

CITIZENS' WATER ADVISORY COMMITTEE (CWAC)

Technical/Planning and Policy Subcommittee

Wednesday, February 25, 2015, 12:00 p.m.

Director's Conference Room

Tucson Water, 3rd Floor

310 W. Alameda Street, Tucson, Arizona



Legal Action Report

1. Roll Call/Call to Order

The meeting was called to order by Subcommittee Chair, Mark Murphy, at 12:01 p.m.
Those present and absent were:

Present:

Mark Murphy	Chairperson-Representative, Mayor
Mitch Basefsky	Representative, City Manager
Chuck Freitas	Representative, City Manager
Brian Wong	Representative, City Manager
Placido dos Santos	Representative, City Manager
Alan Tonelson	Representative, Ward 1
Kelly Lee	Representative, Ward 6

Absent:

None

Tucson Water Staff Present:

Andrew Greenhill	Intergovernmental Affairs Manager
Wally Wilson	Chief Hydrologist
Kris LaFleur	Staff Assistant
Johanna Hernandez	Staff Assistant

Others Present:

Mark Lewis	Representative, Ward 5 (not a member of subcommittee)
Amy Stabler	City of Tucson, Ward 6
Katie Bolger	City of Tucson, Ward 2
Eve Halper	Bureau of Reclamation

2. **Announcements** – No action taken.

3. **Call to Audience** – No action taken.

4. **Review & Approval of January 28, 2015 Legal Action Report and Meeting Minutes**
– Member Freitas motioned to approve the Legal Action Report and Meeting Minutes of January 28, 2015. Member Tonelson seconded. Motion passed unanimously by a voice vote of 7-0.

5. **PAG Presentation on Shallow Groundwater Studies** – Claire Zucker presented a PowerPoint presentation on Shallow Groundwater Studies. The report was designed to provide a broad overview of the basin and to direct future research. It is noted that the

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data in the report were grouped in an arbitrary fashion and are most meaningful when forming a regional picture of the basin. The study identified 32 shallow ground water areas, grouped into 10 clusters. Usage of exempt wells and non-exempt wells outside AMA are estimated, as those users aren't required to report to ADWR. Well density and drilling trends for the 10 clusters were reviewed, comparing exempt and non-exempt wells. Santa Cruz pumping is reflected as dramatically higher than other shallow area pumping. Rillito-Tanque Verde, Cienega Creek Region, Tortolita Mountains areas reviewed in depth. Drilling, well density, pumping, and water levels were reviewed for each of the three areas. The report shows general and widespread decline in shallow groundwater areas and a lot of unknown factors surrounding the areas.

Note: Ms. Zucker notes slide 10 contains an error; the slide reflects all wells, not exempt wells only.

The study has resulted in increased regional awareness, additional studies and grants to further research. The results indicate a need for outreach to at risk areas owners as they aren't connected to utilities. Watershed Management Group is working on increasing outreach. Water accounting areas and ADWR enhanced aquifer management are discussed as methods of increasing awareness of the conditions of the basin in these areas. Discussion of the overlap of shallow areas and the Tucson Water service area was held.

The data in this report can be used to inform future decisions regarding drought planning that considers differences in local and regional conditions, restoration and tendencies for private pumpers to increase use in drought. Data could also be used to inform considerations of targeted conservation measures. Other future considerations are outreach to private well owners and small utilities, utilities extending water lines into shallow areas, and consideration of shallow areas and riparian impacts in water resource discussions.

Discussion held on the limits of the data presented and the inability to extrapolate site specific information, tools for motivating/incentivizing conservation in shallow areas, and methods for including these areas of concern in water discussions. Extensive discussion held regarding costs of mitigation and monitoring was discussed as a method for discouraging pumping and development in these areas.

Chuck Freitas departed at 12:45 and returned at 12:50

Audience member Mark Lewis was recognized by Chair Murphy and commented on the consideration of extending service out to shallow areas with emphasis on riparian areas.

- 6. Discharges to the Santa Cruz River** – Tucson Water staff member Wally Wilson presented a PowerPoint presentation regarding effluent discharges to the Santa Cruz. The Santa Cruz River has multiple areas of input, output and monitoring points. The following factors affect the water in the Santa Cruz: volume and location of WRF discharge, infiltration rate, current direct diversions and storm flow events. The status of input, output and monitoring on the Santa Cruz was reviewed from 2010, 2014, current data and future expectations. The flow length of the river is affected by infiltration, reclaimed demand, WRF discharges, potable demand and future IPR uses. The data presented reflect a steady decrease of WRF discharge to the river. Drastic decreases

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in discharges to the river are identified as changes in recharge policy, changes in water quality, additional recharge basins and most recently the shutdown of Randolph Park.

Extensive discussion was held regarding the minimum amount of water that needs to be discharged to the river to sustain the ecosystem, there is currently no agreed upon number. Additional discussion held on what water would be discharged to the river, and who would fund that water.

Audience member Mark Lewis was recognized by Chair Murphy and commented on the permits for recharge.

- 7. **Future Meetings/Agenda Items** – See projected agenda for further information.

Kelly Lee departed at 1:31 p.m.

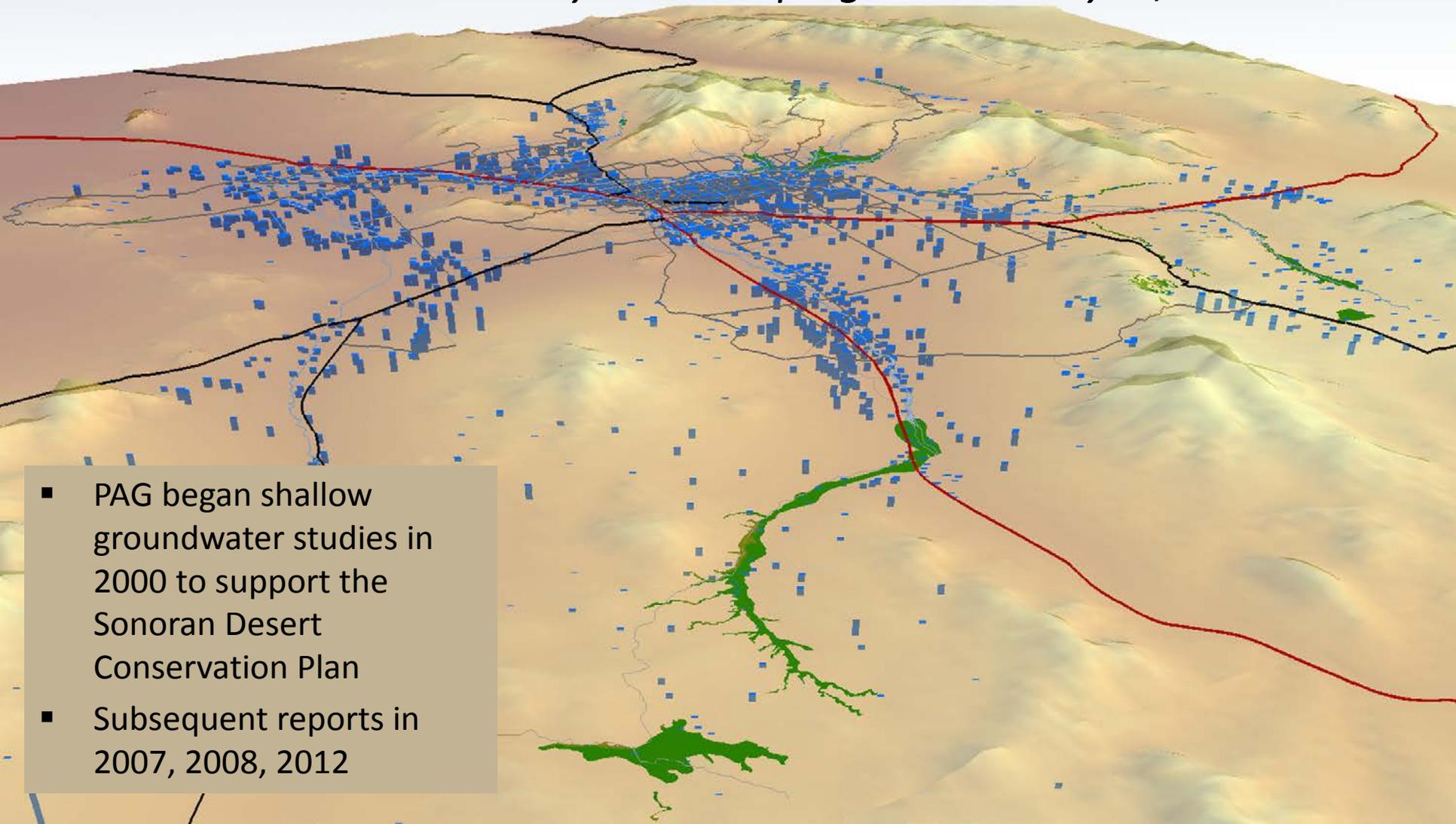
- 8. **Adjournment** – Meeting adjourned at 1:32 p.m.

Pima Association of Governments Sustainable Environment



Shallow Groundwater Areas in Eastern Pima County, Arizona

Water Well Inventory and Pumping Trend Analysis, 2012



- PAG began shallow groundwater studies in 2000 to support the Sonoran Desert Conservation Plan
- Subsequent reports in 2007, 2008, 2012

Shallow Groundwater Areas Identification

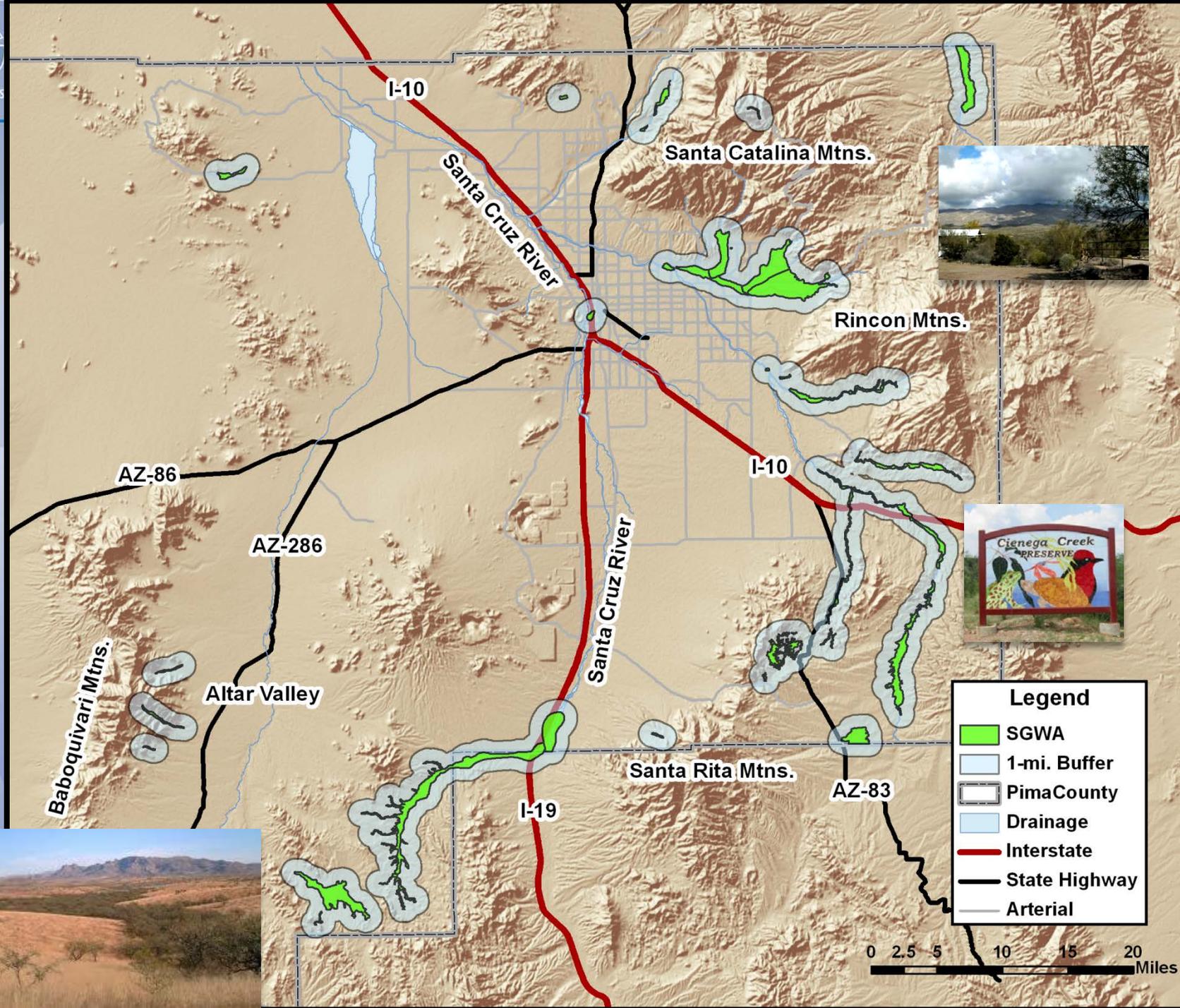


- ✓ Groundwater within 50 feet of surface
- ✓ Commonly supports numerous private wells
- ✓ May, or may not, have surface water
- ✓ Important for Arizona species
- ✓ Rare and precious in the Sonoran Desert

Identification based on...

- Well data review
- Field vegetation surveys
- Aerial imagery & topographic maps

32 Shallow Groundwater Areas



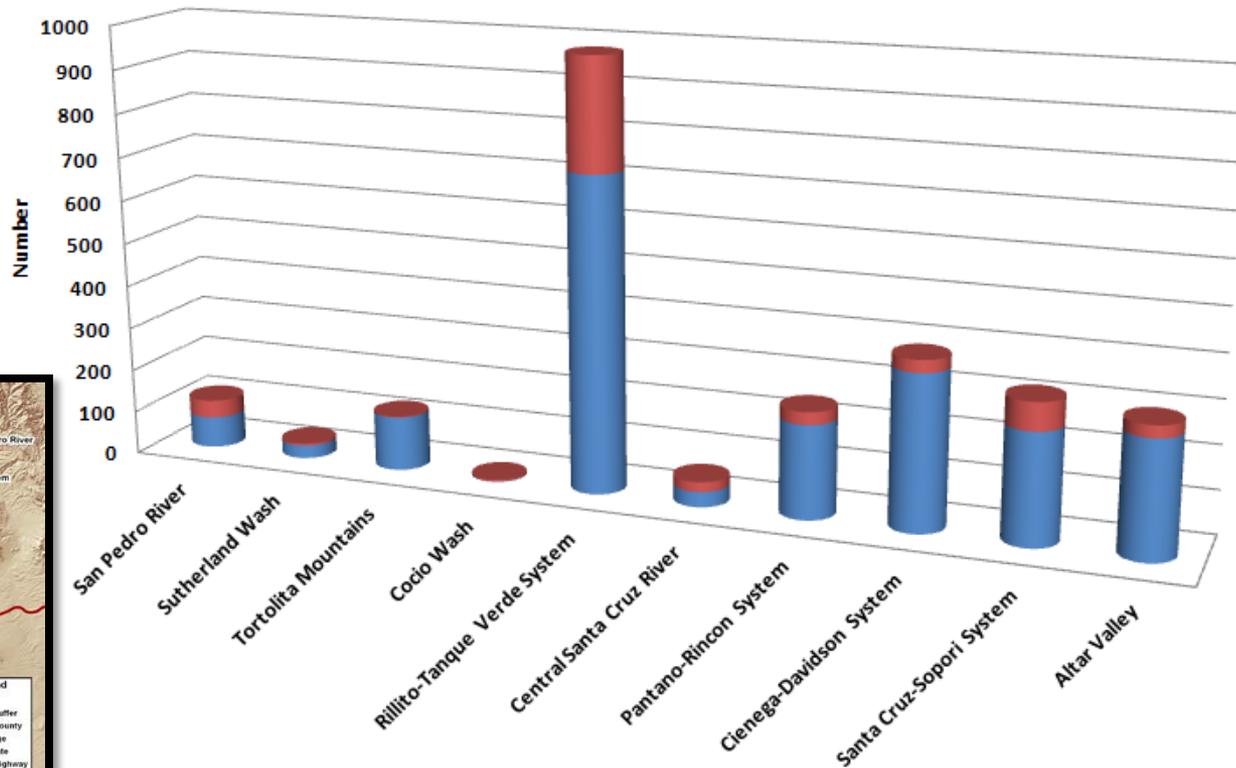
Legend

- SGWA
- 1-mi. Buffer
- Pima County
- Drainage
- Interstate
- State Highway
- Arterial

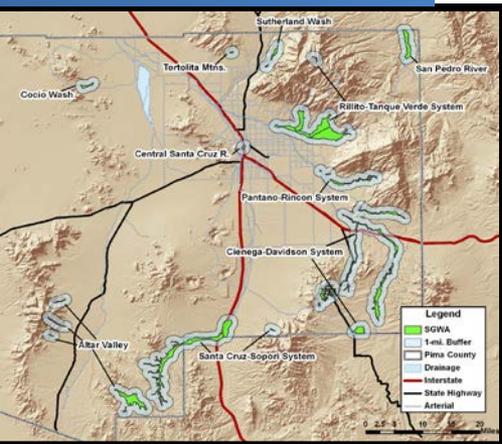


Exempt/Non Exempt Comparison

Numbers of Exempt and Non-exempt Wells by Region (2012)

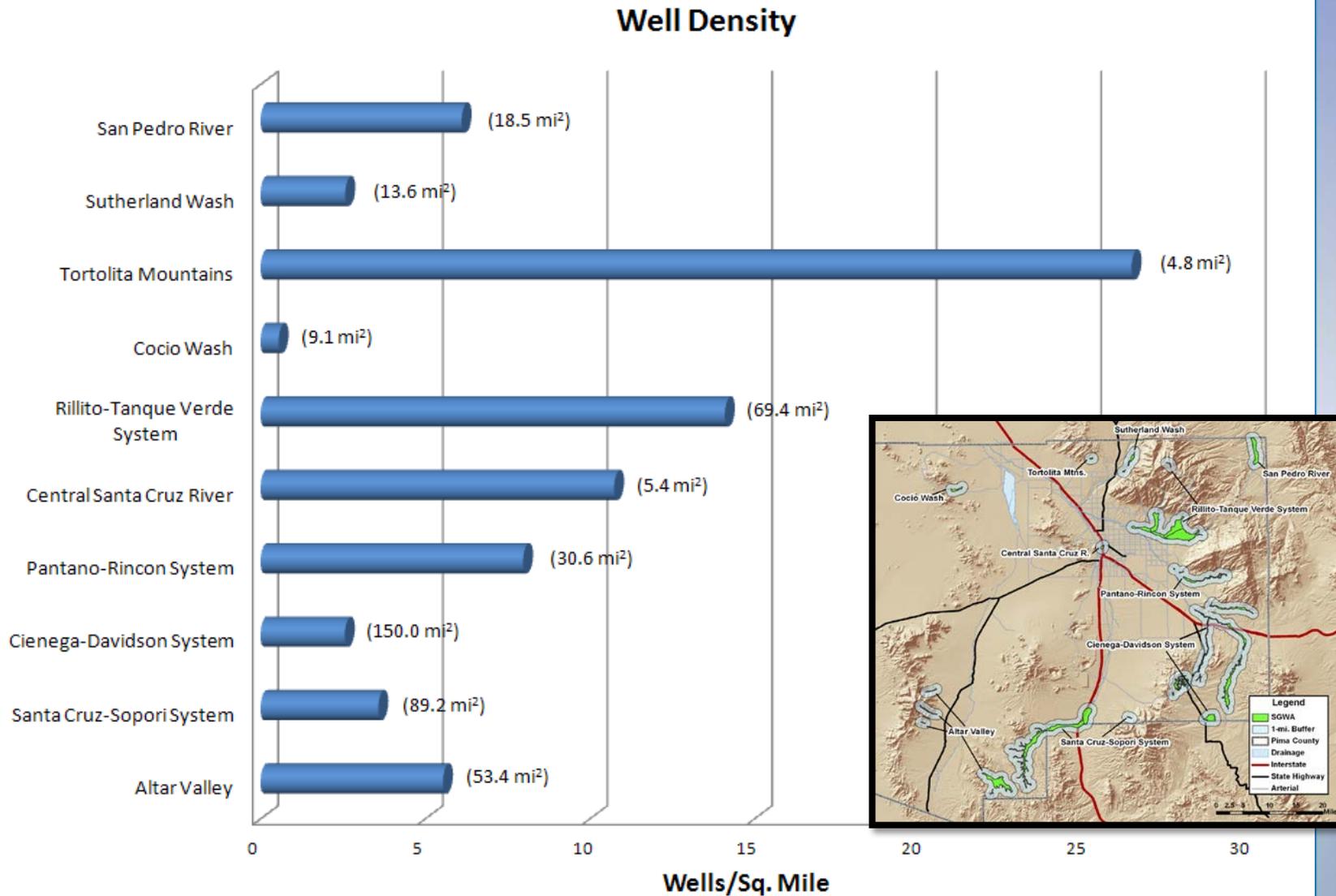


Generally, More Exempt Wells than Non-Exempt

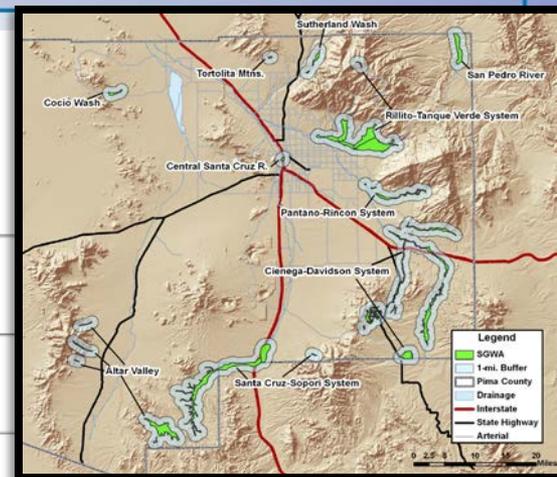
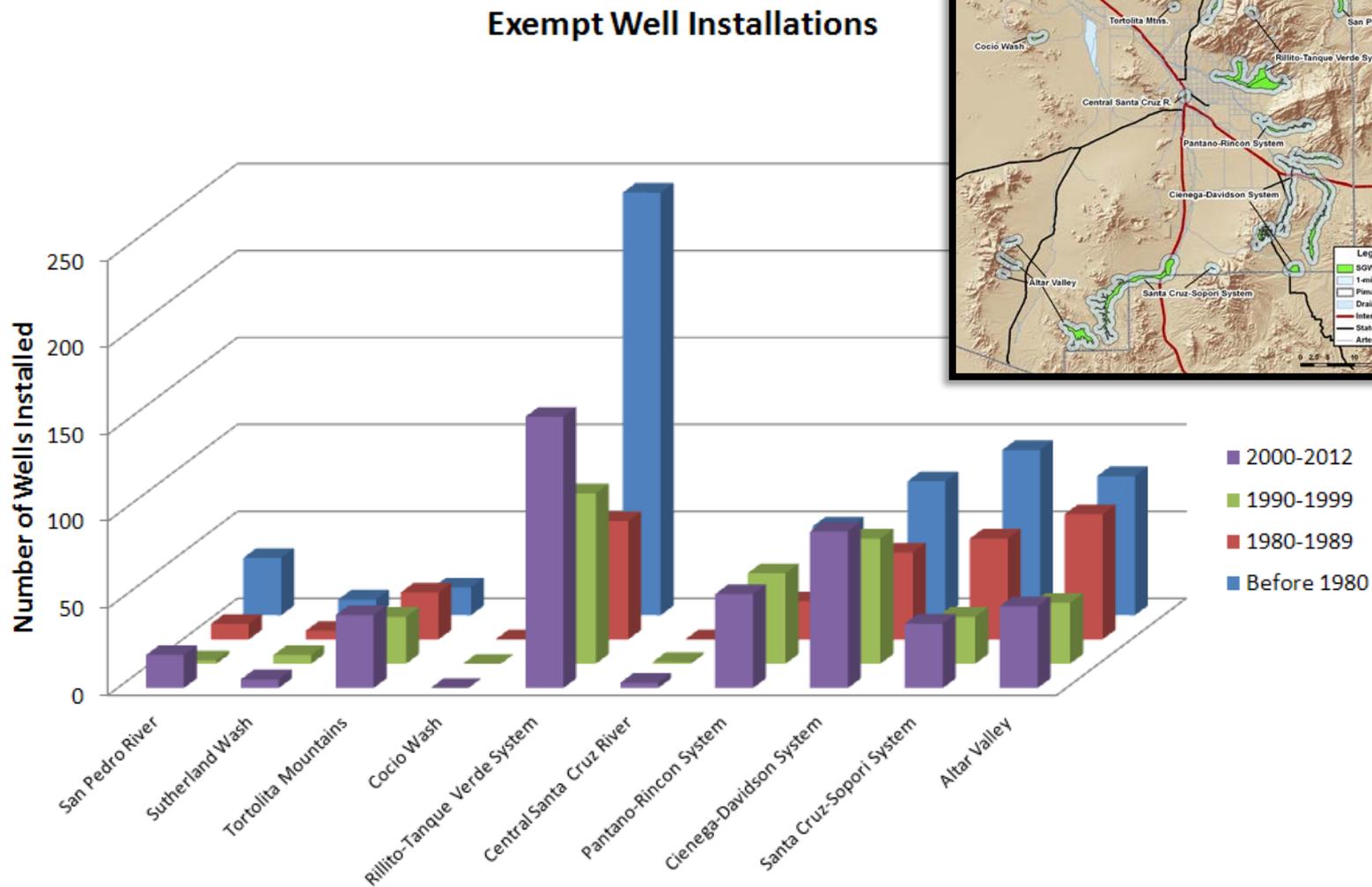


Region	San Pedro River	Sutherland Wash	Tortolita Mountains	Cocio Wash	Rillito-Tanque Verde System	Central Santa Cruz River	Pantano-Rincon System	Cienega-Davidson System	Santa Cruz-Sopori System	Altar Valley
# Non-exempt Wells	41	5	2	4	257	23	29	29	64	28
# Exempt Wells	72	30	125	1	722	35	215	355	255	268

Well Density

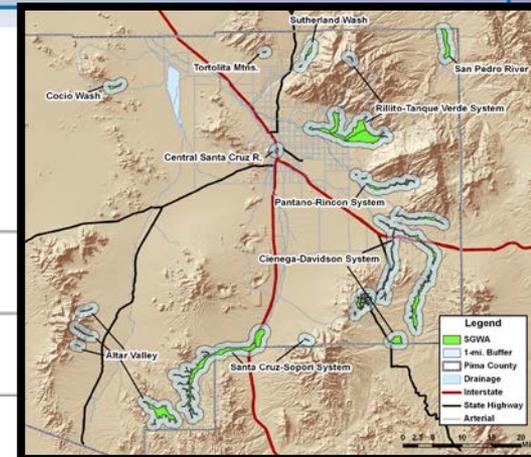
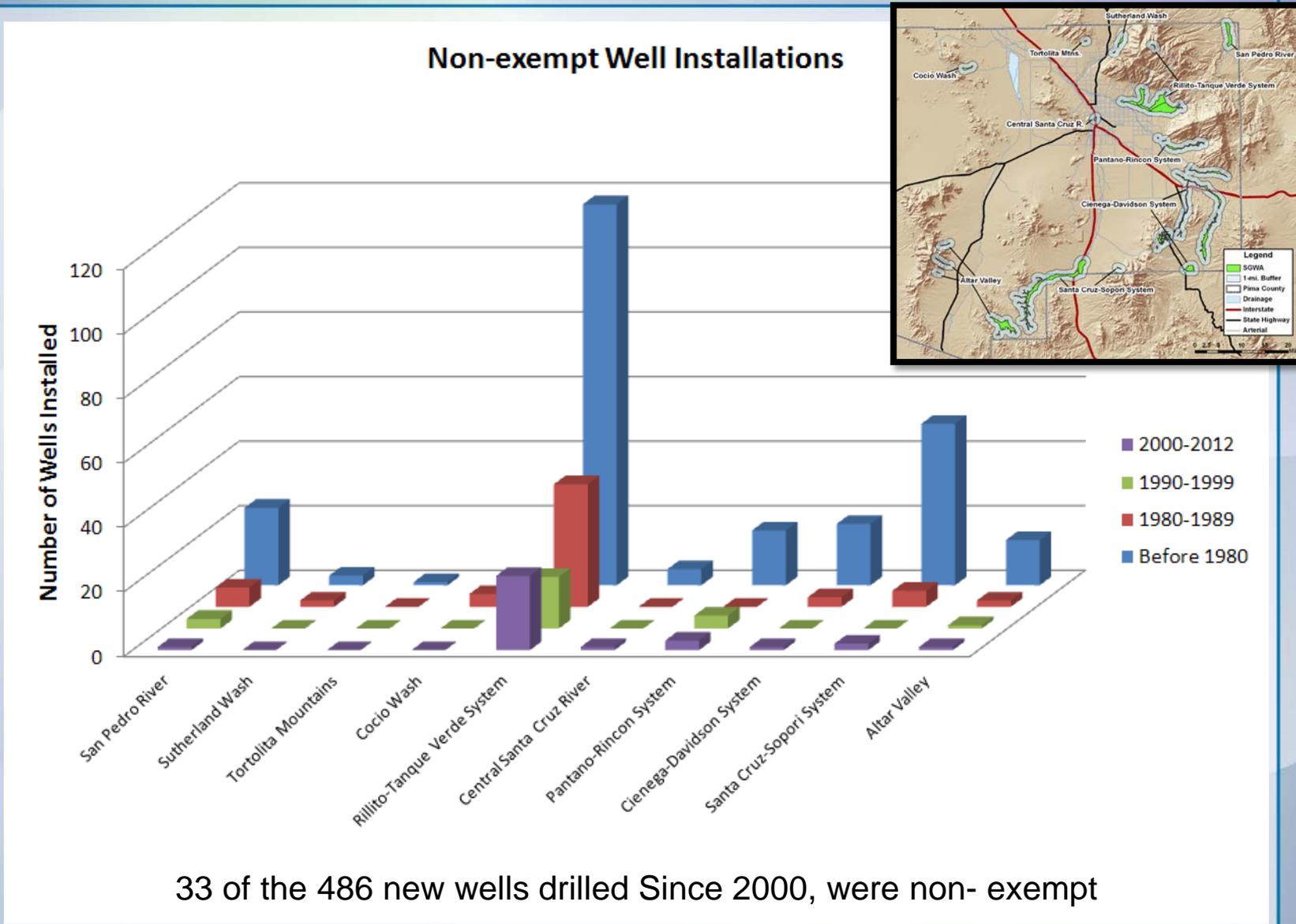


Drilling Trends - Exempt Wells



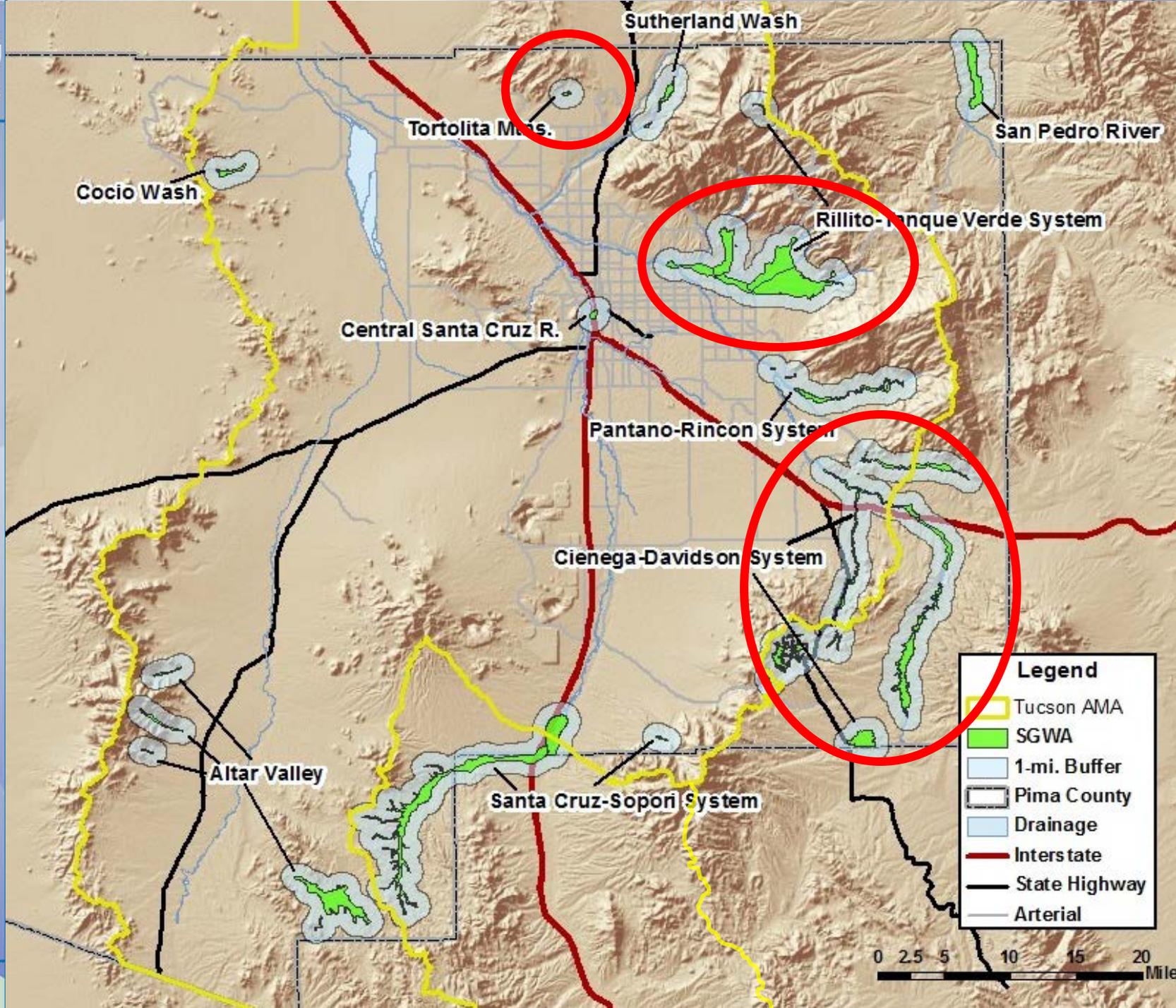
453 of the 486 new wells drilled Since 2000, were exempt

Drilling Trends – Non-exempt Wells



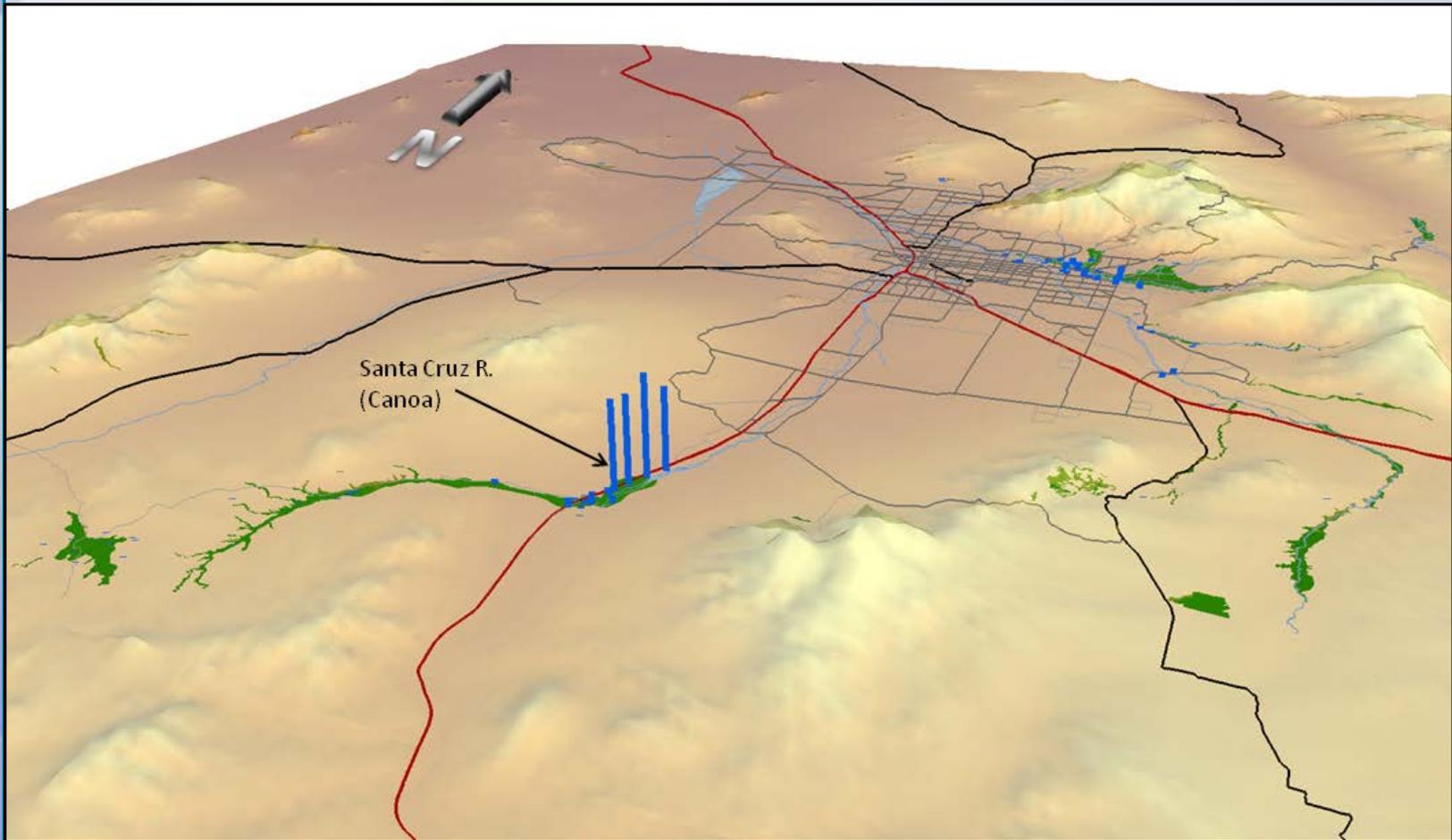
Ten
Regions
with
One-mile
Buffers

Water
levels
and
pumping
trends



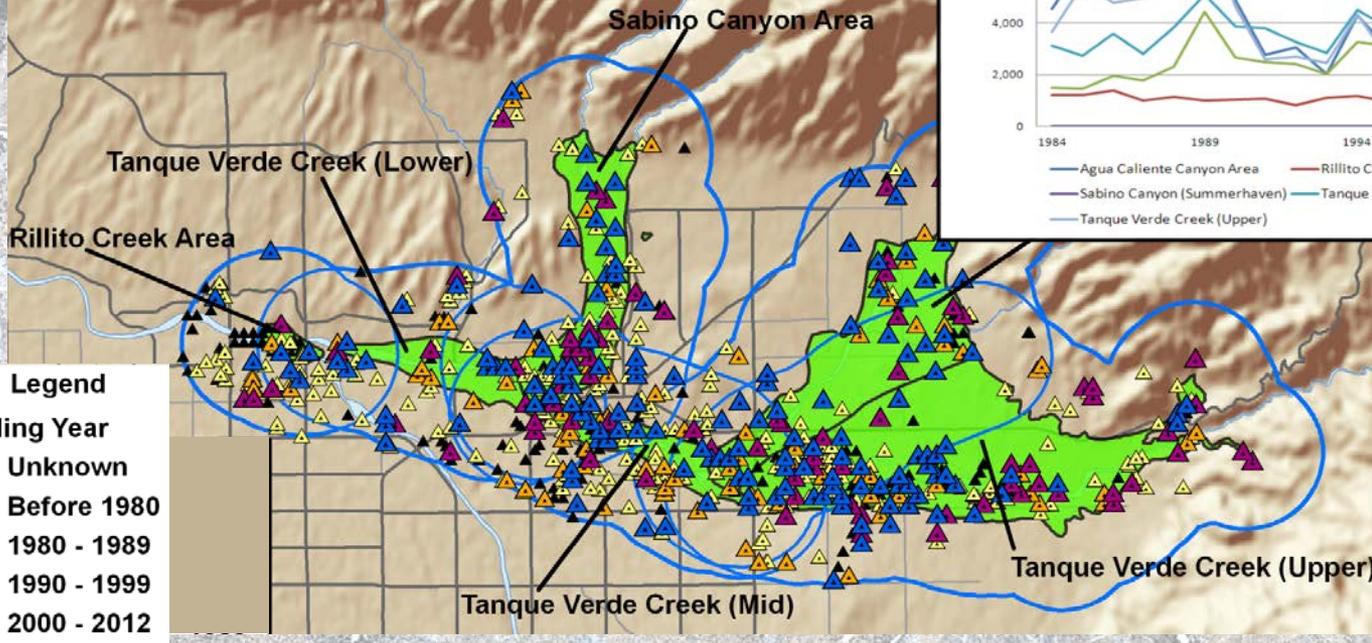
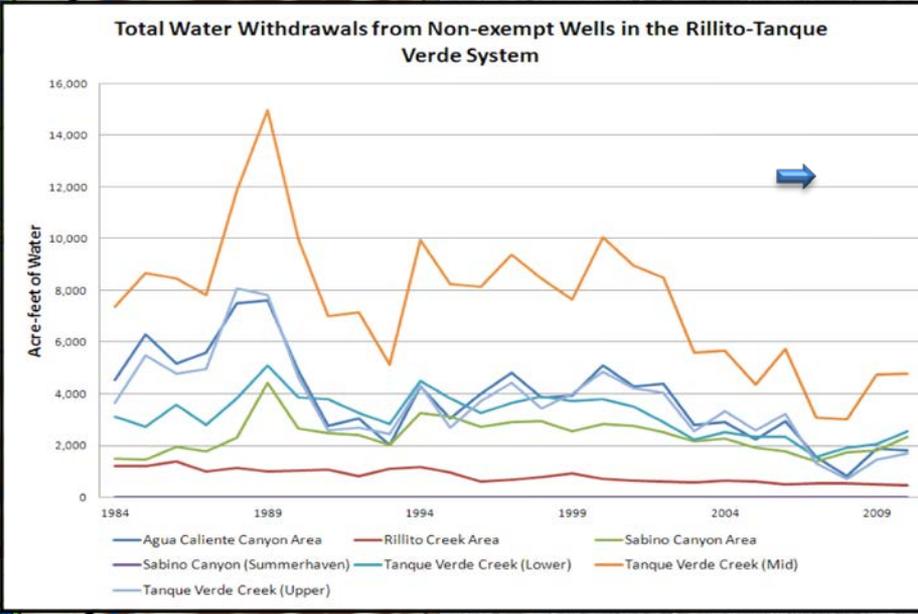
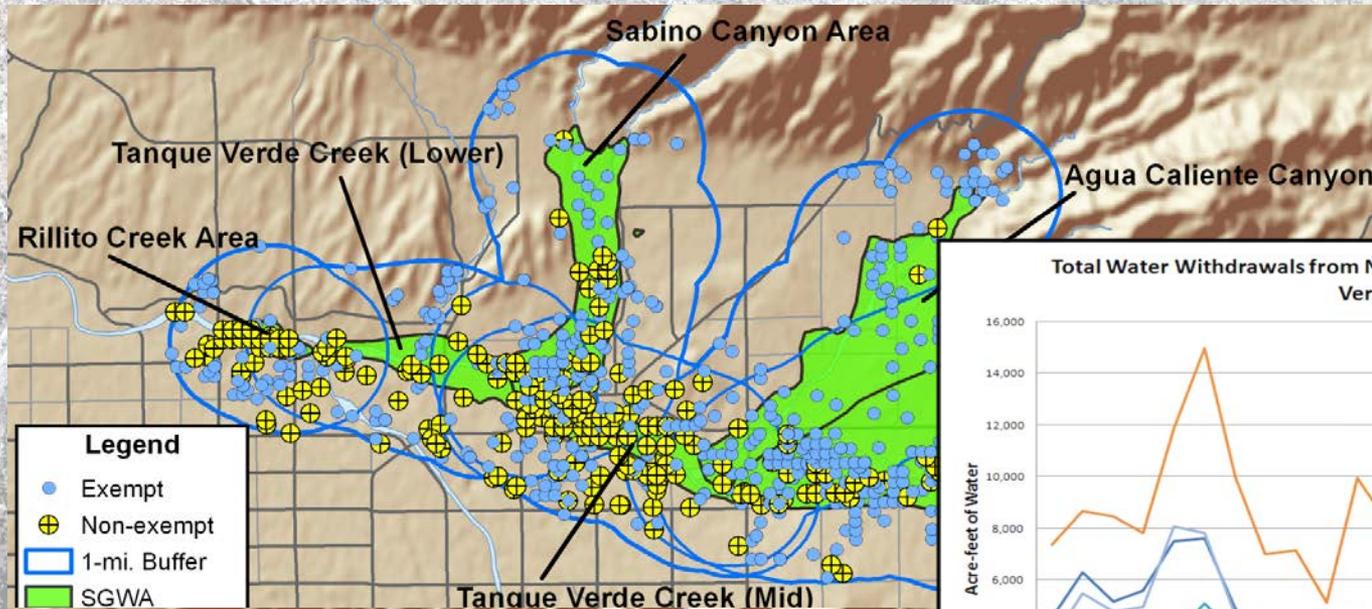
Water Production

Annual Water Withdrawals by Well (2010)

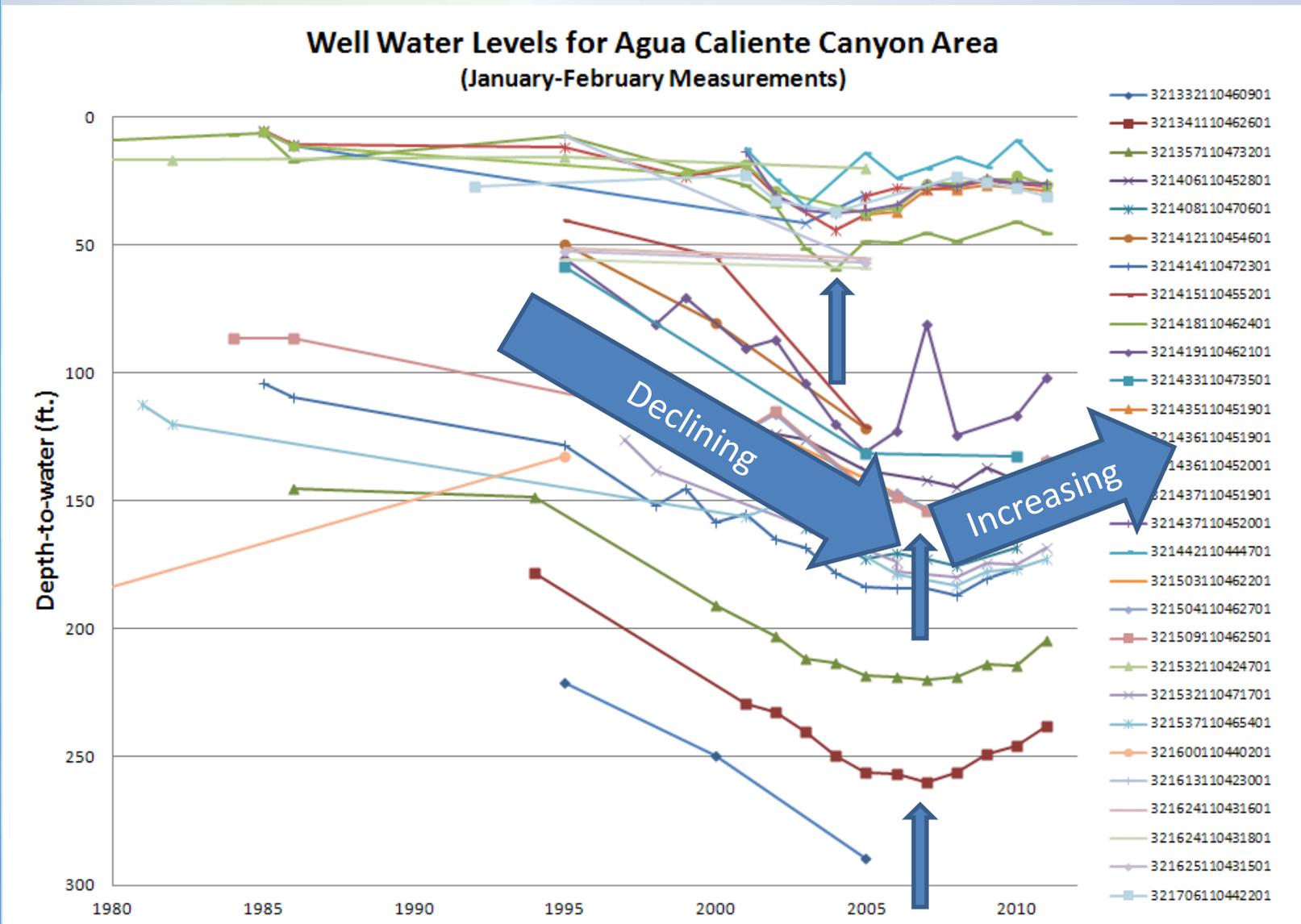


Water withdrawals based on exempt reporting wells only

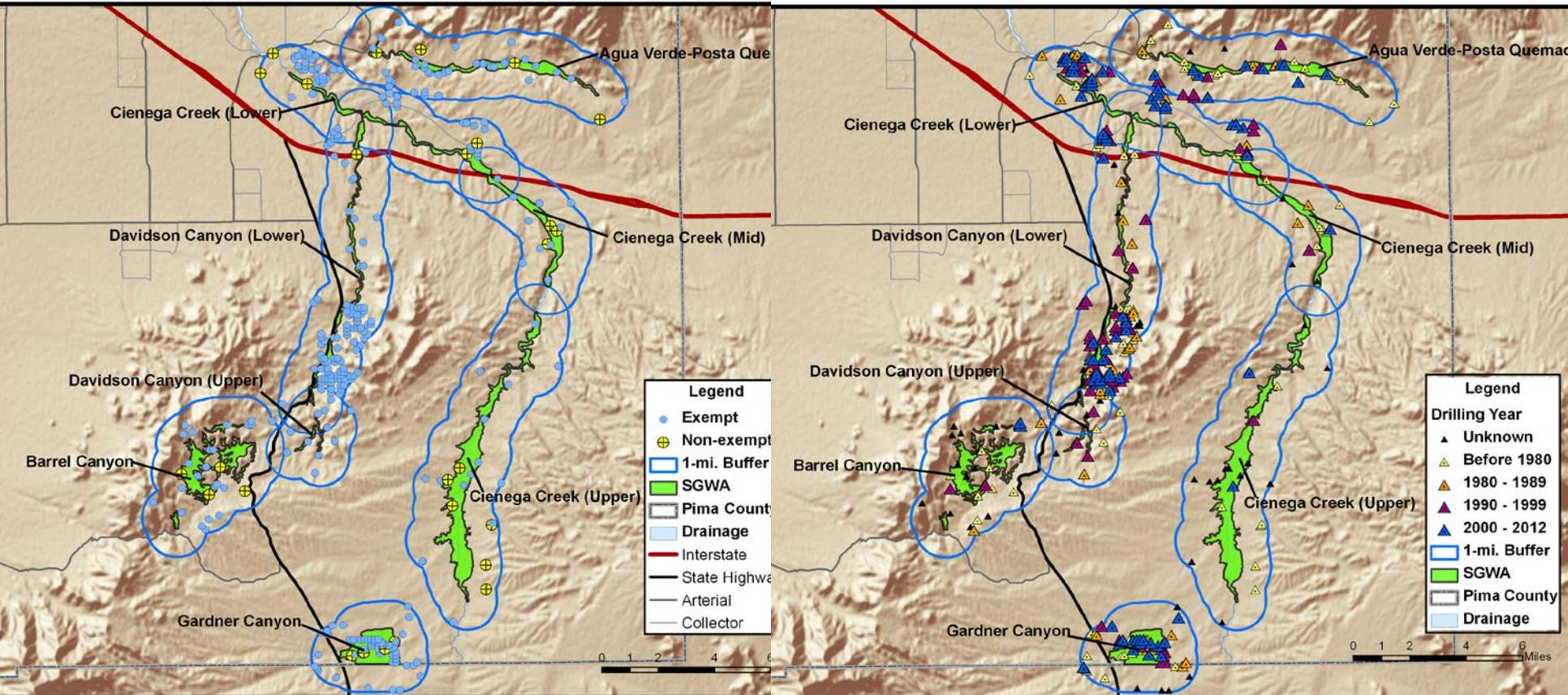
Rillito-Tanque Verde Region



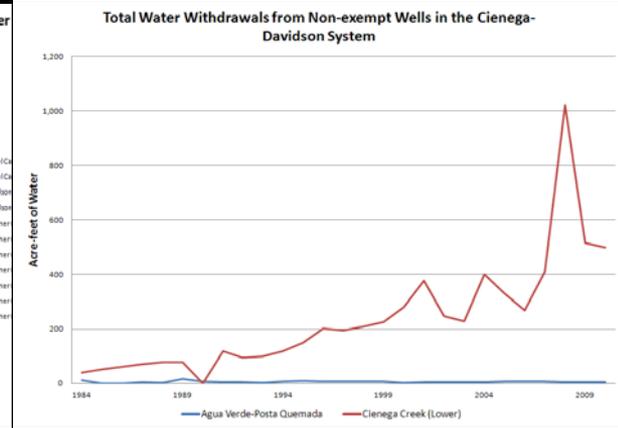
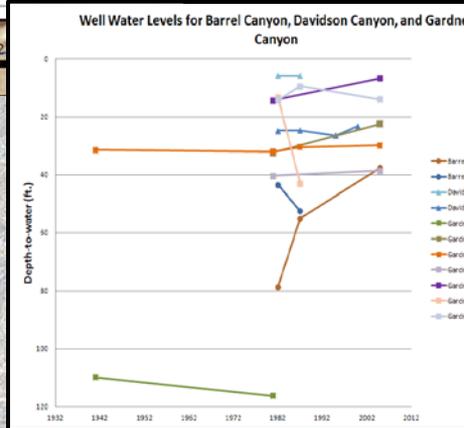
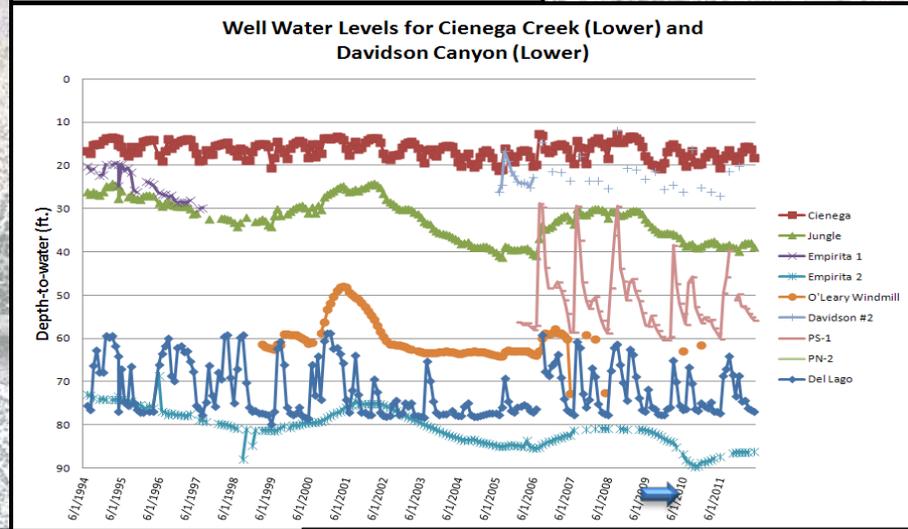
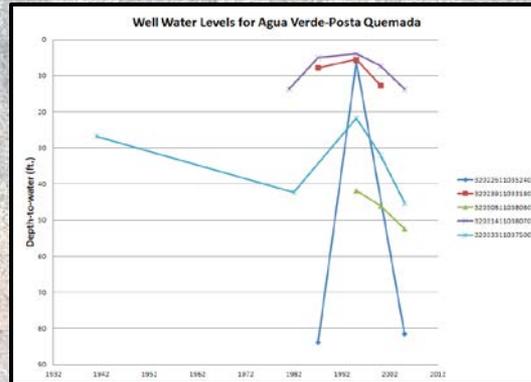
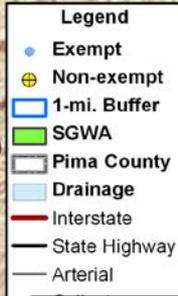
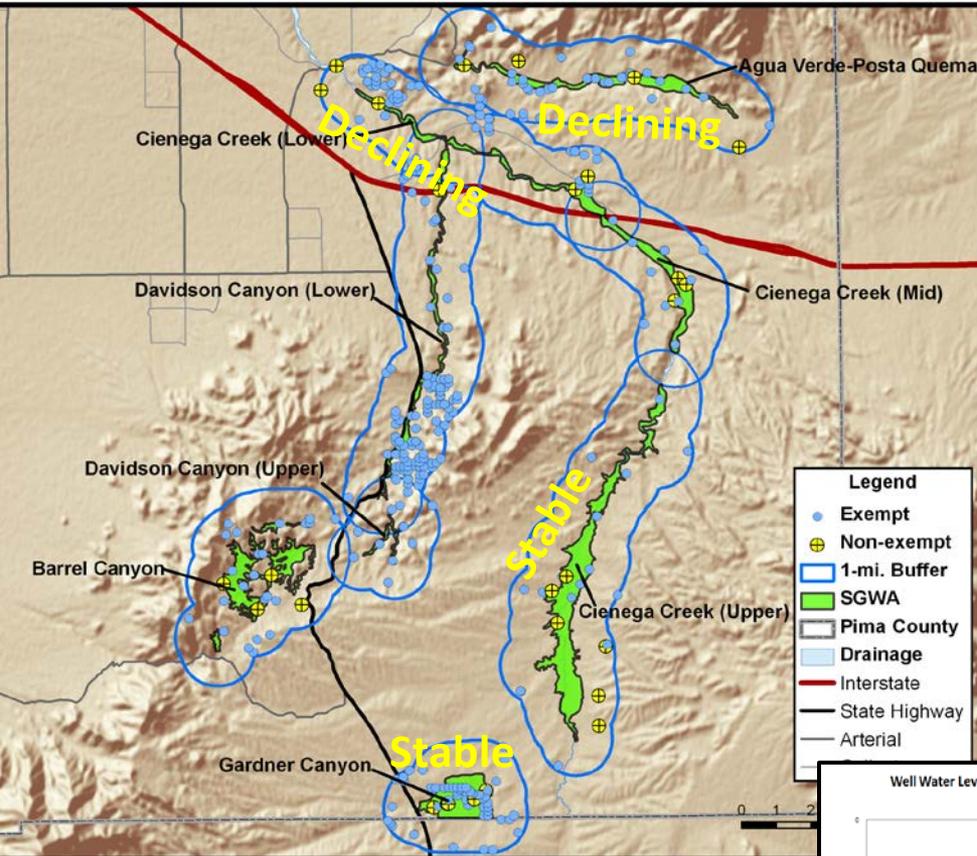
Depth-to-water Trends in Rillito-Tanque Verde System



Cienega Creek Region

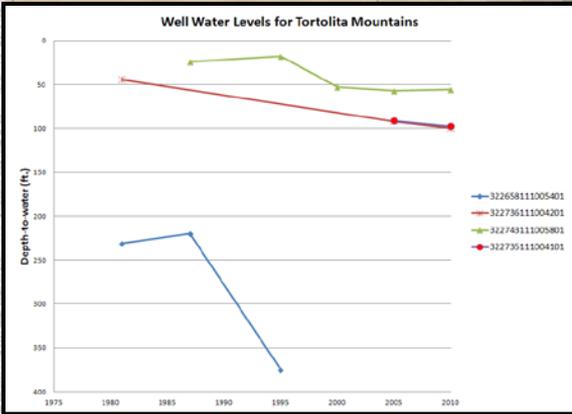
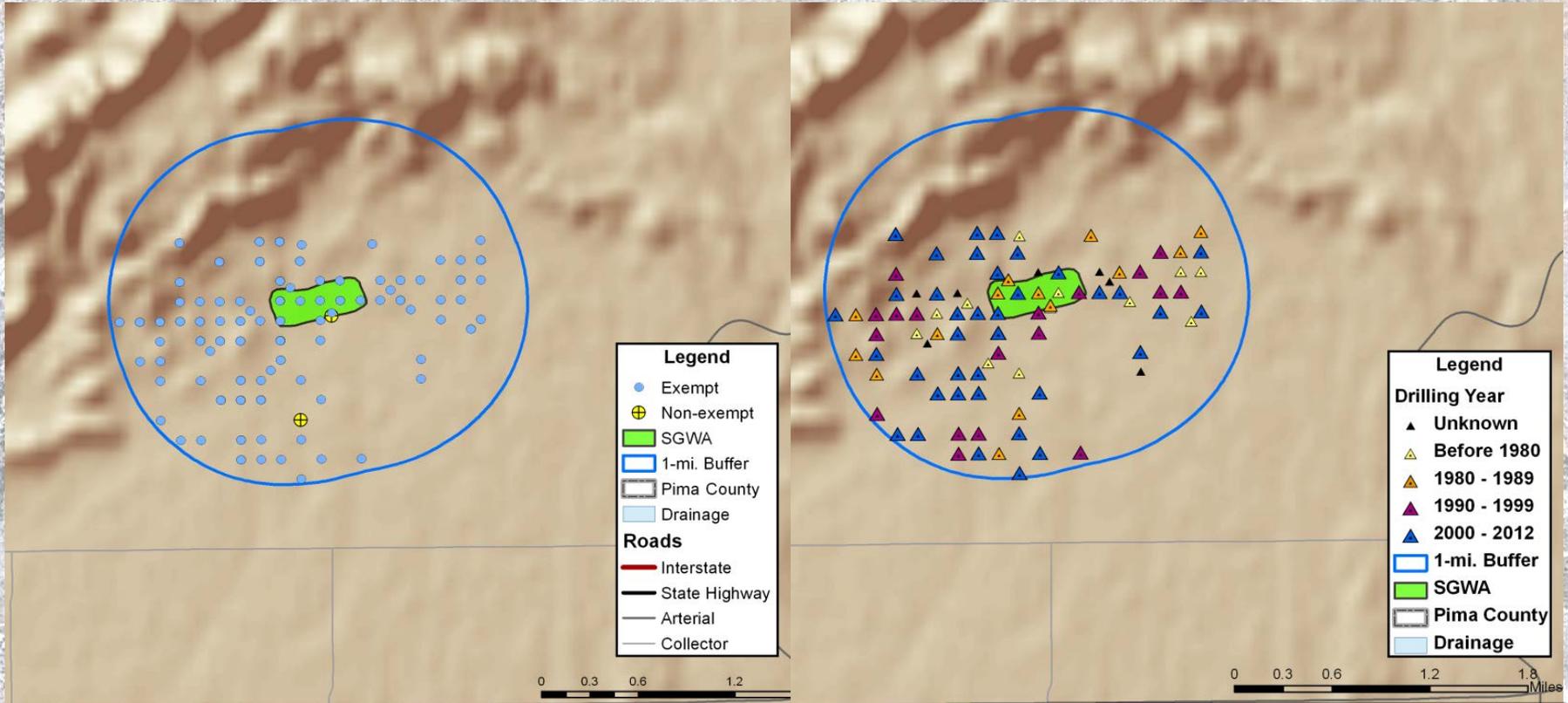


Cienega Creek Region

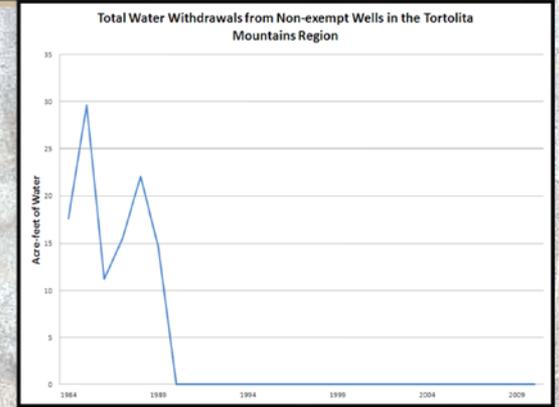


Low-moderate well density
Low-moderate drilling activity
 ⚙️ **Low water withdrawals**
 ⚙️ **Stable, declining, inconclusive**

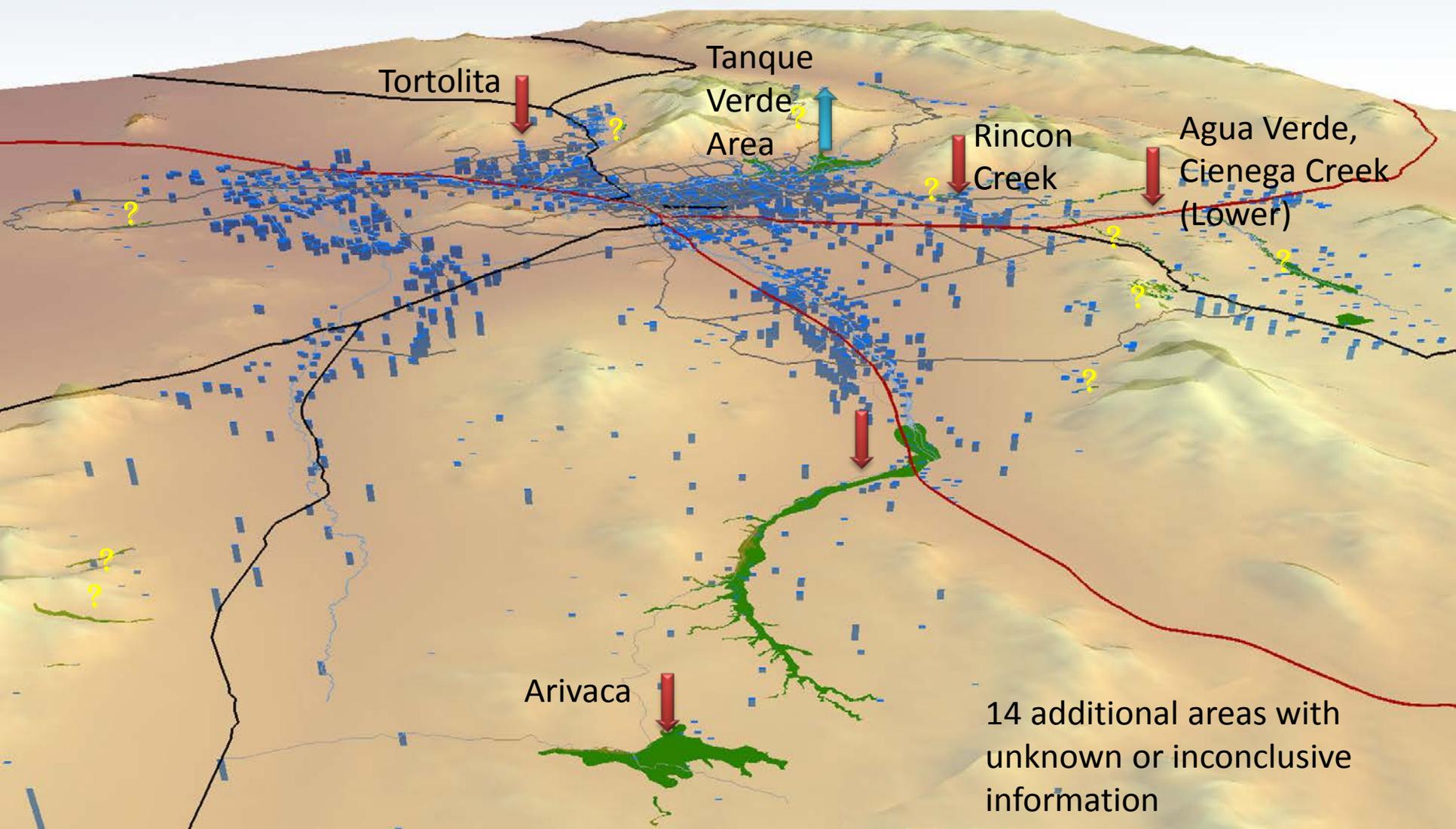
Tortolita Mountains Region



- ⚙️ ⚙️ **Very high well density**
- ⚙️ **Moderate drilling activity**
- ⚙️ **Moderate water withdrawals**
- ⚙️ ⚙️ **Declining water levels**

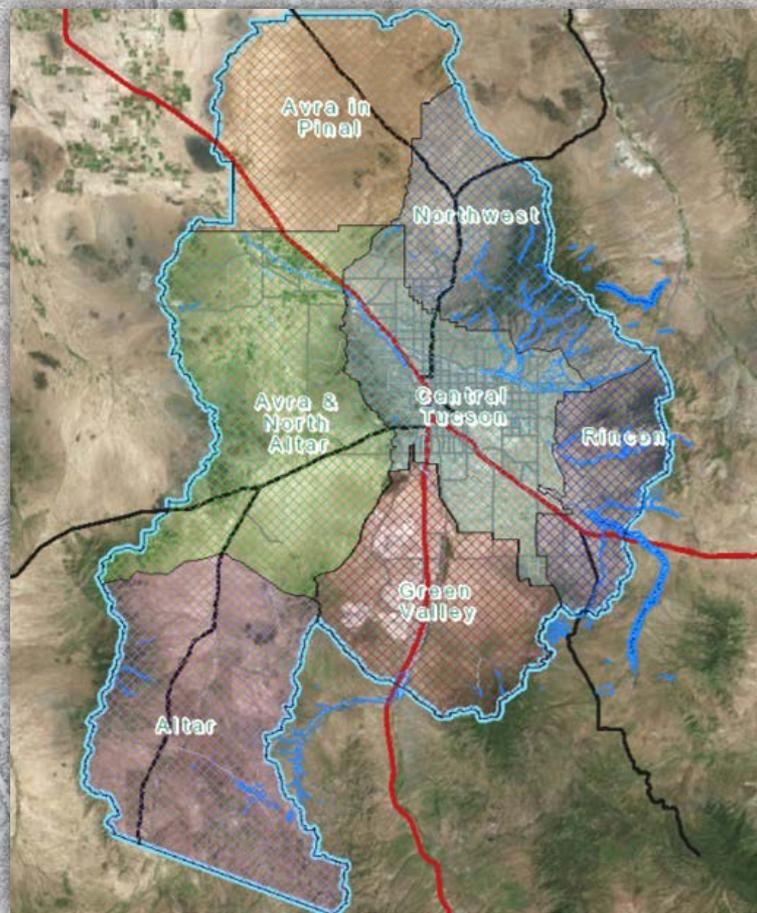


Declining Shallow Groundwater Areas



What Happened Next?

- **Region-wide Awareness**
 - **Common knowledge**
 - **Mayors 2 year plan**
 - **Safe Yield Task Force accounting areas**
 - **Cienega Watershed Partnership Outreach**
 - **Part of the climate change/drought discussion**
 - **private well owners messaging**
- **Studies and Grants**
 - **Community Water Coalition, Outreach Grant (WILD Western Institute for Leadership Development)**
 - **Watershed Management Group, American Rivers, Sabino Cyn**



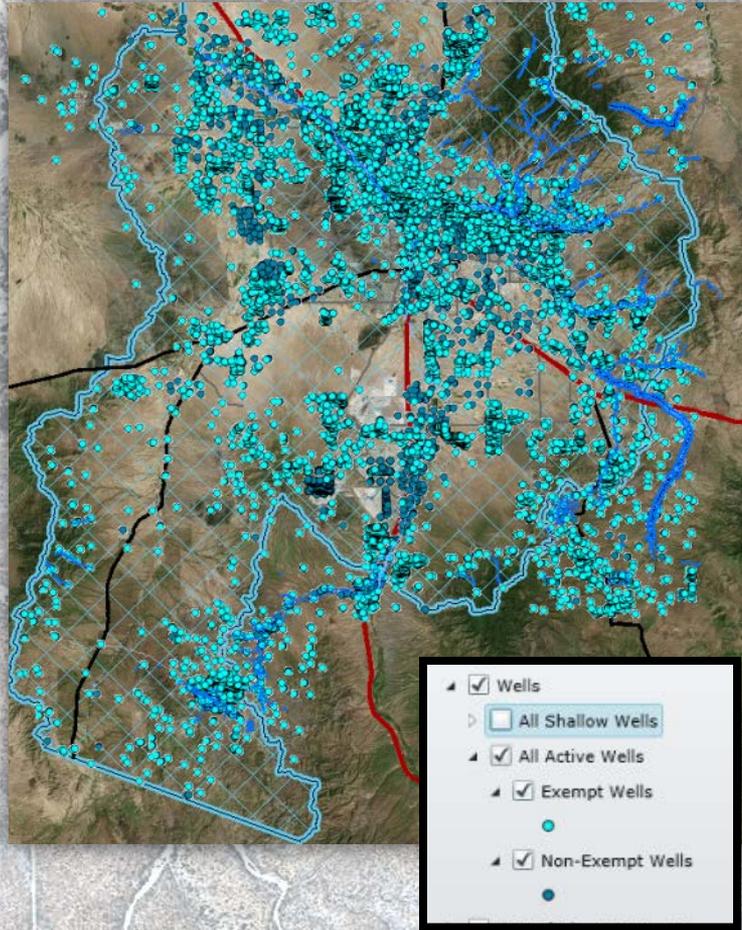
Water Accounting Areas

- In response to ADWR enhanced aquifer management discussions
- SGWAs were a key driver
- ADWR is taking the next step
- data will be available for each accounting area.

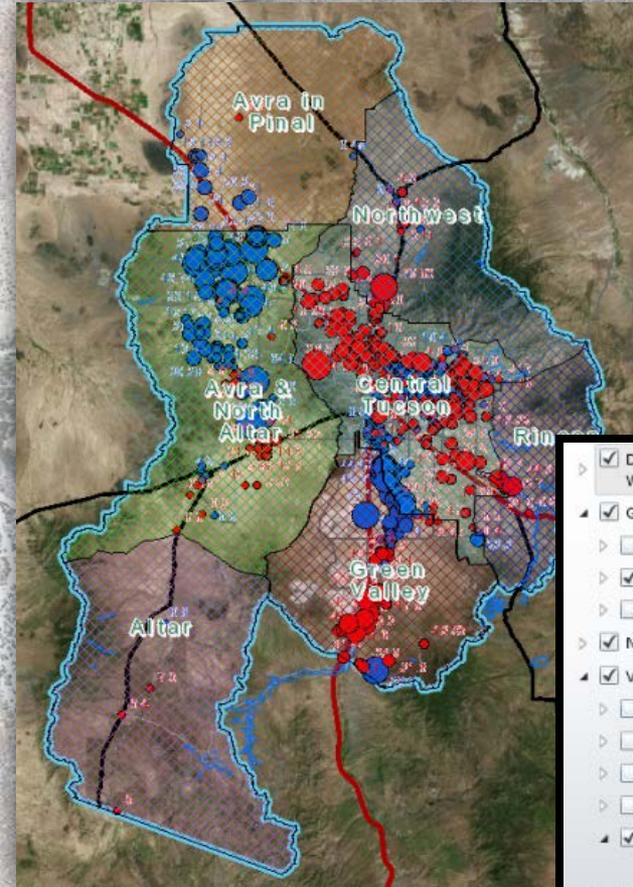
PAG's Interactive Maps

View the Association of Governments' interactive maps containing Geographic Information Systems (GIS) data for the Tucson metropolitan area.

- Air Quality Monitor Sites and Maintenance and Nonattainment Areas
- Census 2010/CDPs
- EV Charging Stations
- Green Infrastructure Planning Tool
- Orthophotos
- PAG School Search
- Transportation Analysis Zones
- Traffic Counts
- Understanding Water

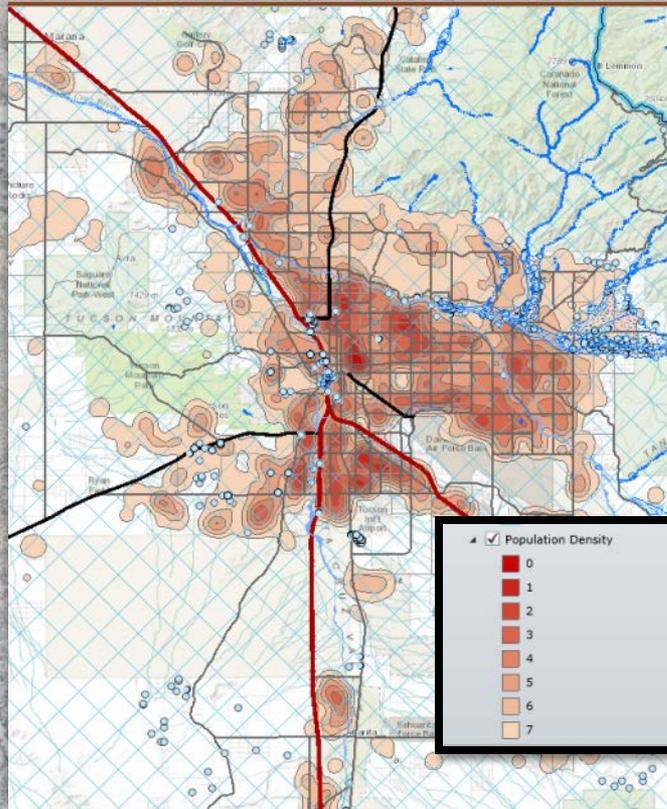


Wells: exempt/non-exempt

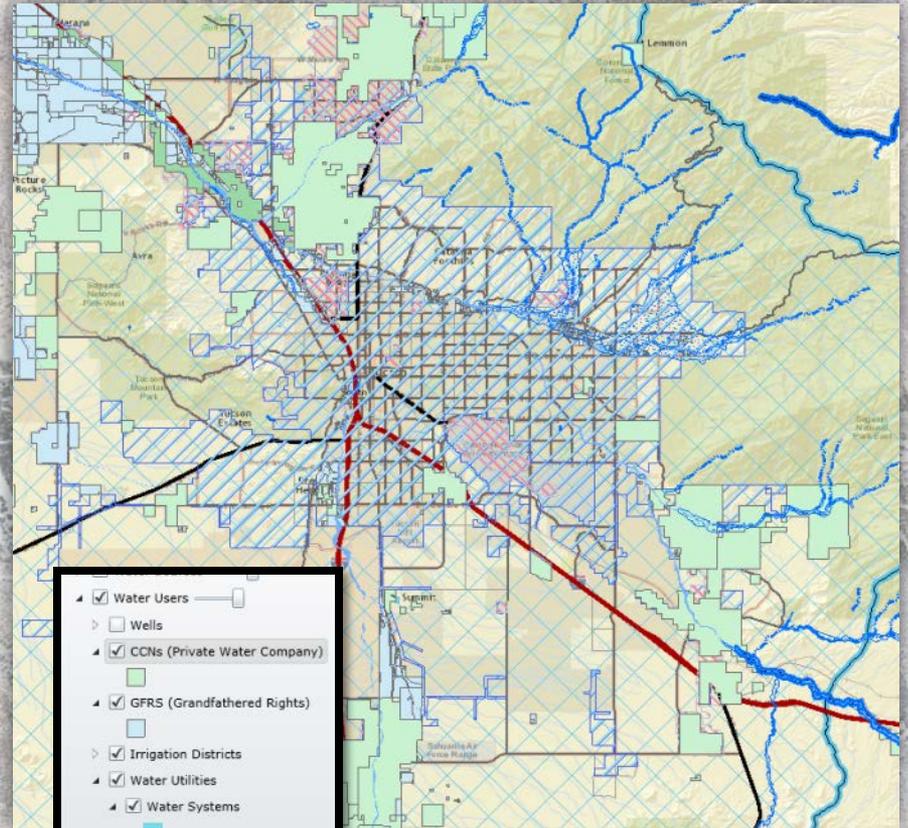


Water level Change

Part of a PAG web-based Planning Tool

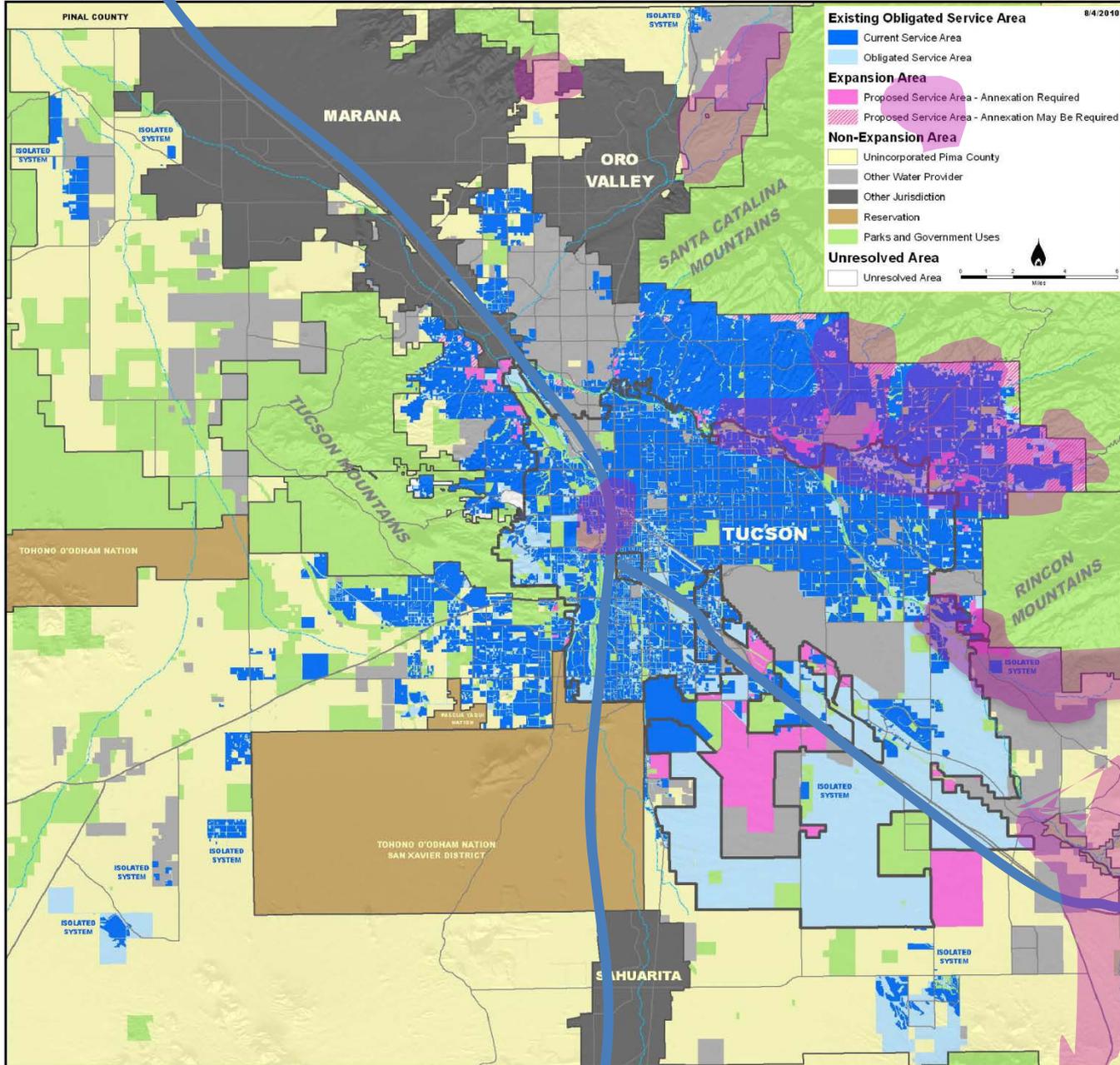


Population



Forest Service, Private water providers, grandfathered rights

Tucson Water Service Area





Changing
Conditions
Hotter
Drier
More of us



Drought Planning

- Consider different responses, ie local conditions vs CAP supply
- Be aware that private well pumping will likely increase with local drought and heat
- Consider restoration possibilities in shallow aquifer (head water) areas



Conservation Planning

- Target outreach to address high water users in foothills areas
- Extend outreach to private well owners and neighboring utilities
- Support a regional private well owner outreach effort
- Promote rainwater harvesting in private well owner areas

Utility Planning

- Consider extending water lines into shallow groundwater areas
- Include sgwas in statewide and regional water resource discussions
- Avoid bad publicity for private well and riparian impacts

Questions?

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(520) 792-1093

Shallow Groundwater Areas in Eastern Pima County, Arizona

WATER WELL INVENTORY AND PUMPING TREND ANALYSIS



October 2012

EXECUTIVE SUMMARY

This report is the fifth in a series of documents produced by Pima Association of Governments (PAG) since 2000 that presents water well information for shallow groundwater areas of eastern Pima County. This project was conducted with input by the Pima County Regional Flood Control District and the Pima County Office of Sustainability and Conservation, and is an outgrowth of an investigation originally conducted for the Sonoran Desert Conservation Plan.

A shallow groundwater area is defined as a site where groundwater is within 50 ft. of the land surface. In eastern Pima County, these areas not only provide water to vegetation and sensitive wildlife habitat, but also provide water to numerous private and public well owners. Competition for limited groundwater in these areas will likely intensify with drought and climate change in the coming years.

A total of 32 shallow groundwater areas, grouped into 10 regions, were included in the project. Three large shallow groundwater regions ring the eastern side of the Tucson basin and two extensive systems are located in the area southwest of Green Valley, Arizona, along the Pima/Santa Cruz county line. In addition, several smaller shallow groundwater areas are identified, many of which not only support a significant number of wells, but also support, valued riparian habitat. Surface flows through these regions recharge into the eastern part of the Tucson basin, the upper Santa Cruz River and the Altar Valley aquifers. Because shallow groundwater areas are generally located along mountain fronts and upland drainages, the habitat they support is critical to the large scale wildlife corridor system within the region.

State and local well data were used to inventory wells, determine well densities and drilling trends, and to evaluate water withdrawals and groundwater levels. The

primary sources of well data were the State of Arizona's Well Registry and the Groundwater Site Inventory, both of which were last updated in April 2012 and are maintained by the Arizona Department of Water Resources (ADWR). PAG's groundwater monitoring data from the Cienega Creek and Davidson Canyon areas, dated May 2012, also were utilized. Since state databases have limited quality control,

this evaluation is most appropriate for use in developing a broad understanding of water trends rather than for site specific studies.

This investigation provides information that is useful to land managers, planners, water providers, private water well owners and ecologists. The report includes maps of each shallow groundwater area and tables listing exempt and non-exempt wells and number of wells per square mile for each area. In addition to the drilling history, water withdrawal information and water level data are provided and graphed when possible. Hydrographs presented in the report show all of the wells within each shallow groundwater area and its one-mile buffer area. This report provides a compilation of data, but it is beyond the scope of this project to describe the implications of variables such as the

well's geographical location, well type or the nearby pumping history.

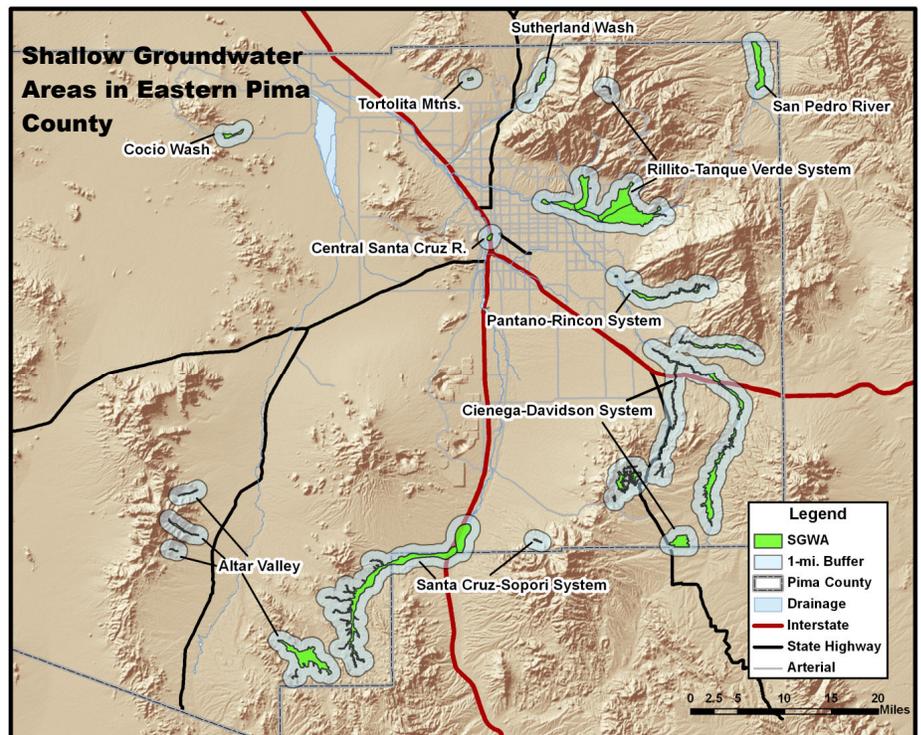
FINDINGS

As of 2012, a total of 2,560 wells were located within or near shallow groundwater areas, with 81 percent of those being exempt. Exempt wells are typically residential or used for watering stock or noncommercial irrigation and they must pump less than 35 gallons per minute. For this study, we assumed exempt wells produced 1 Acre Feet (AF) per year. Total withdrawals within the shallow groundwater area plus buffer zones, were estimated to be 27,821 acre feet (AF) in 2010.

Well drilling continues to be active in shallow groundwater areas in eastern Pima County, with 486 wells being drilled since 2000. Only 33 of these new wells were non-exempt, meaning that the vast majority of new wells are being installed by individuals. Drilling is most active in the Rillito-Tanque Verde, the Cienega-Davidson and the Pantano-Rincon regions. However, the Tortolita Region showed the most wells drilled per square mile within the area.

Repeat water level measurements are the best means of monitoring shallow groundwater aquifers, yet 14 of the 32 areas studied have no repeat measurements, and there is very little consistent monitoring occurring anywhere in the region. PAG's Cienega Creek data is the exception with a record of quarterly or monthly measurements for over 20 years.

Together, the Santa Cruz-Sopori System and



the Rillito-Tanque Verde System represent 92.3 percent of withdrawals from shallow groundwater areas. However, many of the other basins have significant water withdrawals, especially given the size of the basins. Even small groundwater withdrawals can adversely affect riparian vegetation depending on the aquifer storage, geometry of the basin and relative locations of wells and habitat.

Groundwater declines were found in five of the 10 regions including shallow groundwater areas in the Pantano-Rincon, Cienega Davidson, Santa Cruz Sopori, Altar Valley and Tortolita Mountains areas. Two additional regions, the Rillito-Tanque Verde System and the Central Santa Cruz River, showed several decades of decline, but more recently exhibited water level increases. At present, water levels appear to be stable in San Pedro River (Bingham Cienega), Cienega Creek (Upper) and Gardner Canyon.

RECOMMENDATIONS

This report provides baseline groundwater and well information within shallow groundwater areas in eastern Pima County. As our region grows, the need to understand and manage water withdrawals from these sensitive groundwater areas will gain importance. Evaluations, such as the one presented in this report, are helpful to land managers, water providers, municipal and private well owners as we work to maintain a balance between ecological and human water use.

Data limitations are always a concern with this type of analysis, and every effort was made to describe these limitations or to limit the analysis so that conclusions were appropriate. The following supplemental investigations would advance our understanding of the basins, improving our ability to protect water resources and habitat.

Hydrologic Investigations

Further hydrologic investigations, including monitoring, are recommended for areas that exhibit long-term changes in water levels. Groundwater declines were found in five of the 10 regions included in this study: the Tortolita Mountains, the Pantano-Rincon System, the Cienega-Davidson System, the Santa Cruz-Sopori System and Altar Valley. Two additional regions, the Rillito-Tanque Verde System and the Central Santa Cruz River, showed several decades of decline, but more recently exhibited water level increases.

Habitat Assessments

Habitat value assessments are recommended for all the areas, but especially for the eight regions where water level trends were either inconclusive or unknown. Habitat assessments could be conducted using aerial imagery and LIDAR data, to evaluate vegetation composition, structure and canopy. Field work would be critical to verify

the remote sensing data and to assess vegetation health.

Private Well Owner Engagement

Engagement and education of private exempt well owners is recommended. Many of these well owners are likely unaware about the interaction between the aquifer and the viability of habitat on their property or nearby washes and riparian areas. They also may be unaware of local drought severity since drought alert systems are constructed to cover broad geographic areas and in some cases are triggered by large municipal supply levels such as CAP.

Exempt Well Pumping Study

Better data on exempt well pumping are needed in order to understand the water balance within shallow groundwater areas. This is particularly important for areas with declining water levels. Currently, the Arizona Department of Water Resources estimates that exempt wells are pumped at a rate of 1 AF/year, yet they are legally allowed to pump significantly more.

State Reporting Requirements

Changing state policy so that all well owners, including non-exempt well owners outside the AMAs, report pumping would greatly help our understanding of these basins. In particular, both the San Pedro River region and the Cienega-Davidson System, have non-exempt wells located just outside the AMA boundary.

Surface Flow Evaluations

A more rigorous appraisal of surface flows and precipitation is needed to determine year-round surface water availability to the riparian vegetation within shallow groundwater areas.

water level data for those wells tapping the shallowest parts of the aquifers showed variability that is indicative of surface water influence.

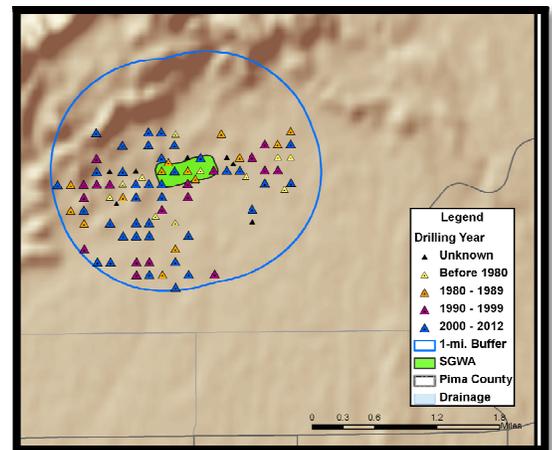


Additional Data and Statistical Analyses

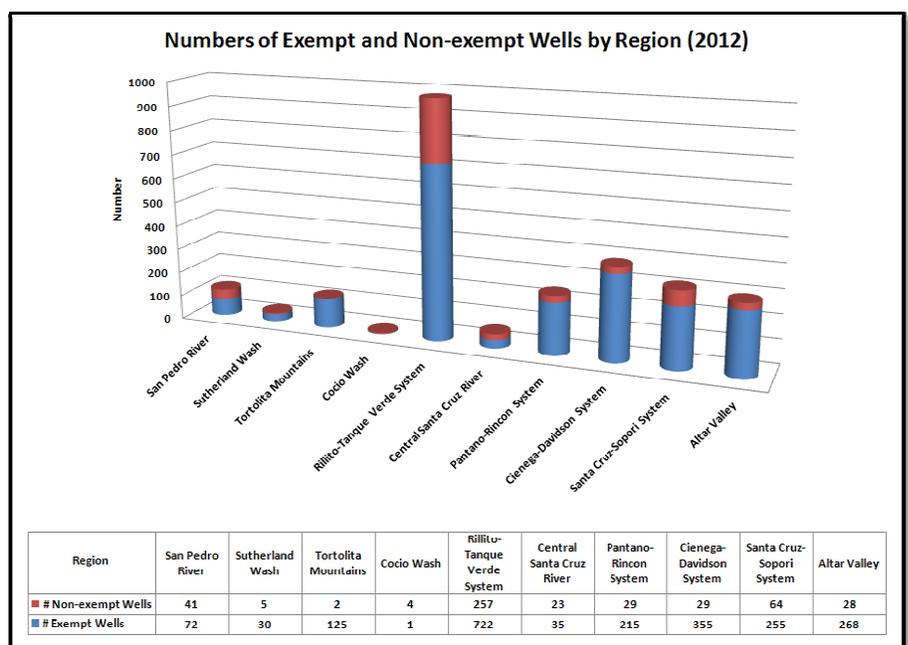
Applying statistical and water level trend analyses could provide additional insight on water level trends within individual shallow groundwater areas. Information such as the time of year for the measurements, nearby pumping information and the geographic location of the wells would be important supplemental data for an accurate trend analysis.

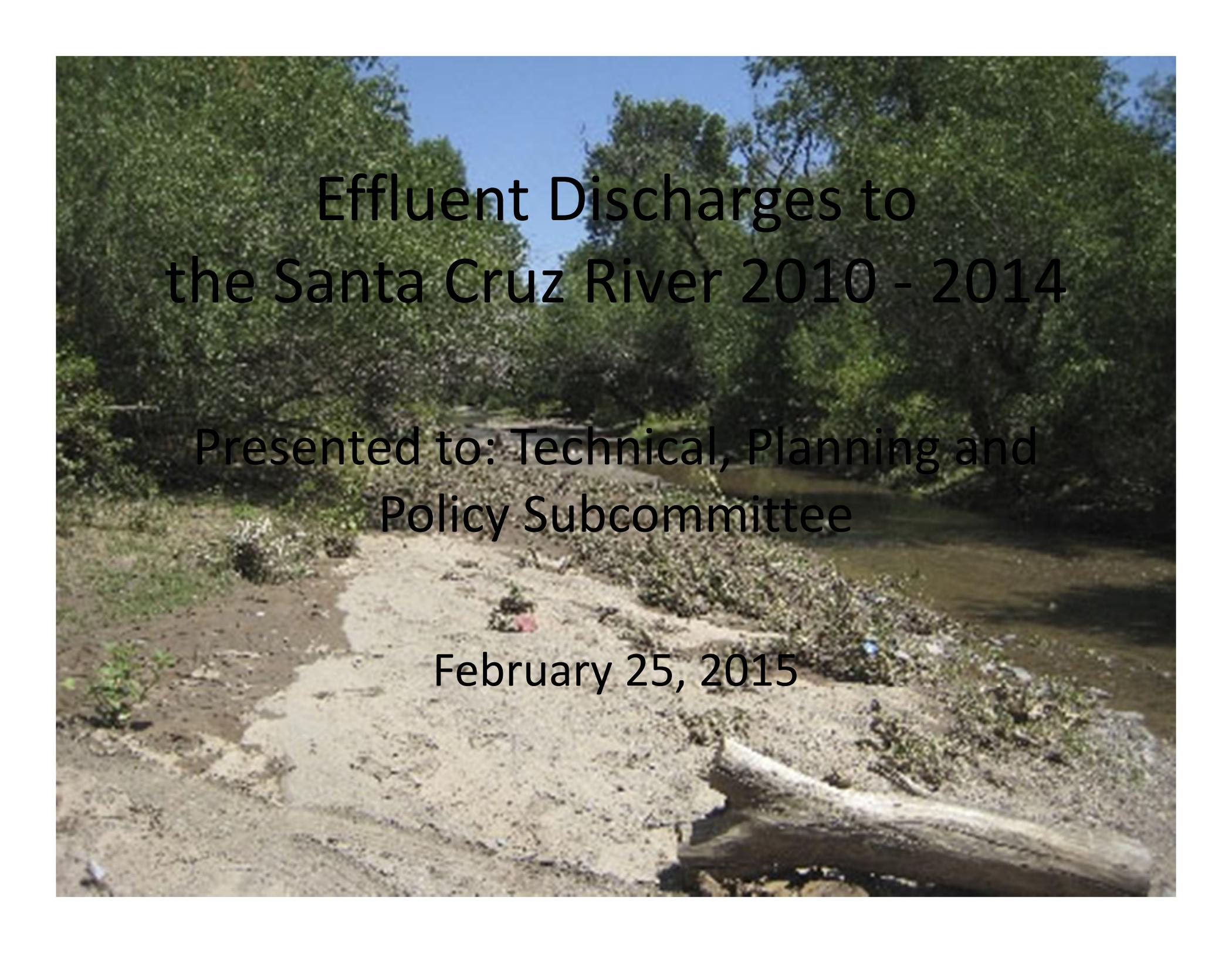
Repeat Evaluations

Repeating this study every five-years would help the region stay informed about new drilling, groundwater use and water level trends.



Drilling History in the Tortolita Mountains (Example graphic)

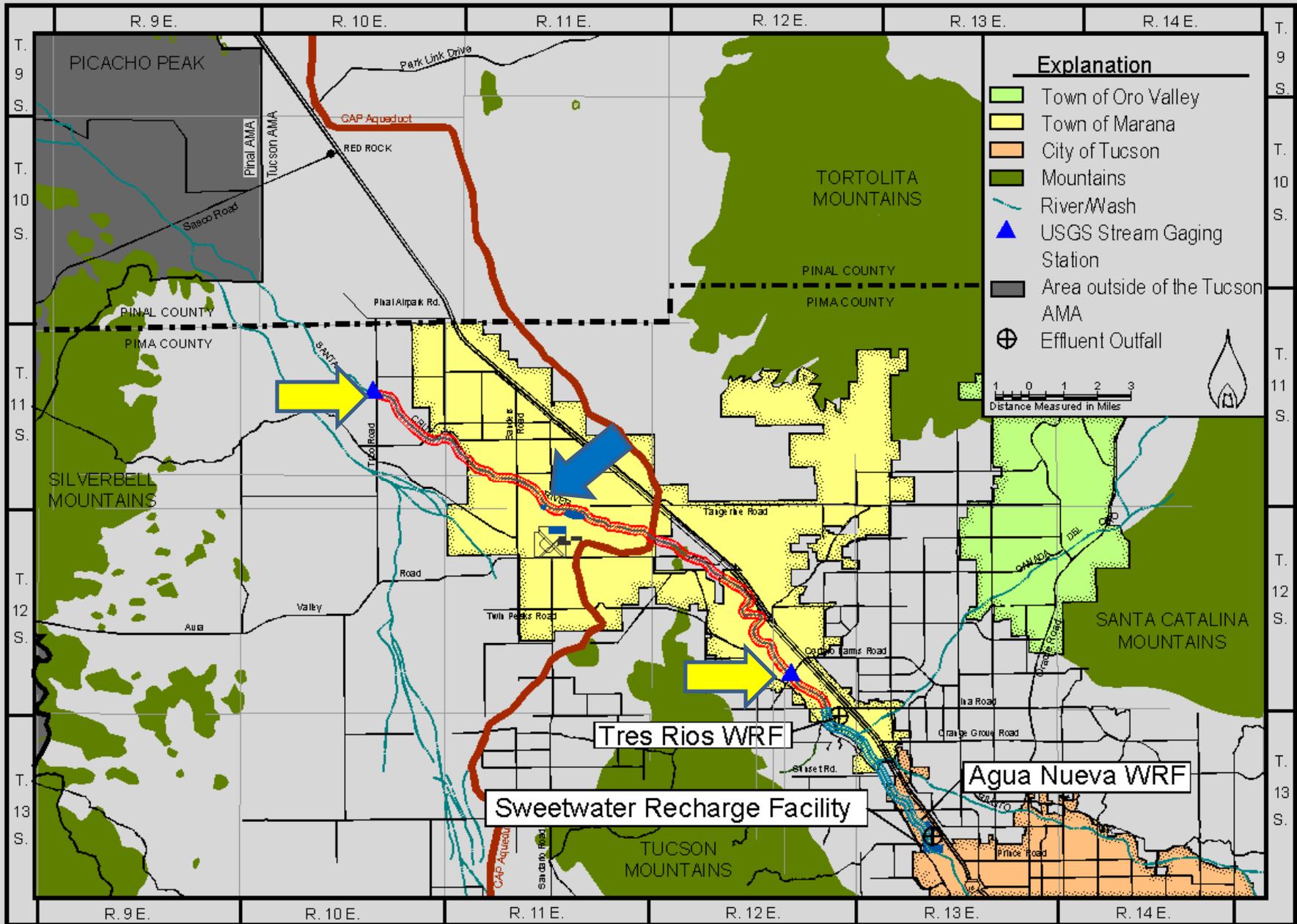




Effluent Discharges to the Santa Cruz River 2010 - 2014

Presented to: Technical, Planning and
Policy Subcommittee

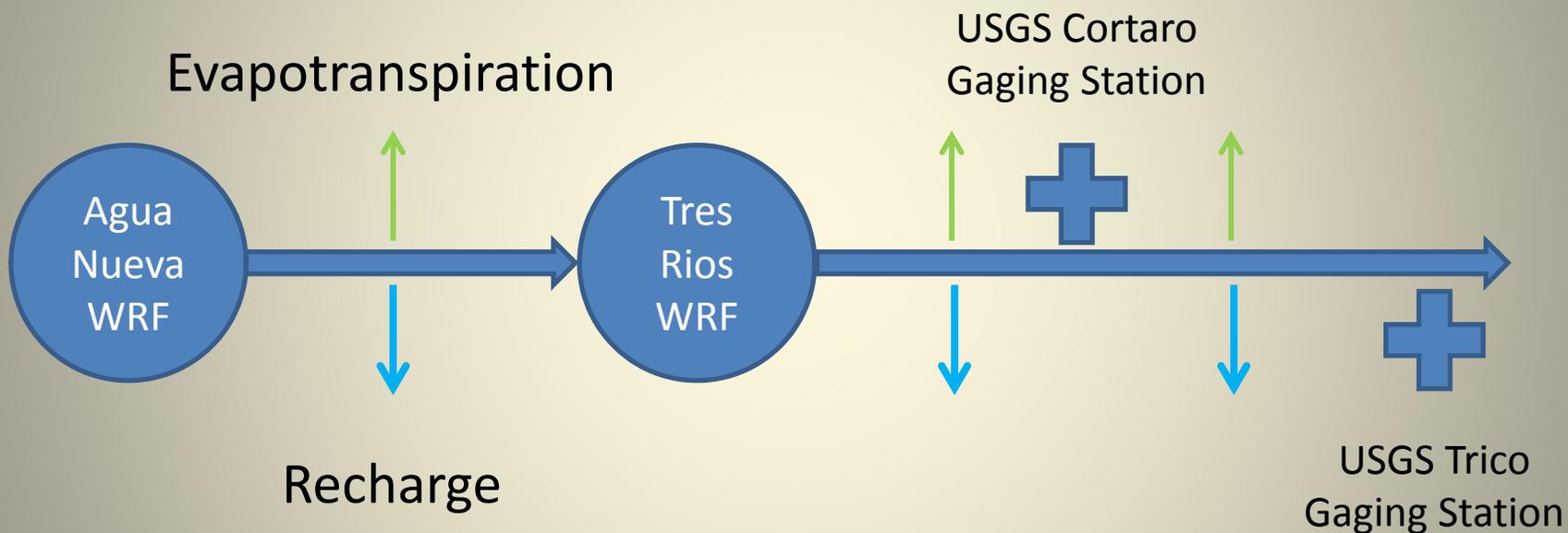
February 25, 2015



Santa Cruz Managed Recharge Projects

Santa Cruz River Schematic

Input, Output and Monitoring Points



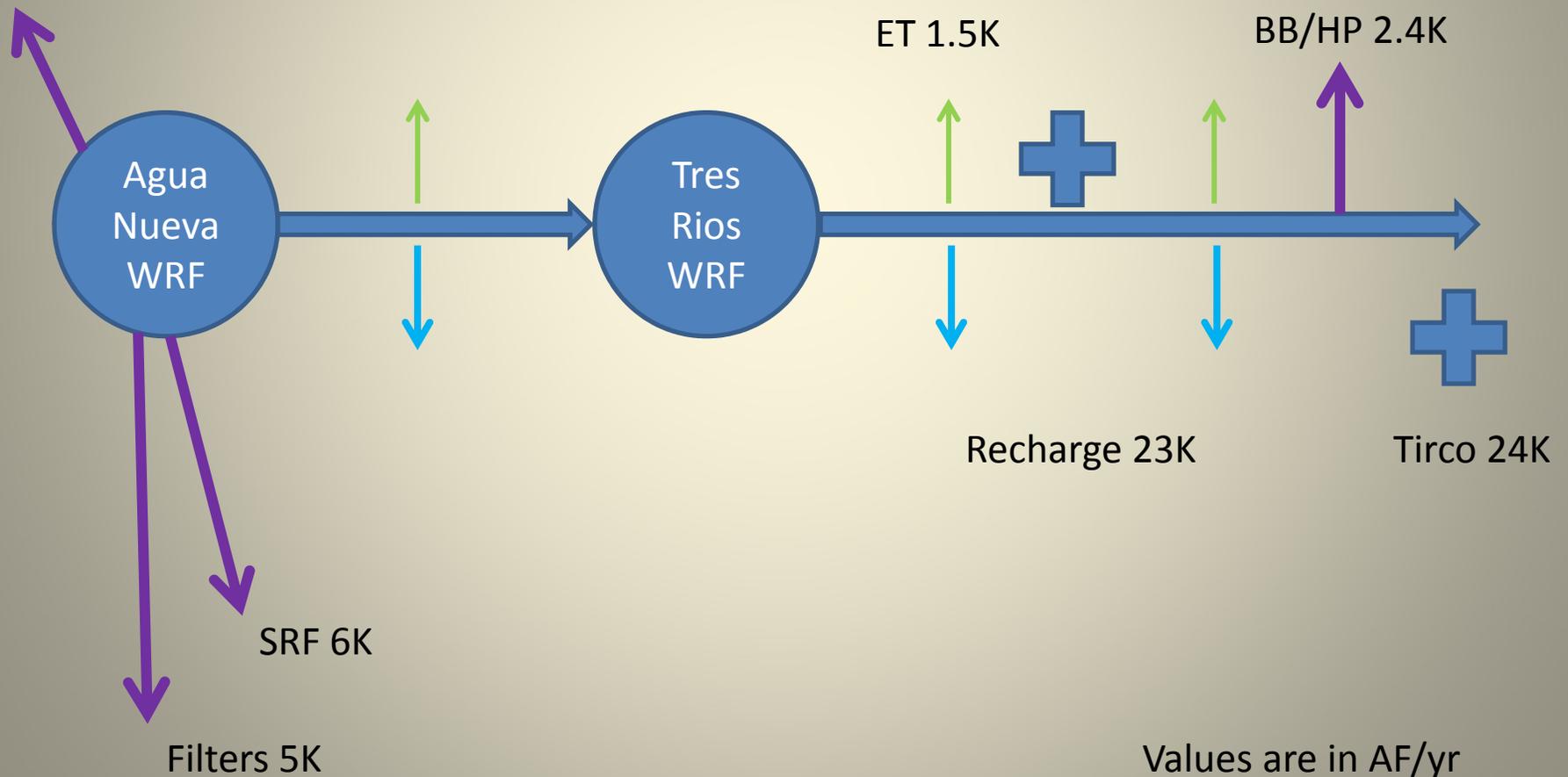
Factors Affecting Water Budget of the Santa Cruz River

- Volume and Location of WRF Discharge
- Infiltration Rate
 - Water Quality
 - Channel Modifications
- Current Direct Diversions
 - SRF Recharge
 - Reclaimed Use
 - Downstream Diversions
- Storm Flow Events

Santa Cruz River Schematic

Input, Output and Monitoring Points 2010

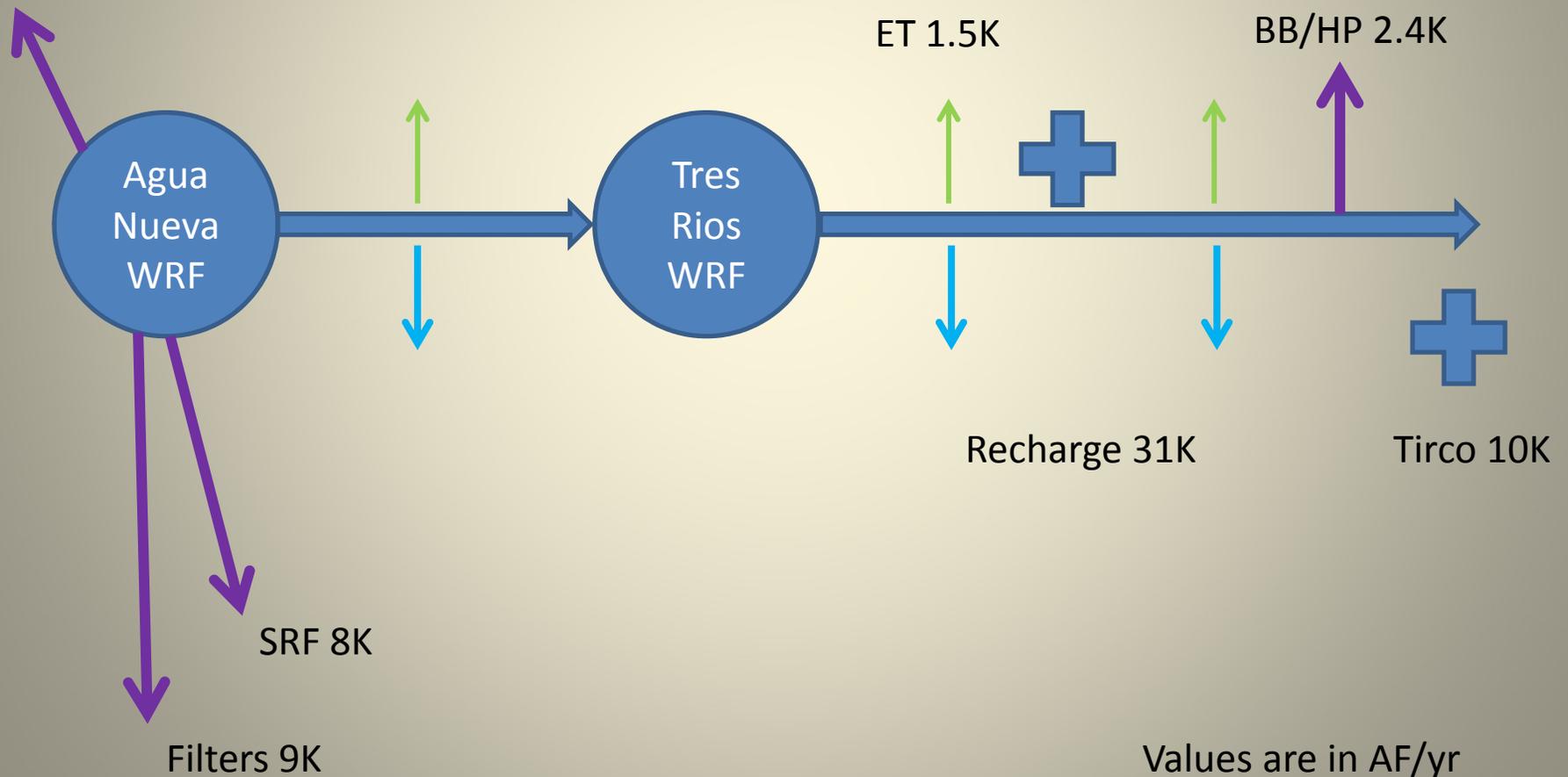
SGC 500



Santa Cruz River Schematic

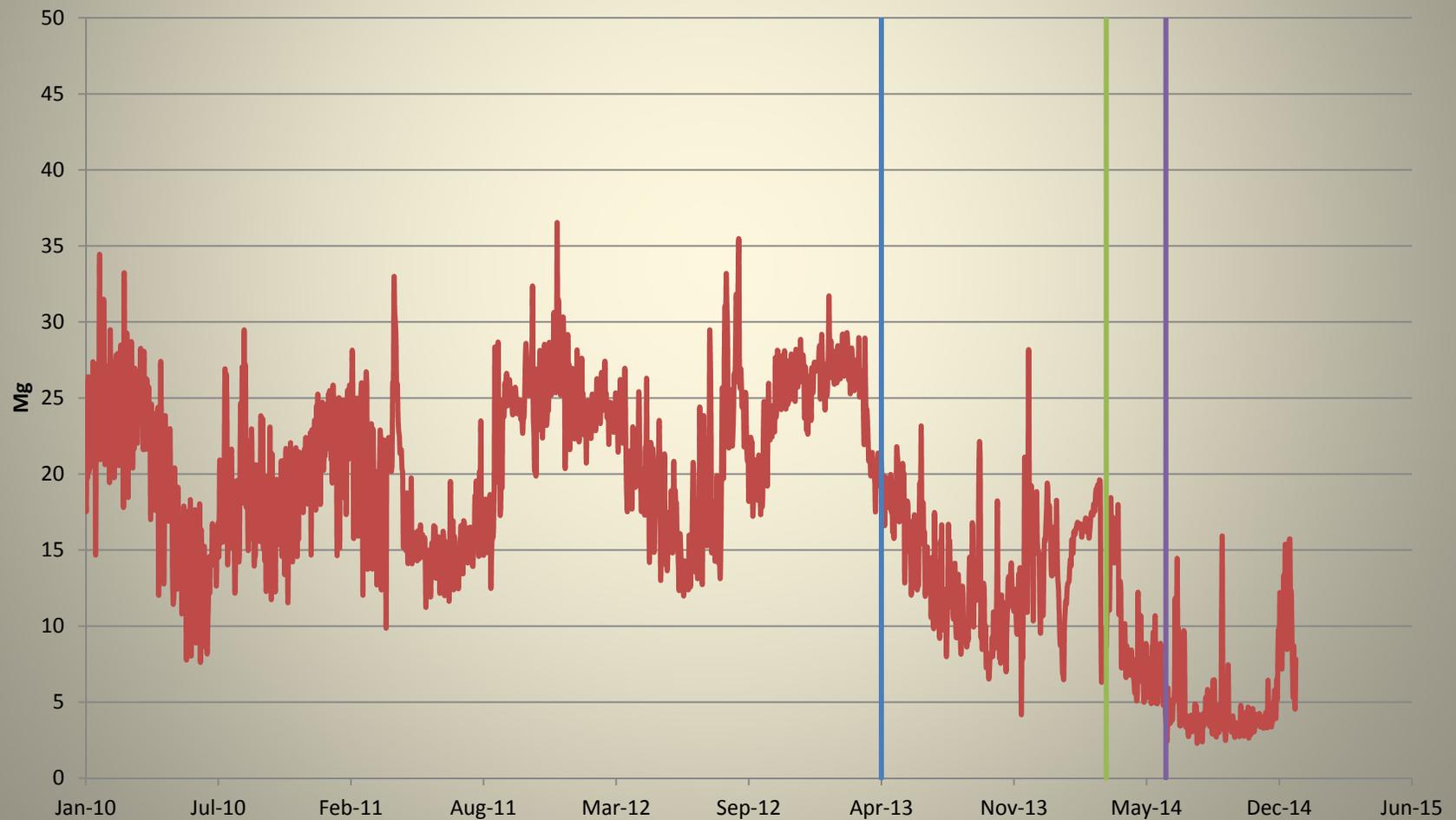
Input, Output and Monitoring Points 2014

SGC 500

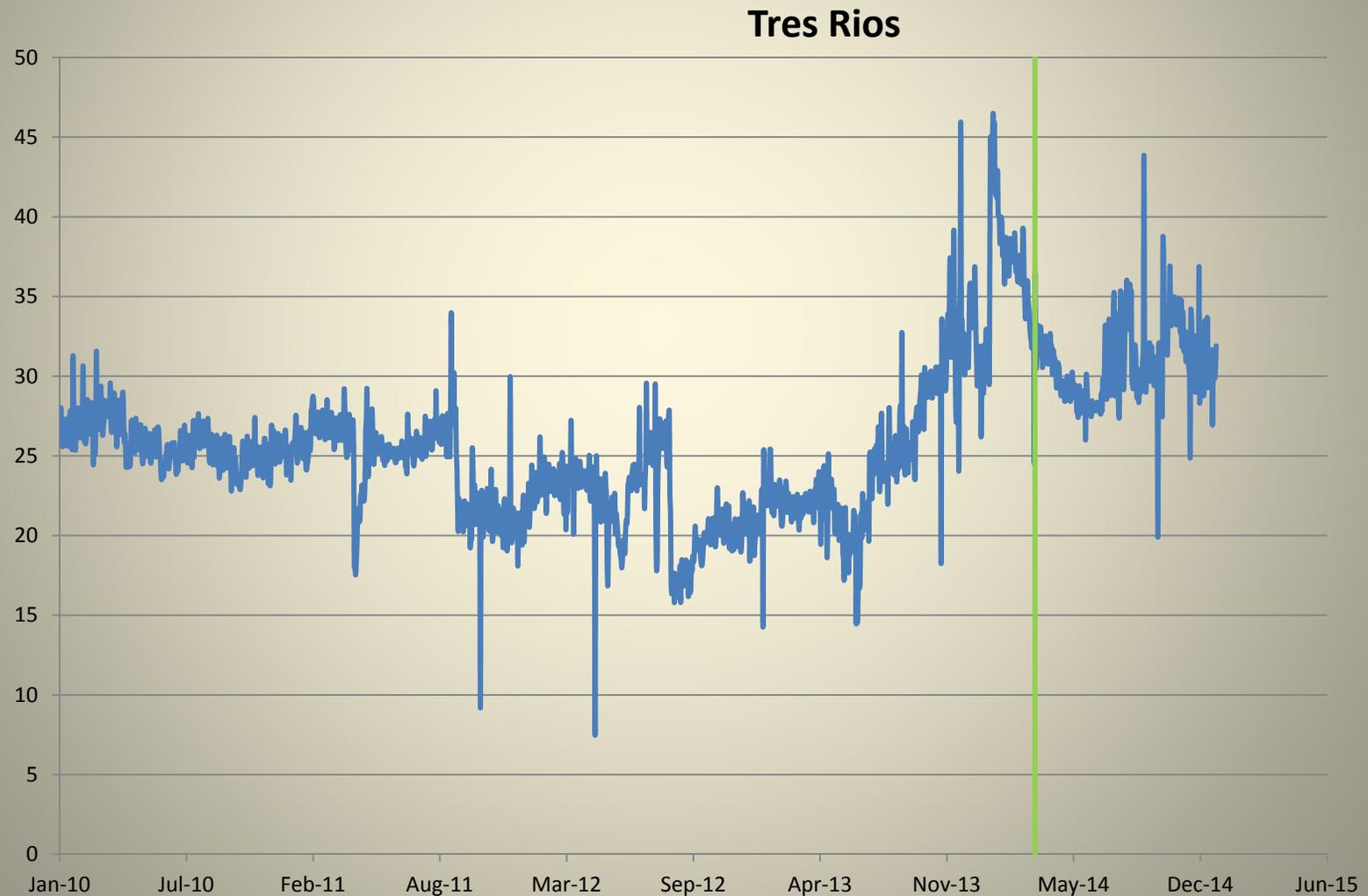


Discharge from Roger Road/Agua Nueva WRF 2010 - 2014

Aqua Nueva



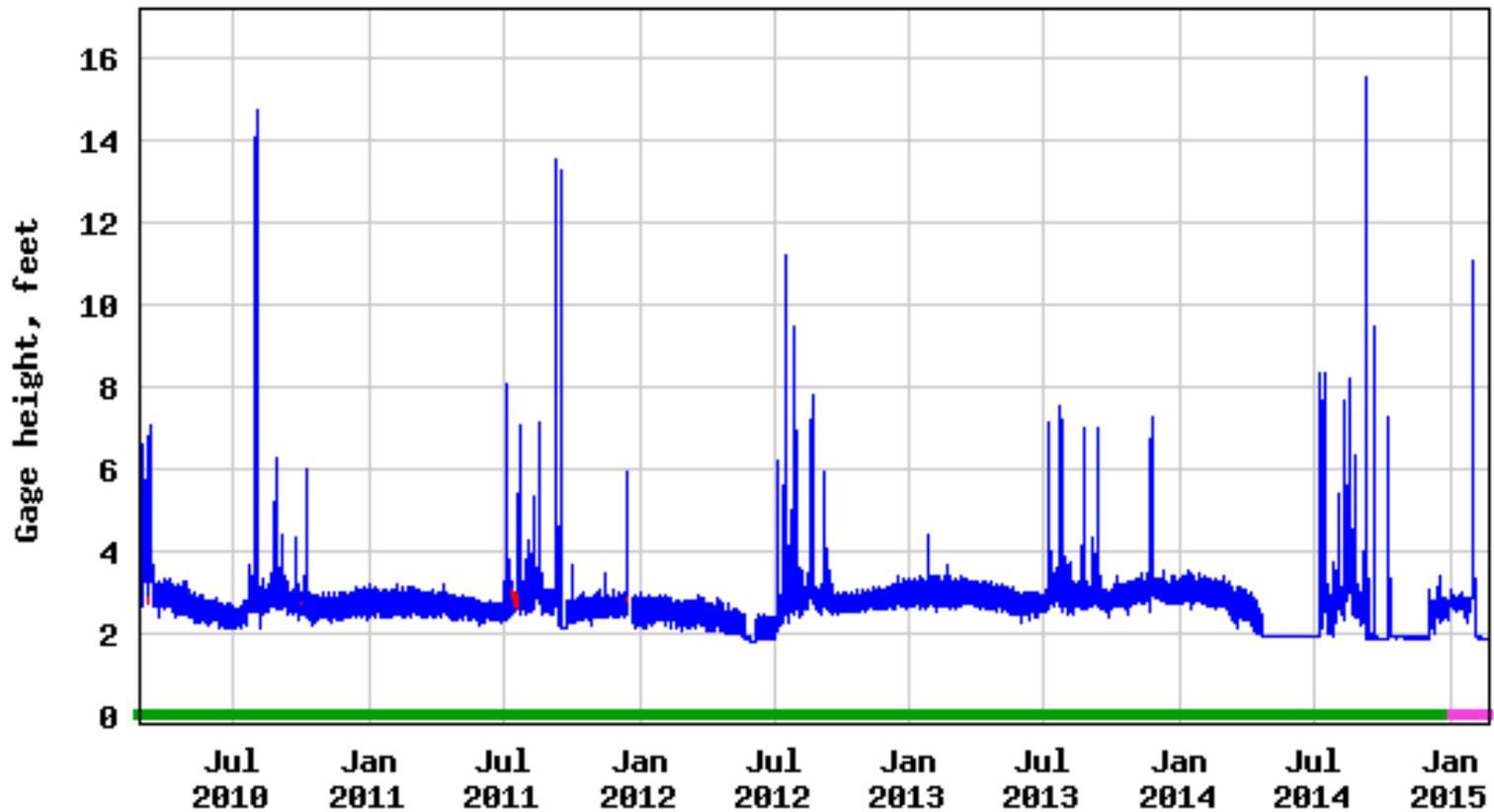
Discharge from Ina Road/Tres Rios WRF 2010 - 2014



Stream Gage Data 2010 - 2014



USGS 09486520 SANTA CRUZ RIVER AT TRICO ROAD, NR MARANA, AZ.



— Gage height
— Estimated gage height

— Period of approved data
— Period of provisional data

Santa Cruz River Length

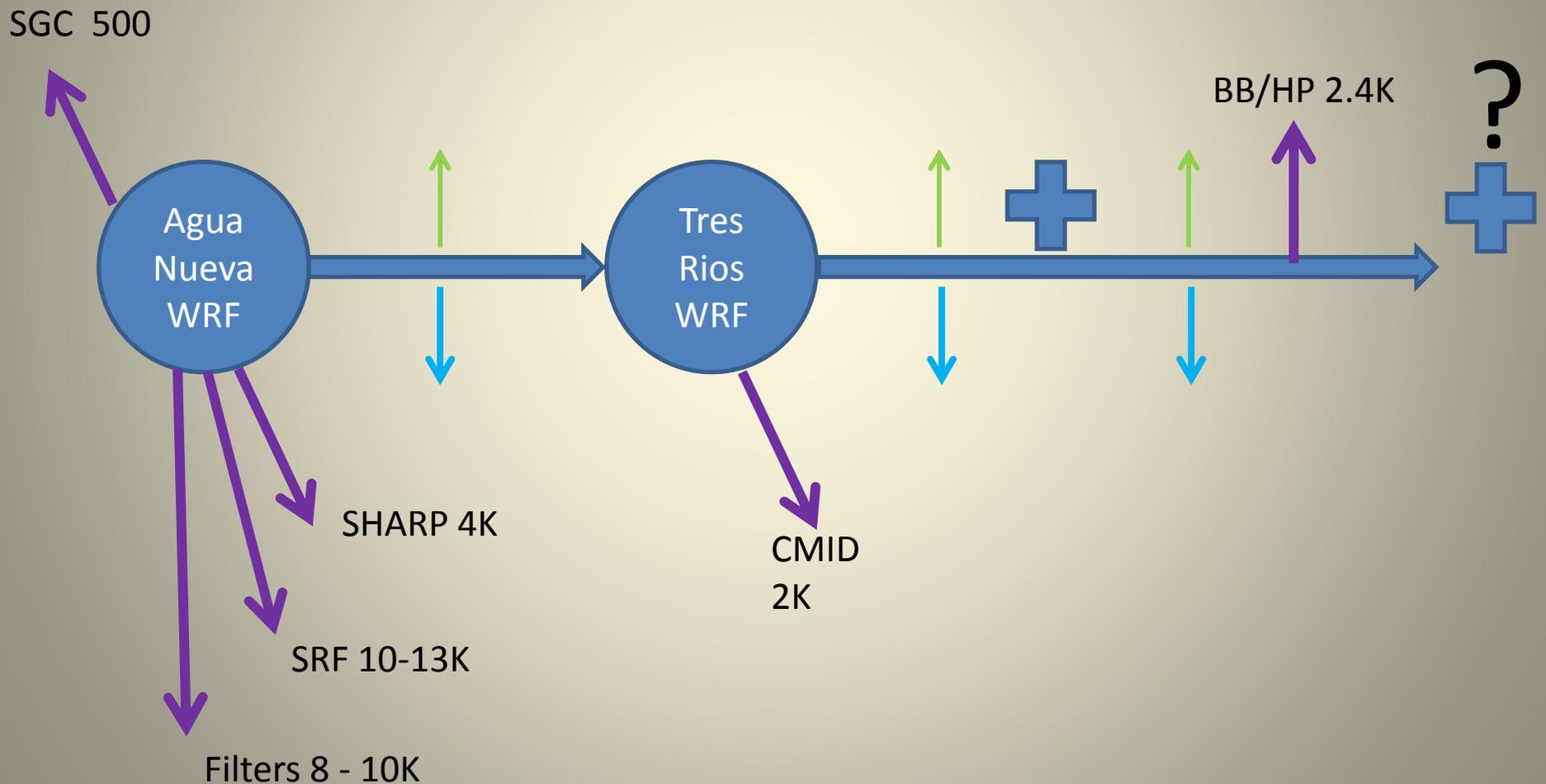


Factors Affecting Santa Cruz River Flow Length

- Infiltration Rates
- Reclaimed Water Demand
- Flows from Silverbell GW Treatment Plant
- Tucson Effluent Discharges at Tres Rios WRF
- USBOR Effluent Discharges at Tres Rios WRF
- Regional Potable Demand/Effluent Generation
- Future Volumes Used for IPR

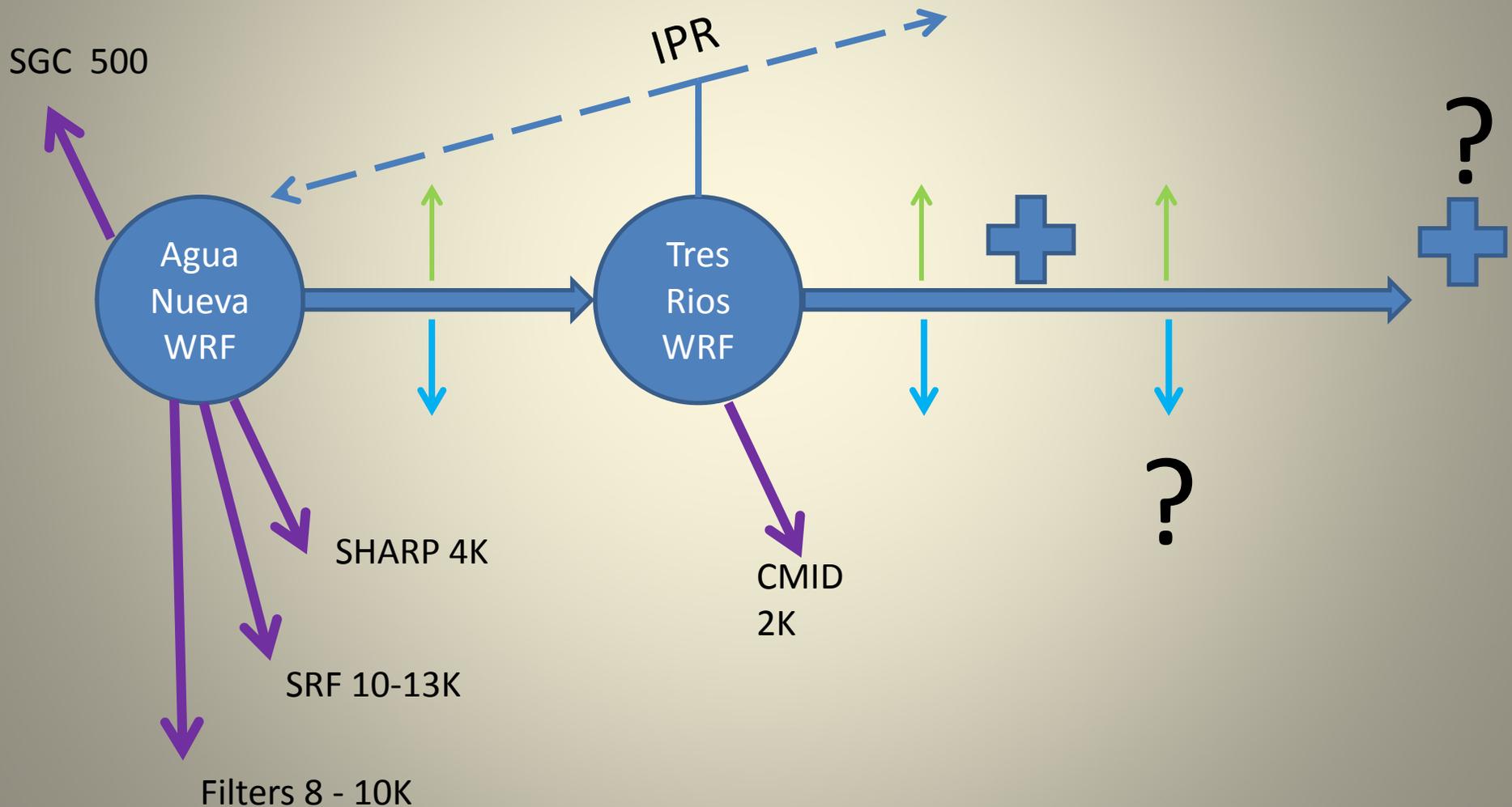
Santa Cruz River Schematic

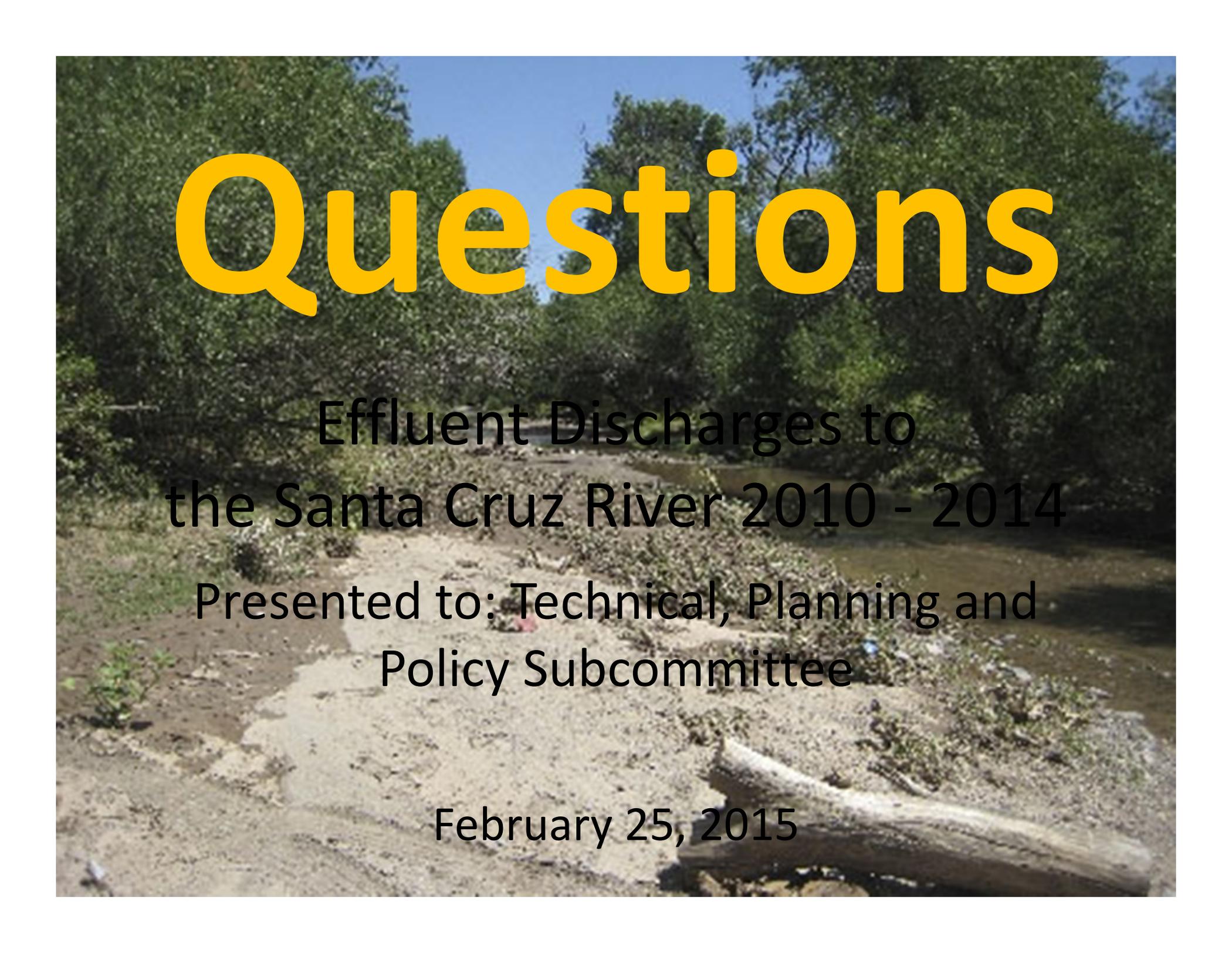
Input, Output and Monitoring Points 2017



Santa Cruz River Schematic

Input, Output and Monitoring Points 20XX





Questions

Effluent Discharges to
the Santa Cruz River 2010 - 2014

Presented to: Technical, Planning and
Policy Subcommittee

February 25, 2015



**Citizens' Water Advisory Committee
Technical Planning, Policy Subcommittee
Projected Agenda**



March 25, 2015

- **Research Update – Kelly Reynolds (30 mins)**
- **Inter-AMA Update – Wally Wilson**

April 22, 2015

- **WSA Policy Review/Water Checkbook Update**

May 27, 2015

- **CAP Joint Recovery Plan – Laura Grignano**
- **Security of Open Water Sources – Allan Tarket**

June 24, 2015

- **Pending**

September 23, 2015

- **FICO Infrastructure and Plans – Matt Bailey**

October 28, 2015

- **The Impact of Emerging Contaminants on Water Sustainability – Shane Snyder**

November 18, 2015

- **Pending**

December 16, 2015

- **Pending**

Future Agenda Items without a Date:

- *-Reclaimed Plant (Wally)*
- *-Cogeneration (Bruce)*
- *-Green Valley-Project Renews*

Green Valley; Arturo Gabaldon arturo@communitywater.com