



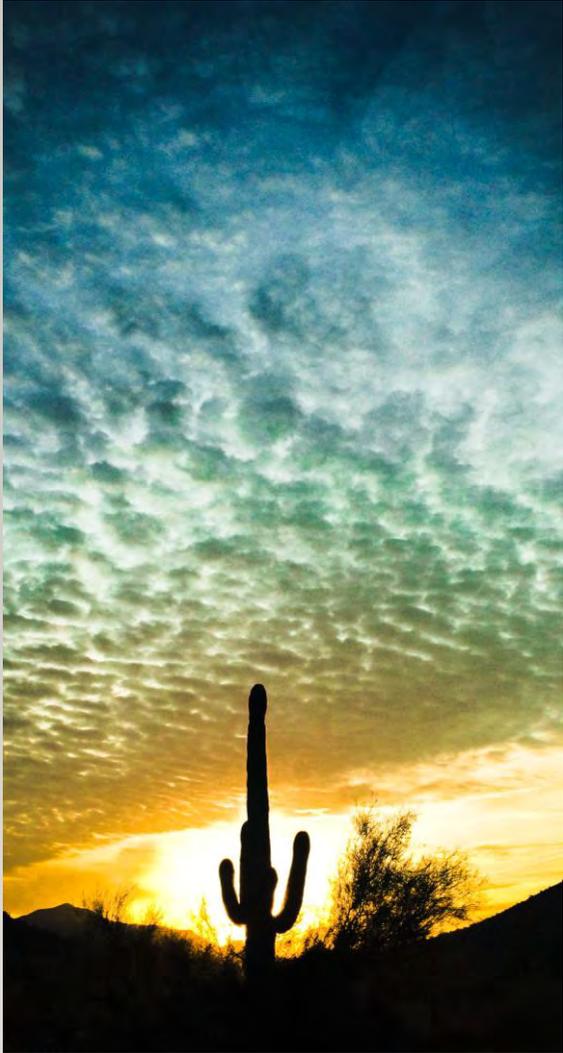
PROTECTING GROUNDWATER WHERE EVER DROP COUNTS

THE ARIZONA EXPERIENCE.

WATER QUALITY ASSURANCE REVOLVING FUND (WQARF)

R. ANDRÉ CHIARADIA





**In Arizona there is a saying,
“whisky is for drinking, water’s for fighting over.”**

**In 2015, the World Economic Forum listed the
lack of fresh water resources as the largest global
threat over the next decade**





GROUNDWATER

WATER HELD UNDERGROUND IN THE SOIL OR IN PORES
AND CREVICES IN ROCK

View of environmental agencies, regulations advisory groups:

- “Water is not just another commercial item – it is a part of our heritage, and must be protected, defended and treated as such” ¹
- “Water resources management serves the purpose of satisfying the needs of people and the economy, protecting waters and the environment connected with these resource” ²
- **Goal of Groundwater protection**, “to limit the degradation of groundwaters intended mainly for consumption and to strive for sustainable management of groundwaters” ³

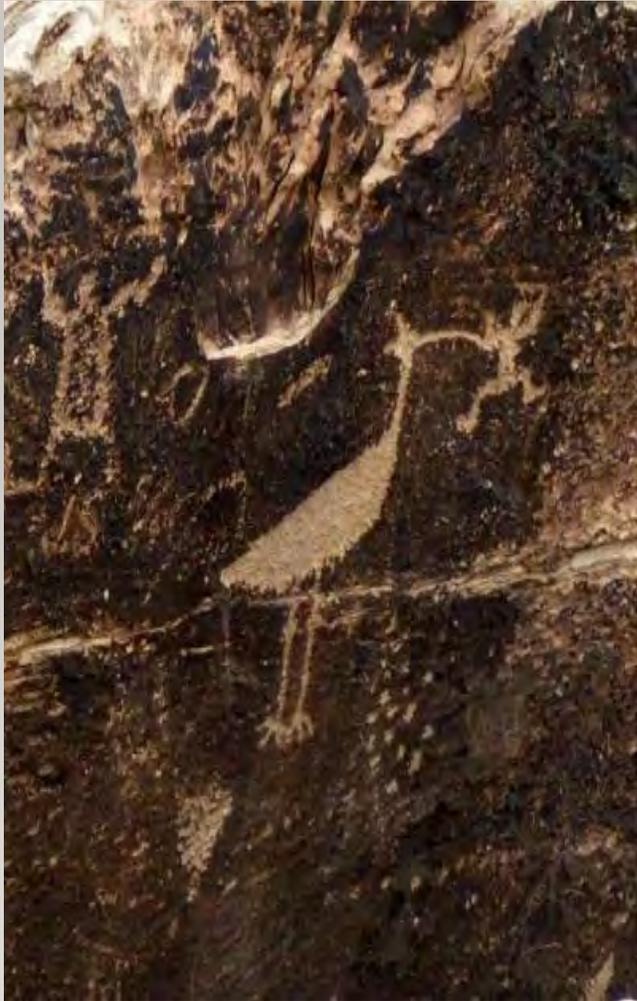
(1-Polish Water Framework Directive, 2000; 2-Polish Water Act, 2001; 3-Polish Hydrogeological Survey)





ARIZONA

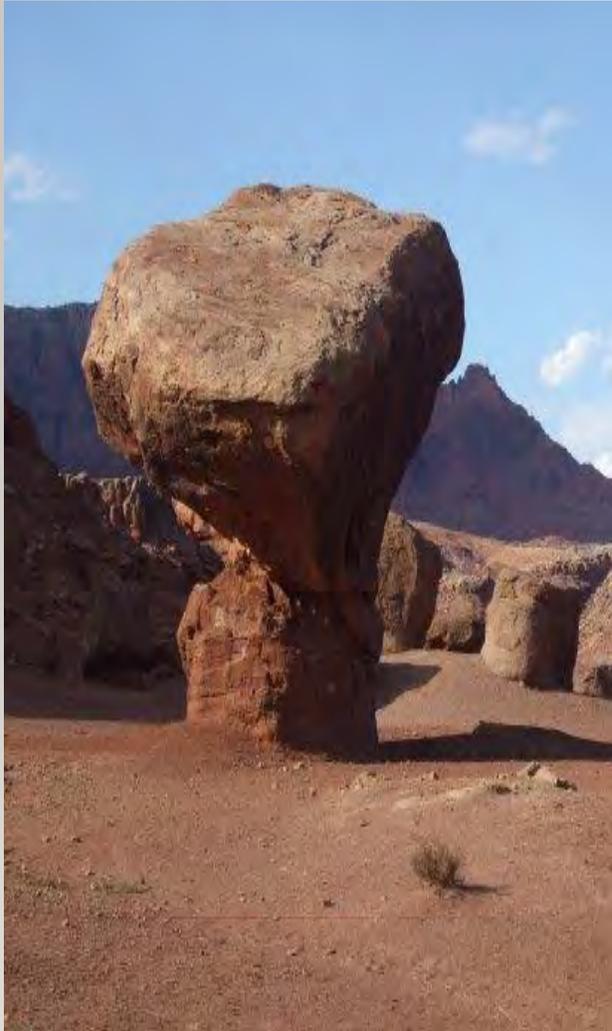
- "**Waters of the state**" means all waters within the jurisdiction of this state including all perennial or intermittent streams, lakes, ponds, impounding reservoirs, marshes, watercourses, waterways, wells, **aquifers**, ... ARS 49-201.14
- All aquifers in this state identified and defined under subsection A of this section and any other aquifers subsequently discovered, identified and defined shall be classified for drinking water protected use... ARS 49-224 (B)
- (ARS - Arizona Revised Statutes)



ARIZONA GROUNDWATER PROTECTION

- The **aquifer water quality standards** (AWQS) [A.A.C. R18-11 Article 4] establishes the water quality goals for groundwater in Arizona. To maintain and protect groundwater quality for drinking water use.
- “to preserve and protect the quality of those waters for all present and reasonably foreseeable future uses” [A.R.S. 49-221] for all aquifers in the state.
- ADEQ has established aquifer water quality standards, based on the primary **maximum contaminant levels** (MCLs) under the Safe Drinking Water Act.

ARIZONA GROUNDWATER PROTECTION



- All aquifers in Arizona are classified for drinking water protected use [A.R.S. § 49-224(B)] unless otherwise designated by the Director of Arizona Department of Environmental Quality (ADEQ)
- To date, no aquifers in Arizona have been reclassified to a non-drinking water protected use.



ARIZONA GROUNDWATER PROTECTION

- Aquifer water quality standards are used to establish clean-up levels for remedial actions initiated under the Water Quality Assurance Revolving Fund (WQARF), federal Superfund and Underground Storage Tank (UST) programs.
 - WQARF and UST regulations authorize ADEQ to approve remedial or corrective actions that may result in water quality exceeding water quality standards after completion of the actions.
- 



ARIZONA GROUNDWATER PROTECTION

- This authority recognizes that, in some cases, it may not be feasible to clean up contaminated groundwater to levels that meet aquifer water quality standards but approval of such remedial actions does not affect the classification of an aquifer pursuant to A.R.S. § 49-224.



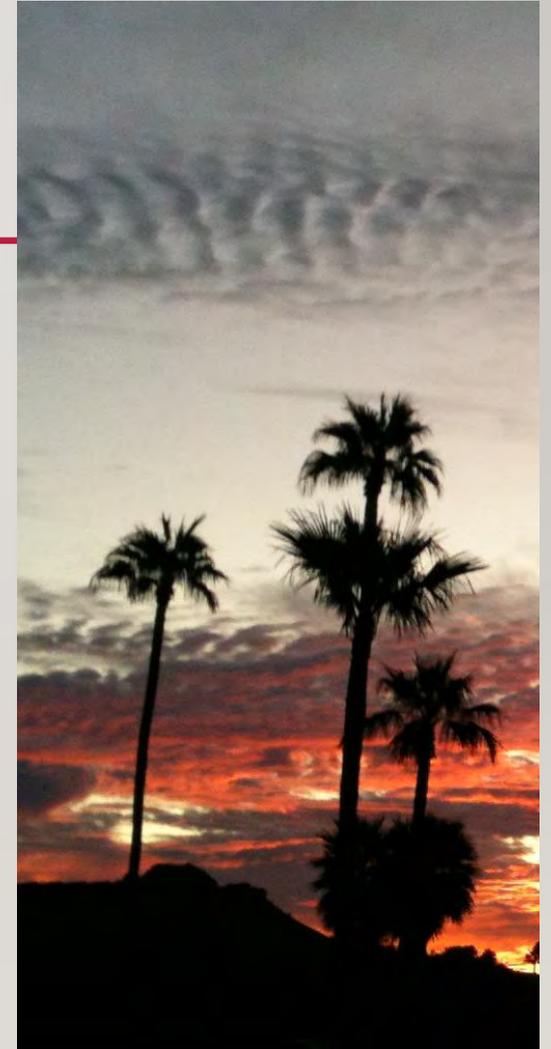
POLAND/ARIZONA

Poland

- **Population:** 37,95 million (2016) * World Bank
- **Area:** 312 679 km²
- **Annual rainfall:** 600 millimeters

Arizona

- **Population:** 7,016 million (2017)
- **Area:** 295 254 km²
- **Annual rainfall:** 205 millimeters

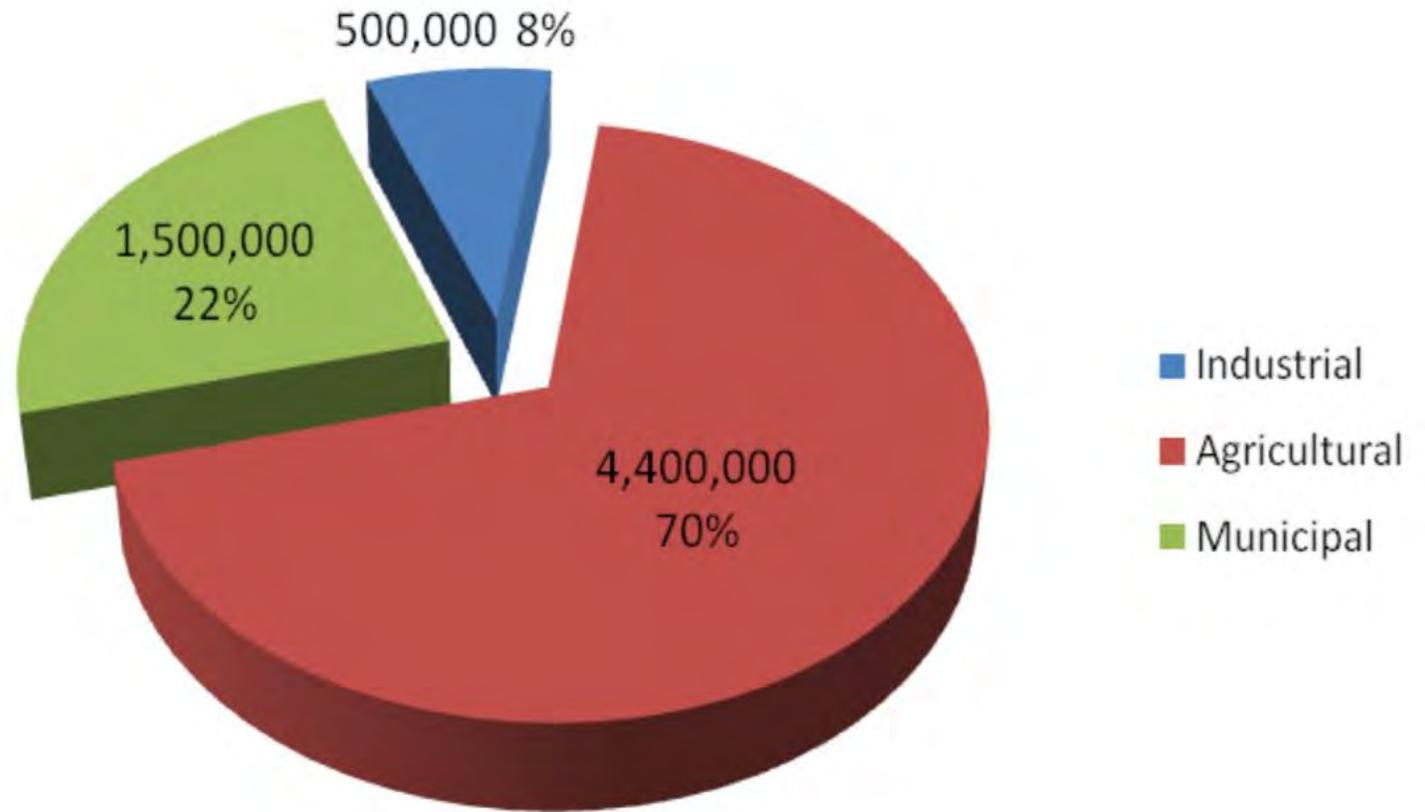




GROUNDWATER CONSUMPTION

- **43%** of **Arizona's** water use comes from **groundwater** sources. (Arizona Department of Water Resources)
- **70%** of water consumption in **Poland** comes from **groundwater** (Polish Hydrogeological Survey)
- **World**
- Groundwater supplies 25 to 40 percent of global drinking water
- 70 percent of water withdrawn from aquifers is consumed by agriculture

WATER USE DISTRIBUTION ARIZONA







ENVIRONMENTAL PROTECTION

- US Federal vs State environmental regulations
- Cleanup of uncontrolled or abandoned releases of hazardous materials



UNITED STATES ENVIRONMENTAL LAW

- The United States Congress enacted federal statutes intended to address pollution control and remediation, including air pollution, water pollution, environmental contaminants and contaminated site cleanup.
- CERCLA, or Superfund program addresses abandoned or historic waste sites (Comprehensive Environmental Response, Compensation, and Liability Act)
- Many federal environmental laws employ cooperative federalism mechanisms
- Federal regulatory programs are administered in coordination with the U.S. states.

US STATE ENVIRONMENTAL LAW

- Federalism in which national, state, and local governments interact cooperatively and collectively to solve environmental issues. The system is dominated by the national government.
- States generally enact their own laws to cover areas not preempted by federal law. This includes areas where Congress had acted, in limited fashion, like site cleanup laws: handling sites outside Superfund.





FEDERAL SUPERFUND LAW

- The Superfund law (Comprehensive Environmental Response, Compensation and Liability Act, "CERCLA") imposes liability on parties responsible for, in whole or in part, the presence of hazardous substances at a site

ARIZONA



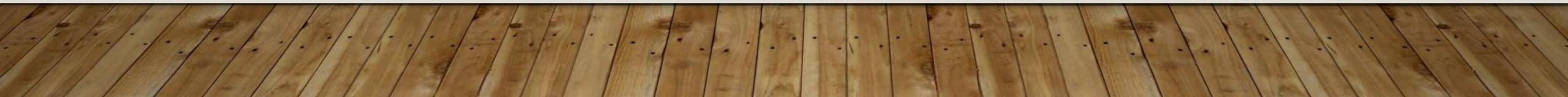
ARIZONA SUPERFUND LAW



- Arizona “Superfund” (WQARF) statute rules do not simply follow those of Federal “CERCLA” rules
- Has a proportional liability scheme based on equitable allocation of liability
- Provides settlement discount of 25% on allocated share of liability
- Focuses heavily on water quality protection; allows options to restore, replace or otherwise provide for a lost resource



ARIZONA SUPERFUND LAW

- Remedial Objectives are defined in terms of resource use and not necessarily numerical standard-although numerical standards apply by default
 - Has provision for expanded Community Involvement through the formation and participation of Community Advisory Boards
 - Gives wide latitude to the Agency Director to authorize and conduct remedial actions
- 

ARIZONA



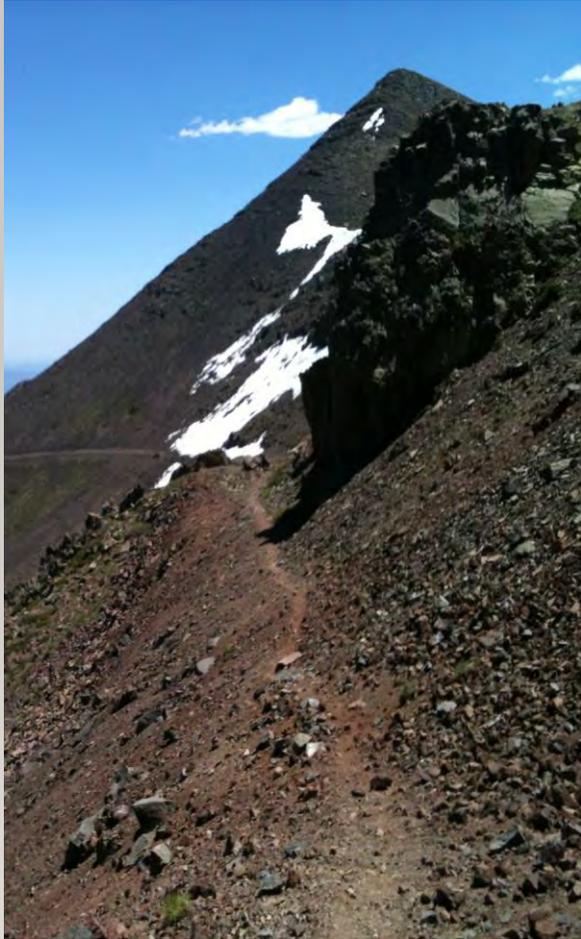
- Arizona Administrative Code
- TITLE 18. ENVIRONMENTAL QUALITY CHAPTER 16. Department of Environmental Quality Water Quality Assurance Revolving Fund Program
- Title 49 established broad authorities for managing and protecting groundwater quality and remediating point and nonpoint sources of pollution. The explicit goal of the statute is to preserve and protect groundwater quality for all present and reasonably foreseeable future uses



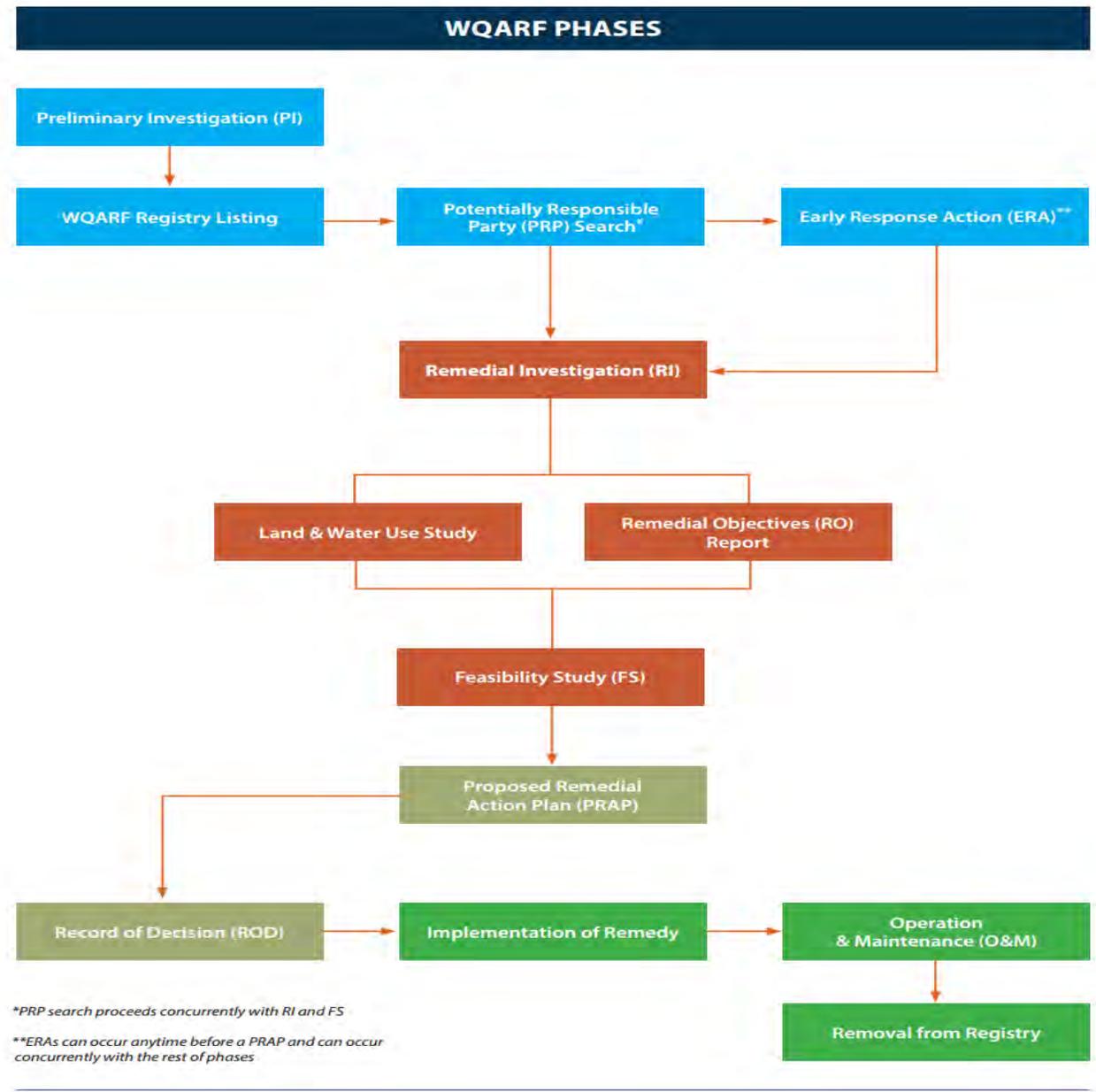


ARIZONA'S SUPERFUND PROGRAM WQARF

- The Water Quality Assurance Revolving Fund (WQARF) program identifies, prioritizes, assesses, manages and remediates threats and impacts to public health and the environment from hazardous materials.
- Sites are scored based on the type of contamination, the contamination's location and the number of people that may be affected.
- Currently, there are 36 sites on the WQARF Registry



WQARF PROCESS



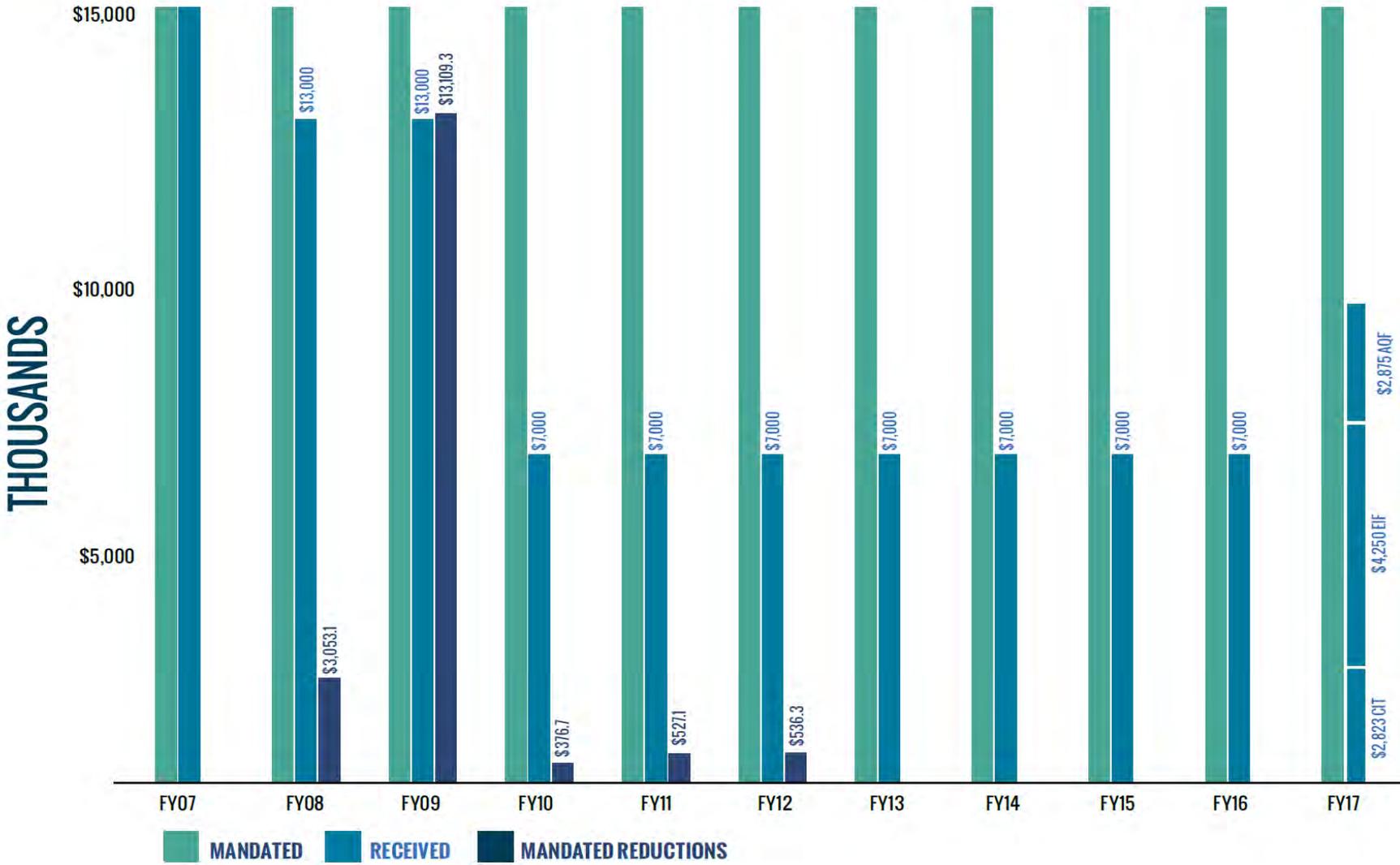
WQARF FUNDING



- The WQARF Program relies on \$18 million annual funding authorized by Arizona Revised Statutes (A.R.S.) § 49-282(B), which specifies Corporate Income Tax (CIT) revenue as the funding source for \$15 million.
- In FY17, WQARF received only \$2.82 million from CIT revenue. ADEQ appropriated funds from other sources including \$4.25 million and \$2.87 million from the emissions inspection (EIF) and air quality funds (AQF).
- During the last 10 fiscal years, Program funds experienced a deficit of \$72.2 million in CIT revenue alone.

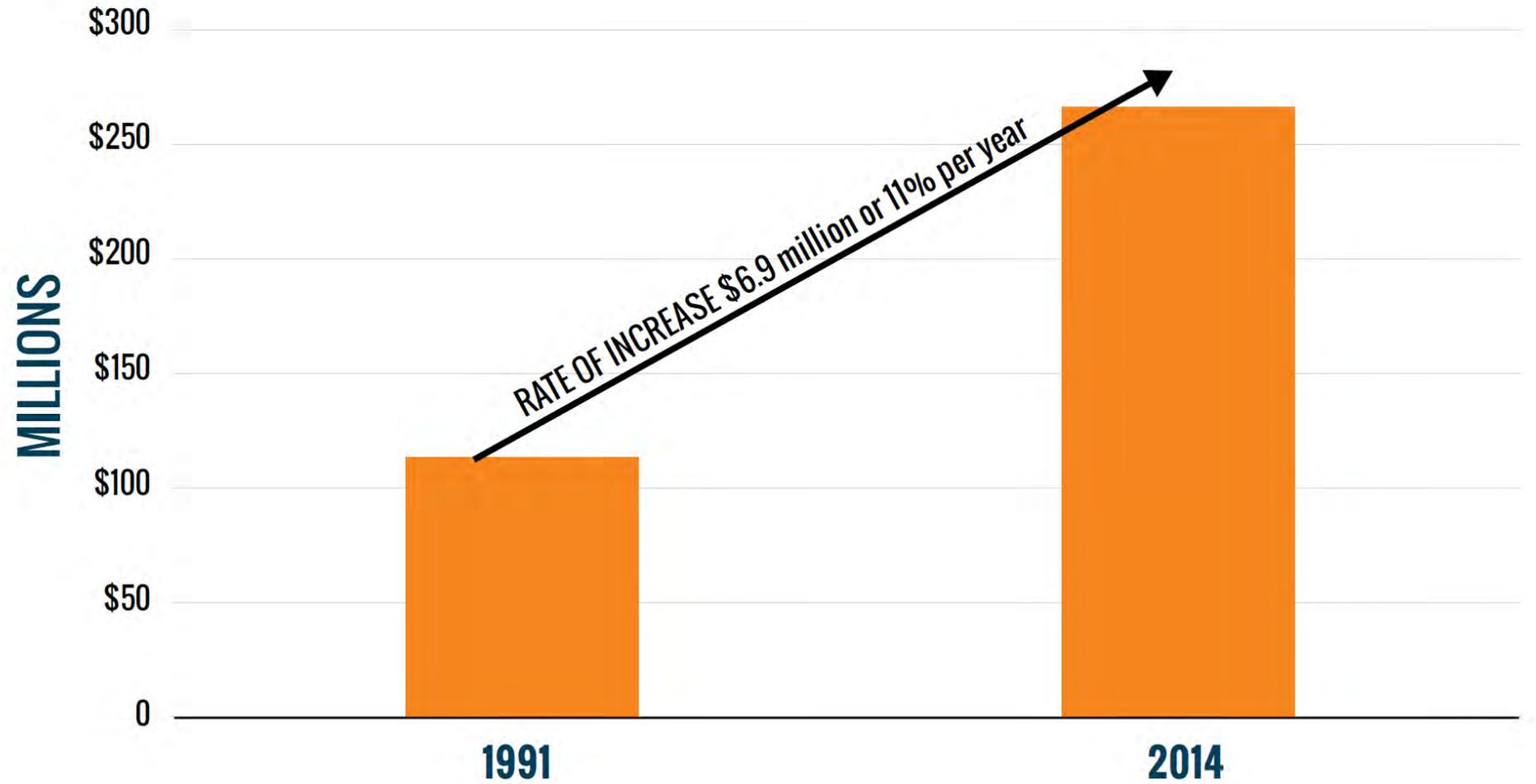


CORPORATE INCOME TAX REVENUE COMPARISON FY08 – FY17





ORPHAN SHARE ESTIMATE BASED ON MODELED TOTAL WQARF LIABILITY



WQARF ACHIEVEMENTS AT LISTED SITES

664 kg of Volatile Organic Compounds removed (soil vapor)

644 669 kg of metals and other hazardous wastes

Of which:

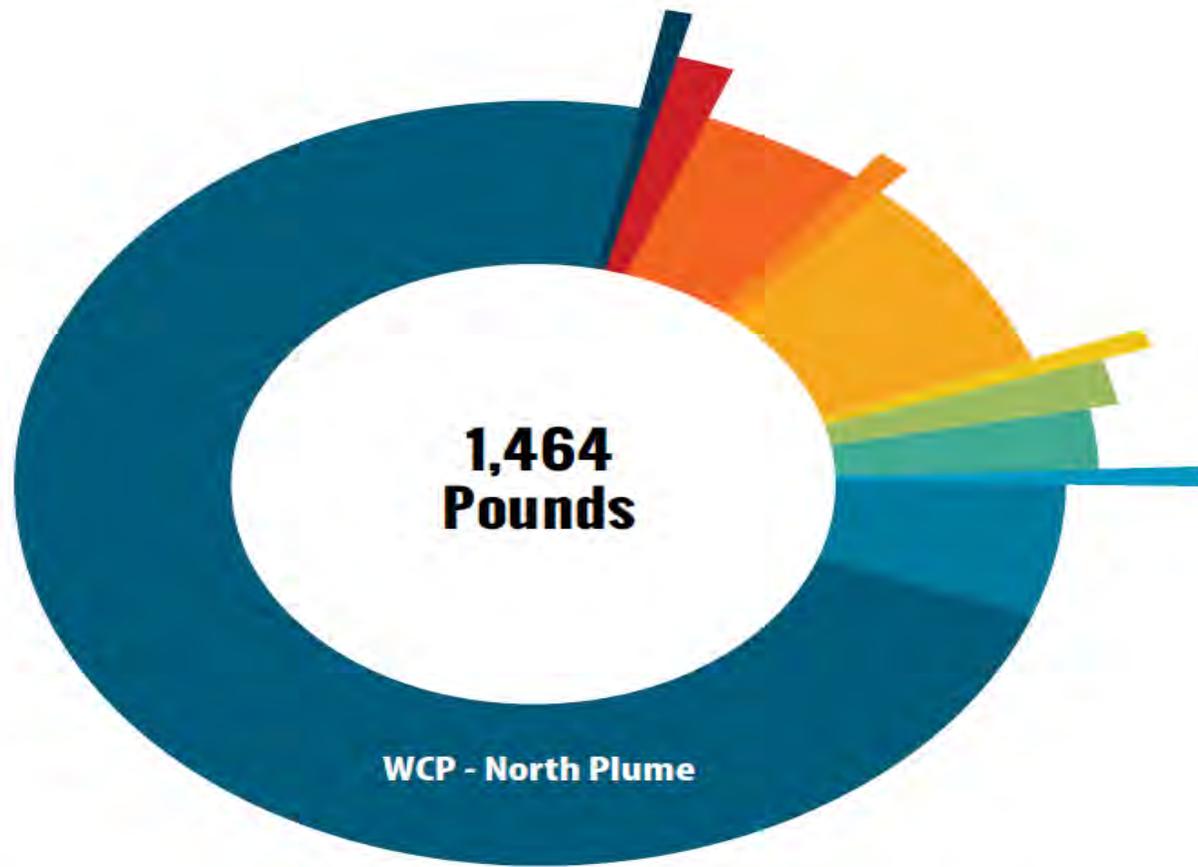
2 449 mt contaminated soil removed

5.66×10^9 L groundwater treated



WQARF SITE MISSION OUTCOME DETAIL

REMEDIATION:



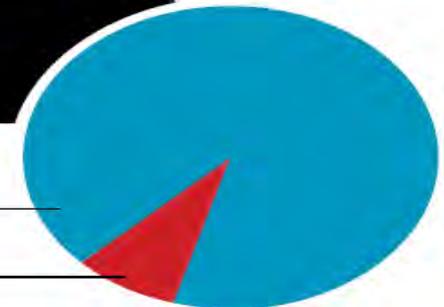
Volatile Organic Compounds (VOCs) Removed

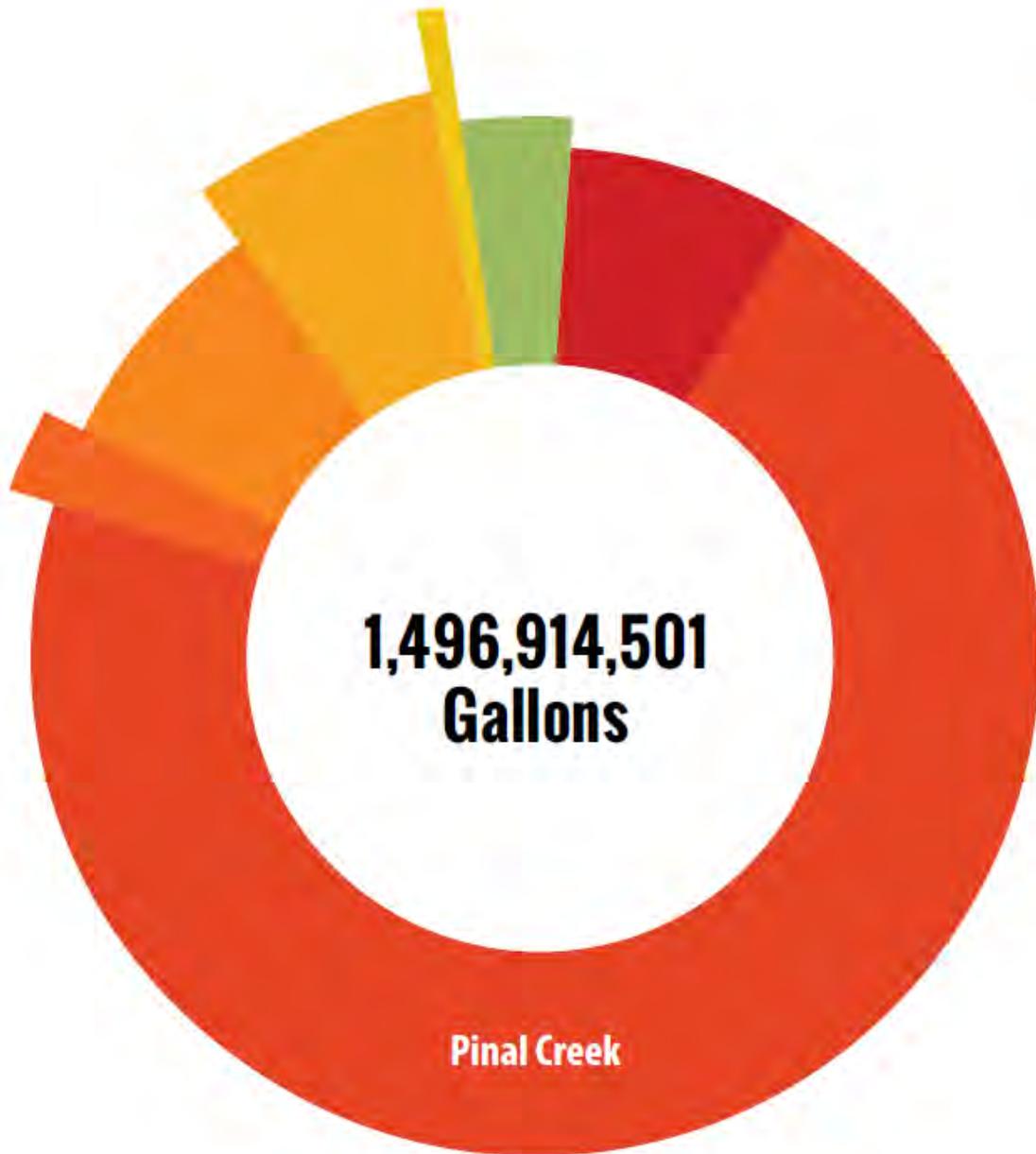
56th St & Earll Dr	30
Central and Camelback	87
Cooper & Commerce	48
ECP 24th St and Grand Canal SVE	73
ECP 32nd St and Indian School - Maroney's SVE	1
ECP 32nd St and Indian School - Viking SVE	134
Los Reales Landfill	2.43
Miracle Mile	.21
Payson PCE Pump & Treat and ERD	.56
Shannon Road/El Camino Del Cerro	20
West Central Phoenix (WCP) North Plume (NP)	1,202

**2,699 Tons
Contaminated Soil
Removed**

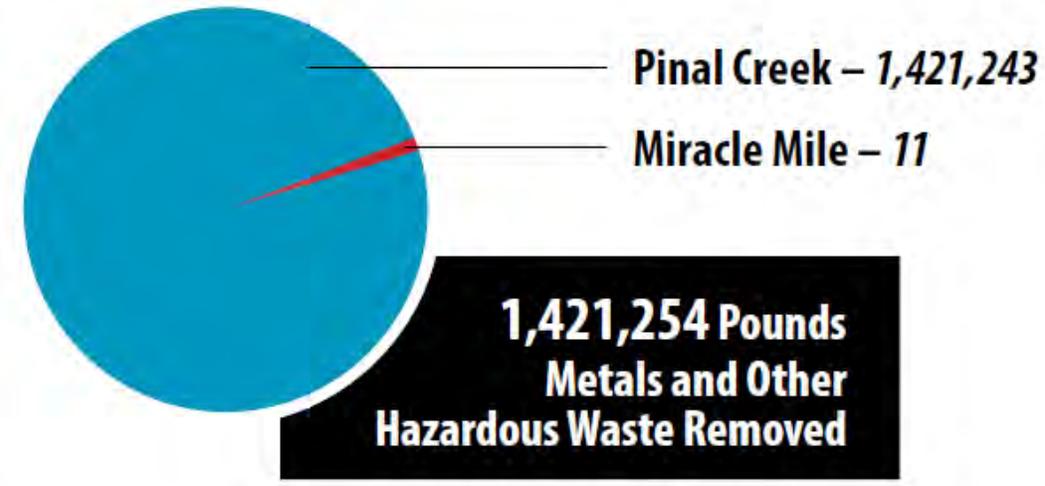
Klondyke Tailings – 2,475

3rd and Smelter – 224





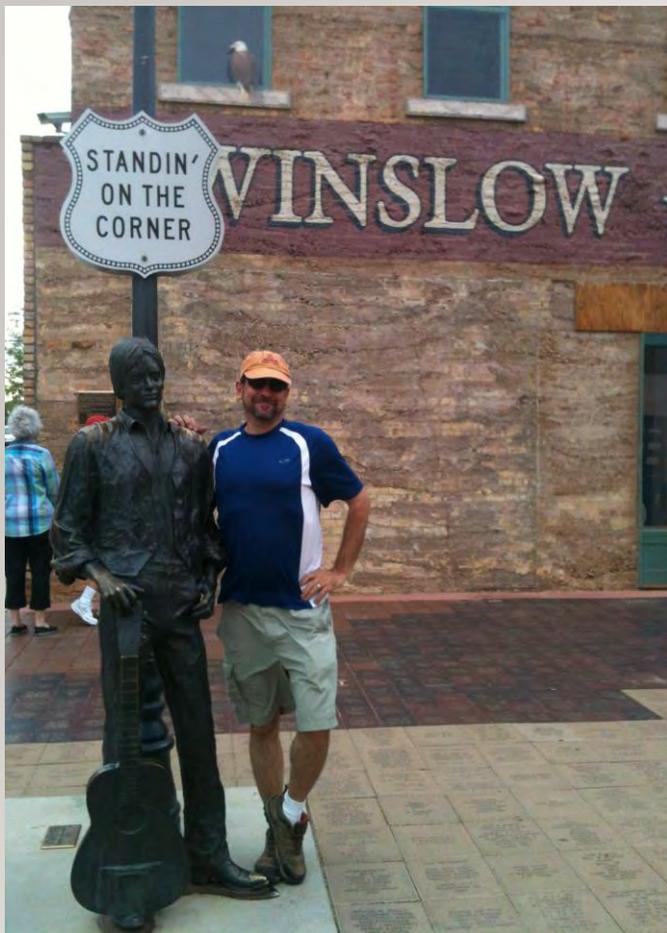
Gallons of Groundwater Treated



56th St & Earll Dr	113,237,166
Central & Camelback	12,675,650
Los Reales Landfill	48,440,481
Miracle Mile	102,480,000
Payson PCE	36,400,000
Pinal Creek	1,066,803,000
Shannon	116,878,204







QUESTIONS?
PYTANIA?

Thank you



Dziękuję

