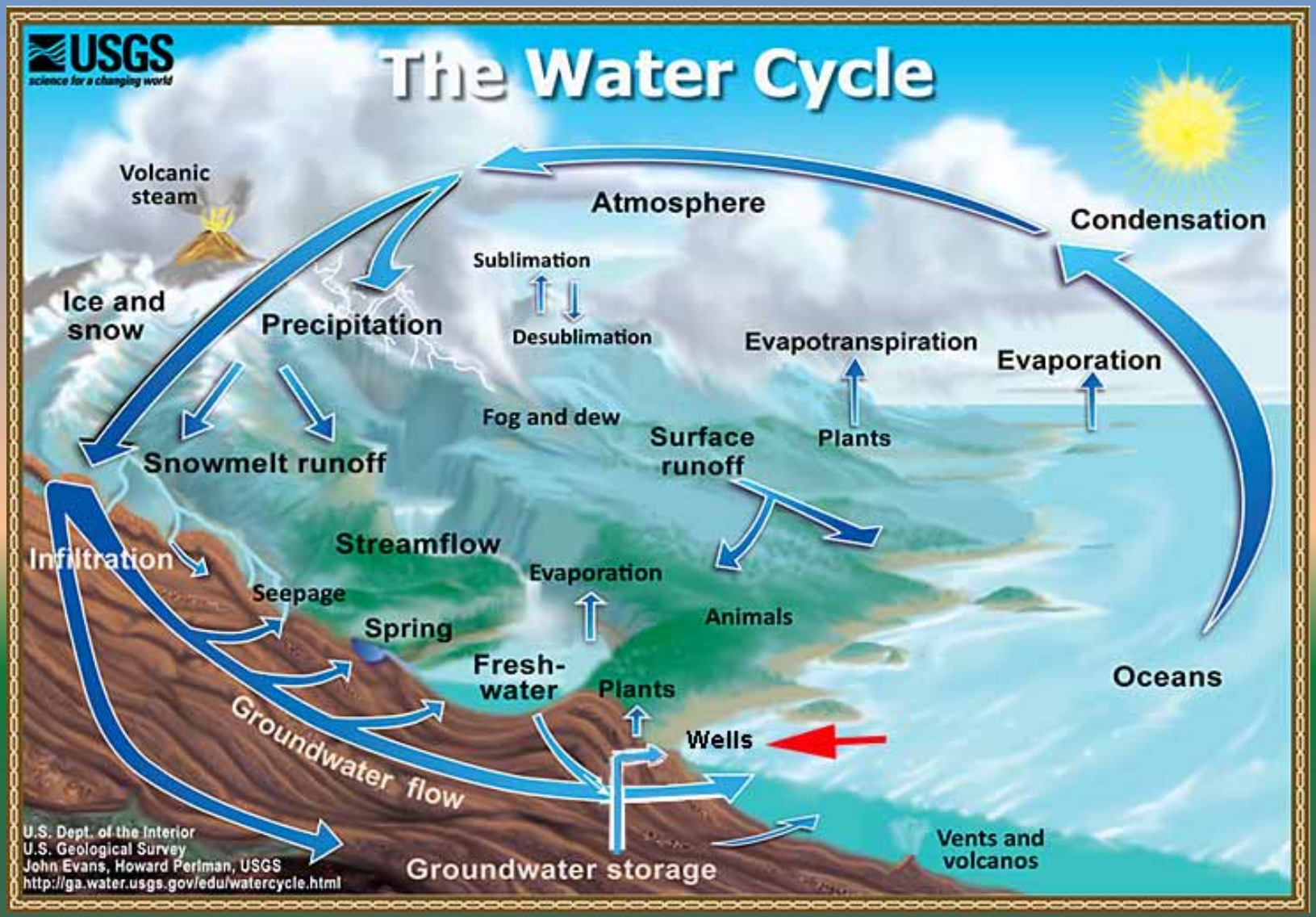
Rainfall and Recharge
Kerr County Aquifers

Daniel J. Brennan

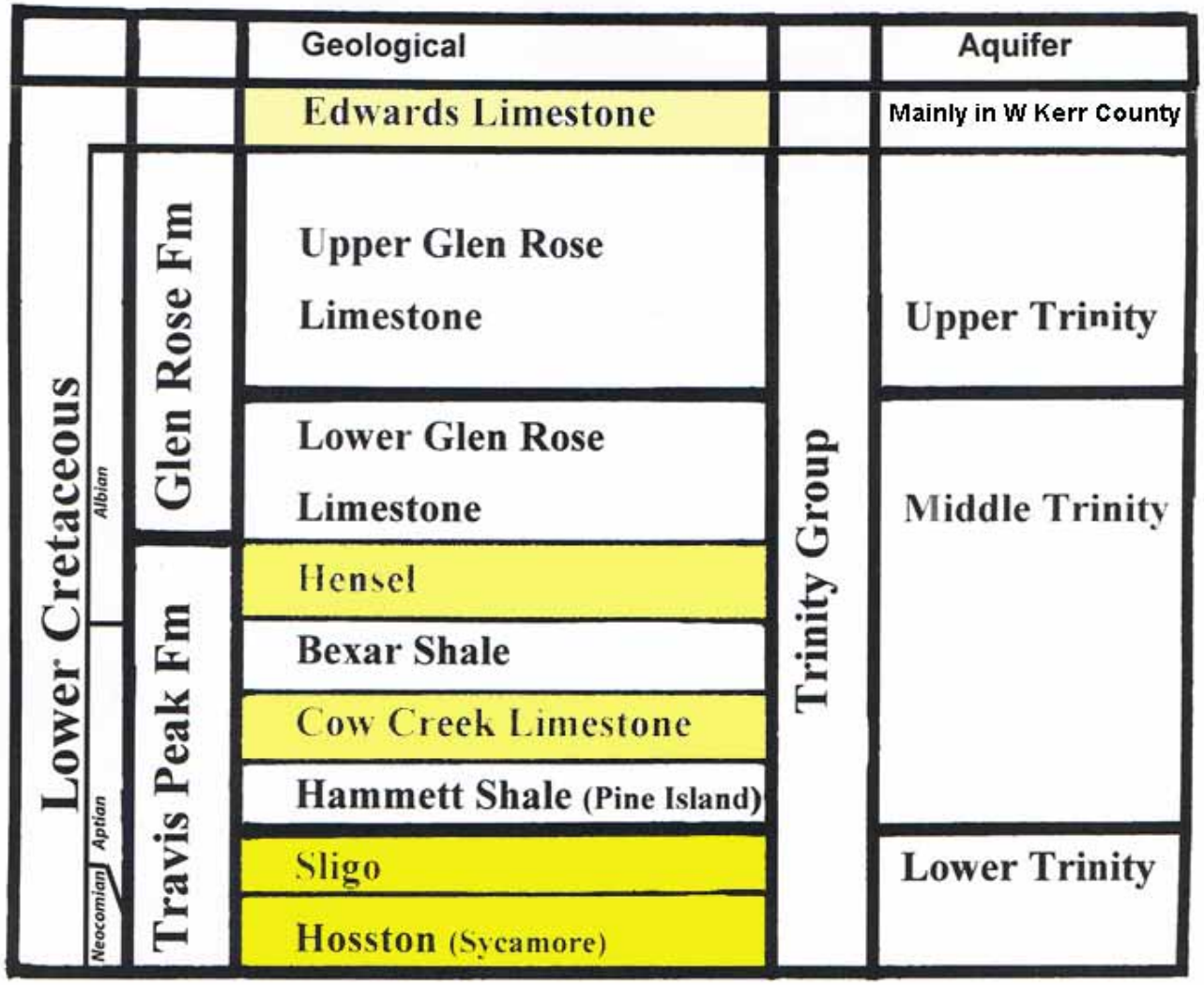
2013

©

Water Cycle-USGS



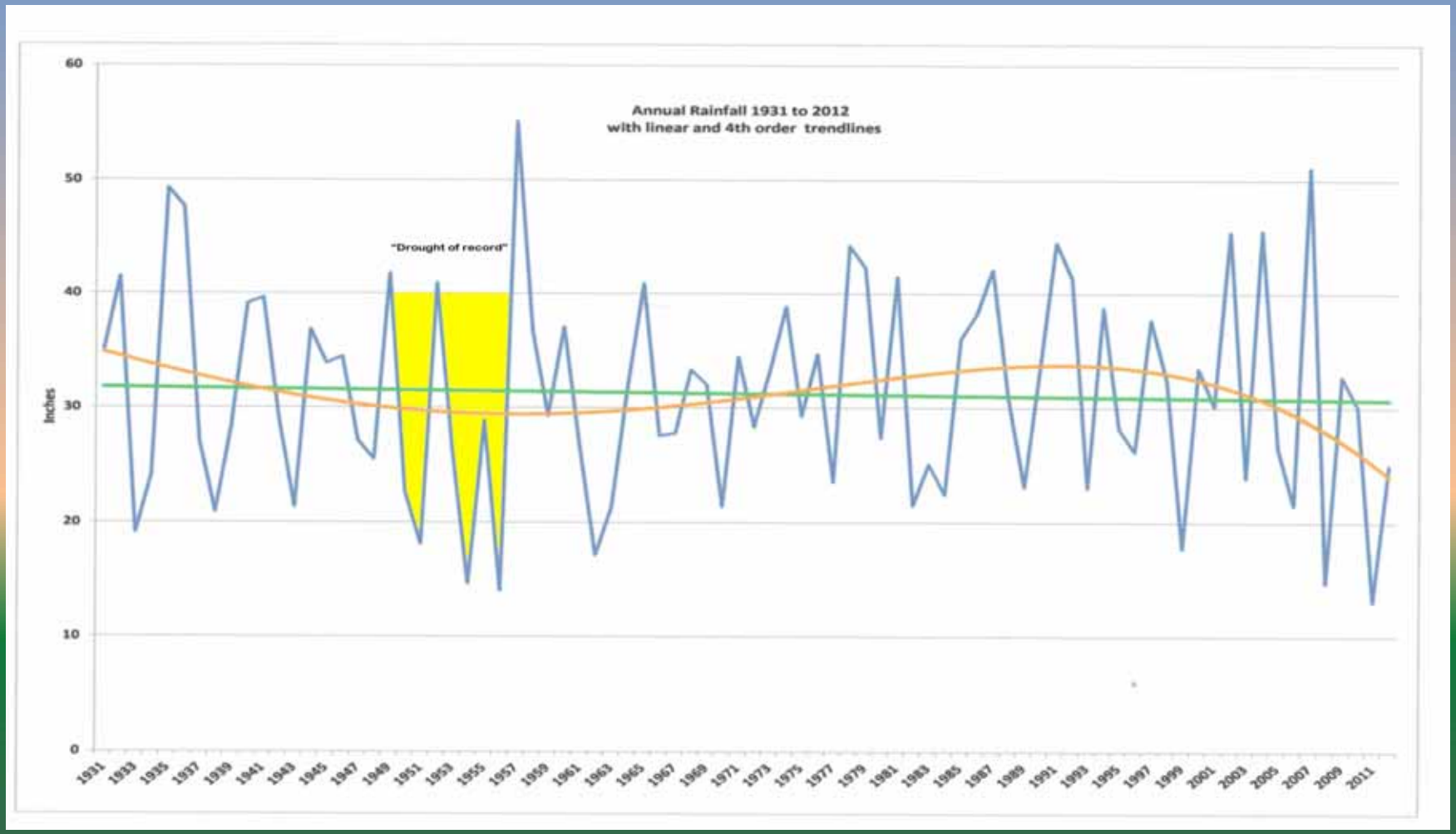
Terminology



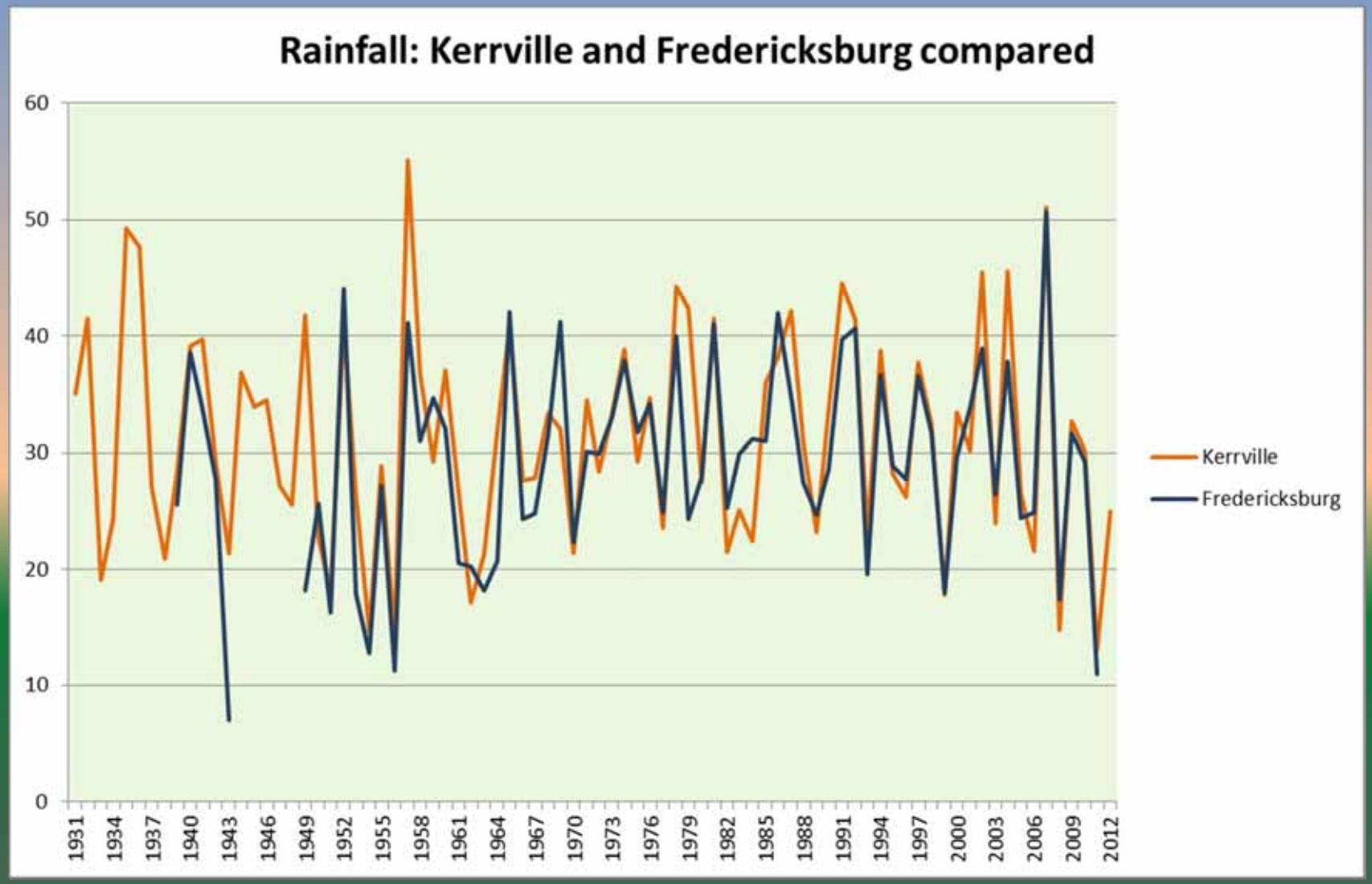
RAINFALL RECORDS

Kerrville Rainfall 1931-2012 with Trends

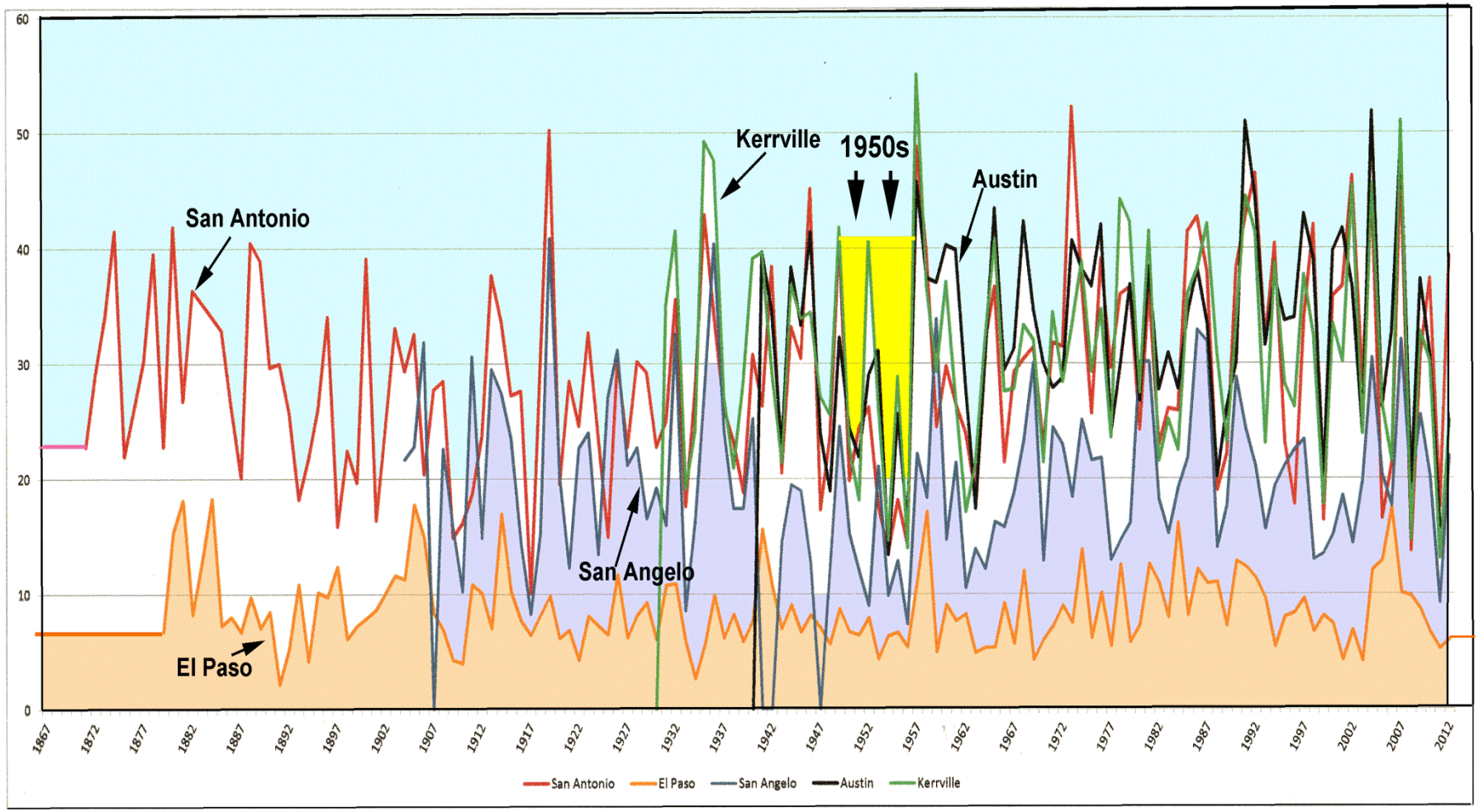
Knipling-Bushland



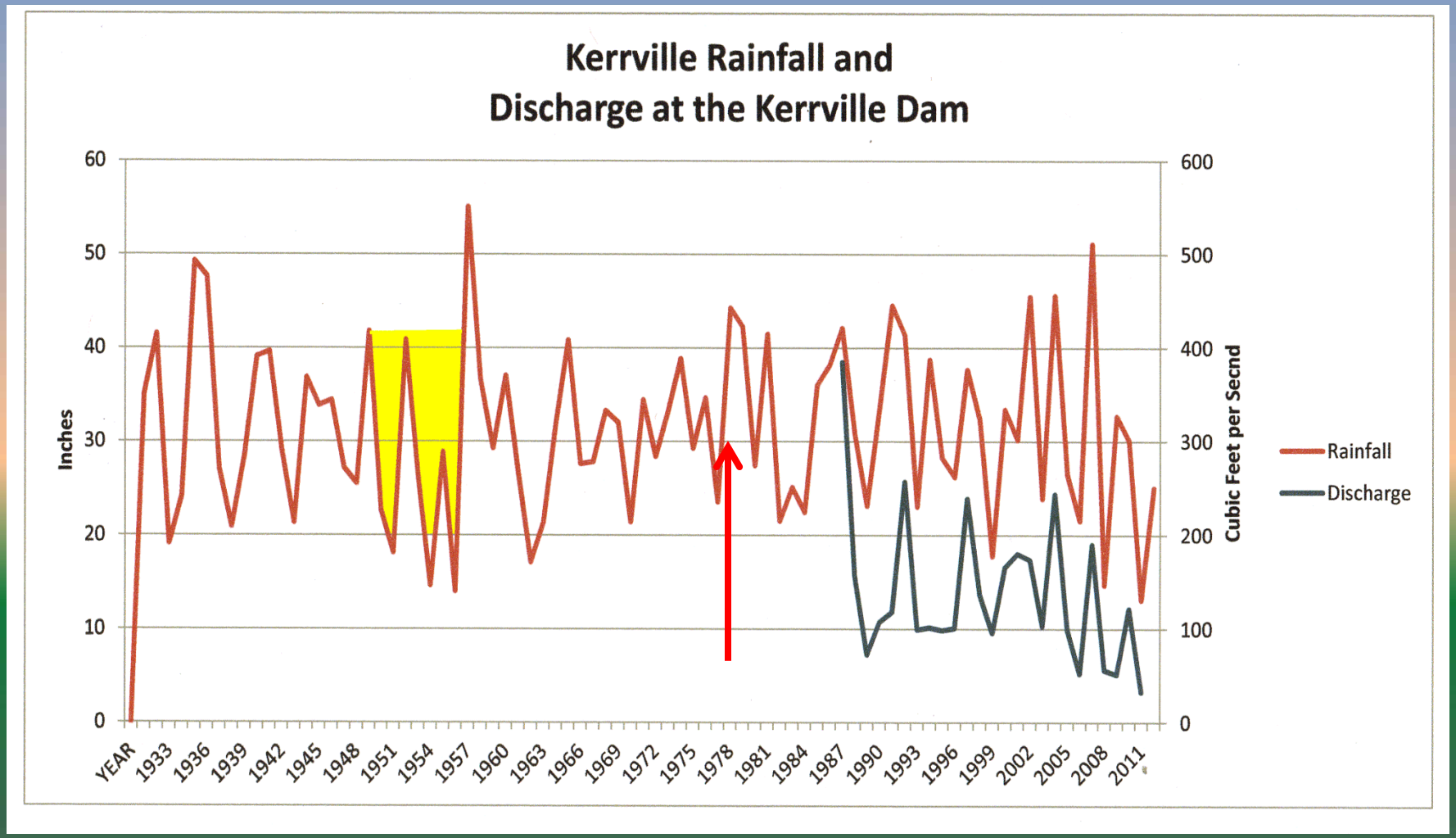
Rainfall –Kerrville and Fredericksburg



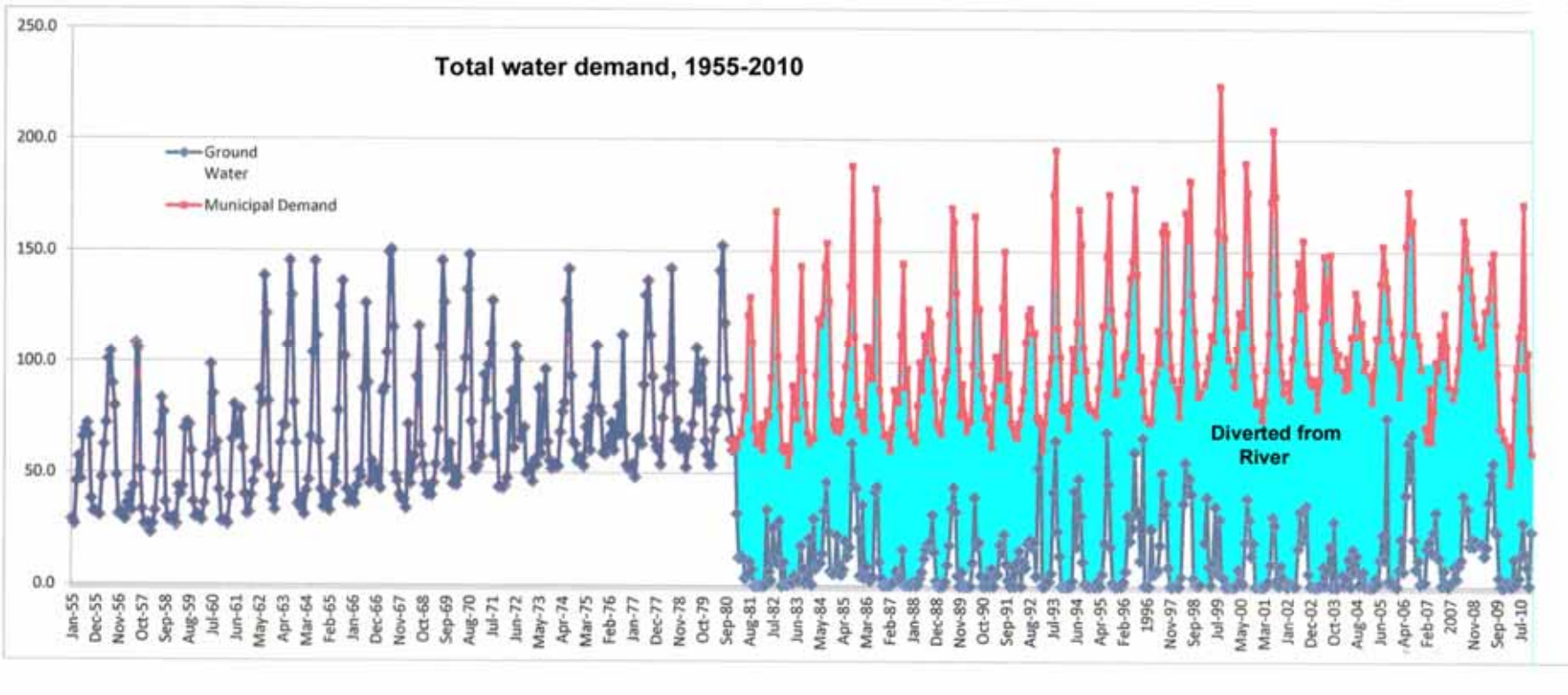
Regional Rainfall Comparisons 1867 to 2012



Rainfall and Discharge at the Dam

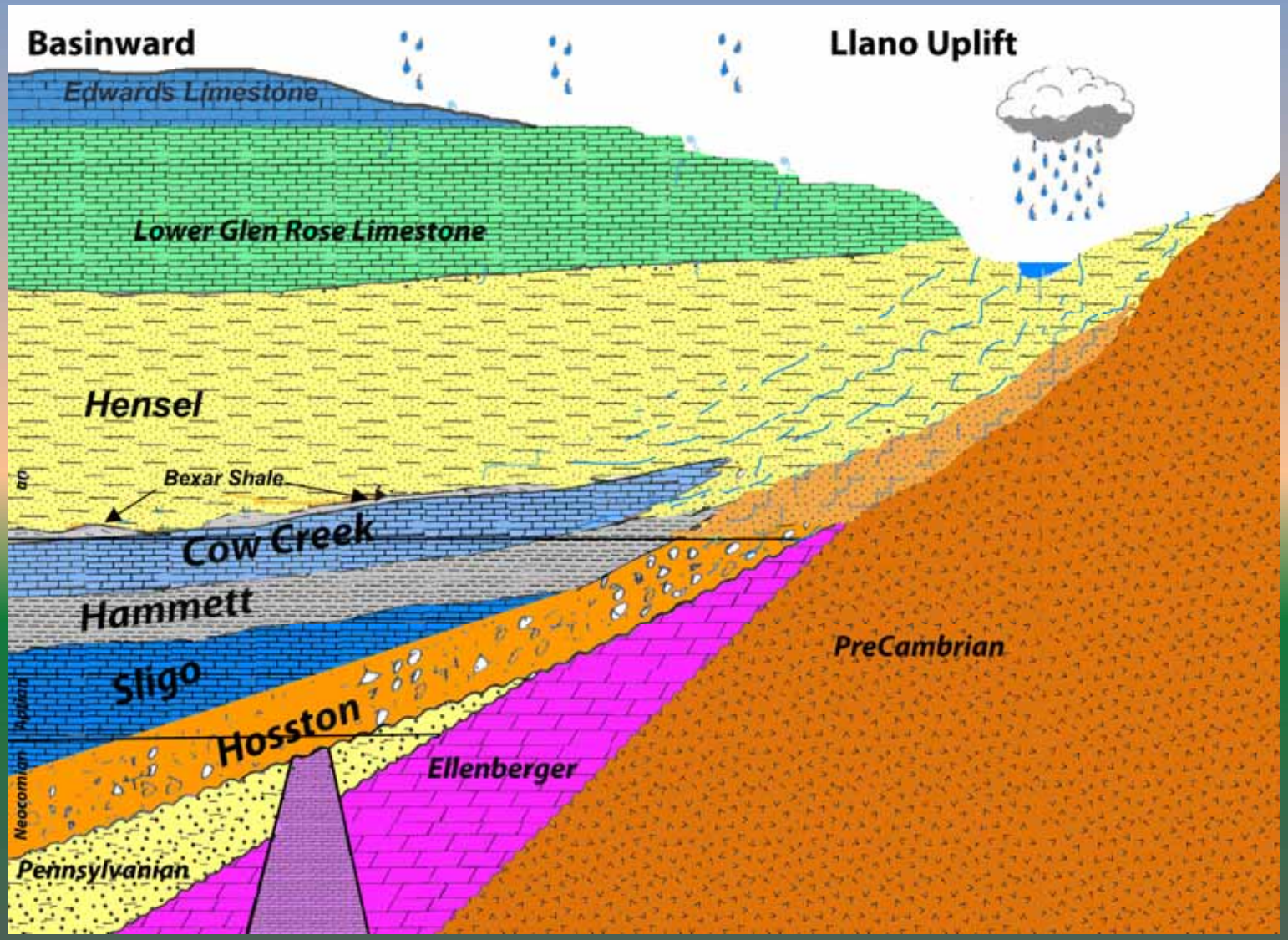


Kerrville Groundwater and River Water pumpage

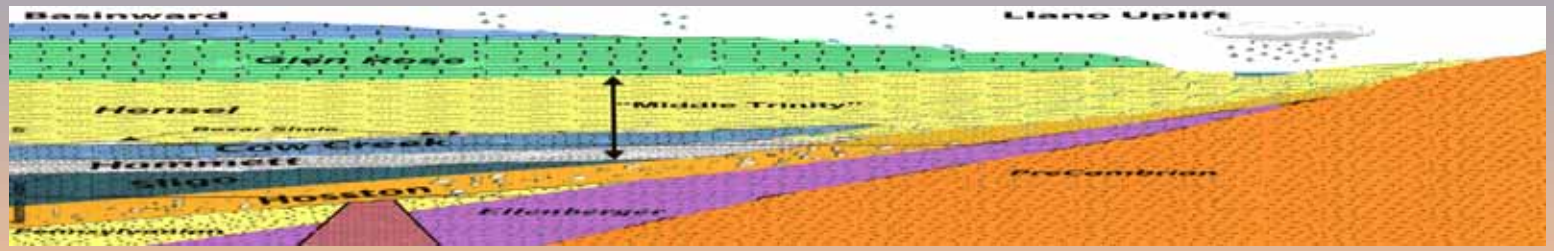


Geologic Concept

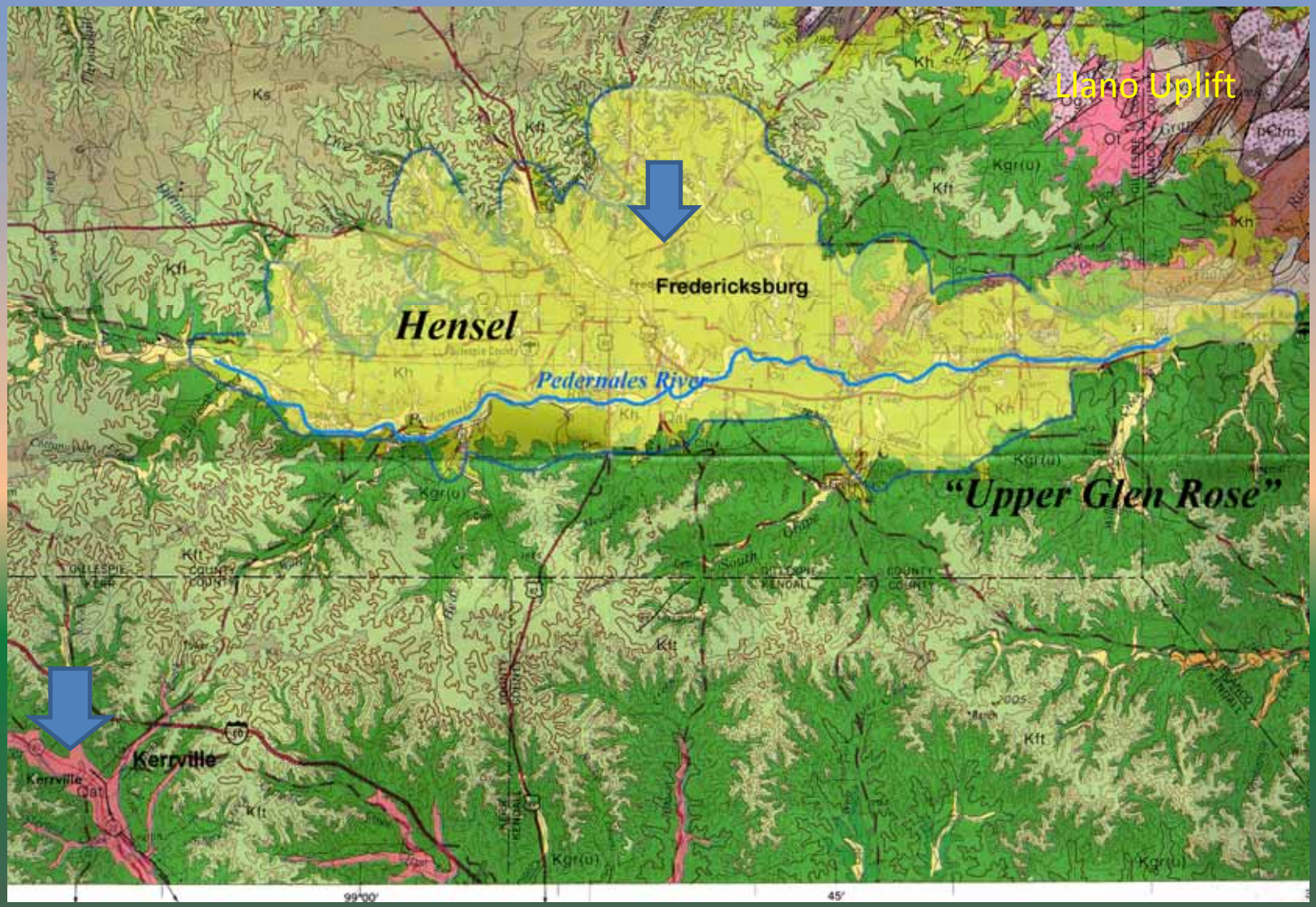
Great Vertical Exaggeration



Much Less Vertical Exaggeration



Recharge Zone

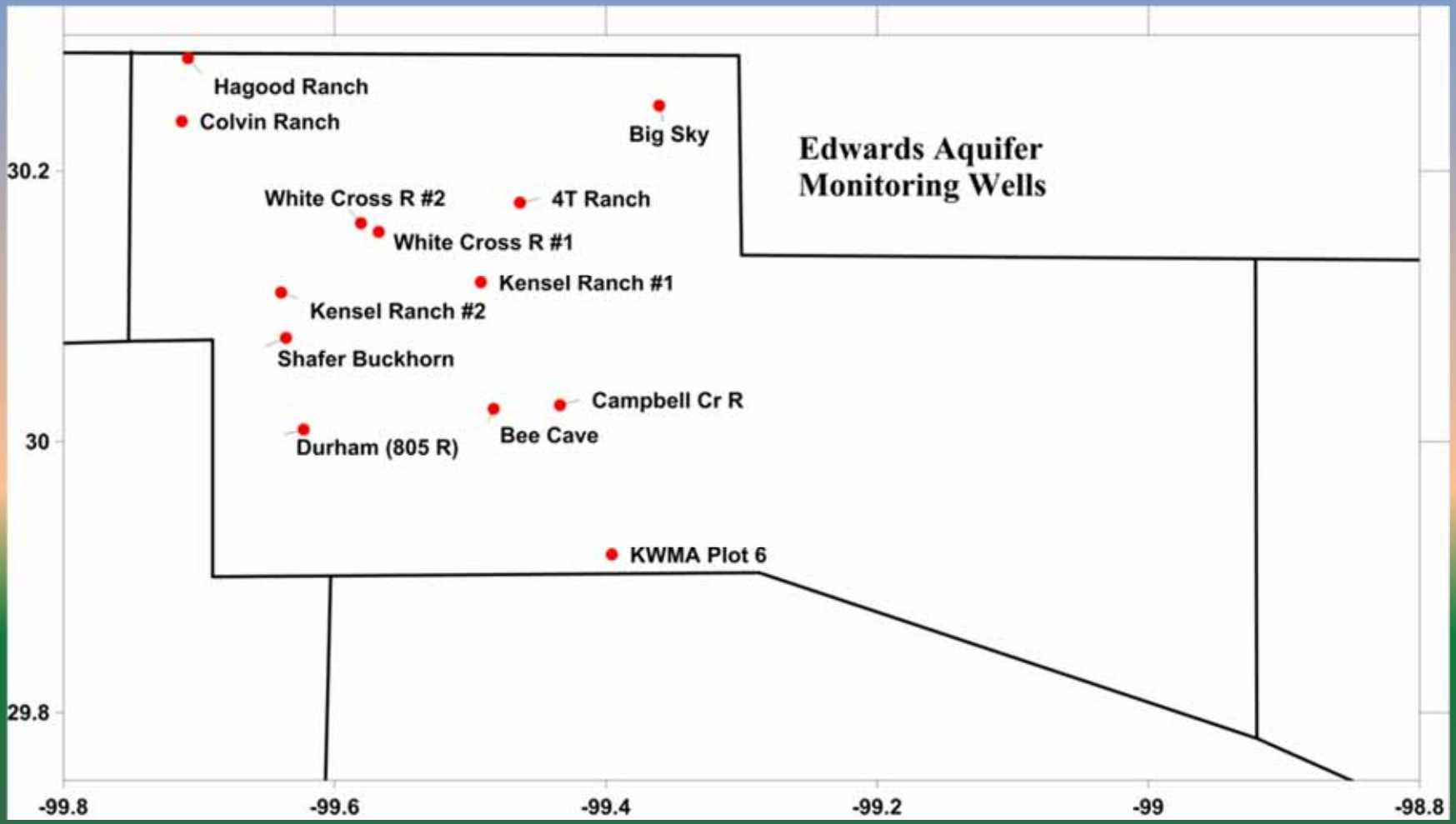


- Llano sheet Geologic Atlas of Texas 1961

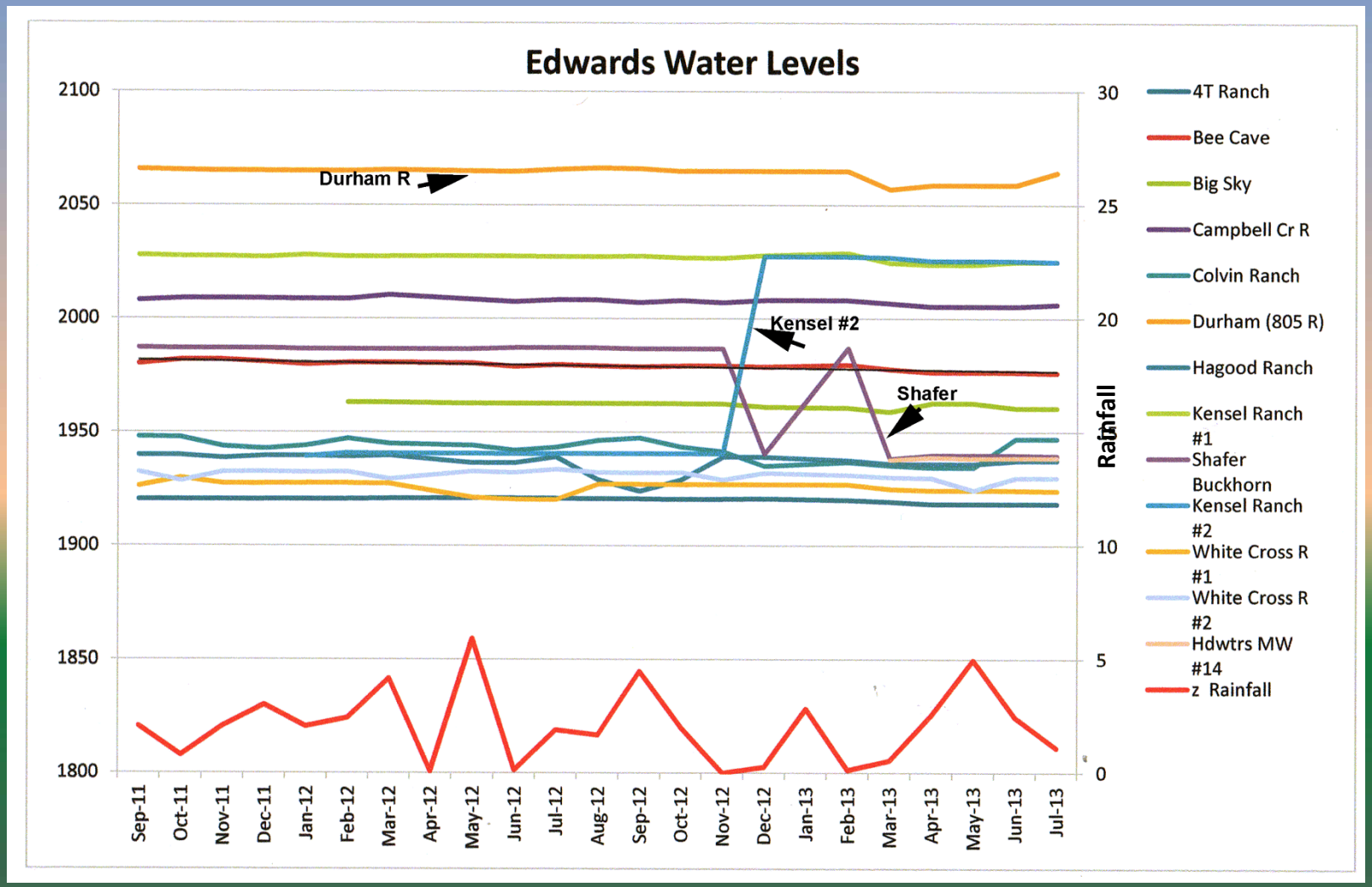
Aquifer Levels Through Time

as measured in monitoring wells

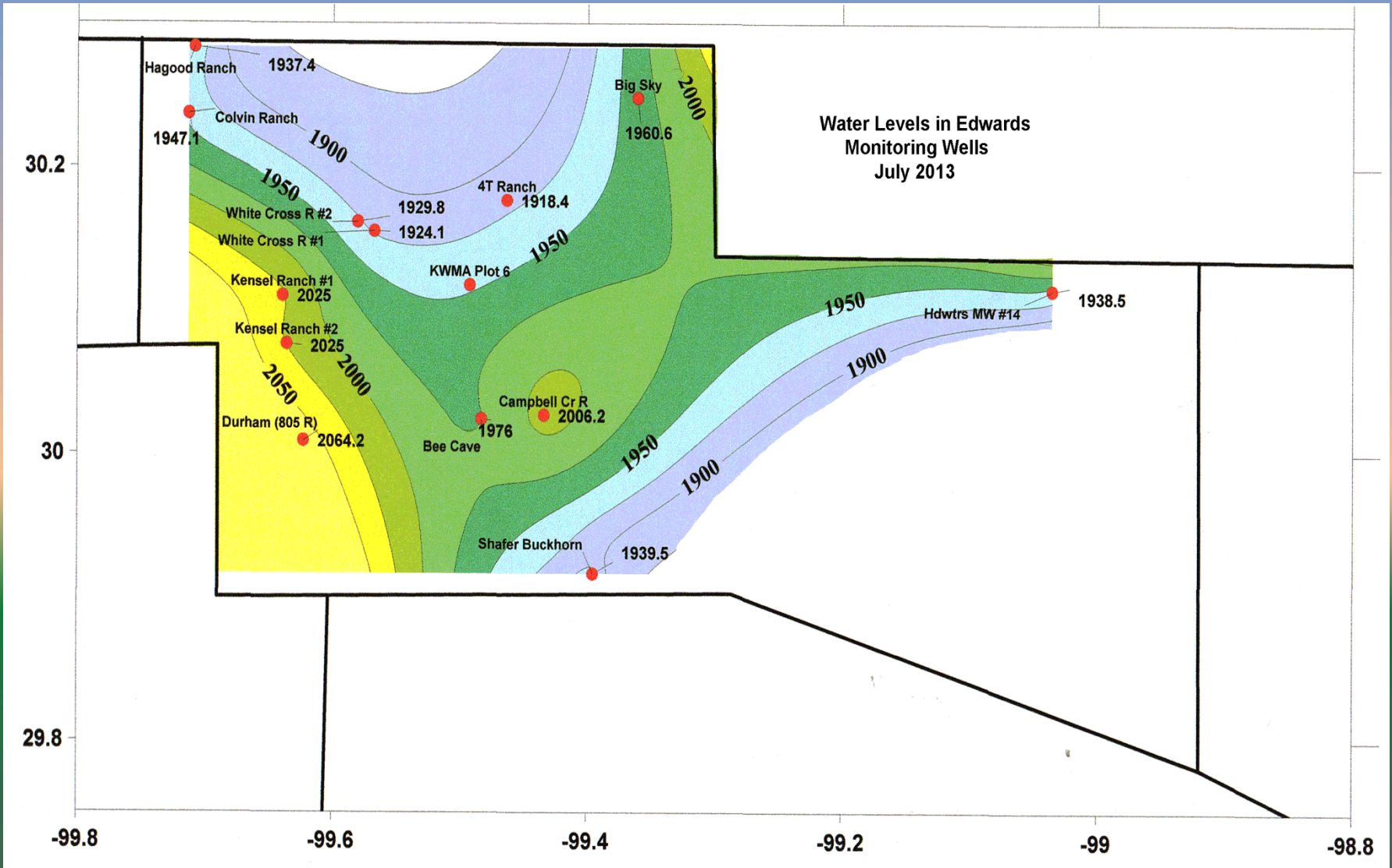
Edwards Aquifer Monitoring Wells



Edwards

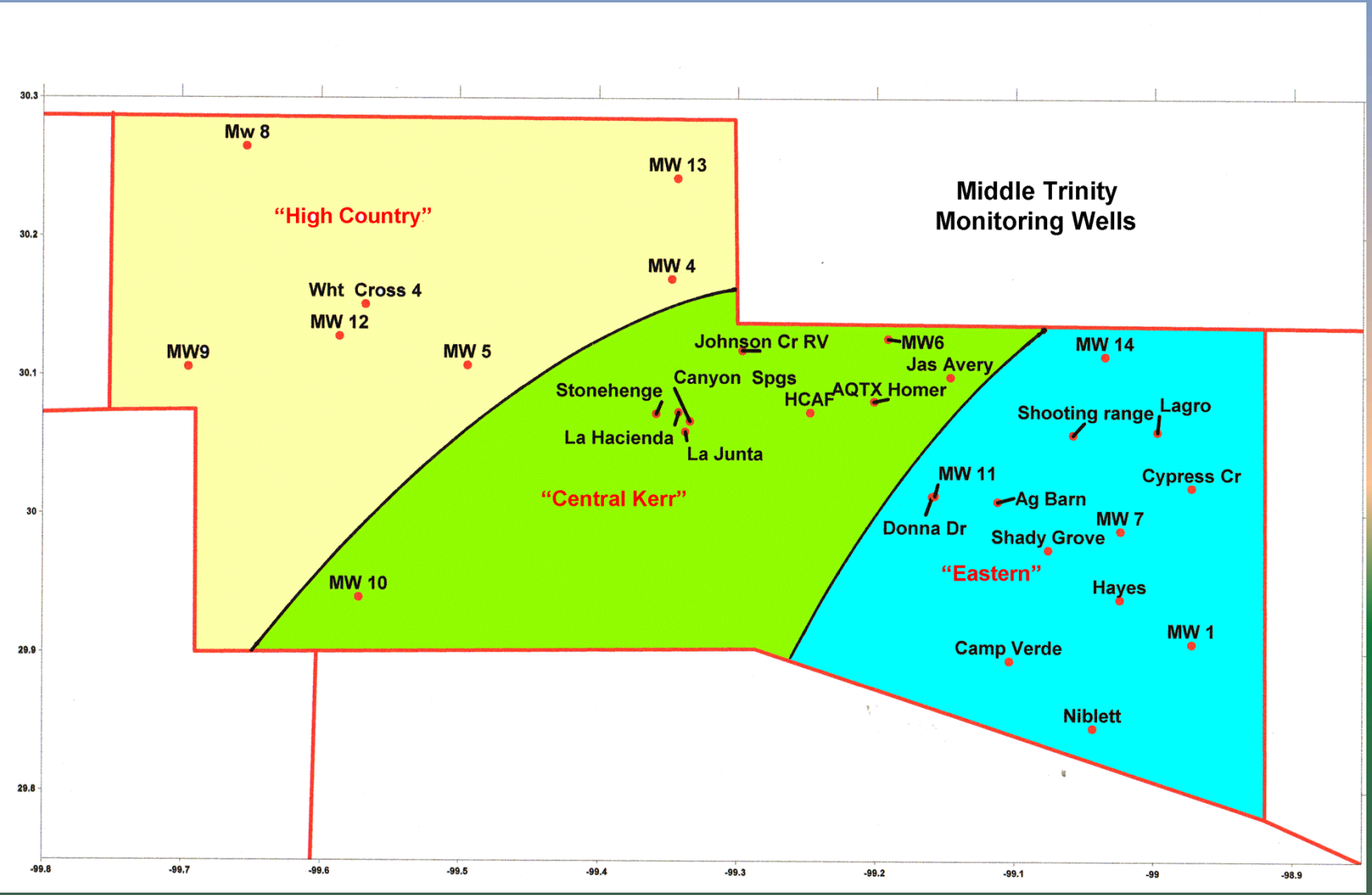

Edwards Water Levels
2100
2050
2000
1950
1900
1850
1800
30
25
20
10
5
0
Rainfall
Durham R
Kensel #2
Shafer
Sep-11
Oct-11
Nov-11
Dec-11
Jan-12
Feb-12
Mar-12
Apr-12
May-12
Jun-12
Jul-12
Aug-12
Sep-12
Oct-12
Nov-12
Dec-12
Jan-13
Feb-13
Mar-13
Apr-13
May-13
Jun-13
Jul-13
4T Ranch
Bee Cave
Big Sky
Campbell Cr R
Colvin Ranch
Durham (805 R)
Hagood Ranch
Kensel Ranch #1
Shafer Buckhorn
Kensel Ranch #2
White Cross R #1
White Cross R #2
Hdwtrs MW #14
z Rainfall

Map of Edwards Water Levels July 2013

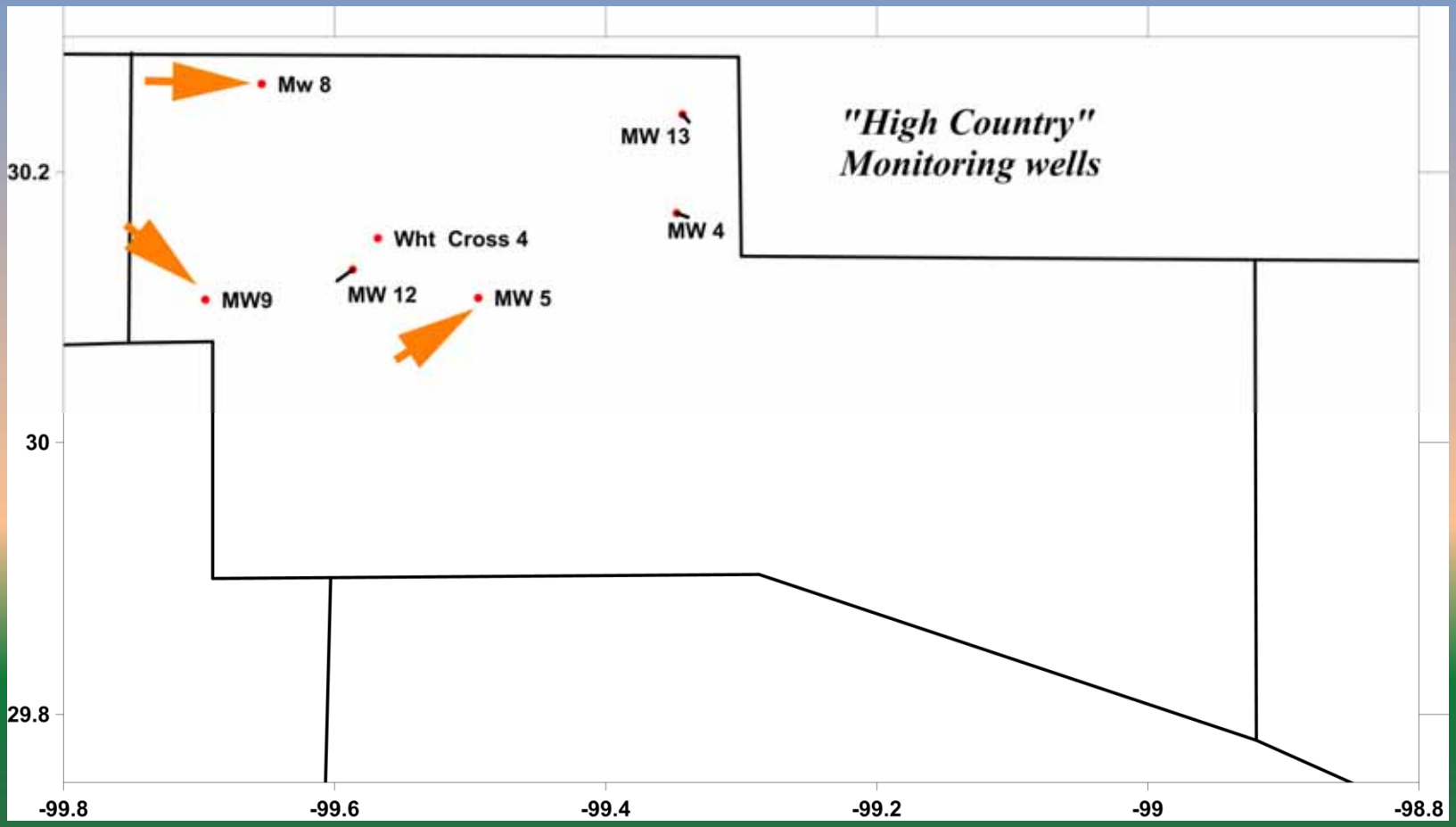


Regions for Mid Trinity Monitoring

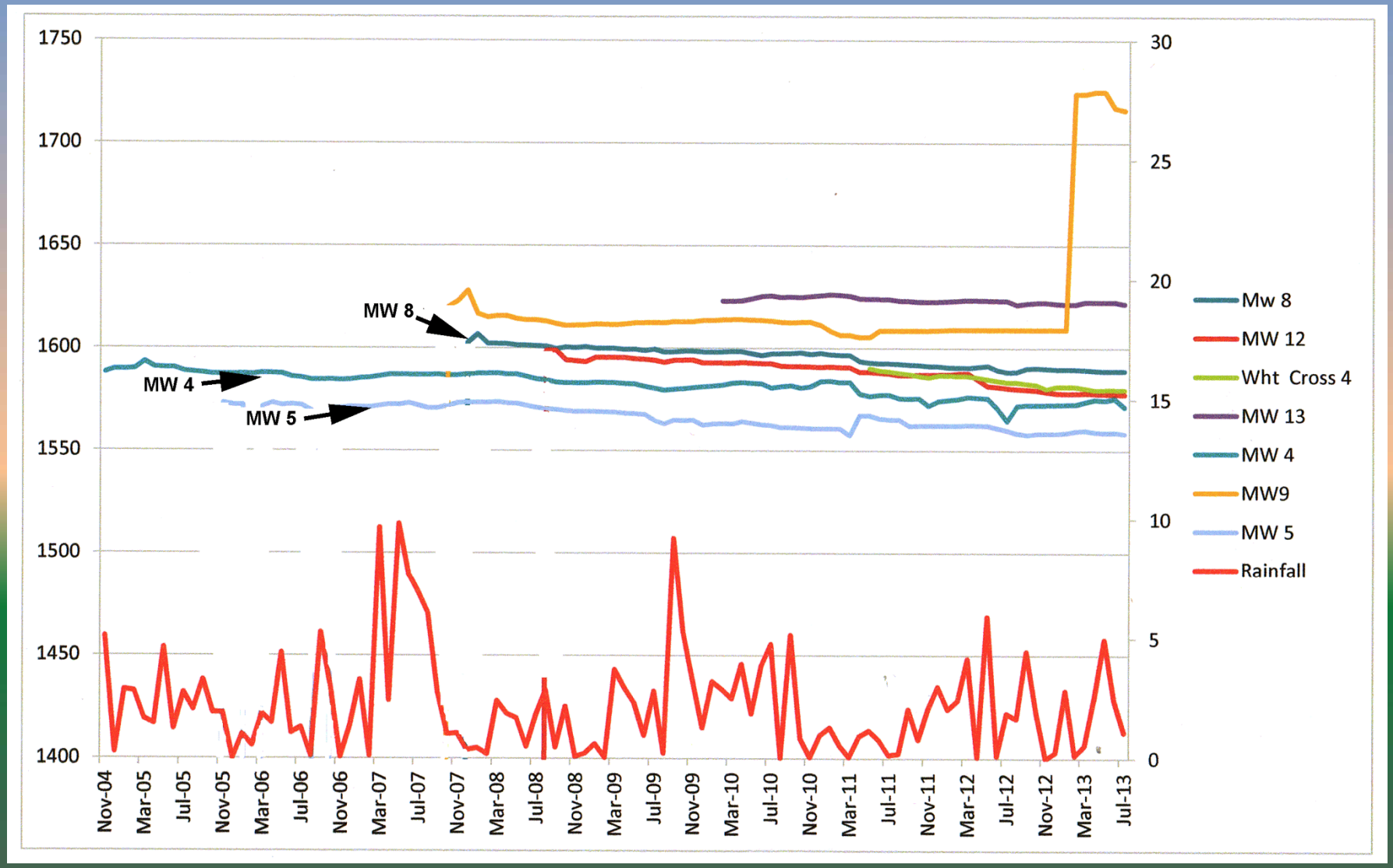
(Hensel and Cow Creek)



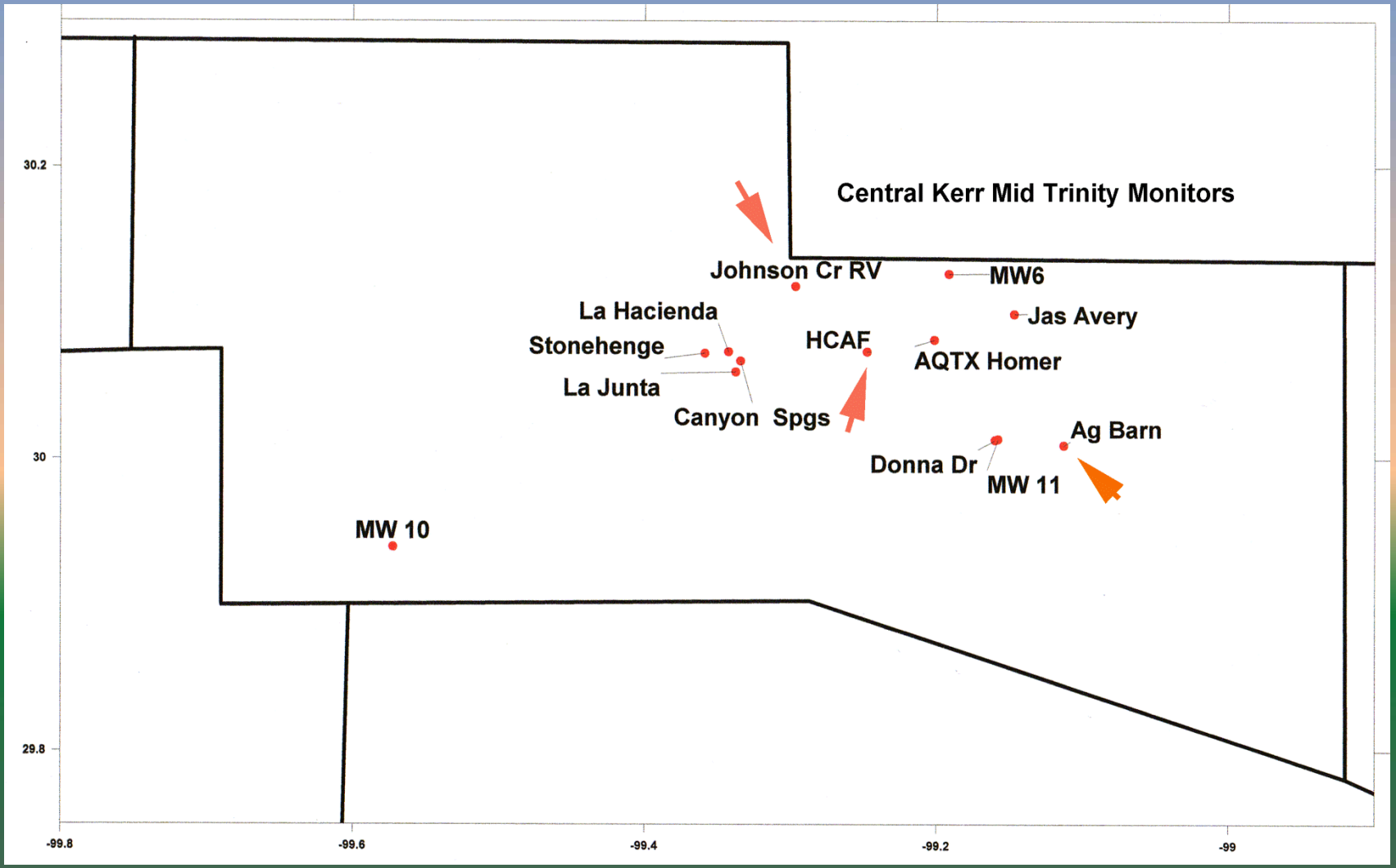
High Country Monitoring Wells



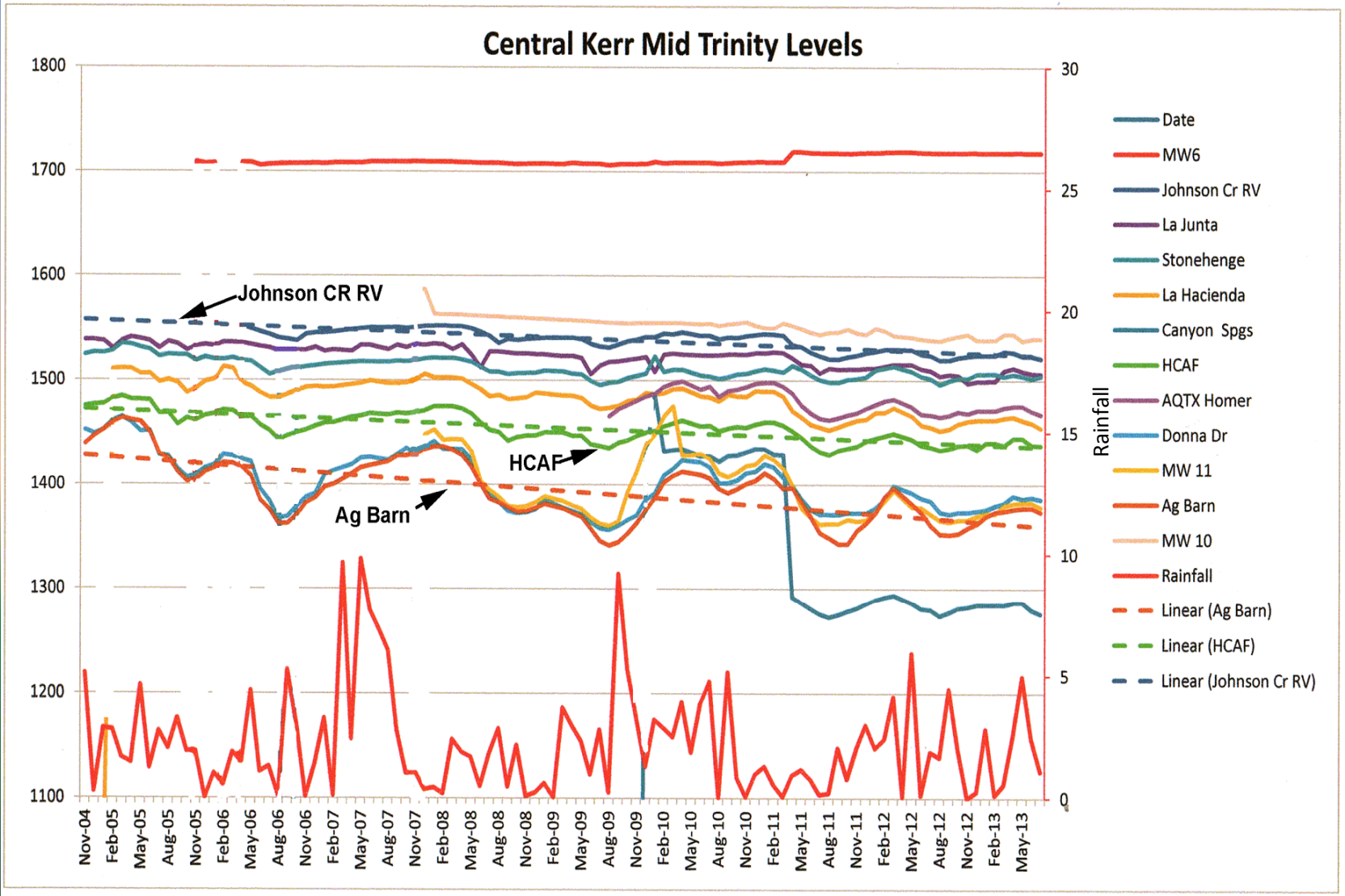
High Country Mid Trinity Levels



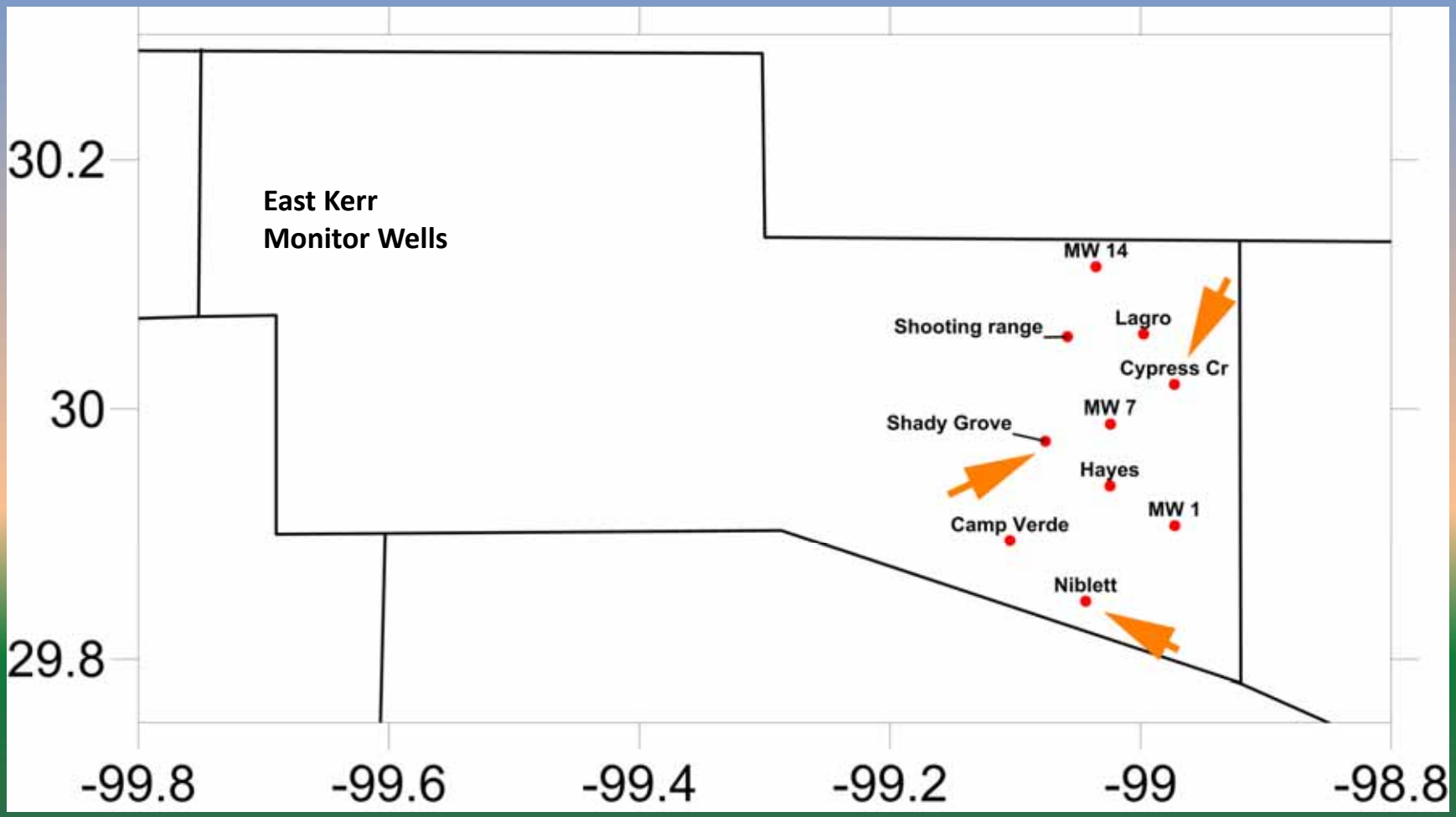
Central Kerr Mid Trinity Monitor Wells



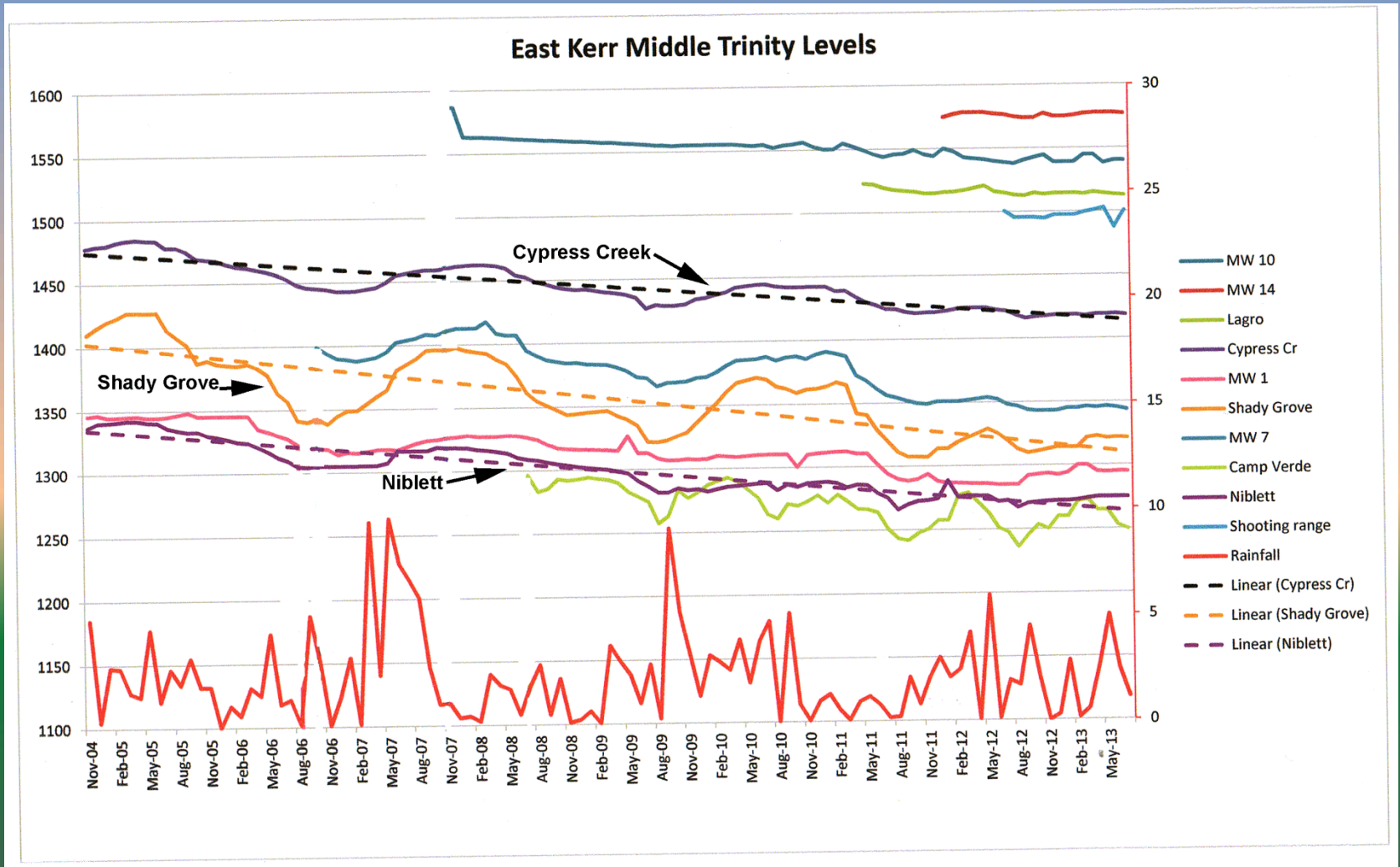
Central Kerr Mid Trinity Levels



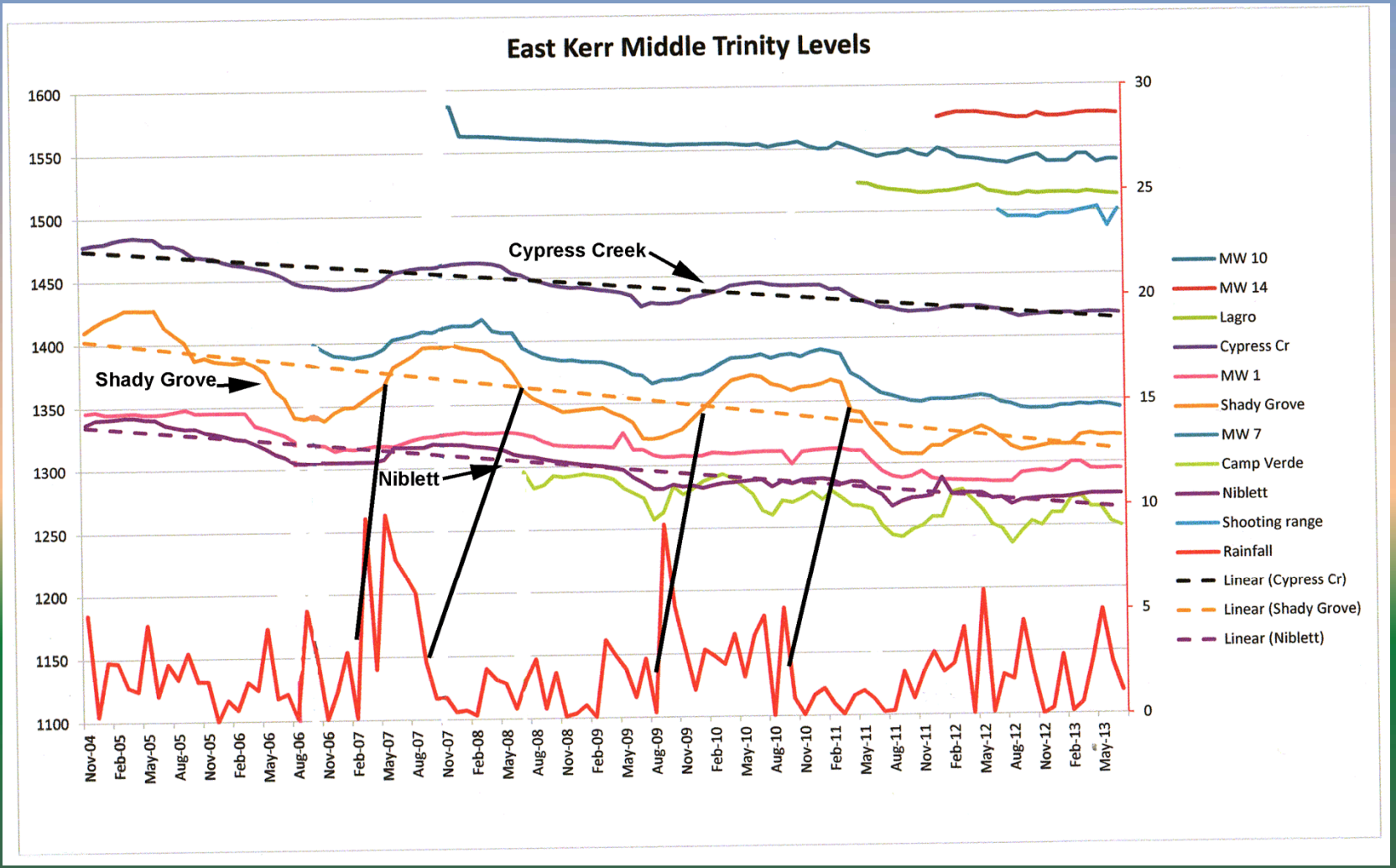
East Kerr Mid Trinity Monitors



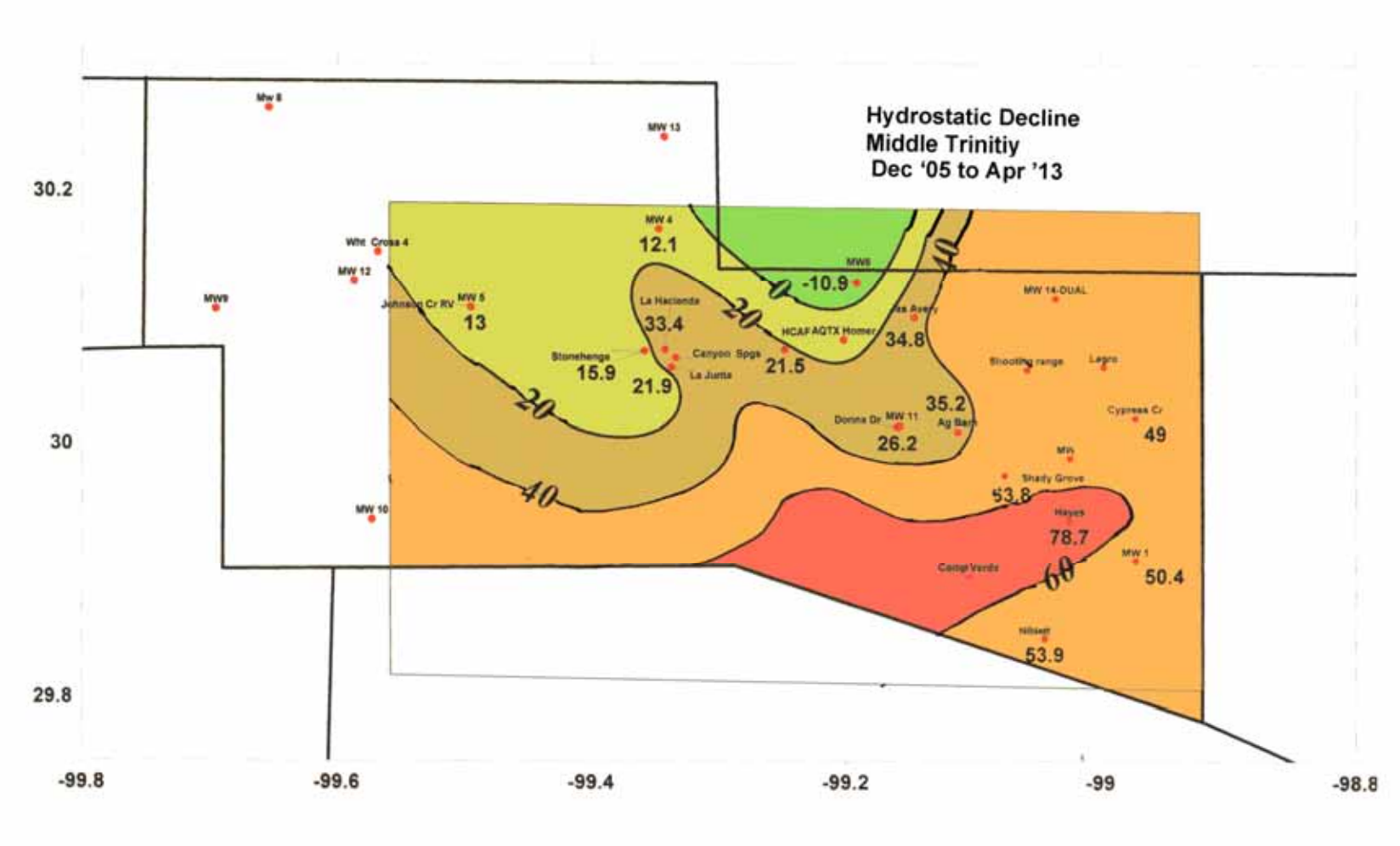
East Kerr Mid Trinity Levels 2004-2013



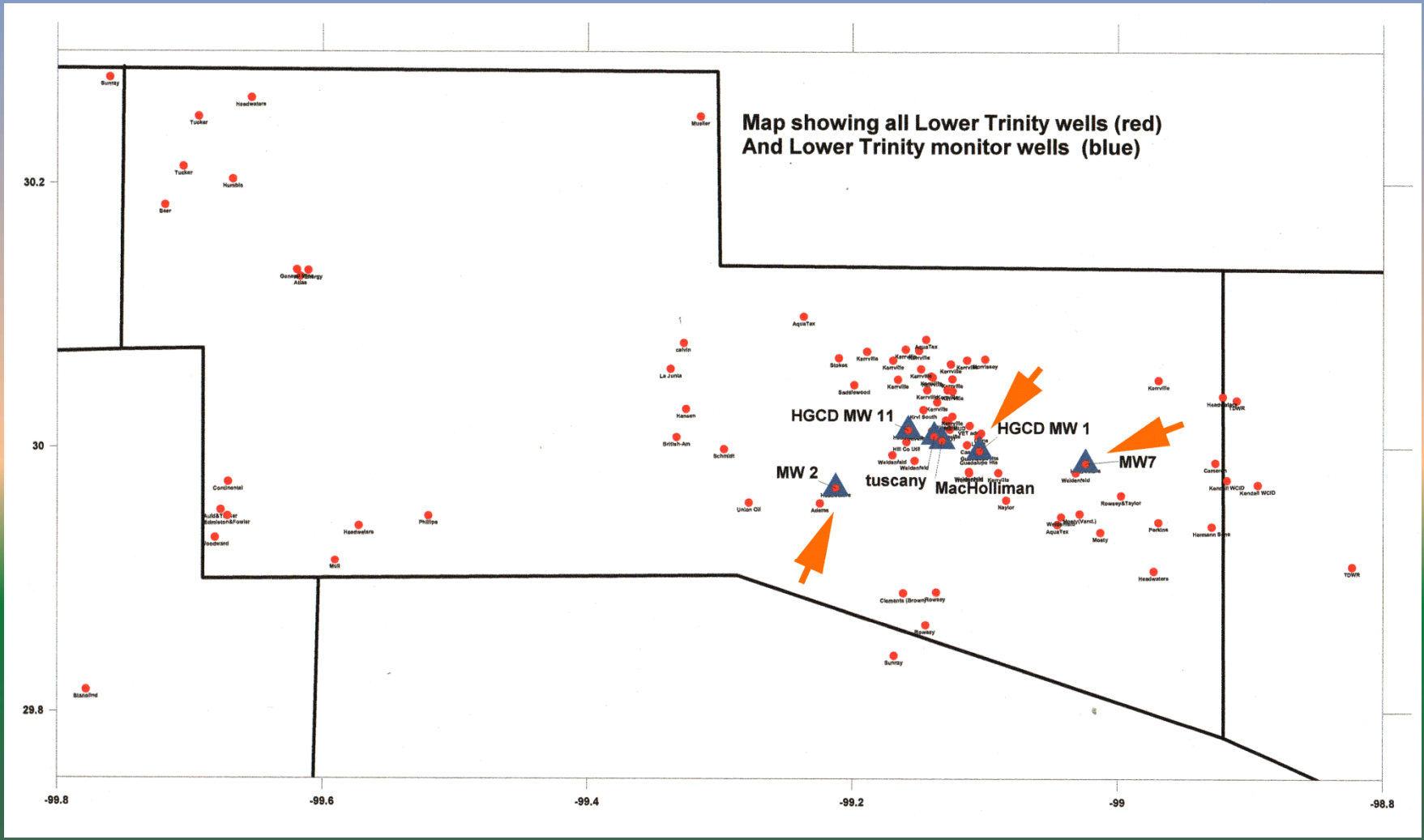
Recharge Time Delay



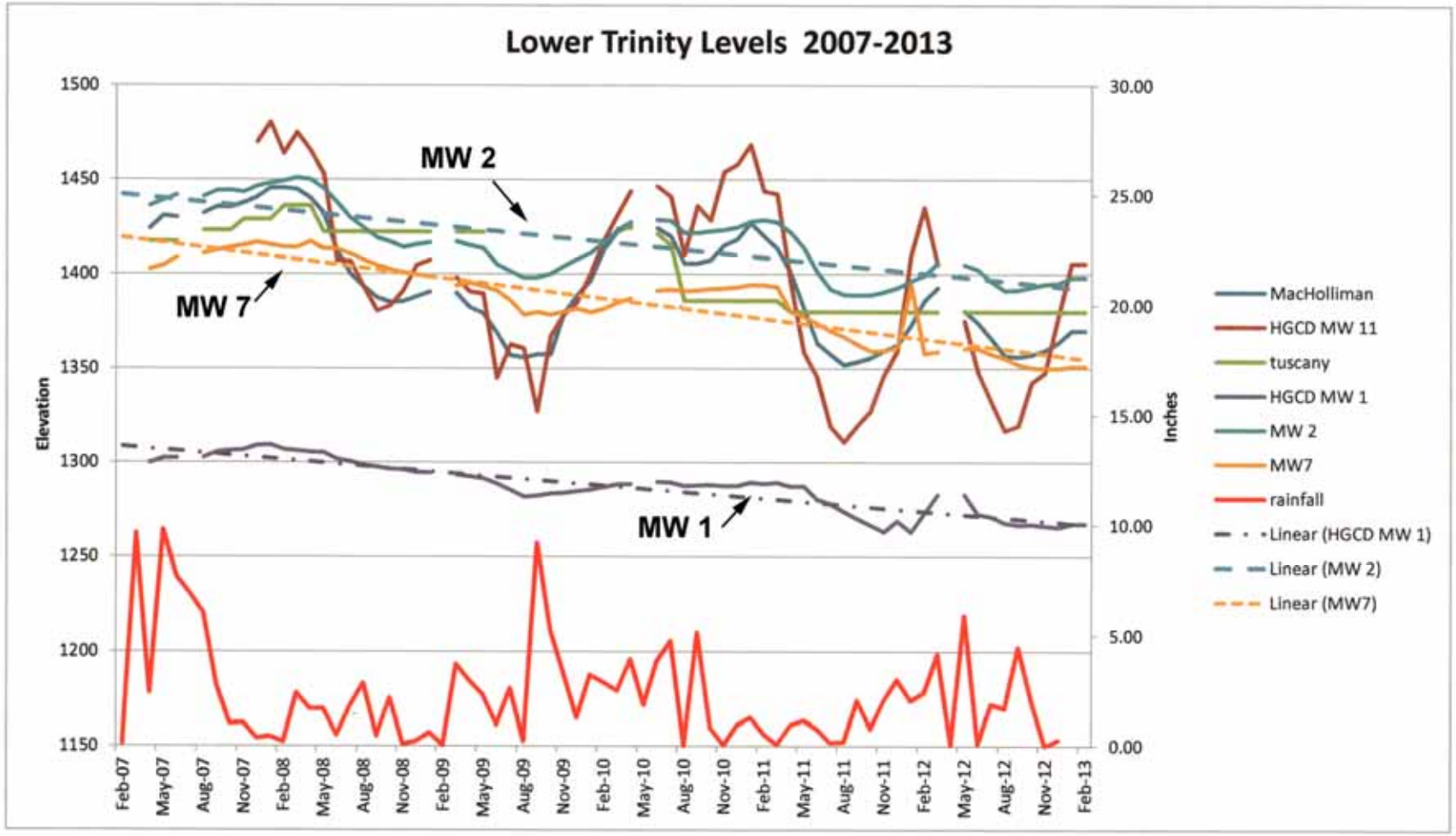
Cumulative Decline 12-05 to 4-13
Mid Trinity Aquifers



Lower Trinity Well locations
(Hosston)



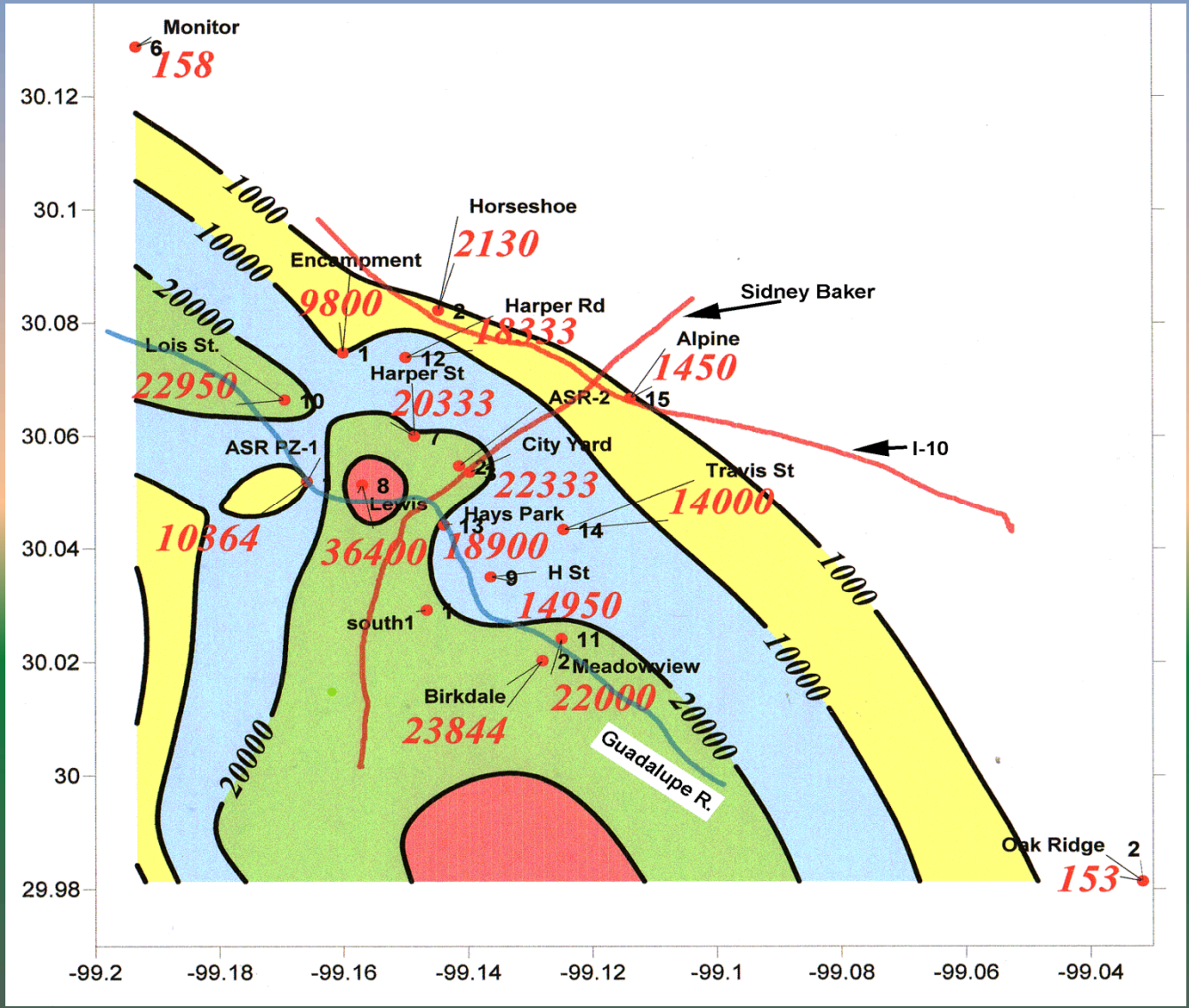
Lower Trinity Water Levels 2007-2013



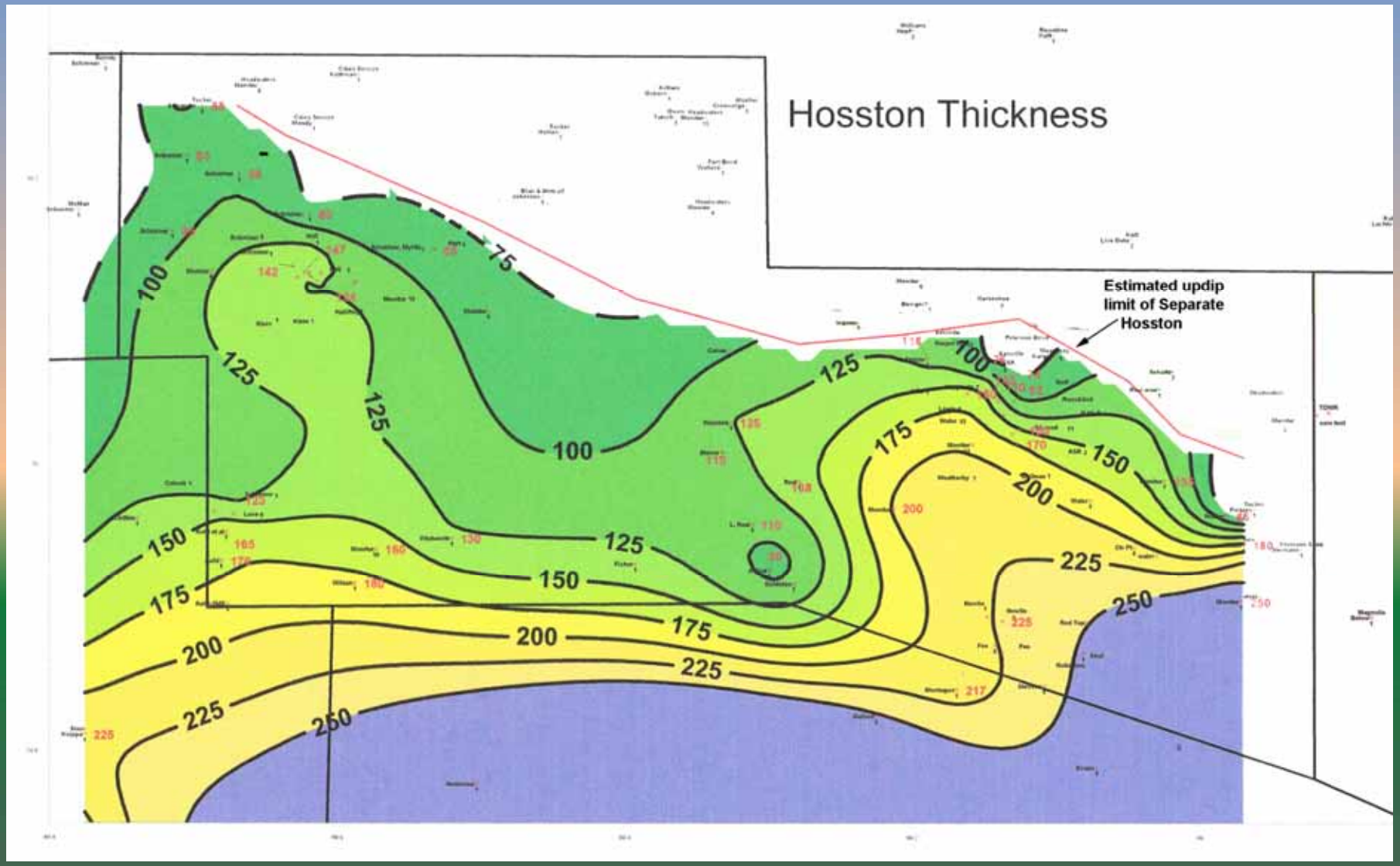
Kerrville Lower Trinity Supply Wells

Aquifer Transmissivity Showing Variations

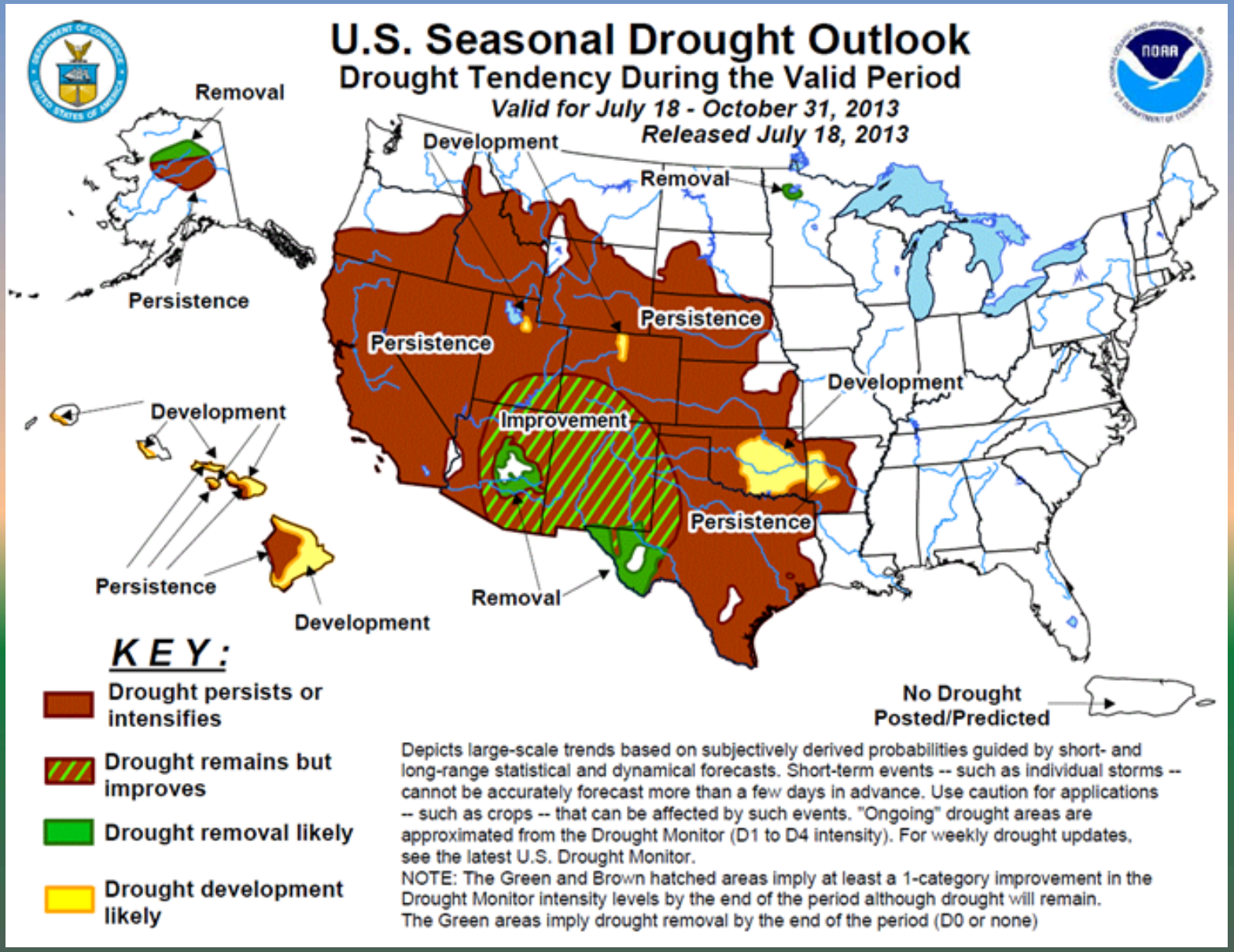
(Amount of water which can be transmitted horizontally)



Hosston (Lower Trinity) Thickness



Current Drought Outlook



Observations

- Rainfall may be cyclic with a period of 60 to 100 ± years between peaks
- Hydrostatic levels have declined over the last 10 Years
- Water Level response lags rainfall by 6 to 8 months but does not return to original levels after a rainy period
- River flow has decreased since 1986

Acknowledgements

Headwaters Groundwater Conservation District

Texas Water Development Board

Kerrville City Water Department

National Weather Service NOAA

U. S. Geological Survey

Paul Tybor-Hill Country Underground Water Conservation District

Ron Blakey, Northern Arizona University

USDA Laboratory –Kerrville