Texas Water Conditions Report

Texas Water Development Board

July 2019

RAINFALL

Rainfall observations from the National Oceanic and Atmospheric Administration – National Weather Service (NOAA-NWS) indicate that much of the state received little or no rainfall in July [orange and red shading in Figure 1(a)]. Monthly rainfall for July was below-average, compared to historical data from 1981–2010, for much of the state [Figure 1(b)], except for the northern Upper coast, and south-eastern East Texas, western High Plains, central North Central, and the Trans Pecos climate division. Rainfall in the northern Upper Coast exceeded 16".

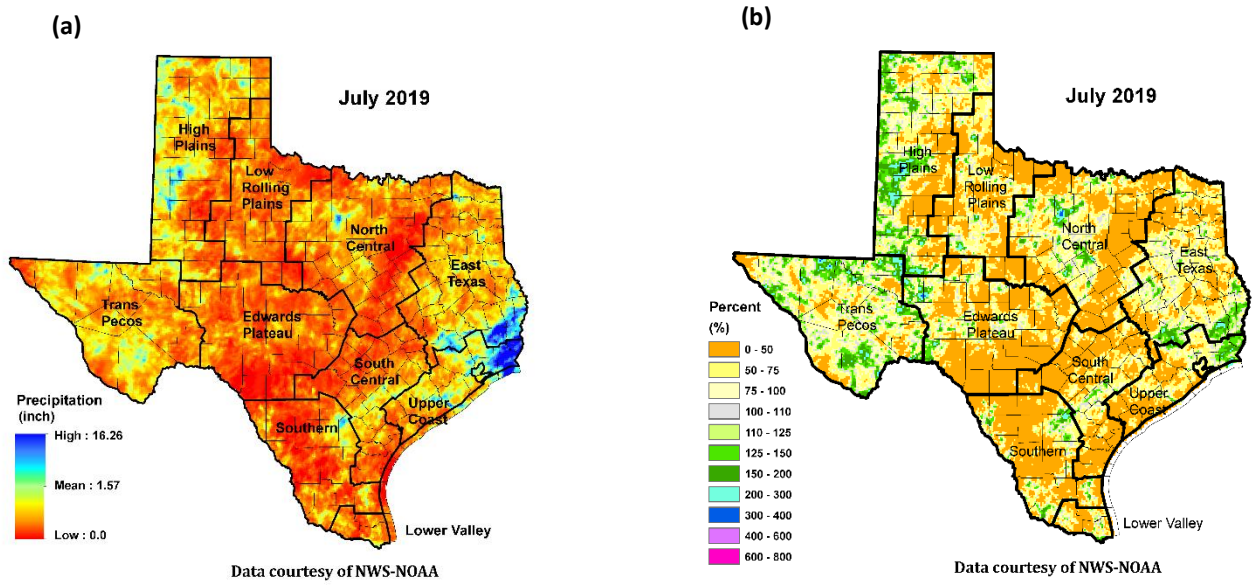

Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for July 2019

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RESERVOIR STORAGE

At the end of July 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 27.8 million acre-feet or 86 percent of total conservation storage capacity (Figure 2). This is approximately 0.7 million acre-feet less than a month ago and 3.2 million acre-feet more than end-June 2018.

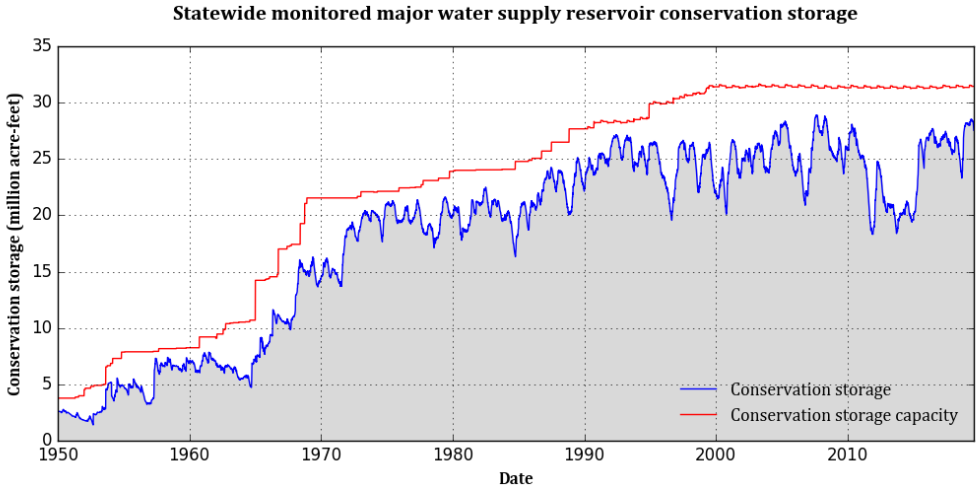


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 29 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 68 were above 90 percent full. Six reservoirs [Palo Duro Reservoir (11 percent full), Mackenzie (12 percent full), O. C. Fisher (13 percent full), White River (23 percent full) Greenbelt (21 percent full), and Falcon (26 percent full)] remained below 30 percent full. Elephant Butte Reservoir (located in New Mexico) was at 28 percent full, which was unchanged from the end of June 2019.

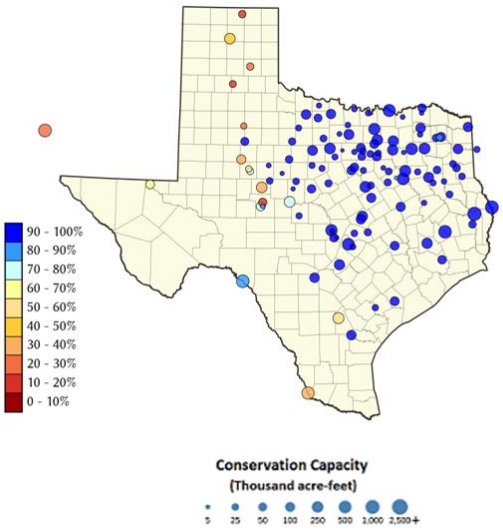


Figure 3: Reservoir conservation storage at end-July expressed as percent full (%)

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 (91.3 percent full), East Texas (95.2 percent full), North Central (98.1 percent full), South Central (97.6 percent full), Edwards (76.7 percent full), and Low Rolling Plains (75.3 percent full) climate divisions (Figure 3). Storage in the High Plains region was severely low (35.4 percent full) and storage in the Southern climate division was moderately low (43.7 percent full). Storage was severely low (32.9 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 and the Lower Rio Grande had moderately low storage, and the Nueces had abnormally low storage.

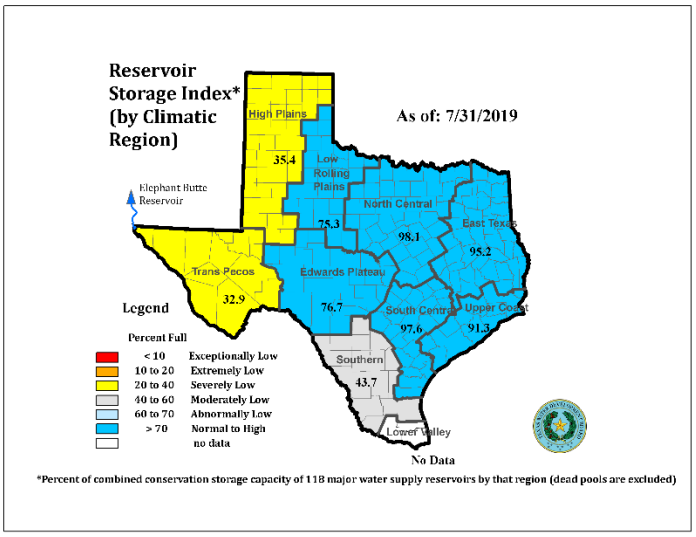


Figure 3: Reservoir Storage Index by climate division at 7/31/2019

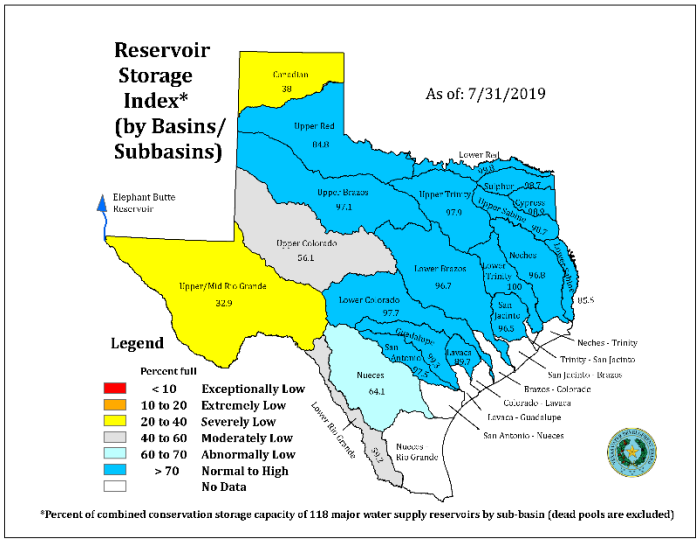


Figure 4: Reservoir Storage Index by river basin/sub-basin at 7/31/2019

*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-July		Storage change from end-June 2019		Storage change from end-July 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Abilene, Lake	7,900	7,079	90	-821	-10	4,223	53
Alan Henry Reservoir	96,207	90,270	94	-2,872	-3	13,742	14
*Amistad Reservoir (Texas & Mexico)	1,840,849	1,515,734	82	1,642	0	345,155	19
*Amistad Reservoir (Texas)	3,275,532	1,719,074	52	10,452	0	162,864	5
Amon G Carter, Lake	19,266	19,181	100	-85	0	1,321	7
Aquilla Lake	43,243	42,231	98	-1,012	-2	5,264	12
Arlington, Lake	40,188	36,524	91	-2,477	-6	4,452	11
Arrowhead, Lake	230,359	218,779	95	-9,411	-4	31,940	14
Athens, Lake	29,503	29,503	100	0	0	1,552	5
*Austin, Lake	23,972	22,818	95	-294	-1	-154	-1
B A Steinhagen Lake	66,961	188	0	-55,796	-83	-63,951	-96
Bardwell Lake	46,122	45,154	98	-968	-2	3,400	7
Belton Lake	435,225	435,225	100	0	0	51,308	12
Benbrook Lake	85,648	78,526	92	-7,122	-8	20,639	24
Bob Sandlin, Lake	192,417	191,174	99	-1,243	-1	5,980	3
Bonham, Lake	11,027	10,373	94	-654	-6	1,000	9
Brady Creek Reservoir	28,808	27,782	96	-994	-3	13,630	47
Bridgeport, Lake	366,236	359,387	98	-6,849	-2	45,954	13
*Brownwood, Lake	128,839	124,431	97	-4,408	-3	35,180	27
Buchanan, Lake	860,607	811,050	99	-5,854	-1	113,992	14
Caddo, Lake	29,898	29,898	100	0	0	2,900	10
Canyon Lake	378,781	378,781	100	0	0	46,036	12
Cedar Creek Reservoir in Trinity	644,686	626,866	97	-17,820	-3	31,569	5
Champion Creek Reservoir	41,580	29,704	71	-474	-1	9,042	22
Cherokee, Lake	40,094	40,000	100	-94	0	5,545	14
Choke Canyon Reservoir	662,820	342,557	52	-8,971	-1	176,587	27
*Cisco, Lake	29,003	27,705	96	-805	-3	5,798	20
Coleman, Lake	38,075	36,584	96	-1,293	-3	6,304	17
Colorado City, Lake	31,040	28,207	91	-2,012	-6	4,317	14
*Coleto Creek Reservoir	30,758	15,885	52	-573	-2	6,128	20
Conroe, Lake	410,988	400,885	98	378	0	-1,896	0
Corpus Christi, Lake	256,062	246,261	96	-8,814	-3	60,496	24
Crook, Lake	9,195	8,603	94	-582	-6	359	4
Cypress Springs, Lake	66,756	66,497	100	-259	0	3,158	5
E. V. Spence Reservoir	517,272	158,192	31	-4,829	-1	104,301	20
Eagle Mountain Lake	179,880	173,654	97	-6,226	-3	20,470	11
Elephant Butte Reservoir (Texas)	852,491	235,269	28	-2,190	0	179,108	21
Elephant Butte Reservoir (Total Storage)	1,973,358	544,604	28	-5,069	0	414,602	21
*Falcon Reservoir (Texas & Mexico)	1,551,007	491,319	32	-76,652	-5	50,244	3
*Falcon Reservoir (Texas)	2,646,817	687,590	26	-97,378	-4	151,100	6
Fork Reservoir, Lake	605,061	592,200	98	-12,861	-2	32,774	5
Fort Phantom Hill, Lake	70,030	69,638	99	-392	-1	14,506	21
Georgetown, Lake	36,823	35,501	96	-1,322	-4	13,605	37
Graham, Lake	45,288	43,938	97	-1,350	-3	5,743	13
Granbury, Lake	132,949	131,890	99	-81	0	12,909	10

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-July		Storage change from end-June 2019		Storage change from end-July 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Granger Lake	51,822	51,822	100	0	0	2,542	5
Grapevine Lake	164,703	164,703	100	0	0	19,225	12
Greenbelt Lake	59,968	12,633	21	-571	-1	-601	-1
*Halbert, Lake	6,033	4,993	83	-380	-6	117	2
Hords Creek Lake	8,443	7,721	91	-379	-4	3,230	38
Houston County Lake	17,113	17,087	100	-26	0	1,443	8
Houston, Lake	130,147	121,290	93	1,408	1	-6,723	-5
Hubbard Creek Reservoir	313,298	308,925	99	-4,373	-1	73,057	23
Hubert H Moss Lake	24,058	23,542	98	-289	-1	857	4
Inks, Lake	13,962	13,058	94	113	1	143	1
J. B. Thomas, Lake	199,931	61,613	31	-3,160	-2	-13,497	-7
Jacksonville, Lake	25,670	25,670	100	0	0	1,156	5
Jim Chapman Lake (Cooper)	260,332	254,679	98	-5,653	-2	40,636	16
Joe Pool Lake	175,358	170,044	97	-5,314	-3	7,178	4
Kemp, Lake	245,307	245,307	100	0	0	74,494	30
Kickapoo, Lake	86,345	83,384	97	-2,961	-3	19,712	23
Lavon Lake	406,388	386,991	95	-19,397	-5	43,602	11
Leon, Lake	27,762	26,587	96	-1,035	-4	6,826	25
Lewisville Lake	563,228	559,721	99	-3,507	-1	76,151	14
Limestone, Lake	203,780	197,375	97	-6,405	-3	30,664	15
*Livingston, Lake	1,785,348	1,785,348	100	0	0	20,151	1
*Lost Creek Reservoir	11,950	11,623	97	-289	-2	456	4
Lyndon B Johnson, Lake	115,249	110,453	96	183	0	-1,163	-1
Mackenzie Reservoir	46,450	5,591	12	-211	0	-542	-1
Marble Falls, Lake	6,901	6,787	98	-103	-1	-38	-1
Martin, Lake	75,726	70,768	93	-4,958	-7	5,637	7
Medina Lake	254,823	248,554	98	-6,269	-2	125,449	49
Meredith, Lake	500,000	206,590	41	-3,500	-1	18,128	4
Millers Creek Reservoir	26,768	26,768	100	0	0	7,218	27
*Mineral Wells, Lake	5,273	5,171	98	-102	-2	832	16
Monticello, Lake	34,740	29,431	85	-815	-2	1,249	4
Mountain Creek, Lake	22,850	22,850	100	0	0	1,246	5
Murvaul, Lake	38,285	37,669	98	-616	-2	3,319	9
Nacogdoches, Lake	39,522	37,301	94	-1,526	-4	2,364	6
Nasworthy	9,615	8,306	86	-87	-1	no data	
Navarro Mills Lake	49,827	47,637	96	-2,190	-4	3,808	8
New Terrell City Lake	8,583	8,583	100	0	0	647	8
Nocona, Lake (Farmers Crk)	21,444	20,660	96	-784	-4	1,083	5
North Fork Buffalo Creek Reservoir	15,400	14,035	91	-1,264	-8	845	5
O' the Pines, Lake	241,363	268,566	100	0	0	42,456	16
O. C. Fisher Lake	119,445	15,819	13	-1,029	-1	5,971	5
*O. H. Ivie Reservoir	554,340	419,055	76	-9,478	-2	340,787	61
Oak Creek Reservoir	39,210	38,460	98	-750	-2	22,465	57

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-July		Storage change from end-June 2019		Storage change from end-July 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Palestine, Lake	367,303	364,307	99	-2,996	-1	27,608	8
Palo Duro Reservoir	61,066	6,415	11	-1,697	-3	5,789	9
Palo Pinto, Lake	26,766	25,641	96	-973	-4	7,338	27
Pat Cleburne, Lake	26,008	25,121	97	-887	-3	2,724	10
*Pat Mayse Lake	113,683	113,683	100	0	0	6,467	6
Possum Kingdom Lake	538,139	537,960	100	-179	0	52,807	10
Proctor Lake	54,762	53,295	97	-1,467	-3	21,907	40
Ray Hubbard, Lake	439,559	422,514	96	-17,045	-4	37,470	9
Ray Roberts, Lake	788,167	784,768	100	-3,399	0	35,133	4
Red Bluff Reservoir	151,110	95,341	63	-2,811	-2	9,144	6
Richland-Chambers Reservoir	1,087,839	1,069,926	98	-17,913	-2	47,055	4
Sam Rayburn Reservoir	2,857,077	2,820,016	99	-37,061	-1	no data	
Somerville Lake	147,104	147,104	100	0	0	18,249	12
Squaw Creek, Lake	151,250	149,988	99	-1,262	-1	-1,262	-1
Stamford, Lake	51,570	51,570	100	0	0	14,810	29
Stillhouse Hollow Lake	227,771	227,514	100	-257	0	42,187	19
Striker, Lake	16,934	16,934	100	0	0	1,648	10
Sweetwater, Lake	12,267	12,213	100	-54	0	10,439	85
*Sulphur Springs, Lake	17,747	16,744	94	-1,003	-6	2,275	13
Tawakoni, Lake	871,685	868,358	100	-3,327	0	57,717	7
Texana, Lake	159,566	143,171	90	-11,288	-7	-8,496	-5
Texoma, Lake (Texas & Oklahoma)	1,258,113	1,258,113	100	0	0	0	0
Texoma, Lake (Texas)	2,525,281	2,656,975	100	-378,056	-15	121,267	5
Toledo Bend Reservoir (Texas & Louisiar	2,236,450	1,913,221	86	-234,157	-10	-65,477	-3
Toledo Bend Reservoir (Texas)	4,472,900	3,830,542	86	-468,314	-10	-130,955	-3
Travis, Lake	1,113,348	1,077,656	97	-35,692	-3	354,414	32
Twin Buttes Reservoir	182,454	132,768	73	-4,731	-3	125,626	69
Tyler, Lake	72,073	70,067	97	-2,006	-3	4,337	6
Waco, Lake	189,418	186,916	99	-2,502	-1	22,136	12
Waxahachie, Lake	10,780	10,335	96	-445	-4	1,293	12
Weatherford, Lake	17,812	17,155	96	-581	-3	2,918	16
White River Lake	29,880	6,828	23	-719	-2	2,468	8
Whitney, Lake	553,344	502,314	91	-45,135	-8	48,263	9
Worth, Lake	33,495	29,995	90	-3,226	-10	2,765	8
Wright Patman Lake	310,382	231,496	100	0	0	0	0
STATEWIDE TOTOL							
STATEWIDE TOTAL	**32,300,210**	**27,848,060**	**86**	**-764,970**	**-2**	**3,296,962**	**10**

* 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 July 2019 show that much of the state had near normal (25–75th percentile, green shading in Figure 6) streamflow. A couple of sub-basins in the Sabine, Trinity, and Brazos river basins had much above normal (> 90th percentile, dark blue shading in Figure 6) streamflow. Some sub-basins in the Upper Rio Grande, lower Colorado, Guadalupe, and San Jacinto river basins had below normal (10–24th percentile, light brown shading in Figure 6) streamflow. A few sub-basins in the Upper Colorado, the lower Nueces, and the Lavaca river basins had much below normal (less than the 10th percentile, dark brown shading in Figure 6) streamflow.

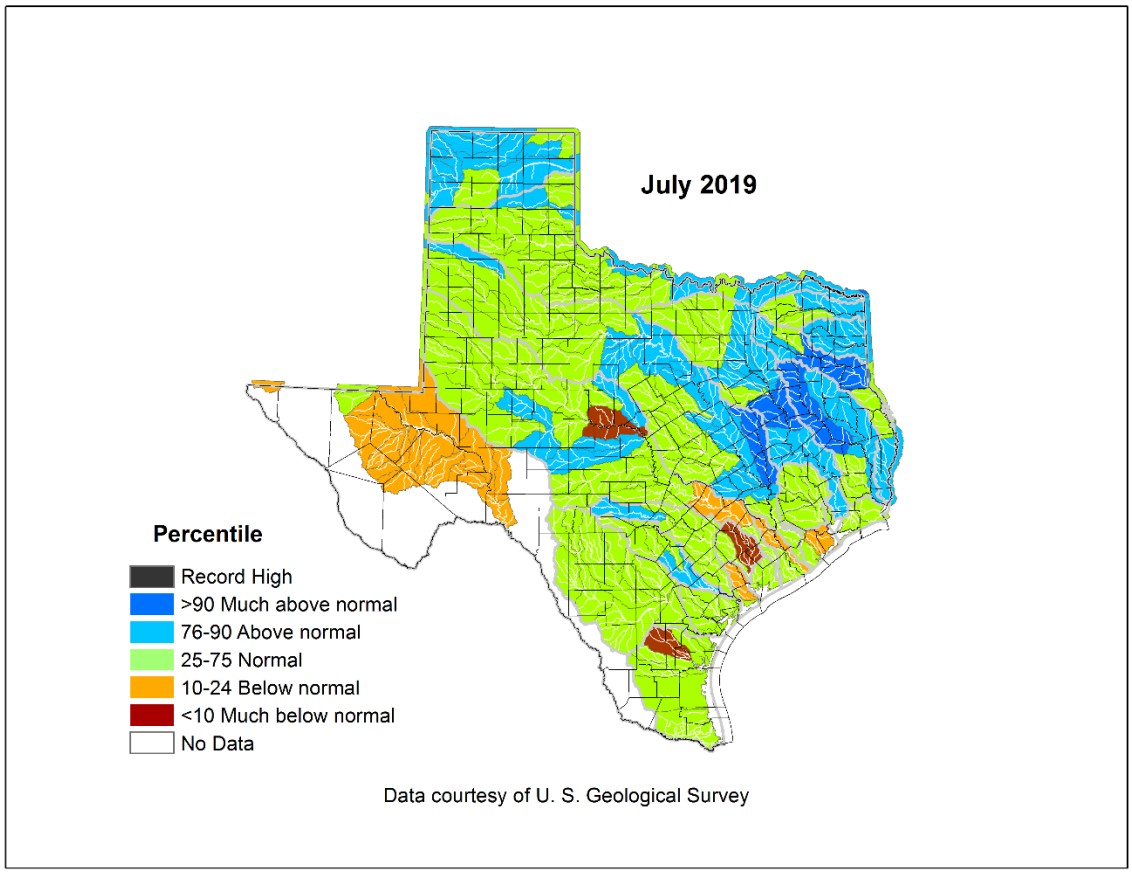


Figure 6: Runoff percentiles by the U.S. Geological Survey's Hydrologic Unit Codes

SOIL MOISTURE CONDITIONS

Root zone soil moisture at the end of July 2019 **[**Figure 7(a)] was moderate [> 0.20 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in most climate divisions except in the Trans Pecos, Southern, Lower Valley, East Texas climate divisions where the area-averaged root zone soil moisture was 0.15, 0.16, 0.18, and 0.19 m^3/m^3, respectively. On a regional basis, and compared to conditions at the end of June 2019, soil moisture content increased [green to blue shading in Figure 7(b)]in the High Plains, Low Rolling Plains, North Central, western and southern East Texas, north-eastern Edwards Plateau, Trans Pecos, north-western and southern regions of the Southern, Lower Valley, and lower and central Upper Coast climate divisions. Soil moisture content decreased [brown and yellow shading in Figure 7(b)] in the East Texas, North Central, northern Upper Coast, central South Central, central Southern, southern Lower Rolling Plains, and central Edwards Plateau climate divisions.

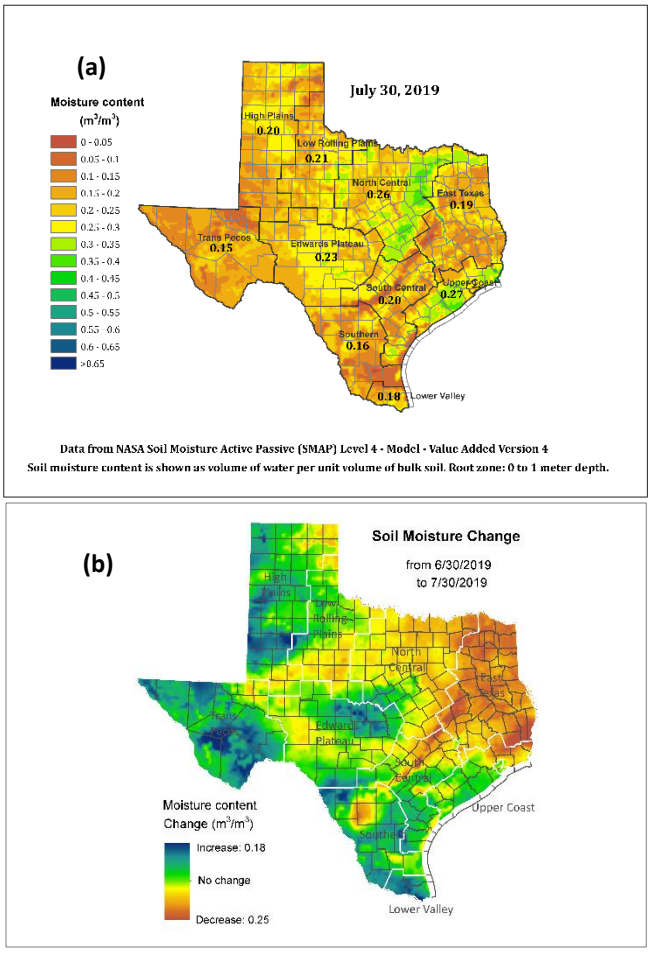
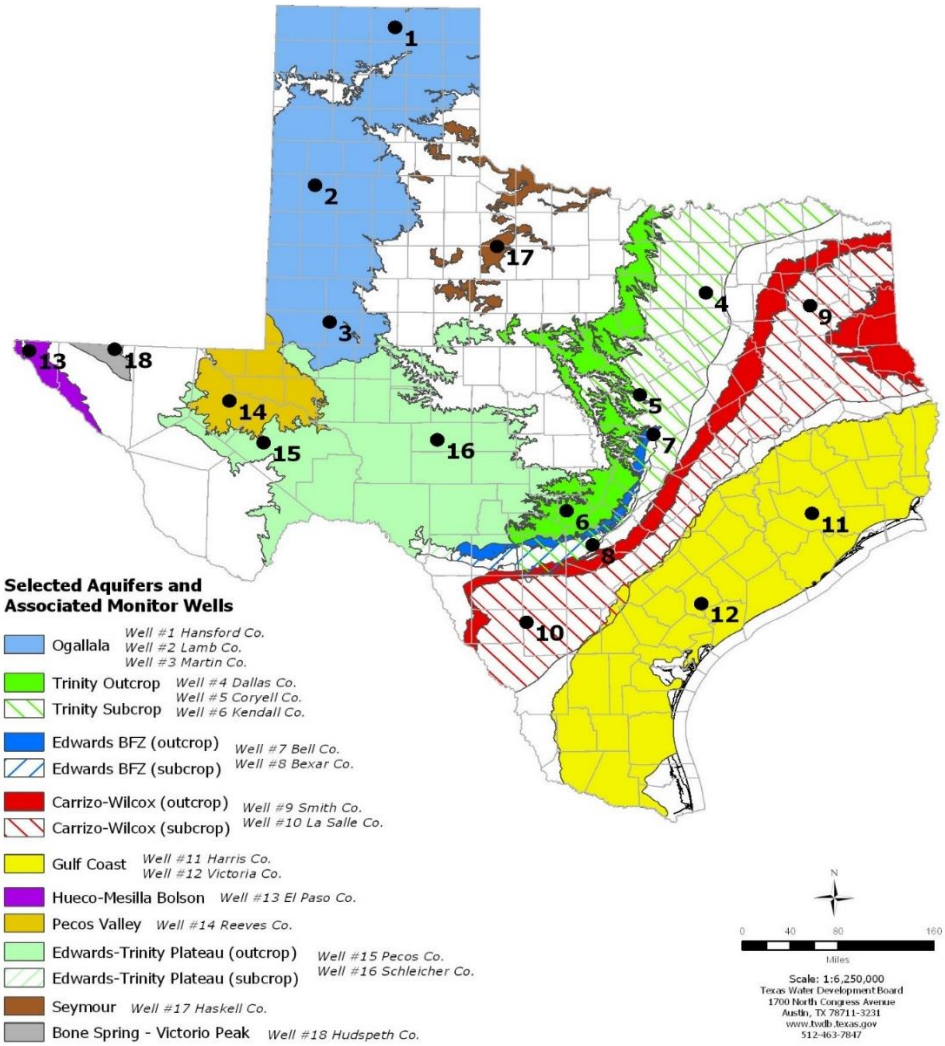


Figure 7: Root zone soil moisture conditions on June 30, 2019 (a) and the difference in root zone soil moisture from end-June 2019 and end-July 2019 (b)

July 2019 GROUNDWATER LEVELS IN OBSERVATION WELLS

Water-level measurements were available for 17 of the 18 key monitoring wells in the state. Water levels rose in 3 monitoring wells since the beginning of July, ranging from an increase of 0.13 feet in the Dallas County Trinity Aquifer well (#4 on map) to 1.04 feet in the Reeves County Pecos Valley Aquifer well (#14 on map). Water levels declined in 14 monitoring wells, ranging from a decline of -0.03 feet in the Lamb County Ogallala Aquifer well (#2 on map) to -9.80 feet in the Bexar County Edwards (Balcones Fault Zone) Aquifer well (#8 on map). The J-17 well (#8 on map) in San Antonio recorded a water level of 57.80 feet below land surface or 672.8 feet above mean sea level. Water levels are 12.2 feet above the Stage 1 critical management level for the San Antonio portion of the Edwards (Balcones Fault Zone) Aquifer.

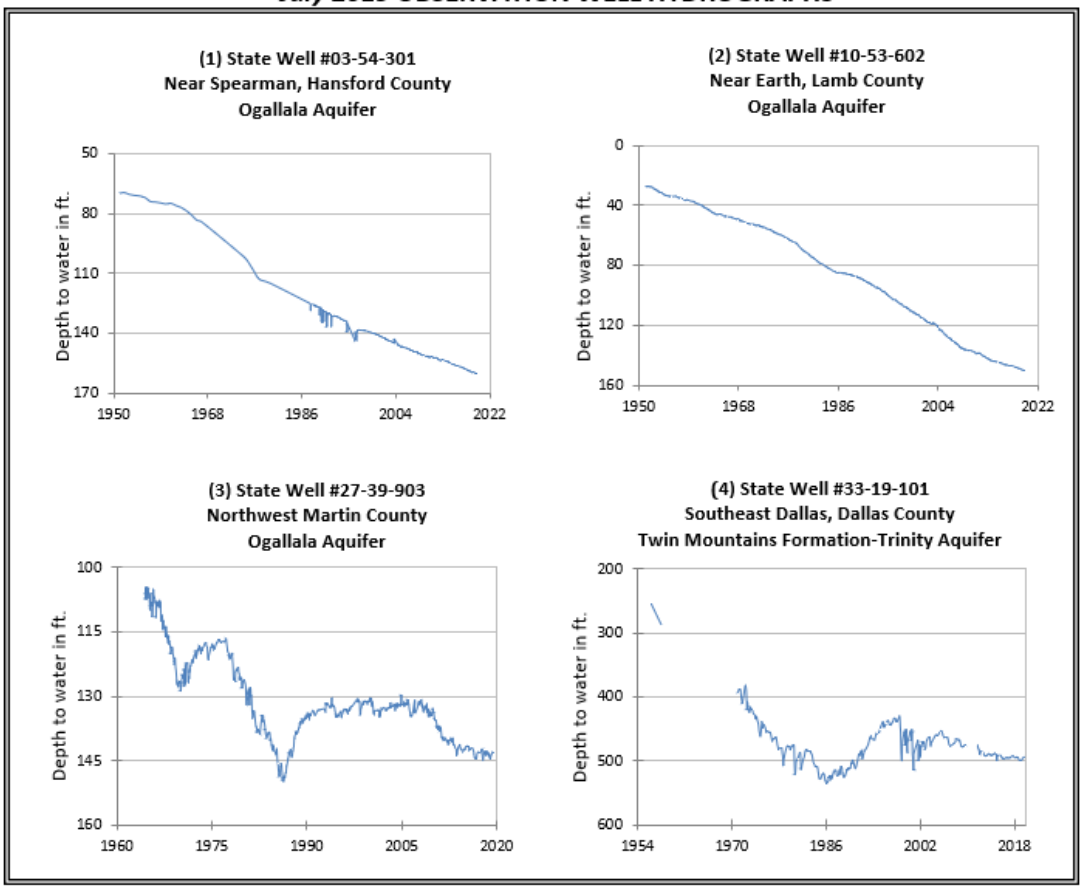


***Well numbers used in this publication on the aquifer map to indicate the monitoring well location (numbers 1–18) are different to the TWDB's seven-digit state well number.**

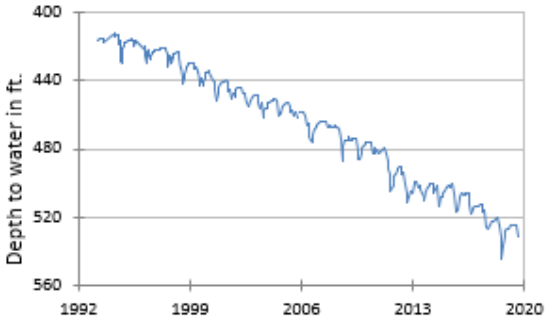
Monitoring Well	July	June	Month Change	Year Change	Historical Change	First Measured
(1) Hansford 0354301	160.43	160.33	*-0.10*	*-1.09*	*-90.31*	1951
(2) Lamb 1053602	150.24	150.21	*-0.03*	*-1.45*	*-122.07*	1951
(3) Martin 2739903	143.21	142.99	*-0.22*	*0.03*	*-38.32*	1964
(4) Dallas 3319101	493.15	493.28	*0.13*	*2.05*	*-271.15*	1954
(5) Coryell 4035404	530.70	524.92	*-5.78*	*13.03*	*-238.70*	1955
(6) Kendall 6802609	123.34	117.47	*-5.87*	*35.89*	*-63.34*	1975
(7) Bell 5804816	120.04	118.05	*-1.99*	*7.93*	*3.47*	2008
(8) Bexar 6837203	57.80	48.00	*-9.80*	*26.21*	*-11.16*	1932
(9) Smith 3430907	434.23	432.91	*-1.32*	*3.01*	*-134.23*	1977
(10) La Salle 7738103	504.24	499.75	*-4.49*	*24.08*	*-251.17*	2003
(11) Harris 6514409	191.64	191.60	*-0.04*	*1.90*	*-56.14**	1947**
(12) Victoria 8017502	34.31	33.98	*-0.33*	*0.18*	*-0.31*	1958
(13) El Paso 4913301	NA	298.21	*NA*	*NA*	*NA*	1964
(14) Reeves 4644501	166.08	167.12	*1.04*	*6.05*	*-73.99*	1952
(15) Pecos 5216802	205.43	198.23	*-7.20*	*21.07*	*41.45*	1976
(16) Schleicher 5512134	278.03	273.80	*-4.23*	*41.57*	*23.87*	2003
(17) Haskell 2135748	44.45	44.70	*0.25*	*2.38*	*-1.45*	2002
(18) Hudspeth 4807516	154.74	154.26	*-0.48*	*1.91*	*-50.82*	1966

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

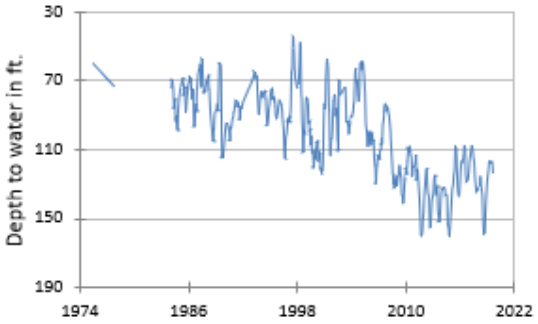
July 2019 OBSERVATION WELL HYDROGRAPHS



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

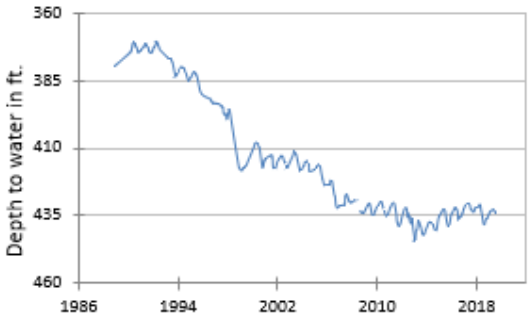


(6) State Well #68-02-609
Waring, Kendall County
Cow Creek Formation-Trinity Aquifer



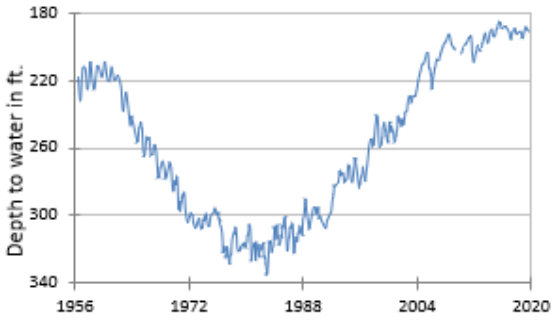
(7) State Well #58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer

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

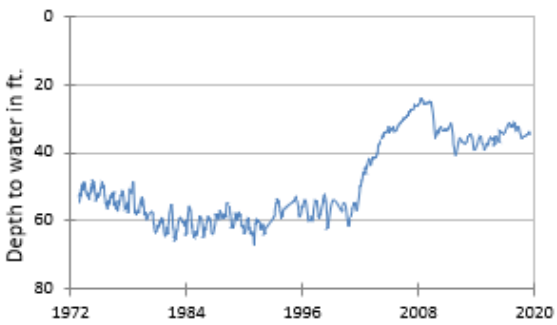


(10) State Well #77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer

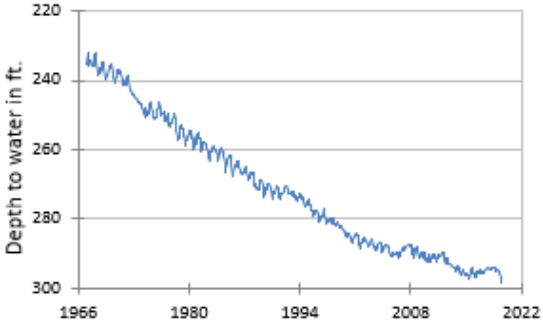
(11) State Well #65-14-409
Alief, Harris County
Evangeline Formation-Gulf Coast Aquifer



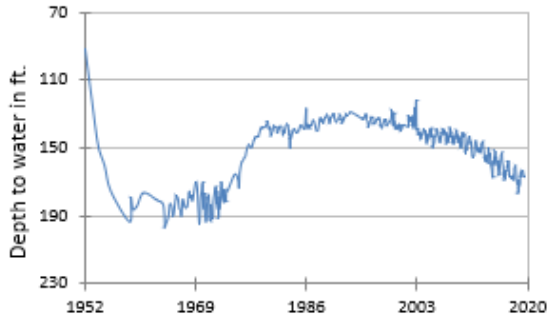
(12) State Well #80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



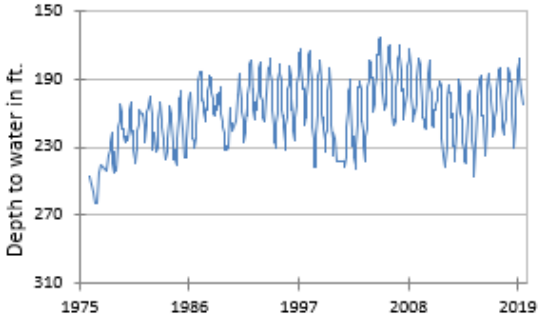
(13) State Well #49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolson Aquifer



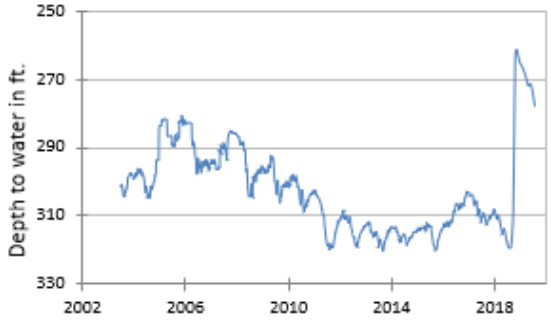
(14) State Well #46-44-501
Near Pecos, Reeves County
Pecos Valley Aquifer



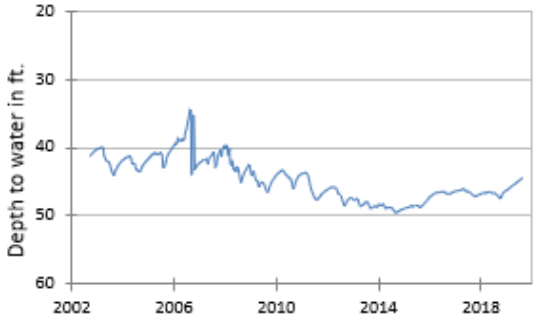
(15) State Well #52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



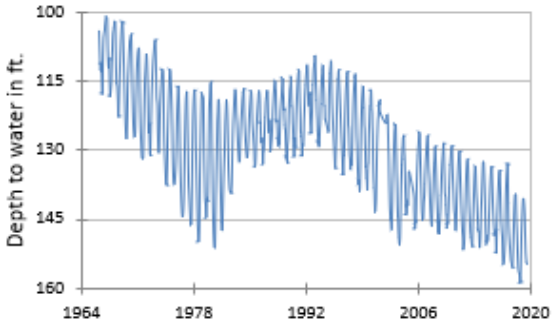
(16) State Well #55-12-134
Eldorado, Schleicher County
Trinity Aquifer



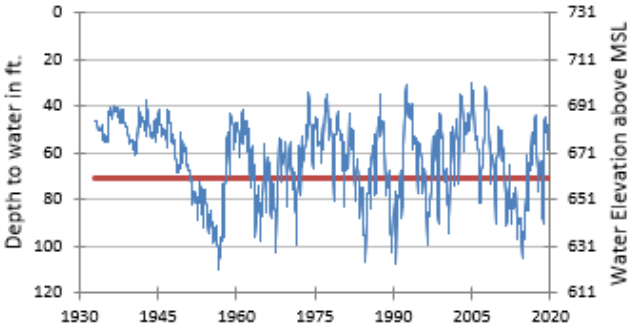
(17) State Well #21-35-748
Near O'Brien, Haskell County
Seymour Aquifer



(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 July water-level measurement in this Edwards (Balcones Fault Zone) Aquifer well, elevation 731 feet above mean sea level, was 57.80 feet below land surface, or 672.8 feet above mean sea level. This was 9.80 feet below last month's measurement, 26.21 feet above last year's measurement and 11.16 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.

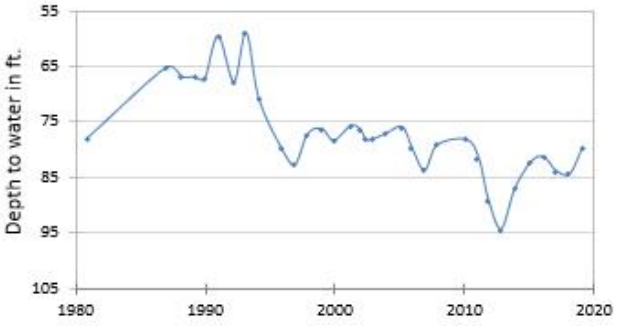
HYDROGRAPH OF THE MONTH

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

Yegua-Jackson Aquifer

The Yegua-Jackson Aquifer is a minor aquifer stretching across the southeast part of the state. It includes water-bearing parts of the Yegua Formation (part of the upper Claiborne Group) and the Jackson Group (comprising the Whitsett, Manning, Wellborn, and Caddell formations). These geologic units consist of interbedded sand, silt, and clay layers originally deposited as fluvial and deltaic sediments. Freshwater saturated thickness averages about 170 feet. Water quality varies greatly due to the composition of the water bearing formations, and in all areas the aquifer becomes highly mineralized with depth. Most groundwater is produced from the sand units of the aquifer, where the water is fresh and ranges from less than 50 to 1,000 milligrams per liter of total dissolved solids. Some slightly to moderately saline water, with concentrations of total dissolved solids ranging from 1,000 to 10,000 milligrams per liter, also occurs in the aquifer. The water is primarily used for livestock and domestic consumption, while other uses include municipal, industrial, and agricultural purposes.

Well #59-24-703, 446 feet deep
stock, Grimes County



The initial measurement of 78 feet below land surface was recorded by a registered water well driller in November of 1980. Roughly six years later, the Texas Water Development Board began measuring water levels in the well and continues to do so on a near-annual basis. The period of record reveals a general downward trend in water level that is likely a result of nearby pumping of water for livestock and domestic consumption. The latest measurement of 79.67 feet below land surface is from January of 2019. This is only 1.67 feet lower than the original measurement in 1980.

Far away (left), and close-up (right) images of well #59-24-703.