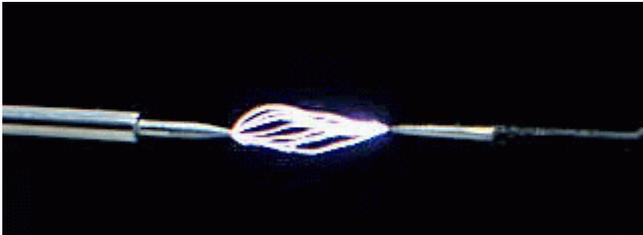
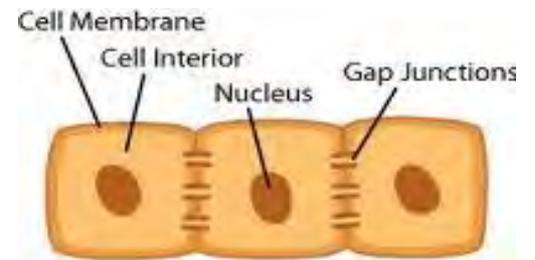


Arkansas Water Plan Gap Analysis

February 18, 2014

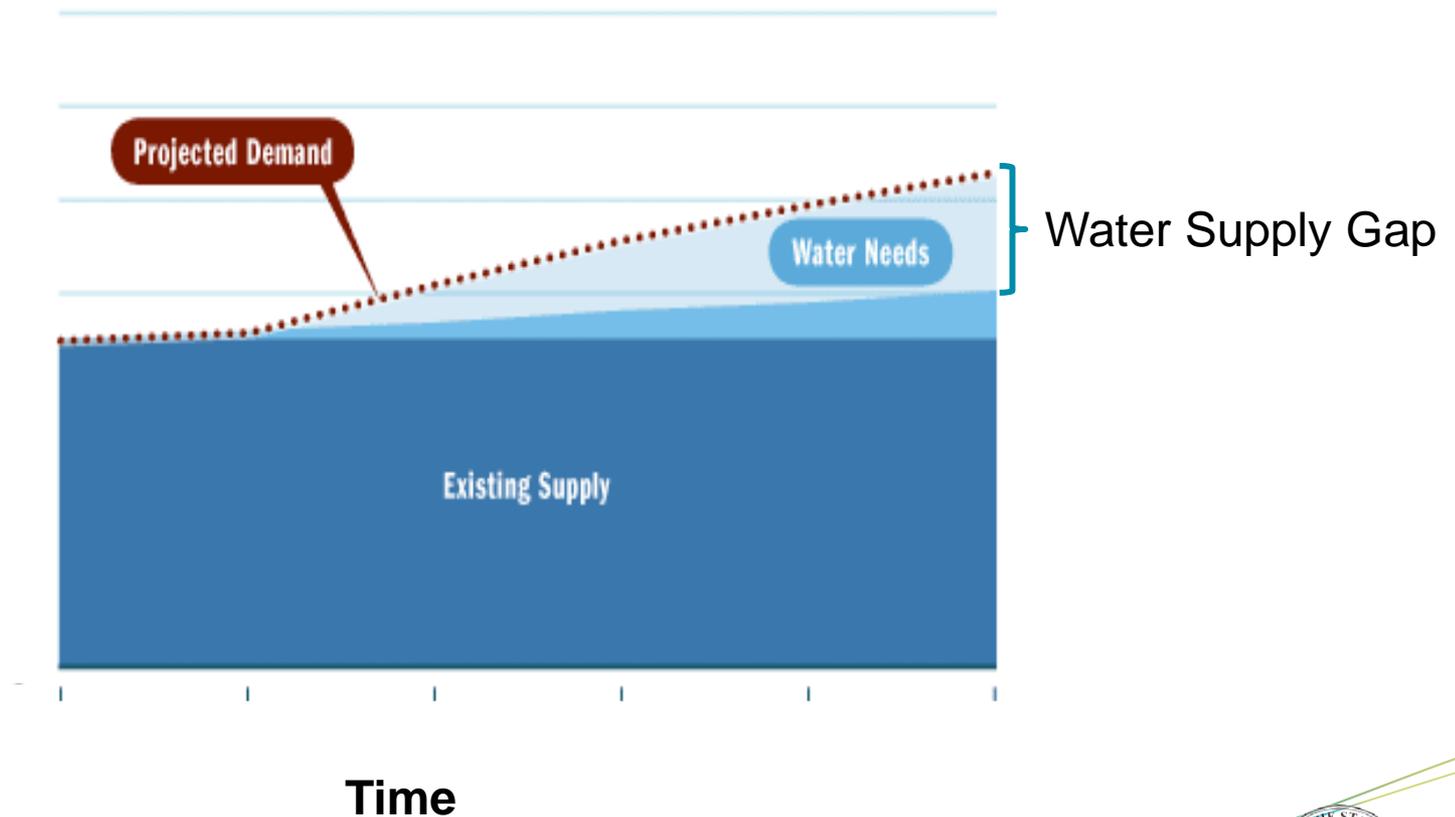
Low Gap Arkansas



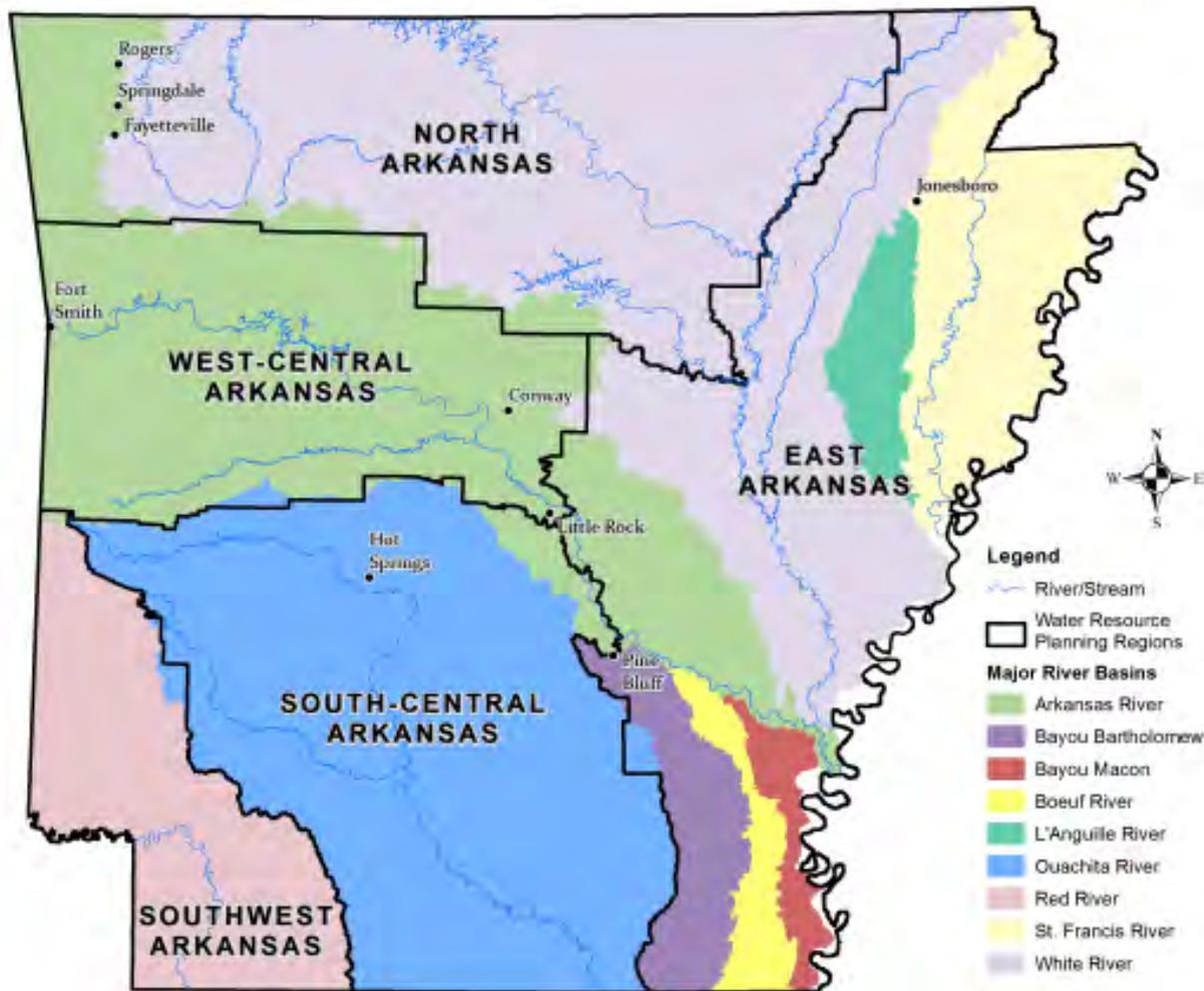
What is a Gap?



Example Water Supply Gap



Arkansas Gap Analysis



Gap Analysis Objectives

- **Objective**

- Quantify gaps in water supply associated with the 2050 planning horizon across the state
- Identify areas for which the Regional Water Resource Planning groups should consider options for addressing gaps

- **Uses Data from AWP Reports**

- Water Demand Forecast Report
- Groundwater Modeling
- Excess Surface Water Calculations

Surface Water Availability

- Surface water currently provides about 30% of Arkansas water supply
- Available surface water quantified as “excess surface water”
- Excess Surface Water (A.C.A. § 15-22-304):
“Twenty-five percent of that amount of water available on an average annual basis above the amount required to satisfy existing and projected needs.”

Instream Flow Requirements Include:

- Fish & Wildlife Flows (Arkansas Method)
- Water Quality (7Q10)
- Navigation
- Interstate Compacts

USGS Historical Gaged Streamflow

Instream Flow Requirements

75%
Unallocated

25% Available Excess Surface Water

Future Water Demands

Historical Streamflow Includes:

- Existing Uses
 - Riparian and Non-riparian Uses
 - Federal Water Project Needs
 - Firm Yield of All Affected Reservoirs
- Aquifer Recharge Requirements

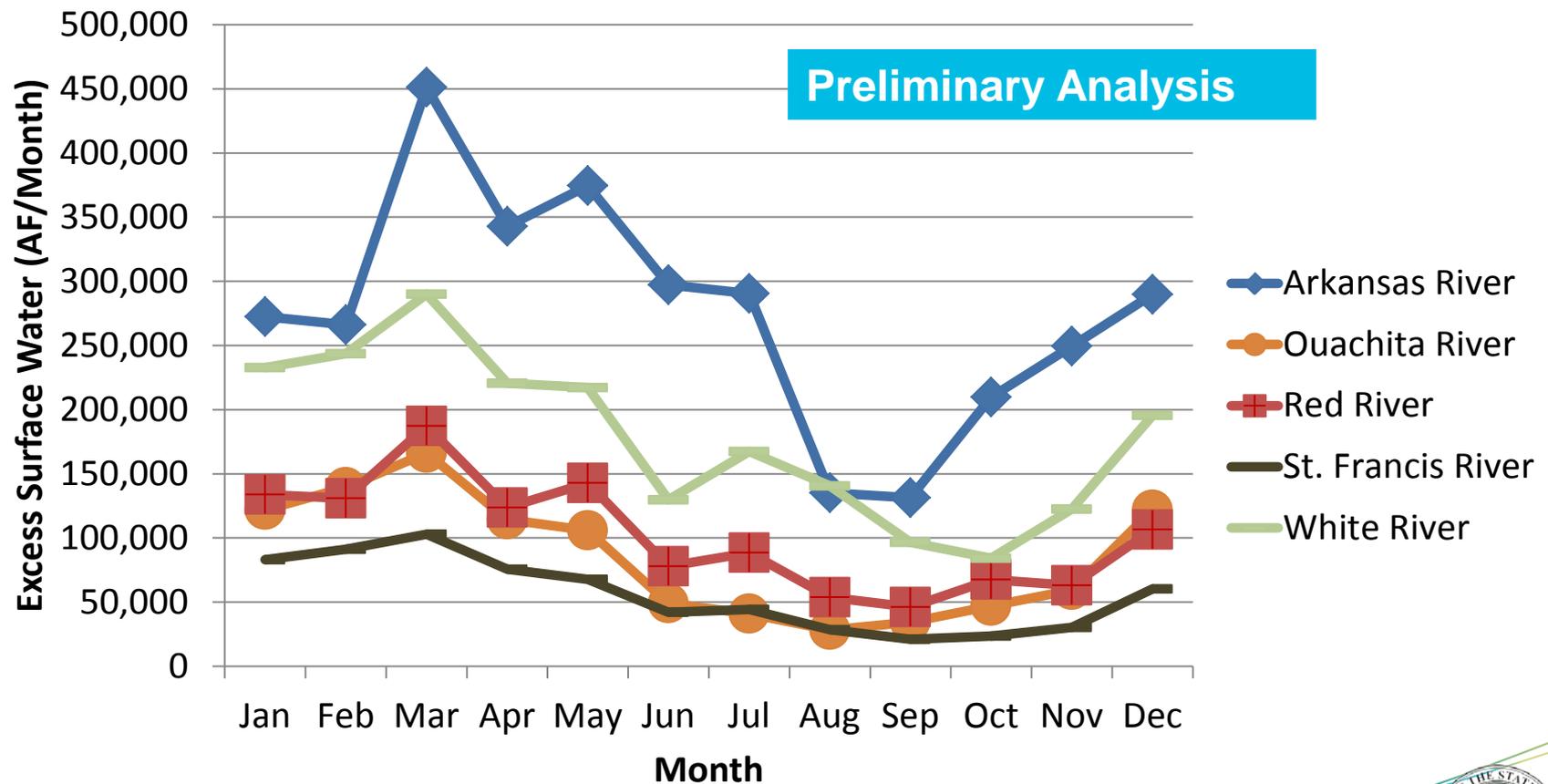
Surface Water Gap

- Excess surface water is available in every river basin – on an average annual basis
- Excess Surface Water was recalculated at a monthly timestep to evaluate the seasonal availability of surface water in each major basin
- The summer months have lower flows, so there is less water that meets the definition of “excess”

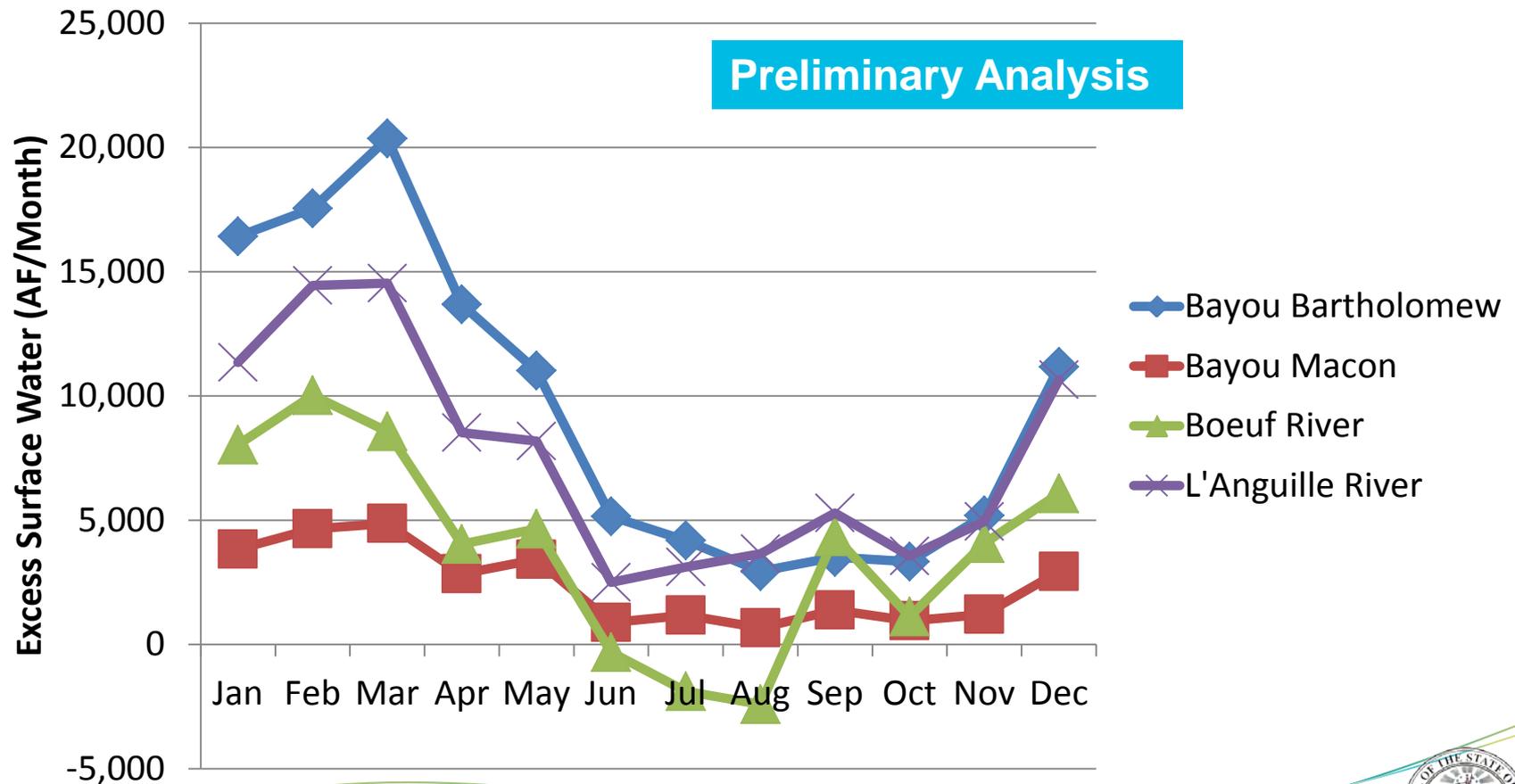
Excess Water, by River Basin

River Basin	Excess Water (Million ac-ft/yr)
Arkansas River	3.3
Delta	1.6
Ouachita River	1.0
Red River	1.1
White River (Cache)	1.7

Monthly Excess Surface Water – Large Rivers



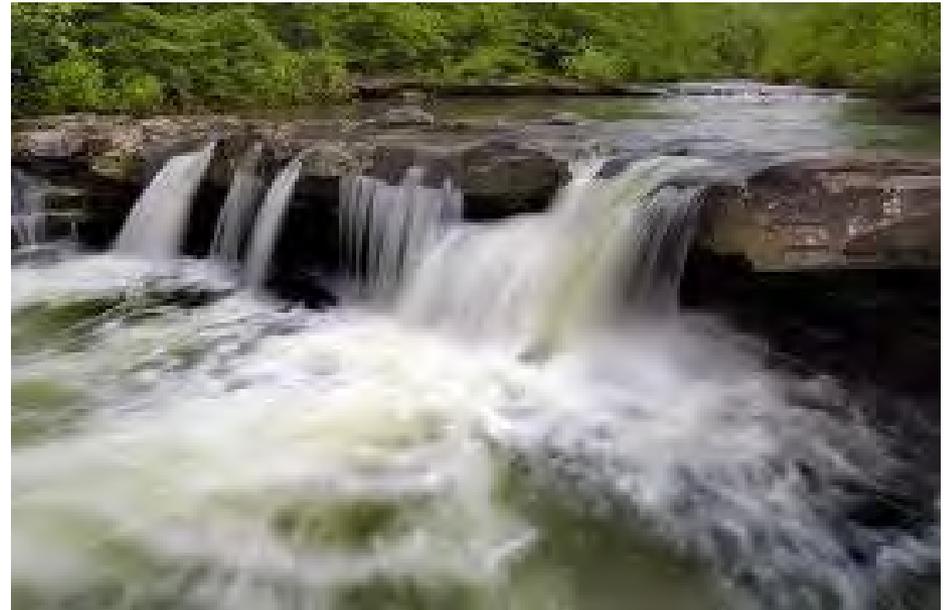
Monthly Excess Surface Water – Small Rivers



North Region Planning Area

Surface Water Gap

- On an average annual basis, there is excess surface water available in all basins
- Provisionally, there is also excess water on a monthly basis
- Separating the flows in the Upper and Lower White River Basin is ongoing



Groundwater Gap Analysis

Groundwater Gap =

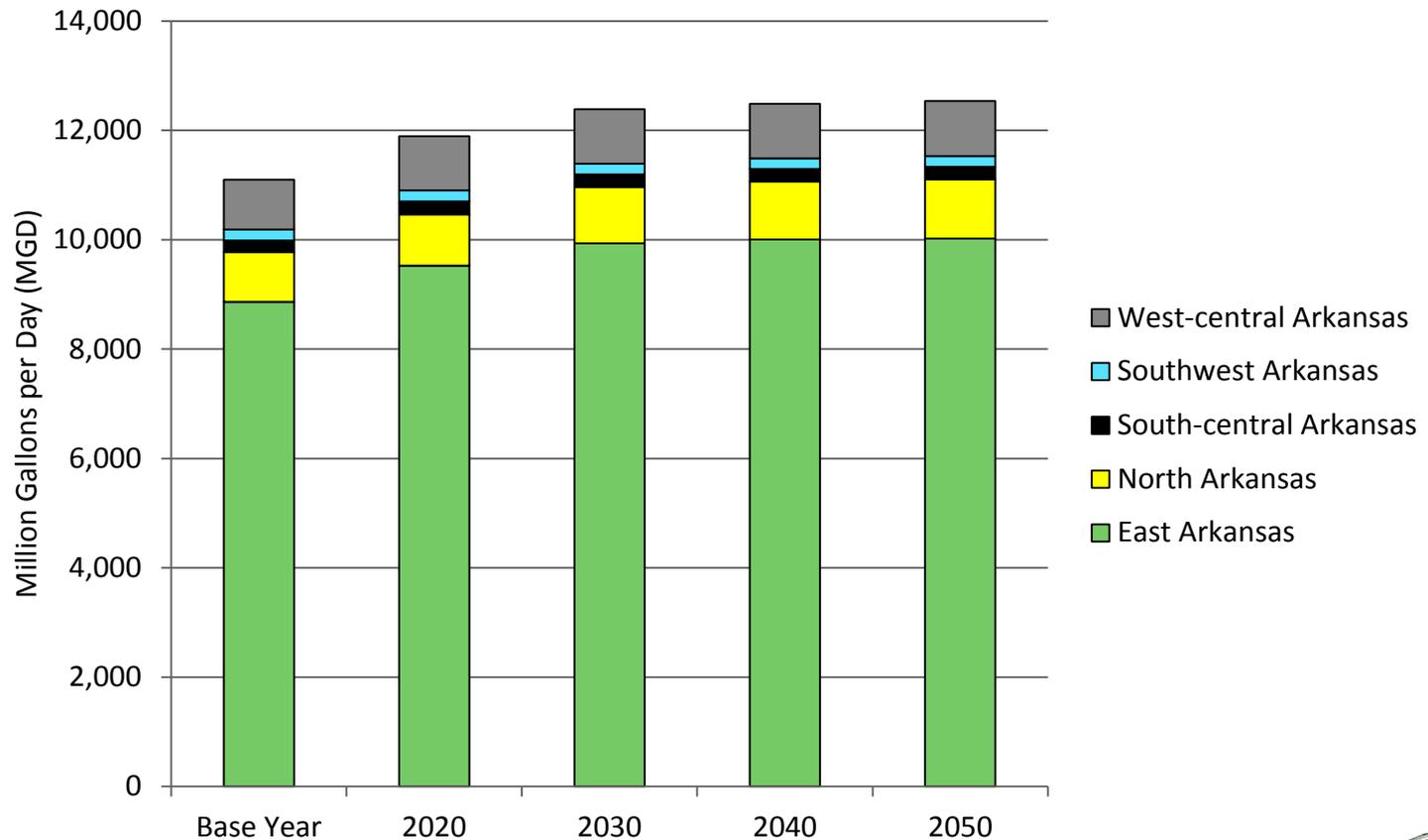
Groundwater Demand – Groundwater Yield

Groundwater Demand is calculated as the sum of 11 demand sectors from the Water Demand Forecast Report

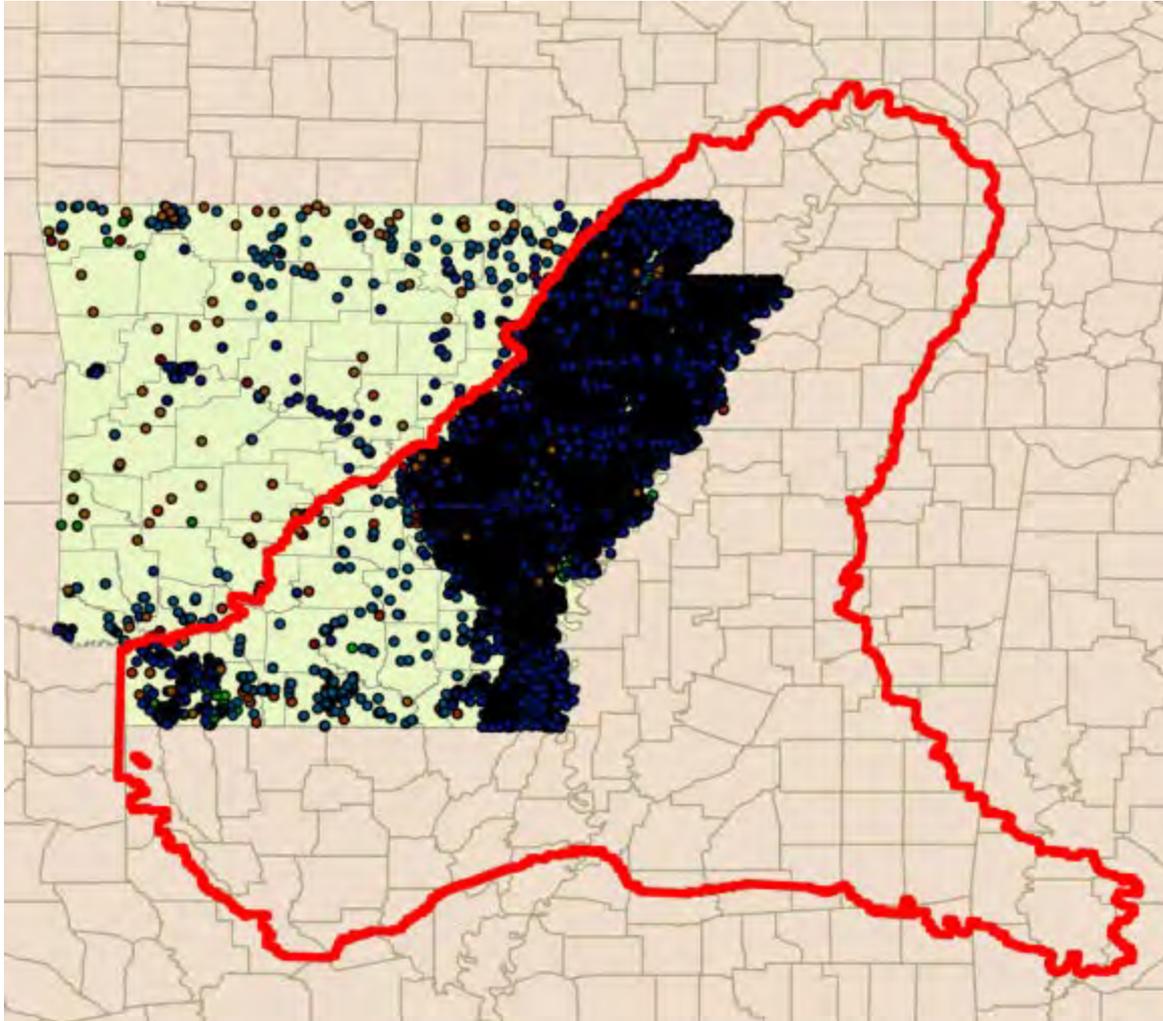
Groundwater Yield is assumed to be equal to 2010 groundwater demands regions

Groundwater Gap = 2050 Demand – 2010 Demand

Total Water Demands by Water Planning Region

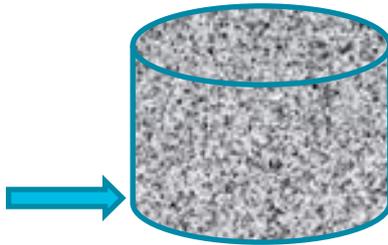


USGS Groundwater Model

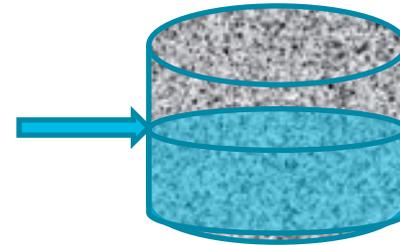


Groundwater Modeling Scenarios

- Scenario 1:
- Allows full dewatering or mining of the aquifer

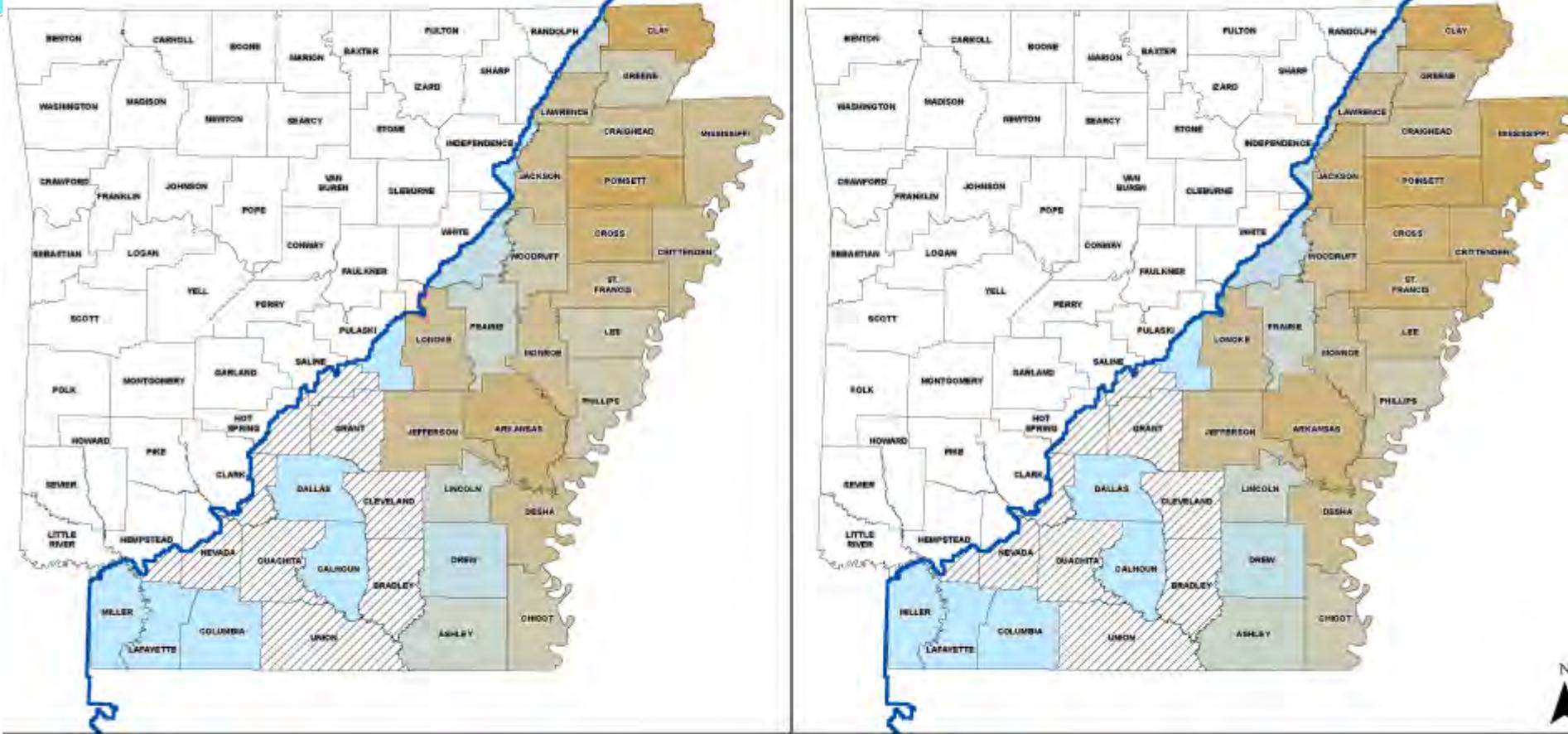


- Scenario 3:
Stops pumping when water level reaches half of the aquifer thickness



BASE PERIOD

YEAR 2050



- Legend**
- MWRAS Outline
 - County Boundary
 - Demand**
 - No significant demand
 - < 50 MGD
 - 50 - 100 MGD
 - 100 - 200 MGD
 - 200 - 300 MGD
 - 300 - 400 MGD
 - 400 - 500 MGD

Figure 5-12
Distribution of Demand in the Alluvial Aquifer in Base Period and 2050

Arkansas State Water Plan Update
 Groundwater Availability



BASE PERIOD



YEAR 2050

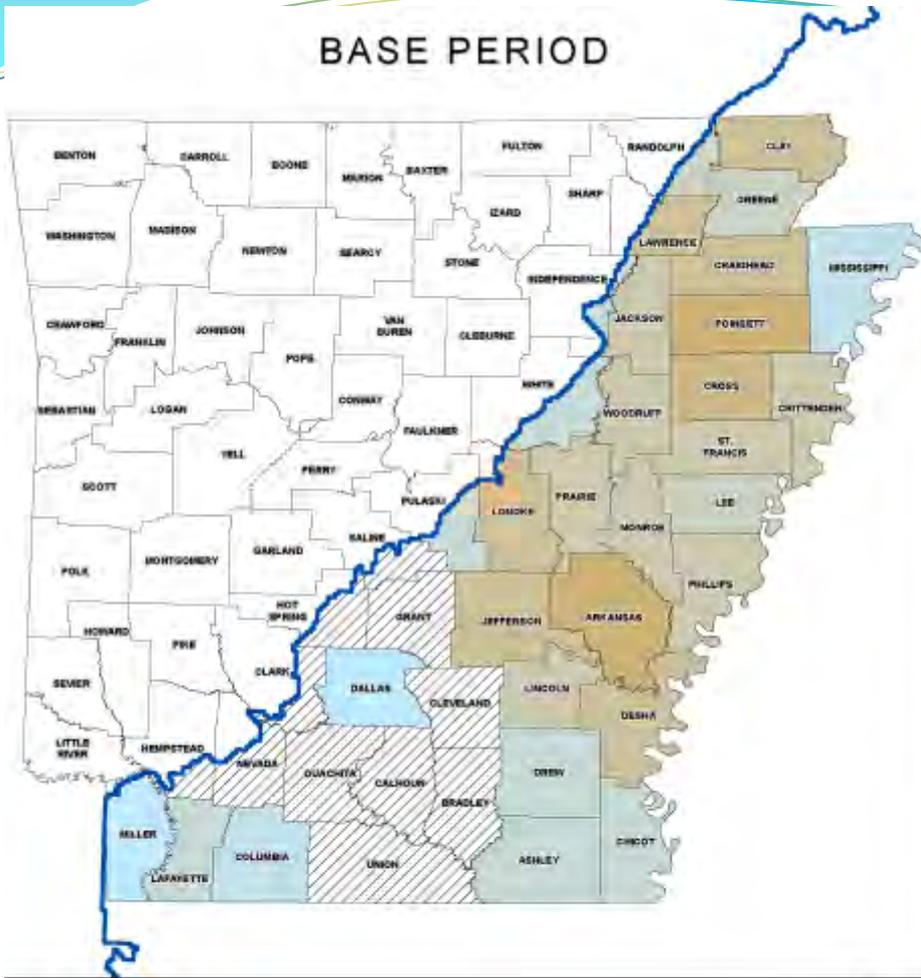


Figure 5-15
Supply Gap Map for Alluvial Aquifer Scenario 1 Base Period and 2050

Arkansas State Water Plan Update
 Groundwater Availability



BASE PERIOD



YEAR 2050



Legend

MBRAS Outline	1 - 10 MGD	200 - 300 MGD
County Boundary	10 - 30 MGD	300 - 400 MGD
Supply Gap	50 - 100 MGD	400 - 500 MGD
No significant supply gap	100 - 200 MGD	> 500 MGD
< 1 MGD		

Figure 5-19
Supply Gap Map for Alluvial Aquifer Scenario 3 Base Period and 2050

Arkansas State Water Plan Update
 Groundwater Availability

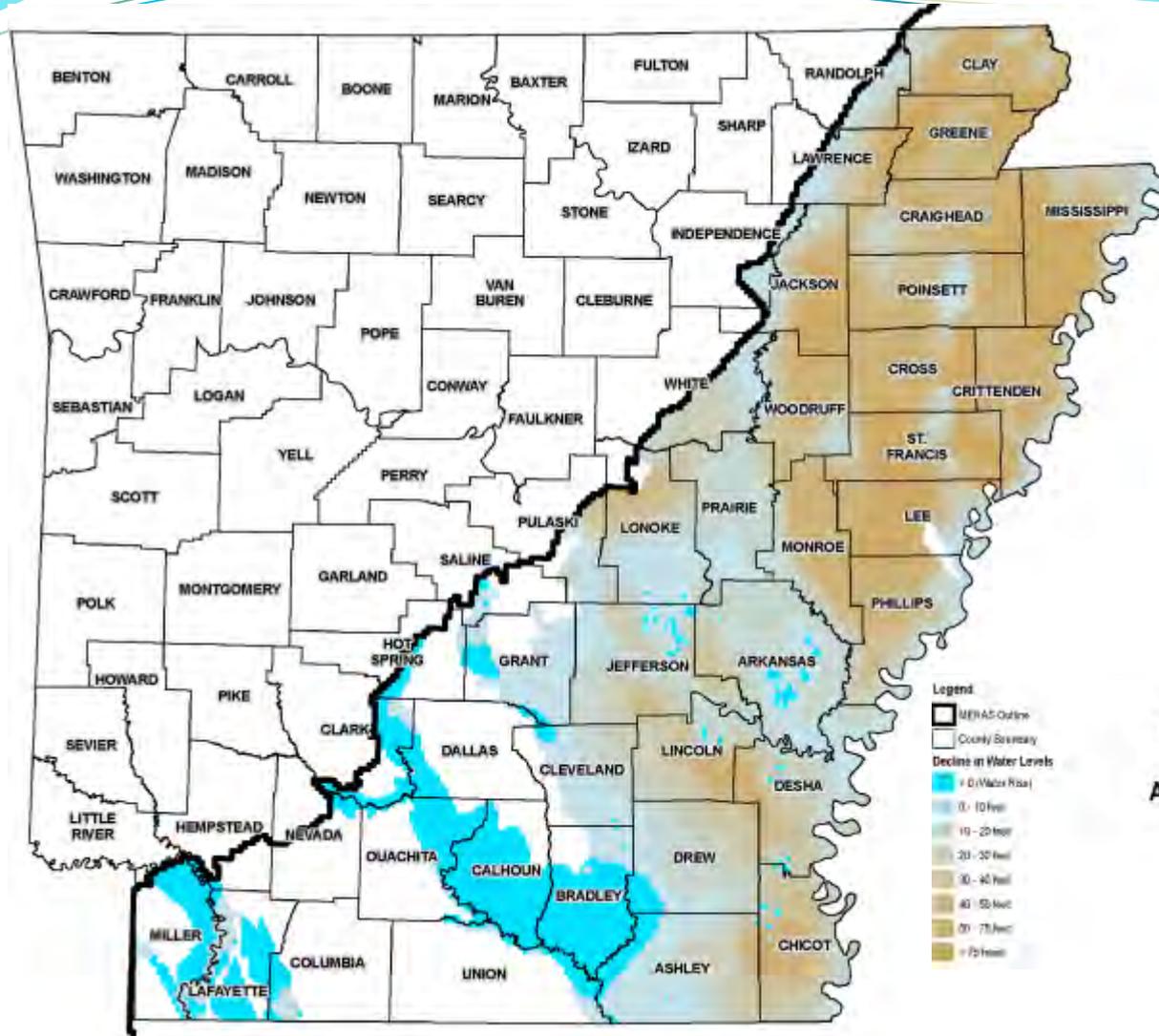
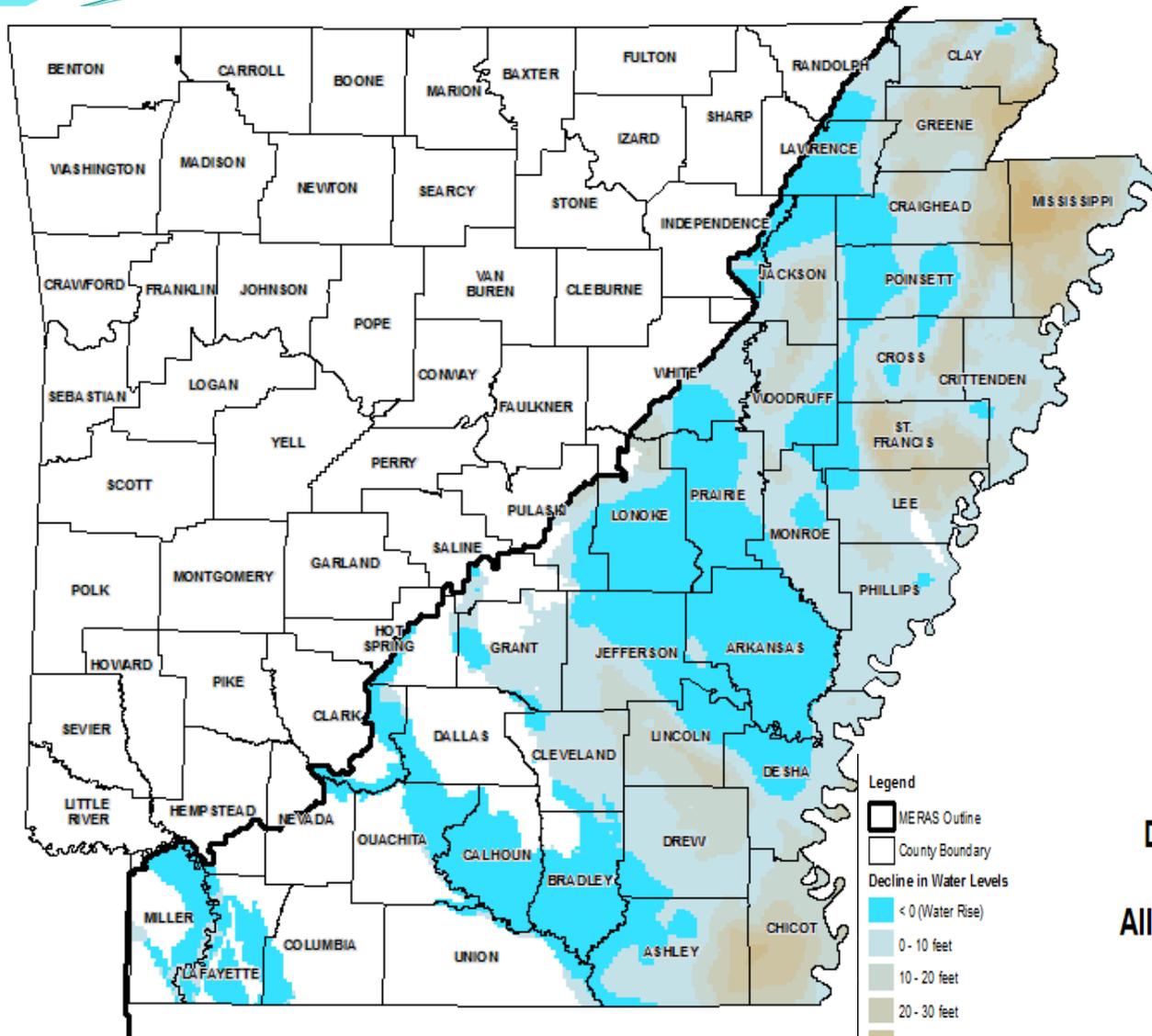


Figure 5-17
Decline in Water Levels
Base Period to 2050
Alluvial Aquifer, Scenario 1

Arkansas State Water Plan Update
 Groundwater Availability





- Legend
- MERAS Outline
 - County Boundary
 - Decline in Water Levels
 - < 0 (Water Rise)
 - 0 - 10 feet
 - 10 - 20 feet
 - 20 - 30 feet
 - 30 - 40 feet
 - 40 - 50 feet
 - 50 - 75 feet
 - > 75 feet

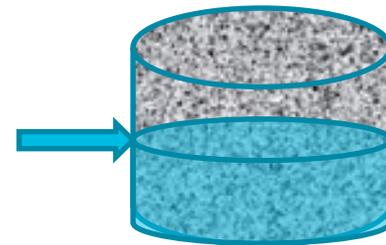
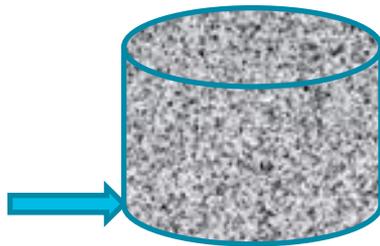
Figure 5-21
Decline in Water Levels
Base Period to 2050
Alluvial Aquifer, Scenario 3

Arkansas State Water Plan Update
Groundwater Availability



East Planning Area Groundwater Gap

Available Groundwater	2050 Groundwater Supply Gap	Units	Available Groundwater	2050 Groundwater Supply Gap	Units
3,070	4,935	MGD	1,770	5,943	MGD
3,438,665	5,527,974	AFY	1,982,680	6,656,388	AFY



Groundwater Gap Summary

- About 35% of water demand can be met with groundwater in 2050 under full dewatering scenario
- Significant drawdown in groundwater levels by 2050 would result under the full dewatering scenario
- Dewatering the aquifer can result in irreparable damage to the aquifer
- About 20% of water demand can be met with groundwater in the sustainable pumping scenario
- Declines in groundwater levels would be moderated under sustainable pumping

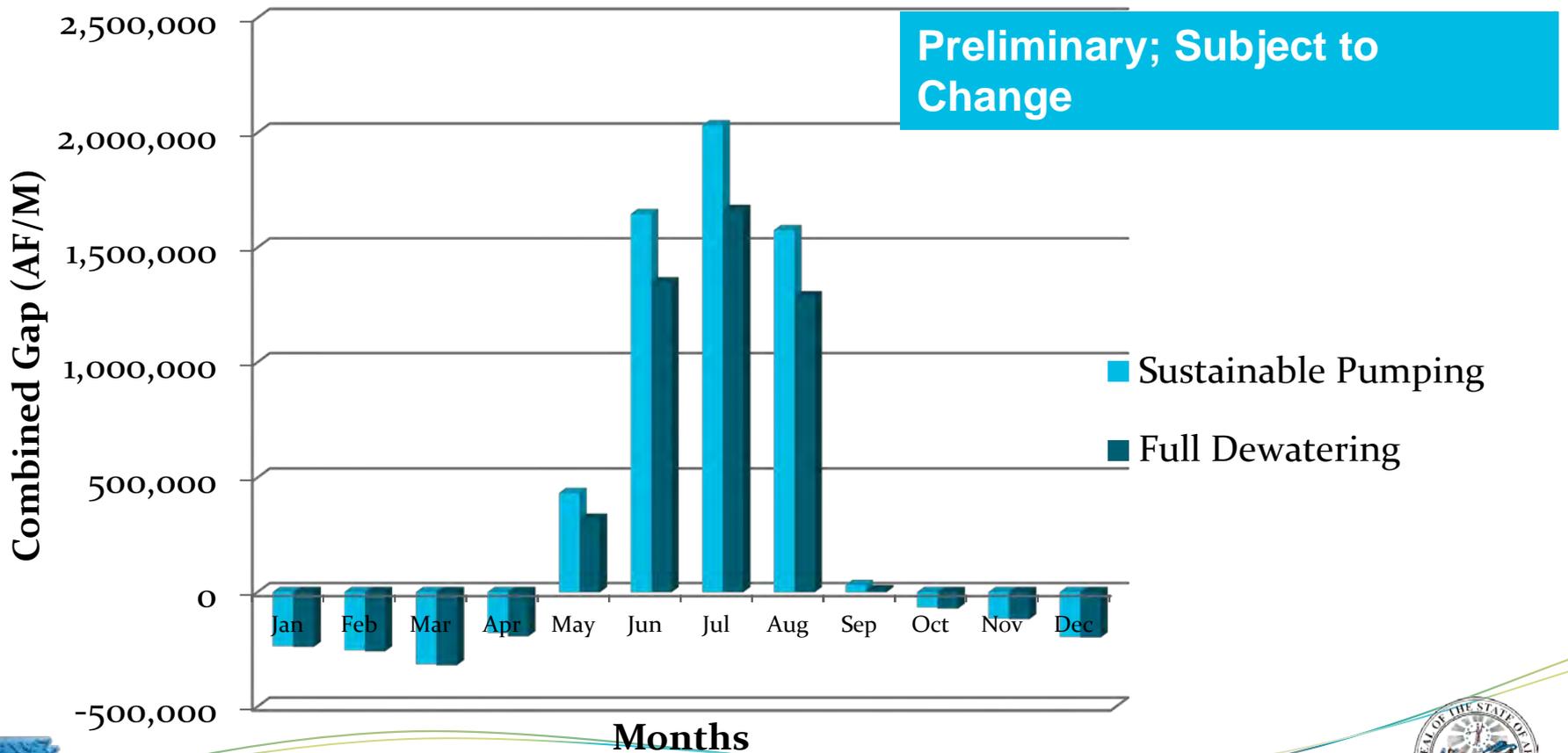
Combined Source Gap

- Combines all available supply sources to meet all identified demand
- Combined Source Gap assumes that excess surface water will be put to use to meet groundwater demand within the same basin
- **Combined Source Gap =**
Total Groundwater Gap - Excess Supply Available

Planning with the Combined Source Gap

- In Regional Planning Areas where the Combined Source Gap is <0 (no gap)
 - There is sufficient combined water resources to meet demands
 - The infrastructure necessary to use surface water to meet demands may not be in place
- In Regional Planning Areas where the Combined Source Gap is > 0 (gap)
 - The water resources are not sufficient to meet demands
 - Additional water management recommendations should be considered (e.g., storage, reuse, conservation, etc.)

East Regional Planning Area Combined Source Gap



Combined Source Gap Summary – East Regional Planning Area

- A Combined Source Gap of over 3,000,000 AFY is predicted for 2050 in the Bayou Macon, Boeuf River, L'Anguille River, St. Francis River, and White River basins (full dewatering scenario)
- A Combined Source Gap of over 4,200,000 AFY is predicted for 2050 in the Bayou Bartholomew, Bayou Macon, Boeuf River, L'Anguille River, St. Francis River, and White River basins (sustainable pumping scenario)
- The Combined Source Gap is seasonal, occurring in May - September

Comments

Questions