



Successfully Reducing Your Groundwater Footprint (and Second and Third Order Effects)



Presented to Water Resources Research Center

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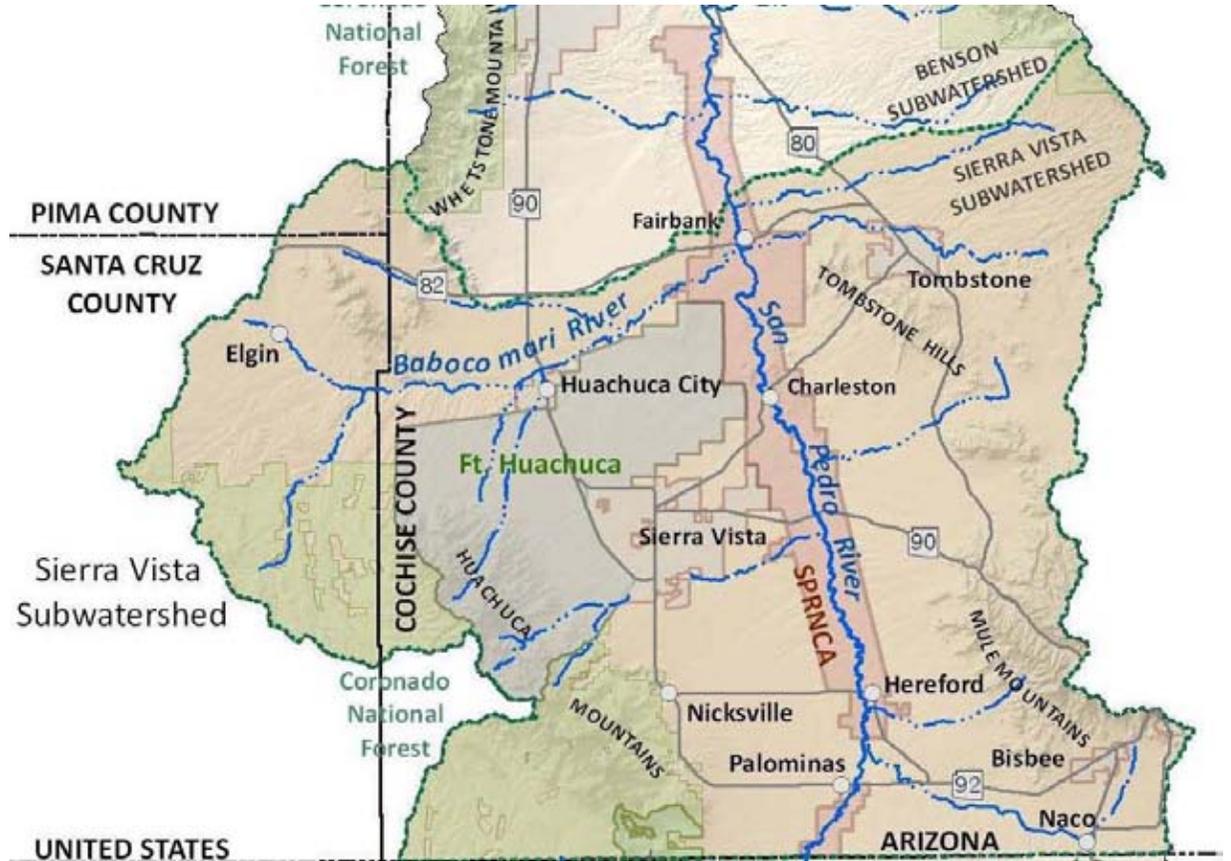


Agenda

- Why Groundwater is So Important to Fort Huachuca
- How the Fort has Reduced its Groundwater Footprint
- Second and Third Order Effects of Conservation
- Water Strategy for the Future
- Questions



Location





Overview of the Endangered Species Act (ESA)

- Bipartisan Legislation from Congress
- Signed into law by President Richard Nixon on December 28th, 1973.
- Purpose was to protect critically-imperiled species from extinction as a “consequence of economic growth and development untempered by adequate concern and conservation.”



Section 7(a)(2) – Federal Agency Consultation Requirements

Each Federal agency shall, in consultation with the Secretary, insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in the destruction or adverse modification of designated critical habitat.



History of ESA and Fort Huachuca

- Biological Opinions Issued in 1999, 2002, & 2007.
- Approach in Biological Assessment has been different.
- Result of each BO has been litigation.
- Current litigation was initiated in fall of 2007 and is anticipated to be significantly delayed due to death of presiding judge.



2007 Biological Opinion

- Key Items of Importance in 2007 BO Issued by the US Fish and Wildlife Service (USFWS)
 - Covers a 10-year time frame (2007 to 2016)
 - Provides flexibility of up to 3,000 additional personnel
 - Fort is responsible for off-post groundwater use that is outside the control of the fort
 - Requires fort's participation in Upper San Pedro Partnership

Sensitive Species On Fort Huachuca



Agave – Bat Food Source



Mexican Spotted Owl



Arizona Tree Frog



Sonoran Tiger Salamander



Huachuca Water Umbel



Mexican Garter Snake



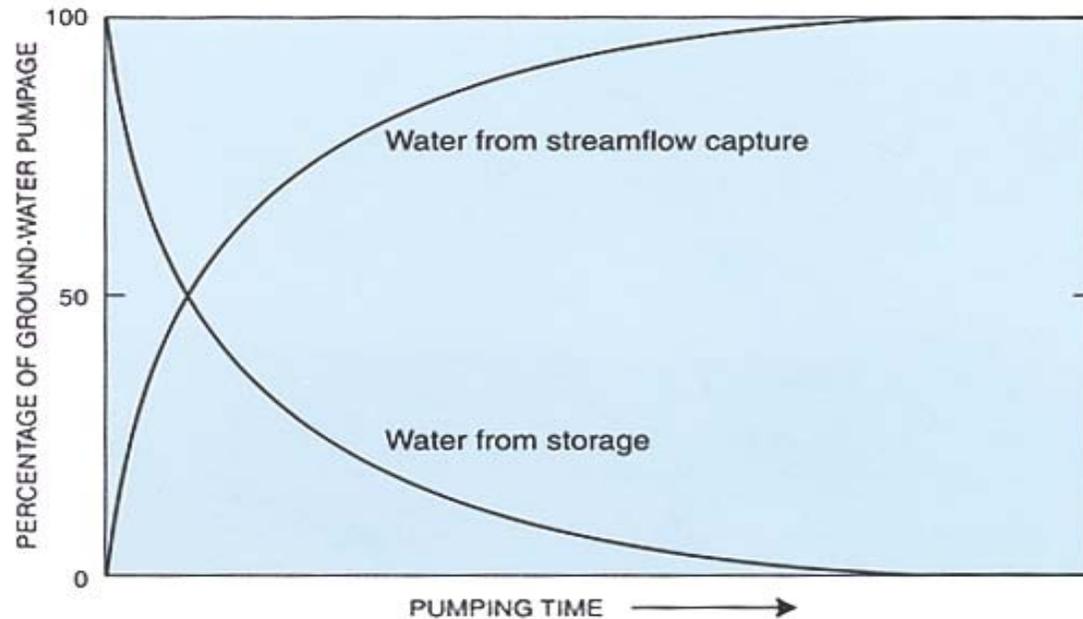
Lesser Long-nosed Bat



Chiricahua
Leopard Frog



Source of Water to Wells



- Sources of water to a pumping well:
 - Groundwater held in storage
 - Capture of natural discharge

Natural discharge includes the discharge of groundwater to surface water sources (i.e., springs, seeps, streams) and through evapotranspiration by plants accessing groundwater.



Reuse, Recharge, and Artificial Turf



**Treated Effluent Irrigates
Golf Course
250 afa**



**Detention Basins to detain and
recharge stormwater
8 afa**



**Artificial Turf Field reduces
irrigation requirements
68.5 afa**



**Rooftop Capture at Field House
1.0 afa**



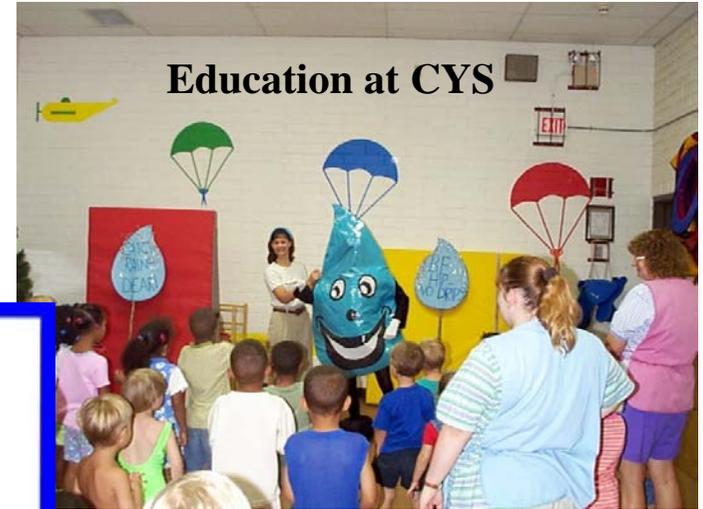
Conservation and Education



840 Waterless Urinals
103 afa



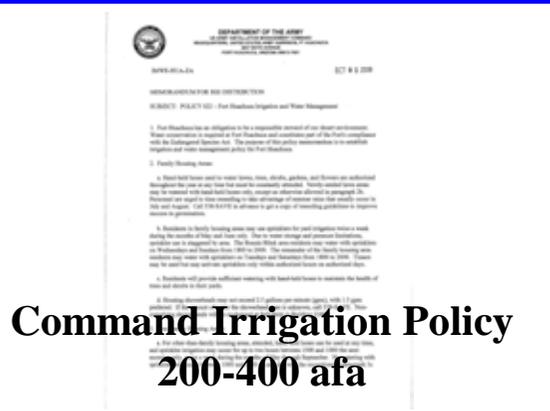
Low flow fixtures
81 afa



Education at CYS



Energy and Water Efficient
New Homes and Landscapes



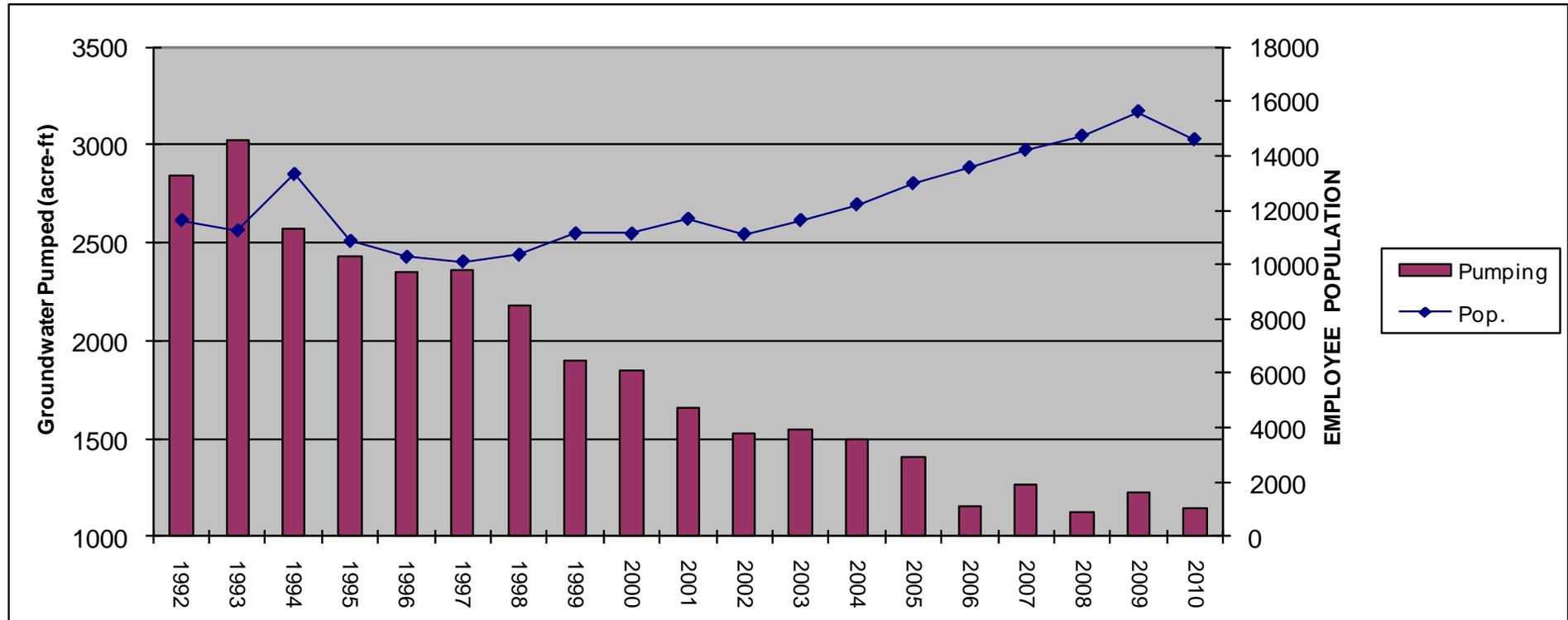
Command Irrigation Policy
200-400 afa



Education at Safety Day



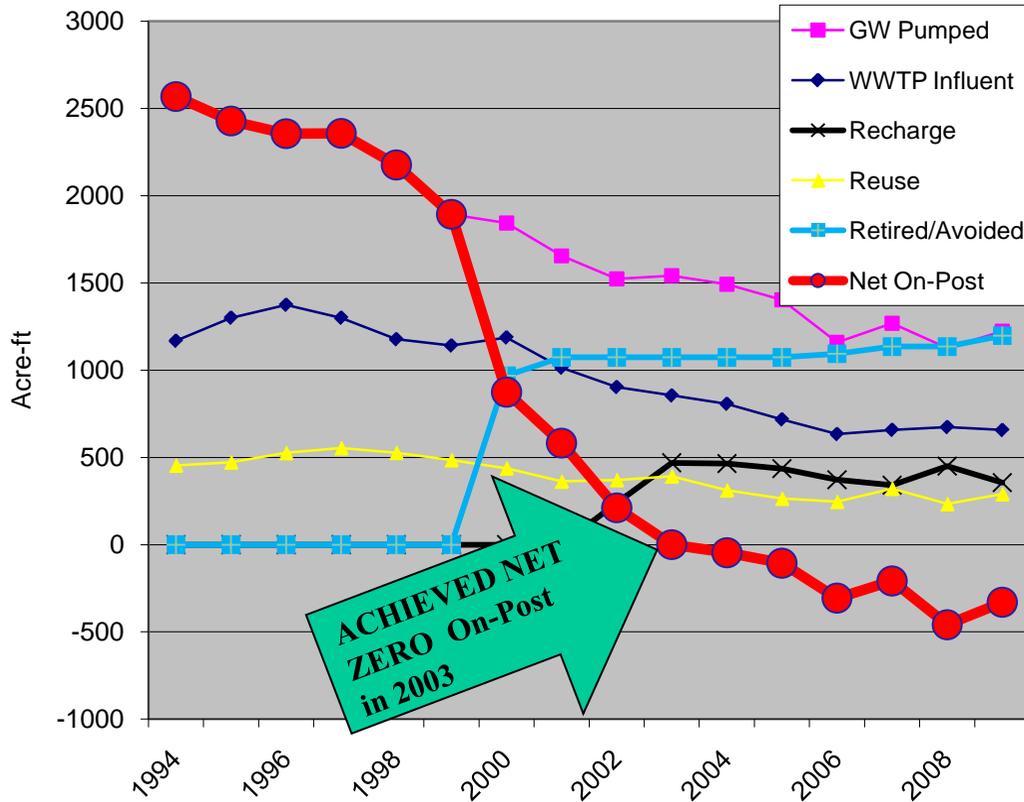
Groundwater Pumping at Fort Huachuca



****TOTAL WATER SAVINGS = 3,000 acre-feet*/year (almost 1B gallons)
Associated energy cost avoidance more than \$3M in FY 10.**

* Acre-foot of water is approximately 326,000 gallons. **Total Savings includes conservation, reuse, recharge, and conservation easements.

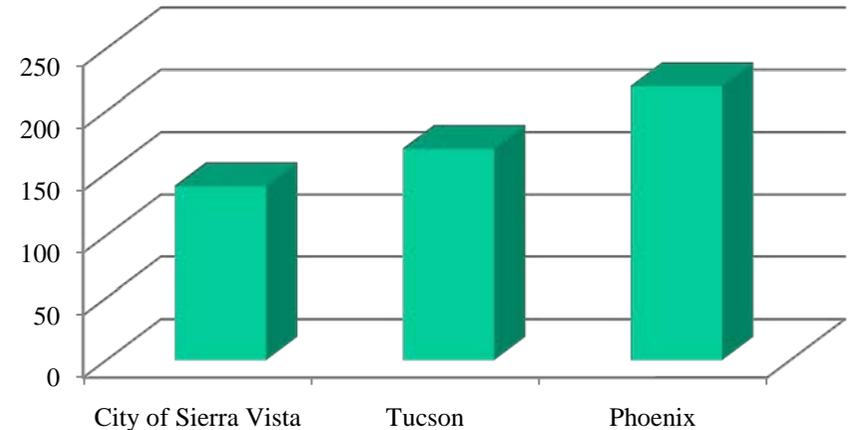
Net Zero Water Consumption



ACHIEVED NET ZERO On-Post in 2003

Fort Huachuca On-Post Net Pumping has been below zero since 2003.

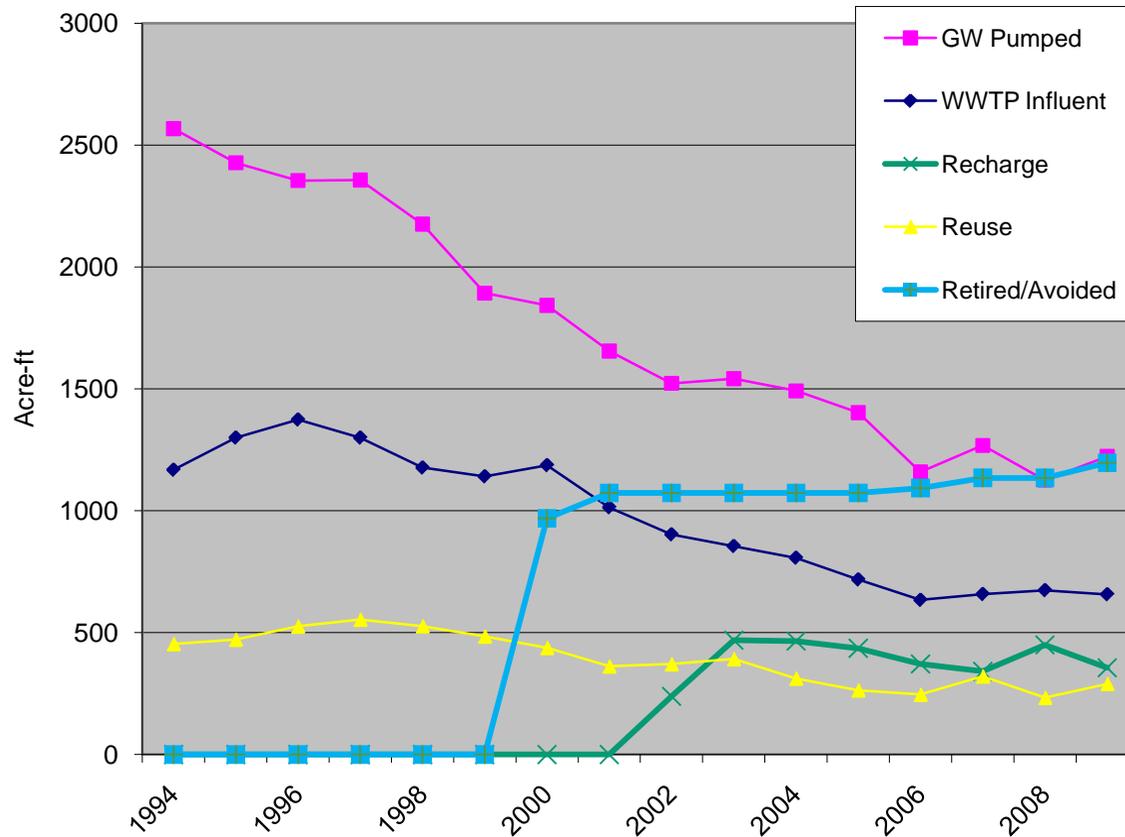
Gallons Per Capita Per Day



Comparison of Consumptive Water Use in Arizona

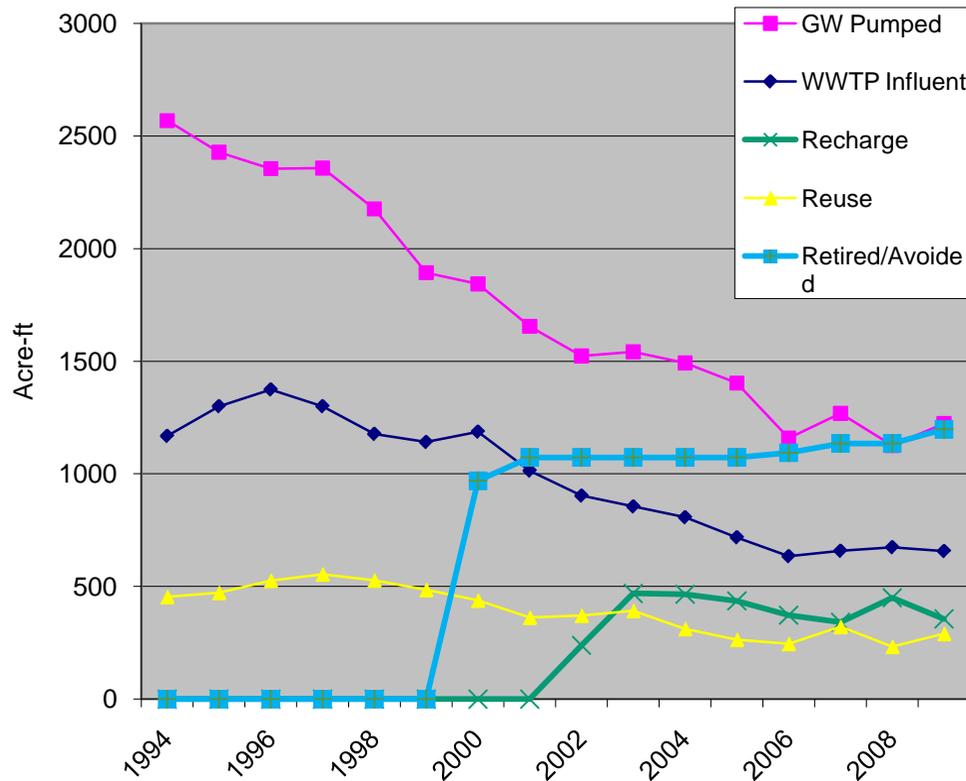


Water Trendlines



- Groundwater pumping has decreased by more than 60% since 1993 (3028 to 1142 afa).
- Conservation easements have retired 1073 afa of agricultural pumping and 124 afa of avoided future residential pumping.

2nd and 3rd Order Effects



- Conservation:
 - decreases WWTP influent volume,
 - increases concentrations of chemicals in influent, and
 - results in ineffective and inefficient treatment.
- Lower influent volume results in decreased treated effluent volume.
- Lower treated effluent volume results in fewer reuse and recharge options.



Water Strategy

- Complete Huachuca City Effluent Project
- Construct new stormwater basins to enhance recharge.
- Harvest rainwater to offset potable water use with concept designs now available for five new systems.
- Meter operations and admin facilities for feedback to unit commanders for conservation improvement.
- Continue to acquire Conservation Easements to avoid future pumping.
- Continue to work with off-post partners.



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Questions???