Historical Context of the Recharge Program

Gerry Walker, Deputy Assistant Director

March 29, 2017

Why did Arizona need a recharge program? Because Arizona needed to manage water supplies.

1. To promote the use of renewable water supplies over non-renewable groundwater, by allowing for effective and flexible storage and recovery of the renewable supplies.

   Other drivers: available CAP water and CAP underutilization; safe-yield and need for water augmentation; AZ discussions with other Basin States

2. To provide for the efficient use of water resources by being flexible in recovery of water

1970's and Earlier

* As early as 1970's, the concept of recharge was being discussed in Arizona
* Was already taking place in California in the form of stormwater recharge in alluvial aquifers or recharge of reclaimed water

1980 Groundwater Code

* The Code did not prohibit recharge nor did it provide protection
* Established safe-yield as the management goal for Tucson, Phoenix and Prescott AMAs
* Established guidelines for First Management Plans: 1983 for Tucson, Phoenix and Prescott and 1985 for Pinal
* FMP included no artificial recharge of water (effluent or CAP) because projected full utilization of supplies
* Water supplies termed Dependable, Return Flow or Mined Groundwater
* Recognized augmentation would be needed

Interlude (Background)

* CAP water availability looming as construction progressed; first deliveries made to Harquahala Irrigation District in 1985
* CAP water not able to be taken by everyone yet; ag converting from groundwater to surface water distribution systems
* Take or pay provisions motivated CAP subcontractors to want to utilize their allocations
* Subsurface storage more cost effective, lower evaporative losses and less environmental impacts

Interlude (Negotiation)

* Phoenix AMA cities, through AMWUA, proposed first draft of legislative concepts
  * Legislation required to provide protection
  * Proposed credit accrual system
* ADWR followed with own concepts
  * Wanted CAP water to be used directly
  * Opposed to 100% credits; didn't want net loss to aquifer
  * Concerned about location of recovery (within AOI)
  * Hydrologic feasibility and consistent with management plan

Interlude (Negotiation, con't)

* 1985 - Governor Babbitt appointed an Interim Study Committee to review artificial groundwater recharge
* Senator Hays, Senator Mawhinney, Senator Usdane, Senator Haradt and Senator Sawyer
* Ultimately, the 1986 legislation was the product of a joint effort between ADWR, major cities and agricultural interest groups

1986

* Legislature passed two bills, the Artificial Groundwater Recharge (AGR) and Underground Storage and Recovery (US&R) Programs
* Authorized ADWR to begin regulating the use of water in artificial recharge projects through a permitting process.
* AGR provided for recharge with no credits and no recovery
* US&R provided for recharge of water that couldn't be used directly, accrual of credits and recovery from the AOI or storer's service area
* NOTE: 1987 CAP deliveries up to 500,000 AF

Interlude II (1987-1993)
"Five Programs, Two Variations and Still Growing"

* During this time period, changes were made to the program each legislative session to meet specific needs or authorize specific activities
* 1989 Recharge Status Report showed over 1,600 AF recharged; 13 facilities completed
* 1990 **Indirect Storage and Recovery** enacted; allowed recovery outside of AOI; set to expire in 1995
* 1991 **Aquifer Replenishment** authorized creation of groundwater replenishment districts
* 1992 **Annual Storage and Recovery**

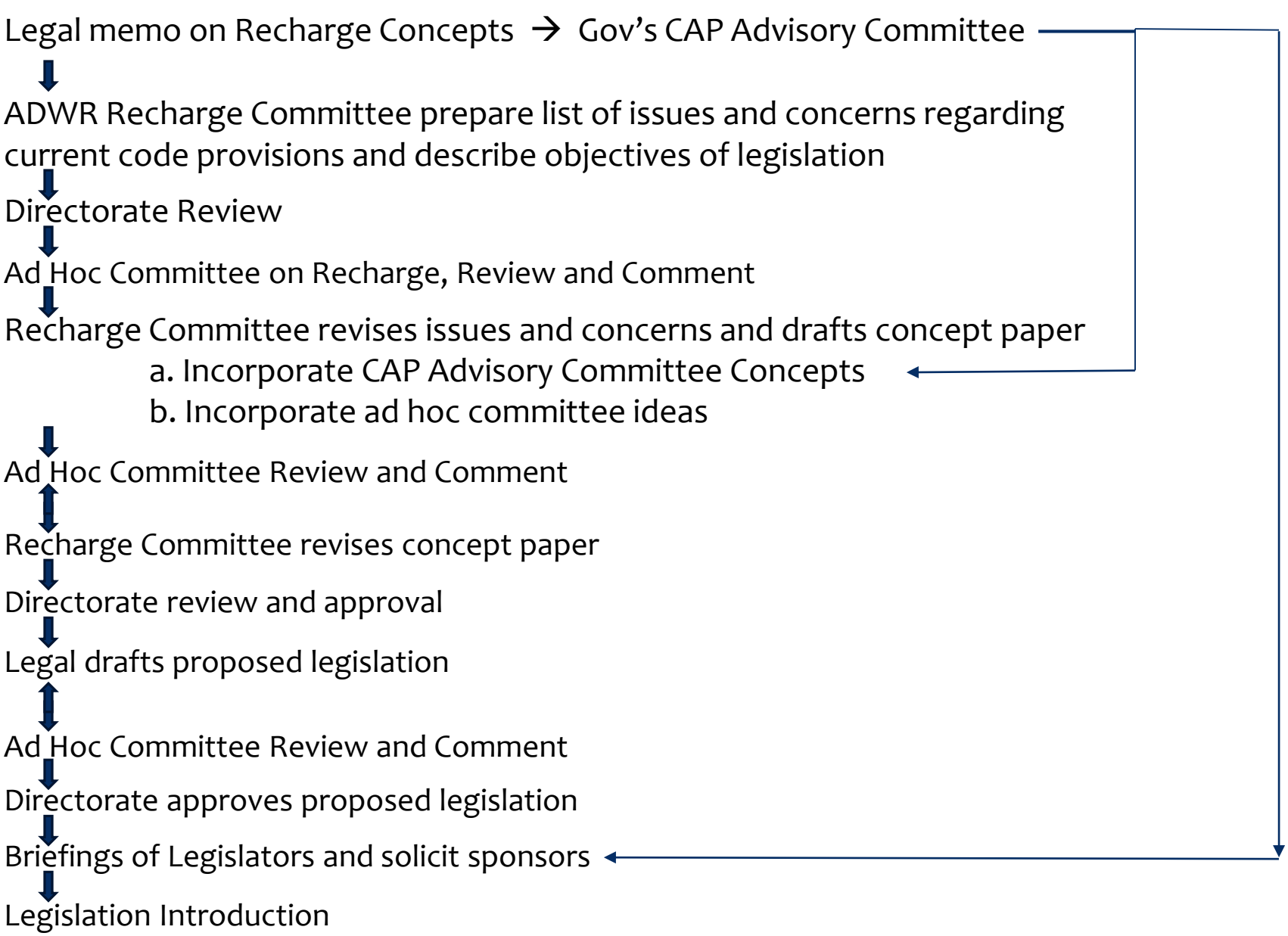
Interlude II (1987-1992)

* 1992 Recovery outside AOI authorized as long as consistent with management plan
* 1992 Water retains legal characteristic; 10% cut
* 1992 State Demonstration Projects – CAWCD to store excess CAP water
* 1992 Parks and National Monuments – allowed for recharge in natural stream channel

1993

* CAP declared substantially complete in October
* ADWR undertaking review of recharge programs and ways to improve
* Looking at how recharge could assist with CAP utilization issues
* October 1993 Concept Paper identified 4 major issues:
  (1) Recharge through non-constructed or instream projects
  (2) Indirect Storage Projects
  (3) Marketability of credits
  (4) "Cut for the Aquifer"

Flow Chart for 1994 Recharge Legislation



1994

* **Underground Water Storage, Savings and Replenishment Act** became effective in July
* Primary goal was to incorporate into a single, comprehensive stream-lined program
* Three Categories: facilities, water storage and recovery
* Recovery outside AOI if consistent with management plan
* Cuts to the aquifer
* Authorized Managed USF ; credits not used for AWS

What were the discussions in 1993 that led to the 1994 statutory changes?

Objectives of Recharge Legislation:

1 – 3 Related to process improvements

4. Review major policy principles and update where appropriate.

5. Review a variety of specific issues related to implementation of recharge laws.

6. Implement the recommendations of the Governor's CAP Advisory Committee.

7. Provide incentives to encourage increased recharge, if possible.

FROM: October 14, 1993 "1993 Recharge Legislation Concept Paper"

Policy Principles re: Recharge Projects

1. Will be a useful tool to reduce overdraft and achieve AMA management goals
2. Will make more water available for future growth and demand
3. May provide efficient and cost effective management; will facilitate storage for peak demands and shortages
4. Are needed to assist in using AZ's 2.8 MAF
5. Must be technically feasible and adequately financed
6. Must benefit water users in the AMA

Policy Principles (con't)

7. Storage and recovery must not cause harm to others

8. Should not negatively impact water quality.

9. Only allowed with water for which water rights are clearly established

10. Credits only issued for water that actually recharges the aquifer. Credits may not be earned for recharge of water that would have been naturally recharged. They are defined to differentiate them from recharge that occurs incidentally to water use or disposal. **Instream credits may only be earned if it is demonstrated that the water could have been used or disposed of by means other than discharging the effluent to the stream**

Policy Principles (con't)

11. Future recovery from area where stored; or another location if consistent with management policy

12. Credits may only be earned for surplus water; imported and effluent are surplus, some CAP is surplus

13. A 5% or 10% deduction in credits may be made for the general benefit of water management. No deduction for effluent or water stored to replace superfund withdrawals

Historic concerns regarding Passive (Managed) Recharge

* Discharging water into natural channels is not a recharge activity because there is no control over where the water recharges or whether it reaches the aquifer
* Because the discharge of effluent into river channels had been occurring for many years, that volume was included as a component of natural recharge (stream infiltration), in most studies, the primary component. If this water received credits and was recovered, there is an impact to ability to attain safe yield
* Should pumping credits be earned for a farmer that puts too much water on his fields?

Historic concerns regarding Passive (Managed) Recharge

* Could result in overall degradation of water quality because storing poorer quality effluent and removing groundwater
* Would the credits earned in this manner dissuade entities from storing CAP water?
* Compromise of the committee was that passive recharge of effluent should be allowed but on a more restrictive basis than for CAP water
* Amount of water consumed by riparian vegetation must be considered and excluded from storage credits

Questions?

Gerry Walker

Deputy Assistant Director

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PROTECTING
ARIZONA'S WATER SUPPLIES
for ITS NEXT CENTURY

SOUTHERN ARIZONA WATER USERS ASSOCIATION

Update to the Governor's Water Augmentation Council

March 29, 2017

Joe Olsen, General Manager, Metro Water District

Tim Thomure, Director, Tucson Water

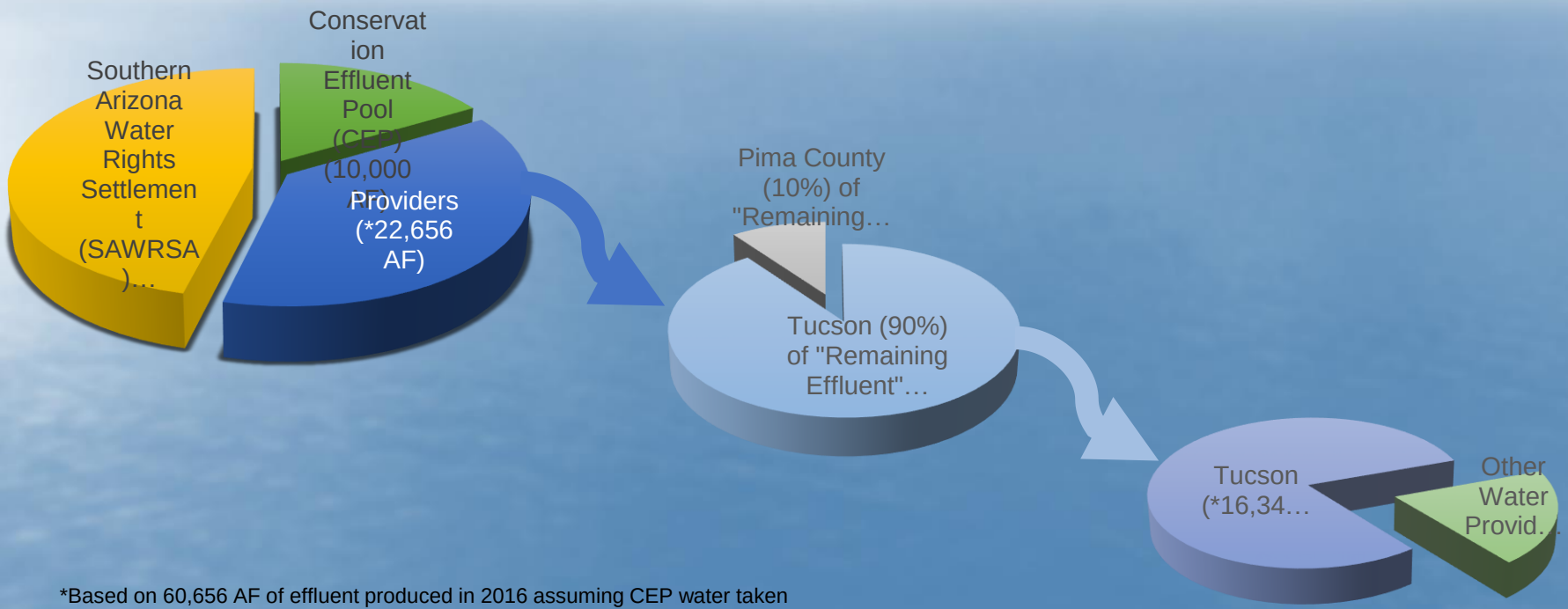
ABOUT SAWUA

- Voluntary nonprofit organized in 1999
- Comprised of 15 members, including the largest water providers in the Tucson region, wastewater reclamation entities, and agricultural water users
- Members coordinate in the development of effective water resource policy and planning in an effort to preserve and enhance the quality and quantity of the region's water resources

TYPICAL WATER PROVIDER PORTFOLIO

- Three primary sources of water supply
  - Groundwater
  - Central Arizona Project
  - Recycled Water

RECYCLED WATER ENTITLEMENTS



*Based on 60,656 AF of effluent produced in 2016 assuming CEP water taken

OTHER WATER PROVIDERS - 2016 METRO WATER SUMMARY

- Metro Water utilizes renewable water supplies to offset groundwater pumping
- Environmental uses are preserved through the Conservation Effluent Pool

Gross Effluent = 4,246 AF

- less contribution to SAWRSA
- less contribution to CEP (currently 0, could be 700 AF)
- less contribution to Pima County

Net Effluent = 2,045 AF

- less share of ET losses, diversions and outflow

Remaining Effluent = 1,174 AF

- Less 50% Cut to the Aquifer

Recharge Credits Earned = 587 AF

A Vision for the Santa Cruz River

AGUA DULCE

THE SANTA CRUZ RIVER

HERITAGE PROJECT

Revitalizing a River with Reclaimed Water

Infrastructure to Create a Flowing Channel

New investment is relatively minimal

- Existing Reclaimed Mains
- Proposed Outflow Locations (@2500 AFY)
- Anticipated Flow

Riparian Areas

In the Santa Cruz

- Reclaimed water north of 29th Street and north of Cushing Street
- Adding approximately 2,500 AFY in each location
- Cultivating native vegetation

Benefits of…

AGUA DULCE
THE SANTA CRUZ RIVER
HERITAGE PROJECT

- Virtually all of the City's reclaimed water put to beneficial use.
- Increased river flows and riparian habitat in the City.
- Potential economic development driver.
- Lower cost than potable reuse. Maximizes use of existing infrastructure.
- Supports historical and cultural community projects.
- Improves water management efficiency.

CITY OF FOUNDED 1775 TUCSON

TUCSON WATER

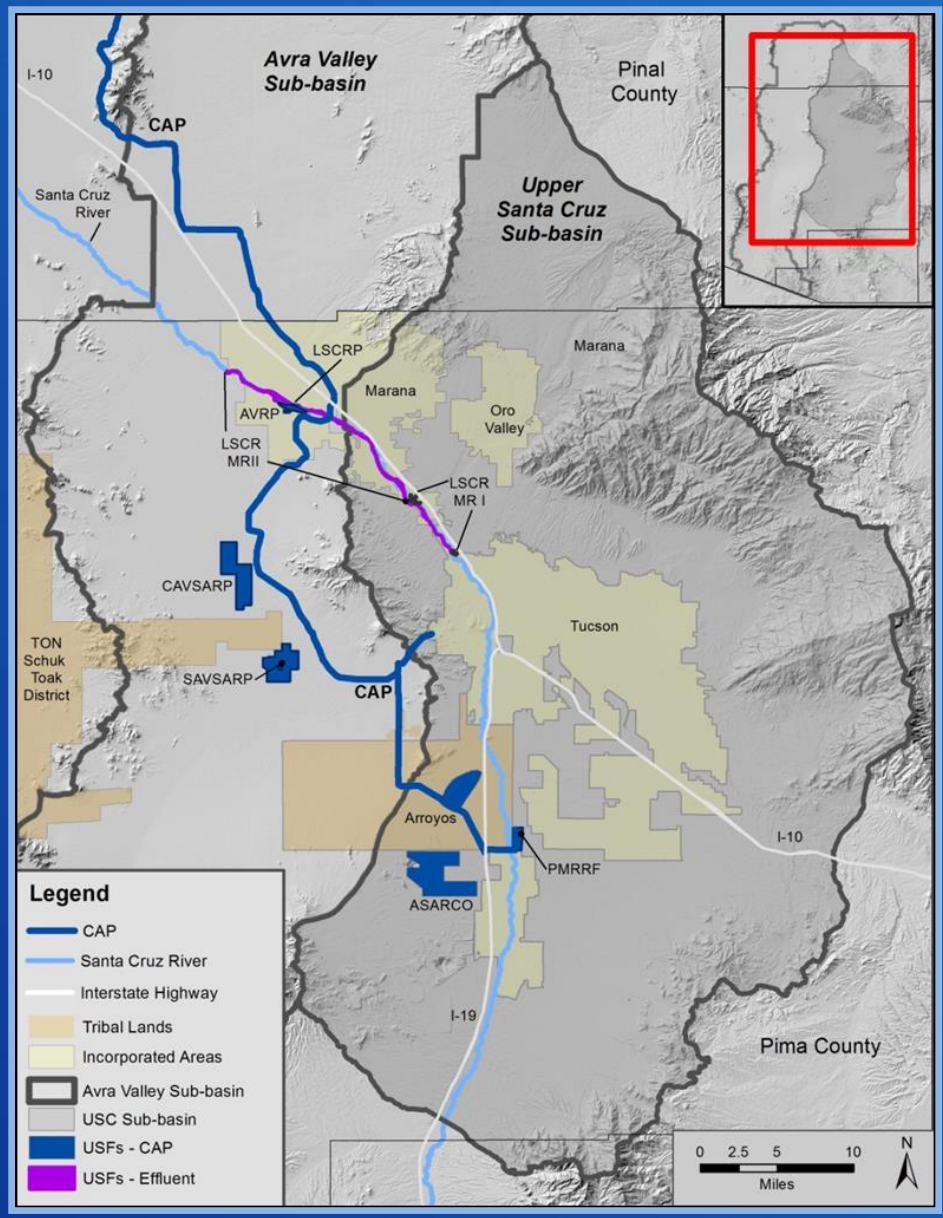
Concern: ***Cut to the Aquifer***

- Managed and Constructed are both effective
- 50% cut for Managed projects
- Forces “engineered” projects
- Forces higher costs
- Barrier to conjunctive uses

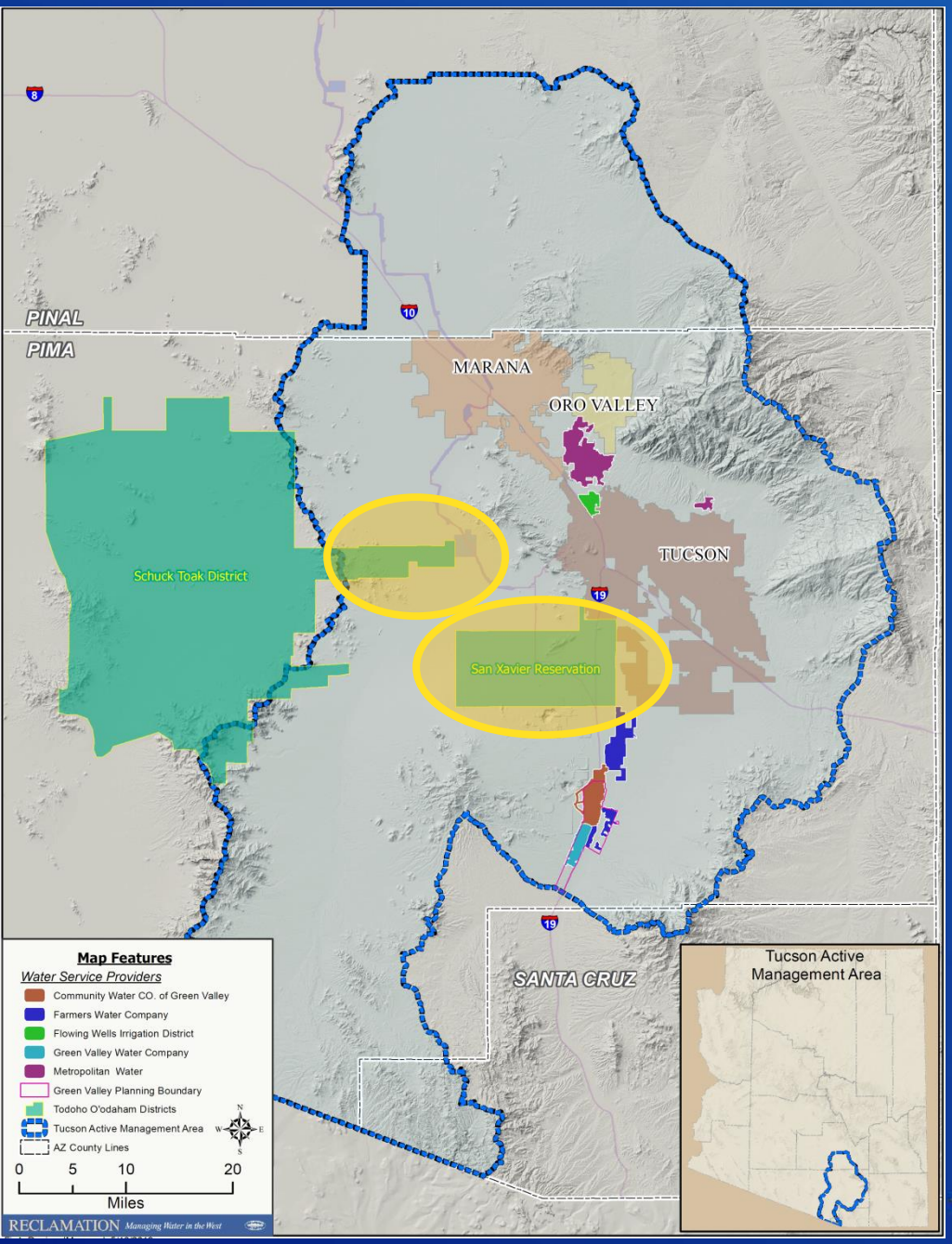
Southern Arizona Water Rights Settlement Act & Effluent Utilization

Governor's Water Augmentation Council

Recycled Water Committee
March 29, 2017



RECLAMATION



SAWRSA (1982)

Southern Arizona Water Rights Settlement Act

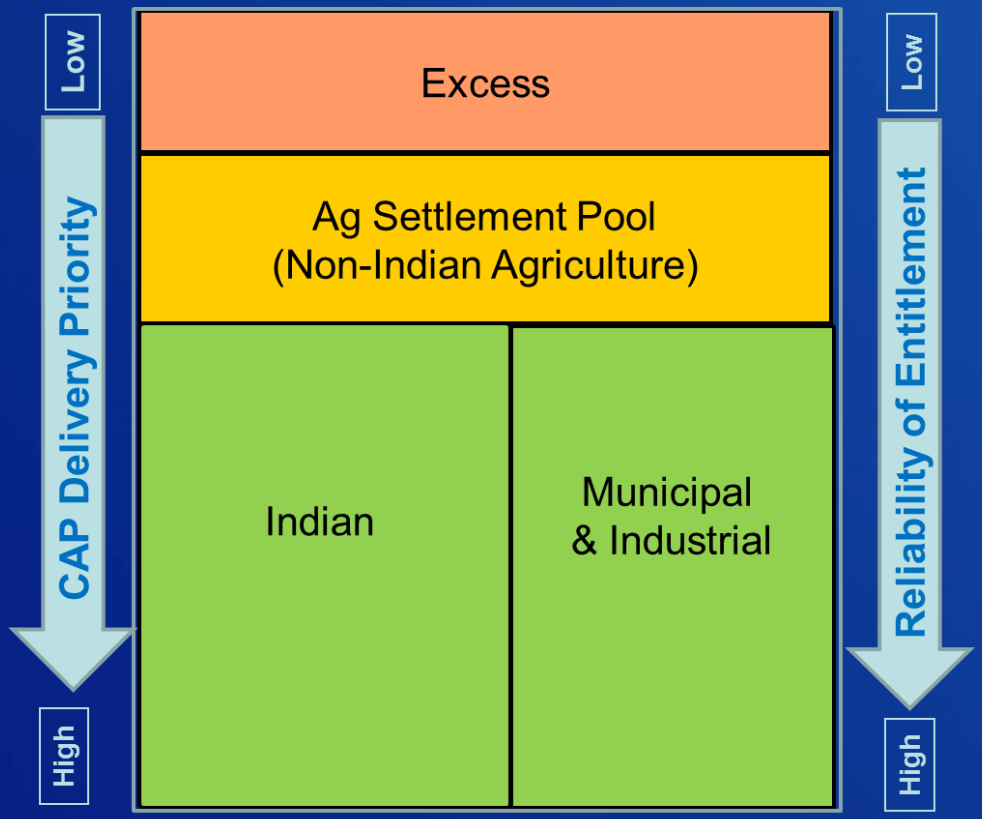
- Settled water rights claims of the San Xavier and Schuk Toak Districts of the Tohono O'odham Nation (TON) g
- SOI required to deliver 66,000 AFY of water to San Xavier and Schuk Toak Districts
  - 37,800 AFY Indian Priority CAP Water
  - 28,200 AFY Water to be determined
- Establishes Cooperative Fund to pay for water deliveries
- Requires Tucson to provide 28,200 AFY of effluent treated to secondary standards

AWSA 2004 (SAWRSA) Obligation

- Requires the SOI to deliver 66,000 AFY of CAP to the Tohono O'odham Nation
  - 37,800 AFY of Indian priority CAP water
  - 28,200 AFY of water identified as NIA priority CAP water
- Confirms the Cooperative Fund to pay for delivery of the 66,000 AFY
- NIA priority water must be "firmed" to M&I priority

AWSA Firming Program

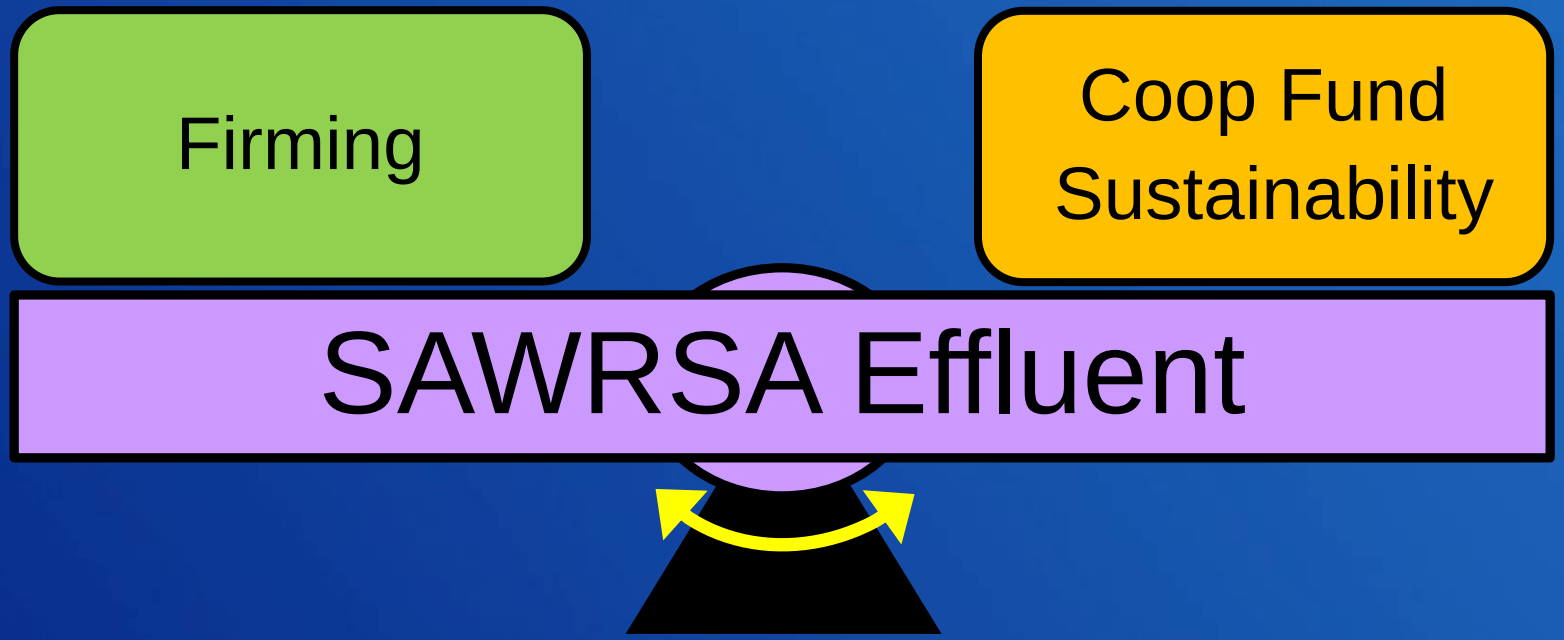
- Make NIA supplies "as reliable as" M&I
  - During times of shortage utilize other sources



CAP Delivery Priority

Order of reduction in times of CR shortage

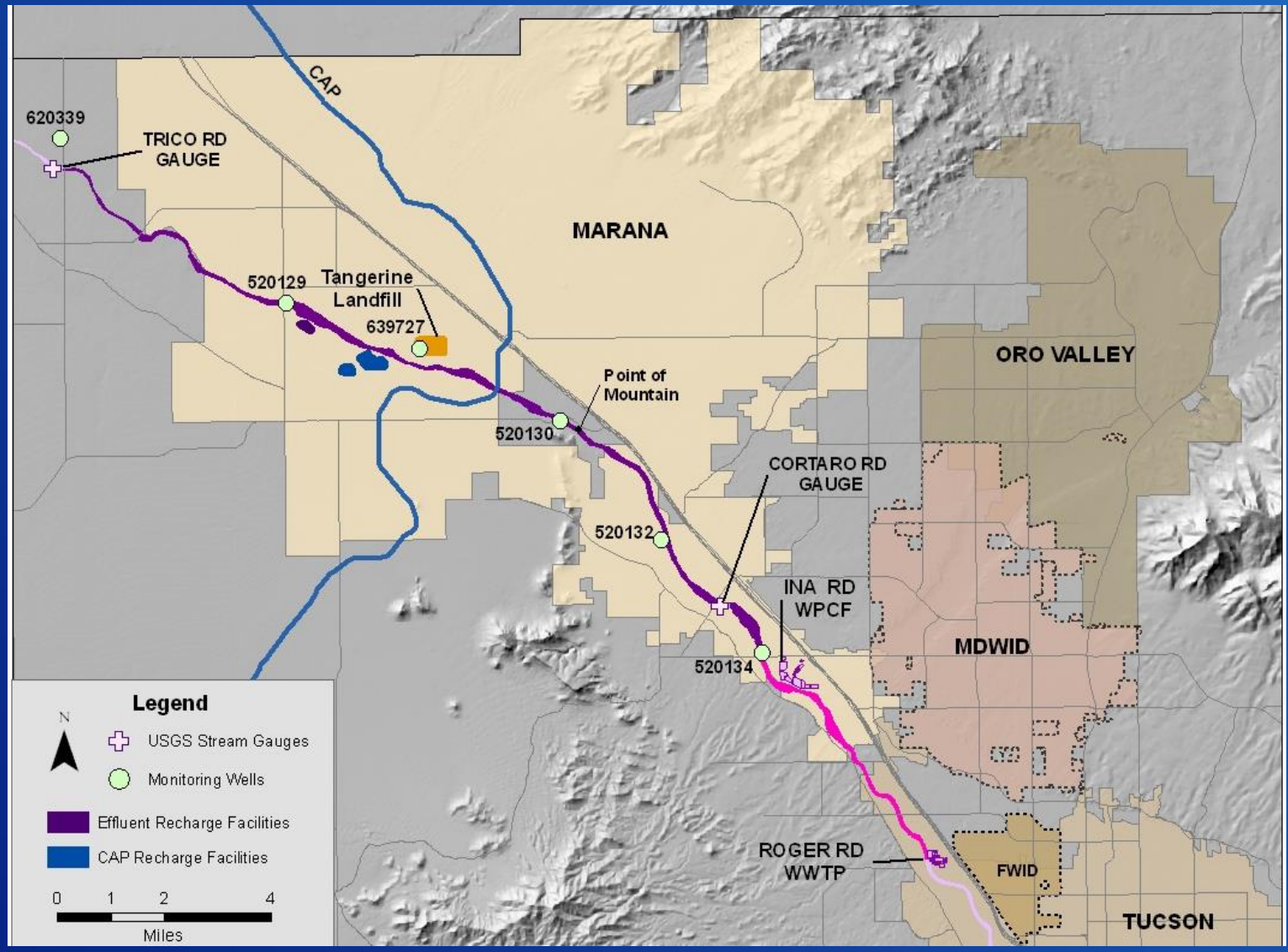
RECLAMATION



Reclamation manages SAWRSA effluent to:

- Firm NIA priority SAWRSA CAP water
- Finance water delivery under SAWRSA

Santa Cruz River Managed Recharge



RECLAMATION

Managed Recharge

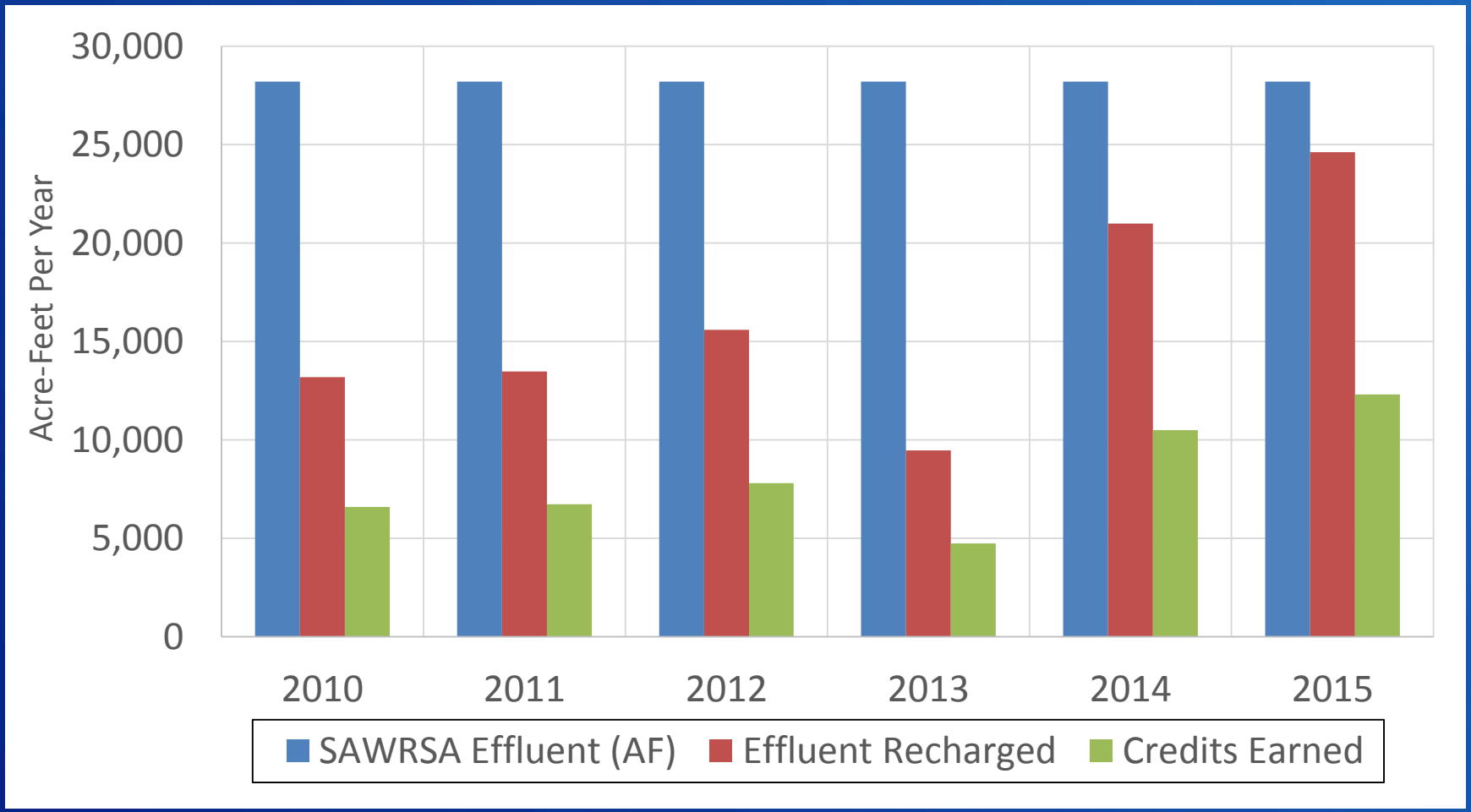
Santa Cruz River Managed Underground Storage Facility

- Permitted in 1999
- Joint Project with Tucson
  - Facility permitted to recharge 9,307 AFY
  - Managed recharge 50% (~4,500 AFY)
  - Split 50/50 (~2,250 AFY maximum)

Lower Santa Cruz River Managed Recharge Project

- Permitted in 2003
- Partners: Tucson, Pima County, Oro Valley, Marana, CMID, AVID, FWID, MDWID and Reclamation
  - Facility permitted to recharge 43,000 AFY
  - Managed recharge 50% (21,500 AFY)
  - Started in 2003
  - Complicated allocation equations

Reclamation Managed Recharge



RECLAMATION

Credit Value

- 2003 – Robson Communities
  - 3,500 acre-feet at $80/acre-foot
- 2015 – Central Arizona Groundwater Replenishment District
  - 60,000 acre-feet at $180/acre-foot
- Open Solicitations

2015 – Credits - Value

- Managed Recharge
  - Credits: 12,312 af
  - Cut to the Aquifer: 12,312 af
  - Value of Cut to the Aquifer:
    - 12,312 af @$180/af = $2,216,000

Trust Responsibility

- SAWRSA Obligations to the San Xavier & Schuk Toak Districts of the Tohono O'odham Nation
- Effluent provided by Settlement Parties as a resource to meet those obligations
- Maximize value of the effluent

In-Channel

- In Channel Recharge
  - Multiple Channels
  - T-berms
  - Grade Control Structures
  - Rubber Dam

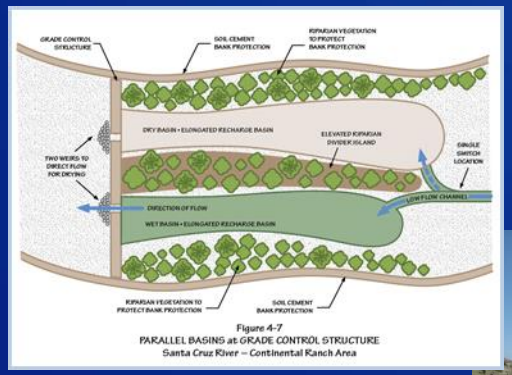


Figure 4-7
PARALLEL BASINS at GRADE CONTROL STRUCTURE
Santa Cruz River – Continental Ranch Area

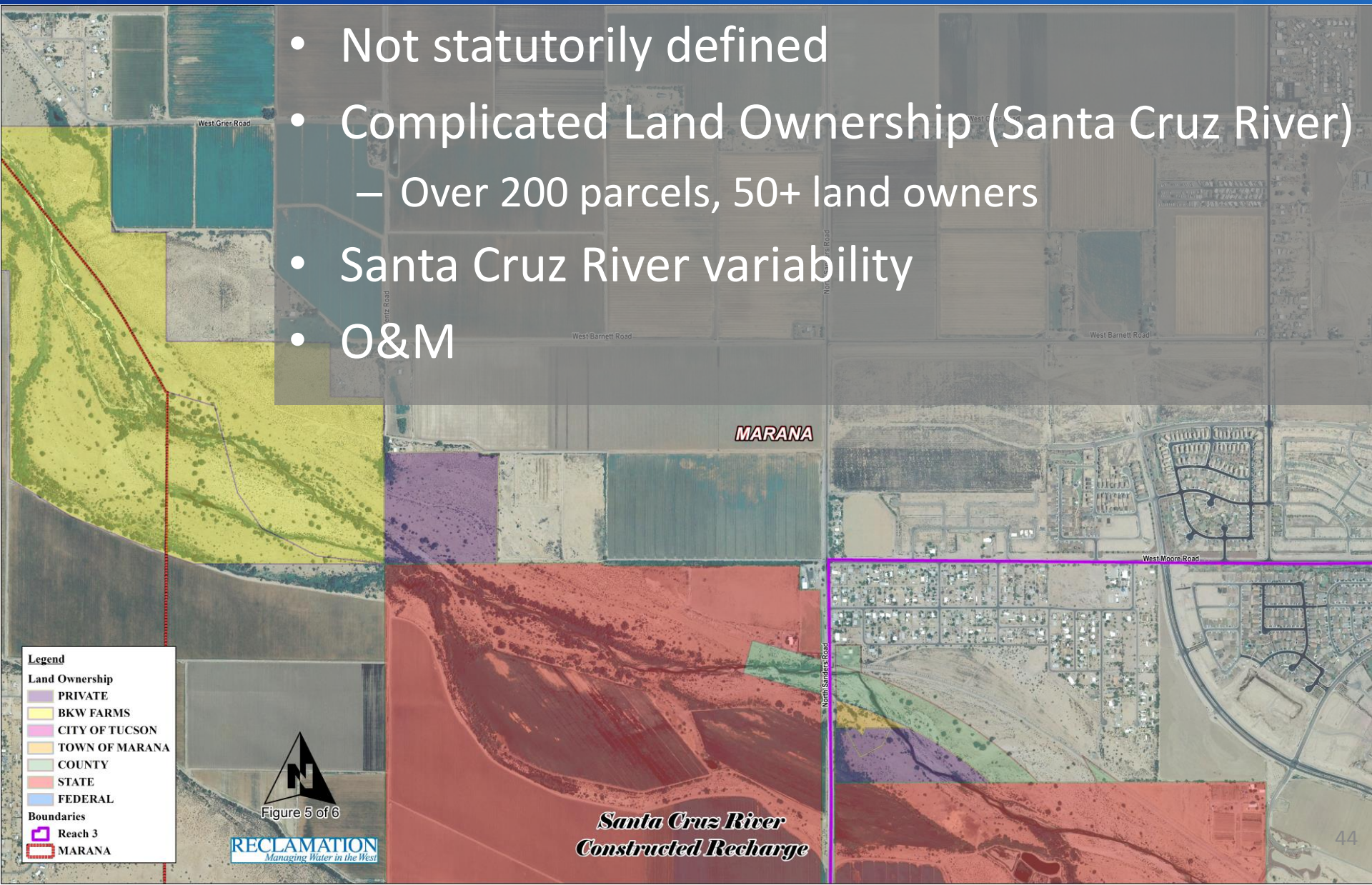
Enhanced Recharge Project

- 2011 – Conducted cooperative small scale constructed recharge test
- 1/3rd of a mile, 0.41 acres of additional flow path
- Successful results for about 5 months, until monsoons

RECLAMATION

In-Channel Lessons Learned

- Not statutorily defined
- Complicated Land Ownership (Santa Cruz River)
  - Over 200 parcels, 50+ land owners
- Santa Cruz River variability
- O&M



Off-Channel

Off-Channel

- Groundwater Savings Facilities
- Basin Recharge

CMID GSF

- Reclamation Water Storage Permit – 2012
- Cooperative Project with CMID & Metro Water
- Working to deliver water following Tres Rios WRF upgrades

Off-Channel Lessons Learned

- Effluent distribution difficulties
- Groundwater Savings Facilities
  - Agricultural Scheduling
  - Land-Development Possibilities
- USF (Basins)
  - Large initial investment
  - Piloting required to know recharge performance

RECLAMATION

Legislative Change?

- Enhanced Aquifer Management
- Governor's Blue Ribbon Panel
- R.U.M.P. Group

A Path Forward

- Timing of a solution is critical
- Looming Shortages on the Colorado River
- Increased Water Delivery Costs and Potential Funding Shortfalls
- Partnerships – Regional Solutions

QUESTIONS?

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RECLAMATION

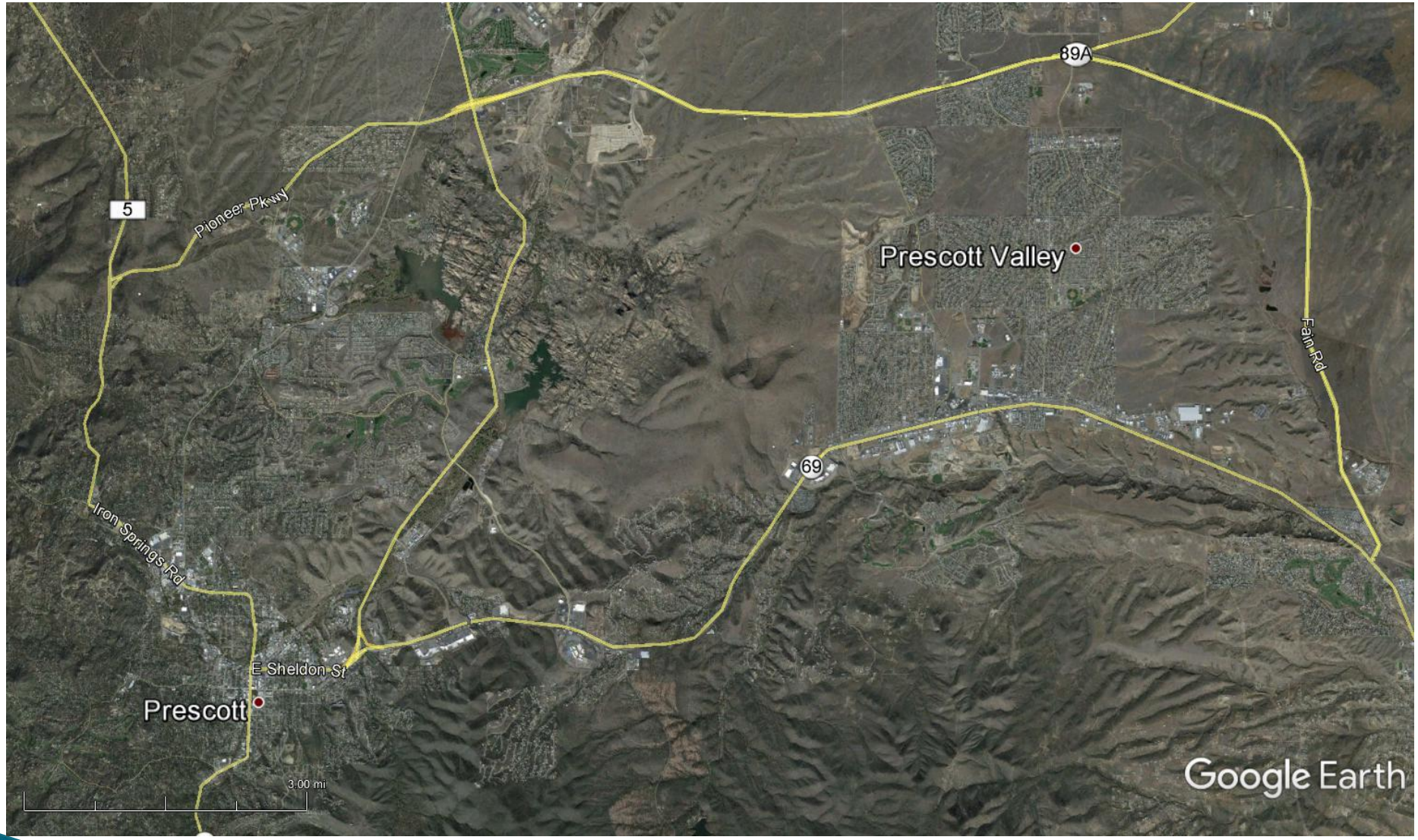
Reclaimed Water Use and Recharge

GWAC Recycled Water Committee
March 29, 2017

John Munderloh
Water Resources Manager

Town of Prescott Valley

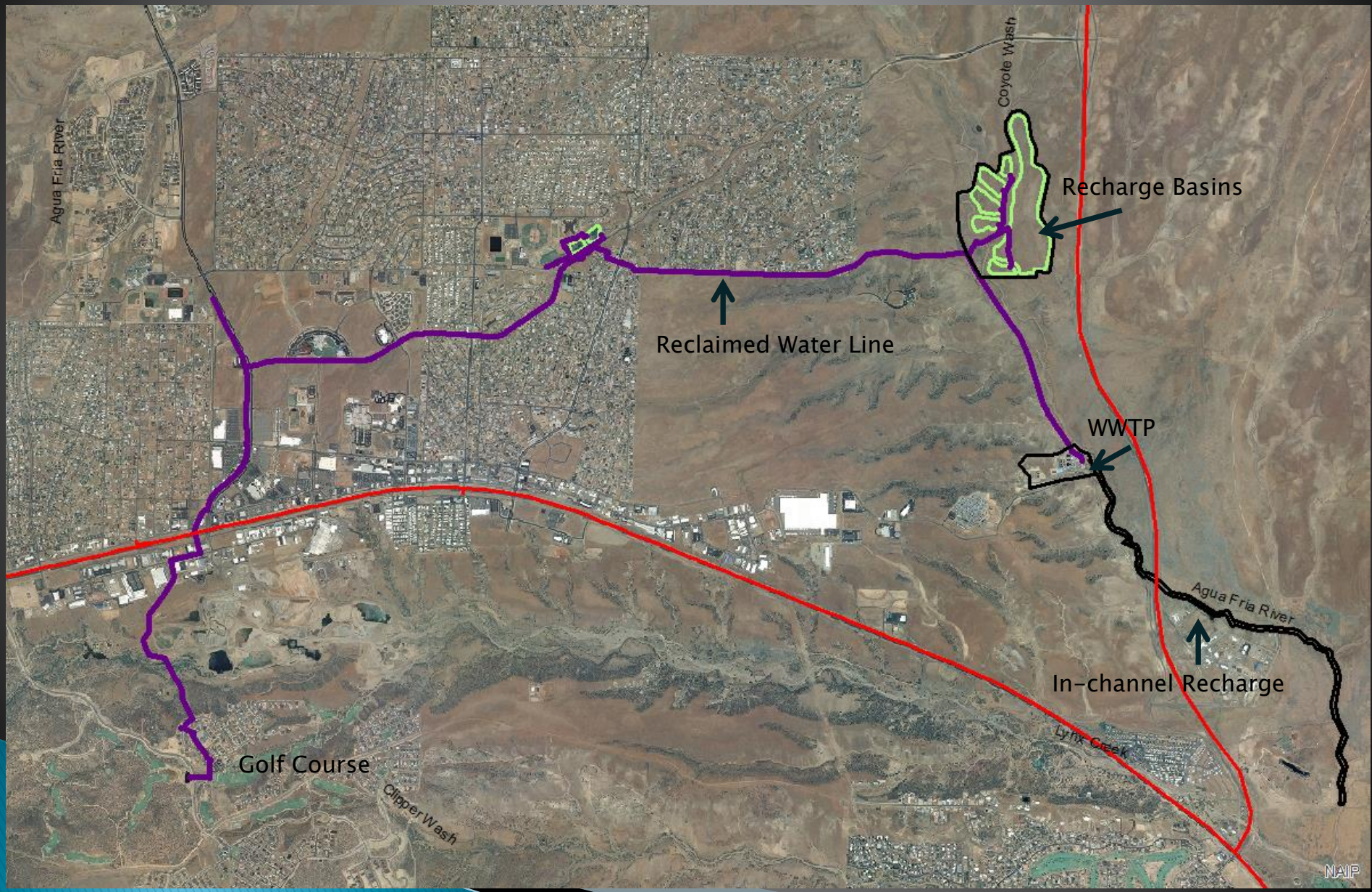
- **Incorporated 1978**
- **Improvement District (1990's)**
  - 5,000 Septic Systems converted to Central Collection and Treatment
- **2017 Water Service Pop. 48,000**


89A
5
Pioneer Pkwy
Prescott Valley
Fain Rd
69
Iron Springs Rd
E Sheldon St
Prescott
3.00 mi
Google Earth

Reclaimed Water System

- Two pumping plants and seven mile pipeline to Stoneridge Golf Course

Reclaimed System & Recharge Facilities



In-Channel Recharge Facility

- Bed of Agua Fria River (Ephemeral)
- 2003-2004 Managed (50% credited)
- 2004-Present: Constructed (Berms)
- Average approx. 65% credit (permit compliance)

Recharge Facility

- 2013: Off-channel Recharge Basins

Prescott Valley Water Portfolio (buildout)

Pre-1999 Groundwater	6,000 AF
Big Chino Groundwater	3,800
CAP water	0
	9,800
Effluent from GW & BC (60%)	5,880
First Generation Rollover	3,530
	9,410 *

*Some Portion Dedicated to Safe Yield

Effluent Credits for Growth

- 1999 – ADWR Declaration of Groundwater Mining closed basin to new GW uses
- **Effluent is currently Prescott Valley's only alternative water supply**
- Prescott Valley is not a Designated Provider
  - Developers obtain own Certificates of AWS
- Make effluent available for CAWS's
- Public Transparency (no favorites)
- Disconnect water from politics

2007 Effluent Auction

- 2006 – Physical Availability Determination for PV Effluent
- Price Floor Agreement with reputable investment firm
  - Negotiated Base Price
  - Set Terms and Conditions
  - Guaranteed purchaser
  - Incl. 1st Gen Rollover
- Public Auction Oct. 30, 2007
  - 3 bidders
  - Sold the Price Floor Agreement

2007 Effluent Auction (cont.)

- 2,724 acre-feet/yr of effluent recharge credits
  - 1,107 af/yr immediately available
  - 1,617 af/yr step up options as recharge increases
- 1st public auction of a water right in AZ
- Established Market Value of Water Rights
- $24,650/af ($67 million total value) for "paper" water

Effluent Auction (cont.)

- Nominated Top Water Deal in World for 2007 (Global Water Intelligence)
- Voted 2nd place by world-wide water community (award presented in London by Nobel Peace Prize Winner Mohamed Yunis)

Effluent is Critical Water Supply

- Projected to be 50% of Prescott Valley's Water Portfolio
- Only Alternative Water Supply (currently)
- Available to meet Safe Yield in lieu of CAP Supplies
- Recharge process turns it into a potable supply

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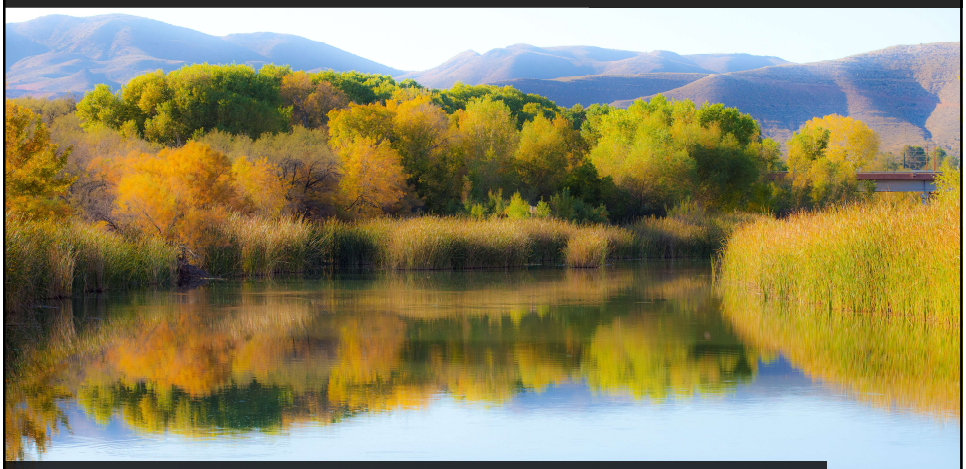


Western Rivers Action Network

Taking Action to Protect Western Rivers

Photo: Doug Von Gausig

Audubon

Audubon protects birds and the places they need, today and tomorrow

Audubon ARIZONA

Audubon
WESTERN RIVERS
ACTION NETWORK

Audubon's multi-state grassroots effort to protect rivers.

Advocate for conservation action that will increase river flow, enhance the health of our environment and restore valuable wetlands and forests.

Approximately 8,000 Arizonans; 35,000 across the West

In Arizona – eight Audubon chapters, numerous wildlife resource partners (hunter/angler organizations), business and community leaders

Non-traditional partners; non-partisan

Science, communication, action

Photo: Havasu NWR, USFWS

Engaging the Network

Audubon

Oak Creek - Orien Richmond

- Webinars and informational workshops
- Legislative briefings
- Meetings with legislators and agency leaders
- Western Rivers Day at the Arizona Legislature
- Advocacy alerts
- Networking, information-sharing

Arizona's Important Bird Areas

Audubon ARIZONA

46 IBAs have been designated, each of which is critical to the long-term sustainability of wild bird populations

Of these 46 IBAs, approximately 2/3 are directly tied to riparian habitats or other significant water resources.

Engaging the Network

Audubon ARIZONA

We love birds!

But we're also more than birds…

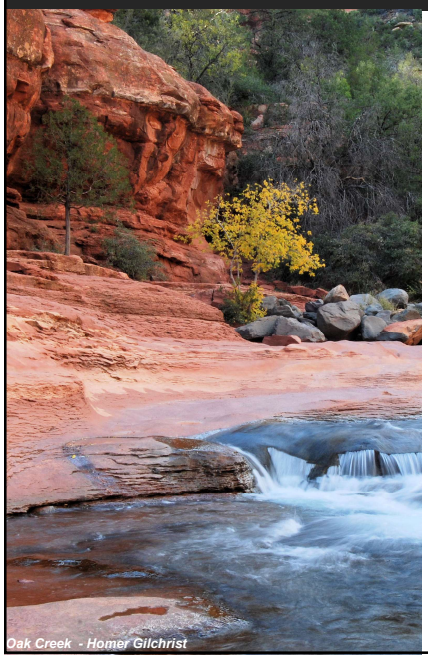
Hunters, anglers, outdoor recreation enthusiasts, businesses, agencies and elected officials are engaged

Economic development tied to water resources and habitat

Photo by Tice Supplee

Current priorities and activities

Audubon ARIZONA



- Drought Contingency Plan (DCP and DCP+) and Minute 32X with Mexico
- Groundwater Management Act and related tools
- Minimize partisanship in water management decision-making
- Expanding the toolbox – innovation in policies, practices, funding, and available tools
- On-the-ground conservation and restoration projects (San Pedro River, Verde River, Santa Cruz River)
- Economic benefits of water in rivers, streams, and wetlands

Recycled Water

Audubon

Why do Audubon Arizona and our WRAN partners care about recycled water?

Birds and other wildlife need water, too!

There is no such thing as "waste water" in Arizona.

Recycled water presents an opportunity to restore flow to rivers, and to protect flows where they still exist

Recycled Water


Photo by Steve Prager


Photo by Steve Prager

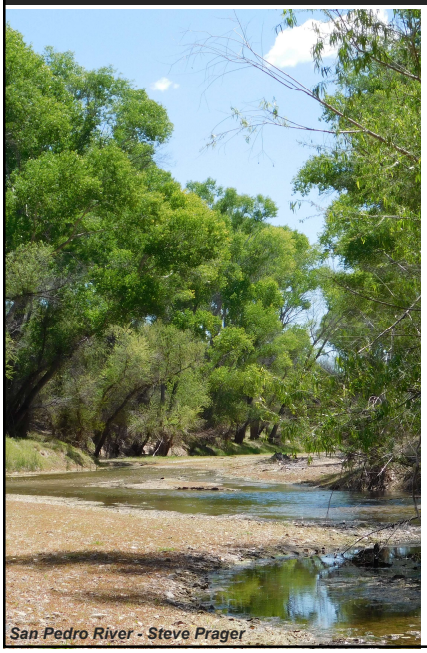
- Fish and wildlife depend on sufficient water flows to their habitats. Lack of adequate flow as a result of diversion can cause deterioration of water quality and ecosystem health.
- Recycled water can provide an additional source of water and help us decrease the diversion of water from sensitive ecosystems. It can also feed "created" wetland habitats that benefit wildlife.
- Recycled water can support a dependable, locally-controlled water supply
- Filtration through wetlands and streams can reduce and prevent pollution.
- Recycled water can be directly used to create or enhance wetlands and riparian habitats, or can indirectly prevent the use of other water that would impact habitat.

Recycled water programs of many scales – benefiting habitat, rivers and streams – are already in place or in the works:

- Audubon Arizona – *Nina Mason Pulliam Rio Salado Audubon Center*
- City of Phoenix – *Tres Rios*
- Town of Gilbert – *Gilbert Riparian Preserve*
- San Pedro River – *Cochise County Recharge Network*
- Santa Cruz River – *Tucson Wastewater Discharge*
- Gila River – *Gila River Indian Community*


Photo by Mick Thompson

Audubon ARIZONA


San Pedro River - Steve Prager

WRAN can be a partner and a resource for information-sharing

Example: story maps

- Communication and data-sharing tool
- Includes ADWR's Planning Areas

We'd like to be a resource in this subcommittee's research and deliberations, particularly related to new projects that may have wildlife benefits, as well as public policy considerations

Audubon

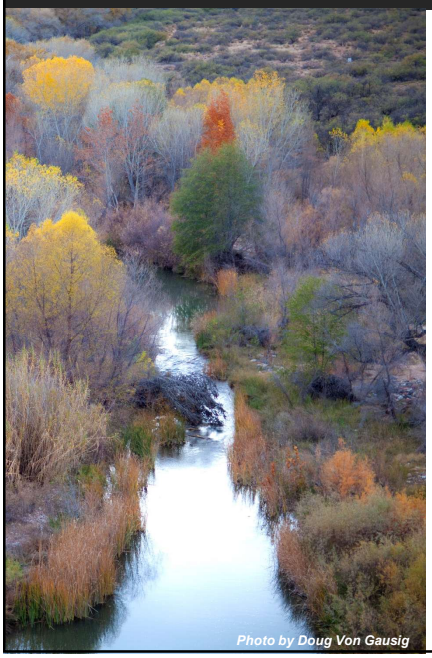


Photo by Doug Von Gausig

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WESTERN RIVERS
ACTION NETWORK

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