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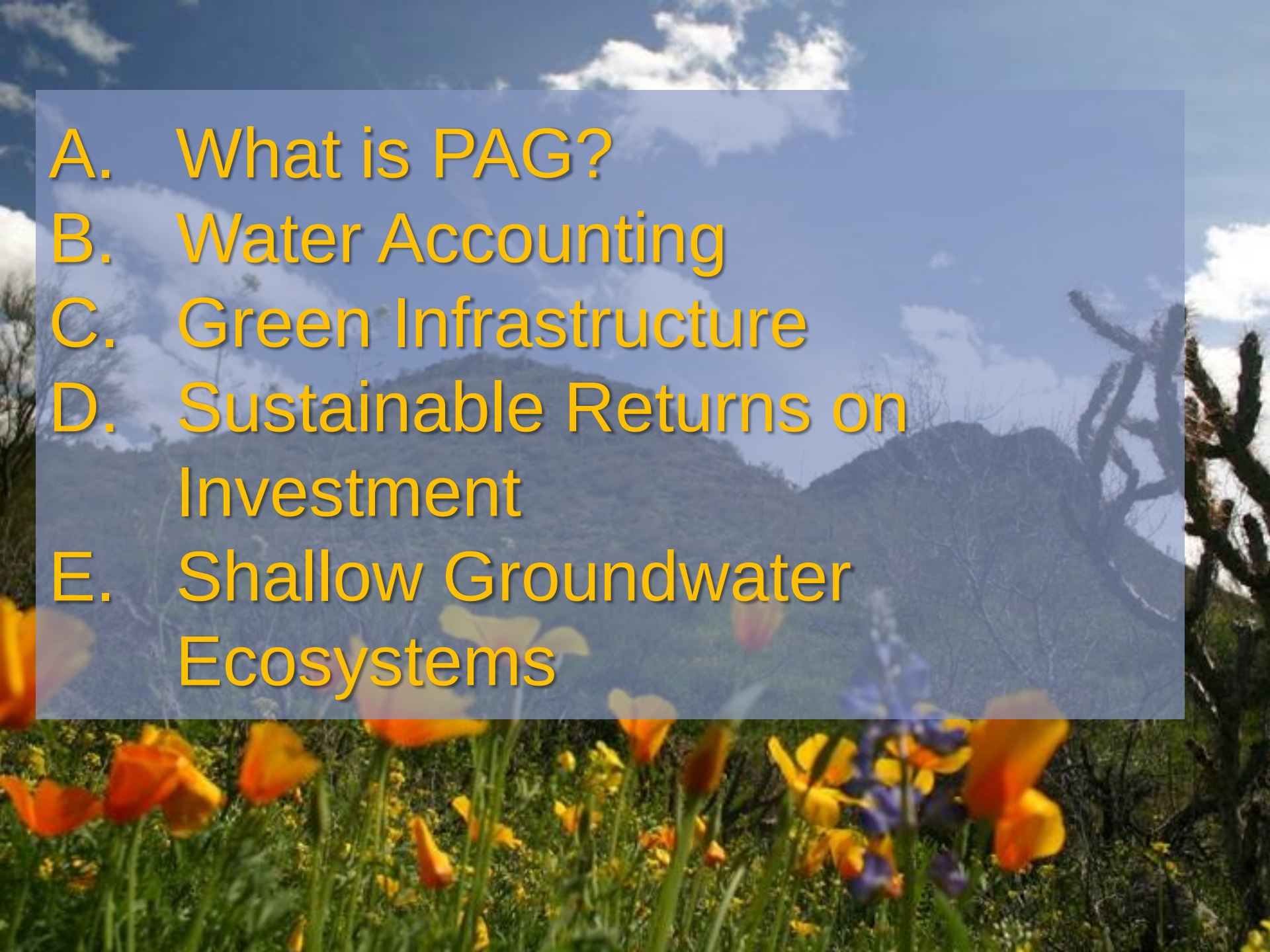
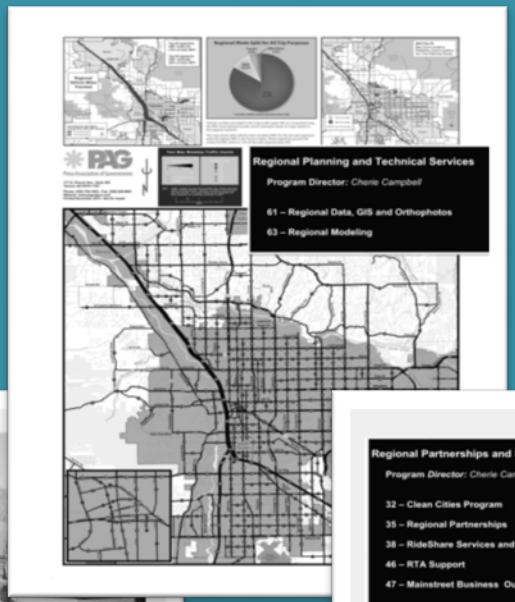
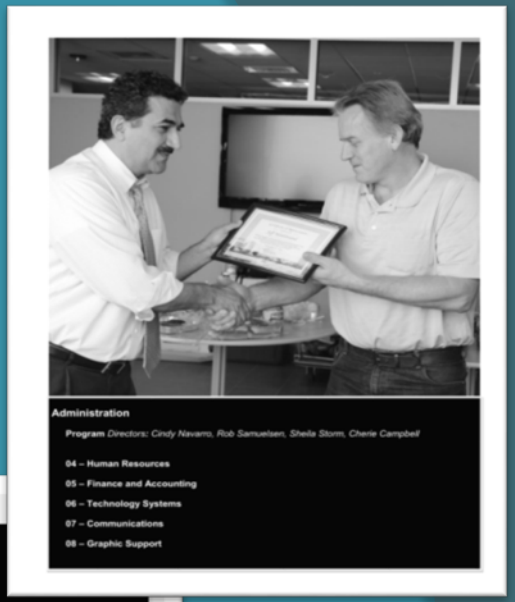
Interactive water map and implications for green infrastructure and shallow groundwater area planning in the Tucson basin

SWAN, March 2015


A. What is PAG?
B. Water Accounting
C. Green Infrastructure
D. Sustainable Returns on Investment
E. Shallow Groundwater Ecosystems

Technical Services





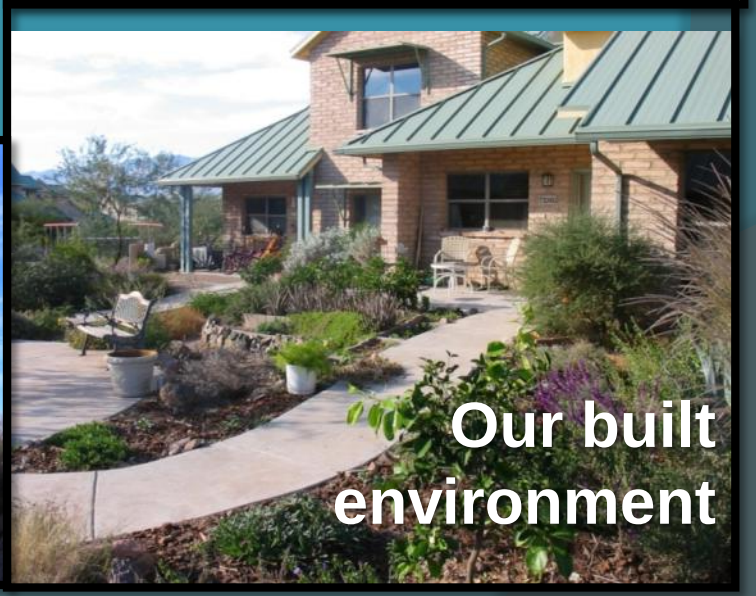
Sustainable Environment

Transportation

Administration

Regional Partnerships

Sustainable Environment



PAG Committees

Environmental Planning Advisory Committee (EPAC)

Air Quality Subcommittee

Collaborative Riparian Health Assessments

Watershed Planning Subcommittee

Stormwater Management Working Group

PAG Sustainable Environment

Linking key planning elements to build a resilient future

- Air Quality
  - Greenhouse gas
  - Solar energy
- Watershed Planning
  - Water quality
  - Water resources
- Climate Resilience
  - Green infrastructure

Provide local governments with objective, reliable information, communicating a regional perspective on key water issues.

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Climate Resilience

Extreme Weather Vulnerability

Stressors: precipitation and heat

Impacts: Urban and Natural Systems: wildfires, heat damaged infrastructure, runoff volumes, tire failures

- Higher temperatures, more days above 100˚
- Unpredictable precipitation

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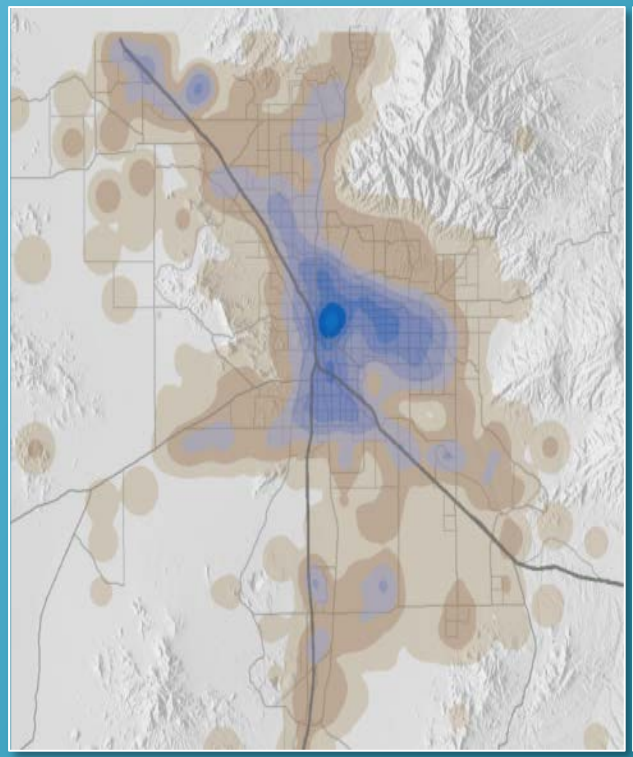
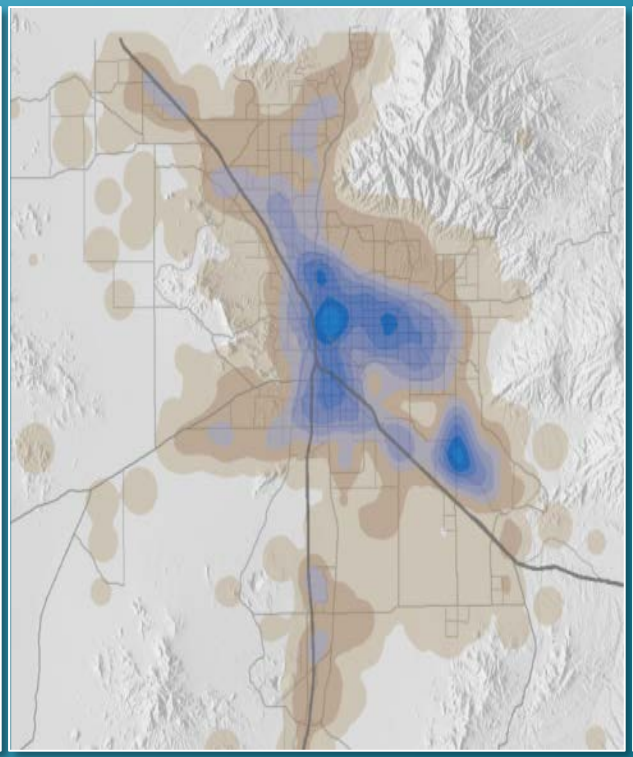
Population Planning

Edge Growth



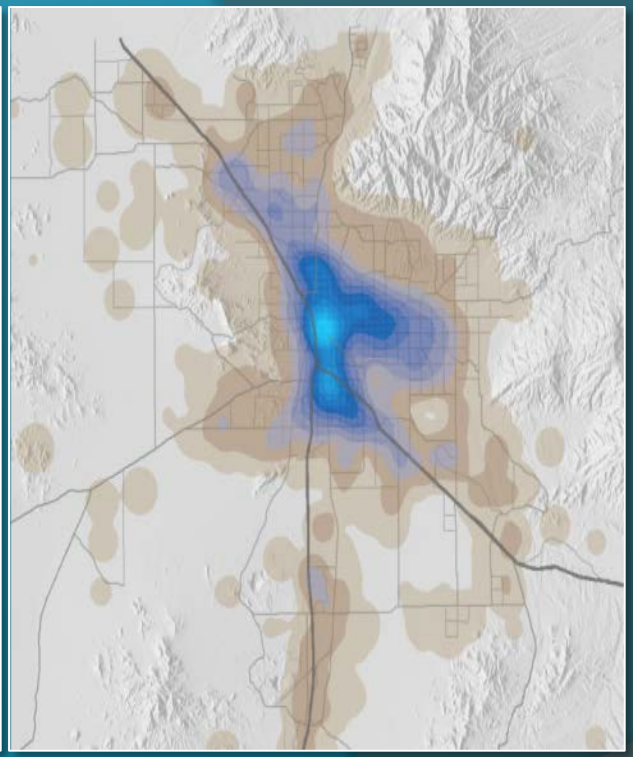
New Land Developed	315 sq miles
Population Density	2,113 ppl/sq. mile

Planned Future



New Land Developed	234 sq miles
Population Density	2,360 ppl/sq. mile

Vision Future



New Land Developed	98 sq miles
Population Density	3,240 ppl/sq. mile

Public Engagement

http://gismaps.pagnet.org/RTPSurvey/

How Should We Invest in our Transportation System?

On this page you can choose how you think we should invest our future transportation dollars.

Before getting started, we need to estimate how much funding will be available for transportation improvements. To establish a baseline funding estimate, we need to know whether you support extending the Regional Transportation Authority (RTA).

Do you support additional future transportation projects? *(What is the RTA?)* ⓘ ○ Yes ◉ No

Budget

$4.7 Billion (Committed Funds) | $4.9 Billion

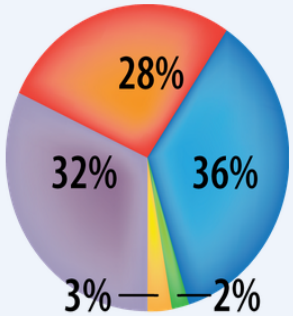
Pie chart funding element color code: • Maintenance • Roads • Bike/Ped • Transit • Programs

○ **Maintain the current approach to transportation funding**

Maintain the current approach to transportation funding *This option would largely maintain the region's existing approach to transportation investments. In this option:*

Click Here For More Infomation ⓘ.

◉ **Emphasize preserving the current transportation system**



Emphasize preserving the current transportation system *This option would increase the proportion of regional funding dedicated to preserving the existing system. In this option:*

Click Here For More Infomation ⓘ.

- **Funding dedicated to preserving the current transportation system would significantly improve the condition of roadways**
- **The operation of the transit system would be maintained and funding would be available for a few high capacity services, such as streetcar extensions, BRT, or light rail, on selected corridors.**

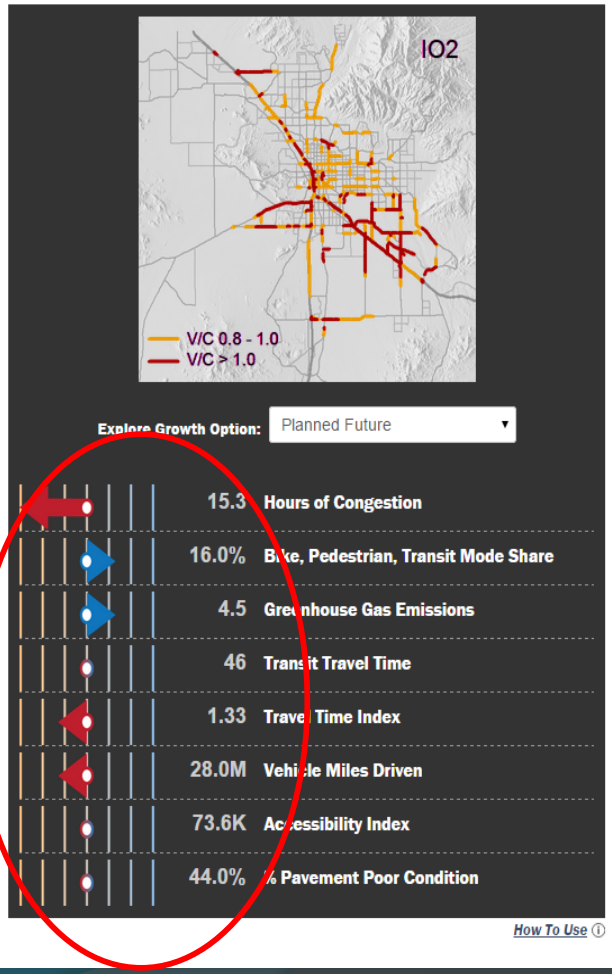
○ **Emphasize more investments in transit and bike/pedestrian infrastructure**

Emphasize more investments in transit and bike/pedestrian infrastructure *This option would emphasize more funding for transit service and bike and pedestrian improvements. In this option:*

Click Here For More Infomation ⓘ.

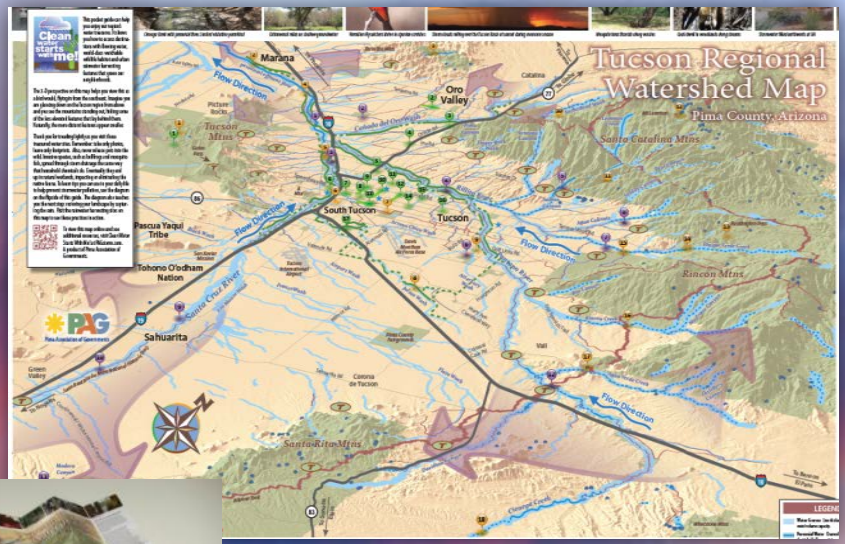
○ **Emphasize more investments in cross-town traffic movement and inter-regional trade connections**

Emphasize more investments in cross-town traffic movement and inter-regional trade connections *This option would focus investments to expanding roadway capacity and cross-town traffic flows as well as focusing on connections important for the*

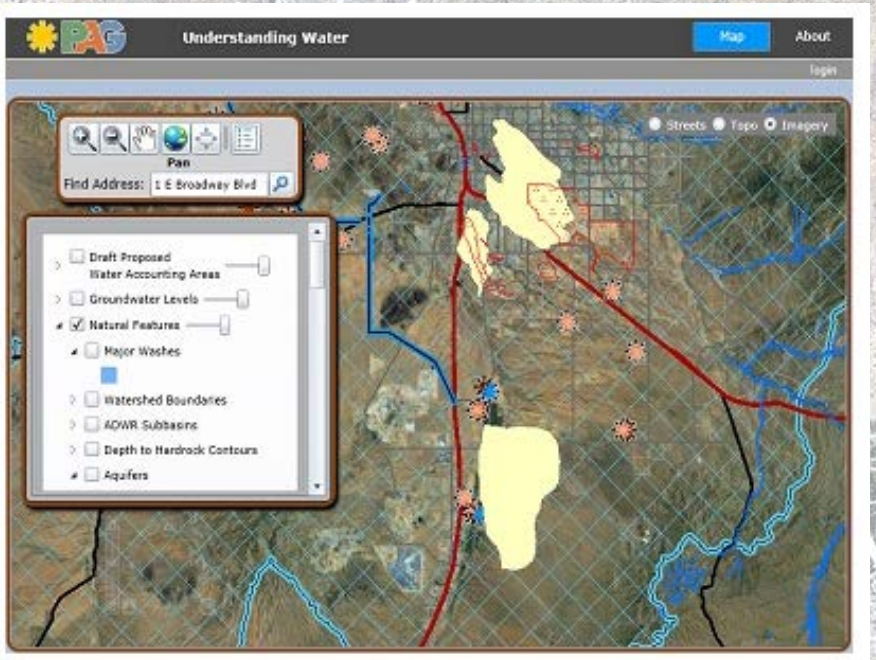


Region-wide water data

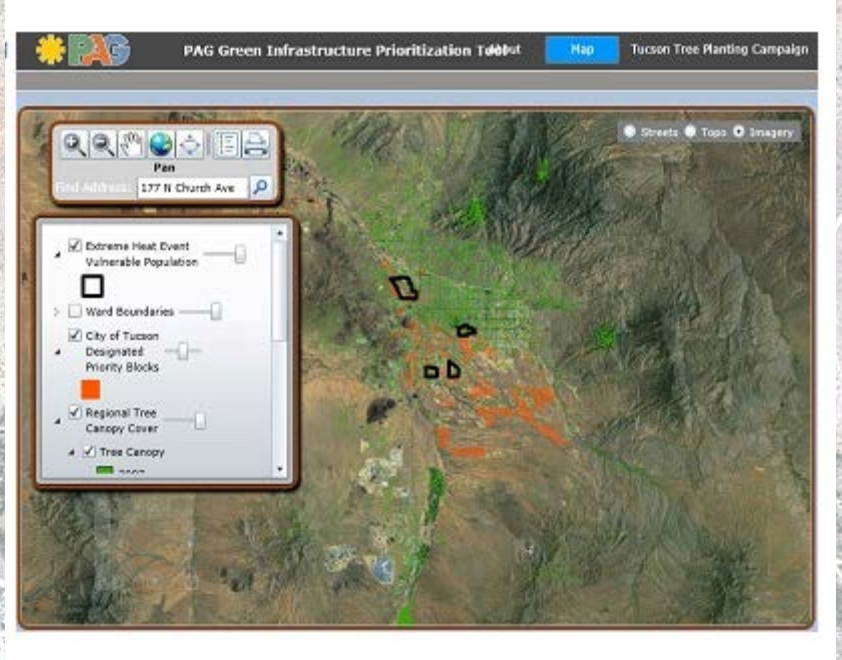
Setting the stage for regional thinking about our watershed



PAG Web-based Interactive Maps - Water

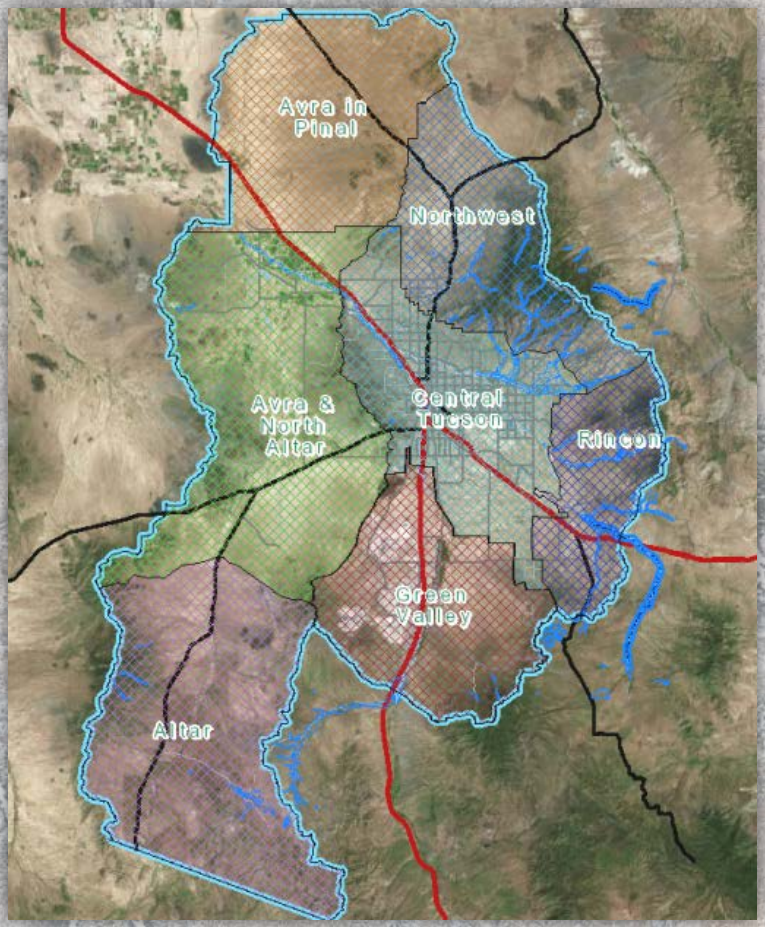


Water Resource Accounting



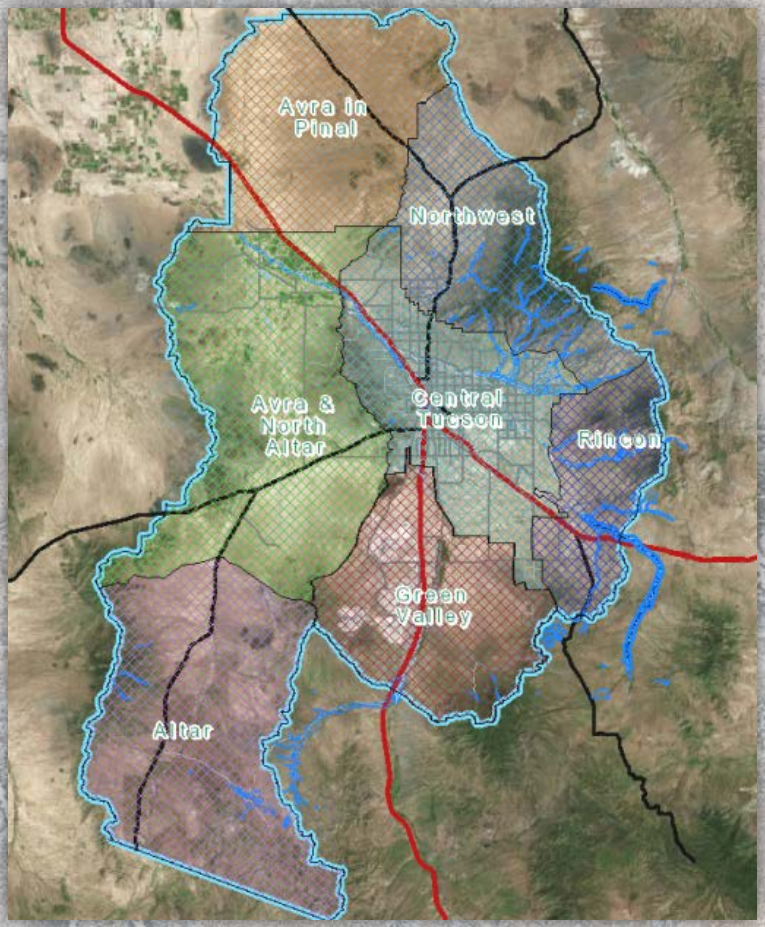
Green Stormwater Infrastructure Priortization

Shallow Groundwater Dependent Ecosystems



Water Accounting Areas

- In response to ADWR enhanced aquifer management discussions
- Sub-basin balance plus paper water
- ADWR is taking the next step
- Data will be available for each accounting area



SGWAs were a key driver for PAG

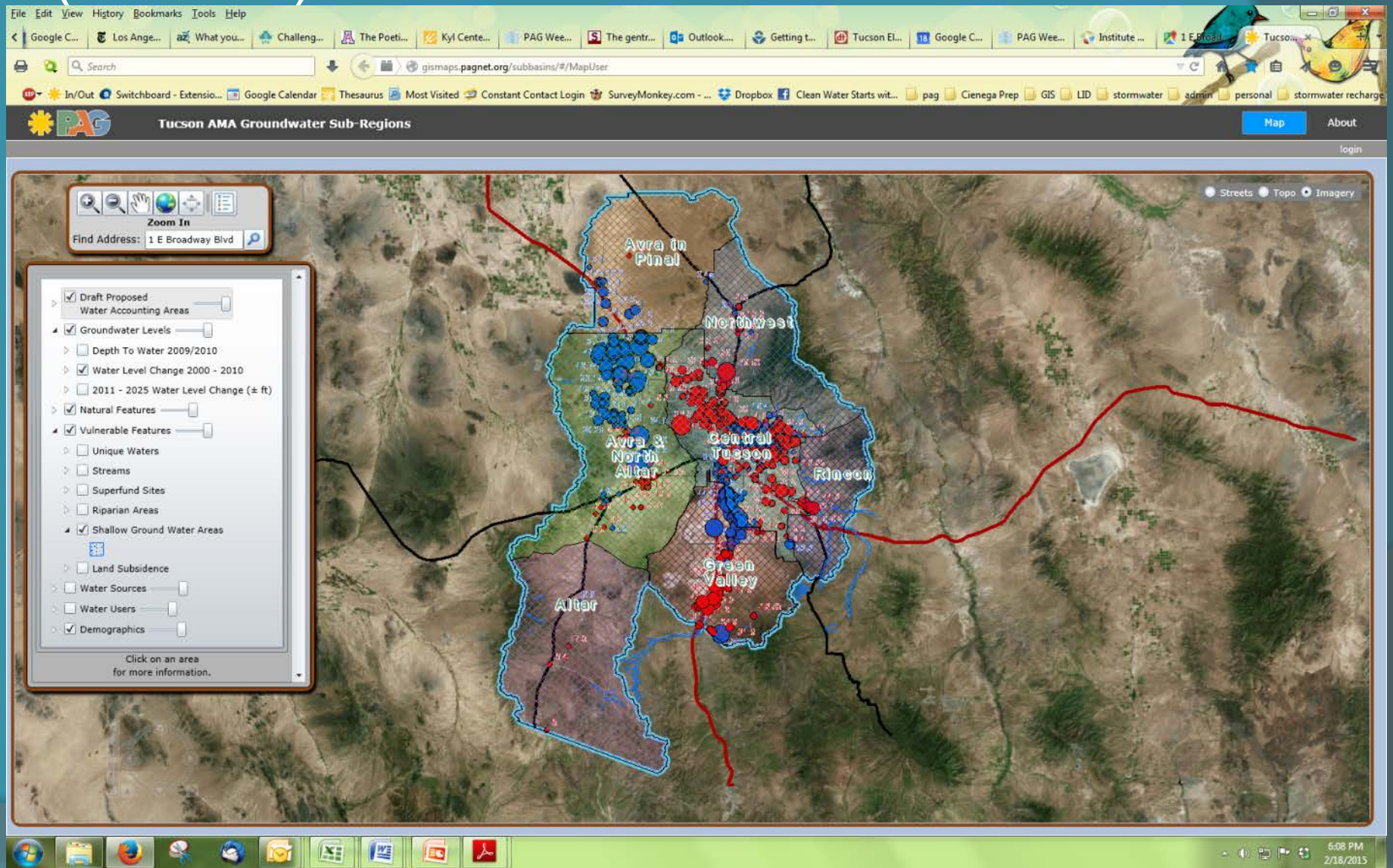
-Urban periphery

-Wells Not Receiving Coordinated Drought Messaging

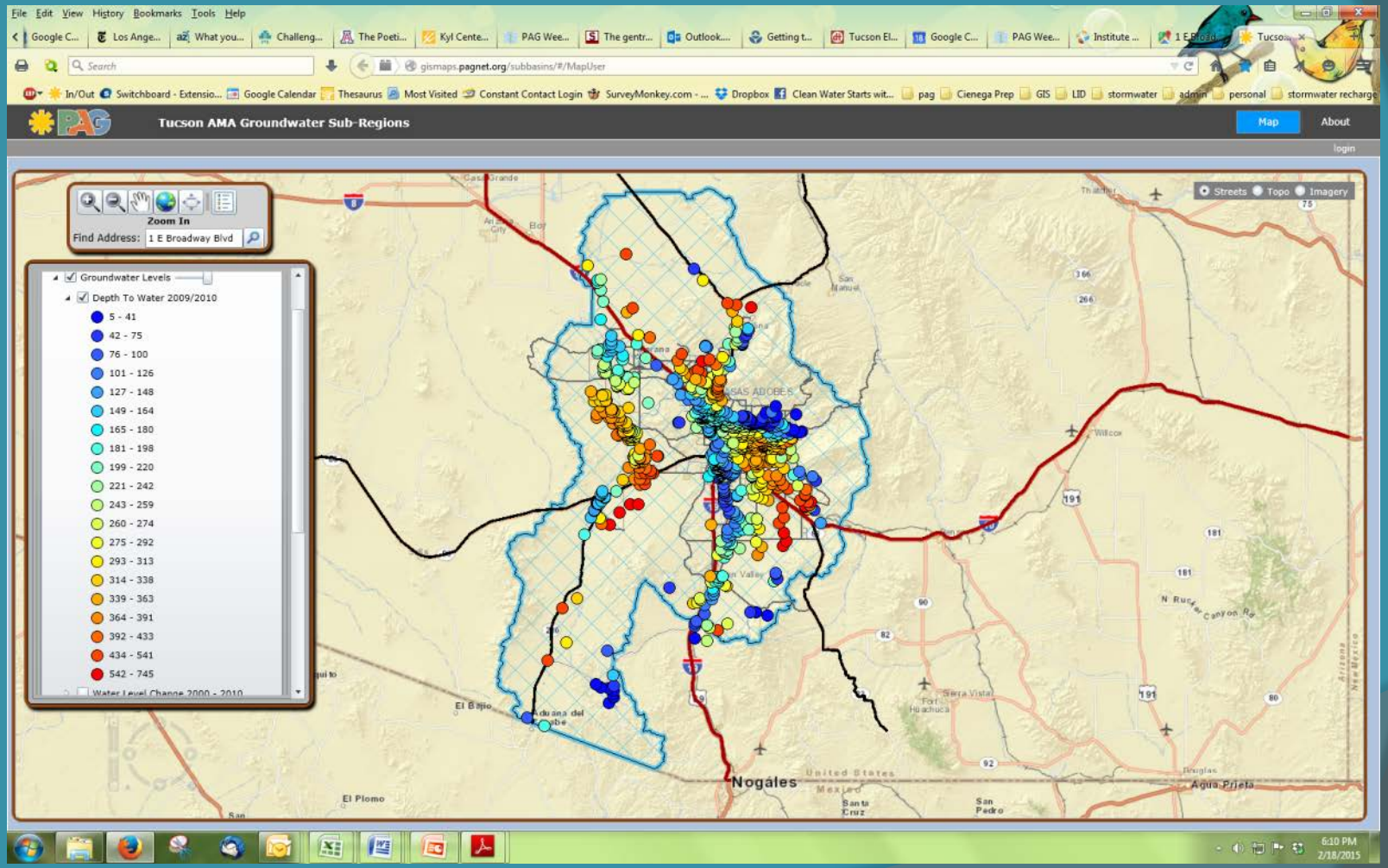
-Localized conditions

-Water for the Environment

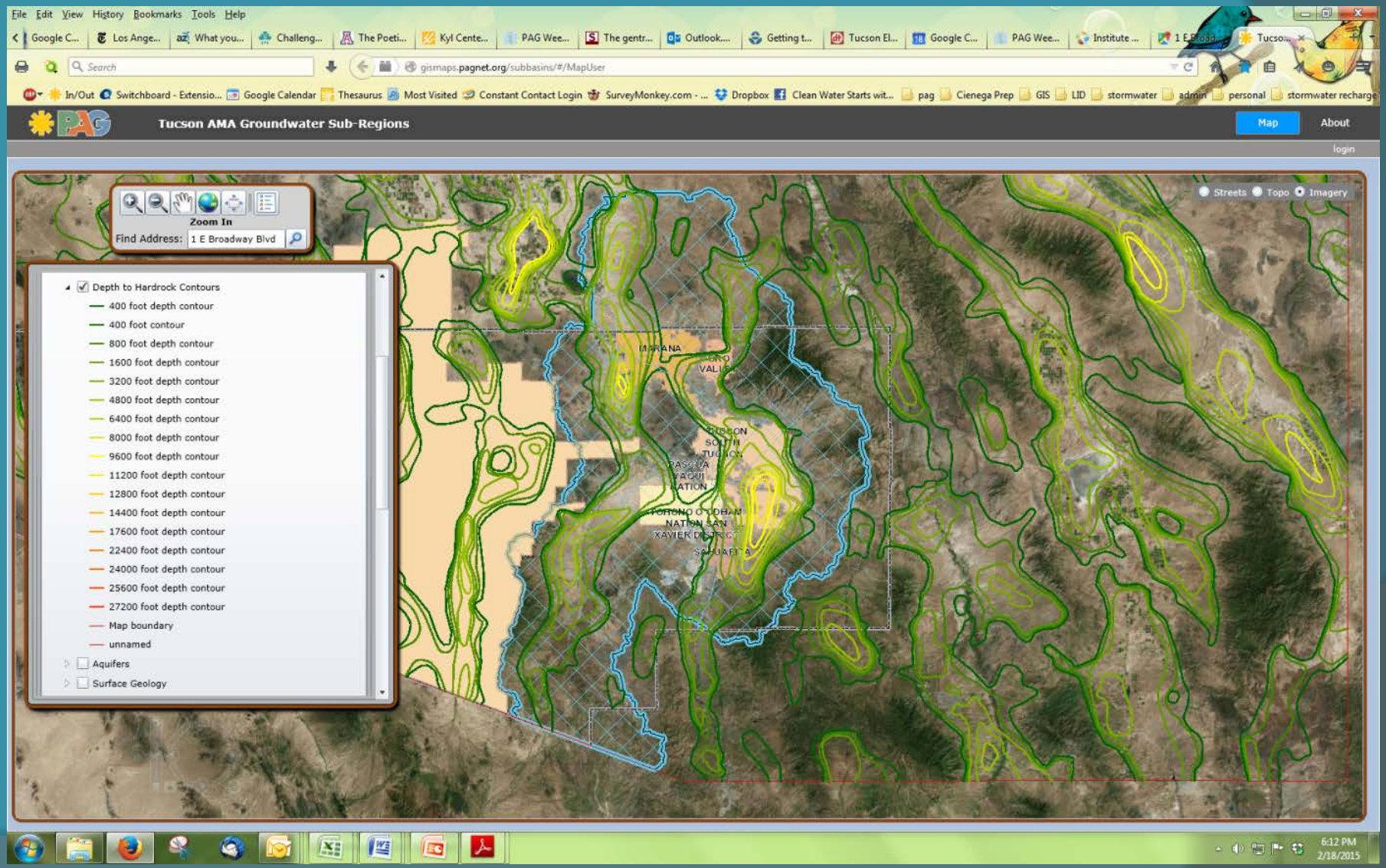
Water Level Change 2000-2010 (ADWR) and WAAs



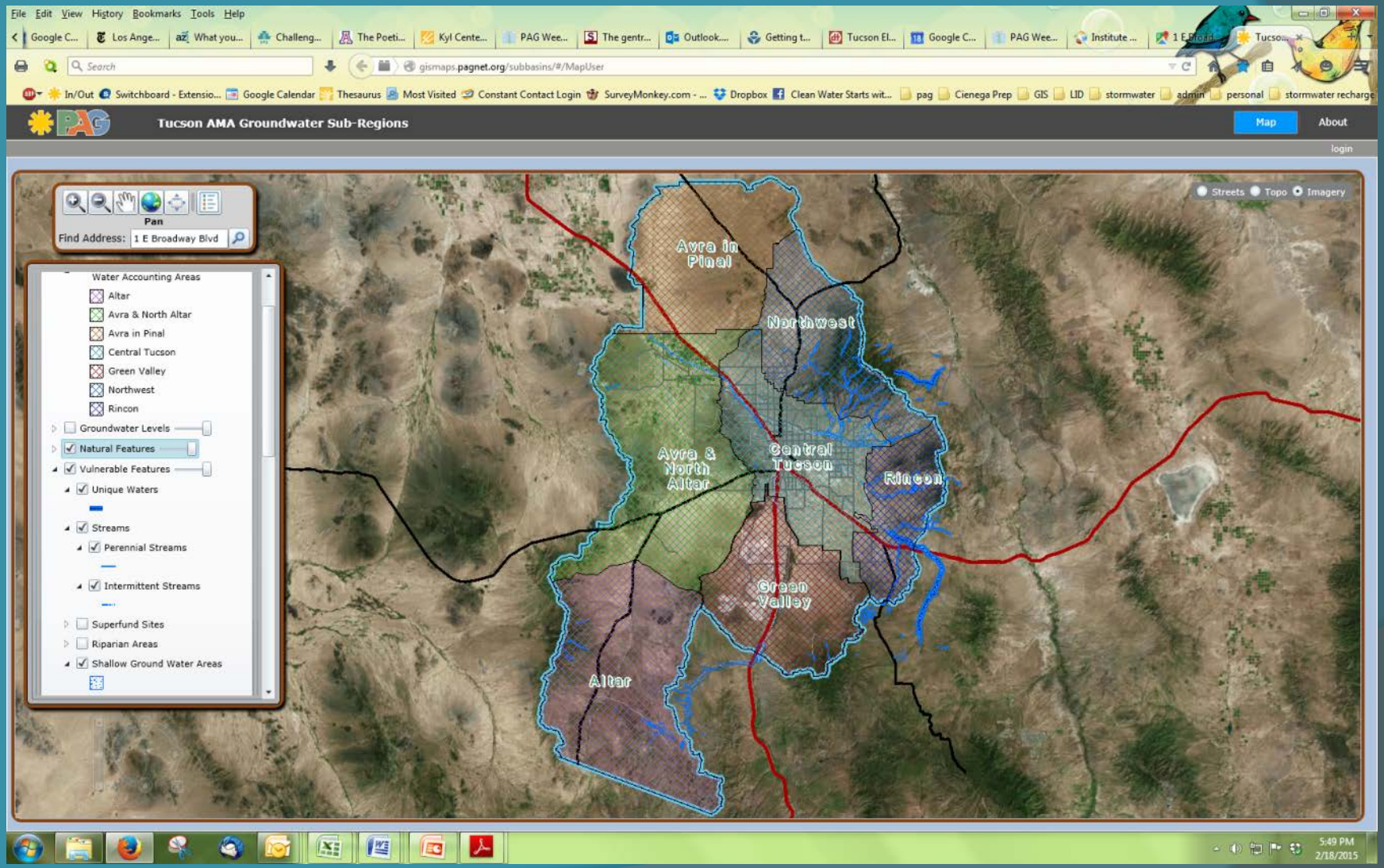
Depth to Water



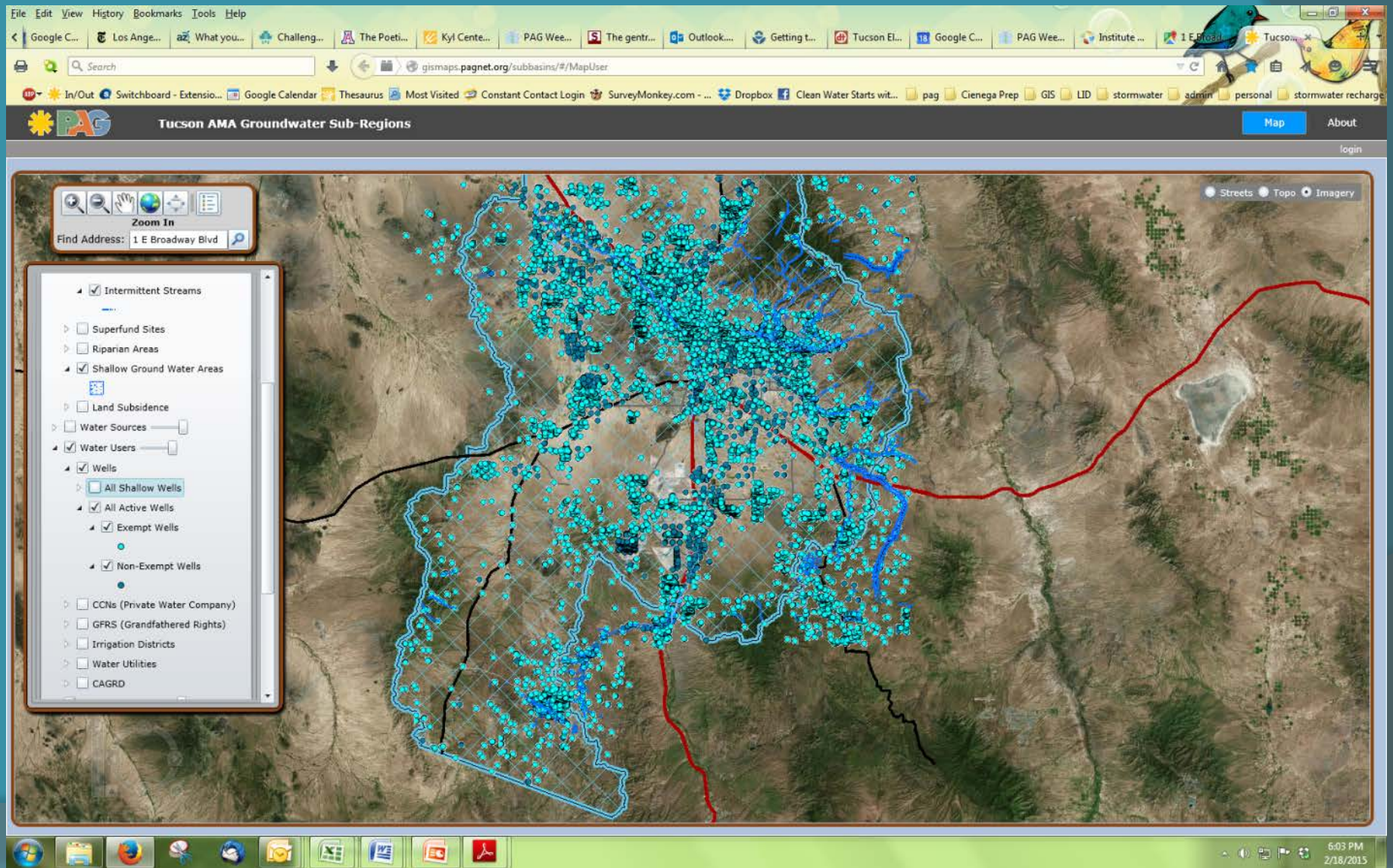
Depth to hard rock and jurisdictions



WAAs and SGWAs and intermittent streams

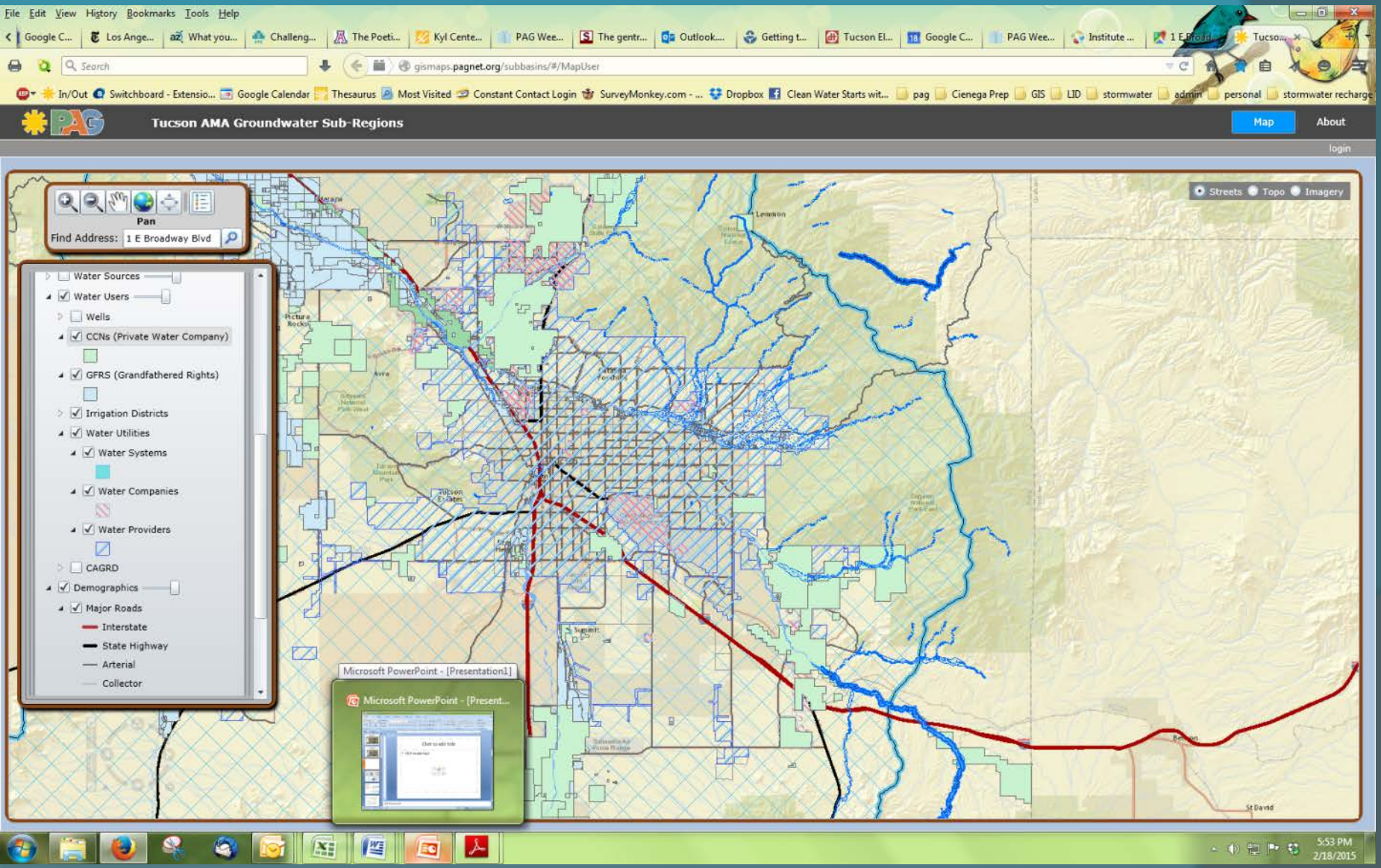


Exempt and non-exempt wells

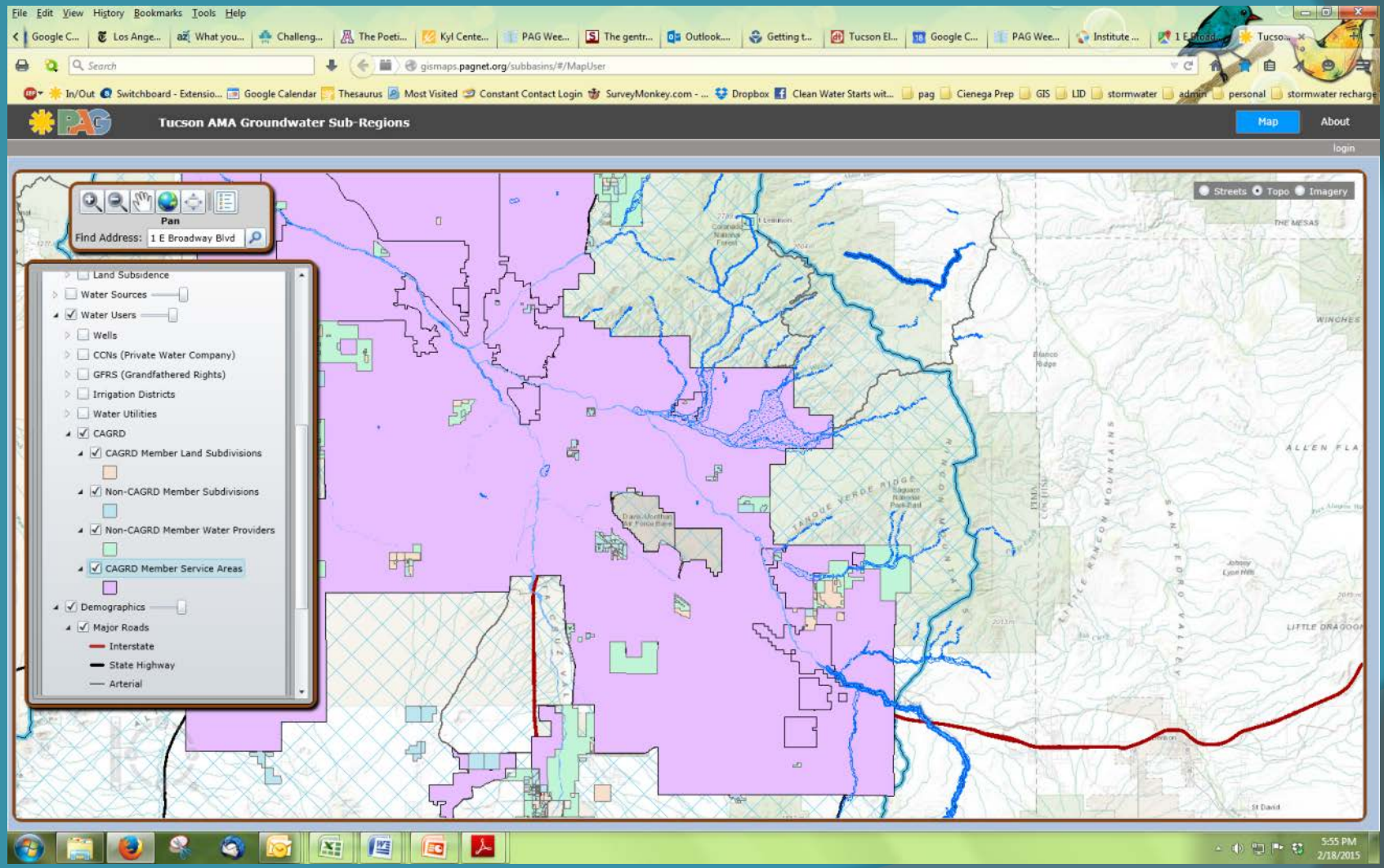


National Forest

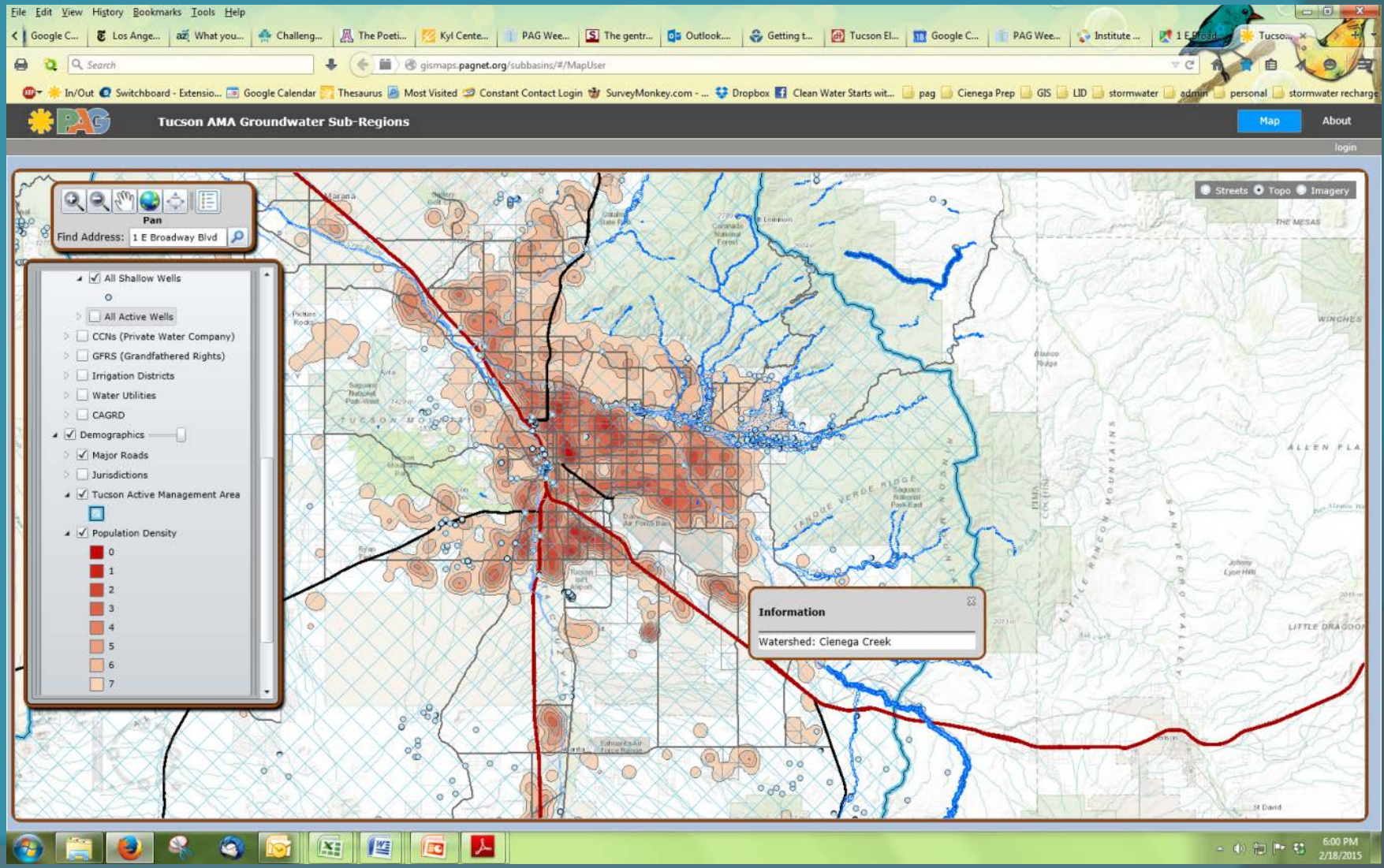
Private water companies, grandfathered rights, irrigation districts, water utilities



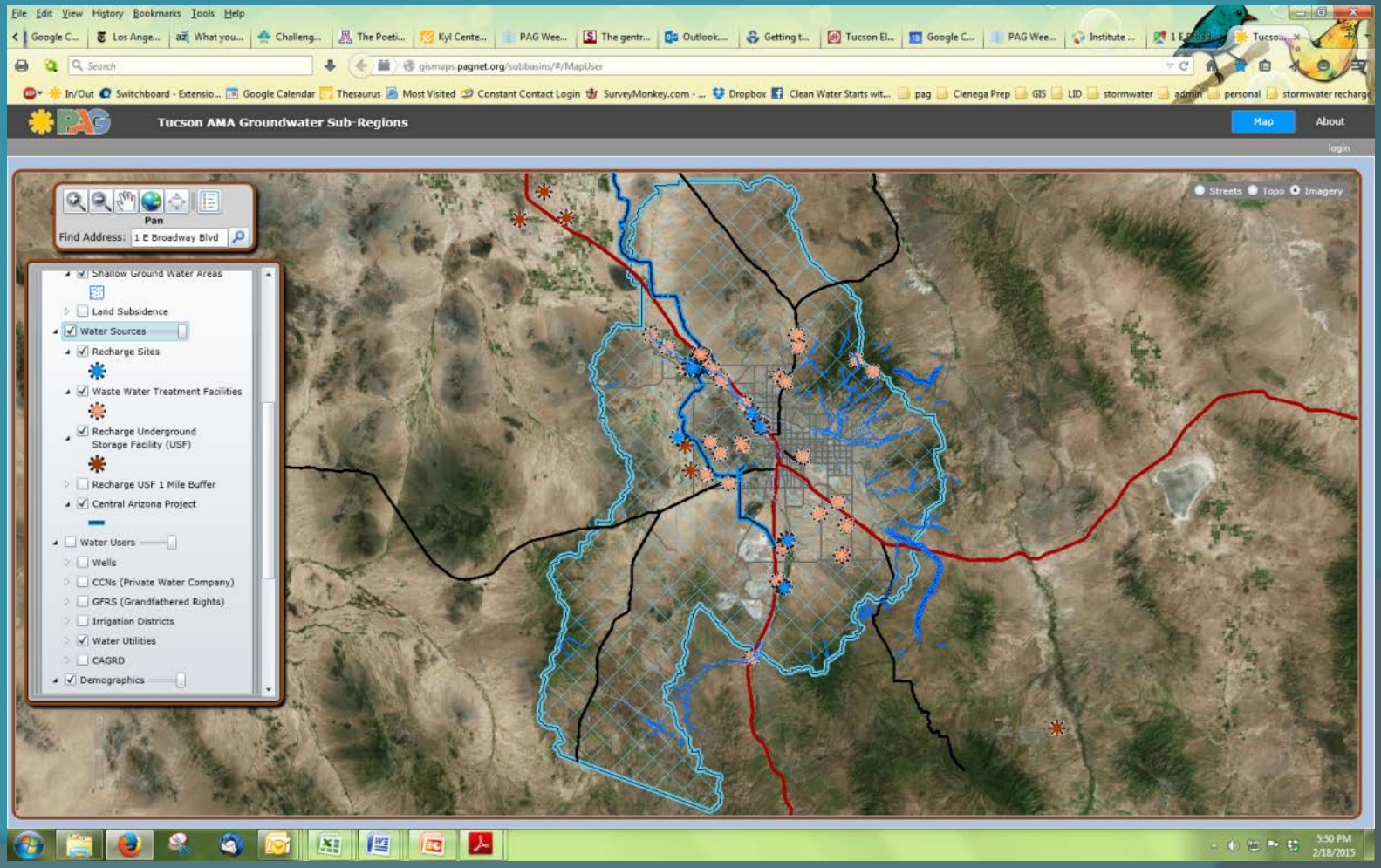
GRD and SGWAs



Population density and shallow wells

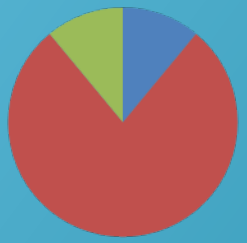


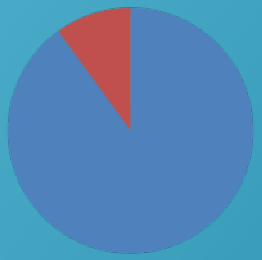
CAP, Recharge, WWTPs, USFs and SGWAs



(FUTURE) WATER ACCOUNTING AREA SUMMARY

CENTRAL TUCSON

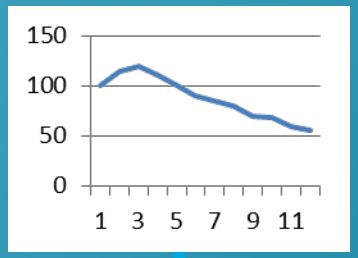




Groundwater Pumped

CAP Used

Reclaimed Water Used

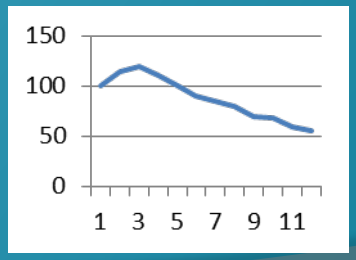


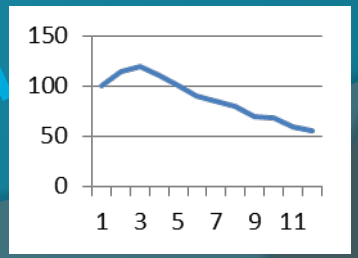
Number of Exempt Wells
Number of Non-Exempt Wells
Volume of CAP Recharged
Volume of CAP Recovered

Map Includes Dots for Wells:
Municipal, Agriculture, Mining and Exempt

Map of WAA

Average Water Level Change
2013 – 2014 XXX
2000 – 2014 XXX





Arid West Stormwater… our “Other” water

- Intermittent
- Often channelized
- Runs through streets
- Picking up pollutants

Green Infrastructure

Utilizing stormwater flows in the built environment

- PAG resolution
- Web-based prioritization tool
- Regional collaboration

Economic Vitality – Winter 2015

Green Infrastructure for Regional Vibrancy Resolution

A PAG resolution recognizing the value of green infrastructure / Low Impact Development

Particularly emphasizes impacts to **economic vitality**

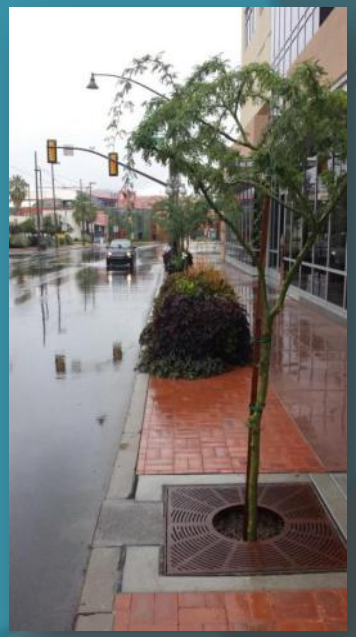
- Increase home property values and commercial business success
- Attract a professional workforce and new business
- Build urban tourism and connect to ecotourism
- Counteract heat and water resource concerns

Heat Resilience Through Shading

Sonoran Viewscapes & Branding

Mobility Safety

Pedestrian Buffers



Business Vibrancy

Reduced Irrigation

Image sources: PAG

Economic Vitality – Winter 2015

Green Infrastructure Business Case. . .

Answering the question: Is green infrastructure cost effective?

Autocase: A locally calibrated design tool Integrated into the Envision Rating System

- Assesses the Return on Investment over a project's life cycle
- Considers arid region pay back

Financial Benefits

Increased Value- Pavement longevity
Property and sales

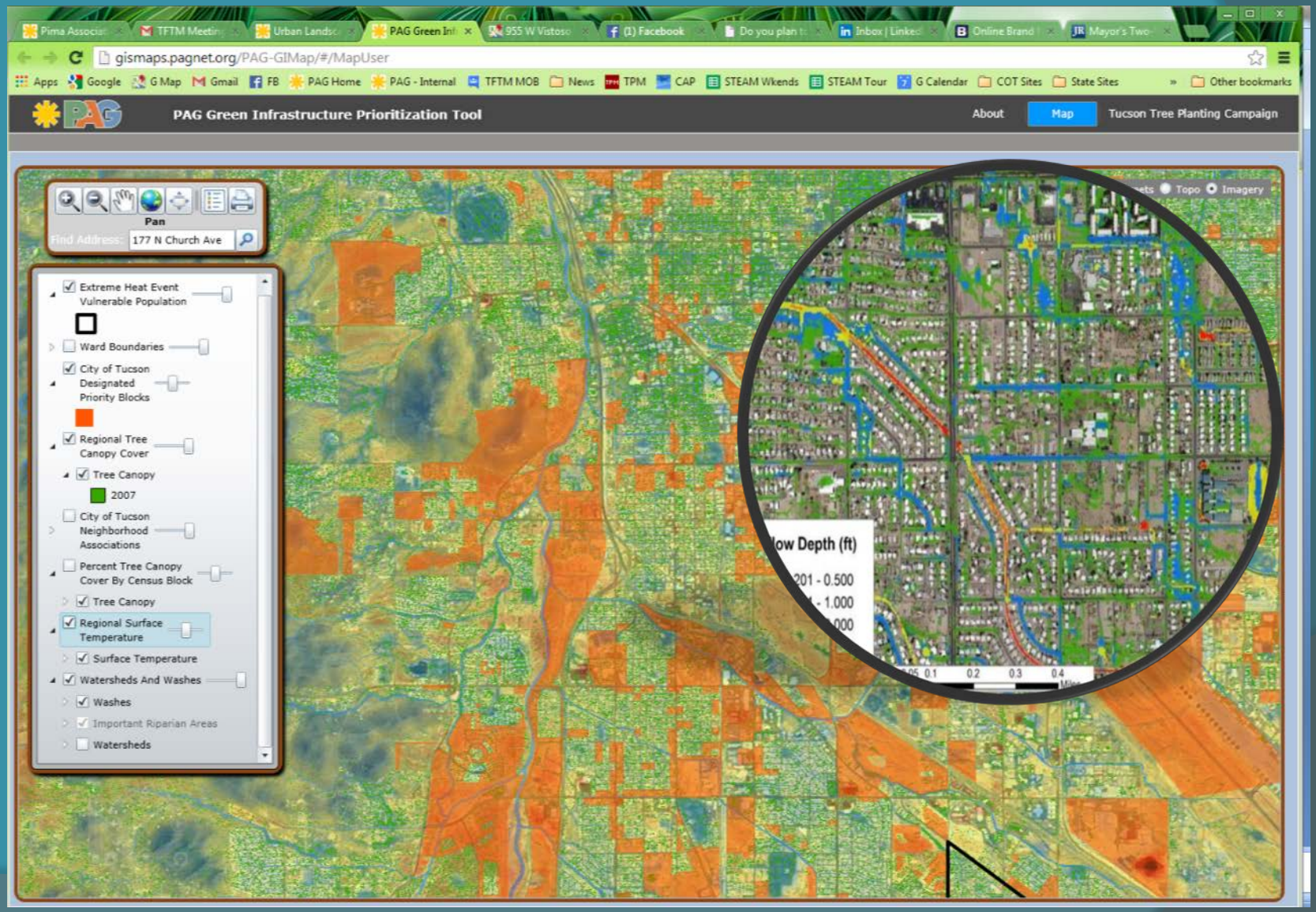
Increased Safety- Traffic accidents
Heat injury / mortality
Flooding

Reduced Costs- Irrigation
Air pollution
Energy

AutoCASE™

Image sources PAG

Green Infrastructure Combating Heat



Regional Collaboration

- Arid LID conference
  Presentation and facilitated workshop to assess next steps
- PC guidance manual, 2015
- Case Studies
  20 (commercial, streets, institutional)

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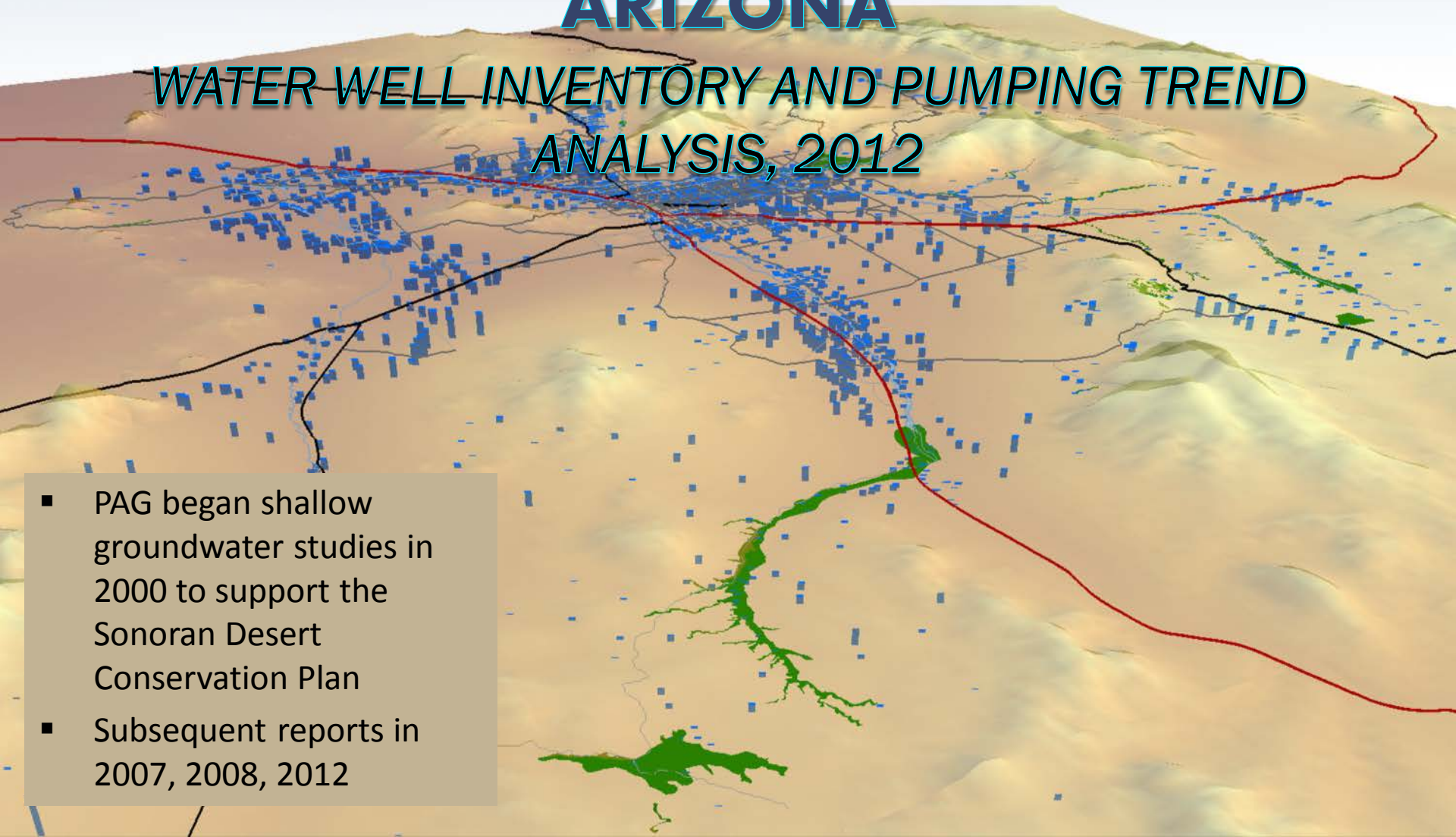
SHALLOW GROUNDWATER AREAS IN EASTERN PIMA COUNTY, ARIZONA

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

I-10

Santa Cruz River

Santa Catalina Mtns.

Rincon Mtns.

I-10

AZ-86

AZ-286

Santa Cruz River

Baboquivari Mtns.

Altar Valley

Santa Rita Mtns.

I-19

AZ-83

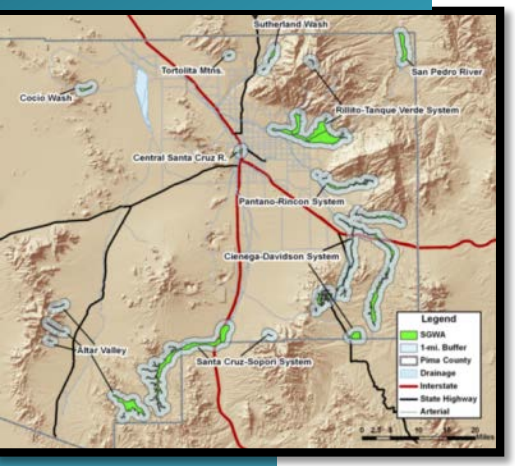
Legend

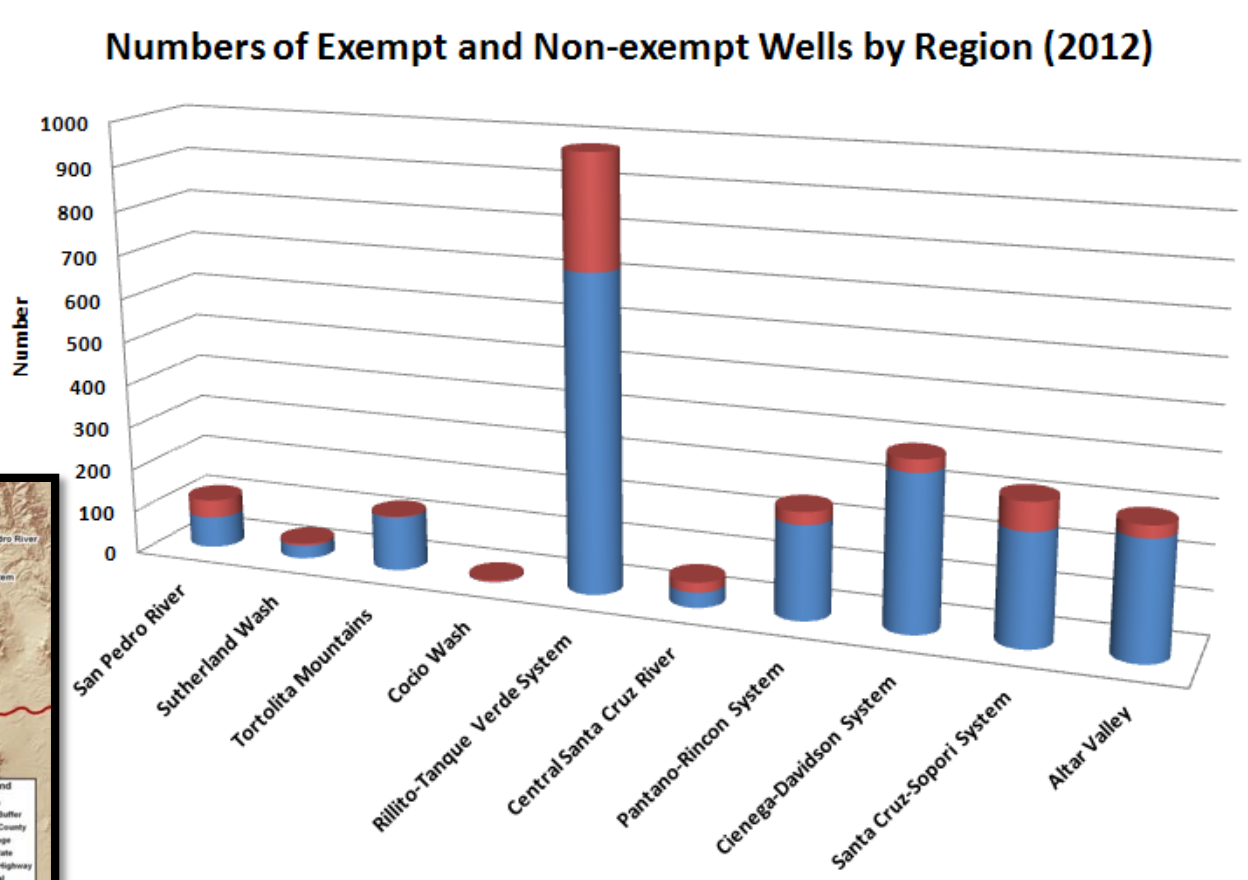
- SGWA
- 1-mi. Buffer
- PimaCounty
- Drainage
- Interstate
- State Highway
- Arterial

0 2.5 5 10 15 20 Miles

Exempt/Non Exempt Comparison

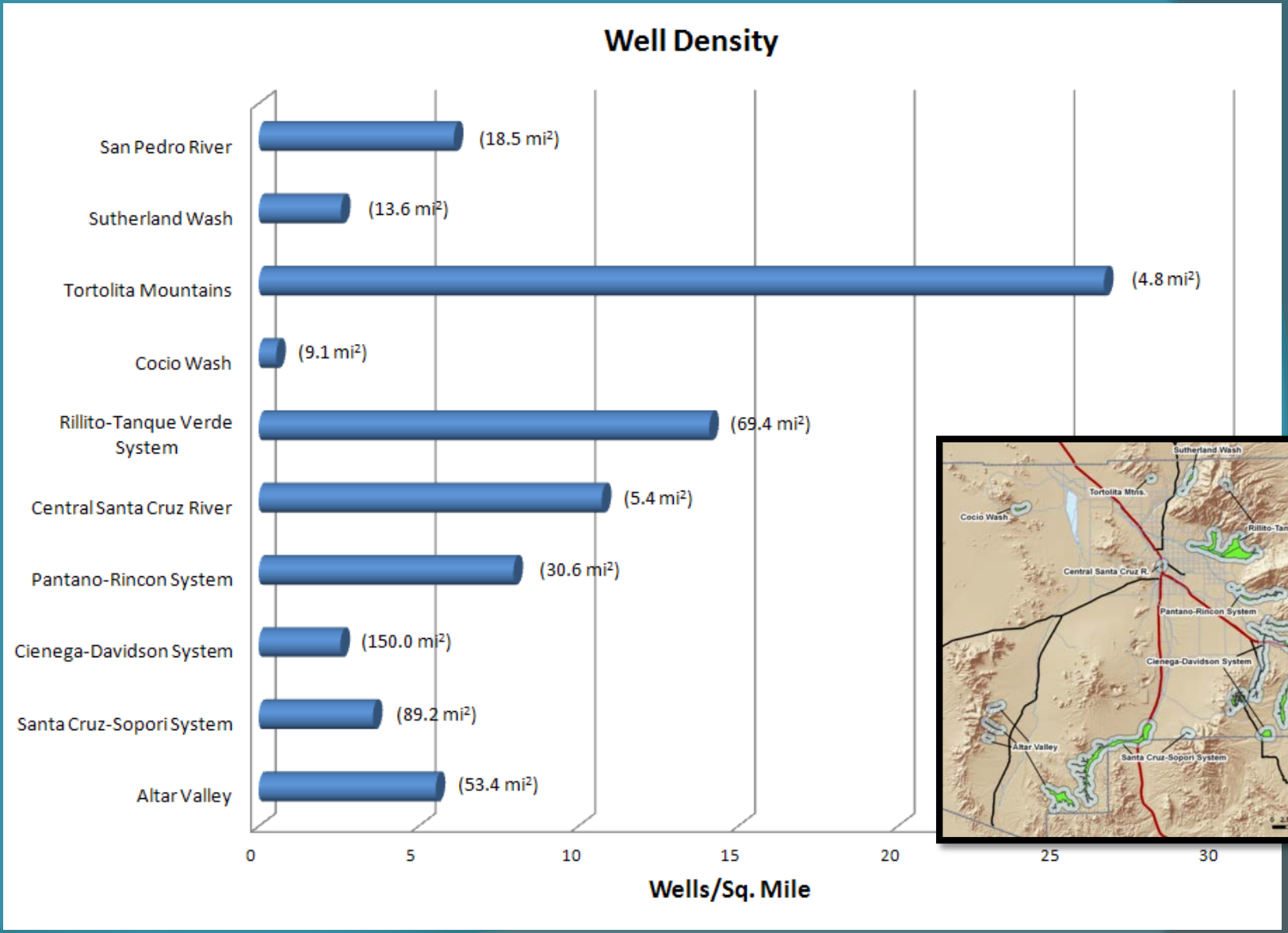
Generally, More Exempt Wells than Non-Exempt



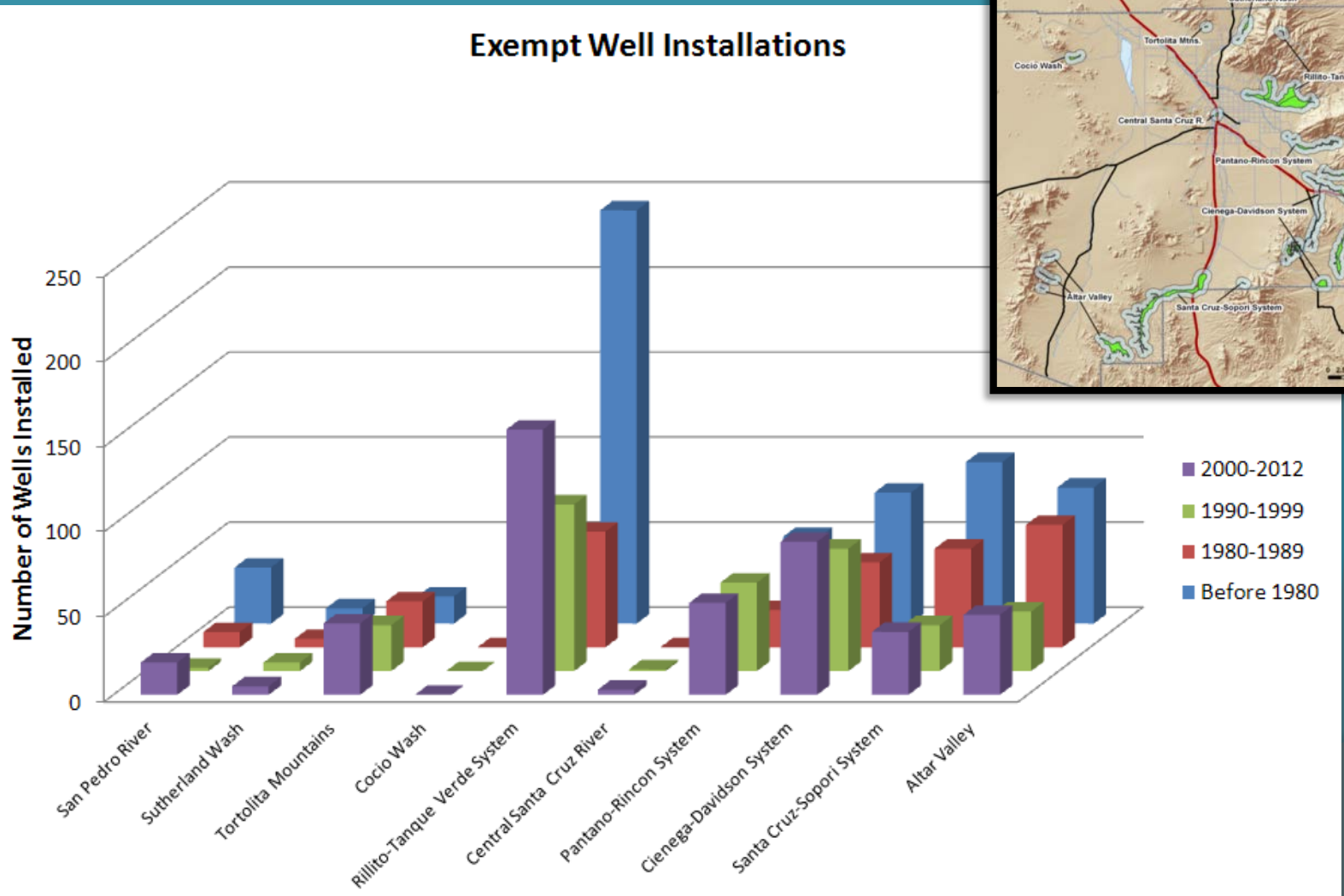


Region	San Pedro River	Sutherland Wash	Tortolita Mountains	Cocio Wash	Rillito-Tanque Verde System	Central Santa Cruz River	Pantano-Rincon System	Cienega-Davidson System	Santa Cruz-Sopori System	Altar Valley
# Non-exempt Wells	41	5	2	4	257	23	29	29	64	28
# Exempt Wells	72	30	125	1	722	35	215	355	255	268

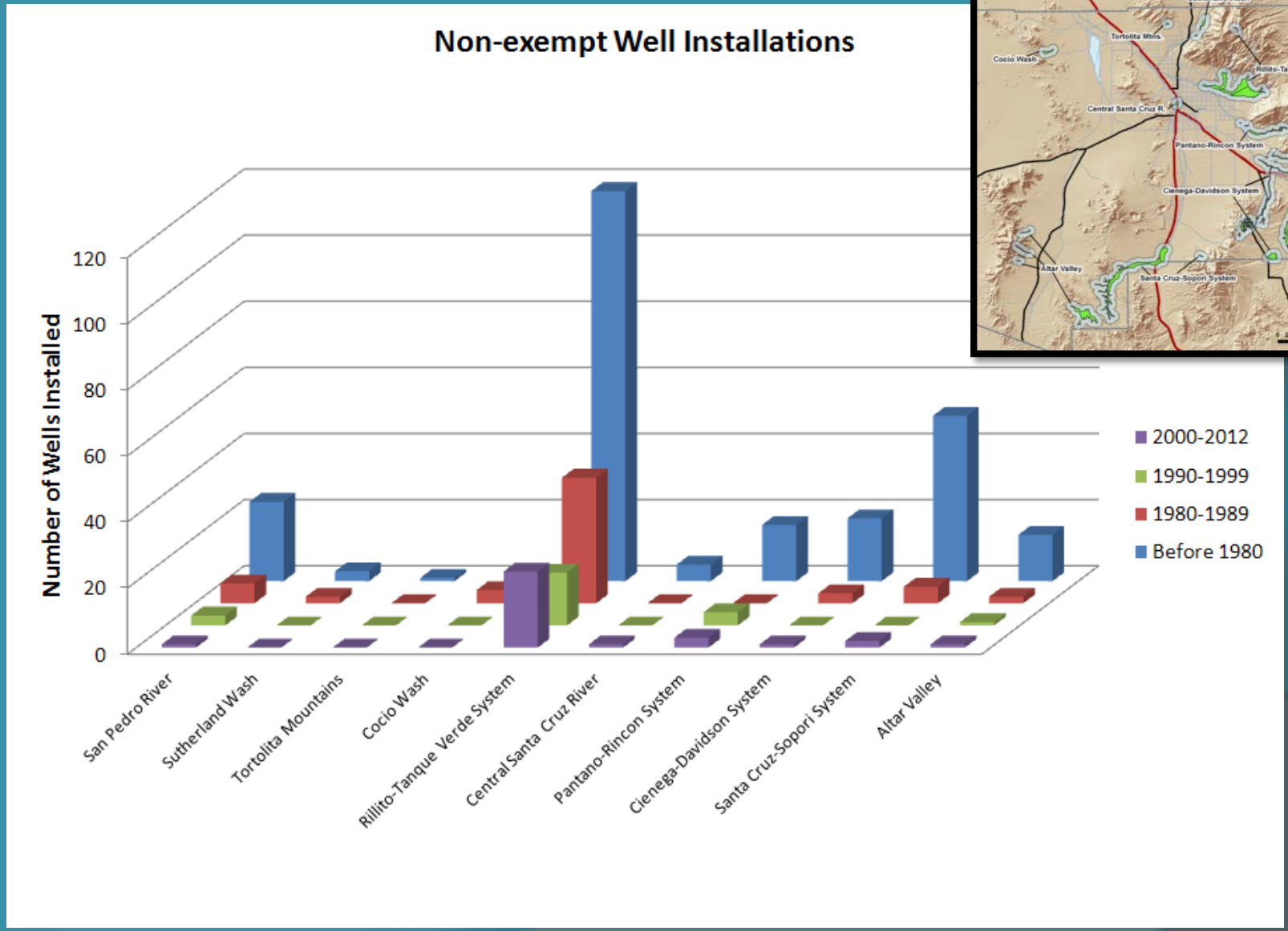
Well Density



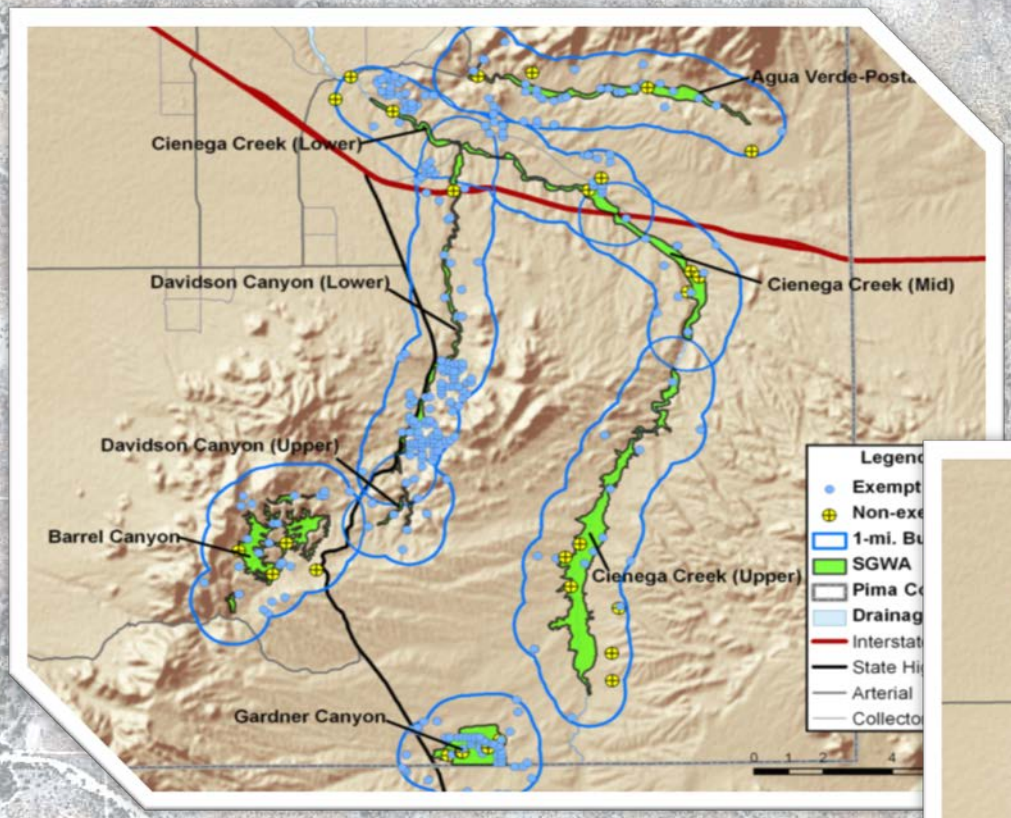
Drilling Trends – Exempt Wells

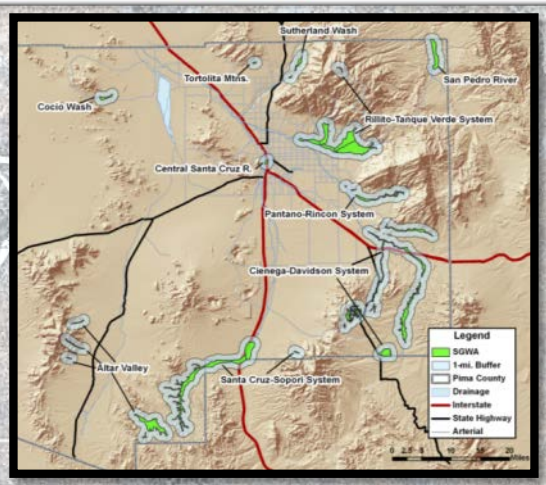


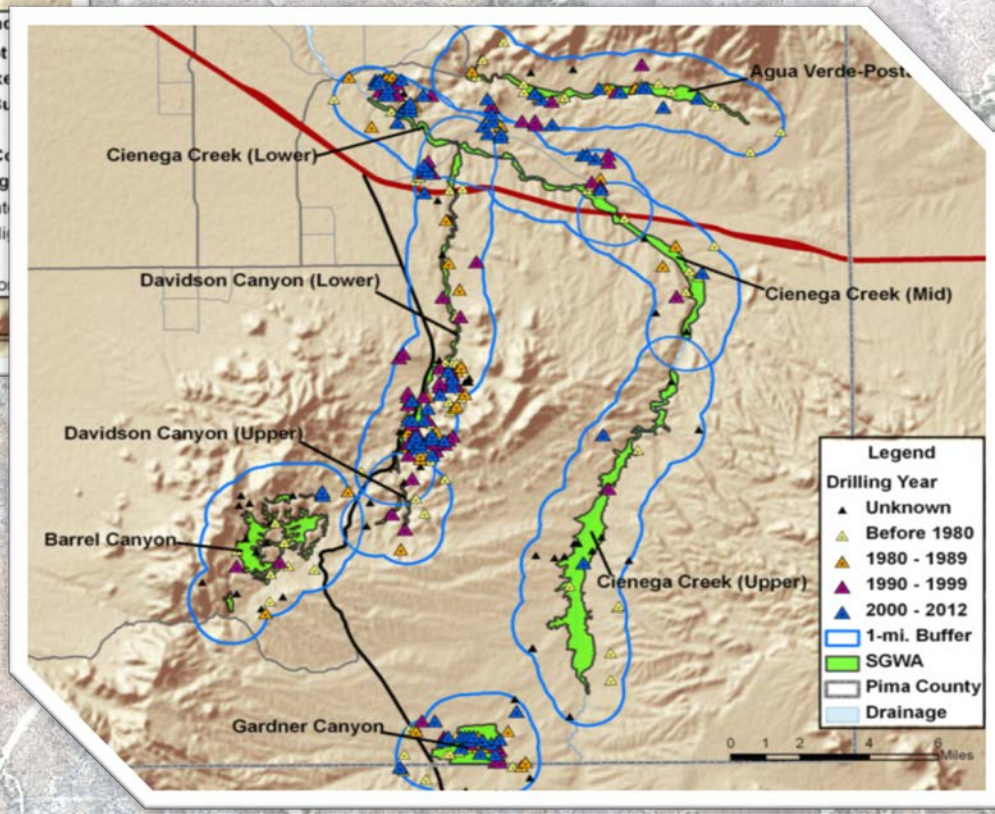
Drilling Trends – Non-exempt Wells



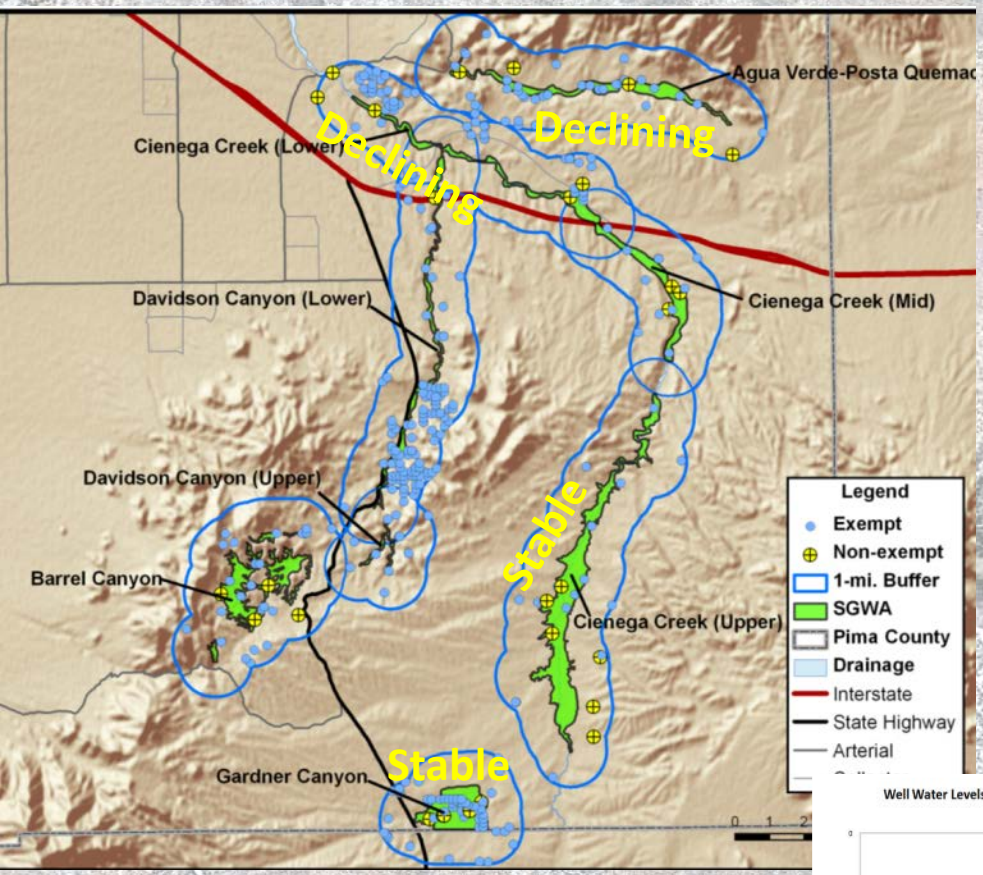
Cienega Creek Region

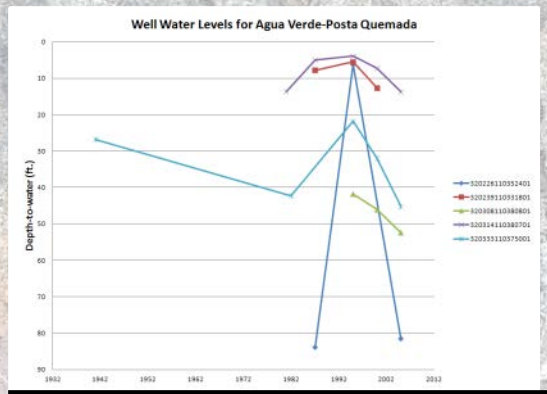


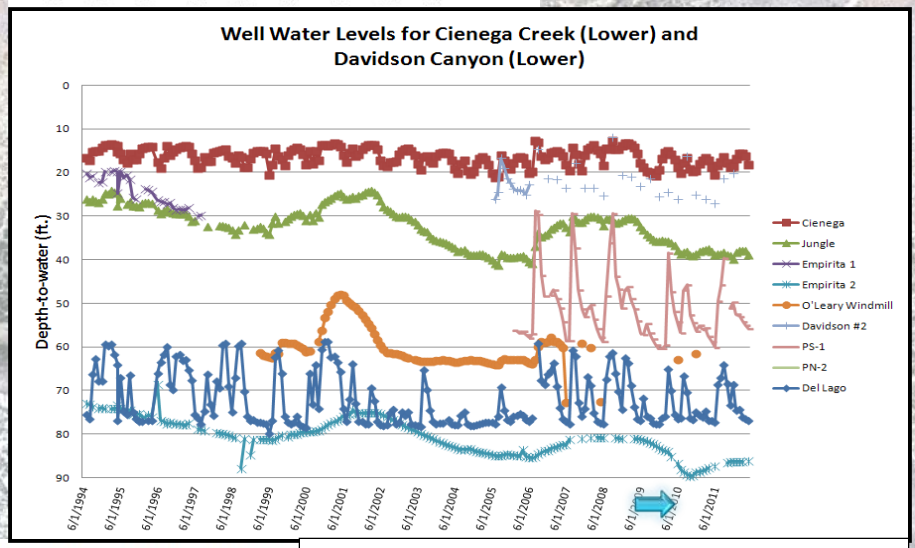


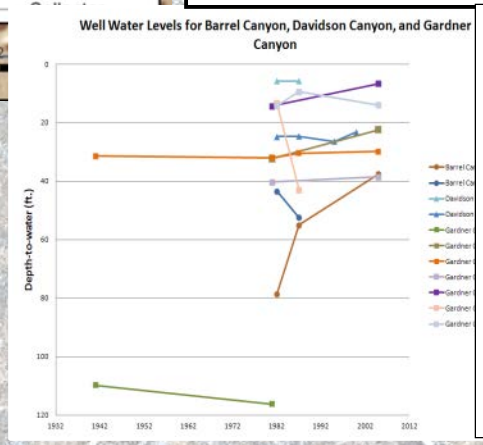


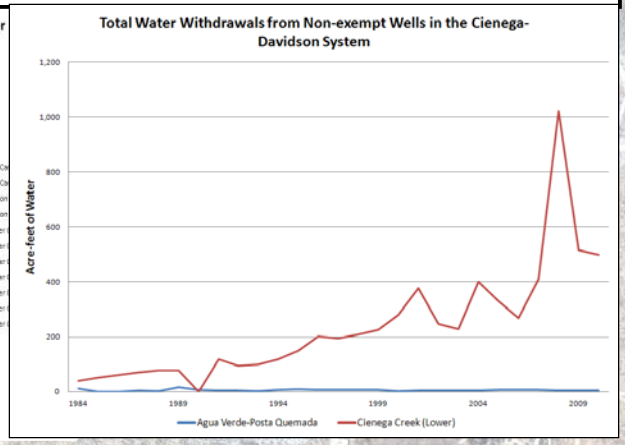
Cienega Creek Region





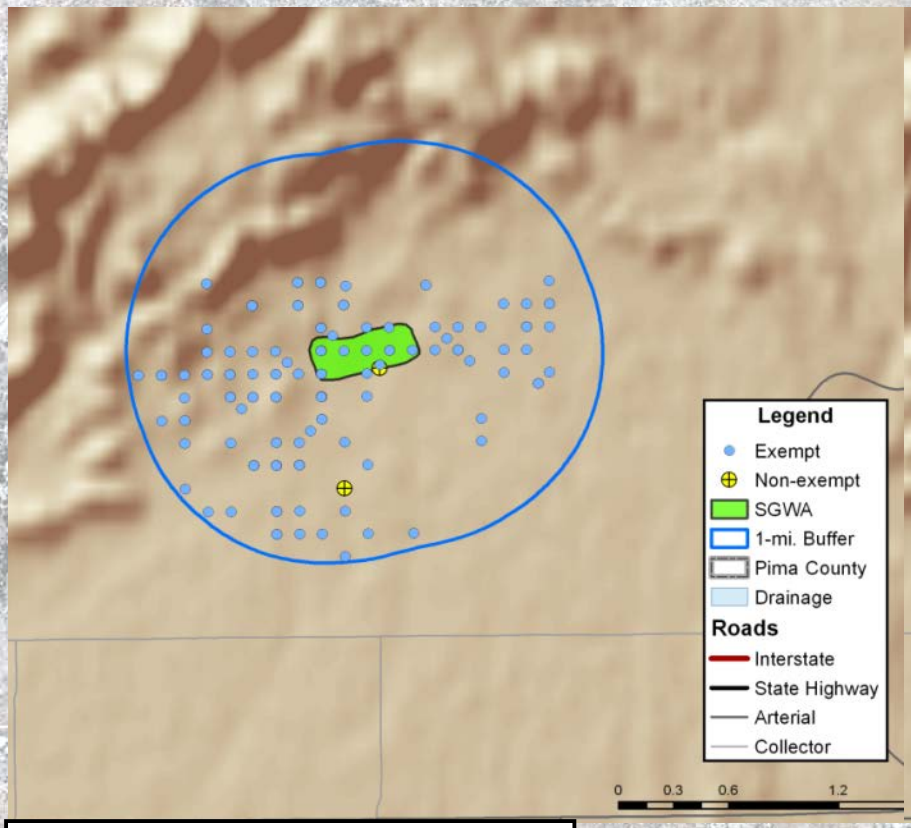


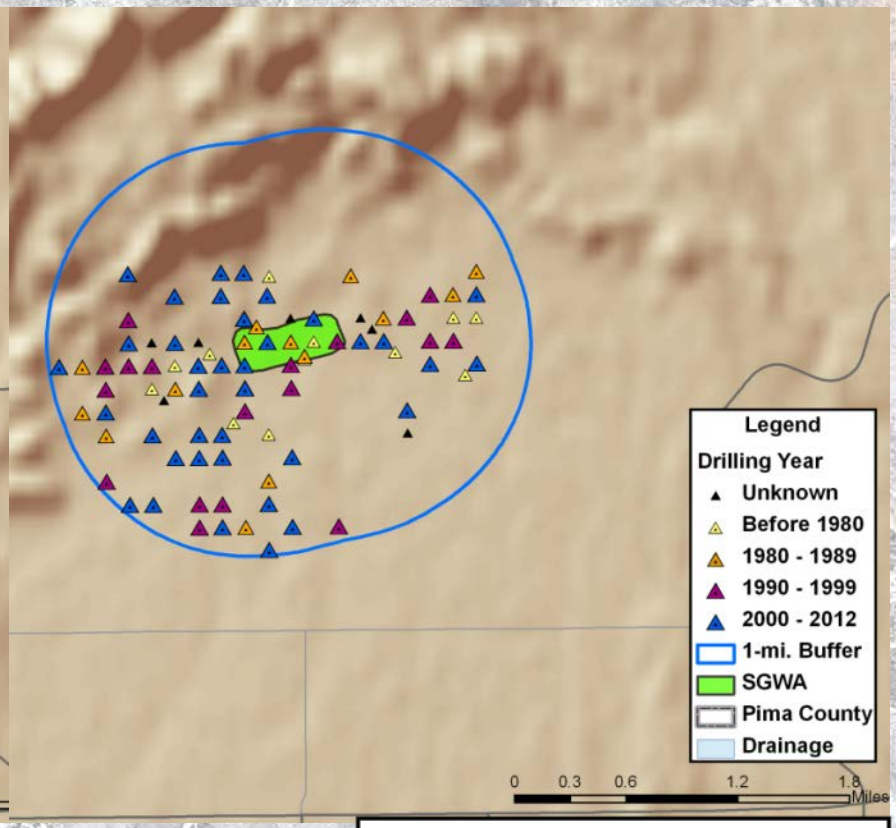


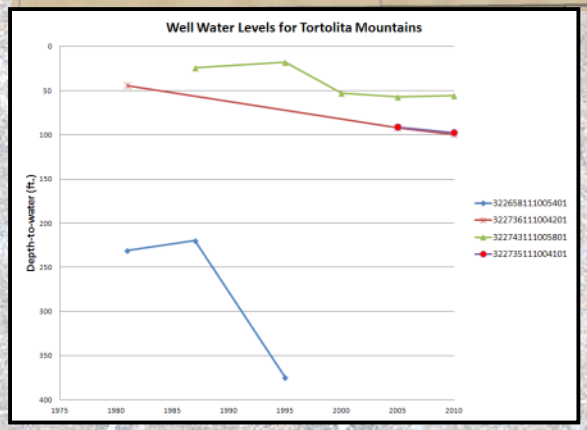


Low-moderate well density
Low-moderate drilling activity
- **Low water withdrawals**
- **Stable, declining, inconclusive**

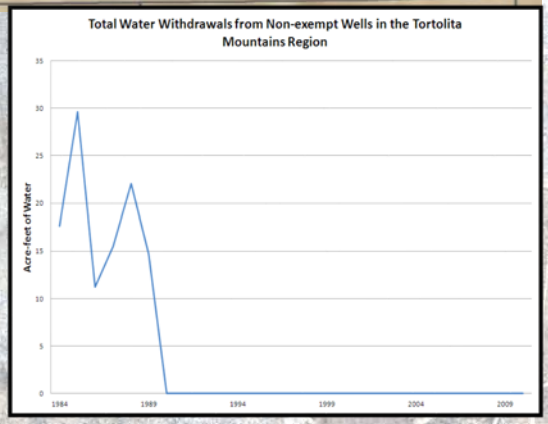
Tortolita Mountains Region



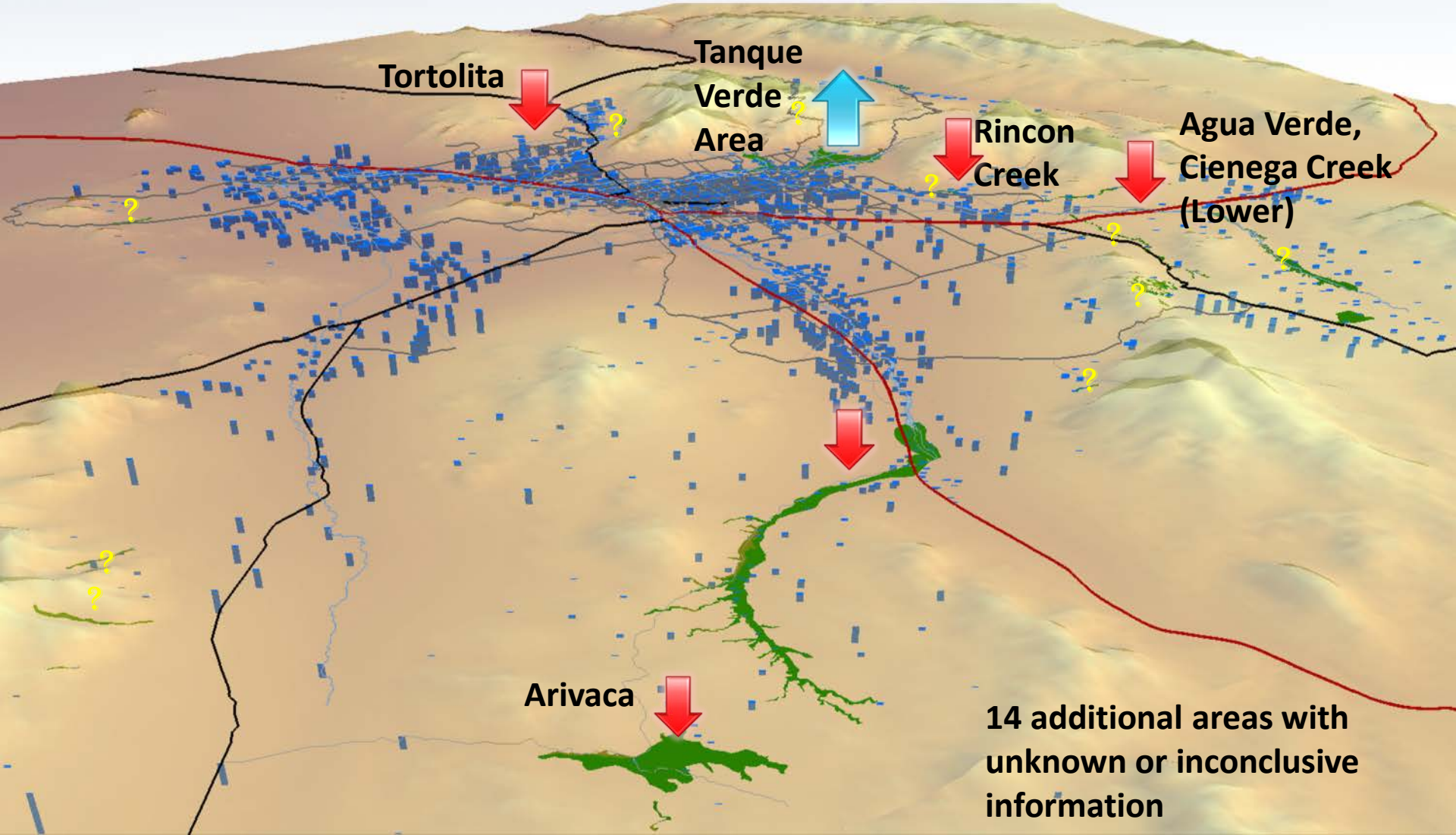




- ✡ ✡ Very high well density
- ✡ Moderate drilling activity
- ✡ Moderate water withdrawals
- ✡ ✡ Declining water levels



Declining Shallow Groundwater Areas



Drought and Planning

- Consider local conditions vs CAP supply
- Private well pumping will likely increase with local drought and heat
- Consider restoration possibilities in shallow aquifer (head water) areas
-


Questions?
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