GROUNDWATER STATUS IN LOUISIANA

prepared by the

U.S. Geological Survey

February 5, 2009

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COOPERATIVE PARTNERSHIPS

- Louisiana Department of Transportation and Development
- Capital Area Ground Water Conservation Commission
- Louisiana Department of Natural Resources
- Sparta Ground Water Conservation Commission
- U.S. Army at Fort Polk

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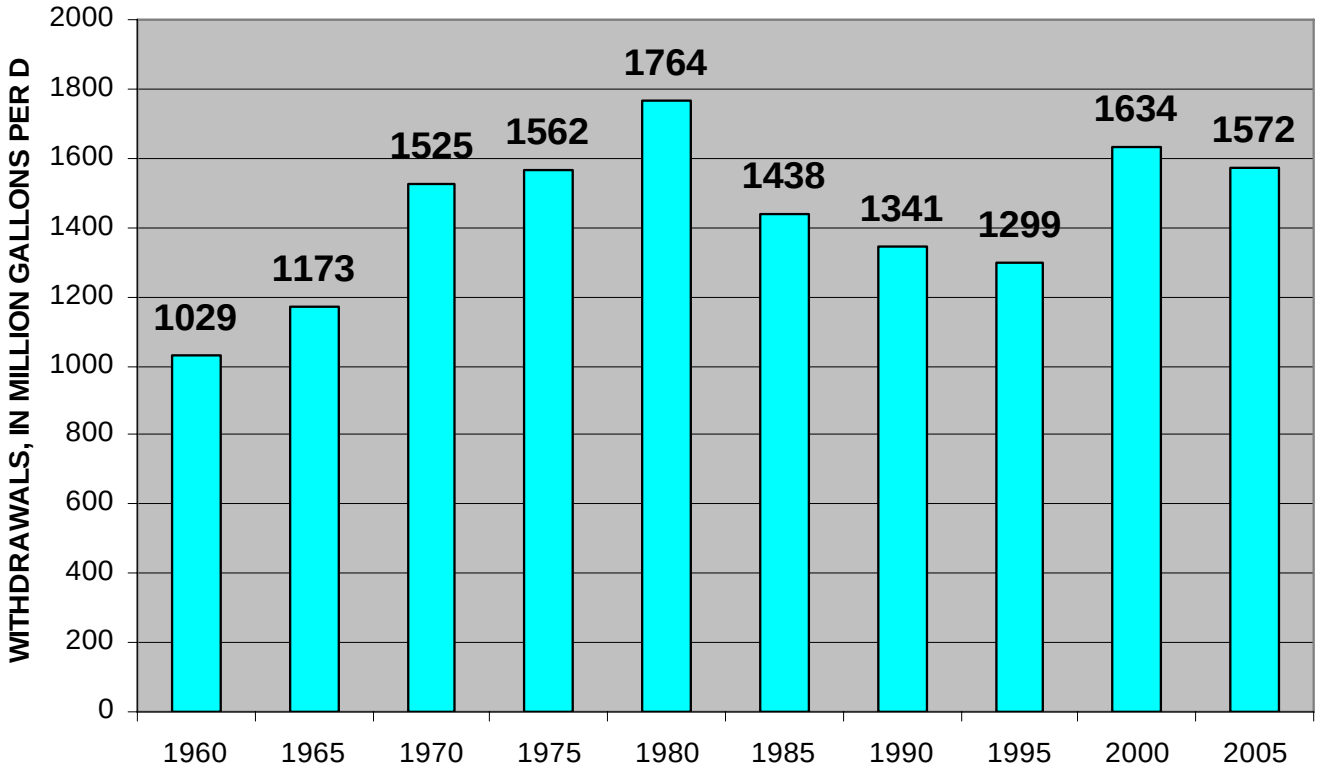
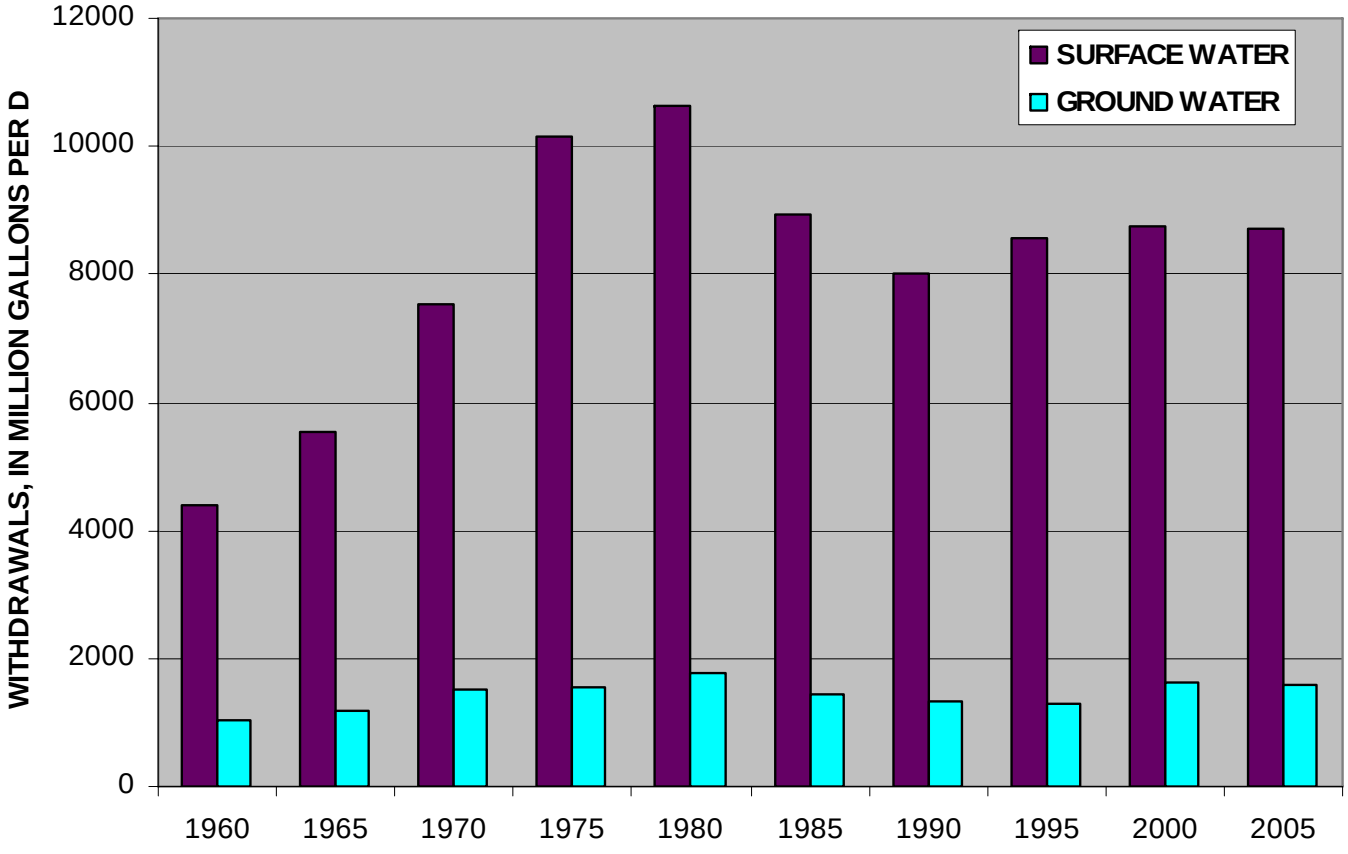
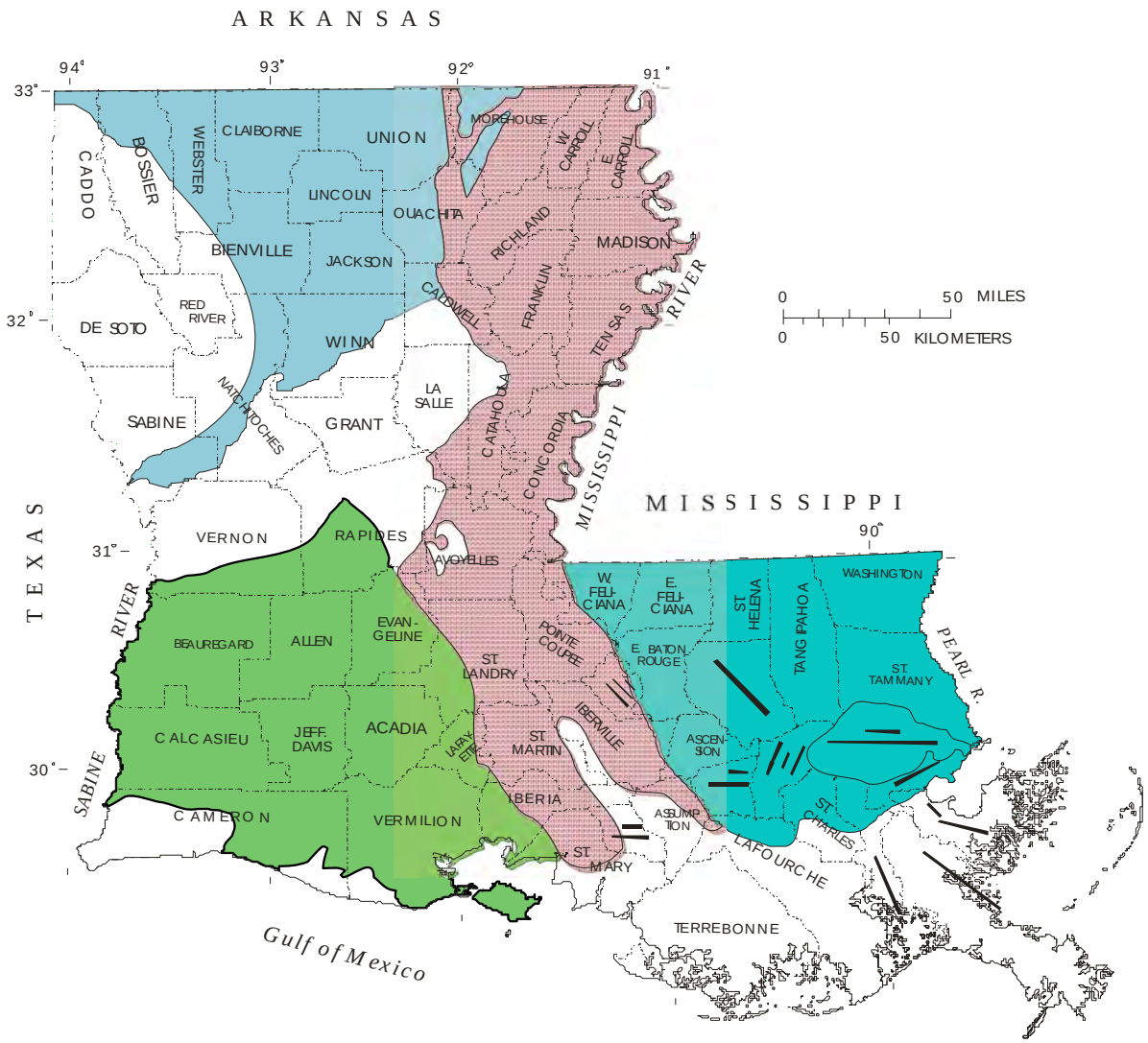
GROUND-WATER WITHDRAWALS IN LOUISIANA, 1960-2005



WATER WITHDRAWALS IN LOUISIANA, 1960-2005

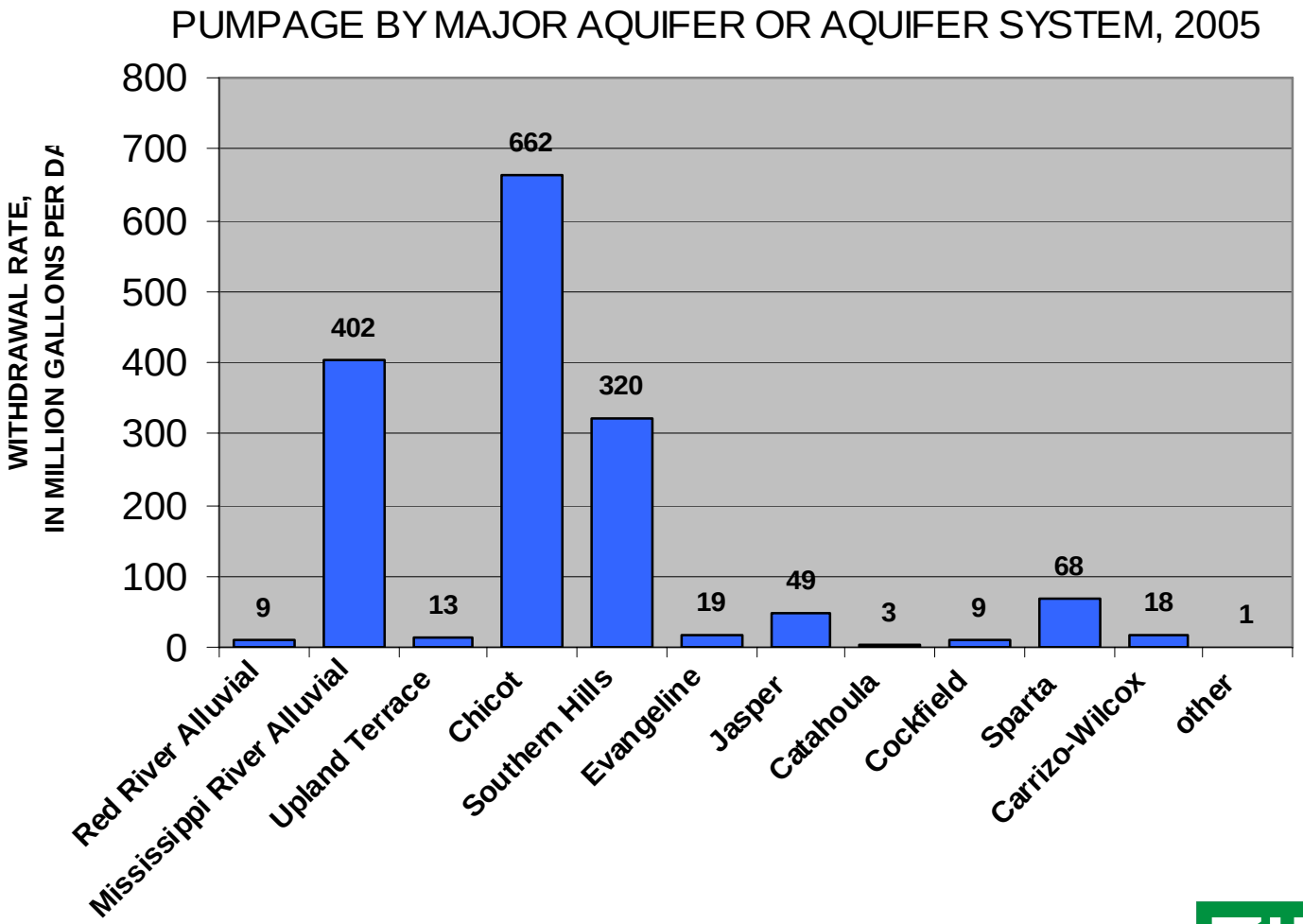




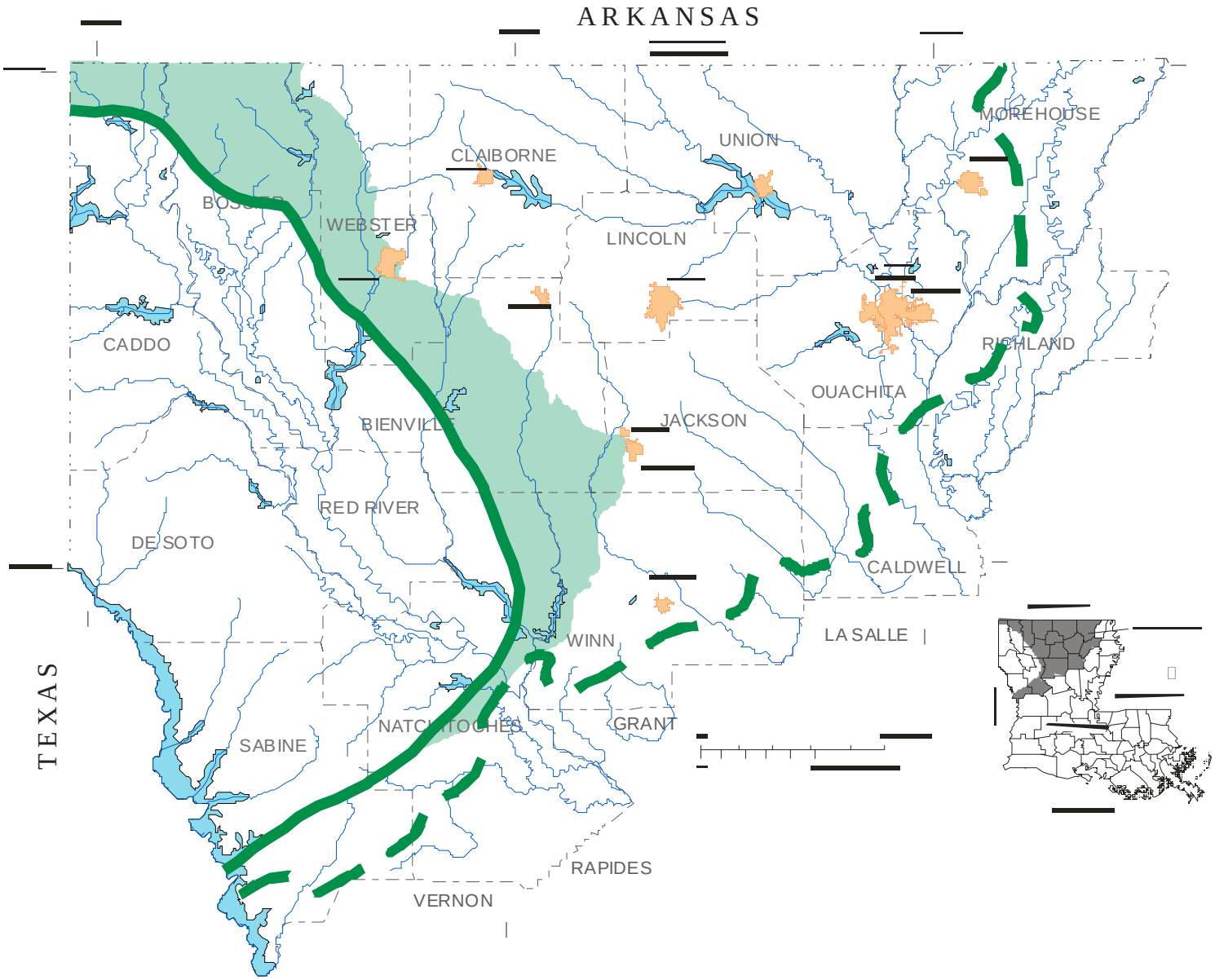
EXPLANATION

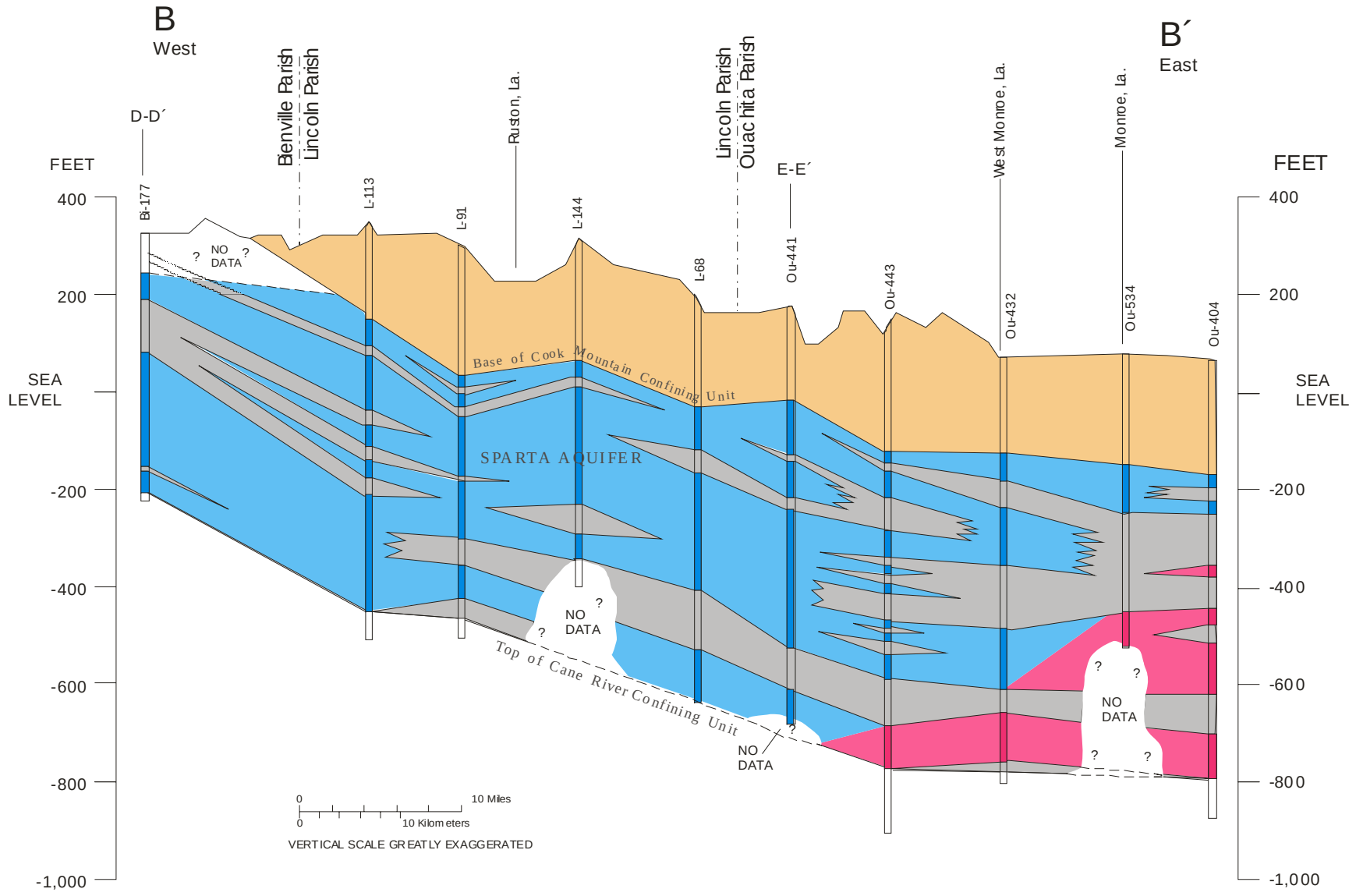
SELECTED AQUIFERS AND AQUIFER SYSTEMS:

- SPARTA AQUIFER
- MISSISSIPPI RIVER ALLUVIAL AQUIFER
- CHICOT AQUIFER SYSTEM
- SOUTHERN HILLS AQUIFER SYSTEM

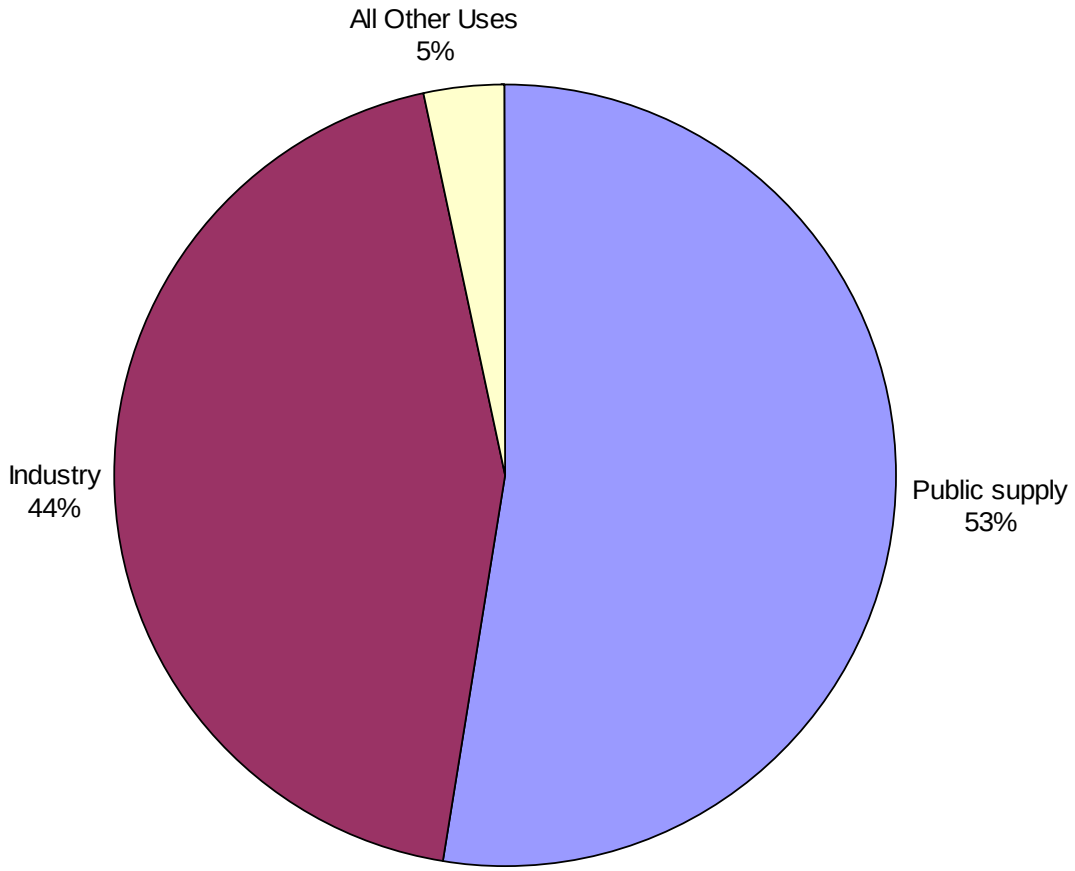

PUMPAGE BY MAJOR AQUIFER OR AQUIFER SYSTEM, 2005
WITHDRAWAL RATE,
IN MILLION GALLONS PER DA
800
700
600
500
400
300
200
100
0
9
402
13
662
320
19
49
3
9
68
18
1
Red River Alluvial
Mississippi River Alluvial
Upland Terrace
Chicot
Southern Hills
Evangeline
Jasper
Catahoula
Cockfield
Sparta
Carrizo-Wilcox
other

Freshwater extent of the Sparta aquifer in north Louisiana

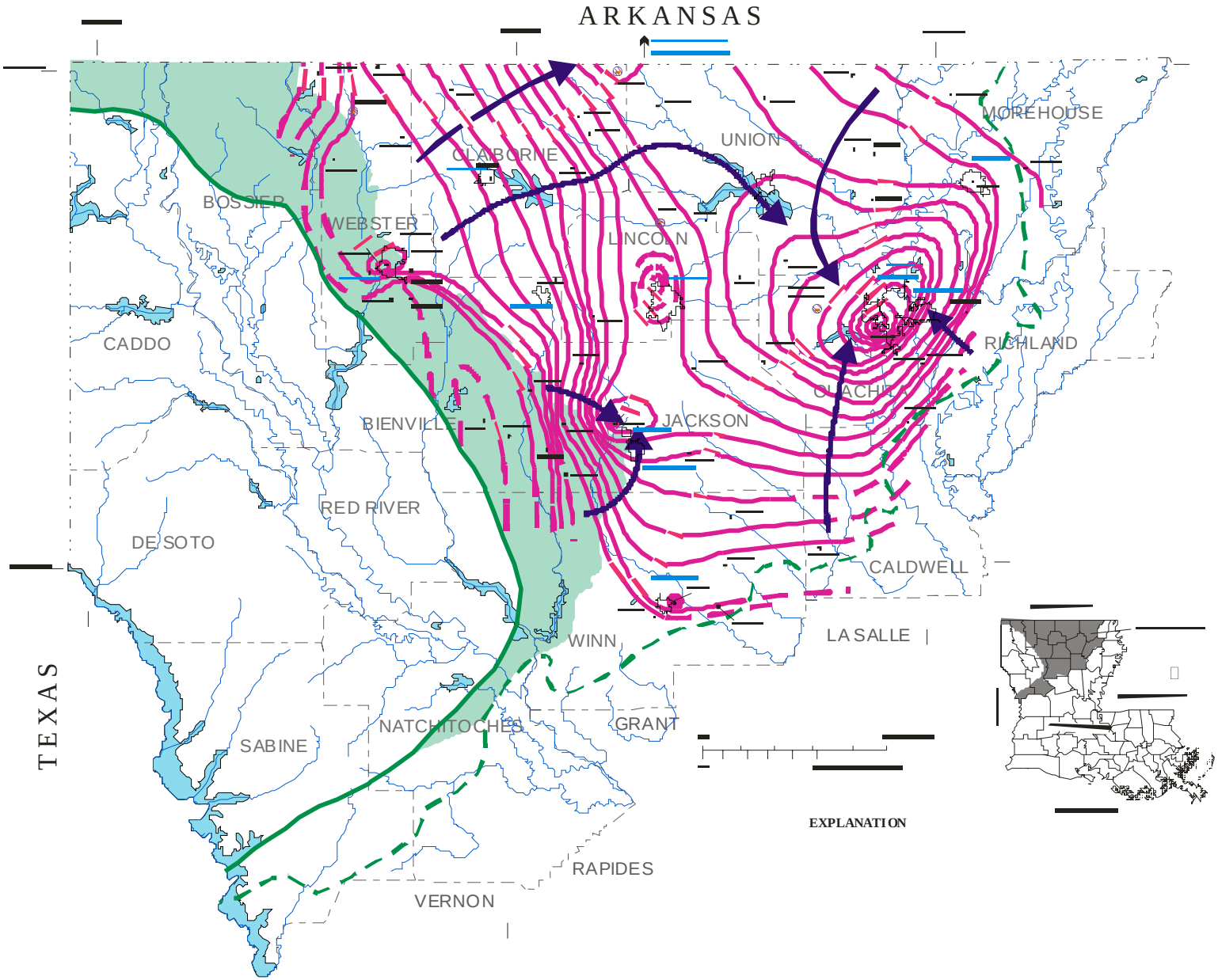



B
West
B´
East
D-D´
E-E´
Bienville Parish
Lincoln Parish
Ruston, La.
Lincoln Parish
Ouachita Parish
West Monroe, La.
Monroe, La.
FEET
400
200
SEA LEVEL
-200
-400
-600
-800
-1,000
Bi-177
L-113
L-91
L-144
L-68
Ou-441
Ou-443
Ou-432
Ou-534
Ou-404
NO DATA
Base of Cook Mountain Confining Unit
SPARTA AQUIFER
Top of Cane River Confining Unit
0
10 Miles
10 Kilometers
VERTICAL SCALE GREATLY EXAGGERATED

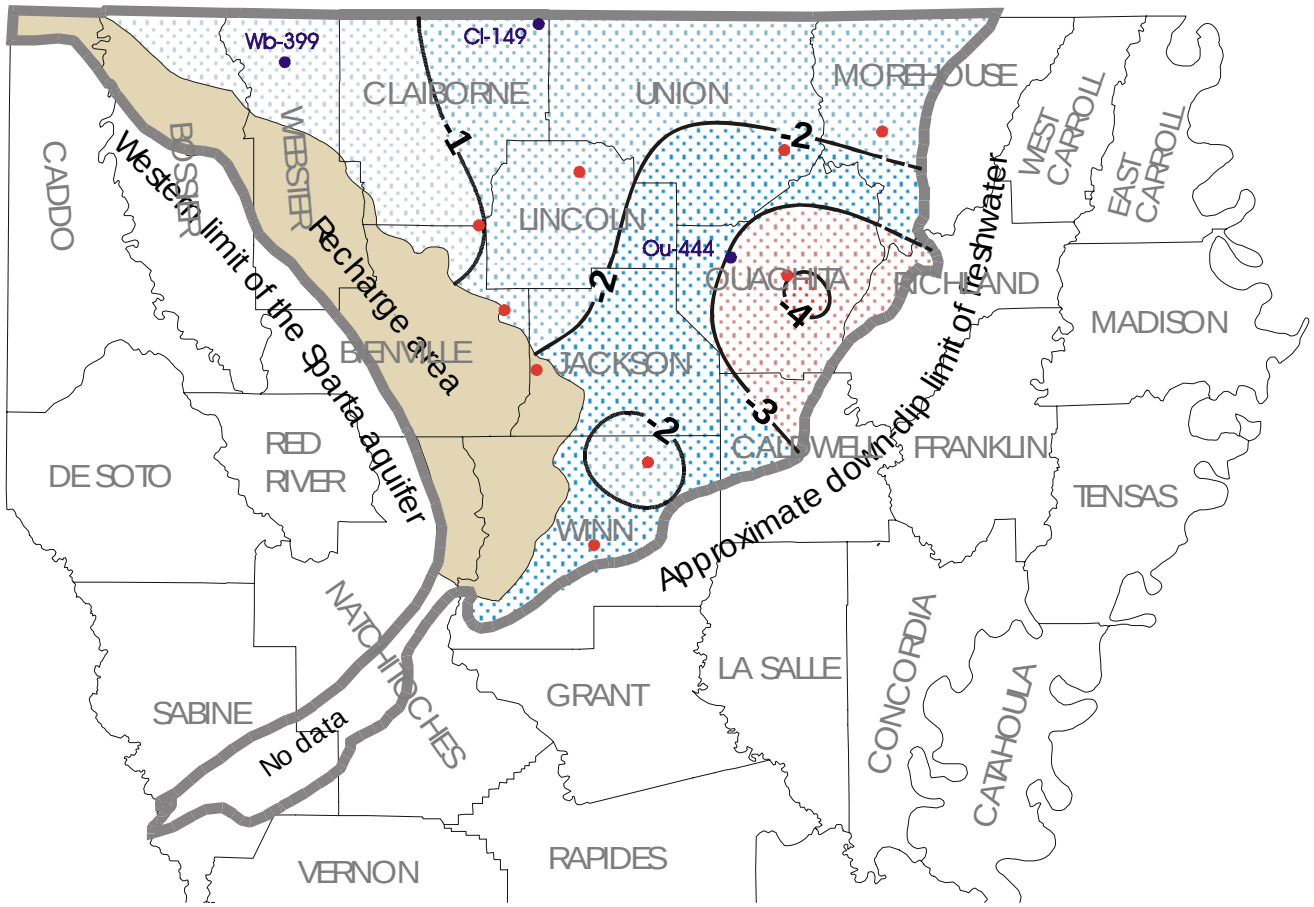
WITHDRAWALS FROM THE SPARTA AQUIFER IN LOUISIANA, 2005
(68 MILLION GALLONS PER DAY)



Potentiometric map of the Sparta aquifer in north Louisiana, 1996



Water-level decline in the Sparta aquifer in northern Louisiana during the period 1990 to 2000, based on data from USGS/DOTD water-level networks.



Areal extent of freshwater in the Sparta aquifer system in Louisiana

—1— Contours indicate approximate water-level declines at monitor wells, in feet per year, for the period 1990-2000. Dashed where indefinite

Control point

Wb-399 Control point and well number for which hydrograph is shown

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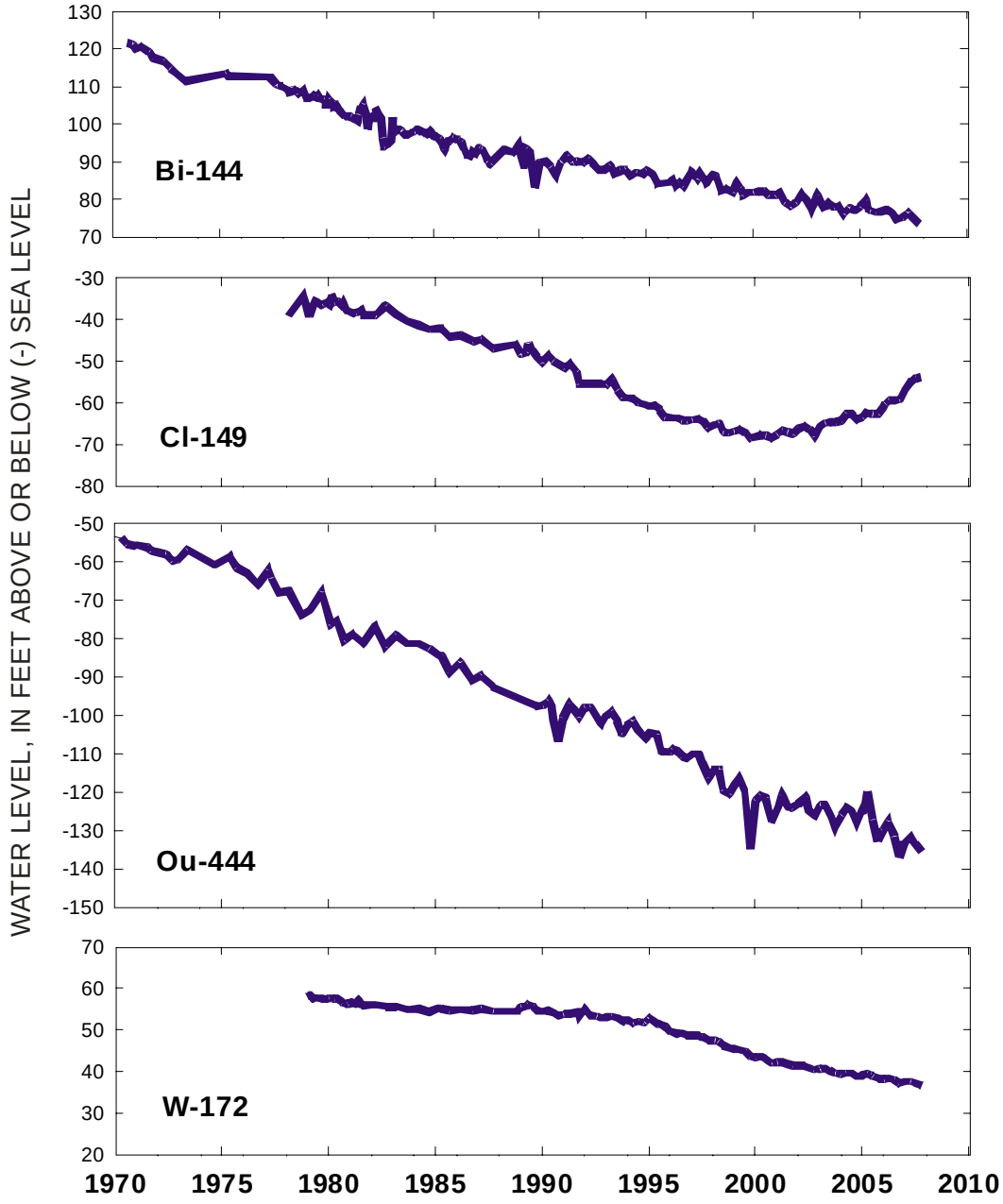
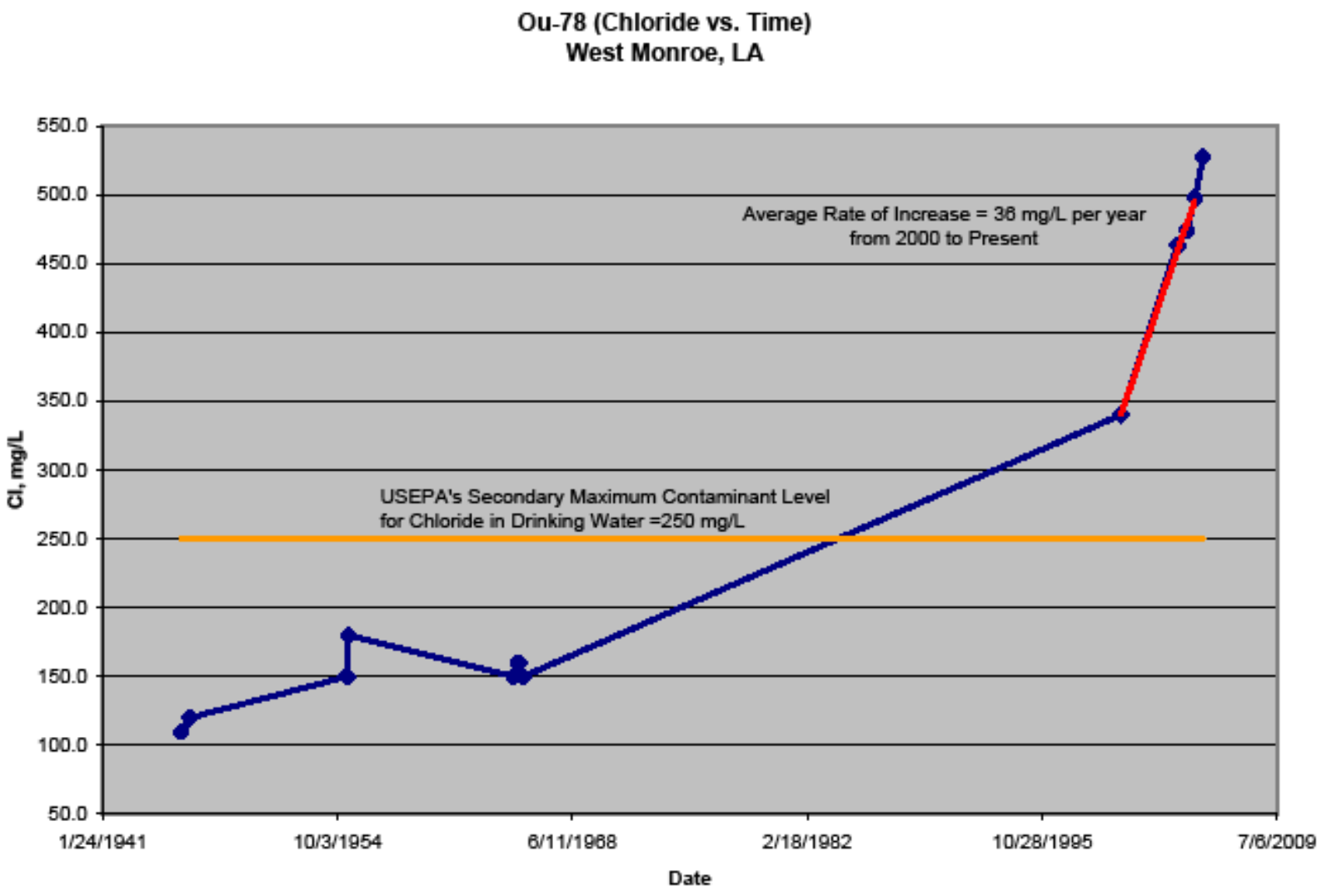
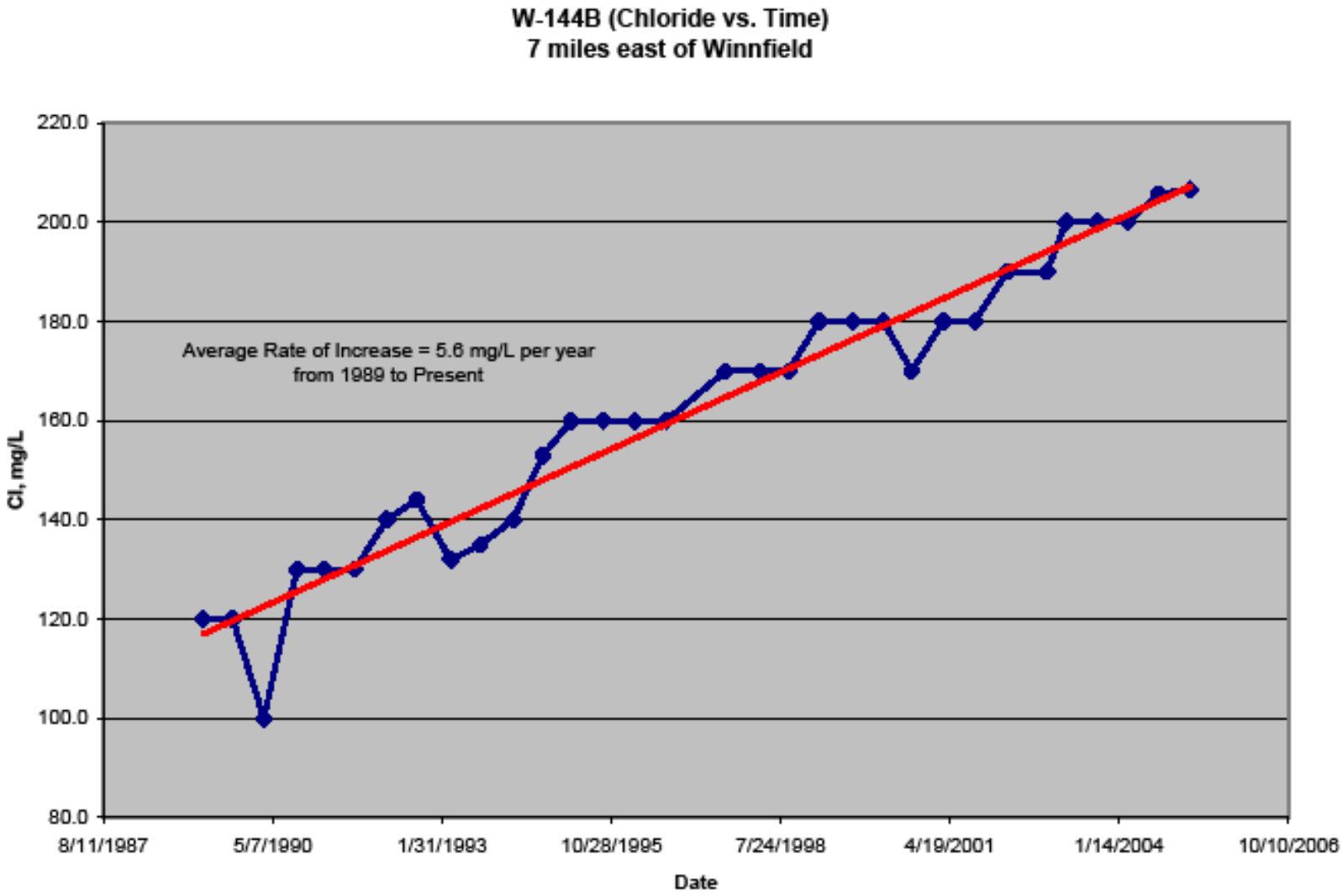
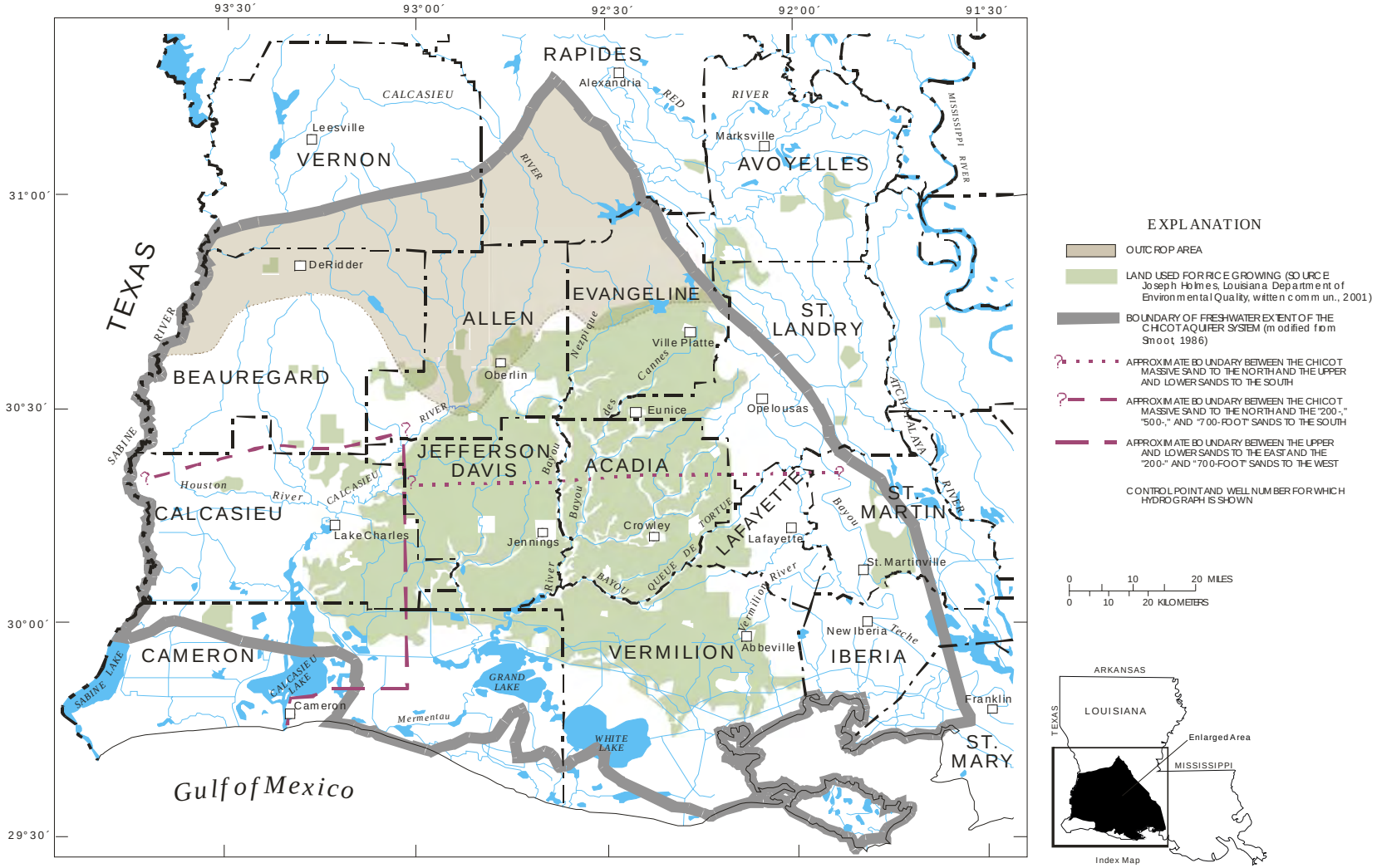
Water levels in the Sparta aquifer, 1970-2007

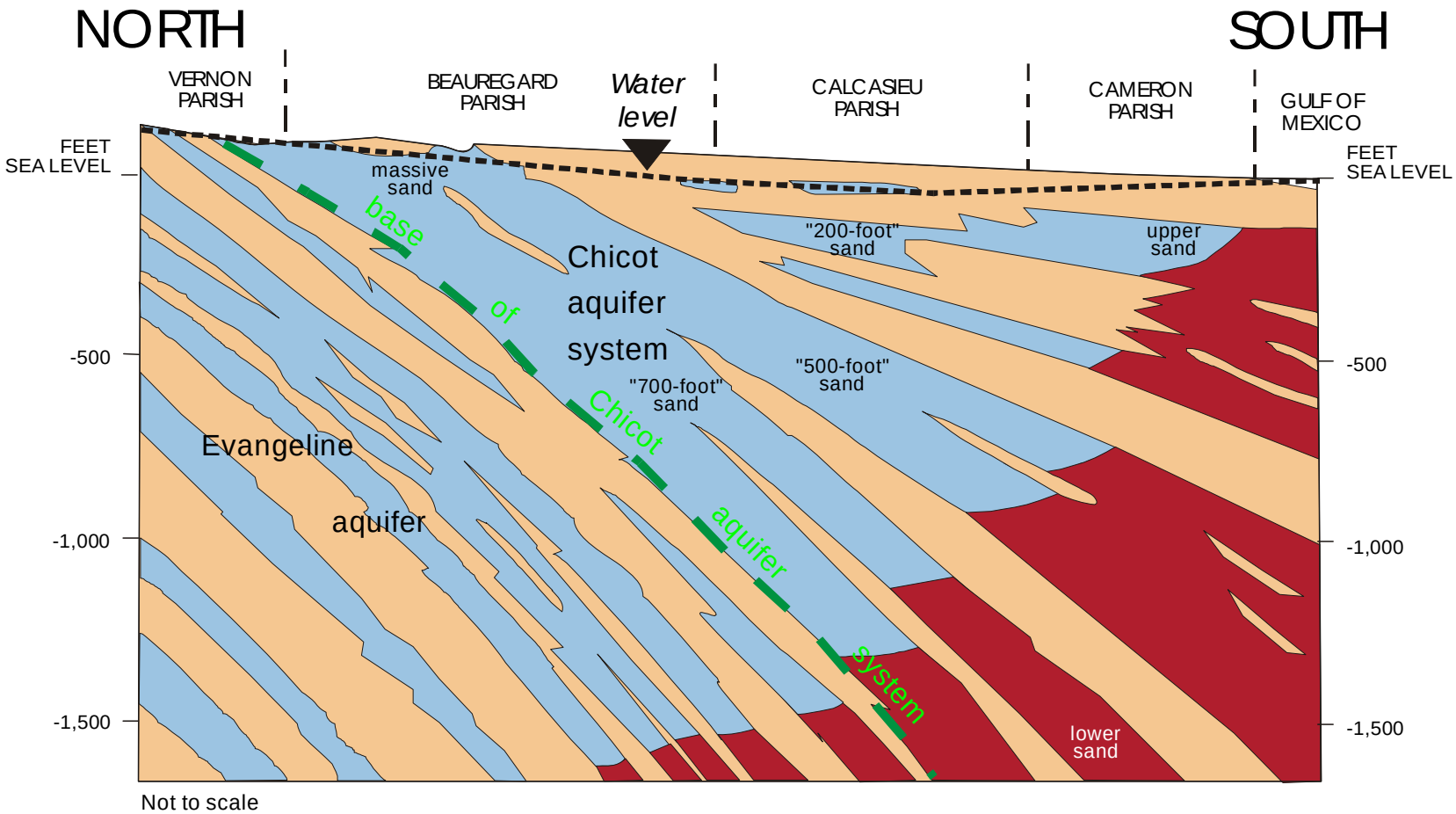



Ou-78 (Chloride vs. Time)
West Monroe, LA
Average Rate of Increase = 36 mg/L per year
from 2000 to Present
USEPA's Secondary Maximum Contaminant Level
for Chloride in Drinking Water =250 mg/L
Cl, mg/L
550.0
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
1/24/1941
10/3/1954
6/11/1968
2/18/1982
10/28/1995
7/6/2009
Date

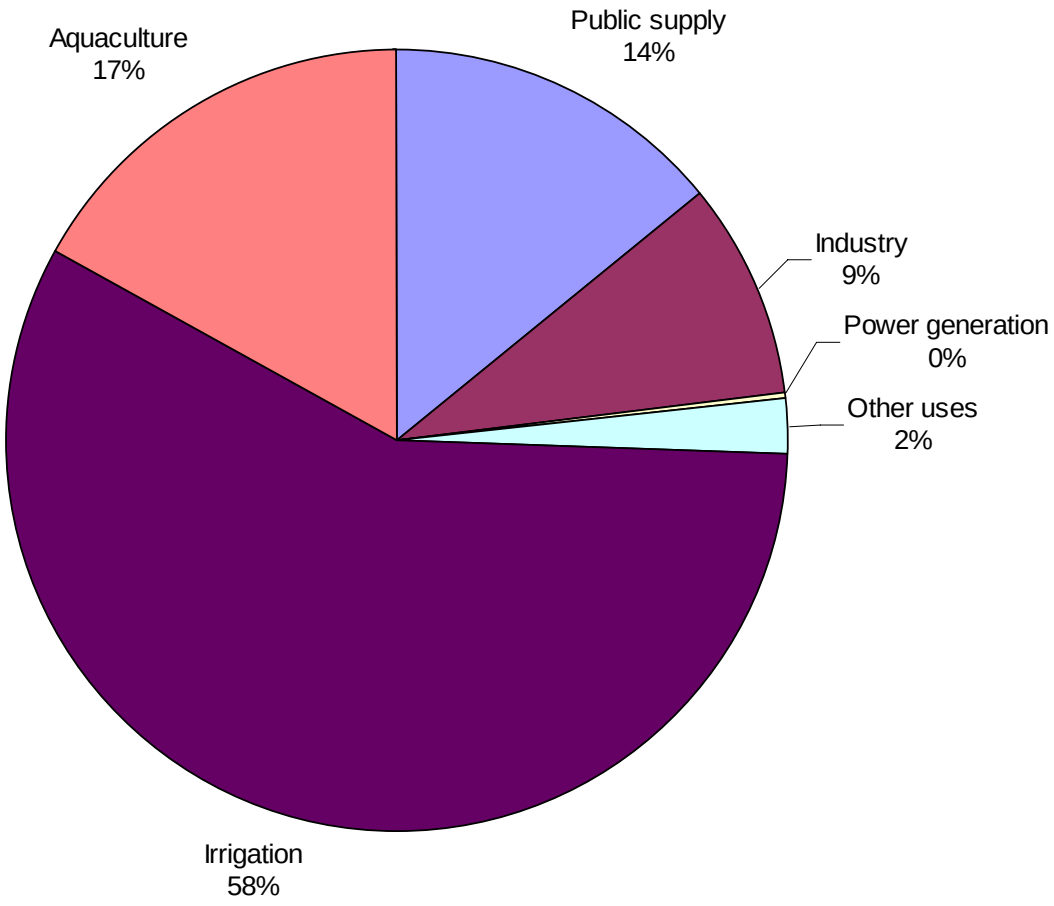

W-144B (Chloride vs. Time)
7 miles east of Winnfield
Average Rate of Increase = 5.6 mg/L per year
from 1989 to Present
Cl, mg/L
220.0
200.0
180.0
160.0
140.0
120.0
100.0
80.0
8/11/1987
5/7/1990
1/31/1993
10/28/1995
7/24/1998
4/19/2001
1/14/2004
10/10/2006
Date

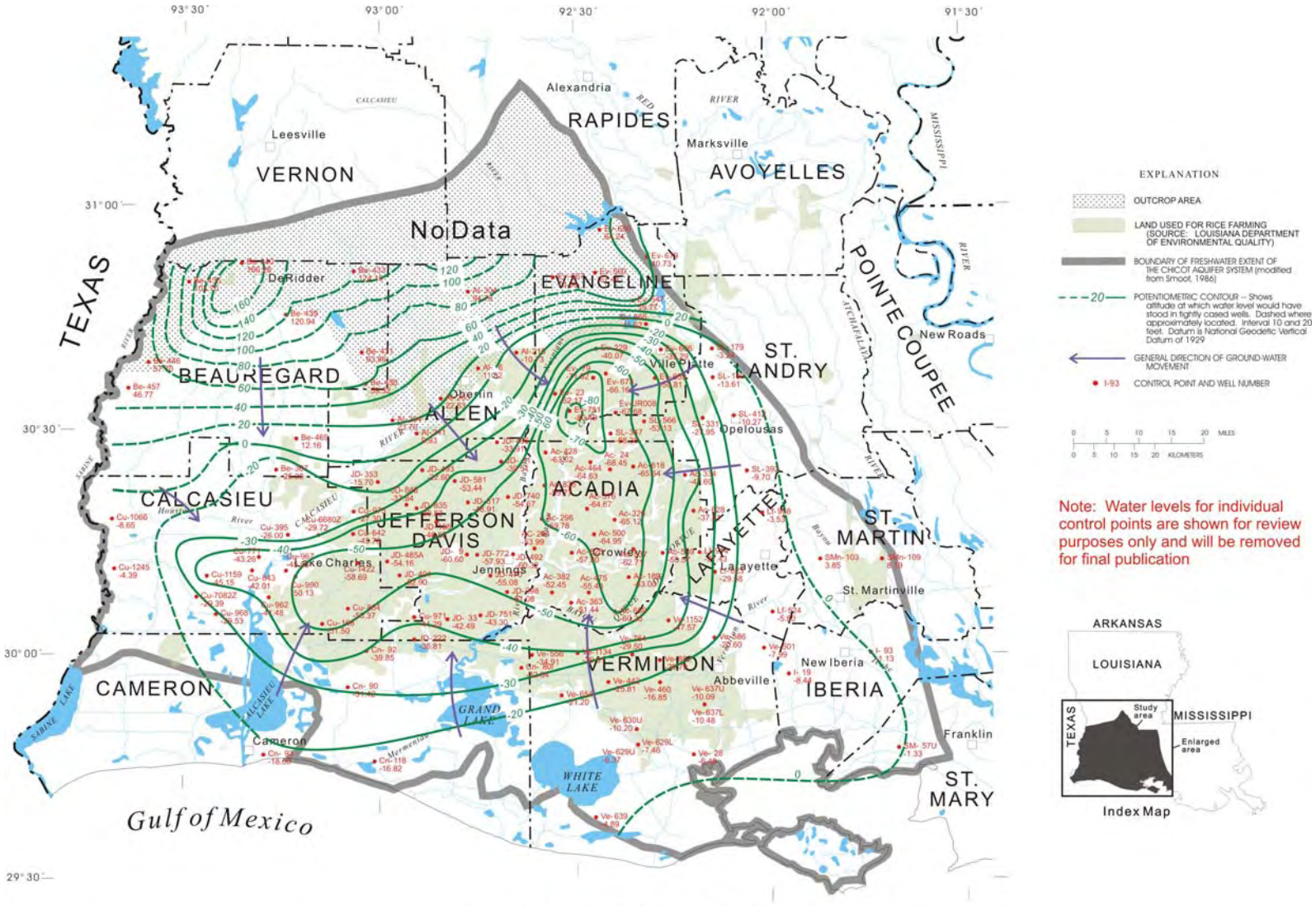
Location of the Chicot aquifer system and rice-growing area in southwestern Louisiana




NORTH
SOUTH
VERNON PARISH
BEAUREGARD PARISH
Water level
CALCASIEU PARISH
CAMERON PARISH
GULF OF MEXICO
FEET SEA LEVEL
FEET SEA LEVEL
massive sand
base of Chicot aquifer system
"200-foot" sand
upper sand
"500-foot" sand
"700-foot" sand
Chicot aquifer system
Evangeline aquifer
lower sand
-500
-1,000
-1,500
-500
-1,000
-1,500
Not to scale

WITHDRAWALS FROM THE CHICOT AQUIFER SYSTEM, 2005
(660 MILLION GALLONS PER DAY)





Map credit: Modified from Official Map of Louisiana, Louisiana Department of Transportation and Development, 1986

Figure 5. Potentiometric surface of the massive, upper, and "200-foot" sands of the Chicot aquifer system in southwestern Louisiana, June 2002.

Water levels in the Chicot aquifer system, June 2002.

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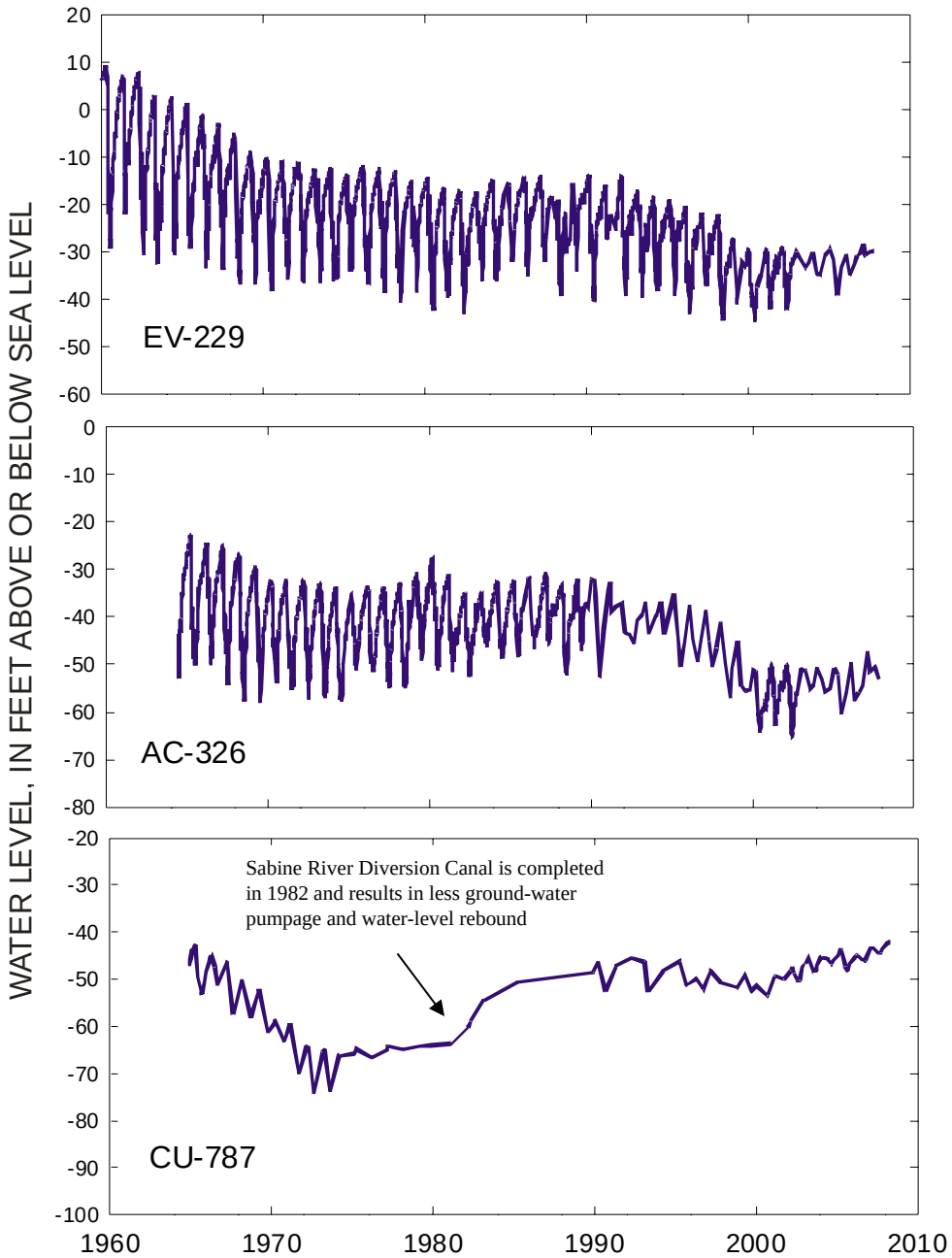
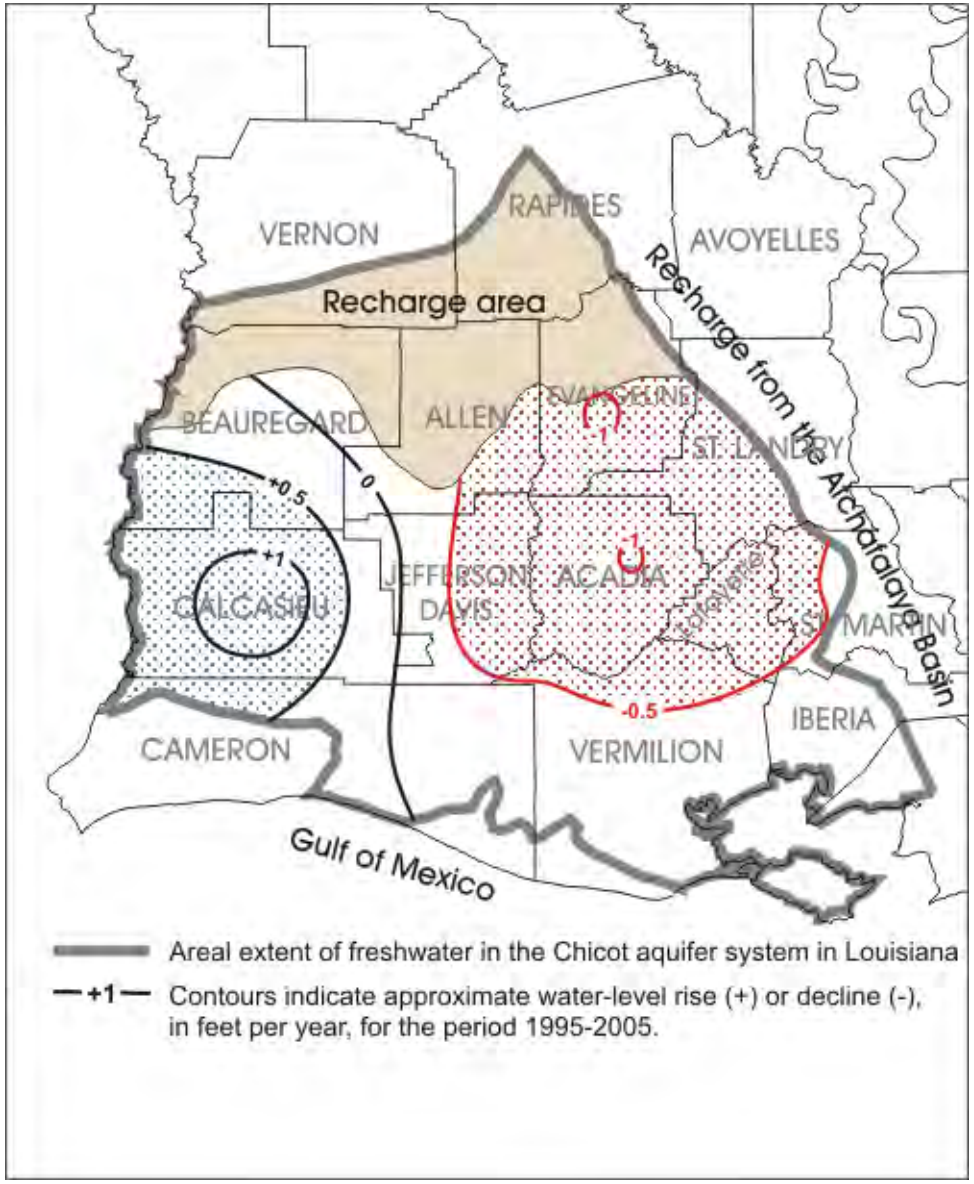
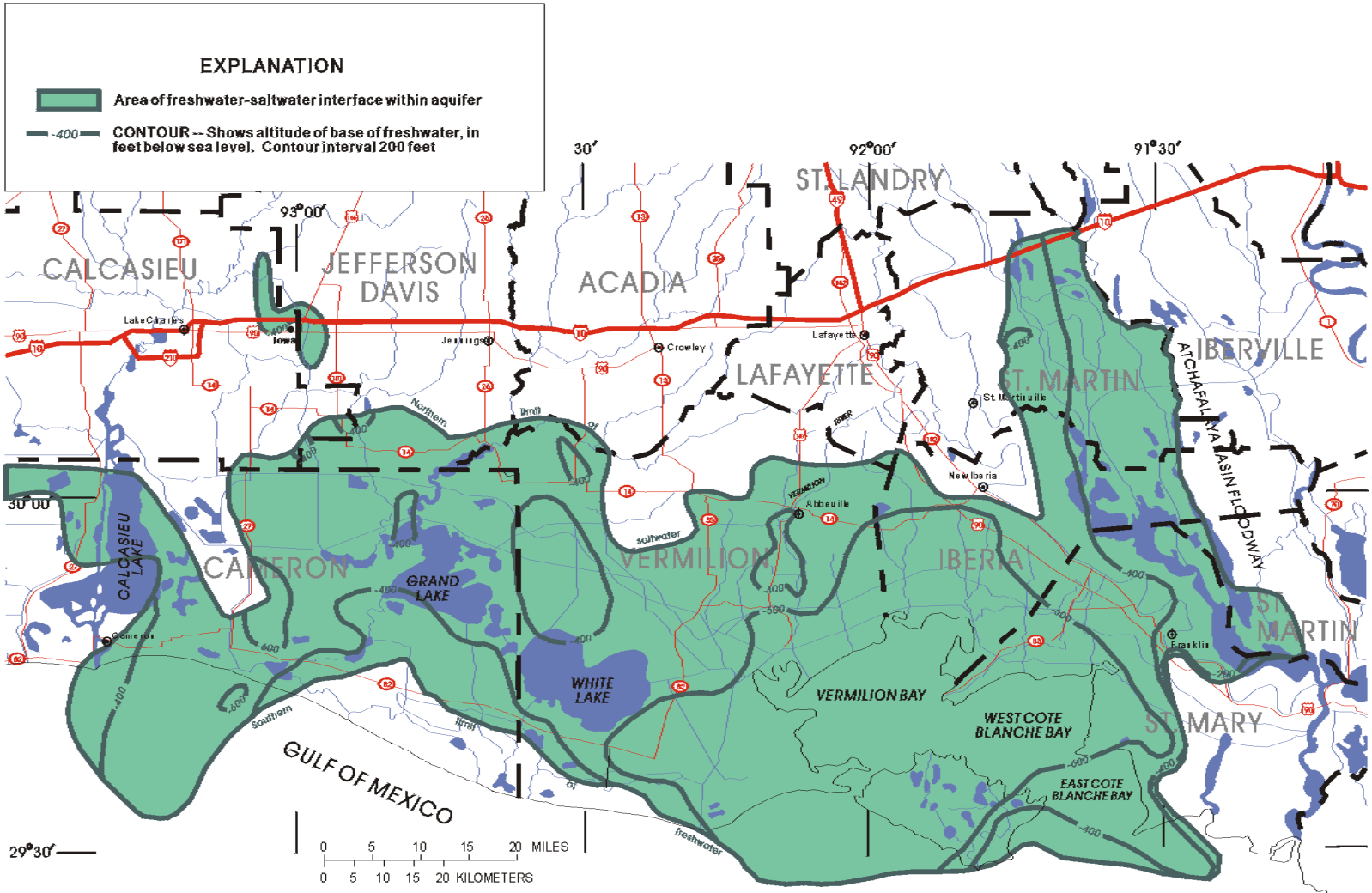


Water levels show long-term declines and seasonal fluctuations at 3 wells screened in the Chicot aquifer system in southwestern Louisiana, 1960-2010.

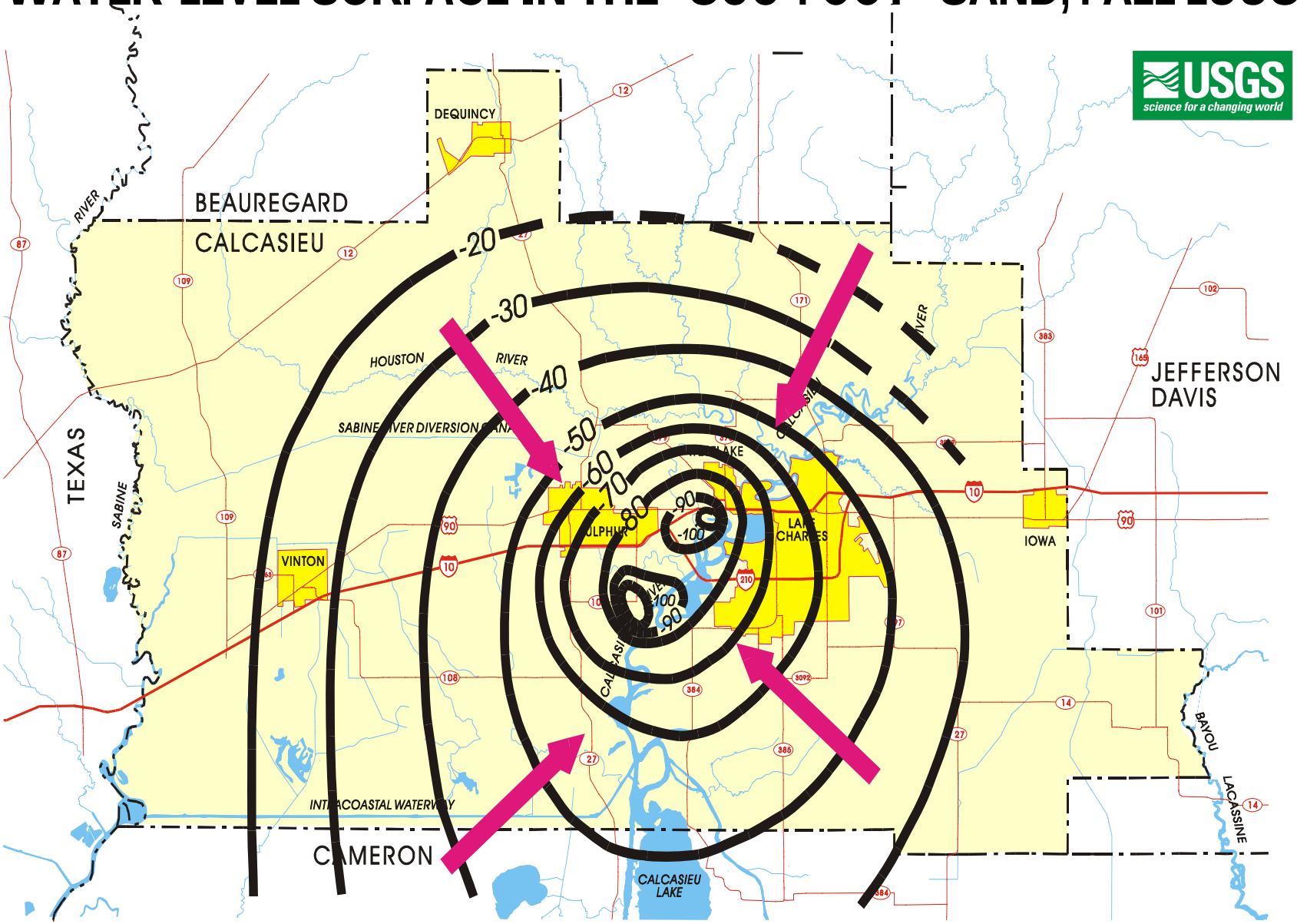
Water-level decline in the Chicot aquifer system during the period 1995 to 2005, based on data from the USGS/DOTD water-level network.



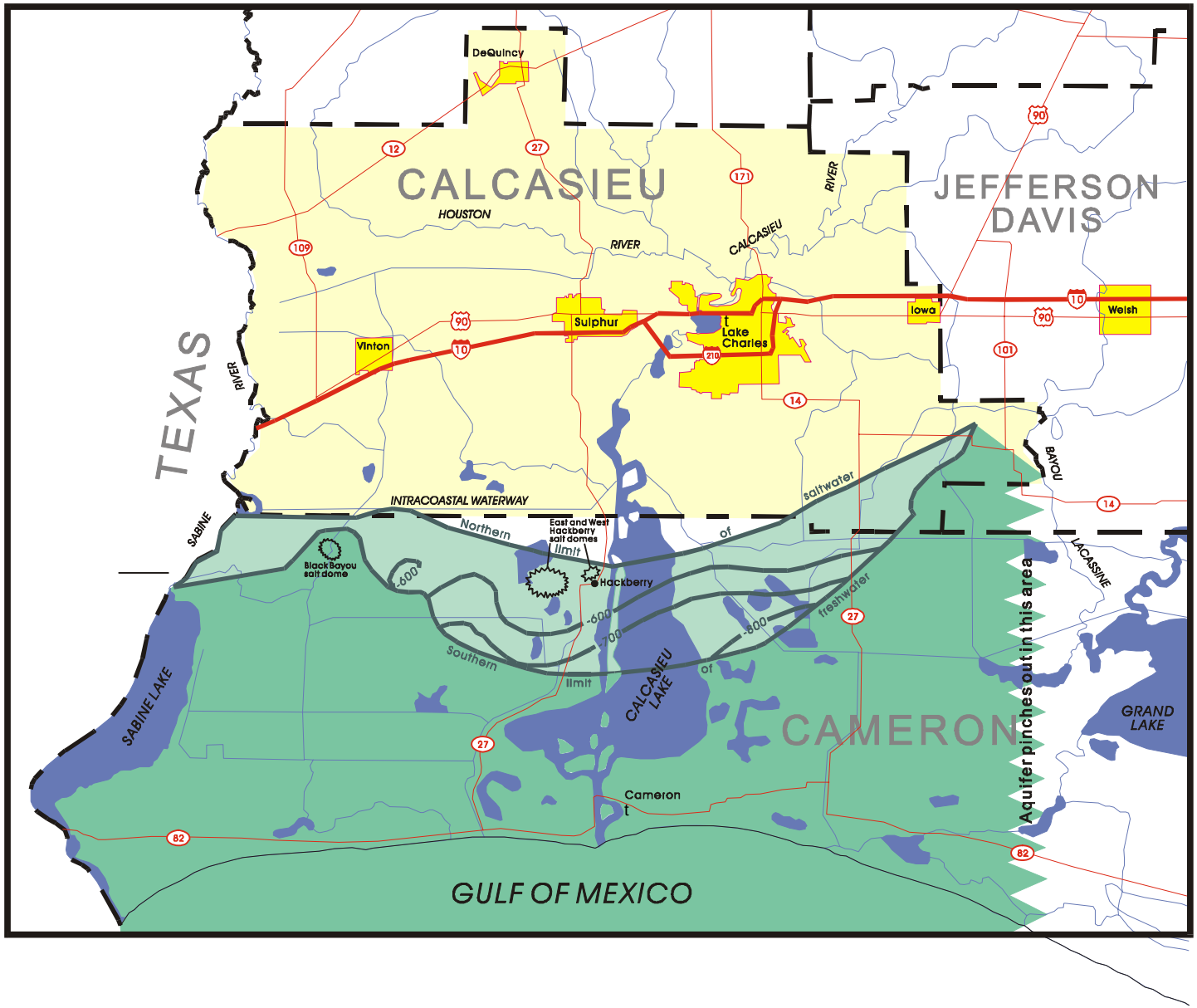


Distribution of saltwater in the Chicot upper sand in southwestern Louisiana (modified from Nyman, 1984).

WATER-LEVEL SURFACE IN THE "500-FOOT" SAND, FALL 1995



Areas of saltwater in the “500-foot” sand, 1996



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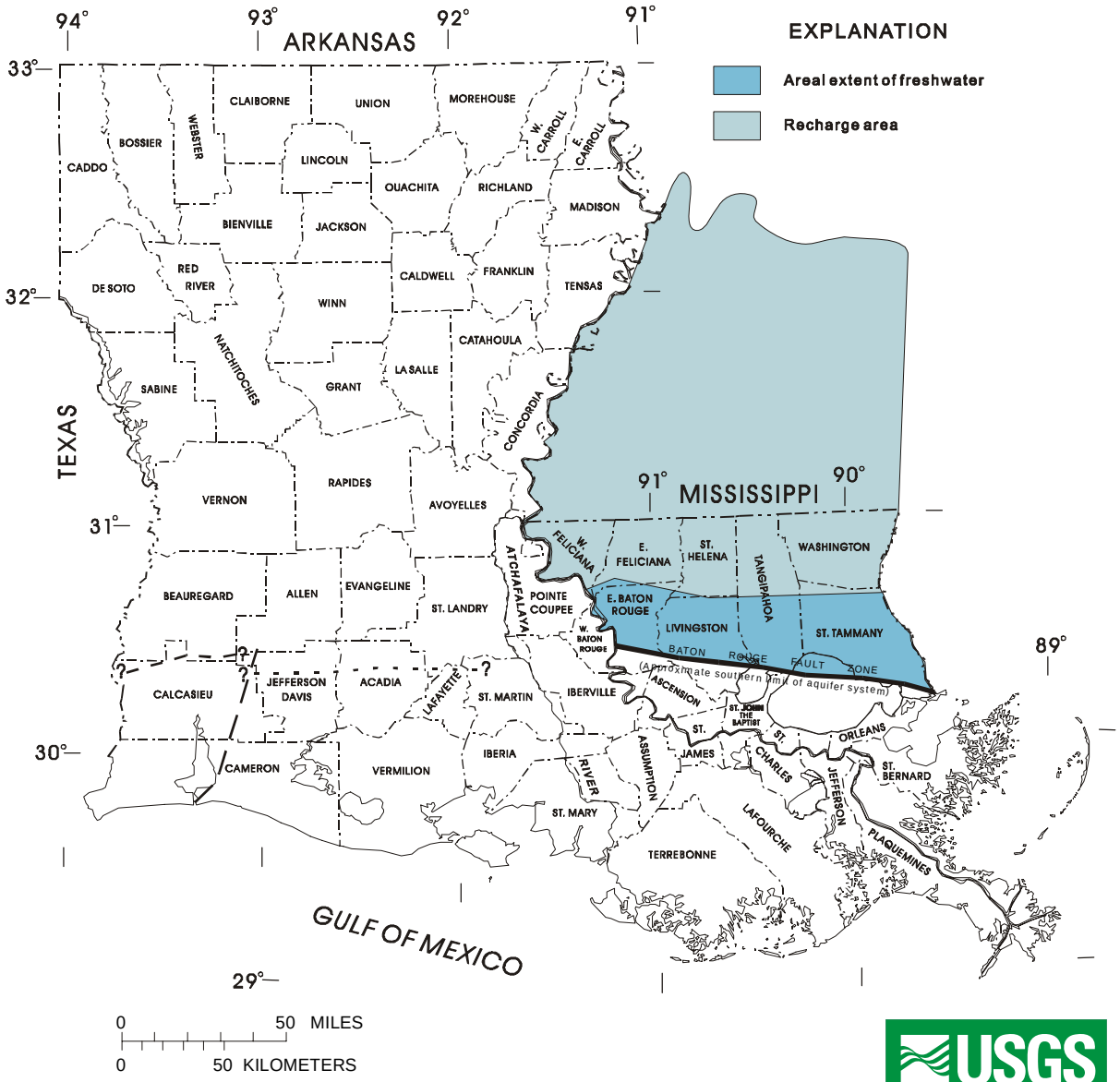
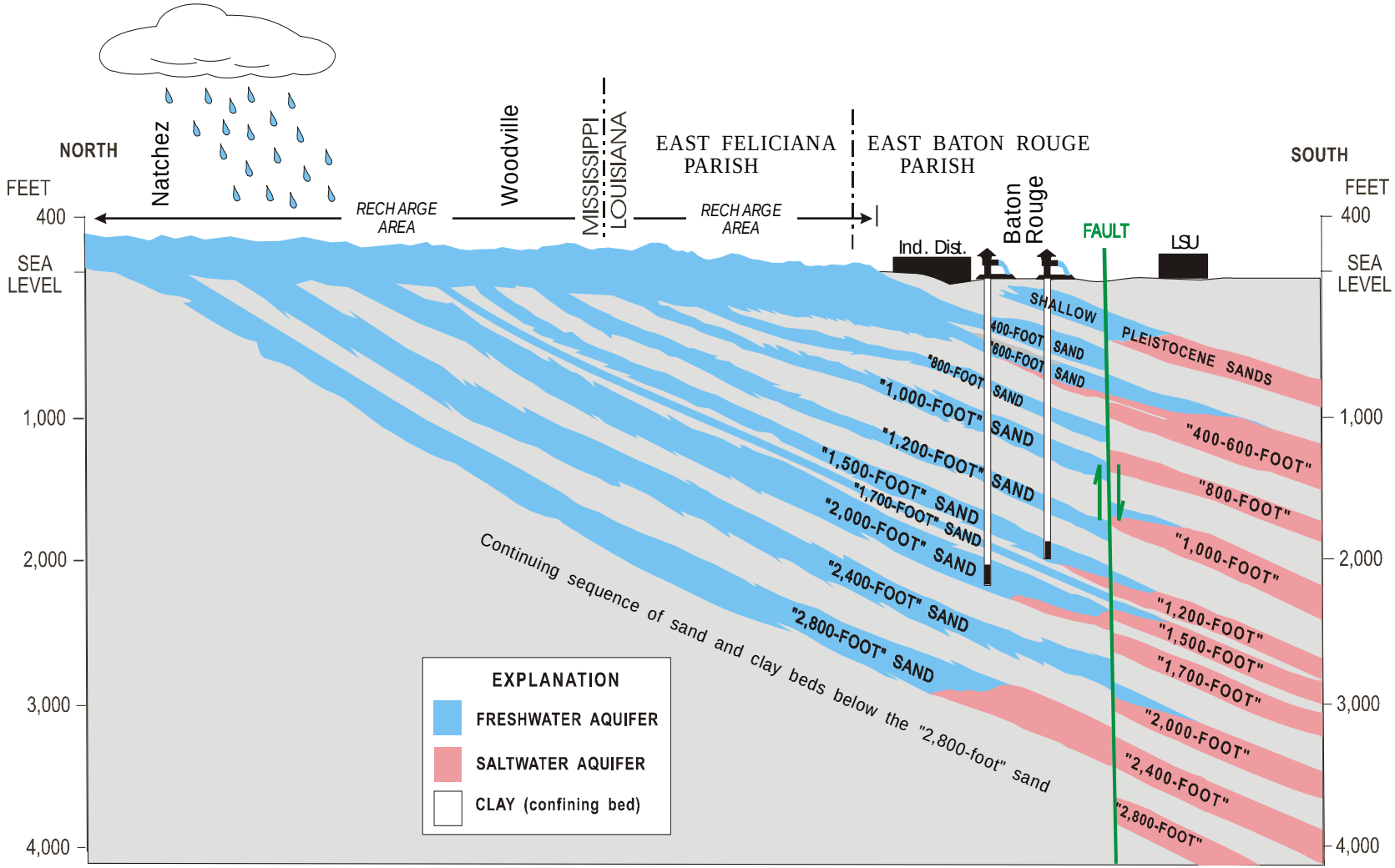
Southern Hills aquifer system





Idealized cross-section showing aquifers in the Baton Rouge area.

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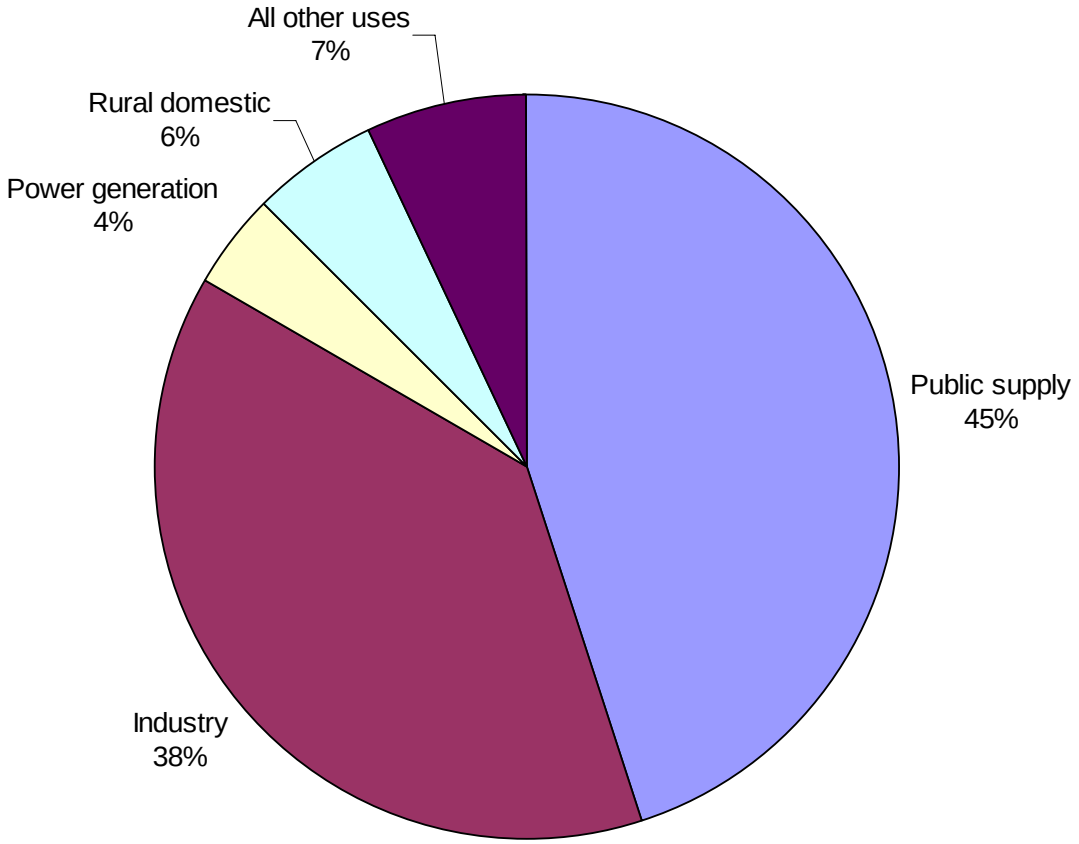
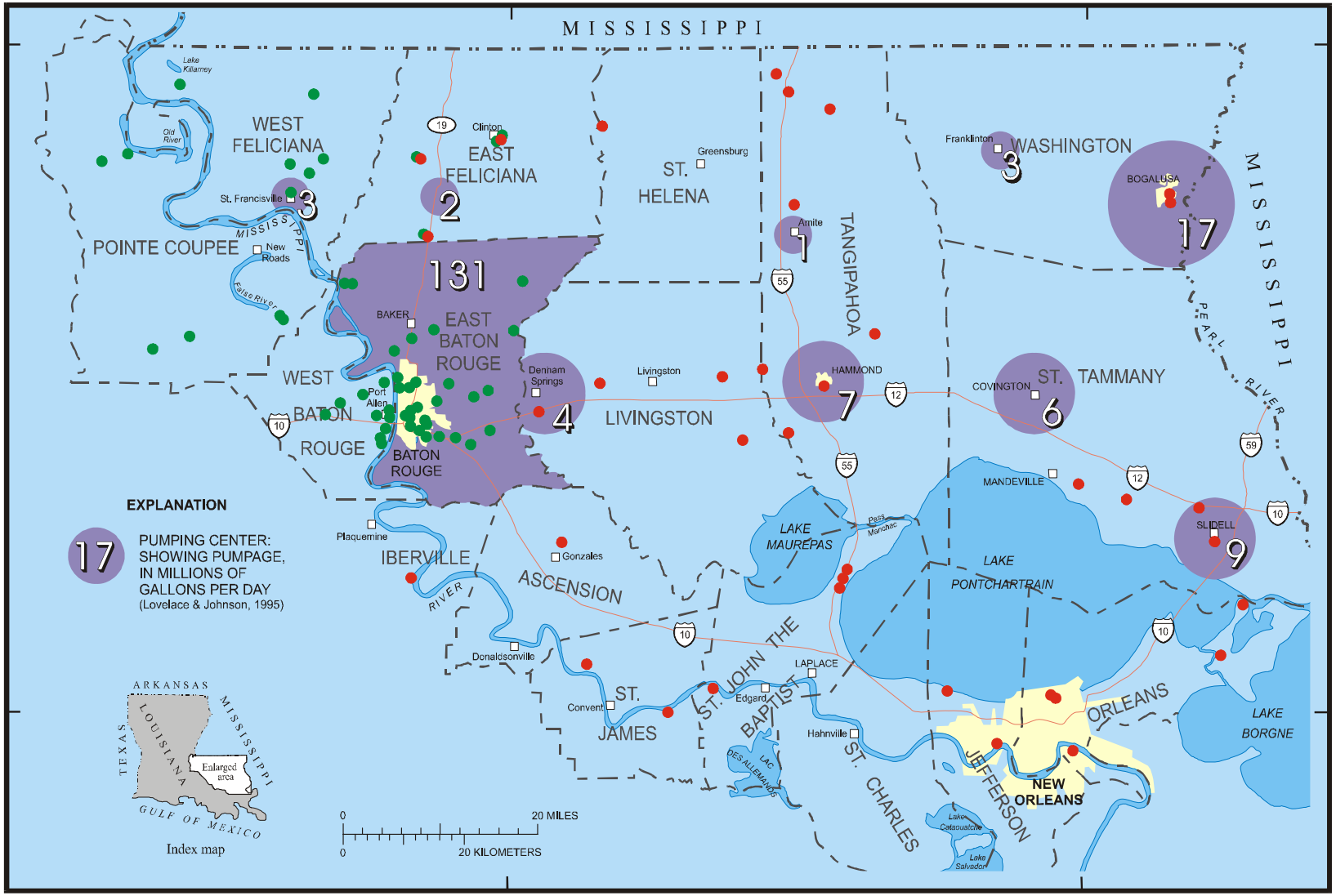
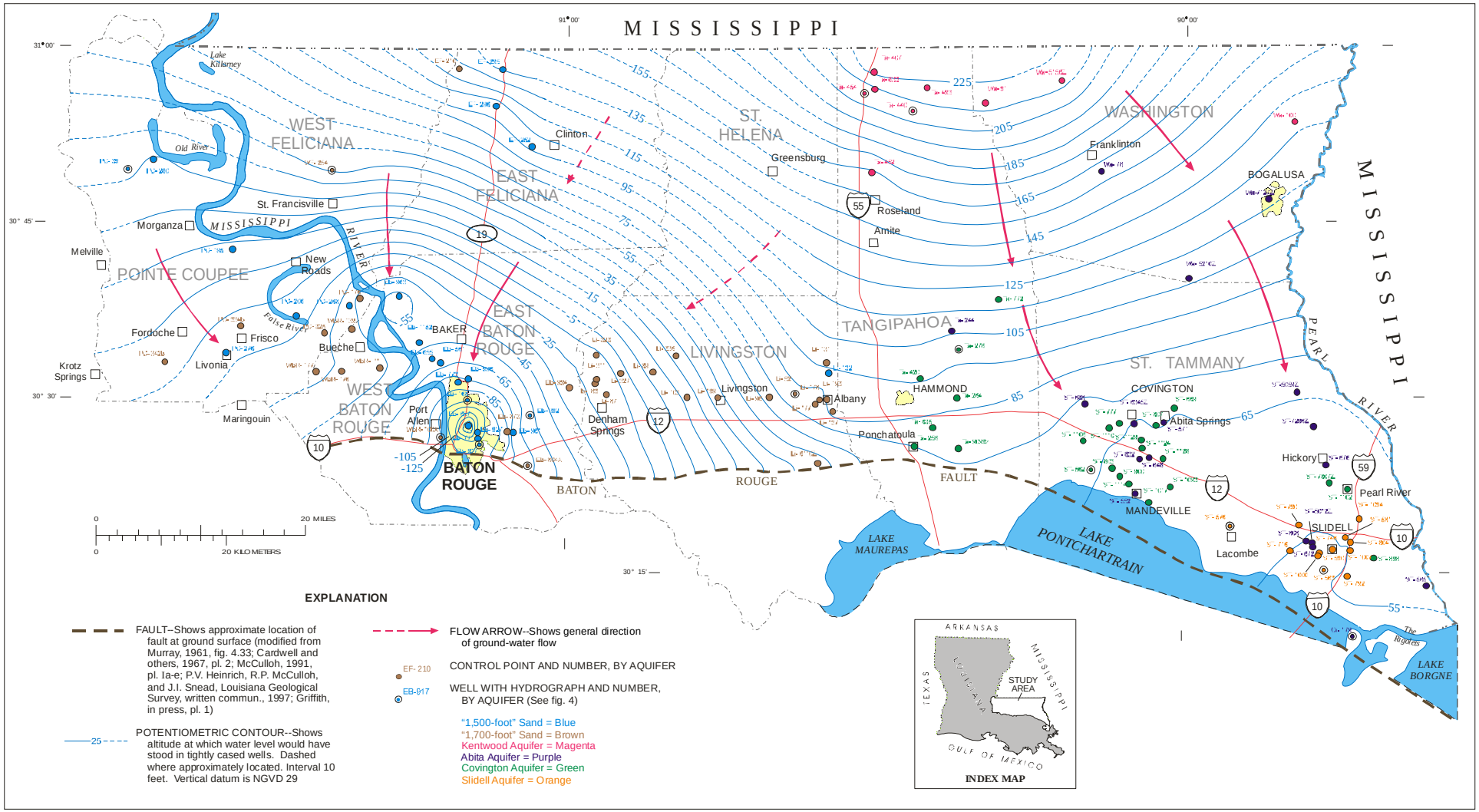
WITHDRAWALS FROM THE SOUTHERN HILLS AQUIFER SYSTEM, 2005
(320 MILLION GALLONS PER DAY)



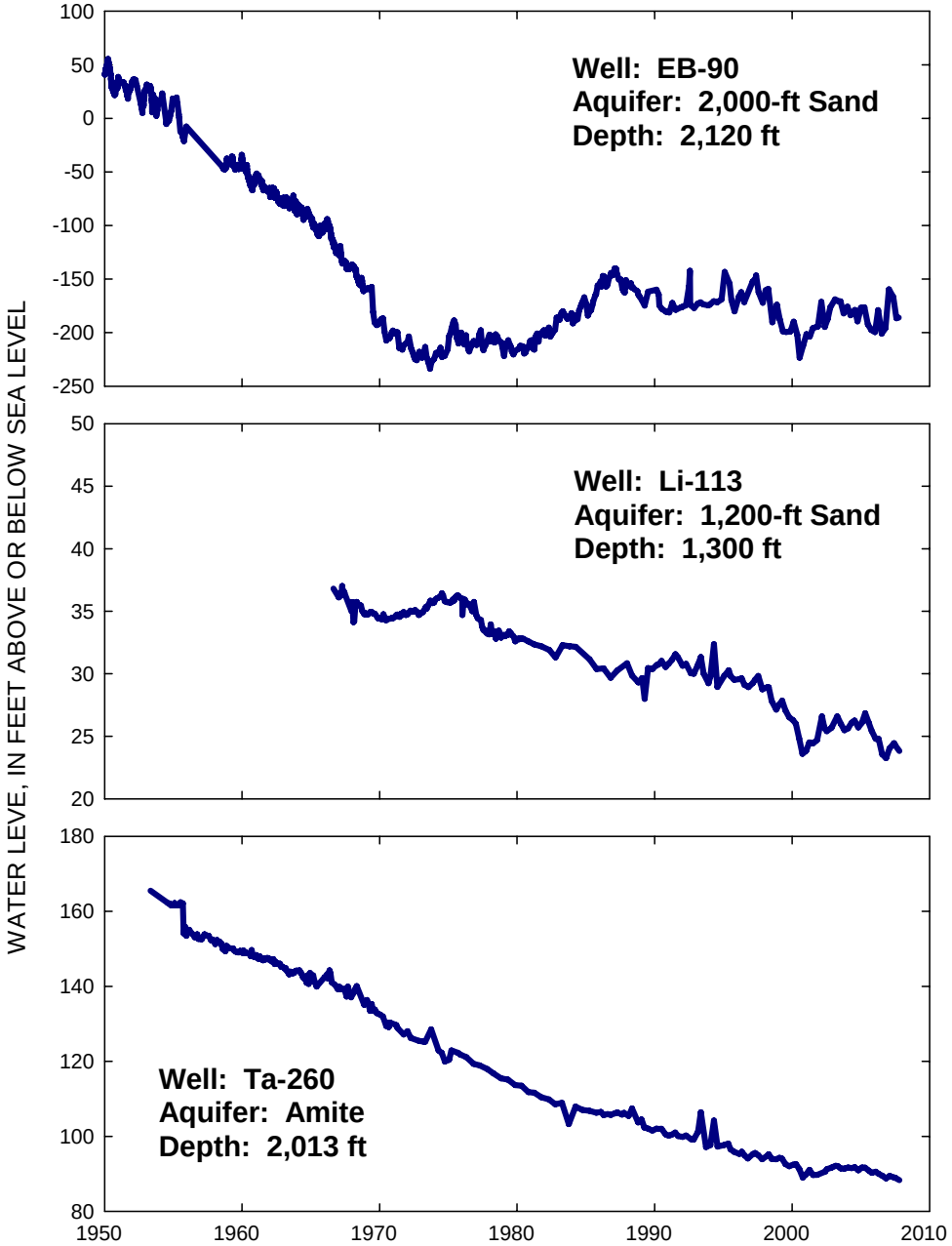
PUMPAGE CENTERS IN THE SOUTHERN HILLS AQUIFER SYSTEM, 1995





Base map modified from Louisiana Oil Spill Coordinator, Office of the Governor, Louisiana GIS CD: A digital Map of the State, Version 2.0

Figure 1. Potentiometric surface of the Kentwood aquifer system and the "1,500-foot" and "1,700-foot" sands of the Baton Rouge area, southeastern Louisiana, March-April, 2003.



Water levels in deep aquifers of the Southern Hills aquifer system in southeastern Louisiana, 1950-2010

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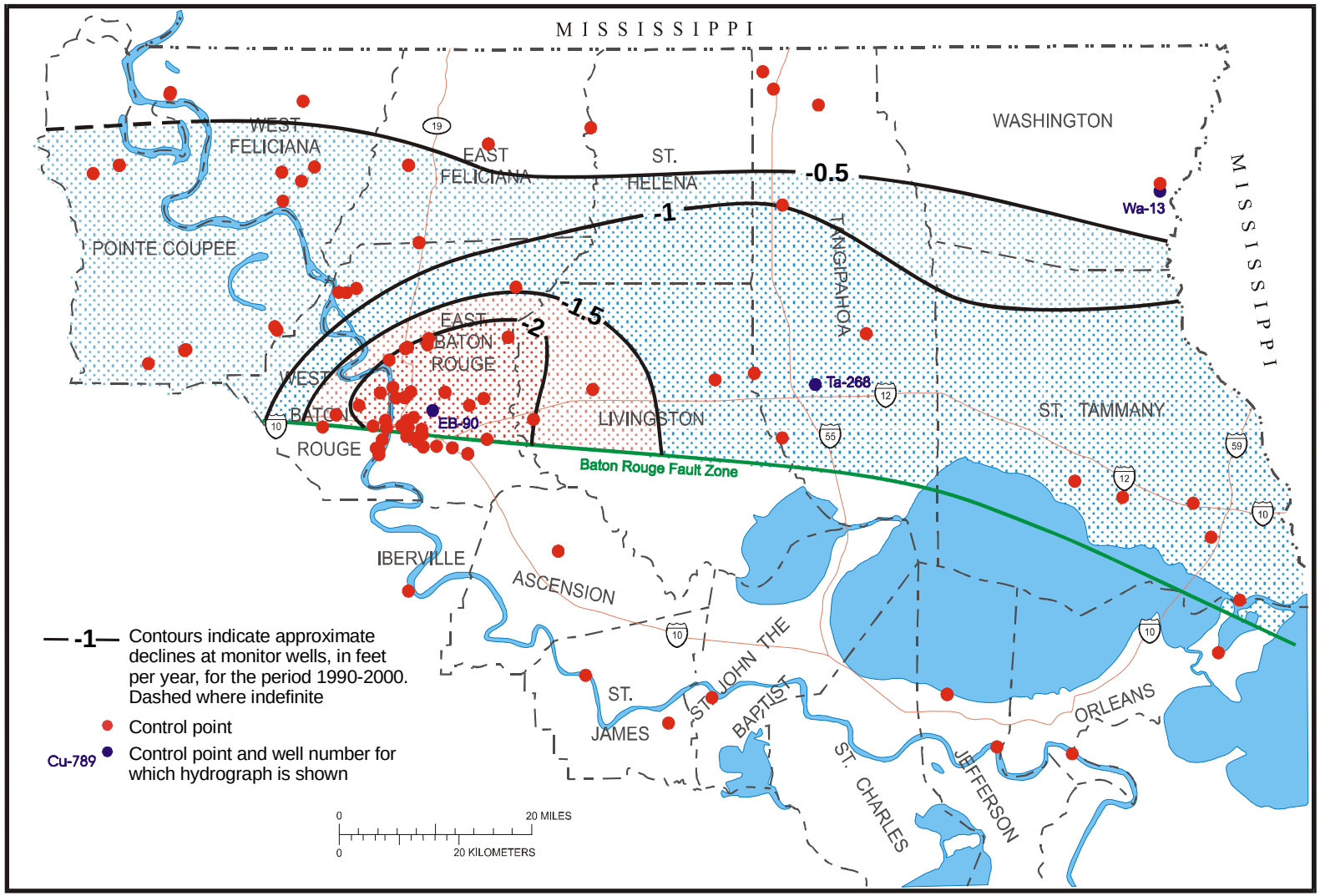
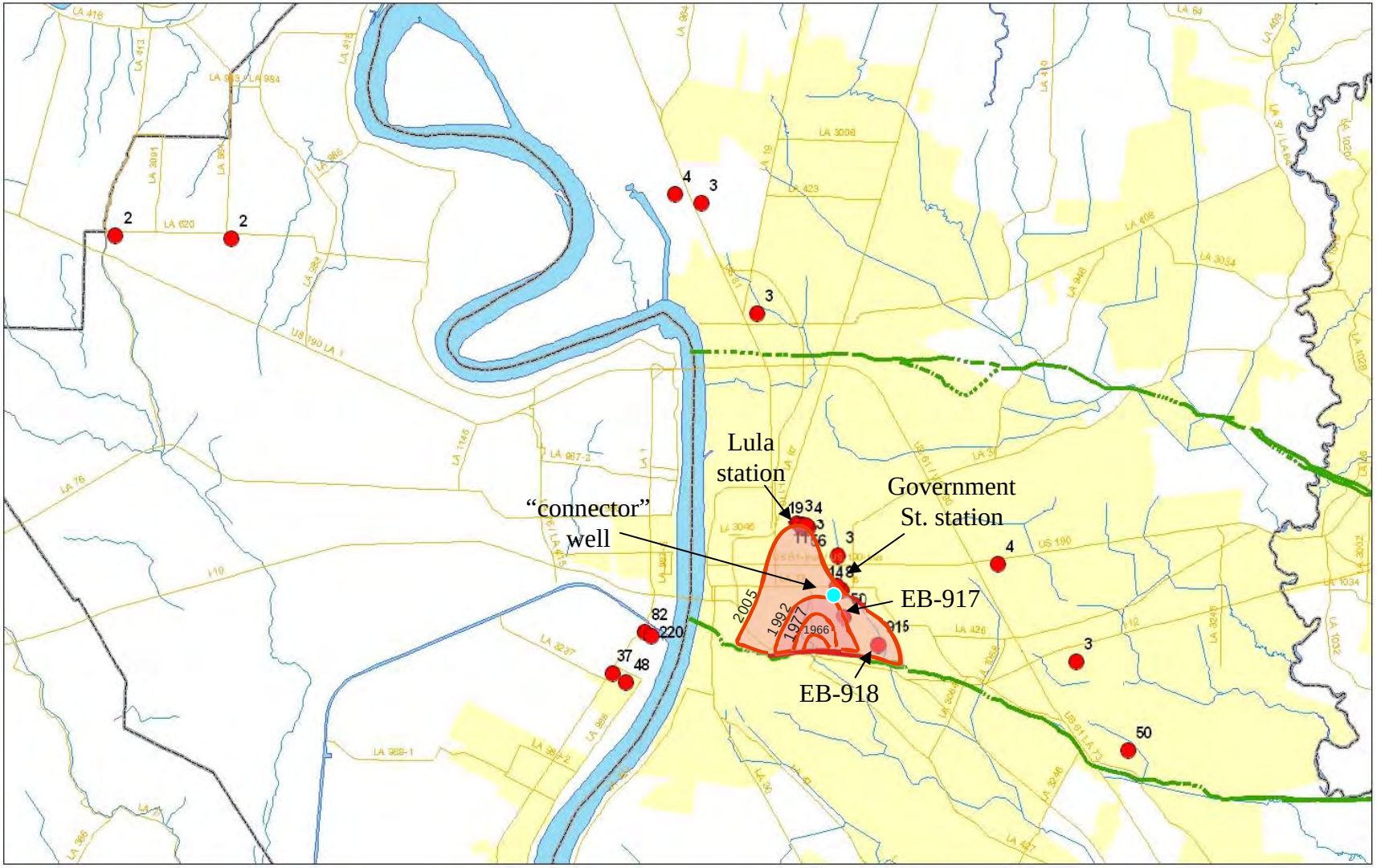
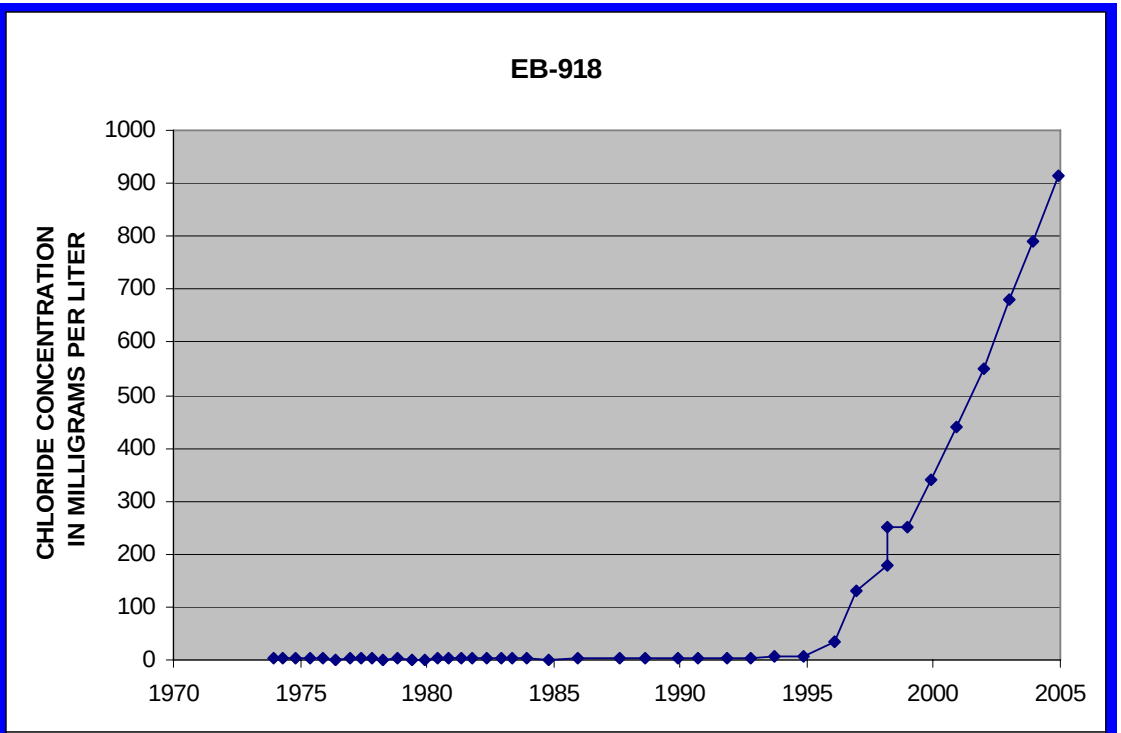


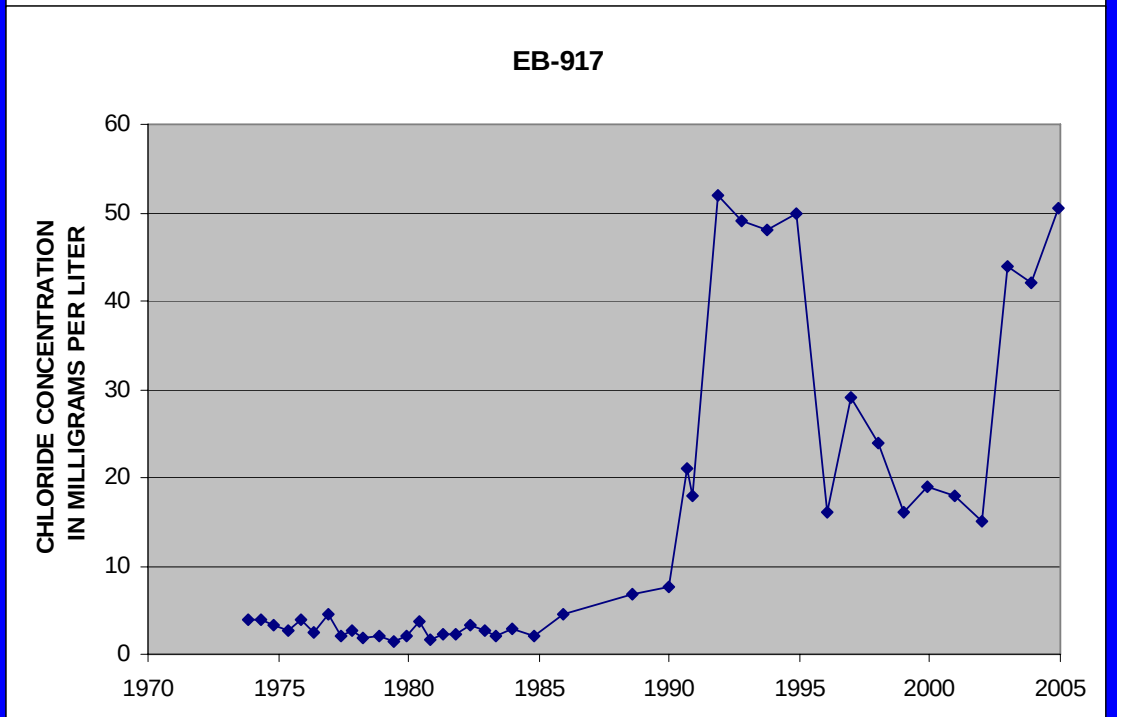
Water-level decline in the Southern Hills aquifer system in southeastern Louisiana during the period 1990 to 2000, based on data from USGS/DOTD/CAGWCC water-level networks.



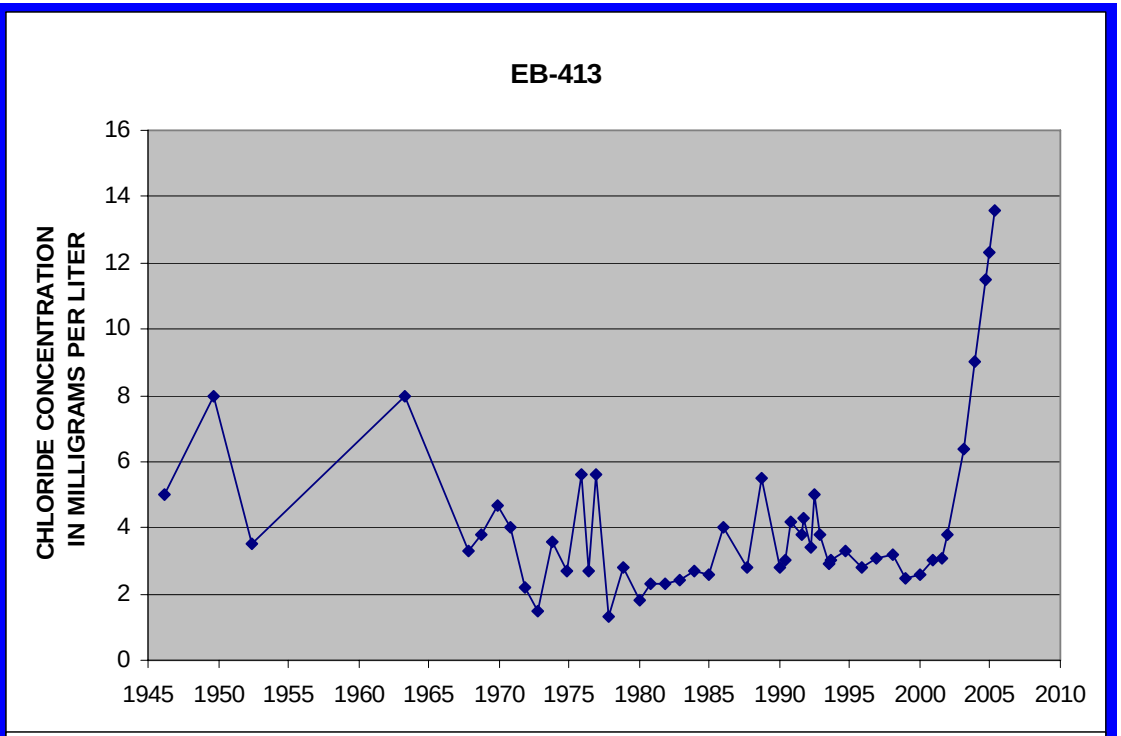
Location of saltwater and chloride concentrations at sampled wells and in the "1,500-foot" sand.

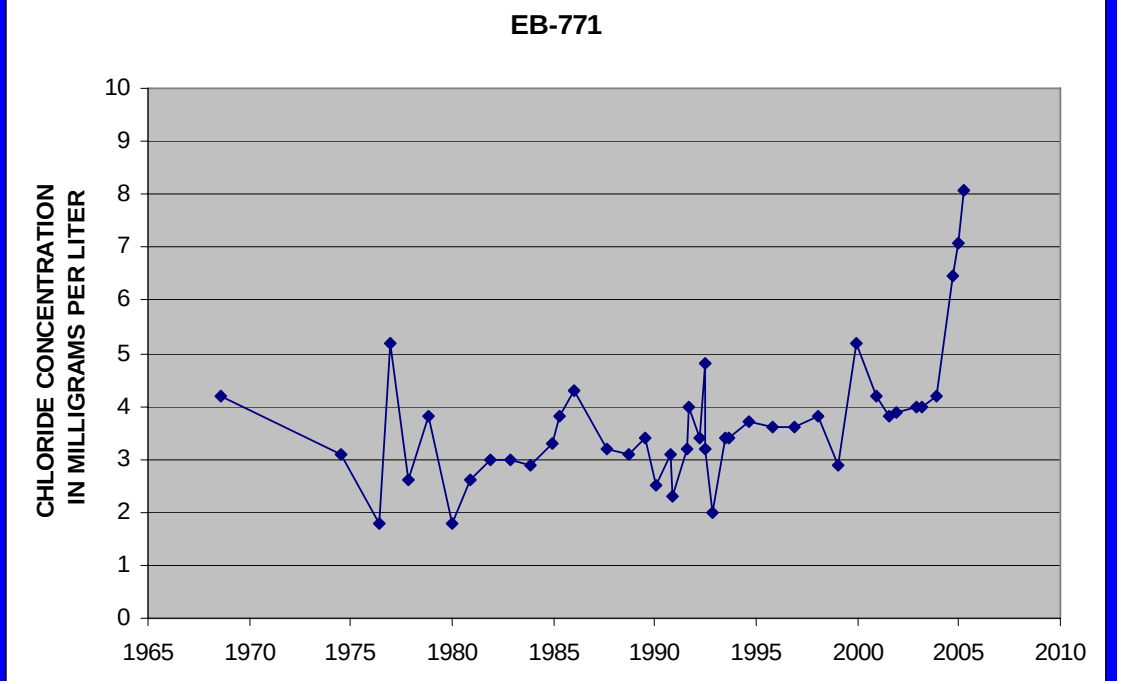
Graphs of chloride concentrations in USGS observation wells screened in the “1,500-foot” sand and located between the Baton Rouge fault and the “connector” well

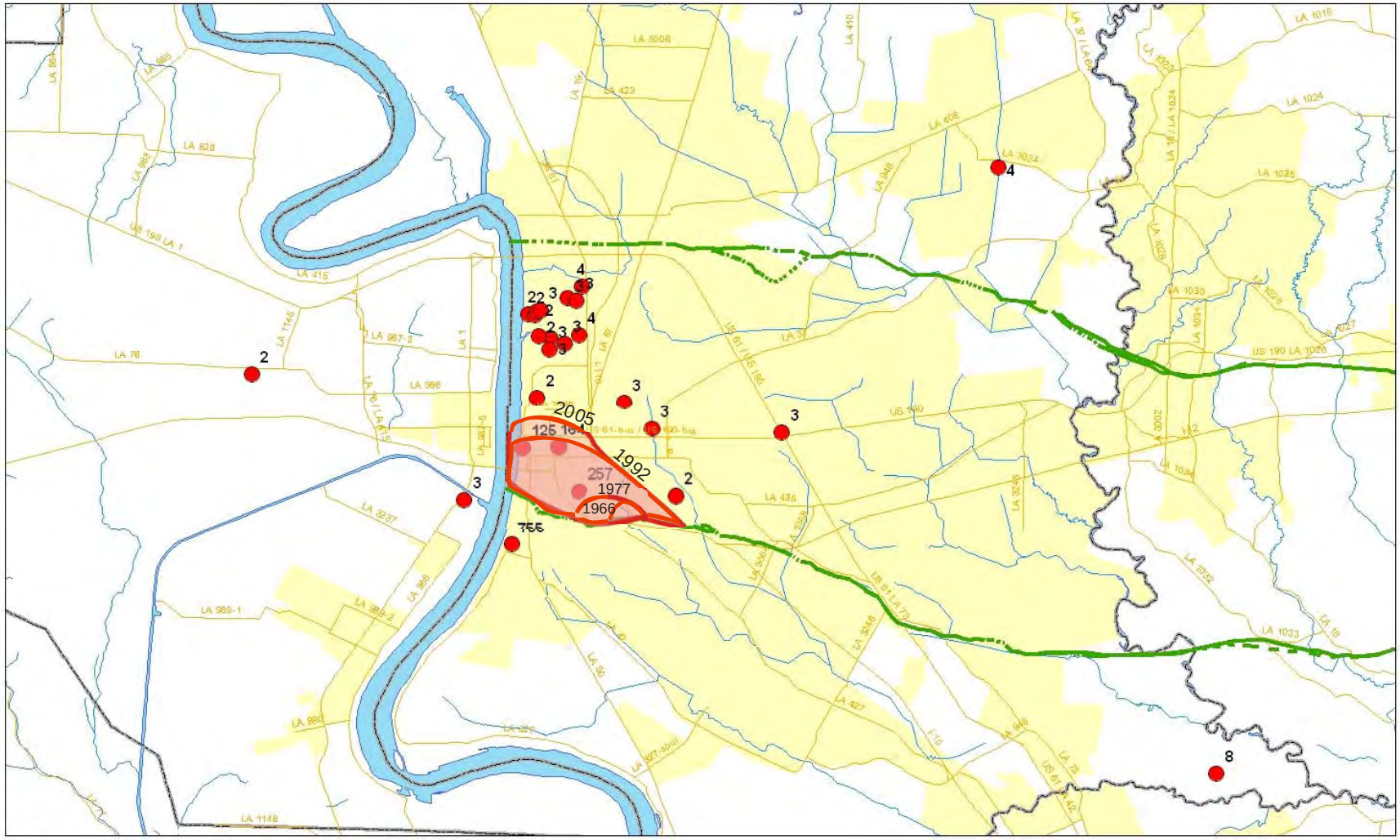




Graphs of chloride concentrations in public supply wells screened in the “1,500-foot” sand at the Government St. station







Location of saltwater and chloride concentrations at sampled wells and in the “2,000-foot” sand.

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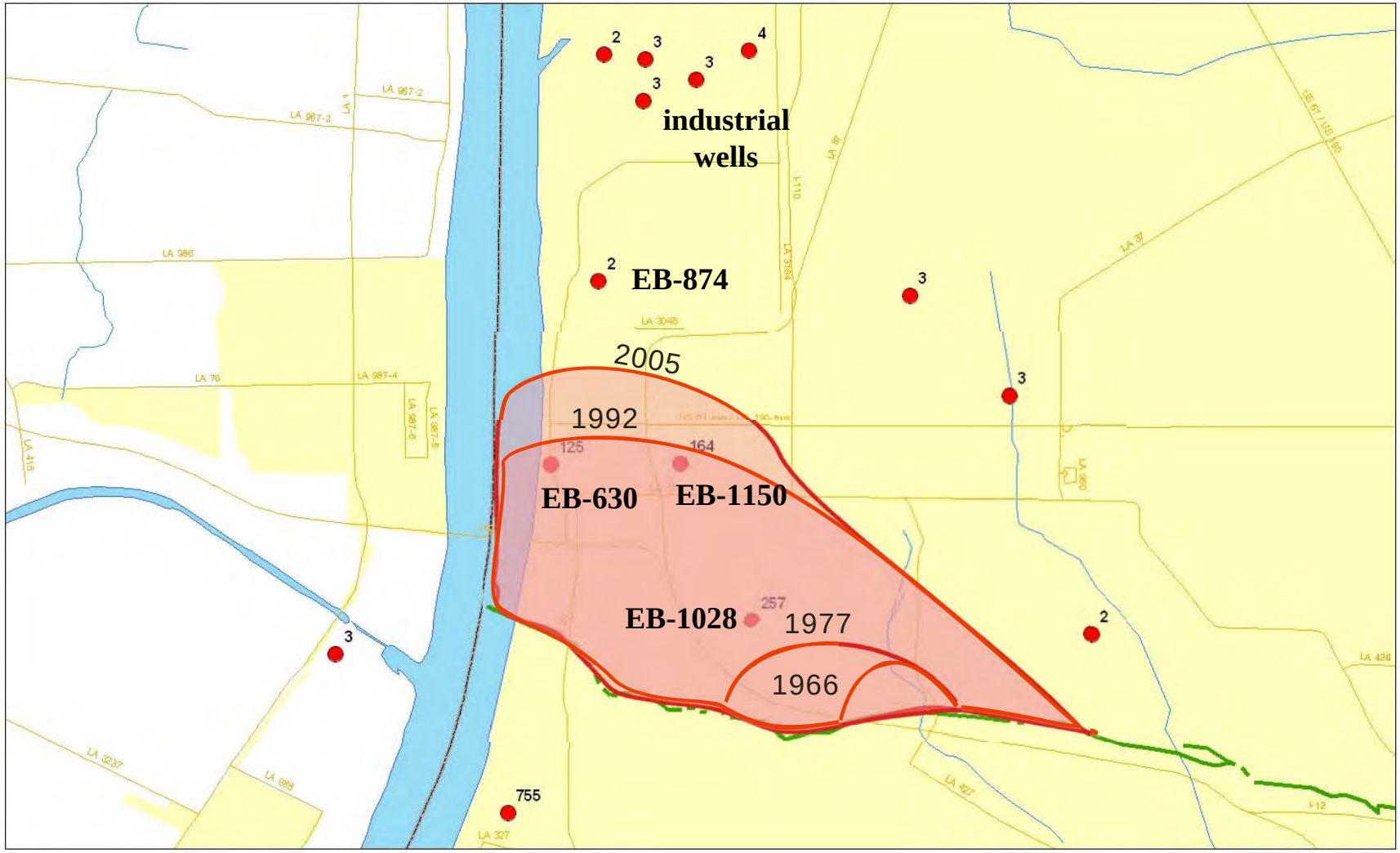
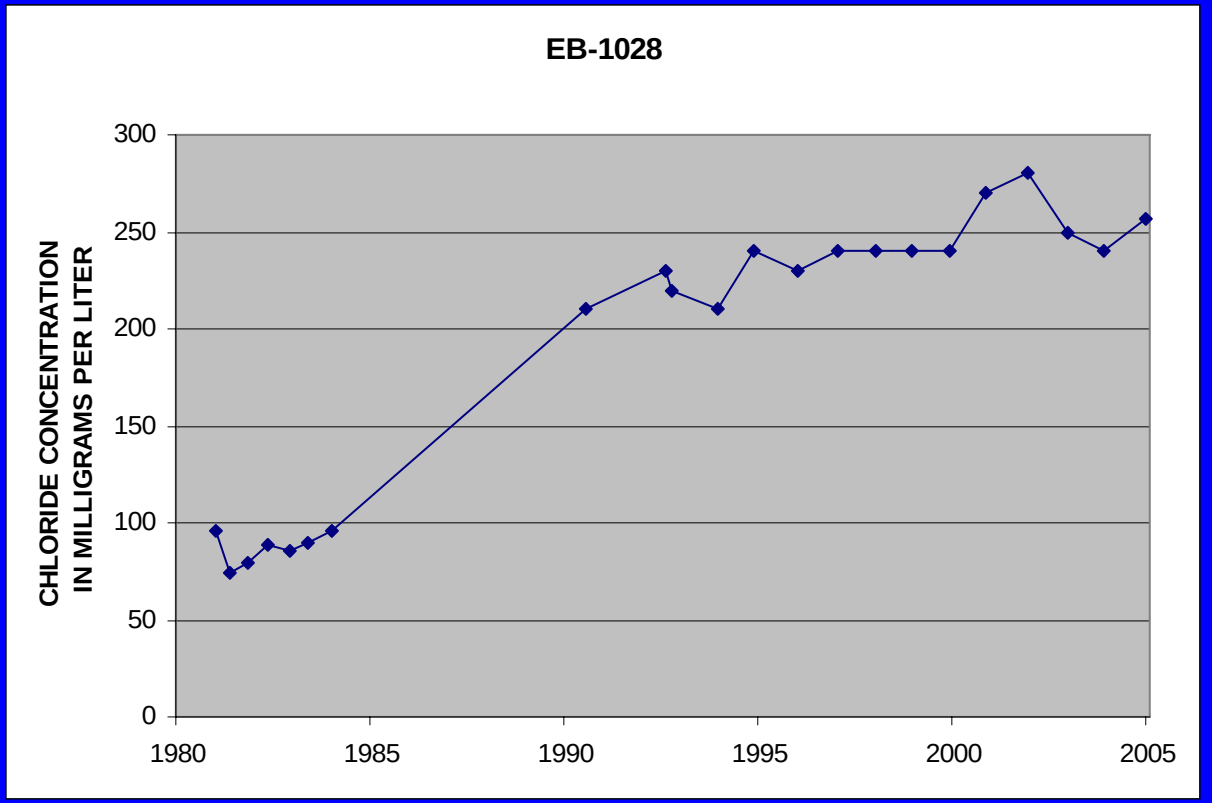
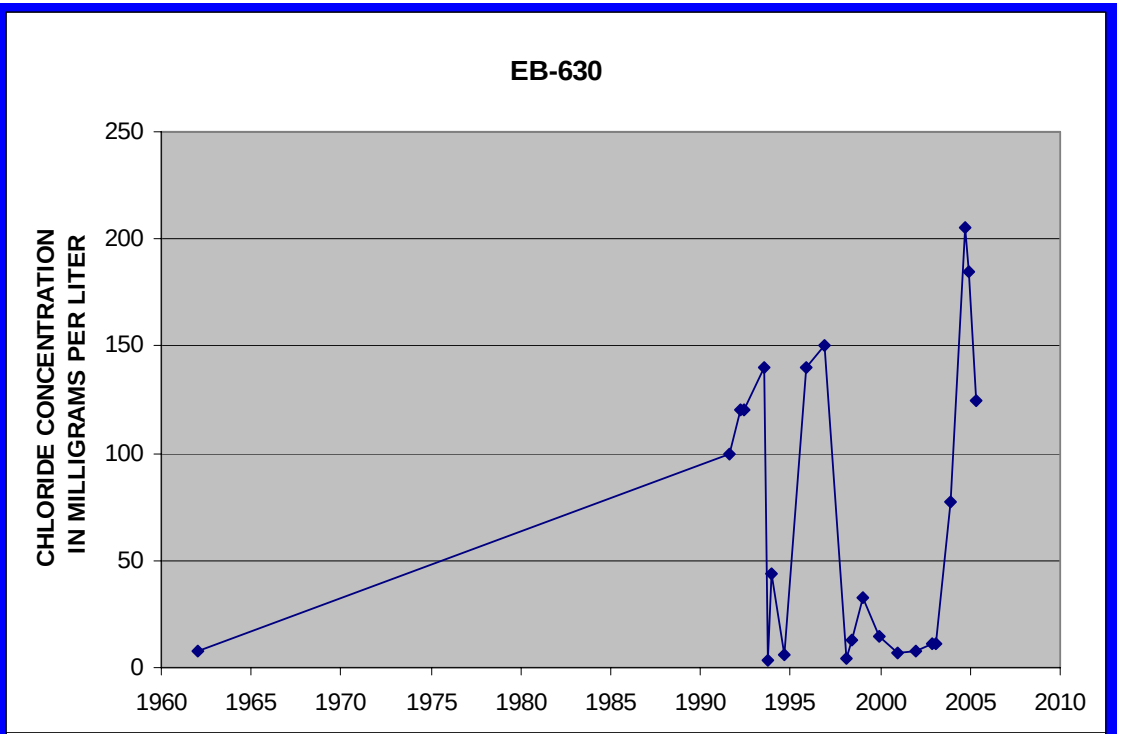


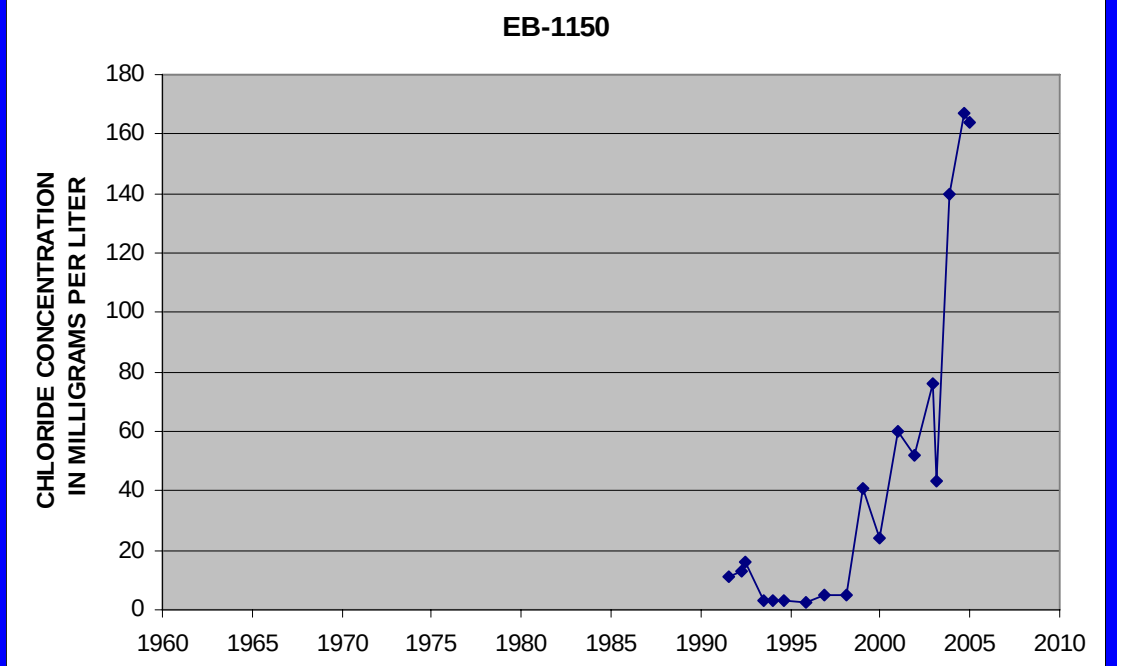
Location of saltwater and chloride concentrations at sampled wells and in the “2,000-foot” sand.

Graph of chloride concentrations at well EB-1028 screened in the “2,000-foot” sand and located between the Baton Rouge fault and downtown pumping stations



Graphs of chloride concentrations in downtown Baton Rouge public supply wells screened in the “2,000-foot” sand





SUMMARY

- Water level declines and saltwater encroachment are serious concerns in the Sparta aquifer in the Monroe area
- Water level declines and saltwater encroachment are potential future concerns in the Chicot aquifer, especially in the Lake Charles area
- Saltwater encroachment is a serious concern in the Southern Hills aquifer system in the Baton Rouge area

For more information on ground-water conditions in Louisiana, visit the USGS Louisiana District web site at:

la.water.usgs.gov

or contact John Lovelace by phone at (225) 389-0281 ext. 3210 or by email to jlovelac@usgs.gov

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