Texas Water Conditions Report

Texas Water Development Board

May 2019

RAINFALL

Rainfall is the primary source influencing water conditions in Texas. Observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that total rainfall for May [Figure 1(a)] over the North Central, East Texas, northern and central South Central, Edwards Plateau, northern and central Upper Coast, northern and western Southern, eastern Trans Pecos, southern and central Low Rolling Plains, northern, north central and southern High Plains climate divisions was above-average compared to historical data from 1981–2010. Rainfall exceeded 15” in portions of the East Texas and Upper Coast climate divisions. Rainfall in the south-central High Plains, southwestern and northern Trans Pecos, southwestern and southeastern Southern, and the Lower Valley climate divisions was below-average [Figure 1(b)].

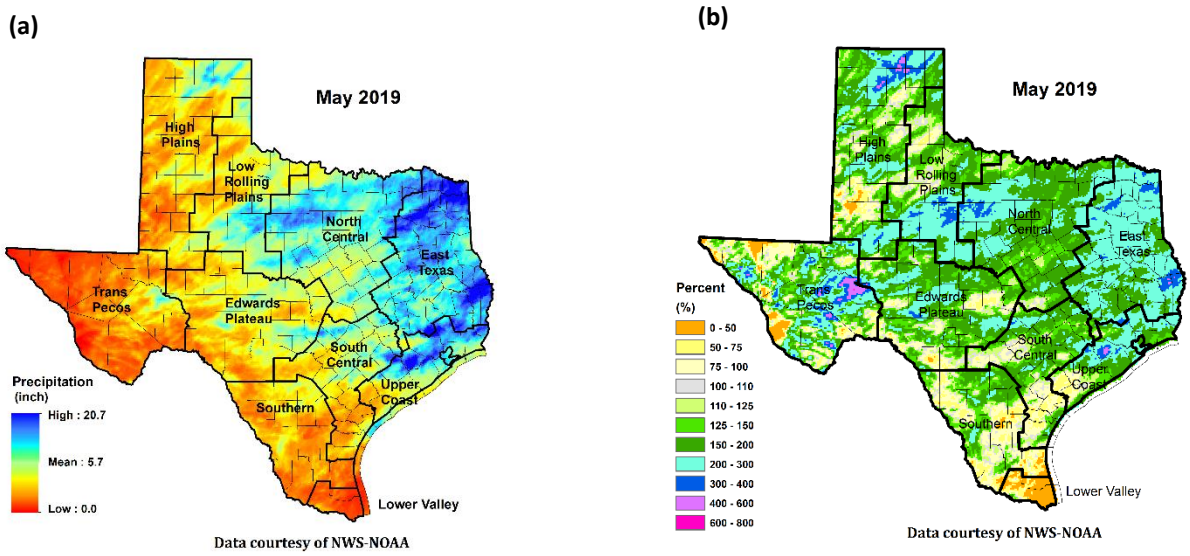

Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for May 2019

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RESERVOIR STORAGE

At the end of May 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 28.7 million acre-feet or 89 percent of total conservation storage capacity (Figure 2). This is approximately 0.29 million acre-feet more than a month ago and 2.4 million acre-feet more than end-May 2018.

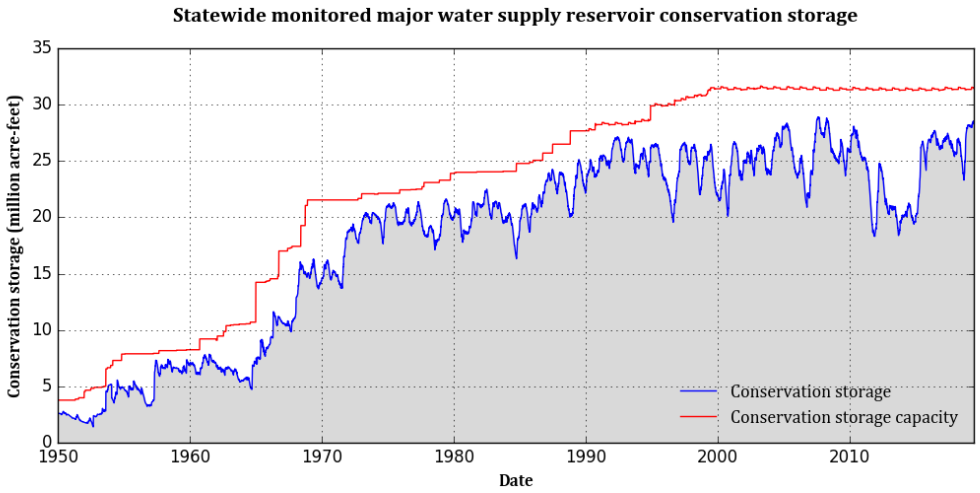


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 86 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 13 were above 90 percent full. Six reservoirs [Palo Duro Reservoir (17 percent full), Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (24 percent full) Greenbelt (22 percent full), and E. V. Spence (29 percent full)] remained below 30 percent full. Notable though was the 17-percentage point increase in storage in Palo Duro Reservoir from end-April 2019. There were 9 reservoirs with low storage (below 70 percent full) located in the Panhandle, West, and South Texas regions. Elephant Butte Reservoir (located in New Mexico) was at 25 percent full, which is an improvement of 9 percentage points from the end of April 2019.

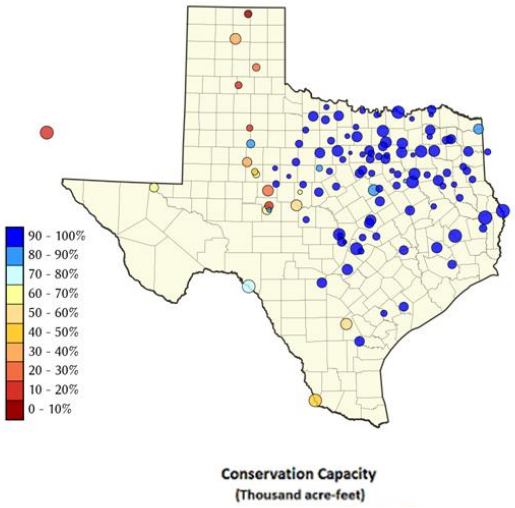


Figure 3: Reservoir conservation storage at end-May expressed as percent full (%)

Storage is based on end of the month data in 118 major reservoirs that represent 96 percent of the total conservation storage capacity of 188 major water supply reservoirs in Texas plus Elephant Butte Reservoir in New Mexico. 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.

Total regionally-combined conservation storage was at or above-normal (storage ≥70 percent full) in the Upper Coast (95.4 percent full), East Texas (99.8 percent full), North Central (99.9 percent full), South Central (99.9 percent full), and Low Rolling Plains (76.7 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (35.7 percent full) and storage in the Southern climate division was moderately low (50.3 percent full). Storage was severely low (30.5 percent full) in the Trans Pecos climate division. Combined conservation storage by river basin or sub-basin depicts a similar picture (Figure 4). Storage in basins/sub-basins in the North Central, Eastern, and South-Central regions of the state was normal to high (>70 percent full). The Upper/Mid Rio Grande and the Canadian River Basin had severely low storage, the Upper Colorado had moderately low storage, and the Lower Rio Grande and the Nueces had abnormally low storage.

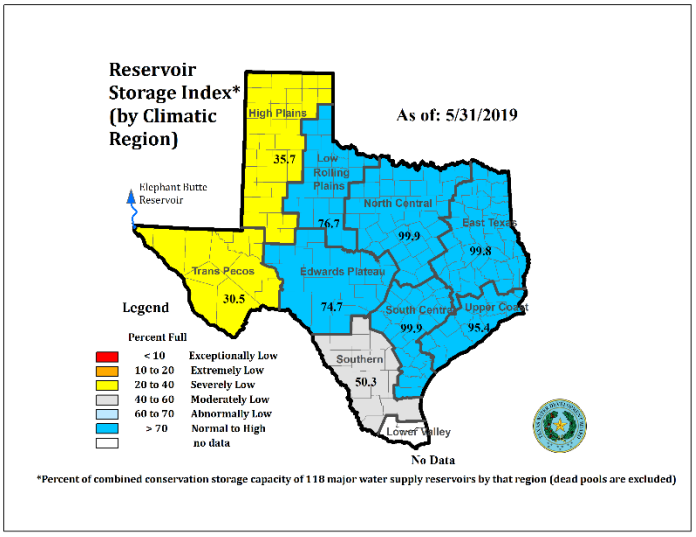


Figure 3: Reservoir Storage Index by climate division at 5/31/2019

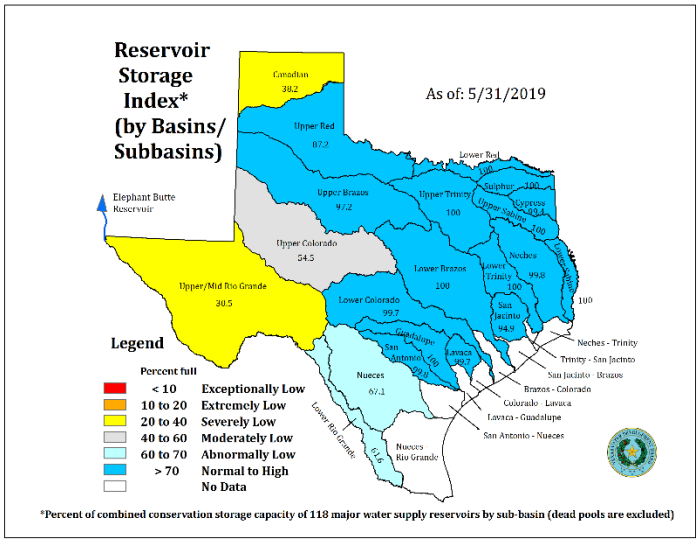


Figure 4: Reservoir Storage Index by river basin/sub-basin at 5/31/2019

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

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-May		Storage change from end-April 2019		Storage change from end-May 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Abilene, Lake	7,900	7,900	100	0	0	4,177	53
Alan Henry Reservoir	96,207	92,383	96	2,139	2	11,660	12
*Amistad Reservoir (Texas & Mexico)	1,840,849	1,466,273	80	59,070	3	117,786	6
*Amistad Reservoir (Texas)	3,275,532	1,620,618	49	-160,672	-5	-113,383	-3
Amon G Carter, Lake	19,266	19,266	100	0	0	0	0
Aquilla Lake	43,243	43,243	100	0	0	890	2
Arlington, Lake	40,188	39,230	98	-958	-2	2,519	6
Arrowhead, Lake	230,359	230,359	100	0	0	24,731	11
Athens, Lake	29,503	29,503	100	0	0	0	0
*Austin, Lake	23,972	22,865	95	-107	0	108	0
B A Steinhagen Lake	66,961	61,882	92	810	1	1,114	2
Bardwell Lake	46,122	46,122	100	0	0	438	1
Belton Lake	435,225	435,225	100	0	0	23,550	5
Benbrook Lake	85,648	85,648	100	0	0	5,028	6
Bob Sandlin, Lake	192,417	192,417	100	0	0	0	0
Bonham, Lake	11,027	11,027	100	0	0	116	1
Brady Creek Reservoir	28,808	28,744	100	-64	0	13,449	47
Bridgeport, Lake	366,236	366,236	100	0	0	13,421	4
*Brownwood, Lake	128,839	128,839	100	0	0	28,662	22
Buchanan, Lake	860,607	816,688	100	1,302	0	61,706	8
Caddo, Lake	29,898	29,898	100	0	0	0	0
Canyon Lake	378,781	378,781	100	0	0	31,322	8
Cedar Creek Reservoir in Trinity	644,686	644,686	100	0	0	7,821	1
Champion Creek Reservoir	41,580	30,515	73	2,323	6	11,392	27
Cherokee, Lake	40,094	40,094	100	0	0	20	0
Choke Canyon Reservoir	662,820	360,979	54	0	0	180,142	27
*Cisco, Lake	29,003	27,997	97	2,754	9	4,997	17
Coleman, Lake	38,075	38,075	100	0	0	5,886	15
Colorado City, Lake	31,040	31,040	100	47	0	6,073	20
*Coleto Creek Reservoir	30,758	15,938	52	1,098	4	5,060	16
Conroe, Lake	410,988	393,916	96	-1,126	0	-14,772	-4
Corpus Christi, Lake	256,062	255,864	100	789	0	56,198	22
Crook, Lake	9,195	9,195	100	0	0	125	1
Cypress Springs, Lake	66,756	66,756	100	0	0	388	1
E. V. Spence Reservoir	517,272	150,430	29	8,684	2	92,477	18
Eagle Mountain Lake	179,880	179,880	100	0	0	7,237	4
Elephant Butte Reservoir (Texas)	852,491	209,681	25	75,138	9	62,860	7
Elephant Butte Reservoir (Total Storage)	1,973,358	485,373	25	173,931	9	145,510	7
*Falcon Reservoir (Texas & Mexico)	1,551,007	624,770	40	-103,850	-7	111,710	7
*Falcon Reservoir (Texas)	2,646,817	875,491	33	-52,108	-2	213,806	8
Fork Reservoir, Lake	605,061	605,061	100	0	0	20,353	3
Fort Phantom Hill, Lake	70,030	70,030	100	0	0	12,062	17
Georgetown, Lake	36,823	36,823	100	0	0	12,370	34
Graham, Lake	45,288	45,288	100	0	0	3,302	7
Granbury, Lake	132,949	132,949	100	1,221	1	6,657	5

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-May		Storage change from end-April 2019		Storage change from end-May 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Granger Lake	51,822	51,822	100	0	0	0	0
Grapevine Lake	164,703	164,703	100	0	0	2,981	2
Greenbelt Lake	59,968	13,358	22	601	1	-905	-2
*Halbert, Lake	6,033	5,334	88	-155	-3	55	1
Hords Creek Lake	8,443	7,240	86	1,583	19	2,310	27
Houston County Lake	17,113	17,113	100	0	0	193	1
Houston, Lake	120,686	119,451	92	-10696	-8	-10696	-8
Hubbard Creek Reservoir	313,298	313,298	100	0	0	60,740	19
Hubert H Moss Lake	24,058	24,014	100	-44	0	333	1
Inks, Lake	13,962	12,892	92	0	0	-60	0
J. B. Thomas, Lake	199,931	67,619	34	-40	0	-15,359	-8
Jacksonville, Lake	25,670	25,670	100	0	0	12	0
Jim Chapman Lake (Cooper)	260,332	260,332	100	0	0	12,242	5
Joe Pool Lake	175,358	175,358	100	0	0	1,328	1
Kemp, Lake	245,307	245,307	100	0	0	38,338	16
Kickapoo, Lake	86,345	86,345	100	0	0	14,319	17
Lavon Lake	406,388	406,388	100	0	0	7,791	2
Leon, Lake	27,762	27,762	100	0	0	5,776	21
Lewisville Lake	563,228	563,228	100	0	0	18,737	3
Limestone, Lake	203,780	203,780	100	0	0	16,916	8
*Livingston, Lake	1,785,348	1,785,348	100	0	0	0	0
*Lost Creek Reservoir	11,950	11,950	100	0	0	139	1
Lyndon B Johnson, Lake	115,249	110,759	96	1,097	1	123	0
Mackenzie Reservoir	46,450	5,763	12	152	0	-608	-1
Marble Falls, Lake	6,901	6,858	99	49	1	22	0
Martin, Lake	75,726	75,084	99	-642	-1	1,325	2
Medina Lake	254,823	254,217	100	4,163	2	106,636	42
Meredith, Lake	500,000	203,784	41	10,209	2	5,832	1
Millers Creek Reservoir	26,768	26,768	100	0	0	4,727	18
*Mineral Wells, Lake	5,273	5,273	100	0	0	316	6
Monticello, Lake	34,740	31,098	90	372	1	1,415	4
Mountain Creek, Lake	22,850	22,850	100	0	0	0	0
Murvaul, Lake	38,285	38,285	100	0	0	1,093	3
Nacogdoches, Lake	39,522	39,325	100	174	0	1,752	4
Nasworthy	9,615	8,418	88	-88	-1	842	9
Navarro Mills Lake	49,827	49,827	100	0	0	0	0
New Terrell City Lake	8,583	8,583	100	0	0	52	1
Nocona, Lake (Farmers Crk)	21,444	21,444	100	0	0	26	0
North Fork Buffalo Creek Reservoir	15,400	15,400	100	0	0	2,799	18
O' the Pines, Lake	241,363	268,566	100	27,203	10	14,515	5
O. C. Fisher Lake	119,445	17,024	14	231	0	6,331	5
*O. H. Ivie Reservoir	554,340	380,712	69	61,920	11	285,916	52
Oak Creek Reservoir	39,210	39,210	100	0	0	21,472	55

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-May		Storage change from end-April 2019		Storage change from end-May 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Palestine, Lake	367,303	367,303	100	0	0	6,893	2
Palo Duro Reservoir	61,066	10,543	17	10,267	17	9,998	16
Palo Pinto, Lake	26,766	26,766	100	0	0	4,269	16
Pat Cleburne, Lake	26,008	26,008	100	0	0	297	1
*Pat Mayse Lake	113,683	113,683	100	0	0	0	0
Possum Kingdom Lake	538,139	527,299	98	-9,766	-2	9,283	2
Proctor Lake	54,762	54,762	100	0	0	12,550	23
Ray Hubbard, Lake	439,559	438,306	100	418	0	10,100	2
Ray Roberts, Lake	788,167	788,167	100	0	0	1,134	0
Red Bluff Reservoir	151,110	96,184	64	-2,755	-2	281	0
Richland-Chambers Reservoir	1,087,839	1,087,839	100	0	0	0	0
Sam Rayburn Reservoir	2,857,077	2,857,077	100	0	0	94,022	3
Somerville Lake	147,104	147,104	100	0	0	1,515	1
Squaw Creek, Lake	151,250	151,250	100	0	0	0	0
Stamford, Lake	51,570	51,570	100	0	0	9,673	19
Stillhouse Hollow Lake	227,771	227,771	100	0	0	28,434	12
Striker, Lake	16,934	16,934	100	2	0	0	0
Sweetwater, Lake	12,267	12,267	100	0	0	10,169	83
*Sulphur Springs, Lake	17,747	17,747	100	3,245	18	1,962	11
Tawakoni, Lake	871,685	871,685	100	0	0	11,415	1
Texana, Lake	159,566	159,106	100	8,155	5	39,340	25
Texoma, Lake (Texas & Oklahoma)	1,258,113	1,258,113	100	0	0	0	0
Texoma, Lake (Texas)	2,525,281	3,493,145	100	889,234	35	814,451	32
Toledo Bend Reservoir (Texas & Louisiar	2,236,450	2,236,450	100	125,629	6	170,204	8
Toledo Bend Reservoir (Texas)	4,472,900	4,540,683	100	314,941	7	404,091	9
Travis, Lake	1,113,348	1,113,348	100	0	0	278,439	25
Twin Buttes Reservoir	182,454	135,491	74	11,758	6	122,705	67
Tyler, Lake	72,073	72,073	100	0	0	611	1
Waco, Lake	189,418	189,418	100	0	0	5,305	3
Waxahachie, Lake	10,780	10,780	100	0	0	122	1
Weatherford, Lake	17,812	17,812	100	0	0	859	5
White River Lake	29,880	7,239	24	2,062	7	2,325	8
Whitney, Lake	553,344	553,344	100	0	0	37,851	7
Worth, Lake	33,495	33,495	100	0	0	3,665	11
Wright Patman Lake	310,382	310,382	100	0	0	0	0
STATEWIDE TOTOL							
STATEWIDE TOTAL	**32,379,096**	**28,707,372**	**89**	**294,374**	**1**	**2,416,232**	**7**

* Total volume below elevation of conservation pool top is used as conservation storage capacity, because the dead pool storage is unknown.
**Monthly and yearly changes do not include reservoirs that did not have data in the last month or last year.

Note:
Conservation storage capacity is the space available to store water above the lowest outlet and below the top of the conservation pool (some may have seasonal variations), 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 the conservation pool or normal maximum operating level) or any water in the dead pool 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.

STREAMFLOW CONDITIONS

Computed runoff by hydrologic unit codes for May 2019 show that much of the state had above normal (76–90th percentile, light blue shading in Figure 6) or near normal (25–75th percentile, green shading in Figure 6) streamflow. A couple of sub-basins in the Canadian, Lower Red, Sulphur, Sabine, Neches, Trinity, Brazos, and Lower Colorado river basins had much above normal (> 90th percentile, dark blue shading in Figure 6) streamflow. A few sub-basins located in the Sabine, the Upper Trinity, Lower Trinity, and lower reaches of the Upper Colorado river basins had record high (black shading in the Figure 6) streamflow. Some sub-basins in the Upper Rio Grande and the Upper Colorado had below normal (10–24th percentile, light brown shading in Figure 6) streamflow.

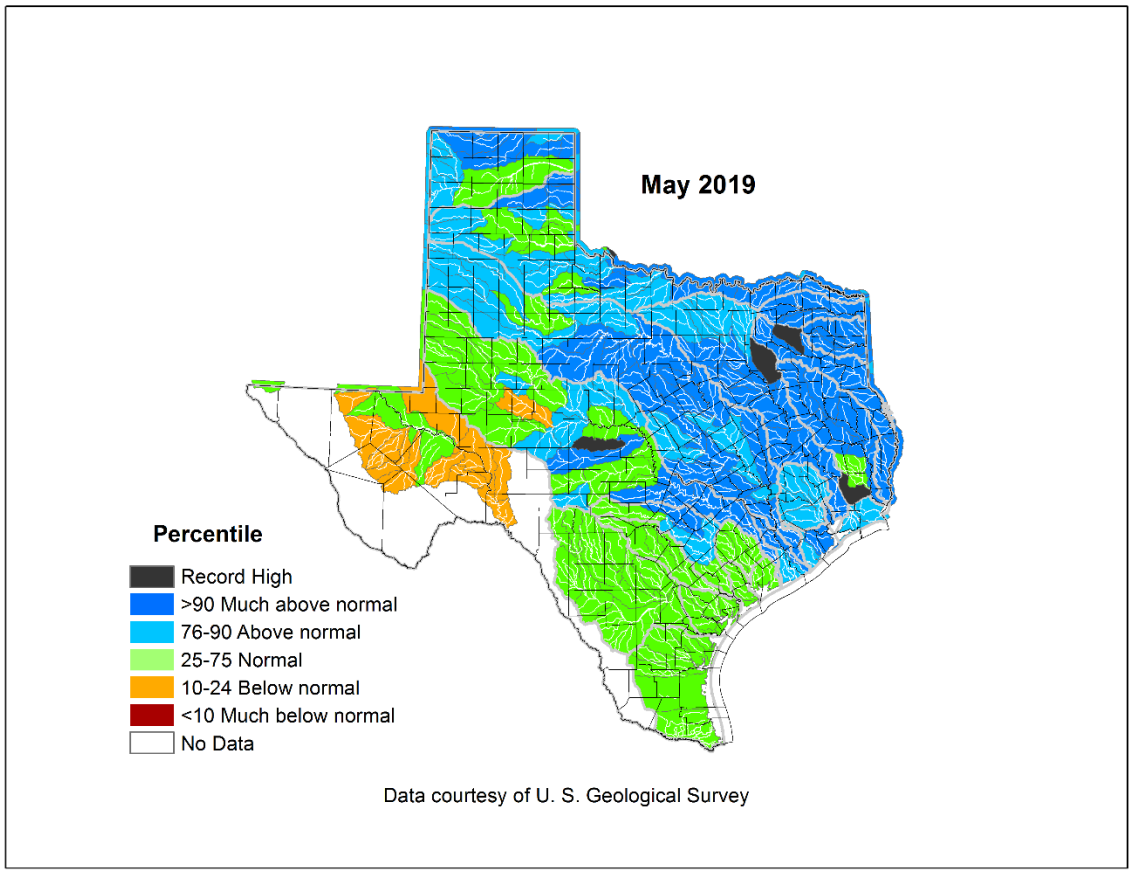
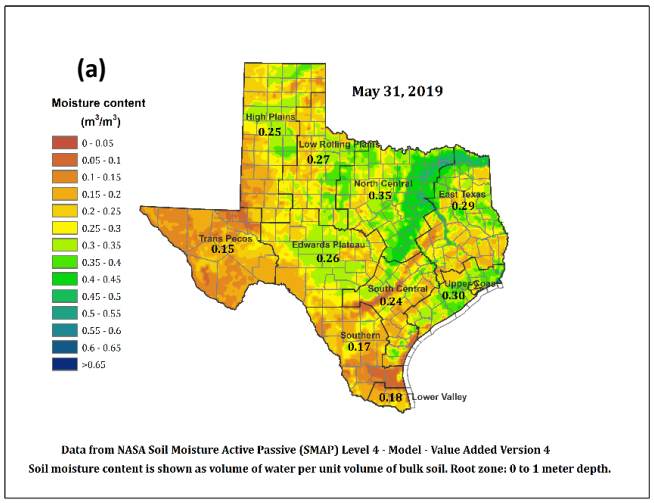


Figure 6: Runoff percentiles by the U.S. Geological Survey's Hydrologic Unit Codes

SOIL MOISTURE CONDITIONS

Soil moisture at the end of May 2019 **[**Figure 7(a)] was moderate [> 0.20 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in all climate divisions of the state except in the Trans Pecos and the Southern climate divisions where the area averaged soil moisture was 0.15 and 0.17 m^3/m^3, respectively. On a regional basis, and compared to conditions at the end of April 2019, soil moisture content increased [green to blue shading in Figure 7(b)]in the central and northern High Plains, Low Rolling Plains, North Central, western and southern East Texas, western Edwards Plateau, eastern Trans Pecos, northern South Central, central Upper Coast, and western Southern climate divisions. Soil moisture content decreased [brown and yellow shading in Figure 7(b)] in the eastern and southern regions of the Southern, central and southern South Central, northern Edwards, southern Eastern, southern and western Trans Pecos and southern High Plains climate divisions.



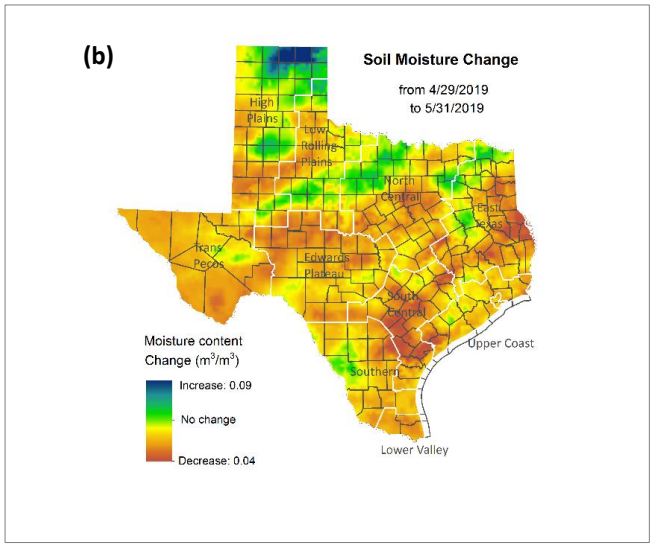
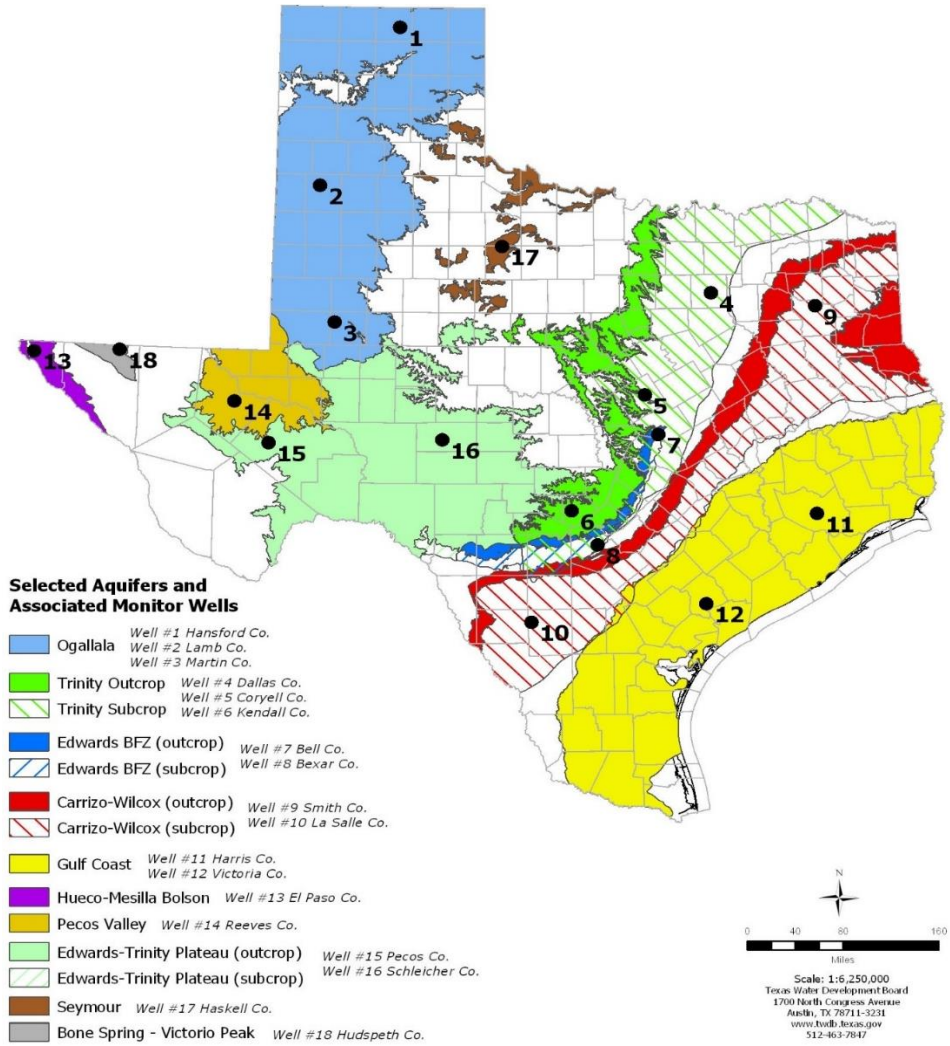


Figure 7: Root zone soil moisture conditions on April 31, 2019 (a) and the difference in root zone soil moisture from end-April 2019 and end-May 2019 (b)

May 2019 GROUNDWATER LEVELS IN OBSERVATION WELLS

Water-level measurements were available for all 18 key monitoring wells in the state. Water levels rose in 10 monitoring wells since the beginning of May, ranging from an increase of 0.07 feet in the Coryell County Trinity Aquifer well (#5 on map) to 2.87 feet in the La Salle County Carrizo-Wilcox Aquifer well (#10 on map). Water levels declined in 8 monitoring wells, ranging from a decline of -0.06 feet in the Hansford County Ogallala Aquifer well (#1 on map) to -4.67 feet in the Hudspeth County Bone Spring - Victorio Peak Aquifer well (#18 on map). The J-17 well (#8 on map) in San Antonio recorded a water level of 51.00 feet below land surface or 679.6 feet above mean sea level. Water levels are 20 feet above the Stage 1 critical management level for the San Antonio portion of the Edwards (Balcones Fault Zone) Aquifer.

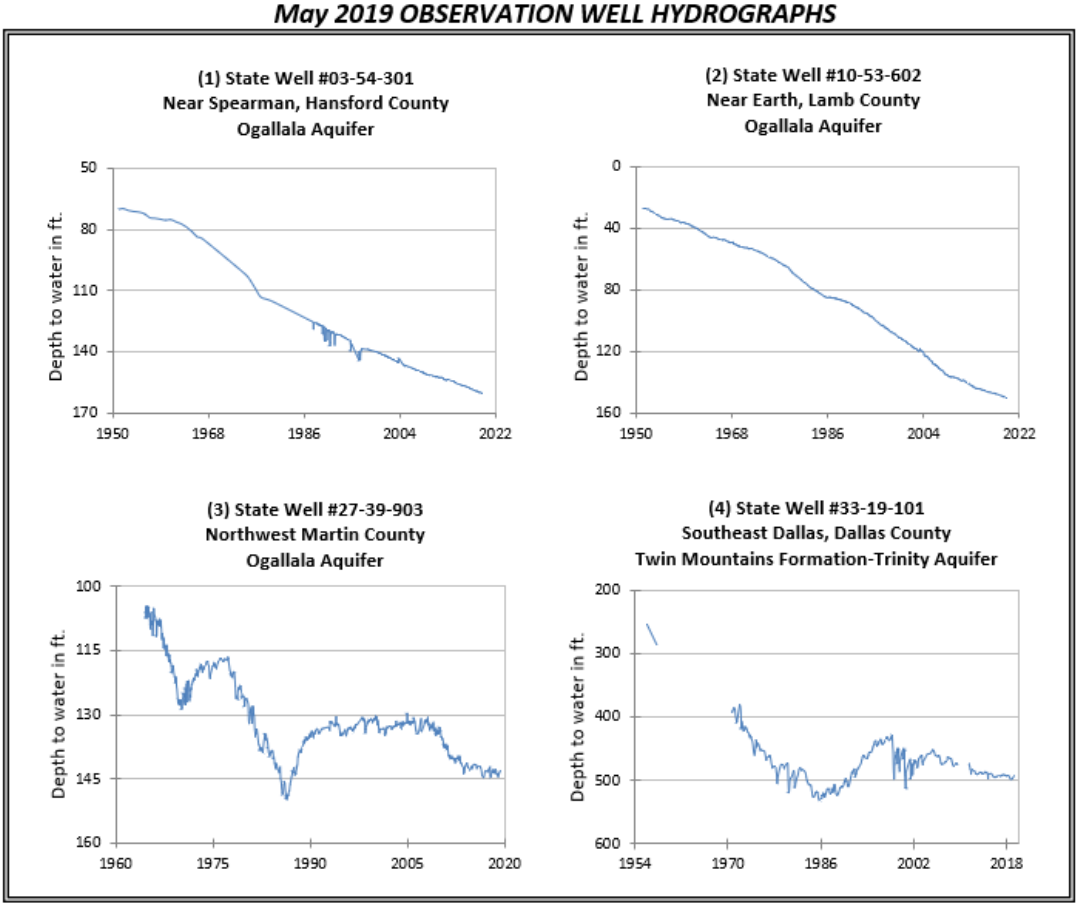


***Well numbers used in this publication on the aquifer map to indicate the monitoring well location (numbers 1 - 18) are different than the TWDB's seven-digit state well number.**

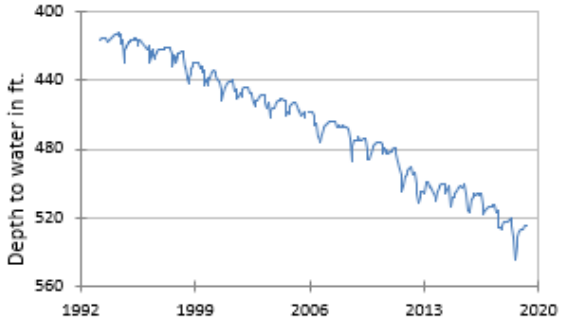
Monitoring Well	May	April	Month Change	Year Change	Historical Change	First Measured
(1) Hansford 0354301	160.34	160.28	*-0.06*	*-1.06*	*-90.22*	1951
(2) Lamb 1053602	150.18	150.06	*-0.12*	*-1.52*	*-122.01*	1951
(3) Martin 2739903	143.17	143.47	*0.30*	*-0.14*	*-38.28*	1964
(4) Dallas 3319101	493.79	495.19	*1.40*	*-1.00*	*-271.79*	1954
(5) Coryell 4035404	524.04	524.11	*0.07*	*0.56*	*-232.04*	1955
(6) Kendall 6802609	116.71	117.75	*1.04*	*19.99*	*-56.71*	1975
(7) Bell 5804816	118.06	120.02	*1.96*	*8.13*	*5.45*	2008
(8) Bexar 6837203	51.00	50.20	*-0.80*	*25.81*	*-4.36*	1932
(9) Smith 3430907	433.06	432.91	*-0.15*	*0.00*	*-133.06*	1977
(10) La Salle 7738103	491.80	494.67	*2.87*	*23.19*	*-238.73*	2003
(11) Harris 6514409	190.63	190.07	*-0.56*	*1.15*	*-55.13**	1947**
(12) Victoria 8017502	33.62	34.54	*0.92*	*-1.00*	*0.38*	1958
(13) El Paso 4913301	298.16	296.87	*-1.29*	*-4.00*	*-66.26*	1964
(14) Reeves 4644501	165.66	163.38	*-2.28*	*4.69*	*-73.57*	1952
(15) Pecos 5216802	196.82	198.49	*1.67*	*13.60*	*50.06*	1976
(16) Schleicher 5512134	271.57	272.18	*0.61*	*42.76*	*30.33*	2003
(17) Haskell 2135748	44.93	45.19	*0.26*	*1.72*	*-1.93*	2002
(18) Hudspeth 4807516	152.38	147.71	*-4.67*	*0.74*	*-48.46*	1966

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

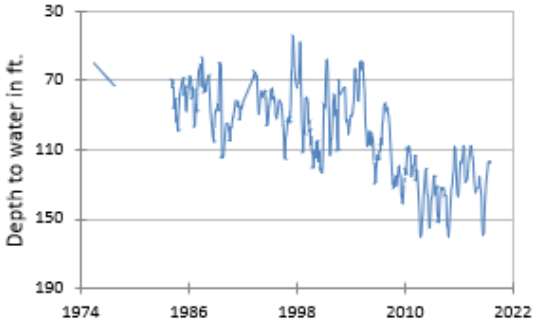
May 2019 OBSERVATION WELL HYDROGRAPHS



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

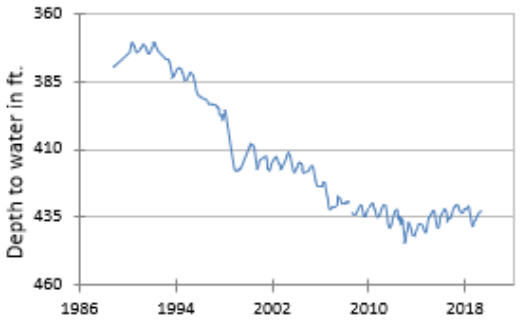


(6) State Well #68-02-609
Waring, Kendall County
Cow Creek Formation-Trinity Aquifer



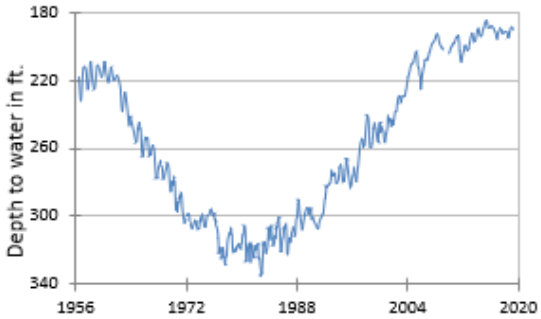
(7) State Well #58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer

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

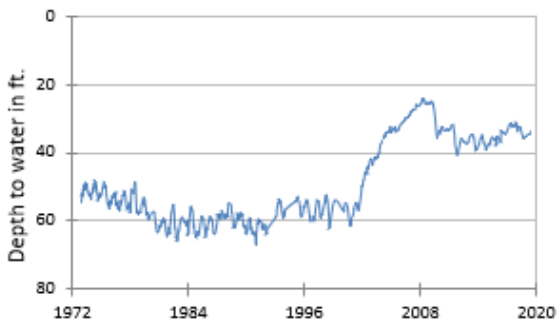


(10) State Well #77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer

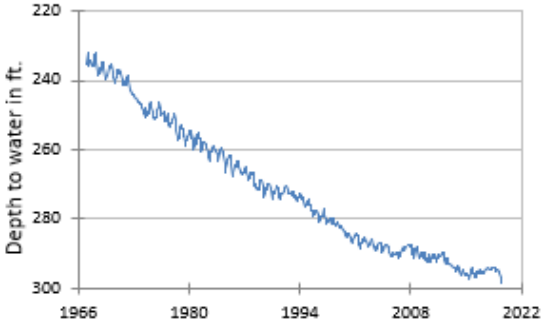
(11) State Well #65-14-409
Alief, Harris County
Evangeline Formation-Gulf Coast Aquifer



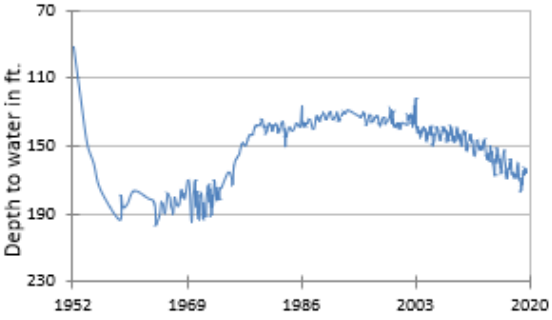
(12) State Well #80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



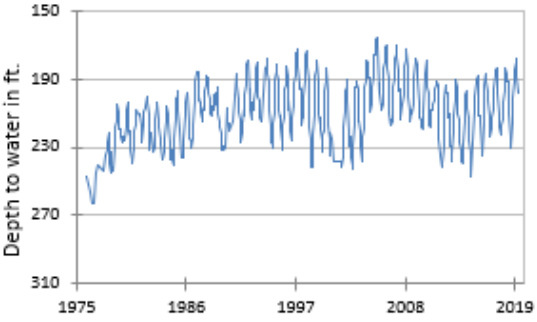
(13) State Well #49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolson Aquifer



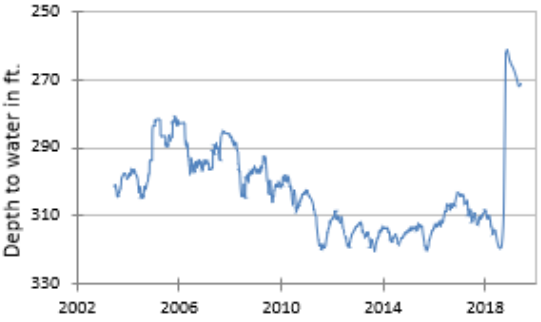
(14) State Well #46-44-501
Near Pecos, Reeves County
Pecos Valley Aquifer



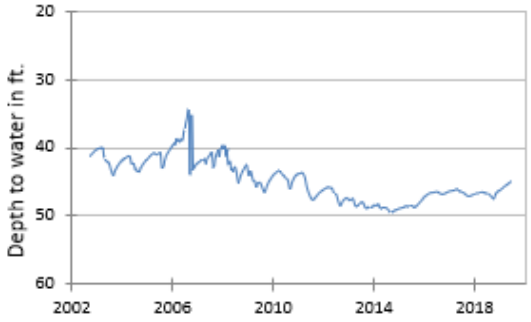
(15) State Well #52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



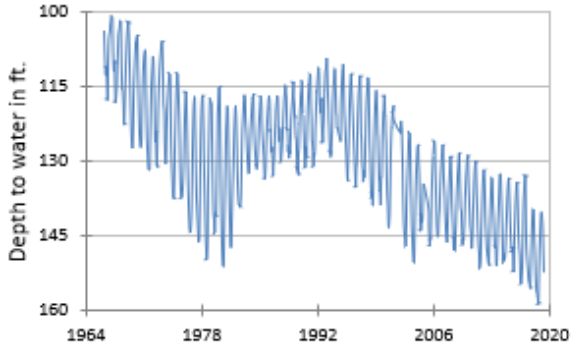
(16) State Well #55-12-134
Eldorado, Schleicher County
Trinity Aquifer



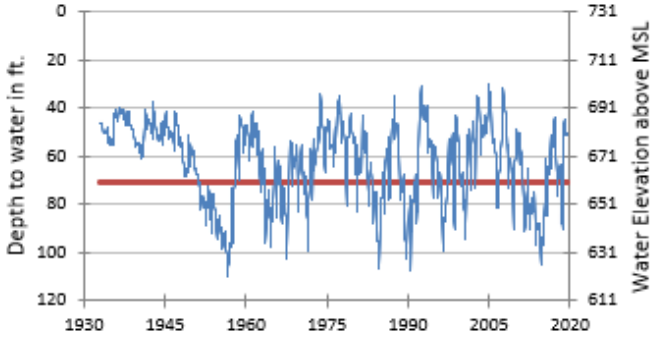
(17) State Well #21-35-748
Near O'Brien, Haskell County
Seymour Aquifer



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



(8) State Well #68-37-203 (J-17)
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 51.00 feet below land surface, or 679.6 feet above mean sea level. This was 0.80 feet below last month's measurement, 25.81 feet above last year's measurement and 4.36 feet below the initial measurement recorded in 1932.

Water levels below the red line indicate periods in which Edwards Aquifer Authority Stage 1 drought restrictions are in effect.

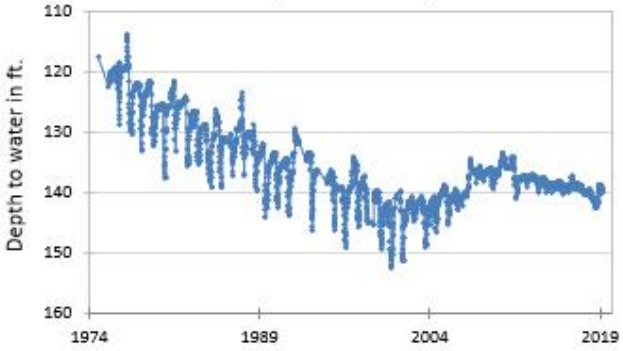
Hydrograph of the Month

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

The Hickory Aquifer, a minor aquifer found in the central part of the state, consists of the Hickory Sandstone Member of the Riley Formation. The Hickory Aquifer reaches a maximum thickness of 480 feet and freshwater saturated thickness averages about 350 feet. The groundwater is generally fresh with a total dissolved solids concentration of less than 1,000 milligrams per liter, though the upper portion of the aquifer typically contains iron in excess of the state's secondary drinking water standards. Another great concern is naturally occurring radio activity: gross alpha radiation, radium, and radon are commonly found in excess of the state's primary drinking water standards. The groundwater is used for irrigation throughout its extent and for municipal supply in the cities of Brady, Mason, and Fredericksburg. Slight water level fluctuations occur seasonally in irrigated areas.

Hickory Aquifer

Well #56-06-614, 641 feet deep
unused, McCulloch County



The initial measurement of 117.66 feet below land surface was recorded by the Texas Water Development Board in November of 1974. The next year, the TWDB installed an automatic water-level recorder in the unused well which then took hourly measurements (displayed online) and near-weekly measurements (in the groundwater database). The period of record reveals seasonal fluctuations in water level that decreased in intensity around 2002 (likely a result of decreased nearby pumping). As a result, water levels increased gradually for several years. Overall, water levels are on an average decline at a rate roughly equal to -0.48 ft/yr.

Far away (left), and close-up (right) images of well #56-06-614.