

Water Sustainability Seminar Series  
Academy Village  
April 16, 2014

## Cienega Watershed Partnership



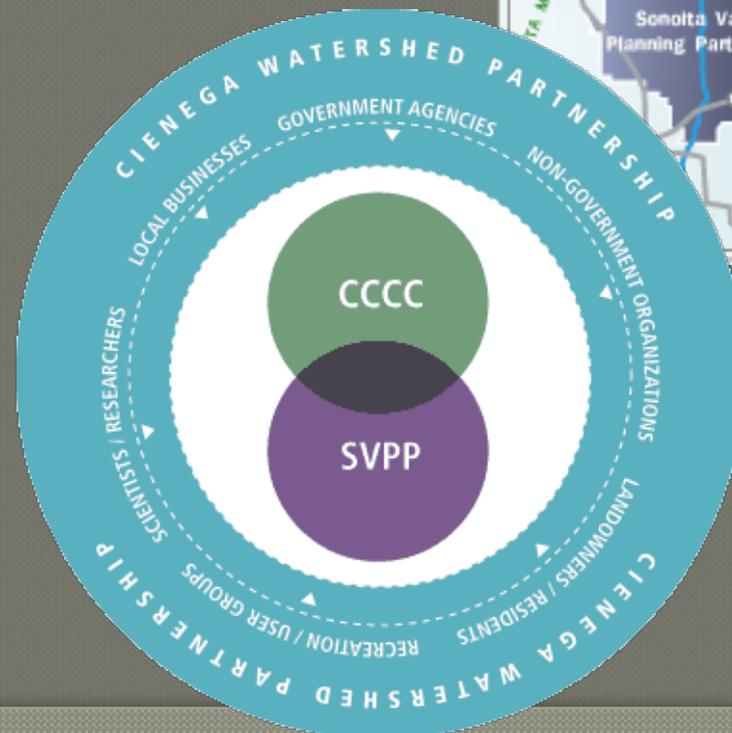
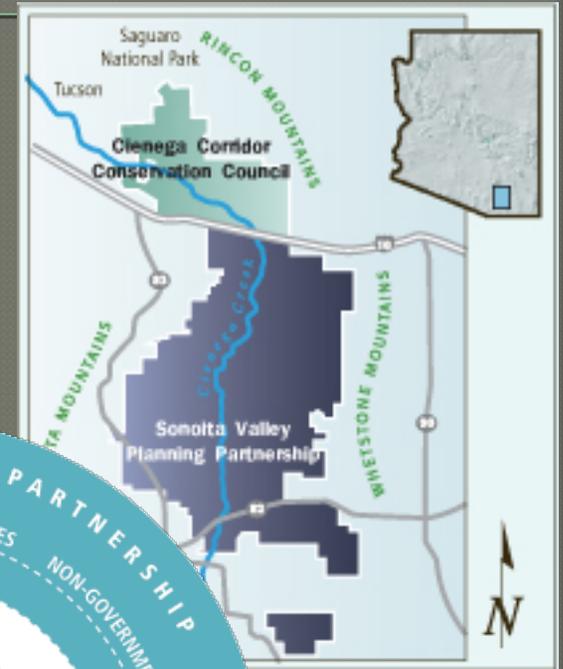
# Overview

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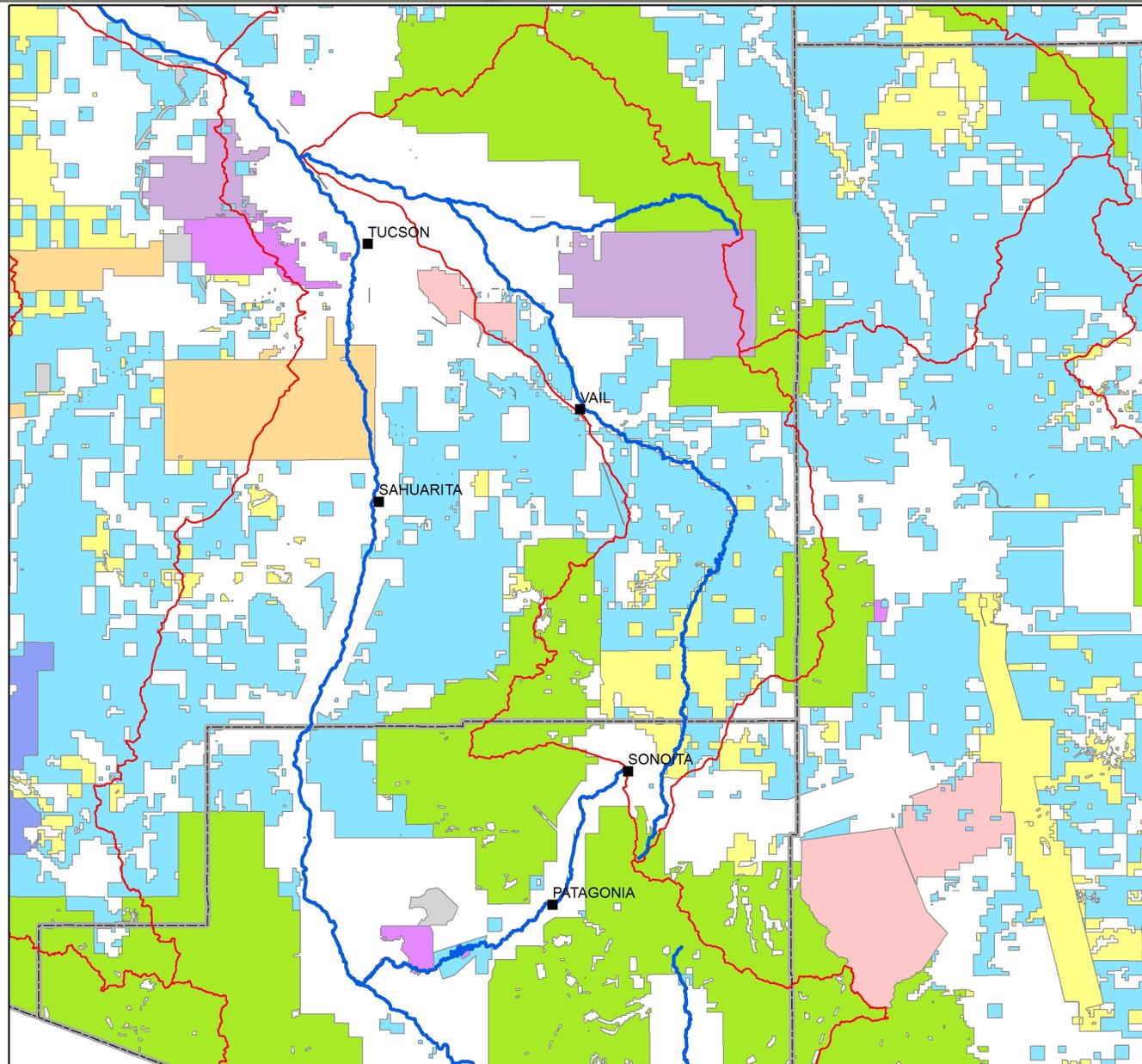
- General introduction
- Cienega Watershed: Area, geography, ecosystems
- Watershed and hydrology
- Conservation and watershed protection
- The Cienega Watershed Partnership
- Achievements to date, challenges and opportunities ahead

# General introduction

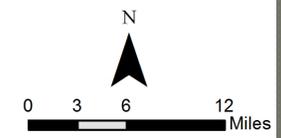
- ① The Cienega Watershed
- ① Cienega Watershed Partnership
- ① Today's presenters



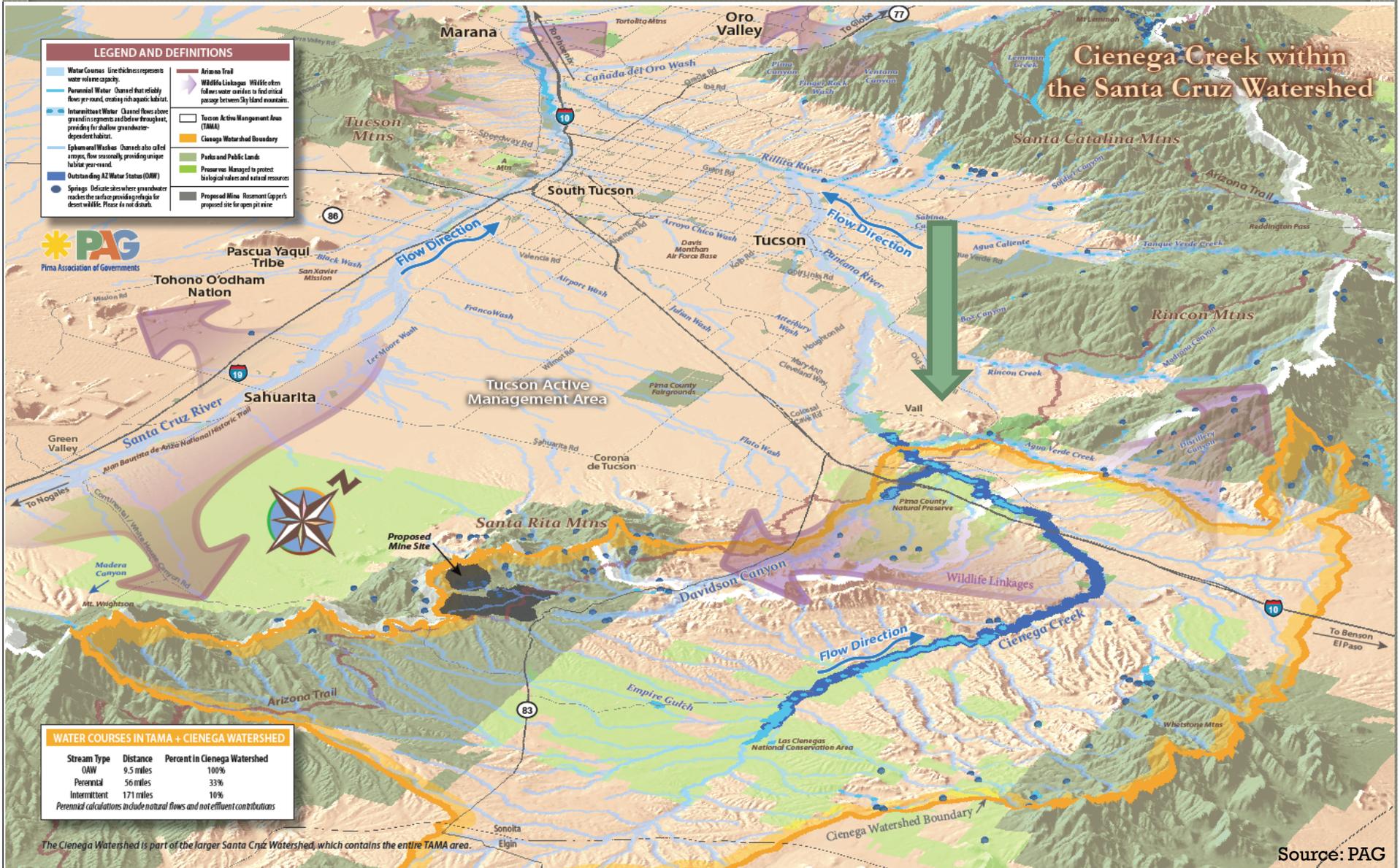
# The Cienega Watershed



- Legend**
- Cities and Towns
  - ALRIS\_Streams
  - Watershed Boundary
  - - - County
  - Arizona-New Mexico Boundary
  - Land Ownership (BLM)**
  - US Bureau of Land Management
  - USDA Forest Service
  - Indian/Tribal
  - State
  - State Park
  - State Game and Fish
  - US Department of Defense
  - National Park Service
  - US Fish and Wildlife Service
  - Private
  - Other Federal Agency



# The Cienega Watershed



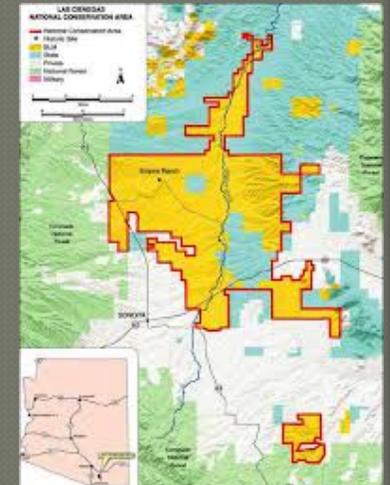
# The Cienega watershed

- Contains five of the rarest habitat types in the American Southwest
  - Cienegas (marshlands)
  - Cottonwood-willow riparian forests
  - Sacaton grasslands
  - Mesquite bosques, and
  - Semi-desert grasslands
- Cienega Creek is one of the few remaining perennial streams in Arizona, providing critical habitat for wildlife, especially Threatened and Endangered species
- Historically important ranching operations
- Important sites for cultural/archaeological resources
- LCNCA managed by the Bureau of Land Management



# Las Cienegas NCA

- Unique effort to protect landscape threatened by fragmentation and development (1990s)
- Has become a national example of effective stakeholder engagement and adaptive management
- Strong partnerships b/w federal and state agencies, NGOs, university, ranchers, and local communities



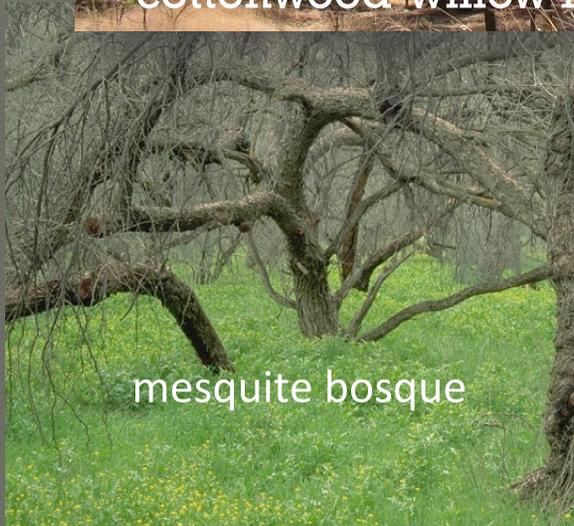
# Wildlife habitat



cottonwood-willow riparian



semi-desert grasslands



mesquite bosque



cienega wetlands



sacaton grasslands



Lesser long-nosed bat



Southwestern willow flycatcher



Western yellow-billed cuckoo

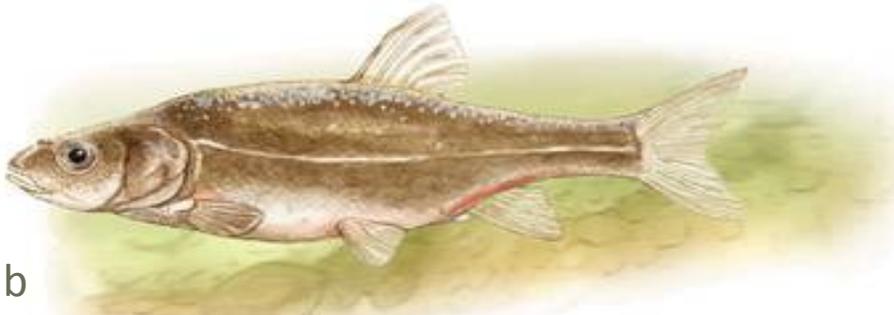


Chiricahua leopard frog



Gila topminnow

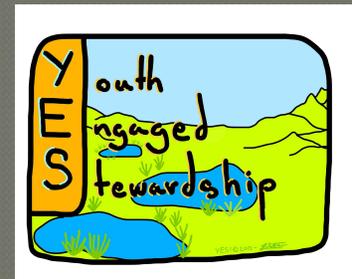
Mexican garter snake



Gila chub

*images courtesy of Pima County, SDCP*

# Las Cienegas NCA - Multiple uses



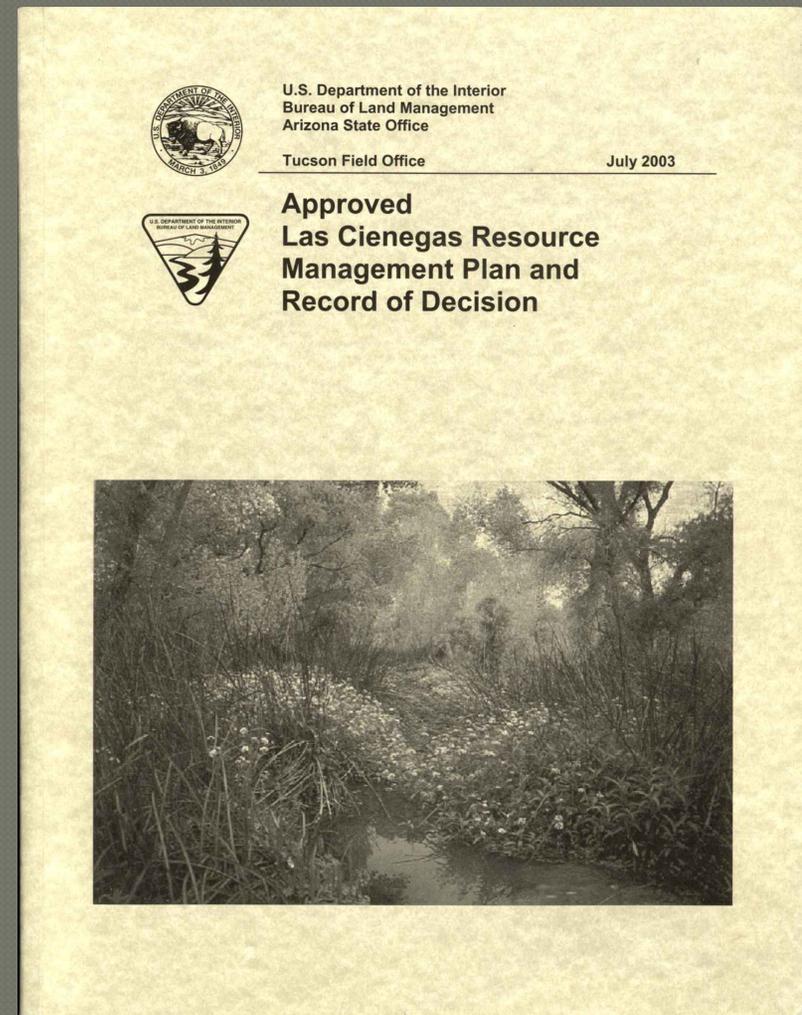
# Stakeholder Involvement

- ◎ History of strong public engagement
- ◎ Consensus based decision making
- ◎ Strong partnerships
- ◎ Adaptive management

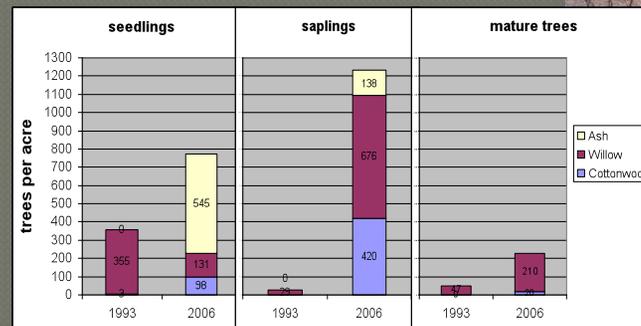
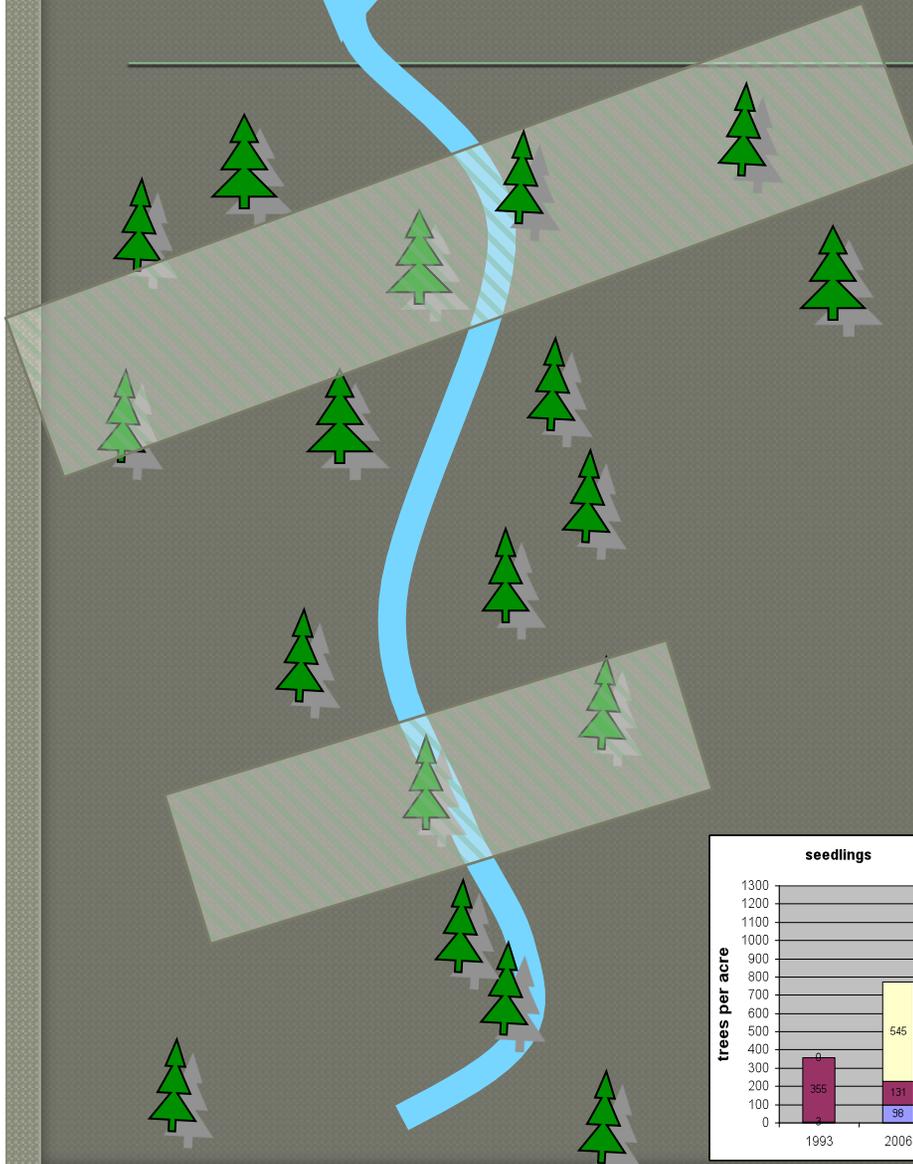


# LCNCA Management Plan

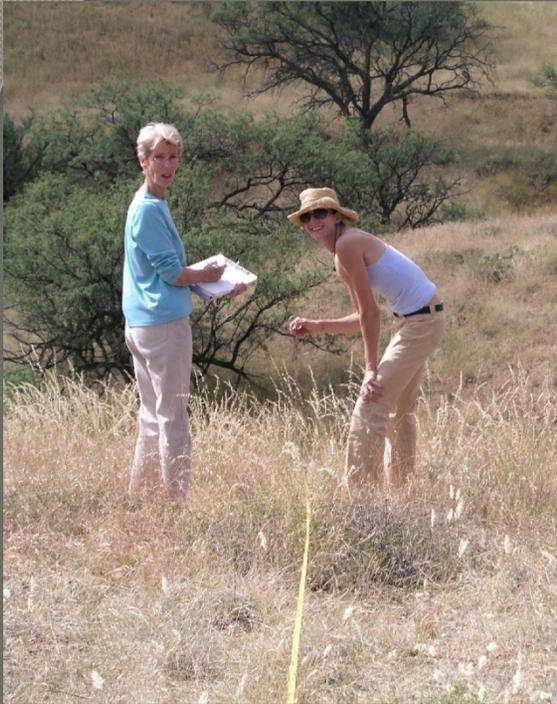
- ③ **Collaborative plan**
- ③ **Ecologically-based, measurable objectives**
- ③ **Adaptive design**



# Foundations – Baseline Inventories

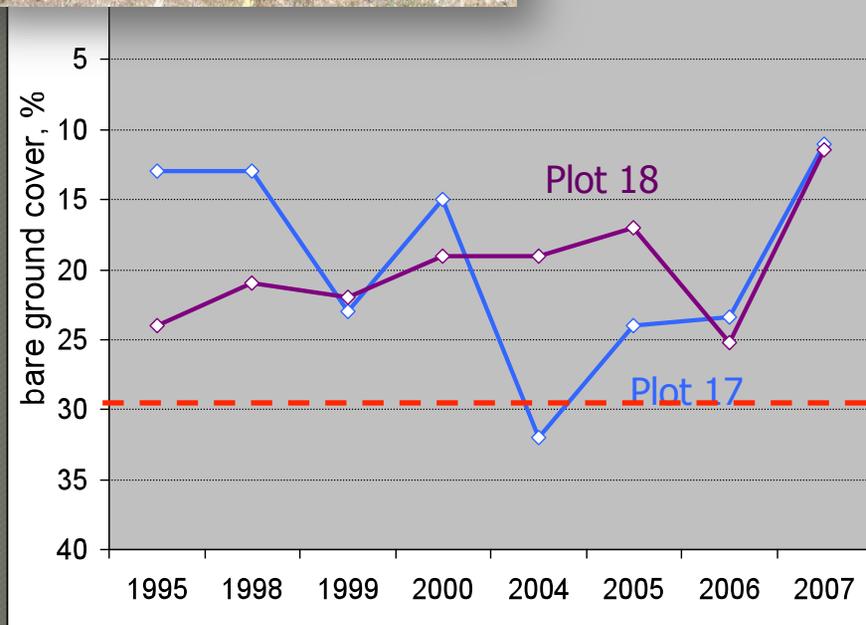


# Foundations – Ecological Monitoring Program

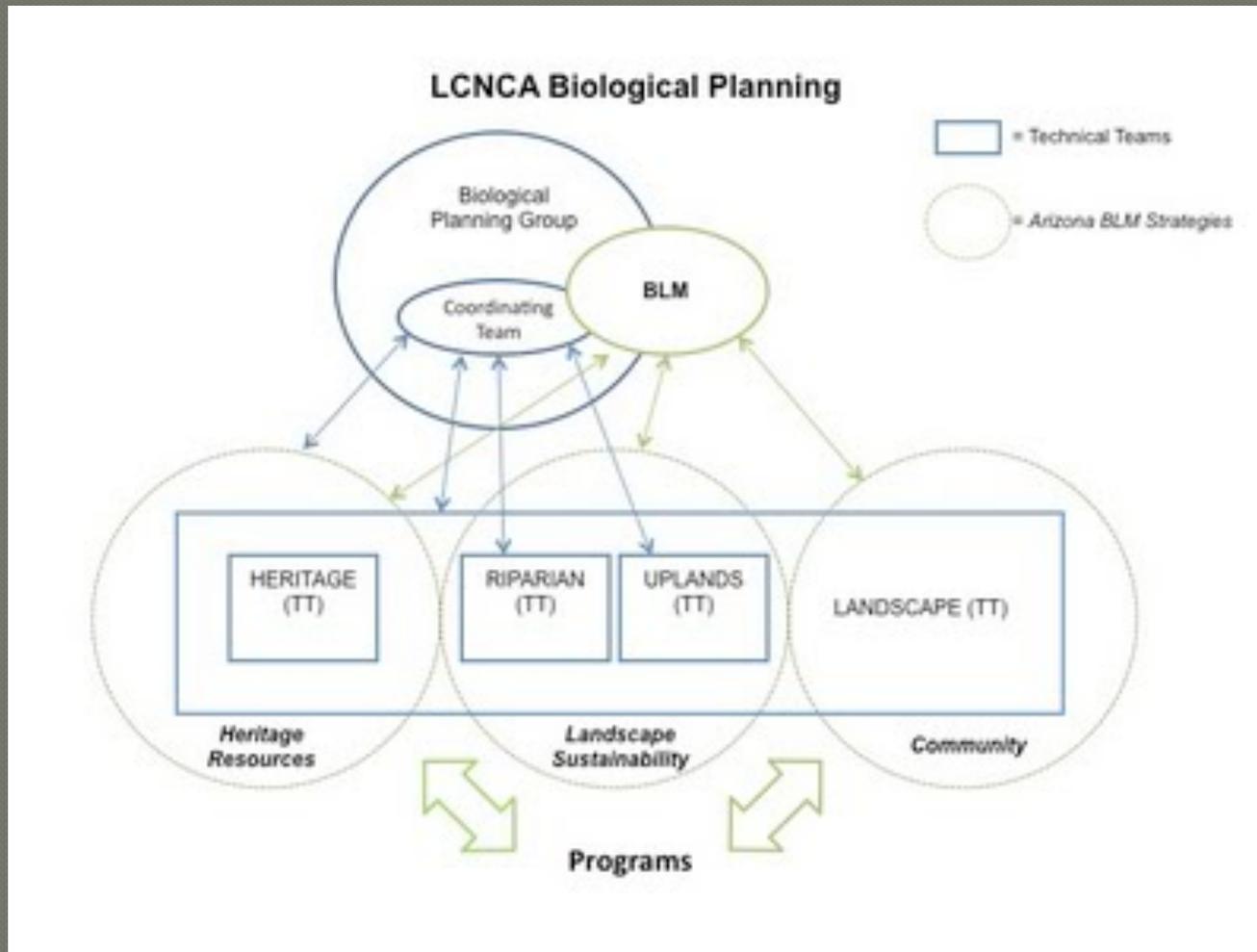


Monitoring must be

- Targeted
- Reliable
- Feasible
- Transparent



# Collaborative Structure



**Plan**



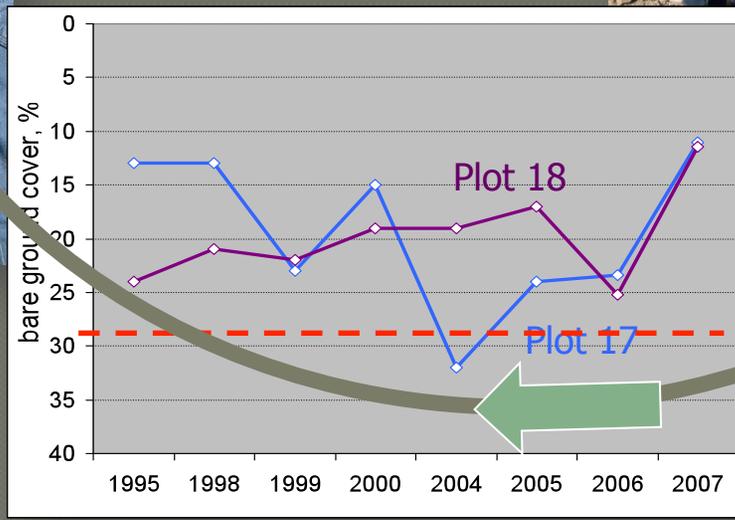
**Act**



**Adjust**

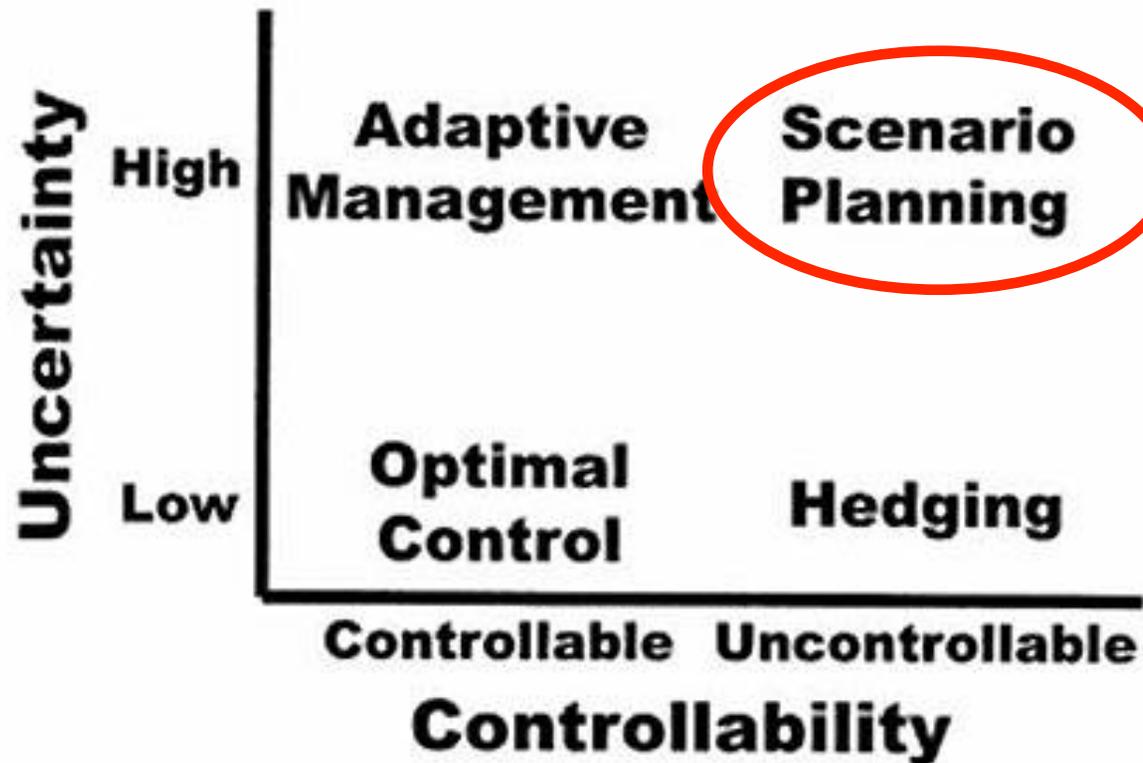


**Monitor**

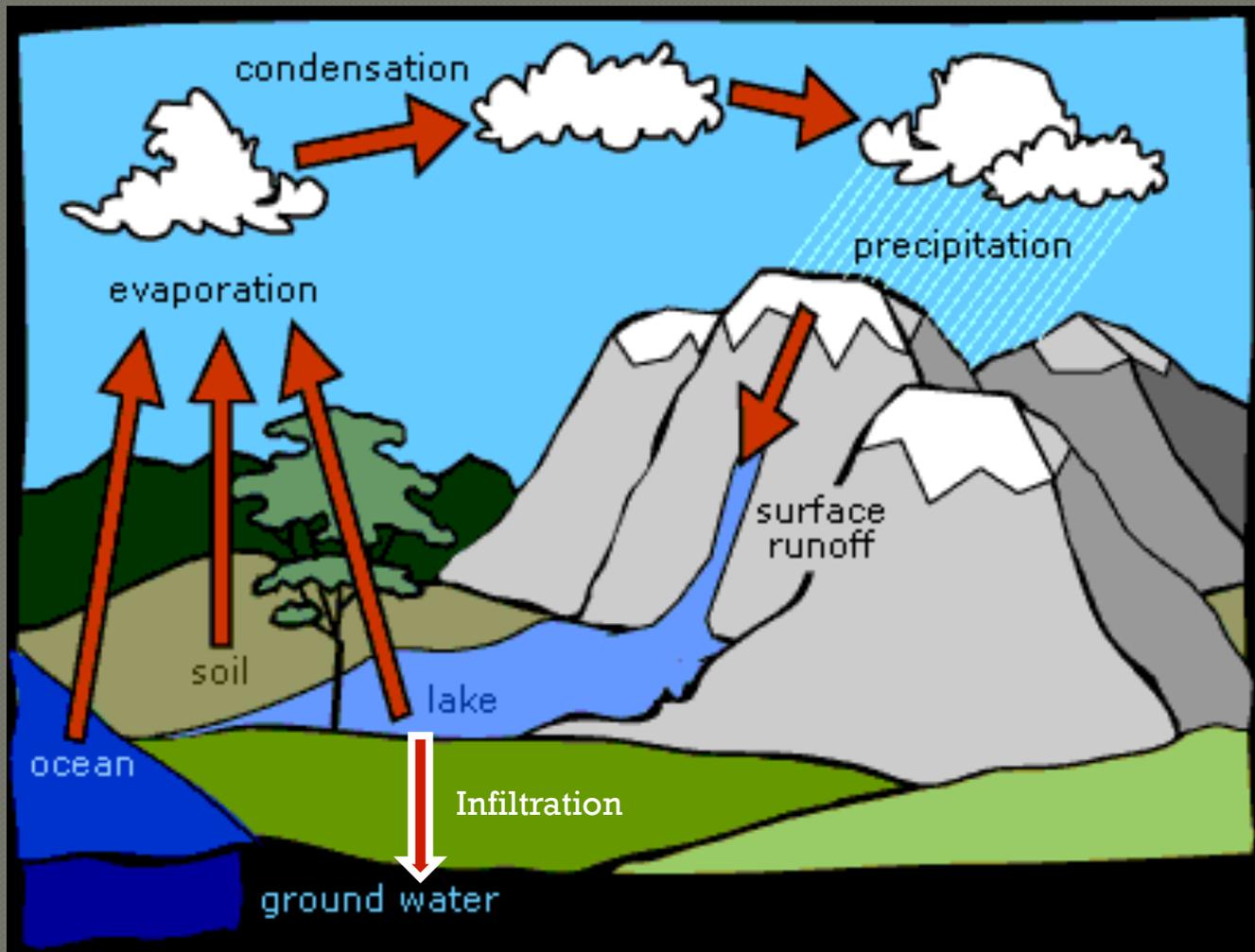


**Evaluate**

# Climate Change and Uncertainty

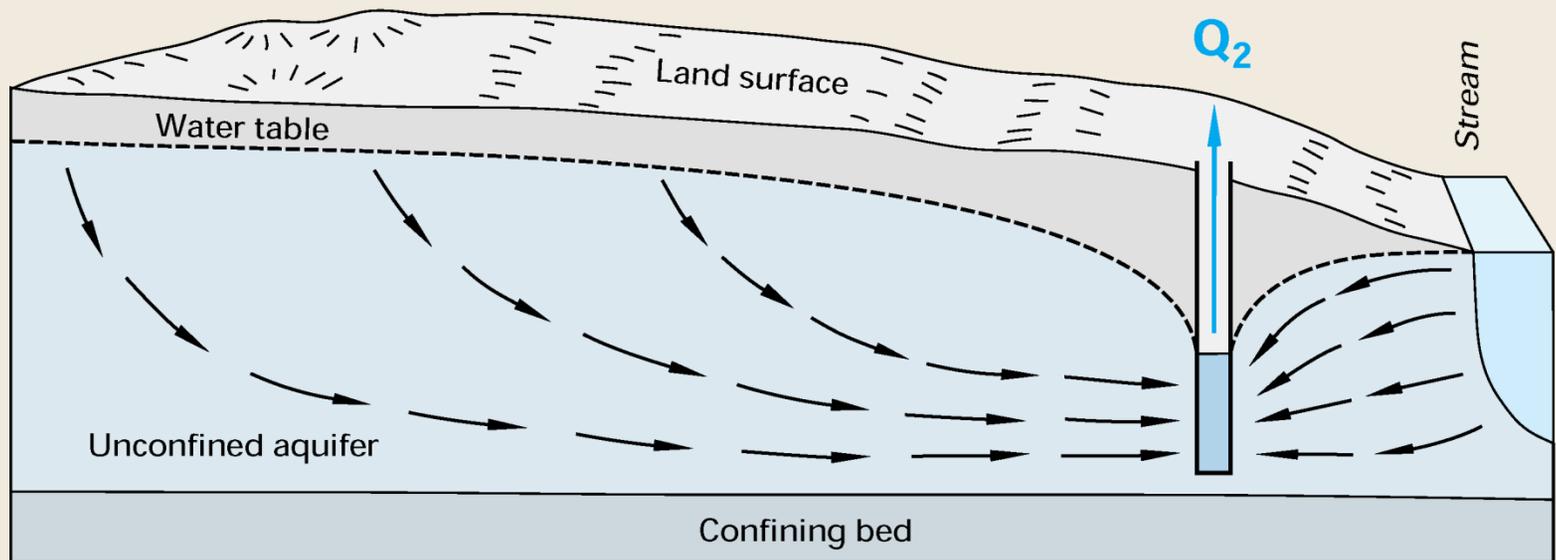


# Water... Some Basics...

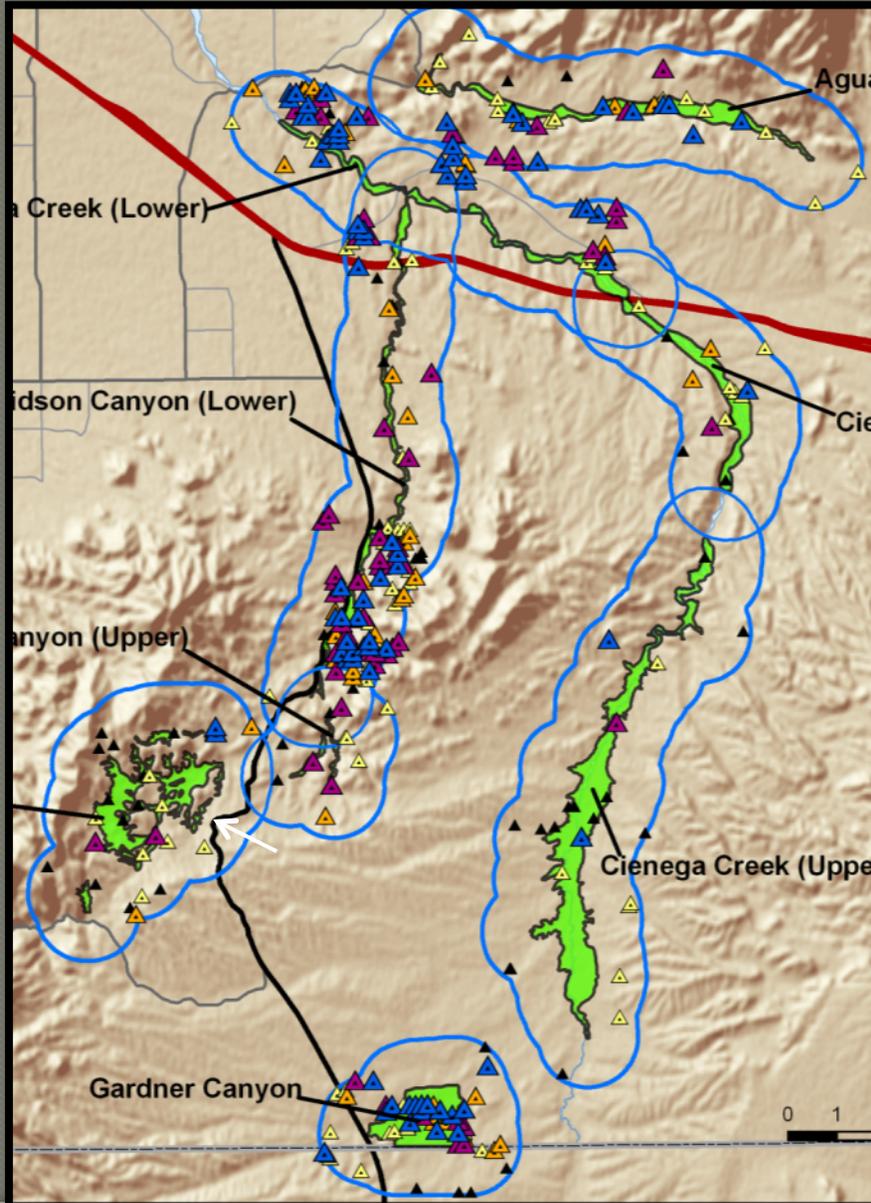


# Some (more) Basics...

**C**



# Drilling and Pumping



- 355 exempt
- 29 non-exempt (7.6%)
- Low well density (overall)

## Drilling History

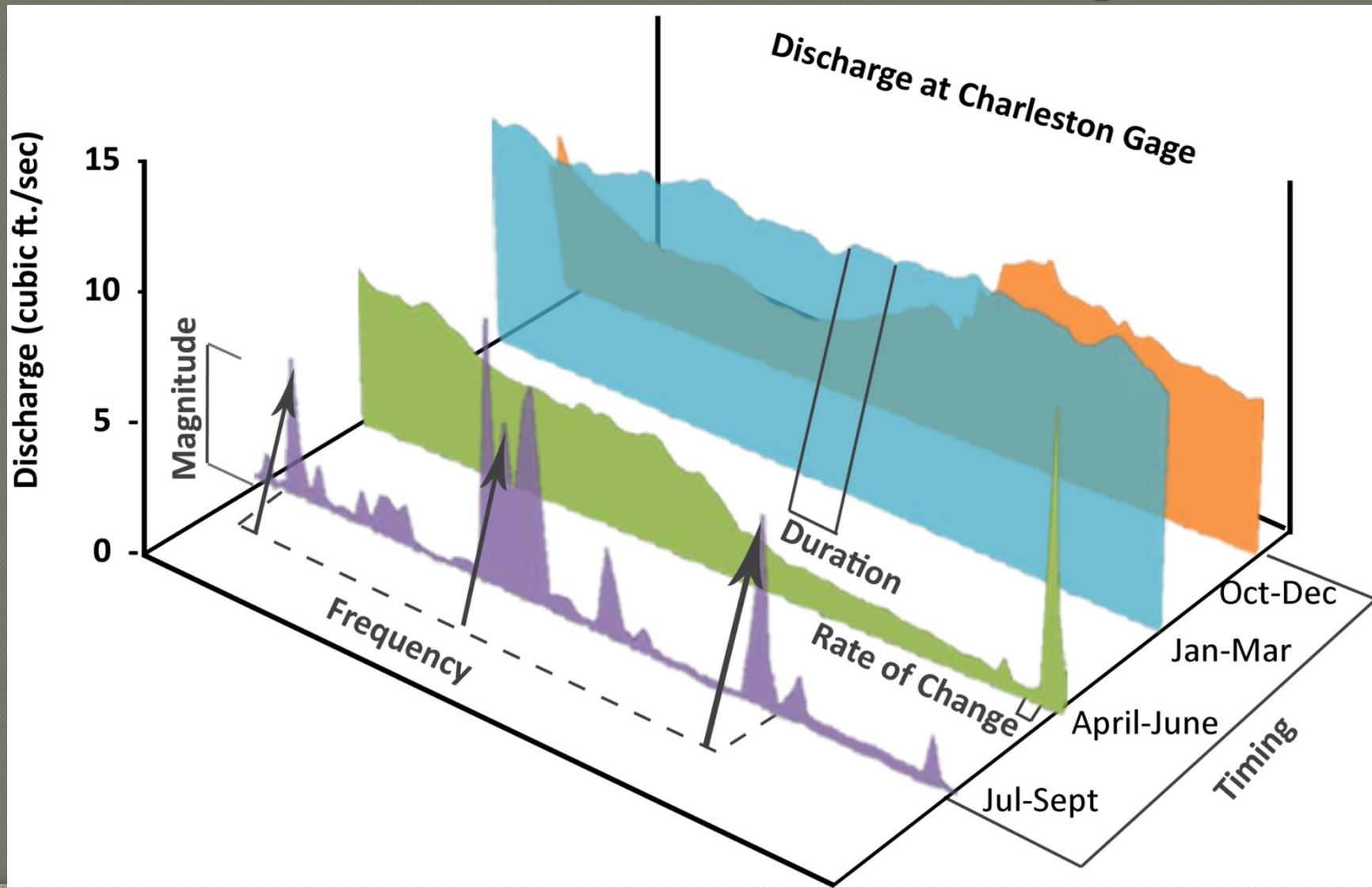
- Increase number of new wells each decade
  - # of wells drilled since 2000 are labeled on the map

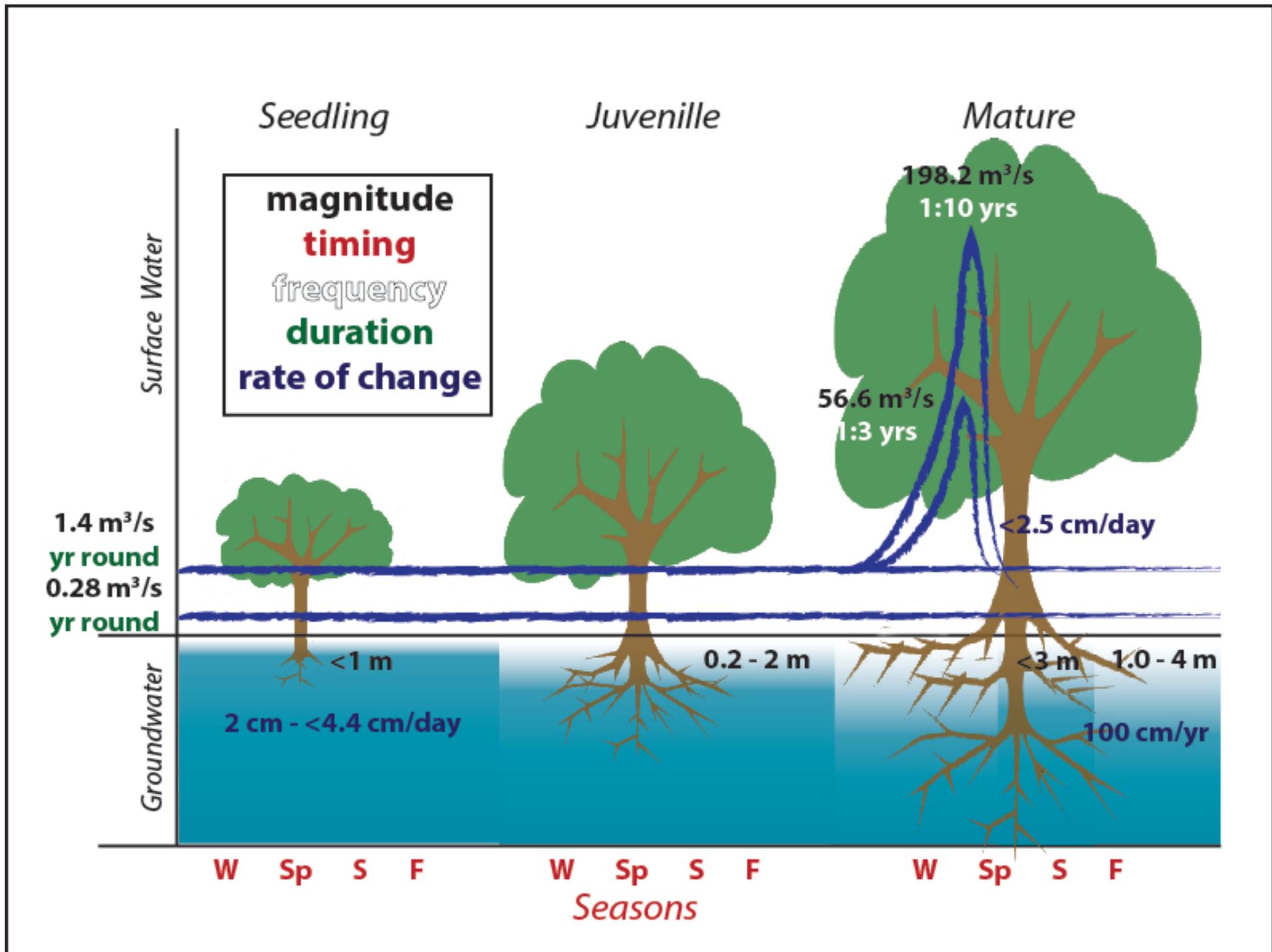
## Water Withdrawals

- Estimate 353 AF annually withdrawn from exempt wells (1 AF/yr)
- 501 AF withdrawn from as reported for 4 of the 29 non-exempt wells in 2010

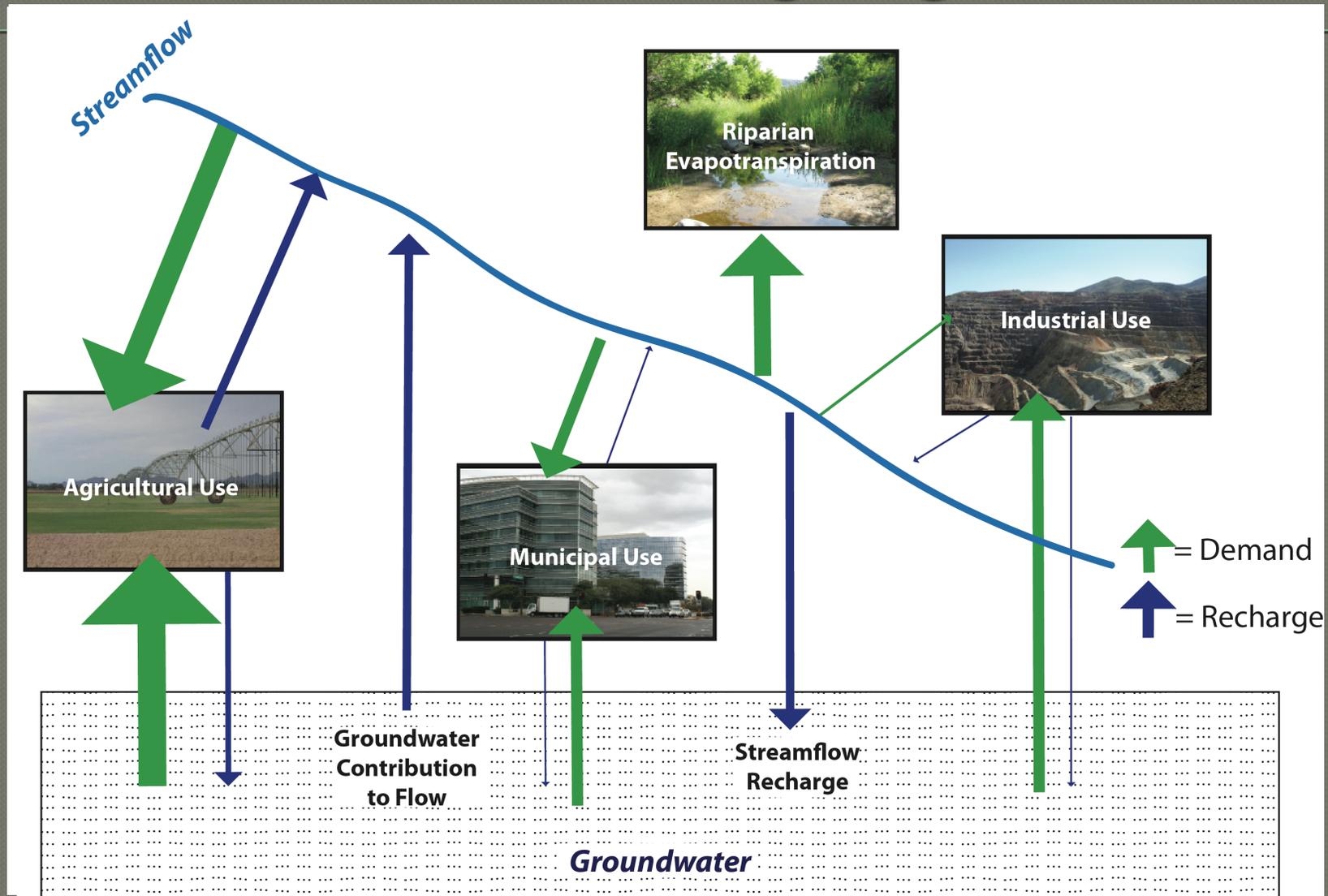
Source: PAG's shallow groundwater study using ADWR data

# Water for Riparian and Aquatic Ecosystems



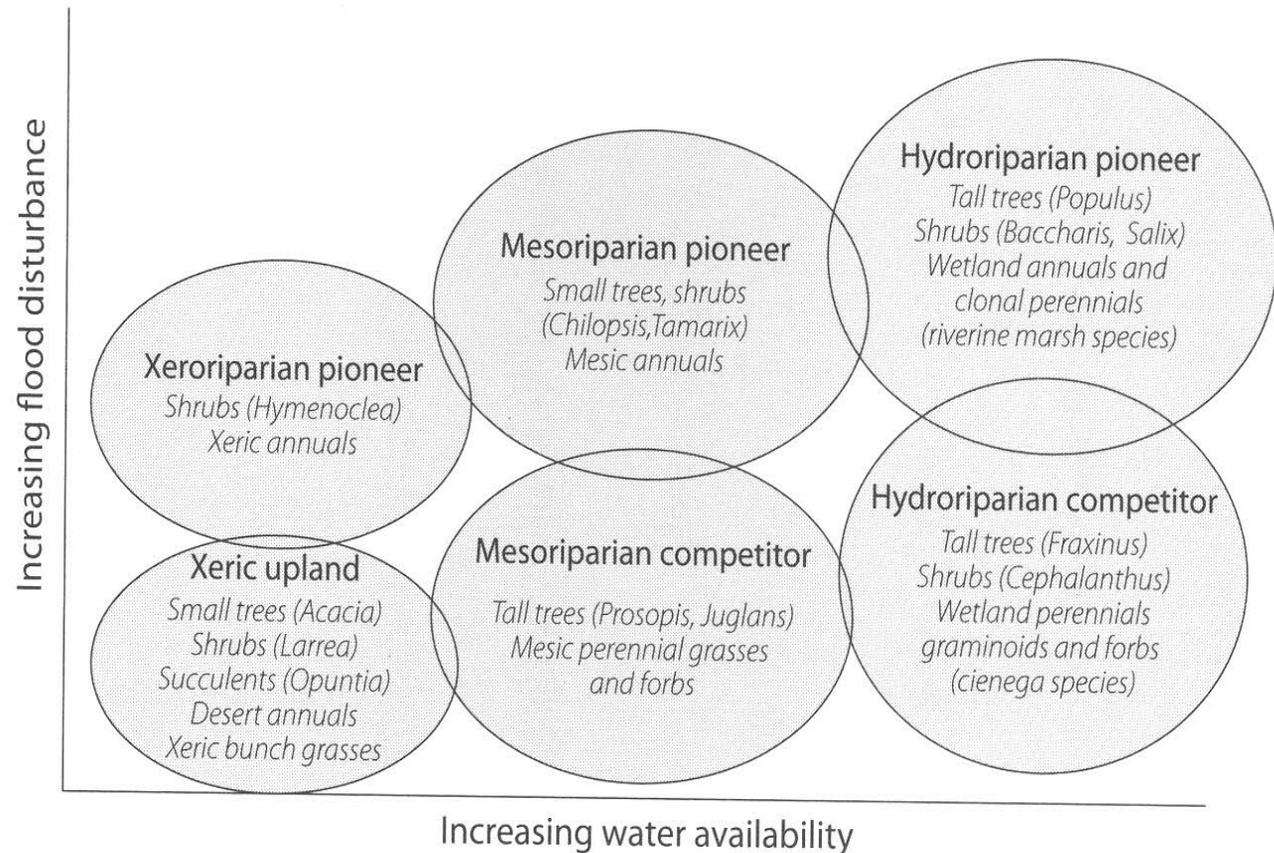


# A Changing Climate



# Changing Riparian Areas

Fig. 1.1. Vegetation types along desert rivers such as the San Pedro are arrayed along gradients of water availability and flood intensity and frequency.



Source: Stromberg, Lite, Dixon, and Tiller (2009)

# Drought on Cienega Creek

Significant long-term baseflow decline stresses the ecosystem

## ANNUAL AVERAGES

- **Streamflow**

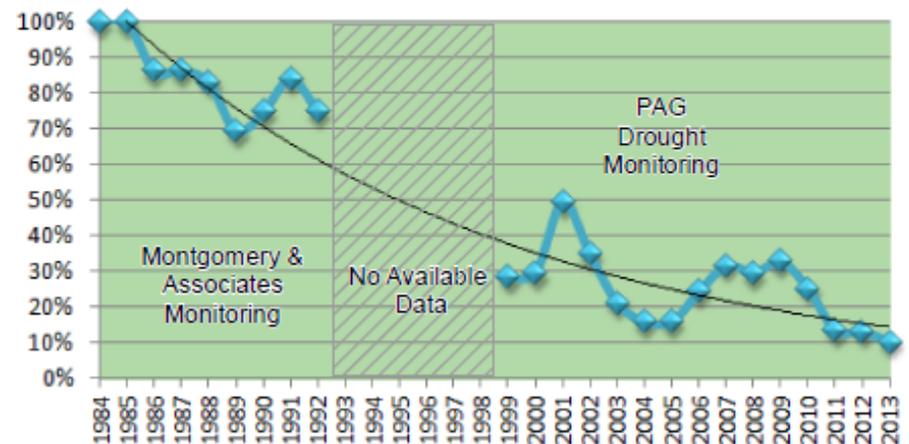
- ~45% of pre-drought volume

- **Groundwater levels:**

- ~6 feet lower pre-drought avg (1994-2002)

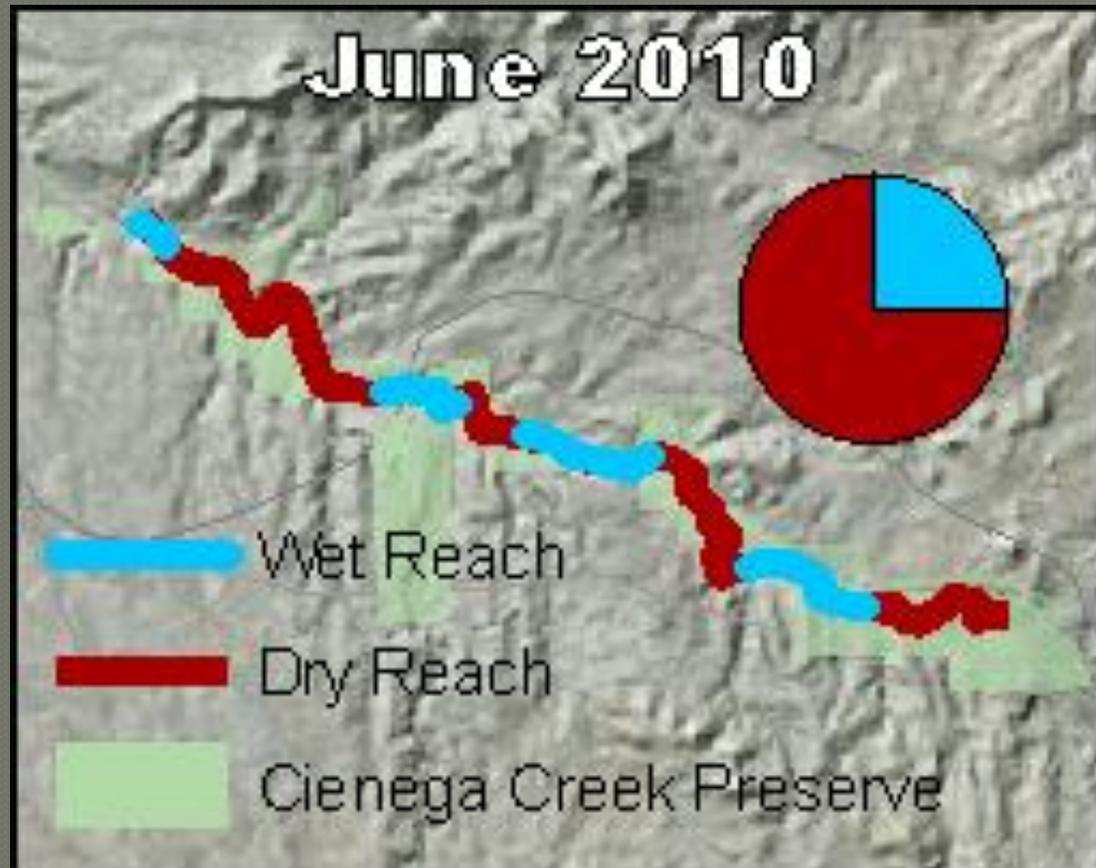
- Months prior to winter rains most impacted

Percent Flowing (Wet) from June 1984 - 2013

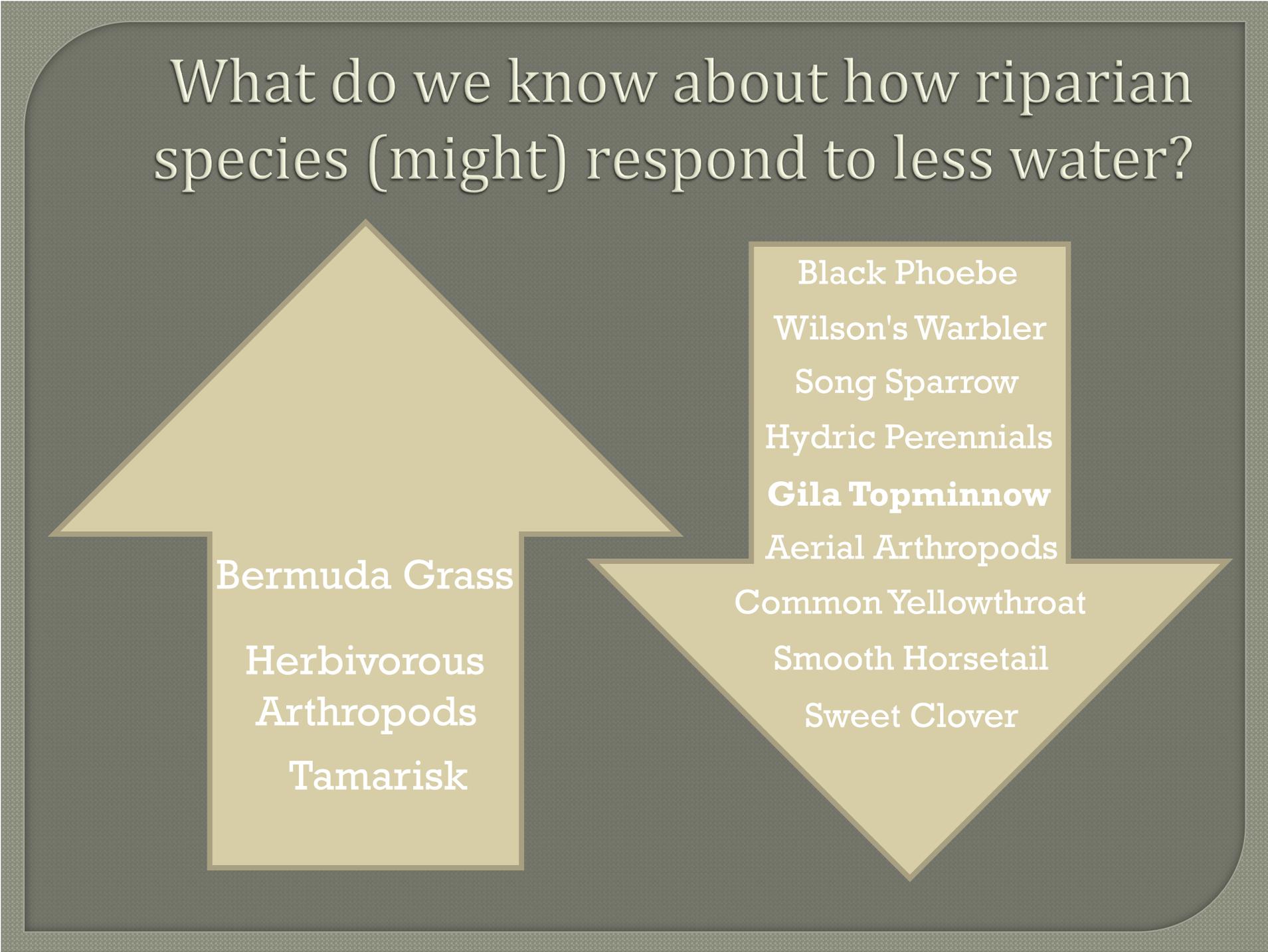


Source: PAG Monitoring Data

# Wet Dry Mapping



# What do we know about how riparian species (might) respond to less water?



Bermuda Grass

Herbivorous  
Arthropods

Tamarisk

Black Phoebe  
Wilson's Warbler  
Song Sparrow  
Hydric Perennials  
**Gila Topminnow**  
Aerial Arthropods

Common Yellowthroat

Smooth Horsetail

Sweet Clover

# Current Flow Supporting the Environment

## Defined:

Flow that currently supports the environment and includes

- Annual baseflow
- Groundwater underflow
- Average annual evapotranspiration (*Riparian extent*)

## Applied:

797 acre-feet (af) of baseflow

+

8,022 – 8,299 af of evapotranspiration

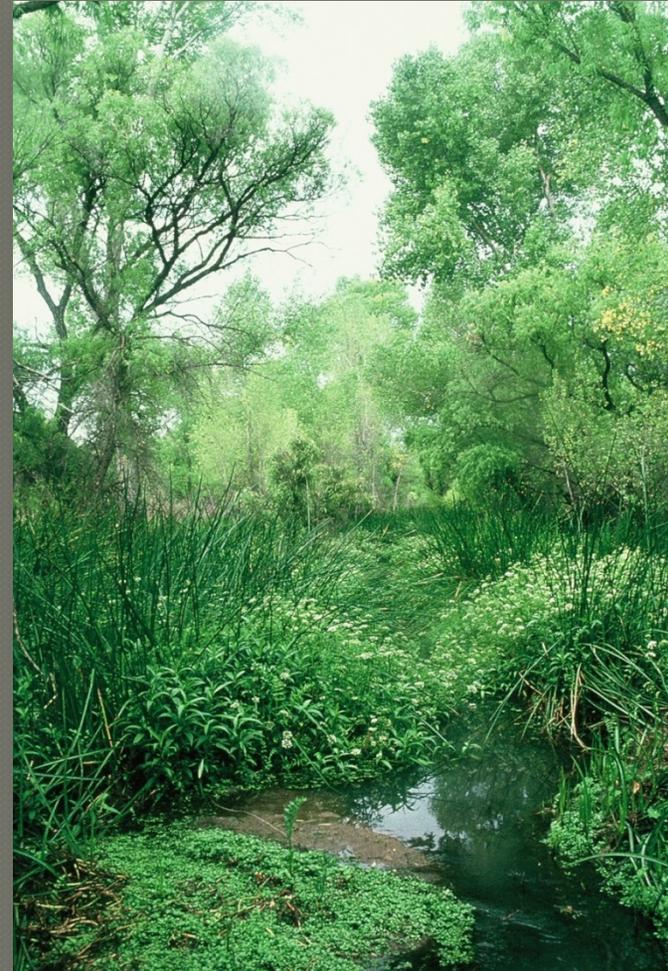
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8,819 – 9,096 af currently supporting environment

# Current Flow Supporting the Environment

## Contemplated:

- Mean annual flow = 537 af (2012) to 9,417 af (1966)
- 50 year average flow = 4,311 af
- 4,311 af < ~8,819 af
- **Groundwater matters!**



# Regional Importance

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- Rare low elevation perennial stream
- Critical wildlife corridor (SCDP)
- Successful preservation of threatened and endangered species
- Long-term monitoring reveals fragile system dependence on stable baseflows
- Disruptions from drought, pumping, or diversions could jeopardize hydrologic balance and dependent habitat

# Challenges

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- Wells are not regulated
- Changes in temperature and precipitation patterns will impact the stream and its ecosystems
- Additional development ...

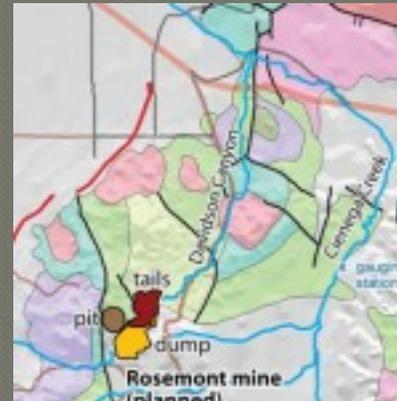
# Rosemont Mine and the Watershed

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- Outstanding Water – Cienega Creek
- Impacts to groundwater levels
  - “hydroriparian habitat along Empire Gulch could transition to mesoriparian or xeroriparian, although this is highly uncertain”
- Need for mitigation and monitoring of impacts from mine
  - Cienega Creek Watershed Conservation Fund
- Insufficient information on climate change impacts

# Challenges ahead and CWP's Role

- Water quality and quantity Dewatering of the creek and wetlands through development, mining, and climate change
- Maintaining biodiversity and critical habitat
- Spread of invasive species (e.g., mesquite, bullfrogs)
- Connectivity to larger landscapes
- Loss of cultural heritage connections
- Sustainable ranching, recreation and educational activities
- Changing public policies
- Urbanization and Development



# How CWP Meets Challenges

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- Partners, Partners
- Collaboration
- Shared Resources
- Stewardship



DOI Partners in Conservation  
Award January 2014

# CWP Initiatives and Projects

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- Stakeholder involvement
  - State of the Watershed
  - Science on the Sonoita Plain
  - Other workshops and trainings (e.g., climate change, watershed restoration)
- FROG conservation project
- Heritage: Oral history – Back Then
- Youth Engaged Stewardship (YES!)

# CWP Programs

## Stakeholder Involvement: State of the Watershed

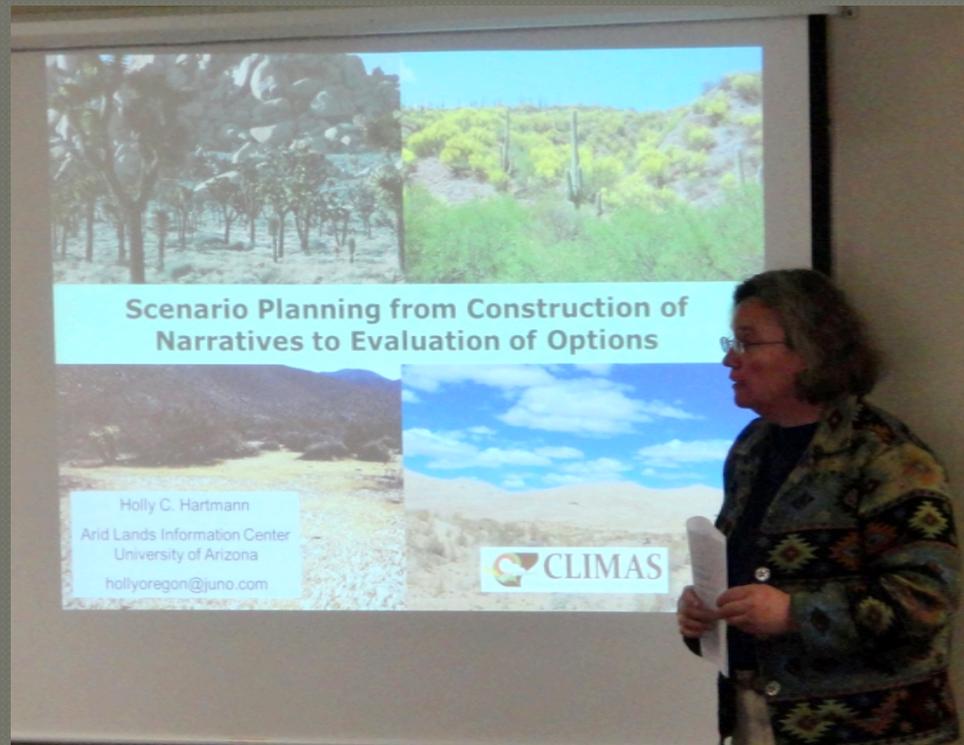


- Partners gather periodically to address strategies and issues to ensure sustainable management of the Cienega Watershed in the State of the Watershed Workshops.
- Topics: Watershed Stress, Data Gaps, Climate Change Scenario Planning, Shared History

# CWP Programs

## Climate Change Scenario Planning

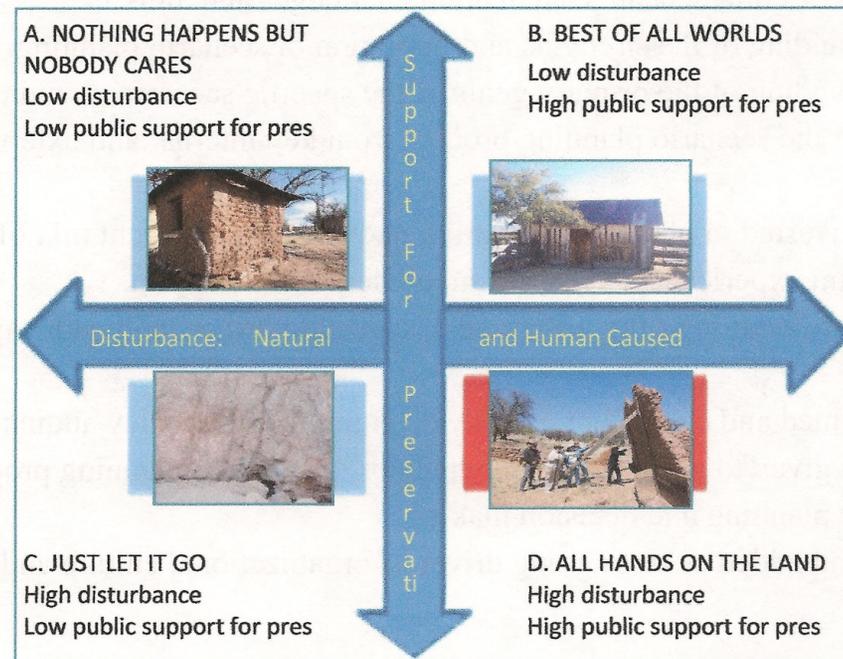
- Lead by the University of Arizona, in 2013, four teams developed potential scenarios. Results were reported at the 2013 Science on the Sonoran Plain Symposium.



# CWP Programs

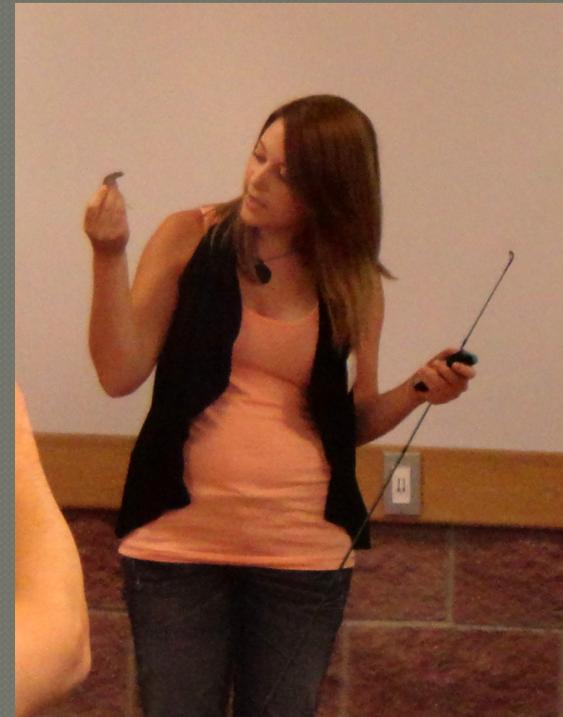
## Climate Change Scenario Planning

- 17 partners completed Phase 1 of scenario planning for climate change and other high risk, low control impacts that could occur in the watershed over the next 100 years.



# CWP Programs

## Science on the Sonoita Plain Symposium



- 2014 (June 7) marks the 6<sup>th</sup> Science on the Sonoita Plain Symposium established to bring together scientists and stakeholders.

# CWP Programs

## Science on the Sonoita Plain Symposium



- The results of scientific investigations that are occurring within the unique and diverse resources of the Sonoita Plain in the upper watersheds of Cienega Creek, Sonoita Creek, and the Babocomari River are shared at this annual event.

# CWP Programs:

Preserving Native Species and Habitats



- Native Frog Conservation and Monitoring
  - Partners expanded new leopard frog breeding populations and took steps to eliminate non-native aquatic species such as bullfrogs and mosquito fish.

# CWP Programs

## Native Frog Conservation and Monitoring

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- A frog-rearing facility was built at the Las Cienegas National Conservation Area.
- Lands were inventoried for frog populations

# CWP: Programs

## Native Frog Conservation and Monitoring

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- Outreach to local residents resulted in private ranches and individuals joining the effort.
- Monitoring ensures that bullfrogs do not return, spoiling three years of intensive work.

# CWP Programs

## Heritage in Action



- The CWP Oral History Work Group inventoried and digitized 240 oral histories. Several are available on line at the Arizona Memory Project and CWP web site.

# CWP Programs

## Shared History of the Watershed



- In November 2012, partners recorded 'A Shared History of the Cienega Watershed'.

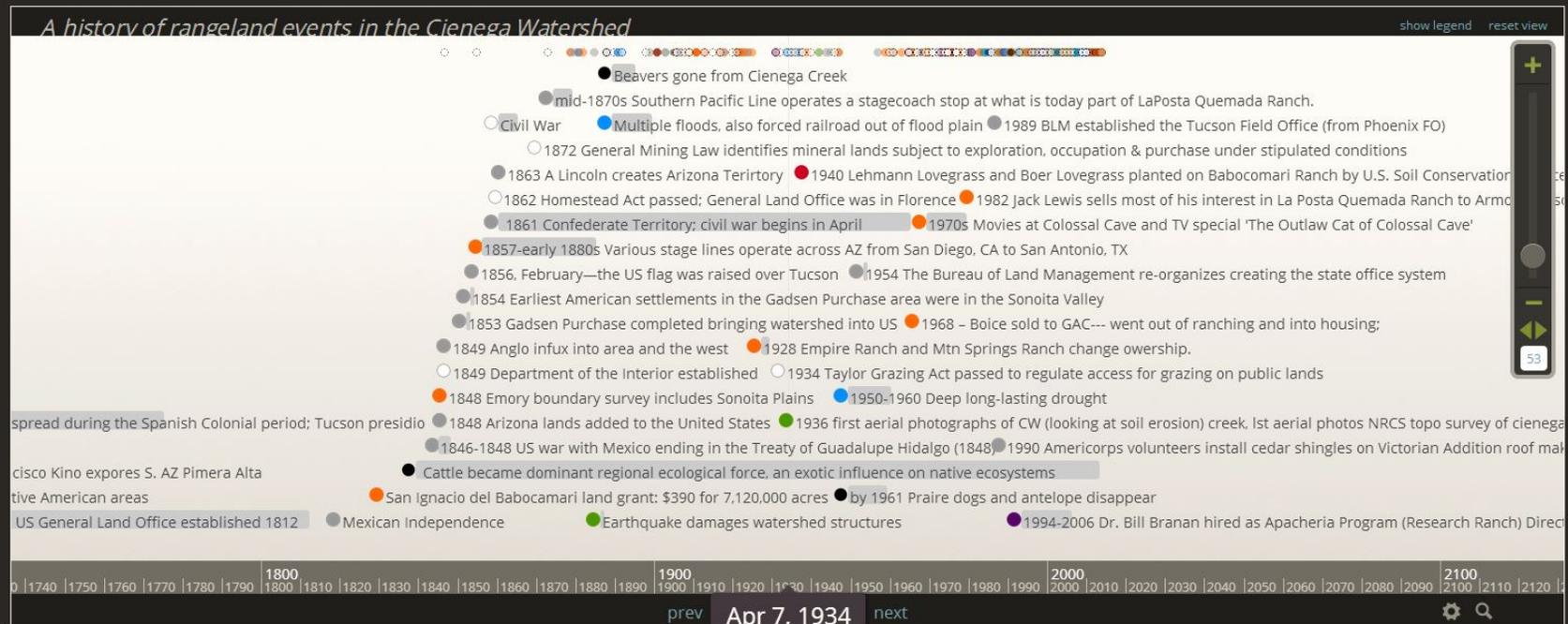
# CWP Programs

## Heritage in Action

### Cienega Watershed Timeline Project

This project aims to tell the story of historical changes in the Cienega Creek Watershed with the following goals:

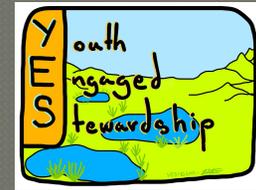
1. collect event information relevant to the watershed history including categories such as Climate/Weather, History, Land Forms, Land Use, People, Plants, Legislation/Policies, and Prehistory
2. disseminate the timeline in multiple formats for both public and science use
3. mine the information to find lessons learned in order to sustain the watershed and its resources



- The Cienega Timeline Project developed from the shared history exercise in 2012 and has become an interactive database of over 600 events and climate data.

# CWP Programs

## Youth Engaged Stewardship (YES!)

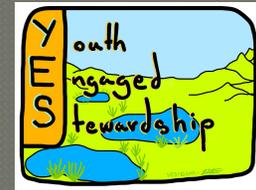


- Engaging youth as decision makers on public lands is one of the aims of this innovative program.



# CWP Programs

## Youth Engaged Stewardship (YES!)

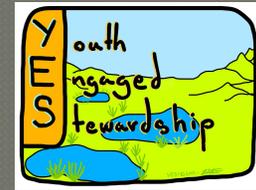


- Over nine sessions in the summer, YES! partners orient youth to the LCNCA
- Teens then form a youth board, decide on a stewardship project, design, manage and implement that project, including the budget.



# CWP Programs

## Youth Engaged Stewardship (YES!)



- YES! stewardship projects focus on habitat restoration. In 2012, youth decided to rehabilitate a stock pond for native frog habitat.

# CWP Programs

## Youth Engaged Stewardship (YES!)



- The 2013 YES! participants organized a volunteer work day to help install native plants to a restored pond in order to improve habitat for native fish and frogs.

# GET INVOLVED!

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- May 2 Biological Planning at LCNCA
- June 7 Science on the Sonoita Plain
- YES! June and July 2014
  
- Join the CWP!
- Become a Board or Advisory Council Member!
  
- Donate to programs.

