Texas Water Conditions Report

Texas Water Development Board

MAY 2016 RESERVOIR STORAGE

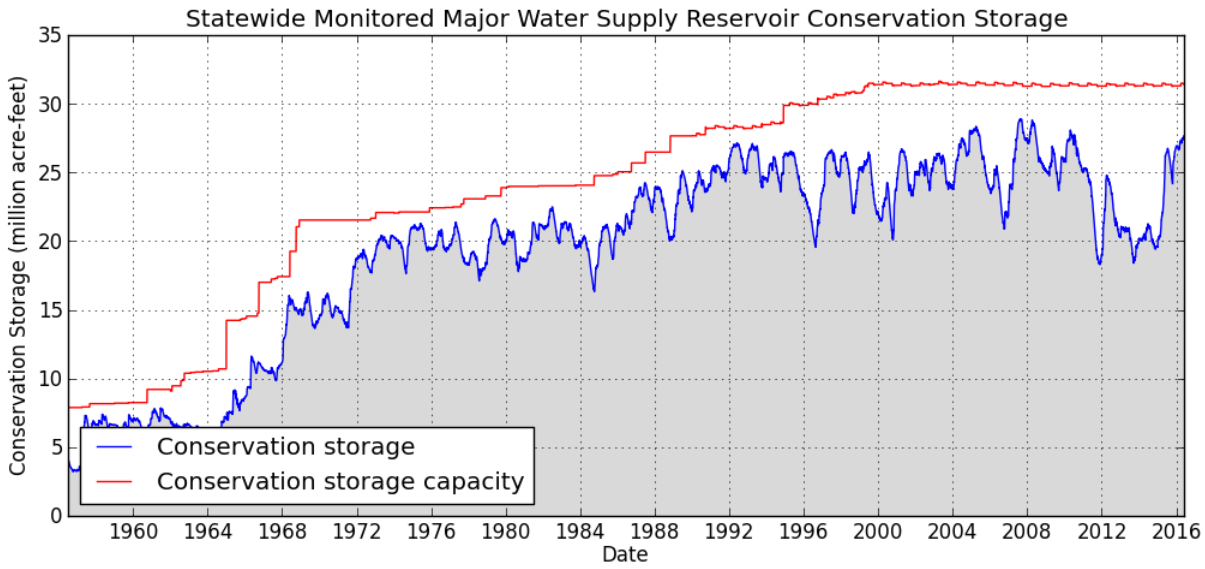
At the end of the month, total conservation storage in 114 of the state's major water supply reservoirs was at 27.67 million acre-feet or 88% of total conservation storage capacity. This is approximately 0.17 million acre-feet more than a month ago and 1.5 million acre-feet more than storage at this time last year.

Eighty (80) reservoirs held 100% of conservation storage capacity, primarily in the North Central (48) and East (19) regions. Two (2) reservoirs remain below 10% full: Palo Duro (3%) and Twin Buttes (9%).

Total combined storage was greater than or equal to 70% in the East (100%), Upper Coast (100%), North Central (100%), South Central (100%), Trans-Pecos (89%), and Low Rolling Plains (80%) regions. The region with the lowest percentage of storage was the High Plains (24%) region. Storage increased in six regions and decline in two regions over the past month.

Elephant Butte reservoir held 308,153 acre-feet or 16% of storage capacity. This is 27,000 acre-feet less than a month ago.

Storage is based on end of the month data in 114 major reservoirs that represent 96% of the total conservation storage capacity of 188 major water supply reservoirs in Texas. Major reservoirs are defined as having a conservation storage capacity of 5,000 acre-feet or greater. Only the Texas share of storage in border reservoirs is counted.



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CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of Lake or Reservoir	Conservation Storage Capacity (acre-feet)	Conservation Storage end of May 2016 (acre-feet)	(%)	Change since end of Apr 2016 (acre-feet)	(%)	Change since end of May 2015 (acre-feet)**	(%)
HIGH PLAINS							
Palo Duro Reservoir	61,066	2,020	3	406	1	486	1
Meredith, Lake (Texas)	500,000	133,120	27	247	0	83,807	17
Meredith, Lake (Texas & Oklahoma)	779,556	133,120	17	247	0	83,807	11
MacKenzie Reservoir	46,450	7,304	16	-112	-0	1,196	3
White River Lake	29,880	9,712	33	-9	-0	-767	-3
TOTAL	**637,396**	**152,156**	**24**	**532**	**0**	**84,722**	**13**
LOW ROLLING PLAINS							
Greenbelt Lake	59,968	15,788	26	1,398	2	2,386	4
N. Fork Buffalo Crk Reservoir	15,400	12,876	84	-251	-2	-1,539	-10
Kemp, Lake	245,307	245,307	100	1,069	0	86,274	35
Millers Creek Reservoir	26,768	26,768	100	0	0	0	0
Alan Henry Reservoir	94,808	89,862	95	2,068	2	-4,946	-5
Stamford, Lake	51,570	51,570	100	0	0	16,620	32
J B Thomas, Lake	199,931	137,303	69	-1,577	-1	-14,424	-7
Fort Phantom Hill, Lake	70,030	70,030	100	0	0	41,052	59
Sweetwater, Lake	12,267	2,589	21	426	3	898	7
Colorado City, Lake	30,758	8,121	26	-135	-0	502	2
Champion Creek Reservoir	41,580	10,256	25	930	2	7,739	19
Abilene, Lake	7,900	7,900	100	1,341	17	no data	
Coleman, Lake	38,075	38,075	100	0	0	15,474	41
Hords Creek Lake	8,443	7,248	86	2,366	28	3,621	43
TOTAL	**902,805**	**723,693**	**80**	**7,635**	**1**	**153,657**	**17**
NORTH CENTRAL							
Nocona, Lake (Farmers Crk)	21,444	21,444	100	0	0	0	0
Hubert H Moss Lake	24,058	24,058	100	1,436	6	0	0
Texoma, Lake (Texas)	1,258,113	1,258,113	100	0	0	0	0
Texoma, Lake (Texas & Oklahoma)	2,525,281	1,258,113	50	0	0	0	0
*Pat Mayse Lake	113,683	113,683	100	0	0	no data	
Kickapoo, Lake	86,345	86,345	100	0	0	0	0
Arrowhead, Lake	230,359	230,359	100	0	0	0	0
Bonham, Lake	11,027	11,027	100	0	0	0	0
Crook, Lake	9,195	9,195	100	0	0	0	0
Amon G Carter, Lake	19,266	19,266	100	0	0	0	0
Ray Roberts, Lake	788,167	788,167	100	0	0	0	0
Jim Chapman Lake (Cooper)	260,332	260,332	100	0	0	0	0
Graham, Lake	45,288	45,288	100	0	0	0	0
*Lost Creek Reservoir	11,950	11,950	100	0	0	0	0
Bridgeport, Lake	366,236	366,236	100	0	0	0	0
Lewisville Lake	563,228	563,228	100	0	0	0	0
Lavon Lake	406,388	406,388	100	0	0	0	0
Hubbard Creek Reservoir	318,067	314,674	99	114,831	36	219,596	69
Possum Kingdom Lake	523,873	523,384	100	2,447	0	6,350	1
*Mineral Wells, Lake	6,760	6,760	100	0	0	0	0
Weatherford, Lake	17,812	17,812	100	0	0	0	0
Eagle Mountain Lake	179,880	179,880	100	0	0	0	0
Worth, Lake	33,495	33,495	100	0	0	0	0
Grapevine Lake	164,703	164,703	100	0	0	0	0
Ray Hubbard, Lake	452,040	452,040	100	0	0	0	0
New Terrell City Lake	8,583	8,583	100	0	0	0	0
Palo Pinto, Lake	26,766	26,766	100	0	0	0	0
Benbrook Lake	85,648	85,648	100	0	0	0	0
Arlington, Lake	40,188	40,188	100	0	0	0	0

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of Lake or Reservoir	Conservation Storage Capacity (acre-feet)	Conservation Storage end of May 2016 (acre-feet)	(%)	Change since end of Apr 2016 (acre-feet)	(%)	Change since end of May 2015 (acre-feet)**	(%)
(North Central Continued)							
Joe Pool Lake	175,358	175,358	100	0	0	0	0
*Cisco, Lake	25,895	25,895	100	3,188	12	9,207	36
Leon, Lake	26,476	26,476	100	0	0	0	0
Granbury, Lake	125,756	119,531	95	-4,861	-4	-1,708	-1
Pat Cleburne, Lake	26,008	26,008	100	0	0	0	0
Waxahachie, Lake	10,780	10,780	100	0	0	0	0
Bardwell Lake	46,122	46,122	100	0	0	0	0
Proctor Lake	55,457	55,457	100	no data		0	0
Whitney, Lake	553,344	553,344	100	0	0	0	0
Aquilla Lake	43,243	43,243	100	0	0	0	0
Navarro Mills Lake	49,827	49,827	100	0	0	0	0
*Halbert, Lake	6,033	5,489	91	-179	-3	-139	-2
Richland-Chambers Reservoir	1,087,839	1,087,839	100	0	0	0	0
*Brownwood, Lake	128,839	128,839	100	0	0	6,303	5
Waco, Lake	189,418	189,418	100	0	0	0	0
Limestone, Lake	208,014	208,014	100	0	0	0	0
Belton Lake	435,225	435,225	100	0	0	0	0
Stillhouse Hollow Lake	227,771	227,771	100	0	0	0	0
Georgetown, Lake	36,823	36,823	100	0	0	0	0
Granger Lake	50,779	50,779	100	0	0	0	0
Tawakoni, Lake	871,685	871,685	100	0	0	0	0
Mountain Creek, Lake	22,850	22,850	100	0	0	0	0
Squaw Creek, Lake	151,250	151,250	100	0	0	0	0
TOTAL	**10,627,686**	**10,617,035**	**100**	**116,862**	**1**	**239,609**	**2**
EAST							
Wright Patman Lake	310,382	310,382	100	0	0	0	0
*Sulphur Springs, Lake	17,747	15,850	89	-1,897	-11	-1,897	-11
Cypress Springs, Lake	66,756	66,756	100	0	0	0	0
Bob Sandlin, Lake	190,822	190,822	100	0	0	0	0
Caddo, Lake	29,898	29,898	100	0	0	0	0
Martin, Lake	75,726	75,726	100	0	0	0	0
Monticello, Lake	34,740	34,740	100	0	0	0	0
Fork Reservoir, Lake	605,061	600,040	99	-5,021	-1	-5,021	-1
O the Pines, Lake	268,566	268,566	100	27,203	10	0	0
Cedar Creek Reservoir in Trinity	644,686	644,686	100	0	0	0	0
Athens, Lake	29,503	29,503	100	0	0	0	0
Palestine, Lake	367,303	367,303	100	0	0	0	0
Tyler, Lake	72,073	72,073	100	0	0	0	0
Murvaul, Lake	38,285	38,285	100	0	0	0	0
Jacksonville, Lake	25,670	25,670	100	0	0	0	0
Nacogdoches, Lake	39,522	39,522	100	0	0	0	0
Houston County Lake	17,113	17,113	100	0	0	0	0
Sam Rayburn Reservoir	2,857,077	2,857,077	100	0	0	0	0
Toledo Bend Reservoir (Texas)	2,236,450	2,236,450	100	0	0	0	0
Toledo Bend Reservoir (TX & LA)	4,472,900	2,236,450	50	0	0	0	0
*Livingston, Lake	1,785,348	1,785,348	100	0	0	0	0
B A Steinhagen Lake	66,961	57,513	86	-3,862	-6	-8,187	-12
Conroe, Lake	410,988	410,988	100	0	0	0	0
TOTAL	**10,190,677**	**10,174,311**	**100**	**16,423**	**0**	**-15,105**	**-0**
TRANS-PECOS							
Red Bluff Reservoir	151,110	134,078	89	-4,149	-3	15,621	10
TOTAL	**151,110**	**134,078**	**89**	**-4,149**	**-3**	**15,621**	**10**

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of Lake or Reservoir	Conservation Storage Capacity (acre-feet)	Conservation Storage end of May 2016 (acre-feet)	(%)	Change since end of Apr 2016 (acre-feet)	(%)	Change since end of May 2015 (acre-feet)**	(%)
EDWARDS PLATEAU							
Oak Creek Reservoir	39,210	18,392	47	2,034	5	10,322	26
E V Spence Reservoir	517,272	51,670	10	201	0	26,507	5
O C Fisher Lake	115,742	17,702	15	-394	-0	2,360	2
*O H Ivie Reservoir	554,340	86,261	16	9,111	2	4,135	1
Twin Buttes Reservoir	182,454	15,611	9	2,084	1	4,808	3
Nasworthy	9,615	8,085	84	195	2	-685	-7
Brady Creek Reservoir	28,808	13,359	46	975	3	4,826	17
Buchanan, Lake	816,904	811,484	99	2,816	0	411,238	50
Inks, Lake	13,962	13,962	100	1,055	8	1,070	8
Lyndon B Johnson, Lake	115,249	109,602	95	122	0	-607	-1
*Amistad Reservoir (Texas)	1,840,849	1,366,505	74	-4,485	-0	203,059	11
*Amistad Reservoir (TX & Mexico)	3,275,532	1,366,505	42	-4,485	-0	203,059	6
TOTAL	**4,234,405**	**2,512,633**	**59**	**13,714**	**0**	**667,033**	**16**
SOUTH CENTRAL							
Travis, Lake	1,113,348	1,113,348	100	0	0	267,232	24
*Austin, Lake	23,972	23,282	97	648	3	139	1
Somerville Lake	147,104	147,104	100	0	0	0	0
Canyon Lake	378,781	378,781	100	0	0	0	0
Medina Lake	254,823	254,823	100	90,917	36	123,623	49
*Coleto Creek Reservoir	31,040	31,040	100	0	0	0	0
TOTAL	**1,949,068**	**1,948,378**	**100**	**91,565**	**5**	**390,994**	**20**
UPPER COAST							
Houston, Lake	120,686	120,686	100	0	0	0	0
Texana, Lake	159,566	159,566	100	0	0	92	0
TOTAL	**280,252**	**280,252**	**100**	**0**	**0**	**92**	**0**
SOUTHERN							
Choke Canyon Reservoir	695,262	232,163	33	-1,078	-0	-11,799	-2
Corpus Christi, Lake	256,961	188,491	73	-4,701	-2	-59,390	-23
*Falcon Reservoir (Texas)	1,551,007	704,867	45	-62,883	-4	-2,233	-0
*Falcon Reservoir (TX & Mexico)	2,646,817	704,867	27	-62,883	-2	-2,233	-0
TOTAL	**2,503,230**	**1,125,521**	**45**	**-68,662**	**-3**	**-73,422**	**-3**
STATEWIDE TOTAL							
STATEWIDE TOTAL	**31,476,629**	**27,668,057**	**88**	**173,920**	**1**	**1,463,201**	**5**
Elephant Butte Reservoir	1,973,358	308,153	16	-27,075	-1	-91,770	-5

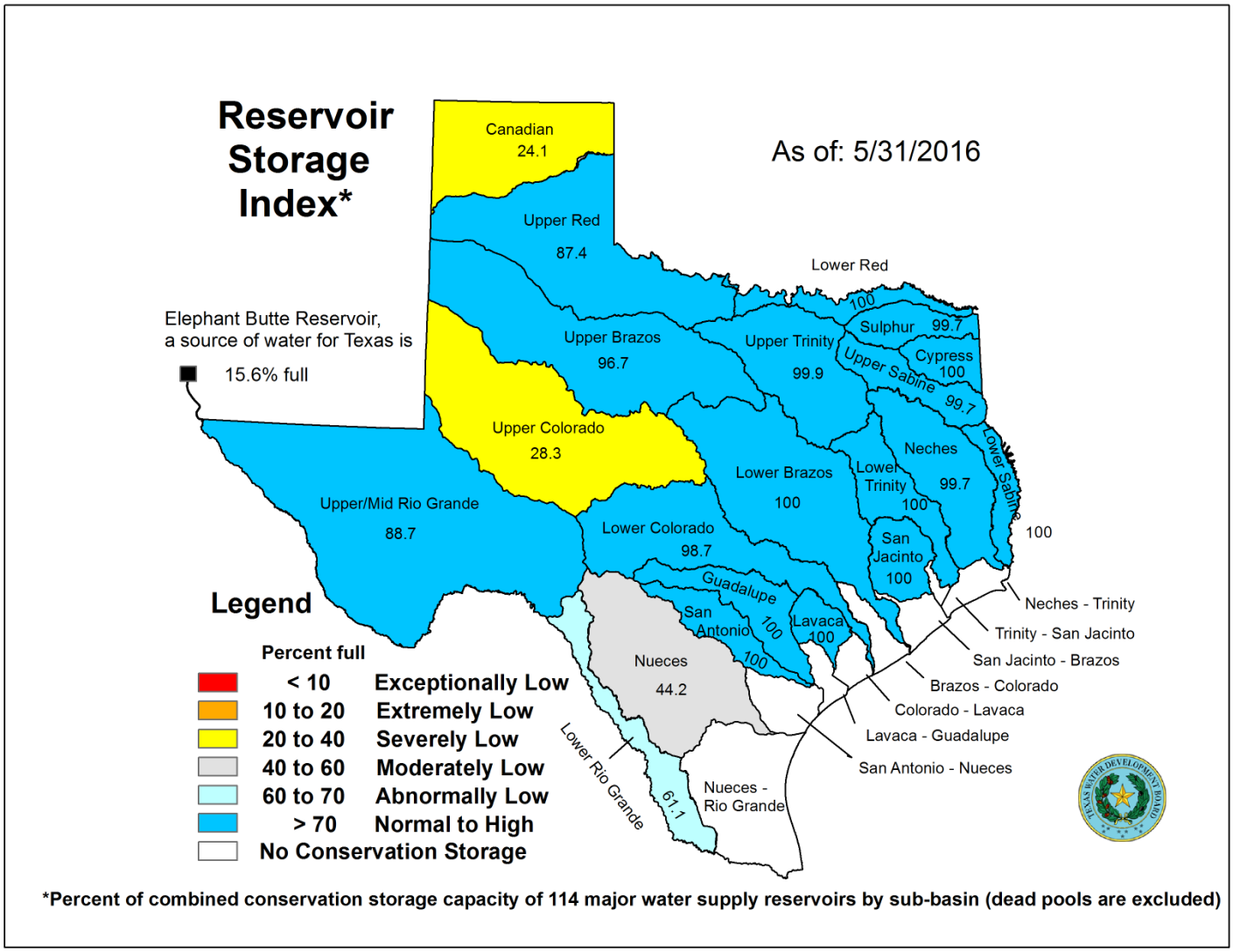
* Conservation volume is used as conservation storage capacity because the dead storage is unknown.

** Monthly and yearly changes do not include reservoirs that did not have data in last monthly or last year, respectively.

Note:

Conservation storage capacity is the space available to store water above the lowest outlet and below the top of conservation pool, or normal maximum operating level. Conservation storage refers to the volume of water held within the conservation storage space. Not included is any water in flood control storage (above the top of conservation pool or normal maximum operating level) or any water in the dead storage. Conservation storage percentage is based on the conservation storage capacity of the reservoir and the conservation storage in the reservoir on date shown. Percent change is given by 100*(current conservation storage - past conservation storage)/conservation storage capacity. Figures shown are for the Texas share of conservation storage in all reservoirs.

MAY 2016 RESERVOIR CONDITIONS



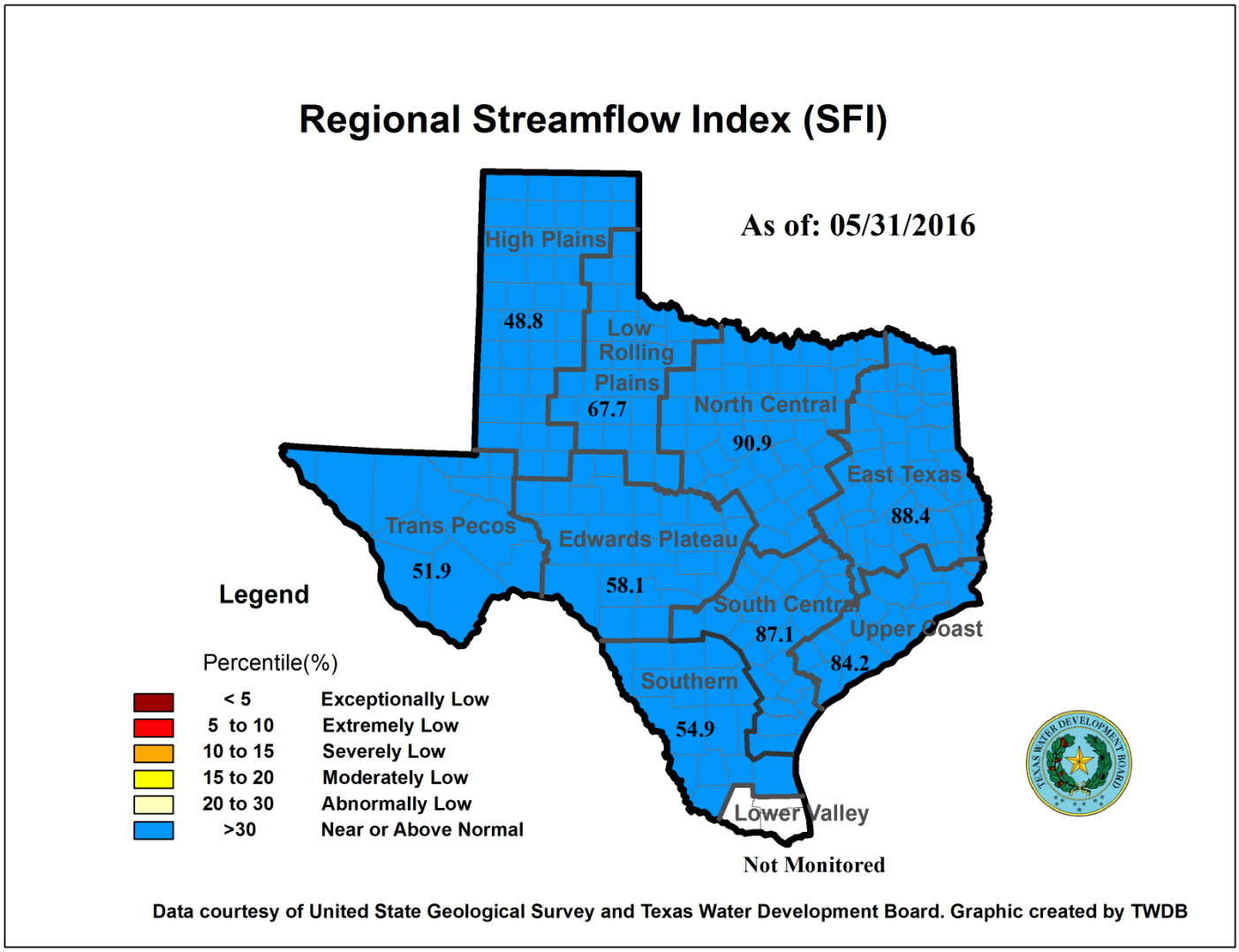
*Reservoir Storage Index is defined as the percent full of conservation storage capacity.

MAY 2016 STREAMFLOW CONDITIONS

The computed 30-day mean flow status for 29 reporting index stations monitored this month is presented below. Mean flow increased at 12 index stations, decreased at 16 stations, and remained unchanged at one (1) station.

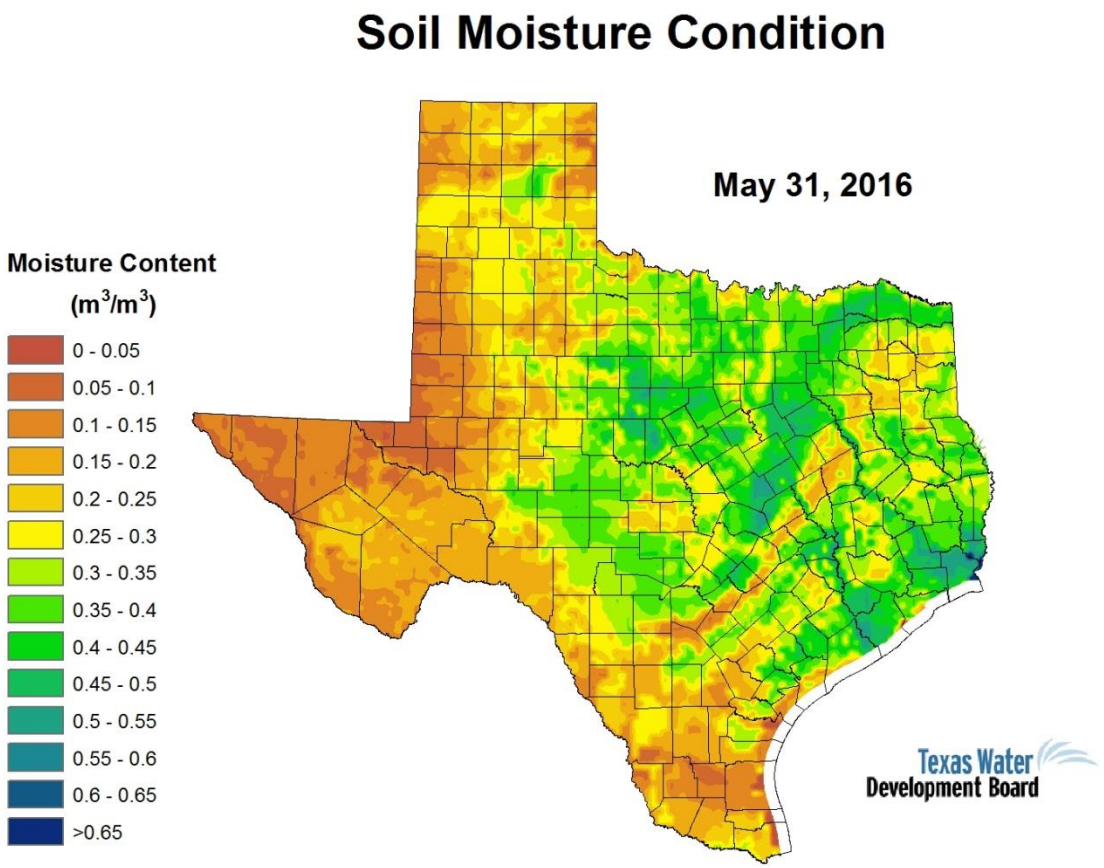
Streamflow Status	Number of Stations
Near or Above Normal (>30%)	28
Abnormally Low (20-30%)	0
Moderately Low (15-20%)	0
Severely Low (10-15%)	0
Extremely Low (5-10%)	1
Exceptionally Low (<5%)	0

On a regional basis, as shown below, flows at index stations were near or above normal in all nine regions. Streamflow in the Lower Valley region is not monitored.



*Streamflow Index is defined as the percentile flow that exceeds a given percent of observed flows.

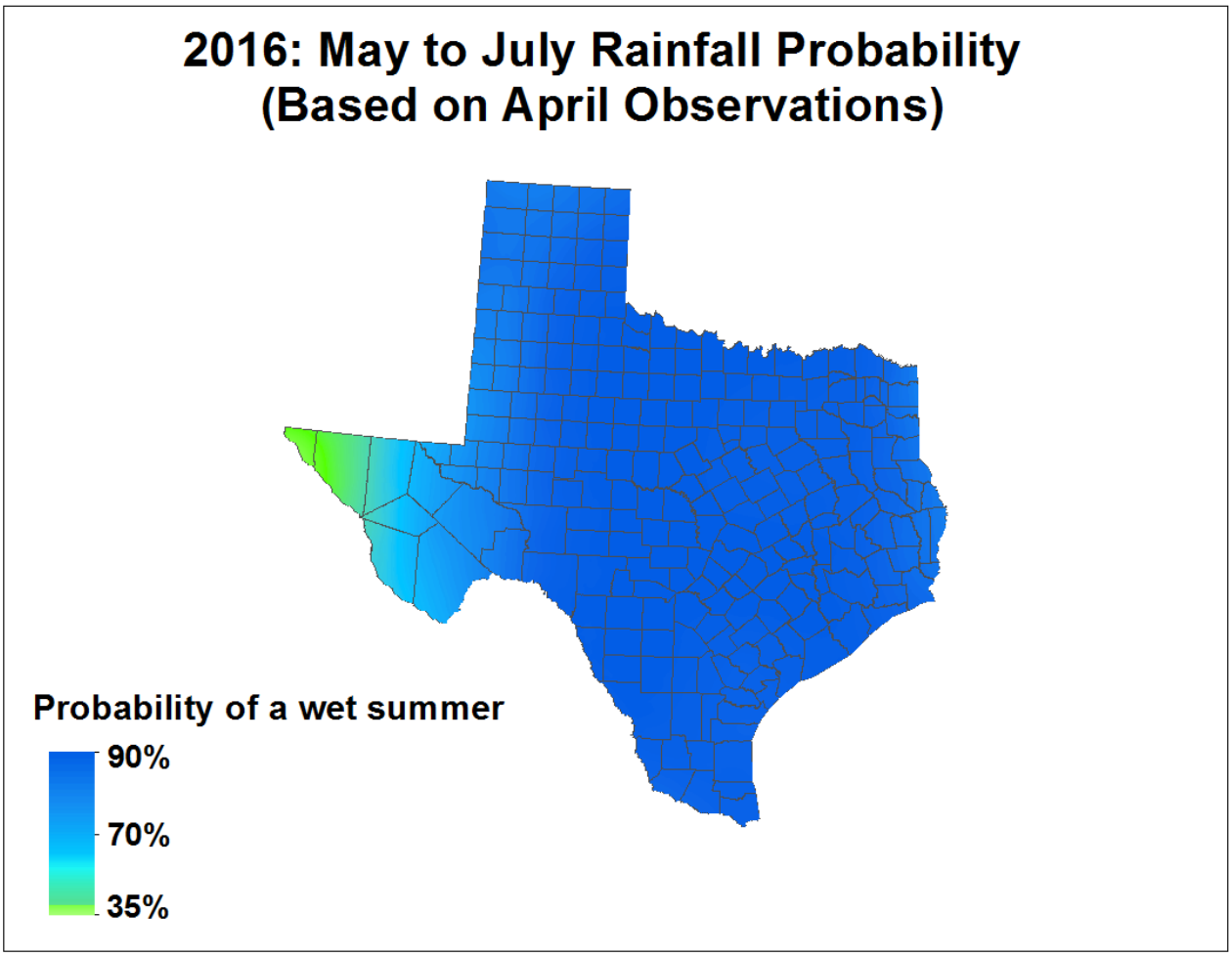
MAY 2016 SOIL MOISTURE CONDITIONS



Data from NASA Soil Moisture Active Passive (SMAP) Level 4 - Model - Value Added Version 2

Soil moisture content is shown as volume of water per unit volume of bulk soil. Root zone: 0 to 1 meter depth.

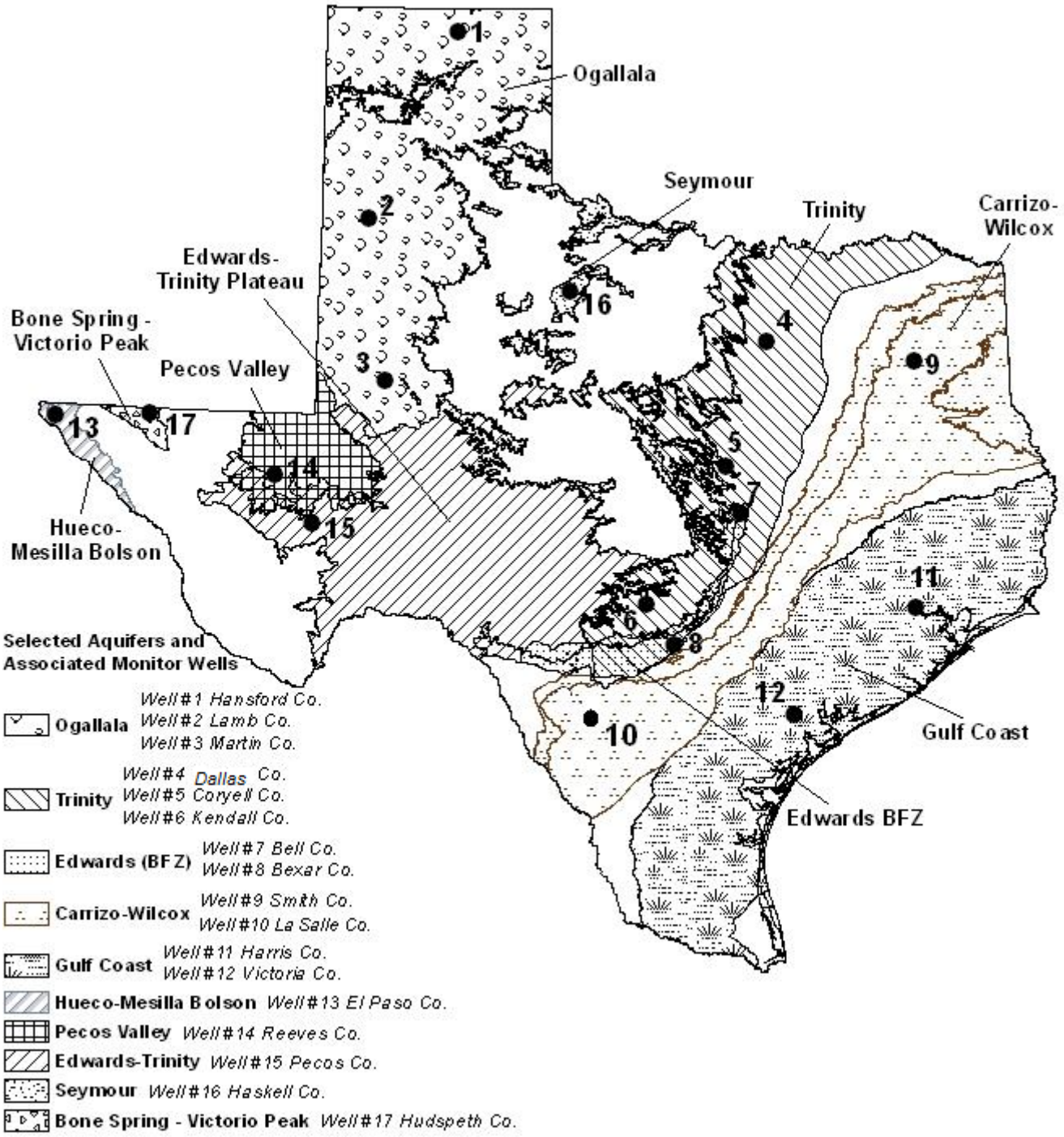
2016 SUMMER RAINFALL PROBABILITY FORECAST



Note:

1. The forecast map (above) provides information on the likelihood that total rainfall from May–July (MJJ) 2016 will be greater than normal, where the term "normal" refers to the average 3-month rainfall observed for MJJ over the time period 1982–2015.
2. The forecast is based on April observations of select atmospheric circulation patterns and soil moisture over Texas known to be influential in driving MJJ rainfall. The forecast is generated using the methodology described in the TWDB Technical Note 15-02 on 'Early warning of summer drought over Texas and the south central United States: spring conditions as a harbinger of summer drought'. It is built on an understanding of the spring drivers of intense summer drought over Texas.
3. A seasonal rainfall forecast typically provides information on the likelihood of above-, near-, or below-normal rainfall for a given season. The forecast is expressed as occurrence probabilities for each of three possible categories: below-normal, near-normal, or above-normal.
4. If there is no clear signal of whether the coming season is going to be wetter or dryer than normal, each category would have an equal likelihood of occurring. Each category would then be assigned a 33.3% probability of occurrence. If, however, there is a clear signal that the coming season is going to be wetter or dryer than normal, then either the wetter or the dryer category will have a greater probability of occurring. For example, if there is a clear signal that the coming MJJ season is going to be dryer than normal, the probabilities for each forecast category might be 55% for the below-normal category, 20% for the near-normal category, and 25% for the above-normal category.
5. For each county, only the highest probability value is shown in shading on the map. For MJJ 2016, all counties have probabilities for above-normal exceeding 35%. Therefore, only the above-normal category is depicted on the map (above).
6. The forecast does not provide information on how much wetter than normal each county is going to be in the MJJ season. The forecast only provides an estimate of what the chances are for each county to experience an MJJ season that will be wetter than the long-term average.
7. The rainfall forecasts provided are only for the MJJ season because the tool is specifically designed to incorporate physical mechanisms in the spring known to influence summer rainfall over Texas. Further research on drivers of rainfall in other seasons is needed before a tool to forecast rainfall in these seasons can be developed.
8. The MJJ rainfall probability forecasts by county are available at: http://www.waterdatafortexas.org/drought/drought-forecast

MAY 2016 GROUNDWATER LEVELS IN OBSERVATION WELLS



May 2016

Water-level measurements were available for 17 key monitoring wells in the state. Water levels rose in 10 monitoring wells since the beginning of May, ranging from an increase of 0.05 feet in the Hansford County Ogallala Aquifer well to 8.9 feet in the Bexar County Edwards (Balcones Fault Zone) Aquifer well. Water levels declined in seven monitoring wells, ranging from a decline of 0.02 feet in the Lamb County Ogallala Aquifer well to 8.05 feet in the Pecos County Edwards-Trinity (Plateau) Aquifer well. The J-17 well in San Antonio recorded a water level of 50.91 feet below land surface or 680.09 feet above mean sea level. There are no restrictions currently in place for the San Antonio portion of the Edwards (Balcones Fault Zone), with water levels at 20.09 feet above Stage I critical management levels.

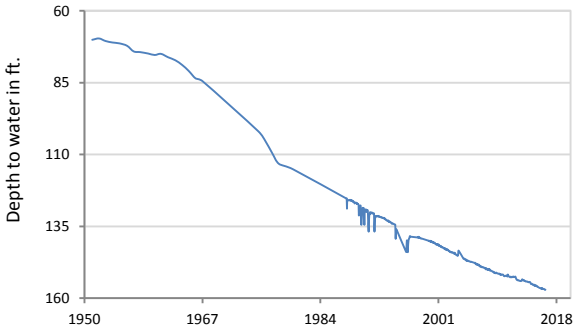
***IDs used in this publication on the aquifer map to indicate the monitoring well location (IDs 1 - 17) are different than the TWDB's six- or seven-digit state well identification number.**

Monitoring Well	May	April	Month Change	Year Change	Historical Change	First Measured
(1) Hansford 0354301	157.02	157.07	0.05	-0.80	-86.90	1951
(2) Lamb 1053602	146.60	146.58	-0.02	-1.2	-118.45	1951
(3) Martin 2739903	142.75	142.49	-0.26	-0.86	-37.86	1964
(4) Dallas 3319101	494.47	495.08	0.61	-4.77	-272.47	1954
(5) Coryell 4035404	505.34	506.58	1.24	-4.46	-213.34	1955
(6) Kendall 6802609	107.67	113.69	6.02	1.01	-47.67	1975
(7) Bell 5804816	118.01	119.46	1.45	3.37	5.33	2008
(8) Bexar 6837203	50.91	59.81	8.9	14.60	4.3	1932
(9) Smith 3430907	432.57	431.9	-0.67	0.12	-66.57	1987
(10) La Salle 7738103	453.60	453.9	0.3	44.39	-200.52	2003
(11) Harris 6514409	189.06	188.82	-0.24	-2.87	-53.56*	1947**
(12) Victoria 8017502	33.43	36.64	3.21	1.89	0.57	1958
(13) El Paso 4913301	294.95	295.77	0.82	2.95	-63.05	1964
(14) Reeves 4644501	167.43	162.69	-4.74	-10.71	-75.34	1952
(15) Pecos 5216802	211.04	202.99	-8.05	2.0	35.84	1976
(16) Haskell 2135748	46.43	46.52	0.19	2.17	-3.43	2002
(17) Hudspeth 4807516	147.24	144.28	-2.96	-1.76	-43.32	1966

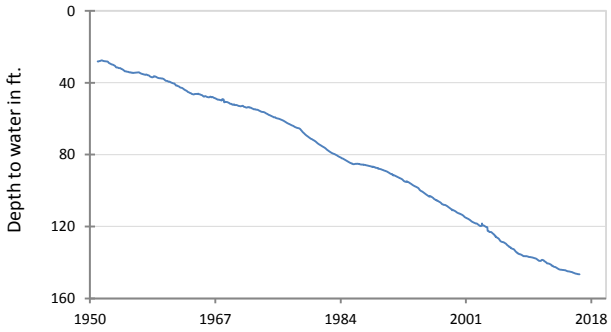
*Change since the original measurement of 135.5 feet below land surface in 1947. (**measurement not shown on the hydrograph)

MAY 2016 GROUNDWATER LEVELS IN OBSERVATION WELLS

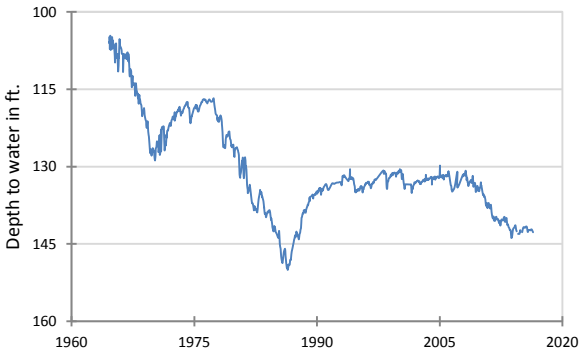
(1) State Well ID 03-54-301
Near Spearman, Hansford County
Ogallala Aquifer



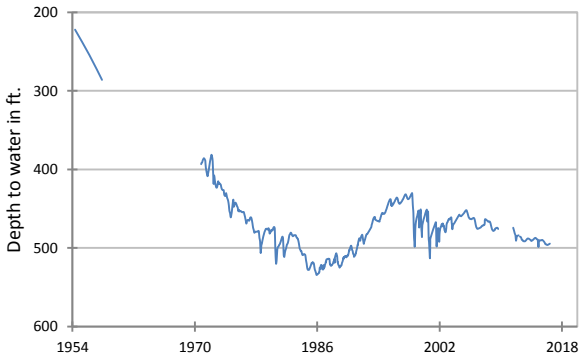
(2) State Well ID 10-53-602
Near Earth, Lamb County
Ogallala Aquifer



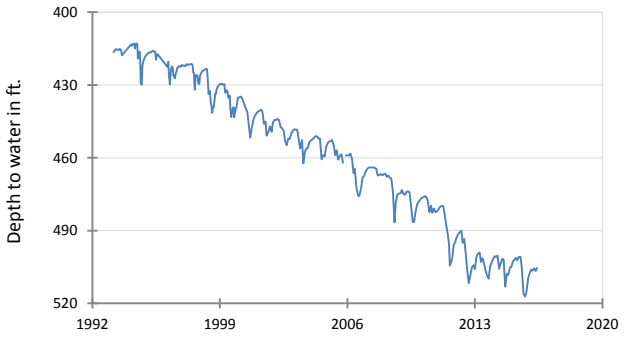
(3) State Well ID 27-39-903
Northwest Martin County
Ogallala Aquifer



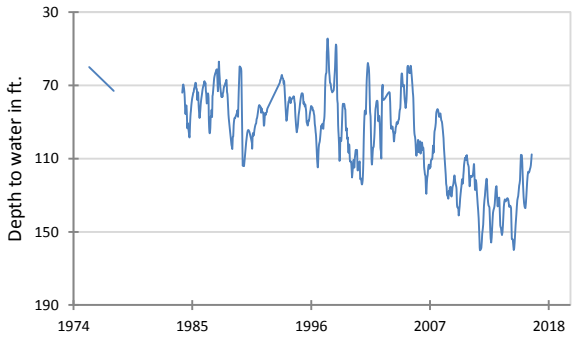
(4) State Well ID 33-19-101
Southeast Dallas, Dallas County
Twin Mountains Formation-Trinity Aquifer



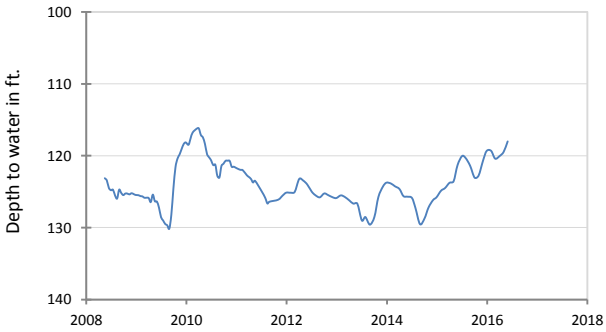
(5) State Well ID 40-35-404
Gatesville, Coryell County
Hosston Formation-Trinity Aquifer



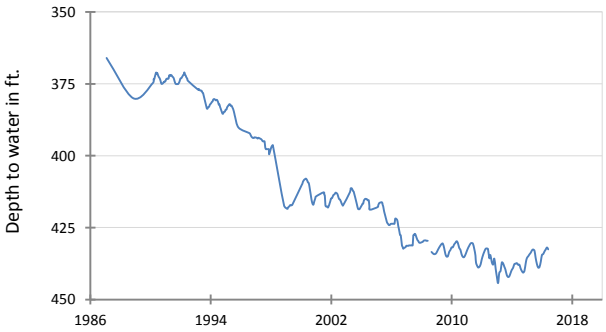
(6) State Well ID 68-02-609
Waring, Kendall County
Cow Creek Formation-Trinity Aquifer



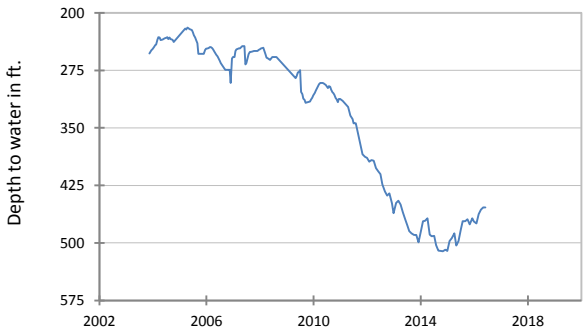
(7) State Well ID 58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer



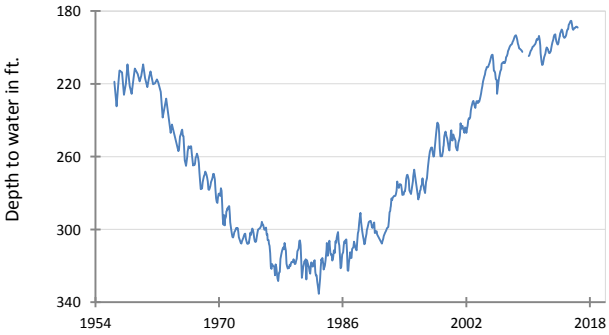
(9) State Well ID 34-30-907
Red Springs, Smith County
Carrizo-Wilcox Aquifer



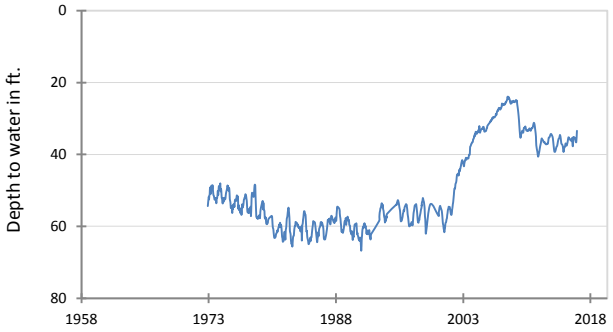
(10) State Well ID 77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer



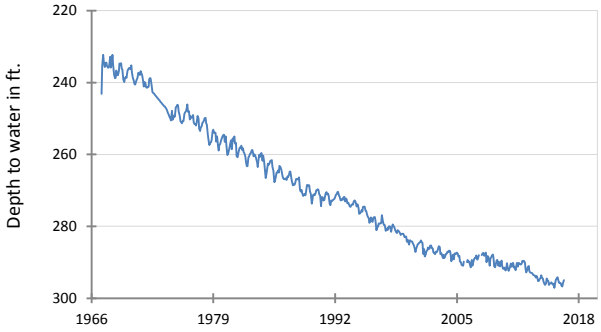
(11) State Well ID 65-14-409
Alief, Harris County
Evangeline Formation-Gulf Coast Aquifer



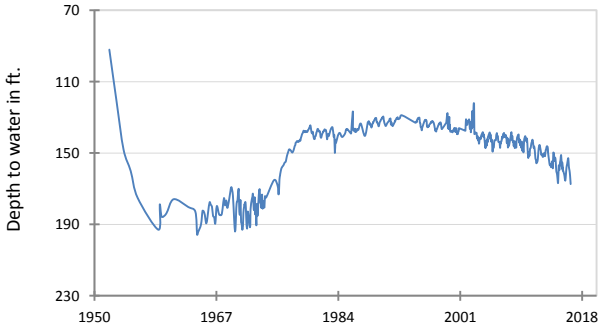
(12) State Well ID 80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



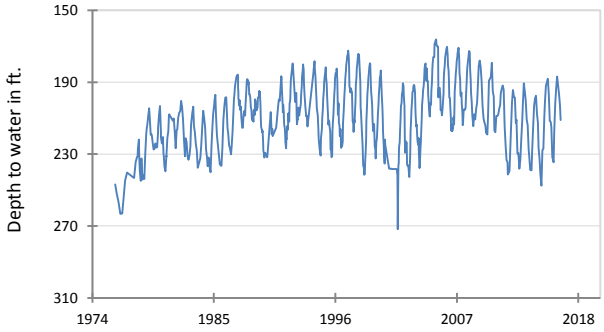
(13) State Well ID 49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolson Aquifer



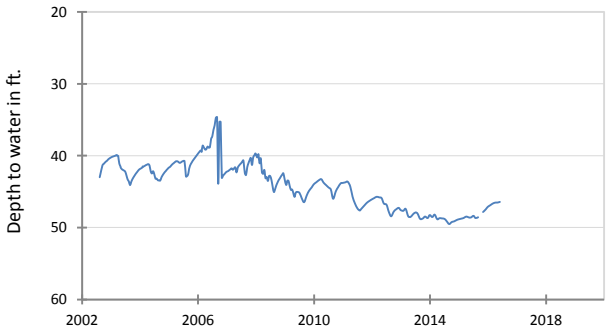
(14) State Well ID 46-44-501
Near Pecos, Reeves County
Pecos Valley Aquifer



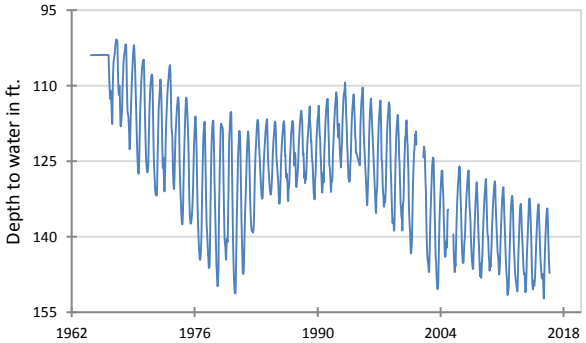
(15) State Well ID 52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



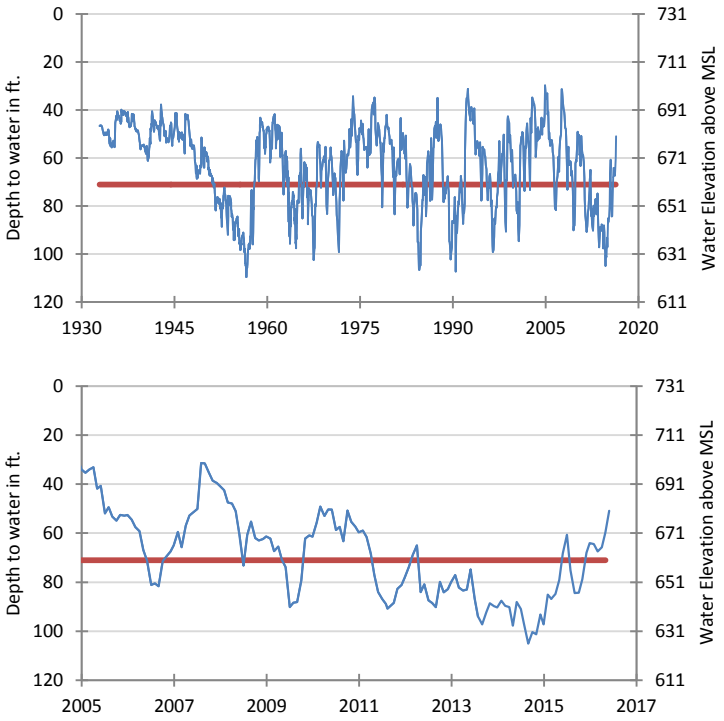
(16) State Well ID 21-35-748
Near O'Brien, Haskell County
Seymour Aquifer



(17) State Well ID 48-07-516
Dell City, Hudspeth County
Bone Spring - Victorio Peak Aquifer

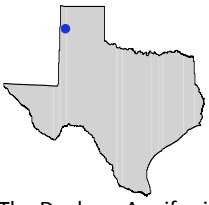


(8) State Well ID 68-37-203 (J-17)
In San Antonio, Bexar County
Edwards (Balcones Fault Zone) Aquifer



The late May water-level measurement in this Edwards (Balcones Fault Zone) Aquifer well, elevation 731 feet above mean sea level, was 50.91 feet below land surface, or 680.09 feet above mean sea level. This was 8.9 feet above last month's measurement, 14.6 feet above last year's measurement, and 4.3 feet below the initial measurement recorded in 1932.

***** Water levels below the red line indicate periods in which Edwards Aquifer Authority Stage I drought restrictions are in effect. *****

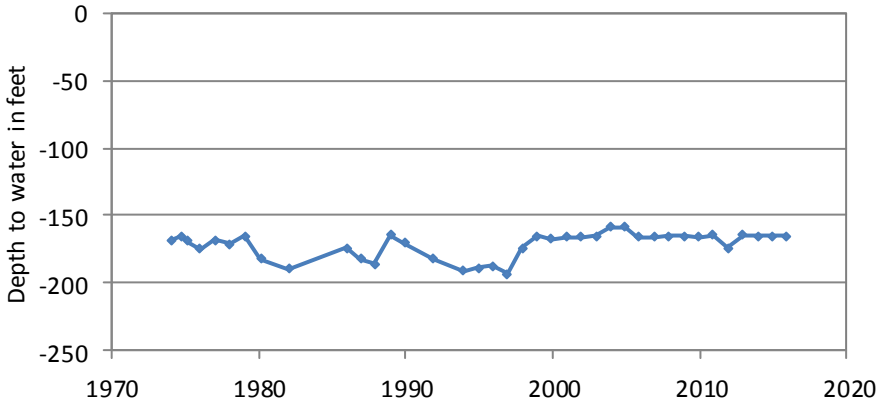


HYDROGRAPH OF THE MONTH

Each month this space features a new hydrograph (marked with the • symbol on the map) depicting different aquifers and their conditions in Texas.

Dockum Aquifer

Well #0750601, 204 feet deep
Stock, northern Deaf Smith County



The Dockum Aquifer is a minor aquifer located in the northwest part of the state. It is defined stratigraphically by the Dockum Group and includes, from youngest to oldest, the Santa Rosa Formation, the Tecavos Formation, the Trujillo Sandstone, and the Cooper Canyon Formation. The Dockum Group consists of gravel, sandstone, siltstone, mudstone, shale, and conglomerate. Groundwater located in the sandstone and conglomerate units is recoverable. The water quality in the aquifer is very hard and generally poor-with freshwater outcrop areas in the east and brine in the western subsurface portions of the aquifer. Naturally occurring radioactivity from uranium present within the aquifer has resulted in gross alpha radiation in excess of the state's primary drinking standard. Radium-226 and -228 also occur in amounts above acceptable standards. Groundwater from the aquifer is used for irrigation, municipal water supply, and oil field waterflooding operations, particularly in the southern high plains. Water level rises and declines have occurred in different areas of the aquifer.

The water level has been measured consistently by the TWDB since 1974. The water level has remained relatively constant, and the measurements have stayed within a range of 34.62 feet. The lowest measurement of 193.5 feet below land surface in 1996 was during a year of drought, and the highest measurement of 158.88 feet below land surface in 2004 was during a year of high precipitation.