This presentation premiered at WaterSmart Innovations

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Conservation Efforts to Sustain a Desert River

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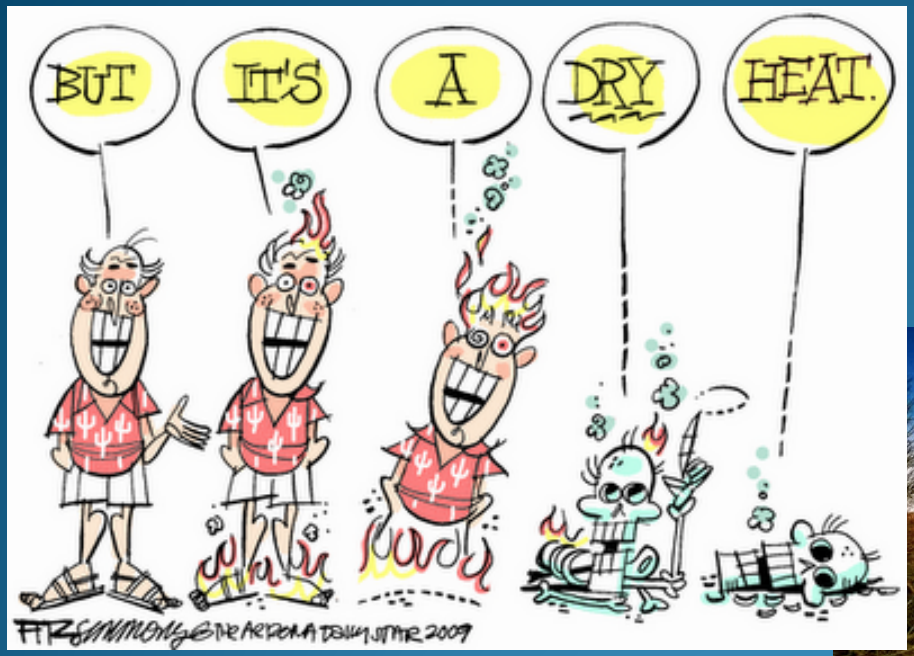
Verde River, Arizona

WESTERN RESOURCE ADVOCATES


BUT
IT'S
A
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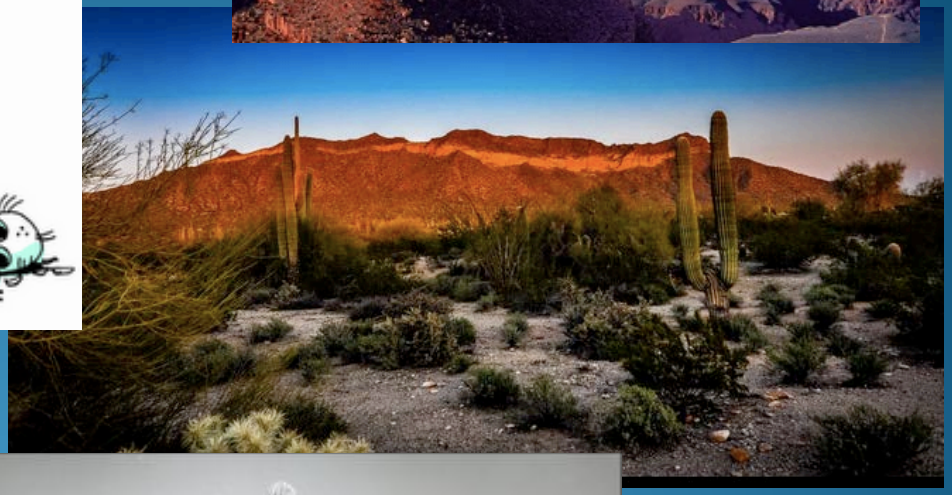
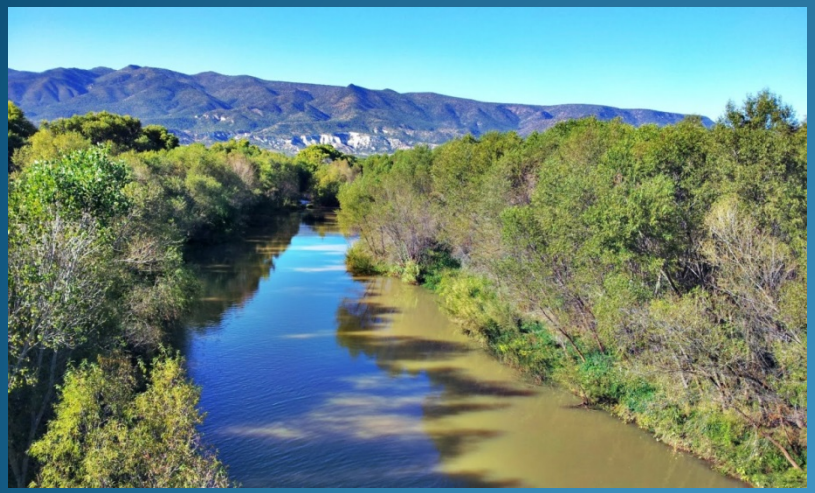
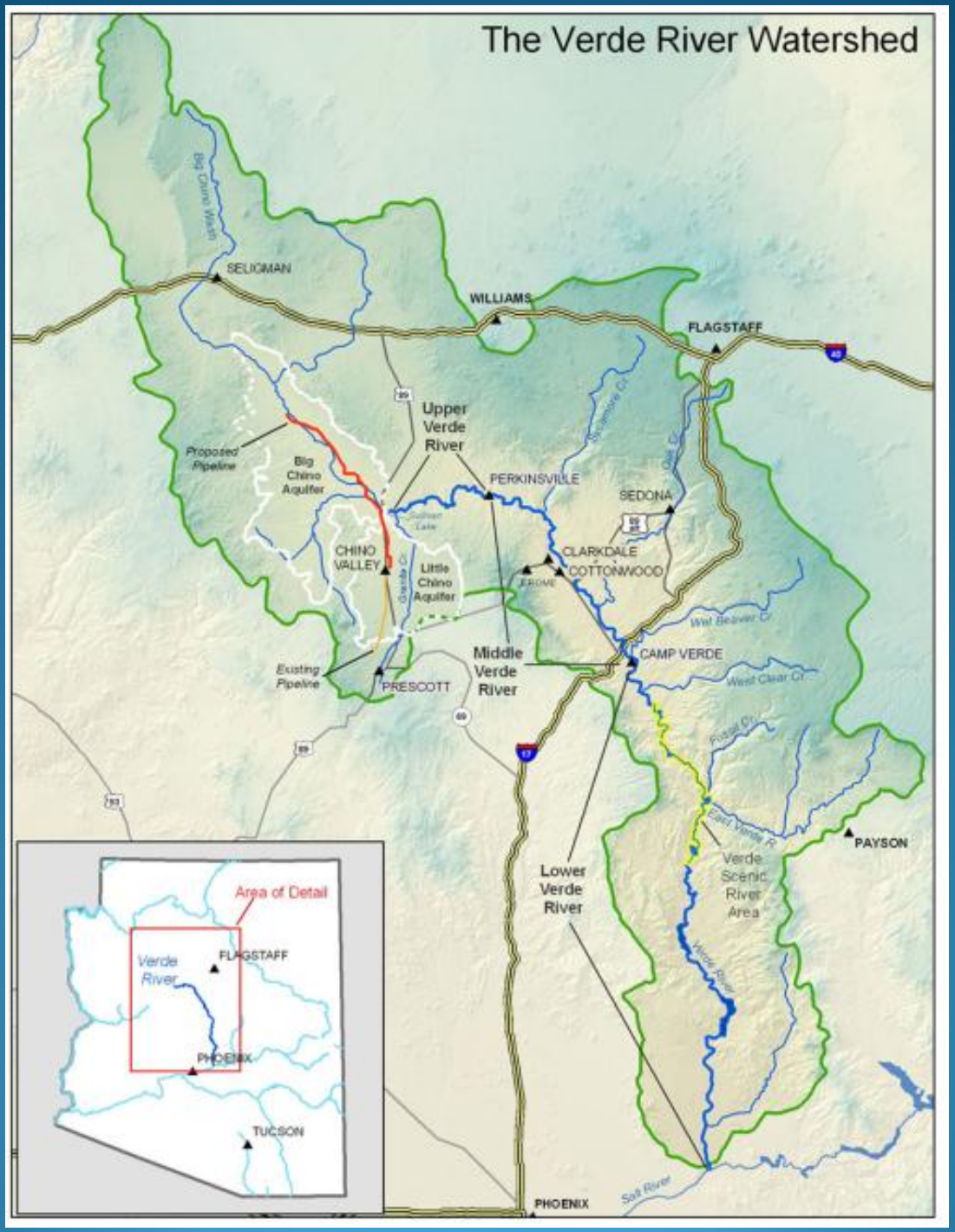
HEAT.






LAS VEGAS
Lake Mead
Colorado River
Kanab Creek
Paria River
PAGE
Lake Powell
ARIZONA
Little Colorado River
FLAGSTAFF
SEDONA
Verde River
Colorado River
Agua Fria River
PHOENIX
Salt River
White River
Black River
San Francisco R.
Gila River
Santa Cruz River
San Pedro River
TUCSON
Mexico
Gulf of California
N
0 50 100 Miles
0 50 100 Km


The Verde River Watershed
SELIGMAN
WILLIAMS
FLAGSTAFF
Upper Verde River
Proposed Pipeline
Big Chino Aquifer
PERKINSVILLE
SEDONA
CHINO VALLEY
Little Chino Aquifer
CLARKDALE
COTTONWOOD
JEROME
Middle Verde River
CAMP VERDE
Existing Pipeline
PRESCOTT
PAYSON
Lower Verde River
Verde Scenic River Area
PHOENIX
Area of Detail
Verde River
FLAGSTAFF
PHOENIX
TUCSON

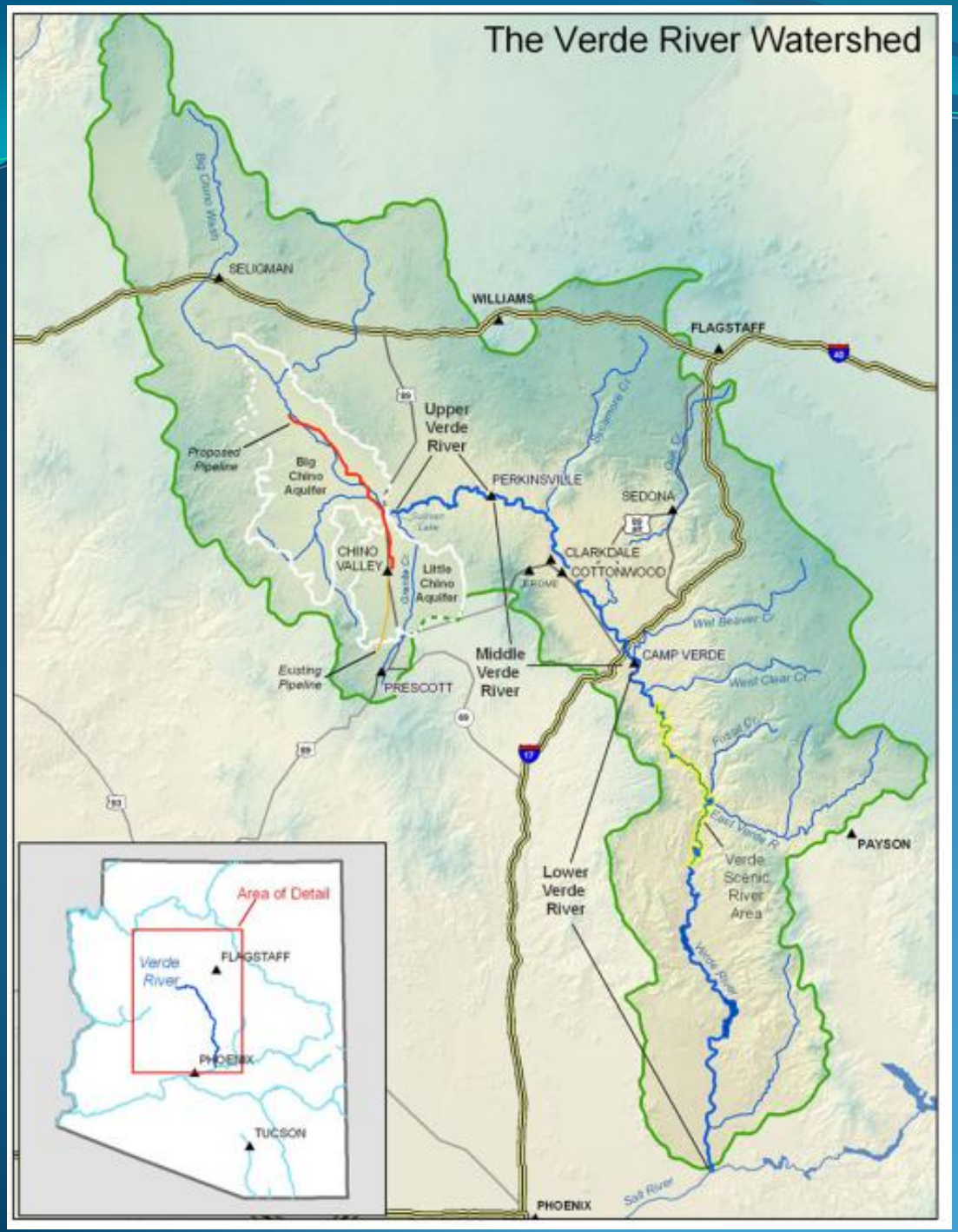
Verde River-Natural Resource Values

- One of the last Fremont cottonwood/Goodding willow forests in Arizona
- Over 200 bird species- largest number of bald eagle nesting sites in Arizona

- One of the most diverse native fish populations in Arizona - endangered species
- Populations of river otter (found in only three Arizona rivers)
- Wild and Scenic River

Community Values

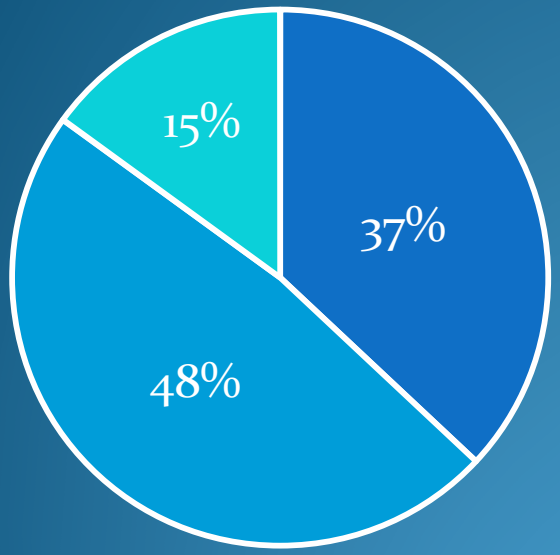
- "The River Runs Through Us"
- River part of local history, identity and rural lifestyle
- Economic Benefits– recreation, tourism, fishing, etc.
  - Lonely Planet top 10 US travel destinations for 2013
  - $87.5 + million generated from direct river-linked activities



Threats

- Impact of development and groundwater transfer on headwater springs
- Agricultural surface water diversions
  - Downstream surface water rights and demand (Phoenix) caps diversions
- Municipal and industrial pumping impacts
  - **1910-2005**
    10,000 afy decrease in base flow
  - **2005-2110**
    +5,400 to 8,600 afy

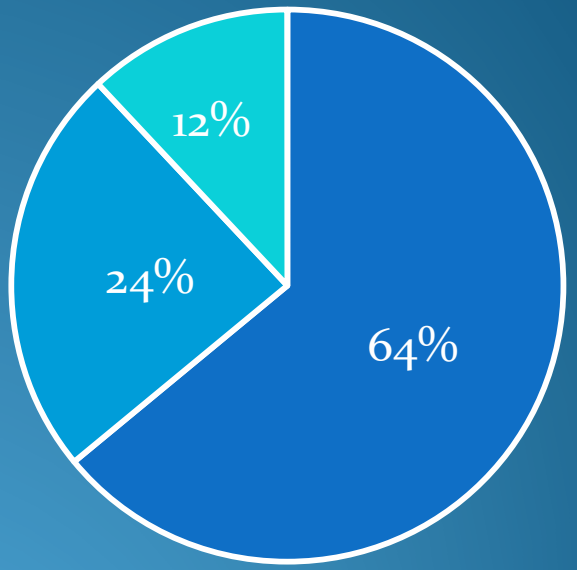
Verde Valley Demand 2006 (38,000 acre-feet)



70,000 residents

Municipal
Agricultural
Industrial

Verde Valley Demand 2050 (47,000 acre-feet)



182,000 residents

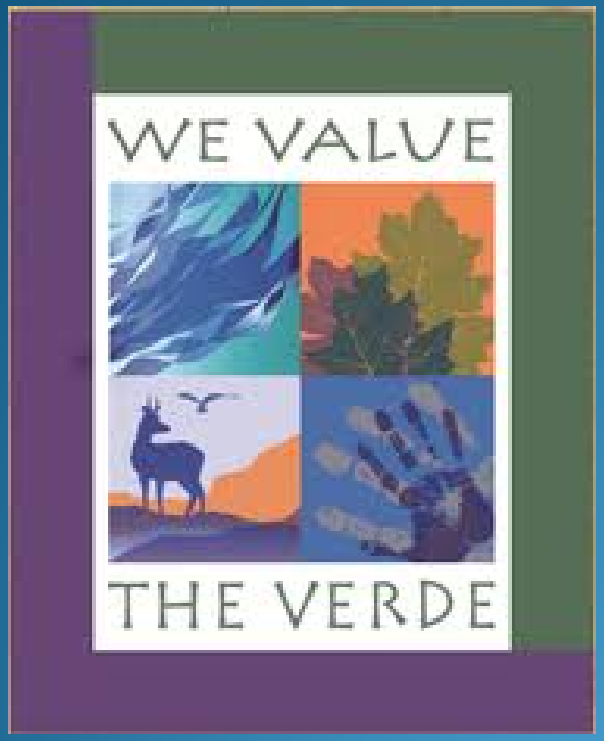
Challenges

- How to support increasing municipal groundwater demand without adversely impacting the river
- Few alternative water supplies
- Limited financial and planning resources
- General recognition of diminishing resources but varying opinions about extent of pumping impacts and how to address them-need for regional approach

Mechanisms

- Demand Management
- Supply Augmentation
- Local Management and Planning
- Spatial Management
- Mitigation Efforts To Offset Municipal Demand

Demand Management



"One for the Verde"

- Regional Ecotourism Initiative
- Direct outreach to hospitality industry that makes a conservation connection to local water resources-not "The World"
- 1% voluntary charge to consumers to support river
- Highly visible regional messaging
- Links participating businesses to an interactive web portal "The Verde Guide"

Demand Management

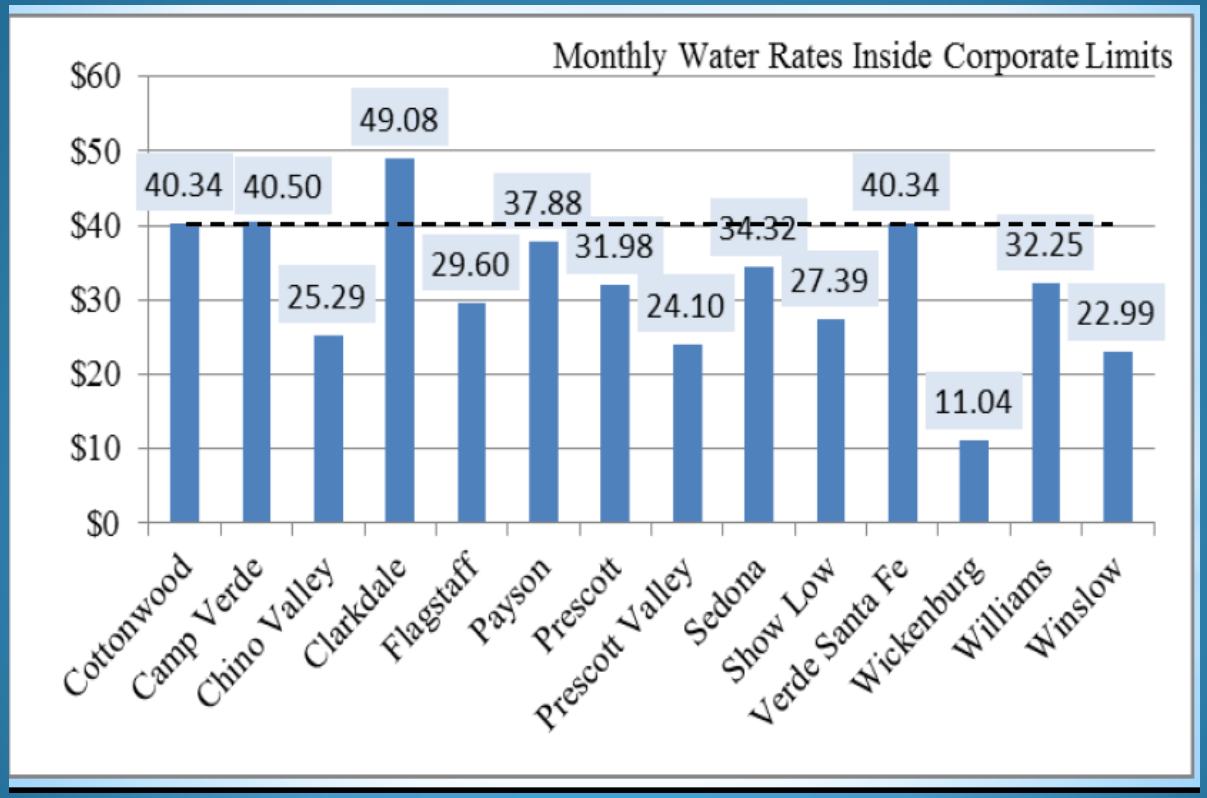
- Cottonwood first in AZ with K-8 water conservation curriculum with linkages to Verde watershed conditions

- Clarkdale permaculture demonstration garden
  - harvested rainwater

- Limited incentive programs-staff and $
  - Regional and non-profit opportunities?

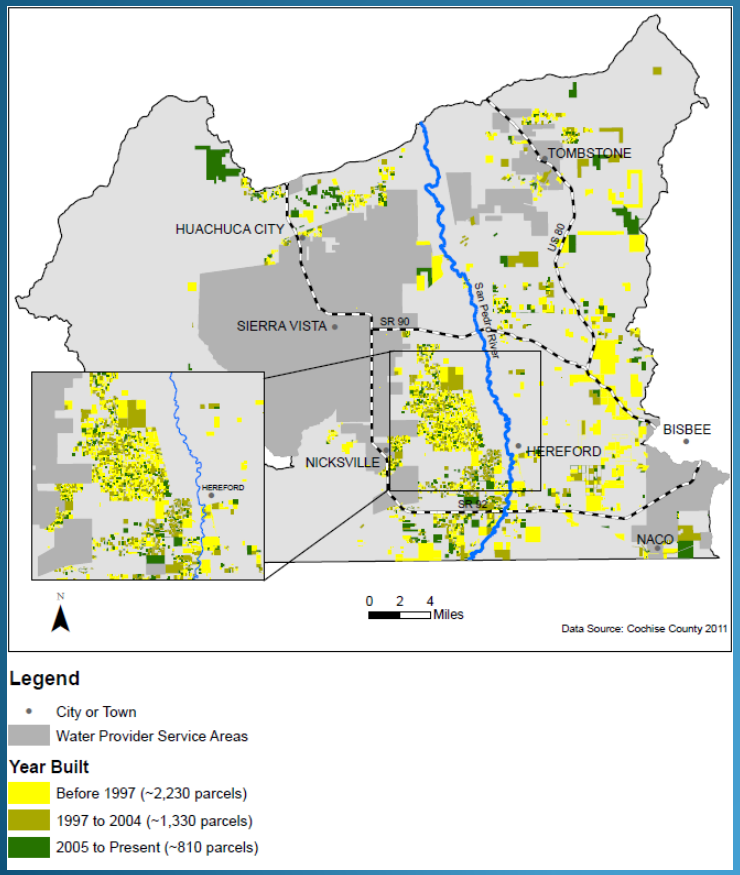
Demand Management

- Water Rates/conservation rate structures
- River enhancement checkbox or allocation of conservation to river - not at this time

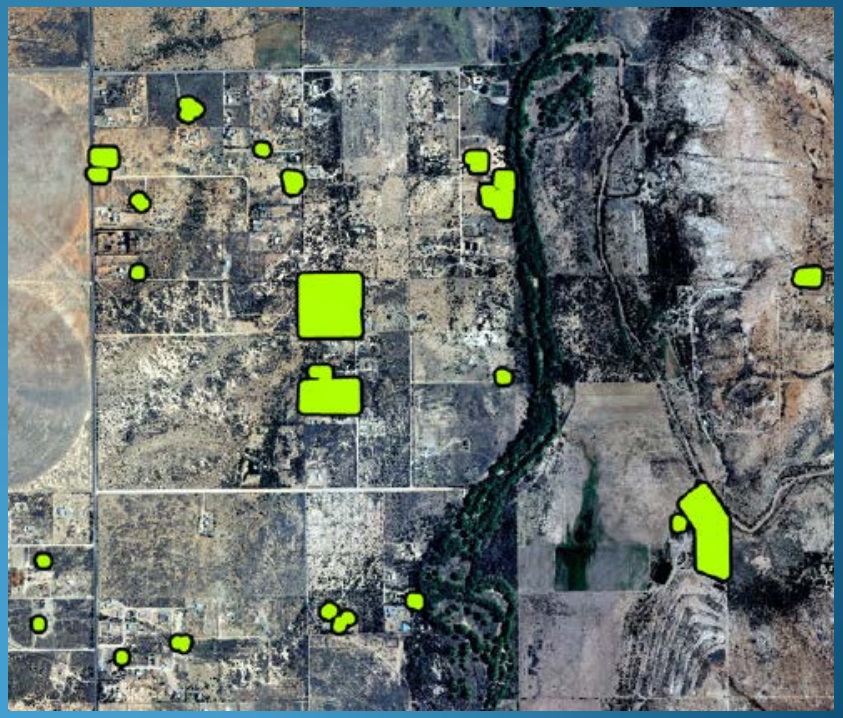


Demand Management-domestic wells

- Target older homes for interior retrofits



- Remote sensing and field surveys to identify largest outdoor uses



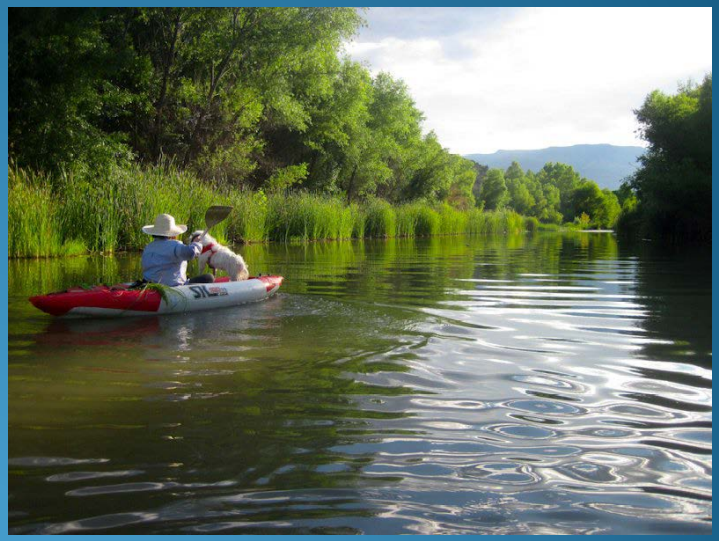
Supply Augmentation

- Lot-scale rainwater harvesting
- Low impact development, stormwater capture

- Upgrades to WWTPs to enhance reuse opportunities
- Sewer service area extension to capture and reuse additional wastewater

Local Management and Planning

"Water = The single most important issue affecting the growth, culture and economy of Clarkdale"



- Water Resource Management Plan
  "Treat the River as a Customer"

- River access to promote sustainable economic development (tied to regional conservation education efforts)
  "…getting folks onto the river to form personal connections is key"

Local Management and Planning

- Codes/ordinances
  - New golf courses and construction projects must use reclaimed water
  - New development WaterSense Codes?

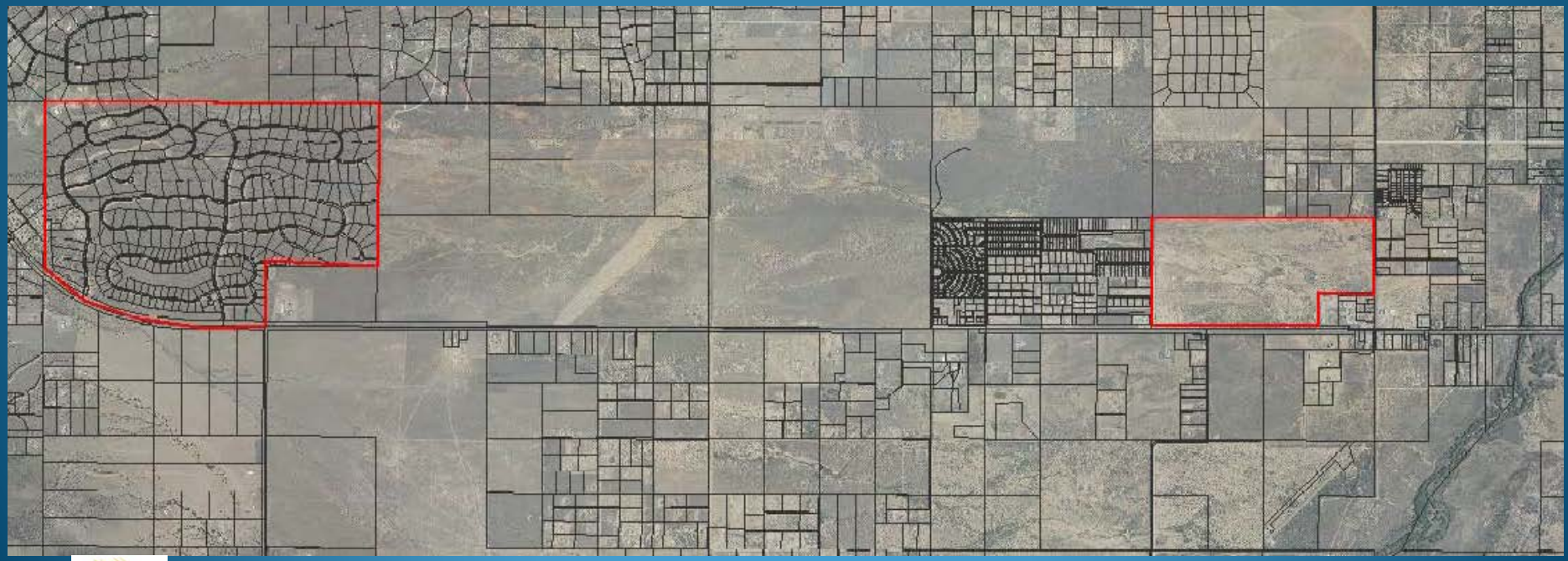
- Municipal control of local utilities
  - Cottonwood 400 af/year loss/pumpage reduction

Local Management and Planning

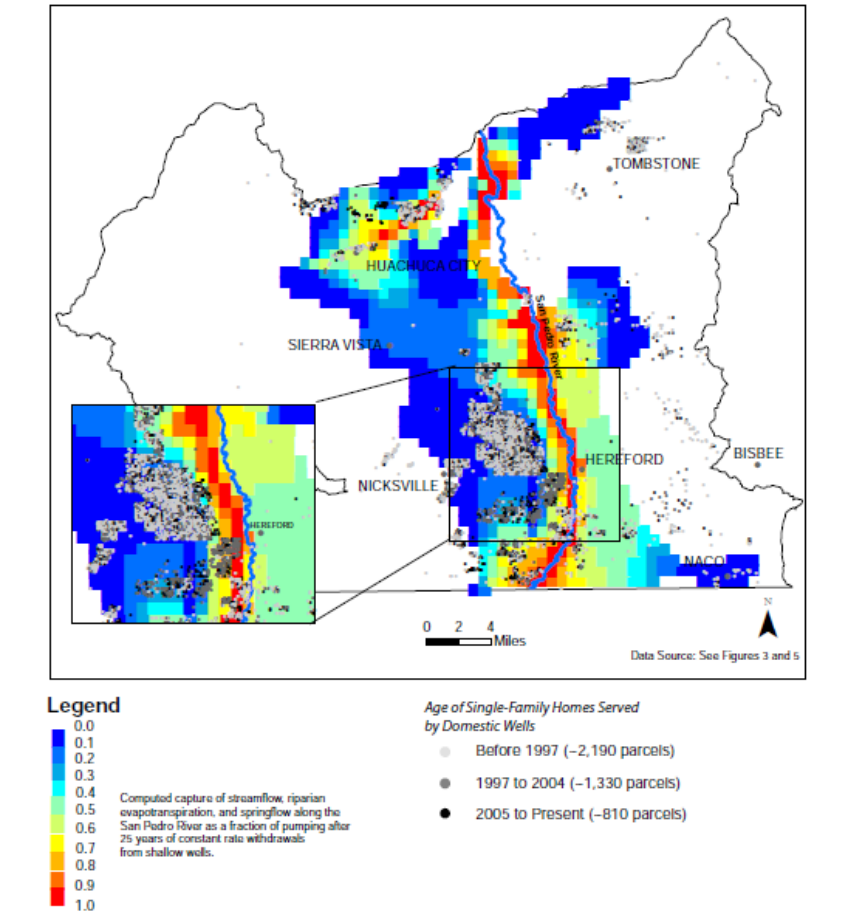
- Western Resource Advocates - Camp Verde Water Conservation Assessment
  - Water planning assistance –
    - General Plan Water Resource Element
  - Resource inventory and demand analysis
  - Identification of conservation potential
  - Recommended conservation options

Spatial Water Management

- Near stream, strategically located stormwater recharge sites identified through groundwater flow models



Spatial Water Management



- Target conservation in areas where wells have the greatest likelihood of capturing groundwater that would otherwise support river flow
- Seasonal/annual municipal pumping regimes depending on water levels (e.g. last on/first off)

Mitigation efforts to offset increasing municipal demand

- Invasive species removal
- Improved agricultural delivery system and efficiency
- Conservation easements to limit growth near river


Questions?