# This presentation premiered at WaterSmart Innovations

watersmartinnovations.com



# A Model for the Nation: Georgia's Statewide Water Loss Management Program





#### **Presented by:**



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CAVANAUGH

Stewardship Through Innovation

# **U.S. Has Reached 52 Percent Drought**



By Sara Jerome @sarmje

It's official: Most of the U.S. is facing d conditions.

"The U.S. Drought Monitor, whi

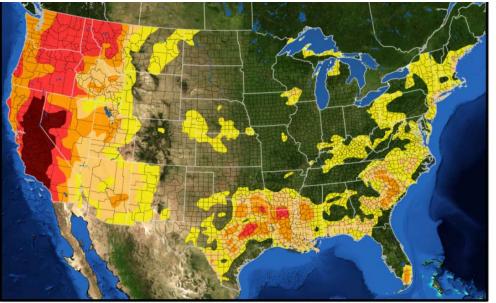
every Thursday, says that 52.00% of th United States - including Alaska, Hav and Puerto Rico - is suffering from a ] precipitation and is now abnormally d stuck in a drought," Gawker reported.

More Than Half of the United States Is Abnormally Dry or Officially in a Drought

# U.S. Drought Monitor | September 8, 2015

analyses every Tuesday and rele

@wxdam



D0 Abnormally Dry D1 Moderate Drought D2 Severe Drought D3 Extreme Drought D4 Exceptional Drought

One of the biggest weather stories in recent years is the distinct lack of

### \* \* \* \* \* \* \* \* \* \* \* \* \* \* \*

Y A VertMarkets Magazine

**Clean Water Edition** 

# **State Of Loss**

How Non-Revenue Water Is Impacting The U.S.

Also In This Issue: Next-Generation Arsenic Removal Disinfection Byproducts:

<u>Water Online</u>

ww.wateronline.com The Magazine

Treatment Options And Challenges

#### $\dot{\phantom{a}}$



#### FIXES

#### The Art of Water Recovery

By DAVID BORNSTEIN JULY 10, 2014 8:00 PM = 53 Comments



Fixes looks at solutions to social problems and why they work.



ORIGIN

TCH TRAILE

JULY 18

Imagine that you run a company that sells bottled water. You spend lots of money, and use lots of energy, pumping the water out of the ground, purifying it and transporting it for sale. Then, one day, you discover that a large number of bottles never make it to the stores. They are falling through holes in the trucks.

Wouldn't you want to know what could be done about it? Wouldn't you be crazy to allow the situation to continue?

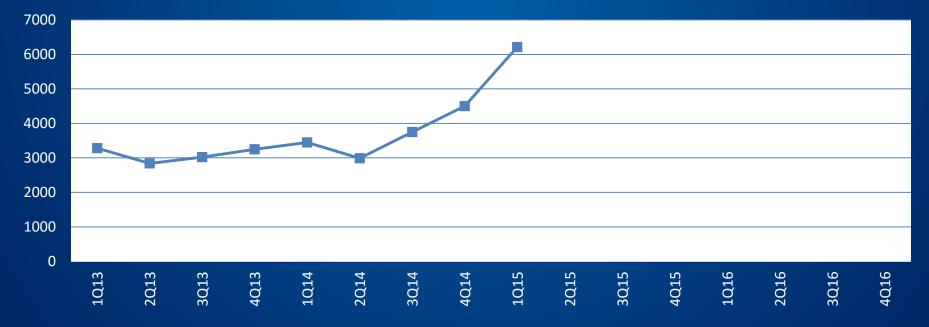
Well, that's what's happening with many water utilities in the United States. The Environmental Protection Agency estimates (pdf) that public water systems lose, on average, one-sixth of their water — mainly from leaks in pipes. The E.P.A. asserts that 75 percent of that water is recoverable. (In truth, the volume of leakage in the nation's 55.000 drinking-water systems is unknown, because few conduct water audits using the <u>standards</u> established by the International Water Association and the American Water Works Association.)





|   | WEBPAGE                              | RANK (monthly avg) | January | February | March |
|---|--------------------------------------|--------------------|---------|----------|-------|
|   | Water Knowledge<br>(RC landing page) |                    | 829     | 813      | 912   |
|   | Water Loss Control                   | 1                  | 2,118   | 1,997    | 2,095 |
| American Water Works  | Water Conservation                   | 2                  | 645     | 585      | 728   |
| Association   | Drought                              | 13                 | 115     | 99       | 158   |
| ASSOCIATION   | Backflow                             | 3                  | 515     | 556      | 661   |
| T   | How Water Works                      | 4                  | 474     | 538      | 522   |
| Dedicated to the World's Most Important Resource <sup>™</sup> | Wastewater                           | 5                  | 421     | 409      | 474   |
|   | Asset Management                     | 6                  | 369     | 313      | 378   |
|   | Small Systems                        | 7                  | 288     | 254      | 321   |
|   | Emergency Preparedness               | 9                  | 238     | 129      | 154   |
|   | Wastewater-Collection-Systems        | 8                  | 191     | 196      | 281   |
|   | Stormwater                           | 16                 | 131     | 79       | 108   |
|   | Groundwater                          | 11                 | 197     | 108      | 88    |
|   | Climate Change                       | 17                 | 105     | 89       | 120   |
|   | Source Water Protection              | 14                 | 103     | 96       | 151   |
|   | Customer Service                     | 10                 | 151     | 122      | 144   |
|   | Desalination                         | 12                 | 101     | 124      | 152   |
|   | Reuse                                | 15                 | 86      | 131      | 119   |
|   | TOTAL                                |                    | 7,077   | 6,638    | 7,566 |

#### AWWA Water Loss Control - Quarterly Webpage Views



### Landscape of Varying Levels of Water Loss Management Policy

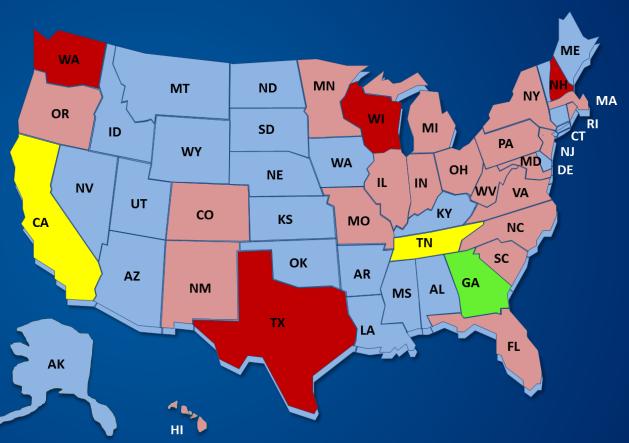
No Policy for Water Loss Management

Basic Water Loss Reporting

Annual Water Loss Reporting with AWWA M36 Terminology

Annual Water Loss Reporting with AWWA Free Water Audit Software

Annual Water Loss Reporting with AWWA Free Water Audit Software with Validation of Audits Submitted



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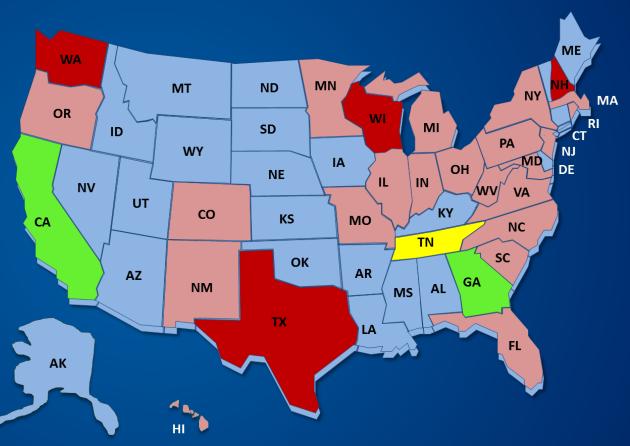
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Outreach

Training &

Tech Asst

#### Statewide Water Loss Management Program – Model Implementation

Phase 1

### Phase 2

#### **Establish Annual M36** Water Auditing

|          | Implement established                      |
|----------|--|
| Require- | requirement for annual M36<br>Water Audits |
| ment     |  |

Educate Regulatory Community on M36 Method and appropriate use of performance indicators

Establish Statewide Water Loss Control Committee

**Develop State Manual and Training Framework** 

Certification Provide extended, progressive training to utilities (funded)

#### **Achieve Minimum** Standard of Audit Reliability

Develop and implement data management system

Establish posting system and communication protocols

Data

Manage-

ment

Validation

Year 3

Establish minimum standards of validation for quality assurance

Determine by Agency or 3<sup>rd</sup> Party

Establish validation program until certification program is in place

Design and implement a Certified Water Audit program for sustained quality control

Statewide Water Loss Control Committee administers certification of individuals

### Phase 3

#### Manage Water Loss Performance for Long-**Term Reduction**

Suite of Performance and **Process Measures** 

System specific improvement over time in a cost-effective manner

No universal targets Excessive thresholds established

Benchmarking

Compliance

Year 5

Annual audit submission threshold exceedances

System specific progress review at permit renewals and extensions

Statewide Data Validity

Year 7

Statewide Water Loss

| 2.2 |     | <br> |     |            | <br> |  |
|-----|-----|------|-----|------------|------|--|
| Yea | r 1 |      | Yea | <b>r 2</b> |      |  |

Resource Management Grade C

Resource Management Grade B

Year 4

Resource Management Grade A

Year 6

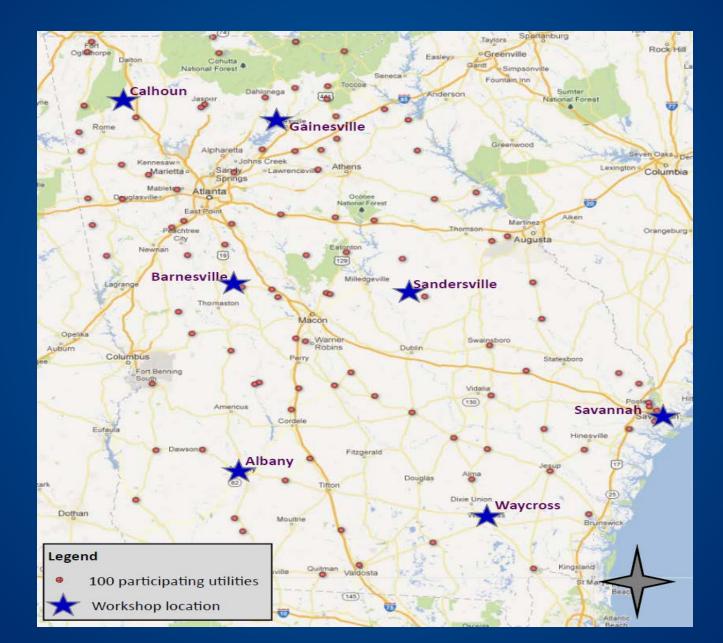
# Georgia Water Loss Program Phasing

|  | 1  |  |  |   |   |
|--|--|--|--|---|---|
| 2010   | 2011   | 2012   | 2013   | 2014  | 2015  |
| Following<br>2008<br>Drought, the<br>Water<br>Stewardship<br>Act was<br>Passed into<br>Law | Annual<br>Auditing<br>Begins,<br>Initial<br>Workshops<br>WLC<br>Committee<br>Formed &<br>Manual<br>Developed | <b>Phase 1:</b><br>Statewide<br>Training on<br>Water<br>Auditing | Phase 1A:<br>Validation of<br>Audits<br>Phase 2:<br>Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Phase 1B:<br>Validation of<br>Audits<br>Phase 2A:<br>Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Phase 1C:<br>Audit<br>Certification<br>Program<br>Phase 2B:<br>Statewide<br>Technical<br>Assistance<br>Projects<br>(Large |
|  |  |  |  |   | Systems)  |

# Georgia Water Loss Program Phasing

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| Passed into<br>Law   | Committee<br>Formed &<br>Manual<br>Developed                 | Auditing   | Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Phase 2B:<br>Statewide<br>Technical<br>Assistance<br>Projects<br>(Large<br>Systems) |

### **Phase 1 - Water Loss Audit Training**



### **Phase 1 - Water Loss Audit Training**

- Webinar kick off
- Workshop 1: Basics
- 2011 Practice Audit & Validation Call
- Workshop 2: Next Steps & Momentum
- Homework Phase
- Workshop 3: Showtime for 2012 Audit
- 2012 Audit Validation Call
- Submittal of 2012 Water Audit to EPD

June 2012 June 2012 July 2012 August 2012 Sept – Dec 2012 Jan-Feb 2013 Feb 2013 March 2013



### **Utility Feedback: Discoveries**



"Discovered production numbers

were significantly off, even though

"Massive amounts of "unbilled" usage"

"Found accounts being metered and billed in different units (gallons vs. CCF)"

<image>



they were "calibrating" the

production meters"

"Water meters are our cash registers and our cash registers need to be functioning properly"

# Utility Feedback: Some of the Biggest Surprises

"Apparent vs Real Loss - didn't realize how much could be lost through faulty meters."





"Amount of money we do not collect"

"Impact of water loss on finances"

"The more money/water we find, the less we may need to borrow for capital projects"

"Performing the audit was easier than we originally thought."



### Water Audits – pre and post Validation (before Training)

| Before Training Program                 |    | Pre-Validation |    |       | Post-Validation |      |       | Change |    |        |
|---|----|----------------|----|-------|-----------------|------|-------|--------|----|--------|
|   |    | AVG            | R  | Range |                 | AVG  | Range |        | ge |        |
| Volume from own sources                 | 78 | 7.3            | 1  | -     | 10              | 4.5  | 2     | -      | 10 | (2.8)  |
| Master meter error adjustment           | 76 | 5.4            | 1  | -     | 10              | 2.9  | 1     | -      | 9  | (2.5)  |
| Water imported                          | 34 | 7.9            | 3  | -     | 10              | 5.1  | 2     | -      | 9  | (2.7)  |
| Water exported                          | 22 | 7.7            | 2  | -     | 10              | 5.0  | 3     | -      | 9  | (2.6)  |
| Billed metered                          | 91 | 7.4            | 3  | -     | 10              | 5.6  | 2     | -      | 10 | (1.8)  |
| Billed unmetered                        | 22 | 8.2            | 4  | -     | 10              | 5.4  | 1     | -      | 10 | (2.9)  |
| Unbilled metered                        | 64 | 6.7            | 1  | -     | 10              | 5.3  | 1     | -      | 10 | (1.4)  |
| Unbilled unmetered                      |    | 5.4            | 2  | -     | 10              | 4.9  | 0     | -      | 9  | (0.6)  |
| Unauthorized consumption                | 92 | 5.1            | 2  | -     | 9               | 5.1  | 5     | -      | 10 | (0.0)  |
| Customer metering inaccuracies          | 91 | 6.1            | 2  | -     | 10              | 3.9  | 1     | -      | 9  | (2.1)  |
| Systematic data handling errors         | 92 | 5.9            | 2  | -     | 10              | 5.1  | 4     | -      | 9  | (0.7)  |
| Length of mains                         | 90 | 6.6            | 1  | -     | 10              | 4.7  | 1     | -      | 10 | (1.8)  |
| # of active + inactive svc connections  | 90 | 6.3            | 1  | -     | 10              | 5.5  | 1     | -      | 10 | (0.8)  |
| Average length of customer service line | 92 | 8.5            | 2  | -     | 10              | 9.5  | 2     | -      | 10 | 1.0    |
| Average operating pressure              |    | 5.4            | 1  | -     | 10              | 4.3  | 1     | -      | 10 | (1.1)  |
| Annual cost of operating water system   |    | 7.9            | 1  | -     | 10              | 7.2  | 1     | -      | 10 | (0.7)  |
| Customer retail unit cost               |    | 7.4            | 1  | -     | 10              | 6.0  | 2     | -      | 10 | (1.4)  |
| Variable production cost                |    | 7.2            | 2  | -     | 10              | 5.7  | 1     | -      | 10 | (1.5)  |
| Water Audit Data Validity Score         | 92 | 68.8           | 39 | -     | 94              | 52.1 | 8     | -      | 77 | (16.7) |

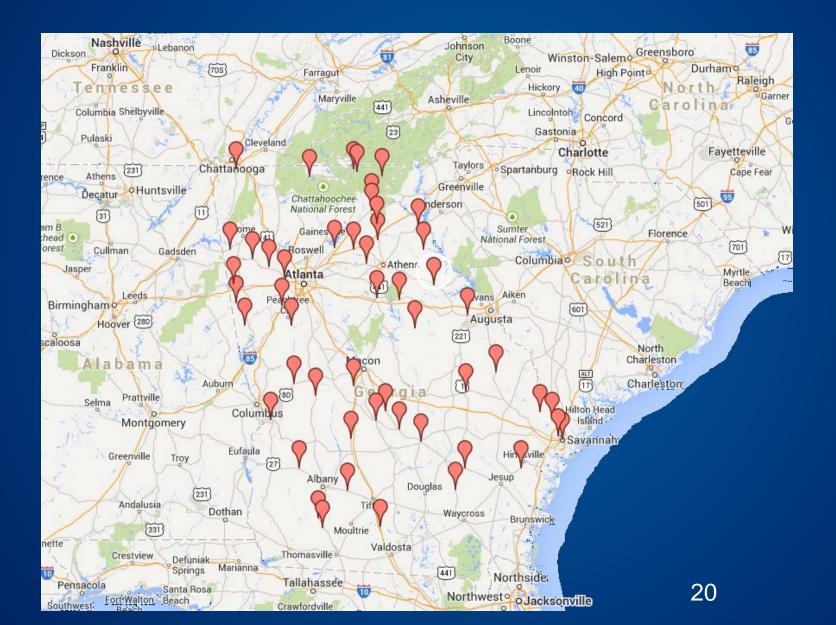
### Water Audits – pre and post Validation (after Training)

| After Training Program                     |     | Pre-Validation |   |     | Post-Validation |      |       | Change |    |       |
|--|-----|----------------|---|-----|-----------------|------|-------|--------|----|-------|
|  | n   | AVG            |   | Rai | nge             | AVG  | Range |        | e  |       |
| Volume from own sources                    | 86  | 5.3            | 2 | -   | 10              | 4.8  | 2     | -      | 9  | (0.5) |
| Master meter error adjustment              | 86  | 3.4            | 1 | -   | 9               | 2.8  | 1     | -      | 8  | (0.6) |
| Water imported                             | 37  | 5.9            | 2 | -   | 10              | 5.7  | 2     | -      | 9  | (0.2) |
| Water exported                             | 24  | 5.8            | 1 | -   | 10              | 5.0  | 1     | -      | 9  | (0.8) |
| Billed metered                             | 100 | 6.0            | 2 | -   | 10              | 5.2  | 2     | -      | 8  | (0.8) |
| Billed unmetered                           | 24  | 6.7            | 1 | -   | 10              | 6.9  | 2     | -      | 10 | 0.3   |
| Unbilled metered                           | 74  | 6.0            | 1 | -   | 10              | 5.9  | 1     | -      | 10 | (0.1) |
| Unbilled unmetered                         | 100 | 5.0            | 0 | -   | 10              | 5.0  | 1     | -      | 10 | 0.0   |
| Unauthorized consumption                   | 100 | 5.1            | 3 | -   | 10              | 5.0  | 5     | -      | 5  | (0.1) |
| Customer metering inaccuracies             | 100 | 4.3            | 1 | -   | 10              | 4.0  | 1     | -      | 10 | (0.2) |
| Systematic data handling errors            | 100 | 5.2            | 0 | -   | 10              | 5.2  | 1     | -      | 9  | 0.1   |
| Length of mains                            | 100 | 4.9            | 1 | -   | 10              | 4.8  | 1     | -      | 10 | (0.1) |
| # of active + inactive svc connections     | 100 | 5.7            | 2 | -   | 10              | 5.6  | 2     | -      | 10 | (0.1) |
| Average length of customer service<br>line | 100 | 8.9            | 1 | -   | 10              | 9.9  | 4     | -      | 10 | 1.0   |
| Average operating pressure                 | 100 | 4.2            | 1 | -   | 10              | 3.7  | 1     | -      | 10 | (0.5) |
| Annual cost of operating water system      | 100 | 7.1            | 2 | -   | 10              | 7.9  | 2     | -      | 10 | 0.8   |
| Customer retail unit cost                  | 100 | 6.2            | 2 | -   | 10              | 6.4  | 2     | -      | 10 | 0.2   |
| Variable production cost                   |     | 5.6            | 1 | -   | 10              | 5.3  | 1     | -      | 10 | (0.2) |
| Water Audit Data Validity Score            | 100 | 55.4           | 3 | -   | 86              | 53.8 | 31    | -      | 74 | (1.6) |

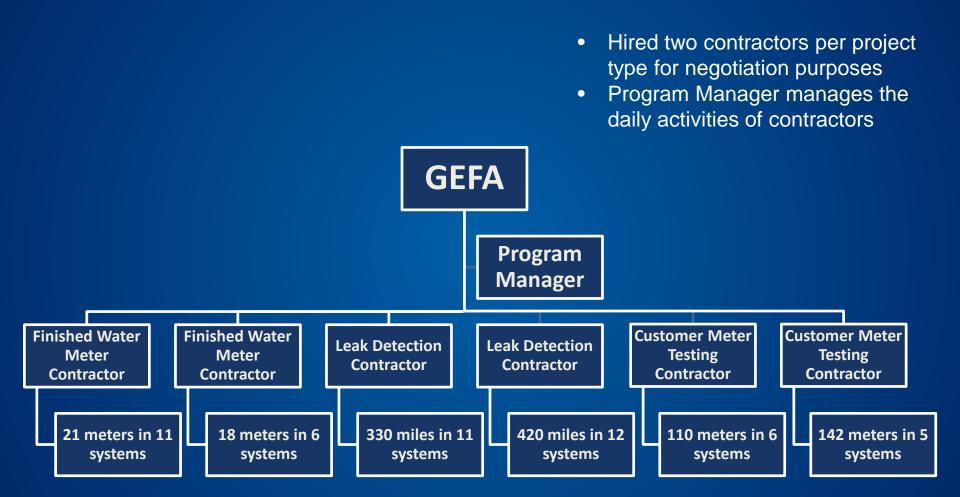
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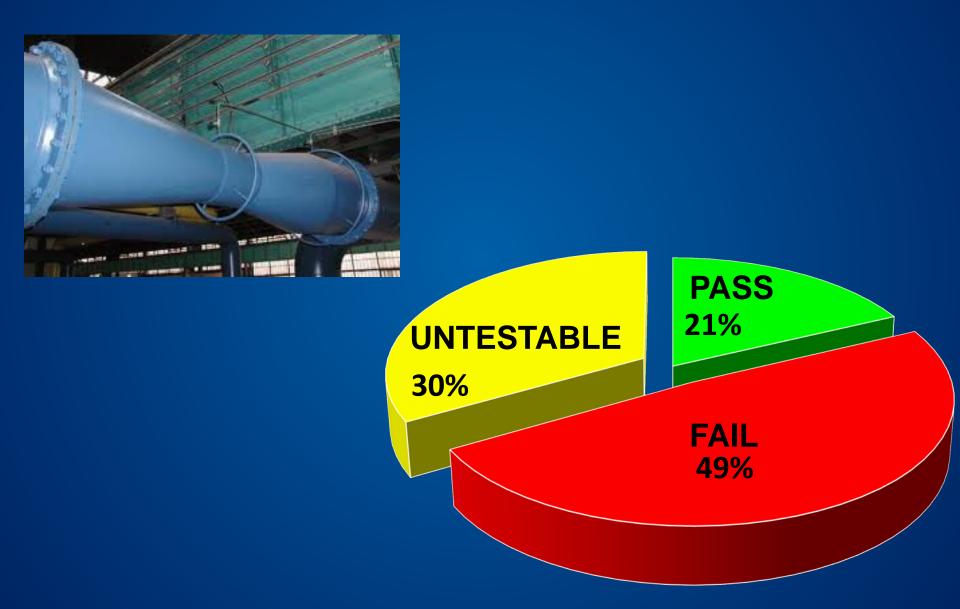
## Phase 2 - Water Loss Technical Assistance (Small)



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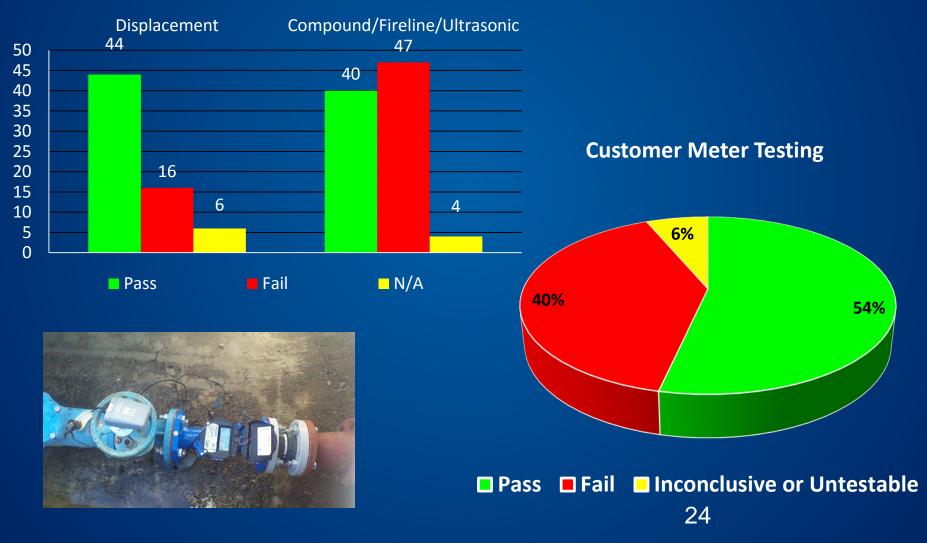
### **Finished Water Meter Testing**





## **Customer Meter Testing (CMT)**

#### **CMT Global Statistics Summary**



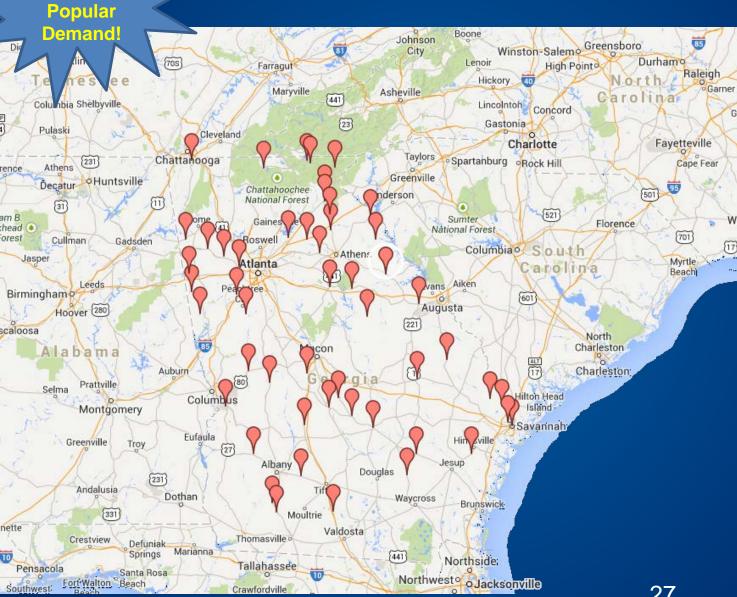
# Phase 2 - Water Loss Technical Assistance (Small)

| Finished Water Meter Flow Verification      |   |  |   |   |                                      |  |  |  |  |
|---|---|--|---|---|--------------------------------------|--|--|--|--|
| Number of<br>Participating Water<br>Systems | Number of Finished<br>Water Meters tested           |  | f meters passing<br>WWA accuracy<br>limits        | Average inaccuracy for meters not<br>passing within AWWA accuracy limits<br>(%) |                                      |  |  |  |  |
| 17  | 28  |  | 7   |   | 13%                                  |  |  |  |  |
| Customer Meter Testing                      |   |  |   |   |                                      |  |  |  |  |
| Number of<br>Participating Water<br>Systems | Number of Customer<br>Meters tested                 | Number of meters passing<br>within AWWA accuracy<br>limits |   | Average inaccuracy for meters not<br>passing within AWWA accuracy limits<br>(%) |                                      |  |  |  |  |
| 12  | 147   |  | 84  |   | 24%                                  |  |  |  |  |
|   | Pile  | ot Leak Det  | tection   |   |                                      |  |  |  |  |
| Number of<br>Participating Water<br>Systems | Number of miles of<br>distribution line<br>surveyed | Number<br>of leaks<br>found                                | Annual leakage<br>volume found<br>( <u>Mgal</u> ) | Annual<br>Energy Cost<br>Savings (\$)   | Annual Chemical Cost<br>Savings (\$) |  |  |  |  |
| 23  | 731   | 118  | 270   | 35,700  | 67,800                               |  |  |  |  |

# Georgia Water Loss Program Phasing

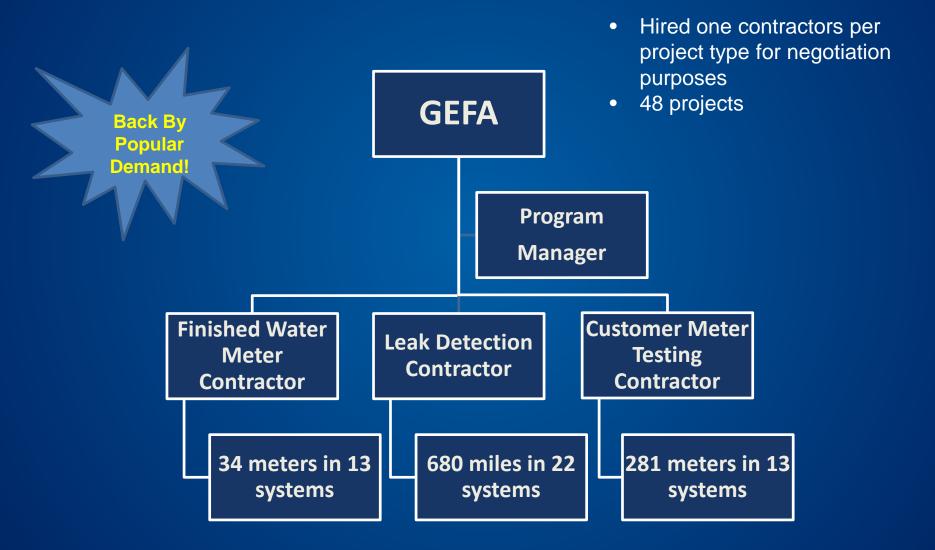
|  |   |  |  | 1  |   |
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# **Phase 2A - Water Loss Technical Assistance** (Small)



**Back By** 

# Phase 2A - Water Loss Technical Assistance (Small)



# Small Water Systems Technical Assistance – Phase IIA Project Summary

| Finished Water Meter Flow Verification |               |                 |                        |                                  |  |  |  |  |  |
|--|---------------|-----------------|------------------------|----------------------------------|--|--|--|--|--|
| Number of                              | Number of     | Number of       | Average UNDER-         | Average OVER-registration of     |  |  |  |  |  |
| Participating                          | Finished      | meters passing  | registration of meters | meters outside AWWA accuracy     |  |  |  |  |  |
| Water                                  | Water Meters  | within AWWA     | outside AWWA           | limits (%)                       |  |  |  |  |  |
| Systems                                | tested        | accuracy limits | accuracy limits (%)    |                                  |  |  |  |  |  |
| 12                                     | 25            | 8               | 20%                    | 15%                              |  |  |  |  |  |
| Customer Meter Testing                 |               |                 |                        |                                  |  |  |  |  |  |
| Number of                              | Number of     | Number of       | Average UNDER-         | Total annual revenue loss from   |  |  |  |  |  |
| Participating                          | Customer      | meters passing  | registration of meters | discovered meter under-          |  |  |  |  |  |
| Water                                  | Meters tested | within AWWA     | outside AWWA           | registration                     |  |  |  |  |  |
| Systems                                |               | accuracy limits | accuracy limits (%)    | (\$)                             |  |  |  |  |  |
| 13                                     | 143           | 83              | 20%                    | \$35,700                         |  |  |  |  |  |
|  |               | Pilot L         | eak Detection          |                                  |  |  |  |  |  |
| Number of                              | Number of     | Number of leaks | Annual leakage         | Total annual energy and chemical |  |  |  |  |  |
| Participating                          | miles of      | found           | volume found (Mgal)    | cost savings from discovered     |  |  |  |  |  |
| Water                                  | distribution  |                 |                        | leakage                          |  |  |  |  |  |
| Systems                                | line surveyed |                 |                        | (\$)                             |  |  |  |  |  |
| 22                                     | 689           | 211             | 529                    | \$388,988                        |  |  |  |  |  |
|  |               |                 |                        |                                  |  |  |  |  |  |

# Georgia Water Loss Program Phasing

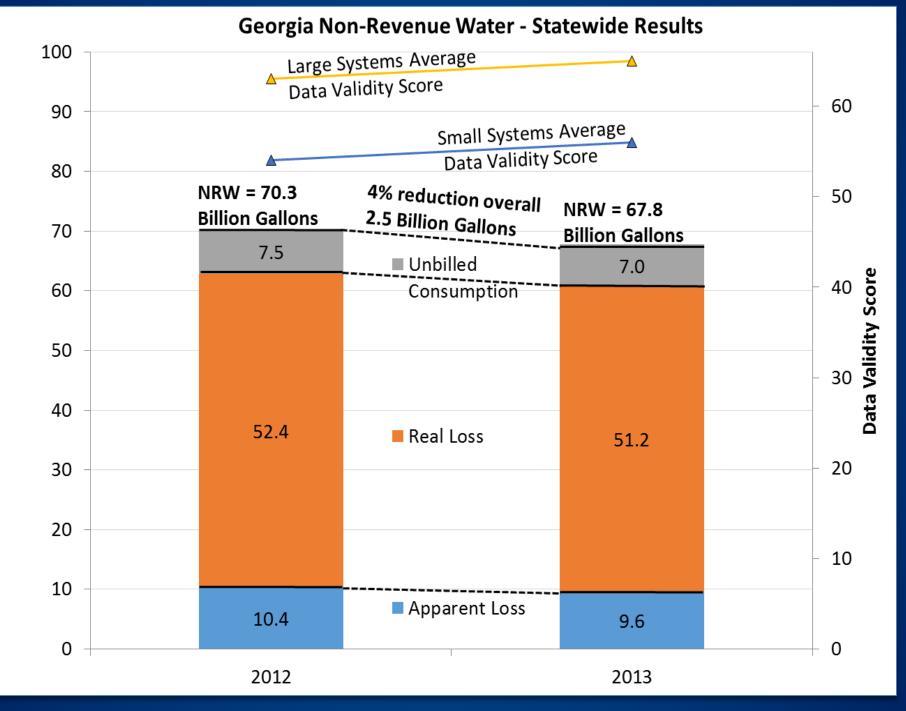
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#### **Statewide Water Loss Management Program – Model Implementation**

| Phase 1   |  | Phase 2  |  | Phase 3  |   |   |
|---|--|--|--|--|---|---|
| Establish Annual M36<br>Water Auditing  |  |  | Achieve Minimum<br>Standard of Audit<br>Reliability  | Manage Water Loss<br>Performance for Long-<br>Term Reduction |   |   |
| Require-<br>ment<br>Outreach<br>Training &<br>Tech Asst                             | Implement established<br>requirement for annual M36<br>Water Audits<br>Educate Regulatory<br>Community on M36 Method<br>and appropriate use of<br>performance indicators<br>Establish Statewide Water<br>Loss Control Committee<br>Develop State Manual and<br>Training Framework<br>Provide extended, progressive<br>training to utilities (funded) | Data<br>Manage-<br>ment<br>Validation<br>Certification | Develop and implement data<br>management system<br>Establish posting system and<br>communication protocols<br>Establish minimum standards of<br>validation for quality assurance<br>Determine by Agency or 3 <sup>rd</sup> Party<br>Establish validation program until<br>certification program is in place<br>Design and implement a<br>Certified Water Audit program<br>for sustained quality control<br>Statewide Water Loss Control<br>Committee administers<br>certification of individuals | Benchmarking<br>Compliance                                   | Suite of Performand<br>Process Measures<br>System specific imp<br>over time in a cost-e<br>manner<br>No universal targets<br>Excessive threshold<br>established<br>Annual audit submis<br>threshold exceedan<br>System specific pro<br>review at permit ren<br>extensions | provement<br>effective<br>s<br>ls<br>ssion<br>aces<br>gress |
| State   | wide Water Loss  |  |  |  | Statewide Da  | ata Validity  |
| Year 1  | Year 2   | Year 3   | Year 4   | fear 5   | Year 6  | Year 7  |
| Resource Management Grade C Resource Management Grade B Resource Management Grade A |  |  |  |  |   |   |

### Funding Sources for the Statewide Water Loss Management Program

|   |  | DWSRF 2%  | DWSRF 2% and 15% set-aside   | DWSRF 2% and<br>Loan Fees  | DWSRF<br>Loan Fees   |
|---|--|---|--|--|--|
| 2010  | 2011   | set-aside   | 2013   | 2014   | 2015   |
| Following<br>2008<br>Drought, the<br>Water<br>Stewardship<br>Act was<br>Passed into | Annual<br>Auditing<br>Begins,<br>Initial<br>Workshops<br>WLC<br>Committee<br>Formed &<br>Manual<br>Developed | Phase 1:<br>Statewide<br>Training on<br>Water<br>Auditing | Phase 1A:<br>Validation of<br>Audits<br>Phase 2:                       | Phase 1B:<br>Validation of<br>Audits<br>Phase 2A:                      | Phase 1C:<br>Audit<br>Certification<br>Program<br>Phase 2B:            |
| Law   |  |   | Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Statewide<br>Technical<br>Assistance<br>Projects<br>(Small<br>Systems) | Statewide<br>Technical<br>Assistance<br>Projects<br>(Large<br>Systems) |





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- Case studies for growing implementation of established IWA/AWWA best practices and innovations for Water Loss Management
- Use special code LEAK for discounted registration rate















### Landscape of Varying Levels of Water Loss Management Policy

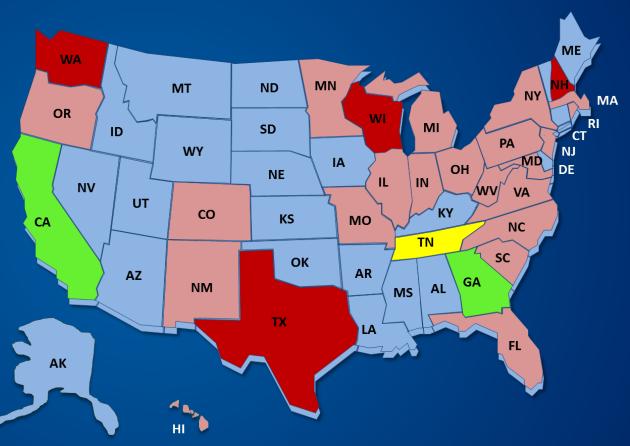
No Policy for Water Loss Management

Basic Water Loss Reporting

Annual Water Loss Reporting with AWWA M36 Terminology

Annual Water Loss Reporting with AWWA Free Water Audit Software

Annual Water Loss Reporting with AWWA Free Water Audit Software with Validation of Audits Submitted



# A Model for the Nation: Georgia's Statewide Water Loss Management Program





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Stewardship Through Innovation