# This presentation premiered at WaterSmart Innovations

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# The Town of Gilbert and Arizona Project WET:

## Working Smarter to Offer Transformative Water Education

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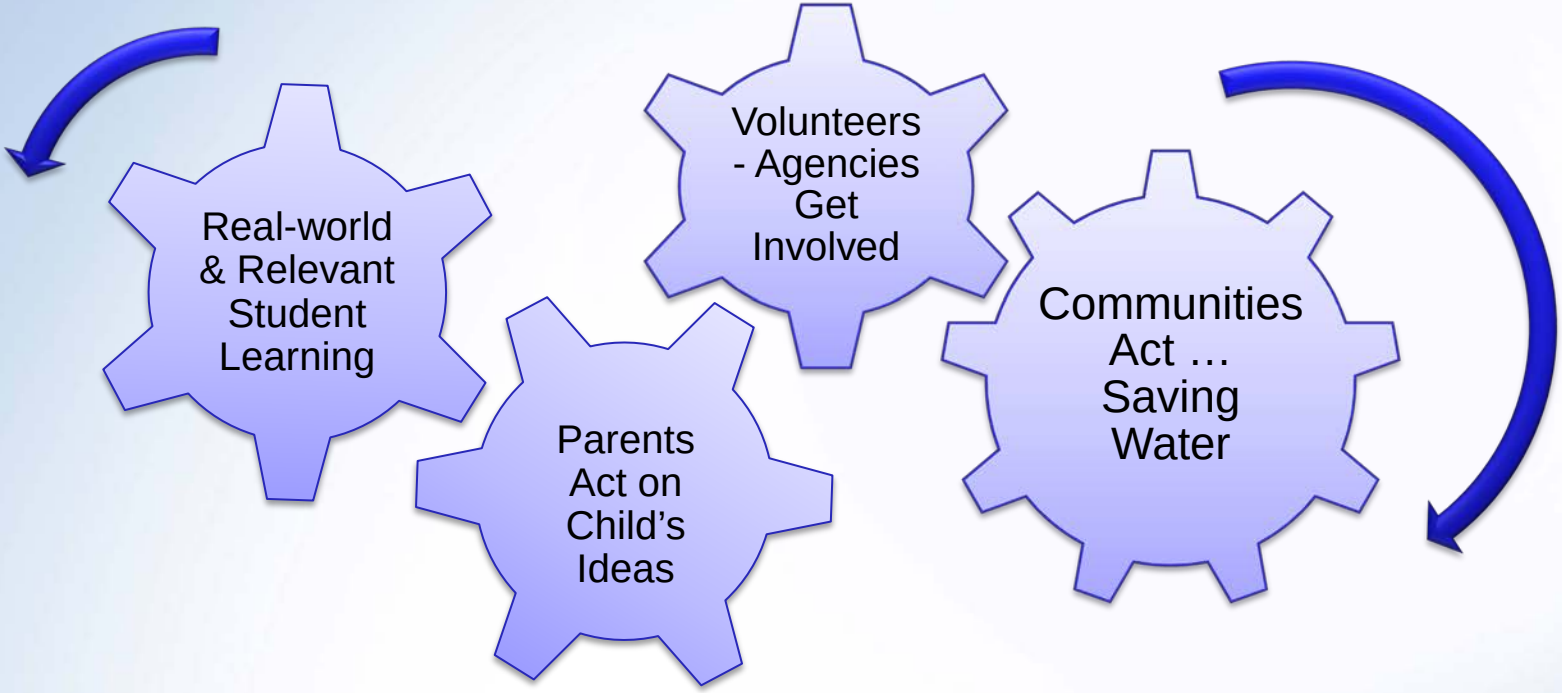
ARIZONA Project WET Water Education

GILBERT ARIZONA

WRRC wrrc.arizona.edu

THE UNIVERSITY OF ARIZONA College of Agriculture & Life Sciences Cooperative Extension

# The APW / Town of Gilbert Connection



# The Partnership

Using targeted Arizona Project WET education programs, the Town of Gilbert meets state requirements AND:

1. Promotes student learning and action
2. Builds buy-in with elected officials and other decision makers
3. Changes water use habits
4. Achieves real water savings

# Transformative

Causing a major change to something or someone, especially in a way that makes it or them better.

# The Partnership

- The Town of Gilbert actively collaborates with Arizona Project WET both directly and indirectly
  - Indirectly, by supporting Arizona Project WET efforts
  - Directly, by contracting for educational services

# School Water Audit Program

Incentivizes school and community water conservation through student-driven inquiry and action.

Projected 40 million gallons saved by students!

SWAP
School Water Audit Program

http://arizonawet.arizona.edu/programs/school_water_audit

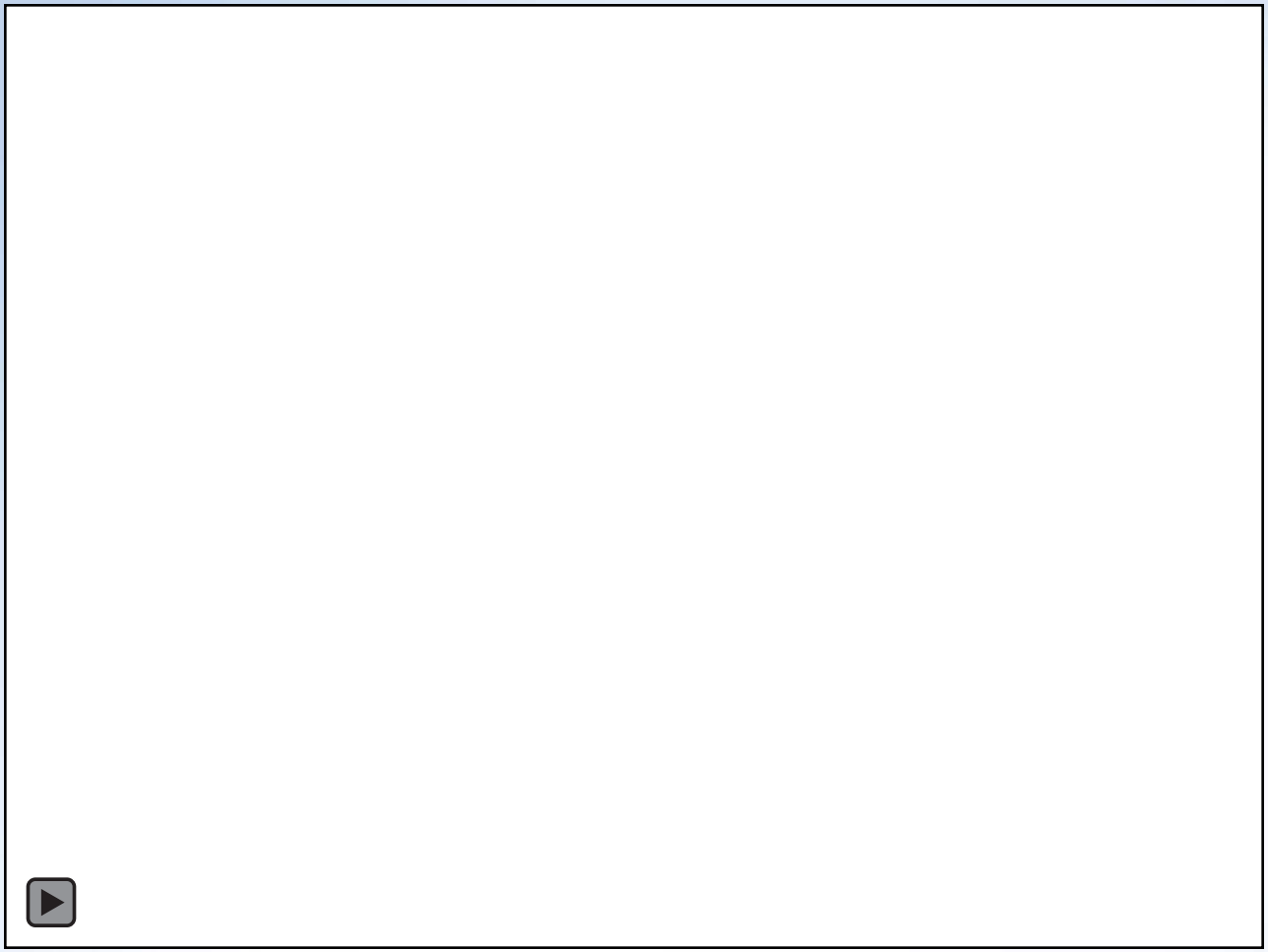
# Why the SWAP?

Students *own* their own data: **measuring directly** the amount of water used in a school.

Students **use technology to decrease water use** in the school and **mathematical thinking skills** to calculate the annual savings in gallons.


Student-led **retrofit installments** and **student presentations to decision makers,** incentivize community commitment and involvement.

# Auditing a Faucet



# Data Sheet

| Appendix 3.1.D: Measure Bathroom Faucet Flow Rate Data Sheet | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Inquiry Question** | How much water is used by students and teachers washing their hands at bathroom faucets **each YEAR**? | | | | | | | | | | | | | |
| **Location** | Location 1: _____ Location 2: _____ | | | | | | | | | | | | | |
| **A** | **B** | **C** | | | | **D** | | | | **E** | | | | **F** |
| **Faucet # ☑ If metered** | **☑ if Leak -ing** | **Baseline flow rate (existing condition i.e. with old aerator or no aerator)? (How many ml in 5 seconds?)** | | | | **Flow rate without aerator? (How many ml in 5 seconds?)** | | | | **Flow rate with new aerator? (How many ml in 5 seconds?)** | | | | **Notes and Comments (Leak level / GPY)** |
| | | **1** | **2** | **3** | **Avg** | **1** | **2** | **3** | **Avg** | **1** | **2** | **3** | **Avg** | |
| Location 1 ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| Location 2 ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| ___ ☐ | ☐ | | | | | | | | | | | | | |
| **Total** | | | | | | | | | | | | | | |
| **Average** | | | | | | | | | | | | | | |

Teacher Name: _____ Student Name: _____ Class Period: ___ Group #: ___ Date: _____

## Appendix 3.1.F: Bathroom Faucet Water Use Calculations Worksheet 1: *Baseline Condition*

**Inquiry Question:** How much water is used by students and teachers washing their hands at bathroom faucets each YEAR?

**Data needed:**

| | | |
|---|---|---|
| *a.* | Average ***baseline*** faucet flow rate = _____ mL/5sec | *(from 3.1.D, Measure Bathroom Faucet Flow Rate Procedure)* |
| *b.* | Average hand-washing frequency = _____ washes/day | *(from 3.1.B, Survey of Hand-Washing Frequency Procedure)* |
| *c.* | Average hand-washing time = _____ min/wash | *(from 3.1.C, Measure Average Hand-Washing Time Procedure)* |
| *d.* | # of hand-washers at the school (students plus adults) = _____ ppl | *(from 3.1.B, Survey of Hand-Washing Frequency Procedure)* |
| e. | # of days that there are people at school = _____ days/year | *(from 3.1.B, Survey of Hand-Washing Frequency Procedure)* |

**Conversion factors:** 1 L/1000mL 0.264 gal/1 L 60 sec/1 min

| | |
|---|---|
| 1. Convert the average flow rate from ml/5 sec. to gal/min. (use a) | $\frac{\text{_____}}{5\text{sec}} \times \frac{1L}{1000ml} \times \frac{0.264gal}{1L} \times \frac{60\text{sec}}{1\text{min}} = \text{_____}\ gal/\text{min}$ |
| 2. For how many total minutes does each person run water for hand-washing in one day? (use b and c) | _____ min/day |
| 3. How much water is used <u>by each person</u> for hand-washing in one day. (use #1 and #2) | _____ gal/day/person |
| 4. How much water, <u>in total</u>, is used at the school for hand-washing in one day? (use #3 and d) | _____ gal/day |
| 5. How much water is used at school for hand-washing in <u>one year</u>? (use #4 and e) | _____ gal/yr |

**Summary Statement:** Based on the *Baseline Flow Rate* of the bathroom faucets, _____ gallons of water are used at this school, for washing hands, each year!

# Science and mathematical thinking

**What else (other than flow rate) do you need to know to calculate the gallons used per year?**

- Frequency
- Duration

How will you calculate/estimate these variables?

# Gilbert Civic Center Water Audit

# Gilbert Civic Center Audit

- Length:  4 hours, but part of a yearlong water curriculum
- Students involved: 120 6th Graders
- Volunteer and staff involved: 17 for a total of 85 hours

# Gilbert Digital video

Gilbert's communications team created a video to cover the day's events and the contribution students made.


https://www.youtube.com/watch?t=1&v=8ILpUol1GCk

# Involving Town Council and the school district

Dignitaries at Civic Center Audit

- Town Councilman Victor Petersen spoke to students at lunch

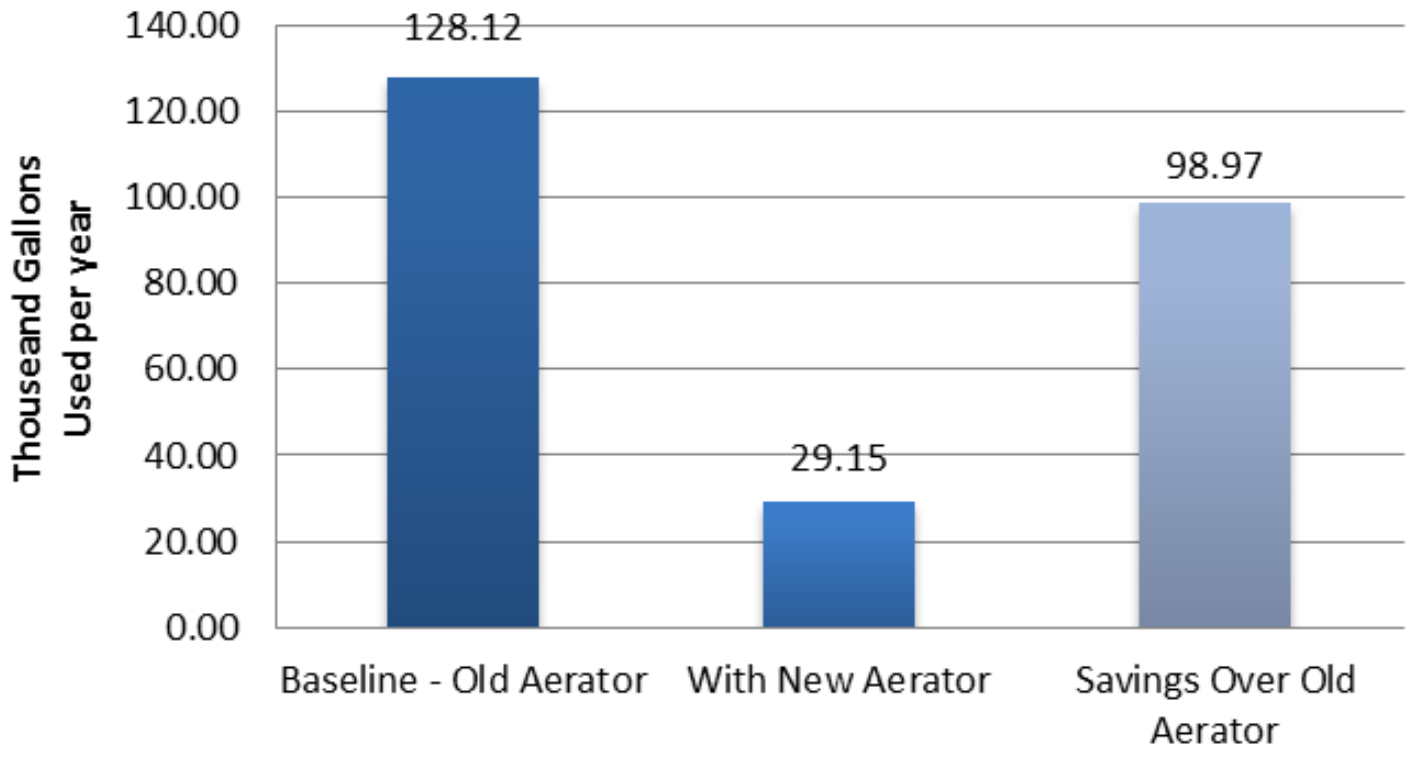
- Gilbert Public Schools Science Coordinator Amy Gingell

# ROI

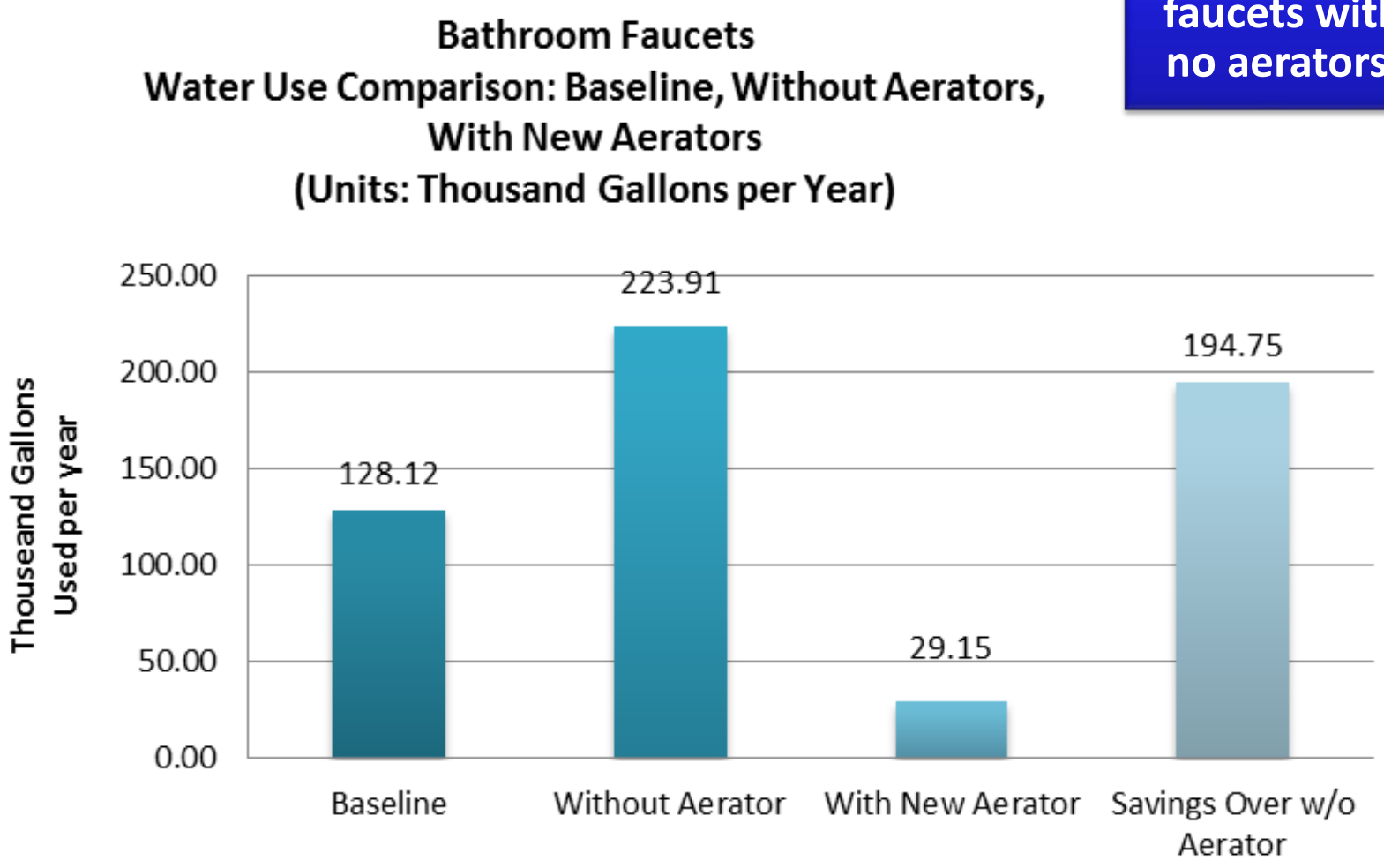
- Gilbert Water Conservation provided: 24 X 0.5 gpm aerators
  - Each aerator cost $0.55
  - Students replaced aerators in 24 sinks
  - With a projected annual savings of $430.00 (both water *AND* sewer rates!)
- Return on investment: **LESS THAN TWO WEEKS**

## Bathroom Faucets
## Water Savings Due to Aerator Replacement
## (Units: Thousand Gallons per Year)

**77% Savings by changing to water efficient aerators.**



**87% Savings compared to faucets with no aerators.**



# Civic Center Audit Impacts

- The SWAP brought together stakeholders from the community
- 120 students took measurements and installed 0.5 gpm aerators
- Using average use data (frequency and duration) the projected water savings was calculated
- Town Councilmember was present and expressed his thanks for this worthy project that not only saved water but also money for the town.
- Town of Gilbert received positive press in the form of a video
- Gilbert students took ownership and action for wise water use in their community

# Water Scene Investigation

ARIZONA Wet Water Education

The WSI Program inspires participants to adopt home water conservation practices through the installation of water efficient technology and comparison of their savings with other water users.

***Bringing it home***

**Projected 4.6 million gallons saved by students!**

WSI Water Scene Investigation

arizonawet.arizona.edu/wsi

# WSI program recruitment

- Long-standing relationship among teachers and Gilbert Water Conservation
- Teachers know they can trust the educational product we deliver
- This trust ensures program filled to capacity with Arizona Project WET facilitators!

# What's different about the WSI

# WSI: Bringing it Home

Students learn to measure baseline data, think critically and install simple retrofit devices. The result is that they teach their parents and siblings to conduct a home audit and replace aerators.


- Water providers and conservation organizations can target the now-aware families for next steps and incentive programs.

# Interview Data Sheet

**Faucet Location:** kid's bathroom

**Table 1** Focus Question: How many minutes per day does water flow from this faucet on an average day?

| Water use | Water User #1: Me | | | Water User #2: Sister | | | Water User #3: _____ | | |
|---|---|---|---|---|---|---|---|---|---|
| | # of Times per Day | Duration for Each Time (*seconds*) | Total Seconds per Day | # of Times per Day | Duration for Each Time (*seconds*) | Total Seconds per Day | # of Times per Day | Duration for Each Time (*seconds*) | Total Seconds per Day |
| Brushing teeth | 2 | 30 | 60 | 2 | 120 | 240 | | | |
| Washing Hands | 5 | 15 | 75 | 4 | 20 | 80 | | | |
| Other uses: Washing face | 1 | 60 | 60 | 1 | 45 | 45 | | | |
| **Each User's Total Seconds Per Day** | ⇨⇨⇨⇨⇨⇨⇨⇨ | | 195 | ⇨⇨⇨⇨⇨⇨⇨⇨ | | 365 | ⇨⇨⇨⇨⇨⇨⇨⇨ | | |

Total *seconds* this faucet runs per day: **User #1's total + User #2's total + User #3's total =** 560 sec/day

For how many *minutes* per day does water flow from this faucet? **Total seconds/60 =** 9.33 min/day

# Faucet Audit Data Sheet

**Table 2** Focus Question: **How much water flows from the bathroom faucet when you turn it on? (in gallons per minute = gpm)**

| ☑ if Leaking | Baseline Flow Rate (how you found the faucet, i.e. may or may not have an aerator) | | | | Flow Rate Without Aerator | | | | Flow Rate With New Aerator | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | Avg | 1 | 2 | 3 | Avg | 1 | 2 | 3 | Avg |
| ☐ | 2.6 | 2.3 | 2.4 | 2.43 | 4.0 | 3.8 | 3.7 | 3.83 | 0.9 | 1.1 | 1.1 | 1.03 |

What is the **Average Baseline** flow rate (gpm) = 2.43 What is the **Average New Aerator** flow rate (gpm) = 1.03

**Notes:** (leak location, old aerator's condition, observations, etc.)

**Table 3** Focus Question: **Does the New Aerator result in water savings?**

| Baseline Water Use | | | | New Aerator Water Use | | | |
|---|---|---|---|---|---|---|---|
| Average Flow Rate (gpm) | | Total Time min/day | Baseline Water Use per Day (Avg x total time = gal/day) | Average Flow Rate (gpm) | | Total Time min/day | New Aerator Water Use per Day (Avg x total time = gal/day) |
| 2.43 | X | 9.33 | 22.67 | 1.03 | X | 9.33 | 9.61 |

Change in daily water use due to aerator installation:

**Baseline Water Use/day – New Aerator Water Use/day = 13.06 gal/day**

# Students input data

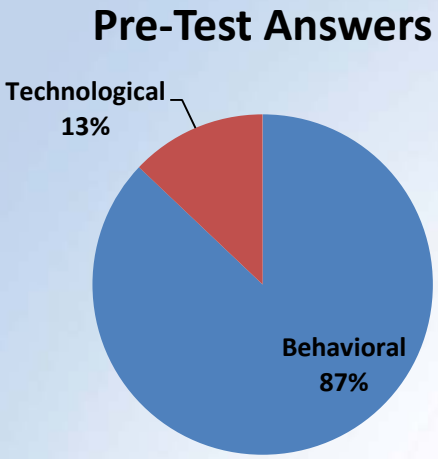
- Website provides running total of water savings

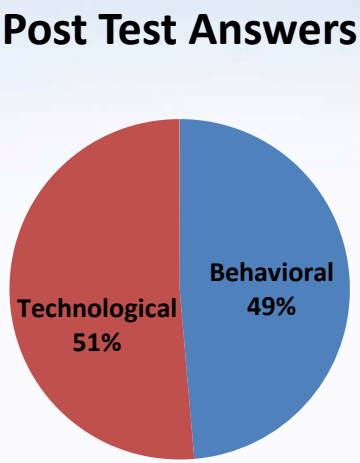
# WSI in Gilbert

- **734 sixth grade students**
- **28 classrooms**
- **350 (48%)** were able to install the aerators on their bathroom faucets at home.
- Of those 350 students, 161 were able to change aerators on two bathroom faucets.
- **511 aerators installed**
- Projected annual **water savings** for this year's Gilbert students is **2,786,961 gallons**

**With the goal of having all of the info necessary to calculate annual water use & savings!**

# WSI Impacts

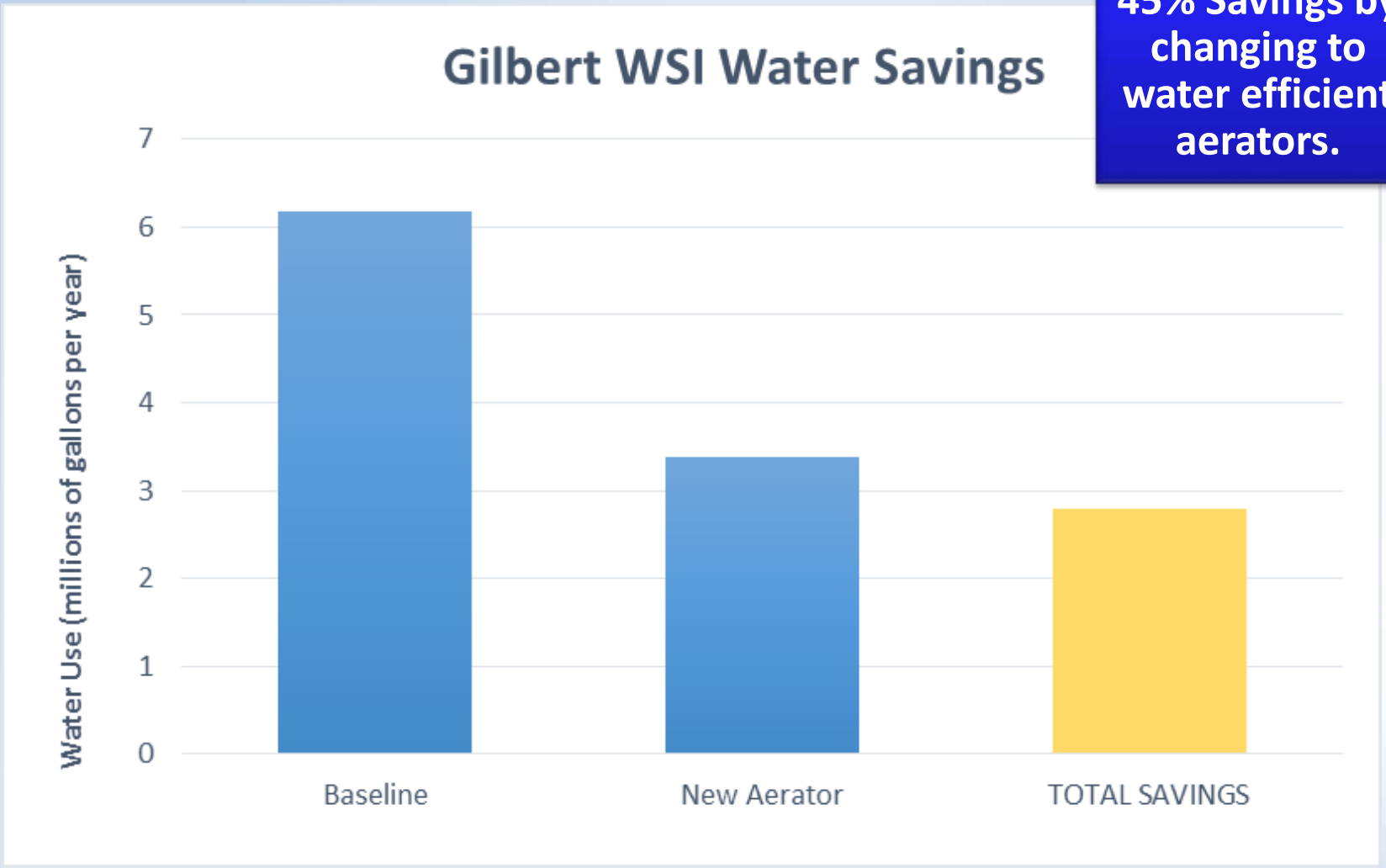


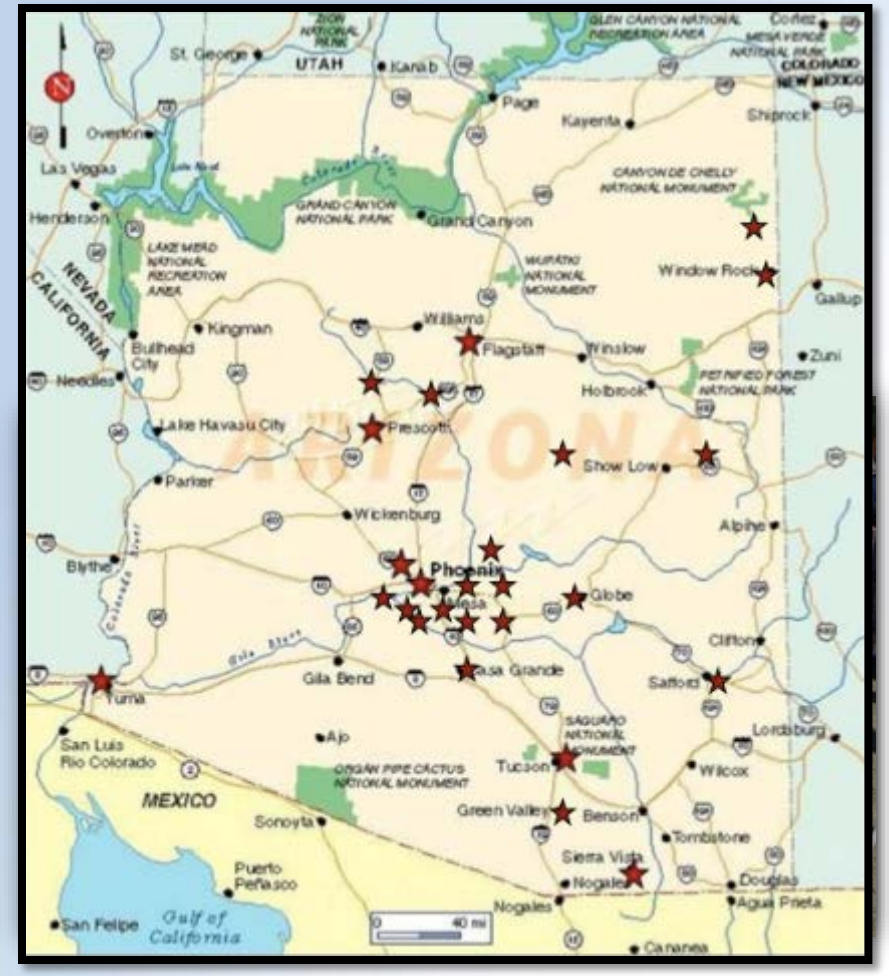

After the WSI, students were able to name nearly 3 more ways to conserve water. Results indicate that students had some prior knowledge of behavior methods, but almost no knowledge of technological methods.

# WSI Results

**45% Savings by changing to water efficient aerators.**



# APW Program since 2000: Arizona Water Festival (AWF)




Arizona Water Festivals instill a deeper understanding of water in the earth system and Arizona's water resources through:

- teacher professional development on a standards-based unit
- water festival event that provides students with a day of exploration and investigation
- volunteer involvement
- sponsorship of effective education from collaboration with local businesses and organizations

25 communities • 71,500 students • 2,400 teachers

AWF Arizona Water Festival

## Before the Festival

Take the: **PRE-TEST**

| Learn about | By Doing: | Using: | Science Standards: |
|---|---|---|---|
| **Watersheds** | **Seeing Watersheds, parts I & II** | **WET Guide 2.0, p. 187** | **3.1, P.O. 1,2; 4.3, P.O. 1,2;6.3,P.O.1,2*** |
| **Water Cycle** | **Water Models** | **Supplement (Old WET Guide)** | **2.2, P.O 1, 3** |
| **Groundwater** | **Get the Groundwater Picture, parts I & II** | **WET Guide 2.0, p 143** | **4.3, P.O. 1, 2, 3, 4** |
| **Water Conservation** | **Blue Planet Activity A Drop in the Bucket** | **Discoverwater.org WET Guide, 2.0, p. 257** | **3.1, P.O. 1,2; 4.3, P.O. 1,2;6.3,P.O.1,2** |

Attend the: **WATER FESTIVAL!** — Science Standards: **3.1, P.O. 1,2; 4. 3, P.O. 1,4; 6.2, P.O. 1,2,3, 6.3, P.O. 1,2**

## After the Festival

| Learn about | By Doing: | Using: | Science Standards: |
|---|---|---|---|
| **Watersheds** | **Sum of the Parts Just Passing Through** | **WET Guide 2.0, p. 283 WET Guide 2.0, p. 163** | **3.1, P.O. 1** |
| **Water Cycle** | **Blue Traveler Activity Thirsty Plants** | **Discoverwater.org Supplement (old WET Guide)** | **2.1, P.O. 2; 4.1, P.O. 1;6.3, P.O. 1, 2;** |
| **Groundwater** | **Common Water** | **WET Guide 2.0, p 249** | **4.3, P.O. 1, 3, 4** |
| **Water Conservation** | **Water Detectives Activity** | **Discoverwater.org** | **4.3, P.O. 4** |

** Note that Strand 1 Science standards are covered throughout the unit as you explore water through scientific inquiry!!

Take the: **POST-TEST**

# The Water Festival Model:
## Community Water Festival

**The Water Cycle**

**Water Conservation**

**Groundwater**

**Watersheds**

Red Area

Green Area

Yellow Area

Blue Area

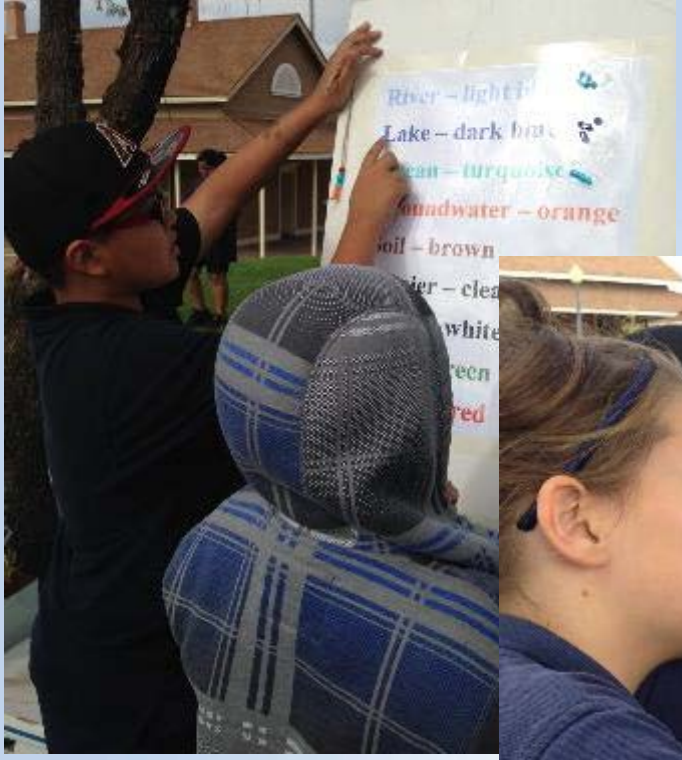
Staging Crew

Parking and Bus Drop-off


# Groundwater Lesson

# Groundwater Lesson


# Water Cycle Lesson





# Water Cycle Lesson

# Water Conservation Lesson


# Watershed Lesson

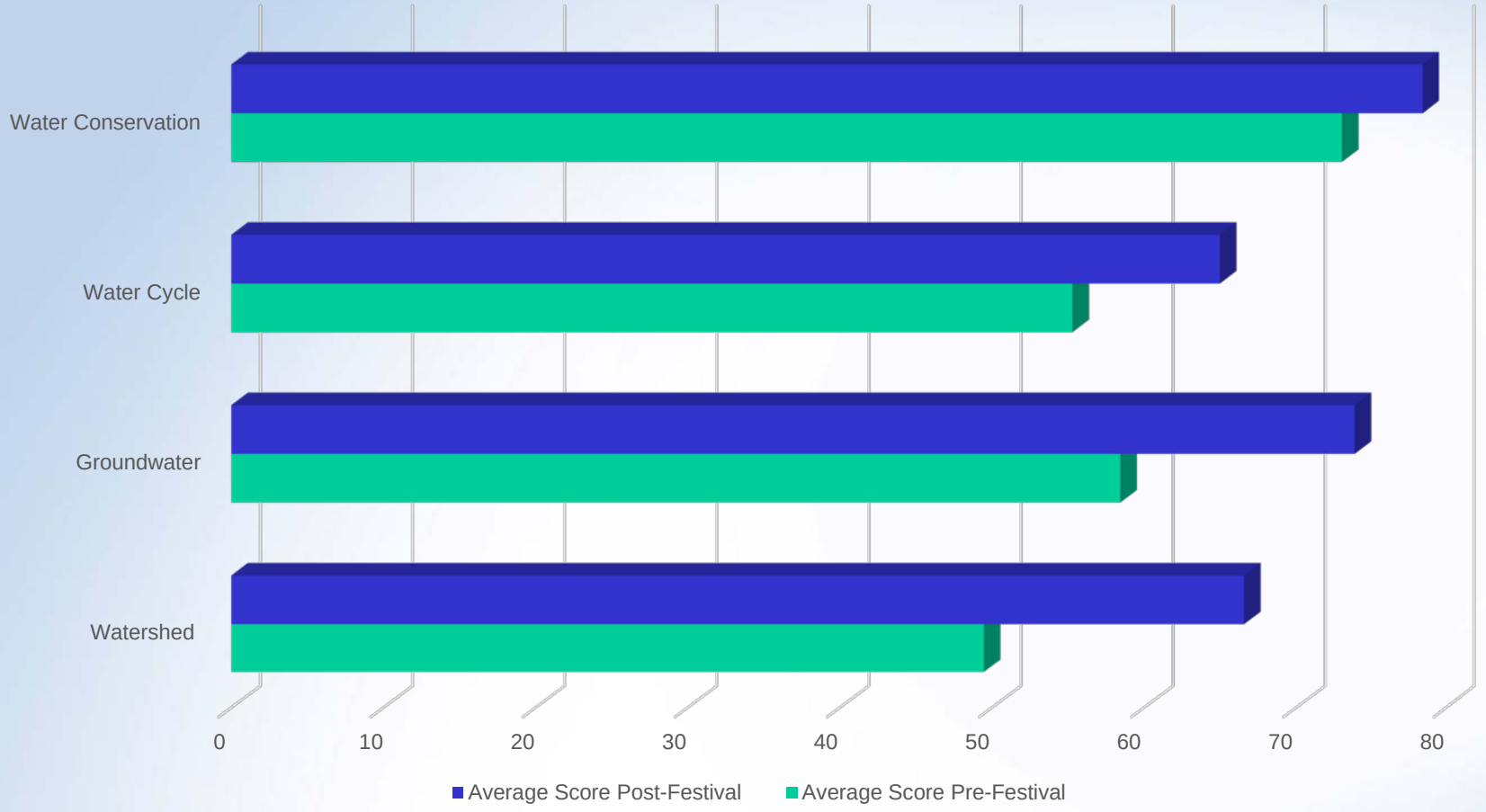
# 4th Annual Gilbert Water Festival

- 912 4th grade students
- 32 4th grade teachers
- 38 community members volunteers from:
  - Gilbert Leadership Class 23
  - Local business JB Water Distillers
  - University of Arizona Master Gardeners
  - Desert Willow Environmental Education Center
  - The Nature Conservancy

# Town Council involved (again!)


- Keep our elected officials in-the-know about our efforts to save water and educate community
- Helps for later buy-in!

# Learning Gains



# What do teachers say?

"My students and I love this program. If it is presented before AIMS it is an excellent way to review concepts already presented in class. My students love doing the hands on experiments because they visually exemplify the concepts learned in class…." – *4th Grade Teacher*

"Thank you so much for this wonderful opportunity! Our class went to the "Water Festival" this afternoon, and it was wonderful! We learned so much, and the lessons also reinforced what we've already covered. What a worthwhile, hands-on activity!"
– *Sharon George, Mesquite Elementary*

# The Gilbert Water Festival:

1. Extends classroom instruction and engages students in the exploration of their water resources
2. Fosters an innovative, playful community with premier education for Gilbert children
3. Increases STEM literacy in our schools by providing professional development to teachers on the subject, as well as student outreach that extends classroom learning with hands-on activities.
4. Develops knowledge, attitudes and behaviors with respect to responsible water stewardship.

# Summary

- Collaboration is key!
- Municipal staff provides time, expertise, and access to facilities for real-world auditing
- Town contracts services with trusted educational institution
- ACTUAL water saved through education programs
- Students engage in real-world conservation and learning!

# Contact Information

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**Gilbertaz.gov/water**


BRUTE