CALIFORNIA WATER QUALITY MONITORING COUNCIL

2018 Council Workgroup Updates

November 29, 2018

Item #6

Water Quality Monitoring Council meeting
November 29, 2018
Item #6a

Molecular methods workgroup update

Susie Theroux, SCCWRP

Refresher: objectives of workgroup

- **Consensus-building**: Identify and provide recommendations on best practices for molecular methods including sample collection, sample processing, and analytical pipelines. Identify key technical challenges in generating DNA-based data to prioritize further research, as well as discuss emerging molecular methods and their potential utility in monitoring applications.
- **Communication**: Provide online resources for communicating molecular results to management communities and water quality managers to enhance the interpretation and efficacy of molecular data.
- **Coordination**: Improve coordination among research groups, sampling programs, and monitoring agencies to enhance collaborations and minimize redundancies in sample collection.

Goals since last Council meeting

- Contact potential members
- Develop list of priority topics for workgroup
- Schedule first meeting

Membership

Type	Contact	Organization
Regulatory	Jeff Rodzen	California Dept Fish and Wildlife
Industry	Gregg Schumer	Cramer Fish Sciences
Industry	Scott Blankenship	Cramer Fish Sciences
Regulatory	Ed Hancock	Lahontan Water Board
Academic	Kevan Yamahara	MBARI
Industry	Kat Bruce	NatureMetrics
Academic	Adam Wall	NHMLA
Academic	Joshue Steele	SCCWRP
Academic	Amy Zimmer-Faust	SCCWRP
Academic	John Griffith	SCCWRP
Non-profit	Marika Schulhof	SeaGrant
Academic	Michael O'Mahoney	Smithsonian
Regulatory	Ali Dunn	SWAMP
Regulatory	Marissa Van Dyke	SWAMP IQ
Regulatory	Keith Bouma Gregson	SWAMP/OIMA
Regulatory	Greg Gearheart	SWAMP/OIMA
Academic	Sarah Stinson	UC Davis
Academic	Melinda Baerwald	UC Davis
Academic	Holly Bik	UC Riverside
Academic	Zack Gold	UCLA
Academic	Rachel Meyer	UCLA (CALeDNA)
Academic	Bob Wayne	UCLA (CALeDNA)
Federal	Josh Israel	US Bureau of Reclamation
Regulatory	Pete Ode	USFW

Priority topics

PRIORITY AREAS

I. A catalog of DNA sampling and analyses across California
   A. Who/what/where/when/how of DNA sampling across the state
   B. Leverage initial survey distributed by Nicole Hack and WB
   C. **Product:** Interactive map to help identify areas to target for future sampling efforts and to identify potential collaborations among sampling teams
   D. List/map of labs/universities/organizations/persons that can advise the Water Boards regarding molecular methods with information on who can perform which analyses where.

II. Method Development and best-practices
   A. Sampling methods
      a. Creation of standardized sampling protocols for SWAMP programs (and beyond)
         i. Stream algae and cyanobacteria
         ii. Stream benthic macroinvertebrates
         iii. Ichthyoplankton
         iv. Meiofauna
         v. eDNA
         vi. Soils
         vii. SAV
         viii. Bacteria (limit to fecal bacteria?)
         ix. Others?
      b. Best practice recommendations
         i. Use of negative and positive controls
         ii. Contamination control
         iii. Use of preservation solution and/or preserving samples for analyses at later dates (useful for TMDL investigations)
         iv. Lab and field Replication
   B. DNA extraction
      a. Are all sampling kits created equal?
      b. What practices can be instituted for quality control?
   C. DNA amplification
      a. Are multiple, pooled reactions required?
      b. Any special reagent considerations that should be recommended/avoided?
      c. What practices can be instituted for quality control?
   D. Barcode primers
      a. How should barcode selection be recommended with regards to:
         i. Single species targets (e.g. arroyo toad)
         ii. Multiple species assemblages (e.g. algae)
      b. Can we provide a recommended primer set(s) for each of the major assemblages?
   E. Bioinformatic analyses
      a. Creation of an open source bioinformatics pipeline that is user-friendly for groups unfamiliar with bioinformatic analyses (MOTHUR, QIIME, Anacapa, others?)
      b. Creation of QC measures to ensure good data regardless of pipeline
      c. Training materials to assist new users with adopting protocols and QC pipelines
   F. DNA reference libraries
      a. Should California rely on a single, curated DNA library versus published, publicly-available libraries (e.g. GenBank, Silva, BOLD)
   G. Data storage
      a. Creation of recommended best practices for storing and publishing molecular data
      b. Reference materials to guide new users on adopting data storage protocol
   H. New technologies and opportunities to advance the state of the science - are there new techniques out there which show promise but need deployment opportunities?
   I. **Products:** series of recommended DNA sampling and analytical protocols for different target organisms and environments. QC protocols for each step of data generation to ensure comparable and known data quality.

III. Implementation
   A. How have other states integrated molecular methods into regulatory programs?
      a. e.g. EPA E. coli qPCR protocol
   B. What key agencies will be involved in verifying and approving a recommended protocol?
      a. ELAP, International Organization for Standardization (ISO/IEC)
   C. How will a sequencing facility become approved by the State for permit compliance?
   D. **Products:**
      a. Submitting recommended protocols (see above) for approval and adoption by monitoring and regulatory agencies
      b. Coordination with ELAP (or others) for approving DNA sequencing facilities for state DNA sequencing projects

Online resources and training workshops
   A. Creating a catalog of reference materials for user community to implement recommended protocols and best-practices
   B. Creating a definitions sheet and FAQ to share with user community (e.g. define barcoding, metabarcoding, eDNA, qPCR, and example applications of each approach)
   C. **Products:** Molecular Methods Workgroup website with:
      a. Copies of recommended sampling, analytical, and QC protocols
      b. Training materials (webinars, Powerpoints, FAQs, definition sheets) to help new users adopt molecular methods
      c. Annual (?) online and in-person trainings for new users and user community

Other?

LINK

First meeting: December 17th, 10am

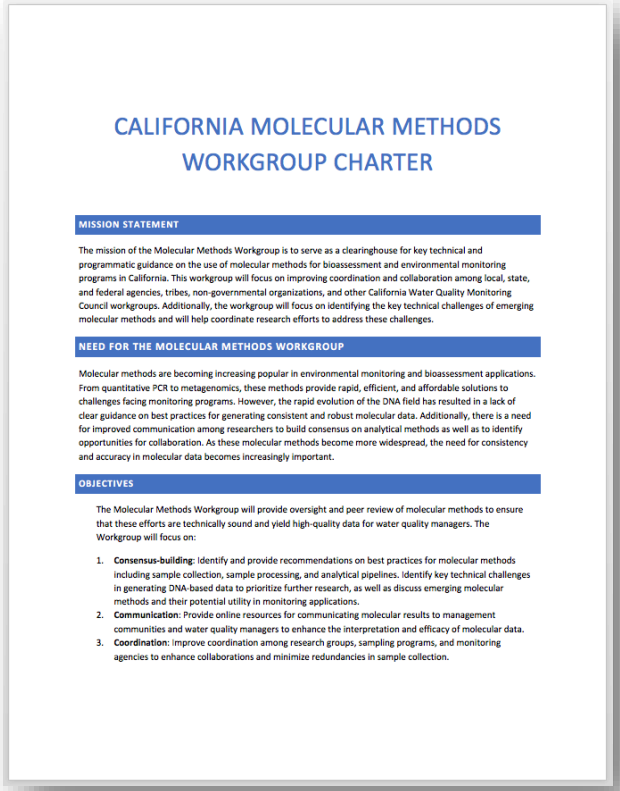
- Agenda
  - Introductions
  - Review of priority topics
  - Timeline for key products
  - Expected participation
  - Opportunities for funding support

Feedback from Council

1. Please send any additional member recommendations to Susie (susannat@sccwrp.org)
2. Please feel free to contact me regarding priority topics, especially with regards to items to tackle in first year
3. Recording of webinar will be posted to Workgroup website (TBD)

Bonus slides

Molecular Methods Workgroup charter



CALIFORNIA MOLECULAR METHODS WORKGROUP CHARTER

MISSION STATEMENT

The mission of the Molecular Methods Workgroup is to serve as a clearinghouse for key technical and programmatic guidance on the use of molecular methods for bioassessment and environmental monitoring programs in California. This workgroup will focus on improving coordination and collaboration among local, state, and federal agencies, tribes, non-governmental organizations, and other California Water Quality Monitoring Council workgroups. Additionally, the workgroup will focus on identifying the key technical challenges of emerging molecular methods and will help coordinate research efforts to address these challenges.

NEED FOR THE MOLECULAR METHODS WORKGROUP

Molecular methods are becoming increasing popular in environmental monitoring and bioassessment applications. From quantitative PCR to metagenomics, these methods provide rapid, efficient, and affordable solutions to challenges facing monitoring programs. However, the rapid evolution of the DNA field has resulted in a lack of clear guidance on best practices for generating consistent and robust molecular data. Additionally, there is a need for improved communication among researchers to build consensus on analytical methods as well as to identify opportunities for collaboration. As these molecular methods become more widespread, the need for consistency and accuracy in molecular data becomes increasingly important.

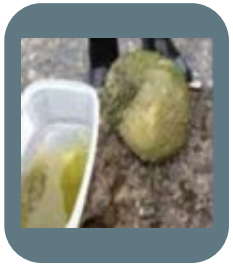
OBJECTIVES

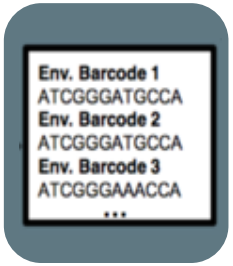
The Molecular Methods Workgroup will provide oversight and peer review of molecular methods to ensure that these efforts are technically sound and yield high-quality data for water quality managers. The Workgroup will focus on:

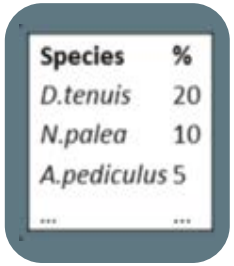
1. **Consensus-building**: Identify and provide recommendations on best practices for molecular methods including sample collection, sample processing, and analytical pipelines. Identify key technical challenges in generating DNA-based data to prioritize further research, as well as discuss emerging molecular methods and their potential utility in monitoring applications.
2. **Communication**: Provide online resources for communicating molecular results to management communities and water quality managers to enhance the interpretation and efficacy of molecular data.
3. **Coordination**: Improve coordination among research groups, sampling programs, and monitoring agencies to enhance collaborations and minimize redundancies in sample collection.

- In collaboration with Nick Martorano, Kris Jones, Nicole Hack
- “The mission of the Molecular Methods Workgroup is to serve as a clearinghouse for key technical and programmatic guidance on the use of molecular methods for bioassessment and environmental monitoring programs in California…"

Generating DNA data







Sampling → DNA extraction → DNA analysis → Bioinformatics → Taxonomy ID → Biological data

CALIFORNIA WATER QUALITY MONITORING COUNCIL

Environmental Flows Workgroup

November 29, 2018

Item #6b

Dan Schultz and Robert Holmes

Update

- *Workgroup Charter finalized.*

- Webpages have been created and are available at https://mywaterquality.ca.gov/monitoring_council/environmental_flows_workgroup/index.html

- *Next Steps*

Bioaccumulation Oversight Group (BOG) Update

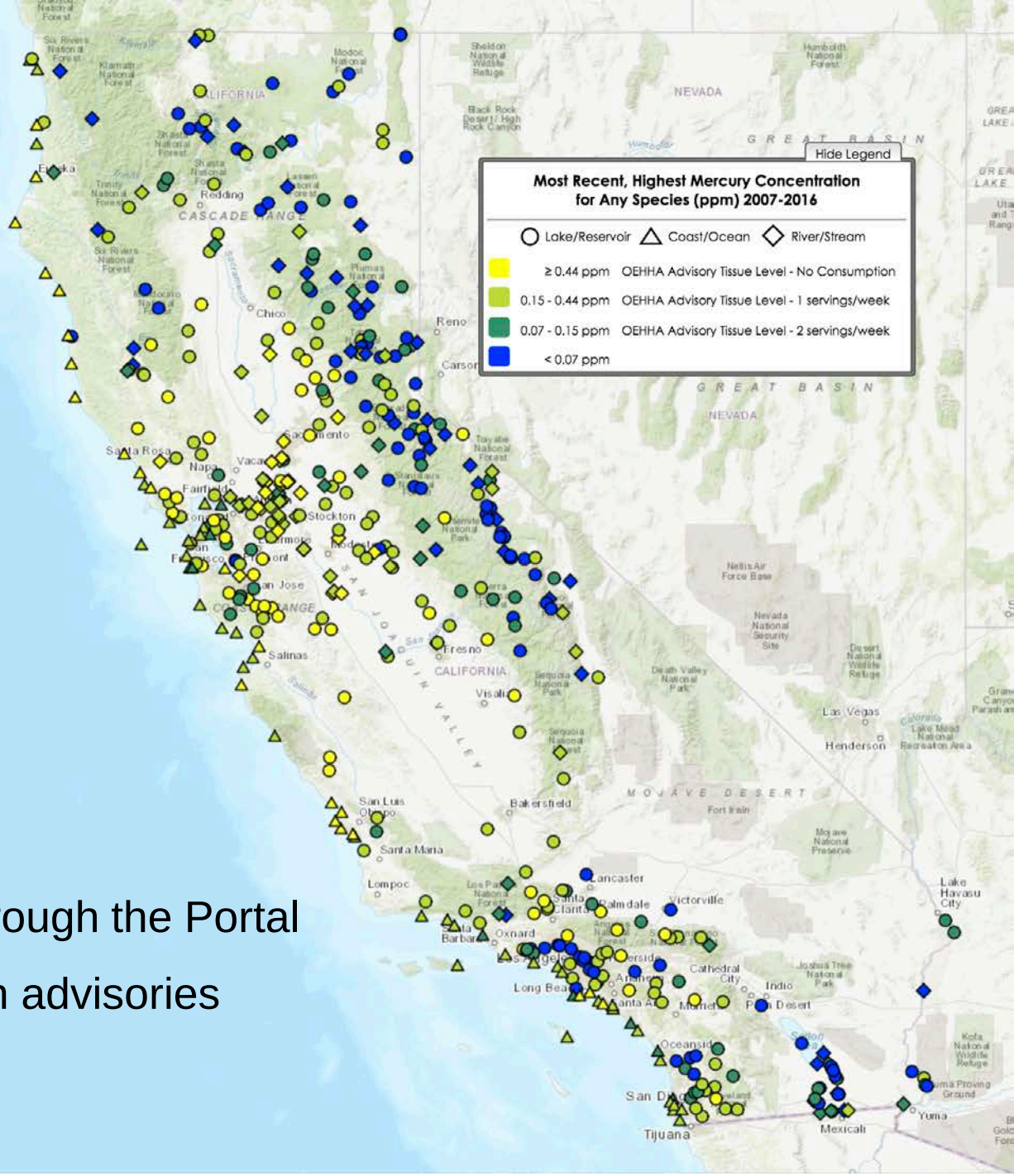
November 29, 2018

Item #6c

Jay Davis

SWAMP Bioaccumulation Monitoring Program

- Began in 2007
- Annual monitoring
- Focus on sport fish
- All water body types
- Lean budget
- Strong peer review
- Annual reports
- Information access through the Portal
- 303(d) listings and fish advisories

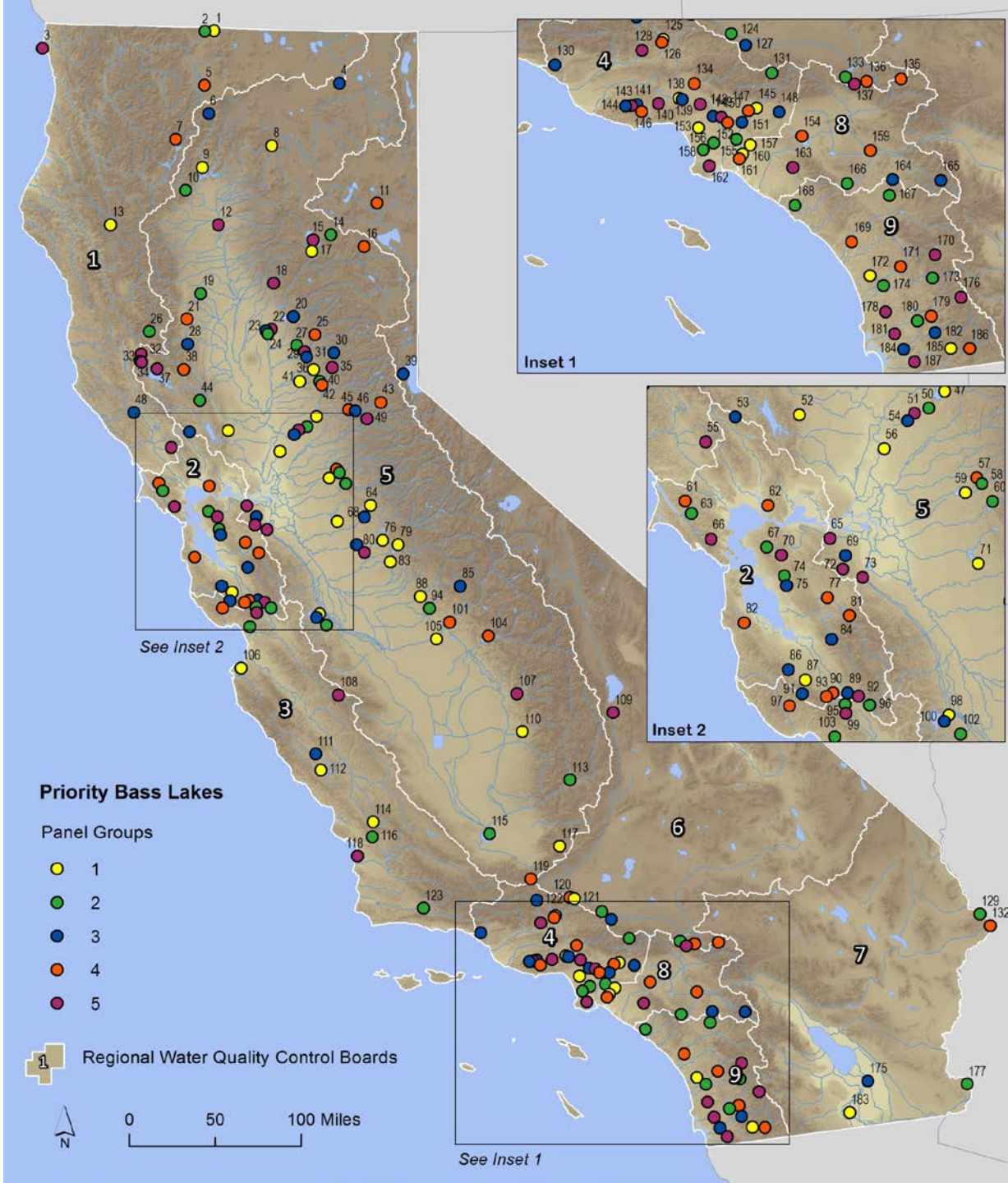


SWAMP Bioaccumulation Monitoring 2018

- **Coastal Waters, Round 2**
- 10-year cycle
- 2018: SoCal Bight
- 2019: SF Bay
- 2020: Central and North Coasts
- **Collaboration**

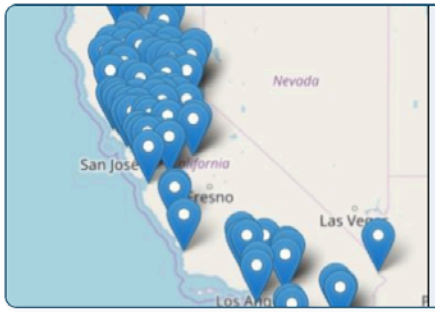
SWAMP Bioaccumulation Monitoring 2019

- **Long-term Bass Lake Monitoring**
- 190 lakes
- 5 panels
- 10-year cycle
- 2015, 2017, 2019….



Bioaccumulation of Pollutants in Fish Tissue

Fish and shellfish are nutritious and good for you to each. But some fish and shellfish may take in toxic chemicals from the water they live in and the food they eat. Some of these chemicals build up in the fish and shellfish - and in the humans that eat fish and shellfish - over time. Although the chemical levels are usually low, it is a good idea to learn about advisories and monitoring in water bodies where you fish, and for fish or shellfish you eat.



Fish Consumption Advisories

Can I eat fish or shellfish caught in my lake, stream or ocean location?

The Office of Environmental Health Hazard Assessment (OEHHA) evaluates contaminant levels in sport fish and issues Fish Consumption Advisories for water bodies in California. Click on the map icon to the left to see an interactive map of current fish consumption advisories issued by OEHHA for specific lakes, rivers or coastal fishing areas. Fish consumption advice is also available for lakes, reservoir, and coastal areas that do not currently have site-specific advice, as well as for fish that migrate.

Contaminant Levels and Long Term Trends in Sport Fish

What are the levels, trands and long-term trends in my lake, stream or ocean location?

Click on the map icon to the left to see an interactive map that allows you to explor fish contaminant data for your favorite fishing locations.

Data are available from extensive monitoring by the Surface Water Ambient Monitoring Program's Bioaccumulation Monitoring Program and from other studies.

Under Development

Impaired Water Bodies

Which lakes, streams and ocean locations are listed by the state as impaired for fish or shellfish consumption?

Click on the map icon to the left to see an interactive map showing California waters placed on the 2014 and 2016 Impaired Water Bodies list as impaired for uses related fish or shellfish consumption.

A GUIDE TO EATING FISH *from* CALIFORNIA LAKES AND RESERVOIRS WITHOUT SITE-SPECIFIC ADVICE

Eat the Good Fish
Eating fish that are low in chemicals may provide health benefits to children and adults.

Avoid the Bad Fish
Eating fish with higher levels of chemicals like mercury or PCBs may cause health problems in children and adults.

Choose the Right Fish
Chemicals may be more harmful to unborn babies and children.

Women (18-45 Years) Children (1-17 Years)	Women (46+ Years) Men (18+ Years)
2 TOTAL SERVINGS A WEEK	**6** TOTAL SERVINGS A WEEK
OR	OR
1 TOTAL SERVING A WEEK	**2** TOTAL SERVINGS A WEEK
OR	OR
0 DO NOT EAT	**1** TOTAL SERVING A WEEK

Rainbow Trout
high in omega-3s

Catfish

Bullhead

Sunfish Species

Brown Trout
16 inches or less
high in omega-3s

Black Bass Species

Carp

Brown Trout
over 16 inches

Serving Size
A serving of fish is about the size and thickness of your hand. Give children smaller servings.

For Adults

For Children

California Office of Environmental Health Hazard Assesment
web www.oehha.ca.gov/fish
email fish@oehha.ca.gov
phone (916) 324-7572

Eat only the skinless fillet

Eat only the meat

Some chemicals are higher in the skin, fat, and guts.

A GUIDE TO EATING FISH *from the* CALIFORNIA COAST

ADVISORY FOR AREAS WITHOUT SITE-SPECIFIC ADVICE

WOMEN 18 - 45 YEARS AND CHILDREN 1 - 17 YEARS

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Small Flatfish: Diamond Turbot, Longfin Sanddab, Speckled Sanddab, and Spotted Turbot

Croaker: White and Yellowfin

Queenfish

Low-PCB Surfperch: Shiner, Silver, and Walleye

Very Low-PCB Surfperch: Barred, Black, Pile, Rainbow, Spotfin, and White

Topsmelt

Barred Sand Bass

Cabezon

California Corbina

Kelp Bass

Lingcod

Medium-Mercury Rockfish: Black, Blue, Brown, Kelp, Olive, Rosethorn, and Vermillion

High-Mercury Rockfish: Black and Yellow, China, Copper, and Gopher

Sharks

Serving Size

A serving of fish is about the size and thickness of your hand. Give children smaller servings.

For Adults

For Children

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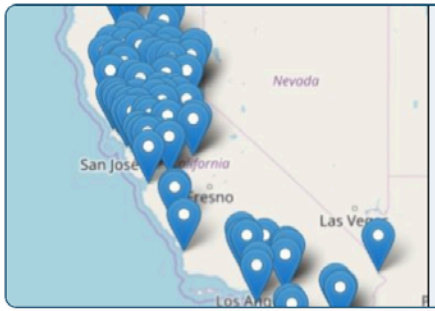

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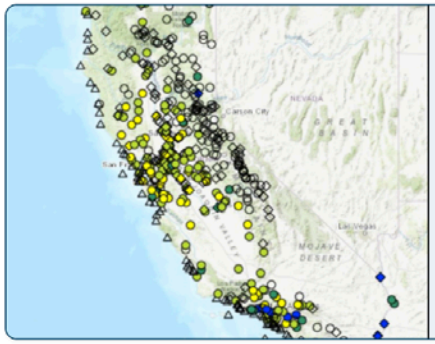

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CALIFORNIA WATER QUALITY MONITORING COUNCIL

California Cyanobacteria Harmful Algal Bloom Network

November 29, 2018

Item #6d

Becky Stanton

CALIFORNIA WATER QUALITY MONITORING COUNCIL

Safe to Swim Workgroup

November 29, 2018

Item #6e

Karen Black, Alisha Wenzel, and Nick Martorano

Update

- *Reconvening the larger Safe to Swim Workgroup as a venue for collaborations across the sub-workgroups.*

- The Coastal Beach Water Quality Workgroup webpages have been revived and are available at: https://mywaterquality.ca.gov/monitoring_council/swim_workgroup/coastal_beaches.html

- A new Safe to Swim map has been created with fecal indicator bacteria information for all waterbody types. https://mywaterquality.ca.gov/safe_to_swim/interactive_map/

- *Next Steps*

CALIFORNIA WATER QUALITY MONITORING COUNCIL

Wetland Monitoring Workgroup

November 29, 2018

Item #6f

Josh Collins

CALIFORNIA WATER QUALITY MONITORING COUNCIL

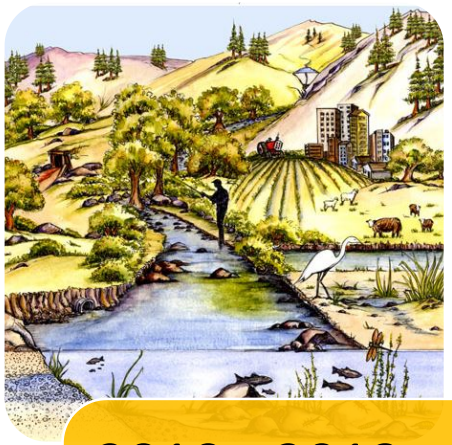
Healthy Watersheds Partnership

November 29, 2018

Item #6g

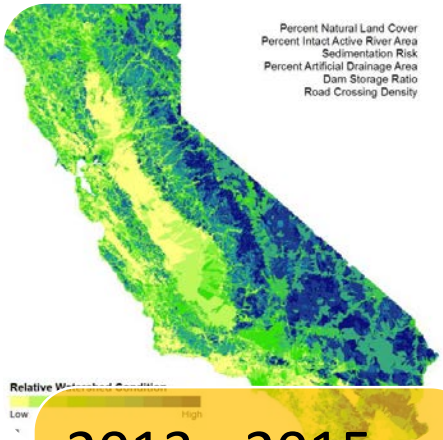
Ali Dunn

After a brief hiatus, the healthy watersheds partnership is reconvening to update existing framework with new methodologies, tools and data



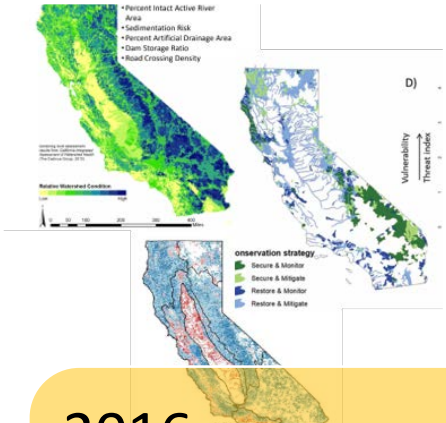
2010 - 2013

- Workgroup formed
- Portal created



2013 - 2015

- CA Integrated Assessment
- Draft business plan, charter and grant applications
- Name change



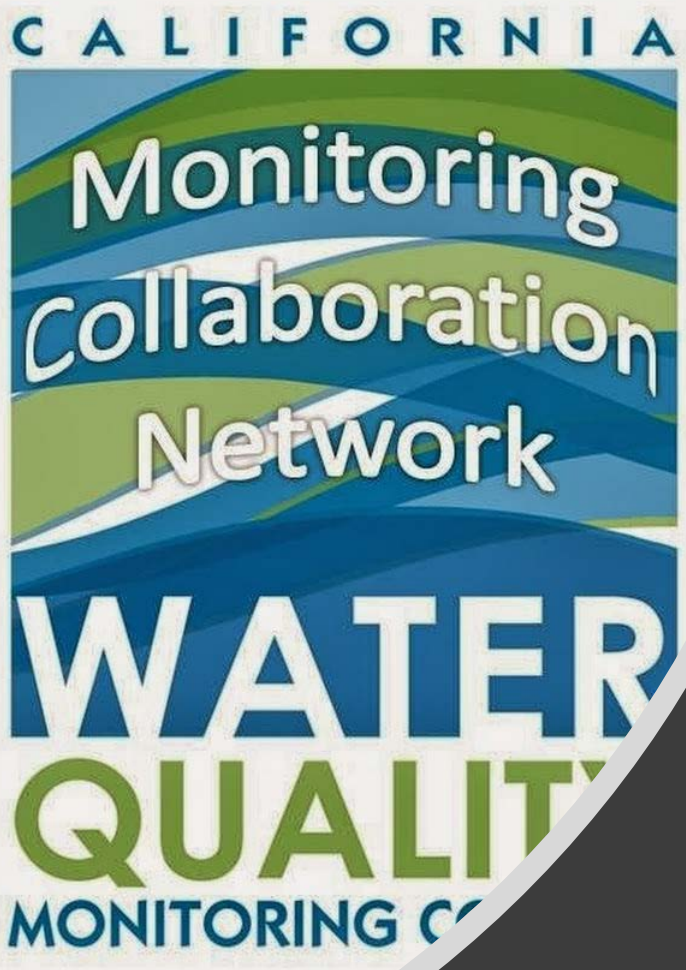
2016 - now

- Last meeting 9/2016
- Grant application – no $
- **NOW → reconvene and update existing framework**

Next steps and
where we could use some help

- Establish strong connections with watershed management efforts across state (targeted outreach at executive level)
  - E.g., DFW-biogeographic data branch, DWR's Water Action Plan
- Develop tools that improve access to watershed data for local management actions
- Update existing framework and assessment with new methodologies and data
  - E.g., TNC's Freshwater Conservation Blueprint products
- Produce demonstration products (support grant funding?)
- **Keep momentum going!**

Feedback?



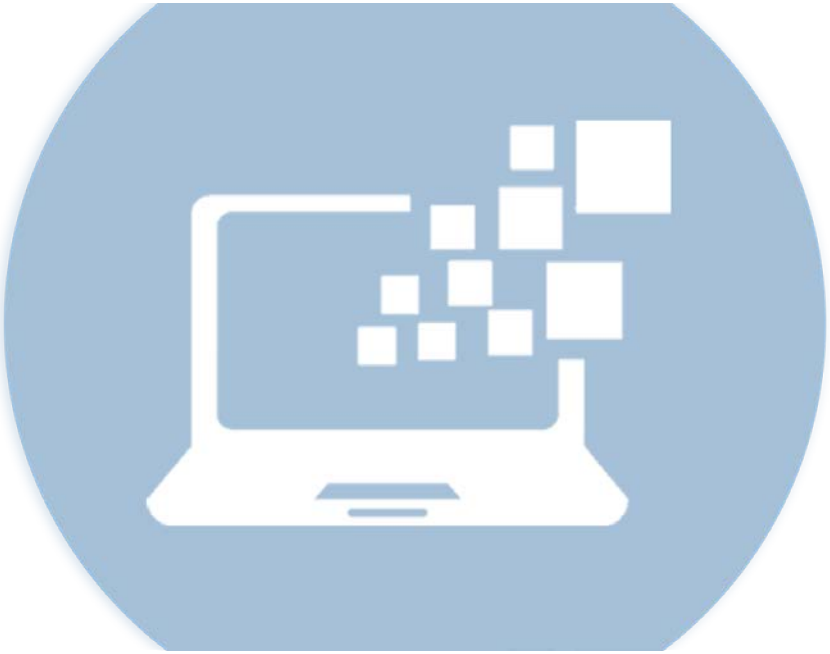
CWQMCN Report November 2018 Item #6h

Erick Burres – Facilitator

213-576-6788
erick.burres@waterboards.ca.gov

Swimmable California Webinar Series 2017-2018

- A Swimmable California: The Importance of Safe to Swim Policies and Programs
- Fecal Indicator Bacteria Methods: The Good, Bad and Ugly
- An Introduction to Water Contact Sanitary Surveys
- Testing Sewer and Stormwater Infrastructure
- Water Quality Improvement Projects and BMPs to Achieve a Swimmable California
- Harmful Algal Blooms and Water Recreation
- QMRA Eligibility: Molecular Source Tracking and Disease Detection
- Beach Water Quality Modeling and NowCasting



Technology Advancements for Water Quality Monitoring Webinar Series

- Fishviews: A Tool for Collaboration and Communication
- EnviroDIY Webinar: California Water Quality Monitoring Collaboration Network
- Raman Spectroscopy for Environmental Analysis
- Use of eDNA Methodology as a Survey Tool for Cryptic or Endangered Aquatic Organisms

Safe to Swim Work Group Meeting
July 2018

www.youtube.com/playlist?list=PLvTjRb8VCkp5eye3qci_PRKwuyRtnEJG_

CWQMCN's h20 monitoring

Stats from the Last 365 Days

- 4,000 Views

Top Countries Watch Time

- USA
- South Korea
- India

Stats Since June 21, 2013

- 102,800 Views

Top Countries Watch Time

- USA
- Ethiopia
- Canada
- Germany
- India

www.youtube.com/CWQMC

CALIFORNIA WATER QUALITY MONITORING COUNCIL

Data Management Workgroup

November 29, 2018

Item #6i

Tony Hale

Updates on recent activities

Data Management Workgroup

Highlighted Activities

- Increased Communication regarding AB 1755: The Open and Transparent Water Data Act
  - Participated in AB 1755 technical workshop (Aug ‘18)
- Data Management Plan guidance
  - Interagency Ecological Program (DUWG)
  - DFW & Delta Stewardship Council
- Advocacy for and Guidance on
  - Digital Object Identifiers
  - Data Sharing Protocols

Data Management Workgroup

Data Management Workgroup

Highlighted Activities (Pt 2)

- Facilitated discussions on data-sharing projects
  - Survey for underserved agencies and other entities
  - CNRA portal
  - USEPA-coordinated Data Federation Pilot
- Produced draft of Open Data Handbook Guidance Outline

Next Steps

- Facilitate outreach for data management plans
- Re-develop the charter for the DMWG
  - From Council Workgroup technical coordination to broader intergroup technical coordination and advancement
- Continue support for data sharing among local agencies and organizations

Data Management Workgroup

Anticipated Impacts of Changing Strategy

Potential Impacts

- Loss of Co-Chair (Currently provided by DWR)
- Dissolution of Steering Committee
- Reduction in ready interagency communication

Workgroup Needs

- Co-Chair (Currently provided by DWR)
- Funding support for facilitation and outreach

Questions?

Tony Hale, PhD
tonyh@sfei.org

CALIFORNIA WATER QUALITY MONITORING COUNCIL

Estuary Monitoring Workgroup

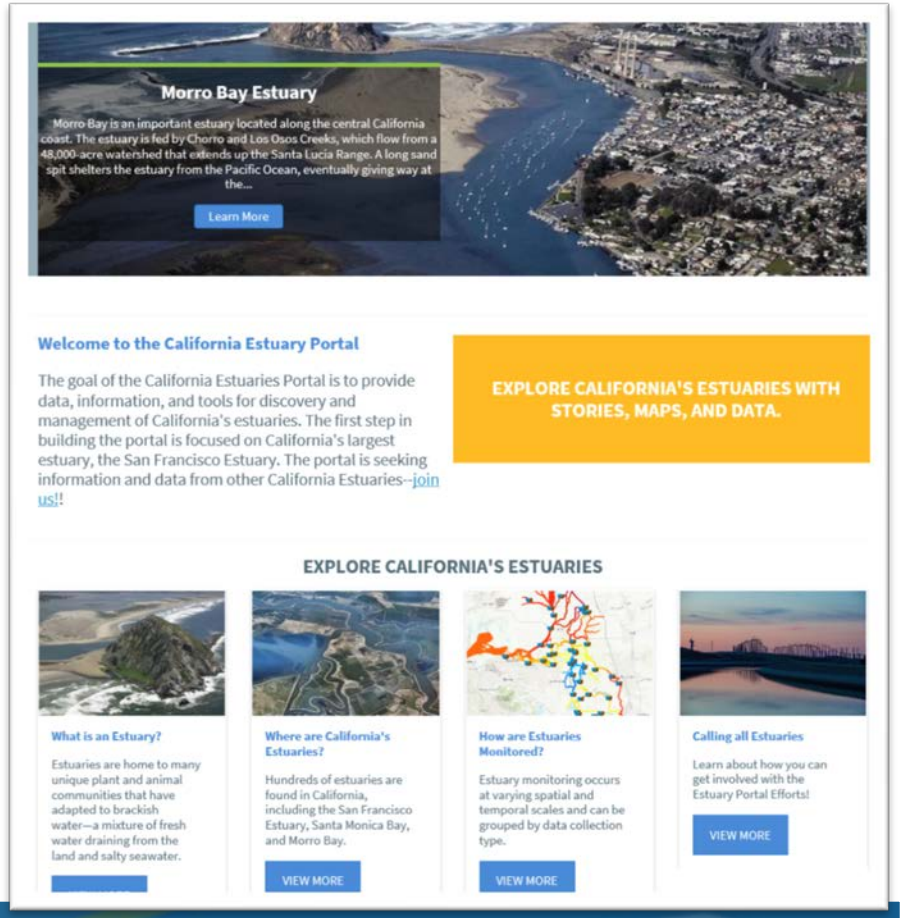
November 29, 2018

Item #6j

Kris Jones

Update

- *Workgroup Focus*—Estuary portal Revamp (launched 3/18)
  - Worked to develop content and tools for data access and visualizations
- Experiencing Leadership Challenges
  - Will need leadership to find new purpose (in line with 5 focus areas)
- *Next Steps*
  - Identify new leadership
  - Develop updated goals for workgroup (5 focus areas)
  - Seek additional partners and re-invigorate workgroup



CALIFORNIA WATER QUALITY MONITORING COUNCIL

Safe Drinking Water Workgroup

November 29, 2018

Item #6k

Karen Mogus