Draft Final White Paper Discussion On:

Evaluation of Potential Indicators & Recommendations for Risk Assessment 2.0 for Public Water Systems

October 7, 2020

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Executive Summary

The California State Water Resources Control Board (State Water Board) is developing Risk Assessment methodologies for identifying "at-risk" public water systems (3,300 or less service connections), tribal water systems, state small water systems, and domestic wells in order to assist with prioritization of Safe and Affordable Drinking Water Fund allocations in the State Water Board's annual Fund Expenditure Plan. **The purpose of this white paper is to provide (1) an overview of the results of the evaluation of 129 potential risk indicators and (2) recommendations on the final risk indicators for Risk Assessment 2.0 for public water systems.**

This effort, the first of its kind by the State Water Board, assessed the Applicability and Data Fitness of 129 potential risk indicators. The evaluation was conducted following the July 22, 2020 webinar workshop and relied on input from internal and external stakeholders. The results of the analysis recommended 51 of the 129 potential risk indicators should be considered for inclusion in Risk Assessment 2.0 (Appendix C), whereas 33 did not meet the Applicability criteria and 45 met the Applicability criteria, but did not meet the Data Fitness criteria.

To facilitate the selection of the final indicators for Risk Assessment 2.0, the State Water Board, in partnership with the University of California, Los Angeles (UCLA), incorporated the results of the potential risk indicator evaluation with internal and external feedback to further refine the list of 51 potential risk indicators to generate a list of 22 recommended risk indicators for Risk Assessment 2.0. A concerted effort was made to:

- Limit the number of risk indicators to a reasonable number in order to simplify the analytical burden while still providing a full picture of risk.
- Avoid duplicative risk indicators.
- Ensure a diversity of risk indicator types.
- Identify the appropriate balance between risk indicators that may be influenced by water system management and risk indicators that are outside a water system's sphere of influence.

The State Water Board is seeking stakeholder feedback on the following 22 recommended risk indicators identified through the evaluation process detailed in this white paper.

Recommended Risk Indicators for Risk Assessment 2.0 by Category

Water Quality	Current Utilization in Complimentary State Efforts
E. coli Presence	Risk Assessment 1.0
Increasing Presence of Water Quality Trends Toward MCL	

Water Quality	Current Utilization in Complimentary State Efforts
Treatment Technique Violations	Risk Assessment 1.0
Past Presence on the HR2W List	
Maximum Duration of High Potential Exposure (HPE)	OEHHA HR2W Tool
Percentage of Sources Exceeding an MCL	

Accessibility	Current Utilization in Complimentary State Efforts
Number of Sources	OEHHA HR2W Tool; DWR Water Shortage Risk Tool
Presence of Interties	OEHHA HR2W Tool; DWR Water Shortage Risk Tool
Water Source Types	OEHHA HR2W Tool
DWR – Drought & Water Shortage Risk Assessment Results	DWR
Critically Overdrafted Groundwater Basin	DWR Water Shortage Risk Tool

Affordability	Current Utilization in Complimentary State Efforts
Percent of Median Household Income (%MHI) (2021-22 Needs Assessment Only)	OEHHA HR2W Tool; SWRCB-FEP 2020/21; UNC Financial Dashboard
Household Burden Indicator (HBI) for Drinking Water (2022-23 Needs Assessment)	UNC Financial Dashboard
Poverty Prevalence Indicator (PPI) (2022-23 Needs Assessment)	
Housing Burden (2022-23 Needs Assessment)	
Extreme Water Bill (2021-22 and 2022-23 Needs Assessment)	SWRCB AB-401 Report
% Shut-Offs (2021-22 and 2022-23 Needs Assessment)	

TMF Capacity	Current Utilization in Complimentary State Efforts
Number of Service Connections	
Operator Certification Violations	Risk Assessment 1.0

TMF Capacity	Current Utilization in Complimentary State Efforts
Monitoring and Reporting Violations	Risk Assessment 1.0; OEHHA HR2W Tool
Significant Deficiencies	
Extensive Treatment Installed	

During the potential risk indicator evaluation process, it became apparent that certain indicators actually reflect water system violations even though these violations may not be considered as significant as a primary maximum contaminant level (MCL) violation. For example, a single missed monitoring and reporting violation over a period of three years may be a general indicator of risk, while an ongoing significant number of monitoring and reporting violations over the same time period reflects an institutional failure.

Since a number of the recommended risk indicators are associated with non-MCL-related violations, further consideration is being given to define what it means for a water system to "consistently fail" or be "at-risk." This may lead to an expanded methodology for how water systems are classified and prioritized for the SAFER Program. The State Water Board will continue to develop these concepts with key stakeholders further in future webinars and white papers.

The State Water Board is committed to continuing to engage the public and key stakeholder groups to solicit feedback and recommendations as it develops its Needs Assessment methodologies that includes Risk Assessment, Affordability Assessment, and Cost Assessment components. The State Water Board will continue to host public webinar workshops to provide opportunities for stakeholders to learn about and contribute to the State Water Board's efforts to develop a more robust Risk Assessments for public water systems, tribal water systems, state small water systems, and domestic wells.

Introduction

In 2016, the State Water Board adopted a Human Right to Water Resolution making the Human Right to Water (HR2W), as defined in Assembly Bill 685, a primary consideration and priority across all of the state and regional boards' programs. The HR2W recognizes that "every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes."

In 2019, to advance the goals of the HR2W, California passed Senate Bill 200 (SB 200) which enabled the State Water Board to establish the Safe and Affordable Funding for Equity and Resilience (SAFER) Program. SB 200 established a set of tools, funding sources, and regulatory authorities the State Water Board can harness through the SAFER Program to help struggling water systems sustainably and affordably provide

safe drinking water to their customers. Foremost among the tools created under SB 200 is the Safe and Affordable Drinking Water Fund. The Fund provides up to $130 million per year through 2030 to enable the State Water Board to develop and implement sustainable solutions for underperforming drinking water systems. The annual Fund Expenditure Plan prioritizes projects for funding, documents past and planned expenditures, and is "based on data and analysis drawn from the drinking water Needs Assessment" (Health and Safety Code §116769).

FY 2020-21 Fund Expenditure Plan

The FY 2020-21 Fund Expenditure Plan does not utilize the Risk Assessment methodologies or results from the efforts detailed in this white paper. The State Water Board intends to incorporate the results of this effort into the next iteration of the Fund Expenditure Plan for FY 2021-22 after the Needs Assessment methodologies have been more fully developed through a stakeholder-driven process.

About the Needs Assessment

The State Water Board's Needs Assessment consists of three core components: the Affordability Assessment, Risk Assessment, and Cost Assessment (Figure 1). The State Water Board's Needs Analysis Unit in the Division of Drinking Water is leading the implementation of the Needs Assessment in coordination with the Division of Water Quality (DWQ) and Division of Financial Assistance (DFA). The University of California, Los Angeles (UCLA) was contracted (agreement term: 09.01.2019 through 03.31.2021)[1] to support the initial development of Needs Assessment methodologies for the Risk Assessment and Cost Assessment.

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[1] The contract with UCLA was written and scoped prior to passage of SB 200 and was originally designed to conduct a one-time Needs Assessment. Three State Water Board workshops hosted in early 2019 informed the original scope of the UCLA contract.

Figure 1: Needs Assessment Components
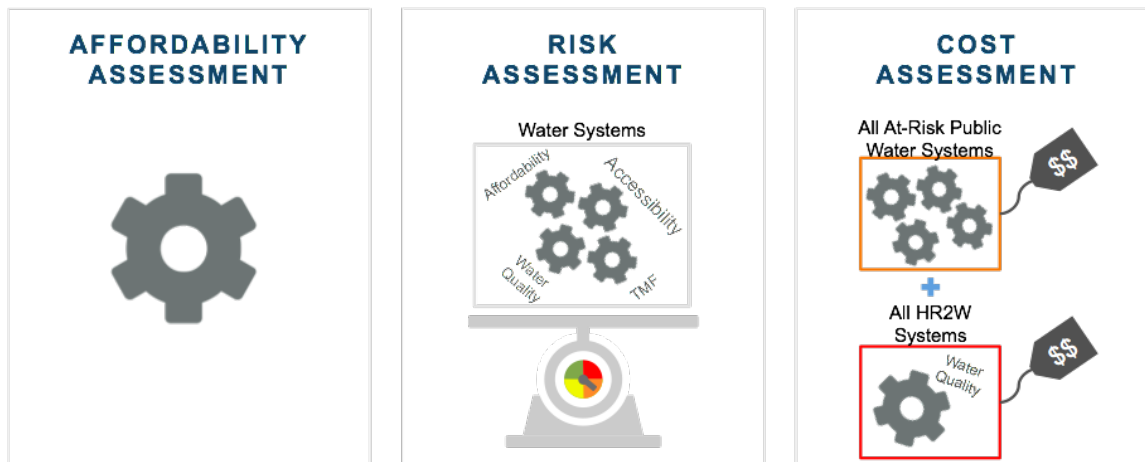
- **Risk Assessment**: Identifying public water systems, tribal water systems, state small water systems, and regions where domestic wells consistently fail or are at-risk of failing to provide adequate safe drinking water.

- **Cost Assessment**: Determining the costs related to the implementation of interim and/or emergency measures and longer-term solutions for failing systems and at-risk systems. Solutions may include, but are not limited to, water partnerships, physical and managerial consolidations, administrators, treatment facility additions or upgrades, distribution system repairs or replacement, and/or point of use/point of entry treatment. The cost assessment also includes the identification of available funding sources and the funding gaps that may exist to support interim and long-term solutions.

- **Affordability Assessment**: Identifying community water systems that serve disadvantaged communities that must charge their customers' fees which exceed the affordability threshold established by the State Water Board in order to provide adequate safe drinking water.

The State Water Board's Needs Analysis Unit will be conducting the Needs Assessment annually to support the implementation of the SAFER Program. The results of the Needs Assessment will be used to prioritize public water systems, tribal water systems, state small water systems, and domestic wells for funding in the Safe and Affordable Drinking Water Fund Expenditure Plan; direct State Water Board technical assistance; and to develop strategies for implementing interim and long-term solutions.

The Risk Assessment methodology will evolve over time to incorporate additional and better-quality data; evidence from targeted research to support existing/new risk indicators and thresholds; experience from implementing the SAFER Program; and further input from the State Water Board and public.
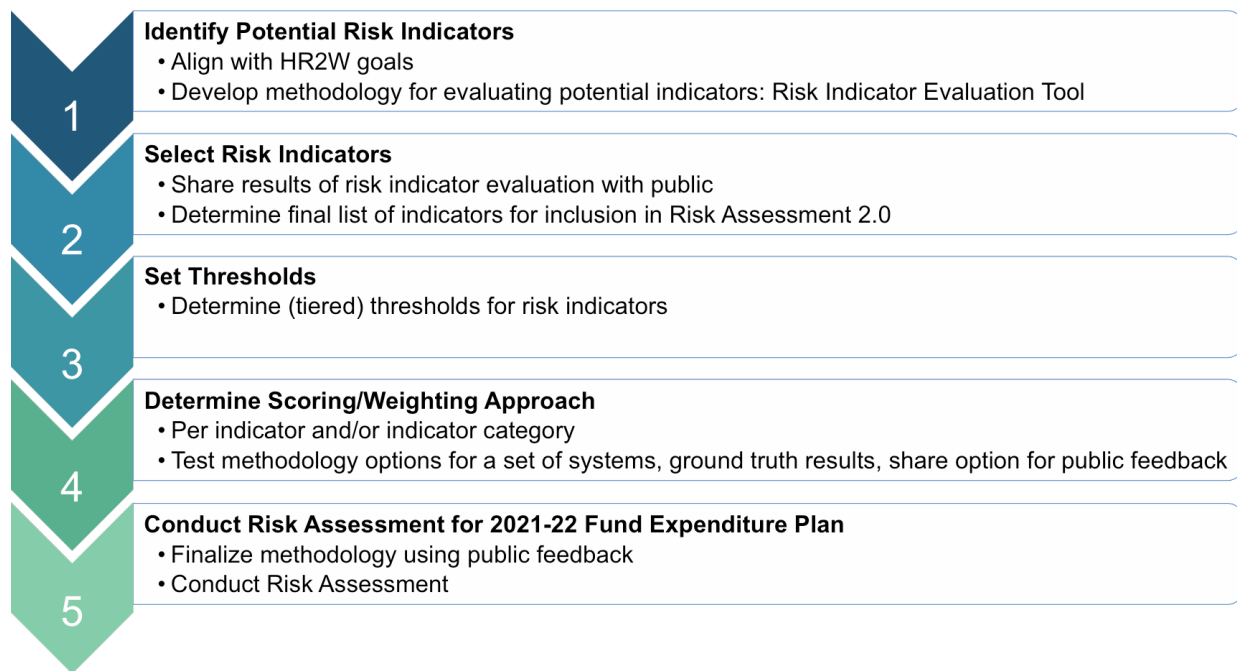
Risk Assessment Components

The goal of the Risk Assessment component of the Needs Assessment is to identify public water systems, tribal water systems, state small water systems and domestic wells in need of potential assistance or intervention before they fail to provide adequate and safe drinking water. The Risk Assessment methodology for public water systems with 3,300 or less service connections, currently under development, incorporates three critical components as follows:

- **Risk Indicators**: quantifiable measurements of key data that allow the State Water Board to assess the probability of a water system's failure to deliver safe drinking water or other infrastructure & institutional failures. Risk indicators that measure water quality, accessibility, affordability, and TMF capacity will be incorporated based on their criticality as it relates to a system's ability to remain in compliance with safe drinking water standards.

- **Risk Thresholds**: the levels, points, or values associated with a risk indicator that delineates when a water system is more at-risk of failing.

- **Weighting and/or Scoring**: the application of a value or weight to each risk indicator, as certain risk indicators may be deemed more critical than others and some may be out of the control of the water system. The application of weights to risk indicators allows the State Water Board to assess all the risk indicators together in a combined Risk Assessment score.

Risk Assessment 2.0 Development Process

The State Water Board and UCLA are developing the Risk Assessment 2.0 methodology through a phased public process from April 2020 through January 2021. This effort is designed to encourage public and stakeholder participation, providing opportunities for feedback and recommendations throughout the methodology development process. Figure 2 provides an overview of the Risk Assessment 2.0 development phases and the following sections summarize previous 2020 webinar workshops associated with this effort.

Figure 2: Phases of Risk Assessment 2.0 Development

1
Identify Potential Risk Indicators
• Align with HR2W goals
• Develop methodology for evaluating potential indicators: Risk Indicator Evaluation Tool

2
Select Risk Indicators
• Share results of risk indicator evaluation with public
• Determine final list of indicators for inclusion in Risk Assessment 2.0

3
Set Thresholds
• Determine (tiered) thresholds for risk indicators

4
Determine Scoring/Weighting Approach
• Per indicator and/or indicator category
• Test methodology options for a set of systems, ground truth results, share option for public feedback

5
Conduct Risk Assessment for 2021-22 Fund Expenditure Plan
• Finalize methodology using public feedback
• Conduct Risk Assessment

Public Webinar Workshop – April 17, 2020

On April 17, 2020, the State Water Board and UCLA hosted a public webinar workshop to introduce the results of Risk Assessment 1.0 and solicit public feedback and recommendations for the next version (Version 2.0) of the Risk Assessment. Feedback from this workshop led the State Water Board and UCLA to identify additional potential risk indicators that align with the three fundamental components of the HR2W (*i.e.*, water quality, accessibility, and affordability), and extended its search to incorporate technical, managerial, and financial (TMF) capacity indicators as well. More information about this webinar workshop can be accessed on State Water Board's SAFER webpage: https://www.waterboards.ca.gov/safer/calendar.html.

Public Webinar Workshop – July 22, 2020

On July 16, 2020, the State Water Board made publicly available a white paper on the *Identification of Risk Assessment 2.0 Indicators for Public Water Systems.*[2] On July 22, 2020, the State Water Board and UCLA, hosted a webinar workshop to solicit stakeholder feedback and recommendations on:

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[2]

https://cawaterboards.sharepoint.com/:w:/r/sites/Executive/SADWF/_layouts/15/doc2.aspx?sourcedoc=%7BC7073C5C-295E-4869-8EB5-5B7265A39C4C%7D&file=White%20Paper%202%20DRAFT%20Outline.docx&action=default&mobileredirect=true&cid=069e1000-c195-4c5e-81e3-21bf4f5c1d9d

- Draft definitions of the four risk indicator categories: Water Quality, Accessibility, Affordability, and TMF Capacity.
- Expanded list of 118 potential risk indicators to be considered for inclusion in Version 2.0 of the Risk Assessment. This effort included full consideration of risk indicators identified in complementary efforts conducted by the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Water Resources (DWR), and the California Public Utilities Commission (CPUC), as well as additional indicators that are recognized by the water sector and its advocates to be key measures of water system resiliency.
- Draft Risk Indicator Evaluation Tool which would be used to assess the applicability and data fitness of the identified potential risk indicators.

Stakeholder feedback and recommendations provided through the public webinar, written comments, and continued dialogue during the feedback period (07.16.2020 - 08.21.2020) are detailed in Appendix A. The following is a brief summary of incorporated feedback:

- 11 new potential risk indicators were identified for consideration and added to the list of indicators to be evaluated. Three potential risk indicators were removed from the list due to redundancy.
- Step 3 of the Risk Indicator Evaluation Tool was modified to strengthen the criteria for "Maybe" - changing from "Step 1 results may be Good or Fair" to "Step 1 results _must_ be Good."
- Specific comments regarding the Applicability of individual potential risk indicators were considered when determining Step 1 evaluation scores (Supplemental Appendices D.1 through D.4)

Potential Risk Indicators Evaluation Methodology

The State Water Board and UCLA developed a Risk Indicator Evaluation Tool to provide a transparent process for narrowing down the list of 129 identified potential risk indicators the State Water Board should be considering for inclusion in Risk Assessment 2.0. The _draft_ Evaluation Tool was presented to the public in a July 16, 2020 White Paper and discussed at the July 22, 2020 webinar workshop (Figure 3). Feedback from the public led to the refinement of the final Evaluation Tool (Appendix A).

Figure 3: Risk Indicator Evaluation Tool

The Evaluation Tool consists of three steps and utilizes a combination of qualitative and quantitative criteria to evaluate risk indicators:

STEP 1 - Applicability: This step evaluates whether a relatively strong relationship exists between a potential risk indicator and a water system's ability to provide adequate and safe drinking water.

- **Excellent**: Evidence-driven
- **Good**: Water sector recognized
- **Fair**: Some water sector debate over relationship
- **Poor**: Neither evidence-based nor water sector approved

STEP 2 - Data Fitness: This step evaluates whether the required data for each risk indicator meets the coverage, availability, and accuracy/quality criteria.

- **Data Coverage**: This criterion evaluates whether the data associated with the risk indicator is available for a majority of all types of California public water systems with 3,300 service connections or less.

    - **Good**: 90% or more
    - **Fair**: 65% - 90%
    - **Poor**: Below 65%

- **Data Availability**: This criterion evaluates whether the data associated with the risk indicator is updated and available on a recurring basis in order to support the State Water Board's annual Risk Assessment data requirements.

    - **Good**: Updated annually or more frequently
    - **Fair**: Updated less than annually but at least every three years
    - **Poor**: Updated less than every three years

- **Data Accuracy**: This criterion evaluates whether the data associated with the risk indicator reasonably or accurately reflects what the data is meant to measure and/or illustrate. High-quality data is accurate, correctly reported, valid, and consistent.

  - **Good**: Credible source, correctly reported
  - **Fair**: Credible source, fairly correctly reported
  - **Poor**: Dubious source, extensive incorrect reporting

STEP 3 - Combined Evaluation: This step combines the evaluations from Steps 1 and 2 to determine if the State Water Board should consider the risk indicator for inclusion in Risk Assessment 2.0.

- **Yes**: Step 1 results must be Excellent or Good; and Step 2 results must be Good for all three criteria.
- **Maybe**: Step 1 results must be Good; and Step 2 results may be Good or Fair for all three criteria.
- **No**: Step 1 results are Fair or Poor; and Step 2 results are Fair or Poor for all three criteria.
- **Future**: Step 1 results are Excellent or Good, and Step 2 results are Fair and Poor. These will be retained for consideration for future iterations to see if data fitness scores improve.

Following the July 22, 2020 webinar workshop, the State Water Board formed an internal Division of Drinking Water Needs Assessment Workgroup, composed of District Engineers, to assist the Needs Analysis Unit and UCLA in evaluating qualitative criteria for each potential risk indicator.

STEP 1: Methodology for Applicability Evaluation

To evaluate the applicability of all 129 potential risk indicators the State Water Board and UCLA consulted with internal and external stakeholders, the Division of Drinking Water Needs Assessment workgroup, and conducted a survey of 52 experienced Division of Drinking Water engineers. The survey asked District staff to assess the applicability criteria to each potential risk indicator.

The utilization of potential risk indicators from Risk Assessment 1.0, OEHHA's HR2W Risk Assessment and Data Tool, DWR's Drought and Water Shortage Risk Scoring Tool, and CPUC's Affordability Metrics Framework efforts was taken into consideration while evaluating applicability. All metrics utilized by these tools and assessments were identified through stakeholder-driven processes. It is important to note that while there are many similarities between these efforts and the State Water Board's SAFER Risk Assessment, the scope, goals, and key stakeholder groups associated with these efforts may differ slightly. These differences were taken into consideration in determining the applicability score for these potential risk indicators.

STEP 2: Methodology for Data Fitness Evaluation

To evaluate the fitness of the required data for each of the 129 potential risk indicators the State Water Board and UCLA relied on both qualitative and qualitative criteria for Step 2. This evaluation effort, assessing coverage, availability, and accuracy of State Water Board data, is the first of its kind. The results of this analysis not only assist the State Water Board in narrowing down the list of potential risk indicators, but also serve as a guide to assist future improved data collection and management strategies. Furthermore, this effort also represents a data "gap" analysis, wherein desired metrics for evaluating system performance and risk that are not currently accessible to the State Water Board were highlighted.

Due the time constraints of the most recent phase of this effort, the evaluation of data quality/accuracy relied on qualitative criteria. A survey of 52 experienced Division of Drinking Water engineers was utilized to solicit quality/accuracy feedback on State Water Board data used by potential risk indicators. Ideally, in the future, the State Water Board will be able to conduct sample data quality audits to assess the accuracy of data.

Data coverage and data availability both rely on quantitative criteria. The evaluation of coverage for State Water Board data relied on 2017, 2018, and 2019 datasets for this analysis. Data that is voluntarily reported can result in data coverage issues. Therefore, a data availability score is downgraded by one criteria level for risk indicators that relay on voluntary data, often from "Good" to "Fair." If data is collected, but is stored in a format that is neither machine-readable, nor readily extractable, a downgraded data availability score of "Poor" may be applied for some risk indicators.

For data sourced from outside of the State Water Board, the evaluation assigned a "Good" data coverage and quality/accuracy score to the relevant indicator, unless proven otherwise. See Supplemental Appendices D.1 through D.4 for the detailed evaluation analysis of each potential risk indicator.

Primary Risk Indicator Data Sources

The majority of data analyzed for this effort came from a few key datasets and databases. Many of these datasets have limitations regarding how data is collected and validated, which ultimately is reflected in the data fitness criteria scoring. The box below summarizes these datasets and databases, highlighting important considerations and caveats as they pertain to this effort. More detailed descriptions can be found in Appendix B.

Safe Drinking Water Information System (SDWIS)
SDWIS is a database developed by U.S. EPA to support Safe Drinking Water Act (SDWA) implementation. SDWIS/State, managed by the State Water Board, tracks and stores general information on drinking water sources, contamination levels, and public water systems violations of U.S. EPA's drinking water regulations. These violations are frequently monitored by staff.

Water quality contaminants have different monitoring frequencies for each water

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source. The variation in monitoring frequency for certain contaminants would cause many of the water quality potential risk indicators to have a "Fair" or "Poor" score for data availability. The State Water Board has decided that for many of these water quality potential risk indicators, a score of "Good" is justifiable for the data availability criteria because drinking water regulations have deemed this monitoring schedule to be an appropriate schedule to protect human health.

Electronic Annual Report (eAR)
The State of California has been collecting annual data from public water systems since the mid-1980s to better assess the status of their operation, maintenance, and ability to comply with Federal and State drinking water standards. The State Water Board utilizes data collected from the Electronic Annual Report (eAR) to determine water system needs, drive policy decisions, and keep the public informed.

While the Small Water System eAR (for systems under 3000 service connection) has 18 sections and approximately 1,120 survey questions, only 34% (386) are mandatory for reporting. This has led data coverage for certain data points to vary dramatically state-wide and from one reporting year to the next. This is reflected in the data coverage score for many risk indicators that rely on eAR data. Furthermore, the quality of data collected through the eAR can vary as well because it is self-reported and the eAR platform has historically had limited quality control validations built-in. Required eAR responses are reviewed by State Water Board staff before migrating the data into SDWIS, but voluntarily reported data is often not verified.

Sanitary Survey
A Sanitary Survey is a comprehensive in-office file review and a physical field visit inspection conducted every three to five years, depending on the system type. The purpose of the Sanitary Survey is to evaluate the adequacy of a water system's performance, which is often difficult to assess through other self-reporting systems. There are eight essential elements of a Sanitary Survey that must be completed[3]; however, Division of Drinking Water staff may employ a different list of questions that are tailored to assess system-specific deficiencies or other issues. This has led to non-uniform data collection across systems state-wide. Furthermore, certain non-mandatory survey questions are not consistently asked each system from one Sanitary Survey to the next, so coverage for individual data points for one system over time can vary. This is reflected in a data coverage score of "Fair" for many risk indicators that rely on Sanitary Survey data.

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[3] Code of Federal Regulation Title 40 [40 CFR] §142.16

Eight Essential Sanitary Survey Elements: Source of supply; treatment; distribution system; finished water storage; pumps and pump facilities; monitoring, reporting, and data verification; system management and operation; and operator compliance with State requirements.

The frequency of Sanitary Surveys for community water systems is three years, which would indicate an availability criteria score of "Fair." While the data collected through Sanitary Surveys tends to be accurate, it is captured in PDF documents that are, currently, neither machine-readable, nor readily extractable. This results in a further downgrading of the data availability score to "Poor" for many risk indicators that rely on Sanitary Survey data.

U.S. Census & American Community Survey
An attempt at a comprehensive census, or complete count, of the United States population has been conducted every ten years since 1790 by the U.S. Census Bureau. Following the 2000 census, however, the U.S. Census Bureau shifted data collection for all person and household-level characteristics besides population counts, housing type and race-ethnicity counts from the decennial census to the newly-formed American Community Survey (ACS). The ACS is not a true census, but is the largest, representative sample of the U.S. population (the initial sampling frame contains over 3 million households), and maintains the same geographical boundaries as the decennial census, with 5-year average ACS estimates available down to the census block group or tract scale, the geographies most relevant to the State Water Board's risk assessment.

One limitation with block group and census tract-level estimates from the 5-year ACS is that the sampling approach can produce high margins of error, including for indicators used in the Risk Assessment such as household income data. Based on OEHHA and others' analysis, even after using exclusion criteria to avoid incorporation of block group data of dubious accuracy from the 5-year ACS still allows for coverage of socioeconomic risk indicators envisioned in the risk assessment. In short, despite its shortcomings, the accuracy and coverage of the ACS makes it a data source of unparalleled quality, availability and coverage for assessing household-level demographic and socioeconomic characteristics across California.

Evaluation Results

The evaluation of 129 potential risk indicators using the Risk Indicator Evaluation Tool is summarized in Tables 1 and 2. The full summarization can be found in Appendix C and detailed written evaluations for each potential risk indicators can be found in Supplemental Appendices D.1 through D.4.

Table 1: Summary of Step 1 and Step 2 Results for 129 Potential Risk Indicators

Steps 1 & 2:	Excellent	Good	Fair	Poor
Applicability	8	86	30	5
Data Coverage		63	28	38
Data Availability		73	23	33

Data Quality/Accuracy		44	58	27

Table 2: Summary of Step 3 – Combined Assessment Results by Risk Indicator Category

Step 3:	No	Future	Maybe	Yes
Water Quality	8	6	2	12
Accessibility	16	8	5	7
Affordability	5	5	13	0
TMF Capacity	5	25	6	6
Total	**34**	**44**	**26**	**25**

An analysis of the potential risk indicators the evaluation indicated should be considered for Risk Assessment 2.0 (Step 3 = Yes or Maybe) shows that 53% (27) were somewhat or wholly duplicative in the type of risk they were assessing when compared to other potential risk indicators. Avoiding duplication refines the list of potential risk indicators from 51 down to 36 indicators for consideration. Table 3 provides a summary of this analysis.

Table 3: Potential Risk Indicator Sub-Categories & Summary of Duplicative Risk Indicators that Scored "Yes" and "Maybe" for Step 3

Water Quality		
Current Water Quality	**Unique**	**Duplicative[4]**
Frequency of Bacteriological Violations (Total Coliform)	Yes	
E. coli Presence	No	A
Level 2 Assessment under rTCR	No	A
Lead and Copper	Yes	
Violation History	**Unique**	**Duplicative**
Treatment Technique Violations	Yes	
Presence of Acute Contaminants: Past MCL Violation	No	A
Past Presence on the HR2W List	No	A

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[4] The letters assigned to risk indicators within a sub-category indicate a duplicative relationship. Different letters within a sub-category are to distinguish between groups of duplicative indicators within the same sub-category.

Exposure	Unique	Duplicative
Maximum Duration of Non-Compliance	No	A
Average Duration on the HR2W List	No	A
Number of High Potential Exposure (HPE)	Yes	
Maximum Duration of HPE	Yes	
Presence of HPE Acute Contaminants	Yes	
Source Risk	**Unique**	**Duplicative**
Increasing Presence of Water Quality Trends Toward MCL	Yes	
Percentage of Sources Exceeding an MCL	Yes	

Accessibility		
Environmental Hazards	**Unique**	**Duplicative**
Proximity to Earthquake Fault	Yes	
Location In or Near a Flood Zone	Yes	
Source Diversification, Condition, and Reliability	**Unique**	**Duplicative**
Number of Sources	No	A
Single Groundwater Source	No	A
Presence of Interties	No	B
Presence of Emergency Interties	No	B
Projected Sea Level Rise as Salt Water Intrusion in Coastal Groundwater	Yes	
Water Source Types	Yes	
Water Shortage	**Unique**	**Duplicative**
DWR – Drought & Water Shortage Risk Assessment Results	Yes	
Critically Overdrafted Groundwater Basin	Yes	
Curtailment Compliance Order	Yes	
Water Rights Allocations	Yes	

Affordability		
Cost of Service-Based Affordability Ratio	**Unique**	**Duplicative**
Percent of Median Household Income (%MHI)	No	A
Percent of County Poverty Threshold (%CPT)	No	A
Percent of Deep Poverty Income (%DP)	No	A

Cost of Service-Based Affordability Ratio	Unique	Duplicative
Household Burden Indicator (HBI) for Drinking Water	No	A
Measures of Community Poverty	**Unique**	**Duplicative**
Poverty Prevalence Indicator (PPI)	No	A
Percentage of Poverty (%Poverty)	No	A
Disadvantaged Community Status	Yes	
Cost of Living	**Unique**	**Duplicative**
Housing Burden	No	A
Shelter Cost (FMR)	No	A
Customer Hardship	**Unique**	**Duplicative**
Extreme Water Bill	No	A
Hours at Minimum Wage to Pay for Drinking Water Bill	No	A
% Shut-Offs	No	B
Duration of Shut-Offs	No	B

TMF Capacity		
Financial Capacity	**Unique**	**Duplicative**
Customers Metered	No	A
Absence of Customer-Level Meters	No	A
Number of Service Connections	No	A
Historical Population Growth	No	B
Water System Size/Socioeconomic Status of the Community	No	B
Managerial Capacity	**Unique**	**Duplicative**
Operator Certification Violations	Yes	
Monitoring and Reporting Violations	Yes	
Member of CalWARN or Alternative Mutual Aid Agreement	Yes	
Baseline Monitoring	Yes	
Data Availability	Yes	
Technical Capacity	**Unique**	**Duplicative**
Significant Deficiencies	Yes	
Extensive Treatment Installed	Yes	

Risk Assessment 2.0 Recommendations

To facilitate the selection of the final indicators for Risk Assessment 2.0, the State Water Board and UCLA incorporated the results of the potential risk indicator evaluation with internal and external feedback to generate a list of recommended risk indicators for Risk Assessment 2.0. A concerted effort was made address the following:

- **Number of Risk Indicators:** The State Water Board does not have a defined limit on the number of risk indicators to employ within Risk Assessment 2.0; however, the State Water Board and UCLA recognize that as more risk indicators are added to the Risk Assessment, the weight or criticality assigned to each individual risk indicator becomes more diluted. Furthermore, an implicit goal of the Risk Assessment is to be digestible or easily understood. Too many risk indicators may overly complicate the Risk Assessment. The State Water Board and UCLA suggest limiting the number of risk indicators between 15 to 28.
- **Duplicative Risk Indicators**: To the greatest extent possible, the Risk Assessment should avoid duplicative risk indicators.
- **Diversity or Risk Indicators**: Strive for a diversity of risk indicators across each of the risk indicator categories: Water Quality, Accessibility, Affordability, and TMF Capacity.
- **Ability to Influence**: Identify the appropriate balance between risk indicators that may be influenced by water system management and risk indicators that are outside a water system's sphere of influence. For example, a water system can directly control their "Monitoring and Reporting Violations" but they cannot substantially influence their community "Poverty Prevalence."

The State Water Board and UCLA are soliciting immediate public and stakeholder feedback on these recommendations from October 13, 2020 through October 30, 2020 to help determine the final list of risk indicators included in Risk Assessment 2.0.

Recommended Water Quality Risk Indicators

An extensive review of 28 potential water quality risk indicators resulted in 14 that were considered. Based on the results of the potential risk indicator evaluation detailed in Appendix C, as well as external and internal recommendations, the State Water Board and UCLA recommend the following water quality risk indicators for inclusion in Risk Assessment 2.0 (Table 4).

Table 4: Recommended Water Quality Risk Indicators by Sub-Category

Current Water Quality	
Risk Indicator	**Definition**
E. coli Presence	Evidence of E. coli or E. coli violation in the past two years. The presence of E. coli in drinking water suggests that the supply has fecal contamination, and in turn, that other pathogens could be present. The presence of these contaminants could also suggest

Risk Indicator	Definition
	that water treatment is inadequate, interrupted, or intermittent.

Violation History

Risk Indicator	Definition
Treatment Technique Violations	This type of violation (which is distinct from more commonly-known MCL or monitoring and reporting violations) is incurred when a water system does not follow required treatment techniques to reduce the risk from contaminants, e.g. exceeding the maximum allowable flow rate of a surface water treatment plant.
Past Presence on HR2W List	The HR2W List includes systems that are in violation of a primary and/or secondary MCL and has have an enforcement action. A system is removed from the HR2W list after they have come back into compliance and a return to compliance action has been issued. This indicator reflects past presence on the HR2W list within the last three years.

Exposure Duration

Risk Indicator	Definition
Maximum Duration of HPE	This indicator focuses on the recurring nature of contamination. Accordingly, it highlights systems that show an ongoing but inconsistent contamination problem. Capturing this recurring exposure may be important, especially when such exposure involves contaminants whose health effects are associated with chronic exposure. A long duration of high potential exposure can also signal that a system may need additional resources or support to remedy contamination.

Source Risk

Risk Indicator	Definition
Increasing Presence of Water Quality Trends Toward MCL	Increasing presence of one or more regulated contaminants, especially those attributable to anthropogenic causes, that are detected at or greater than 80% of the MCL within the past decade.

Risk Indicator	Definition
Percentage of Sources Exceeding an MCL	Percent of the number of sources that exceed any MCL. The number includes water systems sources with an exceedance of any primary chemical contaminant within the past three years. This indicator assumes that the water system is not in violation overall.

Recommended Accessibility Risk Indicators

An extensive review of 36 potential accessibility risk indicators resulted in 12 that should be considered. Based on the results of the potential risk indicator evaluation detailed in Appendix C, as well as external and internal recommendations, the State Water Board and UCLA recommend the following accessibility risk indicators for inclusion in Risk Assessment 2.0 (Table 5).

Table 5: Recommended Accessibility Risk Indicators by Sub-Category

Source Diversification, Condition, and Reliability	
Risk Indicator	**Definition**
Number of Water Sources	Total number of available water sources including surface water, wells, and imported water.
Water Source Type	Total number of water source types.
Presence of Interties	An intertie or interconnection is a connection between one or more water systems where systems can either supply or receive water from each other. Presence of interties is assumed to reduce the risk of a water outage by allowing water systems to switch sources if needed.

Water Shortage	
Risk Indicator	**Definition**
DWR – Drought & Water Shortage	This indicator utilizes DWR's Drought and Water Shortage Risk Scoring Tool[5] results which identifies small water systems and

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[5] DWR's Drought and Water Shortage Vulnerability Risk Assessment

https://water.ca.gov/Programs/Water-Use-And-Efficiency/Making-Conservation-a-California-Way-of-Life/County-Drought-Planning

Risk Indicator	Definition
Risk Assessment Results	rural communities that are potentially at-risk of drought and vulnerable to water shortages. This tool creates an aggregated, comparative risk score for each water system and community derived from a set of indicators that capture different dimensions of exposure to hazards, physical/social vulnerability, and observed supply shortages (29 indicators for small water suppliers and 31 indicators for self-supplied communities).
Critically Overdrafted Groundwater Basin	Water systems in basins considered to be in Critical Overdraft per DWR's Bulletin 118. A basin is subject to critical conditions of overdraft when continuation of current water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts.

Recommended Affordability Risk Indicators

An extensive review of 23 potential affordability risk indicators resulted in 13 that should be considered for Risk Assessment 2.0. Based on the results of the potential risk indicator evaluation detailed in Appendix C, as well as external and internal recommendations, the State Water Board and UCLA recommend the following affordability risk indicators for inclusion in Risk Assessment 2.0 (Table 6).

It is important to note that many of the final affordability risk indicators cannot be utilized in the 2021-22 Risk Assessment and Affordability Assessment because the State Water Board does not have sufficient time to conduct the proper research and stakeholder engagement needed to develop appropriate affordability thresholds by January 2021. Therefore, for the 2021-22 Needs Assessment, the State Water Board will continue to utilize % Median Household Income (%MHI) until appropriate thresholds for the finalized affordability risk indicators can be determined.

Table 6: Recommended Affordability Risk Indicators by Sub-Category

Cost of Service Based	
Risk Indicator	**Definition**
Household Burden Indicator (2022-23 Needs Assessment)	This indicator measures the economic burden that relatively low-income households face in paying their water service costs by focusing on the percent of these costs to the 20th percentile income (i.e. the Lowest Quintile of Income (LQI) for the service area). This indicator is calculated by adding the average drinking water customer charges, dividing them by the 20th Percentile income in a community water system, and multiplying this by one hundred.

Risk Indicator	Definition
% Median Household Income (2021-22 Needs Assessment Only)	This indicator measures the annual system-wide average residential water bill for 6 Hundred Cubic Feet (HCF) per month relative to the annual Median Household Income (MHI) within a water system's service area.

Community Poverty Measure	
Risk Indicator	**Definition**
Poverty Prevalence Indicator (2022-23 Needs Assessment)	This indicator measures the percentage of population served by a community water system that lives at or below 200% the Federal Poverty Level (FPL). This measurement indicates the degree to which relative poverty is prevalent in the community.

Cost of Living	
Risk Indicator	**Definition**
Housing Burden (2022-23 Needs Assessment)	This indicator measures the percent of households in a water system's service area that are both low income and severely burdened by housing costs (paying greater than 50% of their income for housing costs). This metric is intended to serve as an indicator of the affordability challenges low-income households face with respect to other non-discretionary expenses, which may impact their ability to pay for drinking water services.

Customer Hardship	
Risk Indicator	**Definition**
% Shut-Offs (2021-22 and 2022-23 Needs Assessment)	Percentage of residential customer base with service shut-offs due to non-payment.
Extreme Water Bill (2021-22 and 2022-23 Needs Assessment)	This indicator measures drinking water customer charges that meet or exceed 150% of statewide average drinking water customer charges at the 6 Hundred Cubic Feet (HCF) level of consumption.

Recommended TMF Capacity Risk Indicators

An extensive review of 42 potential TMF Capacity risk indicators resulted in 12 that should be considered. Based on the results of the potential risk indicator evaluation detailed in Appendix C, as well as external and internal recommendations, the State Water Board and UCLA recommend the following TMF capacity risk indicators for inclusion in Risk Assessment 2.0 (Table 7).

Table 7: Recommended TMF Capacity Risk Indicators by Sub-Category

Financial Capacity	
Risk Indicator	**Definition**
Number of Service Connections	This indicator measures the total number of customer service connections of the water system. Number of service connections may be used as a proxy to assess whether a water system has adequate financial capacity to support staff and budget.

Managerial Capacity	
Risk Indicator	**Definition**
Monitoring and Reporting Violations	This indicator measures the total number of monitoring and reporting violations for specific contaminants and treatment techniques during a 9-year compliance cycle.
Operator Certification Violations	Failure to have an appropriately certified water treatment or distribution operator. A lack of adequately trained water treatment or distribution operators may be indicative of larger technical and managerial risks borne by the system. Research shows that poorly trained staff and managers working on water systems can result in avoidable waterborne disease outbreaks.

Technical Capacity	
Risk Indicator	**Definition**
Significant Deficiencies	Significant Deficiencies are identified by State Water Board staff during a Sanitary Survey and include, but are not limited to, defects in the design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that U.S. EPA determines to be causing or have the potential for causing the introduction of contamination into the water delivered to consumers.
Extensive	The number of occurrences that meet one or more of the

Risk Indicator	Definition
Treatment Installed	following conditions: • Groundwater source(s) necessitating any treatment other than chlorination • Surface water quality necessitating a surface water treatment plant. Water systems reliant on an impaired water source or sources may experience expensive treatment costs and operations and maintenance difficulties. Furthermore, the threat to customers if failure occurs is greater if the source water is significantly impaired and required extensive treatment.

Classifications

During the potential risk indicator evaluation process, it became apparent that certain indicators actually reflect water system violations even though these violations may not be considered as significant as a primary MCL violation. For example, a single missed monitoring and reporting violation over a period of three years may be a general indicator of risk, while an ongoing significant number of monitoring and reporting violations over the same time period reflects an institutional failure.

To date, the State Water Board has been proposing two tiers of water system classification for SAFER Program prioritization: the HR2W List (updated regularly on the State Water Board HR2W website: https://www.waterboards.ca.gov/water_issues/programs/hr2w/index.html) and an At-Risk Water System List. Currently, the HR2W List includes community water systems and schools that are in violation of a primary and/or secondary MCL and have an enforcement action. Since a number of the recommended risk indicators are associated with non-MCL-related violations, further consideration is being given to define what it means for a water system to "consistently fail" or be "at-risk." This may lead to an expanded methodology for how water systems are classified and prioritized for the SAFER Program. For example, the HR2W List may transition in the future to include an expanded set of criteria such as significant bacteriological deficiencies and other types of violations.

Next Steps

October 13, 2020 Public Webinar Workshop

The State Water Board will be hosting a public webinar workshop on October 13, 2020 to solicit stakeholder feedback and recommendations on:

1. Results of the evaluation of 129 potential risk indicators. Refer to Tables 8 through 11 in Appendix C and the Supplemental Appendices D.1 through D.4.

2. The list of recommended risk indicators (Tables 4 through 7) for inclusion in Version 2.0 of the Risk Assessment for public water systems.

Registration for webinar workshop: SAFER Webinar: *IDENTIFYING AT-RISK PUBLIC WATER SYSTEMS – SELECTING RISK INDICATORS (Part 3)*: *https://waterboards.zoom.us/webinar/register/WN_WDJtKssxRIaSRzFbi2vF0g*

Materials on past Risk Assessment workshops can be found here: SAFER website: *https://www.waterboards.ca.gov/safer/calendar.html*

Determine Final List of Risk Indicators for Risk Assessment 2.0

The State Water Board and UCLA will review and consider public and stakeholder feedback on the recommended risk indicators received from October 13, 2020 through October 30, 2020 to determine the final list of risk indicators for Risk Assessment 2.0.

Phases 3 and 4 of Risk Assessment 2.0 Development

Phase 3: Set Thresholds

- Identify appropriate, potentially-tiered thresholds for Risk Assessment 2.0 risk indicators.
- Distinguish between legislative/regulatory-defined thresholds, thresholds determined by evidence-based studies, thresholds commonly utilized by regulatory agencies, thresholds recognized by sector experience.

Phase 4: Determine Weighting/Scoring Approach

- Develop weighting/scoring Risk Assessment 2.0 methodology – challenges to think through:
    - How does methodology change when data is missing?
    - How should weights be distributed across individual risk indicators and/or risk indicator categories?
- Develop weighting/scoring options for Risk Assessment 2.0 methodology and pilot with a sample set of public water systems. Share results internally and with the public to vet accuracy of results.
- Host public webinar December 2020 to solicit feedback and recommendations on Risk Assessment 2.0 options.

Future Risk Indicators & Data Collection

The results of the evaluation of 129 potential risk indicators recommends 44 indicators should be considered in the "Future." This combined assessment status indicates a potential risk indicator scored well for Step 1: Applicability, but where deficiencies in data fitness prevented the potential risk indicator from being considered for Risk Assessment 2.0. This was especially true for the category of proposed TMF Capacity risk indicators where 26 of 36 indicators scored well on Applicability but did not meet the

Data Fitness criteria. Moving forward, the State Water Board will explore opportunities to develop long-term data collection and quality improvement strategies to address this data "gap."

These strategies may include:

- Enhancements to data collected and managed by State Water Board data systems, such as SDWIS, eAR, etc.
    - Improve data collection portals – enhancing the user experience may result in better data coverage and data quality.
    - Improve guidance and training materials for State Water Board staff and external data sources (water systems, Counties, etc.).
    - Improved data validation processes that would ensure data reported is appropriate and accurate.
- Reduce redundant data collection where possible.
- New data collection efforts to access necessary data required for identified risk indicators that scored well on Applicability. This may include pilot data collection efforts where the State Water Board can confirm a correlation between potential risk indicators and a systems' ability to stay in compliance. If a relationship can be demonstrated – propose initiating a more robust data collection strategy.

The Risk Assessment methodology will evolve over time to incorporate additional and better quality data; evidence from targeted research to support existing/new risk indicators and thresholds; experience from implementing the SAFER Program; and further input from the Board and public.

Appendix A: Public Feedback

In the final selection process of recommended risk indicators for Risk Assessment 2.0, stakeholder feedback and recommendations were provided through the public webinar, written comments, and continued dialogue during the feedback period (07.16.2020 - 08.21.2020).

Input during the Webinar

During the public webinar (07.22.2020), a total of six audience poll questions and five discussion topics were used to assist public participation in providing their input. The poll results and discussion comments on three main topics of the webinar are summarized below.

Definitions of Risk Indicator Categories

Draft definition of the four risk indicator categories (Water Quality, Accessibility, Affordability, and TMF Capacity) to guide identification of new potential indicators for Risk Assessment 2.0 were introduced to solicit public input.

Audience Poll Question 3:

Do these risk indicator category definitions capture what the State Water Board should be considering for Risk Assessment 2.0?
- Yes, I like these definitions
- Maybe, I think they need some minor edits
- No, these need to be re-worked

Poll Result: The majority of poll participants chose either these definitions were good (56%) or needed minor edits (41%).

Discussion Topic 1:

Do these risk indicator category definitions capture what the State Water Board should be considering for Risk Assessment 2.0?

Public Comments: Public questions and feedback do not directly correspond to this discussion topic and are not included here.

Potential Risk Indicators

Draft list of 118 potential risk indicators including risk indicators identified by other state agencies through stakeholder engagement process and recognized by the water sector and its advocates to be key measures of water system resiliency was introduced to solicit public input.

Audience Poll Question 4:
Are there other State or Federal efforts the State Water Board should be considering when developing Risk Assessment 2.0?

- No, you are considering the key efforts
- Yes, I will submit a public comment to identify an additional effort

Poll Result: The majority of poll participants responded that the provided list of potential indicators considered the key efforts (71%).

Audience Poll Question 5:
Do the Potential Risk Indicators identified in the White Paper align with your expectations?
- Yes, this includes most risk indicators I had in mind
- Maybe, I have not had a chance to review all 118 yet
- Maybe, there are some that need to be added/removed from this list
- No, the list of potential risk indicators does not align with my expectations

Poll Results were inconclusive.

Discussion Topic 2:
What additional risk indicators should be considered or evaluated? Are there other State or Federal efforts we should explore to identify additional potential risk indicators?

Public Comments: The following discussion was noted in relation to the topic 2.

- Water Quality Potential Risk Indicators:
  - In the consideration of drinking water standards violation, historical violations should be weighted differently than ones recently occurred.
  - The comments submitted regarding OEHHA's HR2W Tool and DWR's Drought and Water Shortage Risk Scoring Tool should be considered.
- Affordability Potential Risk Indicators:
  - Several potential affordability risk indictors that include the measurement of water rate were developed based on water rates for 6 HCF unit volume of water. However, when calculating affordability, the State Water Board should consider including all customer cost assisted with drinking water, such as, meter charge (fixed charge or connection fee), tax, special assessment which directly goes to the property owner, etc.
  - % Shut-Offs/Duration of Shut-Offs are currently irrelevant due to SB 998 associated with COVID-19.
  - Extreme Water Bill comparing to State average water bill (potential affordability indicator), it is uncertain if the State average water rate is appropriate to be used because of the geographic differences in the standard of living across the state.
- Additional Potential Indicators/Indicator Category Adjustment Suggested:
  - Water Quality indicators should capture some physical risk to the system vulnerability such sanitary deficiencies. Data should be available in the State Water Board's Sanitary Survey.

- Monitoring and Reporting Violations should be captured under Water Quality category, not under TMF Capacity category.
- TMF Capacity indicators should capture more indicators evaluating distribution system condition (e.g., age/condition of pipes, main break/leaks, etc.).

Risk Indicator Evaluation Tool

Draft Risk Indicator Evaluation Tool which would be used to assess the applicability and fitness of the identified potential risk indicators was introduced to solicit public input.

Audience Poll Question 6:

Do you think the steps and criteria in the DRAFT Evaluation Tool are clear?
- Yes, this looks great!
- Maybe, I think this needs some minor changes
- No, this needs a re-design

Poll Result: The majority of participants chose either the steps and criteria in the draft Risk Indicator Evaluation Tool were clear (51%) or needed some minor changes (38%).

Discussion Topic 3:

Are there additional criteria that should be considered for the evaluation of potential risk indicators? Do you have suggested changes to the criteria that are currently included?

Discussion Topic 4:

Open Q&A

Public Comments: The following discussion was noted in relation to the topic 3 and topic 4.

- A total of 118 potential indicators is not a manageable number. Overly complicated ones should be excluded through the evaluation.
- TMF indicators should be equally considered in the evaluation, despite the lack of available data. The State Water Board should reach out to water systems to gather required data, if needed.
- Question about the scoring method in the evaluation whether numerical combined score would be assigned as a result.
- The water systems that are on the At-Risk list should be notified about their listing.
- Method to track system's SAFER status change (e.g., toggle back and forth between "At-Risk" and "Potentially At-Risk") should be established to ensure sustainable funding management.

Input through Written Comment

Additional stakeholder comments that were received through SAFER email (safer@waterboards.ca.gov) for the written comment period (07.22.2020 – 08.21.2020) are detailed in the following section.

Association of California Water Agencies/California Municipal Utilities Association

In their August 21, 2020 comment letter, the Association of California Water Agencies (ACWA) and California Municipal Utilities Association (CMUA), provided several overarching comments. These comments recommended that the State Water Board should evaluate and select indicators focusing on real problems to identify public water systems that are truly close to failing to provide adequate safe drinking water so that the Safe and Affordable Drinking Water Fund properly supports systems with immediate needs. ACWA and CMUA also suggested that the State Water Board should evaluate and select the best predictors based on their criticality as they relate to a system's ability to remain in compliance with safe drinking water standards. They suggested the State Water Board should eliminate redundant indicators to pare down the proposed list of risk indicators. ACWA and CMUA also provided many other specific and technical comments regarding the draft potential indicators and draft Evaluation Tool. The comments were considered and incorporated where appropriate.

Appendix B:
Background on Primary Risk Indicator Data Sources

Safe Drinking Water Information System (SDWIS) & Water Quality Information Replacement (WQIr)

The Safe Drinking Water Information System (SDWIS) is a database developed by U.S. EPA to support Safe Drinking Water Act (SDWA) implementation and primacy state reporting requirements. There are two versions of SDWIS: SDWIS/Federal[6] and SDWIS/ State. SDWIS/State is the State version that tracks and stores general information on public water system contacts, facilities, drinking water sources, violations and enforcement actions, lead and copper analyte results. Some information housed in SDWIS/State is made available to the public through public Drinking Water Watch (pDWW). States report data for public water systems quarterly to U.S. EPA, and U.S. EPA stores this data in SDWIS/Federal.

SDWIS – Inventory, Violation Data & Enforcement Actions
SDWIS stores inventory and basic information, enforcement actions, and violation data for water systems. Inventory data consists of physical infrastructure and acquisition information, including treatment, storage, and distribution of a drinking water system. Inventory data is often sourced from permits, Sanitary Surveys, eAR, and through direct communication with water systems and then entered into SDWIS.

Violation data typically consists of information for water systems, including whether the system has violated any MCL, failed to comply with mandated treatment technique violations, failed to follow established monitoring and reporting schedules or communicate that to the customers. Violations are often determined through review of water quality data that is stored in the Water Quality Information Replacement database. SDWIS enforcement data includes information related to Enforcement Actions that SWRCB staff have taken to ensure that a public water system returns to compliance if it is in violation of a drinking water regulation.

Water Quality Information Replacement (WQIr) – Water Quality Data
Water quality data is submitted to the State Water Board by laboratories that must possess an Environmental Laboratory Accreditation Program (ELAP) certification, to ensure data quality. Once the water quality data has been accepted, it is stored in WQIr (with the exception of lead, copper, total coliform, and E. coli).

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[6] SDWIS EPA

https://www.epa.gov/enviro/sdwis-search
https://public.tableau.com/profile/rafael.maestu#!/vizhome/SystemsandApplications/Dashboard

The State Water Board also requires that contaminant results continually be submitted to WQIr at regular intervals. This is also known as a contaminant's monitoring frequency. Water quality contaminants can have different monitoring frequencies due to regulatory requirements. Furthermore, some water systems may be granted water quality monitoring waivers, which may reduce their monitoring frequency for certain contaminants. For example, a "waiver by data" can be granted to a water system that has conducted at least three rounds[7] of monitoring and all previous analyte results are reliably and consistently below the MCL.

The variation in monitoring frequency for certain contaminants would cause many of the water quality potential risk indicators to have a "Fair" or "Poor" score for data availability. The State Water Board has decided that for many of these water quality potential risk indicators, a criteria score of "Good" is justifiable because drinking water regulations have deemed this monitoring schedule to be an appropriate schedule to protect human health.

Electronic Annual Report (eAR)

The State of California has been collecting annual data from public water systems since the mid-1980s to better assess the status of their operation, maintenance, and ability to comply with Federal and State drinking water standards. The State Water Board utilizes data collected from the Electronic Annual Report (eAR) to determine water system compliance with regulatory and legislative requirements, inform policy decisions, and keep the public informed. The eAR also collects data on behalf of the Department of Water Resources (DWR) for the annual Public Water System Statistics (PWSS) survey to simplify water supplier data reporting and reduce redundant reporting to different state agencies.

Large public water systems, small public water systems, transient non-community, and non-transient non-community water systems are required to complete the eAR. While the Small Water System eAR (for systems under 3000 service connection) has 18 sections and more approximately 1,120 survey questions, only 34% (386) are mandatory for reporting. Examples of mandatory eAR reporting data includes: changes in population, changes in the number and type of service connections, status of source metering, cost of water for specific criteria (6, 9 and 12 HCF) and compliance with operator certification requirements.

Although it is required for each public water system to submit an eAR each year, the voluntary nature of the majority of questions in the eAR results in significant data gaps from one reporting year to the next. For example, an analysis of 28 potential risk

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[7] For a surface water source, "three rounds" means a minimum of annual monitoring for three consecutive years. For a groundwater source, "three rounds" means a minimum of one sample every three years for nine consecutive years.

indicators that rely on 57 unique data points collected from the eAR. This effort's analysis found that 84% (44) had less than 90% coverage for systems from 3,300 service connections or less. 70% (37) of these data points are voluntary eAR survey questions.

The quality of data collected through the eAR can vary as well because it is self-reported and the eAR platform has historically had very little quality control verifications built-in. Small water systems in particular have struggled to respond to eAR survey questions. Misinterpretation of survey questions has led to data quality issues. Required eAR responses are reviewed by State Water Board staff before migrating the data into SDWIS, but voluntary reported data is often not verified. For example, a small data quality audit of 47 public water systems who reported their water rates data through the eAR found that 30% (14) had reported incorrect data.

The State Water Board's Division of Drinking Water, Division of Information Technology, and an external stakeholder group (eAR Input Forum) are working together to address these challenges. Improvement for the 2020 reporting year include the integration of skip logic and hide/reveal functionality which will hopefully result in improved survey completeness by reducing the number of survey questions some systems are asked to respond to. There will also be functionality to auto calculate based on multiple fields to reduce data errors. The State Water Board will continue to refine eAR survey questions, develop improved guidance/reference materials, and improve the user experience to support improved data collection and data quality.

Sanitary Survey

A Sanitary Survey is a comprehensive review and inspection to evaluate the adequacy of the water system to produce and distribute safe drinking water. The Sanitary Survey includes an in-office file review and a physical field visit inspection. There are eight essential elements of a Sanitary Survey that are evaluated to assess a public water system's capability to supply safe drinking water (Code of Federal Regulation Title 40 [40 CFR] §142.16): source of supply; treatment; distribution system; finished water storage; pumps and pump facilities; monitoring, reporting, and data verification; system management and operation; and operator compliance with State requirements.

Sanitary Surveys are a proactive public health measure and an important component of the Safe Drinking Water Act (SDWA) public water system supervision program. The State Water Board, as a primacy agency, is responsible for completing Sanitary Surveys every three years for community water systems and every five years for non-community water systems. The State Water Board's Division of Drinking Water conducts inspections and documents the findings in Sanitary Survey reports, which are often saved as PDF documents. Federal regulation requires each state to retain reports of Sanitary Surveys for at least 12 years (40 CFR §142.14(d)). Local Primacy Agencies are required to complete a Sanitary Survey of each small water system at least once every five years. Local Primacy Agency's Sanitary Survey of a small water system includes, in addition to the elements of a routine inspection, an evaluation of the

watershed for surface water sources and vulnerability assessment for groundwater sources.

The Sanitary Survey allows Division of Drinking Water staff to collect a wide range of information pertinent to the public water systems and their performance that otherwise likely is difficult to be assessed through other self-reporting systems, such as how the public water system responds to customer complaints, whether staffing is adequate, or have an updated map, what are the real time pressure readings, etc. However, because each water system has unique characteristics (e.g., system configuration, operating conditions, and practice, etc.) and face different challenges and issues, such system-specific situations may lead to different approaches in conducting a sanitary survey. While each sanitary survey must evaluate all eight elements, Division of Drinking Water District staff may have a different list of questions that are tailored to each Sanitary Survey addressing system-specific deficiencies or other issues, which leads to non-uniform data collection across systems and State Water Board Districts. Furthermore, certain survey questions are not consistently asked each system from one Sanitary Survey to the next over the years, so consistency on data coverage for one system over time for one data point can vary.

The information obtained from on-site observation/interviews and follow-up communications with the owner of the water system and the operational personnel is documented in the field notes and then organized in the format of an electronic PDF report. The use of a standard form or template of the report that provides uniformity of Sanitary Surveys and help ensure completeness of the survey is, currently, not available. While the data collected through Sanitary Survey tend to be accurate, due to the limitation entailed to the format of a report, they are, currently, neither machine-readable, nor readily extractable. Archived reports of the sanitary survey are not publicly accessible on the State Water Board website. Through the public Drinking Water Watch (pDWW), public can view each of site visit date and a level of the highest deficiency severity corresponding to each site visit. There is, currently, no centralized repository of full Sanitary Survey reports in Division of Drinking Water. Some of full reports are available to access through the modified Drinking Water Watch (mDWW) at an individual report level for the State Water Board staff review.

U.S. Census & American Community Survey

An attempt at a comprehensive census, or complete count, of the United States population has been conducted every ten years since 1790 by the U.S. Census Bureau. The Census Bureau is a principal agency of the U.S. Federal Statistical System and is a part of the U.S. Department of Commerce. The accuracy and coverage of decennial census data, despite legitimate criticisms of its undercounting of disadvantaged populations on the margins, is a data source of unparalleled quality in the U.S. context for assessing household-level demographic and socioeconomic characteristics at scale.

Census data is available at numerous geographical units or scales, from as large as the entire country down to as small as the census block (of which there are 11 million+). These spatial boundaries units are able to be matched consistently[8] to allow for analysis of trends over time within the same space. Despite true census data only being updated every ten years, the availability of this data historically has also been superior to other sources as it is accessible online and to the public at all times in both tabular and spatial forms. Moreover, despite the limitations noted below, census data are especially unique compared to other data sources in allowing the matching of characteristics of a population at geographical units as small as most community water systems, either using block group or census tract-level information.

Following the 2000 census, however, the U.S. Census Bureau shifted data collection for all person and household characteristics besides population counts, housing type and race-ethnicity counts from the decennial census to the newly-formed American Community Survey (ACS). The ACS is not a true census, but is the largest, representative sample of the U.S. population (the initial sampling frame contains over 3 million households), and maintains the same geographical boundaries as the decennial census. While yearly (1-year) ACS estimates are available for large populations, only 5-year average ACS estimates are available down to the census block group or tract scale, which are the geographies most relevant to the Board's risk assessment.[9]

However, one limitation with block group and census tract-level estimates from the 5-year ACS is that the sampling approach can produces high margins of error, including for indicators used in the Risk Assessment such as household income data. Concerns regarding ACS block group estimates are detailed in OEHHA's Human Right to Water Report and several non-water studies. As there remains, however, no alternative underlying source of comparable, spatially-defined socioeconomic data, most scholars and practitioners continue to use ACS estimates. A potentially conservative solution is to exclude from any analysis block groups or tracts with a coefficient of variation above some threshold. Based on OEHHA's analysis, it appears that even using such exclusion criteria, coverage for community water systems will likely be sufficient for key socioeconomic variables derived from the 5-year ACS.

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[8] One needs to use a geographic crosswalk to do so, for instance see https://www.nhgis.org/user-resources/geographic-crosswalks.

[9] No block level estimates are produced for the ACS.

Appendix C:
Summary Potential Risk Indicator Evaluation Results

The following tables summarize the results of the evaluation of 129 potential risk indicators. Detailed evaluation summaries for each potential risk indicator can be found in Supplemental Appendices D.1 through D.4:

- **Water Quality** Supplemental Appendix D.1: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd1_101320.pdf
- **Accessibility** Supplemental Appendix D.2: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd2_101320.pdf
- **Affordability** Supplemental Appendix D.3: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd3_101320.pdf
- **TMF Capacity** Supplemental Appendix D.4: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd4_101320.pdf

Potential Water Quality Risk Indicators

Table 8 includes a summary of evaluation results for potential risk indicators that correspond to aspects of California SDWA water quality requirements. These indicators measure current water quality and trend indicators to identify compliance with water quality and treatment technique regulatory requirements, as well as frequency and duration of exposure to drinking water contaminants.

The full detailed evaluation for each potential Water Quality risk indicators can be accessed in Supplemental Appendix D.1: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd1_101320.pdf.

Table 8: Potential Water Quality Risk Indicator Summary Evaluation Results

Potential Risk Indicator *Total: 28*	STEP 1	STEP 2			Potential Inclusion in Risk Ass.?
	Applicability	Data Coverage	Data Availability	Data Accuracy/ Quality	
Waterborne Illness: Historical customer complaints	Good	Poor	Poor	Poor	**Future**
Waterborne Illness: Current customer complaints	Good	Poor	Poor	Poor	**Future**

Potential Risk Indicator *Total: 28*	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Frequency of Bacteriological Violations (Total Coliform)	Good	Good	Good	Good	**Yes**
E. coli Presence	Excellent	Good	Good	Good	**Yes**
Treatment Technique Violations	Good	Good	Good	Good	**Yes**
Lead and Copper	Good	Good	Good	Fair	**Maybe**
Number of High Potential Exposure (HPE) Contaminants	Good	Good	Good	Good	**Yes**
Presence of HPE Acute Contaminants	Good	Good	Good	Good	**Yes**
Maximum Duration of HPE	Good	Good	Good	Good	**Yes**
Presence of Acute Contaminants: Past MCL Violation	Good	Good	Good	Good	**Yes**
Non-Compliance with Primary Drinking Water Standards	Poor	Good	Good	Good	**No**
Maximum Duration of Non-Compliance	Good	Good	Good	Good	**Yes**
Increasing Presence of Water Quality Trends Toward MCL	Good	Good	Good	Good	**Yes**
Frequency of Water Quality Near MCL	Fair	Good	Good	Good	**No**
Current Water Quality Greater than 50% for Acute Contaminants	Fair	Good	Good	Good	**No**
Past Presence on the HR2W List	Good	Good	Good	Good	**Yes**
Average Duration on the HR2W List	Good	Good	Good	Good	**Yes**
Proximity of Public Water System's Source Water to Septic System	Good	Fair	Poor	Poor	**Future**
Proximity of Untreated	Fair	Fair	Poor	Fair	**No**

Potential Risk Indicator _Total: 28_	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Public Water System's Source to Nearby Surface Water					
Compliance with Well Construction Standards	Good	Poor	Poor	Poor	Future
Emerging Contaminants	Fair	Good	Good	Fair	No
Potential Contamination Hazards	Fair	Good	Fair	Fair	No
Source Water Protection Zones	Fair	Poor	Poor	Fair	No
Level 2 Assessment under rTCR	Good	Fair	Good	Good	Maybe
Percentage of Sources Exceeding an MCL	Good	Good	Good	Good	Yes
Percentage of Total Capacity Exceeding or Approaching MCL	Good	Fair	Fair	Good	Future
Proximity to a Contaminated Well	Fair	Fair	Poor	Poor	No
Age of Well Sources	Good	Fair	Poor	Fair	Future

Potential Accessibility Risk Indicators

Table 9 includes a summary of evaluation results for potential risk indicators that measure a system's ability to deliver safe, sufficient, and continuous drinking water to meet public health needs. These indicators may measure risks impacting a system's quality and quantity of source water; reliability and volume of its delivery/distribution; and ability of customers to access safe drinking water.

The full detailed evaluation for each potential Accessibility risk indicators can be accessed in Supplemental Appendix D.2: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd2_101320.pdf.

Table 9: Potential Accessibility Risk Indicator Summary Evaluation Results

Potential Risk Indicator *Total: 37*	STEP 1	STEP 2			Potential Inclusion in Risk Ass.?
	Applicability	Data Coverage	Data Availability	Data Accuracy/ Quality	
Unplanned Water Outages	Excellent	Poor	Fair	Poor	**Future**
Location in a High Priority Groundwater Basin	Fair	Good	Good	Fair	**No**
Single Groundwater Source	Good	Good	Good	Good	**Yes**
Temperature Shift	Fair	Good	Fair	Good	**No**
Projected Sea Level Rise as Salt Water Intrusion in Coastal Groundwater	Good	Good	Good	Good	**Yes**
Projected Wildfire Risk	Fair	Fair	Good	Good	**No**
Current Wildfire Risk	Fair	Good	Fair	Fair	**No**
Drought Early Warning Forecast	Fair	Good	Good	Good	**No**
Communities in Fractured Rock (Non-Basin) Areas	Fair	Good	Fair	Poor	**No**
Projected Population Growth	Fair	Good	Fair	Fair	**No**
Water Quality in Surrounding Basin	Fair	Good	Fair	Fair	**No**
Presence of Subsidence in Basin	Fair	Good	Good	Fair	**No**
Documented Saline Intrusion	Fair	Good	Good	Fair	**No**
Critically Overdrafted Groundwater Basin	Good	Good	Good	Good	**Yes**
Chronic Declining Water Levels	Fair	Good	Good	Fair	**No**
Surrounding Agricultural Land Use	Fair	Good	Good	Good	**No**
Presence of Interties	Good	Fair	Good	Good	**Maybe**
Presence of Emergency Interties	Good	Fair	Good	Fair	**Maybe**
Number of Water	Good	Good	Good	Good	**Yes**

Potential Risk Indicator *Total: 37*	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Sources					
Water Source Type	Good	Good	Good	Good	**Yes**
Water Level Status	Good	Poor	Fair	Poor	**Future**
Projected Water Shortage	Fair	Fair	Fair	Poor	**No**
Curtailment Compliance Order	Good	Good	Good	Good	**Yes**
Drought Assistance Record	Fair	Good	Good	Good	**No**
Water Production for 55 Gallons Per Capita Per Day (GPCD)	Poor	Good	Good	Good	**No**
(Household-level) History of Past Water Shortages	Good	Fair	Fair	Fair	**Future**
Backup Power Supply	Fair	Fair	Good	Poor	**No**
Distribution System Pressure	Excellent	Poor	Fair	Poor	**Future**
Water Rights Allocations	Good	Good	Good	Fair	**Maybe**
Urban Water Loss	Good	Poor	Good	Good	**Future**
Adequate Storage Capacity	Excellent	Fair	Poor	Fair	**Future**
DWR - Drought & Water Shortage Risk Assessment Results	Good	Good	Good	Good	**Yes**
Source Capacity and Demand Ratio	Good	Fair	Poor	Good	**Future**
Proximity to Earthquake Fault	Good	Good	Good	Fair	**Maybe**
Location in or Near a Flood Zone	Good	Good	Good	Fair	**Maybe**
Use or Dependence on Constructed Conveyance	Good	Poor	Poor	Poor	**Future**

Potential Affordability Risk Indicators

Table 10 includes a summary of evaluation results for potential risk indicators that measure the capacity of households and the customer base as a whole to supply the revenue necessary for a system to pay for necessary capital, operations, and maintenance expenses.

The full detailed evaluation for each potential Affordability risk indicators can be accessed in [Supplemental Appendix D.3](https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd3_101320.pdf): https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd3_101320.pdf.

Table 10: Potential Affordability Risk Indicator Summary Evaluation Results

Potential Risk Indicator Total: 23	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Percent of Median Household Income (%MHI)	Good	Fair	Good	Fair	**Maybe**
Percent of County Poverty Threshold (%CPT)	Good	Fair	Good	Fair	**Maybe**
Percent of Deep Poverty Income (%DP)	Good	Fair	Good	Fair	**Maybe**
Per Capita Income	Fair	Good	Good	Fair	**No**
Average Median Household Income	Fair	Good	Good	Fair	**No**
Percentage of Poverty (%Poverty)	Good	Good	Good	Fair	**Maybe**
Demographic and Socioeconomic Characteristics of Customer Base	Poor	Good	Good	Fair	**No**
Household Burden Indicator (HBI) for Drinking Water	Good	Fair	Good	Fair	**Maybe**
Poverty Prevalence Indicator (PPI)	Good	Good	Good	Fair	**Maybe**
Affordability Ratio (AR$_{20}$) for Drinking Water	Good	Poor	Good	Fair	**Future**
WARi® for Drinking Water	Good	Fair	Good	Fair	**Future**
Extreme Water Bill	Good	Fair	Good	Fair	**Maybe**

Potential Risk Indicator *Total: 23*	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
% Shut-Offs	Good	Good	Good	Fair	**Maybe**
Duration of Shut-Offs	Good	Good	Good	Fair	**Maybe**
Hours at Minimum Wage to Pay for Drinking Water Bill	Good	Fair	Good	Fair	**Maybe**
Socioeconomic Vulnerability Index	Poor	Good	Good	Fair	**No**
Households Delinquent in Paying Bills	Good	Poor	Poor	Poor	**Future**
Households Below the Living Wage	Good	Fair	Fair	Fair	**Future**
Shelter Cost (FMR)	Good	Good	Good	Fair	**Maybe**
Households Receiving Public Assistance	Poor	Good	Good	Fair	**No**
Customers Receiving Water Bill Payment Assistance	Good	Poor	Good	Fair	**Future**
Disadvantaged Community Status	Good	Good	Good	Fair	**Maybe**
Housing Burden	Good	Good	Good	Fair	**Maybe**

Potential TMF Capacity Risk Indicators

Table 11 includes a summary of evaluation results for potential risk indicators that measure a system's technical, managerial and financial (TMF) capacity to plan for, achieve, and maintain long term compliance with drinking water standards, thereby ensuring the quality and adequacy of the water supply.

The full detailed evaluation for each potential TMF Capacity risk indicators can be accessed in Supplemental Appendix D.4: https://www.waterboards.ca.gov/drinking_water/programs/safer_drinking_water/docs/safer_supp_appxd4_101320.pdf.

Table 11: Potential TMF Capacity Risk Indicator Summary Evaluation Results

Potential Risk Indicator *Total: 42*	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?

Potential Risk Indicator _Total: 42_	STEP 1	STEP 2			Potential Inclusion in Risk Ass.?
	Applicability	Data Coverage	Data Availability	Data Accuracy/ Quality	
Active Standing with California Secretary of State (SoS) Status Requirements	Good	Poor	Good	Poor	**No[10]**
Operator Certification Violations	Good	Good	Good	Good	**Yes**
Monitoring and Reporting Violations	Good	Good	Good	Good	**Yes**
Customers Metered	Fair	Good	Good	Good	**Maybe**
Absence of Customer-Level Meters	Fair	Good	Good	Good	**Maybe**
Updated Rate Structure	Good	Poor	Good	Fair	**Future**
Rate Structure: Type	Good	Fair	Fair	Fair	**Future**
Drought Preparedness Plan (Water Conservation Plan)	Fair	Poor	Fair	Fair	**No**
Operating Ratio with Depreciation	Good	Poor	Poor	Fair	**Future**
Adjusted Operating Ratio	Good	Poor	Poor	Fair	**Future**
Non-Capital (simple) Operating Ratio	Fair	Poor	Fair	Fair	**No**
Revenue Collection Per Connection	Good	Poor	Poor	Fair	**Future**
Operating and Maintenance (O&M) Expenditure Per Connection	Good	Poor	Poor	Fair	**Future**
Days Cash on Hand	Excellent	Poor	Poor	Fair	**Future**
Asset Depreciation Ratio	Good	Poor	Poor	Poor	**Future**
Debt to Equity Ratio	Good	Poor	Poor	Poor	**Future**
Outstanding Water Bill	Good	Poor	Poor	Poor	**Future**

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[10] A deviation from Step 3 criteria was made for this potential risk indicator, refer to Supplemental Appendix D.4 for the full evaluation.

Potential Risk Indicator *Total: 42*	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Amount					
Dedicated Fund/Account for Revenues and Expenses	Good	Poor	Poor	Poor	**Future**
Line of Credit with Financial Institution	Good	Poor	Poor	Poor	**Future**
Current Ratio	Good	Poor	Fair	Fair	**Future**
Debt Service Coverage Ratio	Good	Poor	Fair	Fair	**Future**
Emergency Response Plan (ERP)	Excellent	Fair	Poor	Good	**Future**
Capital Improvement Plan (CIP)	Excellent	Poor	Poor	Fair	**Future**
Asset Management Plan (AMP)	Excellent	Poor	Poor	Fair	**Future**
Member of CalWARN or Alternative Mutual Aid Agreement	Good	Fair	Fair	Good	**Maybe**
Insurance Coverage	Good	Poor	Poor	Poor	**Future**
Full-Time Operator	Fair	Poor	Poor	Poor	**No**
Number of Staff Per Connection	Fair	Poor	Poor	Poor	**No**
Operator Training	Good	Poor	Poor	Poor	**Future**
Employee Turnover	Good	Poor	Poor	Poor	**Future**
Cross Connection Control/Backflow Prevention	Good	Fair	Fair	Fair	**Future**
Number of Service Connections	Good	Good	Good	Good	**Yes**
Maintaining a Full Board	Good	Poor	Poor	Poor	**Future**
Training of Board Members	Good	Poor	Fair	Poor	**Future**
Age of Distribution System	Good	Fair	Poor	Fair	**Future**
Financial Audit	Good	Poor	Poor	Poor	**Future**

Potential Risk Indicator _Total: 42_	STEP 1 Applicability	STEP 2 Data Coverage	Data Availability	Data Accuracy/ Quality	Potential Inclusion in Risk Ass.?
Historical Population Growth	Good	Good	Good	Fair	**Maybe**
Water System Size/ Socioeconomic Status of the Community	Good	Good	Good	Good	**Yes**
Baseline Monitoring	Good	Fair	Fair	Fair	**Maybe**
Data Availability	Good	Good	Good	Good	**Yes**
Significant Deficiencies	Good	Good	Fair	Good	**Maybe**
Extensive Treatment Installed	Good	Good	Good	Good	**Yes**