

SWRCB SAFER Program Aquifer Risk Map Methodology *Webinar #3*

October 9, 2020
9:00 am

Remote participation only





Welcome and Meeting Logistics

Itze Abeyta



Water Board's Mission Statement

Preserve, enhance, and restore the quality of California's water resources and drinking water for the protection of the environment, public health, and all beneficial uses, and to ensure proper water resource allocation and efficient use, for the benefit of present and future generations.

Meeting Goals

1. Introduction and background of aquifer risk map development
2. Aquifer risk map methodology and presentation of draft map
3. Opportunity for public comment and feedback

Ways to Participate-

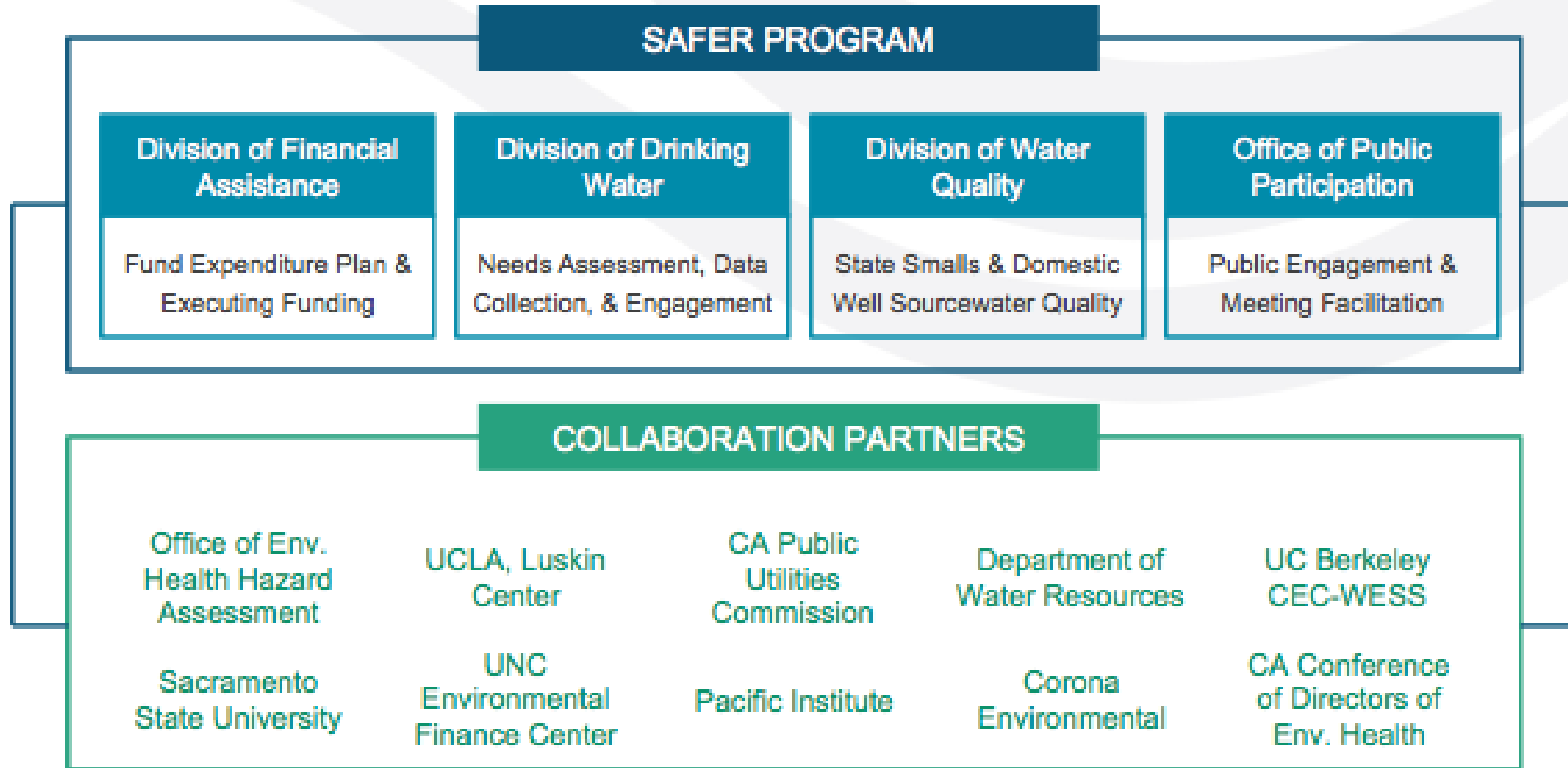
1. **Watch ONLY:** Visit video.calepa.ca.gov
2. **Email:** Submit a comment or ask a question that will be read aloud, send an email to: safer@waterboards.ca.gov
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4. **Raise Hand:** Attendees will be given the opportunity to provide verbal comment or ask questions, if you're interested in this option, please raise your virtual hand when the time is right.

- Please wait for your name to be called.
- Public comments are 3 minutes each.

Aquifer Risk Map Methodology

Scott Seyfried and Emily Houlihan

SAFER Program



SB-200 Requirements

“ 116772. (a) (1) By January 1, 2021, the board, in consultation with local health officers and other relevant stakeholders, shall use available data to make available a map of aquifers that are at high risk of containing contaminants that exceed safe drinking water standards that are used or likely to be used as a source of drinking water for a state small water system or a domestic well. The board shall update the map annually based on new and relevant data. ”

SB-200 Requirements (cont.)

“ (2) The board shall make the map of high-risk areas, as well as the data used to make the map, publicly accessible on its internet website in a manner that complies with the Information Practices Act of 1977 (Chapter 1 (commencing with Section 1798) of Title 1.8 of Part 4 of Division 3 of the Civil Code). The board shall notify local health officers and county planning agencies of high-risk areas within their jurisdictions.

”

Aquifer Risk Map - Timeline



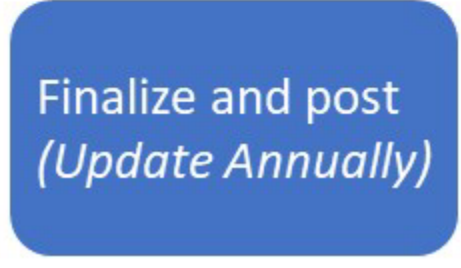
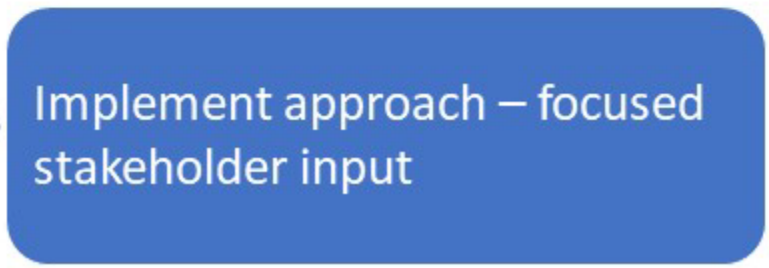
Project Kick Off – Staff Receives Initial Feedback

Follow up Workshop- Staff presents proposed approaches

Draft map presented for comment and review

Informational item on draft map

Map is made available to the public



Aquifer Risk Map – Main Goals

1. Prepare a map depicting relative risk of ambient source groundwater containing chemical constituents at concentrations above regulatory levels
2. Focus on shallow groundwater likely to be accessed by domestic wells and state small systems
3. Water quality risk to be combined with other factors: accessibility, affordability, water shortage risk, and demographic information - as part of the SAFER fund expenditure planning

Previous Work



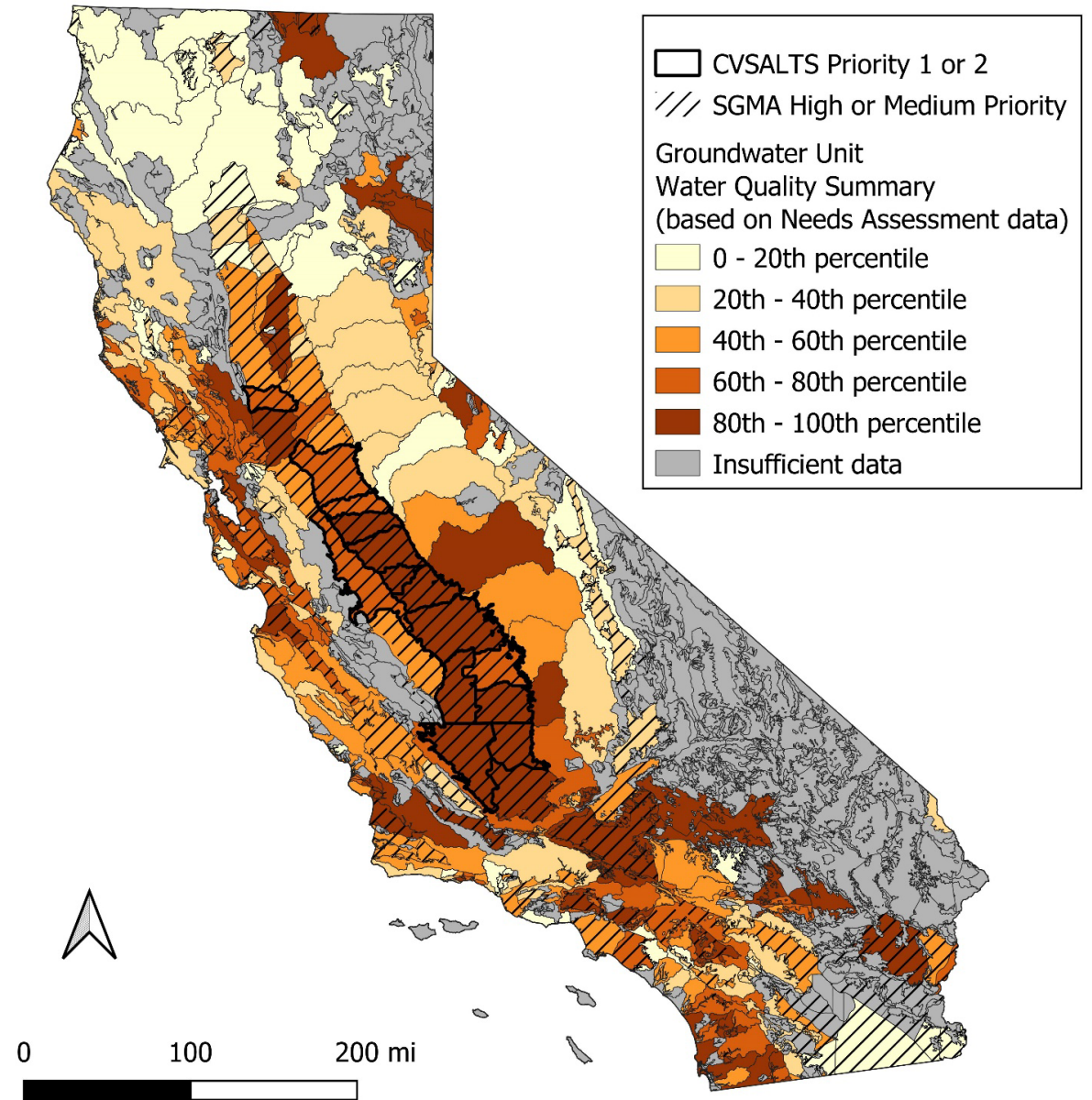
Domestic Well Water Quality Tool (Needs Assessment)

- Uses depth-filtered water quality results from public and domestic wells to estimate domestic well depth groundwater quality per square mile for all chemicals with a maximum contaminant level or MCL. Groundwater quality assessed using 20-year average and using all results from past 2 years.
- Uses OSWCR domestic well construction report counts to estimate density of domestic wells per square mile

Previous Work

Fund Expenditure Plan

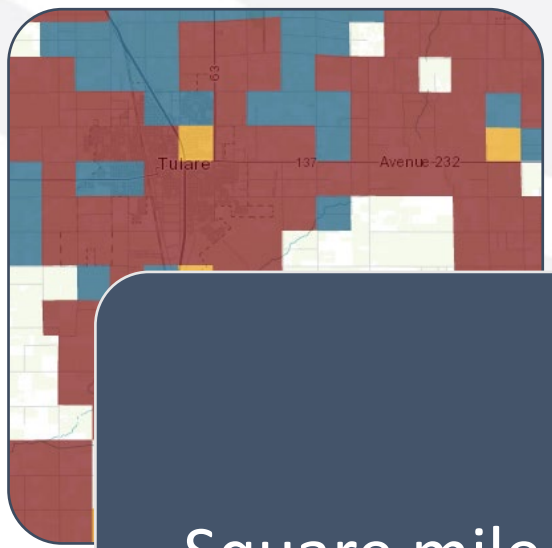
- Aggregates Needs Assessment data by Groundwater Units; units are ranked by the percent of sections “at-risk” for any constituent (“at-risk” = long-term OR recent estimations over MCL)
- Groundwater Units ranked by percentile



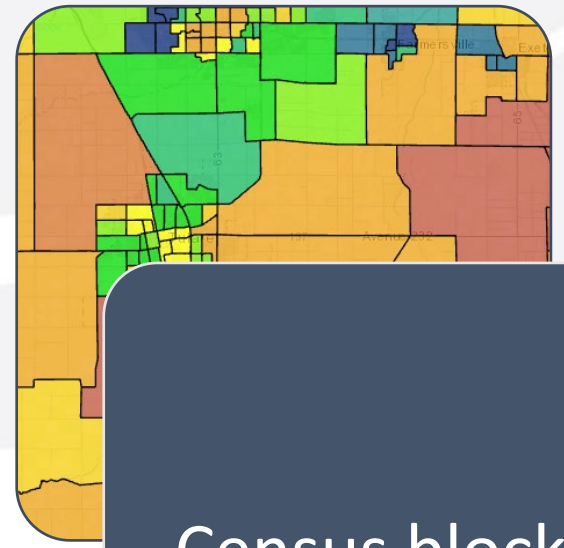
Methodology Overview



Point data
(wells)



Square mile
sections



Census block
groups

Methodology – Data Processing

Data collection, filtering, and de-clustering methodology follows the Domestic Well Water Quality Tool procedure

- Use publicly available data from DDW, GAMA, USGS, DWR, ILRP, and Local Groundwater sources
- Filter wells by depth to identify results that represent domestic depth groundwater
- Temporally and spatially de-cluster data by averaging by year, by well, and by square mile section

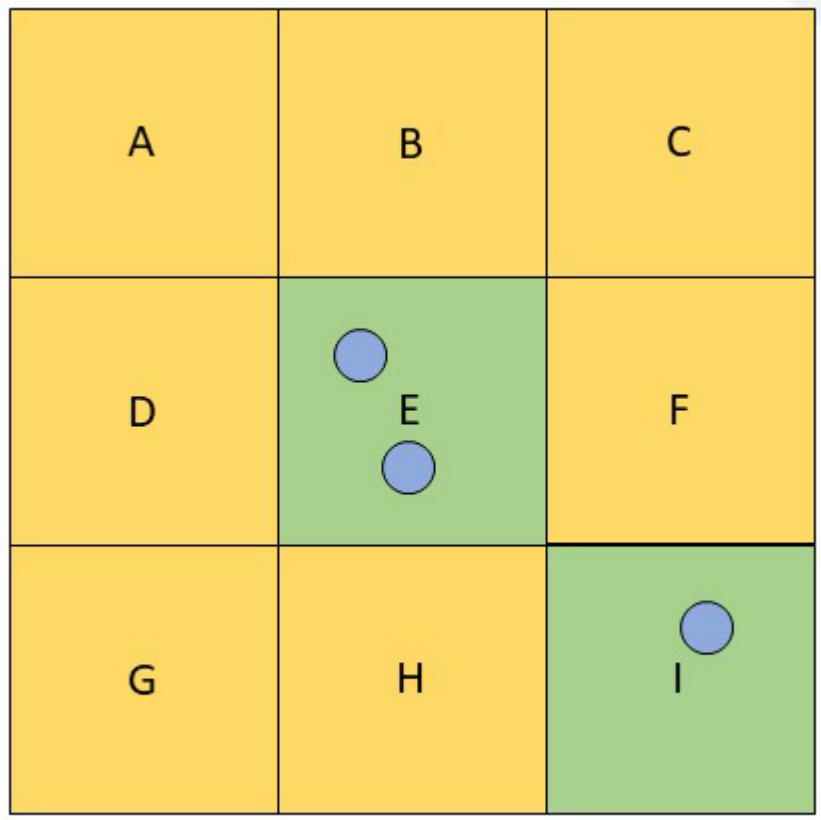
Methodology – Data Processing (cont.)

Water quality data is assessed for long-term average (20 years) and recent results (within 2 years) for all chemical constituents with an MCL

- 96 chemical constituents total, including hexavalent chromium (comparison concentration of 10 ug/L)

Water quality data is assessed for all square mile sections that contain a well with water quality data, and for all square mile sections that are adjacent to a well with water quality data

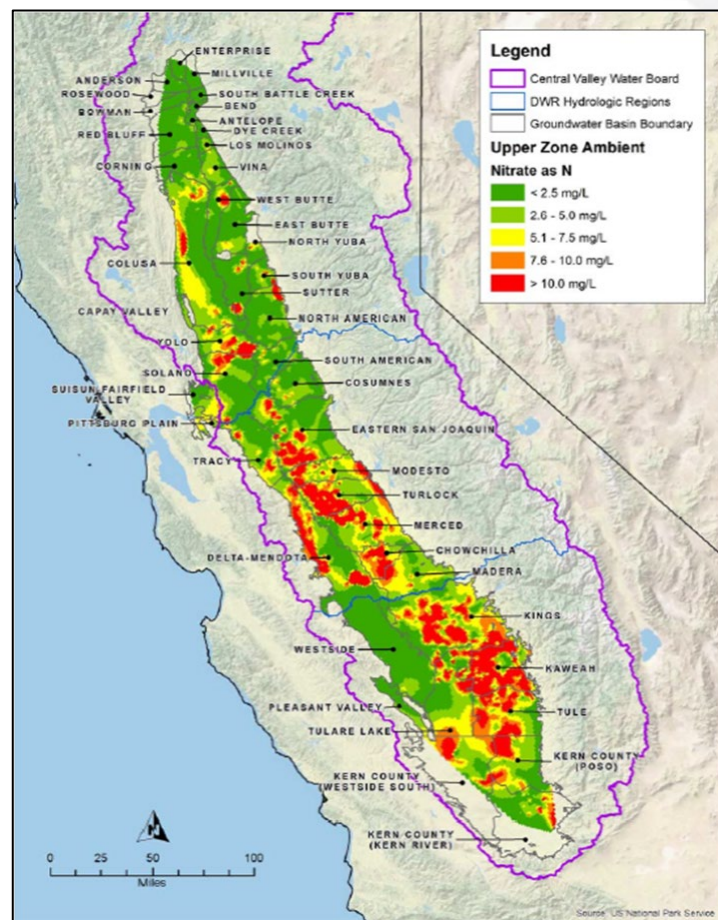
Methodology – De-clustering



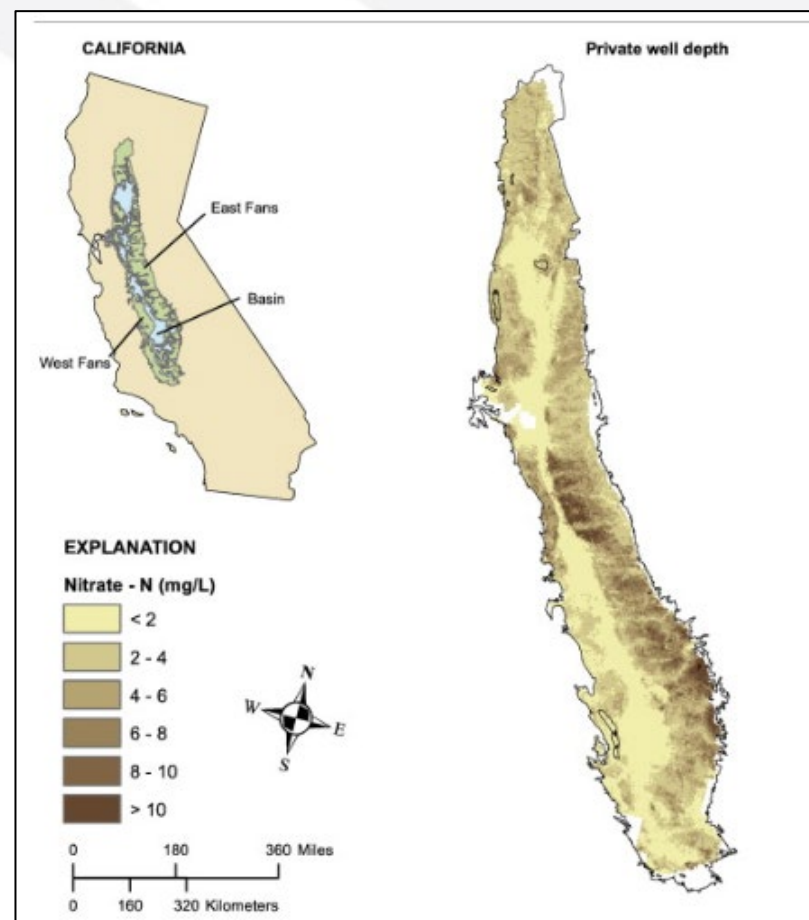
	Long-term average	Recent results
Sections with a water quality well	Average of wells in section	All recent results from wells in section
Sections adjacent to a water quality well	Average of adjacent sections with water quality wells	Averaged recent results from adjacent sections with water quality data

Section	Long-term average (MCL index)	Count of recent results above the MCL
E	3	1
I	2	0
F, H	2.5	0.5
A, B, C, D, G	3	1

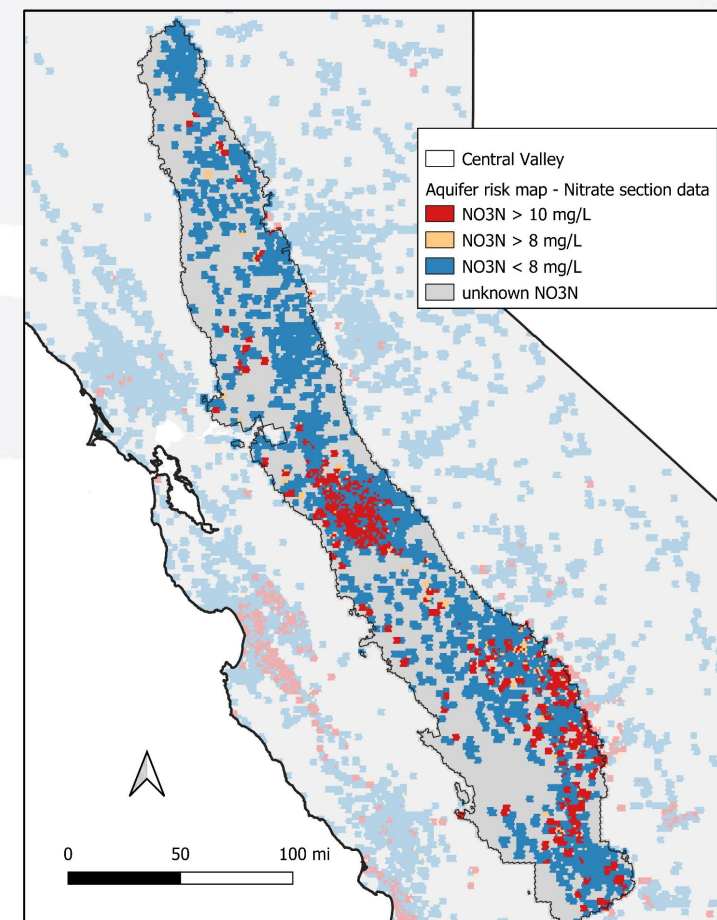
Comparison with other studies



CV-SALTS Upper Zone Ambient nitrate

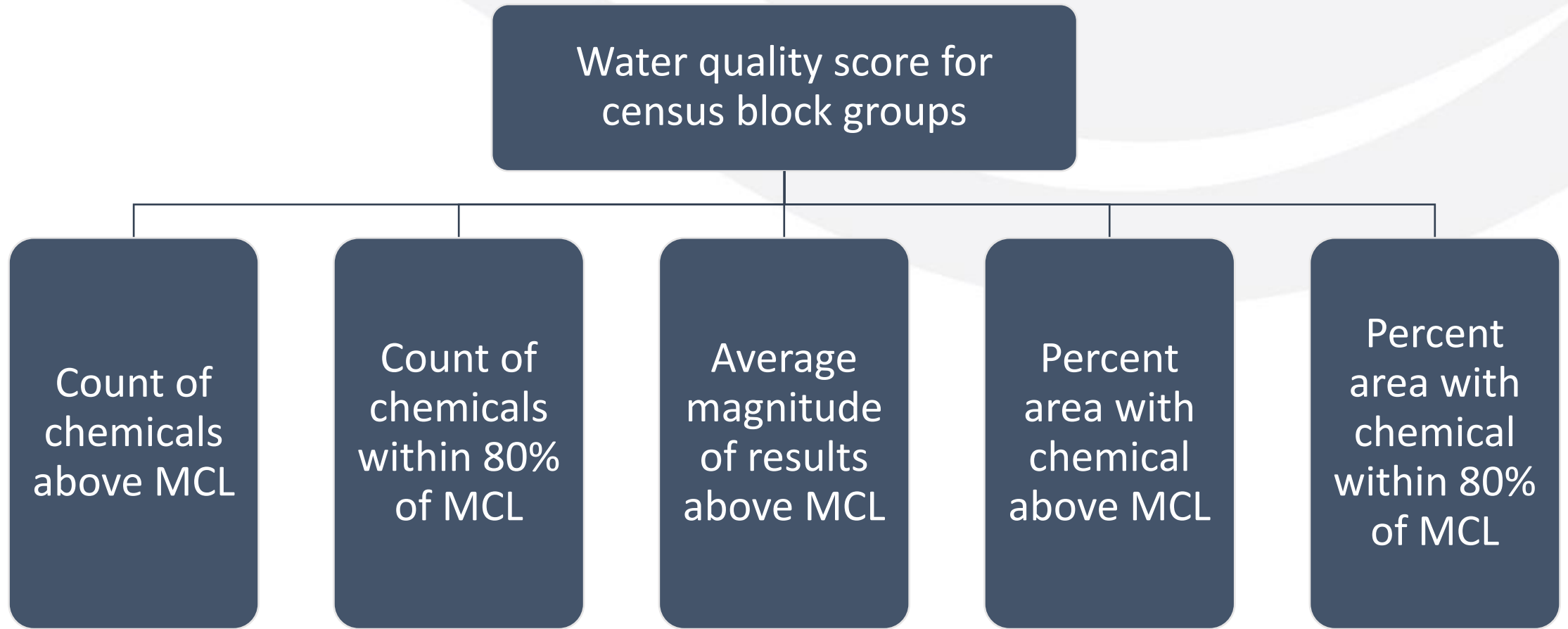


Ransom et al. (2018) Private well depth nitrate



Aquifer risk map nitrate section data

Methodology – Water Quality Metrics



Draft Map Methodology - Water Quality Score

A water quality score is calculated for each census block group by combining the water quality metrics:

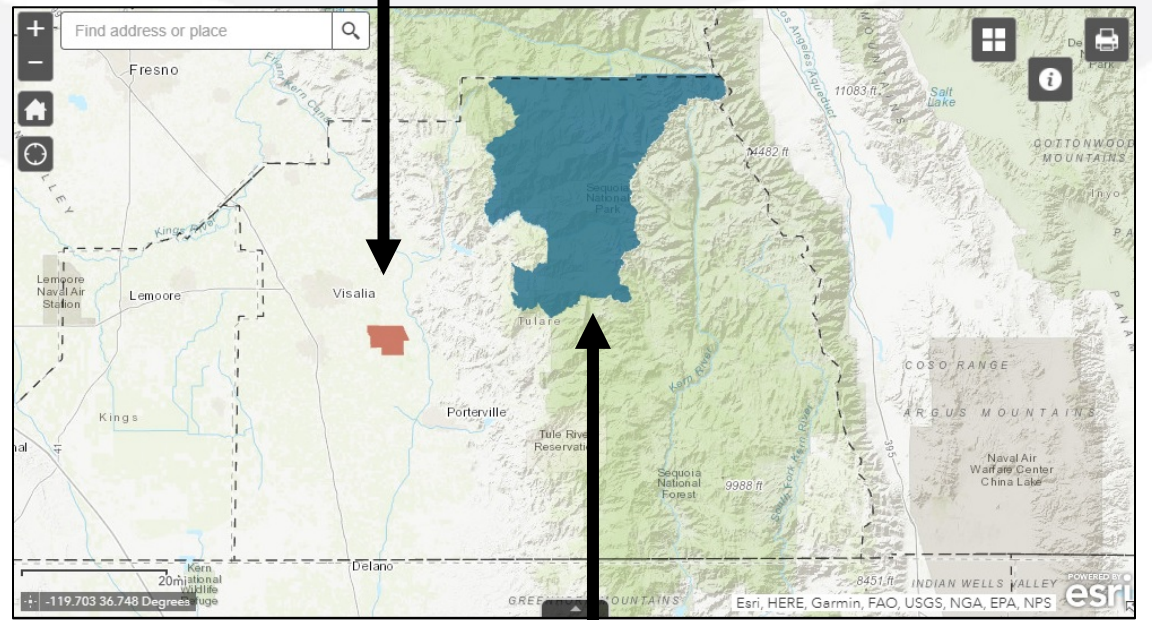
$$\text{Water quality score} = \left(\text{Count of chemical constituents above MCL} + \frac{\text{Count of chemical constituents within 80\% of MCL}}{2} + \frac{\text{Average magnitude of results above MCL}}{10} \right) \times \left(\text{Percent area with results above MCL} + \frac{\text{Percent area with results within 80\% of MCL}}{2} \right)$$

The final scores are converted to percentiles to normalize the numbers

Water Quality Score - Example

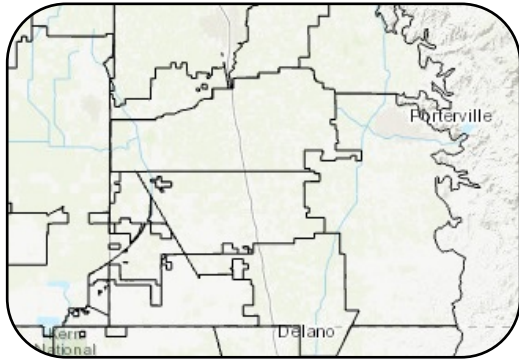
Census Block Group ID	61070025001	61070001001
Water Quality Percentile Score	96	2
Count of Chemicals Above MCL	7	2
Count of Chemicals within 80% of MCL	5	4
Average MCL index (of results above MCL)	2.02	1.28
% of Sections in Block Group with Chemical above MCL or within 80% of MCL	82.69	0.83
Chemicals Above MCL	TCPR123; TL; U; NO3N; PCATE; DBCP; AS	AS; ALPHA
Chemicals within 80% of MCL	NO3N; PCATE; DBCP; AS; CR	ALPHA; U; NO3N; AS
Water Quality Score	802.29	3.42
Percent of Sections in Block Group with Water Quality Data	92.31	14.18

$$Score = \left(7 + \frac{5}{2} + \frac{2.02}{10} \right) * (82.69) \rightarrow 96th\ percentile$$



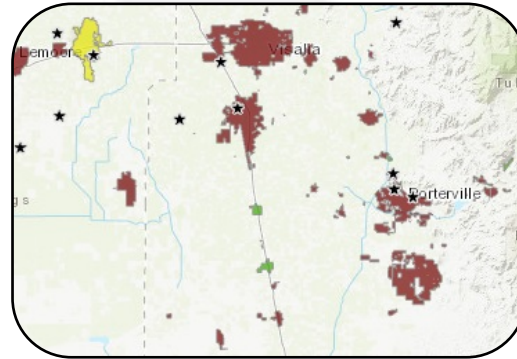
$$Score = \left(2 + \frac{4}{2} + \frac{1.28}{10} \right) * (0.83) \rightarrow 2th\ percentile$$

Map Layers



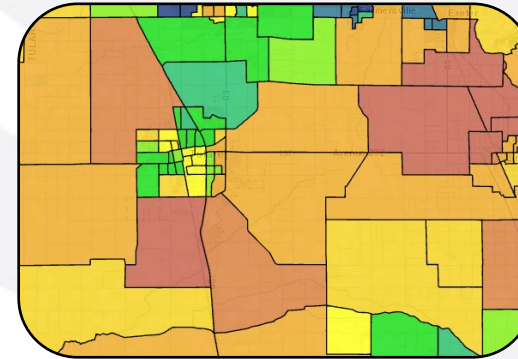
Reference boundaries

- Groundwater Sustainability Agencies, CV-SALTS basin boundaries, etc.



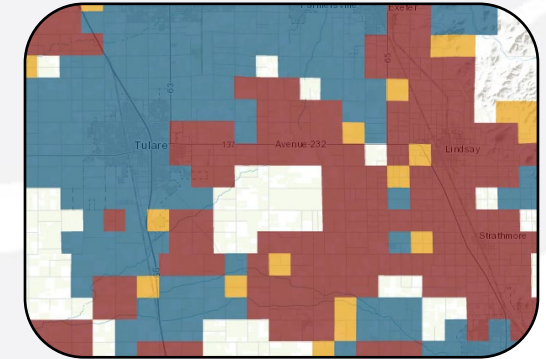
Drinking water supply systems

- Domestic well density estimates (DWR-OSWCR)
- State small water systems (RCAC)
- Public water systems (for reference only)



Domestic depth groundwater quality

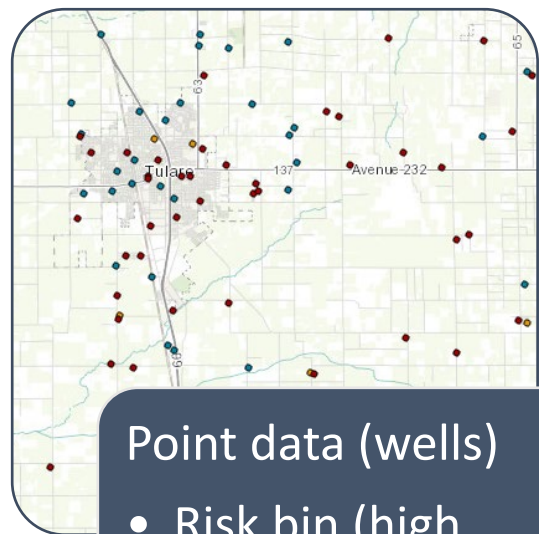
- (next slide)



Groundwater quality by section for individual chemicals

- Arsenic
- Nitrate
- 1,2,3-TCP
- Uranium
- Hexavalent Chromium

Draft Map Layers: Domestic depth groundwater quality



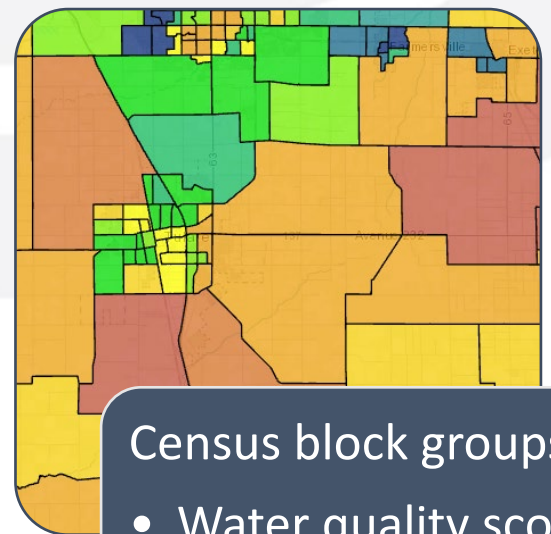
Point data (wells)

- Risk bin (high, medium, low)



Square mile sections (containing and adjacent to WQ well data)

- Risk bin (high, medium, low)

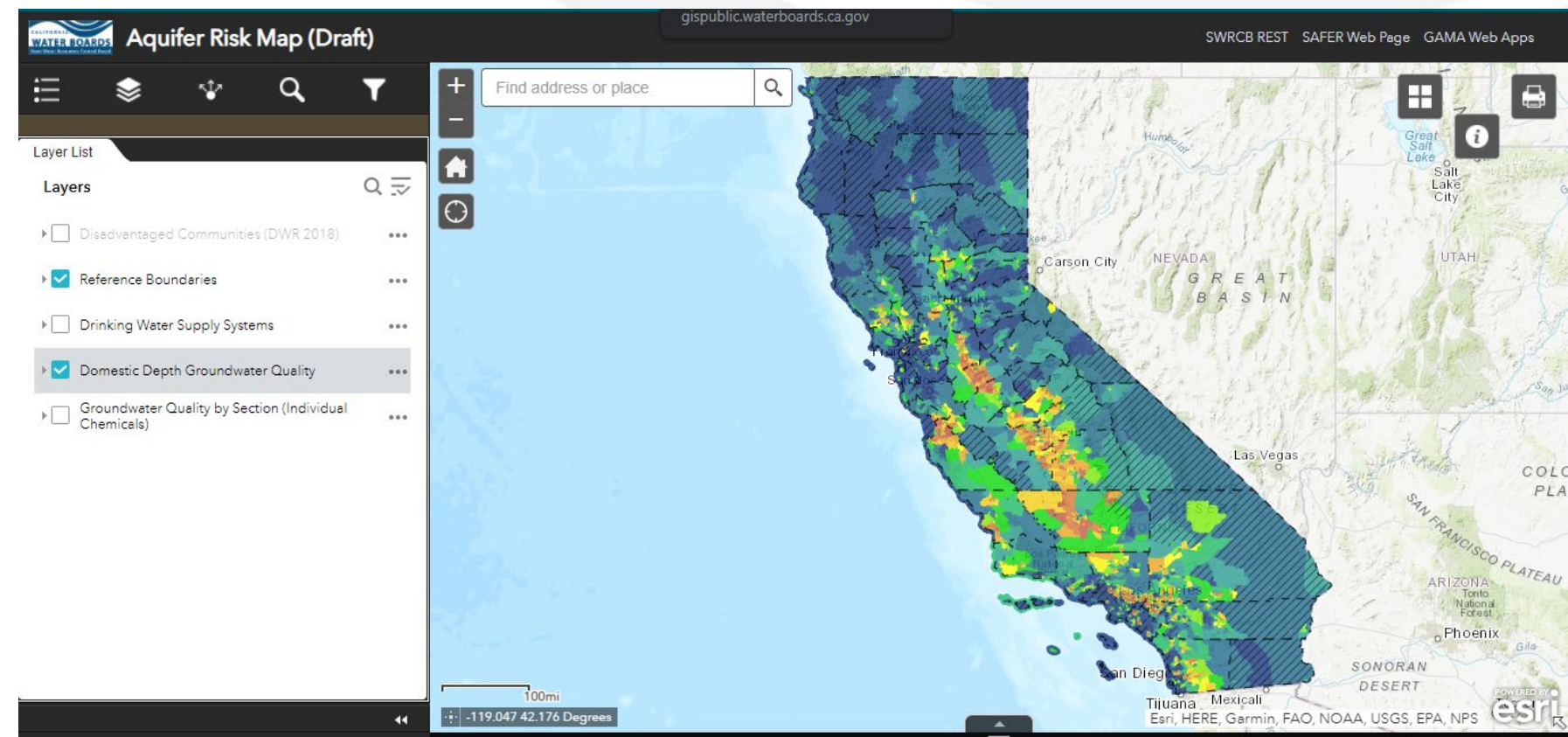


Census block groups

- Water quality score (percentile, 0 – 100)

Draft Map Demonstration

[Link to map](#)

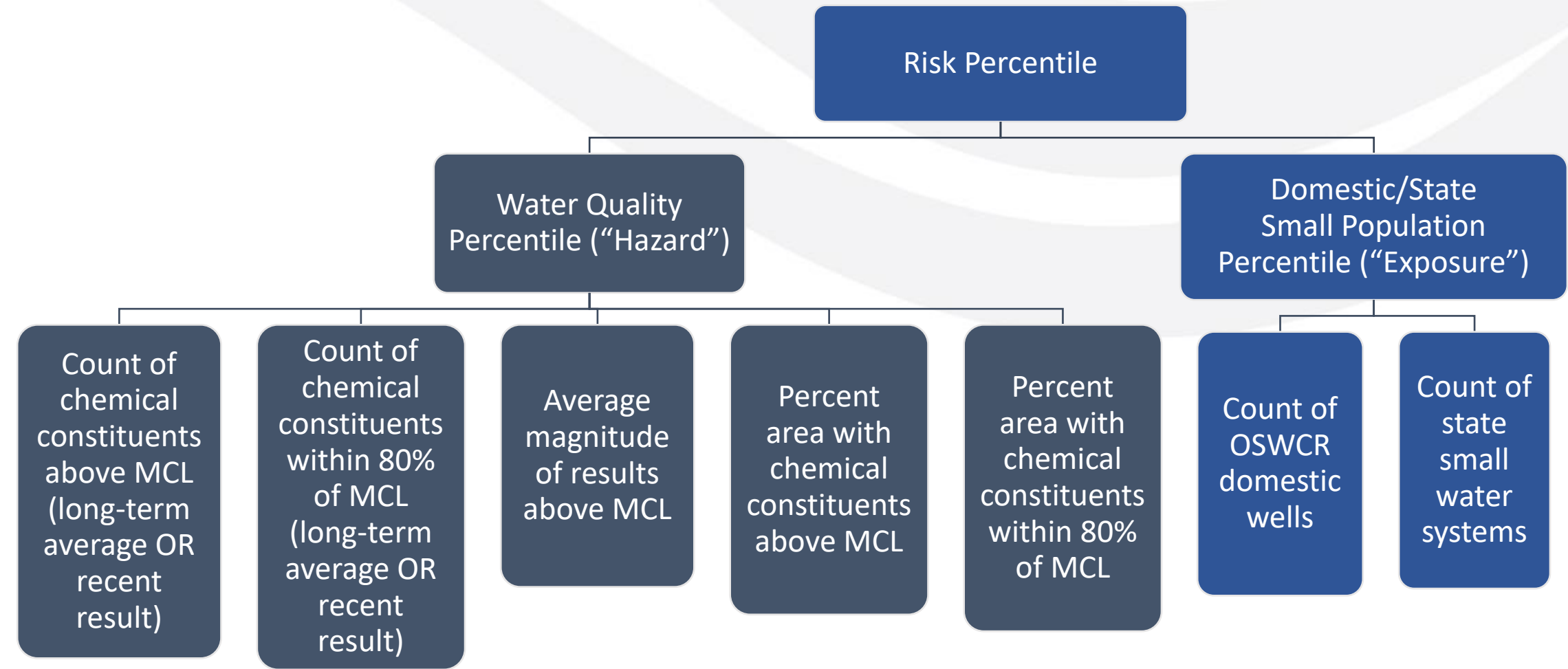


Issue: Areas with No Water Quality Data

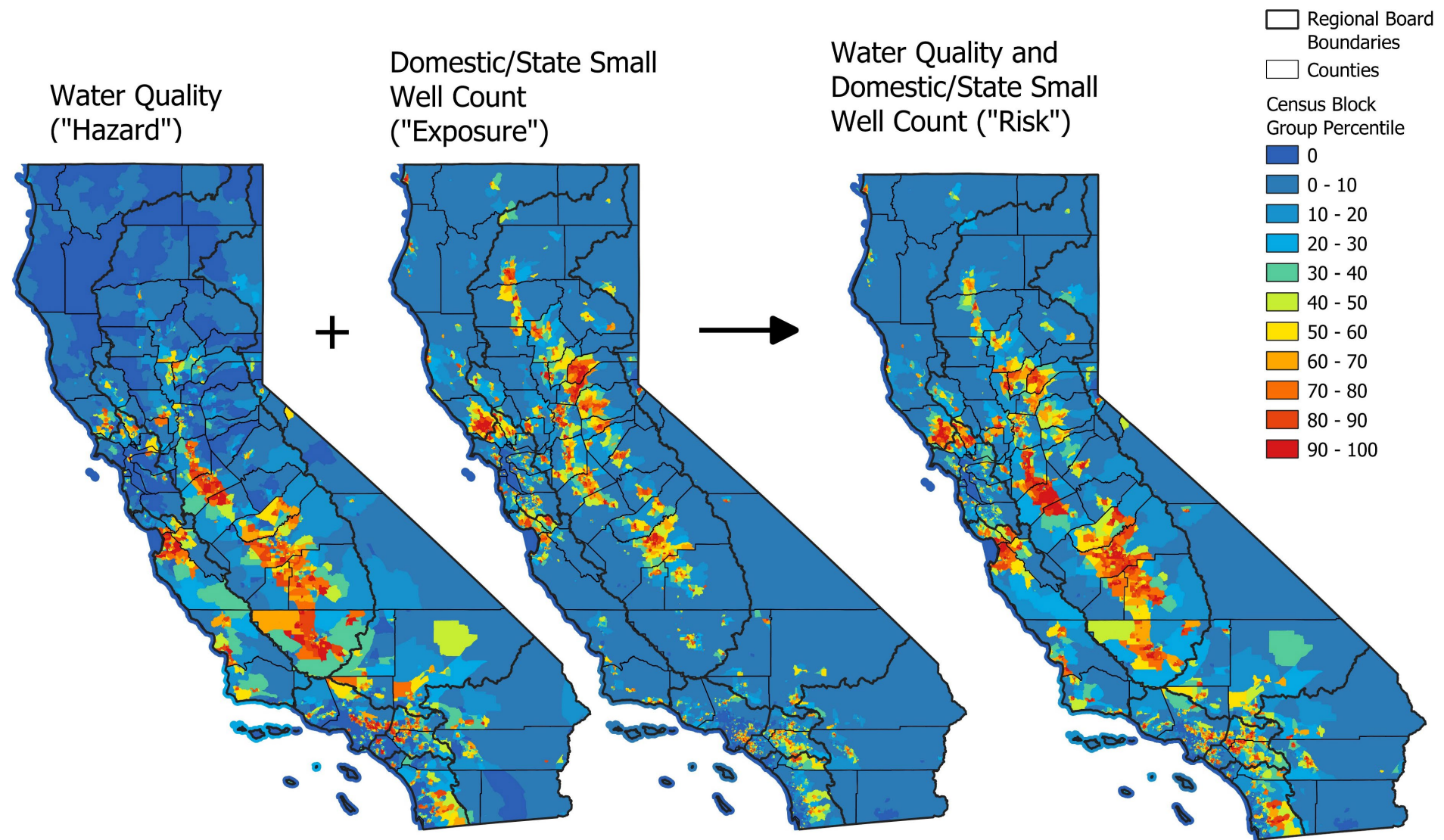


- Many areas contain no water quality data or have low water quality data density (less than 10% of area covered with water quality data).
- USGS and others are working to fill in these areas with water quality estimates based on best science.

Proposed additions



Proposed additions



Ways to Participate-

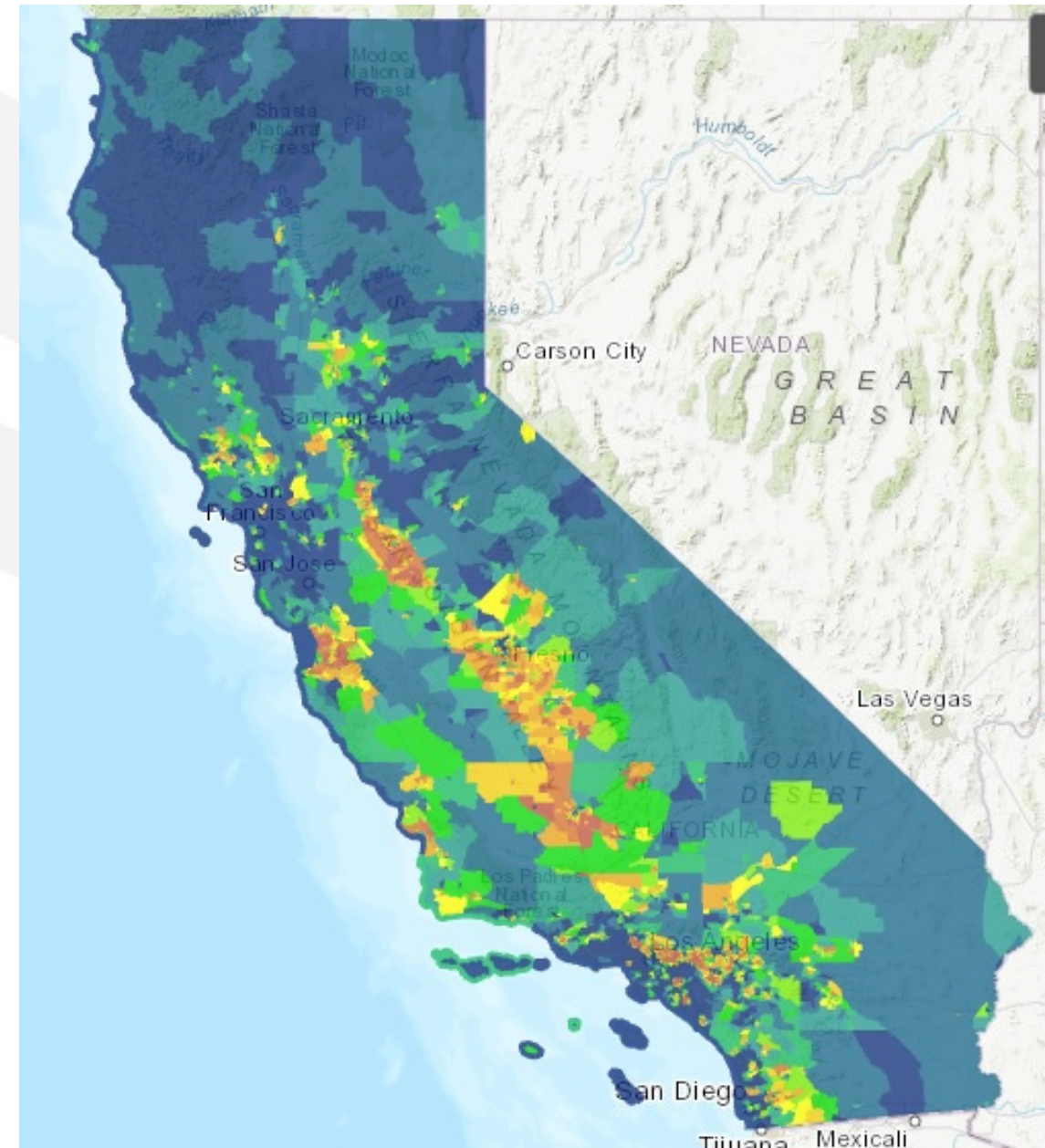
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Feedback - General

Are areas of water quality risk that you are aware of depicted adequately?

Note: A “low” risk percentile score does not mean there is no water quality risk in the area. Some areas may need to be viewed at the section or well granularity to better depict water quality conditions.



Feedback - Specific

Water quality metrics

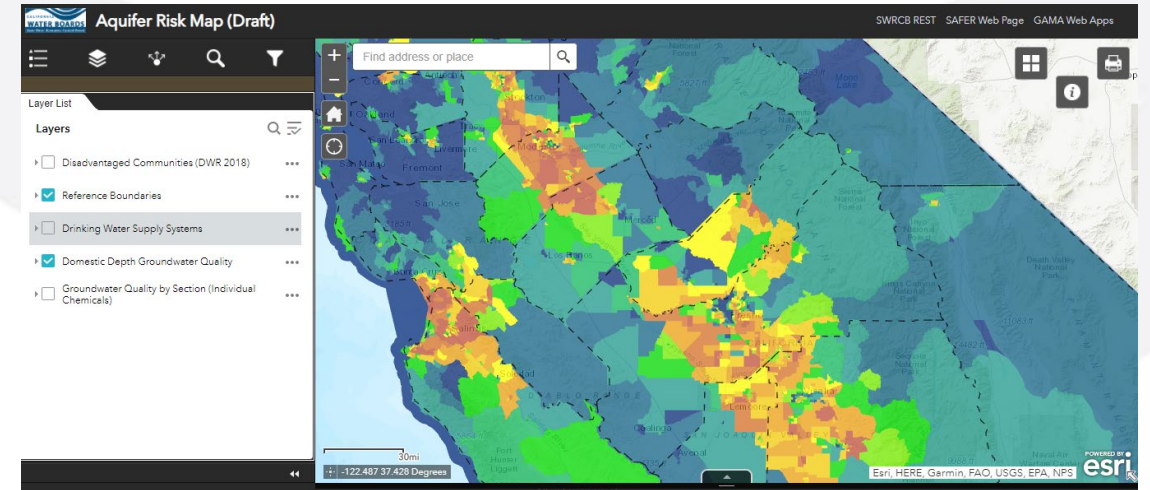
- Should additional metrics be used?
- Should current metrics be removed?

Water quality score calculation

- Should the metric weighting be changed?
- Which metric should be given the most weight?

Display and interpretation

- Is the map easy to use and understand?



Next Steps and Announcements

Upcoming SAFER 2020 Timeline

October 2020

- 13th: Cost Estimate Webinar
- 30th: Finance Dashboard Launched

Dec 2020
10th: SAFER Advisory Group Meeting

- 10th: Advisory Group Member
- 14th: Risk Assessment Webinar

Nov 2020

- 20th: Cost Estimate Webinar

Closing Remarks & Gratitude

Thank you!

Questions or comments please contact us:

SAFER@waterboards.ca.gov