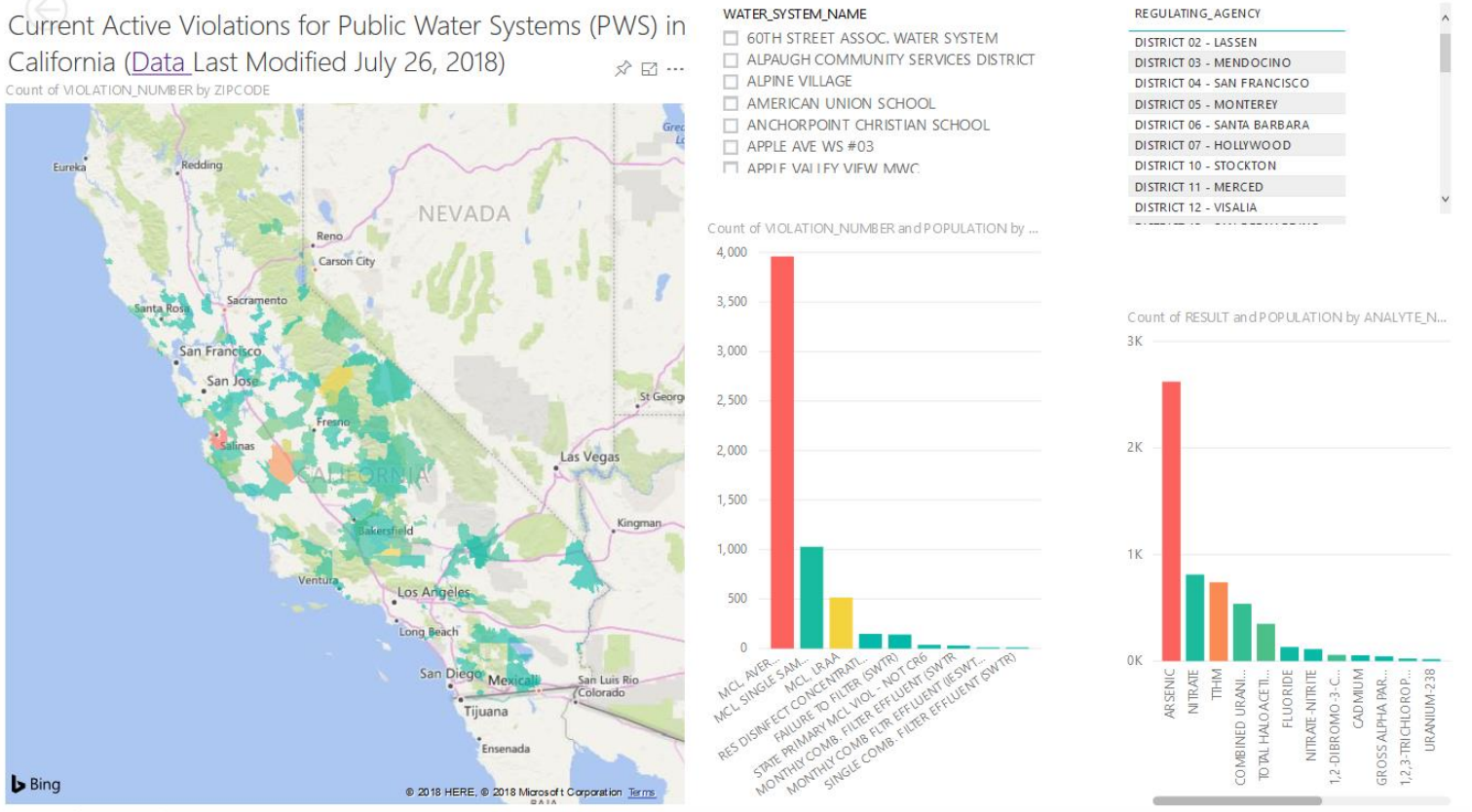
California State Water Resources Control Board
DATA CENTER

Data Engagement Initiatives at the Water Resources Board

California State Water Resources Control Board
Office of Information Management & Analysis

Overview

- CA Water Boards 101
- Build Capacity / Infrastructure at WB
  - Data Flows
  - Data Literacy
- Foster Engagement
- Create Data Products
- Open Data Resolution



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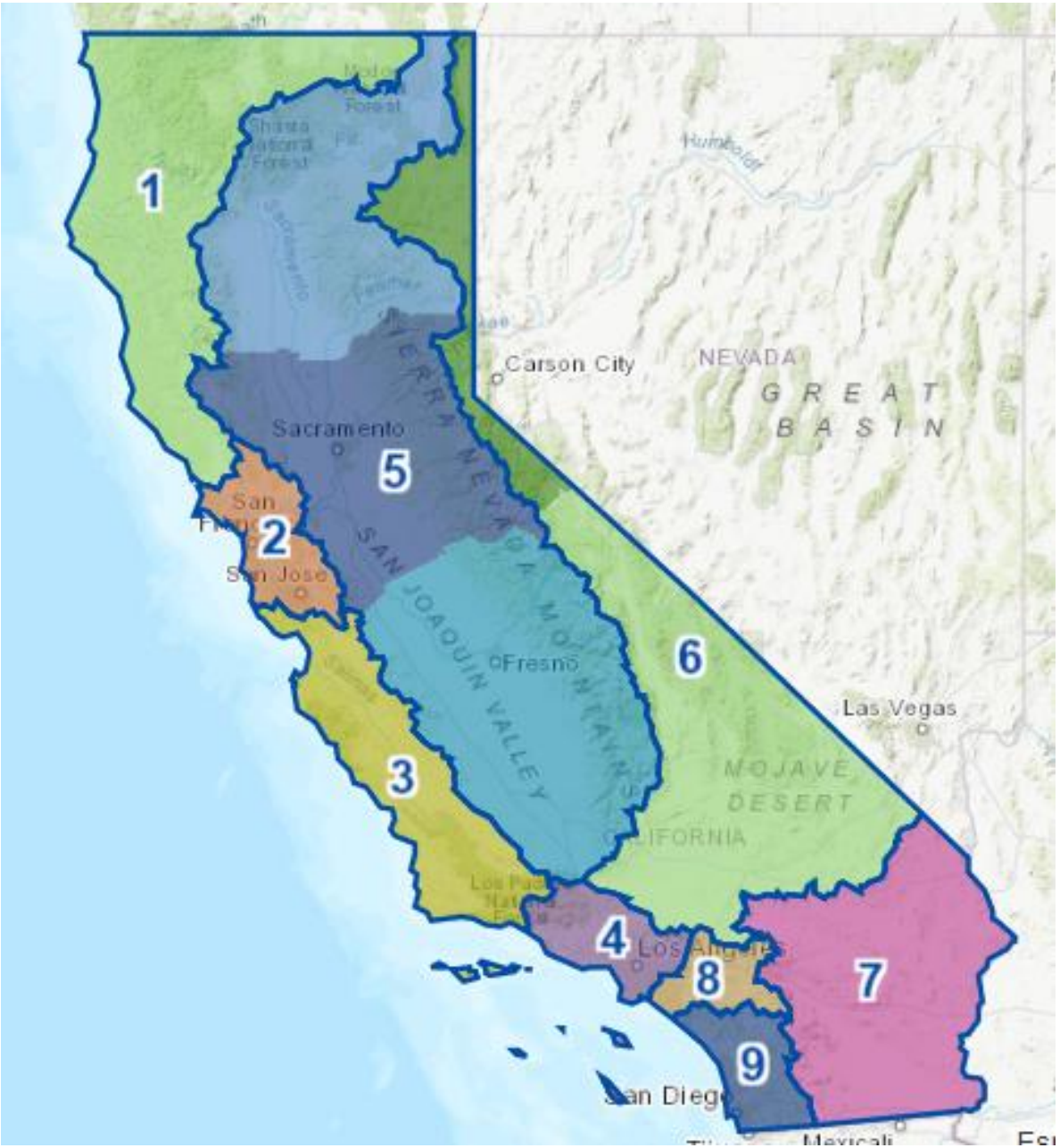
CA Water Boards

- 10 Boards (9 Regional WQ, 1 State WR)
- 68 (7*9 + 5*1 = 68) Governor-appointed Board Members
- State Board has water quality, water rights, drinking water, funding and fiscal/administration duties



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Water Boards by the Numbers

- Water Quality, Water Rights and Drinking Water number (as of June 30, 2018)
  - **10** Boards, **43** office locations
  - **18** drinking water offices, **25** State and Regional Board office locations
  - **>45** programs, ~**15** core regulatory programs
  - **2178** positions, **338** in supervisory / management positions
  - **$736,000,000** annual operating budget
  - Regulate ~**38,000** dischargers
  - Allocate ~**34,000** water right holders
  - Plan/Assess **$37,600,000** in monitoring
  - Fund **$902,000,000** in local assistance funding and cleanup
  - Fund **$10,600,000,000** in loans (as of June 30, 2018)
  - Fund **$20,000,000** in penalties assessed in 2017

Background

- September 2016 – **AB 1755: *The Open and Transparent Water Data Act***
  - Develop an integrated platform for existing water and ecological data
  - Make water-related data, tools, and applications developed using state funds publicly accessible
  - Promote principles of openness and interoperability ("making information accessible, discoverable, and usable by the public can foster entrepreneurship, innovation, and scientific discovery")
- July 2018 – **State Water Resources Control Board Resolution 2018-0032: *Adopting Principles of Open Data as a Core Value and Directing Programs and Activities to Implement Strategic Actions to Improve Data Accessibility and Associated Innovation*** (link)
  - Make Data Accessible ("Open First"): make all critical public data available in machine readable datasets with metadata and data dictionaries
  - Understand Data Quality and Integrity: ensure data are of known and acceptable quality; deploy practices to protect its integrity with standards and protocols

Background

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What is Open Data?

According to Project Open Data[1]:

- **Public** – presumption in favor of openness
- **Accessible** – available in convenient, modifiable, and open formats that can be retrieved, downloaded, indexed, and searched; format should be machine-readable (i.e., data are structured to allow automated processing)
- **Described** – provide sufficient information to understand strengths, weaknesses, analytical limitations, security requirements, as well as how to process (metadata and data dictionaries)
- **Reusable** – available under an open license with no restrictions on use
- **Complete** – published with the finest possible level of granularity that is practicable; aggregate data should reference the primary data
- **Timely** – made available as quickly as necessary to preserve the value of the data, accounting for key audiences and downstream needs
- **Managed Post-Release** – point of contact to assist with data use

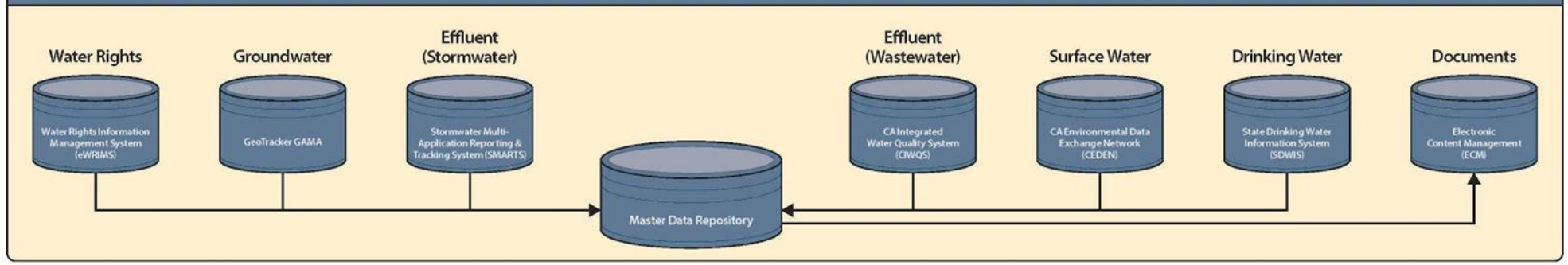
[1]project-open-data.cio.gov/principles/

Build Capacity

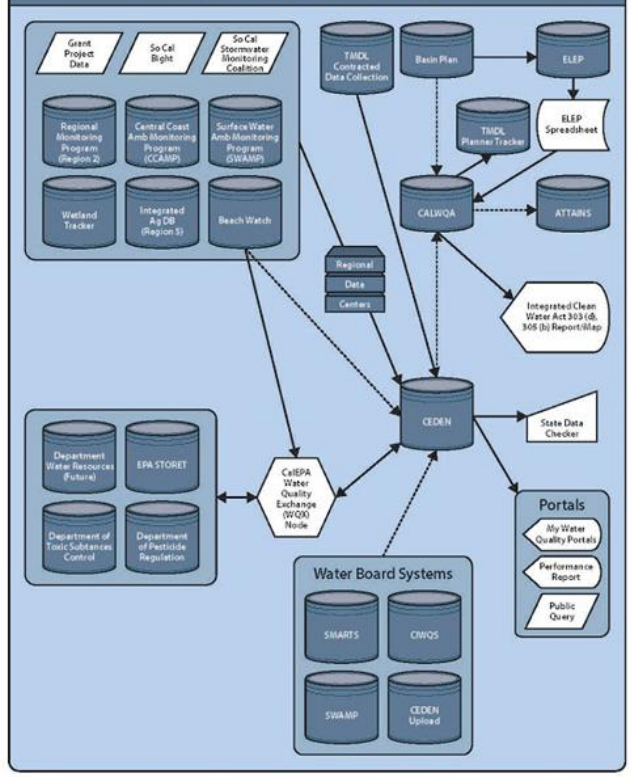
Improve Data Flows / Build Open Architecture and Infrastructure

Enhance organization-wide ‘data literacy’

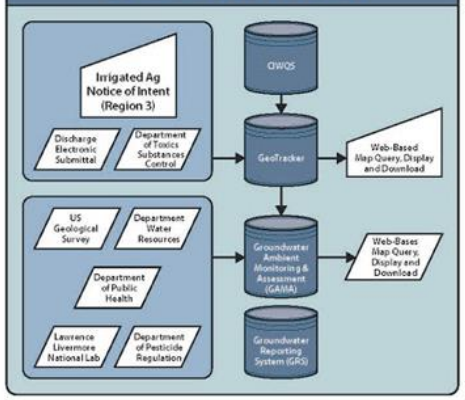
WATER BOARDS' ENTERPRISE TECHNOLOGY APPLICATIONS AND SYSTEMS INFRASTRUCTURE



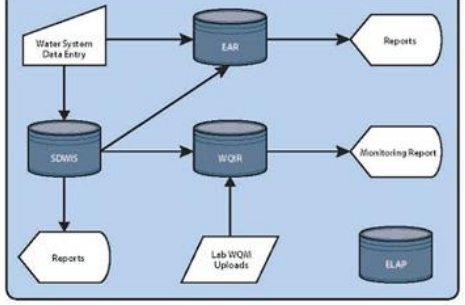
SURFACE WATER



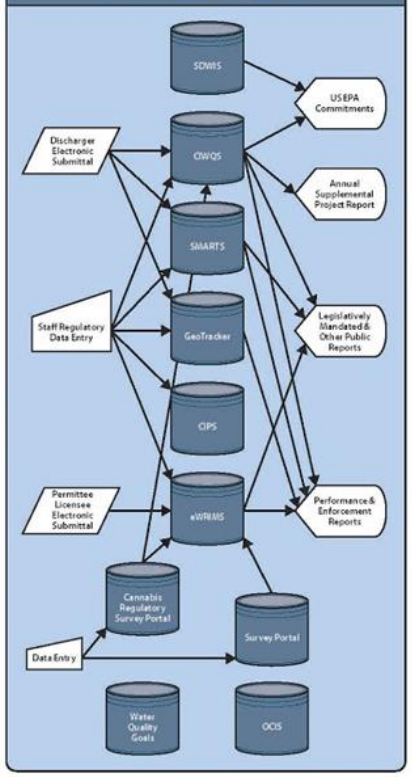
GROUNDWATER



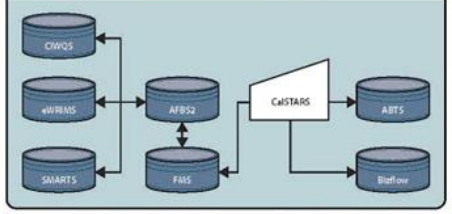
DRINKING WATER



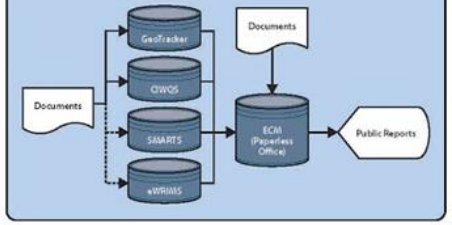
REGULATORY



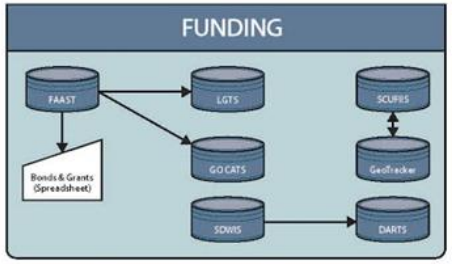
ADMINISTRATION



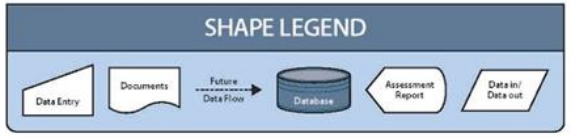
WORKFLOW & DOCUMENT STORAGE



FUNDING

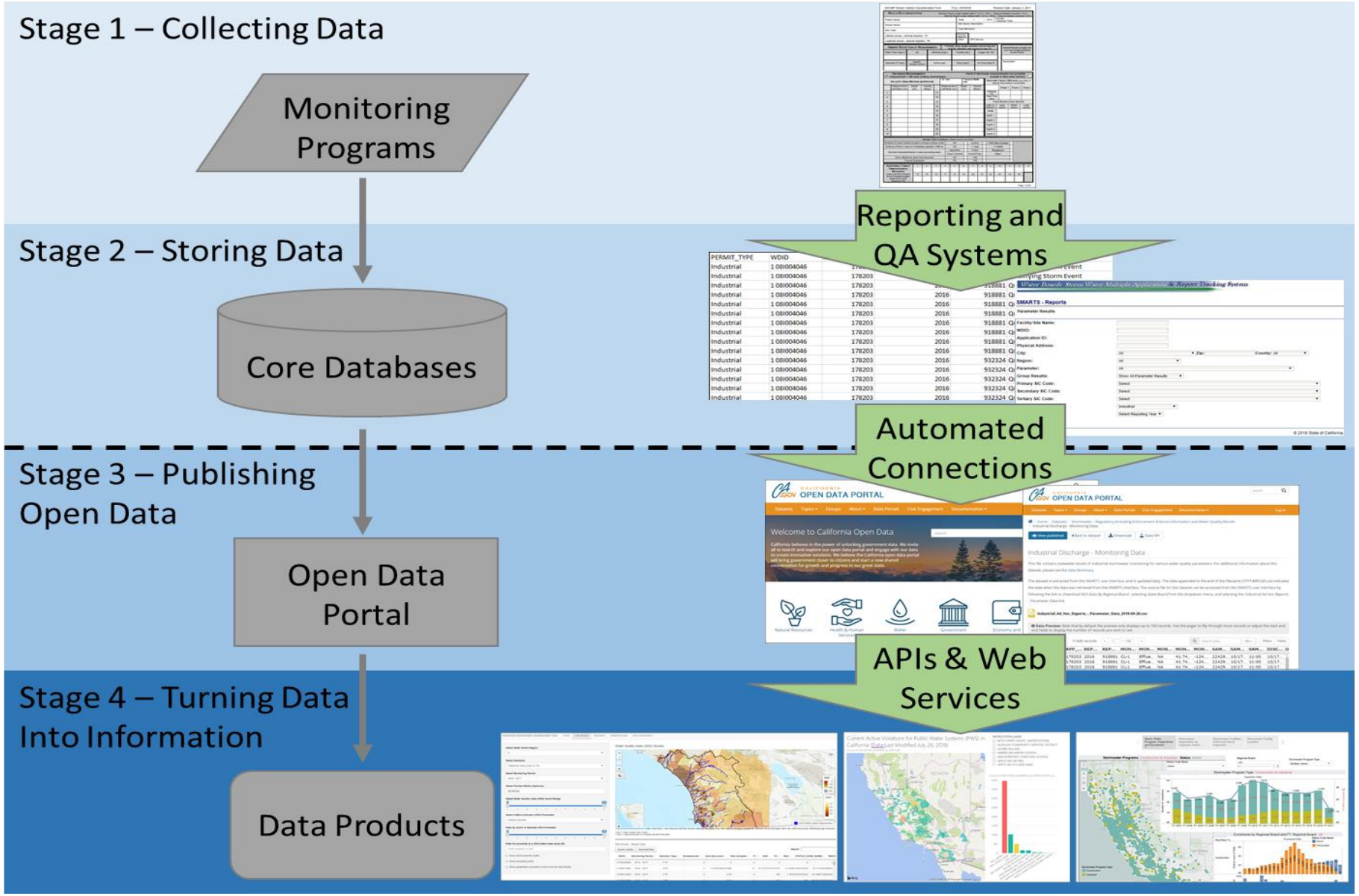


SHAPE LEGEND



Improve Data Flows

Databases
→ Flat Files



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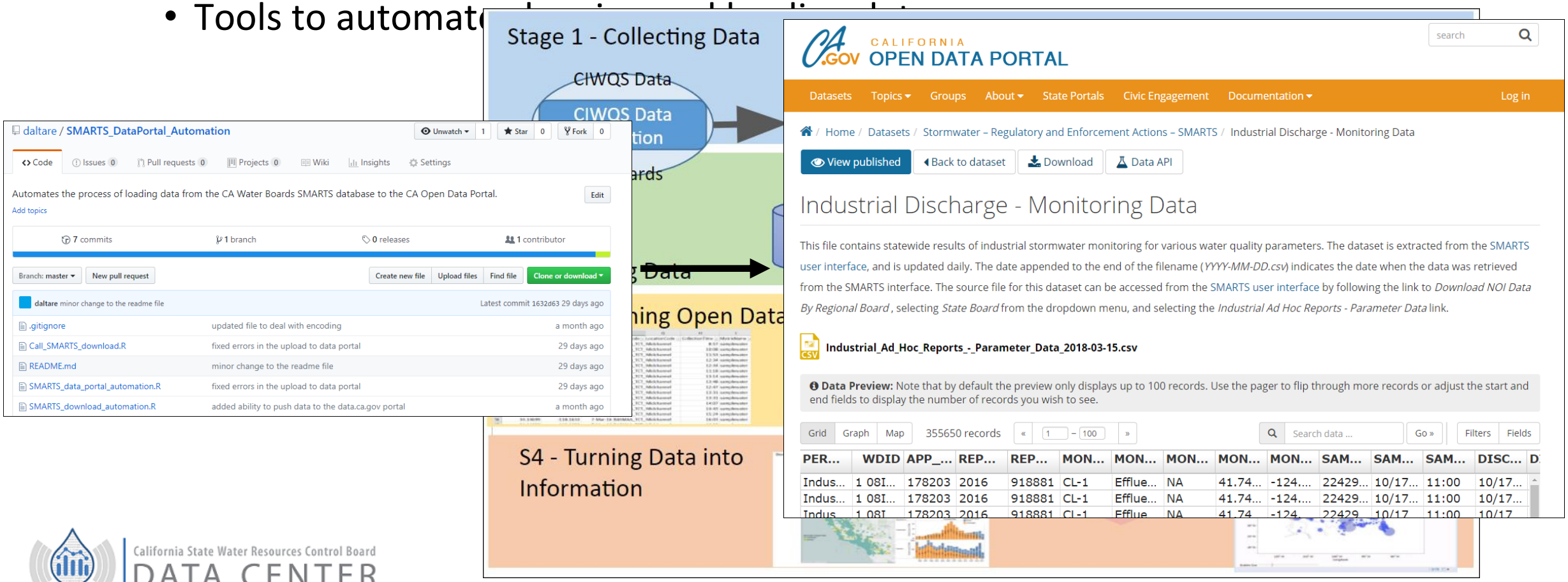
Improve Data Flows

Open Data Portal

- Tools to automate



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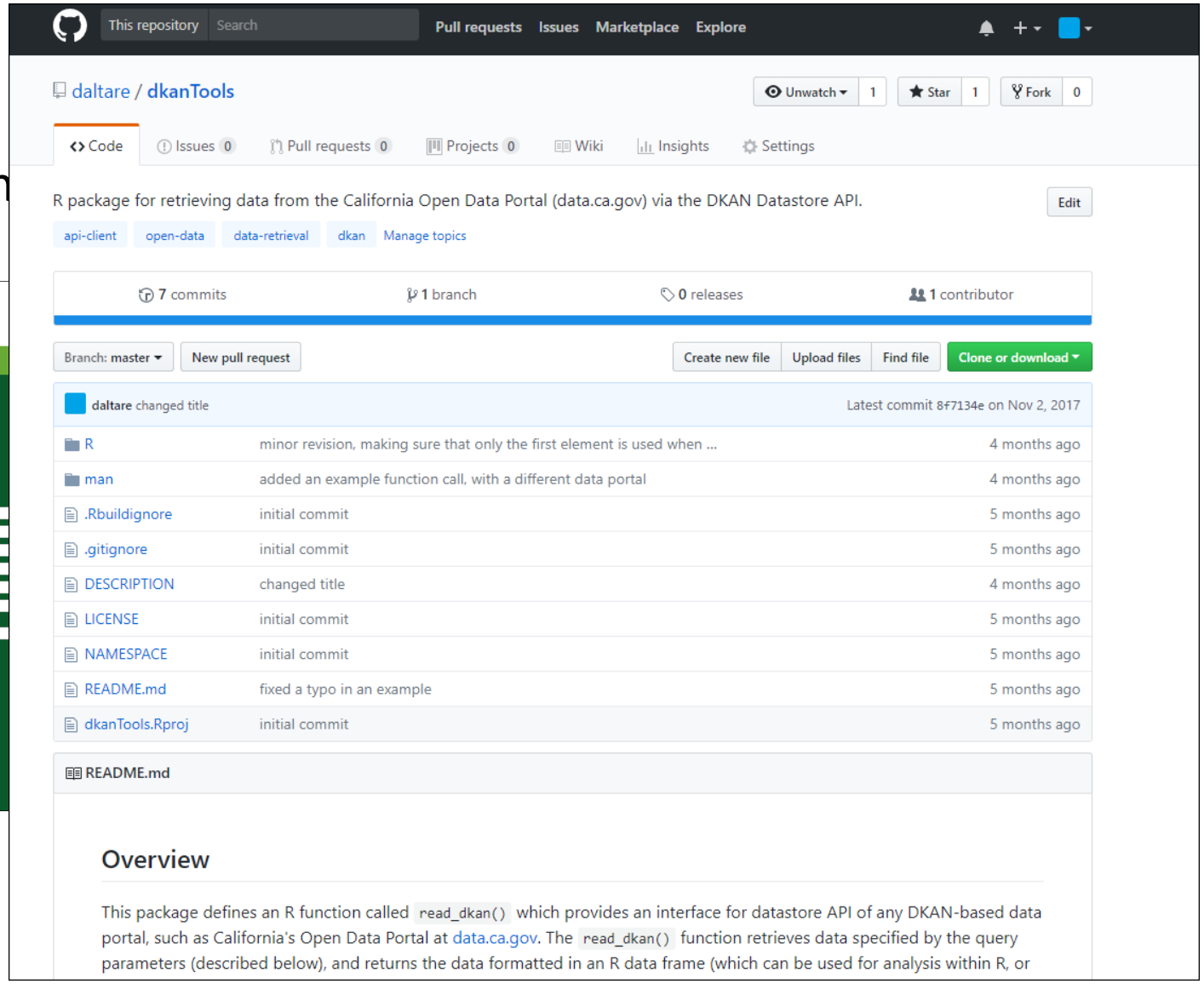
Improve Data Flows

APIs

- Open Data Portal (dkan
- Internal Databases



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Build Capacity

Improve Data Flows / Build Open Architecture and Infrastructure

Enhance organization-wide ‘data literacy’

Build Capacity

Pilot assessment and training program:

- Reinforce basic concepts (how to engage with data)
- Apply best practices throughout the data life cycle (collecting, storing, managing

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CASE CARD

ATTRIBUTE

- Analysis Date
- Analyte
- Collection Method Name
- Data Quality
- Program
- QA Code
- RL
- Result Qual Code
- Result
- Results Comments
- Sample Agency
- Sample Date
- Station Code
- Station Name

Reset | Dot | Line | Pie | Bar | Hist | Box | Map | Stats | f(x) | Annotate

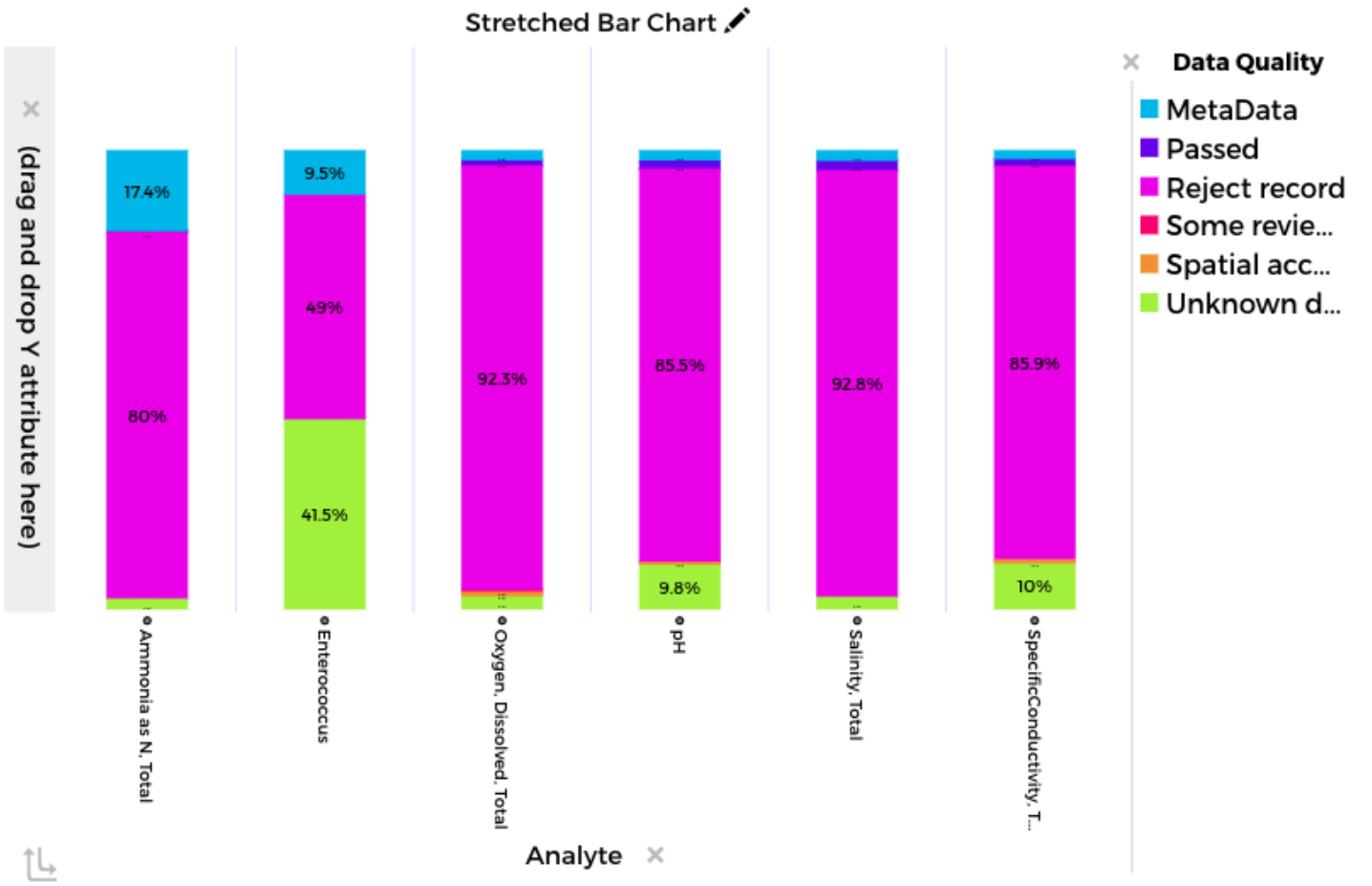


TABLE VIEW | SUMMARY VIEW

v 1.1.0

CA Water Boards - Data Literacy Assessment (10 of 23)

Question 8:

Based on the plot on the left, which analyte did not have any samples that passed the Data Quality check?

A. Ammonia as N, Total
B. Enterococcus
C. Oxygen, Dissolved, Total
D. Salinity, Total
E. SpecificConductivity, Total

CASE CARD 1 of 3403

ATTRIBUTE	VALUE
Analysis Date	
Analyte	pH
Collection Method Name	Field Method
Data Quality	Reject record
Program	National Pollutant Discharge Elimination System (NPDES)
QA Code	None
RL	
Result Qual Code	=
Result	7.48
Results Comments	

Reset | Dot | Line | Pie | Bar | Hist | Box | Map | Stats | f(x) | Annotate

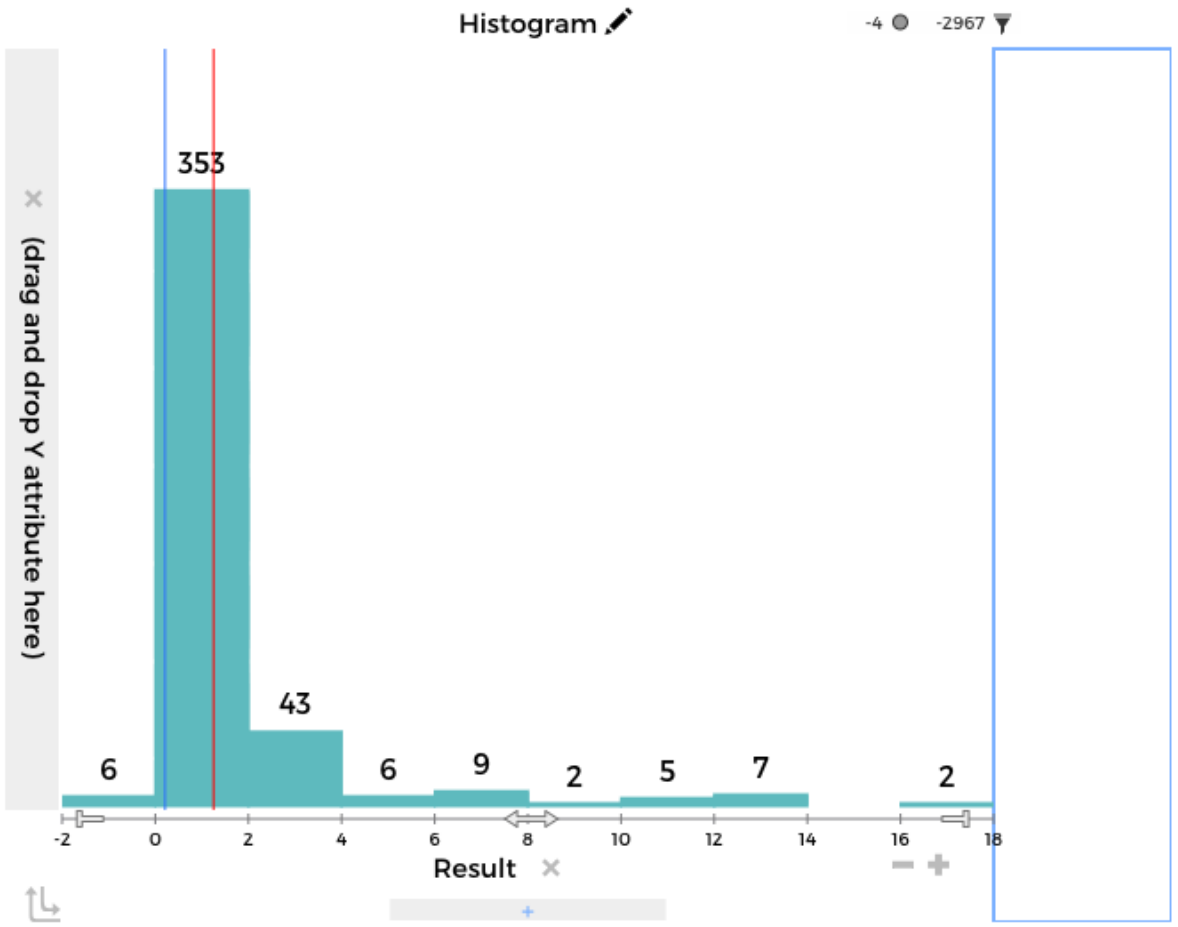


TABLE VIEW | SUMMARY VIEW

v 1.1.0

CA Water Boards - Data Literacy Assessment (9 of 23)

Let us focus our exploration on one specific analyte - Ammonia.

- Click on icon next to Analyte to access its metadata
- Unselect all the analytes except Ammonia as N, Total to keep only the ammonia samples in our dataset
- Now drag and drop Result on the x-axis
- Click on Histogram so that we can better view the distribution of the results
- From Stats, select Mean & Median so that it is displayed in our plot

Question 7:

You will notice that the Mean is larger than the

CASE CARD 1 of 3403

ATTRIBUTE	VALUE
Analysis Date	
Analyte	pH
Collection Method Name	Field Method
Data Quality	Reject record
Program	National Pollutant Discharge Elimination System (NPDES)
QA Code	None
RL	
Result Qual Code	=
Result	7.48
Results Comments	

Reset | Dot | Line | Pie | Bar | Hist | Box | Map | Stats | f(x) | Annotate

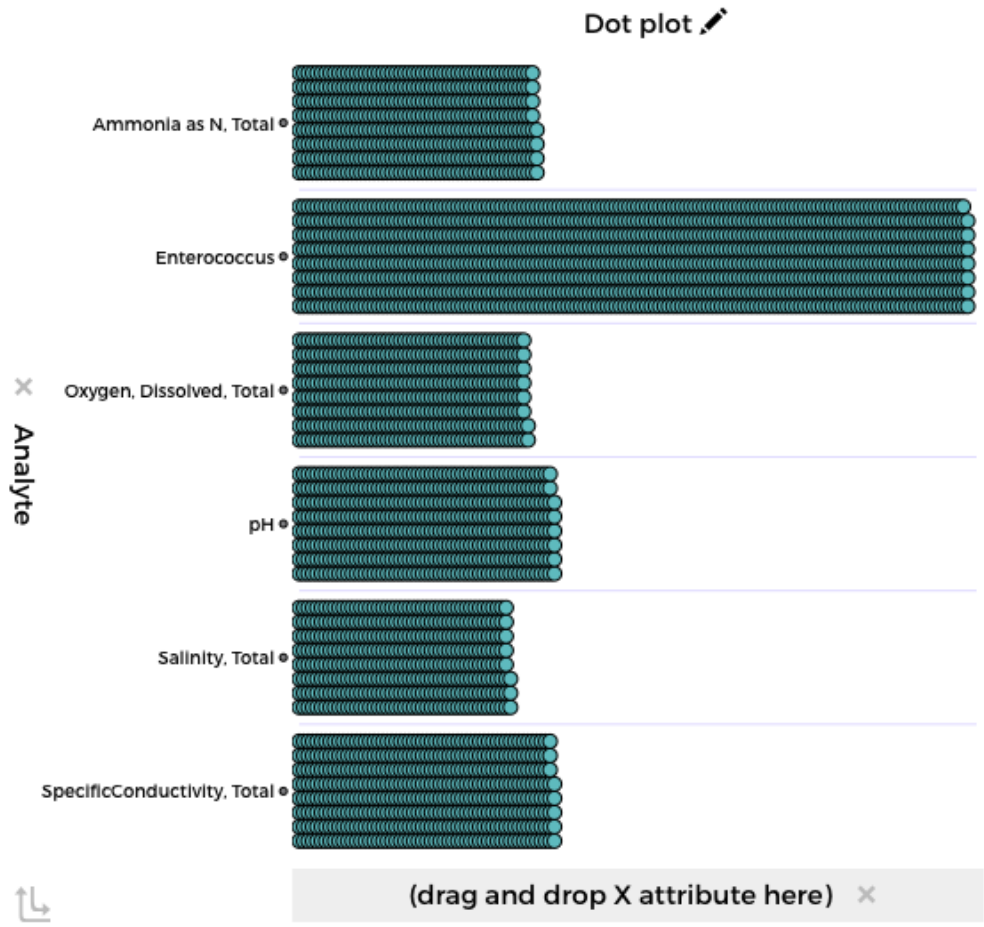


TABLE VIEW | SUMMARY VIEW

v 1.1.0

CA Water Boards - Data Literacy Assessment (7 of 23)

The dataset on the left contains 3403 samples from chemistry and field analyses of the Tijuana River.

- Drag Analyte to the y-axis
- Drag Unit to the x-axis

Question 5:

Based on the plot, which of the following analytes is measured in more than one unit.

A. Ammonia as N, Total
B. Oxygen, Dissolved, Total
C. pH
D. Salinity, Total

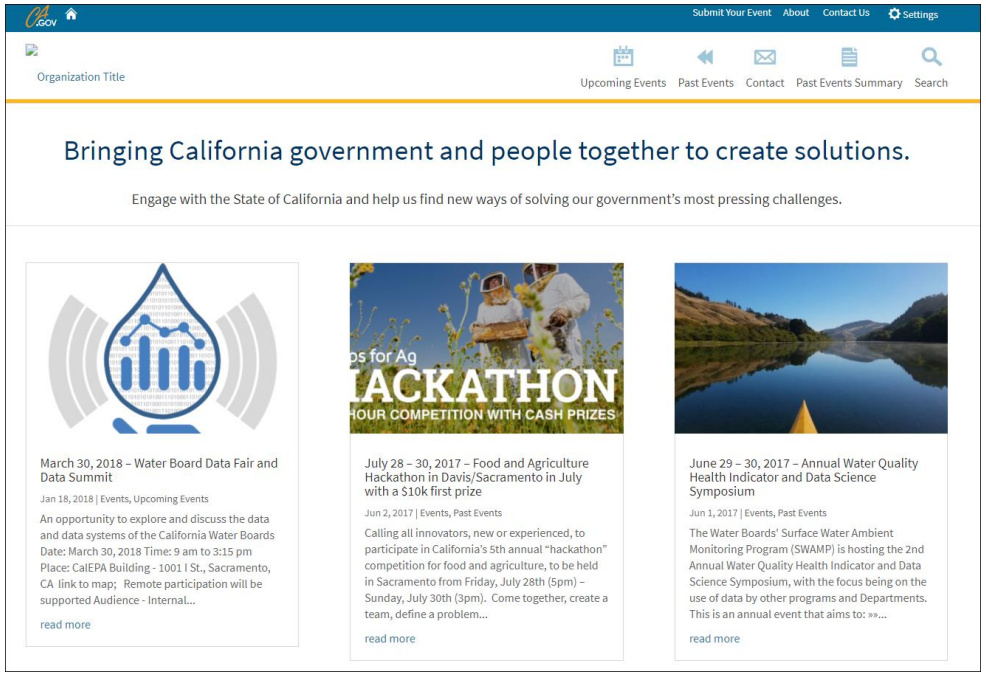
Foster Engagement With Data

Encourage data use and internal / external collaboration

Foster Engagement With Data

Community / Civic Engagement

- Water Board Data Fair – March every other year
- Watershed Health Indicator and Data Science Symposium – June every year
- California Water Data Challenges – Every year (most recent trash and drinking water)
- “Local” hackathons and brigades



Workforce Engagement

- WB Data Science Club
- CalData
- Recruitment Fairs / College Embed

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California Safe Drinking Water Data Challenge

Submit your open data project by Oct. 1, 2018!

WEST BIG DATA INNOVATION HUB

WATER FOUNDATION

GOVERNOR'S OFFICE OF PLANNING AND RESEARCH · STATE OF CALIFORNIA

IMAGINE H$_2$O

BAYAREA COUNCIL

waterchallenge.data.ca.gov

#CAWaterDataChallenge

20 new datasets in machine-readable format

- *Human Right to Water - Drinking Water Enforcement*
- *Monthly Water Production Reported by Water Suppliers in the Electronic Annual Reports (2011-2015)*
- *Drinking Water Watch - Public Water Systems Information*
- *Disadvantaged Communities Mapping and Land Use by Parcel*

...in addition to over 1,000 datasets to explore!

California Safe Drinking Water Data Challenge

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CalGovOps
CALIFORNIA GOVERNMENT OPERATIONS AGENCY

CALIFORNIA Water Boards

DEPARTMENT OF WATER RESOURCES · STATE OF CALIFORNIA

California DEPARTMENT OF TECHNOLOGY

CALIFORNIA natural resources AGENCY

Berkeley Division of Data Sciences

CODE FOR AMERICA NATIONAL DAY OF CIVIC HACKING

WeLL Water Education for Latino Leaders

LEONARDO DICAPRIO FOUNDATION

BERKELEY LAB

BIDS BERKELEY INSTITUTE FOR DATA SCIENCE

UNIVERSITY of WASHINGTON eScience Institute

NATIONAL DATA SERVICE · PARTICIPANT

NEW MEXICO WATER RESOURCES RESEARCH INSTITUTE

Kitware

CALIFORNIA WATER SERVICE CO.

WOLFRAM

jupyter

Data for Good Exchange

Bloomberg®

DATA FOR DEMOCRACY

brighthive

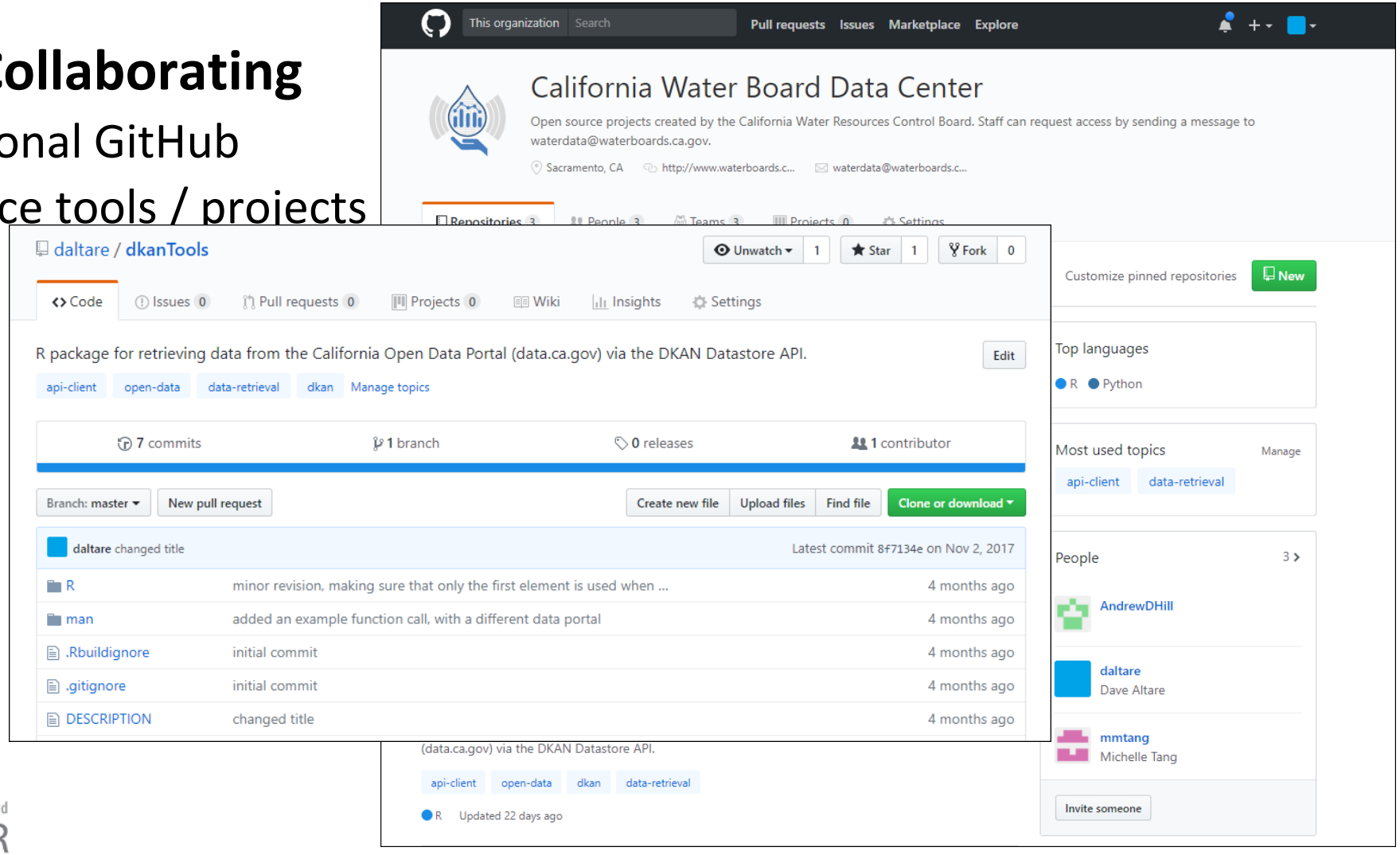
waternow alliance

Microsoft

Foster Engagement With Data

Sharing and Collaborating

- Organizational GitHub
- Open source tools / projects



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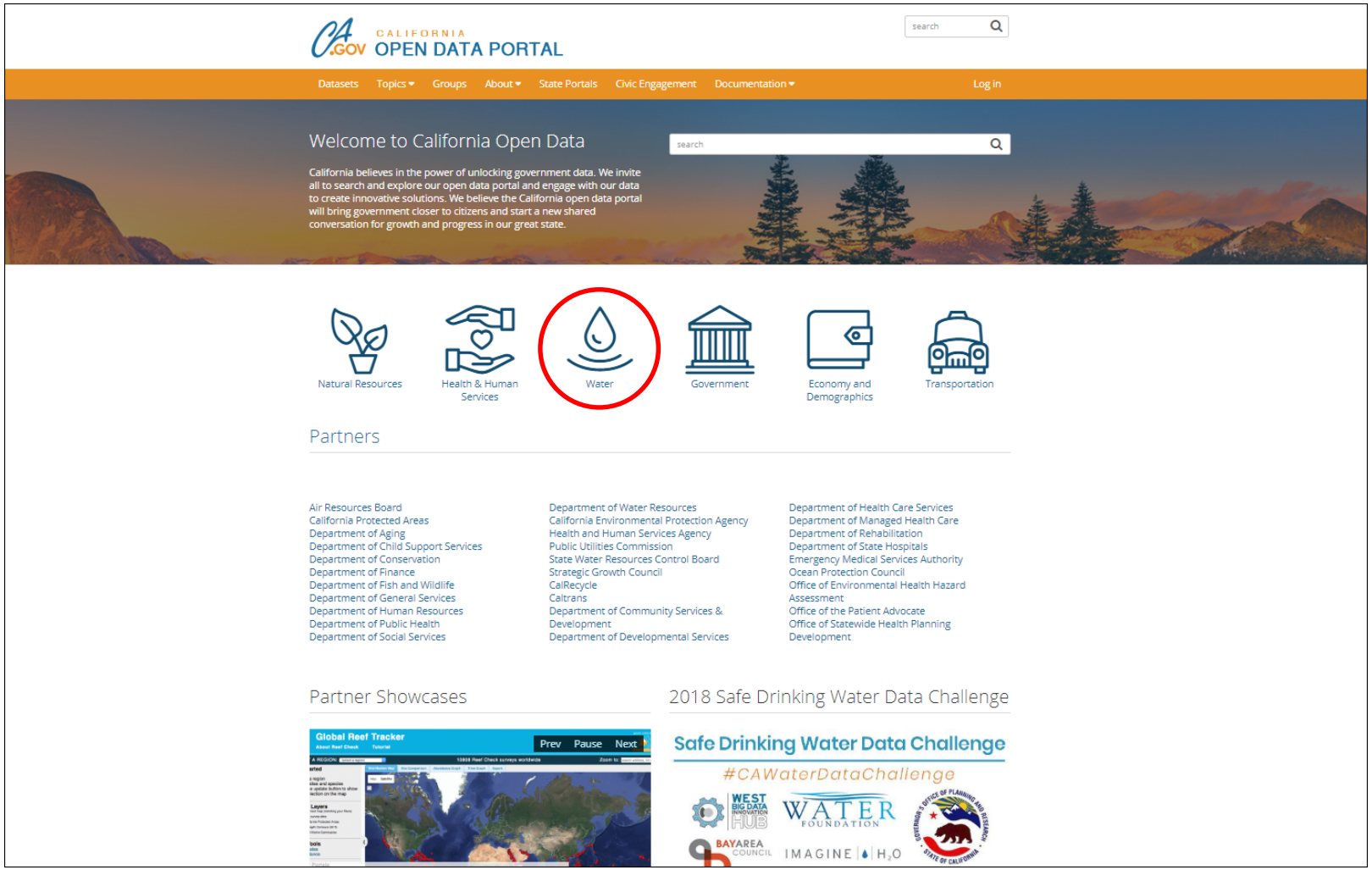
Open Data Services

California Open Data Portal: data.ca.gov

- Click on the Water icon to find State Water Board data



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Open Data Services

California Open Data Portal: data.ca.gov

- Stormwater datasets

CEDEN Water Chemistry dataset](https://...

3x csv pdf

CA Drought Monitor Basic Statistics

California Department of Technology

Water

The U.S. Drought Monitor is produced through a partnership between the National Drought Mitigation Center at the University of Nebraska-Lincoln, the United States Department of Agriculture, and the National Oceanic and Atmospheric Administration...

Stormwater – Regulatory (including Enforcement Actions) Information and Water Quality Results

California State Water Resources Control Board

Water

This dataset looks at all aspects of storm water management in California as managed and regulated by the State Water Resources Control Board, from the Stormwater Multiple Application and Report Tracking System (SMARTS). https://smarts....

7x csv 6x pdf

Drinking Water - Results of Lead Sampling of Drinking Water in California Schools

California State Water Resources Control Board

Water

The Division of Drinking Water (DDW), in collaboration with the California Department of Education, has taken the initiative to begin testing for lead in drinking water at all public K-12 schools. In early 2017, DDW and Local Primacy Agencies...

csv

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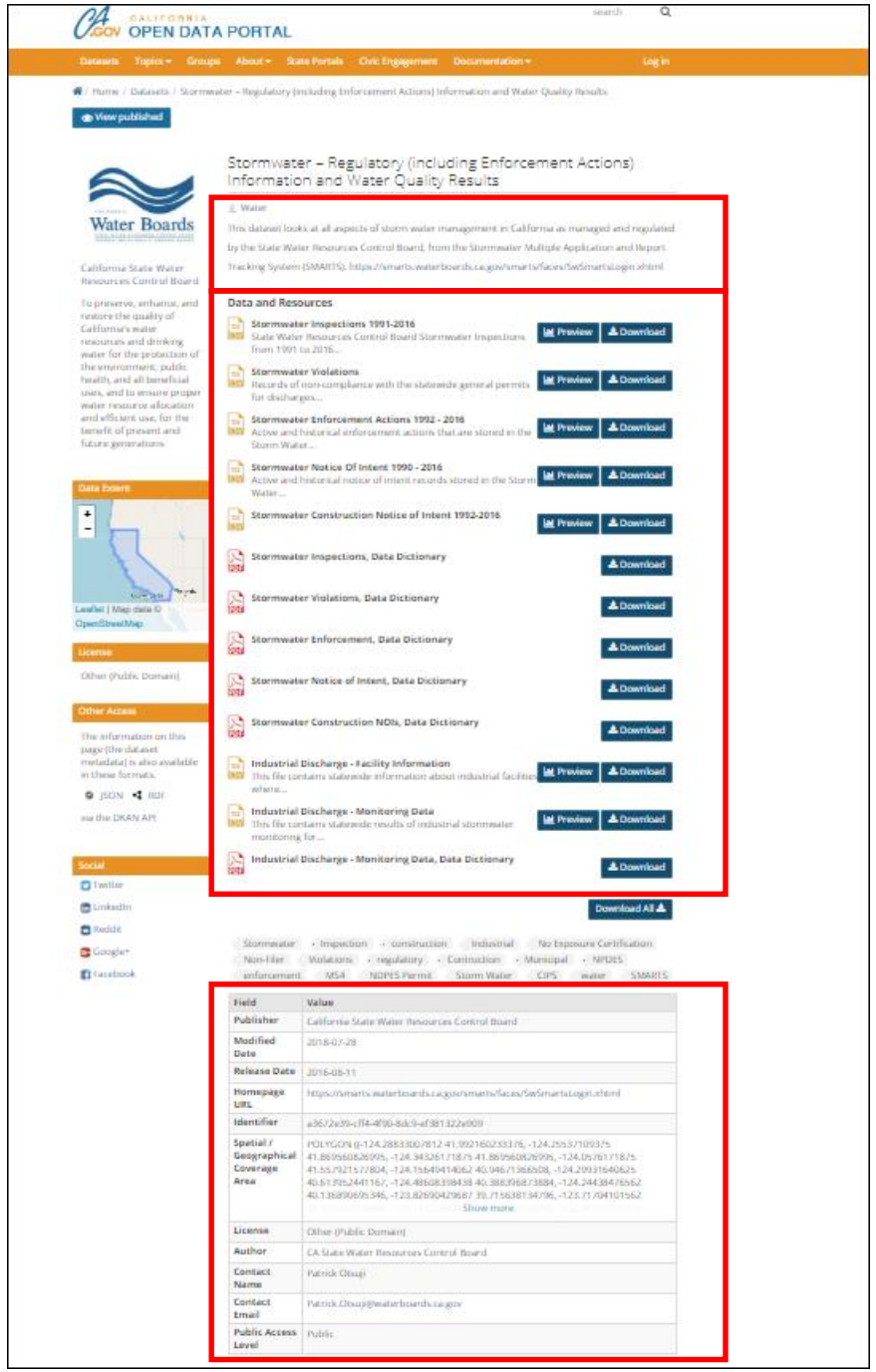
Open Data Services

California Open Data Portal: data.ca.gov

- Datasets available as .csv files
- Data dictionaries
- Data description and metadata

- Currently available stormwater datasets include:
  - Industrial stormwater discharges (monitoring data and facility information)
  - Inspections, violations, and enforcement actions
  - Notice of Intent records



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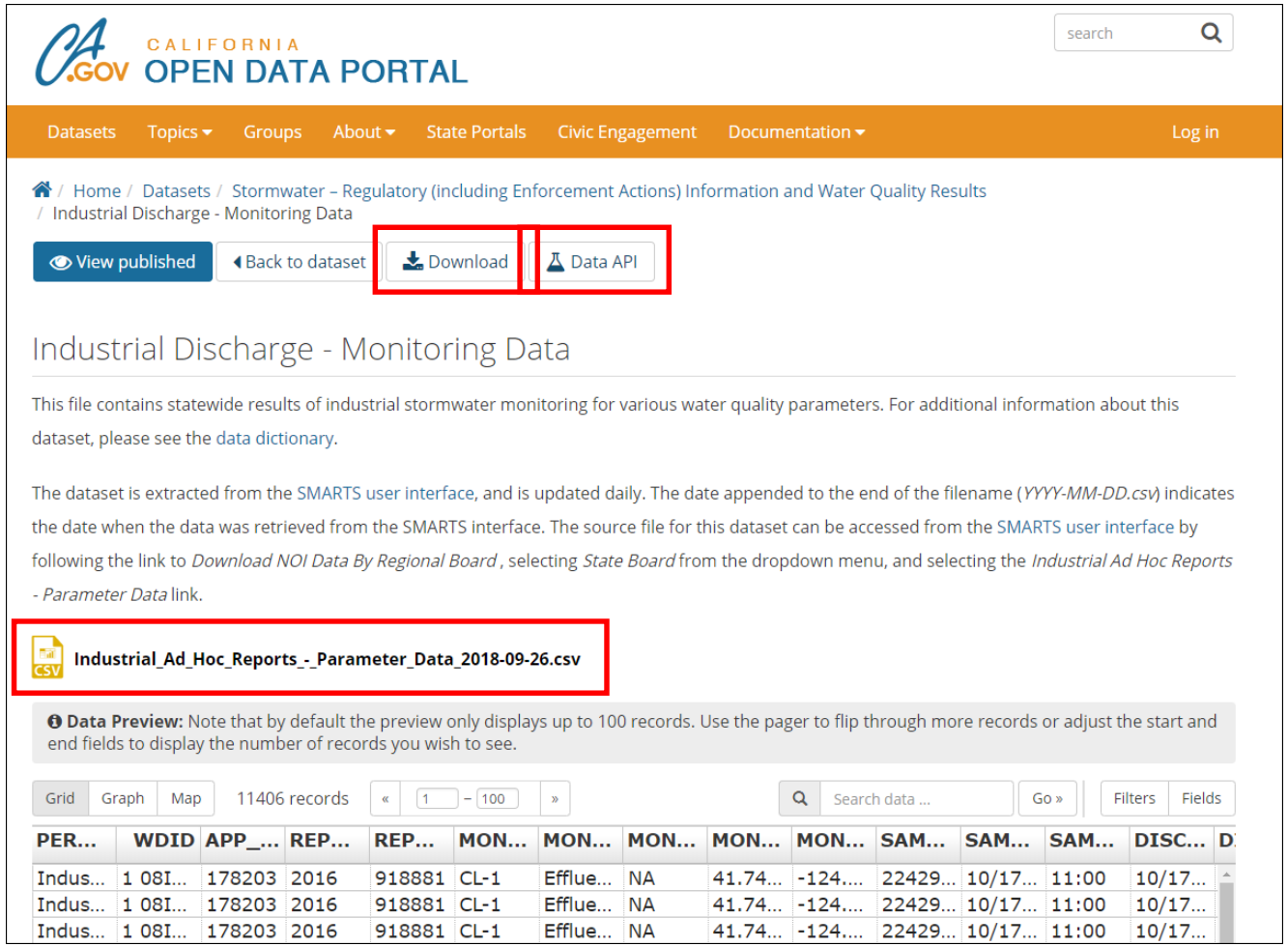
Open Data Services

Industrial Discharge Data

- Updated regularly via an automated process
- Persistent link to the data file (https://data.ca.gov/node/2176/download)
- API enabled



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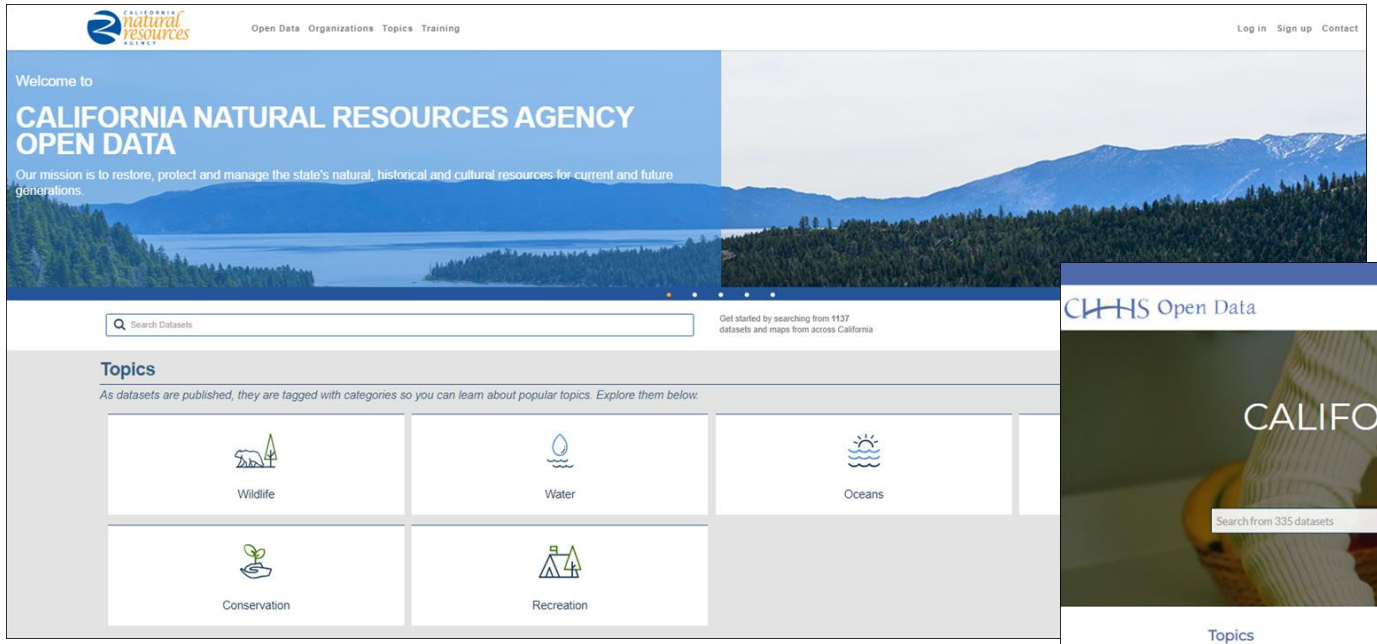
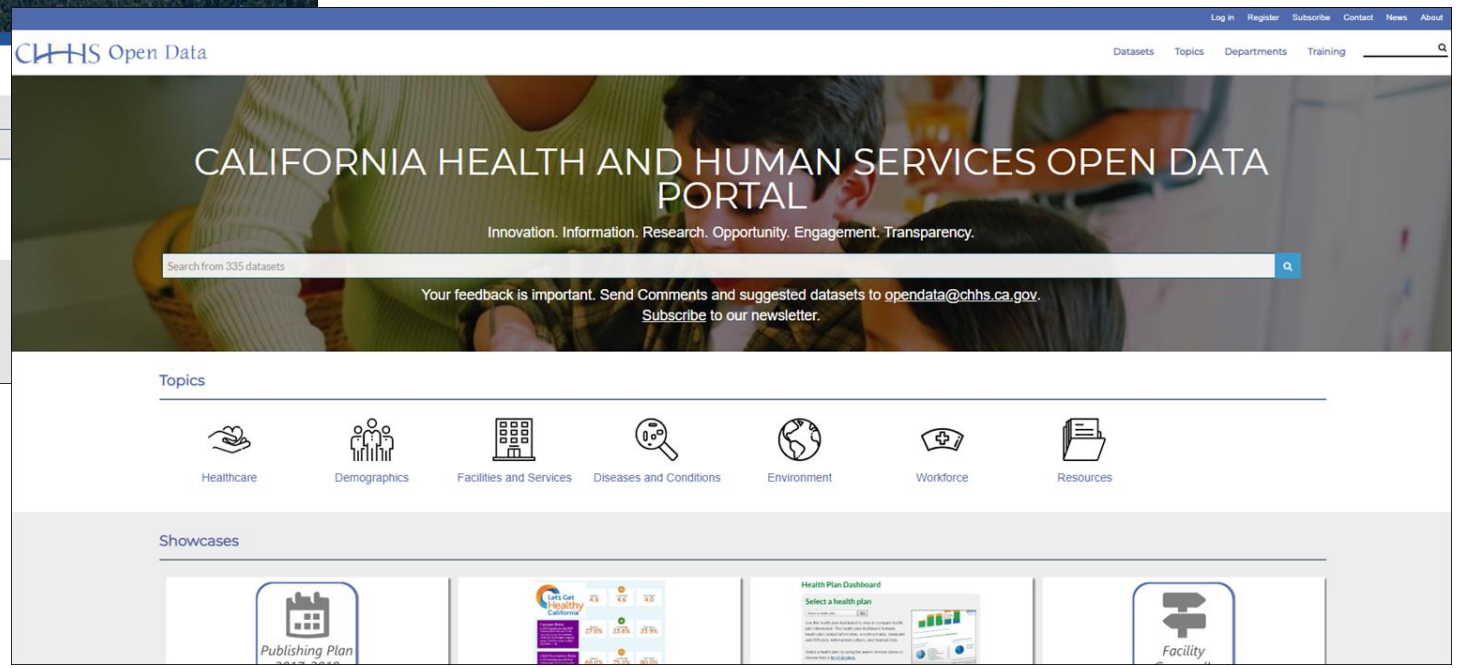
Open Data Services

Other State Portals

- California Natural Resources Agency: data.cnra.ca.gov
- California Department of Health & Human Services: data.chhs.ca.gov
- Others





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Data Driven Management

Water Quality Status Reports (2017, 2018 and 2019):

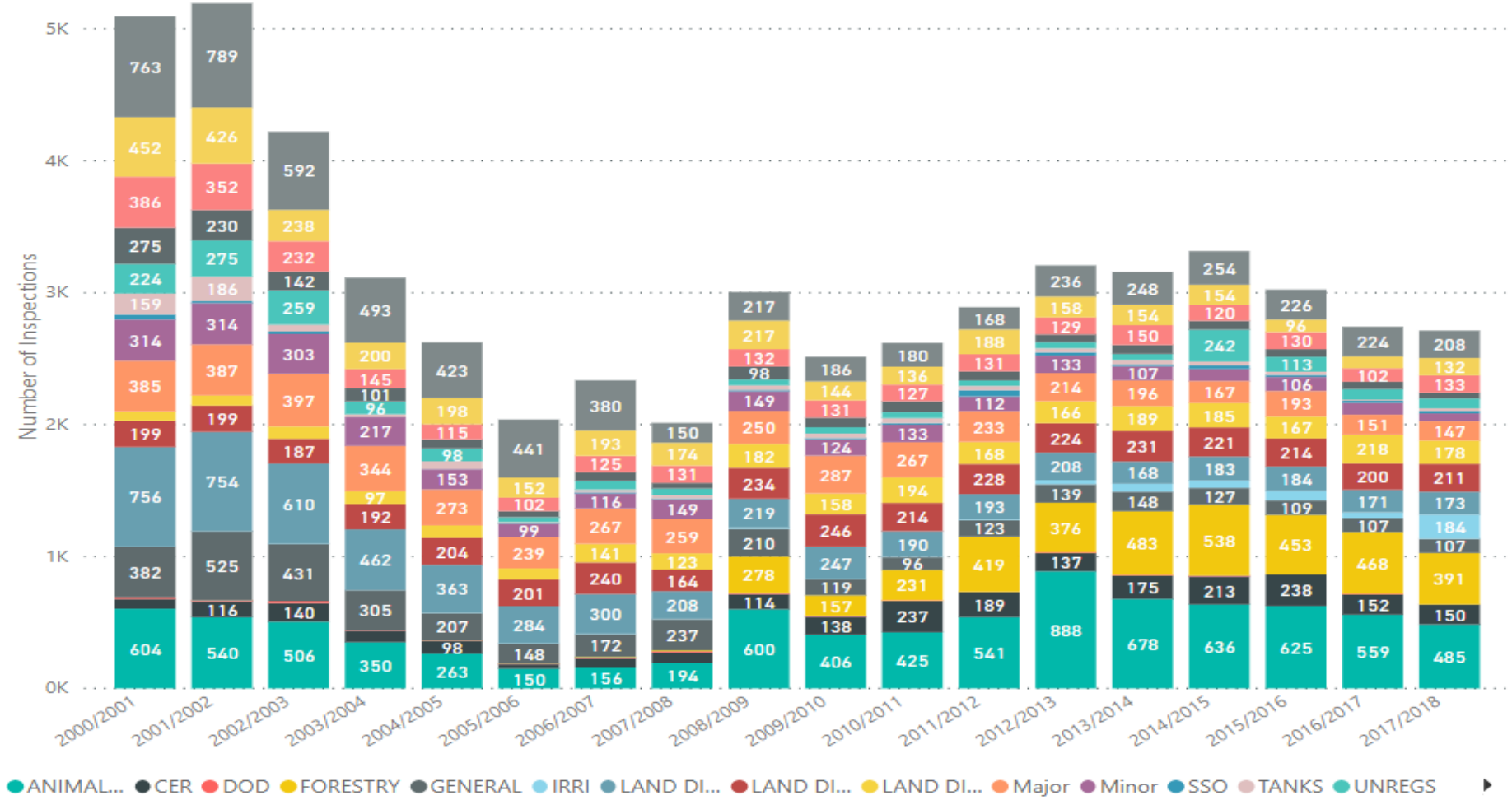
- https://www.waterboards.ca.gov/resources/data_databases/wq_status_report.html

FY2016/17 Water Boards Performance Report Story:

- https://arcg.is/z5Km1

This pilot dashboard shows inspection trends for 9 Regional Boards for all programs could replace almost 50 report cards currently posted as individual HTML pages.

REGULATE: ALL PROGRAMS
MEASURE: INSPECTION TRENDS



Key Statistics FY 2017-18

Master Program Type	Total Inspections
ANIMALWASTE	485
CER	150
DOD	1
FORESTRY	391
GENERAL	107
IRRI	184
LAND DISPOSAL ALL OTHER	173
LAND DISPOSAL CLOSED LANDFILL	211
LAND DISPOSAL OPEN LANDFILL	178
Major	147
Minor	58
SSO	18
TANKS	21
UNREGS	74
WDR All Other	42
WDR BIG	133
WDR Industrial	132

Additionally, the tool encourages more interaction and allows users to see more granular data. All due to open data techniques.

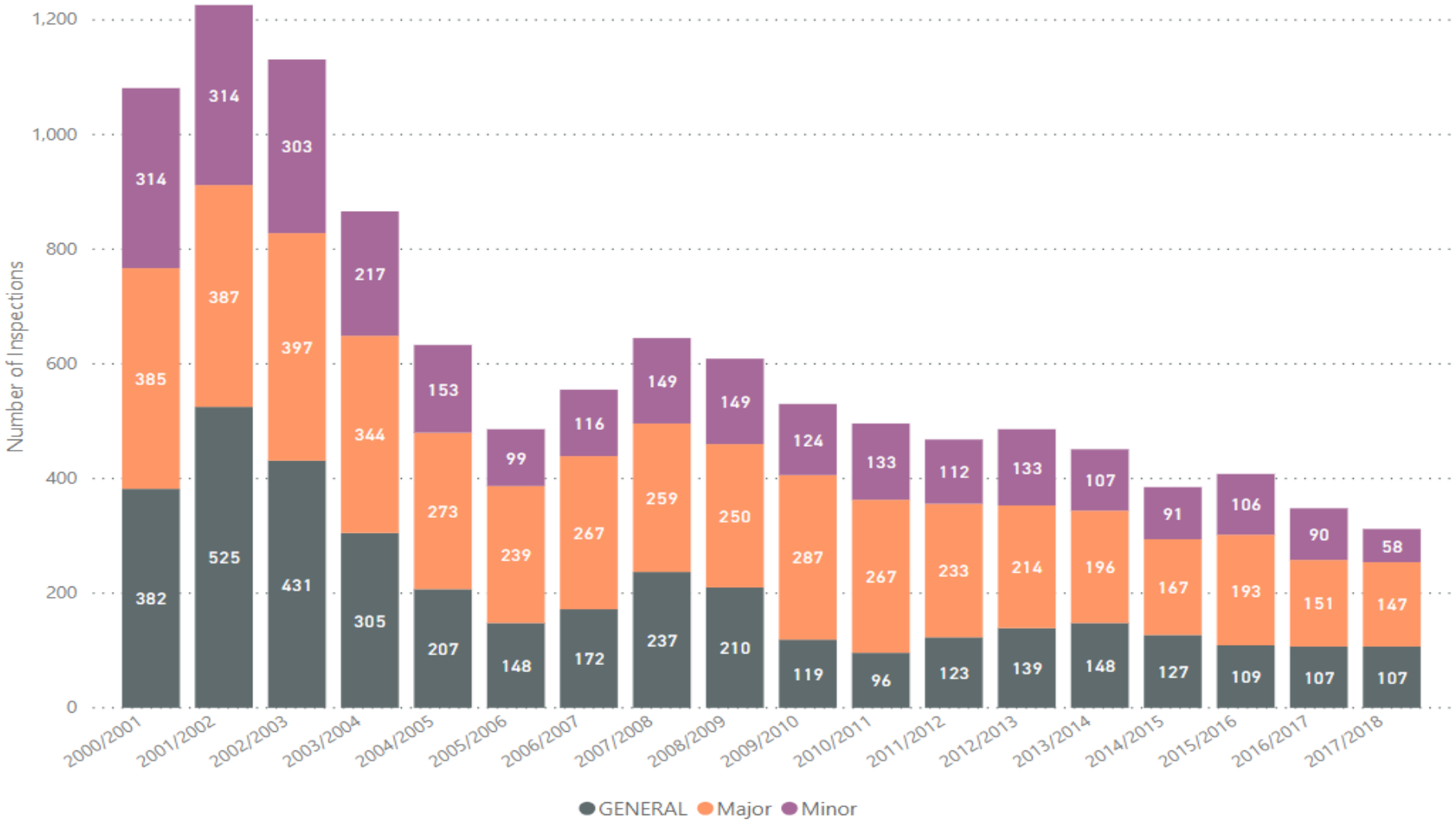
REGULATE: ALL PROGRAMS

MEASURE: INSPECTION TRENDS

REGION: All

PROGRAM CATEGORY: NPDESWW

MASTER PROGRAM TYPE: All



Key Statistics FY 2017-18

Master Program Type	Total Inspections
GENERAL	107
Major	147
Minor	58

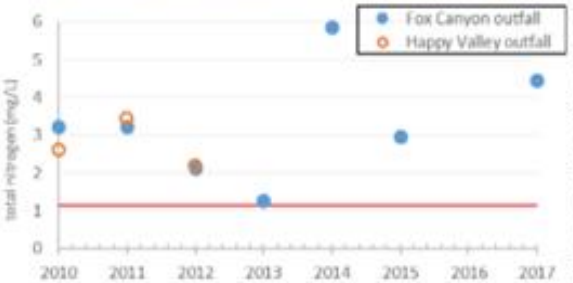
Water Quality Report Card - Algae in the Ventura River

Regional Water Board:	**Los Angeles, Region 4**	**STATUS**	☐ Conditions Improving ☐ Data Inconclusive ☑ **Improvement Needed** ☐ Targets Achieved/Water Body Delisted	
Beneficial Uses Affected:	**REC-1, REC-2, WARM, COLD, EST, WILD, RARE, MIGR, SPWN, WET, MUN**			
Implemented Through:	NDPES Permits, MS4 Permits, Conditional Waivers	**Pollutant Type:**	☑ Point Source ☑ Nonpoint Source ☐ Legacy	
Effective Date:	June 28, 2013	**Pollutant Source:**	Urban Storm Water Runoff	Irrigated Crop Production
Attainment Date:	2023		Onsite Wastewater Treatment Systems	Wastewater Discharges
			Horses and Livestock	Non-Point Source Runoff

Water Quality Improvement Strategy

The Ventura River watershed is in Ventura and Santa Barbara Counties in Southern California. The Ventura River, including its estuary and tributaries, is impaired due to algae, eutrophic conditions, low dissolved oxygen, and elevated nitrogen. The primary sources of these impairments are nutrients discharged from the municipal separate storm sewer system (MS4), agriculture operations, livestock facilities, onsite wastewater treatment systems (OWTS), and the Ojai Valley Waste Water Treatment Plant (WWTP). In 2013, USEPA approved the TMDL for Algae, Eutrophic Conditions, and Nutrients in the Ventura River and Its Tributaries to restore water quality. The TMDL includes numeric targets for algal biomass, dissolved oxygen, and pH, and load allocations (LAs) and waste load allocations (WLAs) for total nitrogen and total phosphorus. The TMDL assigns more stringent nitrogen and phosphorus allocations for dry weather than wet weather because dry weather (May 1 to September 30) is the growing season. The TMDL allows the Ojai WWTP 12 years, MS4 permittees six years, agriculture operations six years, livestock facilities 10 years, and OWTS 10 years to attain allocations. The Ojai WWTP intends to attain WLAs by upgrading its nutrient removal processes. Agriculture operations will implement iterative management practices to control nutrients in their discharges. The MS4 permittees' compliance approach is to eliminate dry-weather discharges by implementing best management practices (BMPs). Horse facilities will implement manure management plans. Individual responsible parties are monitoring their discharges to demonstrate compliance with allocations and multiple responsible parties are jointly monitoring algal biomass, nutrients, and other constituents in receiving waters to assess watershed-wide conditions. The Board intends to adopt a Conditional Waiver for horse facilities in FY 18-19. Agriculture operations will implement nutrient management as required by the Conditional Waiver.

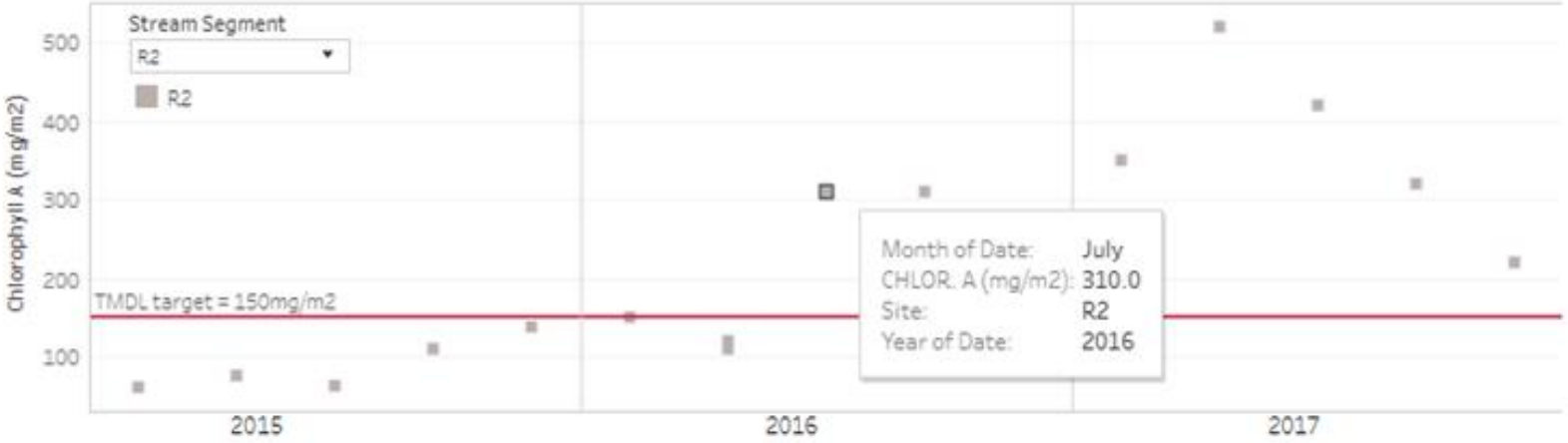
Comparison of MS4 Effluent to Dry Weather WLA



Blank Total Nitrogen values, as seen for Happy Valley outfall after 2012, are due to zero flow and represent WLA attainment.

Water Quality Outcomes

- *Monitoring data show that algal biomass continues to exceed the numeric target. Total nitrogen in MS4 outfalls exceeds the WLA when there is sufficient flow to sample. However, no flow and no sample in the outfalls amounts to WLA attainment.*
- *WLAs have not been incorporated into the MS4 permits, but permittees are implementing BMPs, including a bioswale at the Happy Valley outfall in Reach 4, which has reduced dry-weather flow.*
- *The Ojai WWTP is on schedule to implement the nitrogen removal upgrades required by its permit to attain the WLAs. Venture County is studying which OWTS will be upgraded to advanced treatment. The agriculture LAs are incorporated into a Conditional Waiver.*
- *The TMDL is still in the early stages of implementation. The multiple sources, complex interaction between groundwater and surface water, and variable flow make this a complicated TMDL.*
- *Responsible parties will continue implementation actions.*



A story map

Water Quality Report Card- Pesticides in the Palo Verde Outfall Drain and Lagoon

Regional Water Board -Colorado River Basin, Region 7

Beneficial Uses Affected - Contact Water Recreation (REC-1); Non-Contact Water Recreation (REC- 2); Warm Freshwater Habitat (WARM); Wildlife Habitat (WILD); Rare, Threatened, Endangered Species (RARE)

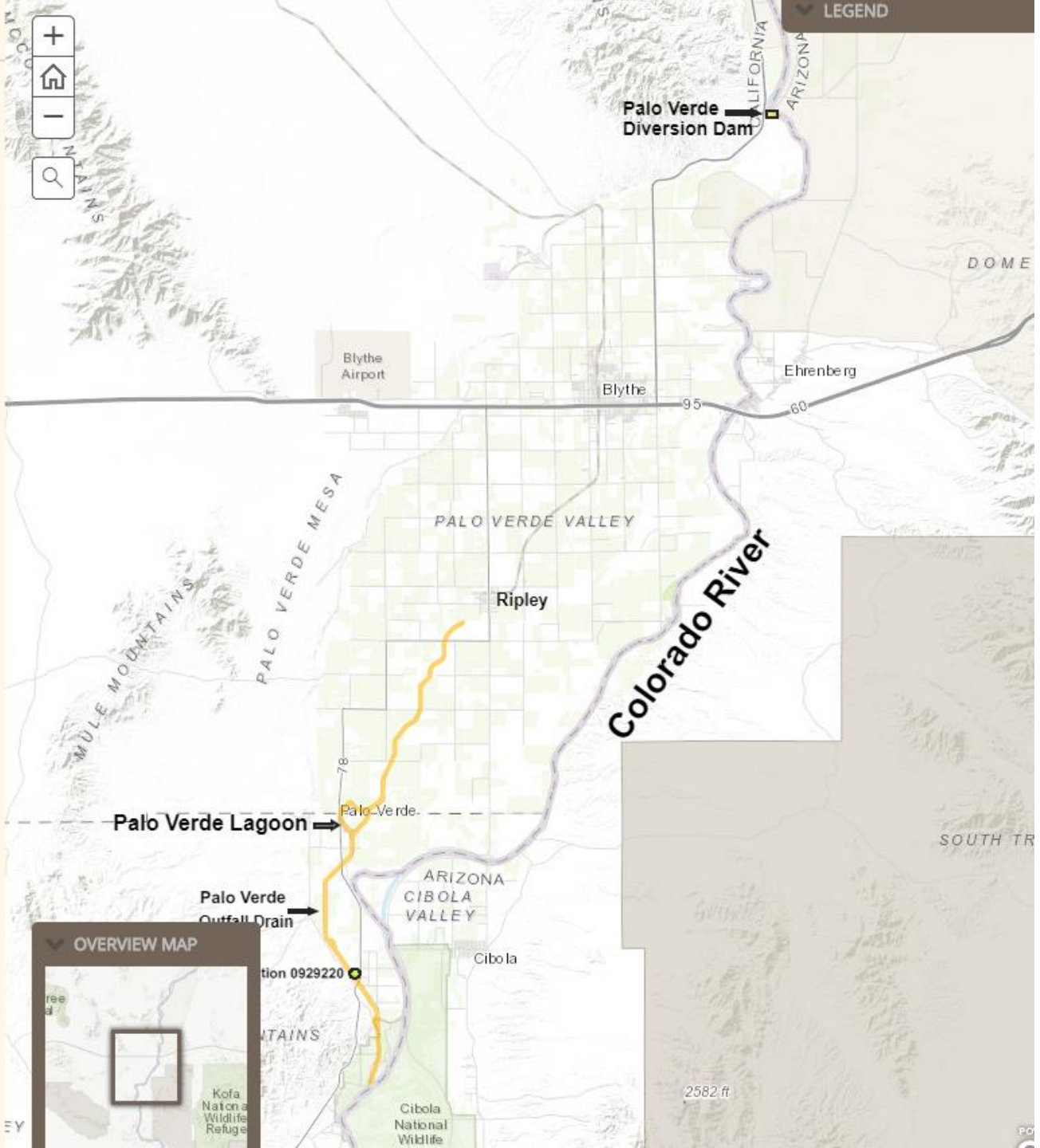
Implemented Through - Conditional Waiver of Waste Discharge Requirements (WDR)

Pollutant Type: Non-Point Source, Legacy Pollutant Source: Irrigated Crop Production

Status: Data Inconclusive

Effective date: September 20, 2012 Attainment Date: 2036

The Palo Verde Outfall Drain (PVOD) and Lagoon is located in Palo Verde Valley and Mesa (approximately 131,000 acres of agricultural land) in Imperial and Riverside counties. Palo Verde Outfall Drain and Lagoon are impaired by the legacy pesticides, Dichloro-Diphenyl-Trichloroethane (DDT) and Toxaphene and listed on the



Water Quality Report Card - North Coastal Basin Rivers Cyanobacteria

Regional Water Board -North Coast Region, Region 1

Beneficial Uses Affected - Cold Freshwater Habitat (COLD); Rare, Threatened, and Endangered Species (RARE); Migration of Aquatic Organisms (MIGR); Spawning, Reproduction, and/or Early Development (SPWN); Commercial and Sport Fishing (COMM); Tribal Tradition and Culture (CUL) Contact Water Recreation (REC-1); Non-Contact Water Recreation (REC- 2)

Implemented Through - Restoration, Coordination efforts

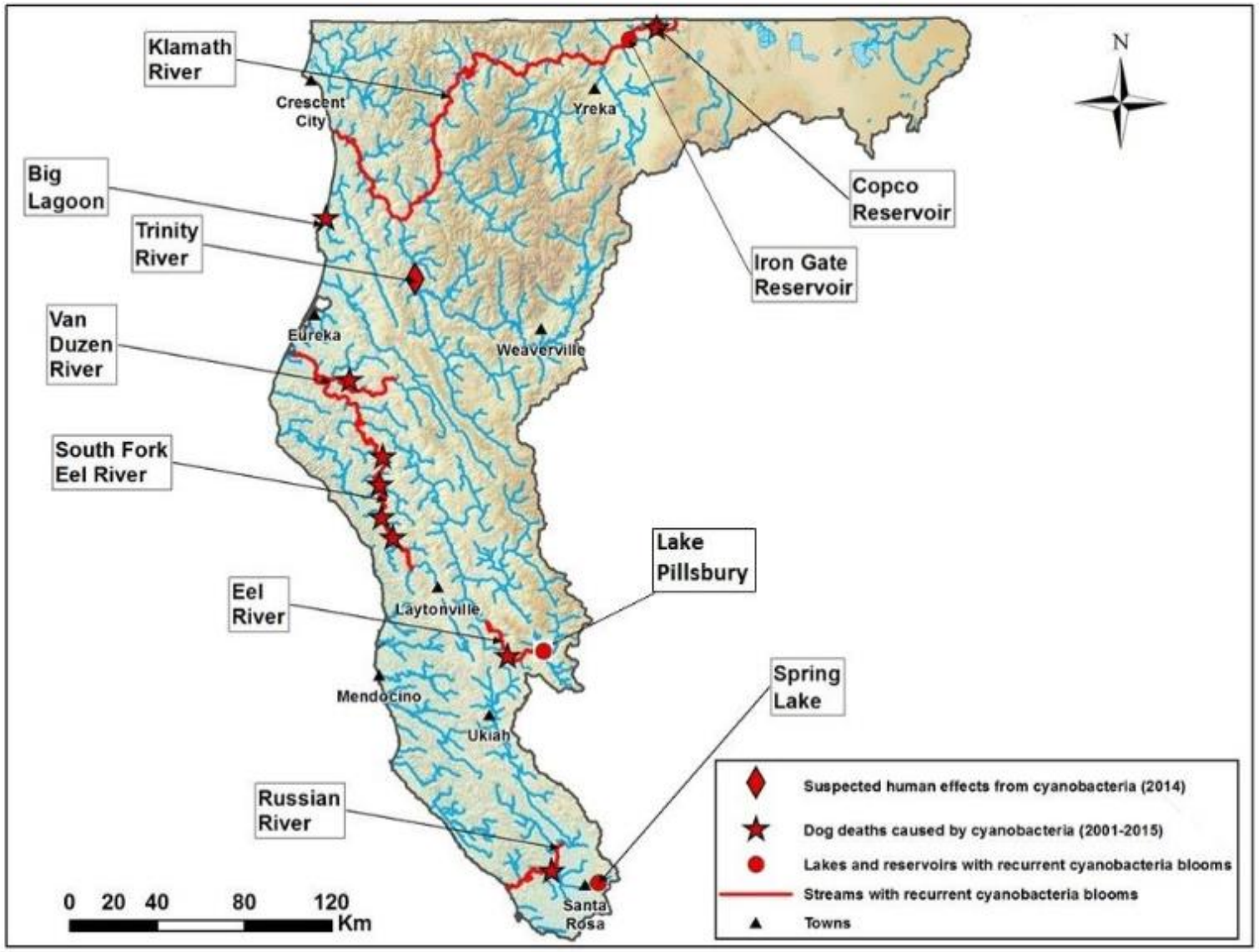
Pollutant Type: Non-Point Source, Legacy

Pollutant Source: Irrigated Crop Production, Hydromodification, Non-Point Source Run-off, Naturally Occurring, Logging, Grazing

Status: - Improvement Needed

Effective date - December 28, 2012

Attainment Date - 2050 or longer



Extra URLs

TMDLs to be done: https://public.tableau.com/views/TMDL1718/Dashboard1?:embed=y&:display_count=yes

Safe to Swim: https://mywaterquality.ca.gov/safe_to_swim/interactive_map/

Rafa’s Tableau wonderland: https://public.tableau.com/profile/rafael.maestu#!/

WQ Story map: https://arcg.is/1LyS9

Github repo: https://github.com/CAWaterBoardDataCenter

Trash related data: https://cawaterboarddatacenter.github.io/Datathon-Resources/

Questions?

Greg Gearheart, Deputy Director
Office of Information Management and Analysis
https://www.waterboards.ca.gov/resources/oima/