

# Strategies for Managing Water and the Environment in an Arid Land



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# WRRC Mission

**The University of Arizona Water Resources Research Center (WRRC) promotes understanding of critical state and regional water management and policy issues through applied research, community outreach and public education.**

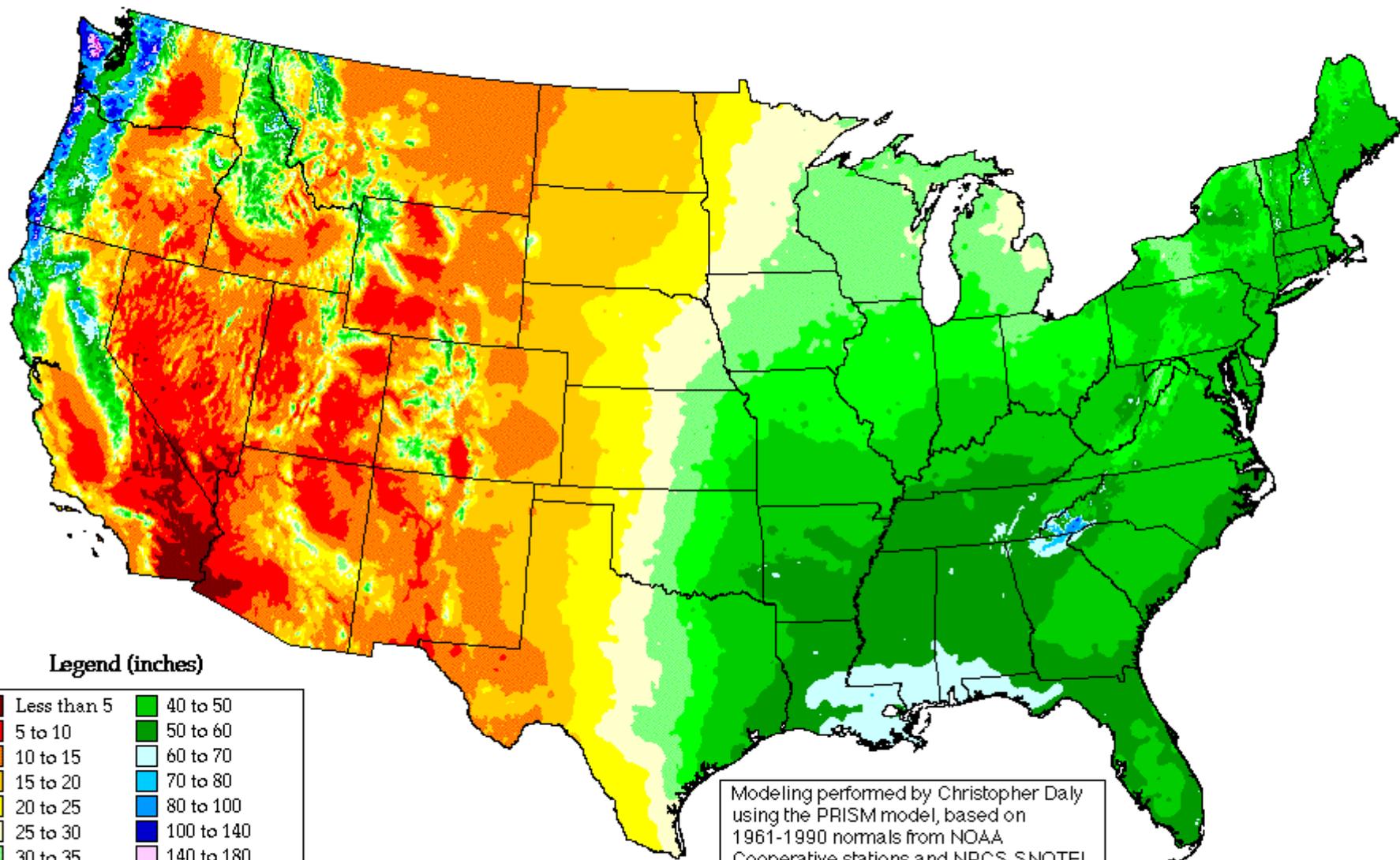
**The WRRC is committed to:**

- **assisting communities in water management and policy;**
- **educating teachers, students and the public about water; and**
- **encouraging scientific research on state and regional water issues.**

**Web site: [wrrc.arizona.edu](http://wrrc.arizona.edu)**

# Annual Average Precipitation

United States of America



## Legend (inches)

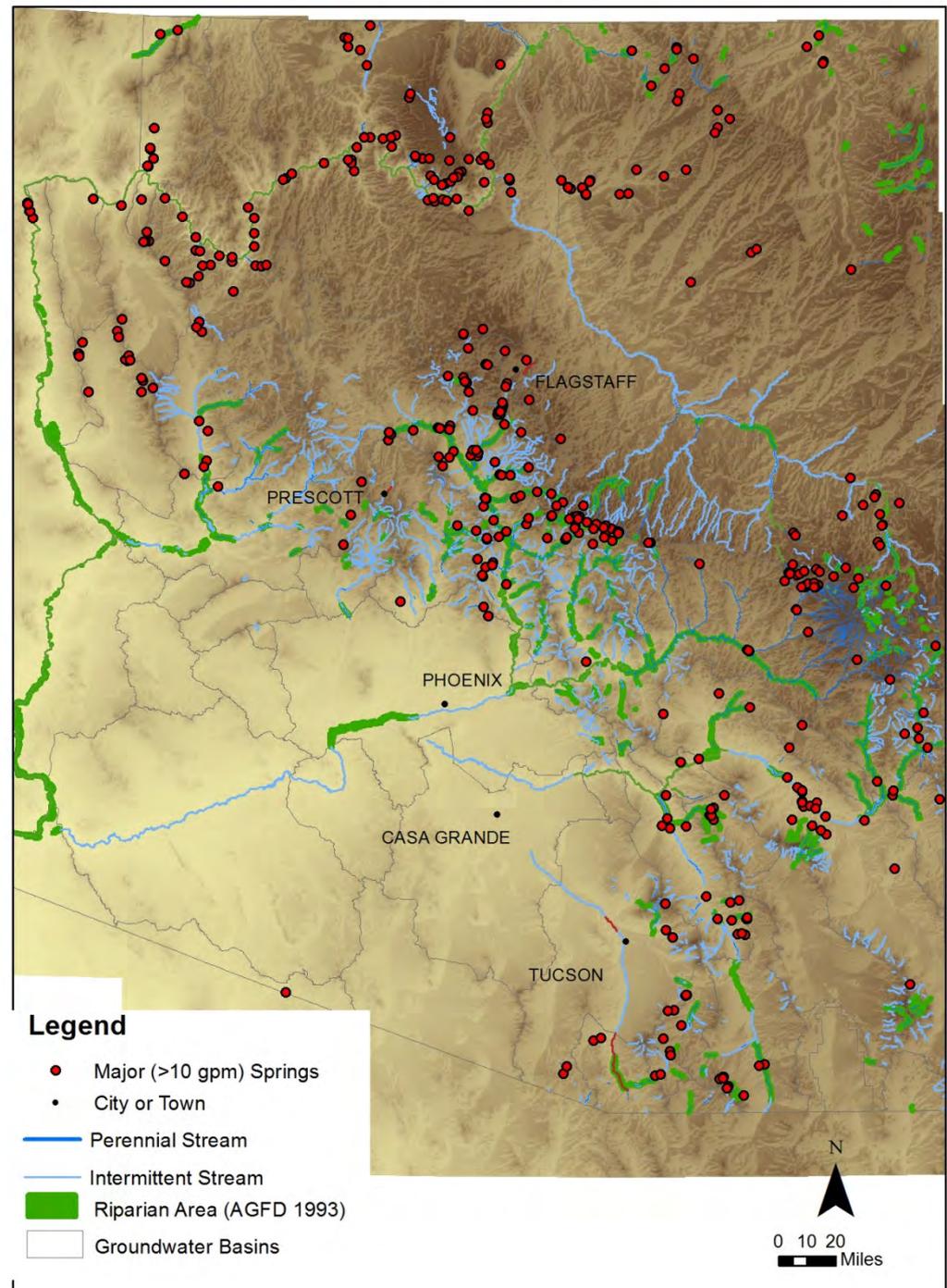
Less than 5	40 to 50
5 to 10	50 to 60
10 to 15	60 to 70
15 to 20	70 to 80
20 to 25	80 to 100
25 to 30	100 to 140
30 to 35	140 to 180
35 to 40	More than 180

Period: 1961-1990

Modeling performed by Christopher Daly using the PRISM model, based on 1961-1990 normals from NOAA Cooperative stations and NRCS SNOTEL sites. Sponsored by USDA-NRCS Water and Climate Center, Portland, Oregon.

Oregon Climate Service  
George Taylor, State Climatologist  
(541) 737-5705

# Streams of Arizona



# Riverine Species of Arizona

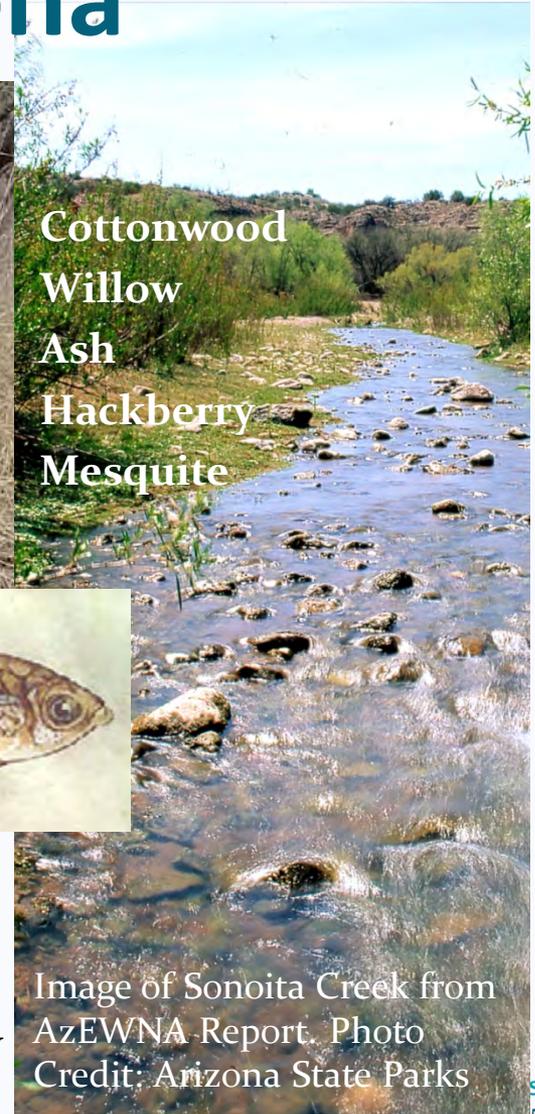


Cattail  
Horsetail  
Scirpus



## Grasses

- Deer grass
- Sacaton



Cottonwood  
Willow  
Ash  
Hackberry  
Mesquite



Saltbush



## Fish

- Gila topminnow
- Mosquito fish
- Sonoran topminnow

Image of Sonoita Creek from  
AzEWNA Report. Photo  
Credit: Arizona State Parks

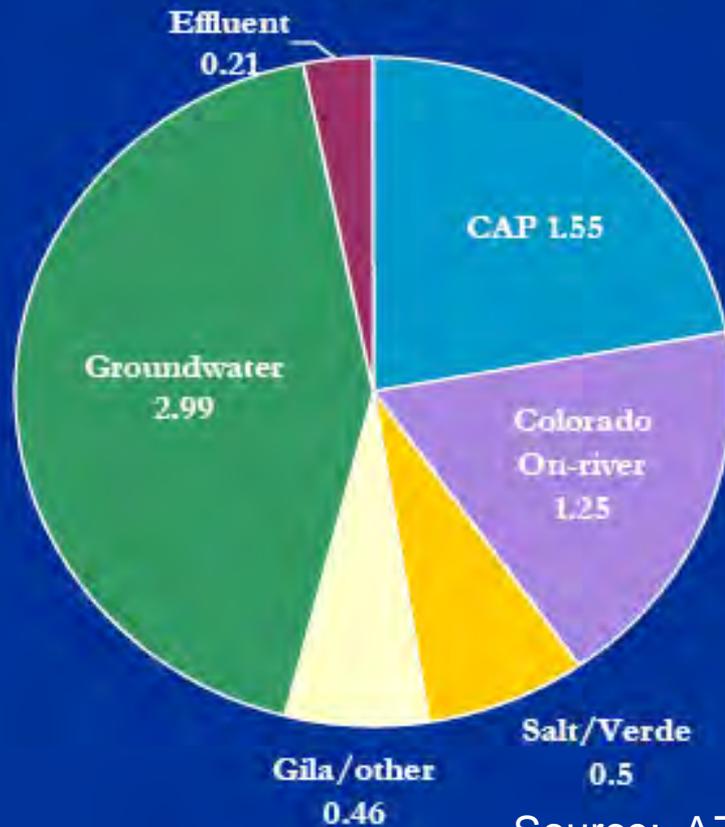
# Arizona Water Supply & Demand

Colorado River on-river diversions are 2.046 Maf of which 0.75 Maf is returned to the system for other use.

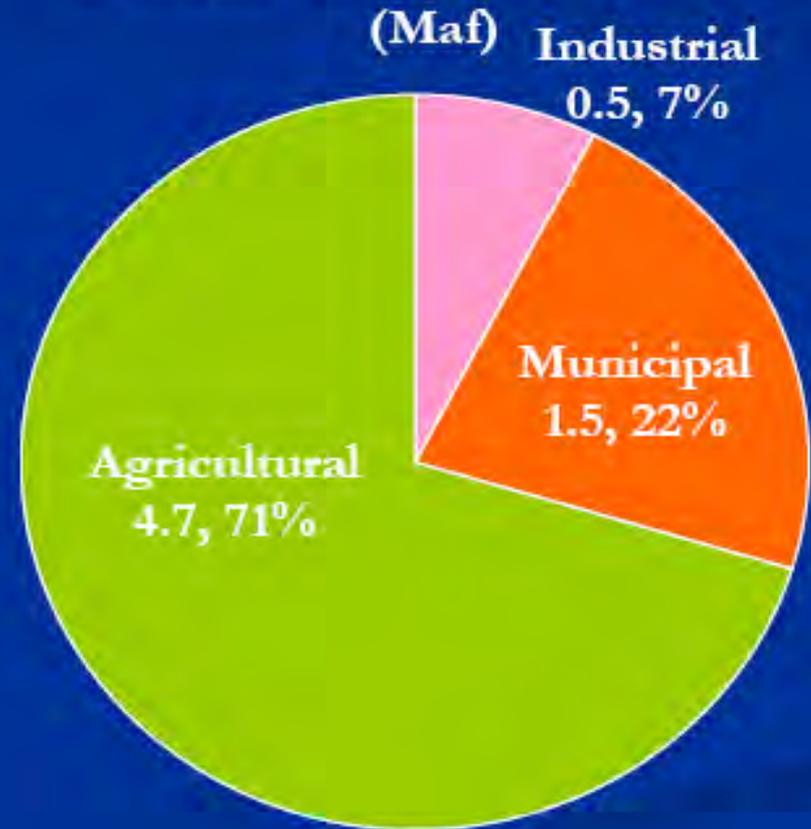
Assumes all well pumpage is groundwater, except for accounting surface wells along the Colorado River.

Demand does not include CAP long-term storage and system losses (approximately 0.3 Maf) or environmental demands on the Colorado River (approximately 0.02 Maf)

## WATER SUPPLIES 2001-2005 (Maf)

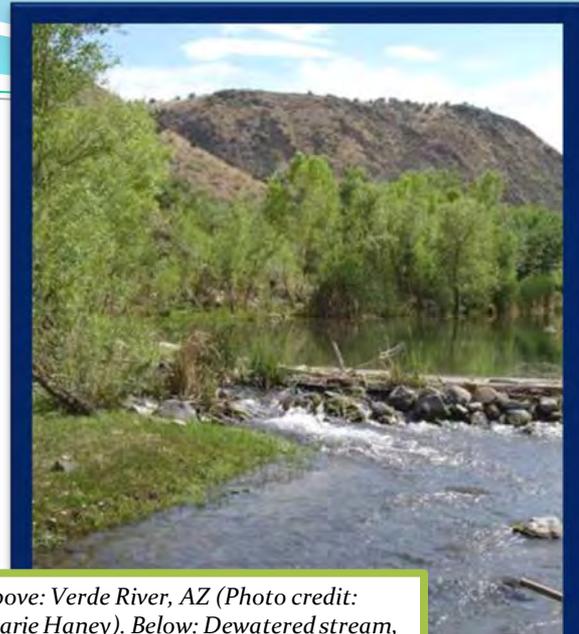
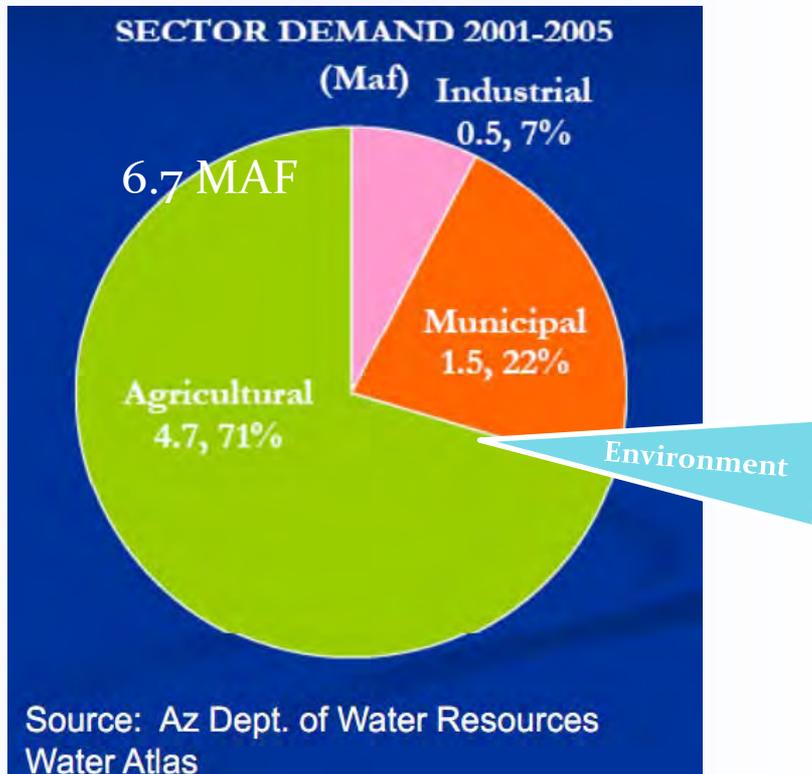


## SECTOR DEMAND 2001-2005 (Maf)

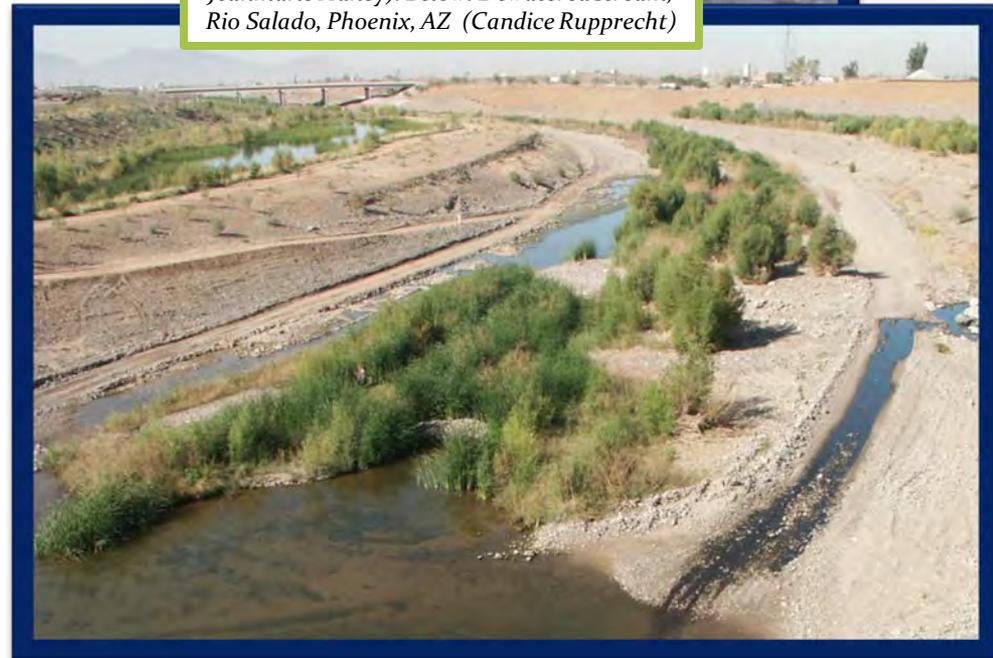


Source: AZ Dept. of Water Resources  
Water Atlas, [www.azwater.gov](http://www.azwater.gov)

# The Forgotten Sector



Above: Verde River, AZ (Photo credit: Jeanmarie Haney). Below: Dewatered stream, Rio Salado, Phoenix, AZ (Candice Rupprecht)



# Arizona's Environmental Issues

- Lack of legal protections
- Attitudes vary – public, policymakers
- Institutional capacity

# Water Policy Framework in the Colorado Basin

- The “Law of the River” governs allocations of water between the 7 basin states
  - Allocates more water than we expect to have available
- State policy framework: (Megdal et al 2011; Garrick et al 2011)
  - Prior appropriation, with ongoing adjudication
  - Surface water and groundwater managed separately
  - No clear process to transfer conserved water to environment
  - Price signals generally absent

# Opportunities for the Environment within the Legal Context

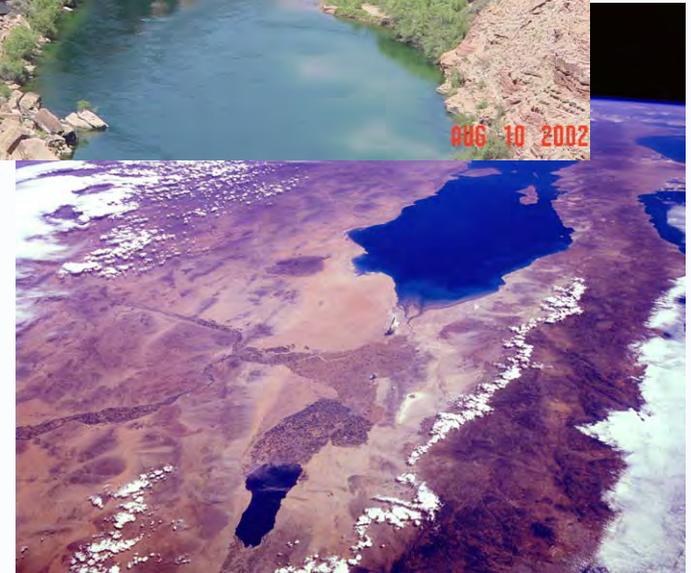
- Use federal regulations that already exist
  - Federal Reserved Water Rights
  - Clean Water Act
  - Endangered Species Act
  - Wild and Scenic Rivers Act
- Encourage voluntary arrangements
  - Develop new preservation, restoration, and enhancement projects
  - Instream flow permits to protect existing flows
  - Water planning

# Arizona's Water Planning & the Environment... the Past

- Since 1964 – 5 Arizona Town Halls on water
  - Environment not mentioned until 1997; not meaningfully until 2004
  - “Comprehensive, multi-use watershed planning is essential to maintaining a healthy natural environment”
- 1980 - Groundwater Management Act
- 2001 - GWMC recommendations for riparian protection had no major effects
- 2011 - Resistance to strong environmental language in Water Resources Development Commission report

# Creating A New History: Recognizing the Environment

- Driven by litigation:
  - Colorado Delta restoration
  - Colorado River basin study
- Endangered Species Act
  - Lower Colorado MSCP
- Arizona We Want survey:
  - People value environment
- WRDC Environmental Report



# Institutional Capacity

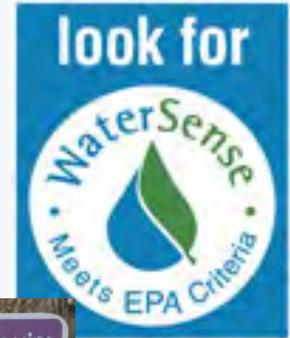
- Lack of statewide data on environmental needs
- Transfers between uses difficult
- Standards for instream flow permits changing
- Declining funding for state agencies
- Lack of expertise integrating environment

# WRRC Areas of Focus

- Goal: Establish tools to improve water management
- Strategies
  - Assess legal framework for opportunities
  - Develop innovative voluntary mechanisms
  - Help people rethink environment, realize its worth
  - Define environmental water needs quantitatively
  - Create tools to use in water planning

# Traditional Conservation Program Challenges

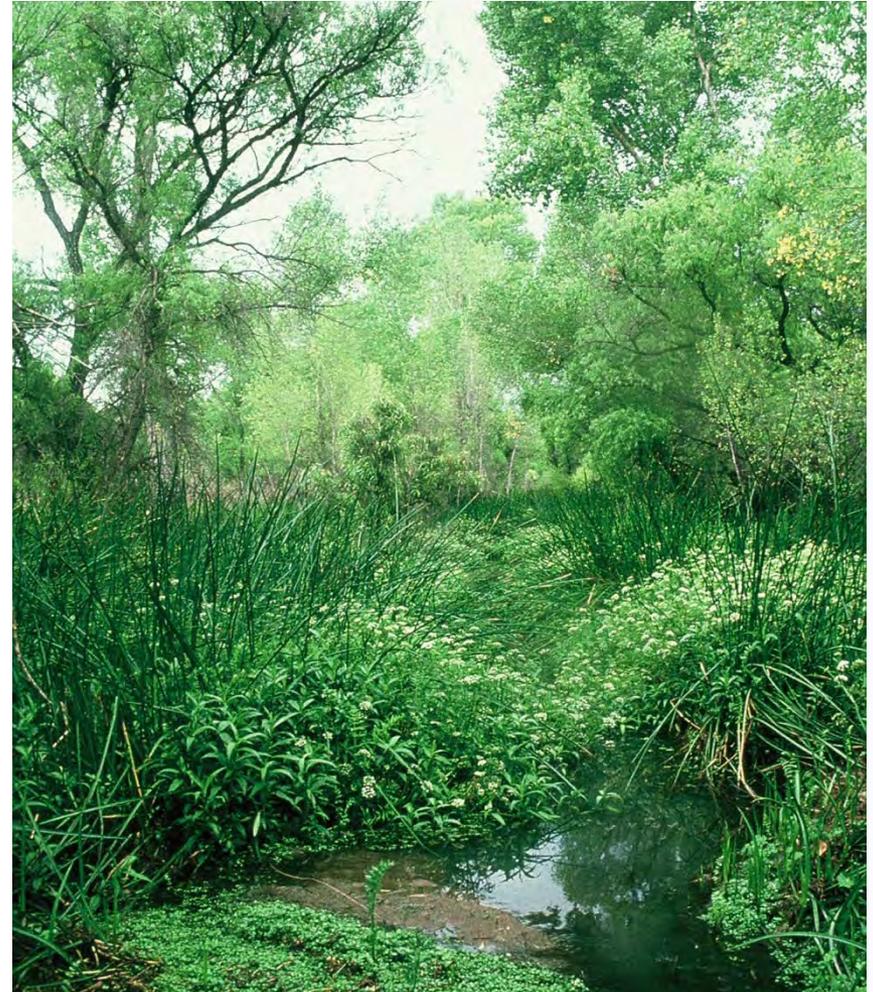
- Ordinances & rate structures *are effective*
- Rebates, water audits, and other voluntary programs go the next step, *but are less effective*
  - Limited participation without much personal motivation



# Motivation to Conserve Water

- Why should I save water?
- How do I save water?
- How are these things connected?

The environment can be a significant motivator that makes these connections.



*Cienega Creek,, Arizona. Photo Credit: Candice Rupprecht*

# Conserve to Enhance

Water saved through  
water conservation



Water delivered to river  
enhancement sites



*Watershed Management Group*



*Watershed Management Group*

# An Innovative Voluntary Mechanism

## How C2E Works

1. Water is conserved (at homes & businesses)
2. Money saved through water conservation
3. Money donated to a C2E fund
4. Money used to implement environmental enhancement projects

Program development funded by the U.S. Bureau of Reclamation. Current funding includes Walton Family Foundation.



Water saved through conservation efforts



Donations support environmental enhancement

# Program Benefits: Water Conservation

- Program results in measurable water conservation that would not have occurred otherwise
  - Extends water supplies
  - Lower infrastructure costs
- Water is becoming more scarce – conservation is no longer an option

# Program Benefits:

## Environmental Enhancement

- Wide range of projects that program can support
- Instream flows, green infrastructure, stream restoration – whatever the community values
- But maintain a connection to water!



Beaver Creek, AZ. Photo credit: Brittany Choate

# Program Benefits: Education

## Link Your Water Savings to Enhancing Local Washes

Did you know your water savings can benefit local rivers, streams, and washes? Thanks to a new program – Tucson Conserve to Enhance (C2E) – Tucson Water customers can donate money saved on their bill to support enhancement of riparian areas in the utility's service district.

Your water bill's "Open Space" checkbox will soon be the "Open Space and Riparian" checkbox. Donations made through the checkbox this year will support the Atterbury Wash restoration project.

In January, a pilot program was launched with participants installing water conservation devices and tracking their savings.

## Your Water CONNECTION

Public participation is essential to assisting Tucson Water in navigating the future and in making our community water sustainable. Residential customers living in neighborhoods inside and outside the City limits, business owners, and representatives from trade groups, professional organizations, and non-profits help to shape Tucson Water's future.

"Participation" comes in many forms: attending a town hall, sitting on an advisory group, filling out an online comment form, speaking with a customer representative or taking time to answer a question. Your involvement has helped Tucson Water staff to develop programs and rebates.

The Deschutes River has been called the lifeblood of central Oregon, yet nearly 98% of the water from the Deschutes just north of Bend is diverted through irrigation canals during the summer. Drastic seasonal fluctuations in streamflow erode streambanks and result in water quality problems and habitat degradation in our river. This problem affects all of us in the community. The solution? **GIVE BACK TO THE DESCHUTES RIVER WITH BLUEWATER**

### BLUE WATER

Blue Water is the result of an innovative partnership between Avion Water Company and the Deschutes River Conservancy (DRC), a local non-profit. 100 percent of your gift to Blue Water supports DRC programs that improve streamflows in the Deschutes River. Your small donation can make a huge difference. Choose from the monthly donation levels below.

- RIVER OTTER \$6.40
- BLUE HERON \$4.80
- RAINBOW TROUT \$3.20
- SPOTTED FROG \$1.60

**What does my monthly donation do?** It helps sustain the quality of life we all enjoy. Additional water in the river boosts water quality, streamside vegetation, fish, wildlife, scenic and recreation opportunities. Fill out the enrollment form on the reverse side and return it with your Avion bill or contact Avion Water Company at 541.382.5342. For more information on DRC programs visit [www.deschutesriver.org](http://www.deschutesriver.org).

**SIGN UP >**

# User Contribution Programs



# Tucson C2E Pilot Program

- To test the C2E concept, Tucson became home to the first C2E Pilot
  - 60 participants began their 2 year enrollment January 2011
- Tucson Water provides water use information
  - Historic (2008-2010) water use establishes baseline
  - Current monthly water use determines conservation
- Each quarter participants receive a survey and a donation request

# 2011 Tucson C2E Pilot Results

Actual donations for 2011: \$1,262

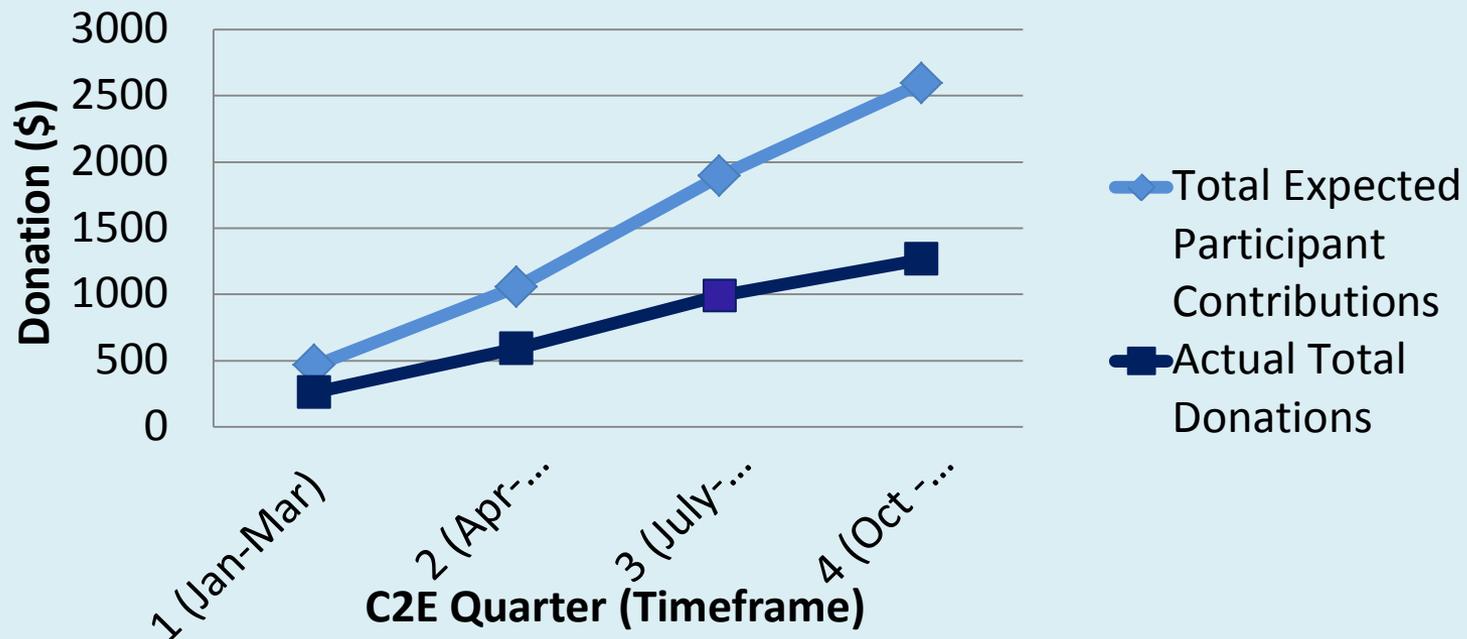
➤ \$3.62 household/month

Total Water Conserved: 1.1 million gallons

➤ 500,000 gal with overages

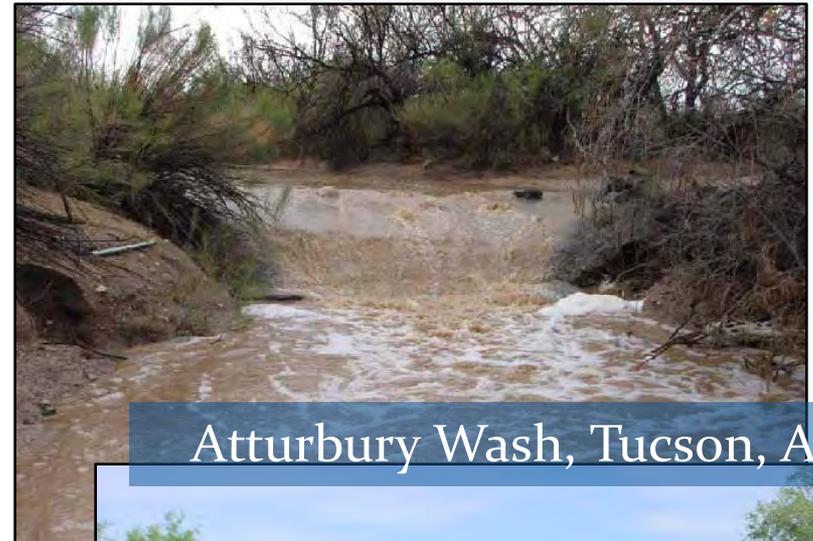


## C2E Conservation-Based Donation Total



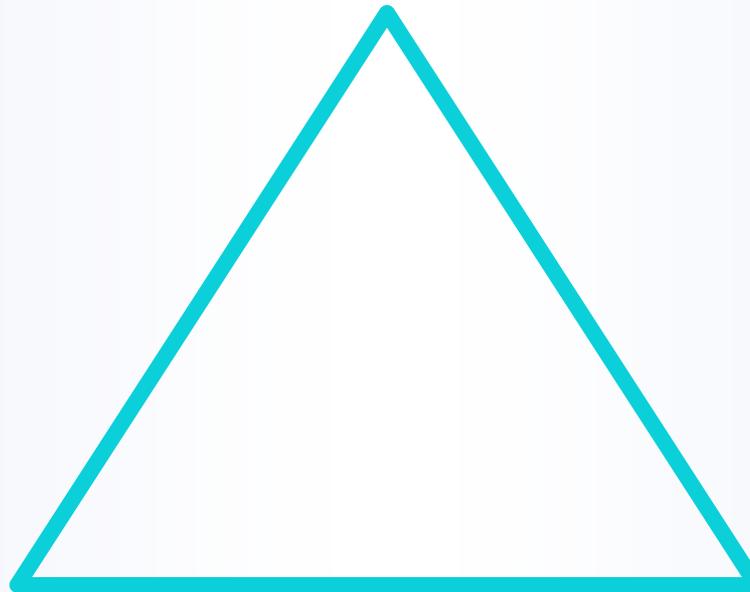
# Tucson Pilot Results: Looking Forward

- ❖ If C2E is scaled up to entire Tucson Water service area...
  - 12,500 participant estimate (~5% TW customers)
  - 850 + acre/feet of water conservation
  - \$500,000/year for local environmental enhancement



# Getting Going: Program Partners

**Water Providers  
and Corporations**



**Community  
Members and  
Local Government**

**Conservation  
Organizations,  
Agencies**

# Getting Going: Environmental Enhancement Priorities



# Getting Going: Tracking Water Savings and Donations

- Need an accounting approach that fits your capacity.
  - For corporations, simply a matter of tracking change in water use and expenses
  - For water providers, need to track water use relative to each user's historic baseline and their donations
  - Many ways to achieve this accounting depending on sophistication of billing software, capacity, etc.



# UTILITY SERVICES STATEMENT

**BANK DRAFT - PLEASE DO NOT PAY**

Tucson Water Customer Service Office  
Phone: 520-791-3242  
Outside Tucson: 800-598-9449  
www.tucsonaz.gov/water

**Account Name:**  
**Account Number:**  
**Service Address:**  
**Bill Date:** 08/03/2011  
**Service Period:** 07/05/2011 to 08/02/2011  
**Hours:** 8:00 am - 5:00 pm MST (Mon-Fri)



Pima County Regional Wastewater  
Reclamation Department  
Phone: 520-740-6609  
www.pima.gov/wwmr

City of Tucson Environmental Services:  
Phone: 520-791-3171  
www.tucsonaz.gov/esd

Last Bill	Payments (Credits)	Deposits Applied	Adjustments	Balance Forward	New Charges	ACCOUNT BALANCE
\$74.83	-\$74.83	\$0.00	\$0.00	\$0.00	\$65.33	\$65.33

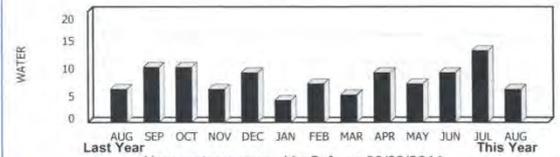
METER INFORMATION						
Meter number	Service Type	Start Date	End Date	Current Read	Previous Read	Consumption (Ccfs)
	WA	07/05/11	08/02/11	2141	2135	6

ACCOUNT ACTIVITY	
LAST BILL	\$74.83
TOTAL PAID SINCE LAST BILL	-\$74.83
ADJUSTMENTS	\$0.00
<b>BALANCE FORWARD</b>	<b>\$0.00</b>

**NEW CHARGES**  
 ENVIRONMENTAL SVCS FEES  
 SEWER VOLUME  
 WATER VOLUME  
 MISCELLANEOUS  
**TOTAL NEW CHARGES**

**ACCOUNT BALANCE**  
 DRAFT AMOUNT ON: 08/23/11

<b>DRAFT DATE:</b>	08/23/2011
<b>DRAFT AMOUNT:</b>	\$65.33
Open Space / Riparian Contribution (optional)	
<b>AMOUNT PAID:</b>	BANK DRAFT - DO NOT PAY



**IMPORTANT MESSAGE**

On July 5, 2011 Water rate changes approved by Mayor & Council became effective. Questions? Please call 791-3242; outside Tucson, 1-800-598-9449.

\* On July 1, 2011 an increase in sewer rates became effective as approved by the Pima County Board of Supervisors. Questions on the sewer charge portion of your bill, call (520) 740-6609.

\*Environmental Services charges reflect a fuel surcharge and an increase in the groundwater protection fee.

Due date applies to current charges ON  
 Any balance forward is due now  
 Please allow 7 days for payments to post to your account.  
 A \$28.00 fee will be charged for returned check.

**BANK DRAFT - PLEASE DO NOT PAY**



UTILITY SERVICES  
PO Box 28804  
Tucson, AZ 85726-8804

Please fold on perforation before tearing and return bottom portion with your payment.

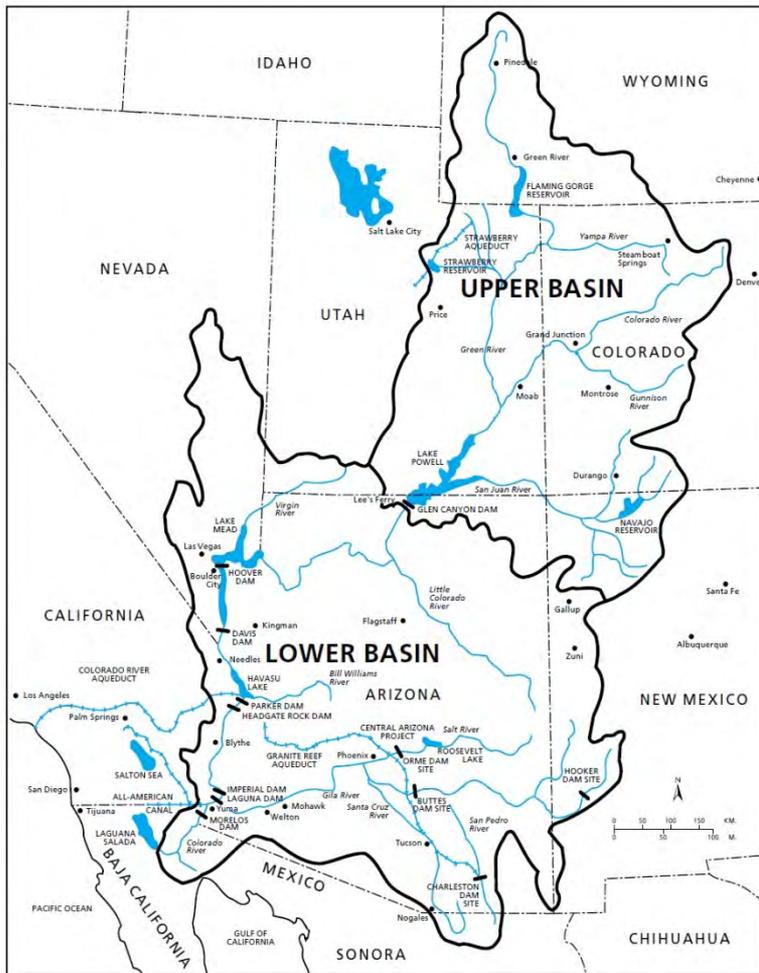
**Account Number:**  
**Service Address:**  
 Cycle Route #: 04-5

<b>DRAFT DATE:</b>	08/23/2011
<b>DRAFT AMOUNT:</b>	\$65.33
Open Space / Riparian Contribution (optional)	
<b>AMOUNT PAID:</b>	BANK DRAFT - DO NOT PAY

Your tax-deductible contribution to "Open Space or Riparian Enhancement" will support the preservation of biologically-rich open space and the Conserve to Enhance program, an effort that links local river and wash enhancement with individual water conservation efforts. Visit www.tucsonaz.gov/water/checkbox to learn more. Your contribution will not affect service fees.

# Tucson Water bill with Checkbox program highlighted

# Supporting Pilot Development in New Communities



## WRRC Role:

- Assistance Tailoring New C2E Programs to Meet Community Needs & Priorities
- C2E Program Design Guide & Guidance on Key Elements
- Integrated Program Development Support
- Active Stakeholder Engagement & Partner Development

# C2E Program Websites:

THE UNIVERSITY OF ARIZONA®

Water Resources Research Center  
College of Agriculture and Life Sciences

Search WRRC:  keyword Search All

About WRRC Director's Page News & Events WRRC Publications Programs Products Resources Personnel

A review of environmental enhancement projects led to a current project that focuses on establishing programs that provide water for the environment, either through direct check box donation programs or voluntary municipal water conservation.

Background  
Several years ago, a series of studies of environmental restoration projects in Arizona (funded by the U.S. Army Corps of Engineers and U.S. Bureau of Reclamation). Completed by 2006, the reports (found here and here) highlighted the importance, and in some cases the need for, water conservation and water conservation in Arizona. A recent report updated information about some of these environmental enhancement projects and added information about a few newer projects.

San Pedro River

**WRRC**  
wrrc.arizona.edu

Watershed Management Group  
Working together towards sustainable solutions

About Us What We Do Programs International Partners/Funders Contribute

Home » Programs » Conserved to Enhance, Tucson

Events Calendar  
• Tucson, AZ  
• Phoenix, AZ  
• E-Newsletter  
• Community Resources  
• FAQ  
• Get Involved  
• Contact Us

IN THE PRESS  
Conserved to Enhance, Tucson  
Make Your Water Conservation Efforts Count towards Improving Desert River Ecosystems!

FEATURED BLOGS  
» WMG Blog!

**Watershed Management Group**  
watershedmg.org/c2e

Tucson Water

Government Neighborhoods Business City Facts Departments A-Z Answers Search

Tucson Water home Customer Services & Billing

"CHECKBOX"  
Tucson Water has partnered with local non-profit organizations to protect and enhance open space and riparian areas in the Tucson region. Join this collaborative effort by making a donation through the "Open Space and Riparian Contribution" checkbox on your utility bill.  
Click here to see a sample of the Utility Services Statement's checkbox and message.

Open Space  
Guided by the vision of the Sonoran Desert Conservation Plan, and with funding largely from voter-approved open space bonds, Pima County has conserved more than 201,000 acres of open space in the last 15 years. This has created a vast network of open space largely around Tucson's urban core with important parcels also being preserved, when possible, within the city of Tucson boundaries.  
Contributions to the Open Space checkbox on your water bill will be used to purchase additional open space parcels and further strengthen this expansive preserve system that both humans and wildlife can enjoy. These new parcels will provide habitat for our unique Sonoran Desert wildlife and possibly provide linkages between existing open space parcels and preserve crucial water resources.

Customer Service  
Online Bill Payment  
Start Service (Residential)  
Stop Service (Residential)  
(Online Services Available 24 hours/day)

E-Mail Us  
Set Up Automated Bill Payment  
Pay My Bill: In Person, By Phone or by Mail  
520-791-3242  
800-598-9449 (Toll Free)  
(Phone hours: Mon. - Fri., 8 a.m. - 5 p.m.)  
Sewer Questions (Pima County)  
520-740-6609  
(Phone hours: Mon. - Fri., 7:30 a.m. - 4:30 p.m.)  
Garbage/Recycling Questions  
(City Environmental Services)

**Tucson Water**  
cms3.tucsonaz.gov/water/checkbox

20 SONORAN INSTITUTE  
Shaping the Future of the West

Home » Where We Work » Southwest » Santa Cruz River » Water For The Environment

Water For The Environment  
Sonoran Institute is a lead organization in launching the nation's first pilot program testing an innovative idea, Conserve to Enhance, that links personal water conservation and local river restoration.  
The Conserve to Enhance concept was developed and researched by the Water Resources Research Center at the University of Arizona.  
Read more about WRRC Conserve to Enhance research.

Contacts - Santa Cruz River  
Emily Brott  
Project Manager  
ebrott@sonoraninstitute.org  
520.290.0828 x 1144  
Chaine Zugmeyer  
Ecological Research Specialist  
czugmeyer@sonoraninstitute.org  
520.290.0828 x 1143

Santa Cruz River Resources

**Sonoran Institute**  
sonoraninstitute.org

# Arizona's Technical Challenges

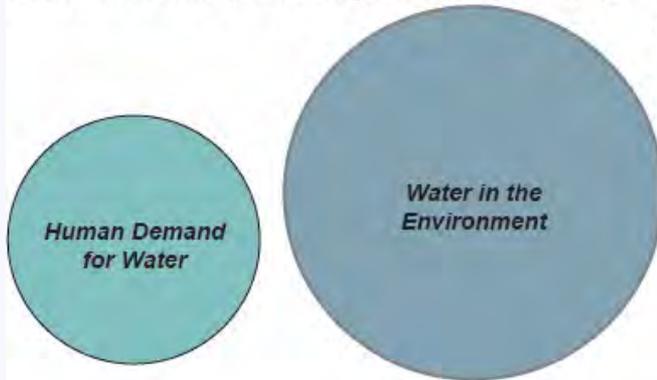
- Need comprehensive regional flow management
  - Poff et al. 2010
- Lack of statewide data on environmental water needs
  - ADWR 2009
- Gaps in understanding about ephemeral rivers
  - Hughes 2005

# Changing the Conversation: Defining All Water Sectors

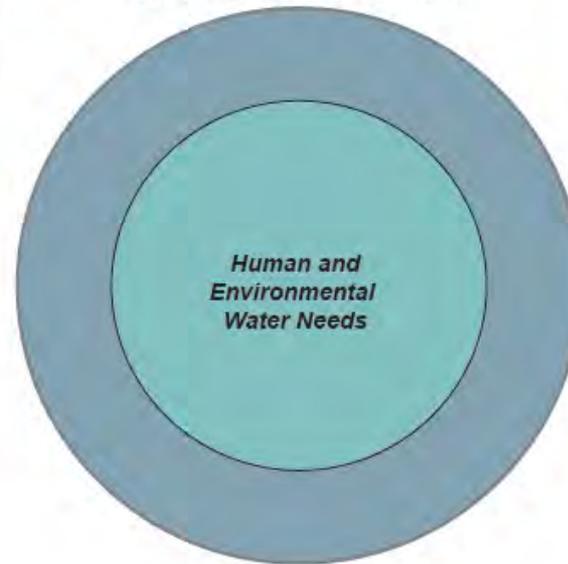
- Information comes from:
  - Arizona Water Atlas (ADWR)
  - Arizona Environmental Water Needs Assessment (AzEWNA) Report and Methodology Guidebook
  - Water Resources Development Commission (WRDC) Environmental and Supply & Demand Reports

# Considering Water Demands

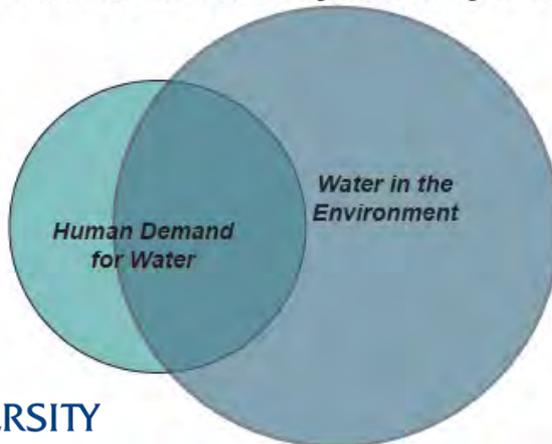
*When we plan for our water resources this is usually how we see them*



*Our goal with this project is to start a dialogue about how the two can be considered together*



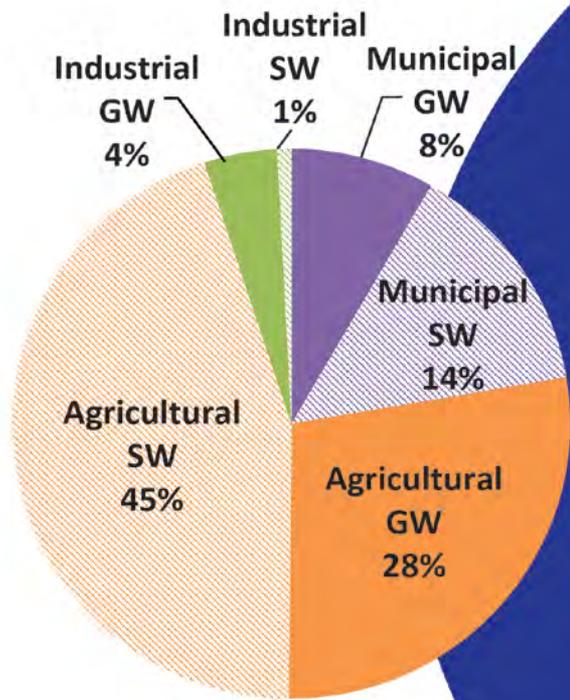
*Human demand and water in the environment are linked, but not always mutually exclusive*



# What is the Environment Worth?

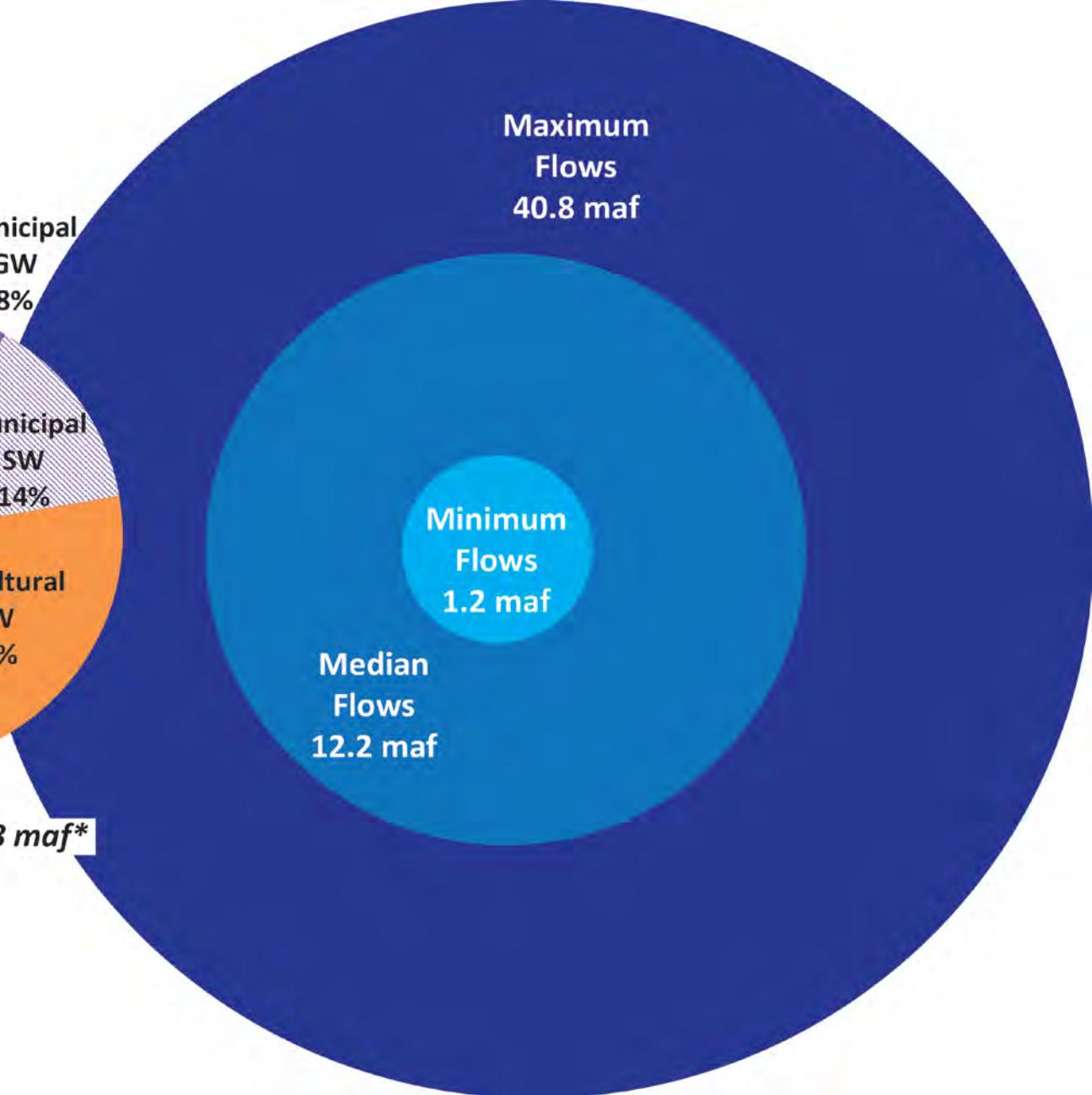
- Economic studies
  - State revenues
  - Housing prices
- Social values
  - Preferences
  - Non-Use
- Ecosystem services



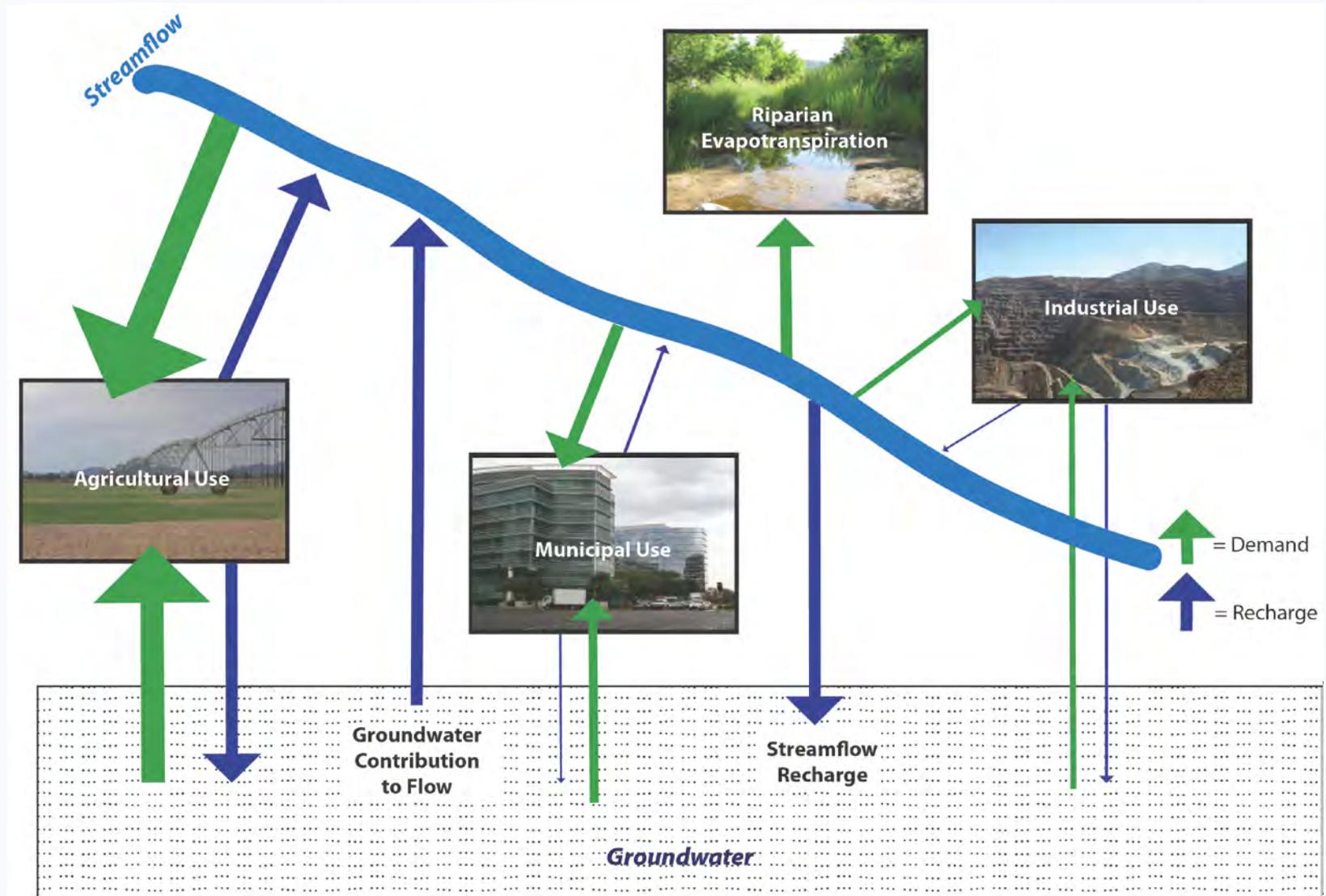


**Total Human Demand in 2006 = 6.8 maf\***

SW= Surface Water  
 GW= Groundwater  
 maf = Million acre-feet



# Arizona Water Demand and Use



# Quantified Streamflow or Environmental Demands?

- Quantified Streamflow
  - Streamflow that supports the environment
    - Annual baseflow
    - Groundwater underflow
    - Riparian extent
    - Average annual evapo-transpiration (ET)

- Environmental Demands
  - The amount of water needed in a watercourse to sustain a healthy ecosystem
    - Magnitude (how much)
    - Frequency (how often)
    - Duration (how long)
    - Timing (how predictable)
    - Rate of Change (how variable)

Discharge (cu ft/sec)

15  
10  
5  
0

Magnitude

Discharge at Charleston, Arizona Gauge

Frequency

Duration

Rate of Change

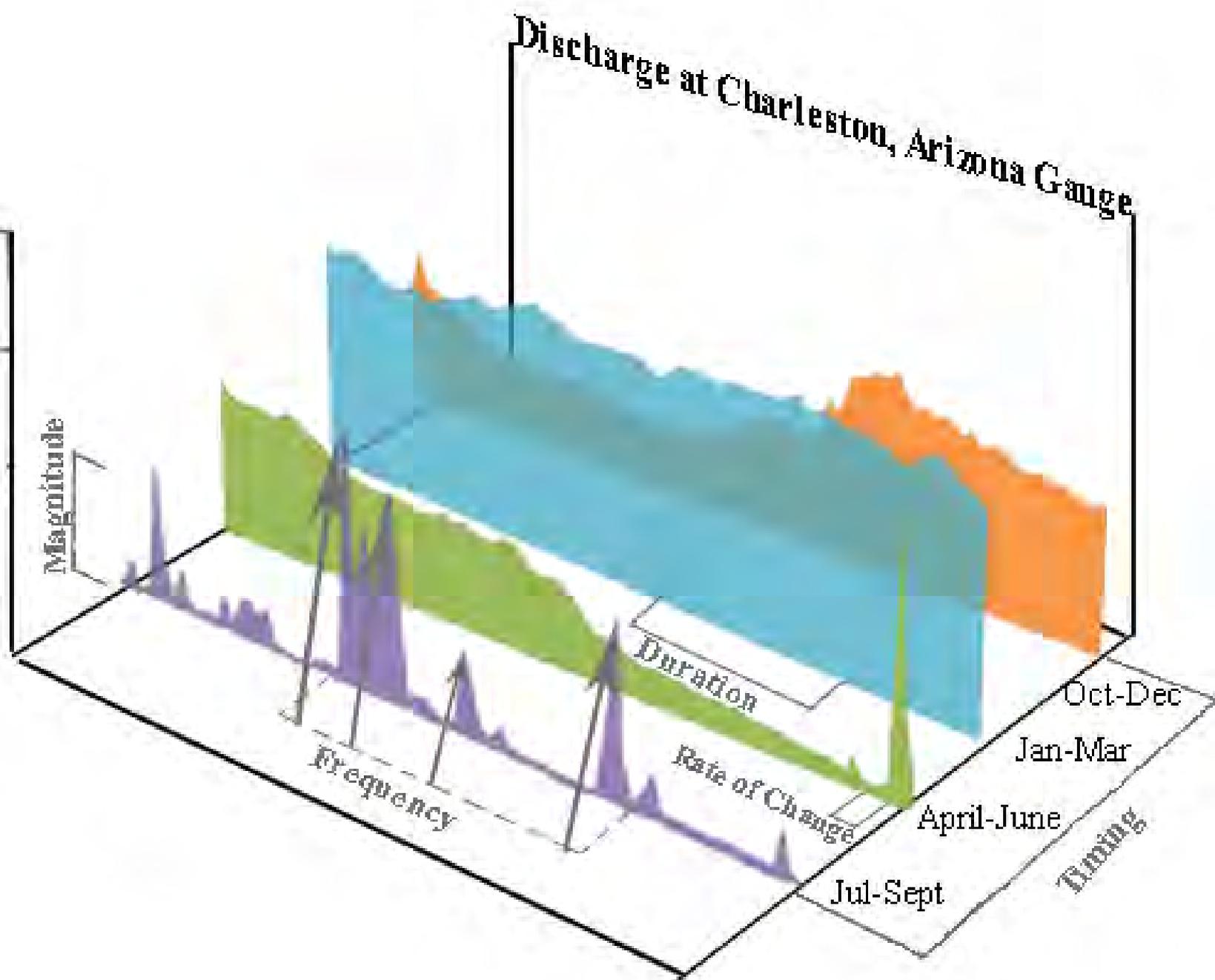
Oct-Dec

Jan-Mar

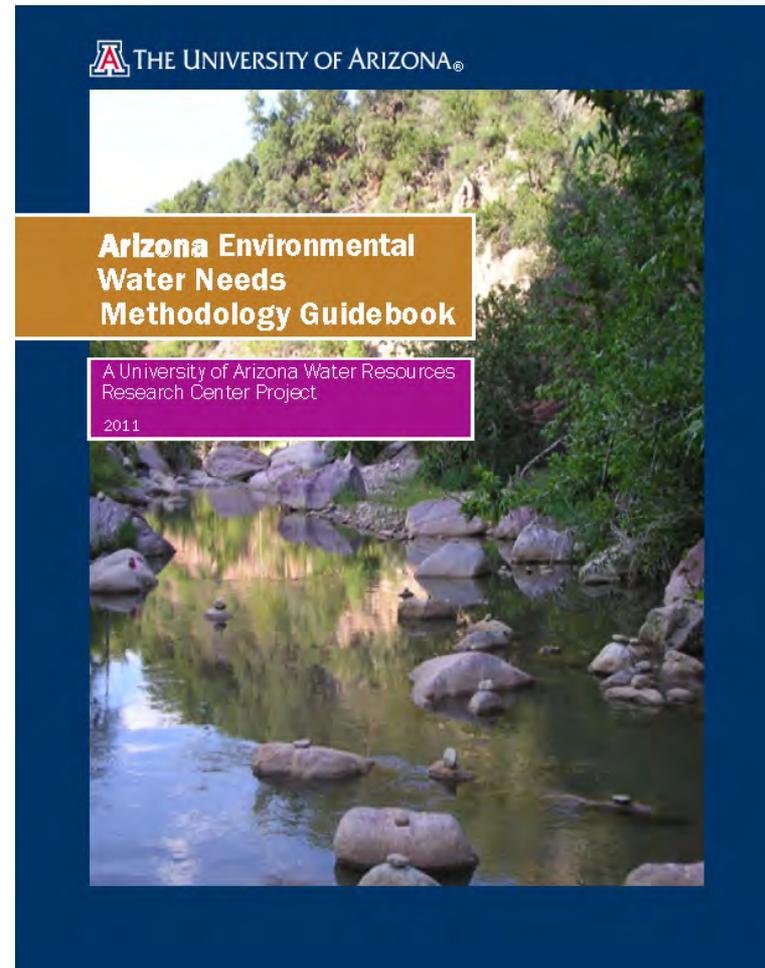
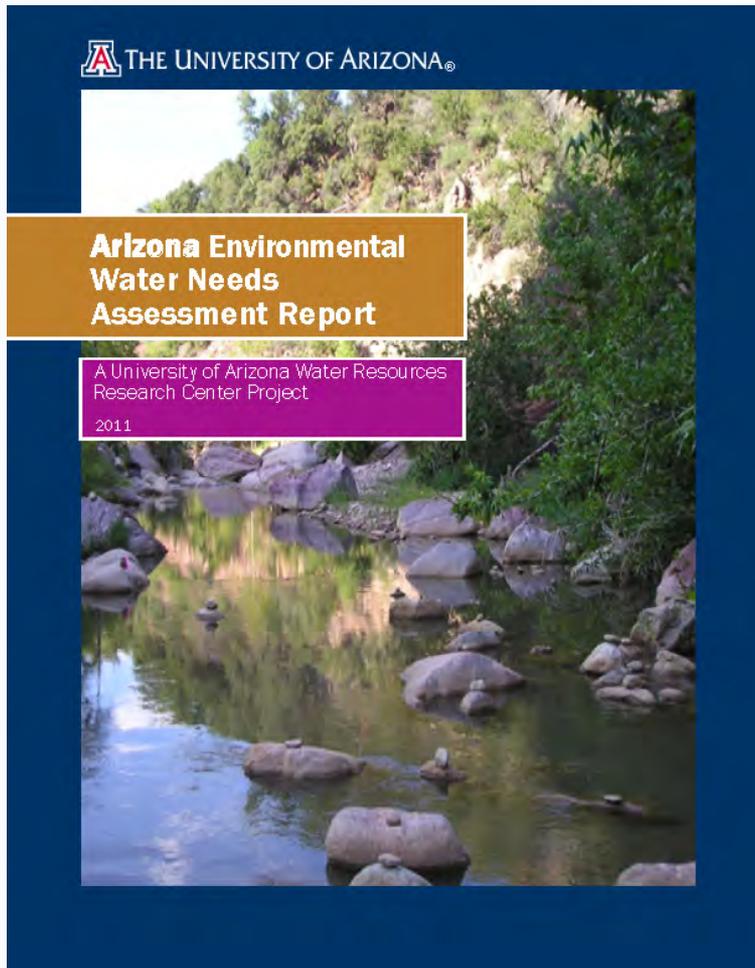
April-June

Jul-Sept

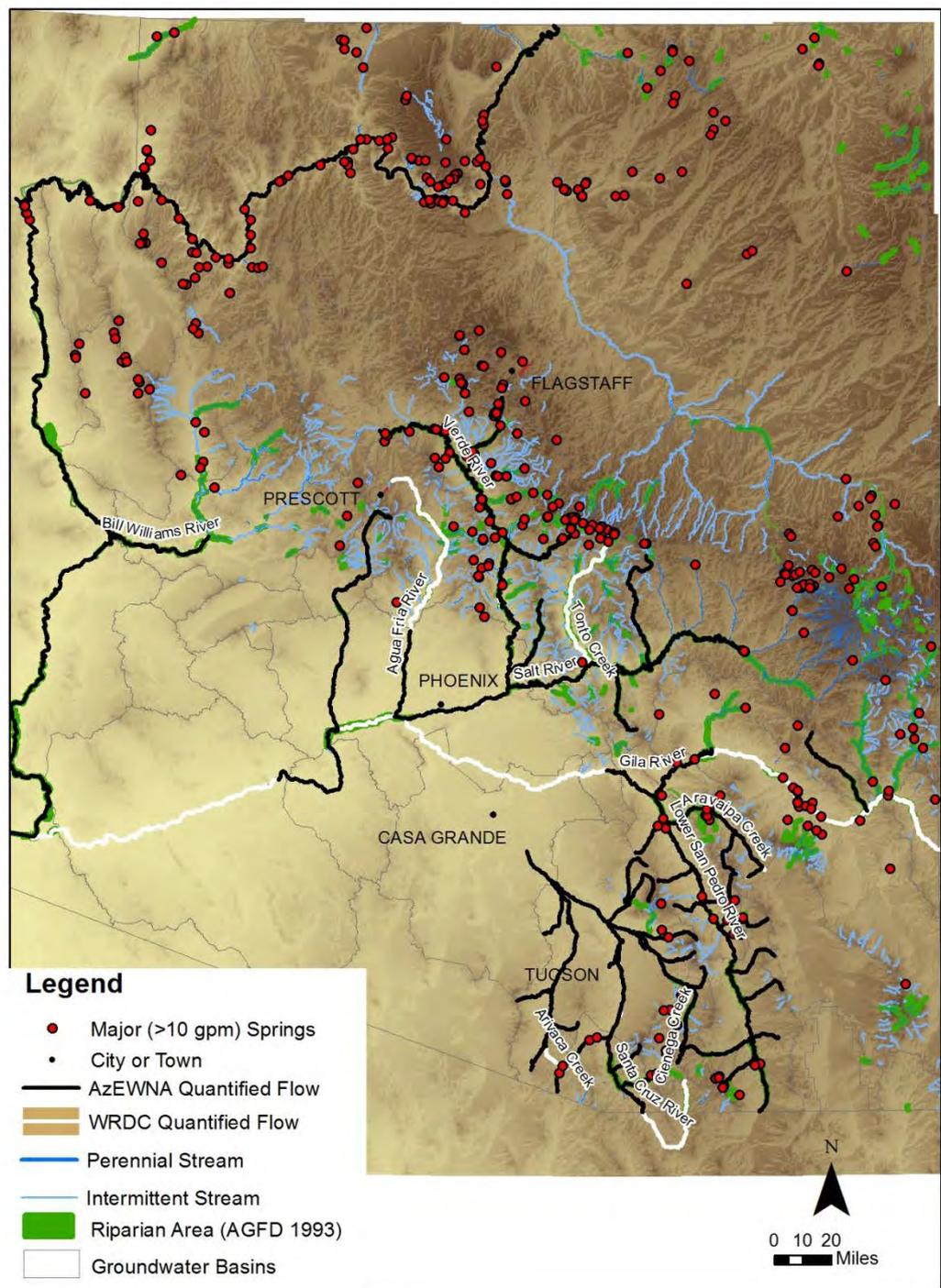
Timing



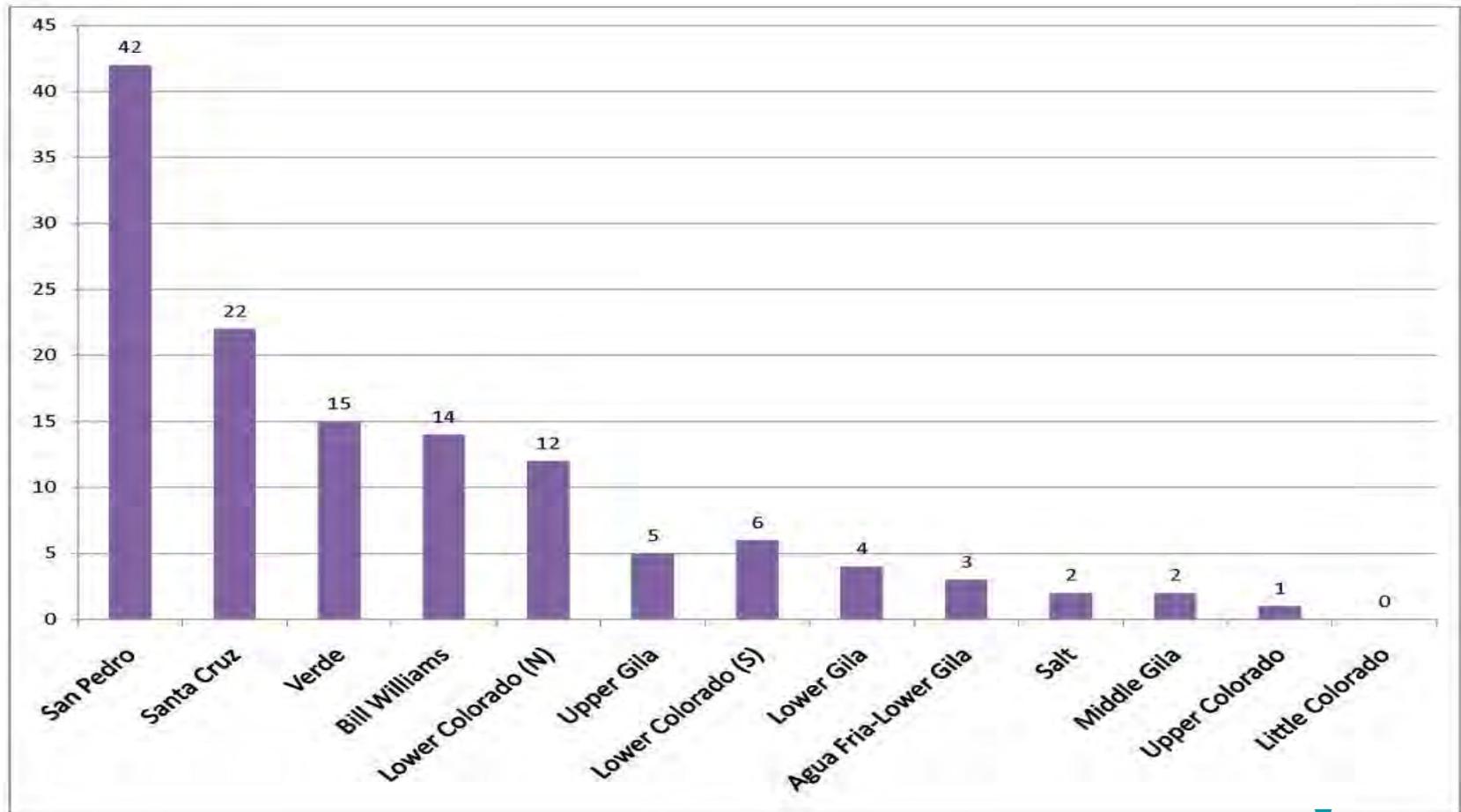
# Examining Environmental Flow Needs



# Extent of Quantified Flows



# # of Studies By Watershed



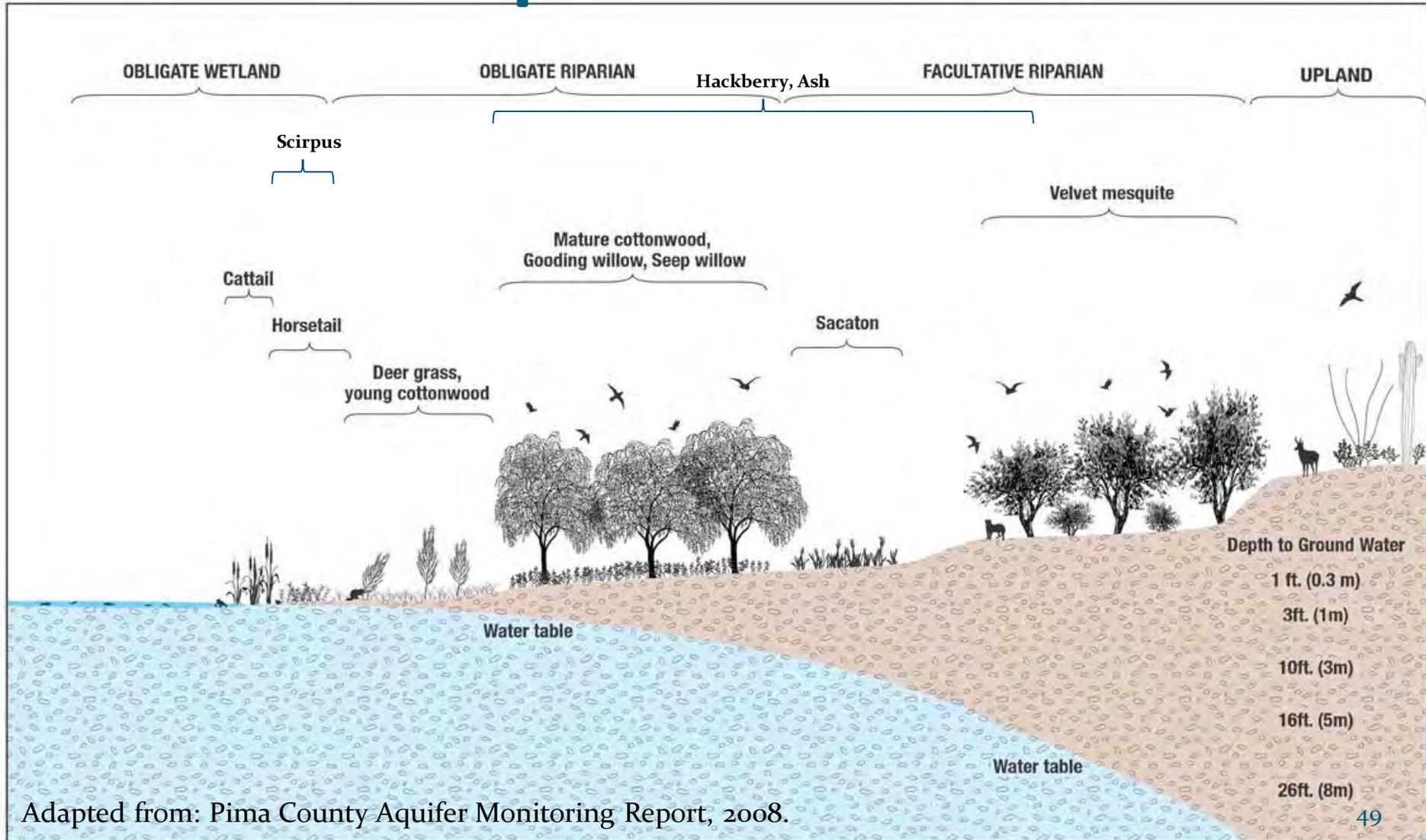
# Summary of Studies - Statewide

93 studies in database

70 give quantitative information about ecological flow needs or ecological responses to flow alteration

	Aquatic Only	Riparian Only	Aquatic/Riparian	TOTAL
<i>Multiple Study Syntheses</i>	5	12	8	<b>25</b>
<i>Review of Multiple Studies</i>	0	15	2	<b>17</b>
<i>Single Study</i>	7	41	3	<b>51</b>
<b>TOTAL</b>	<b>12</b>	<b>68</b>	<b>13</b>	<b>93</b>

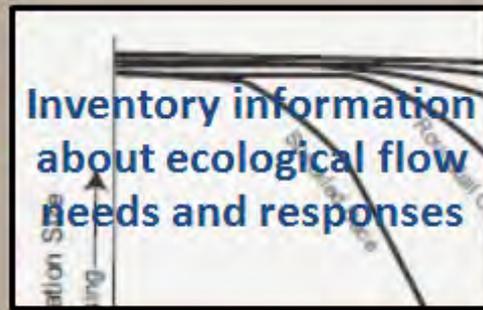
# Riparian Plants



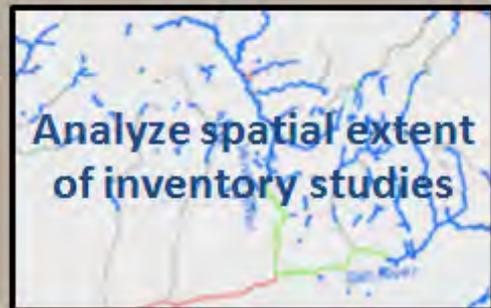
Season	Monsoon	Tropical	Winter-Spring	Dry								
Floods	<ul style="list-style-type: none"> <li>➤ 30–55 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ Short (h)</li> <li>➤ Rapid rise/fall</li> <li>➤ 1:5 years</li> </ul> <ul style="list-style-type: none"> <li>• Herbaceous growth</li> <li>• Litter decomposition</li> </ul>	<ul style="list-style-type: none"> <li>➤ &gt; 850 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ &lt; 2 days</li> <li>➤ Rapid rise/fall</li> <li>➤ 1:25 years</li> <li>➤ Best after Oct 1<sup>st</sup></li> </ul> <ul style="list-style-type: none"> <li>• Establish <i>Populus</i> and <i>Salix</i></li> <li>• Remove non-native fish</li> <li>• Remove beaver dams</li> <li>• Create off-channel habitat</li> <li>• Clear out senescent woody vegetation</li> </ul>	<ul style="list-style-type: none"> <li>➤ 130–140 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ 7–10 days total</li> <li>➤ Quick peak then recede 7–10 days at &lt;2.5 cm day<sup>-1</sup></li> <li>➤ 1:3 years</li> </ul> <ul style="list-style-type: none"> <li>• Herbaceous growth</li> <li>• Remove beaver dams</li> <li>• Refresh: <ul style="list-style-type: none"> <li>○ Riffle habitat</li> <li>○ Off-channel pools</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>➤ 300–850 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ 2-day peak then recede 2–4 weeks at &lt; 2.5 cm day<sup>-1</sup> to low flow</li> <li>➤ 1:5 to 1:10 years</li> <li>➤ Avoid floods for 2 years</li> </ul> <ul style="list-style-type: none"> <li>• Recruit <i>Populus</i> and <i>Salix</i></li> <li>• Minimize <i>Tamarix</i></li> <li>• Scour channel</li> <li>• Remove beaver dams</li> <li>• Flush non-native aquatic species</li> <li>• Elevate groundwater</li> </ul>								
	<ul style="list-style-type: none"> <li>➤ 3–15 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ Short (h)</li> <li>➤ Rapid rise/fall</li> <li>➤ 1:2 years</li> </ul> <ul style="list-style-type: none"> <li>• Herbaceous growth</li> </ul>		<ul style="list-style-type: none"> <li>➤ 6–11 m<sup>3</sup> s<sup>-1</sup></li> <li>➤ 2–4 weeks</li> <li>➤ Constant flows</li> <li>➤ 1:1 year</li> </ul> <ul style="list-style-type: none"> <li>• Native fish spawning</li> </ul>									
Baseflows	<ul style="list-style-type: none"> <li>➤ 0.6–1.5 m<sup>3</sup> s<sup>-1</sup> (common baseflow)</li> <li>• Maintain aquatic habitat</li> <li>• Maintain established riparian vegetation</li> </ul>											
	<ul style="list-style-type: none"> <li>➤ 0.6 m<sup>3</sup> s<sup>-1</sup> (minimum baseflow); up to 2 months; rare; gradual rates of change</li> <li>• Fragment aquatic habitat to favor native species</li> </ul>											
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun

High magnitude floods  
 Moderate magnitude floods  
 Low magnitude floods

# Arizona Environmental Water Needs Assessment



Classify methods used in inventory studies



Distill common findings from studies



Apply e-flow literature to evaluate Arizona methods



# Needs Assessment: Conclusions

- Limited study information in some areas
  - Barrier to developing *statewide* flow needs
- Future studies needed on underrepresented streams and species
  - Should follow holistic approach
- Where information is available, water-related ecological objectives can be quantitatively defined

# Connecting the Environment to Arizona Water Planning (EnWaP)

- Further understand water needs of the environment
- Build upon efforts to address increasing water demands of AZ
- Identify voluntary, stakeholder-driven options for addressing needs of water dependent natural resources



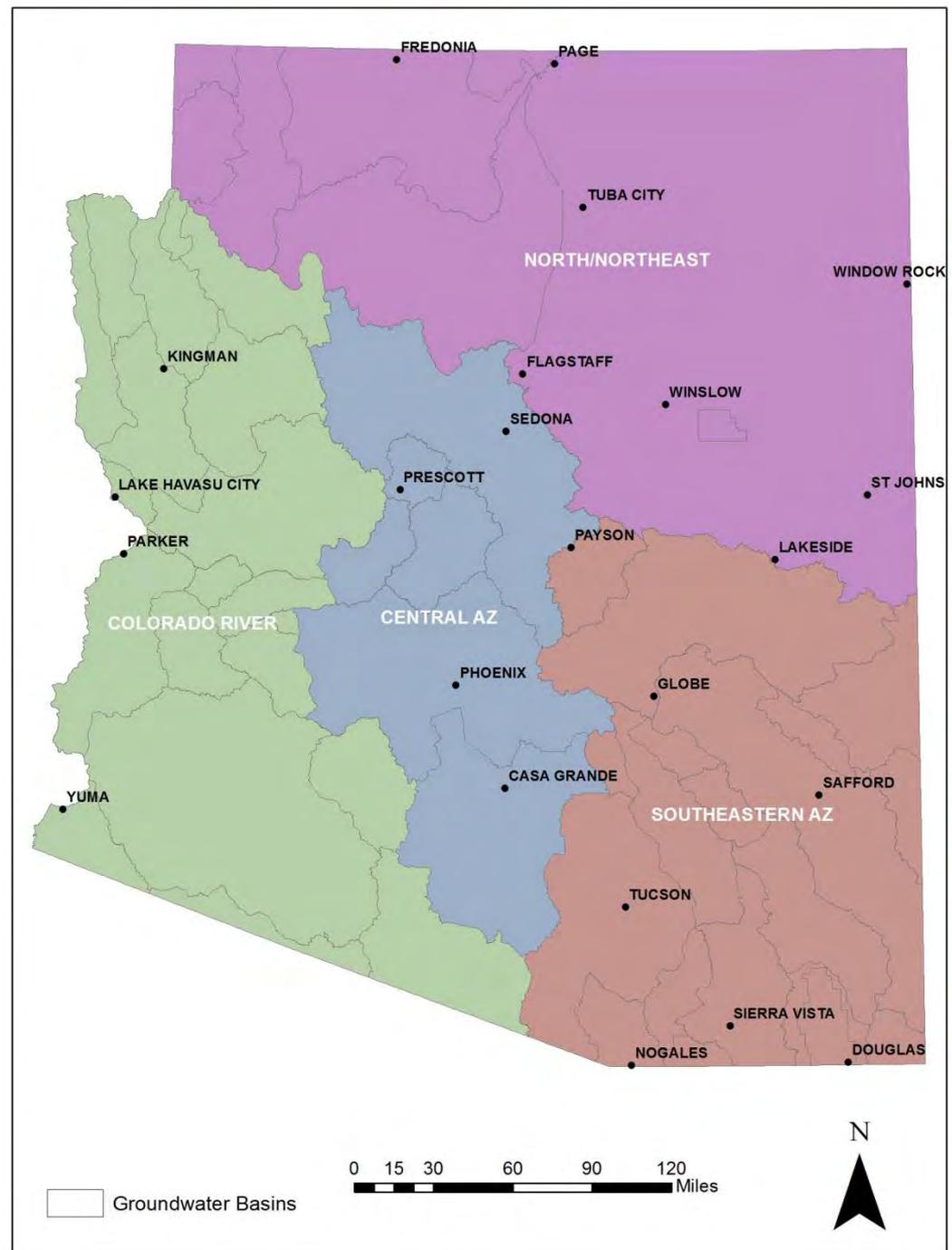
Aravaipa Creek  
Photo credit: ADWR 2009

# Regional Bulletins: Environmental Flows and Water Demands

Contains information on:

- Quantified Environmental Water Demands
- Regional Water Demand by Sector (incl. Environmental)
- Overview of Environmental Demand Aspects Studied
- Information Gaps
- Water Resources and Environmental Designations

Central Arizona, Southeastern  
Arizona, North/Northeast Arizona &  
Colorado River

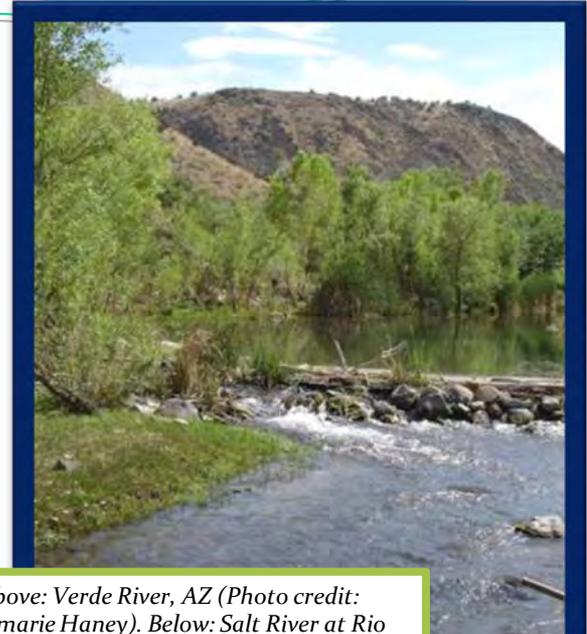


# How you can apply this information

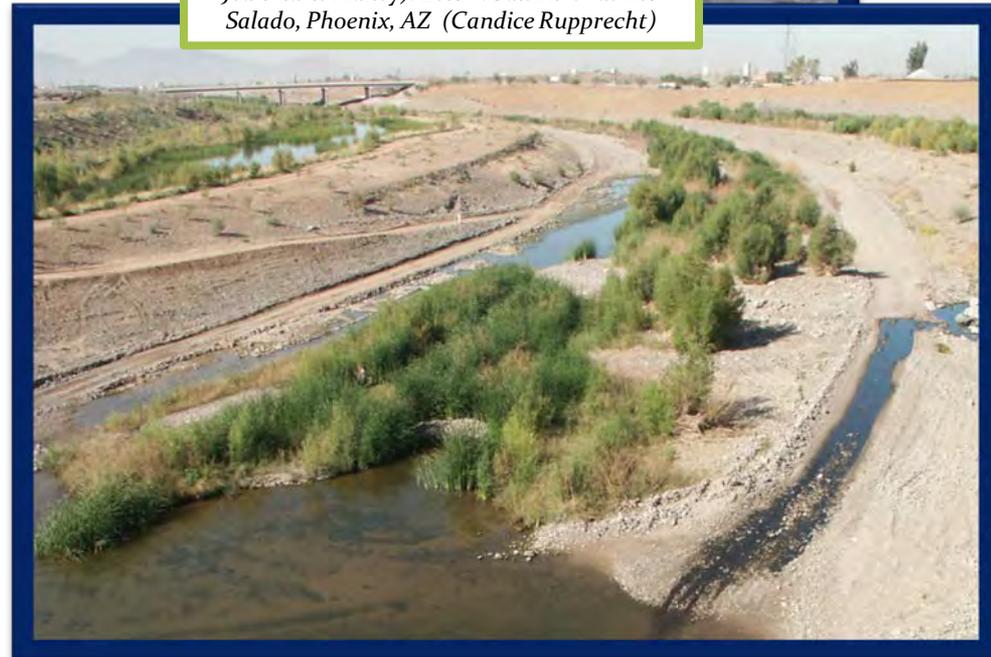
1. Determine how environmental flows interact with other demand sectors
2. Identify factors putting environmental flows at risk
3. Identify studies need to address key information gaps about environmental flows
4. Determine local priorities for ecosystems
5. Develop scenario analyses for water planning that incorporate the environment

# EnWaP Next Steps

- Regional bulletins
- Reach all water sectors
- Start conversations
  - Outreach to watershed and water planning groups
  - Share environmental demand information
- **Is there room for the environment at the table and if so where and how?**



*Above: Verde River, AZ (Photo credit: Jeanmarie Haney). Below: Salt River at Rio Salado, Phoenix, AZ (Candice Rupprecht)*



# Conclusions

*Goal: Ensure a sustainable water future*

- Strategies:
  - Public Education
  - Opportunities for Voluntary Action
  - Raise funds for environment
  - Increase institutional capacity for inclusive water planning

Innovative and practical solutions are possible!

**Will it be enough? You decide!**

A scenic landscape featuring a calm river or lake in the foreground, reflecting the sky and the surrounding trees. The trees are mostly bare, suggesting a late autumn or winter setting. The sky is a clear, deep blue. The word "Questions?" is overlaid in the center of the image in a large, bold, black font.

**Questions?**

# Contact Us

- Learn more:
  - [wrrc.arizona.edu](http://wrrc.arizona.edu)
  - Share your thoughts with us...

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