



Supplemental Appendix D.4 Potential TMF Capacity Risk Indicator Evaluations

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Table of Contents

Active Standing with California Secretary of State (SoS) Status Requirements.....	4
Operator Certification Violations.....	5
Monitoring and Reporting Violations.....	6
Customers Metered.....	9
Absence of Customer-Level Meters	11
Updated Rate Structure.....	12
Rate Structure: Type	13
Drought Preparedness Plan (Water Conservation Plan).....	14
Operating Ratio with Depreciation.....	16
Adjusted Operating Ratio	17
Non-Capital (Simple) Operating Ratio	18
Revenue Collection per Connection	19
Operating and Maintenance (O&M) Expenditure per Connection	21
Days Cash on Hand	22
Asset Depreciation Ratio.....	23
Debt to Equity Ratio	25
Outstanding Water Bill Amount	26
Dedicated Fund/Account for Revenues and Expenses	26
Line of Credit with Financial Institution.....	27
Current Ratio.....	28
Debt Service Coverage Ratio.....	29
Emergency Response Plan (ERP)	30
Capital Improvement Plan (CIP).....	31
Asset Management Plan (AMP)	32
Member of CalWARN or Alternative Mutual Aid Agreement	33
Insurance Coverage.....	35
Full-Time Operator	36
Number of Staff Per Connection	37
Operator Training	38
Employee Turnover.....	39
Cross Connection Control/Backflow Prevention.....	40

Number of Service Connections.....	42
Maintaining a Full Board.....	43
Training of Board Members.....	44
Age of Distribution System.....	46
Financial Audit.....	47
Historical Population Growth.....	48
Water System Size/Socioeconomic Status of the Community.....	50
Baseline Monitoring.....	52
Data Availability.....	53
Significant Deficiencies.....	55
Extensive Treatment Installed.....	57
Appendix D.4.1.....	58

Active Standing with California Secretary of State (SoS) Status Requirements

This indicator reflects whether a water system has ‘active’ or ‘inactive’ standing as a registered business entity with the California Secretary of State. Active standing is judged based on whether water systems appeared in the SoS database of registered entities as active in good standing. Privately-run systems and mutual water companies, among all business corporations and limited liability companies are required to file a statutory Statement of Information with the SoS either every year or every two years as applicable. Entities that fail to file the required statements or to pay their fees lose their active standing and are classified as “cancelled”, “dissolved”, or be attributed another inactive governance status as defined by the SoS.

Step 1: Applicability: Good

This risk indicator was utilized in Risk Assessment 1.0 based on being identified as an applicable managerial risk indicator through a stakeholder-driven process in 2019. A survey of State Water Board District Engineers in July 2020 confirmed the potential applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Active Standing Status with California Secretary of State (annual or biannual, required by Secretary of State for some systems)

Data Coverage: Poor

In Risk Assessment 1.0, the active standing status of about two-thirds of relevant systems was able to be identified. Moreover, only privately-run and mutual water systems, among the larger universe of small water systems, are relevant to be assessed with this indicator, as other system types are not required by California law to update their registration with the California Secretary of State to be considered active operating entities.

Data Availability: Good

Not all water system types are required to report this data, but every privately-run or mutual water system must report this data either every year or every two years.

Data Accuracy/Quality: Poor

To determine active standing status with the Secretary of State, each water system needs to be manually searched using their entity names, which is a very time-intensive and inexact process. Otherwise, no data sources were found that was suitably reliable, readily accessible, or machine readable.

Step 3: Combined Evaluation: No

Active Standing with California Secretary of State (SoS) Status Requirements does not meet necessary Step 2 criteria for data fitness, and unless a major improvement in coverage takes place, does not appear feasible for future risk assessments.

- STEP 1 APPLICABILITY: Good
- STEP 2: DATA FITNESS
 - Coverage: Poor
 - Availability: Good
 - Quality: Poor
- STEP 3: COMBINED EVALUATION: No

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.

Step 1: Applicability: Good

This indicator is used in Risk assessment 1.0. A survey of State Water Board District engineers in July 2020 indicated that applicability of this indicator is “Good.”

Step 2: Data Fitness

Required Risk Indicator Data Point & Source:

- Operator Certification Violations; SDWIS (ongoing, required)

Data Coverage: Good

Operator certification violations are entered into SDWIS if when violations occur. It is assumed converged is “Good.”

Data Availability: Good

Operator certification violations are available through SDWIS on an ongoing basis.

Data Accuracy/Quality: Good

This data is assumed to be accurate.

Step 3: Combined Evaluation: Good

Operator Certification Violations meets some of the combined criteria and may be considered in future.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**

- Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Future**

Monitoring and Reporting Violations

The total number of monitoring and reporting violations for specific contaminants and treatment techniques during a 9-year compliance cycle.

Step 1: Applicability: Good

All water systems are required to monitor water quality and to report water quality information both to regulators and to the public on regular intervals.¹ These monitoring and reporting requirements are mandatory under the Safe Drinking Water Act. If a water system is found out of compliance, it will receive a Monitoring and Reporting (M&R) violation.

M&R violations do not always reflect contamination of delivered water quality itself. Rather, monitoring and reporting violations show that proper reporting procedures or monitoring schedules regarding the containment were not followed.² A lack of compliance regarding procedural requirements can be considered a proxy for lower technical or managerial capacity for a water system.

M&R violations was also used in Risk Assessment 1.0 and identified as an applicable risk indicator through a stakeholder-driven process in 2019. A survey of State Water Board District Engineers in July 2020 confirmed the applicability of this indicator. This metric is also used as a risk indicator by the OEHHA HR2W Tool.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Source:

All Monitoring & Reporting violations for Consumer Confidence Reports, Total Coliform Rule, nitrate, disinfection byproducts (DBP), Surface Water Treatment Rules, the Groundwater Rule, the Lead and Copper Rule. These correspond with violation codes of 3, 4, 23, 24, 26, 27, 31, 36, 38, 51, 52, 53, 56, 71, and 72.

¹ [EPA. \(2019\). Safe Drinking Water Act \(SDWA\) Resources and FAQs.](https://echo.epa.gov/help/sdwa-faqs) Retrieved October 14, 2019
<https://echo.epa.gov/help/sdwa-faqs>

² [Annual Compliance Report \(2016\). State of California & State Water Resources Control Board.](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/2016/2016_acr_fnl070717.pdf)
https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/dwdocuments/2016/2016_acr_fnl070717.pdf

- Violation Maintenance List: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting)
- 3- MONITORING AND REPORTING VIOLATIONS, ROUTINE MAJOR OR ROUTINE MINOR
 - An M&R violation for an inorganic, organic, or radiological constituent where compliance is based on routine samples.
 - Minor - Some but not all samples collected.
 - Major - No samples collected.
- 4- MONITORING AND REPORTING VIOLATIONS, CONFIRMATION/CHECK MAJOR OR CONFIRMATION/CHECK MINOR
 - An M&R violation for an inorganic, organic, or radiological constituent where compliance is based on repeat or confirmation samples 2b-level 2 assessment, mcl triggered (rTCR).
 - Minor - Some but not all samples collected.
 - Major - No samples collected.
- 23- TOTAL COLIFORM RULE (TCR) VIOLATIONS, ROUTINE MAJOR
 - A violation where compliance is based on monitoring and reporting of routine bacteriological samples and a water system did not collect and report all the required samples.
- 24- TOTAL COLIFORM RULE (TCR) VIOLATIONS, ROUTINE MINOR
 - A violation where compliance is based on monitoring and reporting of routine bacteriological samples and a water system did not collect and report some of the required samples.
- 26- TOTAL COLIFORM RULE (TCR) VIOLATIONS, REPEAT MINOR
 - A violation where a system notified of total coliform positive repeat sample and analyzes some but not all of the total coliform positive samples for fecal coliform/E. Coli.
- 27- STAGE I – DBP RULE VIOLATIONS, FAILURE TO HAVE MONITORING PLAN
 - A violation where the water system failed to have a monitoring plan for DBP.
- 27- STAGE I – DBP RULE VIOLATIONS, CHLORINE DIOXIDE
 - A violation where the water system failed to comply with Monitor & Reporting requirements.
- 27- STAGE 1 and 2 – DBP RULE VIOLATIONS, MAJOR/MINOR
 - A violation where the water system failed to monitor and report the DBP samples in accordance with their DBP monitoring plan.
- 31- SURFACE WATER TREATMENT RULE VIOLATIONS
 - A violation where a water system using unfiltered surface water failed to perform routine and/or repeat monitoring for TC/TC and turbidity.
- 31- GROUND WATER RULE VIOLATIONS
 - A violation where a water system that is implementing 4-log removal treatment for viruses failed to monitor or report compliance monitoring at the treatment plan.

- 31- (LT2)/ENHANCED SURFACE WATER TREATMENT VIOLATIONS, MAJOR/MINOR
 - M&R violation for It2 where an unfiltered water system fails to monitor according to 40 CFR §141.701(a)(2).
- 36- SURFACE WATER TREATMENT RULE VIOLATIONS
 - A violation where a water system using filtered surface water failed to perform routine and/or repeat monitoring for filtration or disinfection processes.
- 38- LT-1/INTERIM ENHANCED SURFACE WATER TREATMENT RULE VIOLATIONS
 - A violation where a water system using filtered surface water failed to monitor and/or report the required combined filter effluent samples or individual filter effluent sample.
- 51- LEAD AND COPPER RULE (LCR) VIOLATIONS
 - A violation where a water system failed to monitor and report the initial lead and copper tap samples (this violation type is no longer applicable for most water systems and now only applies to new systems or systems that were not previously required to conduct lead and copper tap monitoring) .
- 52- LEAD AND COPPER RULE (LCR) VIOLATIONS
 - A violation where a water system failed to monitor and report the routine or follow-up lead and copper tap samples.
- 53- LEAD AND COPPER RULE (LCR) VIOLATIONS
 - A violation where a water system failed to monitor and report the routine or follow-up water quality parameter (WQP) samples.
- 56- LEAD AND COPPER RULE (LCR) VIOLATIONS
 - A violation where a water system failed to monitor and report the routine or follow-up source water samples.
- 71- CONSUMER CONFIDENCE REPORT (CCR) VIOLATIONS
 - A violation where a water system failed to prepare, deliver a CCR to their customers/consumers, and provide a copy to the state or county.
- 72- CONSUMER CONFIDENCE REPORT (CCR) VIOLATIONS
 - A violation where a water system prepared an inadequate CCR due to deficient language, content, and/or meeting availability requirements or failed to provide the certification form to the state or county.

Data Coverage: Good

Overall, the coverage of most Monitoring & Reporting violations is good in SDWIS.

Data Availability: Good

State Water Board staff constantly review laboratory or water system reports which indicates whether a Monitoring & Reporting violation has occurred. The data is also entered and maintained by State Water Board staff frequently in SDWIS.

Data Accuracy/Quality: Good

The State Water Board has guidance for district engineers on how to assign violation types as they occur. The overwhelming majority of State Water Board District Engineer survey respondents indicated that data accuracy/quality was good.

Step 3: Combined Evaluation: Yes

Monitoring & Reporting violations meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Customers Metered

Percentage of single and multi-family active service connections for potable water that have meters.

Step 1: Applicability: Fair

This indicator is used in DWR Water Shortage Risk Tool. A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is “Good.” However, public and stakeholder feedback has suggested this risk indicator is less applicable when compared other potential risk indicators. The State Water Board is assigning an applicability score of “Fair.”

Step 2: Data Fitness

Required Risk Indicator Data Point & Source:

- Total Active Potable Water Connections currently in Division of Drinking Water database; eAR (annual, not required)
 - No. of Single-family potable water meter; eAR (annual, required)
 - No. of Single-family potable water meter; eAR (annual, required)

Risk Indicator Calculation Methodology:

Customers Metered= [(No. of Single-family potable water meter + No. of Single-family potable water meter) /Total Active Potable Water Connections currently in Division of Drinking Water database]

Data Coverage: Good

The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- Total Active Potable Water Connections currently in Division of Drinking Water database: **Good**
 - 99% coverage.
- No. of Single-family potable water meter: **Good**
 - 99.5% coverage.
- No. of Multi-family potable water meter: **Good**
 - 99.75 coverage.

Data Availability: Good

- Total Active Potable Water Connections currently in Division of Drinking Water database: **Fair**
 - Coverage is excellent, but this data is not required reporting in the eAR annually.
- No. of Single-family potable water meter: **Good**
 - This data is required reporting in the eAR annually.
- No. of Multi-family potable water meter: **Good**
 - This data is required reporting in the eAR annually.

Data Accuracy/Quality: Good

- Total Active Potable Water Connections currently in Division of Drinking Water database: **Fair**
 - Reporting to the State Water Board is dependent upon water systems self-reporting this information. Considering the self-reported nature of the data, and limited validation for voluntary questions, State Water Board staff and UCLA suggest a data accuracy/quality score of “Fair.”
- No. of Single-family potable water meter: **Good**
 - Required eAR data is often verified by State Water Board staff.
- No. of Multi-family potable water meter: **Good**
 - Required eAR data is often verified by State Water Board staff.

Step 3: Combined Evaluation: Maybe

Customers metered meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Maybe**

Absence of Customer-Level Meters

This indicator examines whether a water system lacks customer-level water consumption meters.

Step 1: Applicability: Fair

This metric was utilized in our Risk Assessment 1.0. While water meters are important, the absence of customer-level water meters is not necessarily a good indicator of whether the system is at risk of failing to provide safe drinking water due to lack of TMF capacity.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Number of Service Connections; Section 3, eAR (annual, required).

Risk Indicator Methodology:

Each data point was filtered to remove answers that indicated the question was not responded to within the eAR ie "Blanks" were removed. Percentages based on total CWS < 3300 SC count for each year

- 2018 CWS < 3300 SC = 2478
- 40200 - SFR Potable UM -(Blanks)
- 40500 - MFR Potable UM -(Blanks)
- 42300 - T Potable UM -None Removed
- 2017 CWS < 3300 SC = 2465
- 40200 - SFR Potable UM -(Blanks)
- 40500 - MFR Potable UM -(Blanks)
- 42300 - T Potable UM -None Removed

Data Coverage: Good

eAR: Good

- 2018
 - 40200 - SFR Potable UM - 99%
 - 40500 - MFR Potable UM - 99%
 - 42300 - T Potable UM - 99.3%
- 2017
 - 40200 - SFR Potable UM - 99%
 - 40500 - MFR Potable UM - 98.9%
 - 42300 - T Potable UM - 99.7%

Data Availability: Good

Data is reported annually and is required.

Data Accuracy/Quality: Good

Individual water systems self-report and submit the data. Required eAR data reporting is typically reviewed by DDW Staff.

Step 3: Combined Evaluation: No

Absence of Customer-Level Meters does not meet the combined criteria requirements and should not be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **No**

Updated Rate Structure

This indicator determines when the water system last updated their rate structure.

Step 1: Applicability: Good

This indicator serves to gauge the financial capacity of water system. More recent rate restructuring may constitute lower financial risk of a supplier. Updated Rate Structure is used in DWR Water Shortage Risk Tool. A survey of State Water Board District engineers in July 2020 indicated that applicability of this indicator is “Good.”

Step 2: Data Fitness

Required Risk Indicator Data Point & Source:

- Date of Most Recent Update to Rate Structure, eAR (annual, not required in 2017, required reporting in 2018)

Data Coverage: Poor

The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- Date of most recent update to the rate structure: **Poor**
 - 56% coverage.

Data Availability: Good

This data is collected annually through the eAR. It was not required reporting in 2017 but it was required reporting in 2018.

Data Accuracy/Quality: Fair

Reporting to the State Water Board is dependent upon water systems self-reporting this information. Considering the self-reported nature of the data, and limited validation, State Water Board staff and UCLA suggest a data accuracy/quality score of “Fair”.

Step 3: Combined Evaluation: Maybe

Updated Rate Structure meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Good**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: Maybe

Rate Structure: Type

This indicator determines the type of rate structure employed by a water system.

Step 1: Applicability: Good

Those with rate structure other than allocation-based rates are considered to have higher capacity to cope financially during a dry period. This indicator is used in DWR’s Water Shortage Risk Tool. A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is “Good.”

Step 2: Data Fitness

Required Risk Indicator Data Point & Source:

- Type of rate structure; eAR (annual, not required reporting)
 - Base Rate (Fixed Base, Variable Base Rate)
 - Usage Rate (Uniform Usage Rate, Variable Usage Rate)
 - Other Rates (Flat Rate)
 - Allocation Based
 - Other rate structure
 - No Rate Structure

Data Coverage: Fair

The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- Type of rate structure: **Fair**
 - 75% coverage.

Data Availability: Fair

- Type of rate structure: **Fair**
 - This data is collected annually through the eAR, but is not required reporting.

Data Accuracy/Quality: Fair

- Type of rate structure: **Fair**
 - Reporting to the State Water Board is dependent upon water systems self-reporting this information. Considering the self-reported nature of the data, and limited validation, State Water Board staff and UCLA suggest a data accuracy/quality score of “Fair.”

Step 3: Combined Evaluation: Future

Rate Structure Type meets some of the combined criteria and may be considered for future.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Drought Preparedness Plan (Water Conservation Plan)

This proposed indicator determines a water system has a recent or updated Drought Preparedness Plan or Water Shortage Contingency Plan.

Step 1: Applicability: Fair

DWR utilizes this metric in their Drought and Water Shortage Risk Scoring Tool to assess water systems’ capacity to reduce risk to drought and/or water shortage events. Having a recently updated Drought Preparedness Plan may indicate higher coping capacity. A survey of State Water Board engineers in July 2020 indicated an applicability score of “Fair”. It also noted that having a Drought Preparedness Plan may not be representing the actual implementation or usefulness/appropriateness of the plan.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Conservation Drought Preparedness Plan Date; eAR (annual, not required); or
- Presence of Drought Preparedness Plan; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Poor

For the data point relying on the eAR, the following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- Conservation Drought Preparedness Plan Date: **Poor**
 - 7% coverage for large water systems between 3,000 to 3,300 service connections.
 - 15% coverage for small water systems below 3,000 service connections.
- Presence of Drought Preparedness Plan: **Poor**
 - This information is not typically captured in Sanitary Surveys.

Data Availability: Fair

- Conservation Drought Preparedness Plan Date: **Fair**
 - This data is collected annually through the eAR, but it is not required reporting.
- Presence of Drought Preparedness Plan: **Poor**
 - The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

- Conservation Drought Preparedness Plan Date: **Fair**
 - Reporting to the State Water Board through eAR is dependent upon water systems themselves reporting such information. Considering the self-reported nature of the data, and the fact that we cannot assume that no eAR response means absence of the Drought Preparedness Plan, a score of "Fair" was assigned. A survey of State Water Board engineers in July 2020 also indicated accuracy/quality score of "Fair."
- Presence of Drought Preparedness Plan: **Good**
 - The data point collected through Sanitary Survey is considered good.

Step 3: Combined Evaluation: No

Combined evaluation suggests that the State Water Board should not consider Drought Preparedness Plan (Water Conservation Plan) as a risk indicator.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Operating Ratio with Depreciation

Operating ratio with depreciation indicates whether operating revenues for a system are sufficient to cover both operations and the necessary reserves that will be used for necessary future capital investments.

Operating Ratio with Depreciation = [operating revenues] / [operating expenses including depreciation]

Step 1: Applicability: Good

This indicator aims to measure a water system's financial capacity, as a system with a high ratio is likely to collect enough operating revenues (mainly through water charges only) to cover both its costs as well as future investments necessary to maintain normal operations. This indicator is also used in the University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections).

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Operating Revenues; Not currently available
- Operating Expenses; Not currently available
- Depreciation; Not currently available

Data Coverage: Poor

This indicator had 25.2% coverage for water systems with 3,300 connections or less (717 out of 2,842 systems) across three non-accessible data sources for four system types. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all water system types are required to report this data annually. While a limited number of small water systems do provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

Among sources where it is reported for certain governance types, the data quality is generally fair, but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Operating Ratio with Depreciation does not meet necessary Step 2 criteria for data

fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Adjusted Operating Ratio

This indicator is defined as operating revenue divided by operating expenses including depreciation plus calculated reserves. Reserves includes depreciation reserves for capital improvement, emergency reserves, operational reserves (or one month of operational expenses), reserve for debt services, and potential climate change resiliency reserve (or 2% of annual budget).

Adjusted Operating Ratio = [Operating Revenues] / [Operating Expenses including Depreciation + Reserves]

Step 1: Applicability: Good

This indicator attempts to measure all necessary operating and reserve funds necessary for a financially-resilient water system.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Operating Revenues; Not currently available
- Operating Expenses; Not currently available
- Reserves; Not currently available
- Depreciation for Capital Improvement; Not currently available
- Emergency reserves; Not currently available
- Operational reserves or 1 month of operational expenses; Not currently available
- Reserve for debt services; Not currently available
- Potential climate change resiliency reserve; Not currently available

Data Coverage: Poor

Data coverage for all the data points is 0% for public water systems with 3,300 connections or less. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all system types are required to report this data annually. While a limited number of small water systems do provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

Among sources where it is reported for certain governance types, the data quality is generally fair, but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Adjusted Operating Ratio does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Non-Capital (Simple) Operating Ratio

The Non-Capital (simple) Operating Ratio is calculated as a water system's operating revenue divided by the operating costs. It excludes depreciation.

Non-capital (Simple) Operating Ratio = [Operating Revenue] / [Operating costs excluding Depreciation]

Step 1: Applicability: Fair

This indicator aims to measure a water system's most basic financial capacity to operate in the short term, but does not convey any information about long term risks.³ This indicator is used by the University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections).

³ Teernstra, B. (1993). How Will Small Water Systems Finance SDWA Compliance?. Journal-American Water Works Association, 85(6), 43-46.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Operating Revenues; Not currently available
- Operating Costs; Not currently available

Data Coverage: Poor

This indicator had 25.2% coverage for water systems with 3,300 connections or less (717 out of 2,842 systems) across three available data sources for four system types. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all water system types are required to report this data annually. While a limited number of small water systems do provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

Among sources where it is reported for certain governance types, the data quality is generally fair, but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Non-Capital (Simple) Operating Ratio does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data fitness can be improved.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **No**

Revenue Collection per Connection

Revenue collection per connection is the operating revenues divided by total number of service connections.

Revenue Collection per Connection = [Operating revenues] / [Total number of service connections]

Step 1: Applicability: Good

This ratio of average revenue per connection is a rough indication of a system's fiscal

capacity.⁴ This indicator has been suggested by some water industry stakeholders and is used by the University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections). A survey of State Water Board engineers in July 2020 supported the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Number of Service Connections; SWRCB-SDWIS (annual, required)
- Operating revenues; Not currently available

Data Coverage: Poor

- Number of Service Connections: **Good**
 - 90% coverage.
- Operating revenues: **Poor**
 - Available for no more than 25% of public water systems with 3,300 connections or less. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

- Number of Service Connections: **Good**
 - Reported annually and required.
- Operating revenues: **Poor**
 - While a limited number of small water systems do provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

- Number of Service Connections: **Good**
- Operating revenues: **Fair**

⁴ See Scott, T. A., Moldogaziev, T., & Greer, R. A. (2018). Drink what you can pay for: Financing infrastructure in a fragmented water system. *Urban Studies*, 55(13), 2821-2837.

- Among sources where it is reported for certain governance types, the data quality for revenue is generally fair, but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Revenue Collection per Connection does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Operating and Maintenance (O&M) Expenditure per Connection

This indicator reflects the ratio of operating expenditures divided by the system’s total service connections.

$$\text{Operating and Maintenance (O\&M) Expenditure per Connection} = \frac{[\text{O\&M expenditure}]}{[\text{Total number of service connections}]}$$

Step 1: Applicability: Good

This indicator aims to measure a water system’s operating financial obligations, which are necessary to ensure high-quality, reliable water delivery. A survey of State Water Board District Engineers in July 2020 supported the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Number of Service Connections; SWRCB-SDWIS (annual, required)
- Operating and Maintenance Expenditures; Not currently available

Data Coverage: Poor

- Number of Service Connections: **Good**
 - 90% coverage.
- Operating revenues: **Poor**
 - Available for no more than 25% of public water systems with 3,300 connections or less. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

- Number of Service Connections: **Good**
 - Reported annually and required.
- Operating revenues: **Poor**
 - While a limited number of small water systems do provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

- Number of Service Connections: **Good**
- Operating revenues: **Fair**
 - Among sources where it is reported for certain governance types, the data quality for revenue is generally fair, but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Operating and Maintenance (O&M) Expenditure per Connection does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Days Cash on Hand

This indicator reflects the number of days a system can continue to pay its operations and maintenance costs without receiving any more incoming revenues from customers.

Days Cash on Hand = [Unrestricted cash + Investments] / [Operating Expenses excluding Depreciation / 365]

Step 1: Applicability: Excellent

Especially in the case of emergencies (such as the current COVID-19 crisis), this indicator helps identify the system's reserves with respect to the expenses required to deliver water to customers while keeping a system solvent. This indicator is also used by the University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections). A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Unrestricted cash & investments; Not currently available
- Operating expenses excluding depreciation; Not currently available

Data Coverage: Poor

Data coverage for all the data points is 0% for public water systems with 3,300 connections or less. No financial data sources were found that was suitably reliable and readily accessible. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all systems are required to report financial data. While small water systems do provide this data through TMF evaluations conducted for certain funding decisions by the Division of Financial Assistance, no database exists of that information. Additionally, gathering this data is very time intensive as they are not in an easily readable or readily extractable format. This data requires manually obtaining and cleaning data.

Data Accuracy/Quality: Fair

Data for number of service connections are good. Among sources where it is reported for certain governance types, the data quality for cash on hand is generally fair but varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Days Cash on Hand does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Excellent**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Asset Depreciation Ratio

This indicator assesses the infrastructure condition of the water system by comparing the amount of assets depreciated to the total amount of assets that can be depreciated.

Asset Depreciation = [Accumulated infrastructure depreciation expense] / [Total depreciable assets]

Step 1: Applicability: Good

The asset depreciation ratio indicates the remaining life expectancy of the system's capital assets, and thus the extent of the need for a capital improvement plan. The higher this number is, the older the infrastructure.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Accumulated infrastructure depreciation expenses; Not currently available
- Total depreciable assets; Not currently available

Data Coverage: Poor

No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all water systems are required to report financial data. While small water systems do provide this data through TMF evaluations conducted for certain funding decisions by the Division of Financial Assistance, no database exists of that information. Additionally, gathering this data is very time intensive as they are not in an easily readable or readily extractable format. This data requires manually obtaining and cleaning data.

Data Accuracy/Quality: Poor

Among sources where it is reported for certain governance types, the data quality for cash on hand is generally poor and varies in terms of outliers and missing data points, especially among smaller systems.

Step 3: Combined Evaluation: Future

Asset Depreciation does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Debt to Equity Ratio

A system's Debt to Equity Ratio reflects its total long-term debt divided by its total net assets.

Debt to Equity Ratio = [total long-term debt] / [total net assets]

Step 1: Applicability: Good

Existing literature suggests financial ratios related to debt, net assets, and current assets and liabilities could be useful for gauging financial health of water systems.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Total long-term debt; Not currently available
- Total net assets; Not currently available

Data Coverage: Poor

No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered, see the end of this section.

Data Availability: Poor

Not all water systems are required to report financial data. While small water systems do provide this data through TMF evaluations conducted for certain funding decisions by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Poor

Even among sources where financial information is reported for certain governance types, there is rarely data available to calculate debt to equity ratio.

Step 3: Combined Evaluation: Future

Debt to Equity Ratio does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and quality can be improved.

- STEP 1 APPLICABILITY: Good
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Outstanding Water Bill Amount

This indicator adds up the sum of uncollected residential water bills at the end of the most recent year, adjusted for system size. Outstanding bills are also known as accounts receivable or collectibles.

Step 1: Applicability: Good

A system's ability to collect revenue in a timely manner may reflect its management capacity and affect its technical or operational capacity. A survey of State Water Board District engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available.

Data Coverage: Poor

- Data coverage is currently at 0%

Data Availability: Poor

Data Accuracy/Quality: Poor

Water industry stakeholders suggest that smaller water systems may not be able to or might be hesitant to report this data.

Step 3: Combined Evaluation: Future

The indicator Outstanding Water Bill does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data regarding uncollected residential water bills can be collected and analyzed is successfully collected through the eAR.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Dedicated Fund/Account for Revenues and Expenses

This indicator reflects if a water system has a protected enterprise fund or dedicated fund/account for system revenues and expenditures. In this context, protected means that there are no excessive non-service-related transfers to a city or county's general fund or corporate parent from the water system enterprise.

Step 1: Applicability: Good

This metric is recognized by stakeholders within the water sector and a survey of State Water Board District engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- Currently data coverage is 0%.

Data Availability: Poor**Data Accuracy/Quality: Poor****Step 3: Combined Evaluation: Future**

Dedicated Fund/Account for Revenues and Expenses does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data on such funds for revenues and expenses could be collected and analyzed across all system governance types.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Line of Credit with Financial Institution

The indicator Line of Credit with Financial Institution reflects whether a water system has a line of credit or an established borrower/lender relationship with a financial institution for their financing needs.

Step 1: Applicability: Good

This metric indicates that the water system has passed some degree of financial review and has been granted credit, which indicates a degree of financial health. In addition, lines of credit with a financial institution are necessary for unexpected capital improvements and other emergencies. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- Currently data coverage is 0% as there is no data source to obtain this information.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: Future

Line of Credit with Financial Institution does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data consistency and reporting across system governance types can be improved and expanded.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Current Ratio

The risk indicator Current Ratio is a measure of financial liquidity showing whether a water system has enough resources to meet its short-term financial obligations by comparing the water system's current assets to its current liabilities.

Current Ratio = [Unrestricted Current Assets excluding Inventories & Prepaid Items] / [Current Liabilities]

Step 1: Applicability: Good

This metric is recognized by some water sector stakeholders as important to measure system financial health. This metric is also utilized on the University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections).

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data coverage: Poor

Coverage for all necessary data points is 0% for public water systems with 3,300 connections or less. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered for a range of financial indicators, see the end of this section.

Data Availability: Poor

Not all system types are required to report this data, even compared to other financial attributes. While a limited number of small water systems might provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

The data quality for this indicator in sources available by system governance type is generally fair, with some unexplained outlier or missing data points.

Step 3: Combined Evaluation: Future

Current Operating Ratio does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data consistency and reporting across system governance types can be improved and expanded.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Debt Service Coverage Ratio

Debt Service Coverage Ratio refers to the ratio of a system's operating income available in proportion to its debt servicing for interest, principal, and lease payments.

Debt Service Coverage Ratio = [Operating Revenues - Operating Expenses excluding Depreciation] / [Principal + Interest Payment on Long-term Debt]

Step 1: Applicability: Good

This ratio determines whether a water system is generating enough operating income to cover its annual debt, interest, or lease payments. This metric is recognized by water sector stakeholders and has also been used by University of North Carolina Environmental Finance Center's California Financial Dashboard for Community Water Systems (with 500-3,300 service connections).

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data coverage: Poor

Coverage for all necessary data points is 0% for public water systems with 3,300 connections or less. No data sources were found that was suitably reliable, readily accessible, or machine readable. For more detail on potential data sources considered for a range of financial indicators, see the end of this section.

Data Availability: Poor

Not all system types are required to report this data, even compared to other financial attributes. While a limited number of small water systems might provide this data in broader TMF assessments when under consideration for certain funding support by the Division of Financial Assistance, no database exists of that information.

Data Accuracy/Quality: Fair

The data quality for this indicator in sources available by system governance type is generally fair, with some unexplained outlier or missing data points.

Step 3: Combined Evaluation: Future

Debt service coverage ratio does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data consistency and reporting across all system governance types can be improved and expanded.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Emergency Response Plan (ERP)

This indicator determines whether the water system's Emergency Response Plan dness Plan properly outlines procedures and responsibilities to respond to emergencies and up to date.

Step 1: Applicability: Excellent

A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is "Excellent."

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Emergency Response Plan review data; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Fair

Many Sanitary Surveys capture this information, but an analysis of data converge was not possible because the data is stored in PDF files that not machine-readable.

Data Availability: Poor

The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Good

A survey of State Water Board engineers in July 2020 indicated that accuracy/quality of this data point is “Good.”

Step 3: Combined Evaluation: Future

Emergency Response Plan (ERP) does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Excellent**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Poor**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Future**

Capital Improvement Plan (CIP)

This indicator determines whether water systems have a Capital Improvement Plan (CIP) adequately prepared and updated.

Step 1: Applicability: Excellent

A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is “Excellent.”

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Capital Improvement Plan review data; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Poor

This information is not typically captured in Sanitary Surveys.

Data Availability: Poor

The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

A survey of State Water Board engineers in July 2020 indicated that accuracy/quality of this data point is “Fair.”

Step 3: Combined Evaluation

Capital Improvement Plan (CIP) does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Excellent**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Asset Management Plan (AMP)

This indicator determines whether water systems have an Asset Management Plan adequately prepared and updated.

Step 1: Applicability: Excellent

A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is “Excellent” while it noted that public water systems may use different terms for this Asset Management Plan, or it may be covered under Capital Improvement Plan or water system’s Master Plan.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Asset Management Plan review data; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Poor

This information is not typically captured in Sanitary Surveys.

Data Availability: Poor

The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

A survey of State Water Board engineers in July 2020 indicated that accuracy/quality of this data point is “Fair”.

Step 3: Combined Evaluation

Asset Management Plan (AMP) does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Excellent**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Member of CalWARN or Alternative Mutual Aid Agreement

This indicator reflects whether the system is a current member of CalWARN or other alternative mutual aid and assistance Program.

Step 1: Applicability: Good

A survey of State Water Board engineers in July 2020 indicated that applicability of this indicator is “Fair”. However, Combined percentage for “Excellent” and “Good” were higher than “Fair” and the score of “Good” was assigned.

Step 2: Data Fitness

Required Risk Indicator Data Points & Sources:

- CalWARN Regional Membership Listing; CalWARN Web Portal⁵ (as needed, not required); or
- Membership status with alternative Mutual Aid Agreement; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Fair

- CalWARN Regional Membership Listing: **Good**
 - Regional Membership Listing for six Regions is provided state-wide through CalWARN Web Portal.
- Membership status with alternative Mutual Aid Agreement: **Poor**
 - This information is not typically captured in Sanitary Surveys.

Data Availability: Fair

- CalWARN Regional Membership Listing: **Good**
 - Regional Membership Listing is provided through CalWARN Web Portal, and is updated as needed.
- Membership status with alternative Mutual Aid Agreement: **Poor**
 - The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Good

- CalWARN Regional Membership Listing: **Good**
 - Regional Membership Listing is provided through CalWARN Web Portal along with the regional map. It is assumed this data accurately reflects current membership.
- Membership status with alternative Mutual Aid Agreement: **Good**
 - When available, data is assumed accurate.

⁵ [CalWARN Web Portal](#)

https://prod.info.com/dashboard/Layout/41EFB108A353467693096E1D202485DB/about/aboutPublic/~calwarn_home.htm

Step 3: Combined Evaluation

“Member of CalWARN or Alternative Mutual Aid Agreement” meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Fair**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Maybe**

Insurance Coverage

This risk indicator examines whether or not a water system has important forms of insurance coverage such as property insurance, management liability, workers compensation, etc.

Step 1: Applicability: Good

This metric is recognized by some water sector stakeholders as important to mitigate major financial risks. A survey of State Water Board District Engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available.

Data Coverage: Poor

- Currently, data coverage is at 0%.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: Future

Insurance Coverage does not meet necessary Step 2 criteria for data fitness but may be a good potential risk indicator for consideration in future iterations of the Risk Assessment if data fitness can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**

- Availability: **Poor**
- Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Full-Time Operator

This risk indicator examines whether or not a water system has a full-time operator. Water systems must meet certain criteria for testing, for which system operators are responsible. Community Water Systems must have operators that have the proper water distribution operator certifications and treatment operator certifications for the size and complexity of their systems in accordance with Title 22, California Code of Regulations, Division 4 (Environmental Health).⁶

Step 1: Applicability: Fair

Many water systems do not have a full-time operator or may have a contract operator that serves several systems or more. For smaller systems, a full-time operator may not be required by regulation. Consequently, indicators which measure compliance with regulations and operator certification issues themselves might better reflect operator-related system TMF issues.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- Currently, data coverage is at 0%.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: No

Full-Time Operator does not meet the combined criteria and should not be considered for inclusion in Risk Assessment 2.0.

⁶ [California Water Boards:](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/rwregulations.pdf)

https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/rwregulations.pdf

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **No**

Number of Staff Per Connection

This risk indicator is defined as the number of water system employees divided by the number of customer connections. It is usually expressed in thousands of connections.

Step 1: Applicability: **Fair**

This metric is utilized by the International Benchmarking Network of the World Bank. Number of Staff Per Connection examines utilization of staff within a particular water system as well as staff productivity and efficiency as a whole.⁷ It could serve as an indicator that determines if certain water systems are understaffed or overstaffed. This metric can also provide insight into a water system's operating expenses in regard to labor and employee salary costs.⁷ However, this indicator lacks criticality and might not be a good measure of whether a public water system is failing to provide drinking water due to lack of TFM capacity. There are many public water systems with small staff that are successful in providing safe drinking water.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available.

Data Coverage: **Poor**

- Currently, data coverage is at 0%.

Data Availability: **Poor**

Data Accuracy/Quality: **Poor**

⁷ [World Bank:](http://documents1.worldbank.org/curated/en/420251468325154730/pdf/588490PUB0IBNE101public10BOX353816B.pdf)

<http://documents1.worldbank.org/curated/en/420251468325154730/pdf/588490PUB0IBNE101public10BOX353816B.pdf>

Step 3: Combined Evaluation: No

Number of Staff Per Connection does not meet the combined criteria and should not be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Fair**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **No**

Operator Training

This risk indicator refers to the total number of hours of training per water system operator. Operators must be certified and recertified periodically. Operator training is a two-step process entailing a course requirement and an examination.⁸ The State Water Board establishes certification requirements for different types and complexity of water systems and water treatment technology.⁸ Community Water Systems must have operators that have the proper water distribution operator certifications and treatment operator certifications for the size and complexity of their systems in accordance with Title 22, California Code of Regulations, Division 4 (Environmental Health).⁹

Step 1: Applicability: Good

This metric is recognized by water sector stakeholders. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Course requirement for operator certification exam; Drinking Water Operator Certification Program (DWOCP) Database
- Continuing education requirements for renewals

Data Coverage: Poor

- Course requirement: **Poor**

⁸ [California Water Boards](https://www.waterboards.ca.gov/water_issues/programs/operator_certification/): https://www.waterboards.ca.gov/water_issues/programs/operator_certification/

⁹ [Title 22, California Code of Regulations, Division 4](https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/rwregulations.pdf): https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/rwregulations.pdf

- Currently, data coverage is at 0%.
- Continuing education requirement: **Poor**
 - Currently, data coverage is at 0%.

Data Availability: Poor

- Course Requirement: **Poor**
 - This data is currently being added to the DWOCP database but is not yet available.
- Continuing education requirement: **Poor**
 - This data is not in the DWCOCP database.

Data Accuracy/Quality: Poor

- Course Requirement: **Poor**
 - Data is being added to the database, so accuracy and quality cannot be determined.
- Continuing education requirement: **Poor**
 - This data is currently not available, so accuracy and quality cannot be determined.

Step 3: Combined Evaluation: Future

Operator Training does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data on operator certification exams and continuing education requirements for renewals can be captured in an accessible dataset. Ideally, operator training data can be expanded and included in the DWCOCP.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Employee Turnover

This risk indicator addresses the frequency of the loss of a water system's workforce over time caused by employee departure, including resignations, layoffs, terminations, retirements, location transfers, etc.

Step 1: Applicability: Good

Water systems that face high employee turnover can face significant issues in their technical and customer relations, and high turnover may be an indicator of additional managerial concerns within a system. A survey of State Water Board engineers in July 2020 tentatively confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- There is currently no data for employee turnover and coverage is 0%.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: Future

Employee Turnover does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data fitness can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Cross Connection Control/Backflow Prevention

This risk indicator addresses whether or not a water system has an active cross connection control/backflow prevention program in place and if it is properly implemented. Cross connections refer to any point of contact between a water system and any non-potable pollutants which might lower quality.¹⁰ Backflow occurs when these non-potable pollutants pour into the drinking water system network. Smaller systems are more likely to struggle with CCC/Backflow prevention.

Step 1: Applicability: Good

This metric is recognized by water industry stakeholders and a survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

¹⁰ EPA: https://www.epa.gov/sites/production/files/2015-09/documents/2007_05_18_disinfection_tcr_issuepaper_tcr_crossconnection-backflow.pdf

Required Risk Indicator Data Points & Sources:

- Backflow Assemblies on the Service Connections or Meter (Reduced Pressure Principle and Double Check Valve assemblies); eAR:
 - Number Tested (annual, required reporting)
 - Last Survey Date (annual, not required reporting)

or

- SWRCB-Sanitary Survey (every 3 years, required)

Data Coverage: Fair

- CCC/Backflow Testing Data: **Poor**
 - 2018
 - Number Tested : **Fair**
 - 82.69% coverage.
 - Last Survey Date: **Poor**
 - 44.45% coverage.
 - 2017
 - Number Tested: **Excellent**
 - 99.79% coverage
 - Last Survey Date: **Poor**
 - 42.05% coverage
- Sanitary Survey Results: **Good**
 - A water system's distribution system is one of the essential 8 elements of Sanitary Survey's and Cross Connection/Backflow Prevention is a high priority checkpoint in the distribution system inspection.

Data Availability: Fair

- CCC/Backflow Testing Data: **Fair**
 - Number tested: **Good**
 - This data is collected annually through the eAR and is required reporting.
 - Last Survey date: **Fair**
 - This data is collected annually through the eAR but is not required reporting.
- Sanitary Survey Results: **Poor**
 - The State Water Board's DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of "Fair" may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of "Poor" is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

- CCC/Backflow Testing Data: **Fair**
 - Reporting to the State Water Board is dependent upon water systems self-reporting this information. Considering the self-reported nature of the data, and limited validation, State Water Board staff and UCLA suggest a data accuracy/quality score of “Fair.”
- Sanitary Survey Results: **Fair**
 - DDW survey takers indicated that this can be difficult to implement for small water systems and for staff to verify.

Step 3: Combined Evaluation: Future

Cross Connection Control/Backflow Prevention does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data fitness for Sanitary Survey Results can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Number of Service Connections

Total number of customer service connections of the water system.

Step 1: Applicability: Good

Number of service connections may be used as a proxy to assess whether a water system has adequate capacity for staff and budget.

The DWR Drought and Water Shortage Risk Scoring Tool¹¹ and OEHHA’s HR2W tool utilize this indicator. A survey of State Water Board District Engineers in July 2020 confirmed the applicability of this indicator and the strong relationship between the number of service connections and a water system’s ability to provide adequate and safe drinking water.

¹¹ The DWR Drought and Water Shortage Risk Scoring Tool uses “Supplier Size” as the title for this metric. The State Water Board has re-named it to “Number of Service Connections” to better reflect the data supporting this metric.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Point & Source:

- Water System Details - Service Connection Count: SDWIS (collected annually through eAR and entered into SDWIS, required reporting)

Data Coverage: Good

- Water System Details: Service Connection Count: **Good**
 - The data is required reporting and the overall coverage score is considered good.

Data Availability: Good

- Water System Details: Service Connection Count: **Good**
 - The data is required reporting annually through the eAR which is then verified by DDW staff and updated in SDWIS.

Data Accuracy/Quality: Good

- Water System Details: Service Connection Count: **Good**
 - The data is verified by DDW staff before it is updated in SDWIS.

Step 3: Combined Evaluation: Yes

Number of Service Connection meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Maintaining a Full Board

Maintaining a Full Board requires that a system maintains a governing or leadership board which actively meets in accordance with legal requirements for the government type/legal entity status of the system.

Step 1: Applicability: Good

This metric is recognized by water sector stakeholders as an applicable risk indicator. A survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator as well.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- Currently data coverage is 0% as there is no statewide data source to obtain this information.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: Future

Maintaining a Full Board (organization) does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if such data can be obtained or collected.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Training of Board Members

The Training of Board Members indicator considers whether the water system's board members have completed training with respect to their service on the board. According to California Health and Safety Code § 116755 subd. (a), mutual water companies are required to complete training.¹² Under SC § 116755, board members must take two hours of training within 6 months of assuming office and are required to retrain every six years.¹³ Training includes topics such as: avoiding conflicts of interest, the duties of

¹² [California Legislative Information:](http://leginfo.ca.gov/faces/codes_displaySection.xhtml?sectionNum=116470&lawCode=HSC)

http://leginfo.ca.gov/faces/codes_displaySection.xhtml?sectionNum=116470&lawCode=HSC

¹³ [RCAC:](https://www.rcac.org/wp-content/uploads/2015/03/Policies-Responsibilities-2015jt.pdf) <https://www.rcac.org/wp-content/uploads/2015/03/Policies-Responsibilities-2015jt.pdf>

public water systems to comply with state and federal law, and management of public water systems.¹⁴

Step 1: Applicability: Good

This metric is recognized by water industry stakeholders and a survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Rural Community Assistance Corporation (RCAC) Training Records – supported by State Water Board grant (every quarter, not required); or
- SWRCB-Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required)

Data Coverage: Poor

- Rural Community Assistance Records: **Poor**
 - This data does not exist in a readable or readily extractable format that would allow the State Water Board to distinguish between water system Board Members and non-Board Member training participants. Therefore, the State Water Board has 0% of the data from these records: it is also not required for reporting purposes.
- Sanitary Survey Results: **Poor**
 - Coverage of this data across public water systems with 3,300 service connections or less can vary because (1) Sanitary Surveys may not include the same survey questions for all water systems or water systems types state-wide and (2) Survey questions may not be consistently asked to each system from one Sanitary Survey to the next, thus coverage for individual data points for one system over time can vary.

Data Availability: Fair

- Rural Community Assistance Records: **Fair**
 - Collected every quarter.
- Sanitary Survey Results: **Poor**

¹⁴ [RCAC: https://www.rcac.org/wp-content/uploads/2015/03/Policies-Responsibilities-2015jt.pdf](https://www.rcac.org/wp-content/uploads/2015/03/Policies-Responsibilities-2015jt.pdf)

- The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Poor

- Rural Community Assistance Records: **Poor**
 - Cannot distinguish between water system Board Members and non-Board Member training participants.
- Sanitary Survey Results: **Poor**
 - DDW survey takers indicated that most have never seen this data and cannot verify it.

Step 3: Combined Evaluation: Future

Training of Board Members does not meet necessary Step 2 criteria for data fitness but is considered a good potential risk indicator for future iterations of the Risk Assessment if data fitness can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Fair**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Age of Distribution System

This proposed indicator determines the age of the distribution system components (i.e., pipes, pumps, pumping stations, valves, meters, fire hydrants, etc.) to assess potential risk of failure to provide adequate and reliable drinking water.

Step 1: Applicability: Good

DDW internal workgroup confirmed that age and condition of a water system’s distribution system can contribute to the deterioration of water quality.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Age and condition of distribution system components review data; Sanitary Survey (every 3-year for community water systems; 5-year for non-community water systems, generally required).

Data Coverage: Fair

Many Sanitary Surveys may capture some of this information while evaluating distribution system. However, because this evaluation needs to rely on other various sources such as maintenance records, written plans, and operational personnel interviews, analysis of data coverage was not possible. In addition, the data is stored in PDF files that not machine-readable, which also hindered the data coverage analysis.

Data Availability: Poor

The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. While a data availability score of “Fair” may perhaps be liberally applied here based on the evaluation criteria, a downgraded score of “Poor” is assigned due to the fact that data collected through Sanitary Surveys (PDF) is not machine-readable or readily extractable without significant effort.

Data Accuracy/Quality: Fair

Piping is essential component of a distribution system, but because most piping is buried, the evaluation of pipe condition needs to rely on other sources/information such as operations data, maintenance records, written plans and SOPs, and staff interviews.

Step 3: Combined Evaluation: Future

Age of Distribution System does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1: APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Poor**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Future**

Financial Audit

This indicator examines whether the water system conducts annual financial audits.

Step 1: Applicability: Good

This indicator is recognized by some water sector stakeholders, DDW’s Needs Assessment Workgroup and UCLA as applicable.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Not currently available

Data Coverage: Poor

- Currently data coverage is 0%.

Data Availability: Poor

Data Accuracy/Quality: Poor

Step 3: Combined Evaluation: Future

Financial Audit does not meet necessary Step 2 criteria for data fitness, but is considered a good potential risk indicator for future iterations of the Risk Assessment if data coverage, availability, and accuracy/quality can be improved.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Poor**
 - Availability: **Poor**
 - Quality: **Poor**
- STEP 3: COMBINED EVALUATION: **Future**

Historical Population Growth

This indicator measures a water system's population change over the past decade. Any increase or decrease in water system population is calculated by comparing decennial total population data using the following example formula:

$$[2020 \text{ Population} - 2010 \text{ Population}] / 2010 \text{ Population}$$

Step 1: Applicability: Good

Population change, especially depopulation, in a community water system service area may indicate an affordability risk. A decrease in population may reduce the water system's revenue base to cover its variable and especially its fixed costs. A decrease in population may thus result in higher rates and charges per customer.

The National Academy of Public Administration (NAPA) recommends population change be considered in the U.S. EPA's framework for community affordability of clean water services. The University of North Carolina's Environmental Finance Center also measures population growth in their water system financial dashboards provided for

several states including the dashboard which will be provided in California's Water System Needs Assessment.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Water system service area boundaries: State Water Board Service Area Boundary Layer (SABL) (updated as needed, not required).
- Block group-Total Population; U.S. Census Bureau's American Community Survey (ACS updated annually).

Risk Indicator Methodology:

Community water system boundaries typically do not align with surrounding municipal or census boundaries where population data is regularly collected. In order to assign a population to a community water system, census block population data from the census is aggregated using spatial-weighting to the water system service area.

Data Coverage: Good

- Water system service area boundaries: **Good**
- There is no required reporting of water system service areas, however; current data coverage is 96.78%.
- Block group-Total Population: **Good**
- Population data from the Decennial Census has 100% coverage and federal law (Title 13, U.S. Code) requires collection.

Data Availability: Good

- Water system service area boundaries: **Good**
 - The State Water Board updates water service area boundaries on an ongoing basis.
- Block group-Total Population: **Good**
 - The national decennial census updates population data at the census block level every ten years. Despite being infrequently updated, the accuracy and coverage of the decennial makes it a data source of unparalleled quality, availability and coverage for assessing population change across California.

Data Accuracy/Quality: Fair

- Water system service area boundaries: **Fair**
 - Water system boundaries in SABL often do not reflect the water system's "water service area," instead they sometimes reflects the water system's jurisdictional area. The State Water Board is working with water systems

to verify their water system boundaries and is building a new tool to allow water systems to edit their boundaries in real time.

- Block group-Total Population: **Fair**
 - Census block population data is accurate. However, the process for assigning census block population data to water system boundaries has spatial limitations and may produce inaccurate data, especially for smaller water systems.

Step 3: Combined Evaluation

Historical Population Growth meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Maybe**

Water System Size/Socioeconomic Status of the Community

A combination of system's size based on service connection number and community's DAC/SDAC status as defined in Public Resources Code Section 75005(g) to jointly assess a system's institutional constraints. The disadvantaged community (DAC) is defined as a community with an annual Median Household Income (MHI) that is less than 80 % of the statewide MHI. A severely disadvantaged community (SDAC) is a community with an annual MHI that is less than 60 % of the statewide MHI.

Step 1: Applicability: Good

This indicator is utilized by OHEEA in their HR2W Tool. Additionally, a survey of State Water Board engineers in July 2020 indicated an applicability score of "Good".

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Water System Service Area Boundaries: State Water Board Service Area Boundary Layer (SABL) (updated as needed, not required).
- Service Connection Number; SDWIS (updated as needed, required).
- Block group-MHI in the Past 12 Months; U.S. Census Bureau/American Community Survey (ACS updated annually, required)
- Statewide MHI; U.S. Census Bureau/American Community Survey (annually, required)

Risk Indicator Calculation Methodology:

- Estimated MHI = $\sum [\text{Block group-MHI} * \text{Portion of Households Served by Water System within Block group}] / \text{Total Water System Households}$

Data Coverage: Good

- Water System Service Area Boundaries: **Good**
 - There is no required reporting of water system service areas, however; current data coverage is 96.78%.
- Service Connection Number: **Good**
 - 100 % coverage.
- Block group-MHI in the Past 12 Months: **Good**
 - 100 % coverage
- Statewide MHI: **Good**
 - 100 % coverage.

Data Availability: Good

- Water System Service Area Boundaries: **Good**
 - The State Water Board updates water service area boundaries on an ongoing basis.
- Service Connection Number: **Good**
 - This data is collected through SDWIS as needed and is required.
- Block group-MHI in the Past 12 Months: **Good**
 - Data is collected annually and is required.
- Statewide MHI: **Good**
 - Data is collected annually and is required.

Data Accuracy/Quality: Good

- Water System Service Area Boundaries: **Fair**
 - Water system boundaries in SABL often do not reflect the water system's "water service area," instead it sometimes reflects the water system's jurisdictional area. The State Water Board is working with water systems to verify their water system boundaries and is building a new tool to allow water systems to edit their boundaries in real time
- Service Connection Number: **Good**
 - This data is frequently reviewed in mDWW and in SDWIS.
- Block group-MHI in the Past 12 Months: **Good**
 - Data is collected annually and is required.
- Statewide MHI: **Good**
 - Data is collected annually and is required.

Step 3: Combined Evaluation: Yes

Water System Size/Socioeconomic Status of the Community (Institutional Constraints) meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Baseline Monitoring

Presence of baseline monitoring of source supply levels.

Step 1: Applicability: **Good**

This indicator is used in DWR’s Water Shortage Risk Tool. A survey of State Water Board District engineers in July 2020 indicated that applicability of this indicator is “Good.”

Step 2: Data Fitness

Required Risk Indicator Data Points & Source:

- Routine monitoring of the *static* water levels in wells, eAR (annual, not required reporting).
- Routine monitoring the *pumping* water levels in wells, eAR (annual, not required reporting).

Risk Indicator Calculation Methodology

Baseline monitoring= Number of systems routinely monitor *static* water levels and *pumping* water levels in wells.

Data Coverage: Fair

The following analysis was completed using the average response rate between the 2017 and 2018 eAR reporting years for public water systems with 3,300 service connections or less:

- Routine monitoring of the *static* water levels in wells
 - 82% coverage.
- Routine monitoring the *pumping* water levels in wells
 - 82% coverage.

Data Availability: Fair

- Routine monitoring of the *static* water levels in wells: **Fair**
 - This data is collected annually through the eAR and is not required reporting.
- Routine monitoring the *pumping* water levels in wells: **Fair**
 - This data is collected annually through the eAR and is not required reporting.

Data Accuracy/Quality: Fair

Reporting to the State Water Board is dependent upon water systems self-reporting this information. Considering the self-reported nature of the data, and limited validation, State Water Board staff and UCLA suggest a data accuracy/quality score of “Fair”.

- Routine monitoring of the *static* water levels in wells: **Fair**
- Routine monitoring the *pumping* water levels in wells: **Fair**

Step 3: Combined Evaluation: Maybe

Baseline Monitoring meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Fair**
 - Availability: **Fair**
 - Quality: **Fair**
- STEP 3: COMBINED EVALUATION: **Maybe**

Data Availability

This indicator determines if the water system has the minimum number of samples per monitoring frequency for 14 contaminants. According to U.S. EPA’s Standardized Monitoring Framework,¹⁵ the following 11 contaminants are required to be sampled at least once every nine years: arsenic, barium, cadmium, mercury, benzene, Methyl Tert-Butyl Ether (MTBE), carbon tetrachloride, toluene, TCE, PCE, xylene and Nitrate. Two contaminants—lead and perchlorate—should be sampled at least three times every nine years.

Step 1: Applicability: Good

Water quality monitoring is necessary to ensure compliance with drinking water standards, and to ensure that water systems and their customers have adequate information related to their water sources. This indicator measures how much data is available to evaluate water quality in current water sampling databases, Water Quality Information replacement (WQIR).

¹⁵ [The Standardized Monitoring Framework: A Quick Reference Guide:](https://www.epa.gov/sites/production/files/2020-05/documents/smf_2020_final_508.pdf)
https://www.epa.gov/sites/production/files/2020-05/documents/smf_2020_final_508.pdf

Data availability metric was utilized by OEHHA in their HR2W tool to characterize the adequacy of information with respect to a system's water quality. Additionally, a survey of State Water Board engineers in July 2020 confirmed the applicability of this indicator. This indicator is duplicative with Monitoring and Reporting Violations risk indicator.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Source:

- WQIR will be the main data source used for this risk indicator. The specific data point utilized are from tables within WQIR, the table names are listed below. (Reviewed frequently in Modified Drinking Water Watch (mDWW) and production WQI, required reporting).
 - Storet.dbf
 - This table is used to match the chemicals listed below to this table.
 - Chemhist.dbf
 - To determine if the minimum required data in the time frame (2008-2016).

Analyte Name	Analyte Number (in WQIR)
Arsenic	01002
Barium	01007
Benzene	34030
Cadmium	01027
Carbon Tetrachloride	32102
Mercury	71900
Methyl Tertiary Butyl Ether (MTBE)	46491 (A-030)
Nitrate as Nitrogen	00618
Perchloroethylene =tetrachloroethylene, PCE	34475
Perchlorate	A-031
Trichloroethylene (TCE)	39180
Toluene	34010
Xylene	81551

- Lead Sampling Analyte results: SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting).

Data Coverage: Good

The coverage for data availability for these 14 contaminants is dependent upon their Federal water system classification in SDWIS. The types of classifications a water system can have includes the following: Transient Non-Community (TNC), Community Water Systems (CWS), Non-Transient Non-Community (NTNC).

- TNCs are only required to monitor for Nitrate and Nitrites, which will drastically lower the coverage for this water system category: **Poor**

- NTNCs and CWSs are required to monitor for all contaminants listed in the table above: **Good**

The overall score for coverage is good excluding TNCs.

Data Availability: Good

Most water systems have monitoring frequencies of 3 years or greater. The systems with results approaching or exceeding the MCL will be monitored at a more frequent rate. While some contaminant’s monitoring data may score “Fair” in availability given the monitoring frequency, a “Good” criteria score is applied here because drinking water regulations have deemed current monitoring frequencies appropriate to protect human health.

Data Accuracy/Quality: Good

- Lead Sampling Analyte results **Fair**
- WQI chemical table: **Good**

The overall score is Good.

All water quality data are submitted by water systems through laboratories that must possess Environmental Laboratory Accreditation Program (ELAP) certification, to ensure that data consistency and data quality needs are met for stakeholders. However, lead results are dependent on various factors including the selection of homes to monitor (self-selected by water systems), sampling protocol (sampling proper taps at adequate stagnation time), homeowners correctly understanding sampling procedures, etc.

Step 3: Combined Evaluation: Yes

Data Availability metric meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

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.

If any significant deficiencies are identified for a water system, the State Water Board must inform the U.S. EPA and the water system is required to address them according to a schedule or the system will receive a violation.

*Currently significant deficiencies are only reported for systems that rely on groundwater sources; however, the State Water Board will begin reporting significant deficiencies for surface water-reliant systems beginning in 2021.

Step 1: Applicability: Good

Sanitary Surveys of water systems serve as a protective measure for protecting public health. The process of identifying significant deficiencies during the survey, and documented it, allows water systems to make corrective actions before they become a significant problem. The 8 essential elements of a sanitary survey include:

1. Source
2. Pumps, controls and pump facilities
3. Treatment
4. Distribution system
5. Finished water storage
6. Monitoring, reporting, & data verifications
7. Water system management and operation
8. Operator compliance with state requirements

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Deficiencies Maintenance List; SDWIS (Reviewed frequently in Modified Drinking Water Watch (mDDW) and in SDWIS, required reporting).

Data Coverage: Good

Since the majority of community water systems (>90%) with less than 3,300 service connections are considered to rely on groundwater as their primary source of water the coverage for this metric is considered to be “Good.”

Data Availability: Fair

The State Water Board’s DDW is responsible for conducting Sanitary Surveys every three years for community water systems and every five years for non-community water systems. The Significant Deficiencies are entered into SDWIS which is machine-readable and readily accessible.

Data Accuracy/Quality: Good

Since Sanitary Surveys are conducted by trained DDW staff the data is considered to be accurate when available.

Step 3: Combined Evaluation: Maybe

The Significant Deficiencies meets some of the combined criteria and may be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Fair**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Maybe**

Extensive Treatment Installed

The number of occurrences that meet one or more of the following conditions:

- Groundwater source(s) necessitating the use of a treatment plant with a treatment status of T3 or higher.
- Surface water source(s) necessitating a surface water treatment plant.

Step 1: Applicability: Good

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.

Step 2: Data Fitness (For public water systems with 3,300 connections or less)

Required Risk Indicator Data Points & Sources:

- Groundwater Systems; SDWIS
 - Any groundwater system with treatment plants that have a T3 or higher treatment status.
- Surface Water Systems; SDWIS:
 - Any surface water systems with sources that receive treatment.

Data Coverage: Good

- Groundwater and Surface Water Systems: **Good**
 - Since treatment plants and their corresponding treatment status are required to be entered into SDIWS the coverage is assumed to be good.

Data Availability: Good

- Water Source Facility Type: **Good**

- This data is updated frequently by State Water Board staff.
- Water Source Facility Treatment Status: **Good**
 - This data is updated frequently by State Water Board staff.

Data Accuracy/Quality: Good

- Water Source Facility Type: **Good**
 - This data is collected from water systems as part of the treatment permitting process and reviewed and maintained frequently by DDW staff.

Step 3: Combined Evaluation: Yes

Extensive Treatment Installed metric meets the combined criteria and should be considered for inclusion in Risk Assessment 2.0.

- STEP 1 APPLICABILITY: **Good**
- STEP 2: DATA FITNESS
 - Coverage: **Good**
 - Availability: **Good**
 - Quality: **Good**
- STEP 3: COMBINED EVALUATION: **Yes**

Appendix D.4.1

Assessment of Financial Data Considered and Mined from Reporting by Systems of Certain Governance Types

This section summarizes the data sources manually mined and considered for use as financial indicators in the Risk Assessment. Data from this effort will also be displayed on the forthcoming University of North Carolina Environmental Finance Center’s California Financial Dashboard for Community Water Systems (with 500-3,300 service connections). Although data on other governance types was searched for, after much consultation with industry experts, only three main, publicly-available and annually-reported data sources were identified and mined for systems of four system governance types:

- Mutual water companies (MWCs)
- Investor-owned utilities (IOUs)
- Special districts
- Municipalities

After mining each of these datasets, however, relevant financial data for indicator construction was only available for about 25% of public water systems with 3,300 connections or less. Moreover, these sources were not particularly well-suited to

machine reading. Below we list general findings on the coverage, availability of relevant data points and quality dimensions of indicators from each of these sources.

PDFs of Form I -990 (for MWCs)

- Coverage: This form is required to be filed by all MWC systems and is searchable in online I-990 databases, including 990 Finder & Open990, but require entering the exact name of the entity that corresponds to each of the water systems.
- Availability of relevant data points: Annual, required reporting. MWCs are exempt from income taxes and are therefore required to file Form I-990 with the federal government, which includes total revenues and expenses, depreciation, assets, liabilities, and cash data. In some cases, these provide a breakdown of revenues, expenses, assets and liabilities, such as accumulated depreciation and total depreciable assets. Most Form I-990s can be found via two publicly accessible websites (990 Finder & Open990) but require entering the exact name of the entity that corresponds to each of the water systems. Additionally, no MWCs explicitly reported their current assets or liabilities; it can be estimated for some of the systems but requires manual extraction of several financial metrics and may even be limited by the heterogeneity of MWCs' financial reports.
- Quality: Fair. Financial statements filed as part of the Form I-990 are not audited, and some anomalies in terms of missing and outlier data were discovered.

PDFs of CPUC Annual Report (for IOUs)

- Coverage: This form is required to be filed by all IOU systems and posted on the CPUC website.
- Availability: Annual, required reporting. California Public Utilities Commission regulation requires all IOUs to report their financial performance. These reports are consistent in their formatting of financial data, allowing for the ability to calculate indicators over time.
 - Data on the following financial attributes useful for relevant indicators are available: Operating revenues, Operating expenses, Depreciation, Cash on Hand, Total assets and liabilities, Total current assets and current liabilities, Accumulated depreciation and total depreciable assets, Long term debt and interest expenses.
- Quality: Good. Regulation by the CPUC requires all IOUs to report their financial performance in identical fashion on an annual basis. This results in more information and financial reports that are consistent across systems.

Excel spreadsheets of State Controller's Office Data (for Cities and Special Districts)

- Coverage: This data is required to be filed by all municipal and special district systems and posted on the State Controllers website.

- Availability: Annual, required reporting. Data is available to calculate the following indicators: Total operating revenue, Total operating expenses, Depreciation, Transfers in and transfers out of the enterprise fund. As a major limitation to these datasets, however, the State Controller's Office only provides balance sheets aggregated at the City or County level (general fund and enterprise funds together), despite providing detailed revenue statements for enterprise funds separately. Consequently, most of the ratios that require financial metrics included in the balance sheet (assets and liabilities) cannot be estimated from this data source. Estimating all financial ratios for every enterprise fund would require retrieving metrics from PDF versions of cities' and counties' Comprehensive Annual Financial Reports (CAFR) such as, but not limited to, cash, accumulated depreciation, total depreciable assets, principal, total assets, etc. We collected cash data from CAFRs to estimate days of cash on hand for city-run systems, but additional manual data collection was not possible within our timeframe.
- Quality: Good. Financial statements are required to be audited.