Hydrologic evidence of drought in New Mexico

Presented to Drought Subcommittee
by Sam Fernald, Director NM WRRI
Clovis, NM 24 July 2013

New Mexico is in severe drought

U.S. Drought Monitor

New Mexico

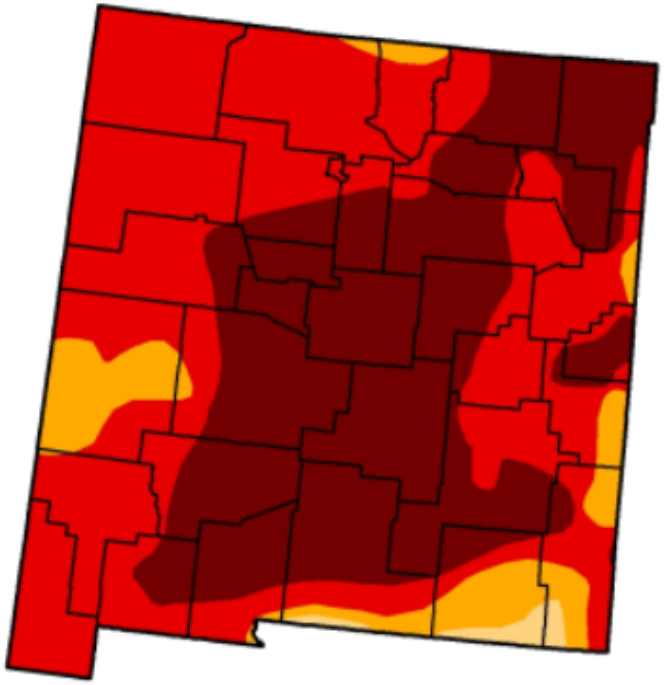
July 9, 2013
Valid 7 a.m. EST

Drought Conditions (Percent Area)

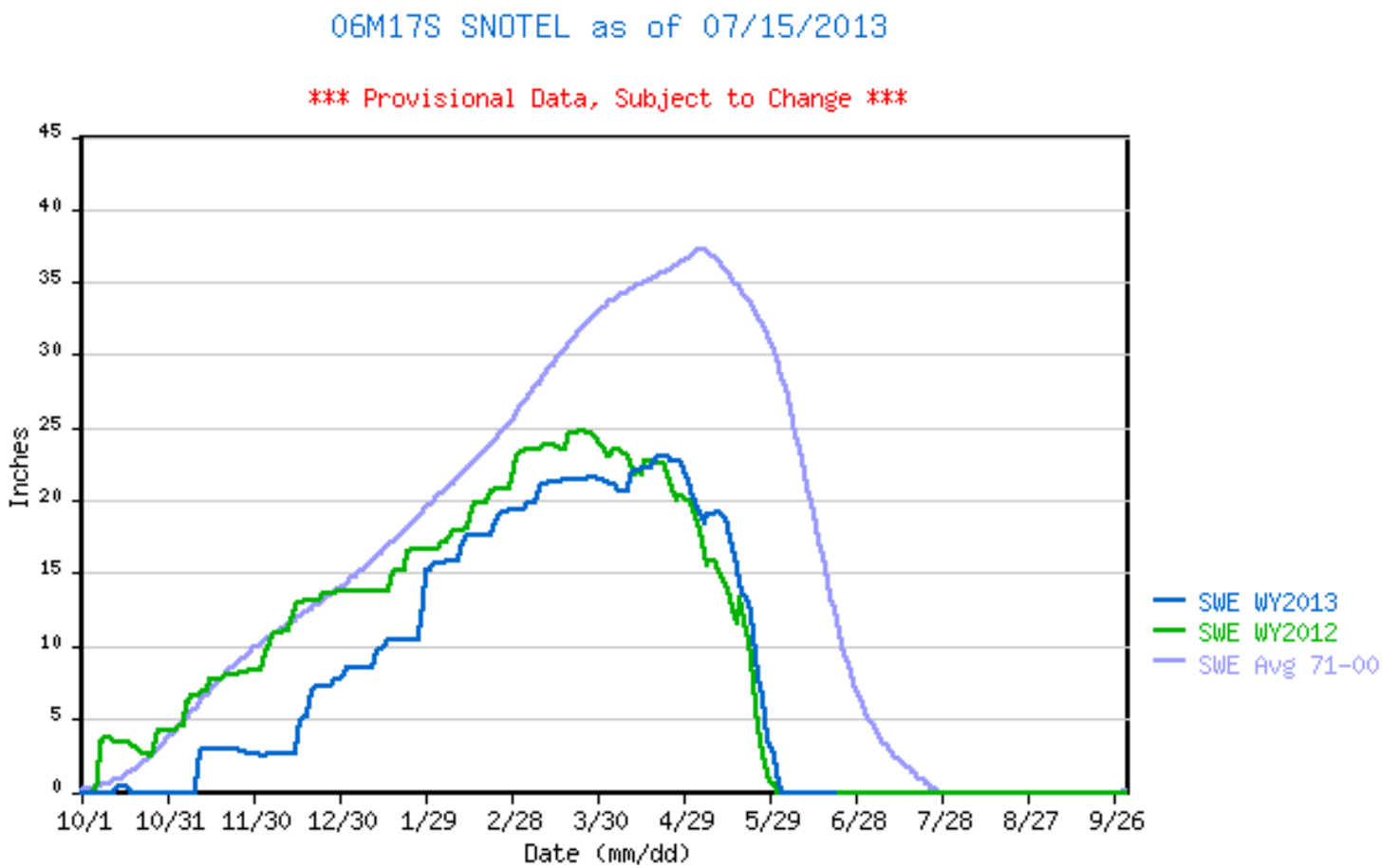
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	0.00	100.00	100.00	98.92	90.91	42.43
Last Week (07/02/2013 map)	0.00	100.00	100.00	98.92	92.58	42.77
3 Months Ago (04/09/2013 map)	0.00	100.00	98.68	93.30	58.73	4.36
Start of Calendar Year (01/01/2013 map)	0.00	100.00	98.83	94.05	31.88	0.97
Start of Water Year (09/25/2012 map)	0.00	100.00	100.00	62.56	12.25	0.66
One Year Ago (07/03/2012 map)	0.00	100.00	99.79	85.70	25.98	0.00

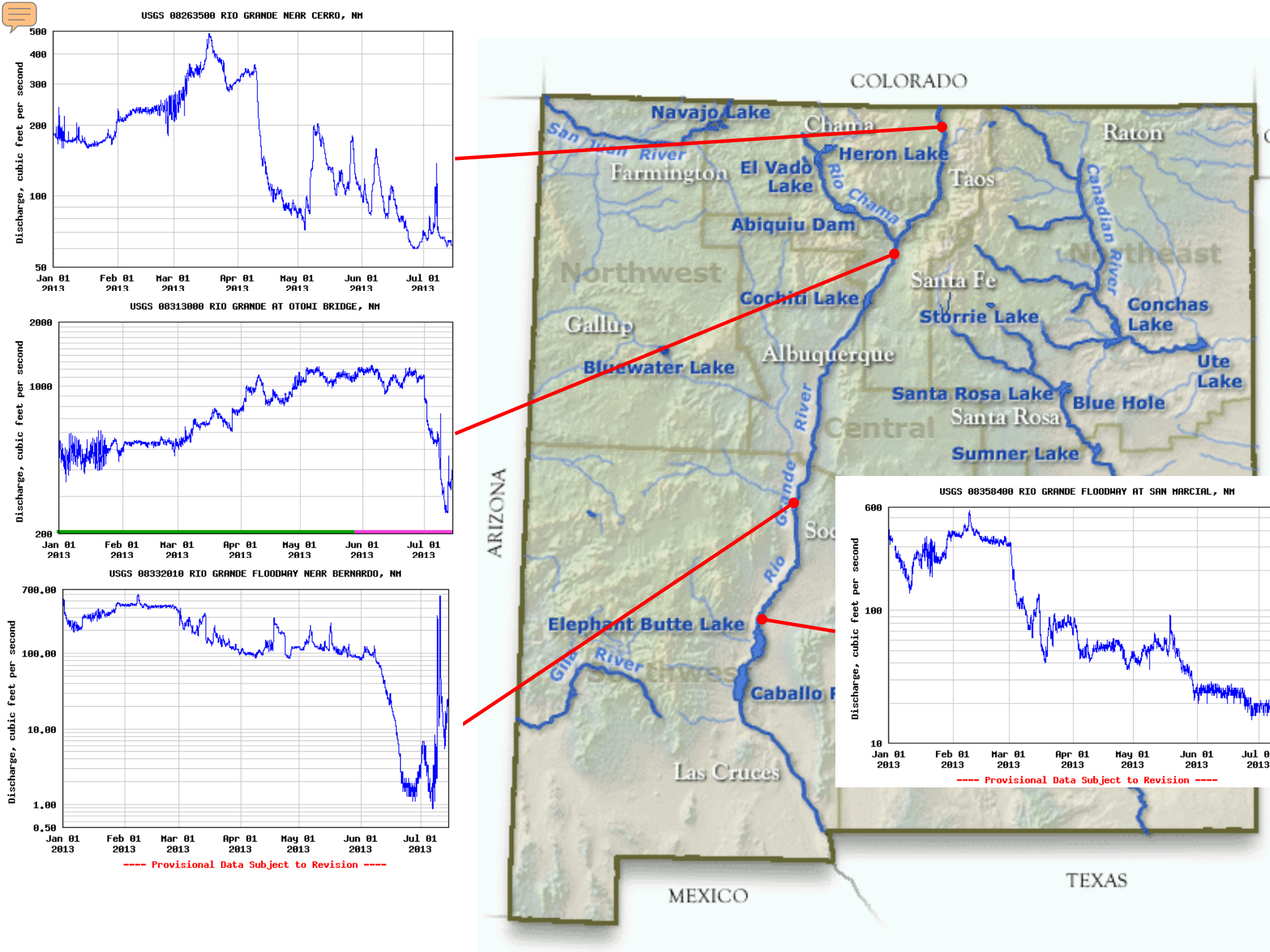
Intensity:

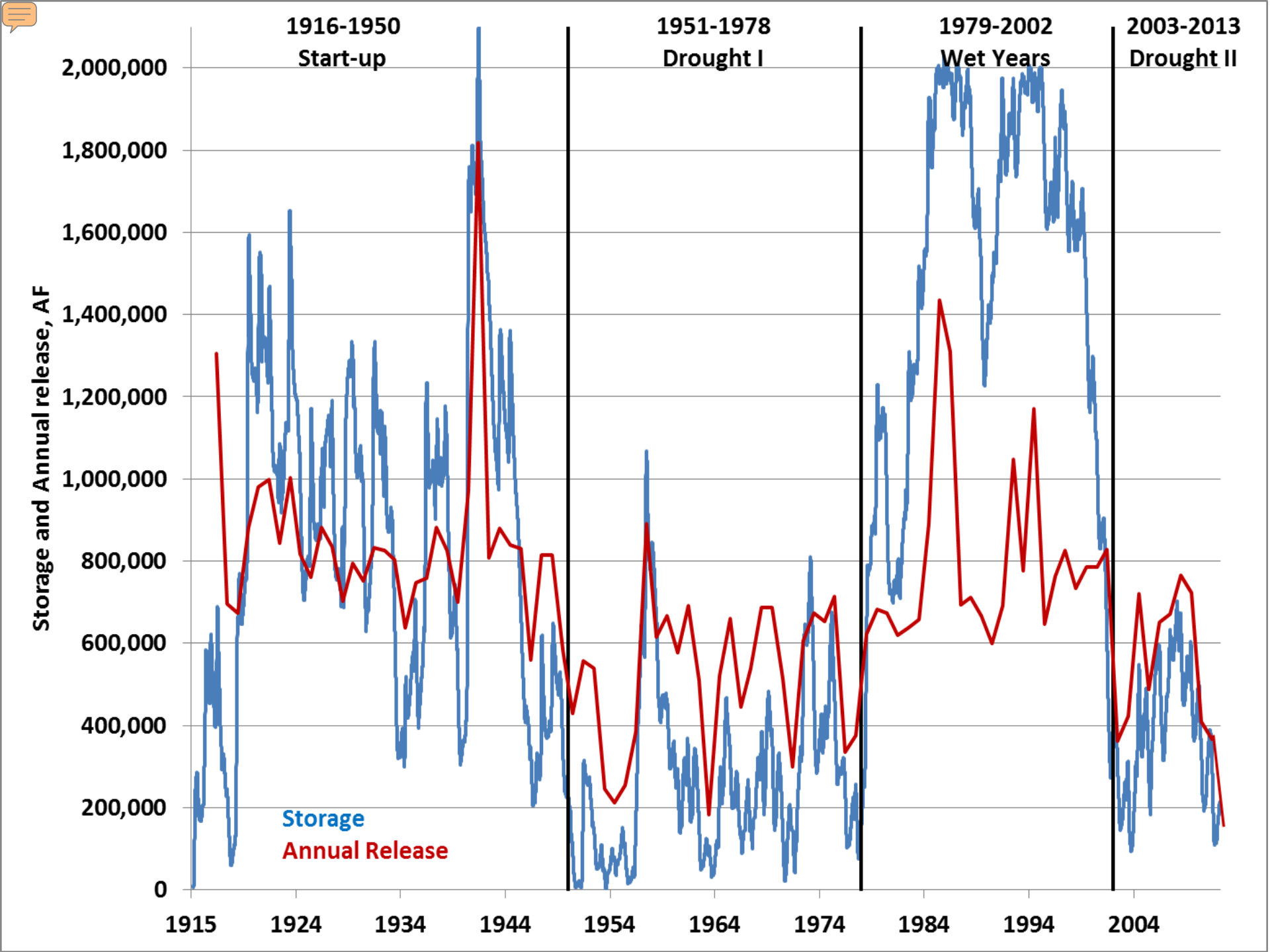
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

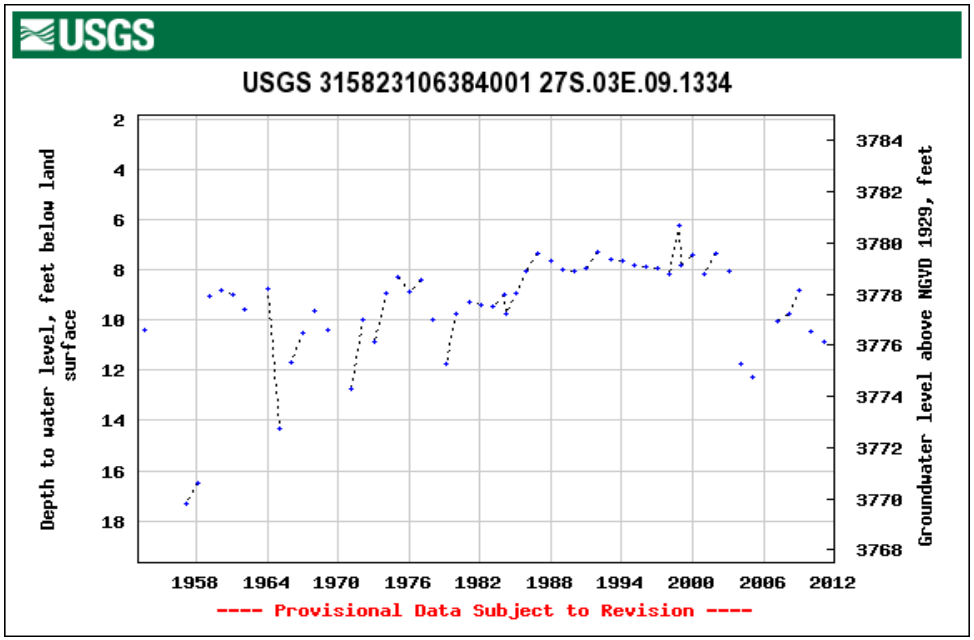


2013 Snowpack

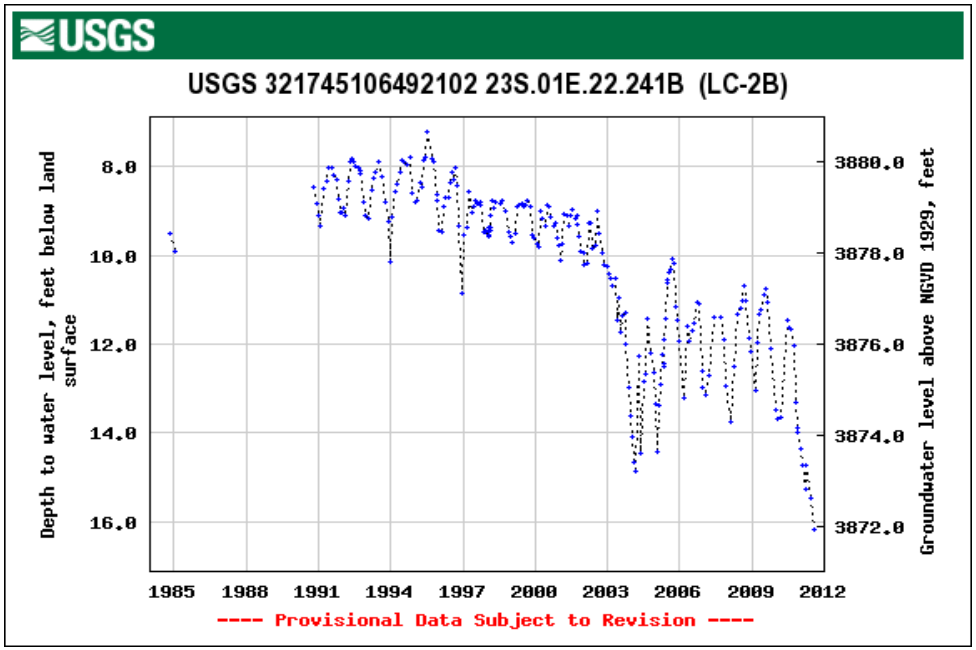



USGS 08263500 RIO GRANDE NEAR CERRO, NM
Discharge, cubic feet per second
500
400
300
200
100
50
Jan 01 2013
Feb 01 2013
Mar 01 2013
Apr 01 2013
May 01 2013
Jun 01 2013
Jul 01 2013
USGS 08313000 RIO GRANDE AT OTOWI BRIDGE, NM
Discharge, cubic feet per second
2000
1000
200
Jan 01 2013
Feb 01 2013
Mar 01 2013
Apr 01 2013
May 01 2013
Jun 01 2013
Jul 01 2013
USGS 08332010 RIO GRANDE FLOODWAY NEAR BERNARDO, NM
Discharge, cubic feet per second
700.00
100.00
10.00
1.00
0.50
Jan 01 2013
Feb 01 2013
Mar 01 2013
Apr 01 2013
May 01 2013
Jun 01 2013
Jul 01 2013
---- Provisional Data Subject to Revision ----
COLORADO
Navajo Lake
San Juan River
Farmington
Chama
Heron Lake
El Vado Lake
Rio Chama
Taos
Raton
Canadian River
Abiquiu Dam
Northwest
Northeast
Santa Fe
Cochiti Lake
Storrie Lake
Conchas Lake
Gallup
Albuquerque
Bluewater Lake
Ute Lake
Santa Rosa Lake
Blue Hole
Santa Rosa
Central
Sumner Lake
ARIZONA
Rio Grande
Elephant Butte Lake
Gila River
Caballo
Las Cruces
MEXICO
TEXAS
USGS 08358400 RIO GRANDE FLOODWAY AT SAN MARCIAL, NM
Discharge, cubic feet per second
600
100
10
Jan 01 2013
Feb 01 2013
Mar 01 2013
Apr 01 2013
May 01 2013
Jun 01 2013
Jul 01 2013
---- Provisional Data Subject to Revision ----


1916-1950
Start-up
1951-1978
Drought I
1979-2002
Wet Years
2003-2013
Drought II
Storage and Annual release, AF
2,000,000
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
1915
1924
1934
1944
1954
1964
1974
1984
1994
2004
Storage
Annual Release

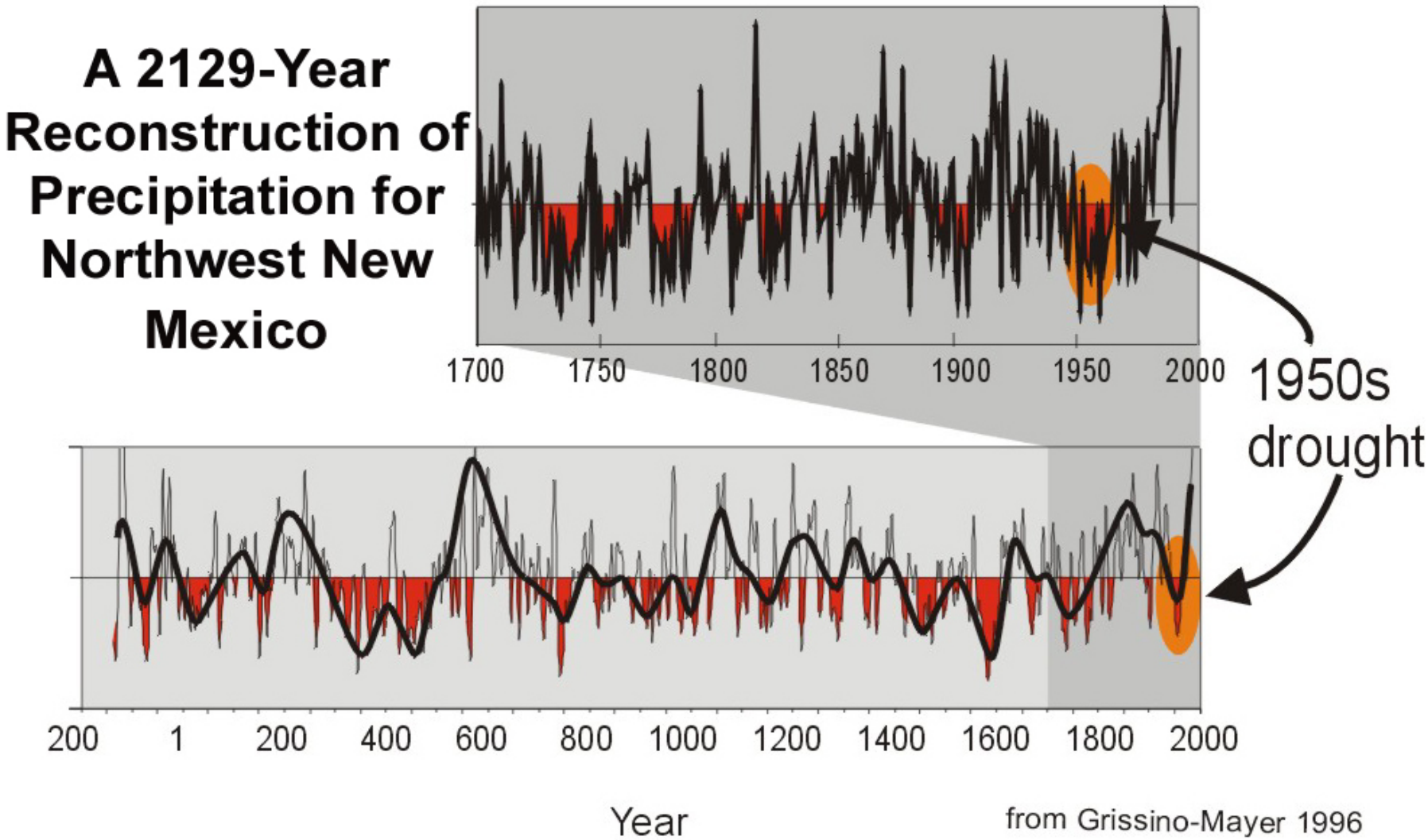


Mesilla Valley shallow groundwater dropped in drought of 1950's and recovered in wet 1980's-90's



Groundwater levels have dropped again in recent drought

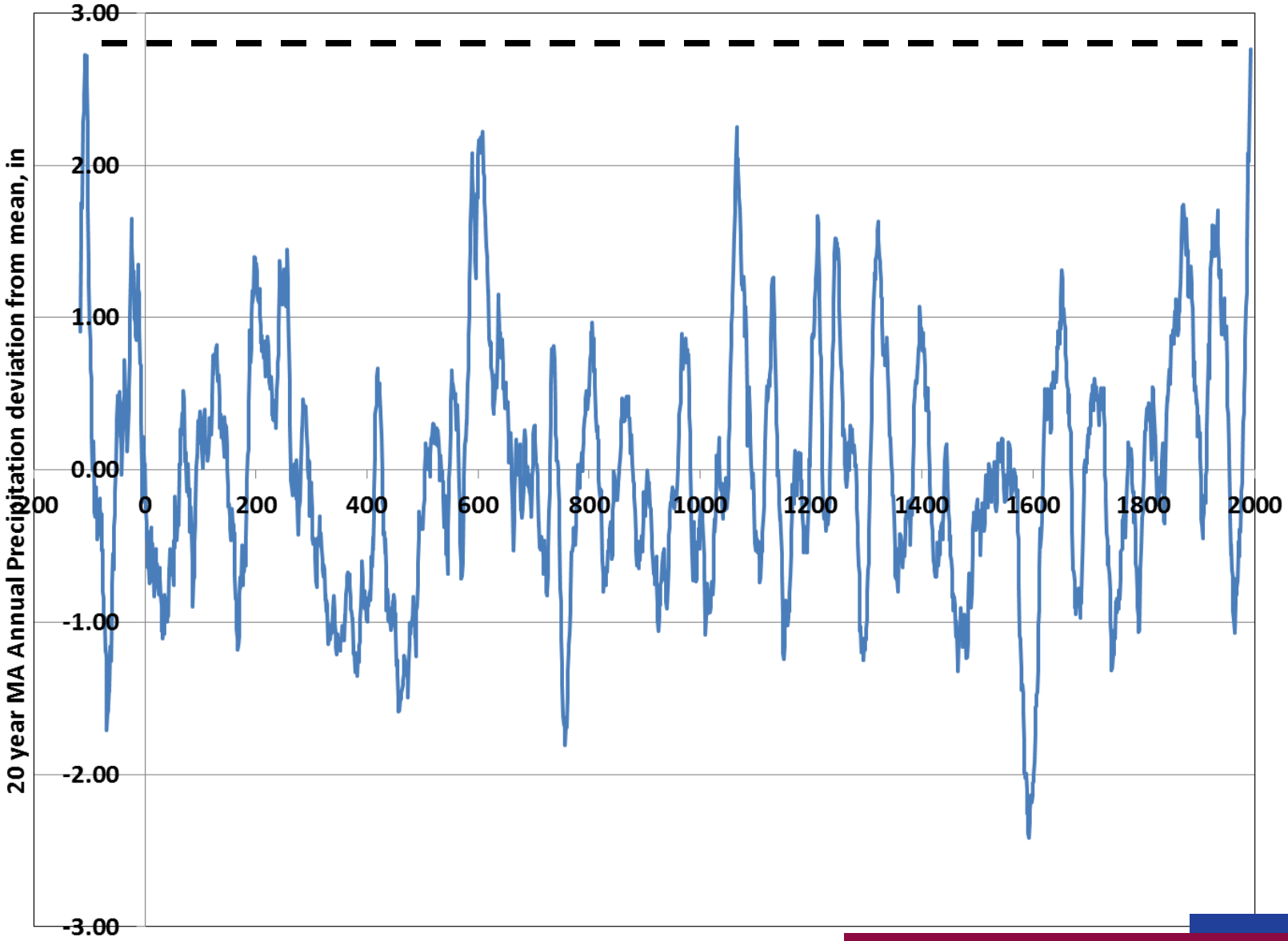
Historic droughts were more severe



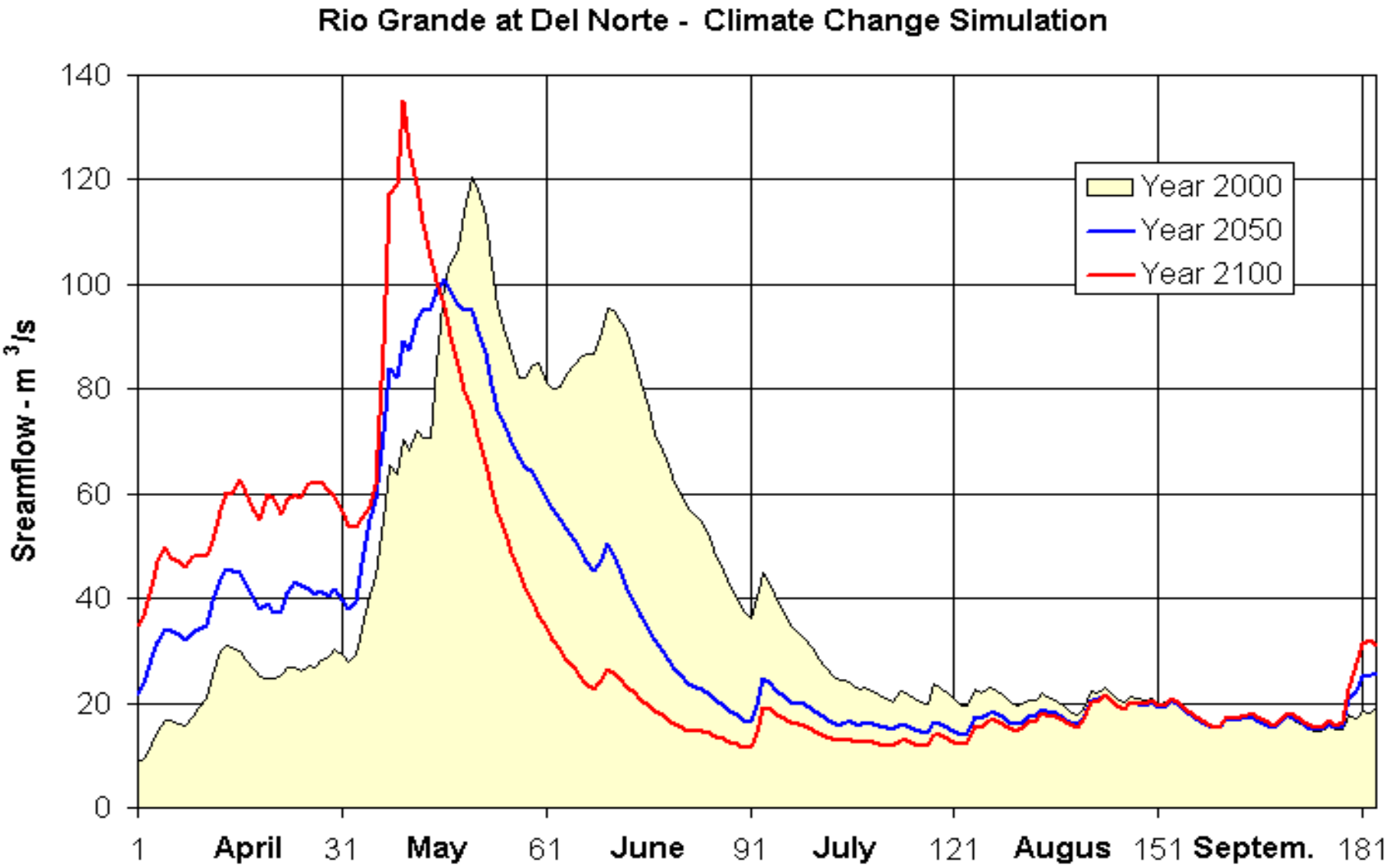
from Grissino-Mayer 1996

Tree Ring Analysis, Malpais, NM, 136 BC-1992

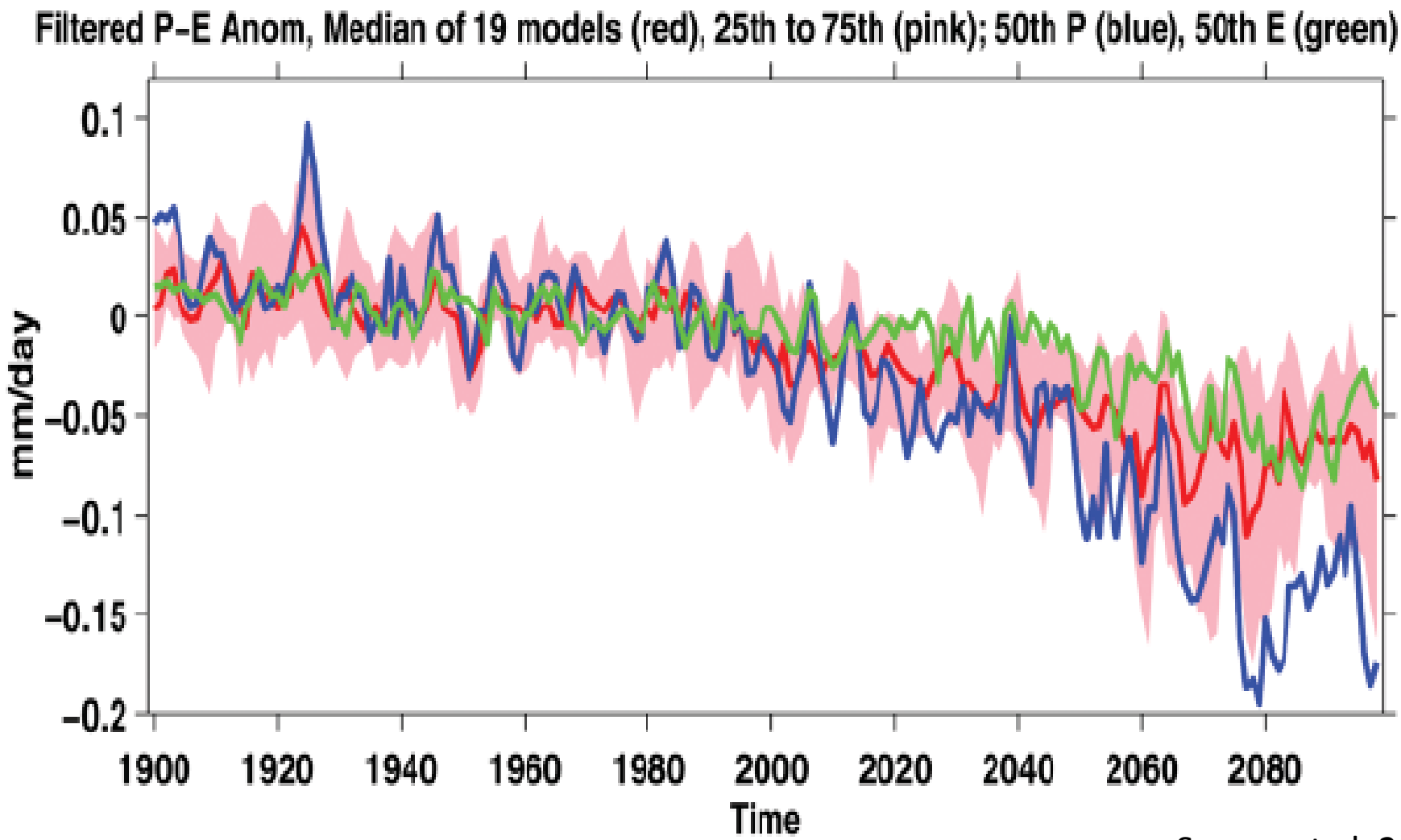
University of Arizona (Grissino-Mayer)



Climate change simulation Rio Grande at Del Norte with periodic changes throughout the 21st century. By 2100, temperature has increased by 4°C, and snowmelt runoff is earlier in the year by ~30 days



Future History: The Long-term GCM Forecast for Southwestern United States



Seager et al, 2007

Signs of drought – Evidence from around New Mexico

Acequias –

Alcalde

– First rotation plan since 1950's

Rio Hondo

– Data for water sharing in March instead of June/July

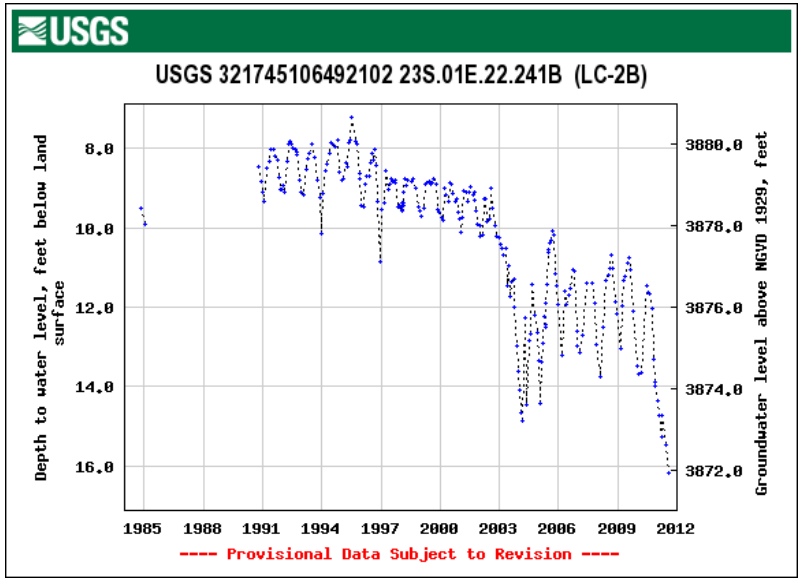
– Pumping from wells to offset surface water

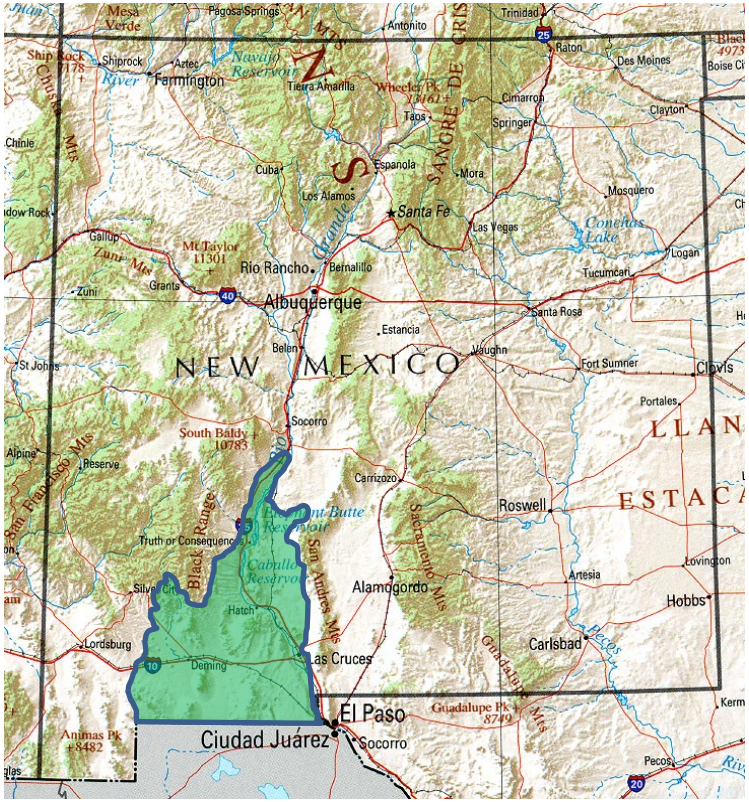
Signs of drought – Evidence from around New Mexico

Oil and Gas

– Farmers selling water for fracking water needs and not using for farming

Signs of drought – Evidence from around New Mexico





Lower Rio Grande –

- Rio Grande project
  - Shortest, smallest release ever
  - Smallest allotment (3.5”)
- Mesilla Valley
  - Dropping water table
  - Burn lake dry

Signs of drought – Evidence from around New Mexico

Ranching

– Destocked herds

Community water supplies

– Non-functioning water systems

Magdalena

Sunland park

Maxwell

THANK YOU