

# Municipal Water Conservation

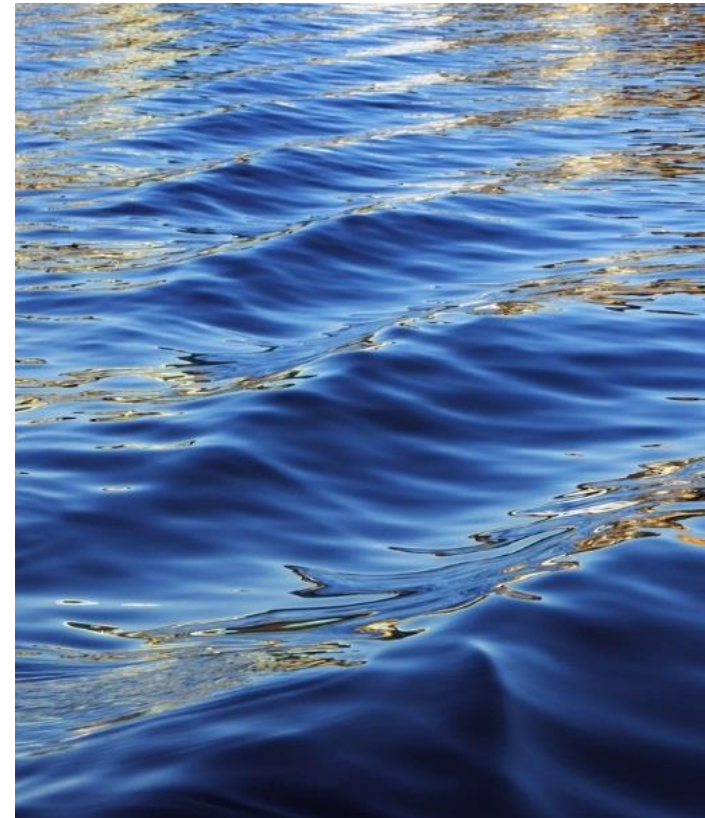
## City of Cheyenne:

Conservation has already cut per capita demand by nearly 5 times more than demand dropped due to other reasons like rate increases or retrofits/new construction.

# Water Sustainability Reduce Your Use



Dena Egenhoff  
City of Cheyenne Board of Public Utilities





# Water Sustainability

Reliable, safe and cost-effective manner





Reliable?



## Lake Powell and the recent drought



EcoWest.org

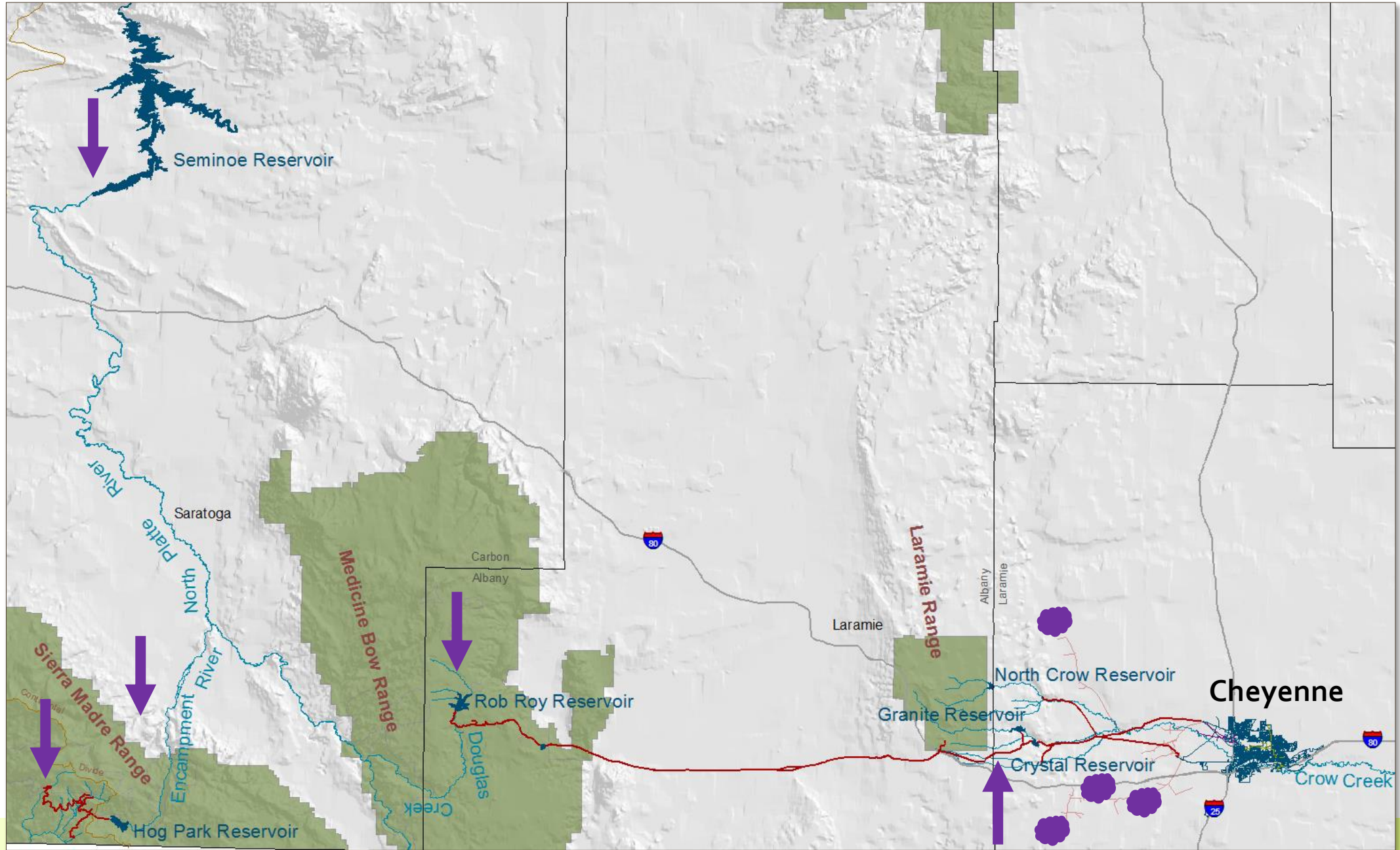
Source: NASA



Safe?



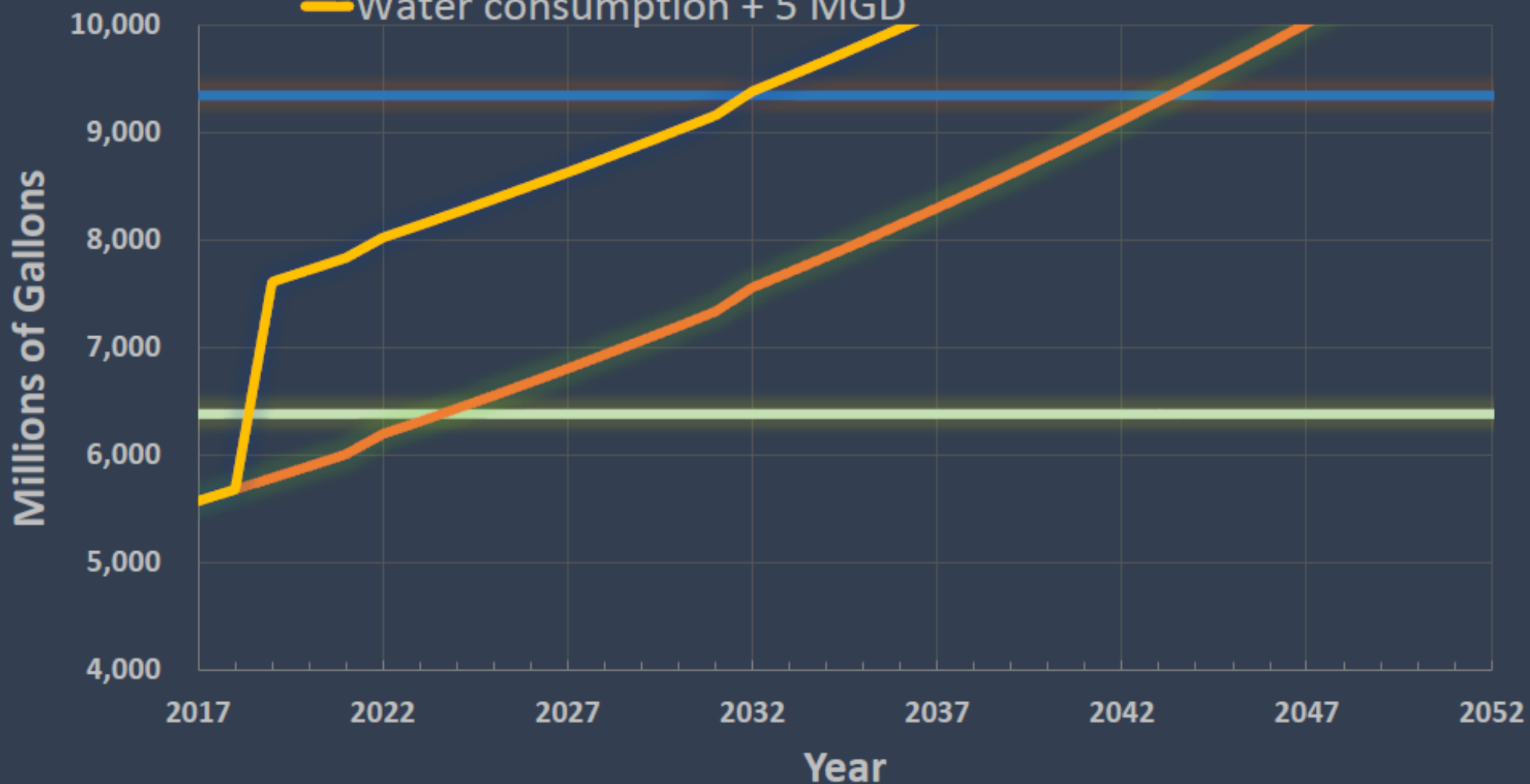
# Cost-Effective?





# Annual Demand vs. Supply

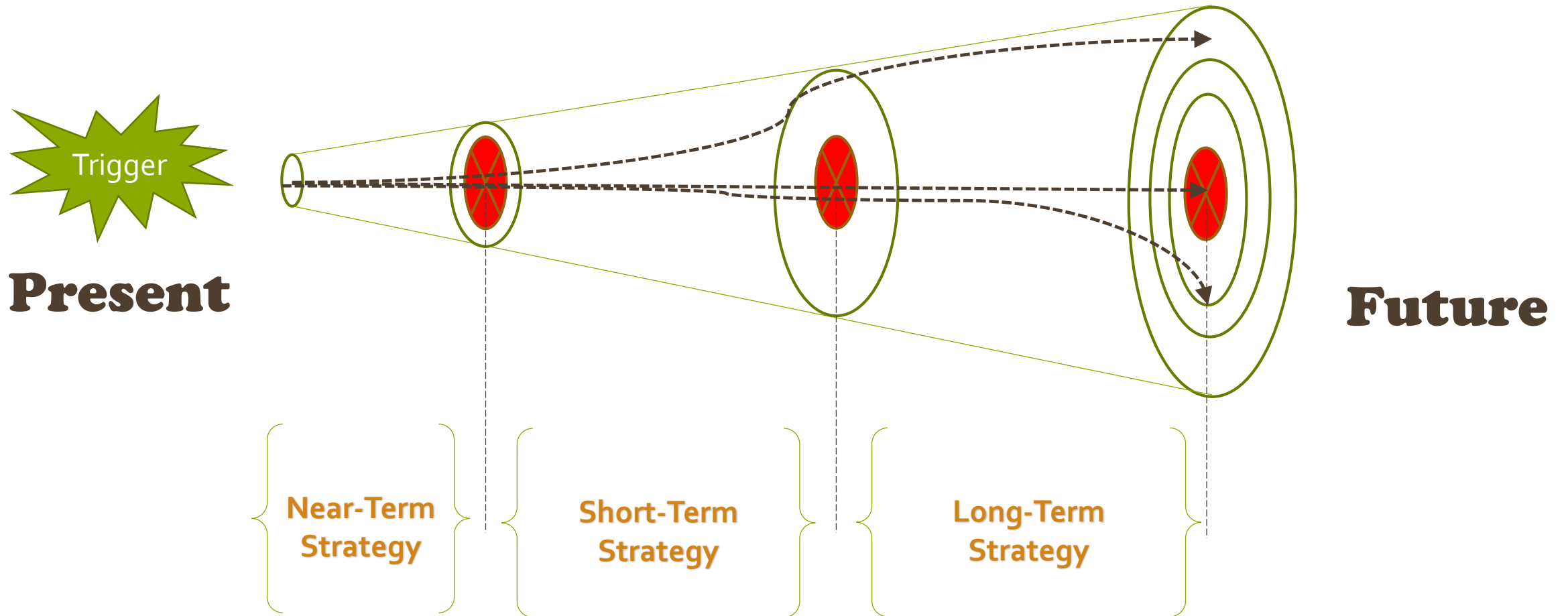
- Water Supply 100% snowpack + groundwater
- Water Supply 2002 drought
- Water Consumption (90th percentile)
- Water consumption + 5 MGD



Three water sources:

1. Groundwater
2. Surface water
3. Reuse water

# The Cone of Uncertainty







# Cheyenne's Water Conservation



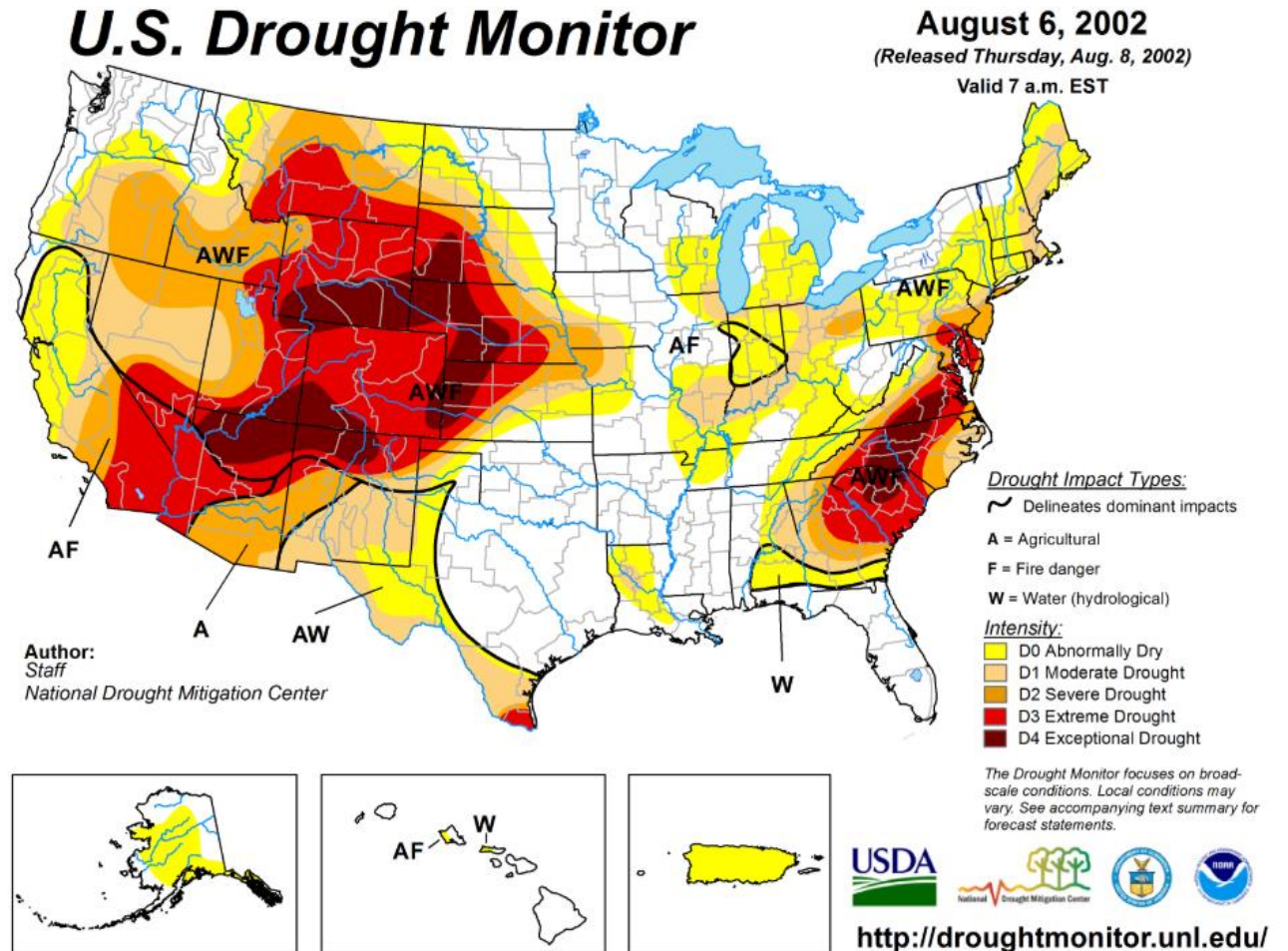
# Trigger Point: 2002 drought

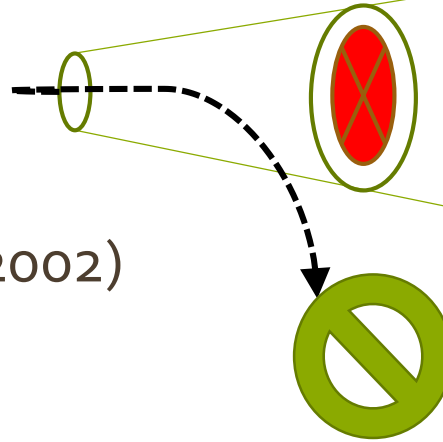


- Water collected 2002=5,614 AF
- Water used 2001= 16,799 AF

## Reservoirs storage capacity

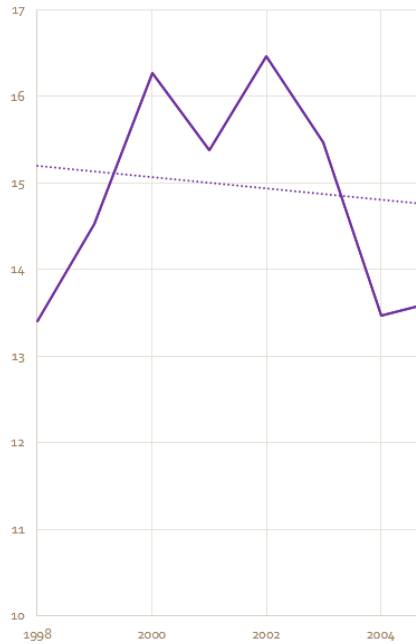
| 2002      | Reservoir % full |
|-----------|------------------|
| January   | 75%              |
| May       | 75%              |
| July      | 63%              |
| September | 54%              |
| November  | 50%              |
| December  | 49%              |





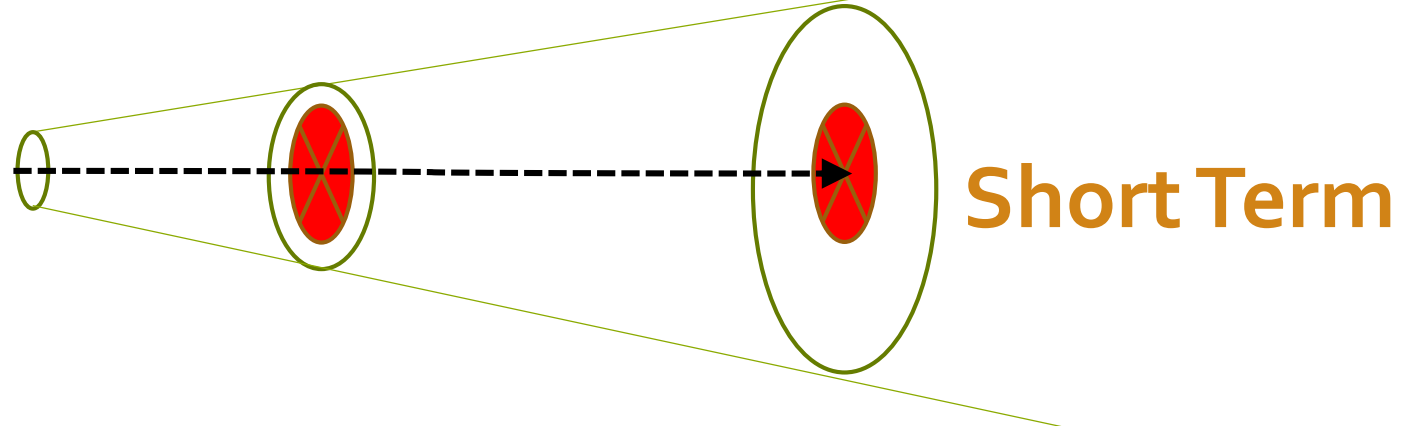
## Near Term Solution

- Asked to voluntarily use less water (2002)
- Provided public announcements and education about the water shortage.



FY 2002 3<sup>rd</sup> highest water consumption in history





- Declared moderate to severe water restrictions (March 2003-April 2004)
- Water Cop (2003)
- \$0.80 per 1,000 surcharge on water consumption (June 2003)
- 2003 Master plan recommendations
- Adopted the Wise Water Plan as a City Resolution #4564 and ordinance with fees (2004)
- Public outreach



# Wise Water Plan

Summer Water Conservation (May 1-September 1)

- No watering b/w 10 am- 5pm
- Water no more than 3 days per week
- Further restrictions based on reservoir levels and trigger points such as:
  - Water no more than 0-2 days per week

All year round water conservation measures

- No wasting water
- Washing vehicles only with automatic shut-off nozzles on hoses
- No washing of sidewalk, parking lots or driveways with a hose except for safety, health or construction reasons.

Enforcement

- Water marshal
- Fees for violations in City's ordinances
- City Code-can shut off water services



**Summer Watering Schedule**  
**May 1st-September 1st**

**Lawns and Turf**

- No watering between 10 am to 5 pm
- No watering more than 3 days/week

**Gardens and Flowers**

- No watering between 10 am to 5 pm

**No Wasting Water** such as allowing water to run down the street.

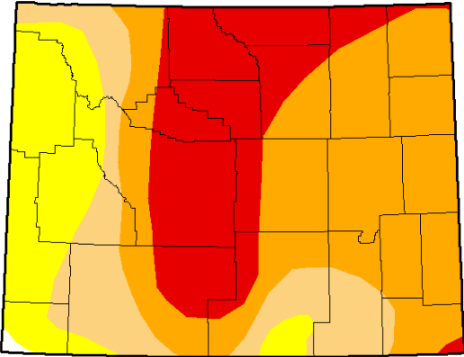
**No Washing Hard Surfaces**  
Such as sidewalks, parking lots or driveways with a hose is prohibited.  
Exceptions are for safety, health or construction reasons.

**Washing Vehicles** is permitted any time, any day, as long as customer use automatic shut-off nozzles on hoses.



# Drought 2006/2012

## U.S. Drought Monitor Wyoming



**August 15, 2006**  
(Released Thursday, Aug. 17, 2006)  
Valid 7 a.m. EST

|                                       | Drought Conditions (Percent Area) |       |       |       |       |      |
|---------------------------------------|-----------------------------------|-------|-------|-------|-------|------|
|                                       | None                              | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4   |
| Current                               | 0.23                              | 99.77 | 82.85 | 66.45 | 25.67 | 0.00 |
| Last Week<br>8/8/2006                 | 0.37                              | 99.63 | 80.56 | 66.26 | 17.12 | 0.00 |
| 3 Months Ago<br>5/16/2006             | 21.40                             | 78.60 | 40.76 | 0.00  | 0.00  | 0.00 |
| Start of<br>Calendar Year<br>1/3/2006 | 18.07                             | 81.93 | 44.33 | 0.00  | 0.00  | 0.00 |
| Start of<br>Water Year<br>8/27/2005   | 12.35                             | 87.65 | 81.76 | 34.22 | 0.00  | 0.00 |
| One Year Ago<br>8/16/2005             | 10.11                             | 89.89 | 83.83 | 45.90 | 0.00  | 0.00 |

**Intensity:**  
■ D0 Abnormally Dry    ■ D3 Extreme Drought  
■ D1 Moderate Drought    ■ D4 Exceptional Drought  
■ D2 Severe Drought

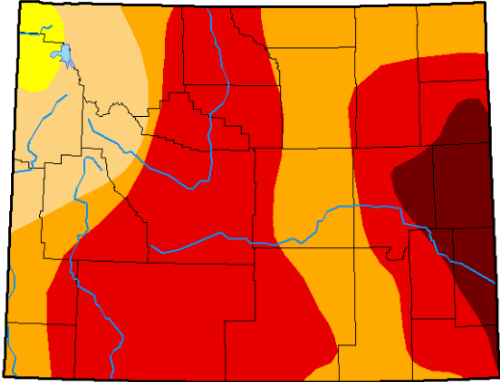
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

**Author:**  
Mark Svoboda  
National Drought Mitigation Center



<http://droughtmonitor.unl.edu/>

## U.S. Drought Monitor Wyoming



**October 2, 2012**  
(Released Thursday, Oct. 4, 2012)  
Valid 8 a.m. EDT

|   | Drought Conditions (Percent Area) |        |       |       |       |      |
|---|-----------------------------------|--------|-------|-------|-------|------|
|   | None                              | D0-D4  | D1-D4 | D2-D4 | D3-D4 | D4   |
| Current                                 | 0.00                              | 100.00 | 98.01 | 86.55 | 57.93 | 7.64 |
| Last Week<br>9/25/2012                  | 0.00                              | 100.00 | 98.01 | 87.30 | 58.34 | 2.72 |
| 3 Months Ago<br>7/03/2012               | 6.44                              | 93.56  | 84.17 | 51.95 | 4.59  | 0.00 |
| Start of<br>Calendar Year<br>01/03/2012 | 99.84                             | 0.16   | 0.00  | 0.00  | 0.00  | 0.00 |
| Start of<br>Water Year<br>09/25/2012    | 0.00                              | 100.00 | 98.01 | 87.30 | 58.34 | 2.72 |
| One Year Ago<br>10/04/2011              | 94.74                             | 5.26   | 0.00  | 0.00  | 0.00  | 0.00 |

**Intensity:**  
■ D0 Abnormally Dry    ■ D3 Extreme Drought  
■ D1 Moderate Drought    ■ D4 Exceptional Drought  
■ D2 Severe Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

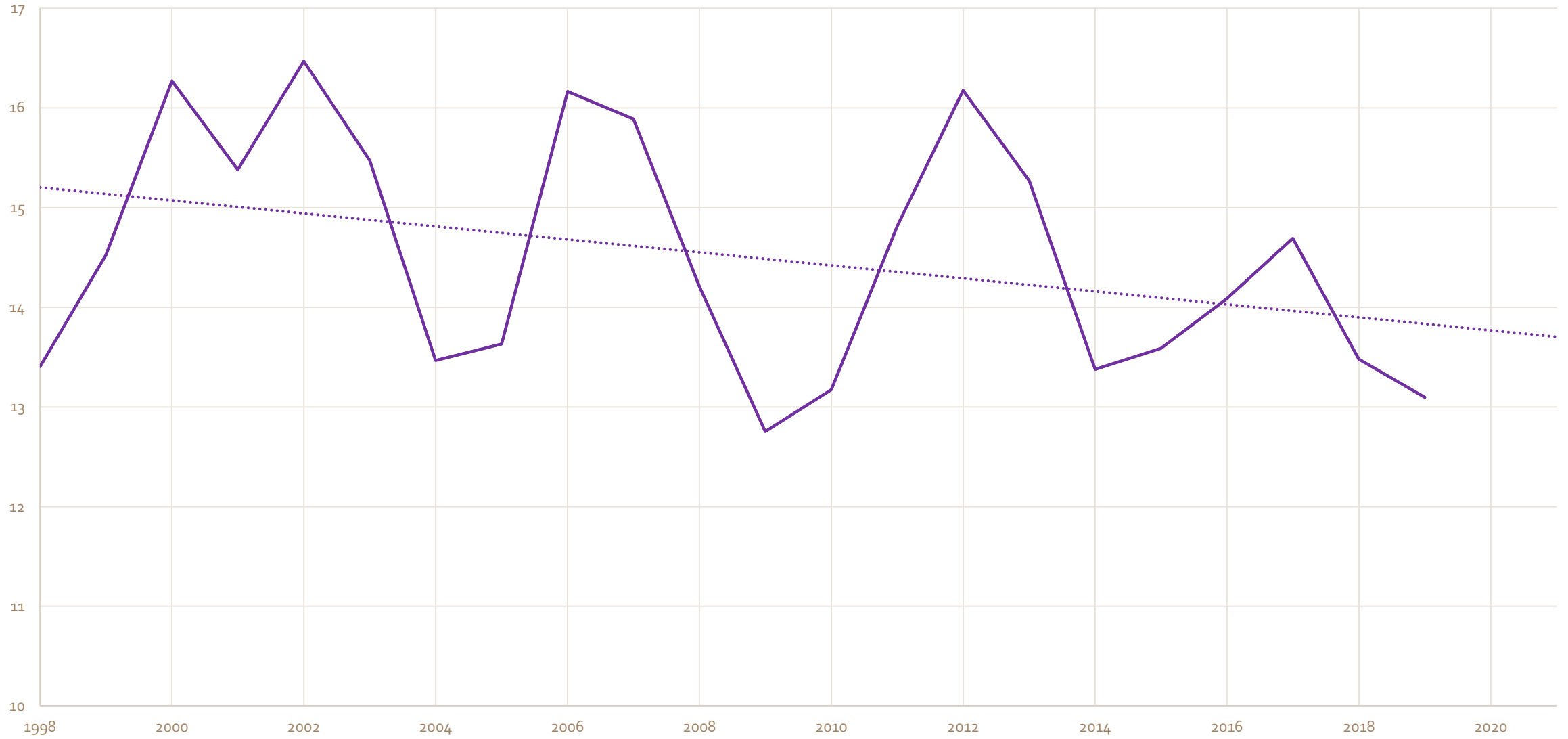
**Author:**  
Anthony Artusa  
NOAA/NWS/NCEP/CPC



<http://droughtmonitor.unl.edu/>



# Cheyenne



— Total Water Delivered (1000 Acre-ft)

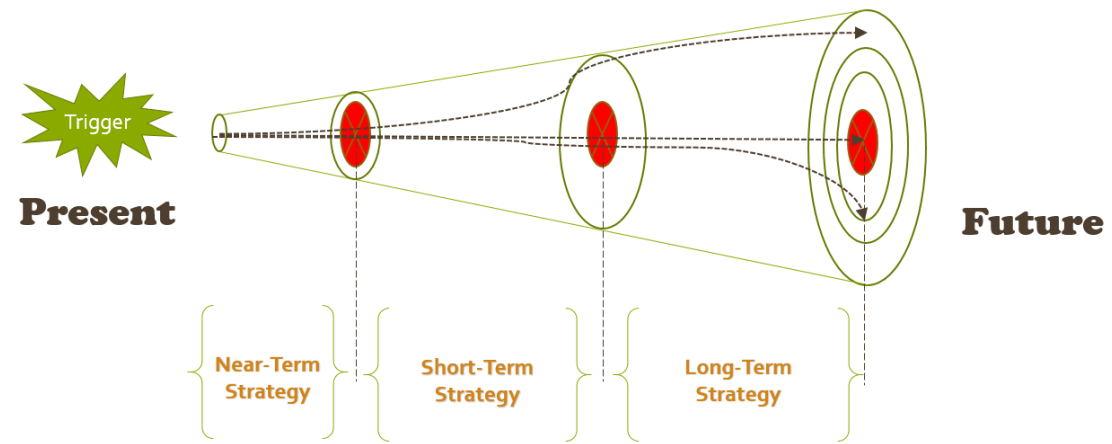
— Total Water Delivered (1000 Acre-ft)

..... Linear (Total Water Delivered (1000 Acre-ft))

# Long term

## Planning

1. Mitigation of risks
  - Tiered rates/Rate Study
  - Future integrated master planning approaches
  - Rebates



# Long term Tiered Rates

Cheyenne, Wyoming

| <b>Residential Single-Family</b>            | <b>Volume rate charge per 1,000 gallons (2020)</b> |
|---|--|
| 1 <sup>st</sup> Block (first 6,000 gallons) | \$4.42   |
| 2 <sup>nd</sup> Block (next 18,000 gallons) | \$5.46   |
| 3 <sup>rd</sup> Block (next 18,000 gallons) | \$6.78   |
| All over (42,000 gallons)                   | \$8.44   |

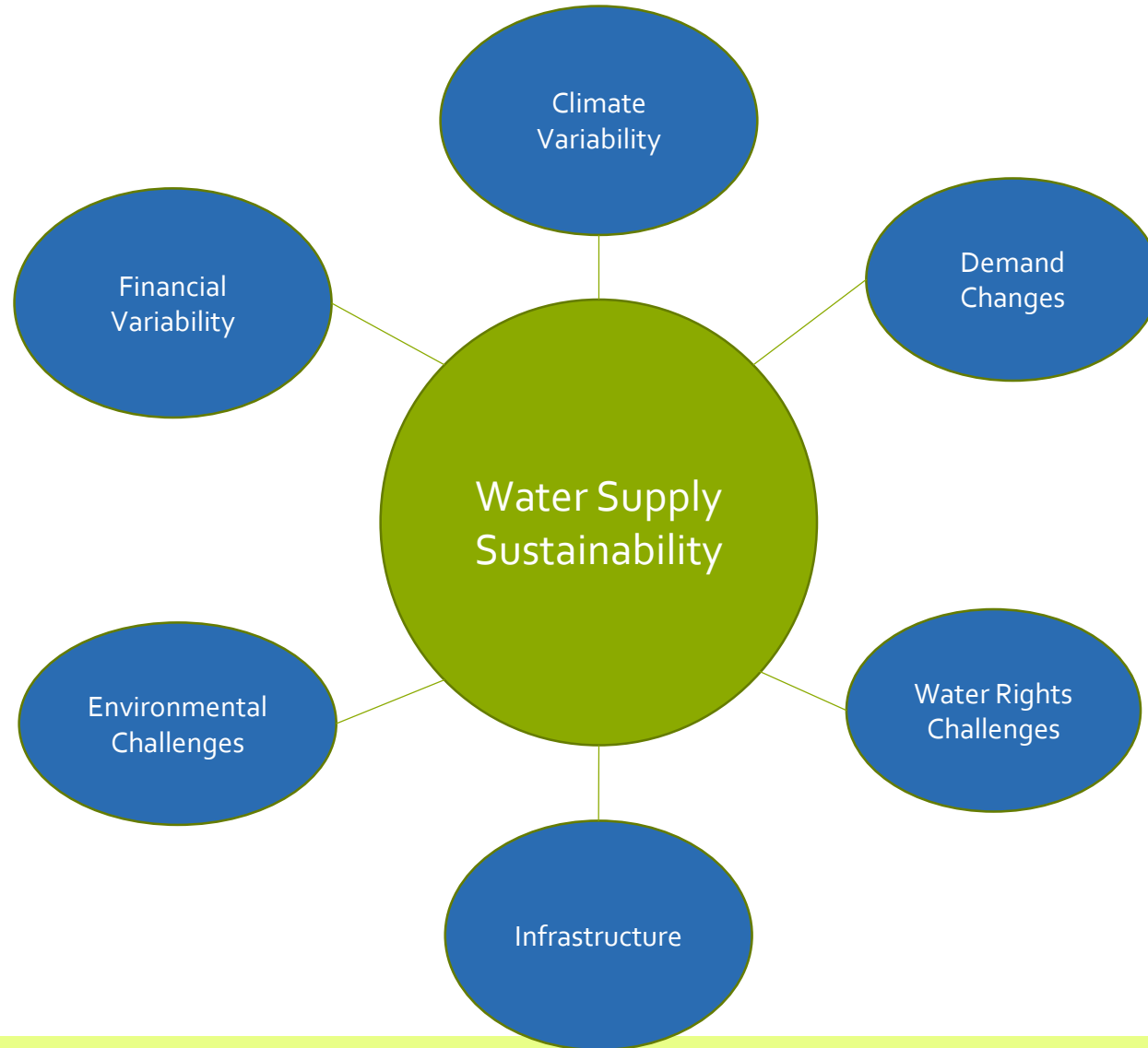
Santa Fe, NM

| <b>Residential</b>                    | <b>Volume rate charge per 1,000 gallons (2020)</b> |
|---------------------------------------|--|
| September-April (first 7,000 gallons) | \$6.06   |
| September-April (>7,000 gallons)      | \$21.72  |
| May-August (first 10,000 gallons)     | \$6.06   |
| May-August (>10,000 gallons)          | \$21.72  |



Long term

# Future integrated planning approaches



# Long term Rebates

1. DRIP program
2. Garden in a Box
3. Toilet



## SAVE WATER AND MONEY

**FREE APPLIANCE REPLACEMENT**

*The Cheyenne Board of Public Utilities wants to help you save water and money.* Income-qualified households are

eligible to receive up to:

- two high-efficiency toilets,
- two low-flow showerheads, and
- two faucet aerators.

**Installation included!**

**Do you qualify?**

- The Direct Remedy Income-Qualified Program (DRIP) is available to property owners and renters.
- Qualifying households must be enrolled in a federal income assistance program.

**LIMITED  
AVAILABILITY  
APPLY  
TODAY!**



City of  
**Cheyenne**  
**Board of  
Public Utilities**

**FILL OUT YOUR APPLICATION TODAY!**

**Customer Service:** 307-637-6460  
2416 Snyder Ave, Cheyenne, WY  
info@cheyennebopu.org



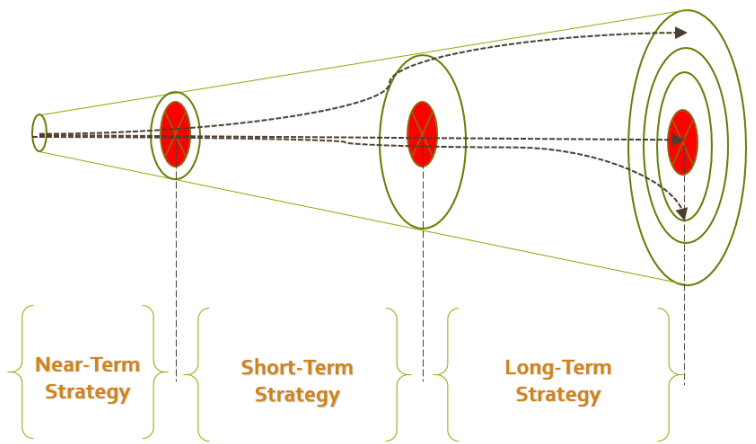
# Long term

## Technology

1. Reuse water-alternative
2. Advanced meter infrastructure (AMI)
3. Water Smart Software
4. Leak detection methods



**Present**



**Future**





# Long term

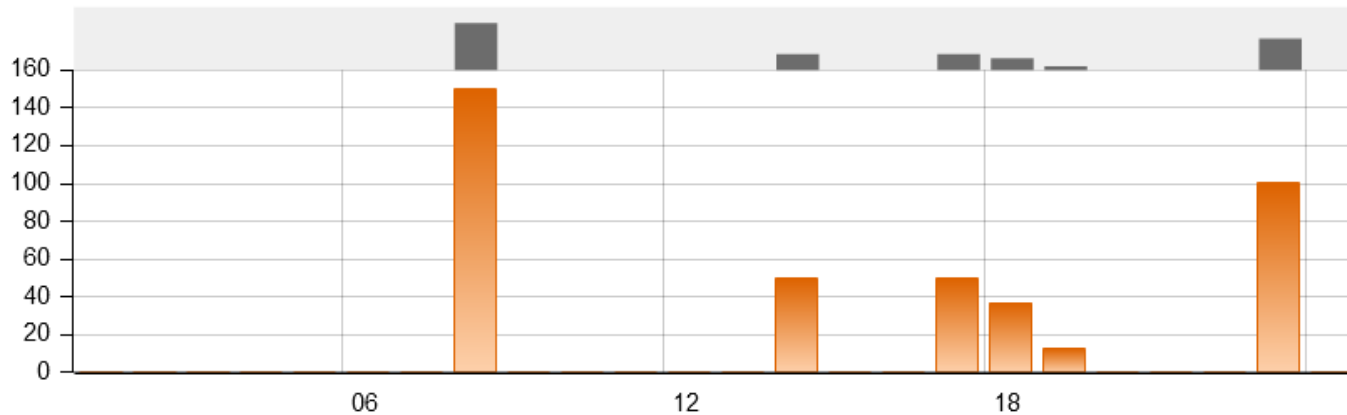
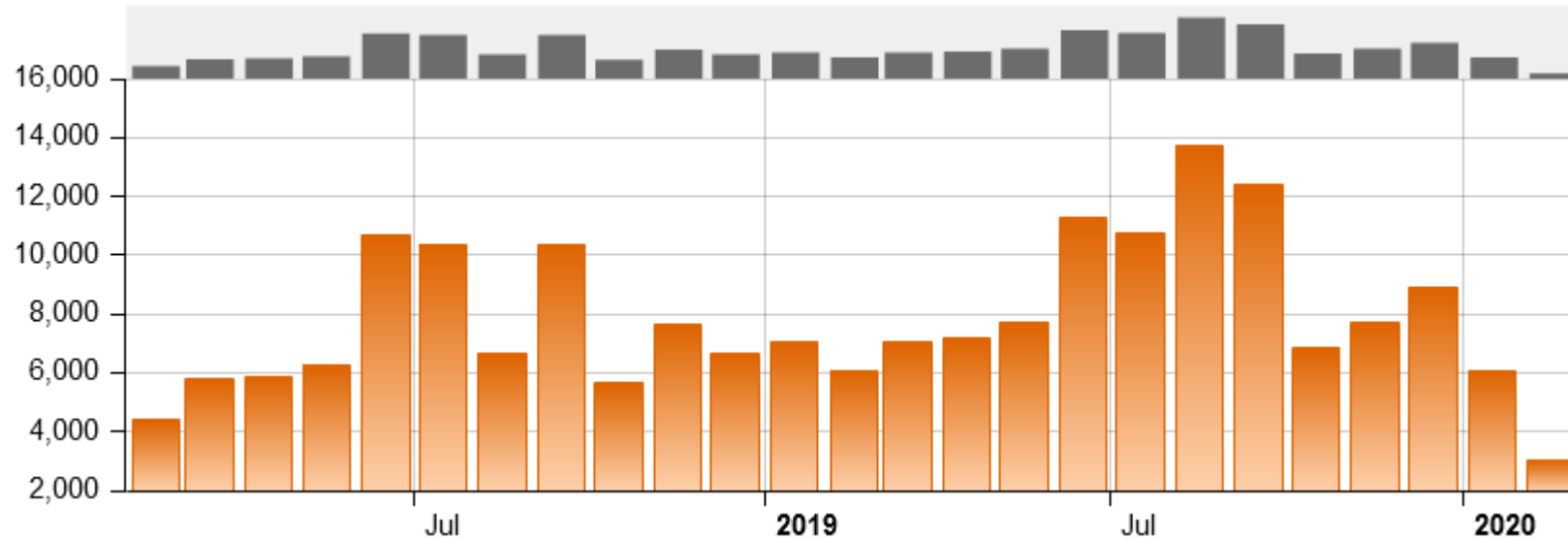
## 1. Reuse

- Started in 2007
- Class A (most stringent classification)
- Irrigate parks, athletic fields, cemeteries, schools and green areas.
- 500 acre-ft/yr. offset



# Long term

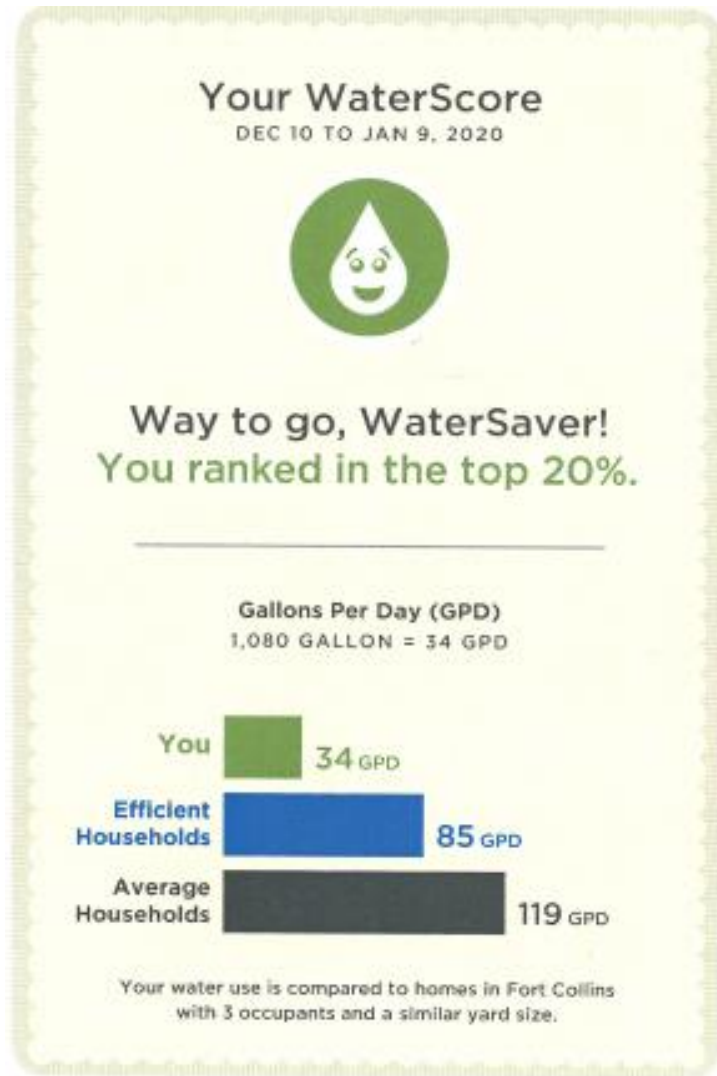
## 2. Advanced meter infrastructure (AMI)



February 9, 2020  
Hourly water use

# Long term

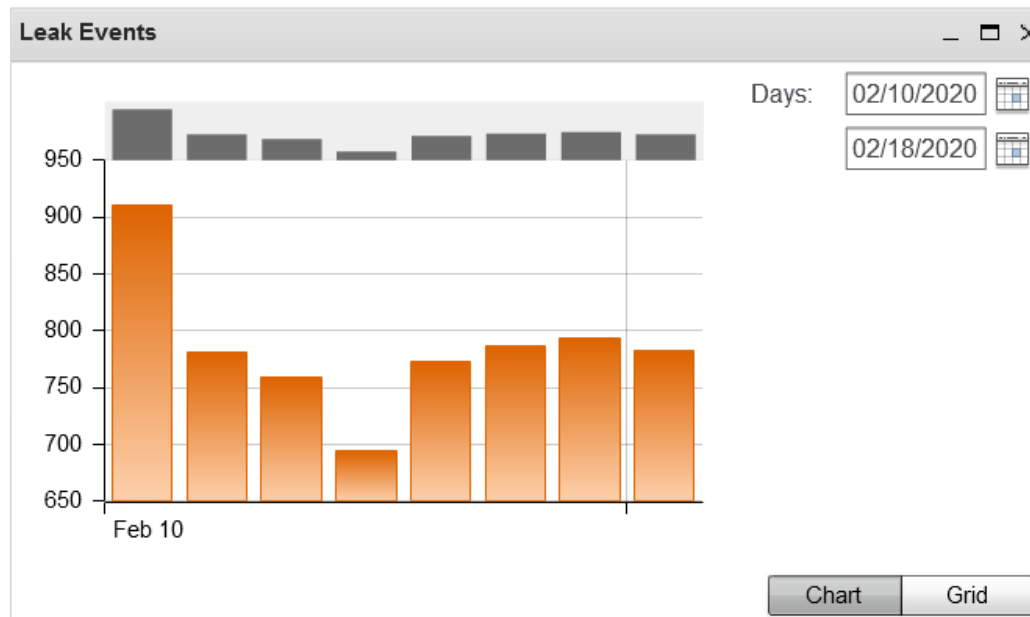
## 3. Water Smart Software



# Long term

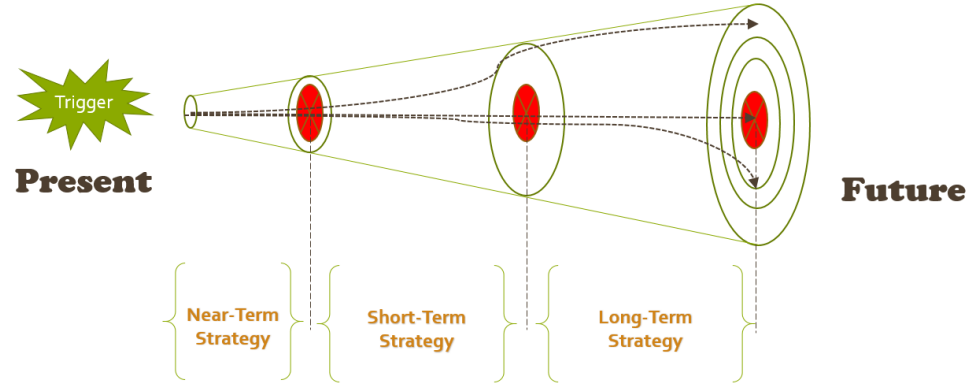
## 4. Leak detection methods

AMI  
Water Smart Software  
AWWA M36 Water Audit and Loss Control Programs  
Monitoring the water distribution system





# Long term



## Public Outreach

1. Stream team
2. School presentations
3. Media releases
4. Website
5. Customer service
6. Educational on the "why"
7. Stakeholder engagement





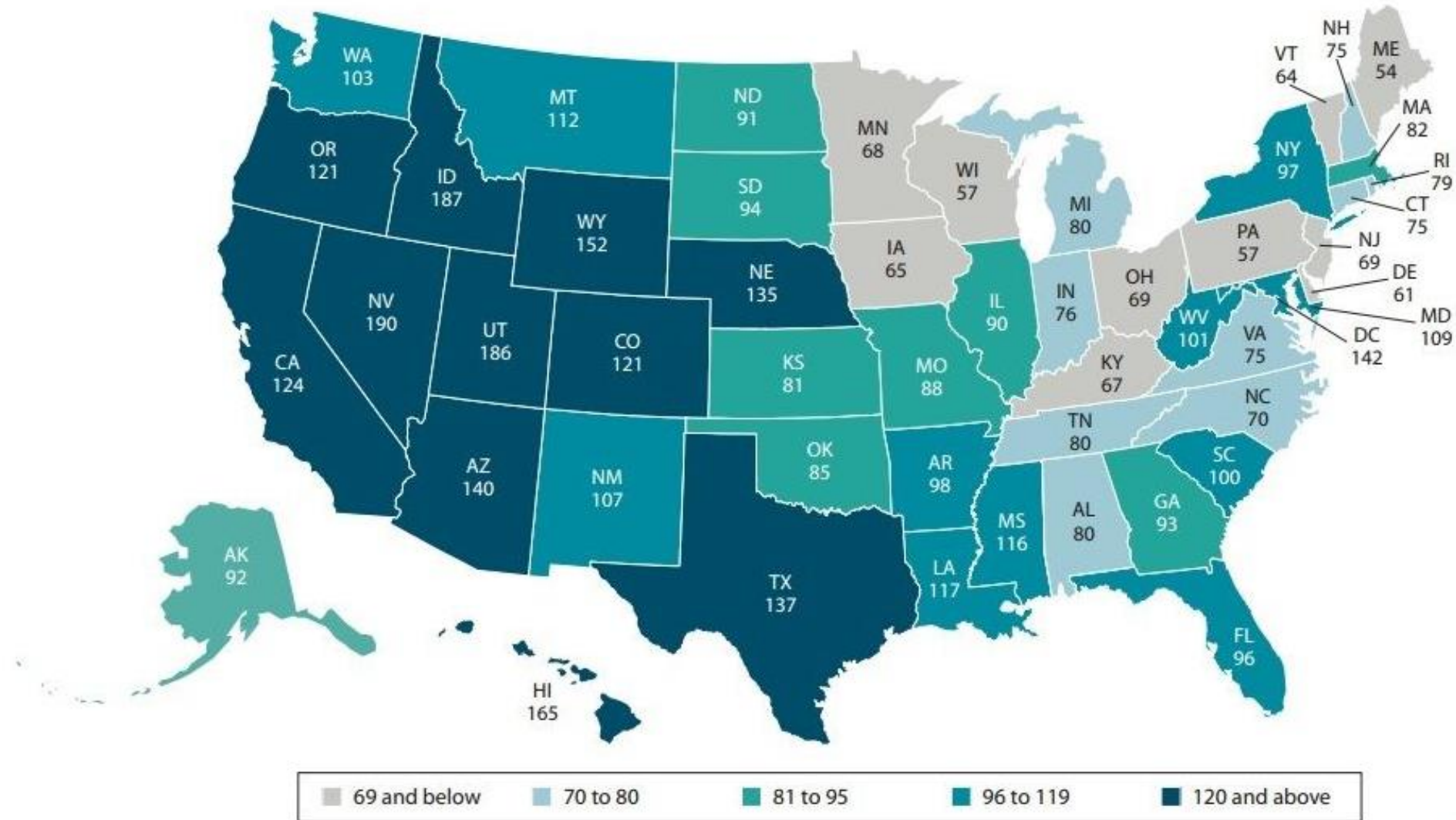
# Water Conservation Results





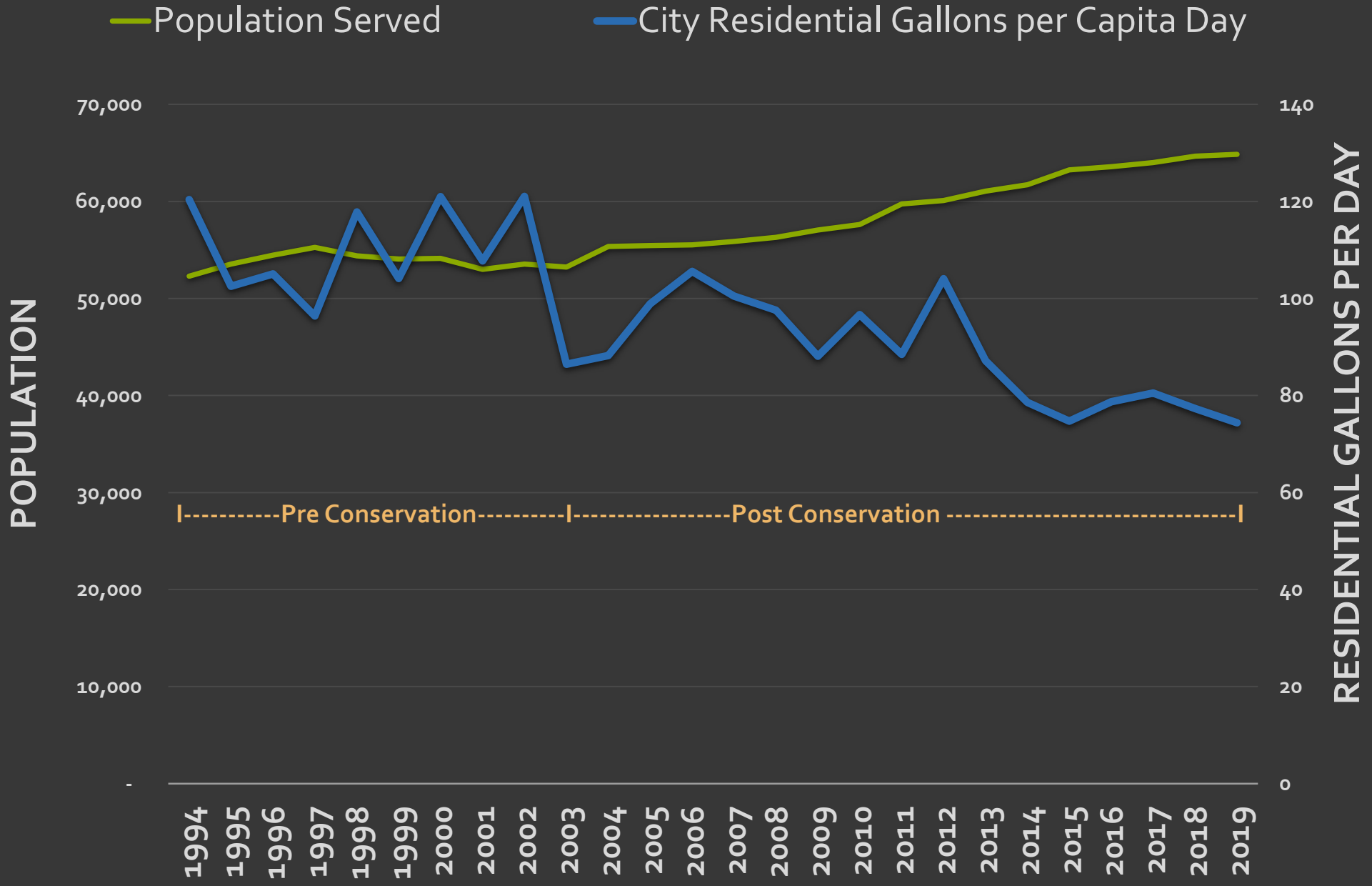
# Domestic Water Use per Capita (in gallons per day) by State, 2005

Nevada, Idaho, and Utah lead the nation in rates of domestic water use per capita.



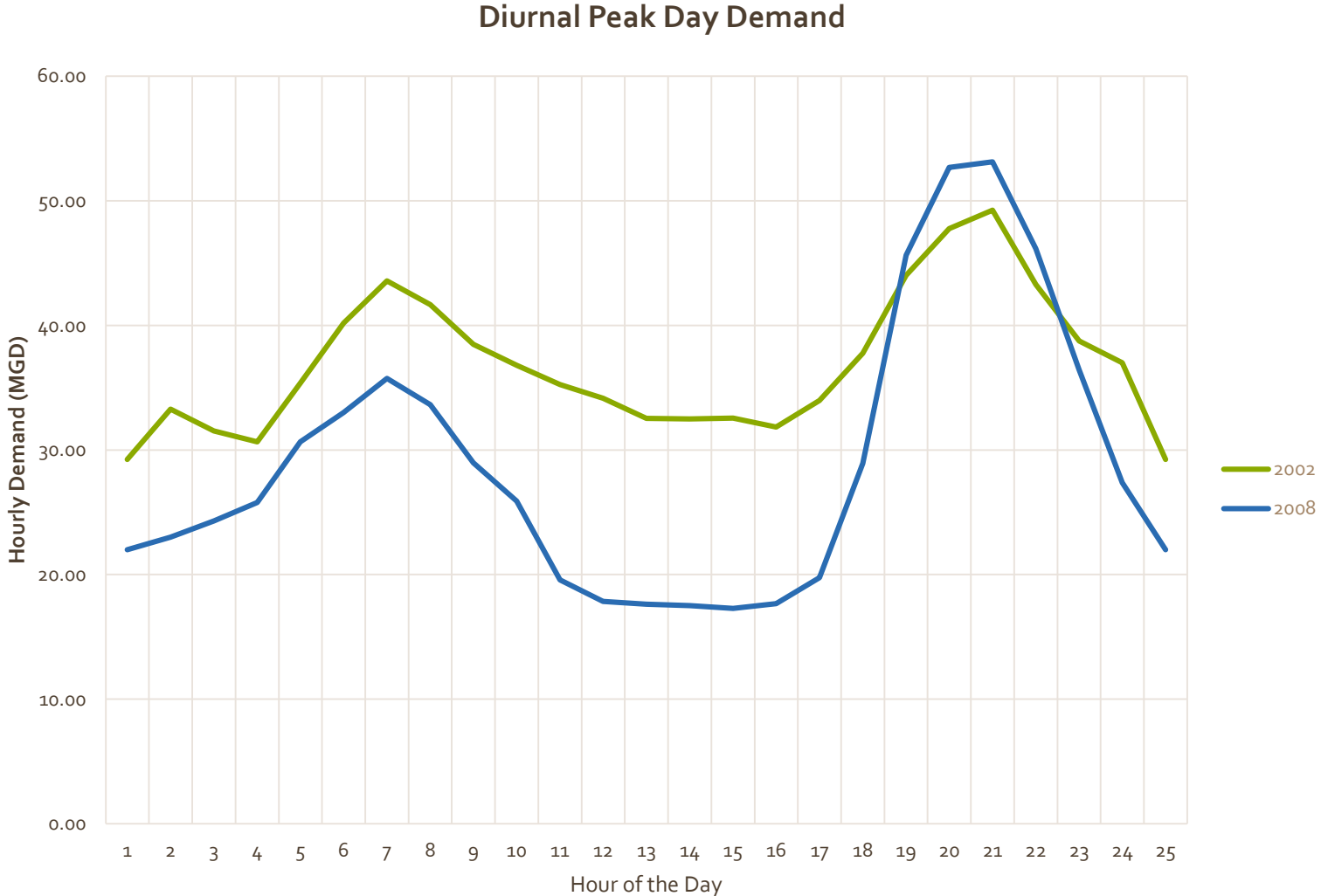
Source: Kenny et al. 2009.

Note: 2005 is the latest year for which data are available. The five categories were constructed to contain roughly the same number of states. Domestic water includes self-supplied withdrawals as well as public-supply water deliveries.





# Changes to plant operations

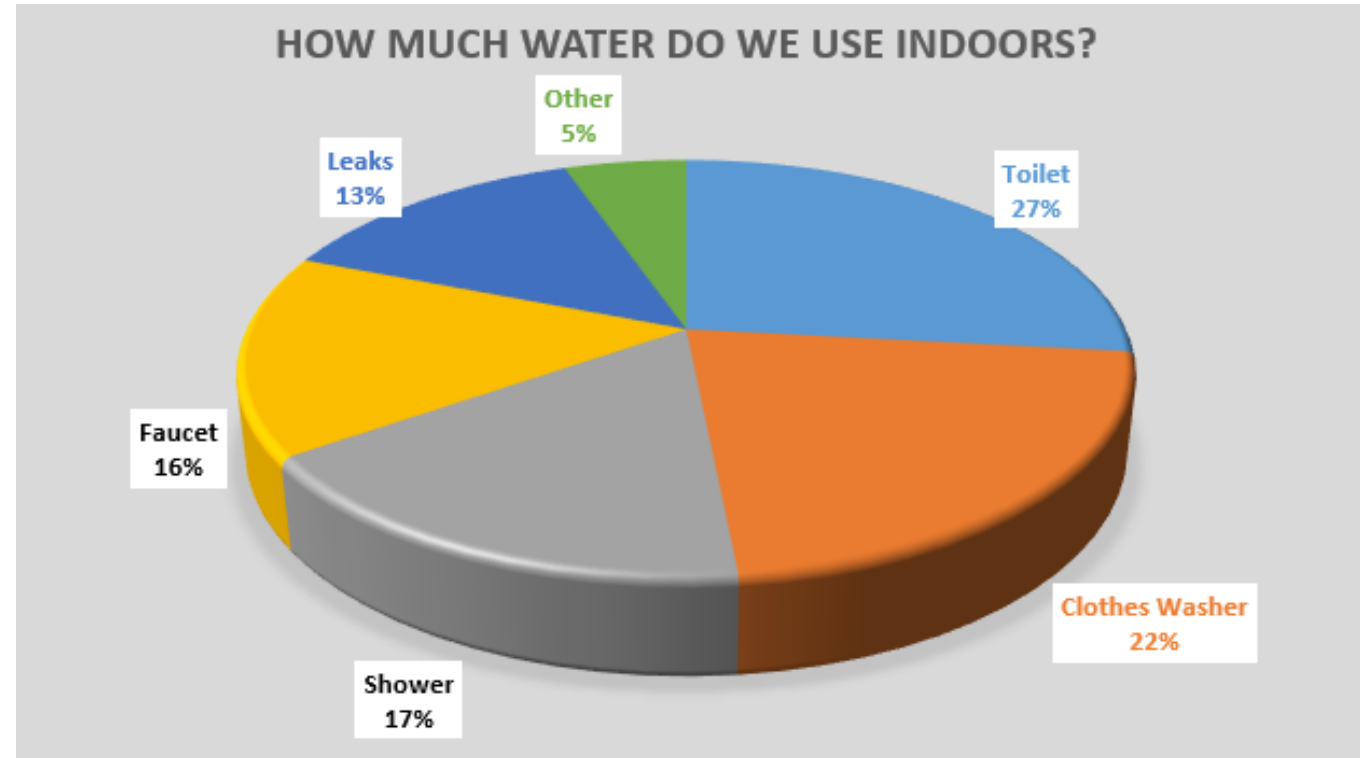
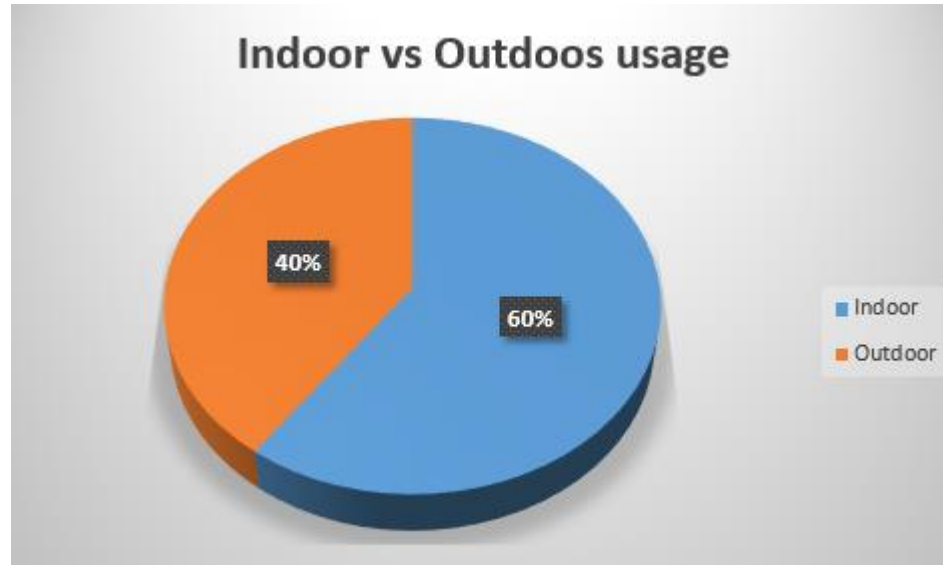




# Water Conservation Focus



# Cheyenne's Water Breakdown



# Indoor-Toilet Talk

- Average adults who is home all day flushes 5-6 times
- Leak is likely due to flapper or overflow tube
- Tank parts last ~ 5 years
- Leaks often are silent, check annually





# Outdoor-Irrigation

- Water Smart Landscapes
- Changes in Unified Development Codes
- Review of system development fees
- Best irrigation practices



| Month            | Fixed Spray Heads                  | Rotor Heads                         | Rotary Nozzles                      | Manual Sprinkler                    |
|------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|
| <b>May</b>       | 1-2 days/week<br>2 cycles of 5 min | 1-2 days/week<br>2 cycles of 10 min | 2-3 days/week<br>2 cycles of 10 min | 1-2 days/week<br>2 cycles of 8 min  |
| <b>June</b>      | 2-3 days/week<br>2 cycles of 7 min | 2-3 days/week<br>2 cycles of 13 min | 2-3 days/week<br>2 cycles of 13 min | 2-3 days/week<br>2 cycles of 10 min |
| <b>July</b>      | 2-3 days/week<br>2 cycles of 9 min | 2-3 days/week<br>2 cycles of 17 min | 2-3 days/week<br>2 cycles of 18 min | 2-3 days/week<br>2 cycles of 13 min |
| <b>August</b>    | 2-3 days/week<br>2 cycles of 8min  | 2-3 days/week<br>2 cycles of 14 min | 1-2 days/week<br>2 cycles of 16min  | 2-3 days/week<br>2 cycles of 12 min |
| <b>September</b> | 1-2 days/week<br>2 cycles of 6 min | 1-2 days/week<br>2 cycles of 12 min | 1 day/week<br>2 cycles of 12 min    | 1-2 days/week<br>2 cycles of 9 min  |
| <b>October</b>   | 1 day/week<br>2 cycles of 3 min    | 1 day/week<br>2 cycles of 5 min     | 1 day/week<br>2 cycles of 6 min     | 1 day/week<br>2 cycles of 4 min     |





# Questions:

Please feel free to contact Dena Egenhoff about any further water conservation planning, implementation, costs and analysis. Each municipal system is unique however water conservation methods are universal.



City of Cheyenne Board of Public Utilities

[degenhoff@cheyennebopu.org](mailto:degenhoff@cheyennebopu.org) | 307-637-6415



# Temporary conservation under DM and Wyoming abandonment law

Under Wyoming's abandonment law, any failure to use available water under a water right, including voluntary participation in a demand management program, for *fewer than five successive years* should not result in a forfeiture of the right.

*Water right holders are encouraged to seek independent legal advice regarding their specific circumstances.*

## **Wyoming Statutes §§ 41-3-401 & 402**

- ❖ A water right holder who fails to use the water for its beneficial purpose, either intentionally or unintentionally, during any five successive years, is considered as having abandoned the water right and forfeits the right.
- ❖ Lack of water to fulfill the right excuses non-use (either low flow or regulation).
- ❖ Forfeiture is not operative until a formal declaration of abandonment has been made (by the Board of Control).
- ❖ Resumption (reactivation) of use prior to a declaration of abandonment preserves the right.
- ❖ Abandonment proceedings may be initiated by the State Engineer, or any person who has a water right from the same source of supply which is equal to or junior in date of priority to the right to be abandoned.
- ❖ Person bringing the abandonment action must show they will be benefitted by the abandonment or injured by reactivation of the right.
- ❖ Surplus water rights (March 1, 1945) and excess water rights (March 1, 1985) are subject to abandonment.
- ❖ Partial abandonment of an irrigation right for partial nonuse during a five-year period may not be sought so long as there was insufficient water to satisfy the water right in full, provided that a useable diversion existed and a diligent effort was made to use the available supply.
- ❖ The holder of a storage right that has not been applied to beneficial use may apply to the Board of Control for an extension of time for up to five years showing reasonable cause for non-use. An extension precludes an abandonment action, and is renewable.
- ❖ Abandonment is not favored in the law, and must be proven by clear and convincing evidence.
- ❖ Abandonment proceedings are decided by the Board of Control, with ability to appeal to the courts.