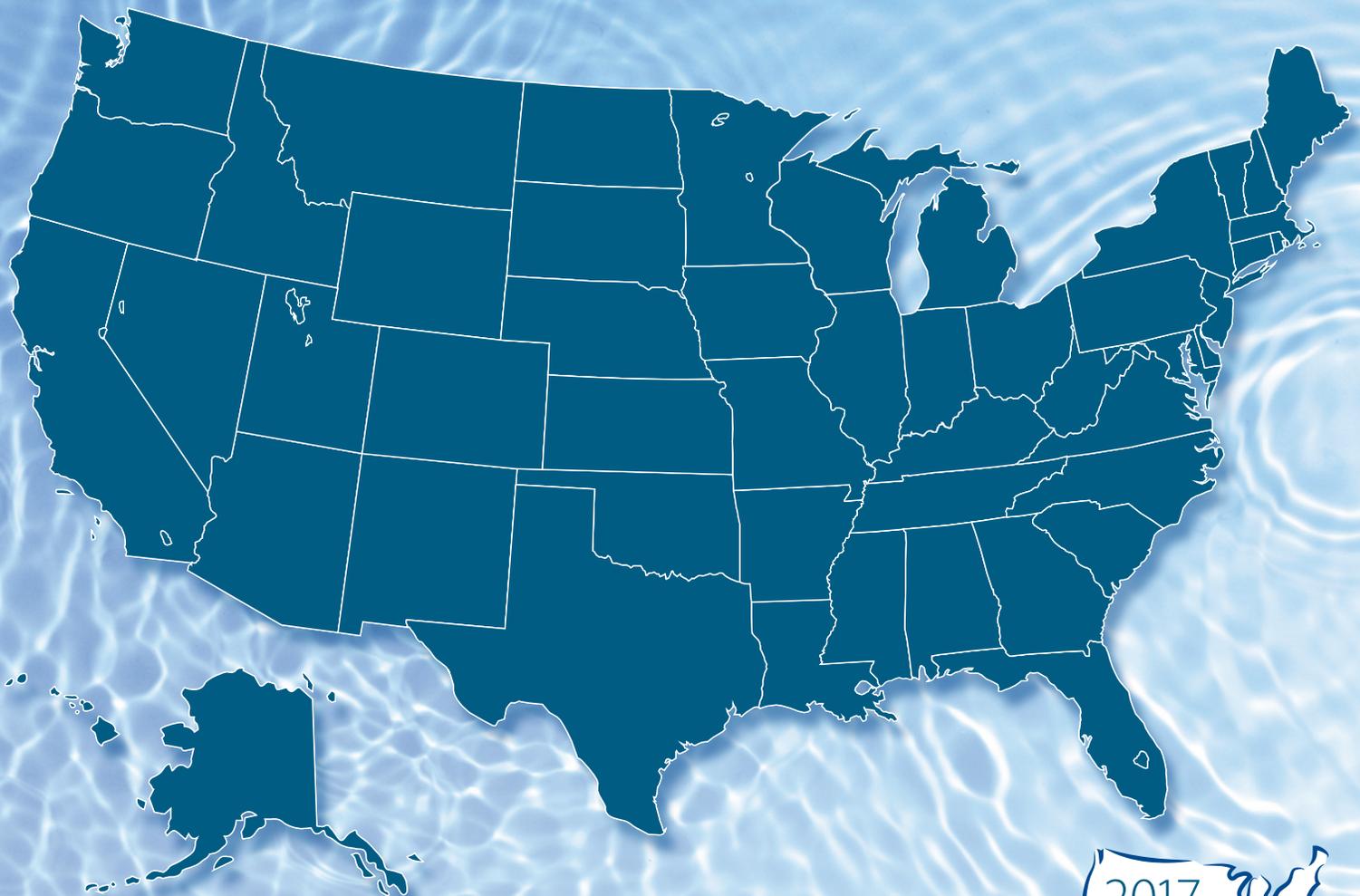


# State-Level Water Loss Laws in the United States



A Supplement to the Alliance of Water Efficiency 2017 Report,  
*The Water Efficiency and Conservation State Scorecard: An Assessment of Laws*



March 2019

## Acknowledgements

This paper was prepared by Alliance for Water Efficiency staff and utilized the results of the 2017 report, *The Water Efficiency and Conservation State Scorecard: An Assessment of Laws*. We would like to thank the Water Efficiency and Conservation State Scorecard project team for their tireless effort and great work.

This document was prepared by:

Lacey Smith  
Alliance for Water Efficiency

Mary Ann Dickinson  
Alliance for Water Efficiency

William Christiansen  
Alliance for Water Efficiency

## Collaborators

The Environmental Law Institute played a key role in the development of both the 2012 and 2017 reports, *The Water Efficiency and Conservation State Scorecard: An Assessment of Laws*. This document would not be possible without their involvement.

Cavanaugh provided critical input related to the water loss portion of the 2017 report, *The Water Efficiency and Conservation State Scorecard: An Assessment of Laws*. This included guidance on the design of the scoring rubric and contributions to final report.



33 N LaSalle Street, Suite 2275

Chicago, Illinois USA

P: 773-360-5100 | F: 773-345-3636

[www.allianceforwaterefficiency.org](http://www.allianceforwaterefficiency.org)

## Table of Contents

Introduction .....	1
Summary of the AWE Water Efficiency and Conservation State Scorecard Water Loss Questions and Findings .....	2
Part One: Low-Priority Water Loss Topic Areas.....	7
Part Two: High-Priority Water Loss Topic Areas .....	7
State Funding for M36-Compliant Technical Assistance .....	7
Water Loss Audit Requirements .....	10
Leak Detection and Correction Requirements.....	12
Conclusion.....	14

## Table of Figures

Figure 1: 2017 Water Conservation and Efficiency State Scorecard Water Loss Question Point Totals.....	6
Figure 2: States Providing M36-Compliant Technical Assistance .....	8
Figure 3: M36 Technical Assistance Example .....	9
Figure 4: State-Level Water Loss Audit Requirements .....	11
Figure 5: State Leak Detection and Correction Requirements .....	13

## Table of Tables

Table 1: 2017 Water Conservation and Efficiency State Scorecard Water Loss Questions and Scoring Guidelines .....	3
Table 2: 2017 Water Conservation and Efficiency State Scorecard Water Loss Question Point Totals .....	5

## Introduction

Throughout the United States, water utilities and water customers alike are burdened by the consequences of utility distribution system water loss. Water losses can be divided into two categories: apparent loss and real loss. Apparent losses include “customer meter inaccuracies, billing system data errors and unauthorized consumption,” while real losses consist of water “that escapes the water distribution system, including leakage and storage overflows.”<sup>1</sup> Both categories have negative impacts on water utilities and their ratepayers.

Real water losses are the most public-facing aspect of water loss. Water main breaks can be highly visible and erode ratepayer confidence in a utility. There are an estimated 237,600 water main breaks in the United States every year, wasting not only water but the costs incurred in treating that water to a drinkable standard, carrying a price tag of \$2.8 billion in lost utility revenue.<sup>2</sup> These problems are not likely to disappear any time soon, as the United States’ drinking water infrastructure ages and repairs are deferred.<sup>3</sup> While not as visible to the public at large, it is also crucial to address apparent water losses that occur when water is treated and delivered but is not accurately quantified. This causes uncertainty in utility data and makes it more challenging to address system water loss.

Each type of loss is a utility liability that can have multiple consequences, including system contamination, decreased revenue, undue stress on source water supplies, unnecessary capital improvements, customer service disruption, and excessive production costs. In a world where confronting the issue of water loss may require \$1 trillion in utility expenditures in the United States in the next 25 years<sup>3</sup>, utilities and states must prioritize this looming challenge.

In 2017, the Alliance for Water Efficiency (AWE) released the *Water Efficiency and Conservation State Scorecard: An Assessment of Laws (Water Efficiency and Conservation State Scorecard)*, which assessed state-level laws governing water conservation and efficiency. The *Water Efficiency and Conservation State Scorecard* catalogued and evaluated state laws related to eight primary topic areas:

1. Plumbing Fixture and Appliance Standards and Building Codes
2. Water Loss
3. Water Conservation Connected to Water Supplier Permits
4. Water Supplier Drought Plan Requirements
5. Water Conservation Plan Requirements (beyond or separate from permit requirements)
6. Financial Assistance
7. Technical Assistance
8. Metering and Billing

This paper takes a closer look at the results of the water loss survey questions included in the 2017 *Water Conservation and Efficiency State Scorecard*. It is organized into three sections.

---

<sup>1</sup> Alliance for Water Efficiency. (n.d.) Water Loss Control. Retrieved from [http://www.allianceforwaterefficiency.org/Water\\_Loss\\_Control\\_Library\\_Content\\_Listing.aspx](http://www.allianceforwaterefficiency.org/Water_Loss_Control_Library_Content_Listing.aspx).

<sup>2</sup> Environmental Protection Agency. (2010). *Control and Mitigation of Drinking Water Losses in Distribution Systems*. Retrieved from <https://nepis.epa.gov/>.

<sup>3</sup> American Water Works Association. (n.d.) *Buried No Longer: Confronting America’s Water Infrastructure Challenge*. Retrieved from <http://www.allianceforwaterefficiency.org/>.

1. First, the survey questions and overall results of the water loss questions in the 2017 *Water Conservation and Efficiency State Scorecard* are presented.
2. Second, results for survey questions related to limits on water loss are briefly presented and discussed. This is a lower-priority focus compared to the third section that covers state initiatives and requirements related to water audits.
3. Third, results of the water loss questions associated with state requirements related to water audits, data validation, and use of the free AWWA Water Audit Software are presented. Regulations related to validated water audits are deemed high priority and given more attention in this paper. Regular, validated water audits represent a crucial step in creating a solid foundation to address water loss, as they provide utilities with the full picture of their loss and allow them to tackle it effectively. This section ends with results of the survey concerning the topic of leak detection and correction requirements.

## Summary of the AWE Water Efficiency and Conservation State Scorecard Water Loss Questions and Findings

The 2017 *Water Conservation and Efficiency State Scorecard* survey expanded on many of the topics addressed in the 2012 survey, including water loss. The 2012 survey asked simply whether or not the state had any regulations or policies for water utilities regarding water loss, requiring a binary yes/no response. In 2017, the water loss question was expanded into several questions. This expansion allowed the survey to capture more information about the specific features of water loss control statutes and regulations, state by state.

The water loss questions in the 2017 *Water Conservation and Efficiency State Scorecard* survey were as follows:

1. Does a state statute(s)/regulation(s) limit water loss in a utility distribution system?
  - a. If yes, is it a: requirement, requirement only in order to receive state funding, or a voluntary target?
  - b. To what water suppliers do the laws apply?
  - c. If there is a numeric limit on leakage or a formula for calculating acceptable levels of leakage, what is it?
  - d. Is submitting audit information required?
    - i. If yes, at what frequency must it be submitted?
    - ii. If yes, is audit data validation required?
  - e. Is leak detection required?
  - f. Is leak correction required?
  - g. Where in state law are these details located?

Through these questions states could score a total of 12 points, with an additional 3 points of available extra credit. States could receive up to 2 extra credit points for leveraging state funding for M36 compliant technical assistance, and 1 point for requiring that audits be conducted using the AWWA Free Water Audit Software. The water loss questions and scoring guidelines from the 2017 *Water Conservation and Efficiency State Scorecard* are found in Table 1; this includes the two opportunities for extra credit. States were not awarded points for question g. which simply asked where in state law the water loss details could be found.

Question	Points	Guideline
a. Does a state statute(s)/regulation(s) limit water loss in utility distribution systems?	0	No
	1	Yes, but it is geographically limited or it applies only in order to receive state funding or a supply permit
	2	Yes and it is a conditionless requirement
<i>Extra Credit #1:</i> State is leveraging state funding for M36-compliant technical assistance to water systems in support of an existing or potential mandate.	1	On a pilot scale only
	2	On a statewide scale (whether or not on a pilot scale too)
b. To what suppliers do the laws apply?	0	No relevant law
	1	Public suppliers
	2	Public and private suppliers
c. If there is a numeric limit on leakage or a formula for calculating acceptable levels of leakage, what is it?	0	No limit or a percentage limit
	1	Statutory or regulatory requirement prompting development of non-universal numeric limits
	2	Non-universal numeric limits
d. Is submitting audit information required?	0	No
	1	Yes
d.i. If yes, at what frequency must it be submitted?	0	One-time requirement
	1	Every 2-5 years
	2	Annually
d.ii. If yes, is audit data validation required?	0	No
	1	Yes
<i>Extra Credit #2:</i> AWWA Free Water Audit Software	1	Audits are required to be conducted using the AWWA Free Water Audit Software
e. Is leak detection required?	0	No
	1	Yes
f. Is leak correction required?	0	No
	1	Yes

Table 1: 2017 Water Conservation and Efficiency State Scorecard Water Loss Questions and Scoring Guidelines

Since the 2012 survey, the number of states with regulations on water loss has grown from 24 to 30. These 30 states received at least one point in the water loss questions: they are addressing water loss in some form. However, while many states have made impressive progress, there remains substantial opportunity to implement effective state-level water loss control regulations across the United States.

Scores for each of the 30 states that earned at least one point are included in Table 2. Points are displayed for each water loss question, as well as a total for each state. The states are ordered from highest to lowest number of points scored. Georgia was the highest scoring state in water loss control, receiving 14 out of 15 possible points. Eleven states received more than 50 percent of the available points. Twenty states do not appear in Table 2: they received zero points overall, indicating that no regulations or statutes at the state level govern water loss. These states have great opportunity to introduce legislation to begin the work of reducing water loss in utilities.

Figure 1 follows Table 2 and displays the point totals for each state via a thematic map.

State	a. State limit on water loss?	Extra Credit: M36 Technical Assistance	b. To what suppliers do laws apply?	c. Numeric limit on leakage?	d. Audit information required?	di. At what frequency?	dii. Data validation required?	Extra Credit: AWWA Software	e. Leak detection required?	f. Leak correction required?	Total
Georgia	2	2	2	1	1	2	1	1	1	1	14
Washington	2	1	2	0	1	2	0	0	1	1	10
Wisconsin	2	1	2	0	1	2	0	0	1	1	10
Arizona	2	1	2	0	1	2	0	0	0	1	9
California	0	2	0	1	1	2	1	1	0	0	8
Indiana	2	0	2	0	1	1	0	1	1	0	8
Kentucky	2	0	2	0	1	2	0	0	0	1	8
Massachusetts	2	1	2	0	1	0	0	0	1	1	8
New Hampshire	1	0	2	0	1	2	0	0	1	1	8
Tennessee	2	0	2	0	1	2	0	1	0	0	8
Texas	1	0	2	0	1	2	0	0	1	1	8
Hawaii	0	2	0	0	1	2	1	1	0	0	7
Maryland	2	0	2	0	1	2	0	0	0	0	7
Oregon	1	0	2	0	1	1	0	0	1	1	7
West Virginia	2	0	2	0	1	2	0	0	0	0	7
Delaware	1	0	2	0	1	0	0	0	1	1	6
Florida	2	0	2	0	1	0	0	0	0	1	6
Illinois	1	0	2	0	1	2	0	0	0	0	6
Nevada	2	0	2	0	0	0	0	0	1	1	6
New Jersey	2	0	2	0	0	0	0	0	1	1	6
New York	1	0	2	0	1	2	0	0	0	0	6
Colorado	0	2	0	0	1	2	0	0	0	0	5
Louisiana	2	0	2	0	0	0	0	0	0	1	5
Minnesota	2	0	2	0	0	0	0	0	0	0	4
Virginia	2	0	2	0	0	0	0	0	0	0	4
Connecticut	1	0	2	0	0	0	0	0	0	0	3
Rhode Island	0	0	0	0	1	0	0	0	1	0	2
Oklahoma	0	1	0	0	0	0	0	0	0	0	1
Pennsylvania	0	0	0	0	0	0	0	1	0	0	1
Utah	0	1	0	0	0	0	0	0	0	0	1

Table 2: 2017 Water Conservation and Efficiency State Scorecard Water Loss Question Point Totals

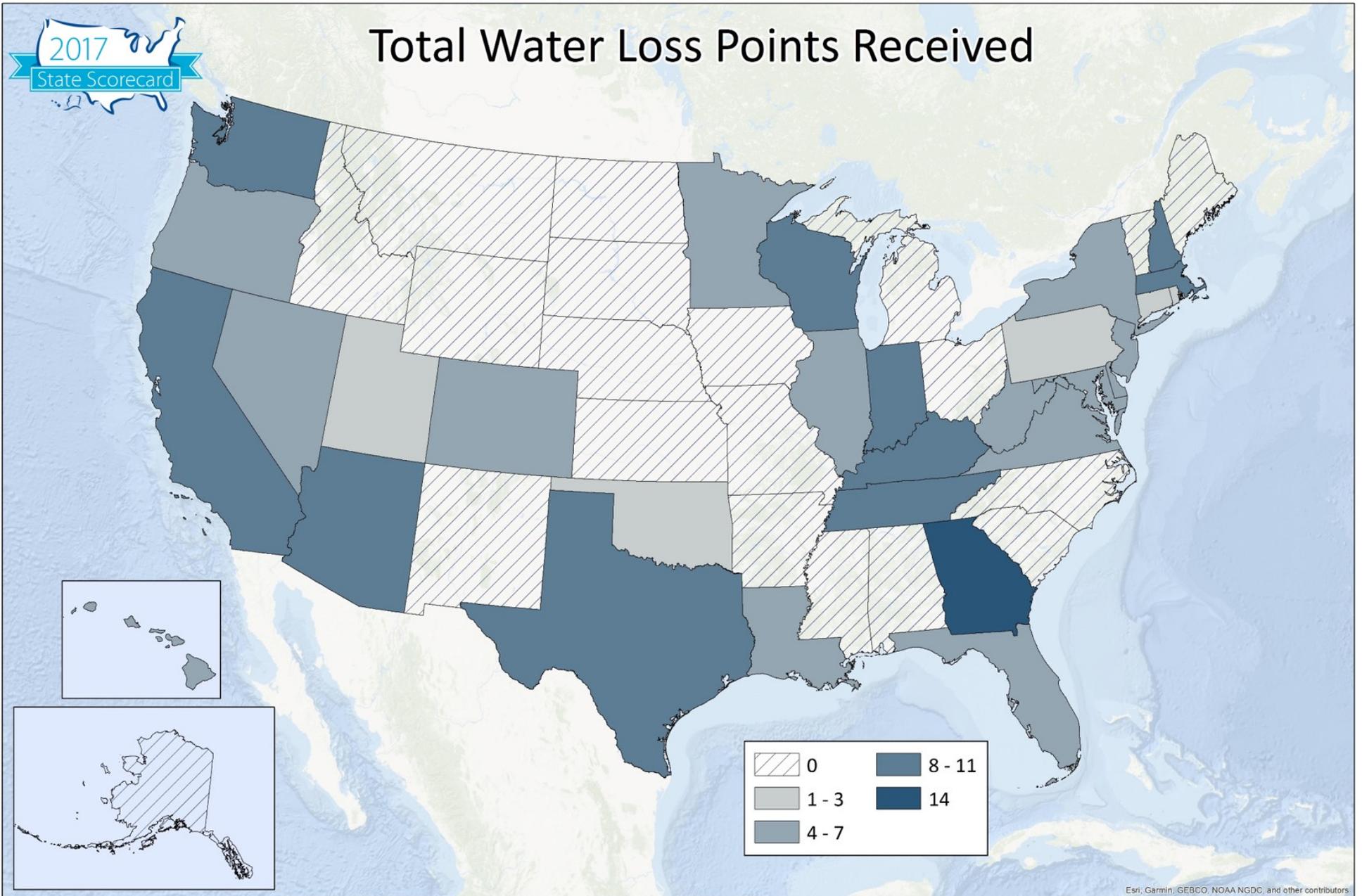


Figure 1: 2017 Water Conservation and Efficiency State Scorecard Water Loss Question Point Totals

## Part One: Low-Priority Water Loss Topic Areas

The first part of this Water Loss Supplement provides a brief overview of questions from the 2017 *Water Conservation and Efficiency State Scorecard* survey that deal with water loss, but that are not considered high-priority topic areas that reflect a state's progress towards effective water loss control. The questions in this section are focused on limits on water loss.

The first question in the water loss survey portion of the Scorecard asked whether any state statutes or regulations exist that limit water loss in utility distribution systems, and what, if any, limitations were included in that regulation. States received one point if the extant statute has limitations based on geography or if the statute only applies in order to receive state funding or a supply permit. Twenty-seven of the 50 states received zero points for this question, indicating that there is no state regulation limiting water loss. Seven states received one point, and 16 received the full two points, for a combined 23 states with some form of water loss control statute or regulation.

Question b. asked to what suppliers water loss regulations apply. Of the states with water loss statutes or regulations on the books (23 total, as identified in question a.), all received full points because they apply their laws to both public and private suppliers. No laws applied exclusively to public suppliers. It is preferable for any water loss regulations to apply to both public and private suppliers so that they are all held to similar standards.

Question c. asked: "If there is a numeric limit on leakage or a formula for calculating acceptable levels of leakage, what is it?" There were two points available. California and Georgia were the only two states to receive points on this question, and they both received the full two points because they have non-universal numeric limits for acceptable levels of leakage. This question represents the water loss community's shift away from using percentage of system volume as the key measure of water loss performance, and towards the use of a suite of key indicators to track progress instead.

## Part Two: High-Priority Water Loss Topic Areas

The second part of this Water Loss Supplement focuses on three high-priority topic areas in the water loss portion of the 2017 *Water Conservation and Efficiency State Scorecard* survey: state funding for M36-compliant technical assistance, water audit information, and leak detection and correction. These topics are considered to be leading metrics of a state's progress towards best practices in water loss control.

### State Funding for M36-Compliant Technical Assistance

States could receive two bonus points for Extra Credit #1, which asks whether the, "state is leveraging state funding for M36-compliant technical assistance to water systems in support of an existing or potential mandate." States received one bonus point if technical assistance is available on a pilot scale, and two if it is available on a statewide scale (whether or not on a pilot scale too). Figure 2 displays the point totals for this question. Georgia, California, Hawaii, and Colorado currently fund M36-compliant technical assistance on a statewide scale, while Washington, Wisconsin, Arizona, Massachusetts, Oklahoma, and Utah have explored this option through pilots.

# M36-Compliant Technical Assistance Funding

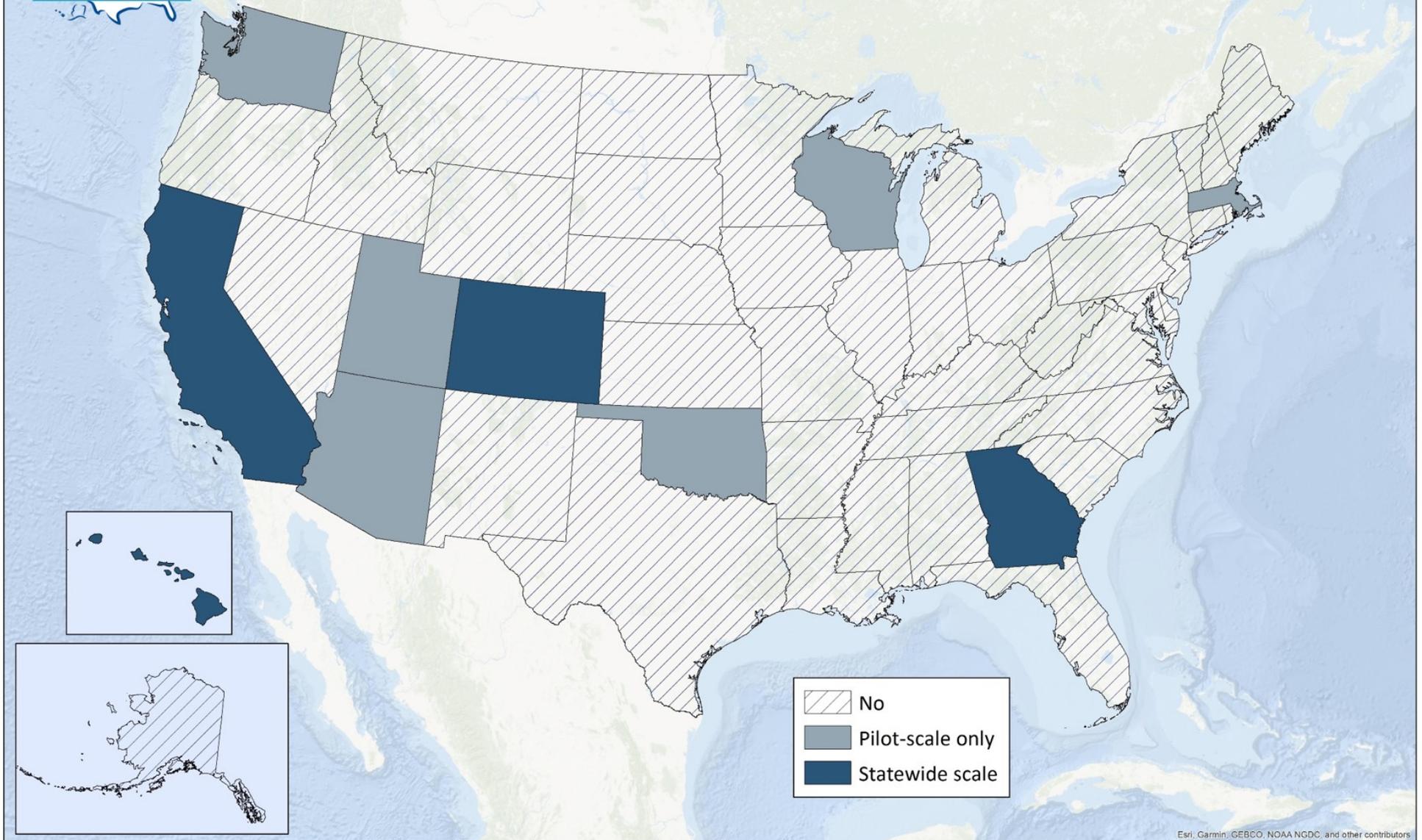


Figure 2: States Providing M36-Compliant Technical Assistance

The first edition of the American Water Works Association (AWWA) *M36 Water Audits and Loss Control Programs Manual* (the M36 Manual) was published in 1990, and it is now in its fourth edition. It is an extensive guide to “the accountable and efficient management of water supplies by utilities”<sup>4</sup> through water loss control. The M36 Manual lays out the importance of water loss control, a step-by-step guide to the IWA/AWWA method of water audits, instructions for the analysis and control of both apparent and real water system losses, and guidance on establishing a successful utility water loss control program.

Providing financial support for M36-compliant technical assistance can prepare the way for states to implement a water loss control mandate because utilities know they will have this resource to support and bolster their efforts. Because utilities will be carrying out the day-to-day effort of water loss control, it is in a state’s best interest to fund resources that will help ensure utility success. Furthermore, by encouraging utilities to rely on one comprehensive source, states help move utilities towards all being on the same page. See Figure 3 for an example of one such technical assistance program in Arizona.

**Technical Assistance Example: Arizona M36 Water Loss Technical Assistance Program Pilot**

One example of a successful M36-compliant technical assistance program is in Arizona. The state’s Water Infrastructure Finance Authority and Department of Water Resources collaborated with the water loss experts at Cavanaugh & Associates to conduct a Pilot Program to introduce and train utility staff on the M36 Methodology, then develop customized recommendations for each system to enhance its water loss control programs.

Six utilities participated in the pilot, which consisted of a kickoff meeting, a training webcast, technical training workshops, utility-specific data collection and analysis, and Level 1 audit validation.

The pilot program was well-received by utilities and state agencies and efforts continue to expand water loss control through the M36 methodology to more utilities in Arizona.

Source: <https://www.azwifa.gov/water-loss-control/>

Figure 3: M36 Technical Assistance Example

---

<sup>4</sup> Kunkel, G.A., Jr. (2016). *Water Audits and Loss Control Programs* (4th Ed.). Denver, CO: American Water Works Association.

## Water Loss Audit Requirements

States could receive up to four points for all portions of question d., plus one extra credit point for Extra Credit #2. Figure 4 displays the scoring in a map.

The questions about water audit submission requirement, frequency, and validation are crucial for determining a state's adherence to the best practices of water loss control. Requiring regular audit submission requires utilities to establish a practice and methodology for performing them. Audits are the most important step in controlling water loss because they identify where and what type of water loss is occurring in a system, empowering utilities to take steps to reduce it. The frequency with which water audits are conducted is addressed in this question as well. Ideally, water utility audits will be performed annually. This aligns utilities with other operations that conduct annual audits, evaluations, and reviews of key performance indicators as a standard business practice. Regular audits allow utilities to identify problems as well as successes and inform decisions based on the most current information.

Validation is important because audit data must be reliable. Without uniform, accurate, and robust data, states cannot set performance benchmarks or compare performance between utilities. Decision-making based on flawed data may lead to poor outcomes, undermining utility stability and public credibility. States earned a bonus point for this question if they require the use of the AWWA Free Water Audit Software for utility water audits. If utilities are using the software, they are required to grade each data input based on the level of confidence of that data input. The software then aggregates these grades to calculate a Data Validity Score, which represents the "degree of confidence of the water audit results and performance indicators."<sup>5</sup> The software also offers guidance based on the data input grades and the overall Data Validity Score, identifying ways that the utility can improve the quality of its inputs. A state-level requirement for the uniform use of one program ensures that water audits are comparable between utilities. The software is accessible, industry-vetted, and easy to use. It allows for varying degrees of complexity and benefits utilities just beginning a water loss control regime as well as those with advanced, long-running water loss control programs.

---

<sup>5</sup> Kunkel, G.A., Jr. (2016). *Water Audits and Loss Control Programs* (4th Ed.). Denver, CO: American Water Works Association.

# Audit Information

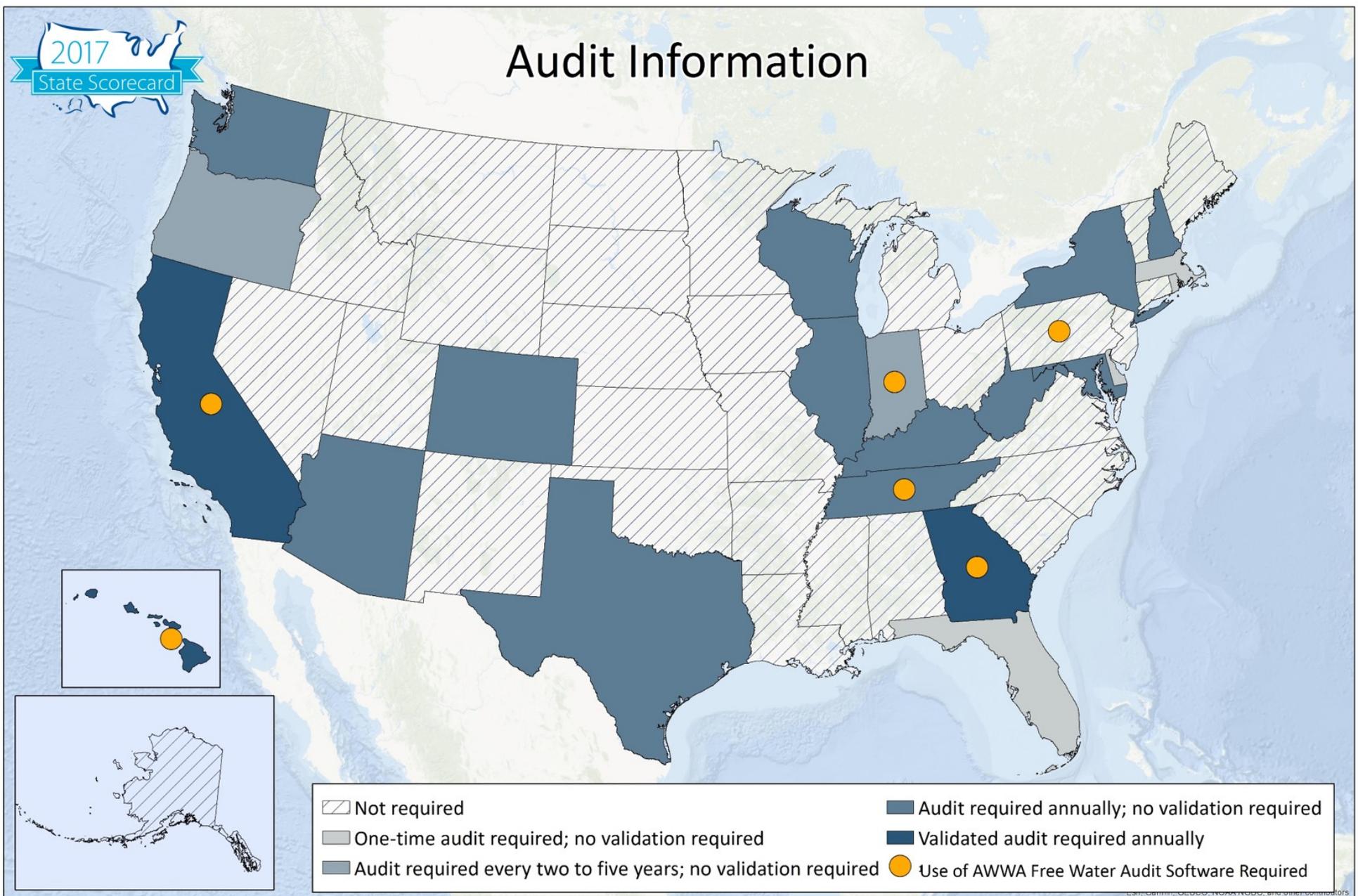


Figure 4: State-Level Water Loss Audit Requirements

## Leak Detection and Correction Requirements

Two points total were available for questions e. and f., which ask whether leak detection and correction are required. The combined point totals for these questions are displayed in Figure 5.

Leaks can be the most obvious, public-facing aspect of water loss. Visible leaks can be dramatic and may erode community confidence in utility operations. Leaks are certainly a priority for reducing non-revenue water. However, if a state requires leak repairs without also requiring regular water audits, they may be putting the proverbial cart before the horse. Reactively fixing leaks is important but utilities must also prioritize establishing a reliable, regular water audit program without which other water loss reduction “activities cannot be reliably planned, or tracked.”<sup>6</sup> Leak detection and correction should be seen as one of a wide assortment of tools that are most appropriately deployed under the auspices of a top-down water loss control program.

---

<sup>6</sup> Kunkel, G.A., Jr. (2016). *Water Audits and Loss Control Programs* (4th Ed.). Denver, CO: American Water Works Association.



## Conclusion

While there are many ongoing efforts to reduce water loss on the utility and local government scales, this study focused on state-level water loss control regulations. Implementing water loss regulations at the state level is an effective way to prioritize the issue, because states are in a unique position to require many water suppliers to focus on water loss and to fund and otherwise support their efforts to do so. In enacting these requirements, states help move their regions and the nation towards decisive action to reduce the urgent problem of water loss.

Policymakers can use this supplement to make their case for implementing water loss control regulations in their state. They can highlight areas in which their state is succeeding and identify areas where the state has opportunity to grow and improve their stance on water loss. States can see how they stack up compared to their neighbors and others in their region. States without existing water loss control measures can use the full *2017 Water Efficiency and Conservation State Scorecard report* as a resource for beginning their work: it cites examples of exemplary water loss regulations in California and Georgia which can be a framework for drafting similar regulations.

As new water sources become less abundant and more expensive to develop, water loss control must be a high priority at all scales of water management.



Alliance  
*for* Water  
Efficiency

33 N LaSalle Street, Suite 2275 | Chicago, IL 60602  
PH: 773-360-5100 | [www.a4we.org](http://www.a4we.org)