Record Breaking Drought
in the Lower Cienega Watershed

Unique, shallow groundwater- dep endent system monitored by PAG **since 1989**

Of **regional importance** for its **unique environmental and recreational value** in an arid landscape

"Outstanding Water" designation by the state of Arizona

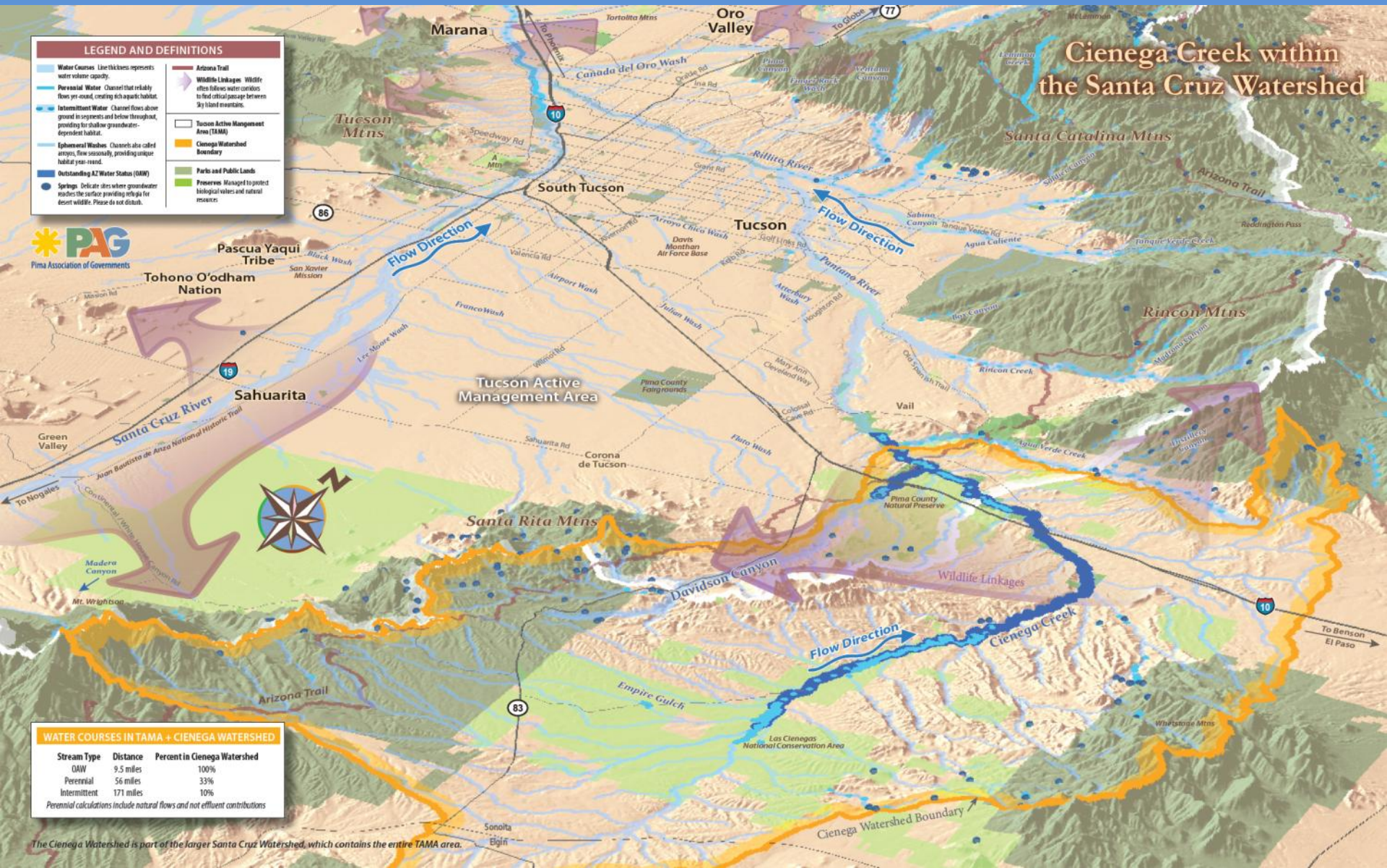
Ashley Hullinger
Watershed Planning Intern

Mead Mier
Watershed Planning Lead

Sustainable Environment Program

Pima Association of Governments

Cienega Creek Preserve

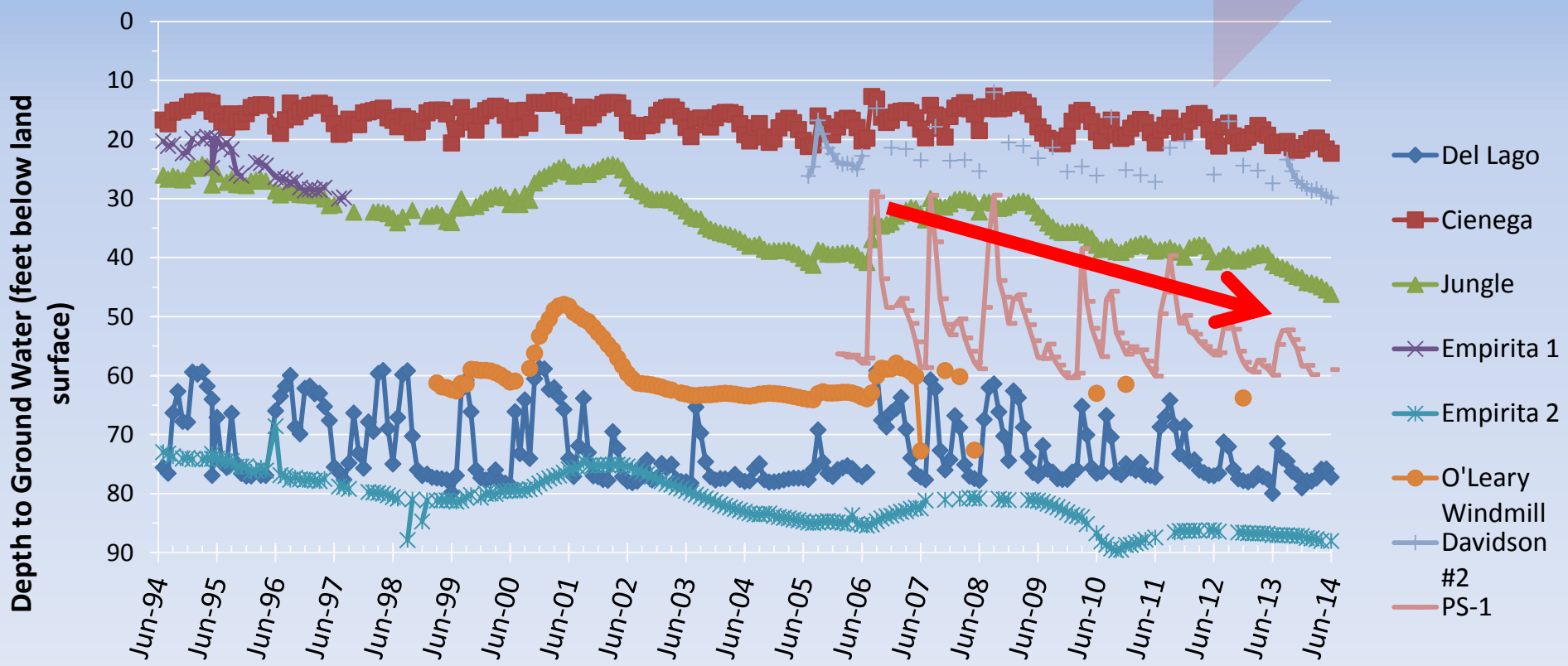


Groundwater Levels

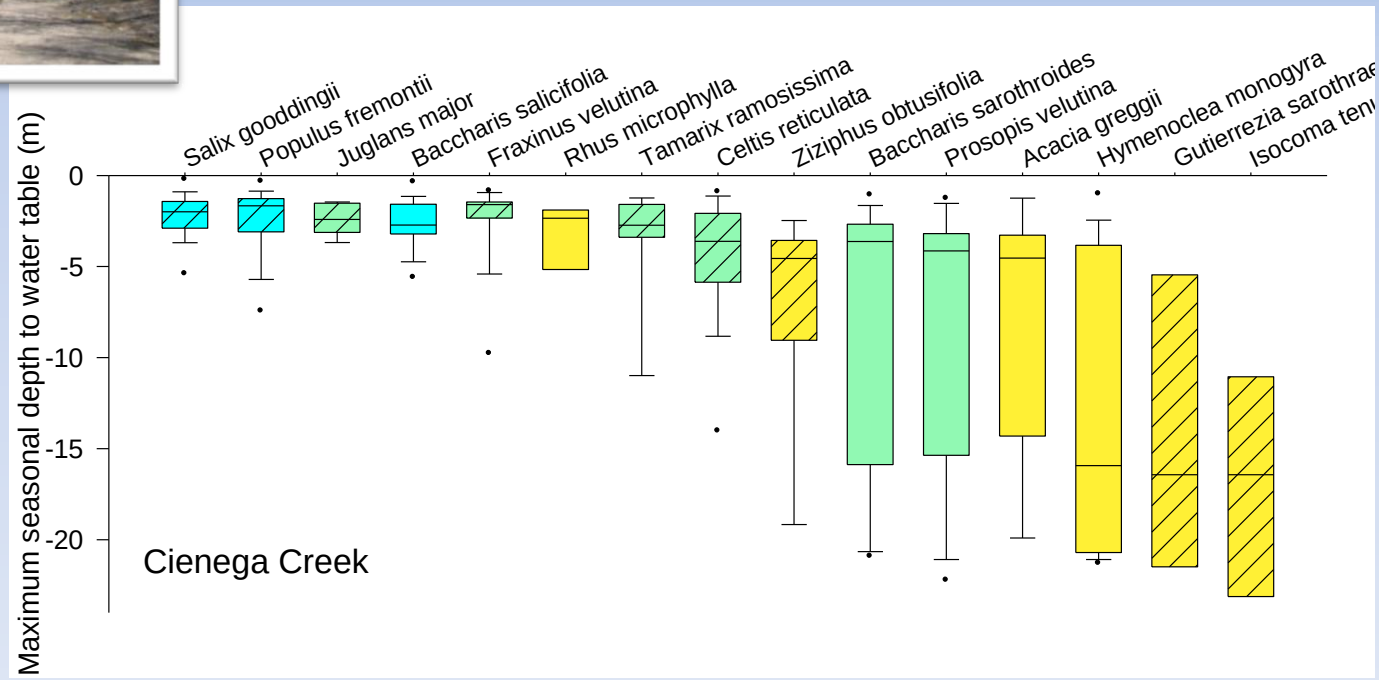
[2013-14] Record Low: average well levels lowered by 5 ft (2nd year)

Average Depth to Water

2005-06	2010-11	2013-14
DtW = 66.44 ft	DtW = 71.68 ft	DtW = 82.14 ft



Significance of Groundwater Levels for Cienega Creek



Source: Stromberg

Significance of Groundwater Levels for Arid Lands Riparian Areas

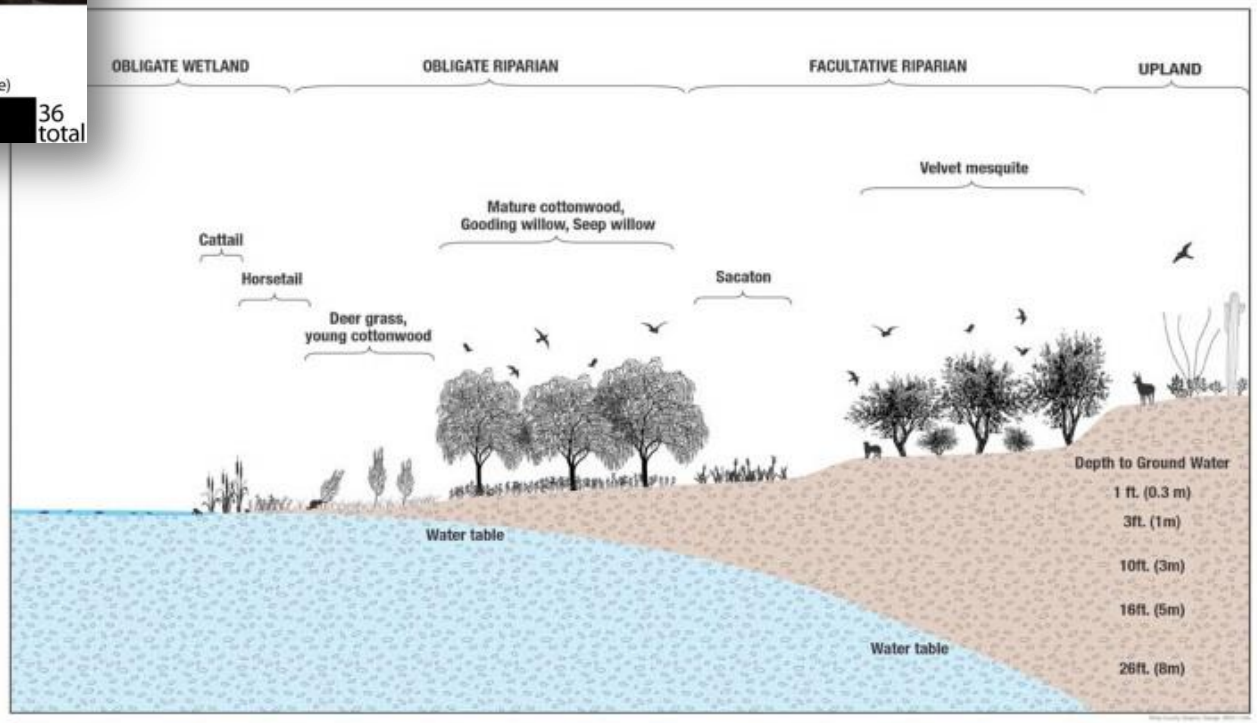
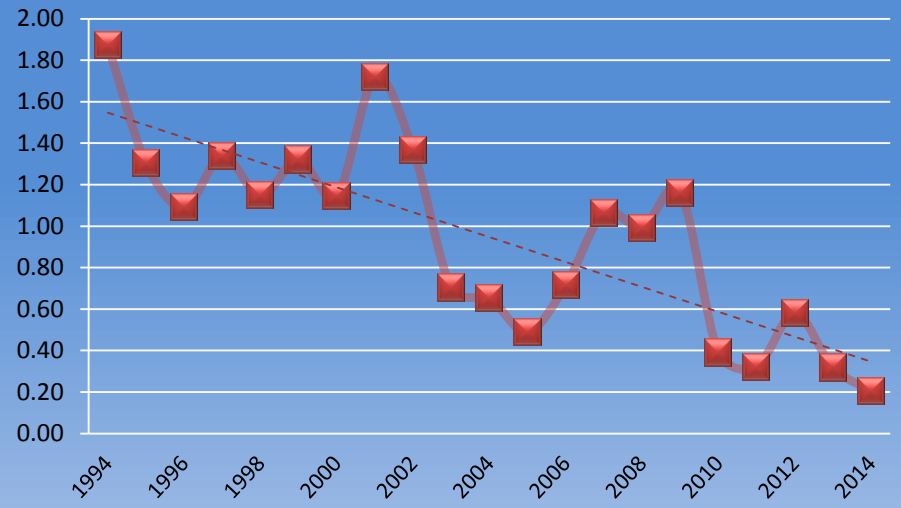
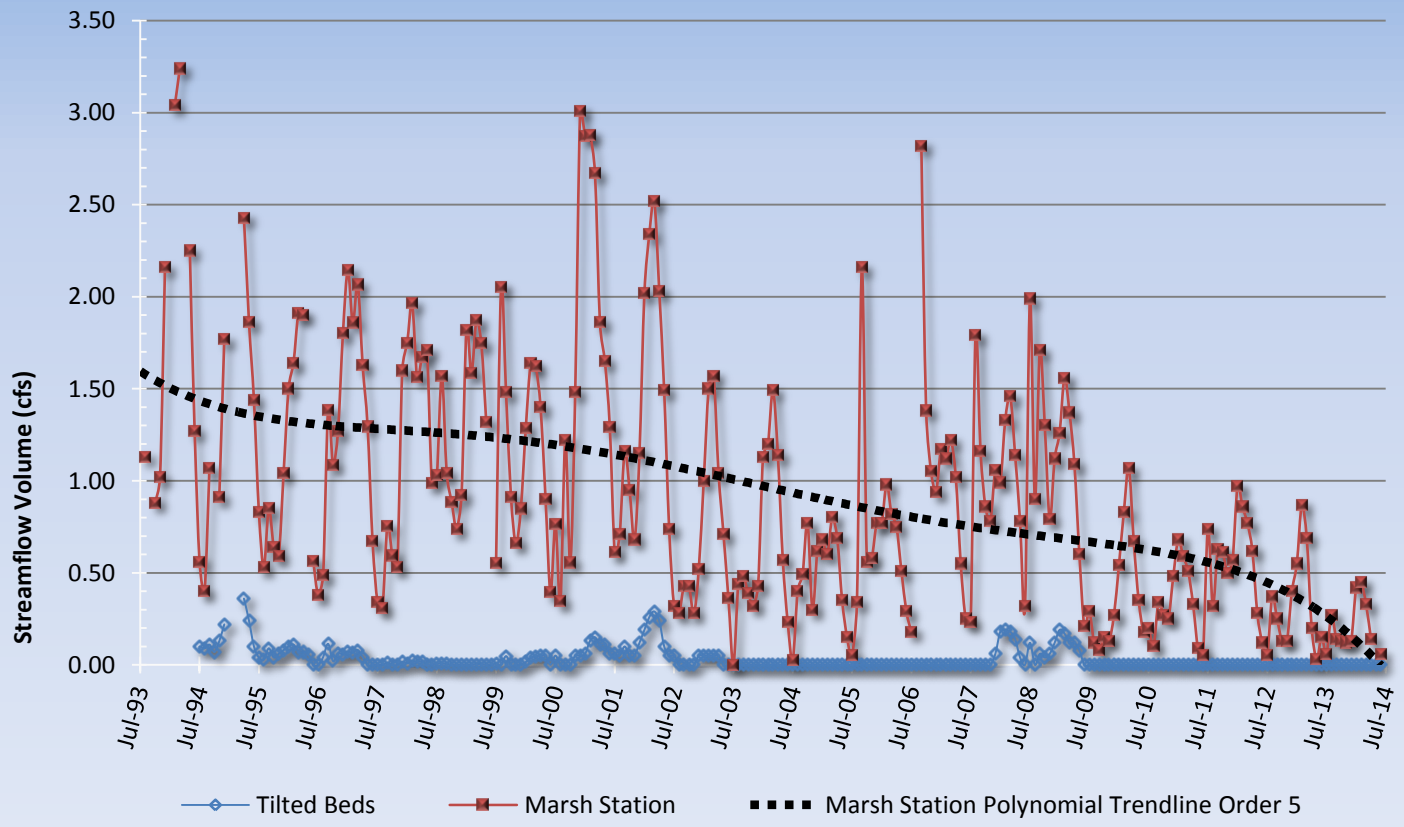


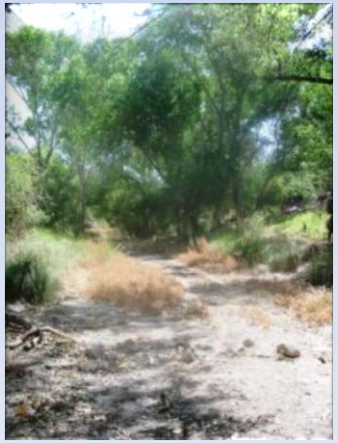
Figure 5. Cross-sectional view of river valley showing relationship between water table and common aquatic and riparian biotic communities (Illustration by Julie Stromberg, Barbara Tellman and Julia Fonseca, based on data in ADWR 1994)

Stream Flow Volume

[2013-14] Record Low:
annual average of 0.21cfs
i.e. ~15% of pre-drought average volume



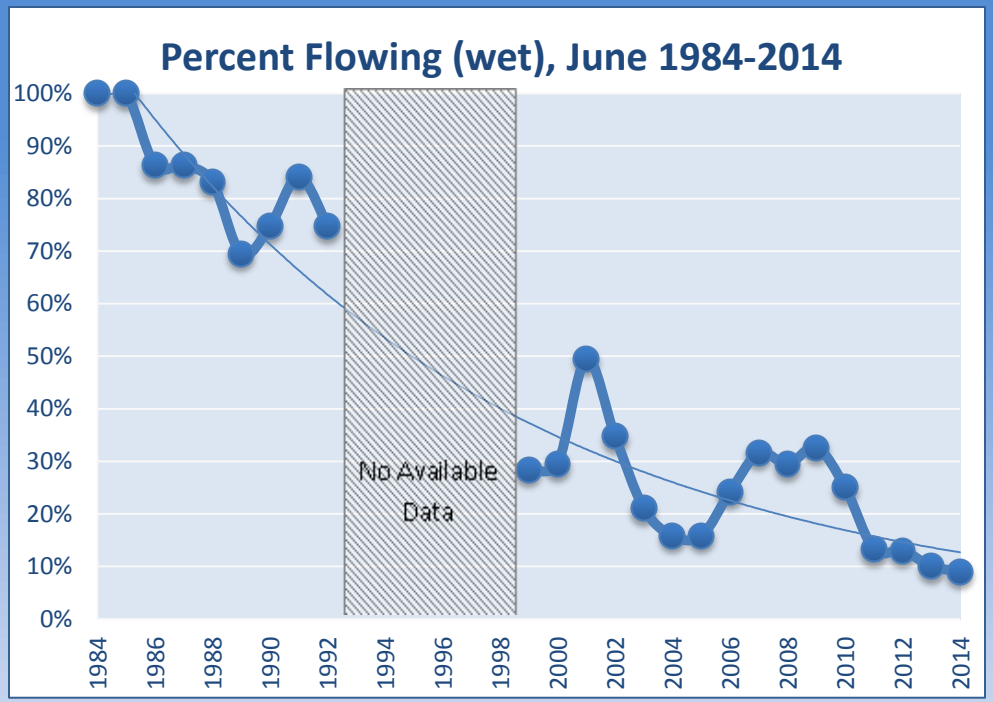


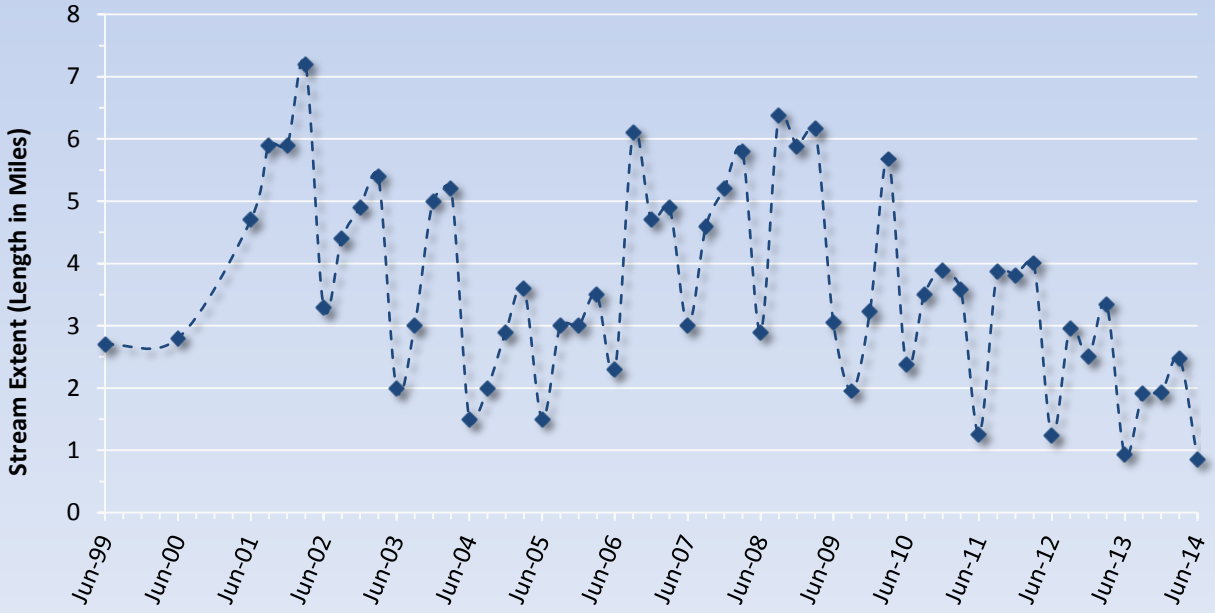


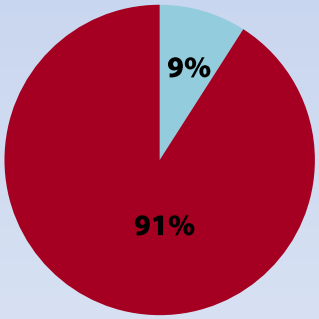
Flow Extent

[2013-14] Record Low:

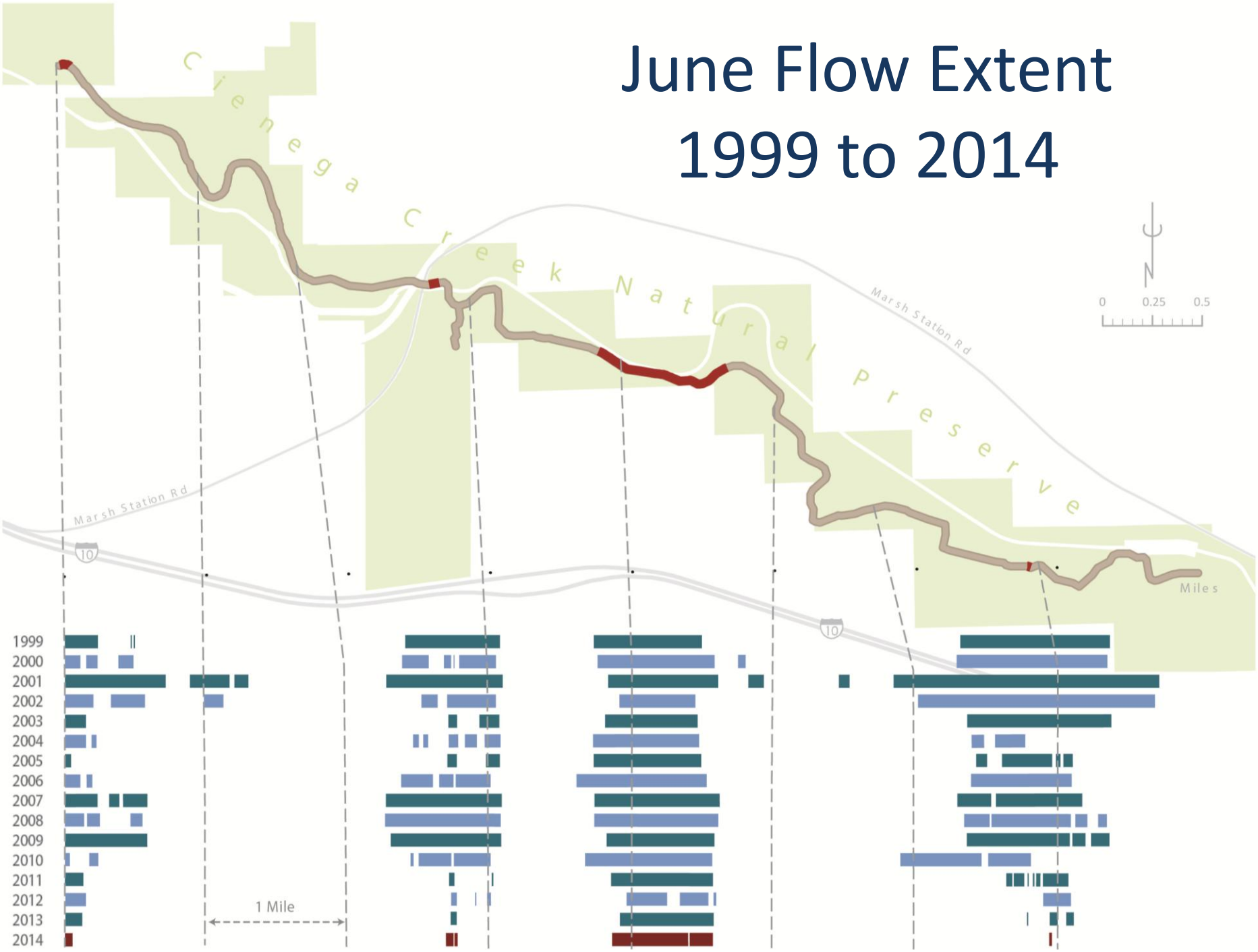
- 0.86 mile of flow extent in June
- i.e. 9% of mid-1980s flow





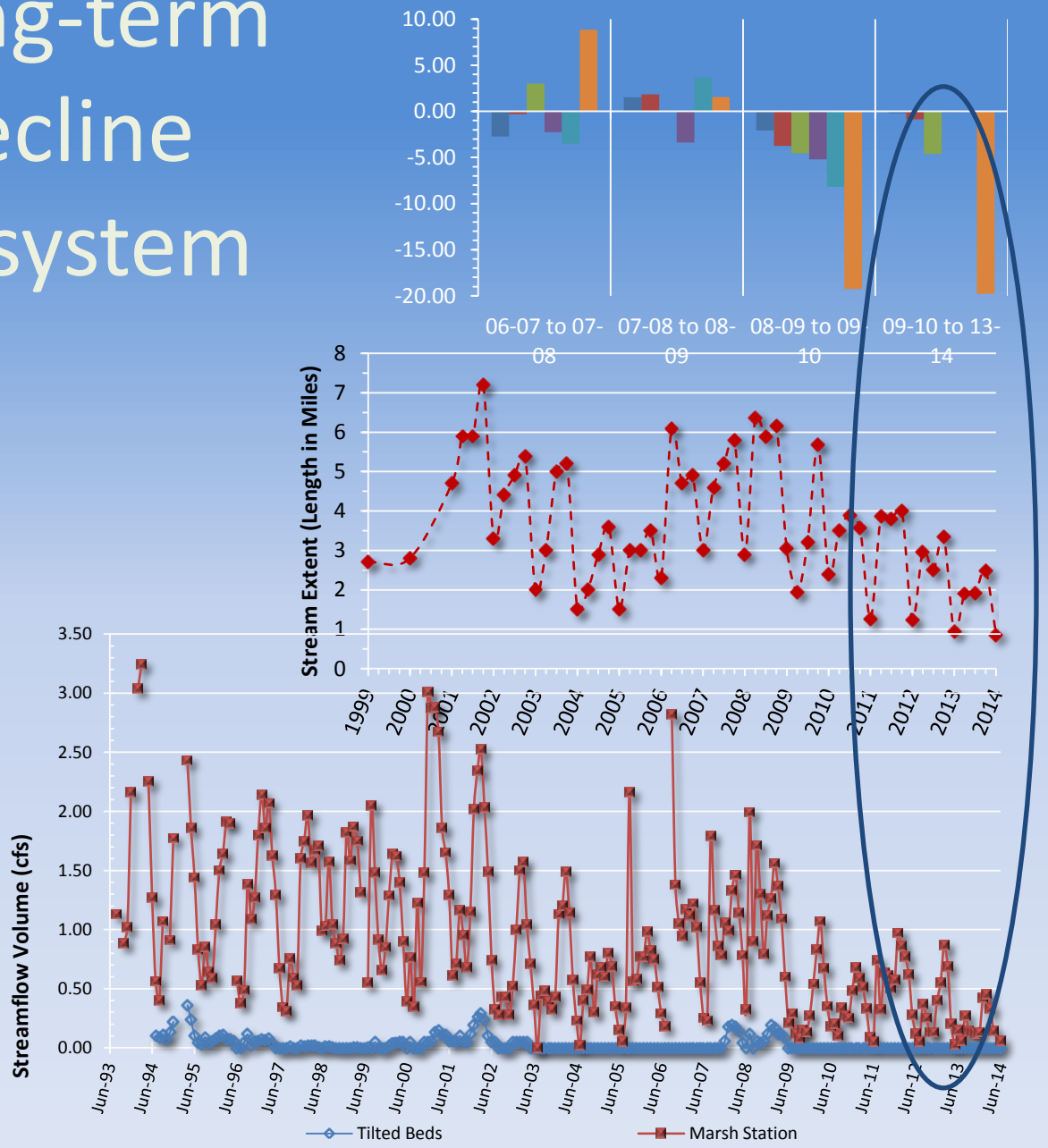


June Flow Extent 1999 to 2014

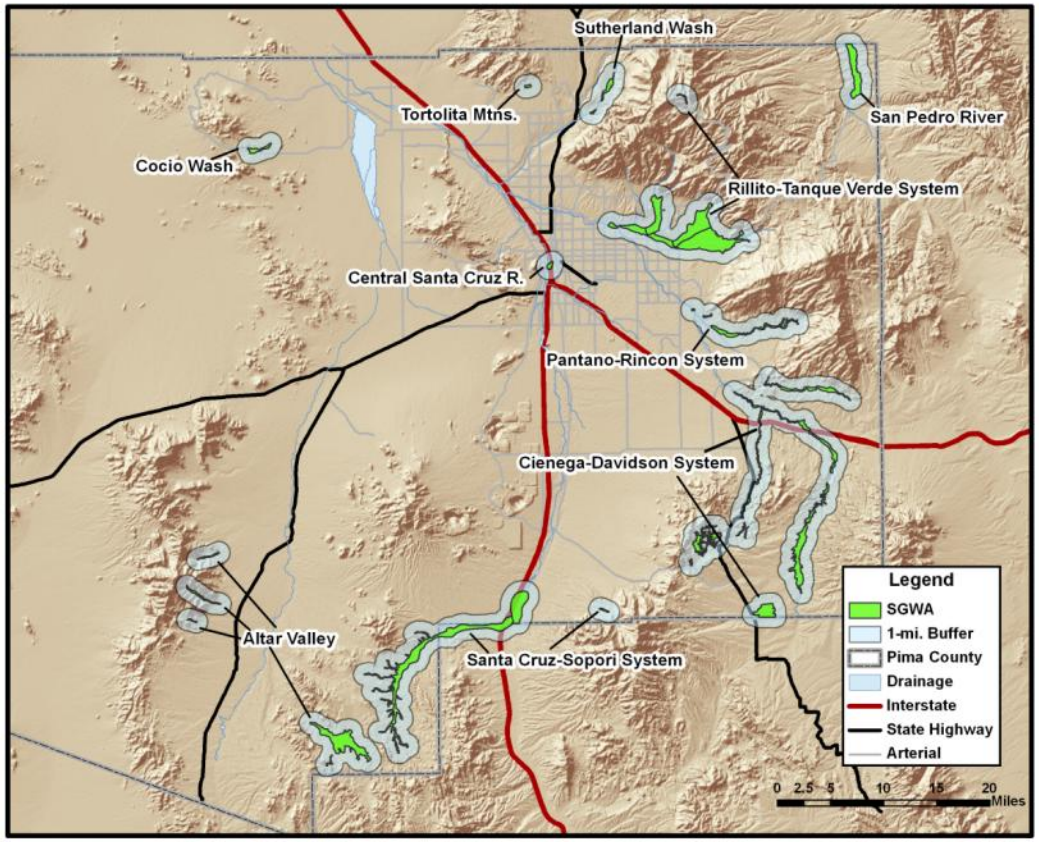


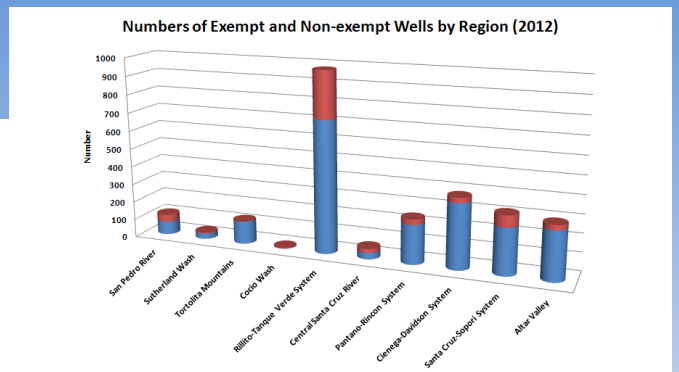
Significant long-term baseflow decline stressing ecosystem

- PAG recommends that further ecological monitoring be conducted to track the populations of species and their habitats and their water needs

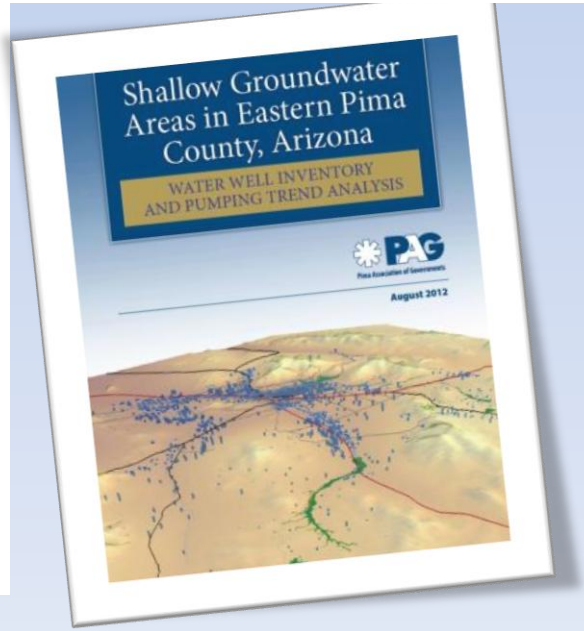


Representative of Urban Periphery and Shallow Groundwater Ecosystems

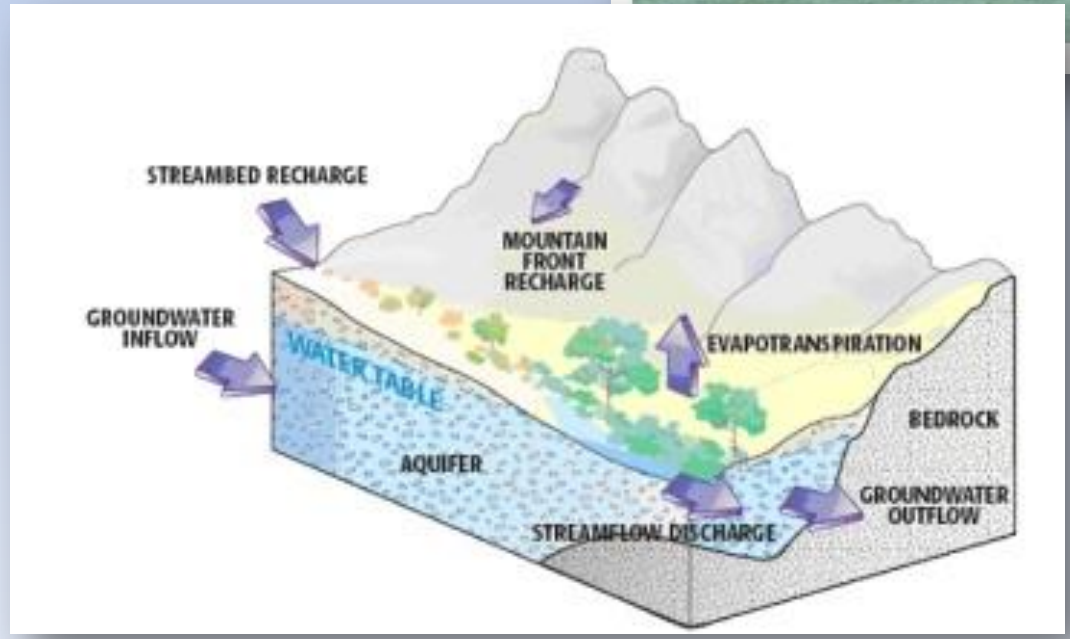




Region	San Pedro River	Sutherland Wash	Tortolita Mountains	Cocio Wash	Rillito-Tanque Verde System	Central Santa Cruz River	Pantano-Rincon System	Cienega-Davidson System	Santa Cruz-Sopori System	Altar Valley
# Non-exempt Wells	41	5	2	4	257	23	29	29	64	28
# Exempt Wells	72	30	125	1	722	35	215	355	255	268

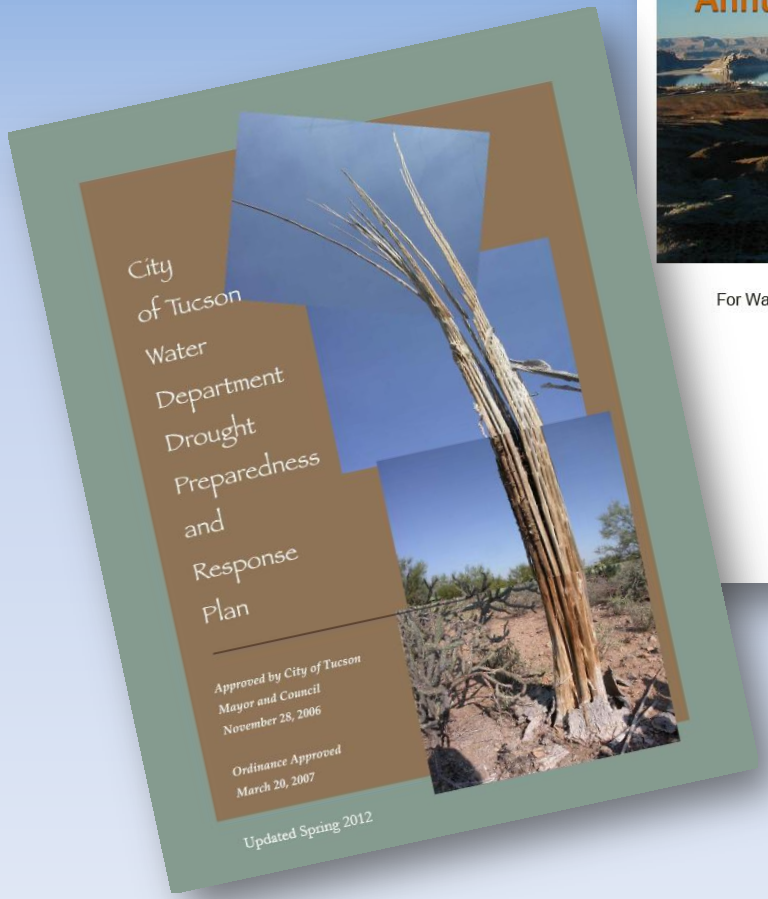


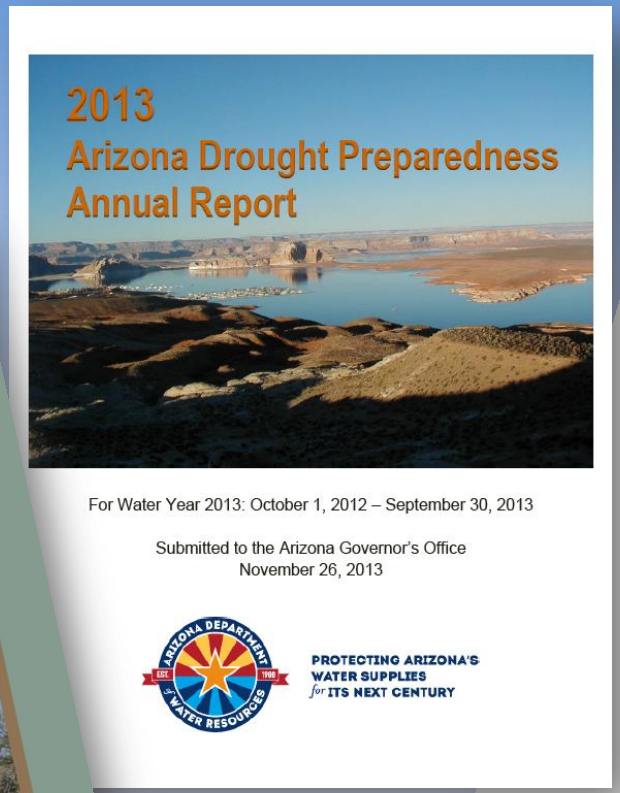
Drought Impacts to Riparian Areas and Well Owners in the Urban Periphery

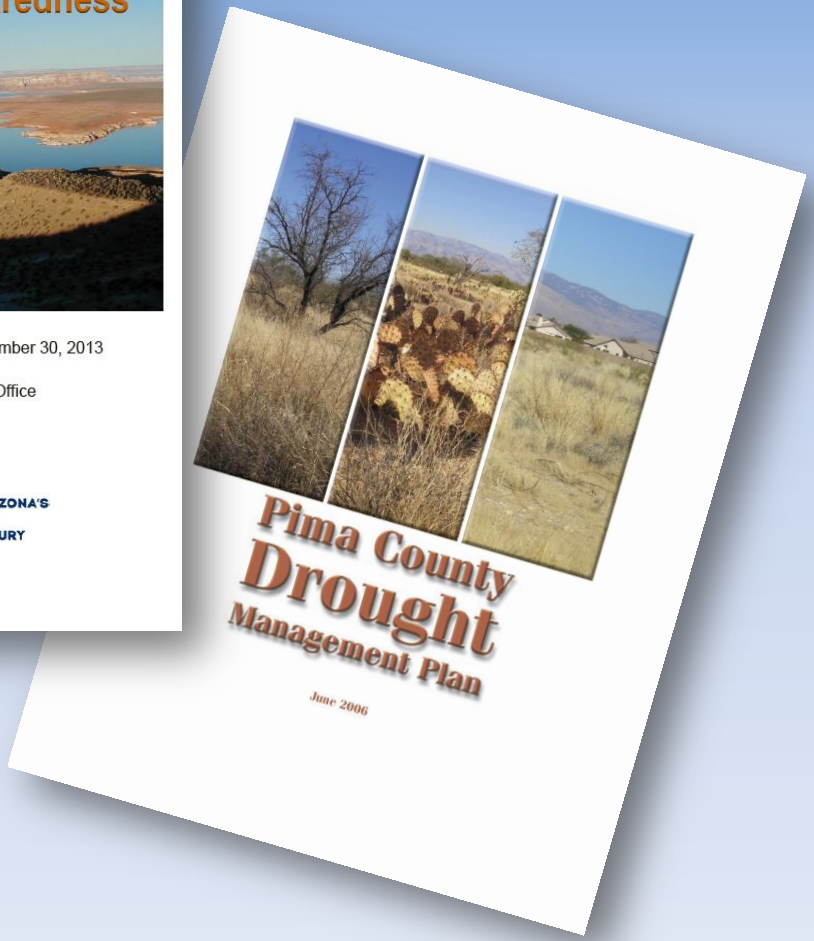
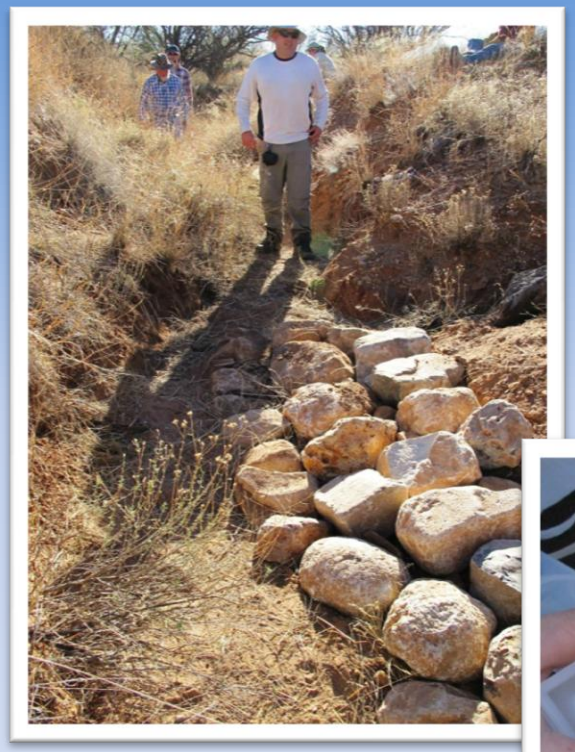


Source: Pima County

Unique, Localized Programs for Vulnerable Areas and Coordinated Messaging







Recommendations: Monitoring