



# Welcome



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## Small Town Forum Goal

Identification of opportunities for collaboration with small towns to support water management through a discussion of challenges, ideas and innovations.








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## Overview of the Day

- Overview of Clarkdale Water Resources and Draft Recommendations
  - *To introduce lay of the land, problems and recommended strategies for Clarkdale.*
- Lunch and Lunch Discussion – Input on recommendations and questions
  - *To examine recommended strategies with other towns and water providers to determine benefits, obstacles and lessons learned.*
- Tools and Funding Opportunities
  - *To set the stage for a discussion of strengths, weaknesses, opportunities and threats in small town water management on day two.*












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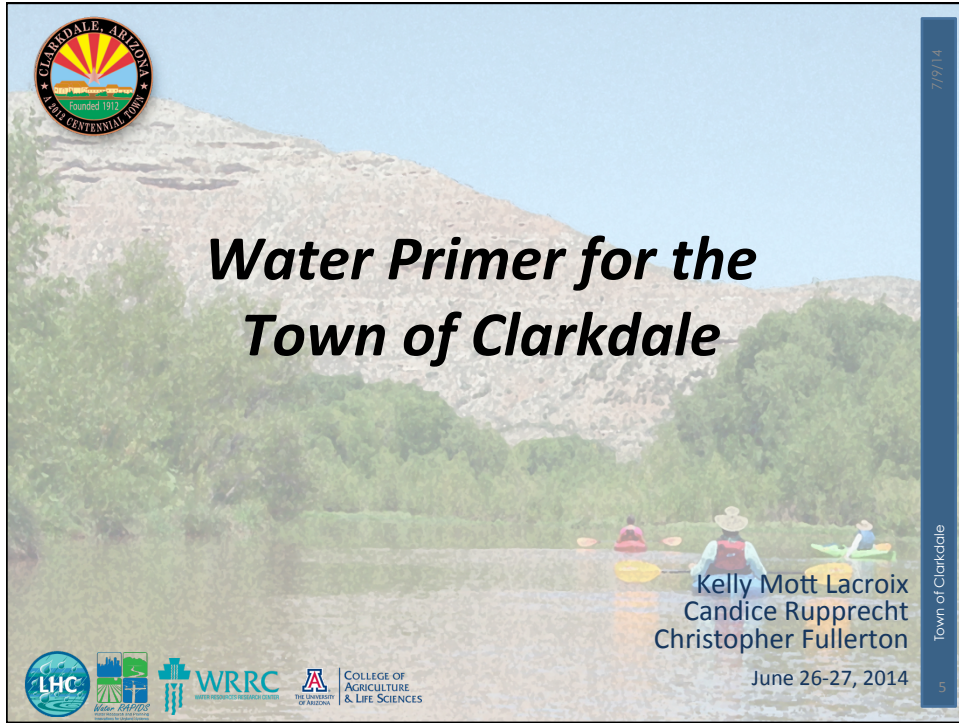



## Overview of the Day

- Share your Story
  - *To understand the water management challenges and innovations in other Towns and water systems.*
- Wine Tasting at Four Eight Wine Works
- Dinner at Su Casa






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# Water Primer for the Town of Clarkdale

Kelly Mott Lacroix  
Candice Rupprecht  
Christopher Fullerton

June 26-27, 2014



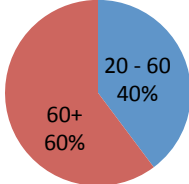
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## Community Context

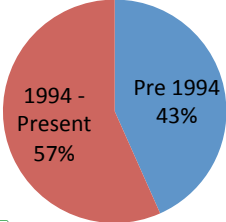
- 4,097 people (2010 Census)
- Annual average growth 2.5%
- 2.23 persons per household

### Age of Residents



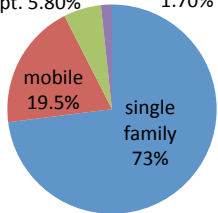
Age Group	Percentage
20 - 60	40%
60+	60%

### Age of Homes








Age Group	Percentage
1994 - Present	57%
Pre 1994	43%

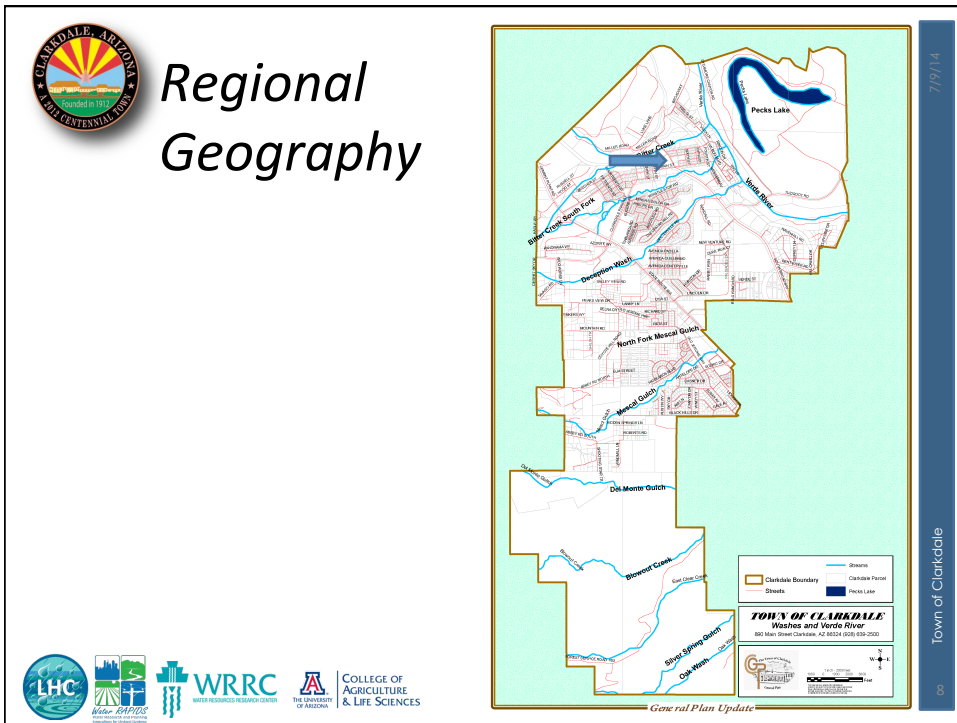
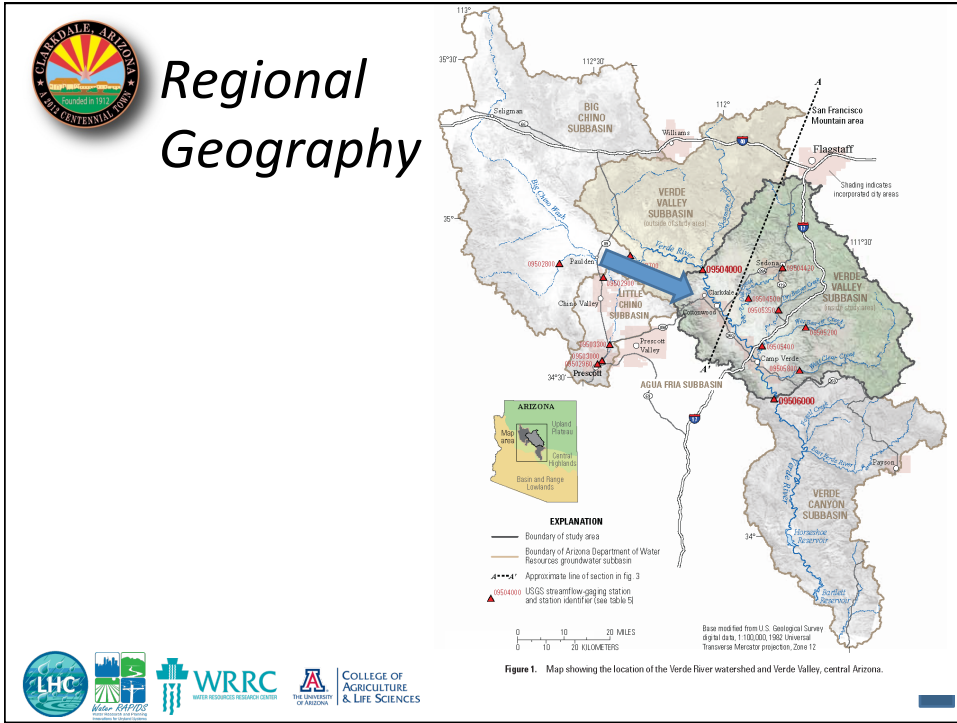
### Household Type



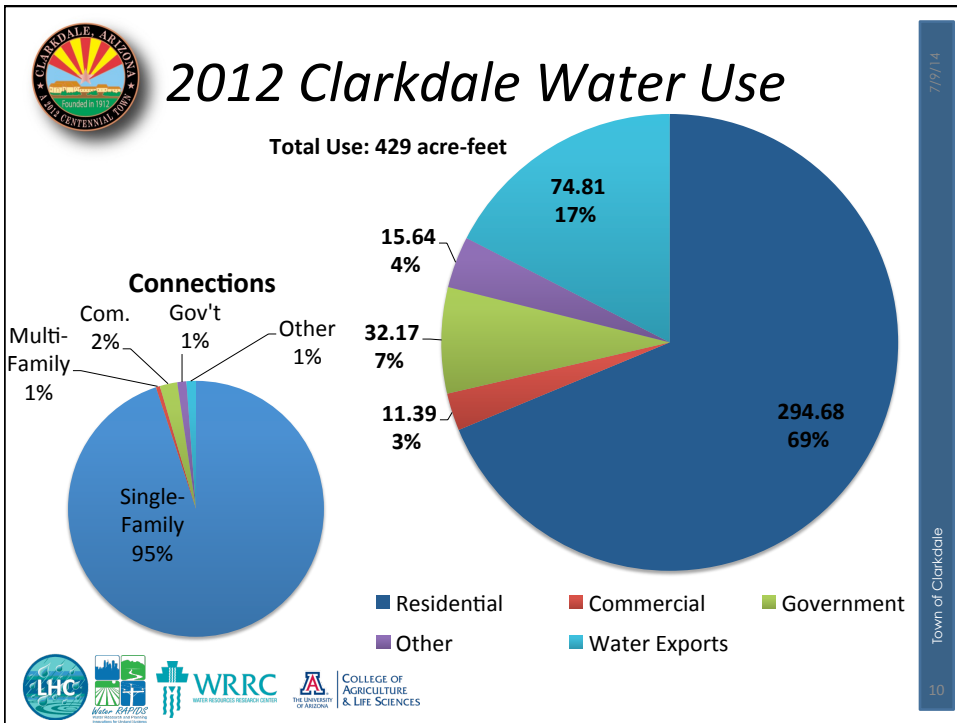
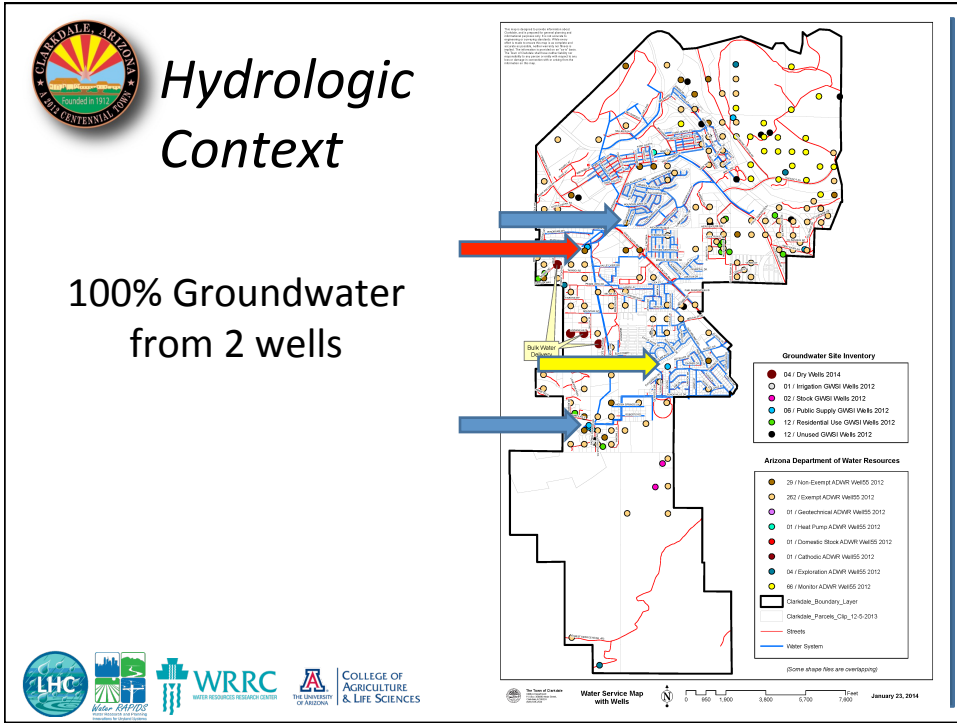
Household Type	Percentage
single family	73%
mobile	19.5%
apt.	5.80%
duplex	1.70%




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## Water Use 2012

Total water production = 690 af  
 Total water use = 429 af  
 Lost and unaccounted for 38%

<p>Avg. Daily Demand  <b>2012</b> = 616,333 gal  <b>2013</b> = 589,643 gal</p> <p>Total System Daily Capacity              is <b>2.4 mgd</b>  <b>2012</b> daily demand is  <b>25% of total capacity</b></p>	<p>Res. GPCD  <b>2012</b> = 67  <b>2013</b> = 57</p> <p>Res. GPCD?  <b>2012</b> = 150              Large lost and              unaccounted for              water</p>
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## Groundwater Current Status and Projections

- Simulation 1: All historic pumping and recharge in the entire model area through 2006 plus future pumping and recharge to 2076.
- Simulation 2: Same historic and future pumping and recharge as simulation but without the pumping from current and future operations of Clarkdale’s municipal water system.

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## Groundwater Current Status and Projections

- As of 2014, the cone of depression due to Clarkdale’s pumping is estimated to have produced 1 to 3 m of drawdown under adjacent areas of the Verde River.
- By 2076, the projected cone of depression broadens to within 2 km of Oak Creek, and results in 2 to 4 m of drawdown under the Verde River.

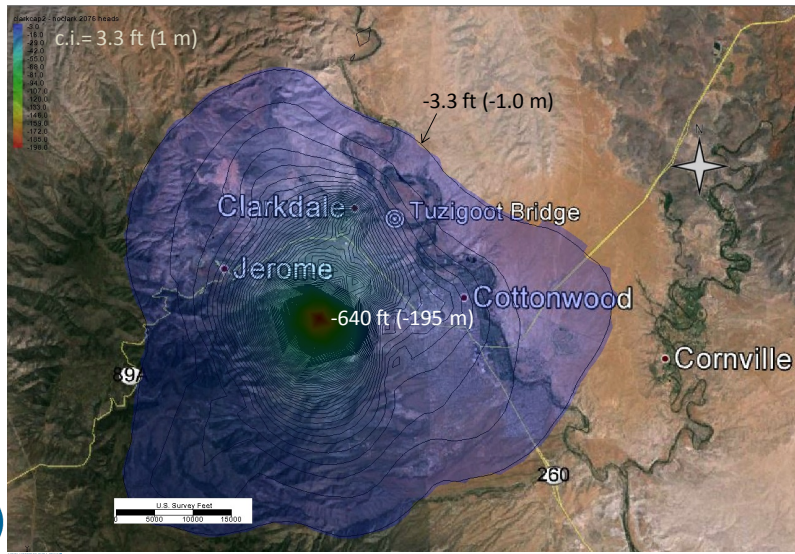


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## Groundwater Current Status and Projections

Simulated Drawdown Attributable to Clarkdale - 2076



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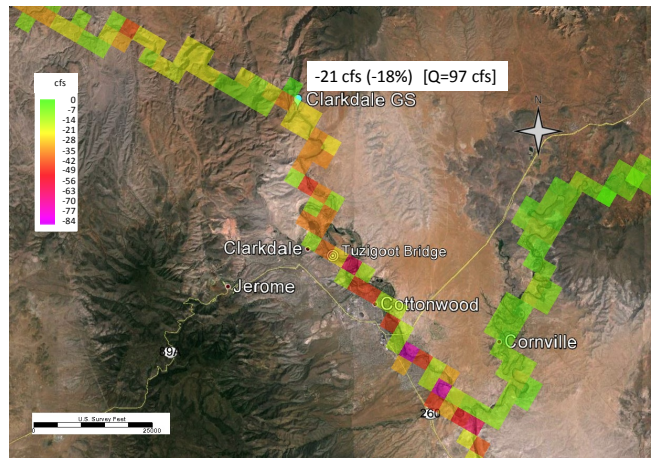
## Groundwater Current Status and Projections

- By 2076, basin-wide pumping *at current levels* is projected to diminish Verde baseflows by about 18% compared to pre-development conditions.



## Groundwater Current Status and Projections

Simulated Change in Baseflow - 1910 to 2076  
contour interval = 1 cubic-foot per second (cfs)







# Groundwater Current Status and Projections

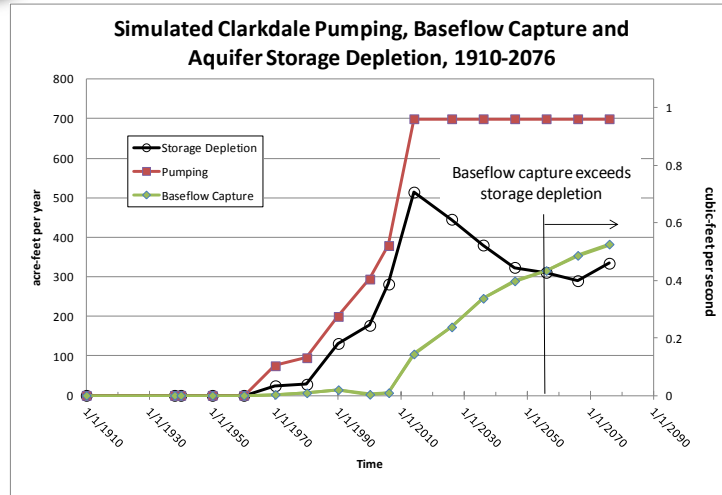
- After 2006 streamflow capture begins
- By 2056 baseflow capture begins to exceed groundwater storage as a fraction of water pumped by Clarkdale wells.
- By 2076, Clarkdale’s simulated pumping is capturing 380 af/yr (roughly 0.5 cfs) of baseflow and 330 af/yr in aquifer storage
- According to the simulations, Clarkdale’s existing well production will not be limited prior to 2076




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# Groundwater Current Status and Projections








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## History of Water Management

YEAR	ACTION
2000	Residents vote for Town water utility in March.
2006	Town acquires local water company in January.
2006	New water service rates billed on an Increasing Block, tiered rate structure.
2007	Drought and Water Shortage Preparedness Plans adopted.
2008	Town adopts SB1525 – Adequate Water Supply Requirements in September.
2012	Town adopts a General Plan, instilling a culture of sustainability in March.
2012	Water Conservation Demonstration Projects – Centennial Plaza.
2012-present	Replacement of aging infrastructure and ongoing funding for water conservation, water resource development and regional organizations.
2013	Complete meter replacement as of September.
2013	Full system leak detection survey identified and fixed 20 leaks.

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## Current Water Management

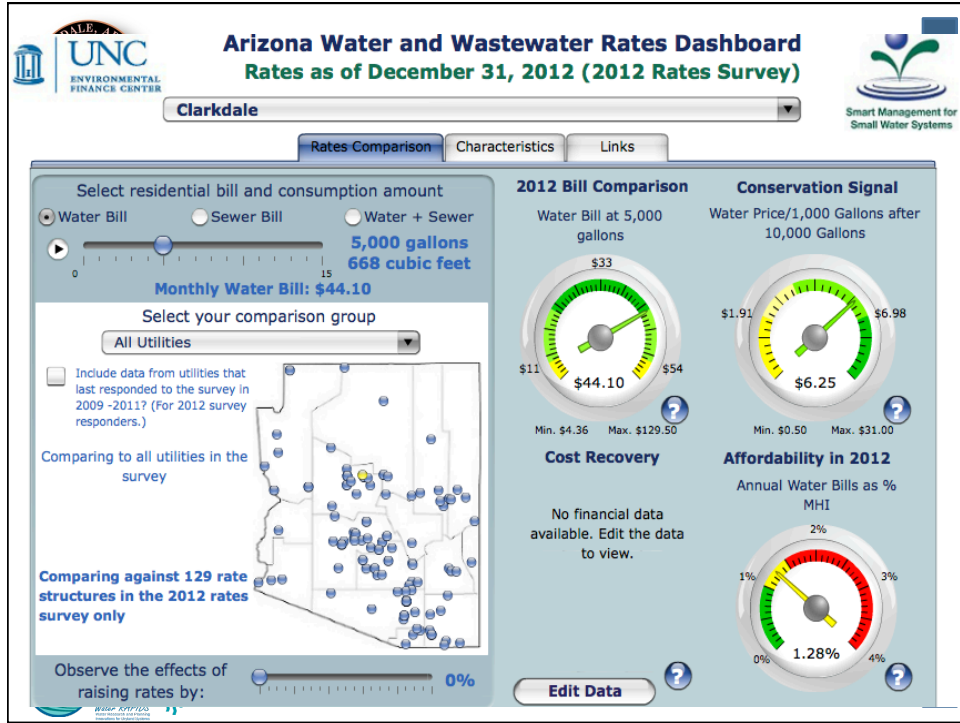
Key aspects:

- Town is a Designated Water Provider and adopted Water Adequacy Requirement
- Town has a commercial/multi-family landscape design ordinance
- Town has aggressive block rate pricing
  - Base fee of \$26.70 for up to 1,000 gal. and increasing block rates every 5,000 gal
  - Town receives water use data 2x per month

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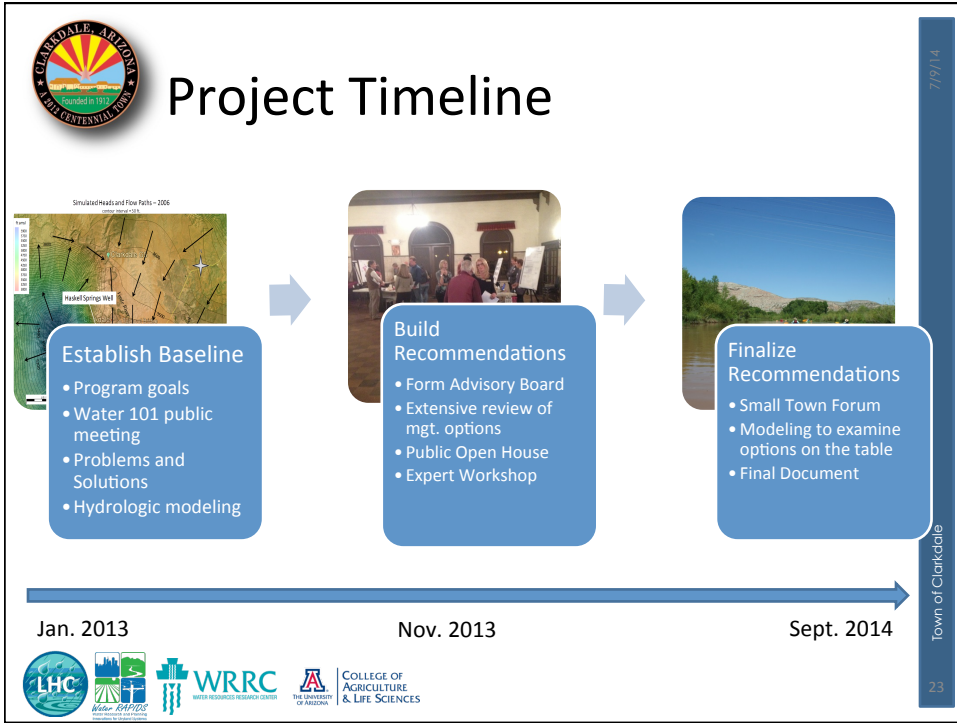
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## Water Resource Management Program (WRMP)

- Two year project
- Funded by the Walton Family Foundation and by Water Conservation Funds
- Expertise from the University of Arizona, Water Resources Research Center and Lacher Hydrological Consulting





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**Water Resource Management Program (WRMP)**

Clarkdale provides a water resources management program that meets the needs of residents, businesses and our natural environment equitably in order to be a robust and resilient community.

Logos at the bottom: LHC, Water 101/102, WRRC (Water Resources Research Center), The University of Arizona, College of Agriculture & Life Sciences.

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## Water Resource Management Issues

- Treated Effluent Utilization
- Stormwater Management
- Infrastructure
- Town Size – Limited Resources
- Small domestic wells
- Decreasing Verde River flows
- Limited groundwater supply



## Draft Recommendations

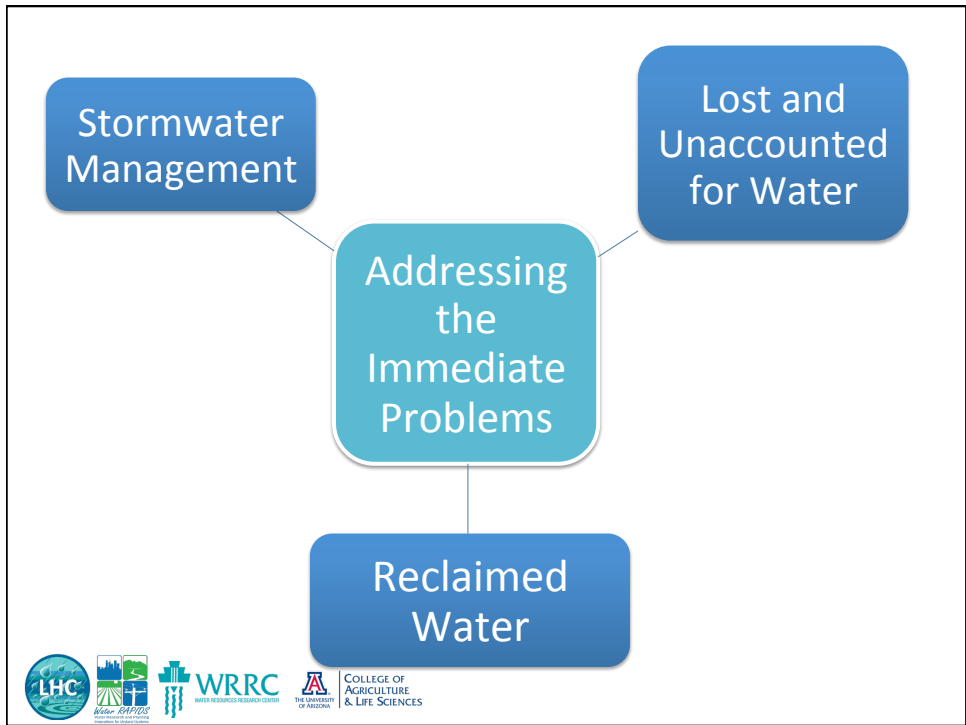
- Develop a Strategic Plan for Reuse of Reclaimed Water
- Develop a Plan for Effective Tracking and Measurement of Lost/Accounted for Water
- Understand and Plan for Stormwater and Rainwater Resources





## Draft Recommendations

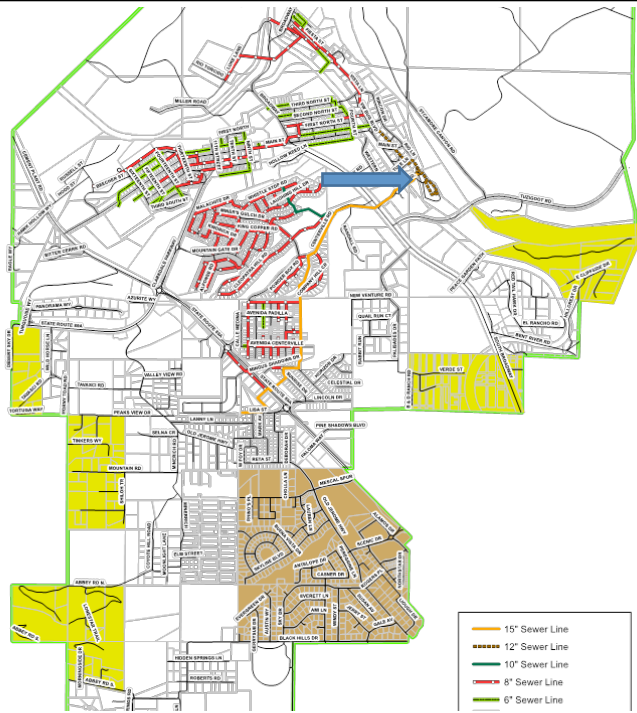
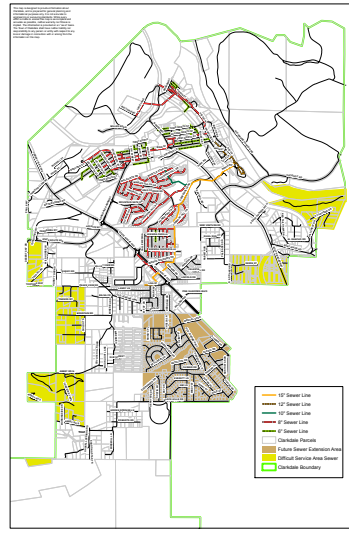
- Assess Community Values regarding Sustainability, Water Management, and the Verde River
- Expand on Public Education and Outreach to Develop Community Consensus for Achievable Objectives in the WRMP
- Create a Community Water Budget
- Link Land Use and Water Management





# Reclaimed Water

- 50% of Town on septic
- 1,080 current connections
- 134 af of A+ effluent each year
- Maximum capacity = 350,000 gallons per day
- Average treatment volume = 130,000 gallons per day
- Lease for disposal expires in September, will be renewed









## Develop a Strategic Plan for Reuse of Reclaimed Water


- Valuing this resource appropriately- don't underprice it
- Use judiciously in recharge operations – “look before you leap”
- Upland well injection versus near-stream recharge
- Indirect potable reuse difficult because of infrastructure costs and small town size.












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## Lost/Accounted for Water


- Substantial improvements including leak detection and 100% meter replacement as of 2013.
- Spiked at over 40% and averaged 35% in 2013.
- A conservative estimate of annual revenue losses from lost and unaccounted for water in Clarkdale is \$212,830








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## Effective Tracking and Measurement of Lost/Unaccounted for Water

- Key near-term component – Understanding will drive other management options
- Water loss control program
  - real and apparent water losses
  - water system mapping
- AWWA Water Audit and/or a WRF Real Loss Component Analysis
  - Quantify water losses
  - Identify authorized consumption and system losses












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## Effective Tracking and Measurement of Lost/ Accounted for Water

- Prioritize losses and layout tools and timeline for addressing the losses
- Water loss control programs are considered to be the most inexpensive demand management strategy, especially in the short term

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## Stormwater Management

- Underutilized resource
- Lack of infrastructure to manage runoff
- Concerns with sediment transport










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## Understand and Plan for Storm & Rain Water Resources


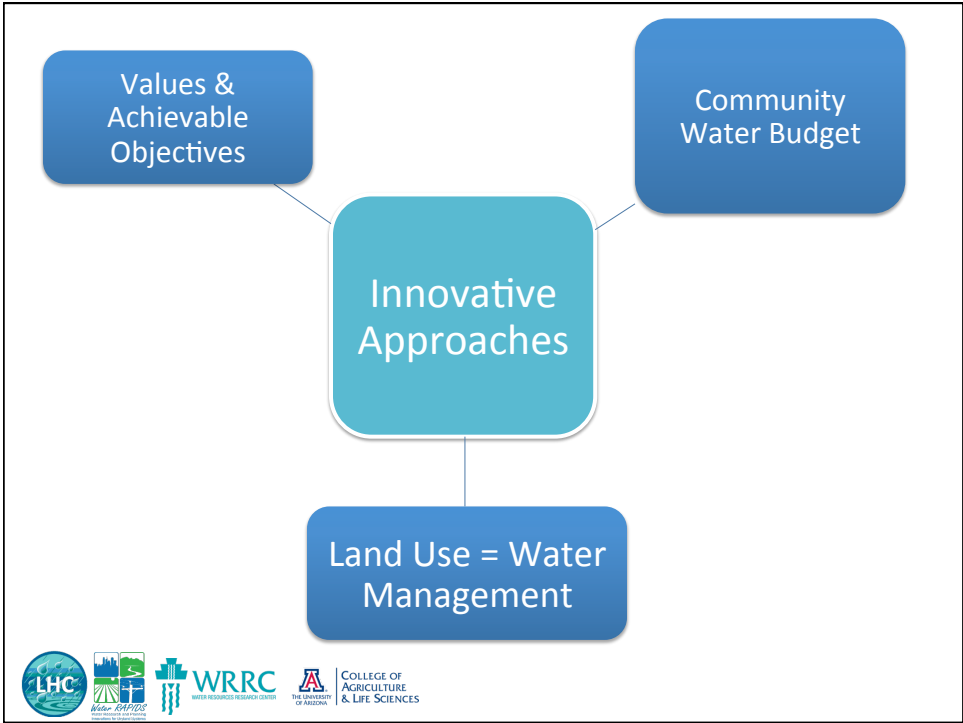
- Need better understanding the geography, existing infrastructure and capacity of Clarkdale to utilize storm and rainwater resources – not a given
- Data gap analysis:
  - Impervious surfaces
  - Rooftops and catchment areas
  - Site analysis for stormwater recharge
  - Calculate evapotranspiration to estimate water available for storage
  - Calculate costs relative to other demand management and supply augmentation strategies
- Desert Rainwater Harvesting Toolbox

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## Public Engagement on Water Sustainability and Values

- Set clear goals from the get go
  - Internally and community-wide
- Allocate adequate time and resources to the engagement process
- Transparency in the planning process – what is the decision space?
- Ensure a diversity of voices are heard









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## Public Engagement on Water Sustainability and Values

- Consider the “Information Age” and age of the populace
- Make all information easily understandable
- Make messages conveyed positive and solution-oriented















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## Public Engagement on Water Sustainability and Values

- Frame education within manageable timeframes with firm reference points, e.g., water levels in June.
- Establish metrics for measuring the usefulness of engagement and be flexible
- Effective and iterative engagement and education should be the cornerstone of the formation and implementation of Clarkdale’s WRMP



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**Questions and Discussion**

CLARKDALE, ARIZONA  
FOUNDED 1912  
100th CENTENNIAL 2012

LHC  
Water Matters

WRRC  
WATER RESOURCES RESEARCH CENTER

THE UNIVERSITY OF ARIZONA  
COLLEGE OF AGRICULTURE & LIFE SCIENCES

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