Opportunities for Stormwater Recharge in Arizona: Augmentation and Streamflow Benefits

Kimberly Schonek, Arizona Water Program Director
kschonek@tnc.org

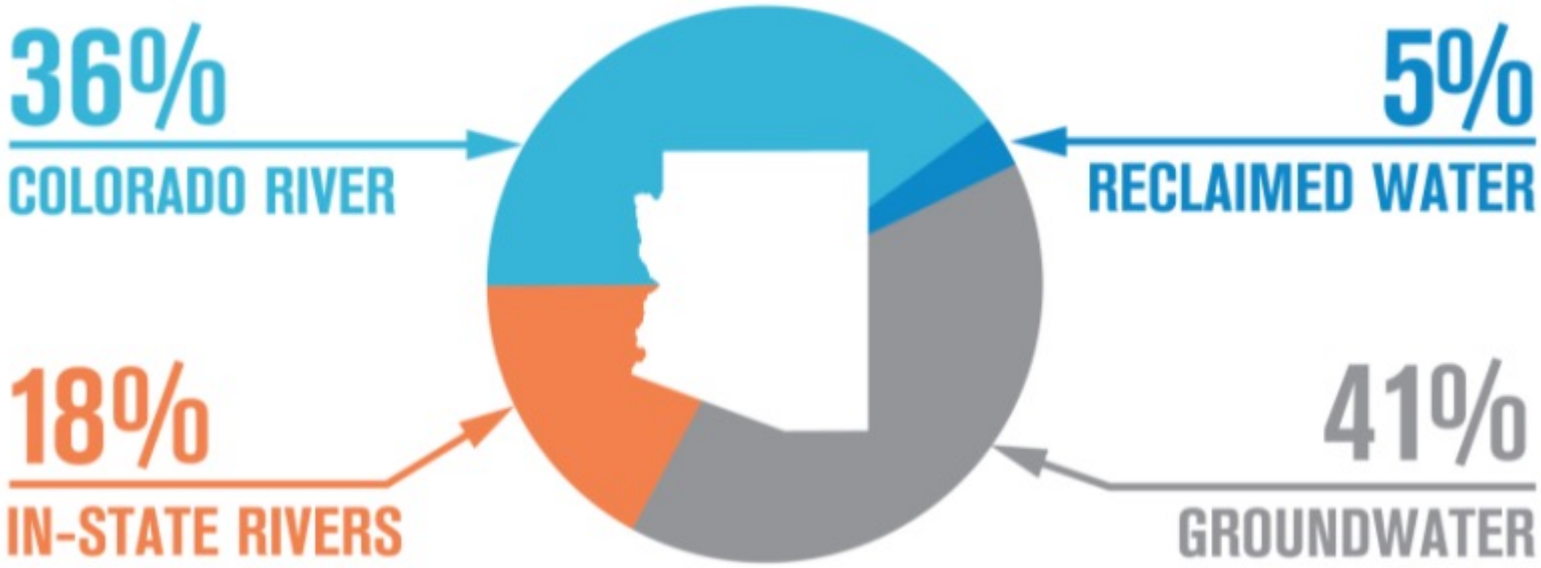
The Nature Conservancy
nature.org

The Nature Conservancy is a global environmental nonprofit working to create a world where people and nature can thrive.

Founded in the U.S. through grassroots action in 1951, The Nature Conservancy has grown to become one of the most effective and wide-reaching environmental organizations in the world. Thanks to more than a million members and the dedicated efforts of our diverse staff and over 400 scientists, we impact conservation in 76 countries and territories: 37 by direct conservation impact and 39 through partners.

The Motivation: Strains on Arizona's Water Supply

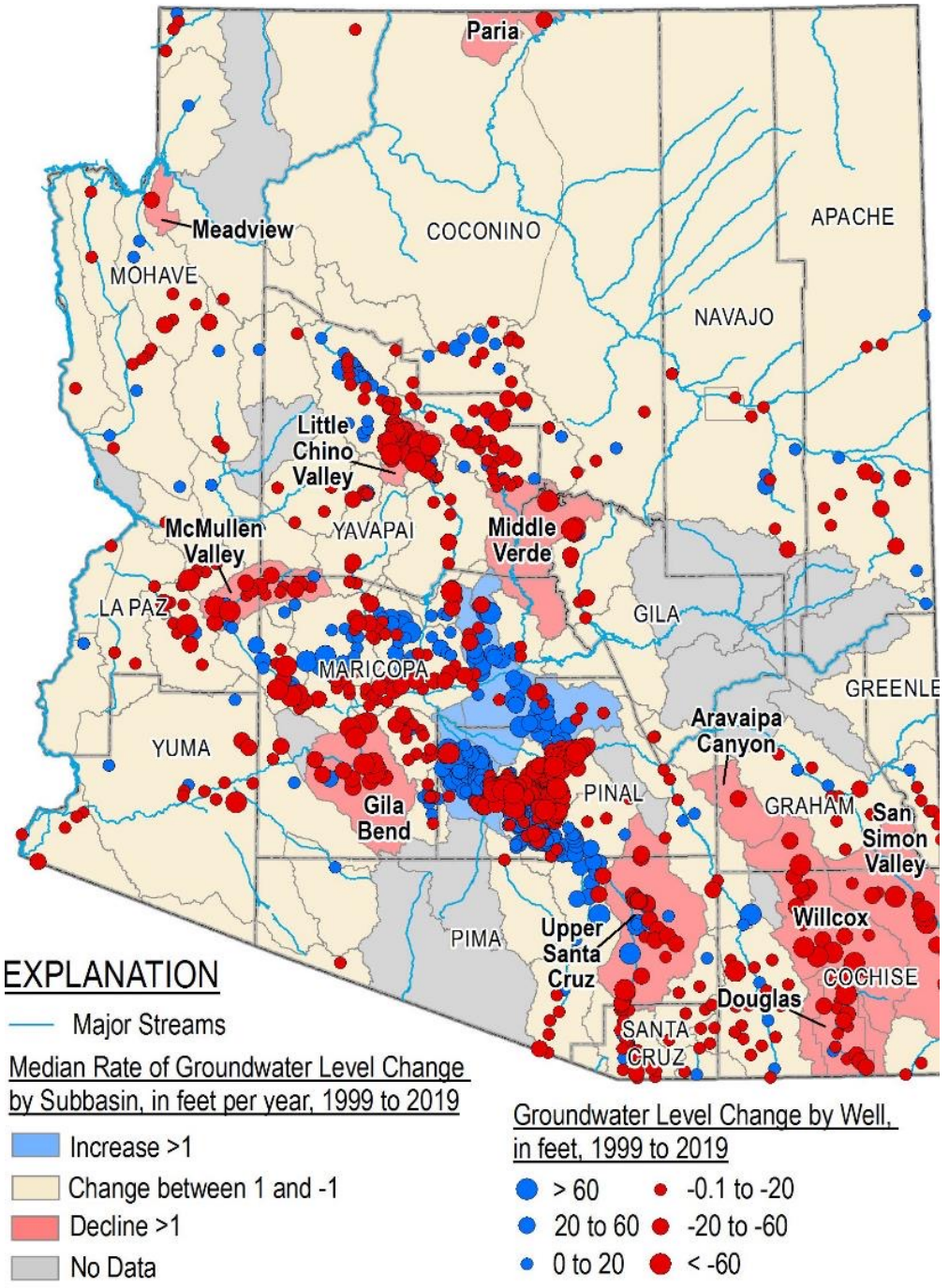
- Groundwater pumping
- Declining Colorado River flows due to climate change
- Rural areas that rely on groundwater
- Densely populated areas facing cuts in Colorado River water deliveries



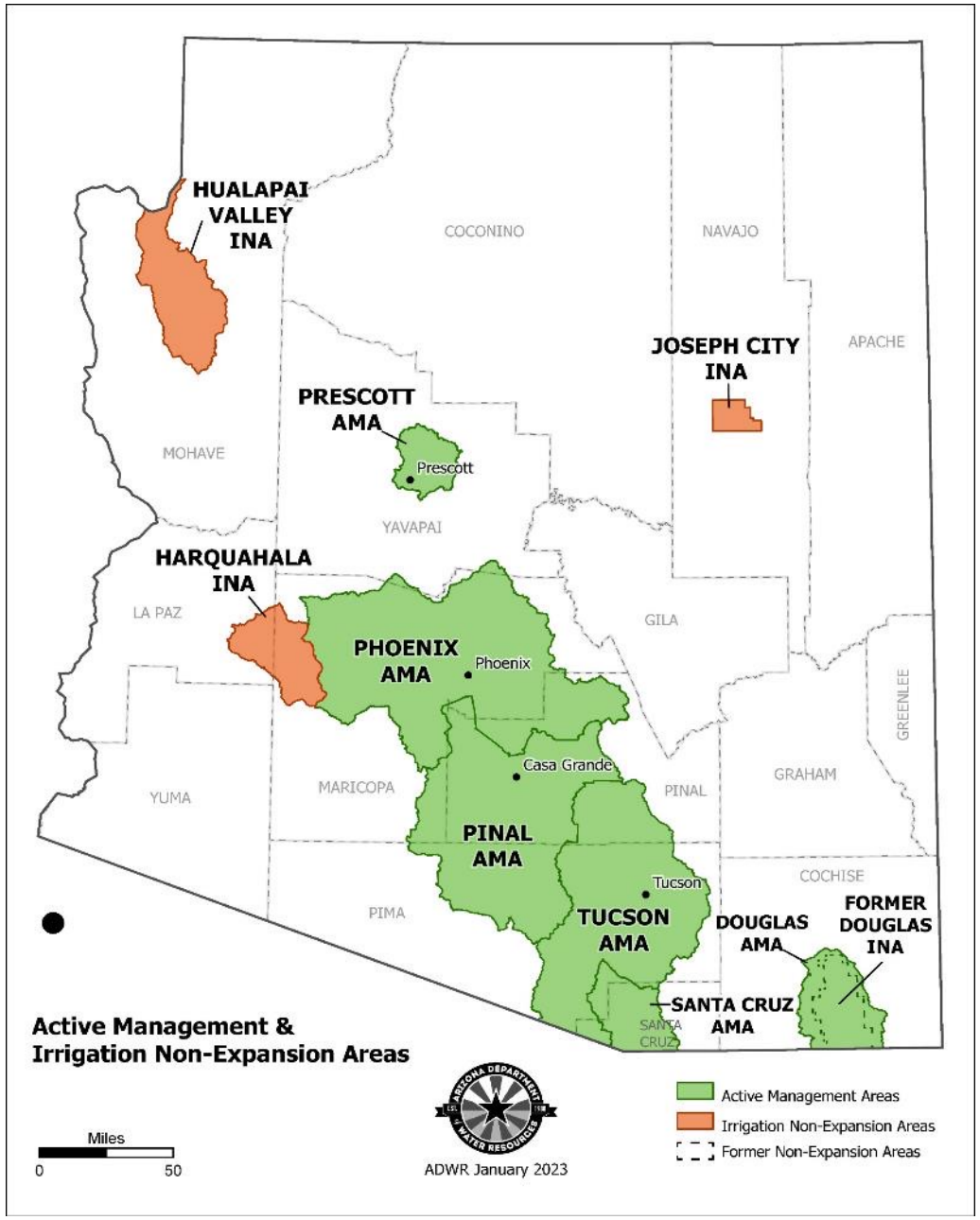
Source: ADWR, Arizona Water Facts, 2019

Declining Groundwater

- Groundwater pumping
- Natural recharge is minimal (~1-2% of precipitation)
- Climate change and increasing temperatures
- Population growth in areas without alternative water supplies and/or infrastructure



Groundwater Pumping is only Regulated in AMAs and INAs



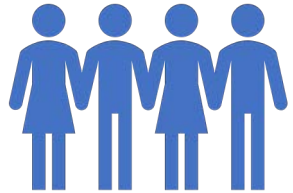
Dwindling Streams

- Streamflow:
  - Baseflow from groundwater discharge
  - Surface runoff from precipitation
- Many formerly perennial streams no longer flow year-round.
- ***Small amounts*** *of water in the* ***right places****, at the* ***right times*** *can provide significant ecological benefits.*

Multi-benefit projects are win-wins for people and nature

Flood events are natural and critical for healthy waterways. They shift sediment, recharge streambank storage, disperse seeds , trigger re-growth and spawning in native species.

Flood events threaten human communities. Washing out roads, houses and causing property damage, injury and sometimes death.



Human communities have changed the timing and magnitude of flood events and the way they reach natural water bodies.

Stormwater is increasingly seen as a resource, but natural systems need to be protected.

Framework for Stormwater Recharge Projects

Water Source

Where is the water? How much is there?

Type of Project

How will the water be captured and stored?

Multiple Benefits

What are the project objectives? Who are key partners?

Which agencies have jurisdiction and what are their relevant authorities?	For example, is the key project partner a Flood Control District or ADEQ-regulated municipal stormwater entity (an “MS4”)?
Are Arizona’s water rights laws implicated?	For example, does the potential project involve a diversion of appropriable surface water or alter flood flows in a manner that may affect downstream water rights?
Is there value in or a need to quantify the potential project impacts?	Conceptual tools may exist to determine that a project captures and recharges only stormwater that would otherwise damage property or that is a product of new development, i.e., “urban enhanced runoff.”
Will the project impact downstream natural flood flows?	Natural flood flows are critical for riparian health by redistributing sediment and supporting riparian species.
Will the project impact downstream water users?	Water users downstream may have claims to flood flows that need to be considered and discussed.
Can project location and design provide increased benefits for streams?	Benefits may include increased recharge and improved water quality. Where a project is located influences how it can benefit streams. Modeling tools can be used to evaluate impacts and choose the most effective project location and design

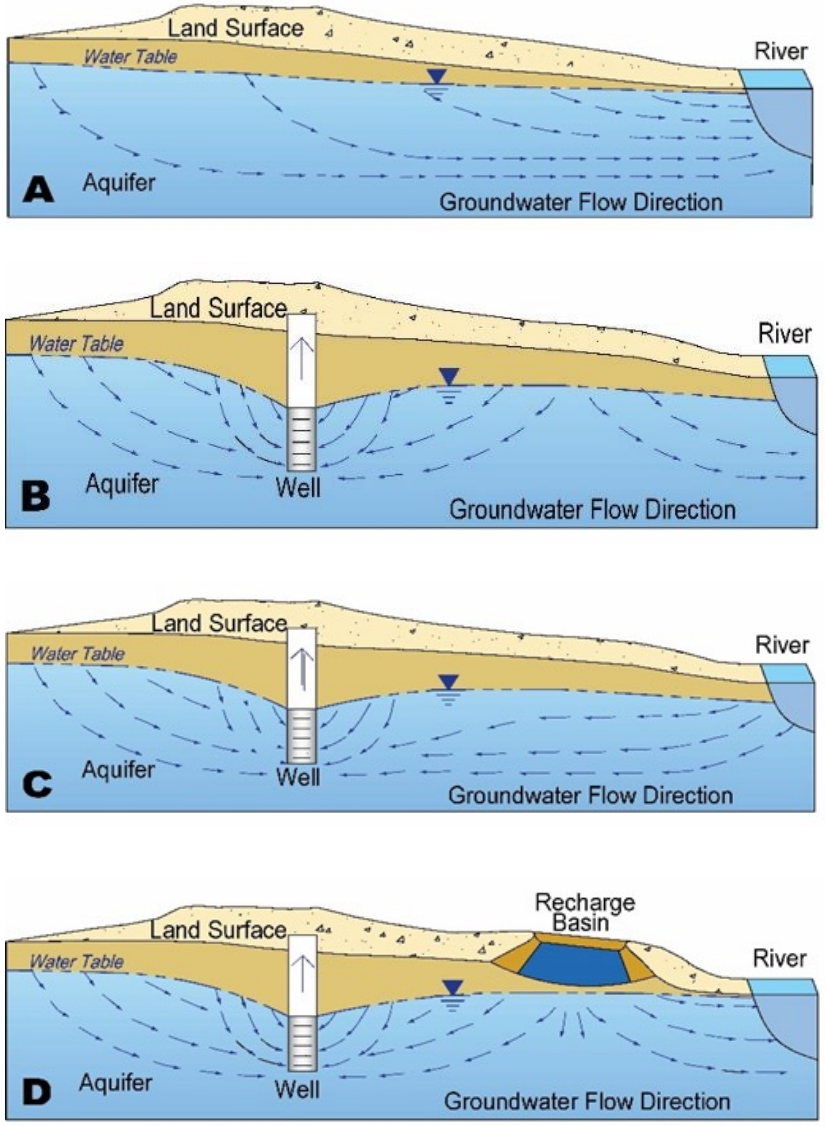
Location, location, location!

A. Under natural conditions, groundwater is discharged into streams.

B. Groundwater pumping increases depth to groundwater and reduces streamflow.

C. A cone of depression expands toward the river and captures water from the stream.

D. Recharging water underground in key areas can stabilize or increase groundwater levels and restore streamflow.



Source: Cochise Conservation and Recharge Network

The Opportunity

- Arizona's basin-fill aquifers provide our groundwater
- Competing demands for groundwater by pumping (people) and discharge (streams)

CCRN IMPACT

Total Benefits
41,209
acre-feet (AF)*

*2015-2021

Recharge & Retired Pumping
31,709 AF

Precluded Pumping
9,500 AF

CCRNSanPedro.org

Project Design Lessons

Cochise Conservation & Recharge Network

Design Projects to Minimize Evaporative Losses

- Less than 1% of precipitation that falls in a watershed runs off as stormwater. Enhancements like infiltration trenches and dry wells can reduce evaporative losses and increase infiltration.

Natural Channels Enhance Recharge

- Detention basins located within, or that discharge to, ephemeral channels slow the release of water. This results in significantly more infiltration than otherwise would have occurred in the channel.

Protect Natural Floodplains to Increase Recharge

- Flood flows are not only essential ecologically, but increase groundwater in storage for months or even years

Thank you!

Kim Schonek, TNC
Water Program Director
kschonek@tnc.org

Juliet McKenna, M&A
Principal Hydrogeologist
jmckenna@elmontgomery.com