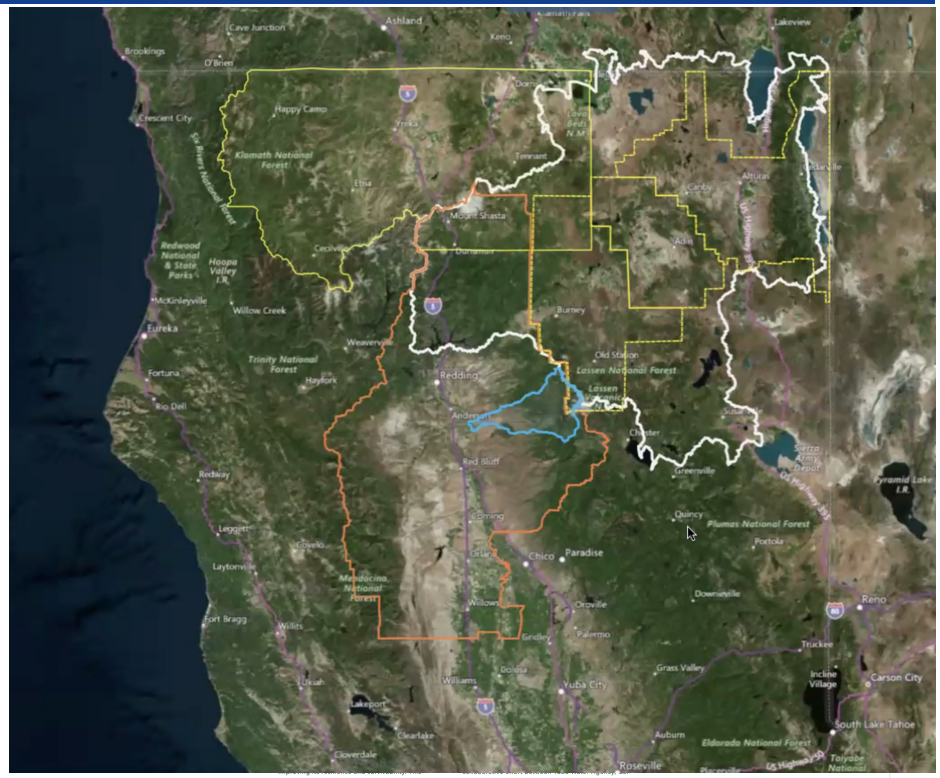
What Does it Do?

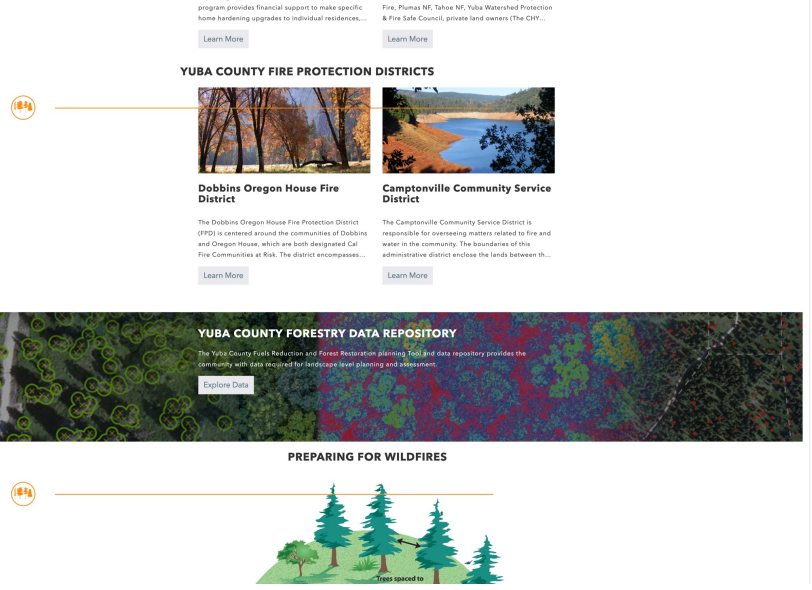
- ✓ **Dynamic Attributes Analysis**
- ✓ **Move the Map to Generate Analytic Data**
- ✓ **Customizable Graph Data**



Upper Watershed Forestry Management Portals

- ✓ **Forest and Watershed Management of Project Data and Analysis**
- ✓ **34 North Data Portals Manage 8 Million Acres in the Upper Sacramento Watershed**
- ✓ **Aggregate Project Data to Distribute to CA Agencies**
- ✓ **2024 Lidar Analysis for Forest Structure and Assessment: Collaboration with University of Washington**
- ✓ **Sacramento Watershed, Shasta, Siskiyou, Burney Hat, Modoc, Battle Creek Data Portals**





2024 New Data and Tools

- ✓ Operationalize Water Data Library
- ✓ Operationalize ECOSTRESS NASA Remote Sensing
- ✓ Aquatic Vegetation Mapping
- ✓ Upgrade EDSM/DJFMP Daily and Weekly Reports
- ✓ Integrate OpenET Models
- ✓ LiDAR
- ✓ Upper Watersheds

Download The BDL App

https://www.baydeltalive.com

THANK YOU!

ZOOPLANKTON MONITORING IN THE SAN FRANCISCO BAY-DELTA ESTUARY

What Are They ?

Zooplankton are small aquatic invertebrates (animals without backbones) that drift in the water with prevailing currents. Although they do not have the ability to swim against currents, some use behaviors, such as vertical migration, to maintain their approximate positions in the estuary. There are many different types of zooplankton in the San Francisco Estuary (SFE); including mysids, copepods, cladocerans, rotifers, and some amphipods.

Zooplankton can live in the open-water portion of the estuary (pelagic), near the bottom of the water column (epibenthic), while others live on submerged aquatic vegetation. Some zooplankton are grazers that eat phytoplankton, ciliates, and detritus, while others are predatory and eat smaller zooplankton.

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Why Is Zooplankton Important ?

Zooplankton are an important component of the aquatic food web of the SFE. They eat phytoplankton and in turn are eaten by other zooplankton, aquatic insects, and fish; thereby providing an important link between primary producers and fish. Most larval and juvenile fish eat zooplankton. Some smaller fish, such as Delta Smelt and Longfin Smelt, rely on zooplankton for food throughout their lives.

READ MORE →

Zooplankton sample stained with Rose Bengal dye (pink) preserved in a sample jar with 10% formalin agter collection. Photo courtesy of April Hennessy, CDFW

Questions Answered

- What are estuaries , And why are they important ?
- What are California's estuaries ?
- How healthy are California's estuaries ?
- What being done to protect California's estuaries ?
- How can i be part of the solution ?

ZOOPLANKTON MONITORING IN THE SAN FRANCISCO BAY-DELTA ESTUARY

How Are They Monitored?

Department of Fish and Wildlife's Zooplankton Study

The California Department of Fish and Wildlife's Zooplankton Study determines the composition (what kinds?), abundance (how many?), and distribution (where are they?) of zooplankton in the upper SFE as part of the Interagency Ecological Program's Environmental Monitoring Program (EMP). The Zooplankton Study monitors zooplankton in the upper SFE from San Pablo Bay east through the Delta.

Seventeen fixed sites are currently sampled monthly. Three additional fixed sites are sampled monthly only when specific conductance is below twenty milliSiemens per centimeter. Additional floating (non-fixed) sites are sampled in the entrapment zone. Entrapment zone sites are sampled where the bottom specific conductivity is two milliSiemens per centimeter and six millisiemens per centimeter.
Since 1995, zooplankton samples from each site have been collected monthly during the DWR Discrete Water Quality Monitoring. Water quality and phytoplankton samples are also collected at each site. Prior to 1995, zooplankton was not always sampled during the winter, and in some years was sampled twice monthly during spring and summer.

READ MORE →

Questions Answered

- What are estuaries , And why are they important ?
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- What being done to protect California's estuaries ?
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ZOOPLANKTON MONITORING IN THE SAN FRANCISCO BAY-DELTA ESTUARY

Water Rights Decision 1641 Compliance

The State Water Resouces Control Board (SWRCB) establishes water quality objectives and monitoring plans to protect variety of beneficial uses of the water within the upper San Francisco estuary.

READ MORE →

2015 Summary

The State Water Resources Control Board (SWRCB) establishes water quality objectives and monitoring plans to protect the variety of beneficial uses of the water within the upper San Francisco estuary. The SWRCB ensures that these objectives are met, in part, by issued to DWR and USBR as conditions for operating the SWP and CVP, respectively. These requirements includes minimum outflows, limits to water diverstion by the SWP and CVP, and maximum allowable sailinity levels. In addition, DWR and USBR are required to conduct a comprehansive monitoring program to determine compliance with the water quality objectives and reports the finding to the SWRCB. Water qiality objectives were issued in December 1999 by D-1641(SWRCB,1999) and revised by order WR 2000-02 in March 2000.

READ MORE →

Reports

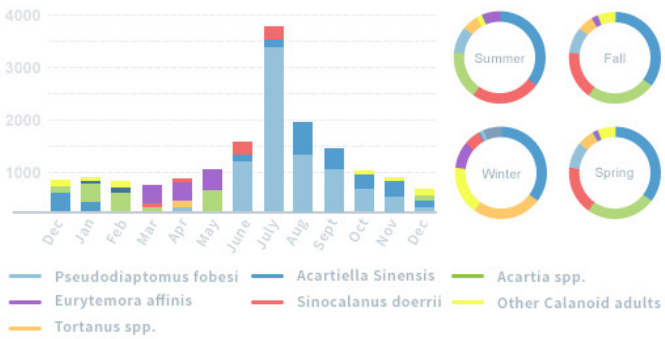
Water Rights Decision 1641
Description of Department of Water Resources Compliance with State Water Resources Control Board Water Right Decision 1641

2011 Water Quality Conditions
Implementation of water quality objectives for the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays

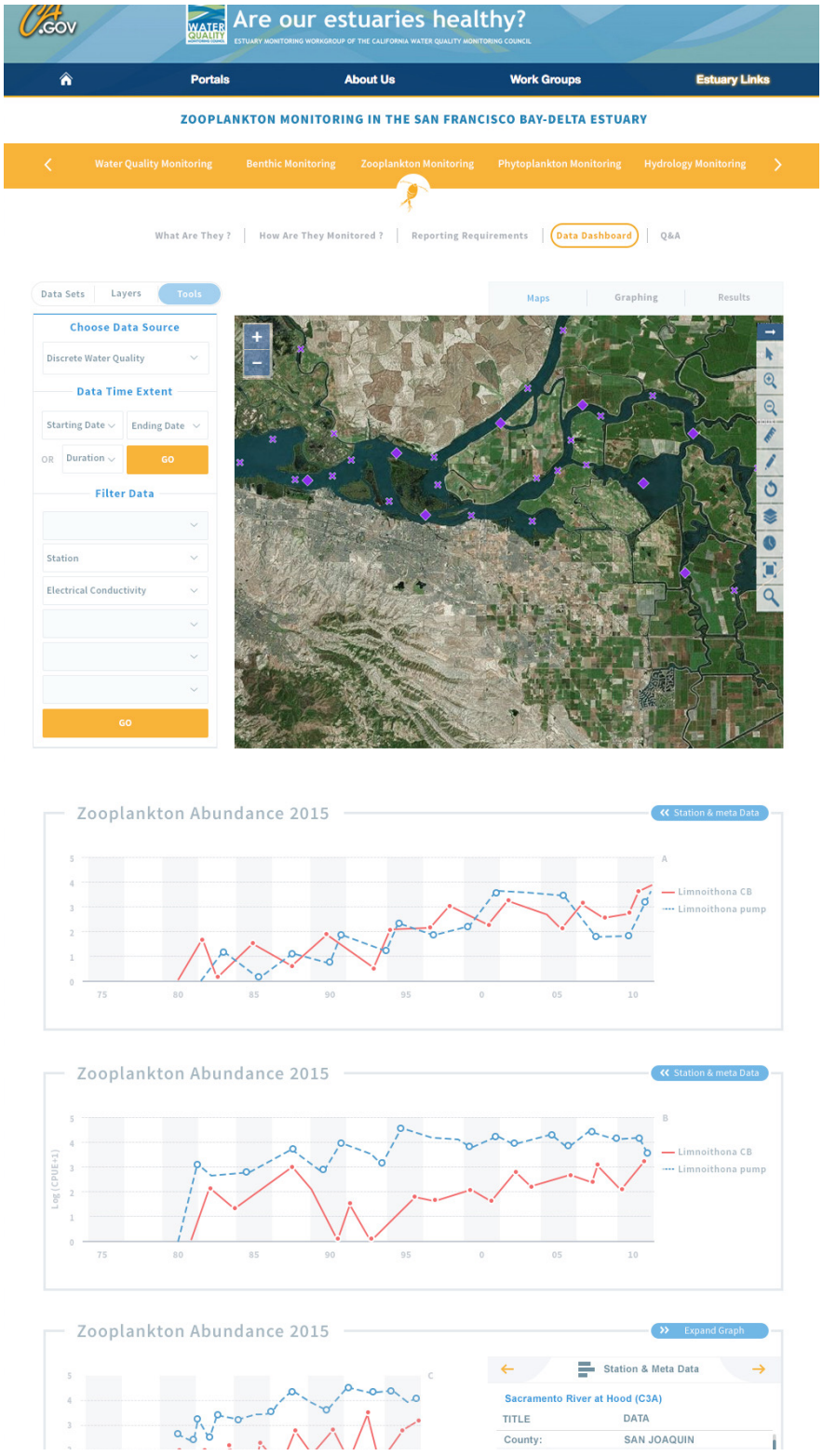
Revised Water Rights Decision 1641
Implementing flow objectives for the Bay-Delta Estuary, approving a petition to change points of diversion of the Central Valley Project and the State

2010 Water Quality Conditions
Implementation of water quality objectives for the Sacramento-San Joaquin Delta and Suisun and San Pablo Bays

2015 Zooplankton Data Highlights



Relative abundance of the most common calanoid copepods (percent mean catch*m-3) from the CB net from all stations by seasons and by months in 2015. Seasonal pie charts include winter (December 2014-February 2015), spring (March-May 2015), summer (June-August 2015), and fall (September-November 2015). Bar graph shows average monthly CPUE of the most common calanoid copepods.


Are our estuaries healthy?
ESTUARY MONITORING WORKGROUP OF THE CALIFORNIA WATER QUALITY MONITORING COUNCIL
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Estuary Links
ZOOPLANKTON MONITORING IN THE SAN FRANCISCO BAY-DELTA ESTUARY
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Benthic Monitoring
Zooplankton Monitoring
Phytoplankton Monitoring
Hydrology Monitoring
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Tools
Choose Data Source
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Data Time Extent
Starting Date
Ending Date
OR
Duration
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Filter Data
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GO
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Graphing
Results
Zooplankton Abundance 2015
Station & meta Data
A
Limnoithona CB
Limnoithona pump
Zooplankton Abundance 2015
Station & meta Data
B
Log (CPUE+1)
Limnoithona CB
Limnoithona pump
Zooplankton Abundance 2015
Expand Graph
Station & Meta Data
Sacramento River at Hood (C3A)
TITLE
DATA
County:
SAN JOAQUIN