Ground Water Protection and Management Report

Produced by the
Arkansas Soil & Water
Conservation Commission

- Act 154 of 1991, Section 15-22-906, Directs the Commission to develop a Comprehensive Ground Water Protection Plan

- CGWPP must contain as minimum:
  - Assessment and monitoring of availability and quality of ground water
  - Classification of groundwater and establishment of ground-water standards and criteria
  - Management program which includes under Section 15-22-908: Designation of Critical Areas including issuance of ground water rights
  - An information and education program

Act 1426 of 2001

- Any well constructed after September 30th, 2001 in a sustaining aquifer must be equipped with a flow metering device.

- September 30th, 2006 any well in a sustaining aquifer, regardless of when constructed, must be equipped with a flow metering device.

- "Sustaining aquifers" are defined by the Arkansas Soil and Water Conservation Commission.

- Domestic wells and wells in the alluvial aquifer are exempt.

PROBLEMS ASSOCIATED WITH GROUND WATER DECLINES

- INCREASED PUMPING COSTS
- SALINE WATER ENCROACHMENT
- WELL INTERFERENCE (LITIGATION)
- LOSS OF STORAGE (COMPACTION)
- LAND SUBSIDENCE
- REDUCED RECHARGE TO STREAMS AND WETLANDS
- REDUCED YIELD TO WELLS

ALLUVIAL AQUIFER HYDROGELOGIC CHARACTERISTICS

- Unconfined aquifer
- Unconsolidated clastic composition
  -gravel, sands, clay
- Thickness ranging from approx.. 50 – 150 ft
- Overlain by a clay layer

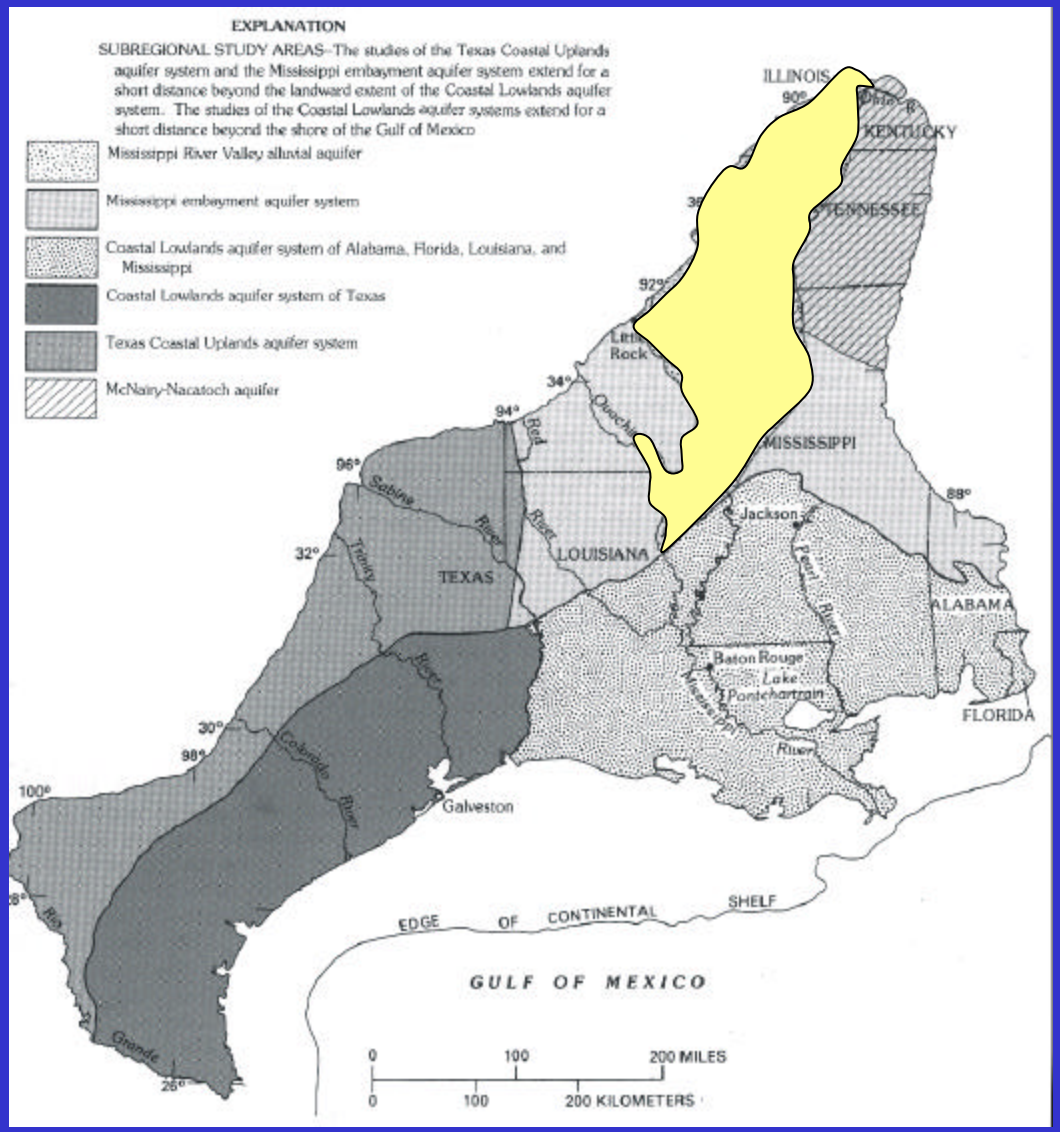
ALLUVIAL AQUIFER HYDROGELOGIC CHARACTERISTICS, CONT.

- Storage—approx. specific yield = 0.3
  1 ft^2 of aquifer yields 0.3 ft^3 of water during a 1-ft water-level decline
- Hydraulic conductivity—generally ranging from 100 – 400 ft/day, averaging about
  250 ft/day in the Grand Prairie area
- Yields—originally ranging 300 to 2,000 gpm; decreasing with decreasing saturated thickness

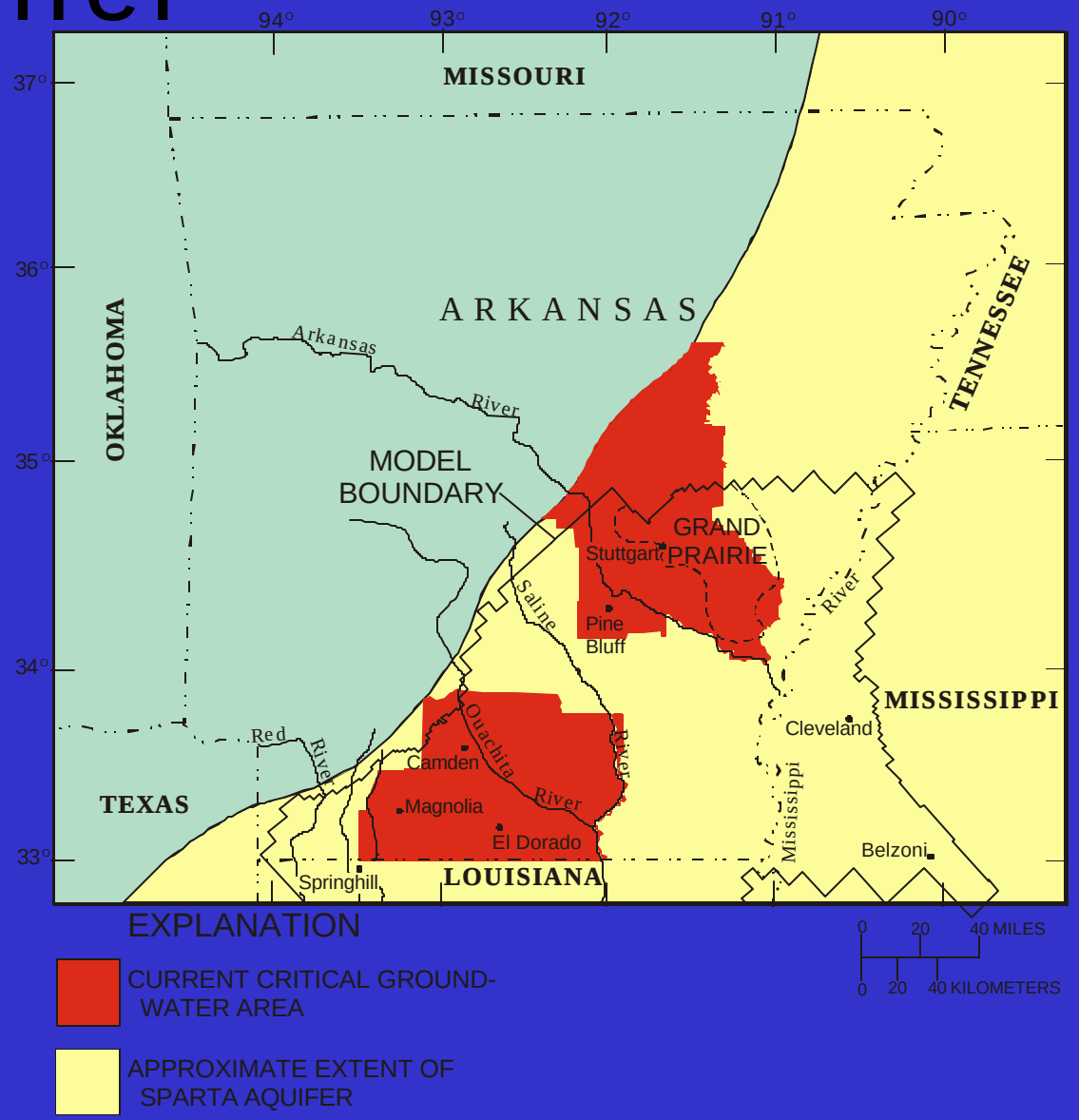
ALLUVIAL AQUIFER HYDROLOGIC STATUS

- Water levels in Arkansas have been on a trend of decline for more than 50 years
- Water is being removed from the aquifer more rapidly than it is being added by recharge
- Water demands from the aquifer continue to increase.
- Water availability from the alluvial aquifer is severely limited in some areas due to decreased saturated thickness; this area will continue to grow as pumpage continues to exceed recharge

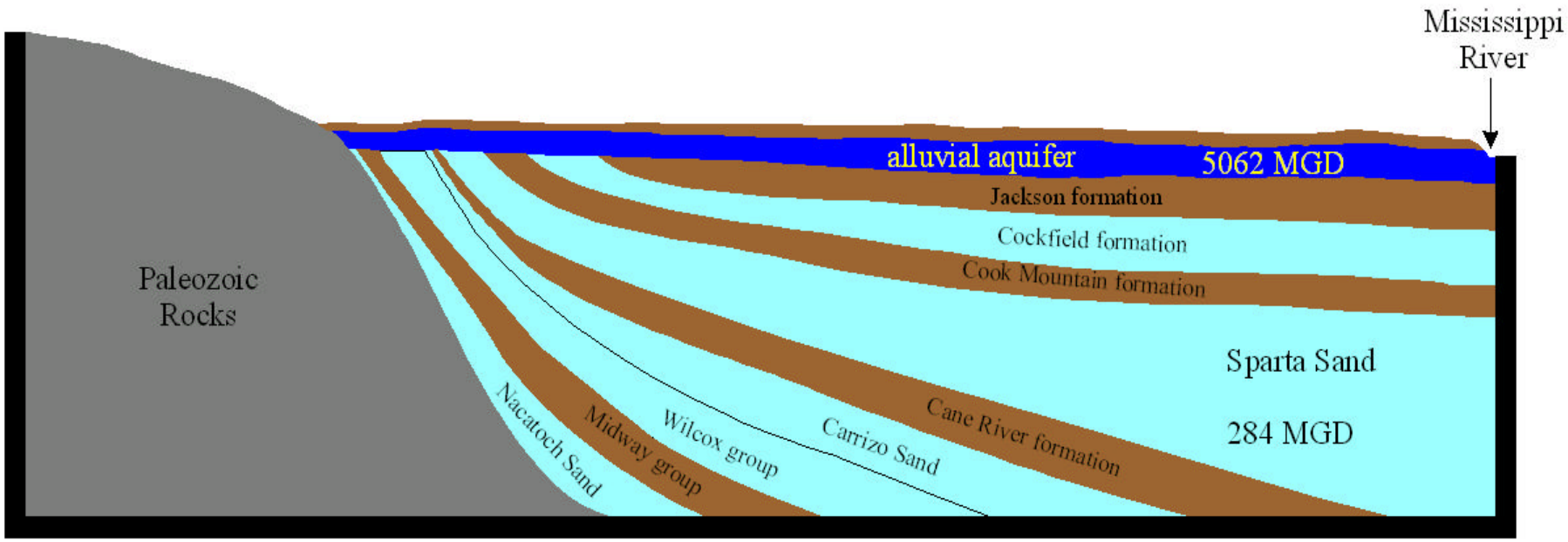
Extent of the alluvial aquifer



Extent of the Sparta aquifer

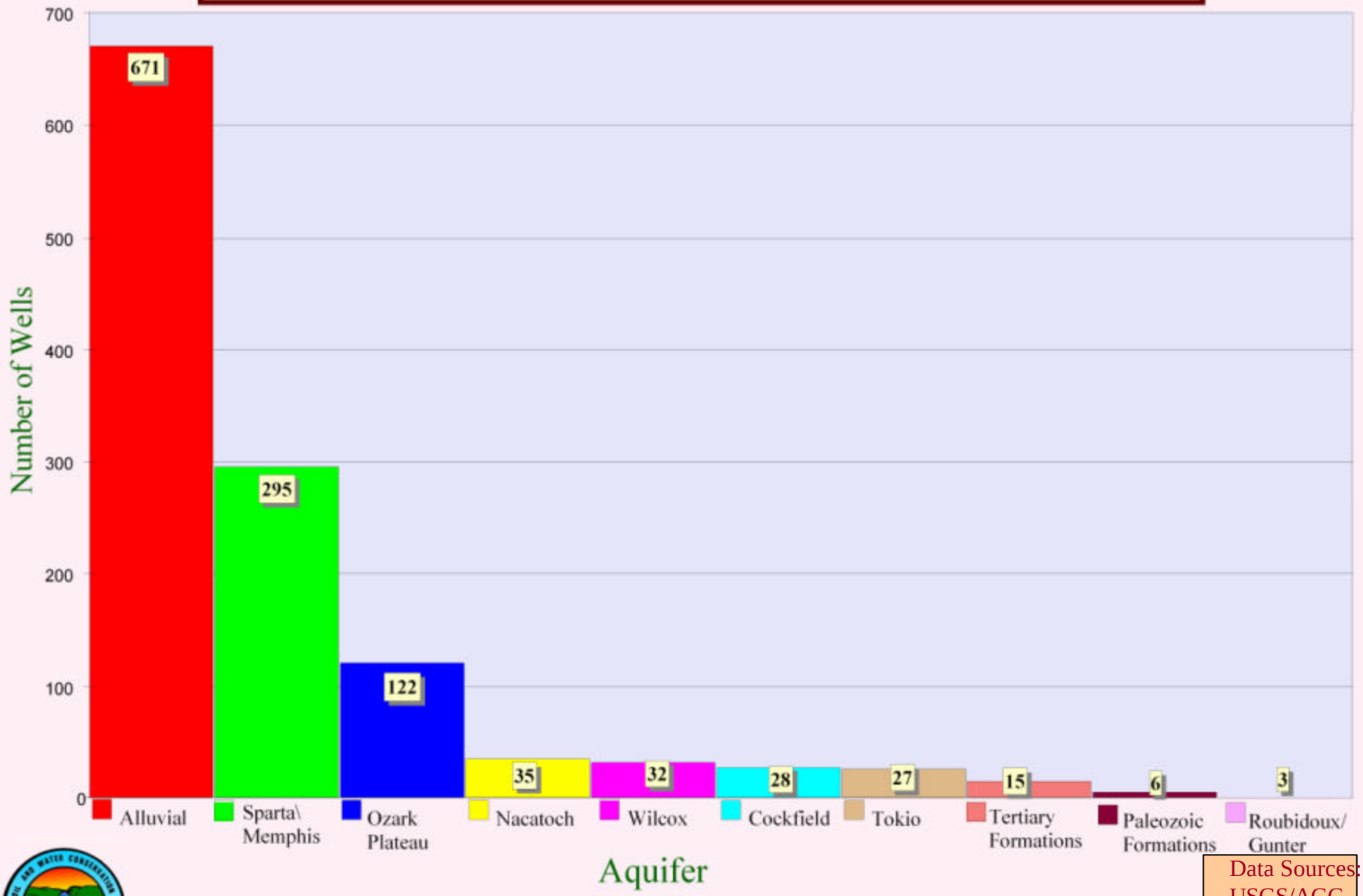


Generalized Geology of Eastern Arkansas



Modified from USGS Water Supply Paper 2275

Arkansas Ground Water Monitoring Network



Data Sources:
USGS/AGC
NRCS
ASWCC

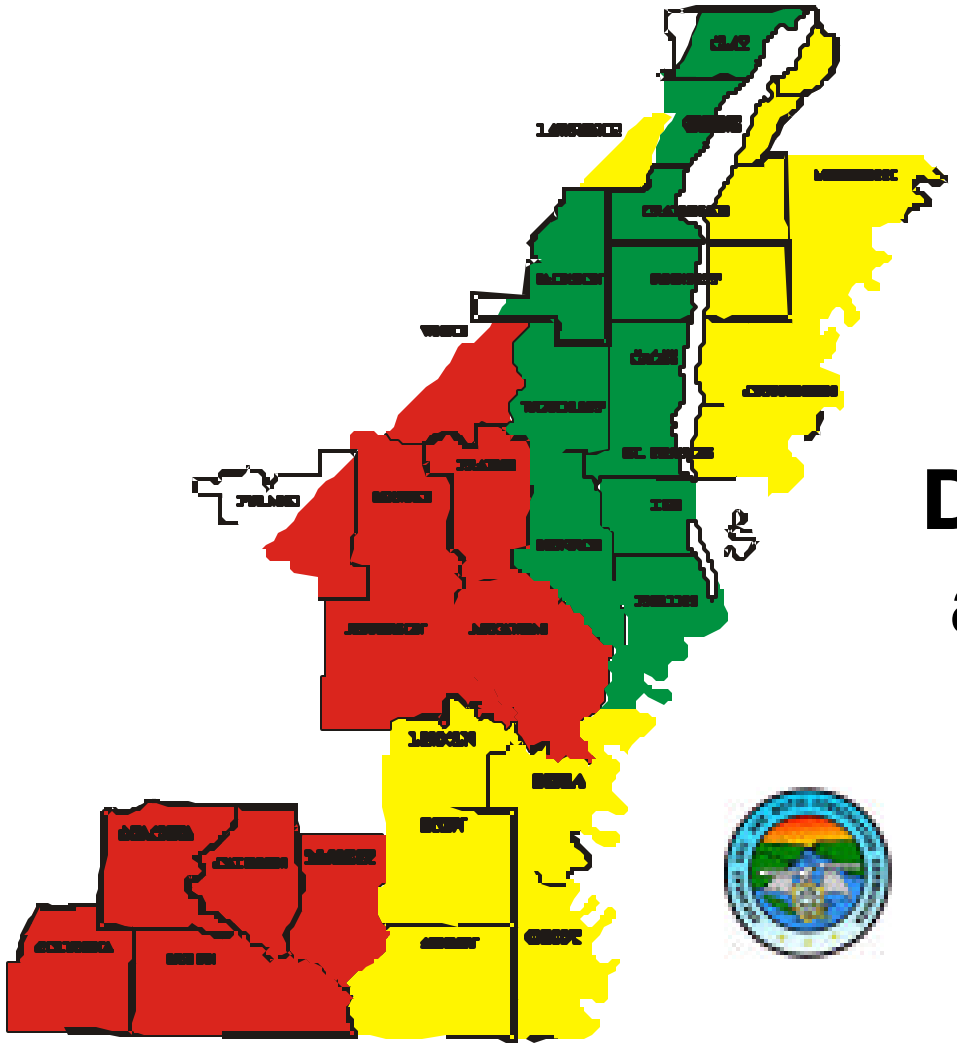
CRITERIA FOR CRITICAL GROUND WATER AREA DESIGNATION (unconfined)

- Significant water level declines
- Reduced saturated thickness
- Water quality degradation.
- Projections (Ground water flow model)
- Safe Yield

DELINEATION CRITERIA

- NATURAL HYDROGEOLOGIC BOUNDARIES
- STATE LINES
- CRITICAL AREA CRITERIA OBSERVED WITHIN COUNTY

Critical Ground Water Designations as of 12/01



CURRENT CRITICAL AREA

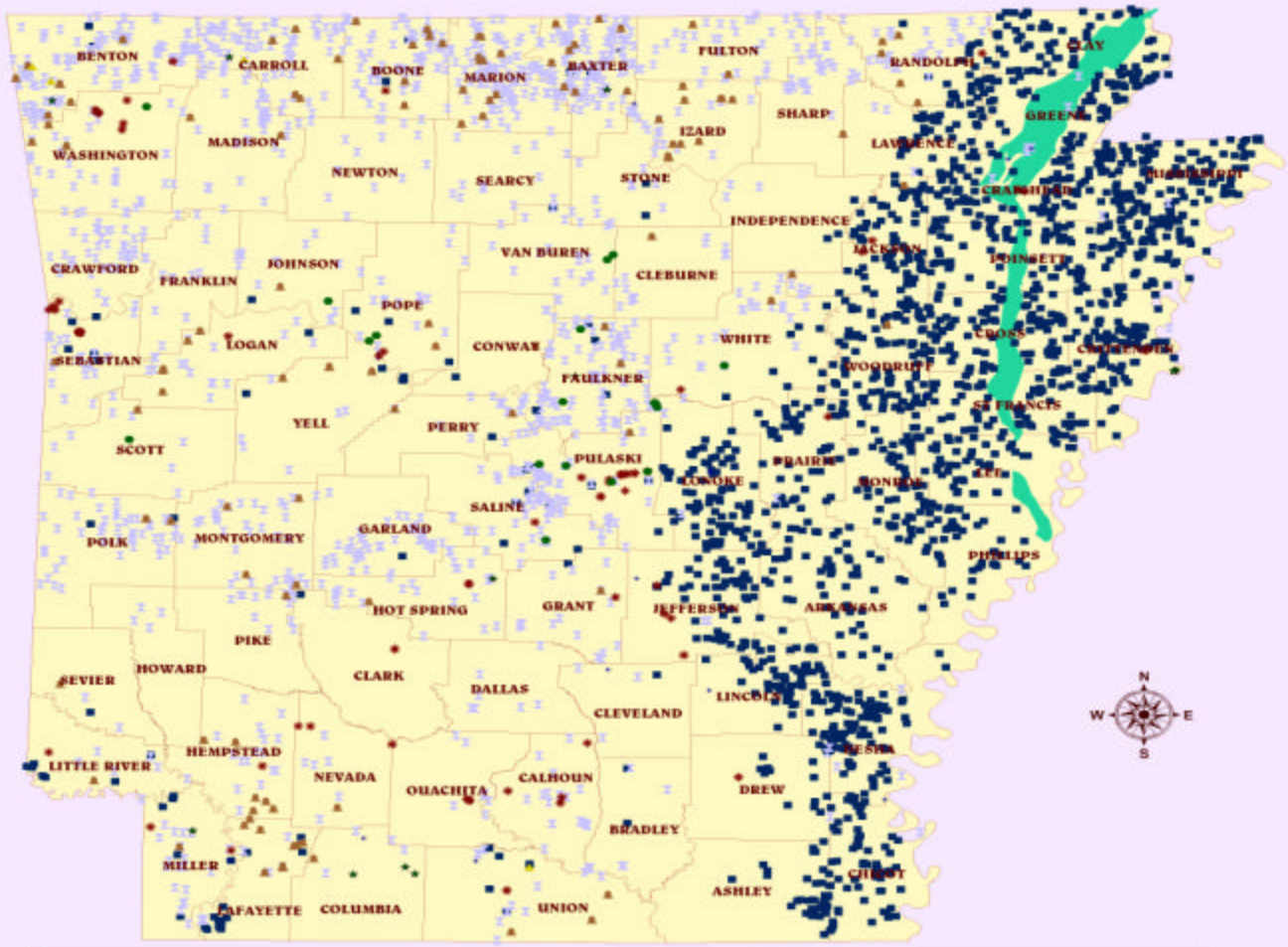
FUTURE STUDY AREA

PROPOSED CRITICAL AREA

BENEFITS OF CRITICAL GROUND WATER AREA DESIGNATION

- INCREASED MONITORING
- LOCAL AWARENESS
- CONSERVATION
- EDUCATION
- LOCAL INITIATIVE TO DEVELOP A PLAN OF ACTION
- NO REGULATION

Wells Reported from October 2000 to October 2001



Legend

- Semi-Public Wells
- Monitor Wells
- Commercial Wells
- Public Supply Wells
- Livestock Wells
- Domestic Wells
- Irrigation Wells
- Crowleys Ridge
- Geothermal Wells
- County Boundaries

Arkansas Ground Water Use Summary

Fourth largest user of ground water in the nation

62 percent of the State's water use is ground water

92 percent of the State's ground-water use is from the alluvial aquifer

98 percent of the alluvial aquifer water use is for agriculture

ALLUVIAL AQUIFER

Statewide

1985 Water Use	**3560**	**mgd**
1995 Water Use	**5062**	**mgd**

Average Change from 1990 to 2000: **-3.03 feet**

Arkansas County

1985 Water Use	**185**	**mgd**	
1995 Water Use	**403**	**mgd**	**118 percent increase**

Jackson County

1985 Water Use	**204**	**mgd**	
1995 Water Use	**284**	**mgd**	**40 percent increase**

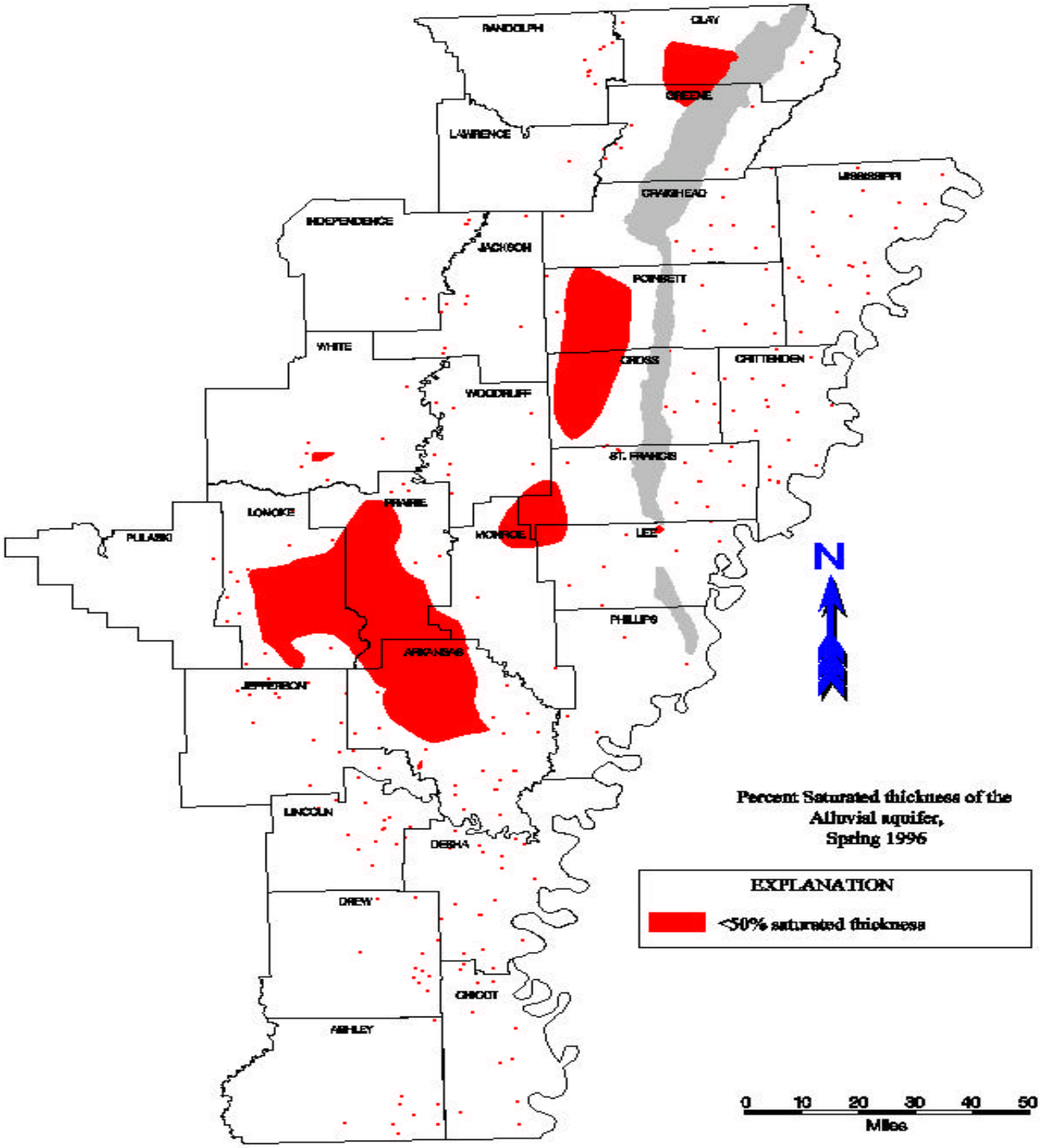
SPARTA AQUIFER

Statewide (81 percent increase)

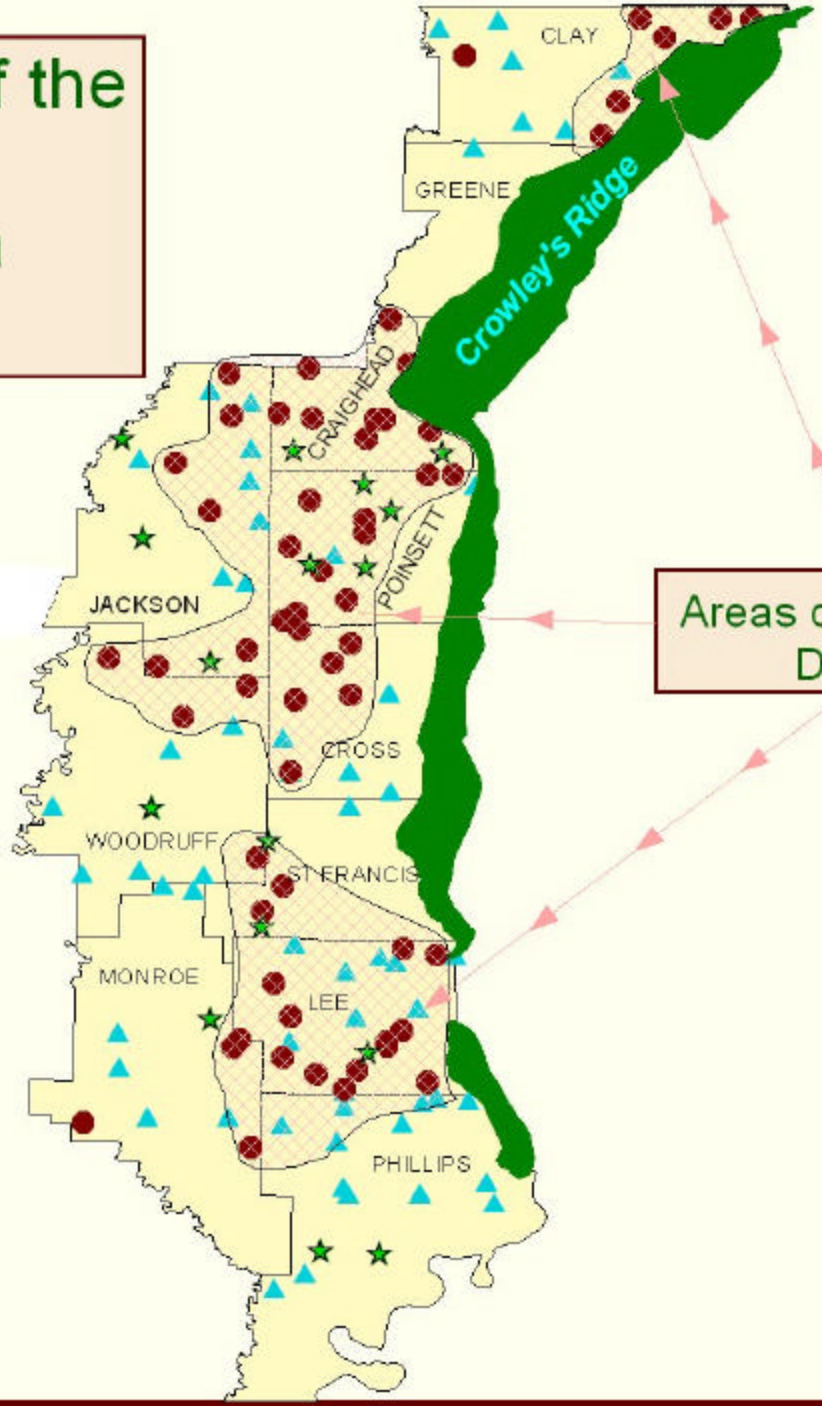
1985 Water Use	157 mgd
1995 Water Use	284 mgd

Arkansas County (38 percent increase)

1985 Water Use	37 mgd
1995 Water Use	51 mgd


RANDOLPH
CLAY
GREENE
LAWRENCE
MISSISSIPPI
CRAIGHEAD
INDEPENDENCE
JACKSON
POINSETT
WHITE
CROSS
CRITTENDEN
WOODRUFF
ST. FRANCIS
LONOKE
PRAIRIE
PULASKI
MONROE
LEE
PHILLIPS
ARKANSAS
JEFFERSON
LINCOLN
DESHA
DREW
CHICOT
ASHLEY
N
Percent Saturated thickness of the
Alluvial aquifer,
Spring 1996
EXPLANATION
<50% saturated thickness
0 10 20 30 40 50
Miles

Water Level Changes of the Alluvial Aquifer in the Cache River Study Area 1995 - 2000

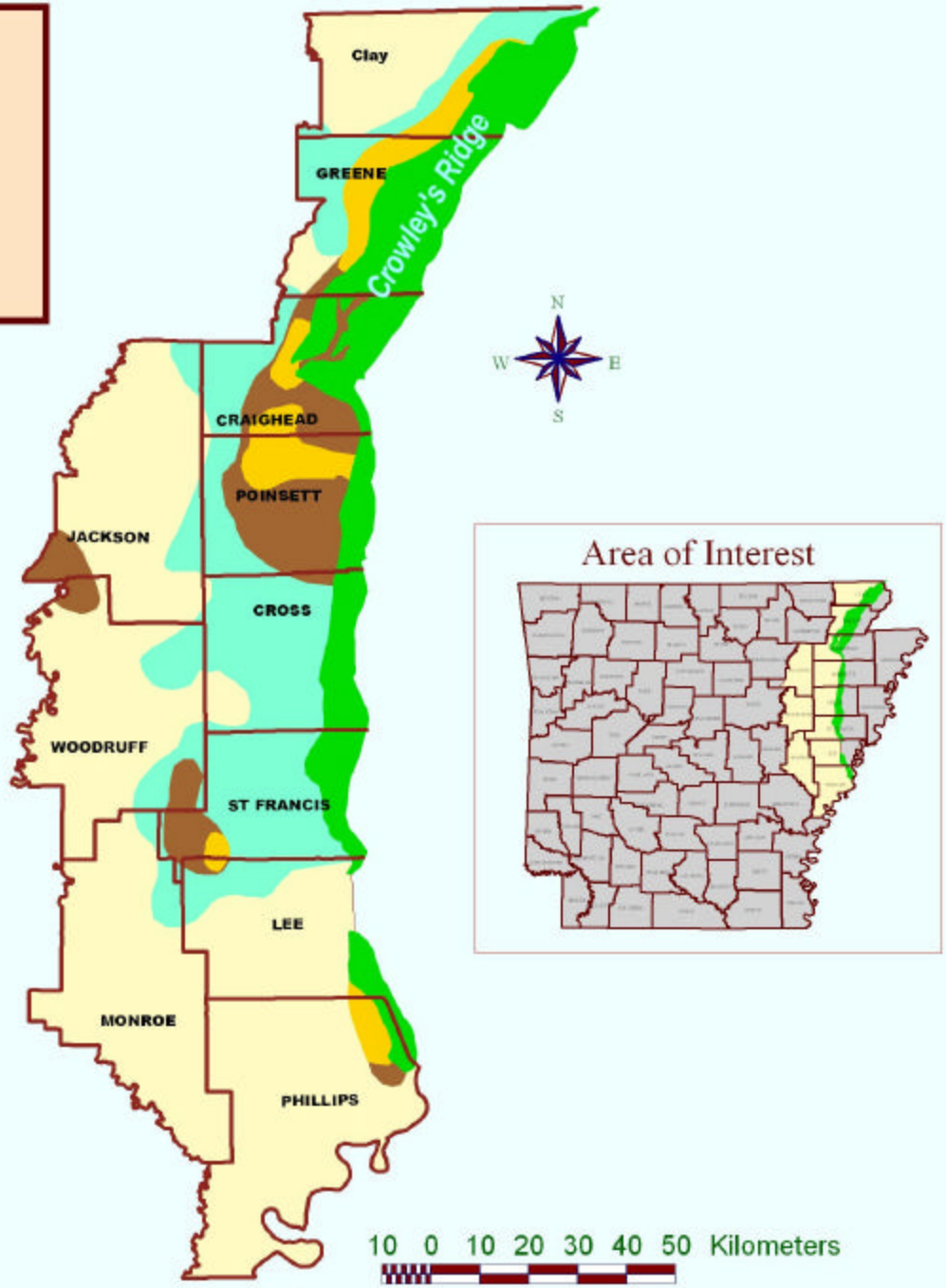


Areas of Greatest Decline

Explanation

- Wells with water level increases, or No significant change.
- Wells with declines 1 foot or greater but less than 5 feet.
- Wells with declines greater than 5 feet.
- County Boundaries

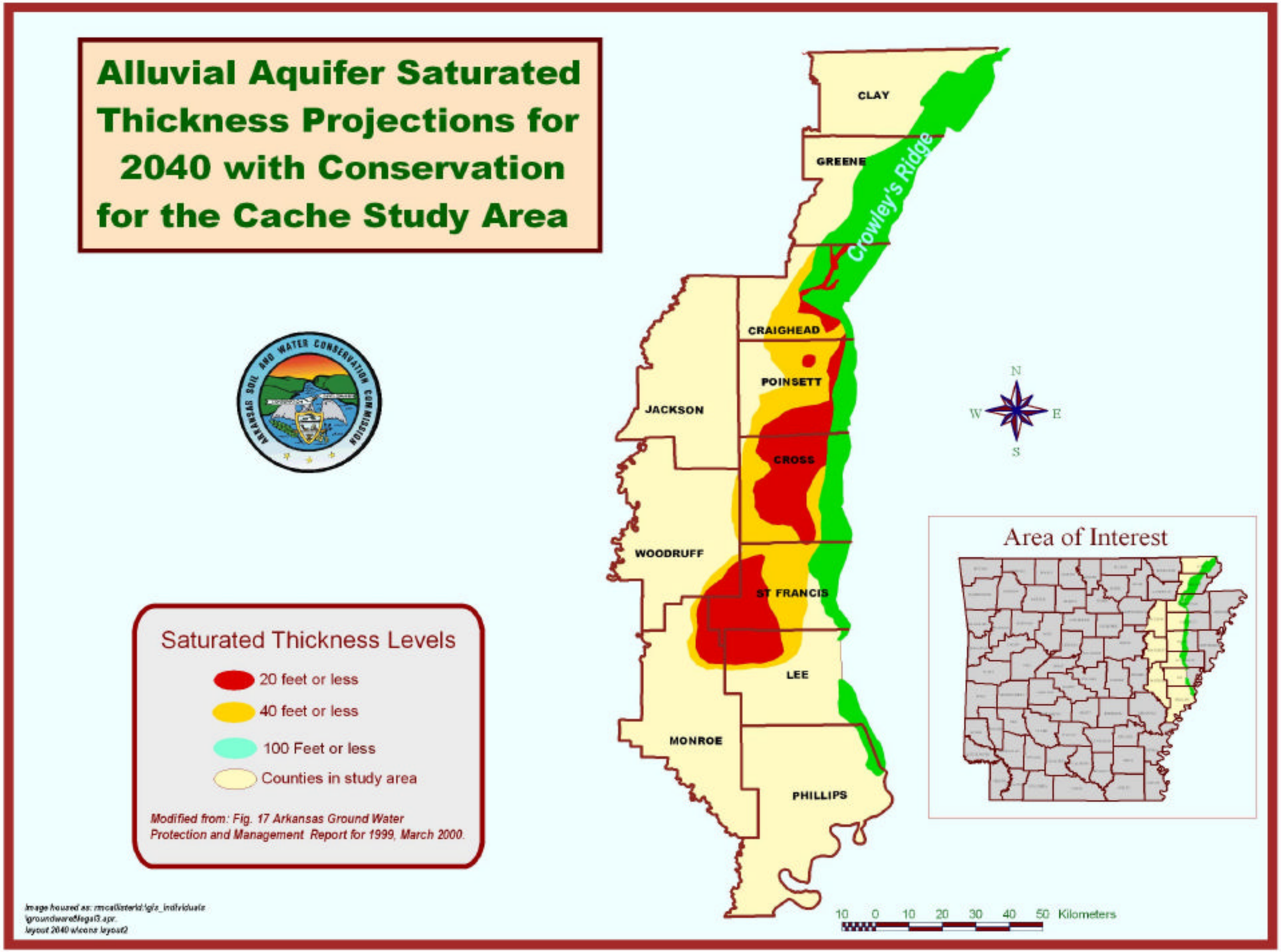
Alluvial Aquifer Areas of Diminished Saturated Thickness in the Cache Study Area



Remaining Saturated Thickness in the Formation

- 40 Feet or less
- 60 Feet or less
- 100 Feet or less
- Counties in Study Area

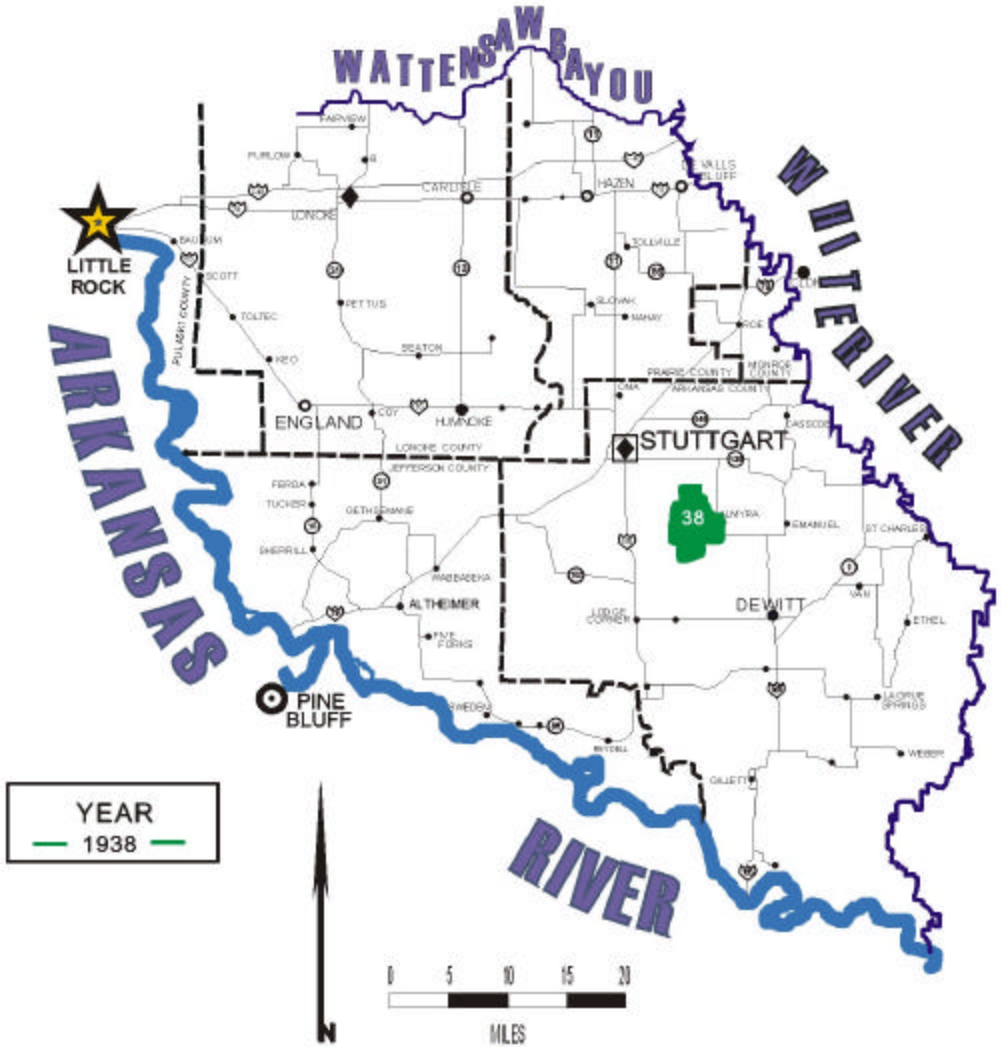
From 1998 U.S.G.S. Data


Alluvial Aquifer Saturated Thickness Projections for 2040 with Conservation for the Cache Study Area
CLAY
GREENE
Crowley's Ridge
CRAIGHEAD
POINSETT
JACKSON
CROSS
WOODRUFF
ST FRANCIS
LEE
MONROE
PHILLIPS
N
W
E
S
Area of Interest
Saturated Thickness Levels
20 feet or less
40 feet or less
100 Feet or less
Counties in study area
Modified from: Fig. 17 Arkansas Ground Water Protection and Management Report for 1999, March 2000.
10 0 10 20 30 40 50 Kilometers

MISSISSIPPI RIVER ALLUVIAL AQUIFER

110 FOOT POTENTIOMETRIC CONTOUR

1938



SOURCE; MODIFIED FROM USGS FILE DATA

Prepared by the SOUTH CENTRAL WATER MANAGEMENT CENTER

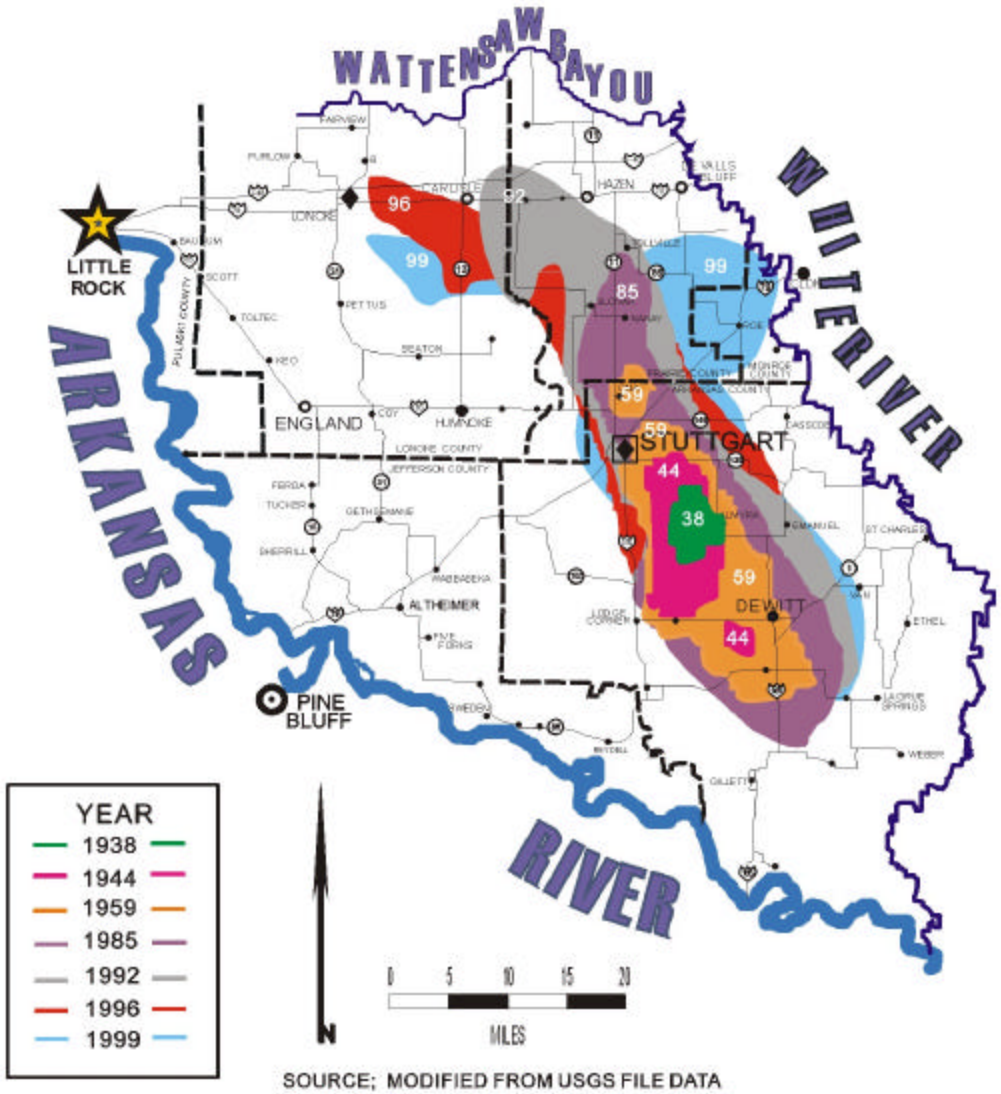
SEPTEMBER 1997

Modified by the Arkansas Soil and Water Conservaton Commission, 1999

MISSISSIPPI RIVER ALLUVIAL AQUIFER

110 FOOT POTENTIOMETRIC CONTOUR

SELECTED YEARS



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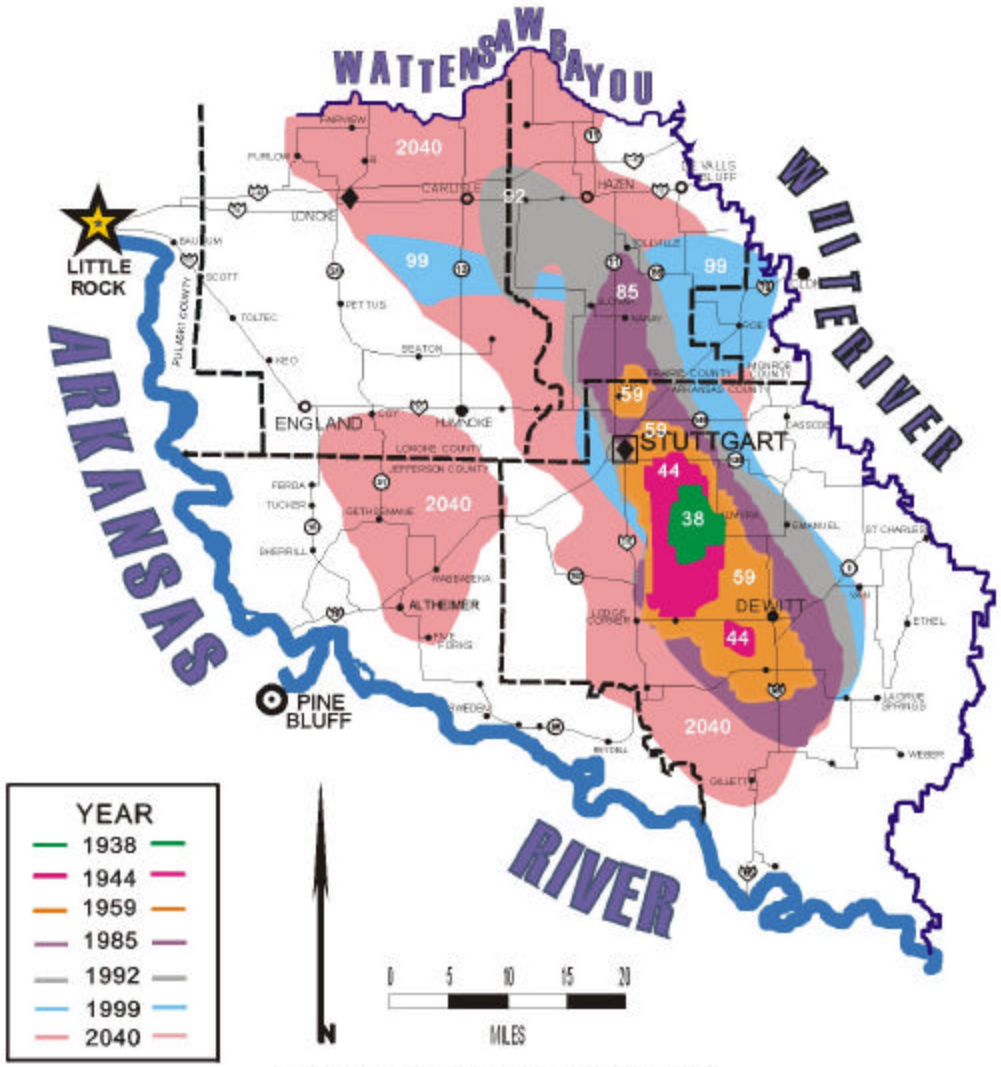

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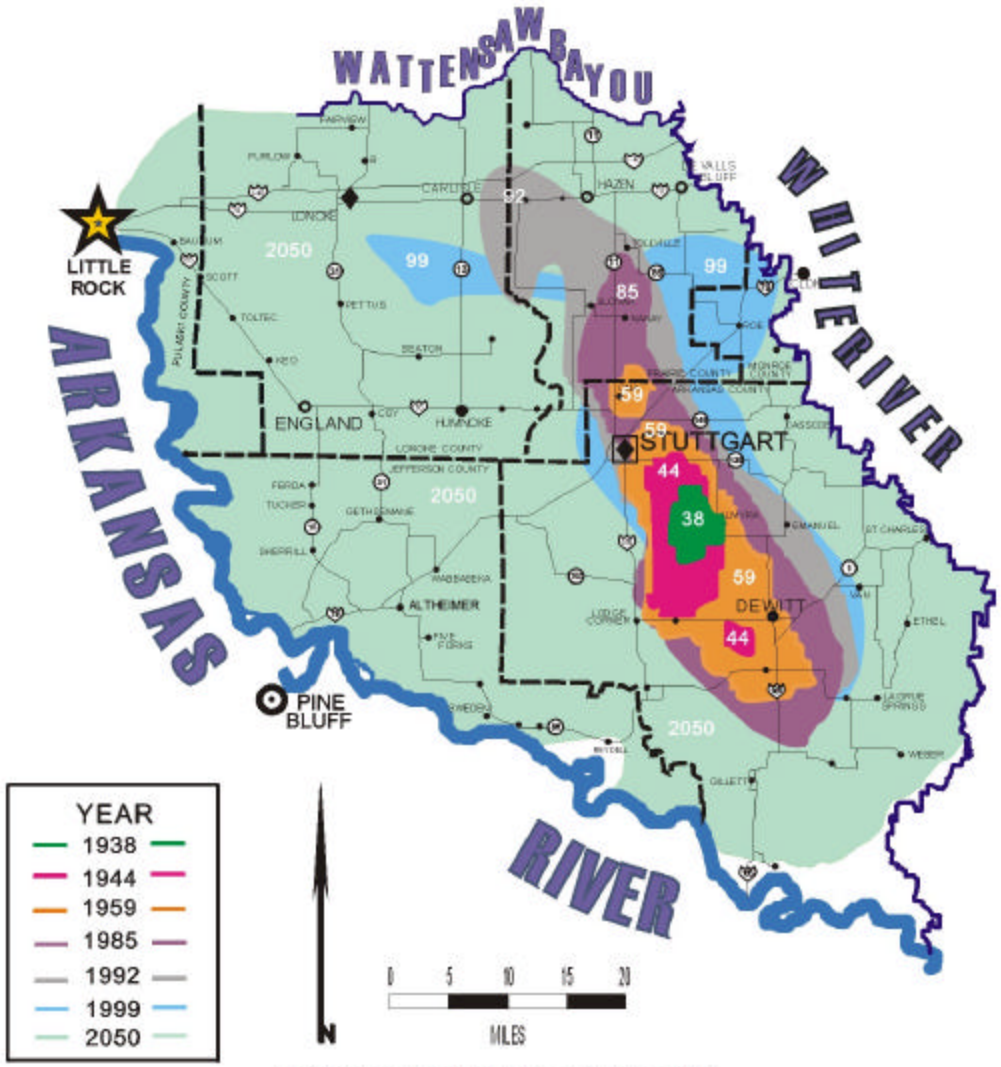

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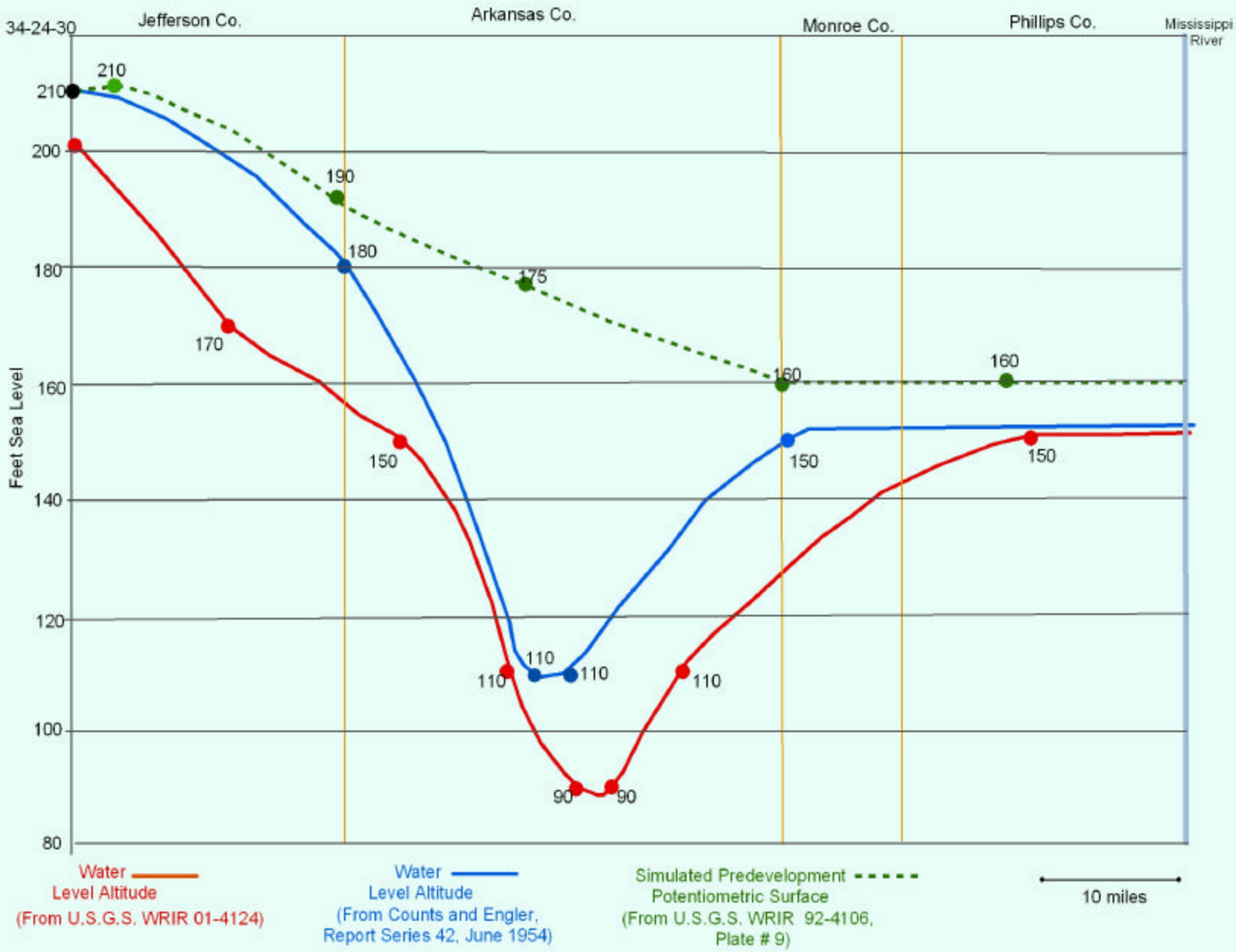
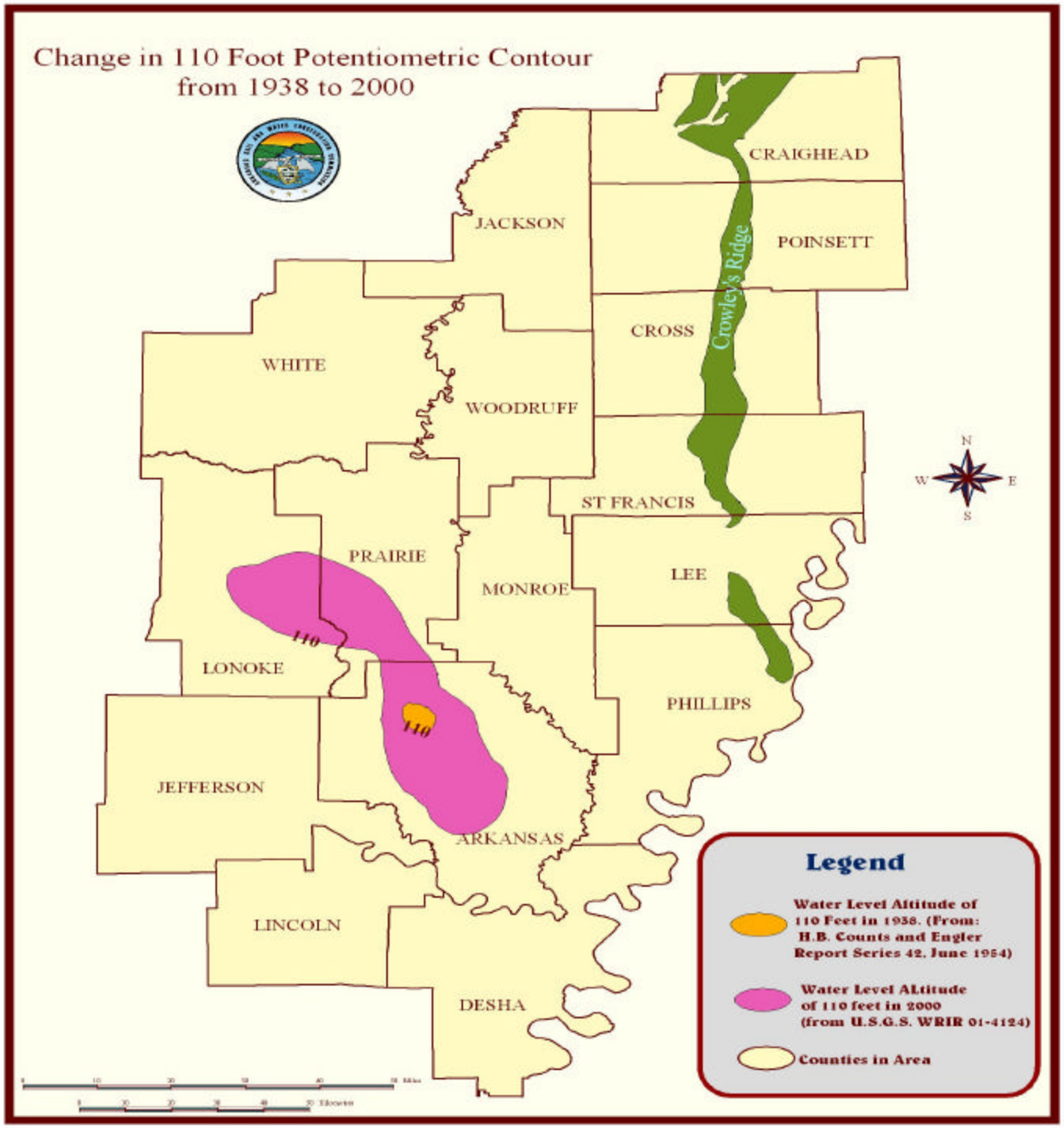
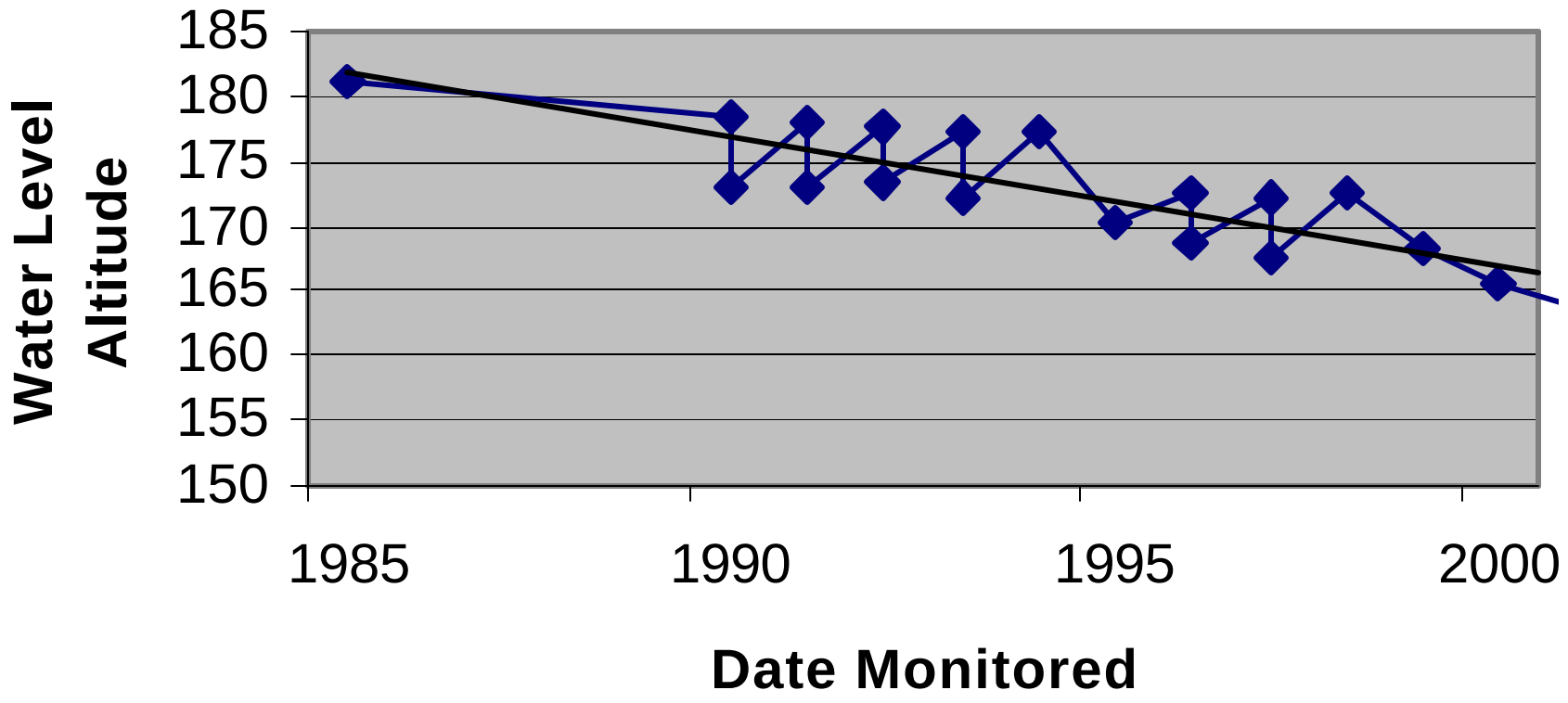
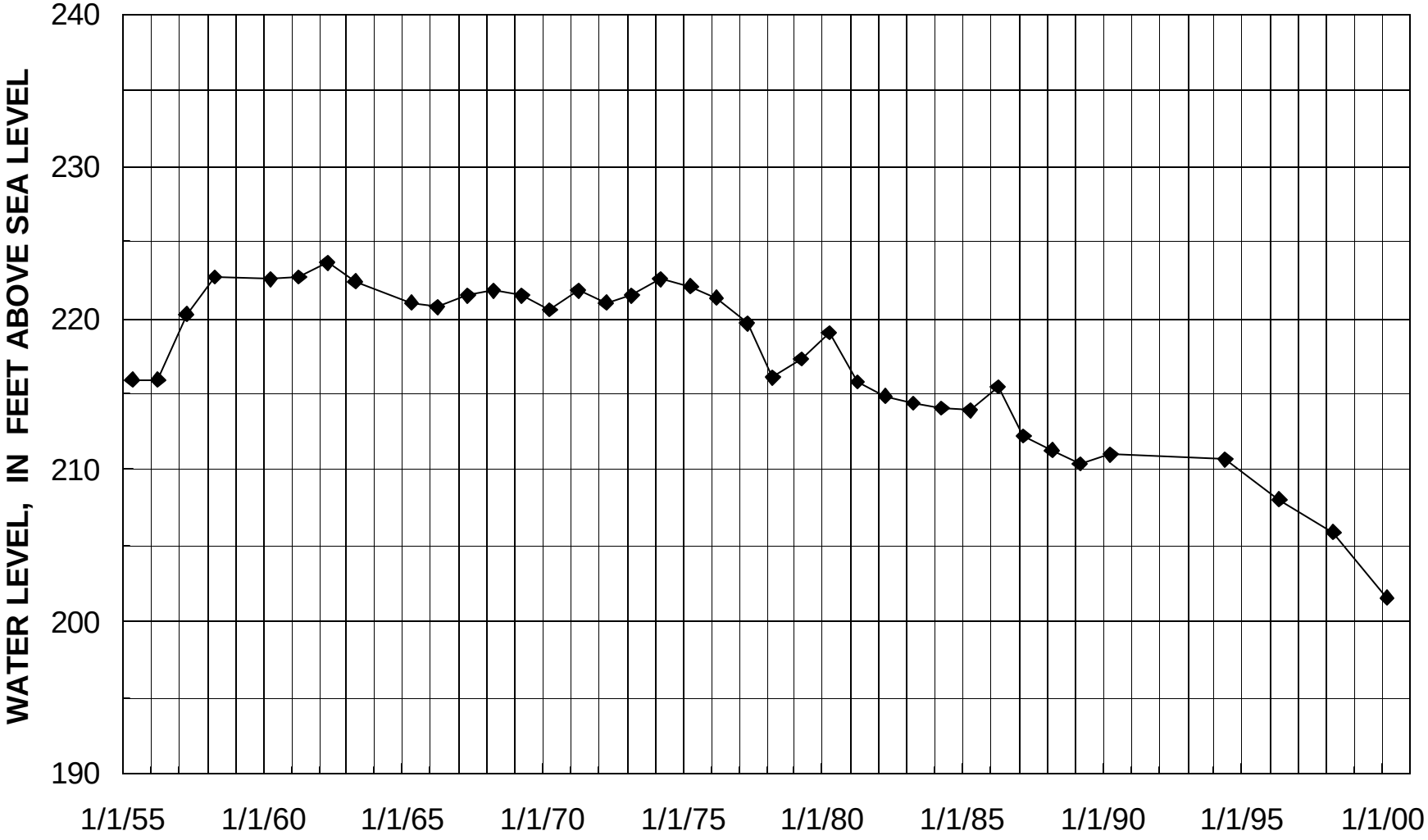

34-24-30
Jefferson Co.
Arkansas Co.
Monroe Co.
Phillips Co.
Mississippi River
Feet Sea Level
210
200
180
160
140
120
100
80
210
190
175
160
160
180
170
150
150
150
110
110
110
110
90
90
Water Level Altitude (From U.S.G.S. WRIR 01-4124)
Water Level Altitude (From Counts and Engler, Report Series 42, June 1954)
Simulated Predevelopment Potentiometric Surface (From U.S.G.S. WRIR 92-4106, Plate # 9)
10 miles


Change in 110 Foot Potentiometric Contour
from 1938 to 2000
CRAIGHEAD
JACKSON
POINSETT
Crowley's Ridge
CROSS
WHITE
WOODRUFF
ST FRANCIS
PRAIRIE
MONROE
LEE
110
LONOKE
PHILLIPS
110
JEFFERSON
ARKANSAS
LINCOLN
DESHA
N
W
E
S
Legend
Water Level Altitude of 110 Feet in 1938. (From: H.B. Counts and Engler Report Series 42, June 1954)
Water Level ALtitude of 110 feet in 2000 (from U.S.G.S. WRIR 01-4124)
Counties in Area

M. P. Murphee
09N01W15DDD1
Jackson County
Alluvial Aquifer



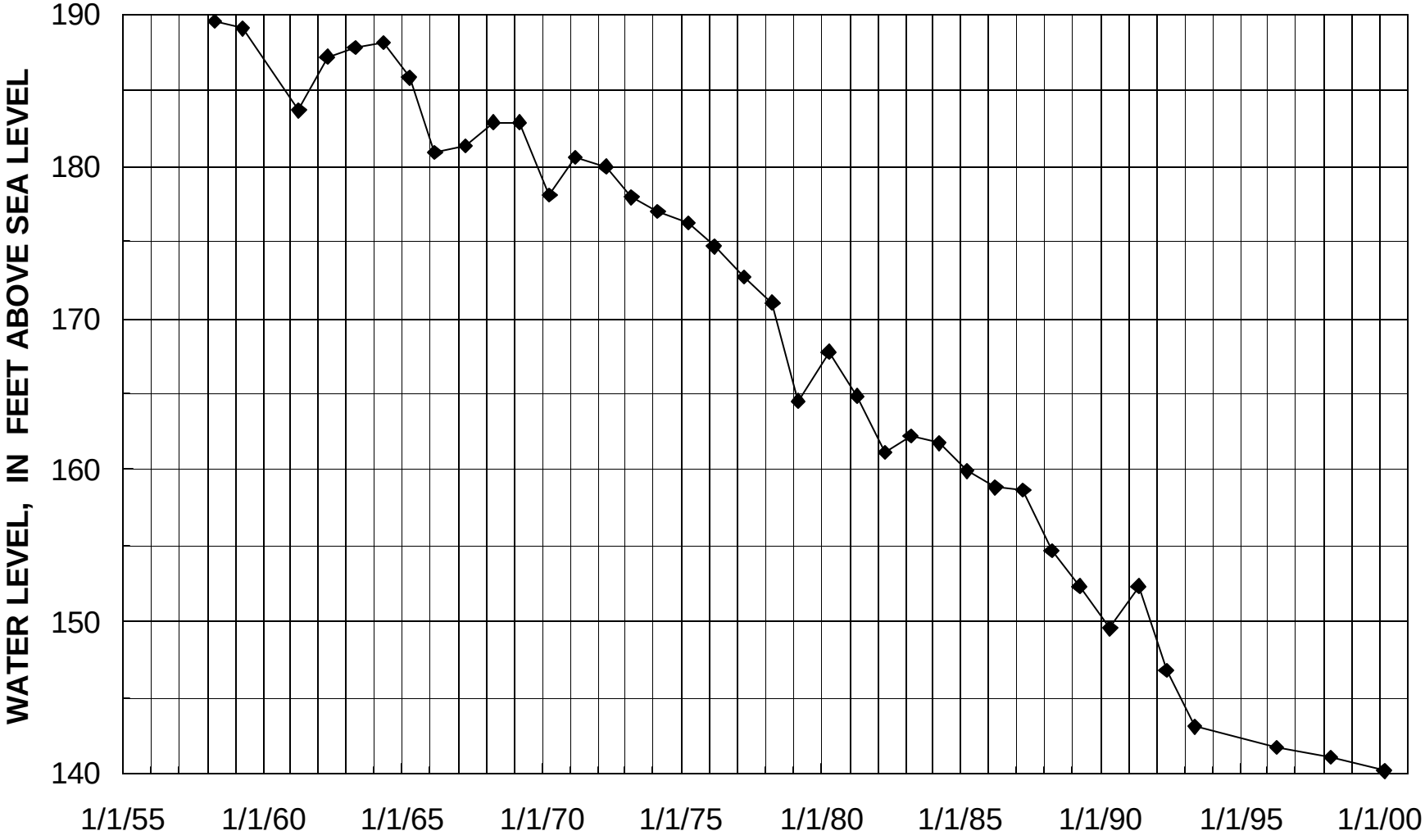
L. JACKSON COUNTY, WELL 12N02W25ABB2



Jackson County

- 21 of the 21 wells monitored from 1999 to 2000 showed declines.
- 14 of the 17 wells monitored from 1995 to 2000 showed declines.

T. POINSETT COUNTY, WELL 11N02E26AAB1



Poinsett County

- 27 of the 27 wells monitored from 1999 to 2000 showed declines.

- 17 of the 22 wells monitored from 1995 to 2000 showed declines.

Cache Study Area

- 195 of 220 wells monitored from 1999 to 2000 showed declines.
- 157 of 182 wells monitored from 1995 to 2000 showed declines.

Grand Prairie Study Area

- 35 of 53 wells monitored from 1999 to 2000 showed declines.
- 21 of 30 wells monitored from 1995 to 2000 showed declines.

Thank You