

Protecting and Sustaining the Upper San Pedro River



7/18/2026

Presented to: The Friends of the San Pedro River

Presented by: Holly Richter, PhD, Principal Resilient Rivers

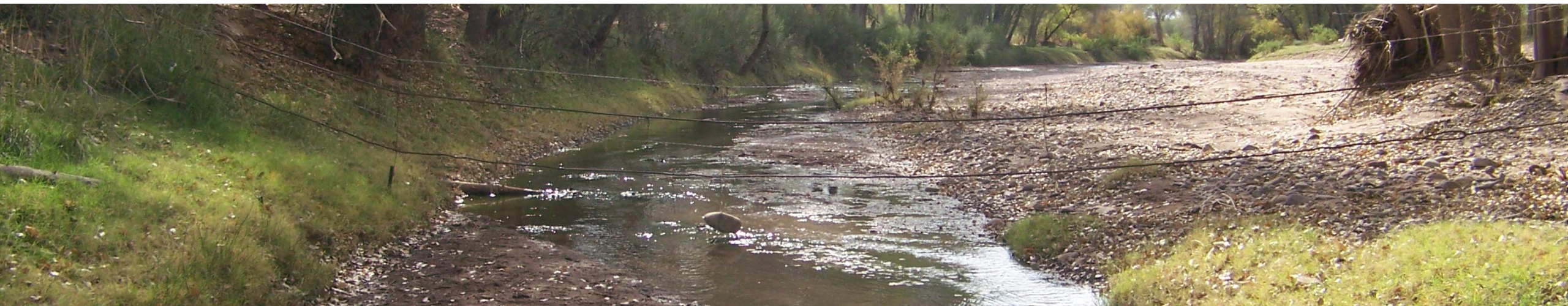




- Water needs
- Monitoring and modeling
- Changing times
- Management measures



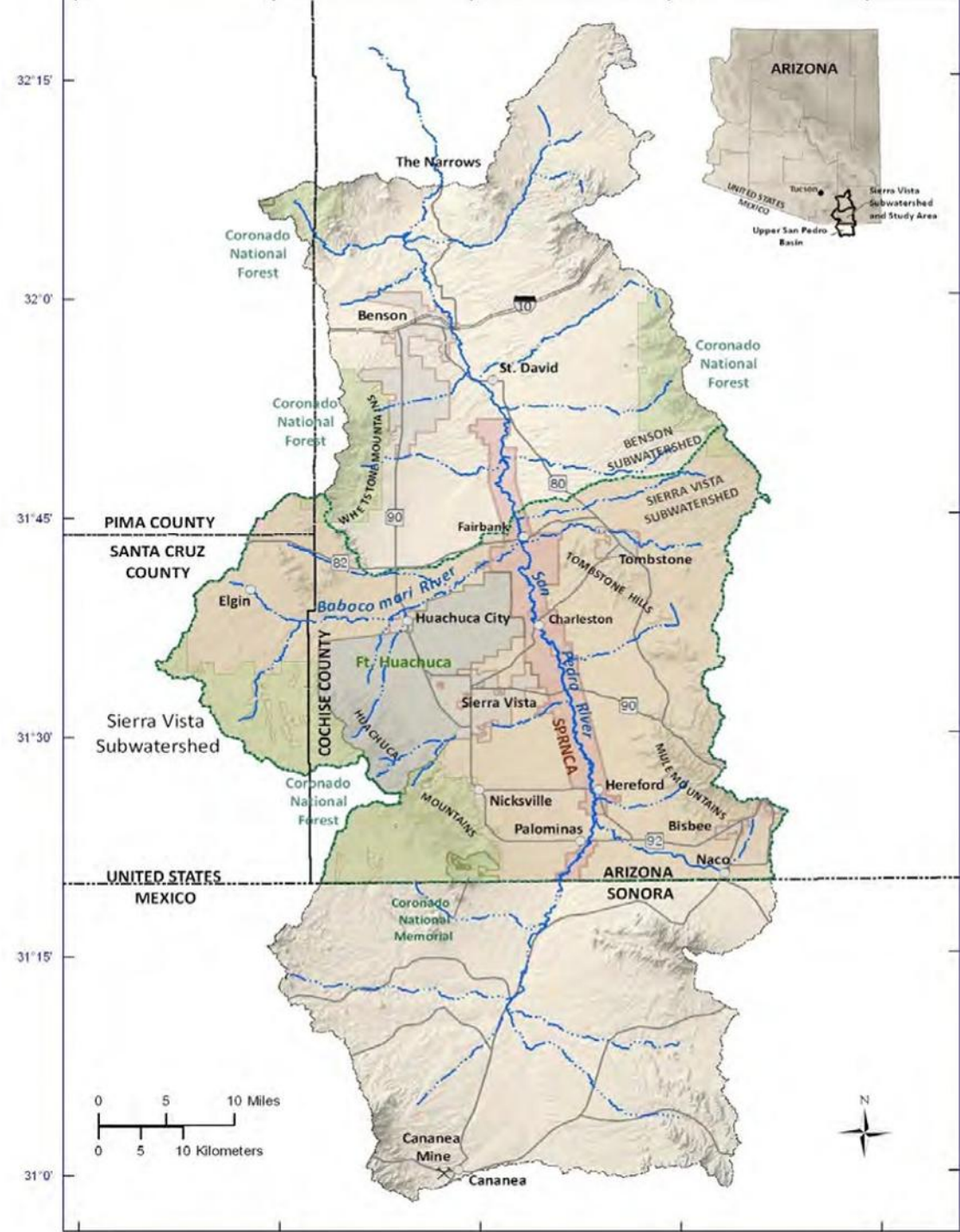
Welcome



Why does it matter?

- Astounding biodiversity values
- Migratory pathway of hemispheric importance
- First Riparian National Conservation Area established in 1988
- International river





Courtesy of USGS

How much?
Where? When?

Water Needs



Riparian Health and Water Needs

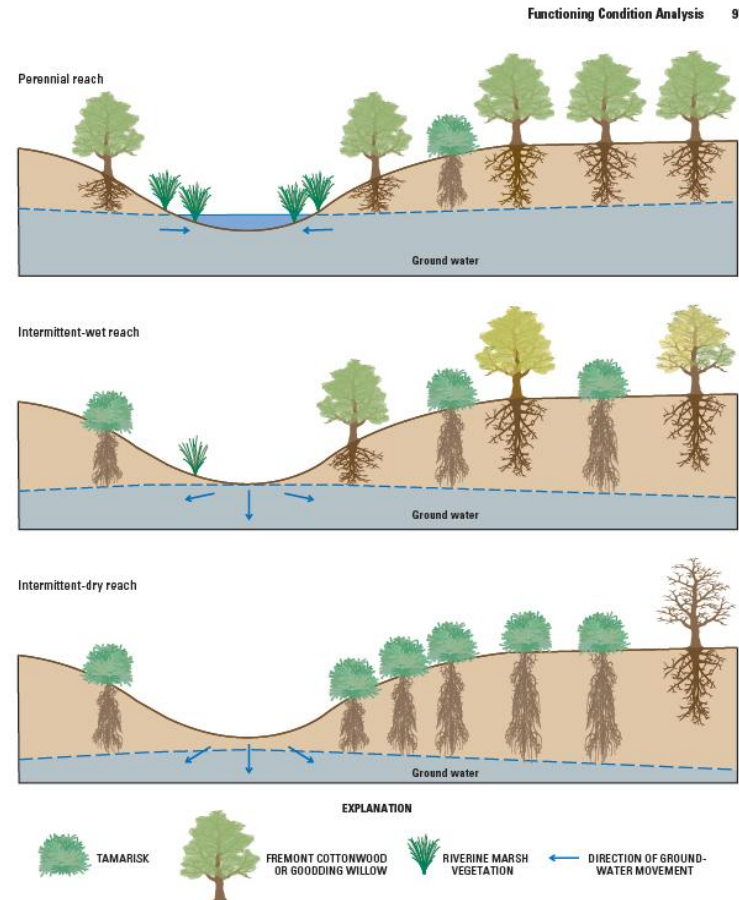
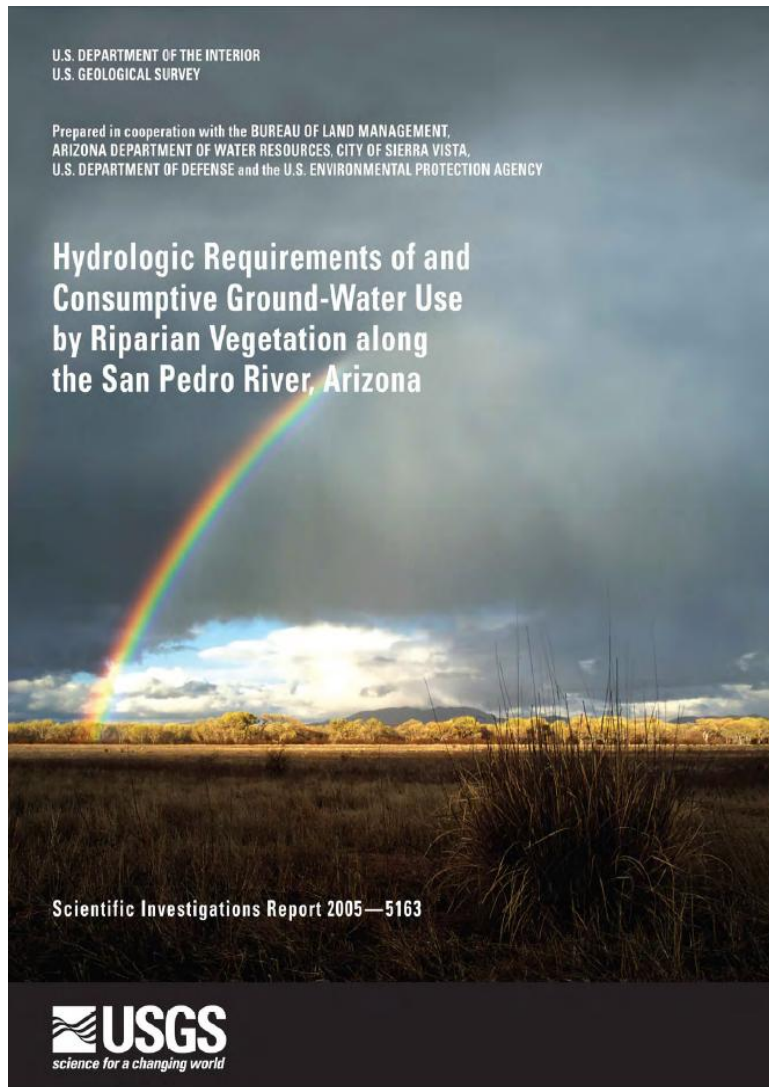


Figure 41. Schematic diagram depicting the three major hydrologic reach types and corresponding vegetation patterns along the Upper San Pedro River, Upper San Pedro Basin, Arizona.

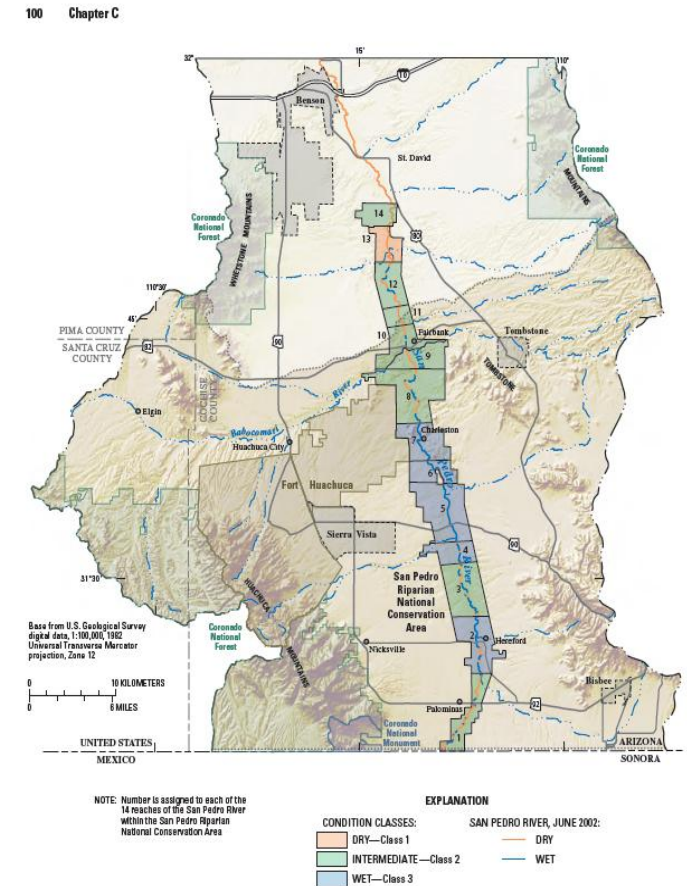
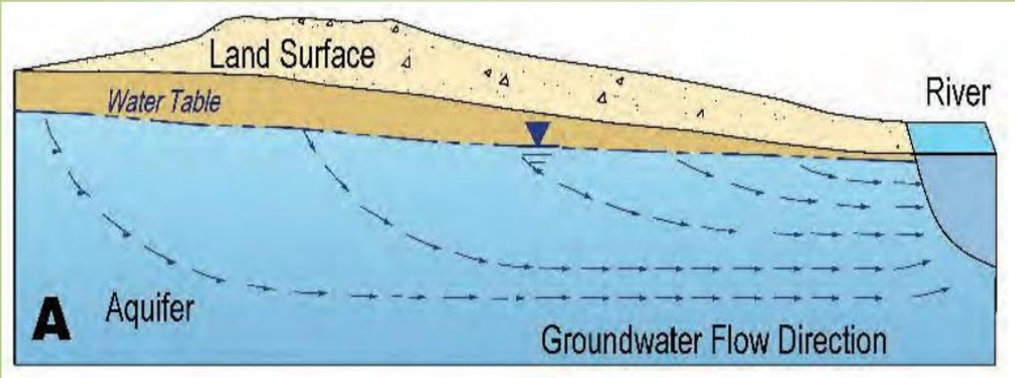
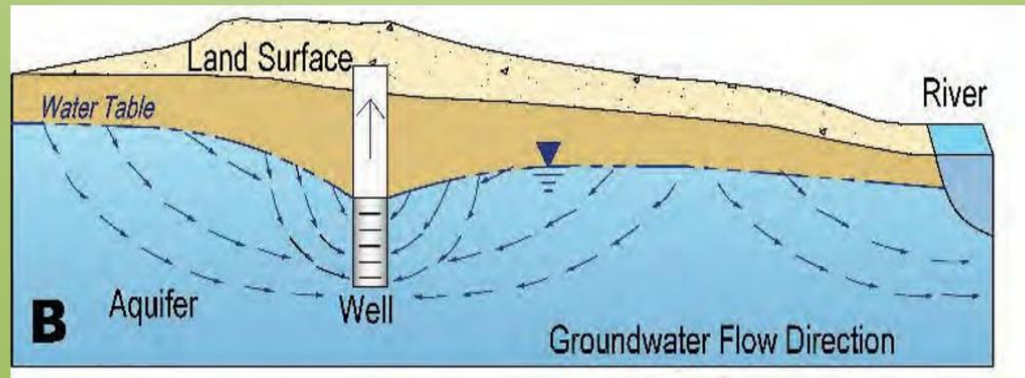


Figure 42. Riparian ecological condition classes for 14 reaches and streamflow presence for June 2002 within the San Pedro Riparian National Conservation Area, Upper San Pedro Basin, Arizona.



Wet reaches



Intermediate reaches

Figure courtesy USGS

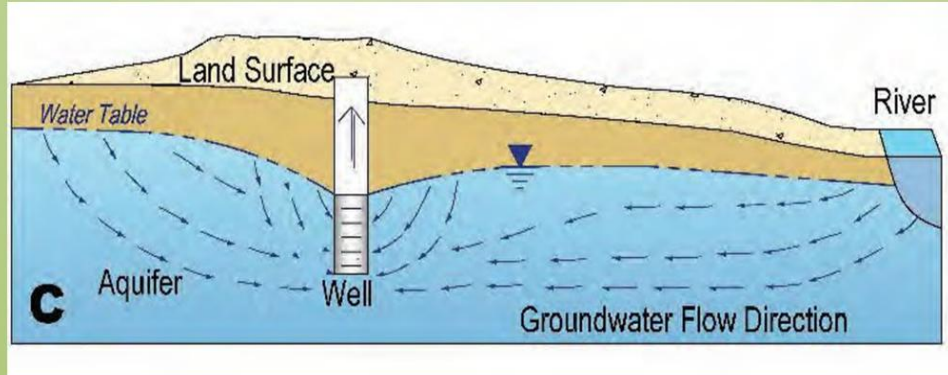
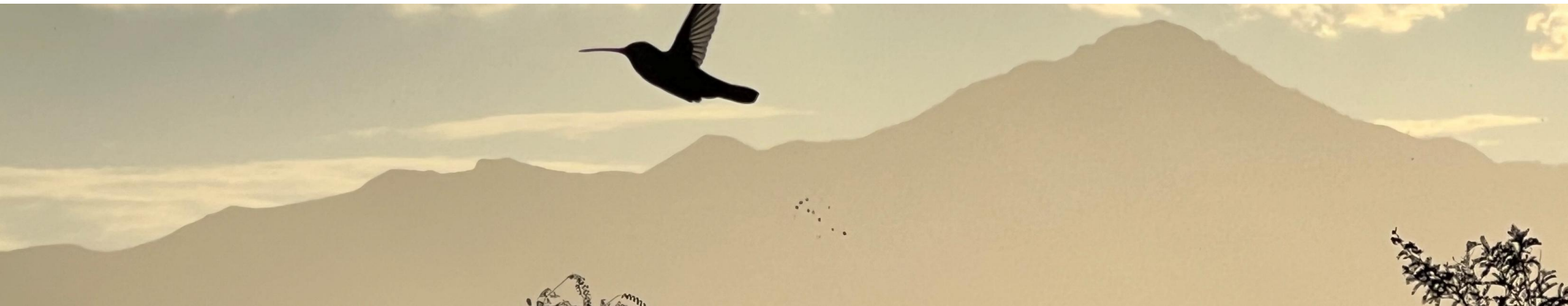


Figure courtesy USGS

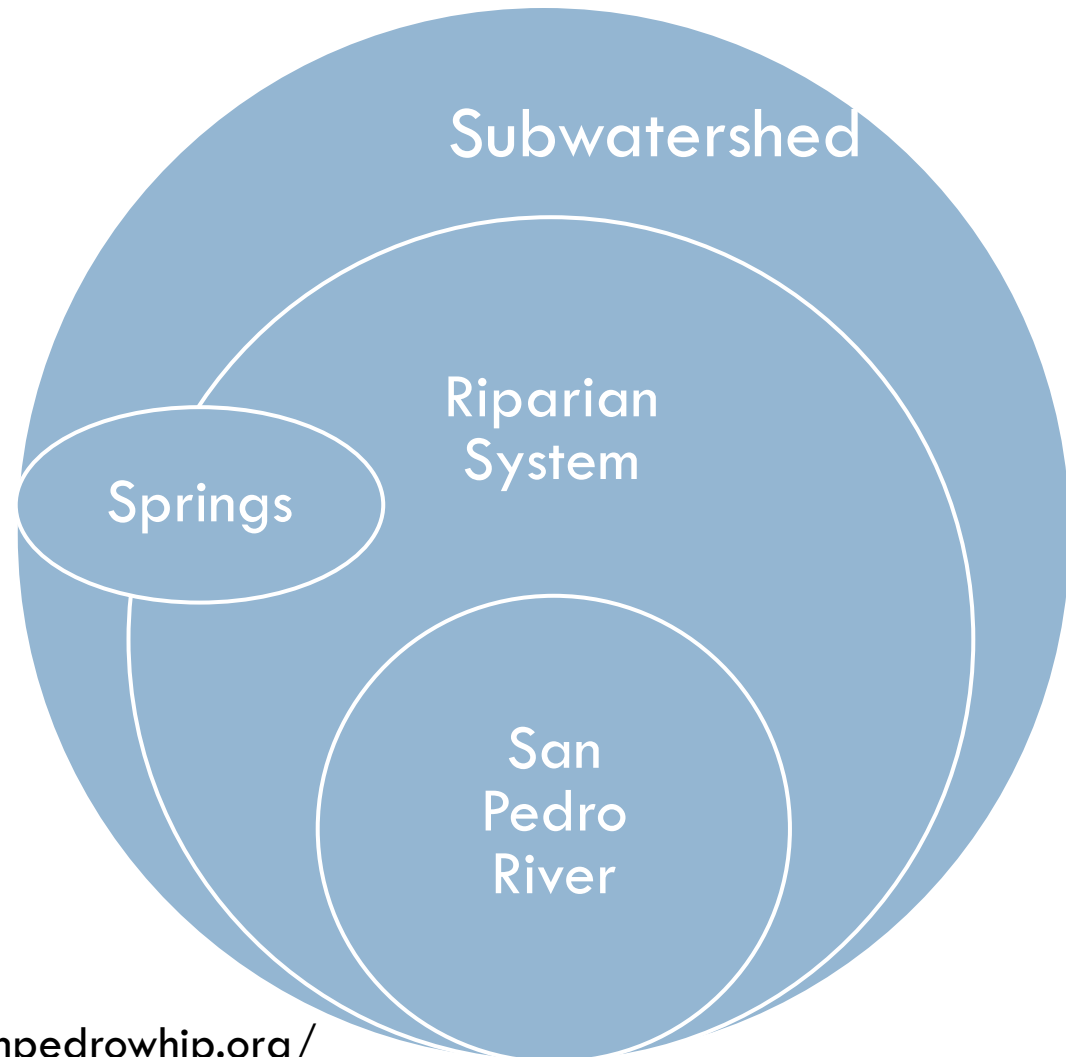
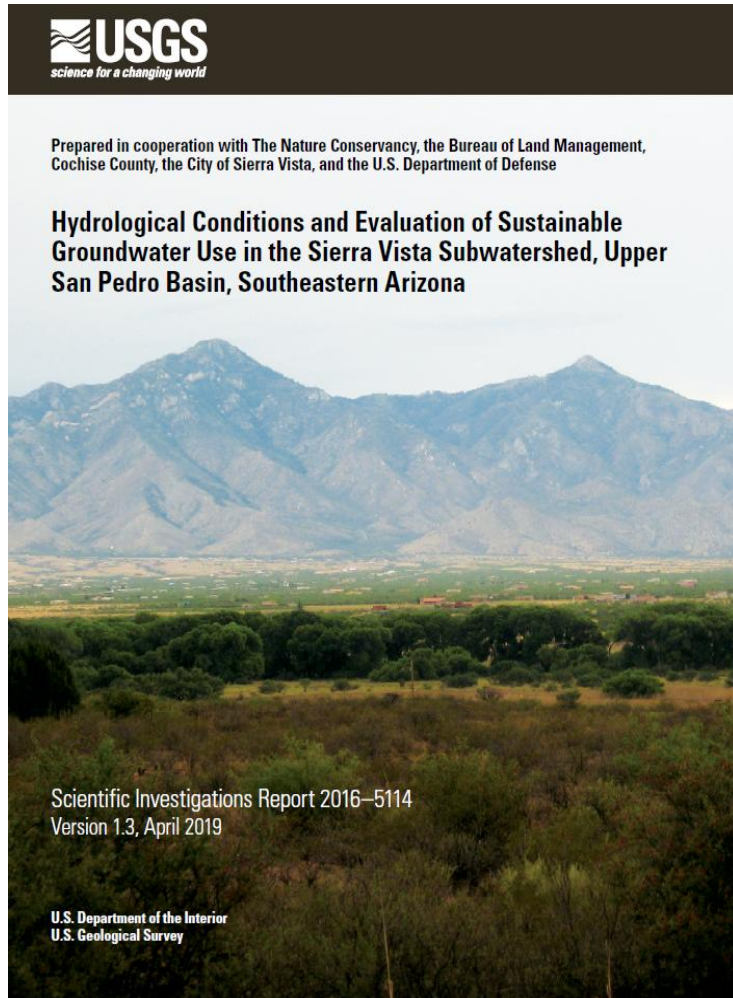
Dry reaches



Monitoring and Modeling

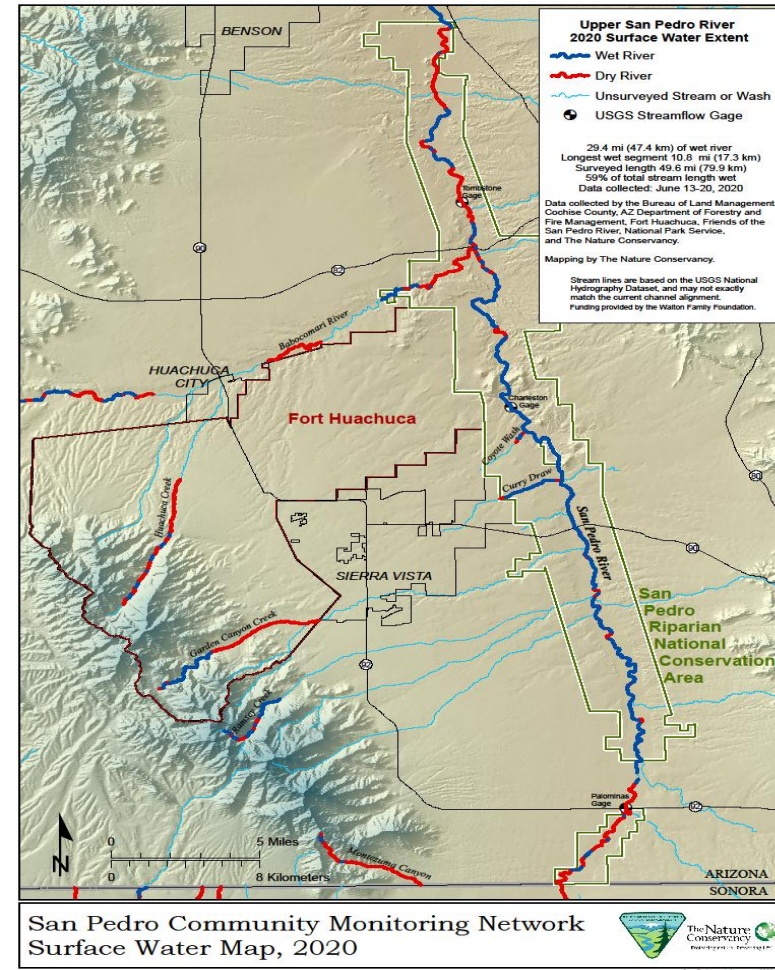
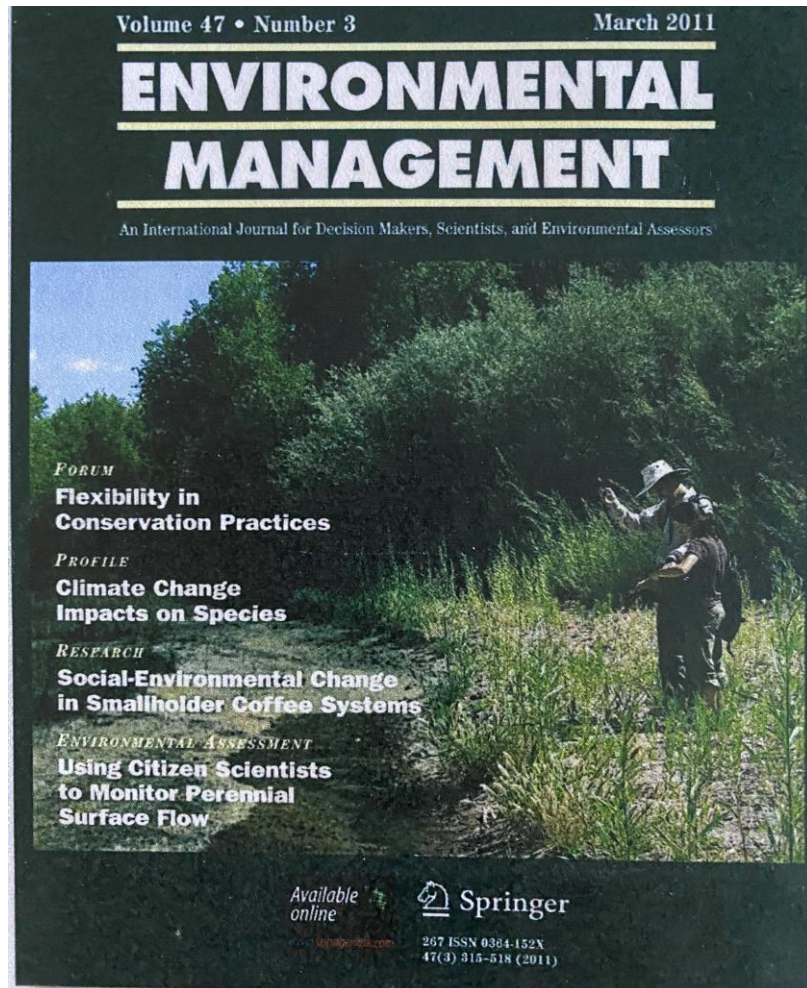


Regional Hydrologic Monitoring Framework

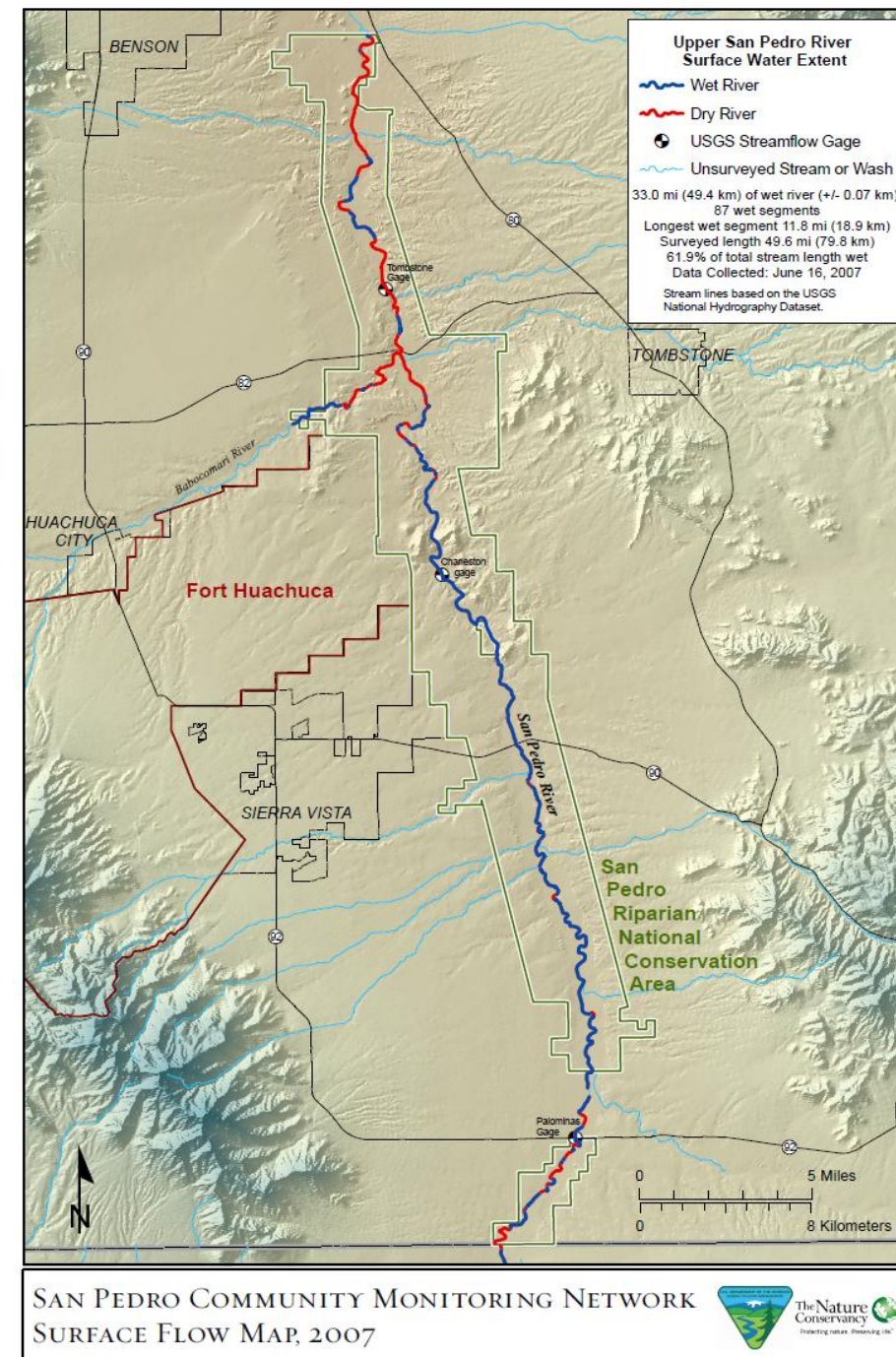


<https://uppersanpedrowhip.org/>

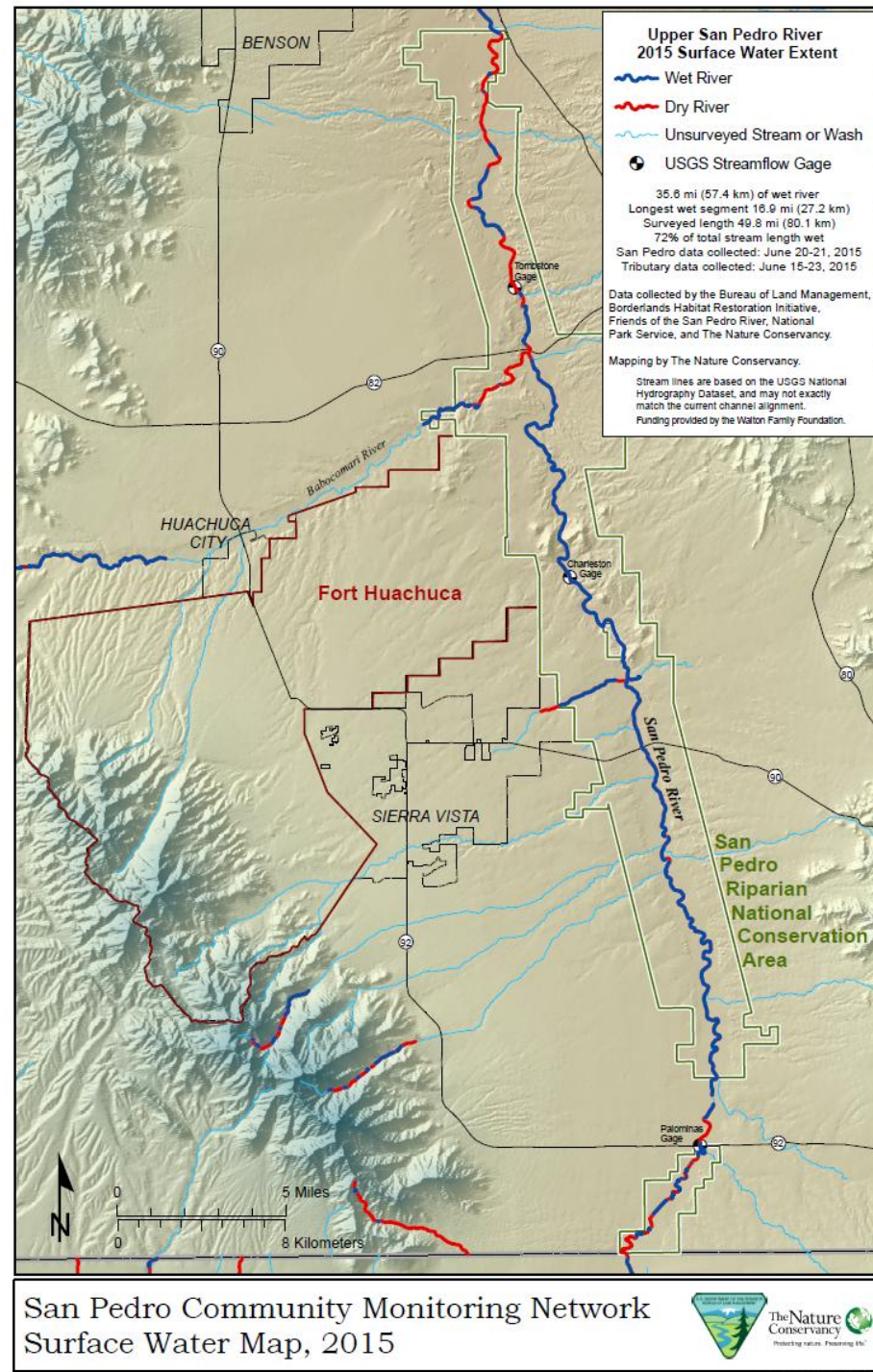
Participatory Citizen Science



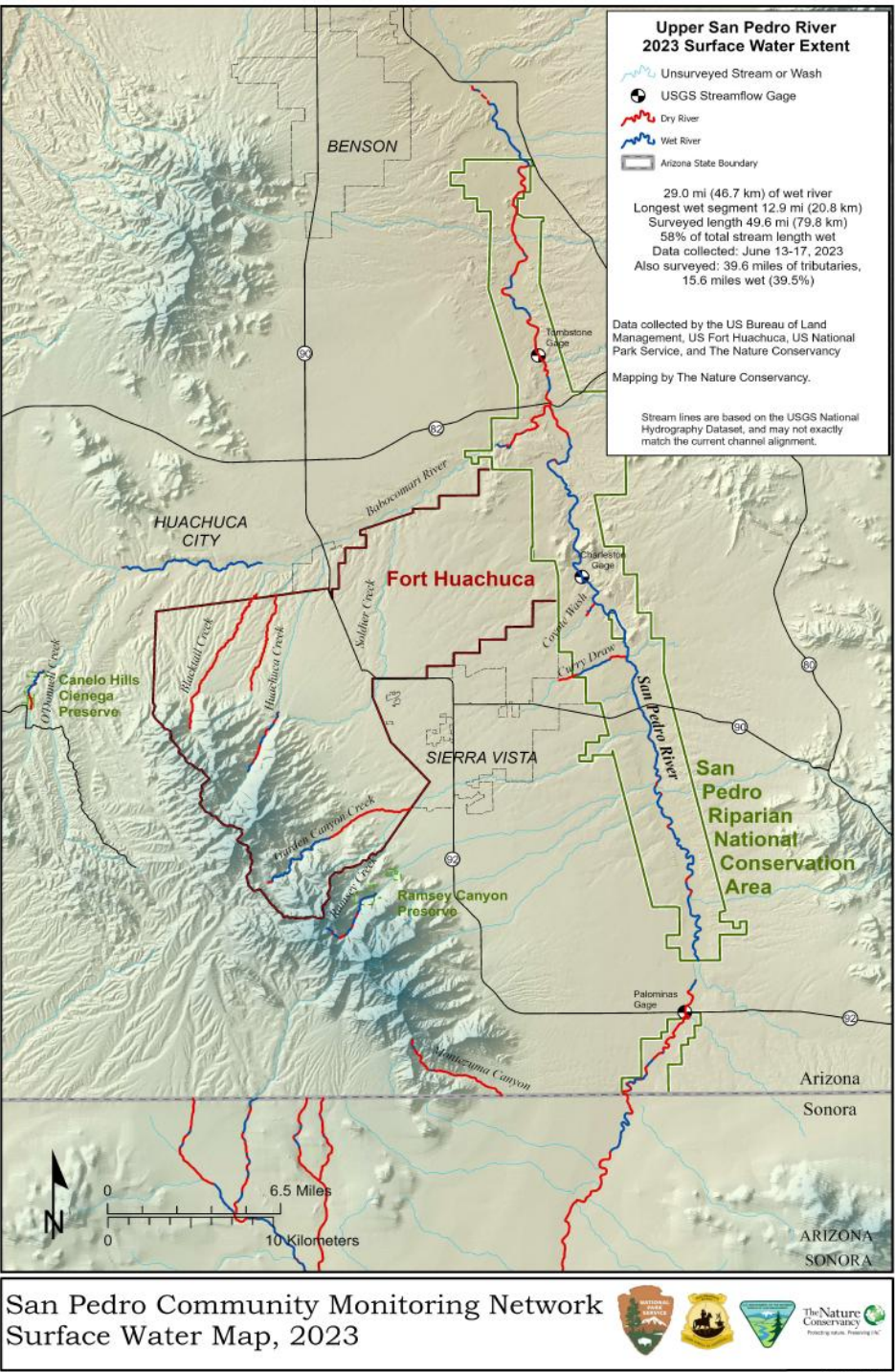
62% wet June 2007



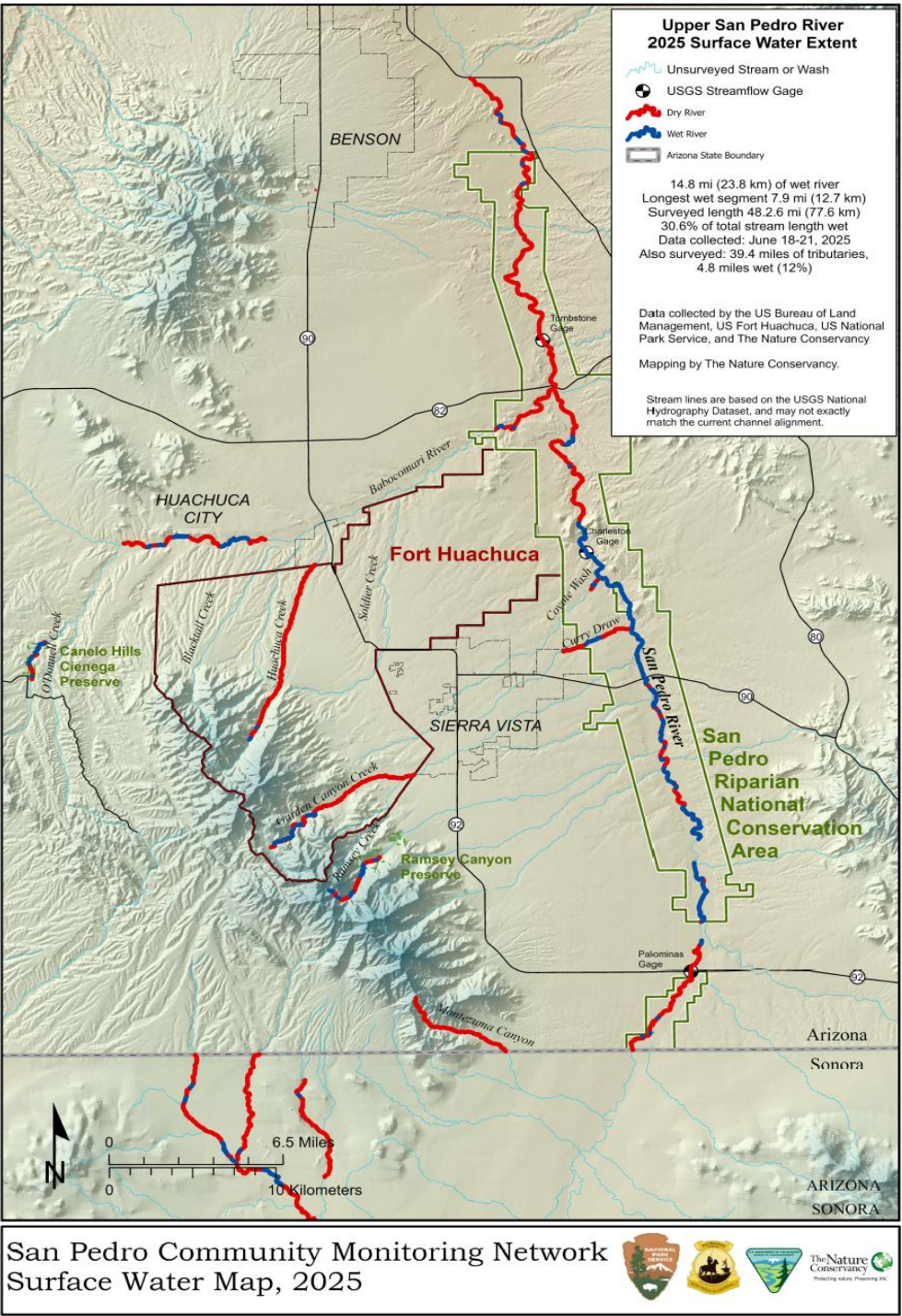
72% wet June 2015



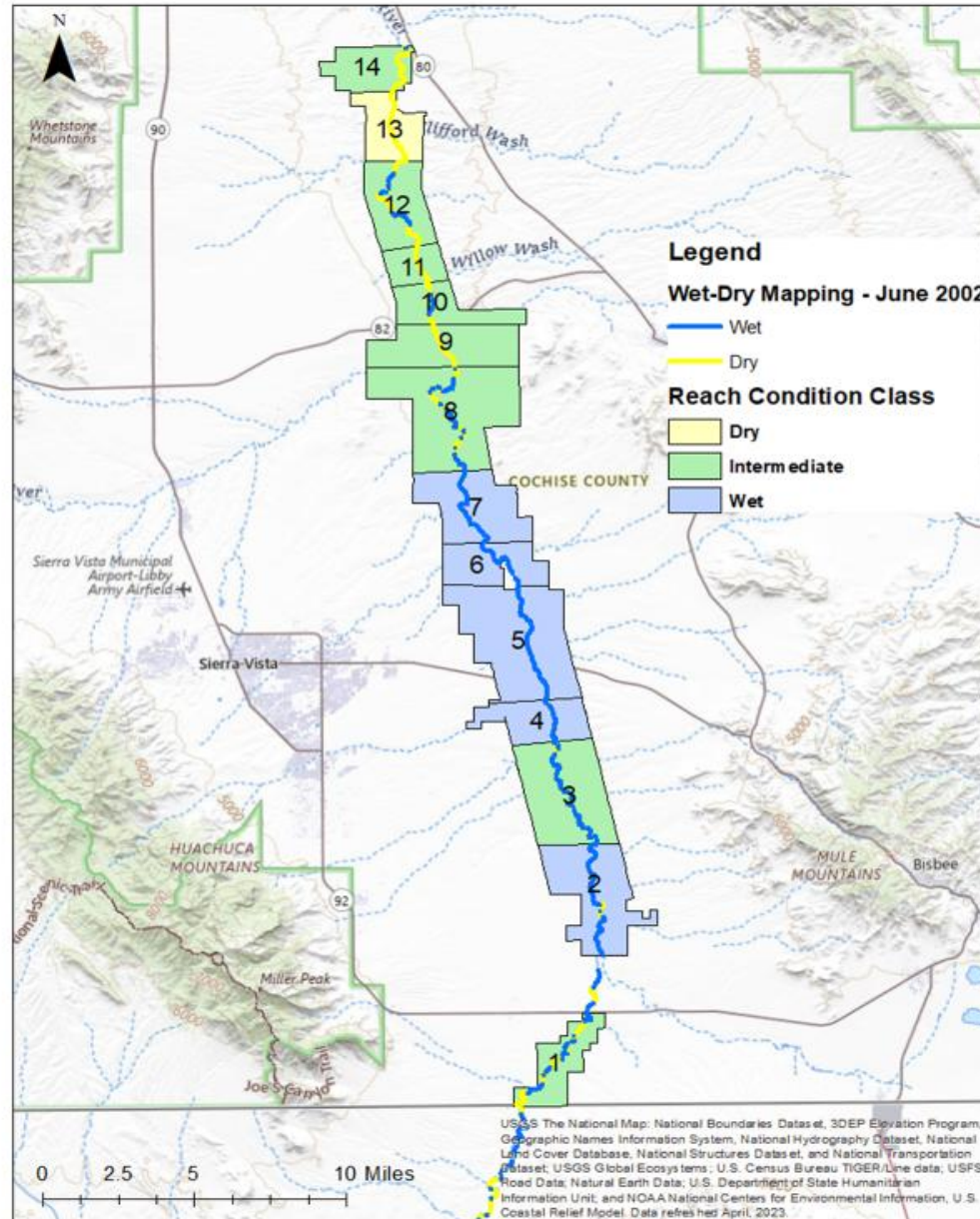
58% wet
June 2023



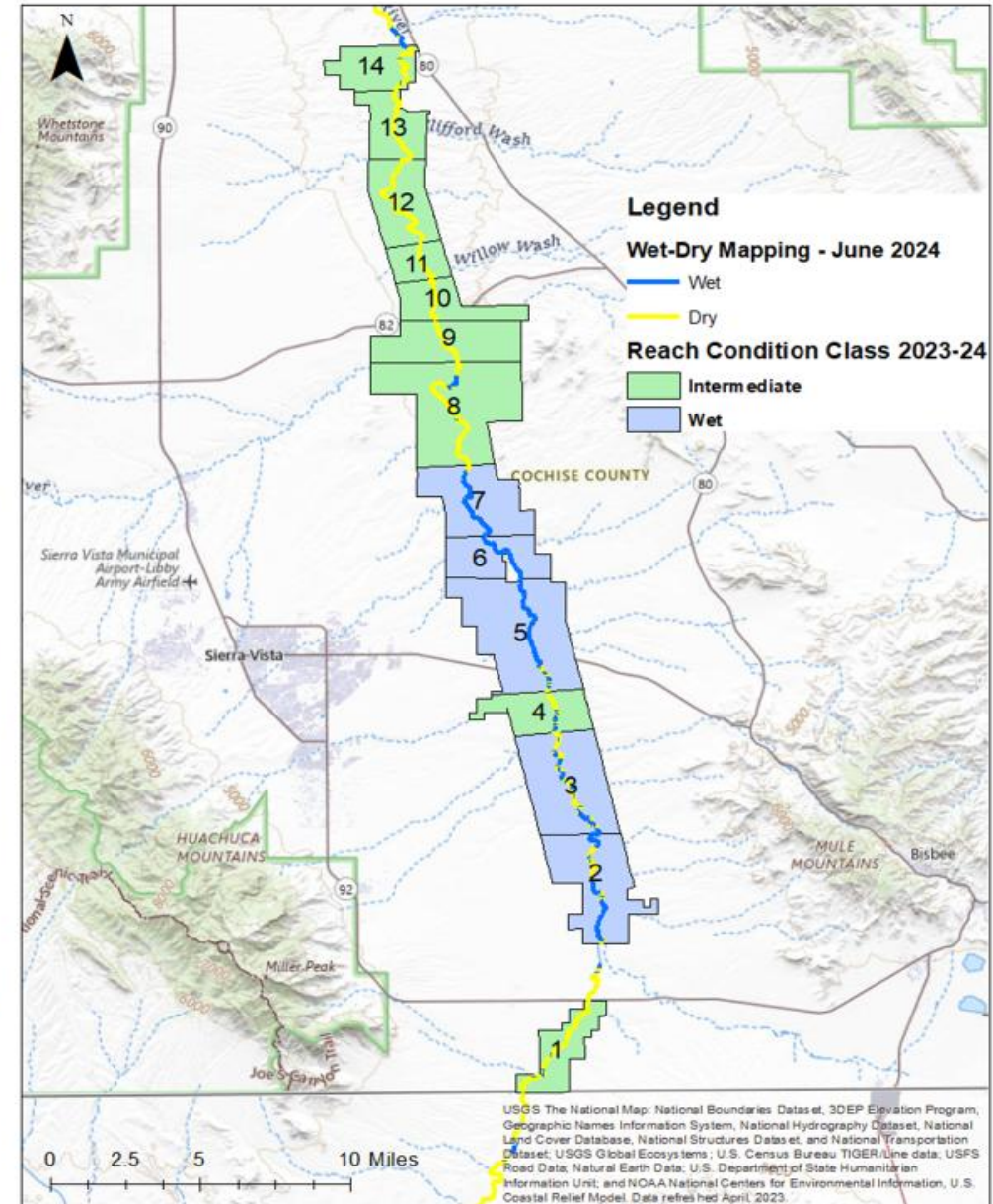
31% wet
June 2025



2002



2023-2024



Web-based Hydrologic Information Portal for the Upper San Pedro Basin (Established 2020)

*The **WHIP** makes the wealth of hydrologic information gathered from the Upper San Pedro Basin **readily accessible** and **useful** to the decision-makers, project managers, scientists, and general public who need it, in formats they can use.*



<https://uppersanpedrowhip.org/>

Funded By:

WaterSMART Applied Science Grant,
Cochise County, AZ Department of Water
Resources, Sierra Vista, The Nature
Conservancy, the Upper San Pedro Partnership

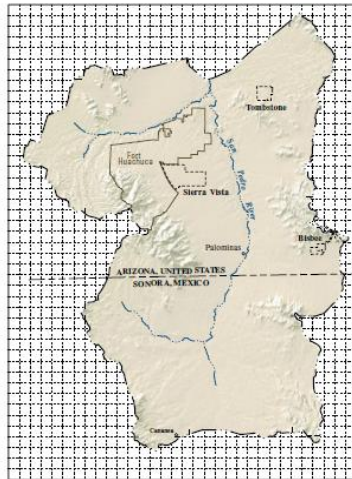


Predictive Groundwater Modeling



Prepared in cooperation with the
UPPER SAN PEDRO PARTNERSHIP and BUREAU OF LAND MANAGEMENT

Ground-Water Flow Model of the Sierra Vista Subwatershed and Sonoran Portions of the Upper San Pedro Basin, Southeastern Arizona, United States, and Northern Sonora, Mexico



Scientific Investigations Report 2006-5228

U.S. Department of the Interior
U.S. Geological Survey

6 Ground-Water Flow Model, Sierra Vista and Sonoran Portions of the Upper San Pedro Basin, Arizona and Mexico

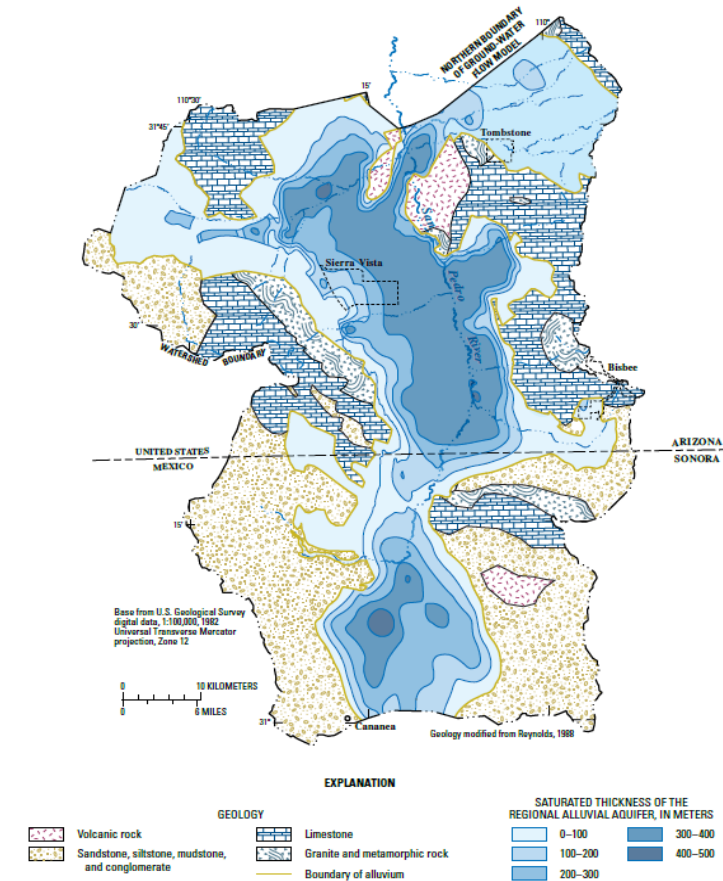
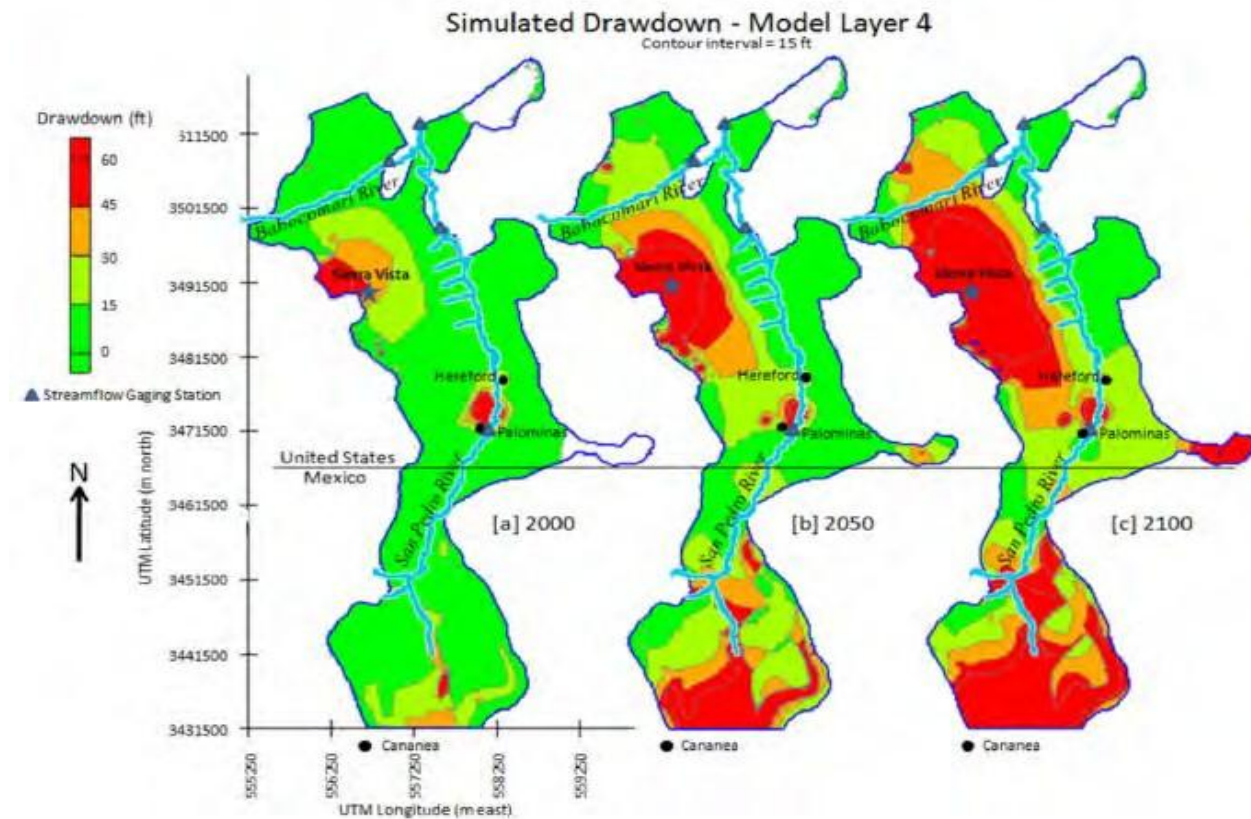


Figure 2. Geology and saturated thickness of the regional aquifer, Upper San Pedro Basin, United States and Mexico.

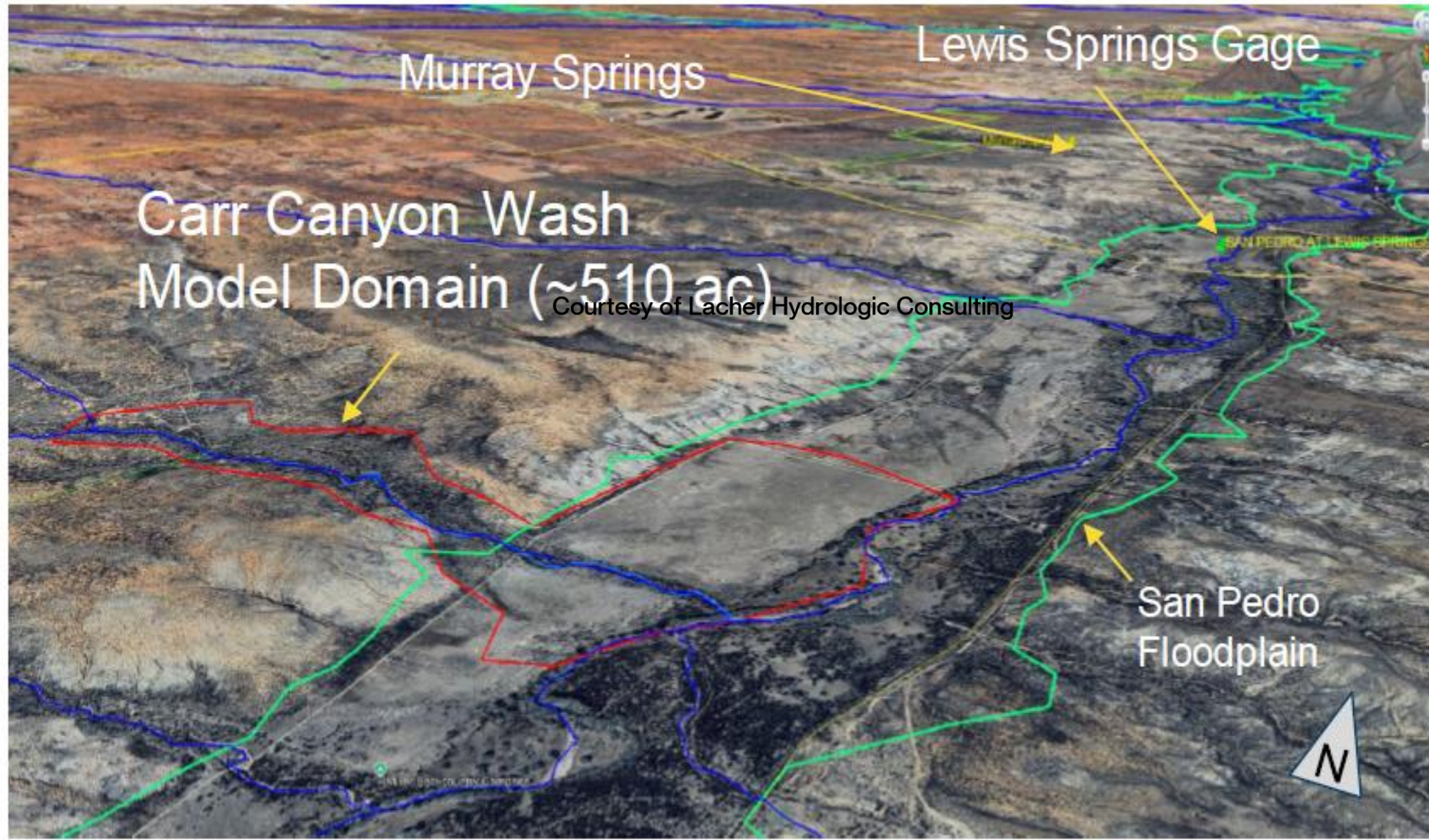
Groundwater Management Scenarios



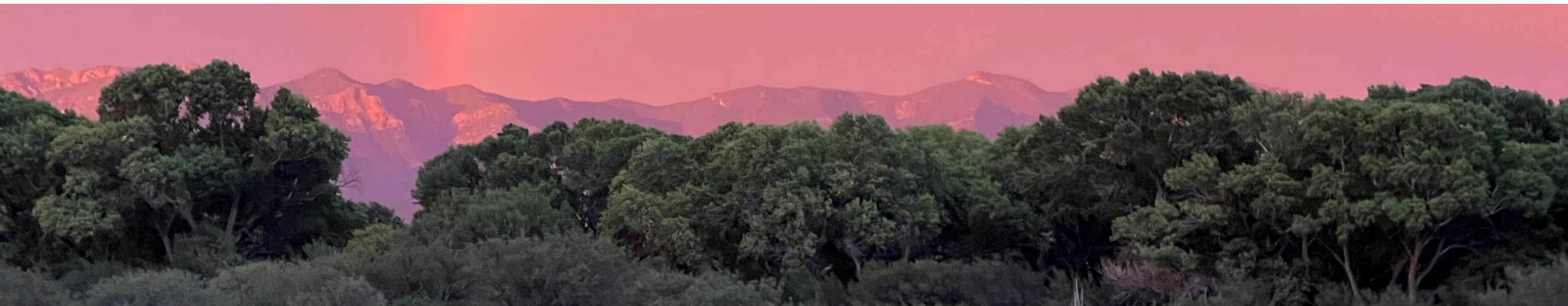
Courtesy of Lacher Hydrologic Consulting

MIKE SHE Modeling

Courtesy of Lacher Hydrologic Consulting



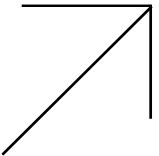
Changing Times

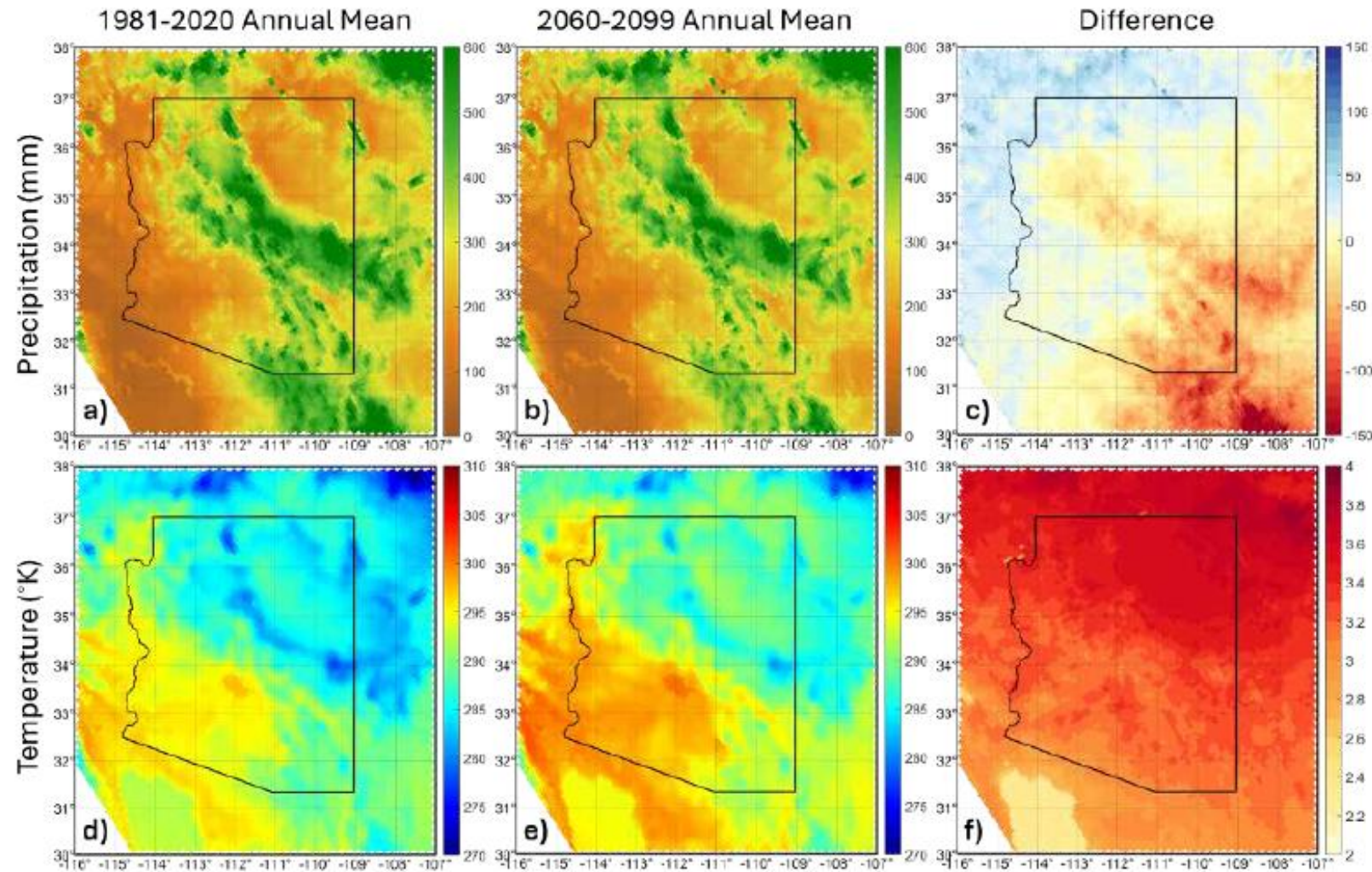




“Warming is having a profound effect on the hydrologic cycle in Arizona, increasing losses to evapotranspiration, reducing soil moisture and decreasing recharge.

Statewide, total water in storage is declining over time. Recharge is critical to reliable water supplies..”





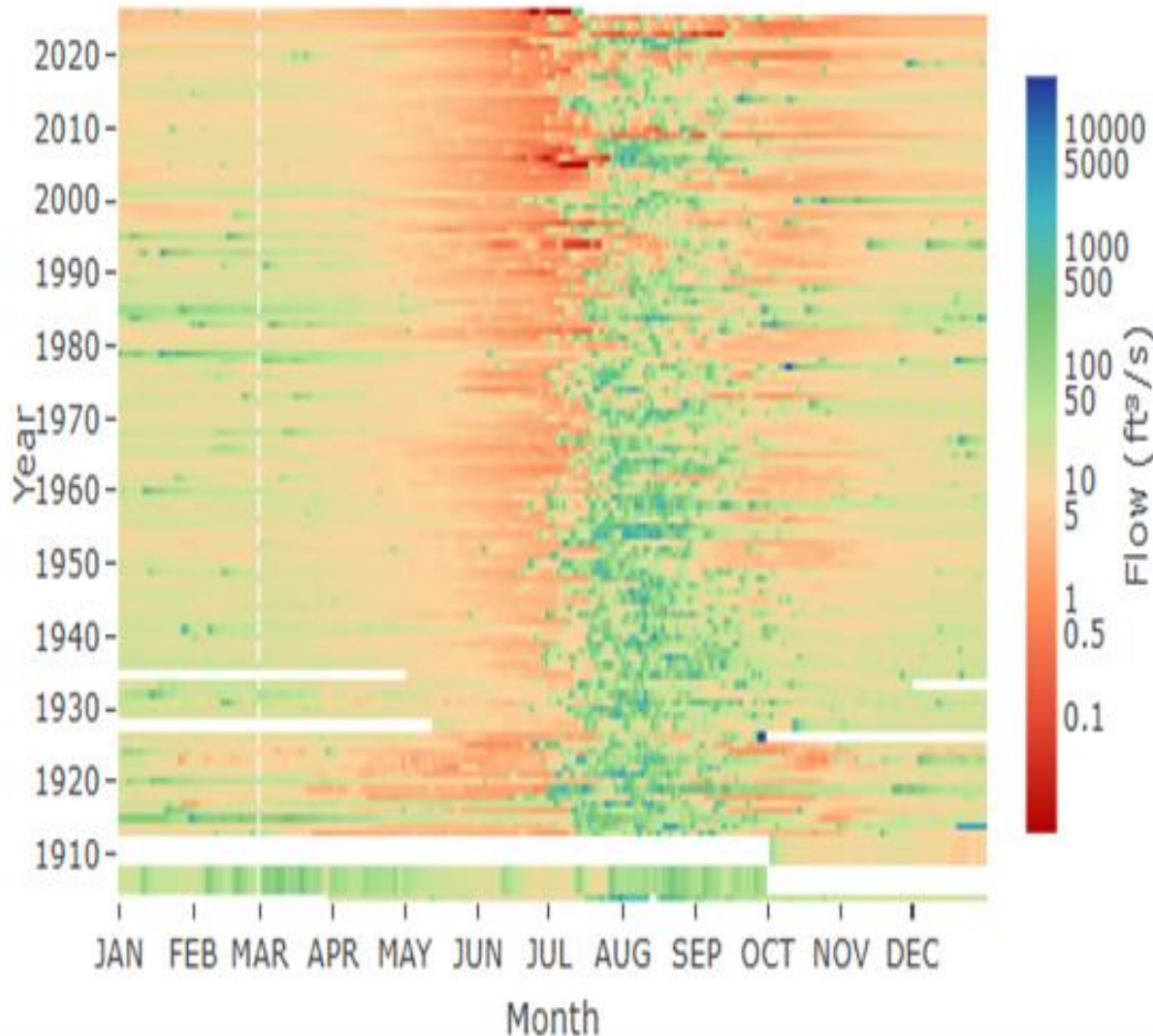
Where do we go from here?

What to expect:

- Higher temperatures
- More evaporation
- Extreme drought
- Extreme floods
- Extreme wildfire
- Reduced soil moisture
- Reduced recharge
- Reduced groundwater storage



USGS Raster Hydrograph (Daily): [USGS] SAN PEDRO RIVER AT CHARLESTON, AZ



USGS Charleston Gage

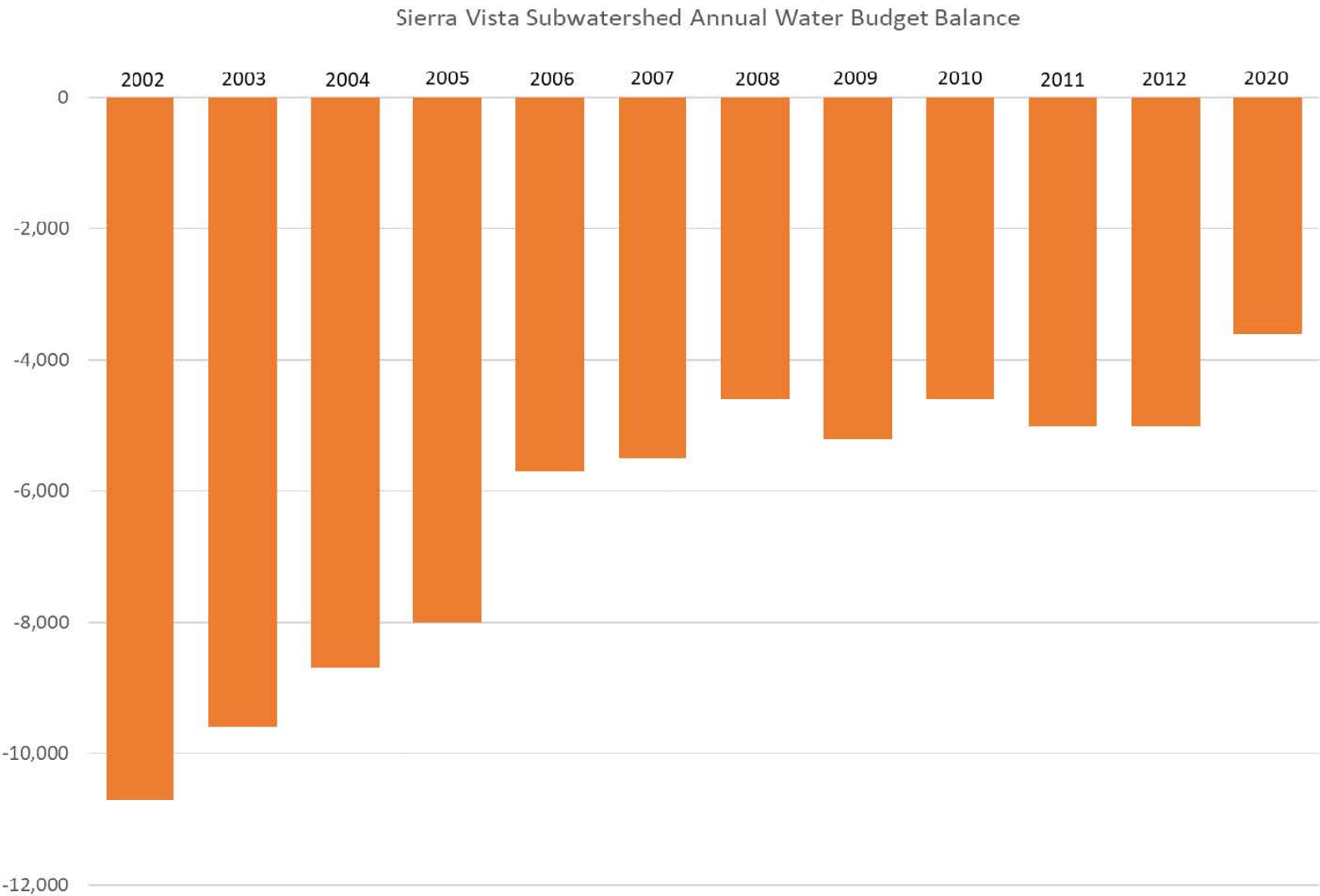
Last 20 years:

- Fewer monsoon flood flows
- Reduced pre-moon baseflows
- Drier winter baseflows
- Some big fall hurricane events

Management Measures



USGS Water Budget 2002-2020

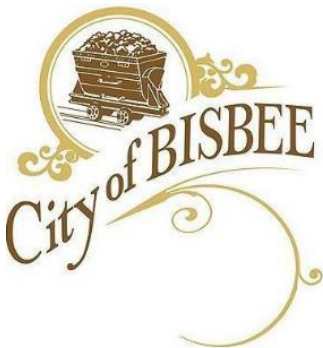
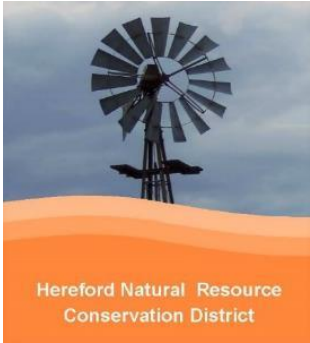


Mission:

► To implement a regional network of land and water management projects that result in a healthy watershed, flowing San Pedro River, conservation of water resources, and a vibrant local economy.

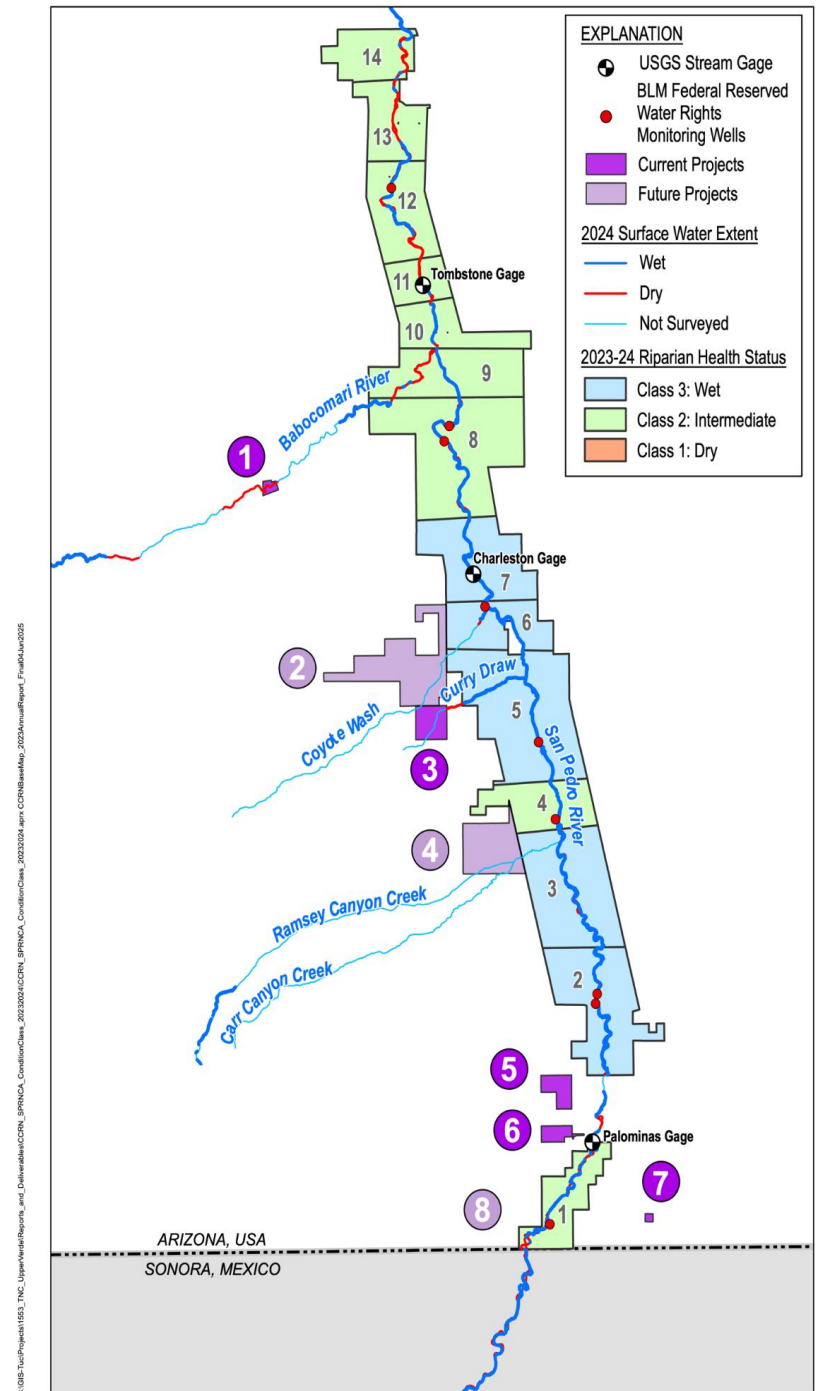


CCRN MEMBERS



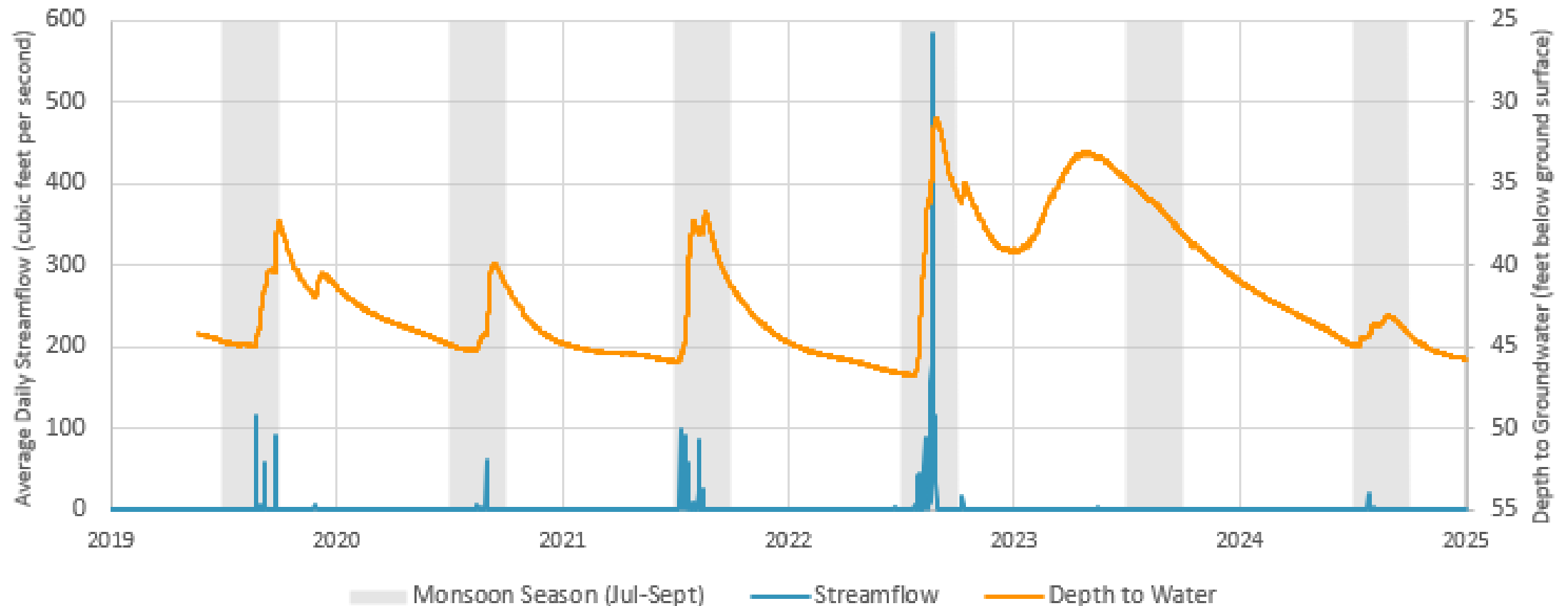
CCRN Project Sites

- 1 Babocomari Floodplain Protection Site
- 2 Coyote Wash Stormwater Management Project
- 3 City of Sierra Vista Effluent Recharge at the Environmental Operations Park
- 4 Carr Canyon Recharge Project (future)
- 5 Three Canyons Conservation Site
- 6 Palominas Stormwater Recharge and Flood Control Project
- 7 Horseshoe Draw Sediment Control and Stormwater Recharge Project
- 8 Border Recharge Project (future)

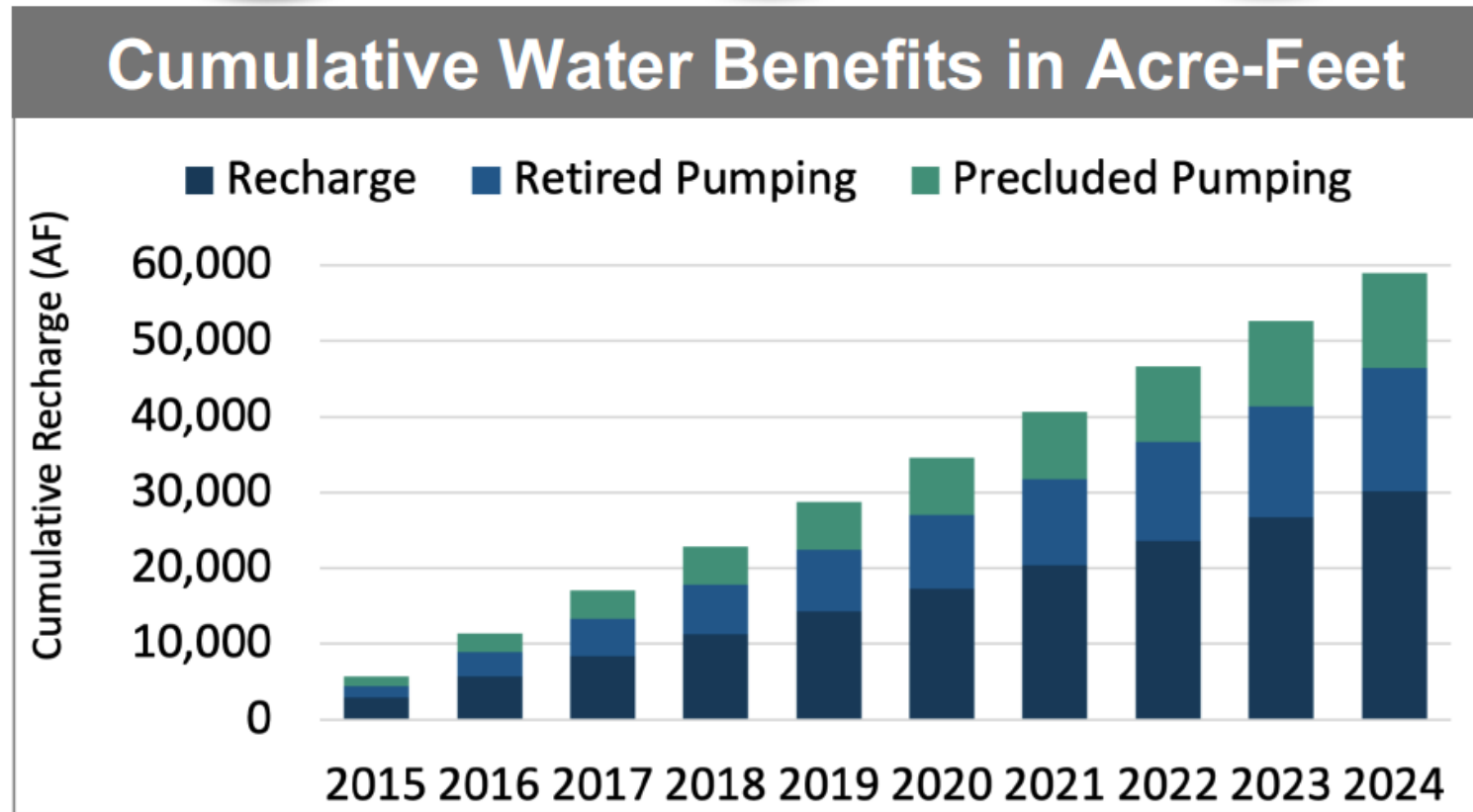


Natural Floodplain Recharge

Streamflow and Depth to Groundwater, Babocomari Site



CCRN Cumulative Benefits (2015 – 2024)



Recharge
30,182 AF

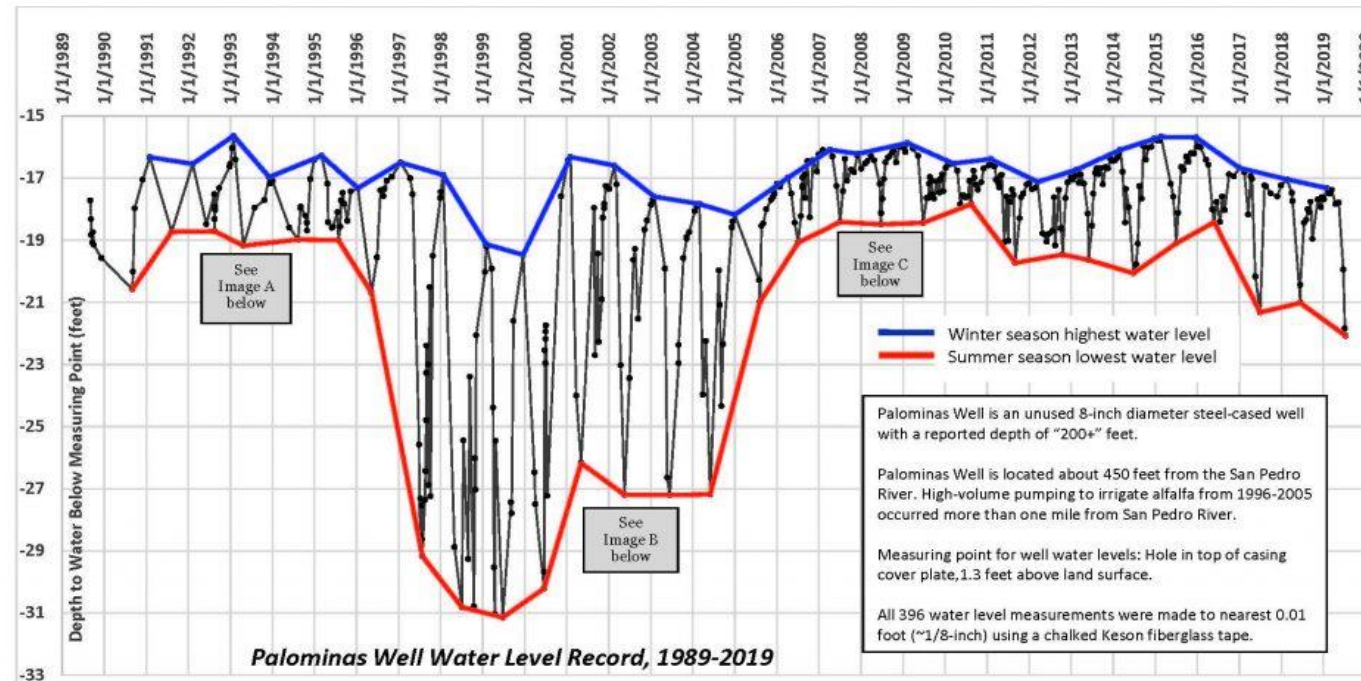
Retired
Pumping
16,280 AF

Precluded
Pumping
12,581 AF

Retired Pumping

33

IMPACT OF HIGH-VOLUME PUMPING ON THE WATER LEVEL IN A WELL NEAR THE SAN PEDRO RIVER



Conservation Easements

34

- Permanent restrictions relative to land and water on a property based on science, to benefit habitats and regional water security
- Can include permanent retirement of historic pumping, preclude future water use, and/or allow for aquifer recharge facilities



CCRN Recharge Project Criteria



Suitability of near surface hydrogeology

Within project site, near-surface soils exhibit suitable permeability rates for potential recharge



Water quality standards

The project must meet ADEQ water quality standards necessary for project permitting



Measurable hydrologic benefit

The project will result in measurable benefit to near stream groundwater levels and/or stream flows within the SPRNCA to sustain riparian health

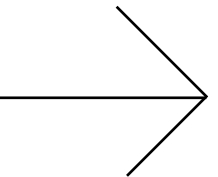


Sierra Vista's Environmental Operations Park

- 50 acres of wetlands
- In operation since 2002
- 3,458 acre-feet of recharge in 2024.
- 29,303 acre-feet since 2025



Future flood-related extremes
provide new opportunities as
well as challenges.

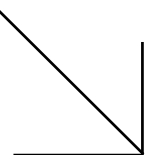


98%

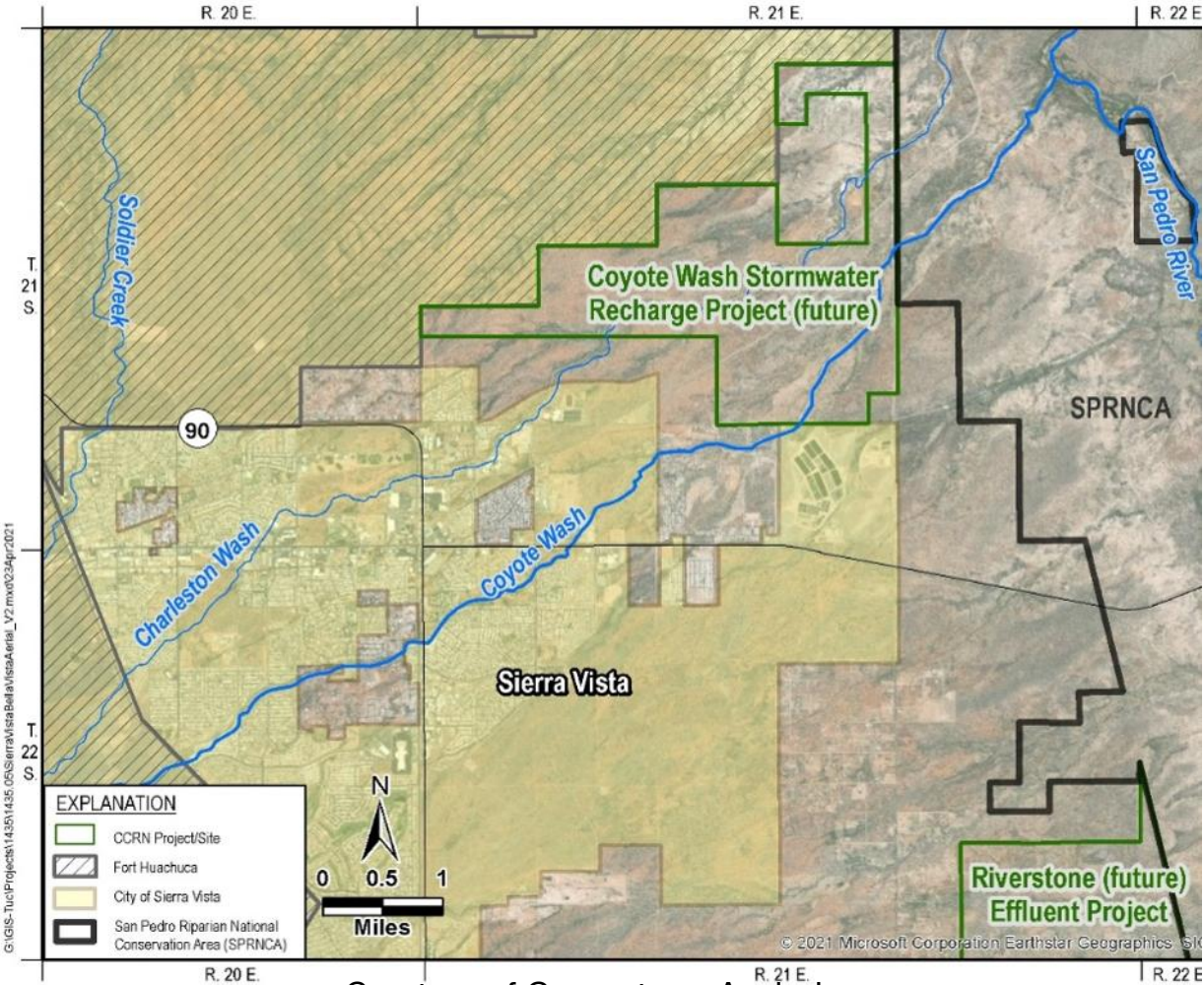
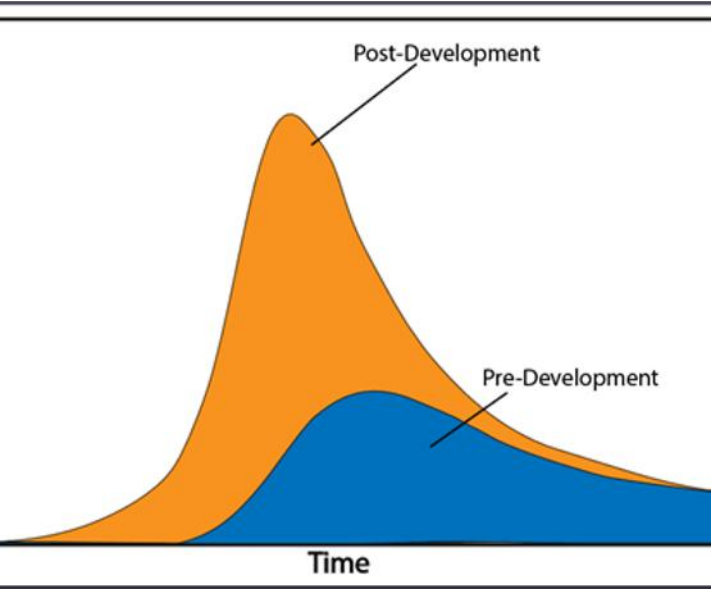
of the rains that falls is lost to
evaporation and use by plants

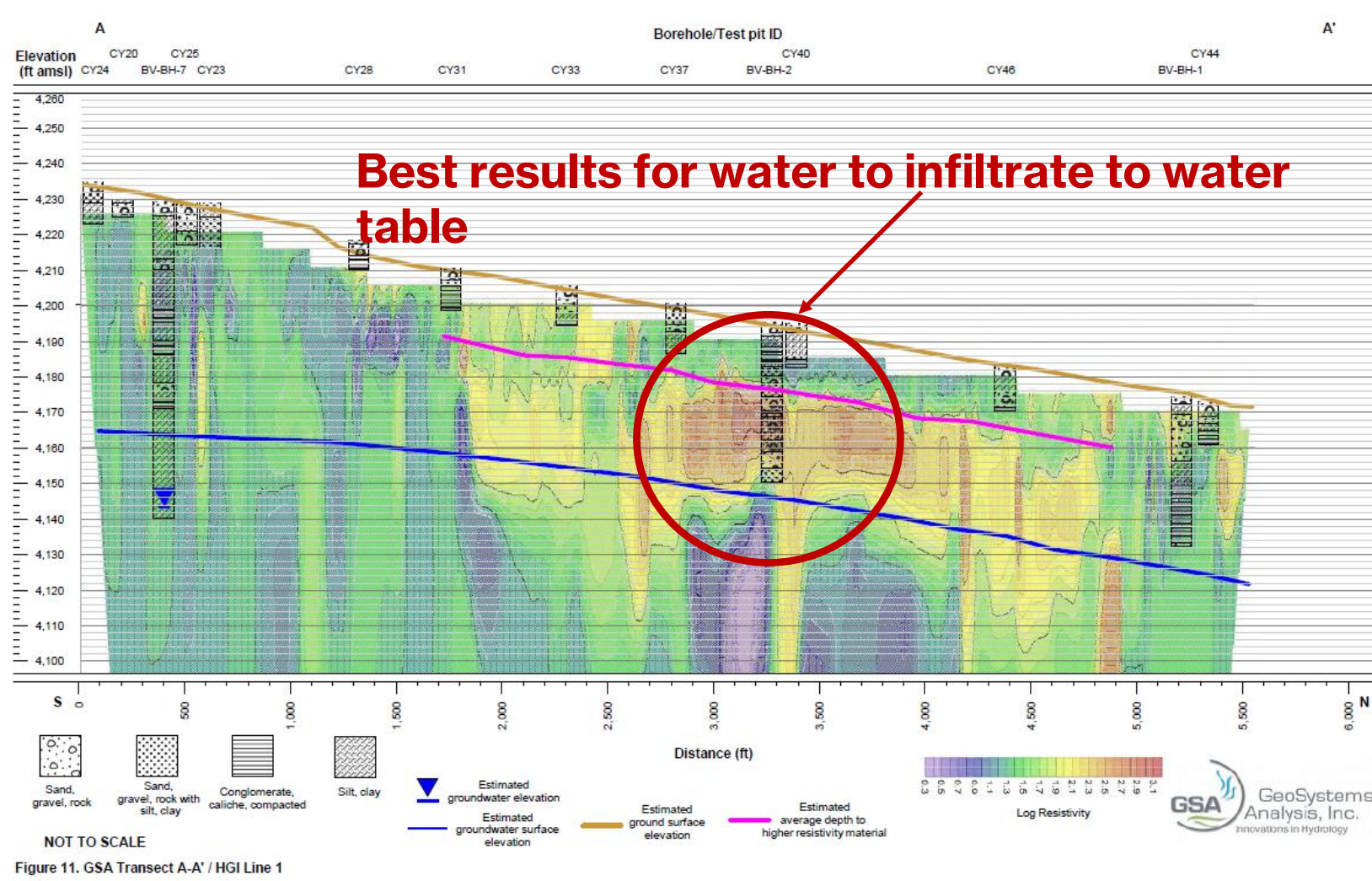
2%

of the rainfall recharges our aquifers

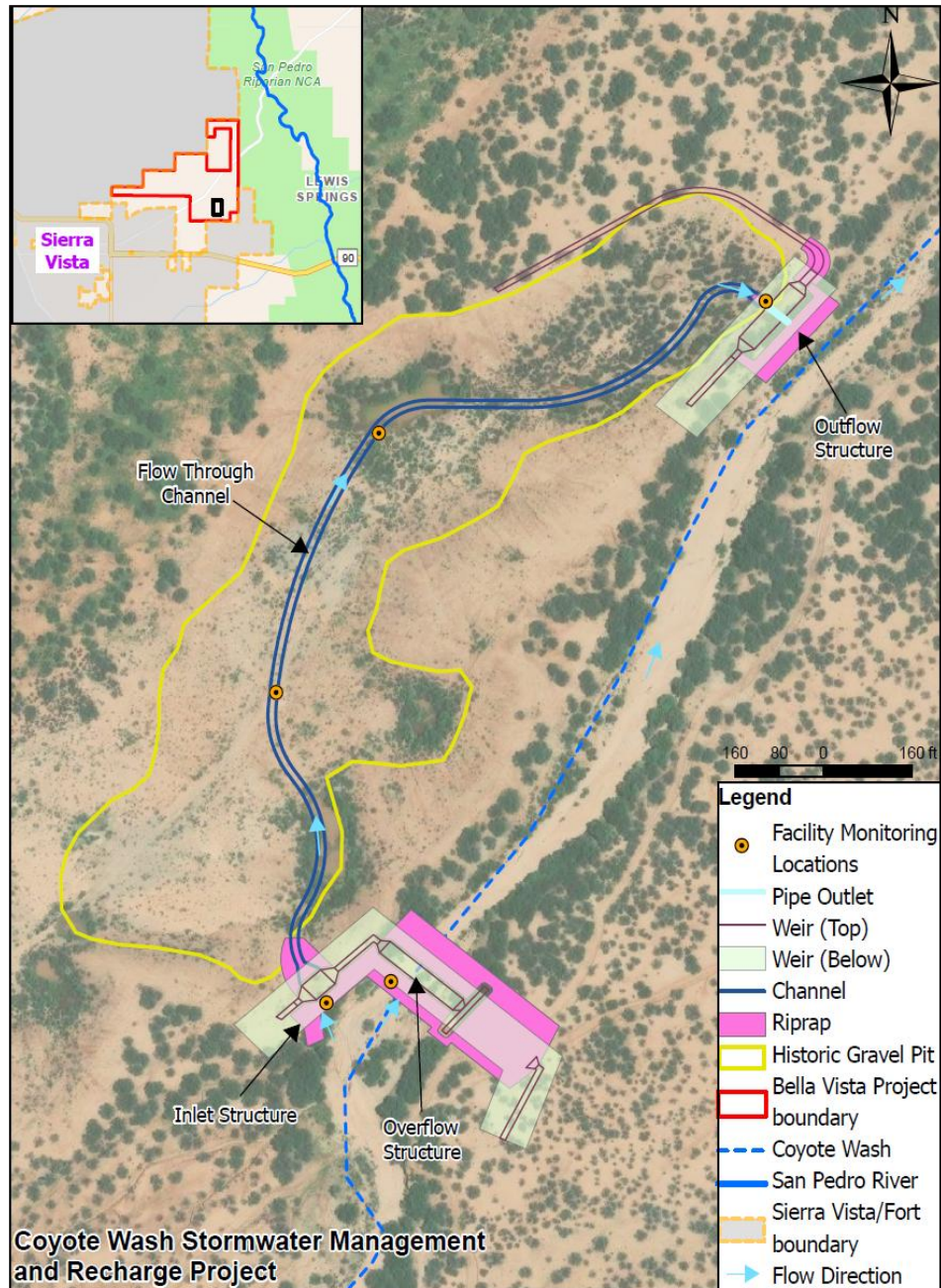


Urban Enhanced Runoff





Courtesy of Geosystems Analysis



Courtesy of Geosystems Analysis

Coyote Wash Stormwater Management Project

Slowing the flow of
“urban enhanced runoff”



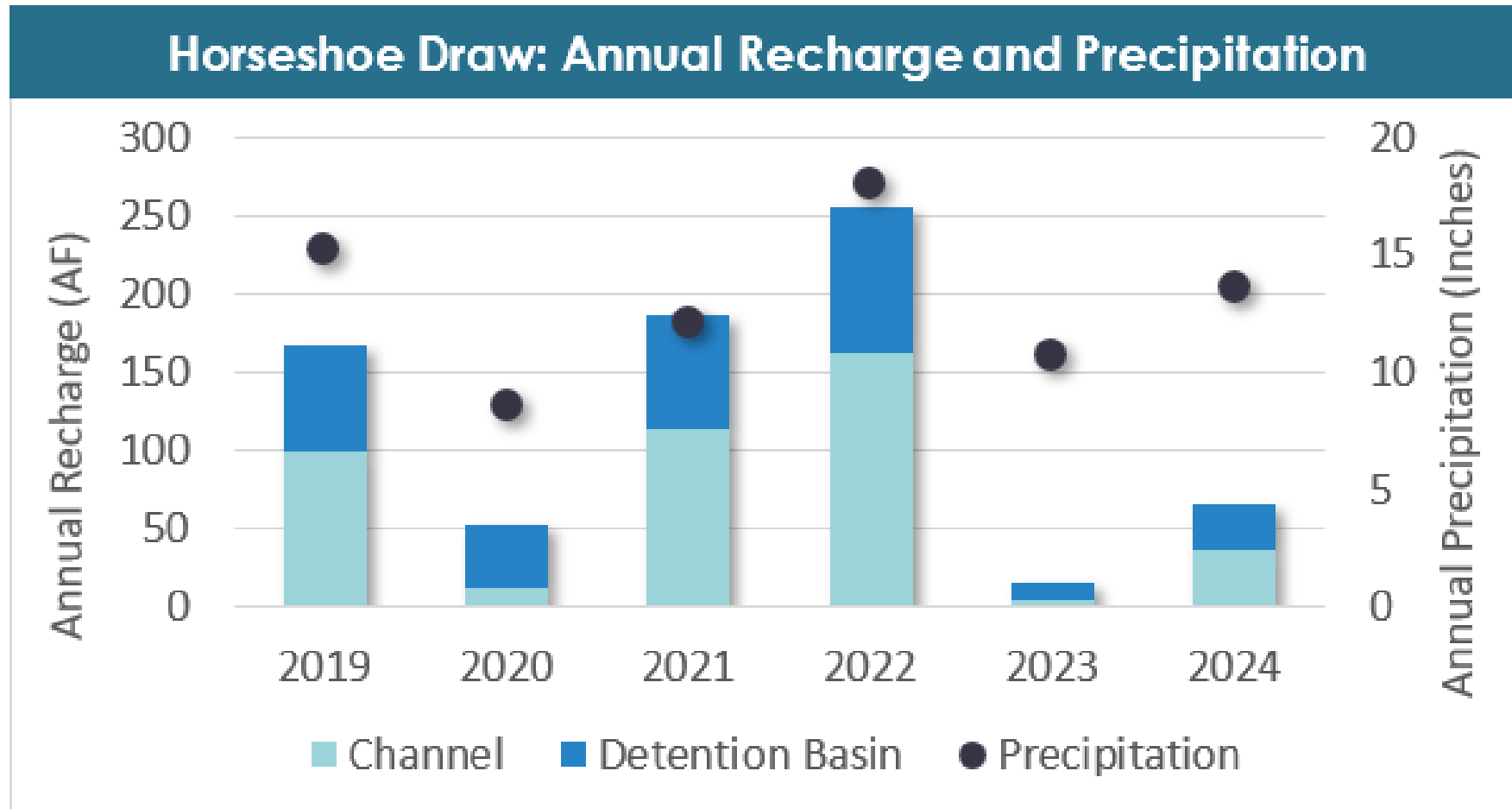
Coyote Wash Stormwater Management Project

Construction
completed this month

Horseshoe Draw Sediment Control and Stormwater Recharge Project



Horseshoe Draw Recharge



Thriving in uncertainty...

-Tools for Adaptation

A strong foundation of science-based data sets and tools

-Real-world Impacts for Resiliency

A network of projects that work together at a regional scale to provide water for SPRNCA where, and how, it's needed most

-Enduring Partnerships

Over a quarter century of collaboration





More information:
CCRNSanPedro.org



Thank you!
Q&A