Comprehensive Update of the Arkansas Water Plan

Water Supply Availability Work Group

Overview of Water Supply Availability Methodology

April 25, 2013

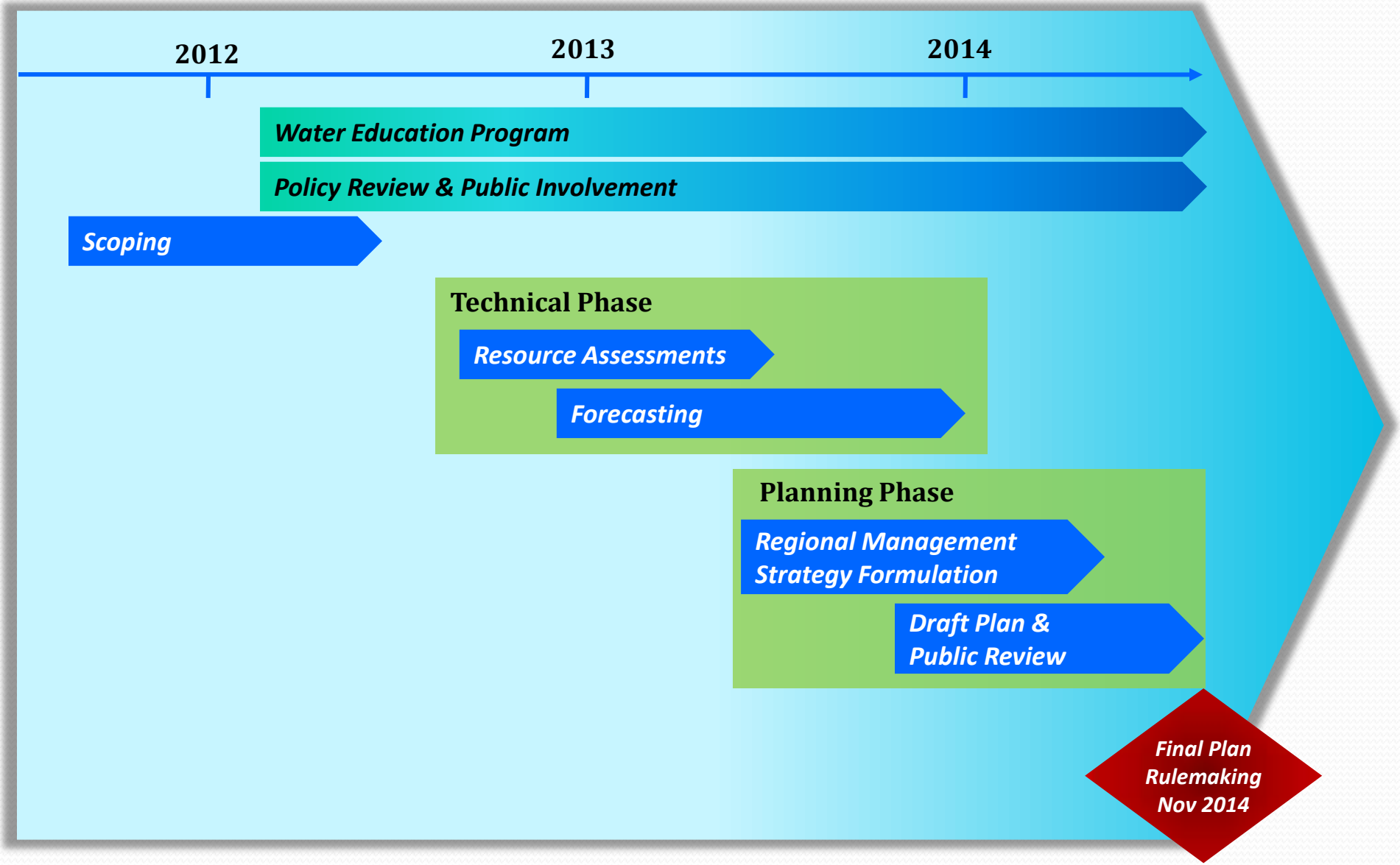
Welcome and Introductions

Review Work Group Purpose and Schedule

Purpose of Work Group

- Actively and constructively participate in the review and development of:
  1. **Water supply availability methodology**
  2. **Water supply availability analyses results**
- Provide information back to community
- Help ensure technically sound and defensible water supply analysis
- Coordinate with other technical work groups as needed
- The work group is advisory and will work by consensus with the ANRC as the final decision maker

Overall AWP Schedule



Water Supply Availability Work Group Schedule

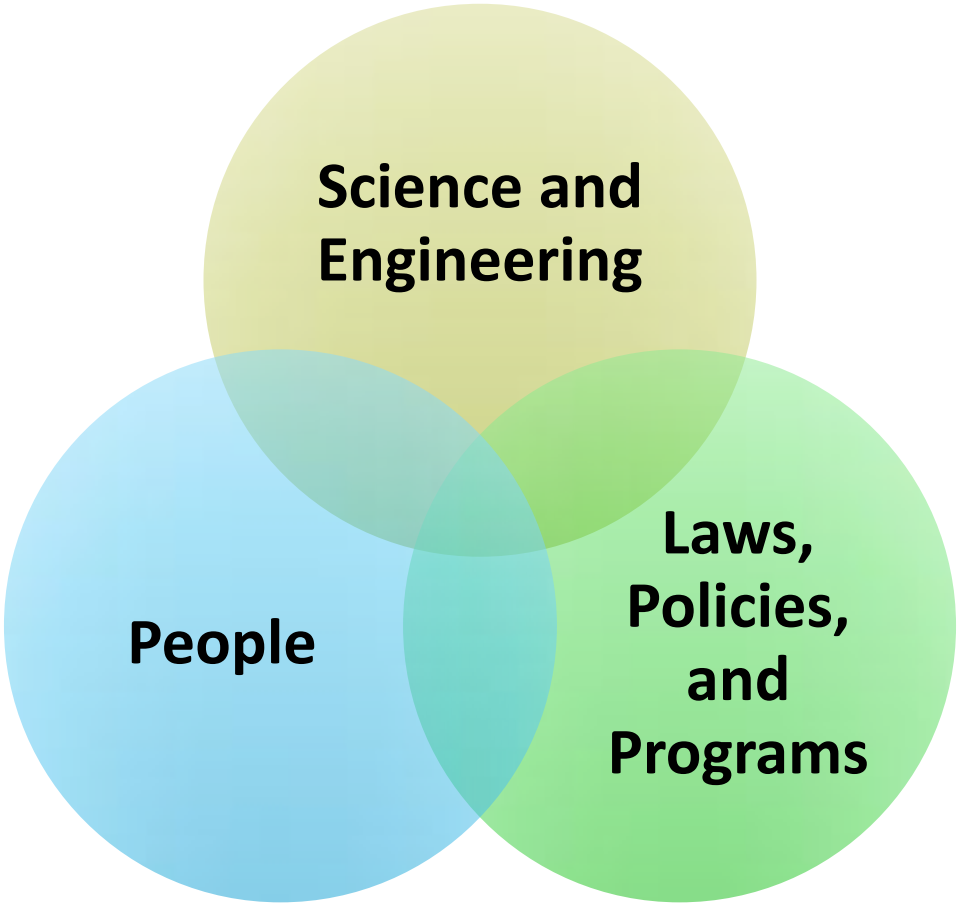
Task	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Full Work Group Meeting – Overview of Methodologies									
Sub-group Meetings to Finalize Resource Specific Methodologies									
Full Work Group Meeting (if needed)									
Develop Water Availability Analyses									
Full Work Group Meeting									
Present Draft Availability Analysis to Public and Stakeholders across State									
Finalize Availability Analysis									

Brief Background on the Arkansas Water Plan Update

What is the Arkansas Water Plan?

- A comprehensive program for the orderly development and management of the State's water and related land resources
- The State policy for the development of water and related land resources in this State
- A planning framework to be used by all State agencies, commissions, and political subdivisions in all matters pertaining to the discharge of their respective duties and responsibilities as they may affect the comprehensive plan (1975 and 1990 are the most recent planning efforts)

What is the Arkansas Water Plan? (continued)



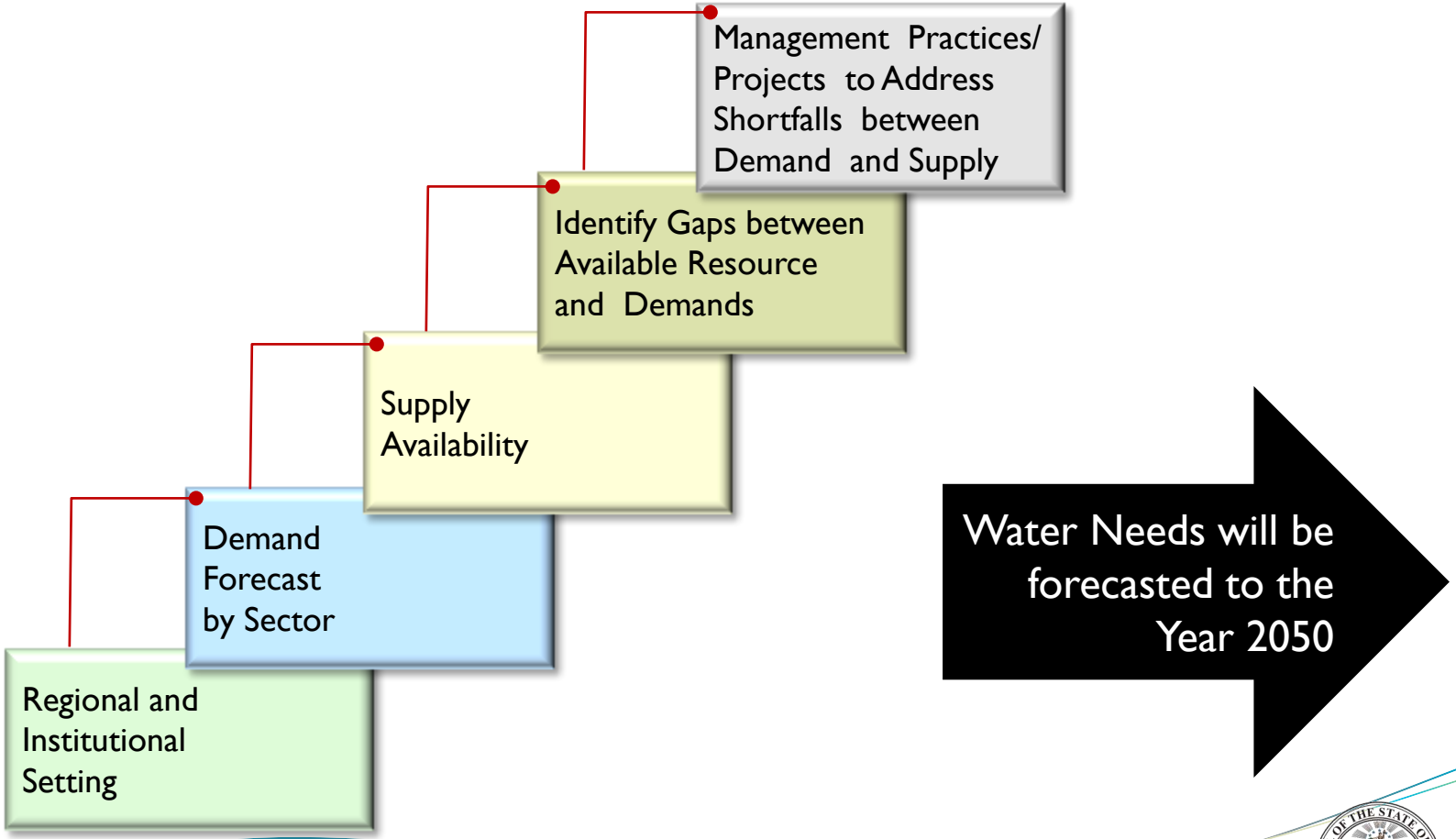
Why do we need to Update the Arkansas Water Plan?

- We depend on water in sufficient quantity & quality for our very existence
- The wise use and protection of this resource is critical for current and future generations
- The existing AWP is over 20 years old
- How we use and value water has changed over this timeframe
- New data and information collection and analysis is needed to define water supply, water needs, and identify potential solutions to meet those needs
- Increasing demands on water resources requires new technical, policy, and financial tools to address identified water resource issues and needs

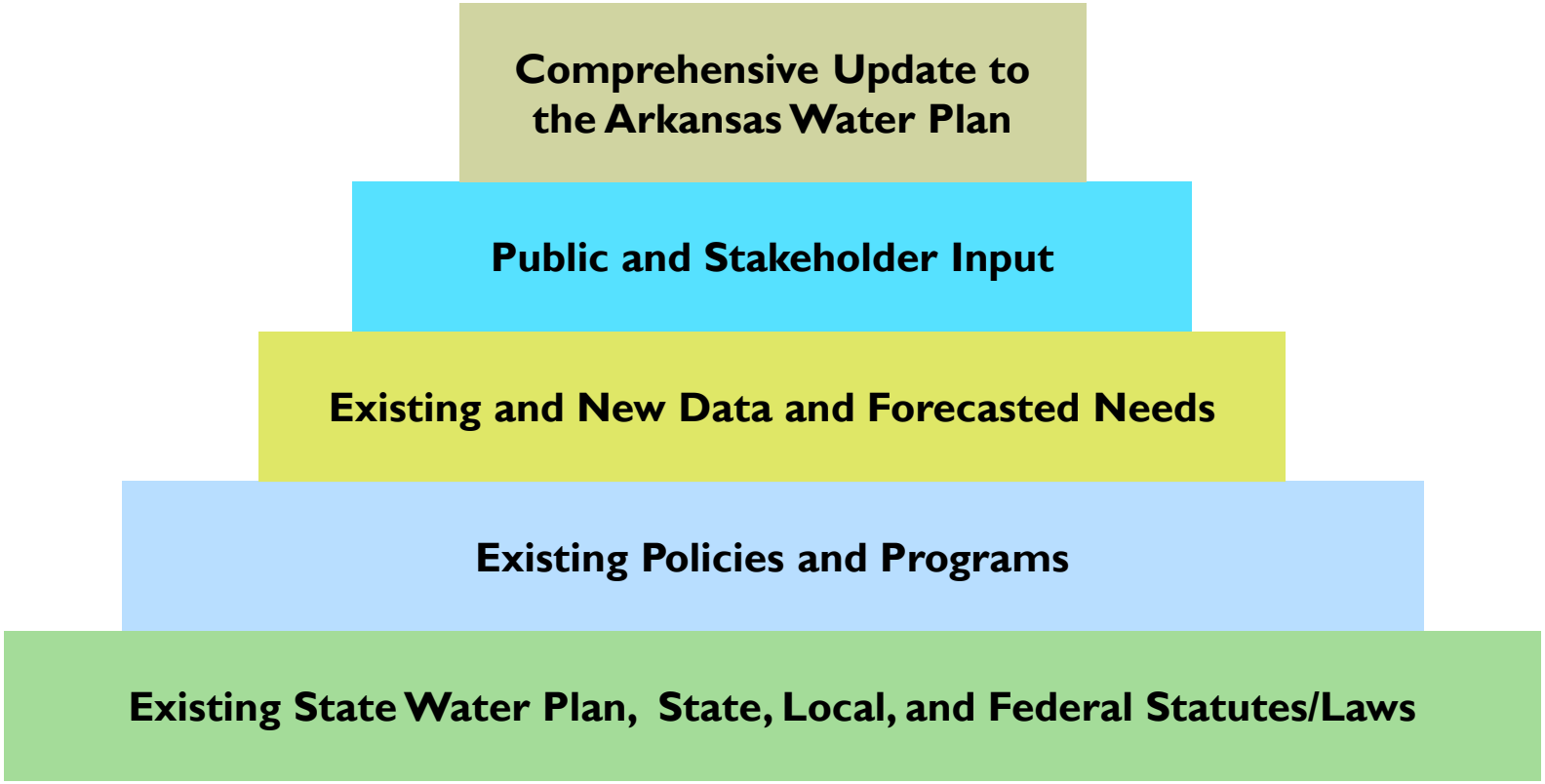
Why is the Arkansas Water Plan Important to our Future?

- While Arkansas has significant water resources -- they are not infinite
- Water is vital to the social and economic well being of our communities, and our overall quality of life
- A dependable water supply requires
  - Good water supply sources (quantity and quality)
  - The ability to provide this water to our homes and businesses
- The Arkansas Water Plan will provide us with the **science and information** to make **informed decisions** on the best way to **conserve and protect water to meet the needs of our citizens and the environment**

The Major Technical and Planning Elements of the Water Plan Update



Building on and Improving Existing Programs and Information

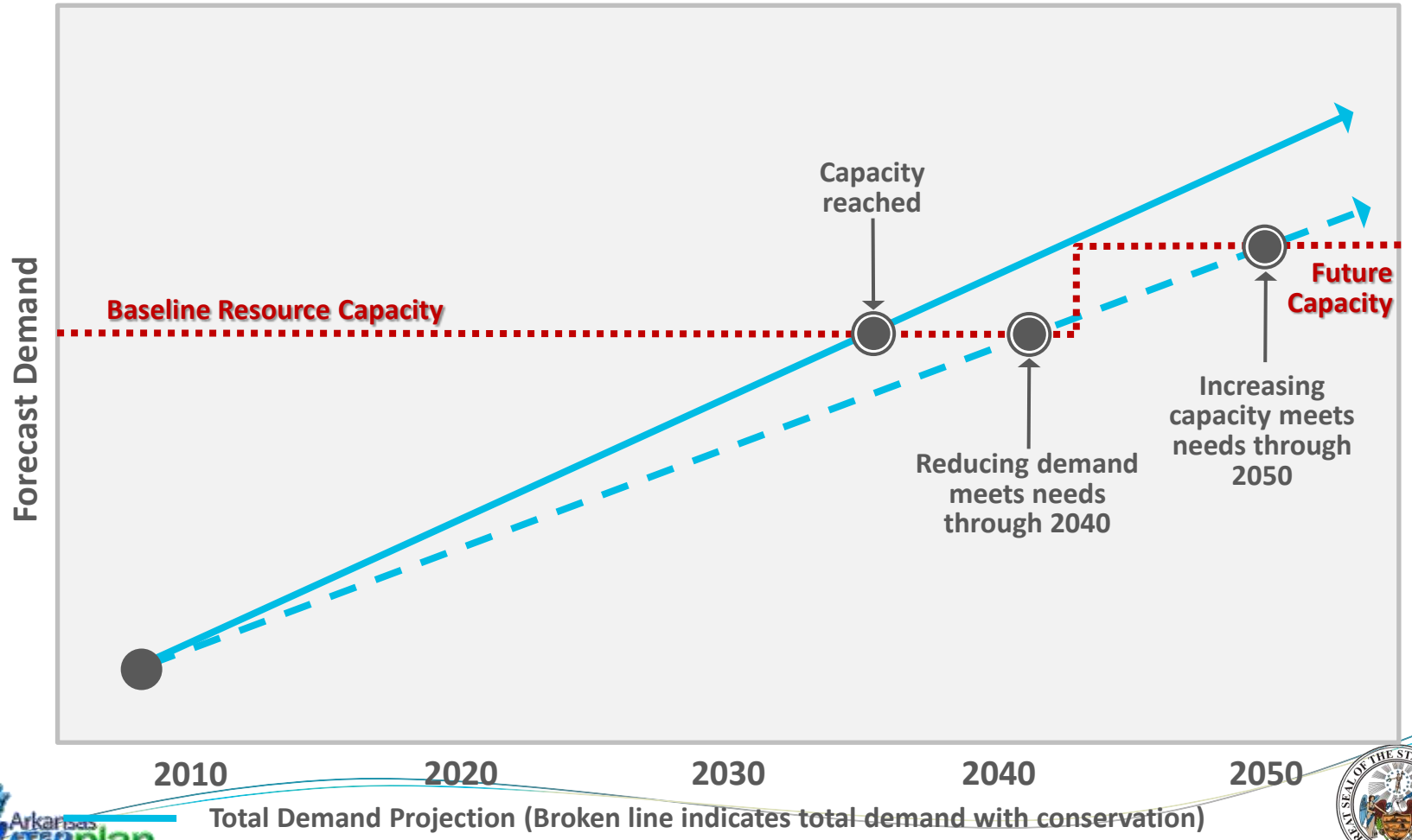


Overview and Content of the Draft Arkansas Water Plan Update Water Supply Availability Memorandum

How much water do we have to meet our current and future needs?

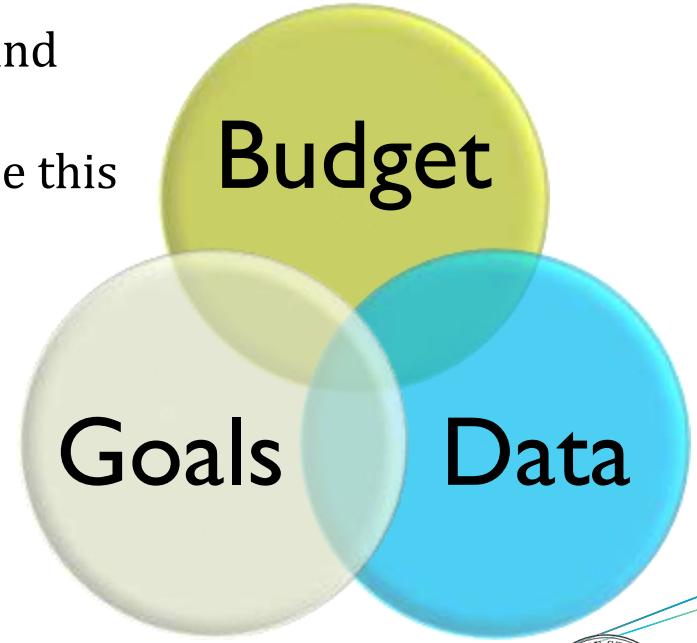
A sound resources assessment is critical in water resources planning

Water Supply Planning – Demand and Supply



Criteria for Selecting a Water Demand Forecasting and Supply Approach

- Goals & Objectives
  - What information is needed by planners and decision-makers?
  - What type of models are needed to provide this information?
- Data Availability
  - What is available?
  - What is the quality?
  - What models will the data support?
- Budget
  - What are financial constraints?



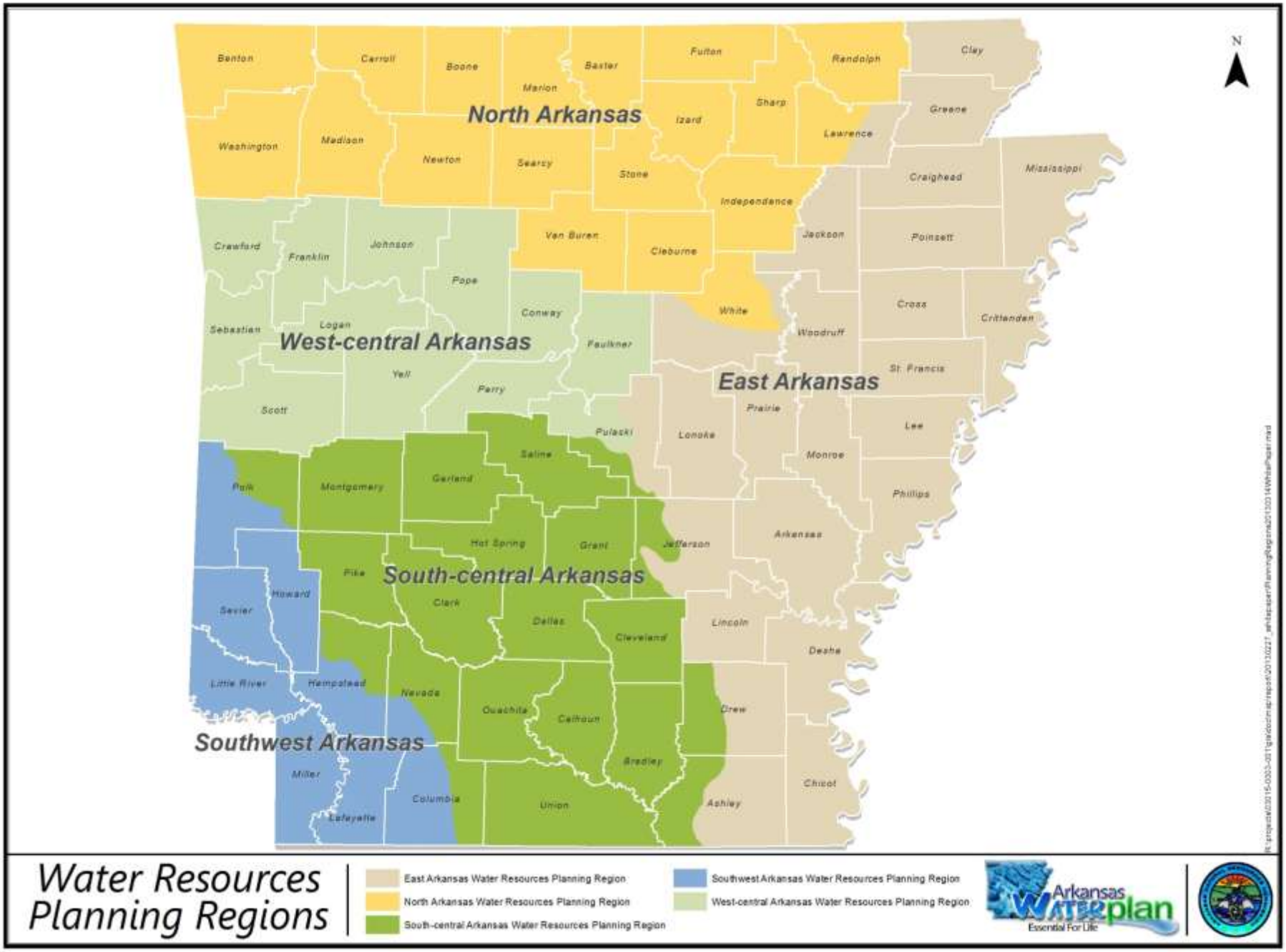
The Arkansas Water Plan Update requires assessment of current and future water supply availability

Groundwater

Surface Water

Water Quality

Fish and Wildlife Flows

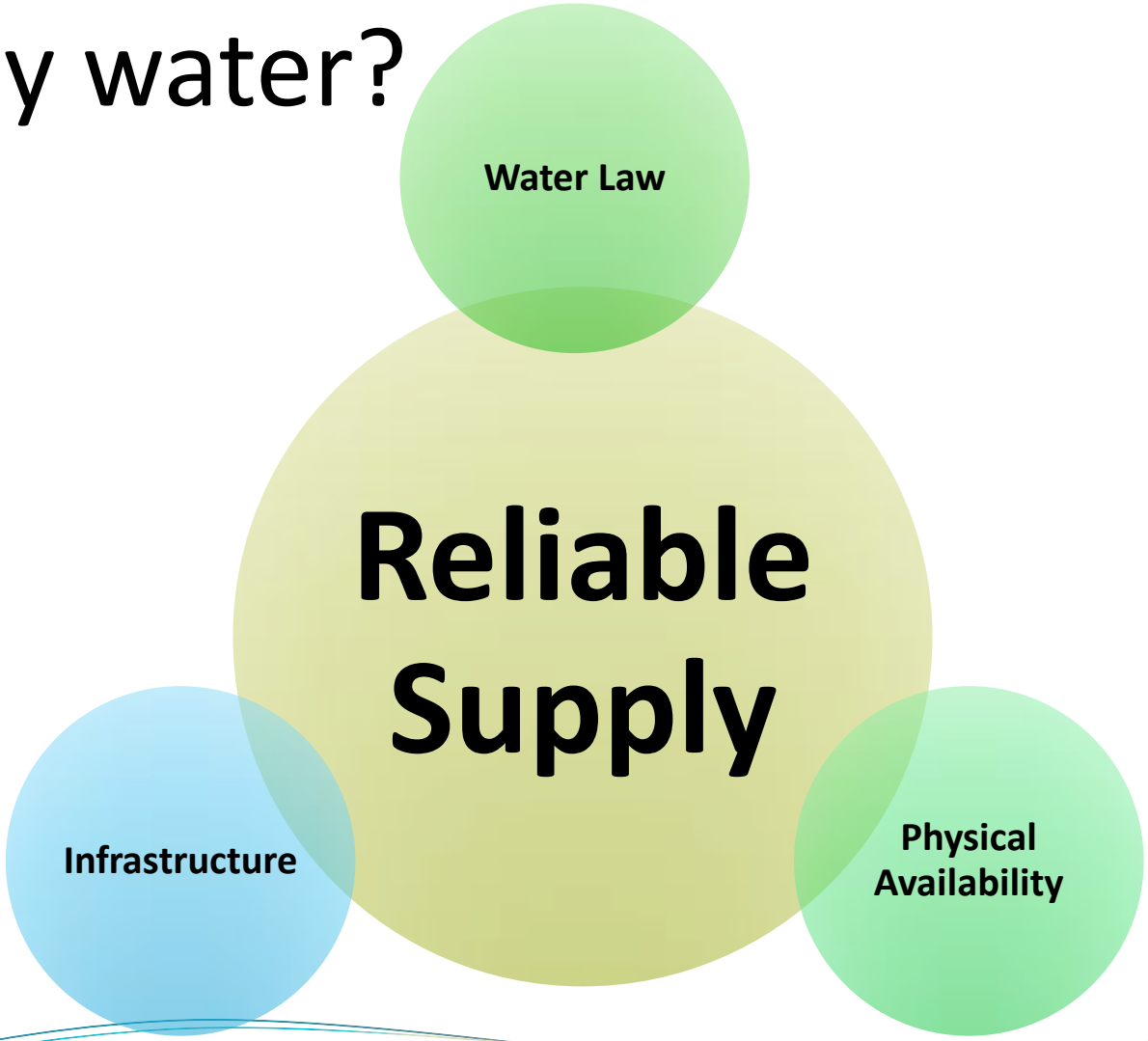


Water Resources Planning Regions

East Arkansas Water Resources Planning Region
North Arkansas Water Resources Planning Region
South-central Arkansas Water Resources Planning Region
Southwest Arkansas Water Resources Planning Region
West-central Arkansas Water Resources Planning Region

Arkansas Water Plan
Essential For Life

What constrains our ability to supply water?

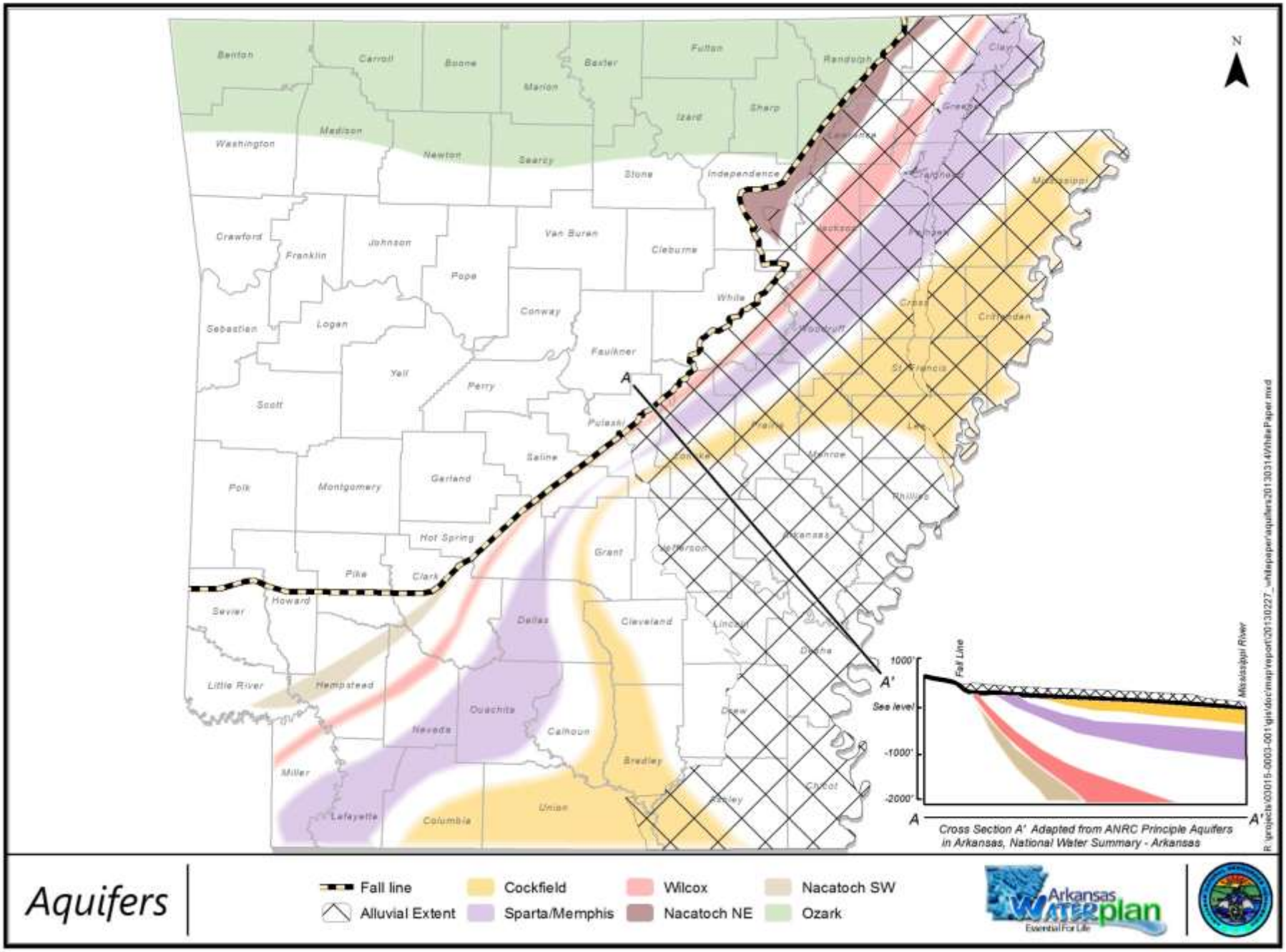


Arkansas Water Rights

- Riparian reasonable use state
- Riparian use of water is a property right
- Reasonable use theory applies to surface water and groundwater
- ANRC Rules for the Utilization of Surface Water provide a mechanism for nonriparian owners to divert excess surface water to nonriparian land upon approval of the ANRC

Overview and Content of the Draft Arkansas Water Plan Update Water Supply Availability Memorandum

Groundwater


Aquifers
Fall line
Alluvial Extent
Cockfield
Sparta/Memphis
Wilcox
Nacatoch NE
Nacatoch SW
Ozark
Arkansas WATERplan
Essential For Life
N
Benton
Carroll
Boone
Baxter
Marion
Fulton
Randolph
Clay
Izard
Sharp
Madison
Washington
Newton
Searcy
Stone
Independence
Greene
Crawford
Franklin
Johnson
Van Buren
Cleburne
Pope
Conway
White
Jackson
Woodruff
Cross
Crittenden
Sebastian
Logan
Yell
Perry
Faulkner
Pulaski
Prairie
Lee
St Francis
Scott
Saline
Monroe
Polk
Montgomery
Garland
Hot Spring
Grant
Jefferson
Arkansas
Phillips
Pike
Clark
Howard
Sevier
Dallas
Cleveland
Lincoln
Desha
Little River
Hempstead
Ouachita
Nevada
Calhoun
Bradley
Drew
Chicot
Miller
Lafayette
Columbia
Union
Ashley
A
A'
1000'
Sea level
-1000'
-2000'
Fall Line
Mississippi River
Cross Section A' Adapted from ANRC Principle Aquifers in Arkansas, National Water Summary - Arkansas
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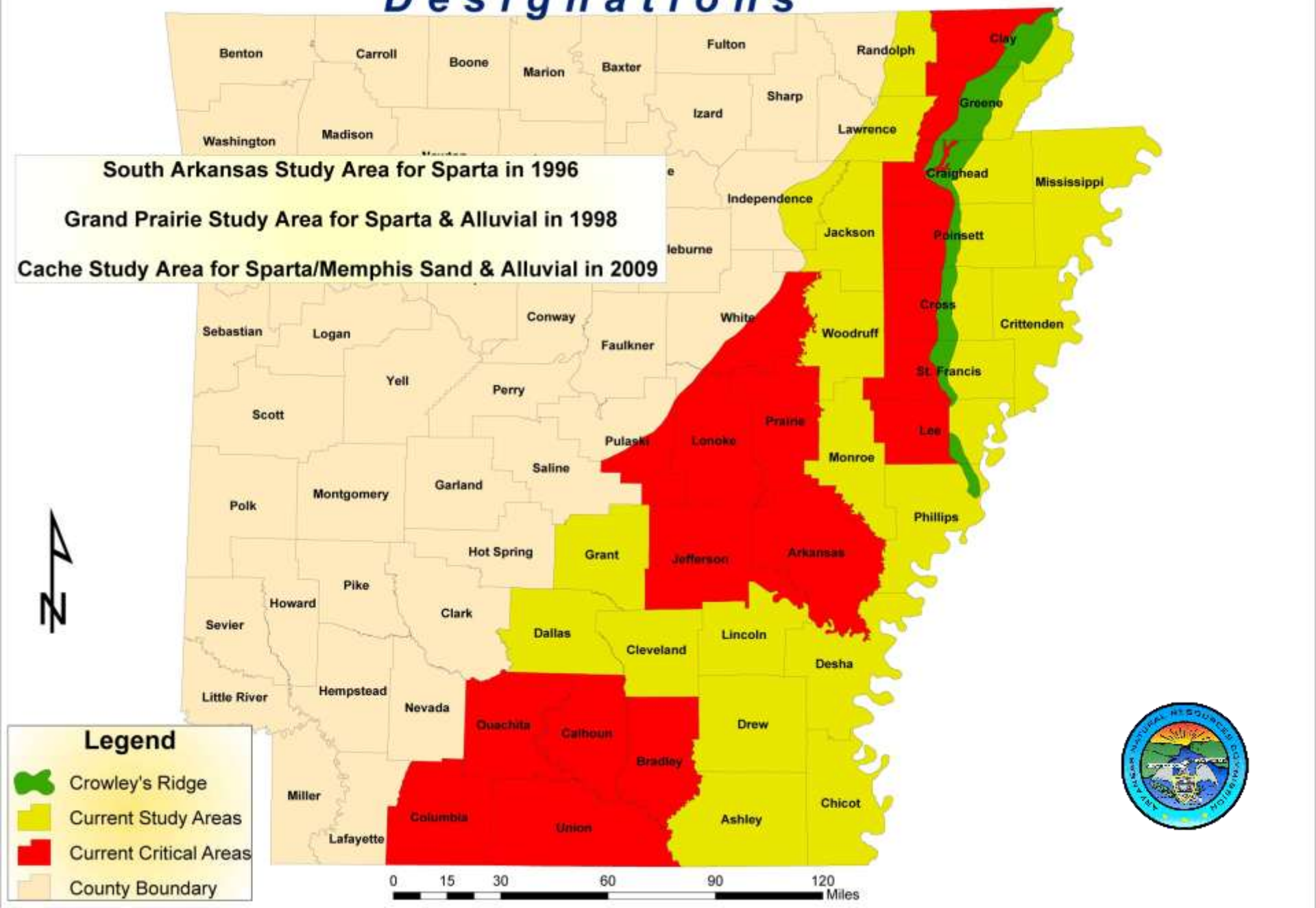
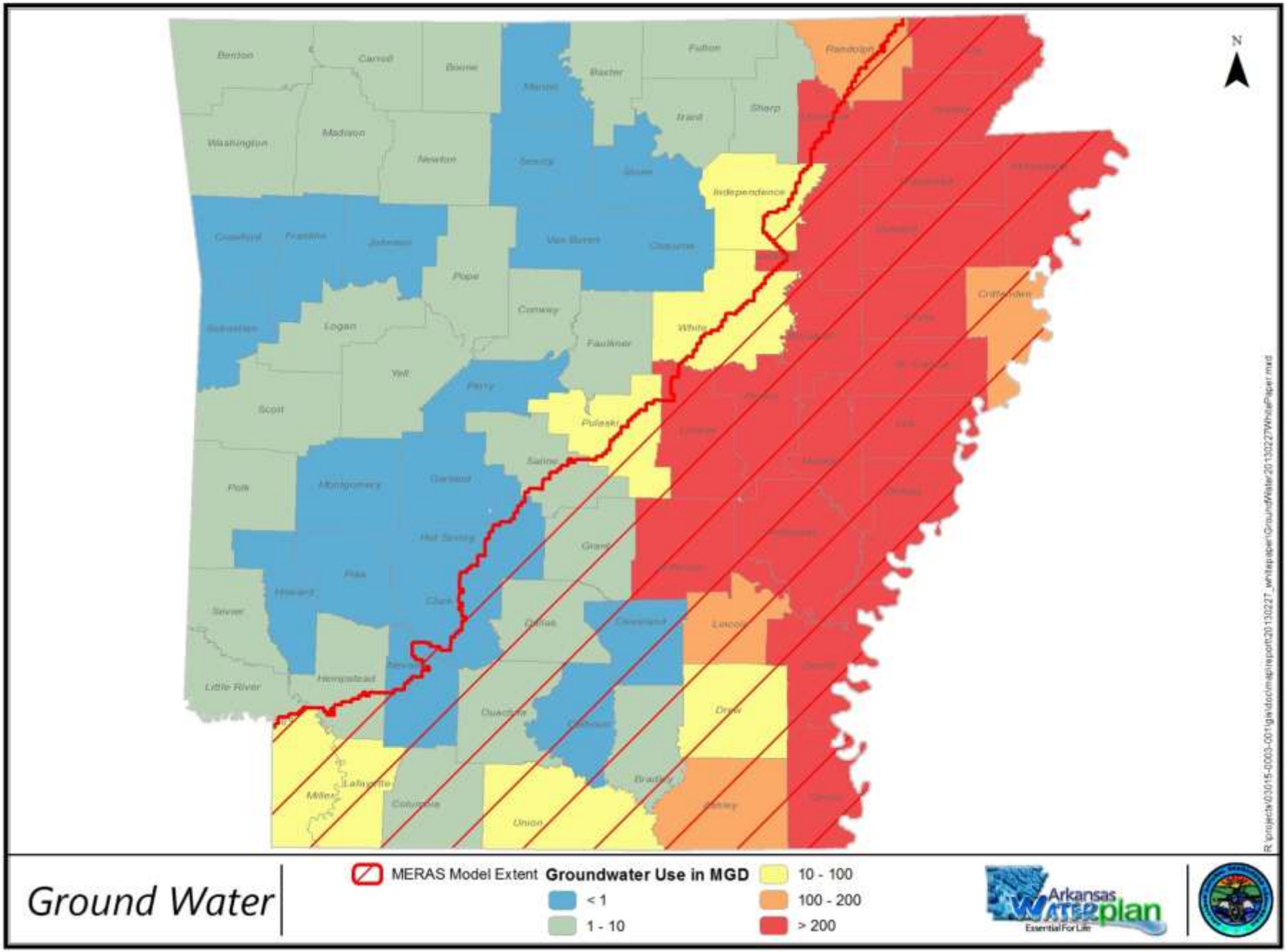
Critical Ground Water Designations




Ground Water
MERAS Model Extent
Groundwater Use in MGD
< 1
1 - 10
10 - 100
100 - 200
> 200
N
Arkansas WATERplan
Essential For Life
Benton
Carroll
Boone
Baxter
Fulton
Randolph
Madison
Newton
Izard
Sharp
Independence
Crawford
Franklin
Johnson
Van Buren
Cleburne
Pope
Conway
Logan
Faulkner
White
Yell
Perry
Scott
Pulaski
Saline
Polk
Montgomery
Garland
Hot Spring
Grant
Pike
Howard
Clark
Sevier
Little River
Hempstead
Nevada
Ouachita
Cleveland
Lincoln
Drew
Lafayette
Miller
Columbia
Union
Bradley
Ashley
Greene
Craighead
Lee
Monroe
Phillips
Desha
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Groundwater Availability in Alluvial and Sparta Sand Aquifers

Current Conditions

- Review MERAS documentation
- Run model simulation
- Summarize model results
  - Pumping, recharge, and boundary conditions
  - Water elevation maps
  - Groundwater in storage

Future Conditions

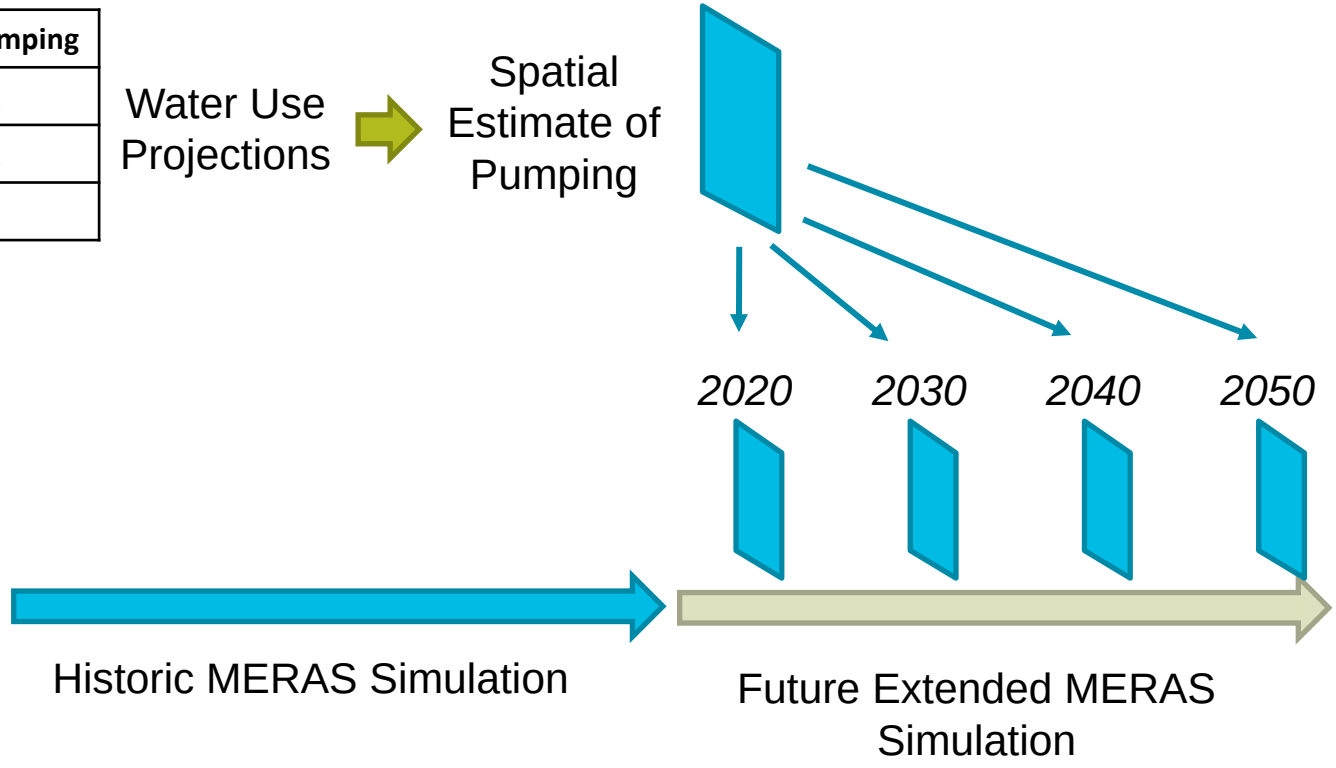
- Incorporate demands out to 2050
- Run model simulations
- Summarize model results
  - Pumping, recharge, and boundary conditions
  - Water elevation maps
  - Groundwater in storage

From Water Use Data to Groundwater Availability

County	Pumping
1	7.2
2	6.1
3	4.5

Water Use Projections

Spatial Estimate of Pumping



Groundwater Availability in Aquifers West of Alluvial and Sparta Sand Aquifers

- Assess baseline and future conditions
- Analysis based on existing information
- Assess water levels, pumping/water use, geology, some estimate of recharge and perhaps loss from aquifers through inter-aquifer flows
- Estimate effects of future demands

USGS Groundwater Availability Study: Future Demand Scenarios

1. Optimized pumping totals from the USGS sustainable yield models
2. Average pumping for each model cell of the Alluvial Aquifer from 2000 to 2005
3. Includes drawdown constraints equal to an altitude of approximately 50 percent of the predevelopment saturated thickness of the alluvial aquifer *

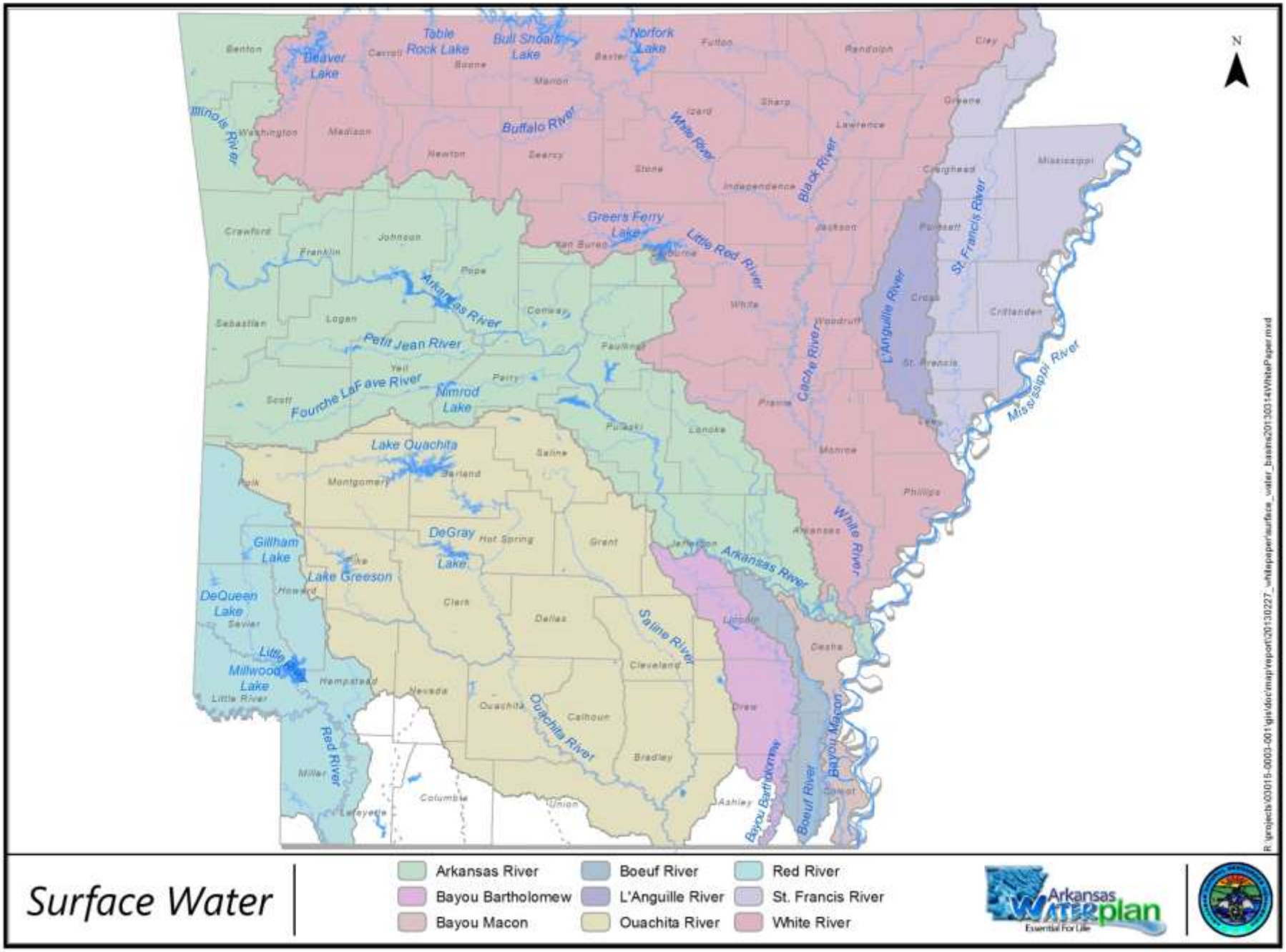
*One of the current water level criteria for an unconfined aquifer as a Critical Ground-Water Area (Arkansas Natural Resources Commission, 2012).

Evaluate Groundwater Drawdown Thresholds and Impact on Supply Need

- Simulate Future Water Use Under Various Aquifer Thresholds
  - Current ANRC target level used to attain sustainable yield
  - Lower thresholds
  - Economic-based thresholds
  - Develop a mining related alternative that would estimate the length of time to deplete the resource at current and/or future withdrawal levels
- Compare Results of Simulations with Various Aquifer Thresholds

Overview and Content of the Draft Arkansas Water Plan Update Water Supply Availability Memorandum

Surface Water


Surface Water
Arkansas River
Bayou Bartholomew
Bayou Macon
Boeuf River
L'Anguille River
Ouachita River
Red River
St. Francis River
White River
N
Beaver Lake
Table Rock Lake
Bull Shoals Lake
Norfork Lake
Greers Ferry Lake
Nimrod Lake
Lake Ouachita
DeGray Lake
Lake Greeson
Gillham Lake
DeQueen Lake
Millwood Lake
Buffalo River
White River
Black River
Little Red River
Arkansas River
Petit Jean River
Fourche LaFave River
Cache River
L'Anguille River
St. Francis River
Mississippi River
Saline River
Ouachita River
Red River
Bayou Bartholomew
Bayou Macon
Boeuf River
Illinois River
Little River
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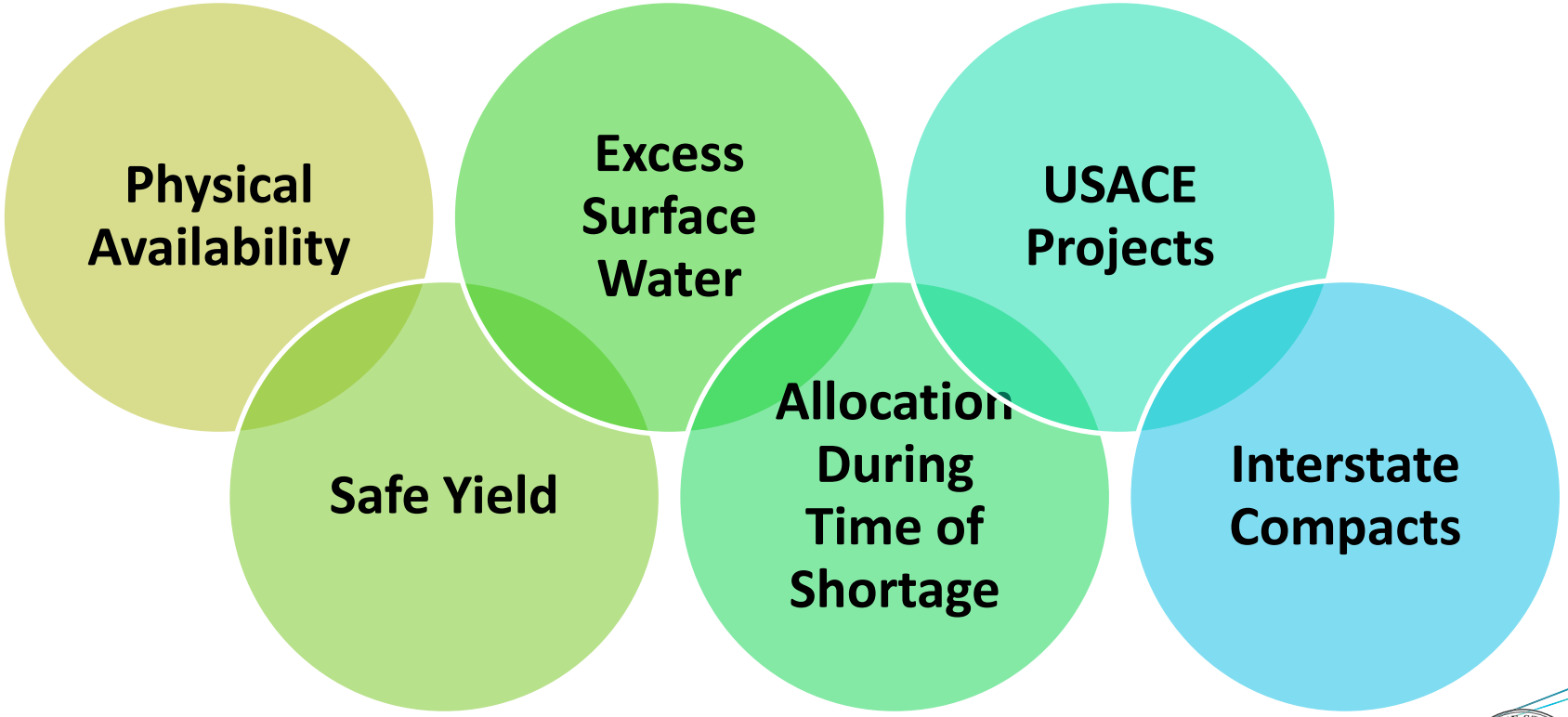
Surface Water Analyses



Physical Availability

- Analysis based on existing streamflow information
- Statistical analysis
- Address data gaps

Safe Yield

- A.C.A. § 15-22-301 requires the ANRC to define the safe yield of streams and rivers in Arkansas.
- Current definition: The safe yield of a stream or river is defined as the amount of water that is available, or potentially available, on a dependable basis which could be used as a surface water supply.
- 1990 Water Plan Update Safe Yield Definition: The amount of water available on a dependable basis was defined by ANRC as the discharge which has been equaled or exceeded 95 percent of the time for the available period of record. Not all of this streamflow is available for use – must take into account minimum streamflows.

Safe Yield (continued)

- Definition will be Reviewed during 2014 Water Plan Update
- If necessary, definition can be revised during 2014 Water Plan Update

Excess Surface Water – A.C.A. § 15-22-304

- 25 % of that amount of water available on an average annual basis above the amount required to satisfy existing and projected needs. Needs include:
  - Existing riparian rights as of June 28, 1985
  - The water needs of federal water projects existing on June 28, 1985
  - The firm yield of all reservoirs in existence on June 28, 1985
  - Maintenance of instream flows for fish and wildlife, water quality, aquifer recharge requirements, and navigation
  - Future water needs of the basin of origin as projected in the state water plan

Excess Surface Water (continued)

- Estimates will be updated using same method as 1990 with updated streamflow records
- Locations will include 1990 Water Plan Update gages plus additional locations based on existing and anticipated use

Allocation During Time of Shortage

- ANRC may allocate during time of shortage
- ANRC can be petitioned by 3rd party
- AWP Update will not establish “allocation levels”
- Allocation statue recently revised by Arkansas Legislature – ANRC will amend Rules for the Utilization of Surface Water Title 3

USACE Projects

- Summary of USACE projects
- Current allocation status
- Summary of general process required for reallocation

Interstate Compacts

- Arkansas River Compact
- Red River Compact

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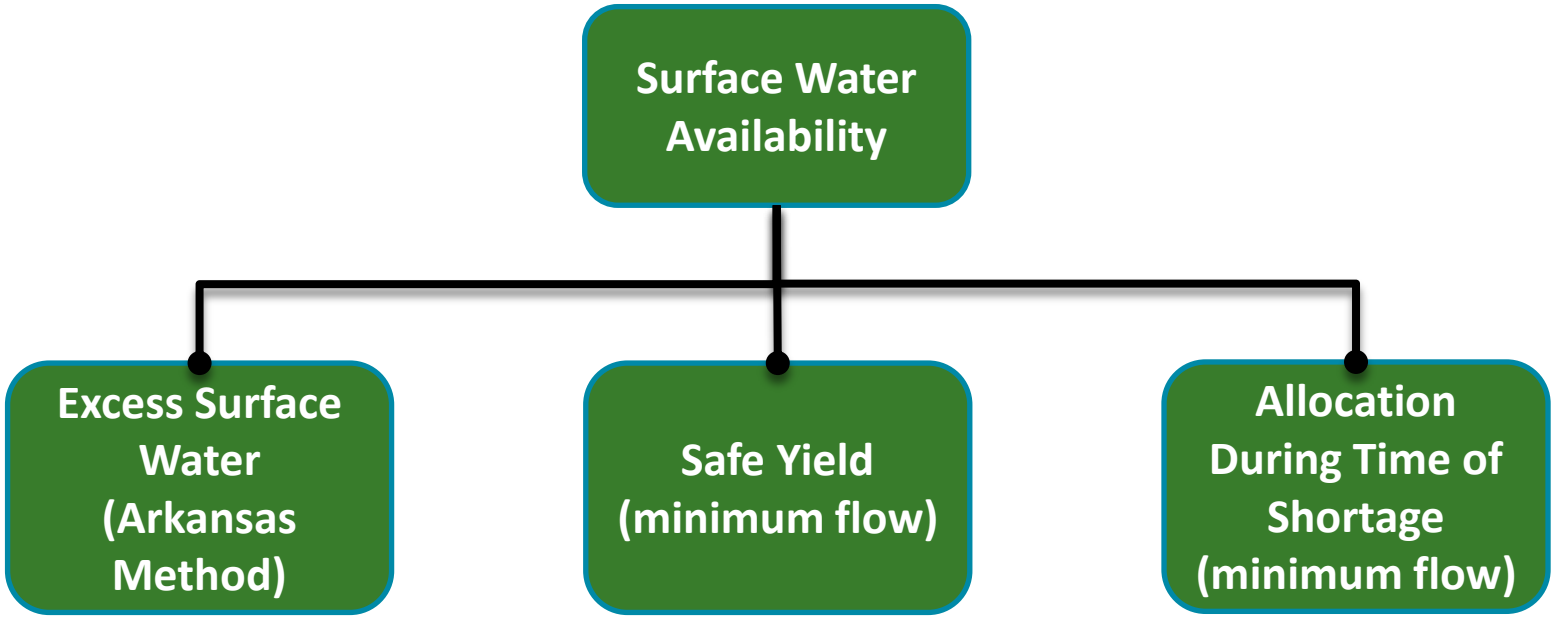
Fish and Wildlife Flows

Fish and Wildlife Flows



Fish and Wildlife Sub-Group Recommendations

- For excess surface water calculations that will be completed for the AWP Update, the Arkansas Method will be utilized
- Develop resource mapping based on available GIS datasets
- Evaluate the Arkansas Method to assess whether it adequate for use excess surface water calculations in the future and recommend other methodologies if appropriate
- Evaluate and assess methods for establishing minimum instream flows
- Potentially "pilot" implementation of other fish and wildlife methods in areas of the state where surface water availability has been a concern

Overview and Content of the Draft Arkansas Water Plan Update Water Supply Availability Memorandum

Water Quality

Surface Water Quality

- Current surface water quality
- Surface Water Quality Changes
  - Long-term trends
  - Changes since 1990 update
- Surface Water Quality Issues
  - Existing
  - Changes since 1990 update
  - Emerging

Groundwater Quality

- Current Ground Water Quality
  - Compilation
  - New figures/tables
  - Summary by aquifer/Region
- Ground Water Changes
  - Long-term trends
  - Changes since 1990 update
- Ground Water Quality Issues
  - Existing
  - Changes since 1990 update
  - Emerging

BREAK

Additional Discussion and Schedule for Water Supply Availability Sub-group Calls