Texas Water Conditions Report

Texas Water Development Board

February 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) for February indicate that total rainfall in February [Figure 1(a)] over the western and central regions of the state was below 50 percent of average compared to historical data from 1981–2010 [Figure 1(b), light brown shading]. There were isolated patches of above-average rainfall in the northern High Plains, western Trans Pecos, northern East Texas, central Upper Coast, and southern South Central climate divisions [Figure 1(b), green shading].

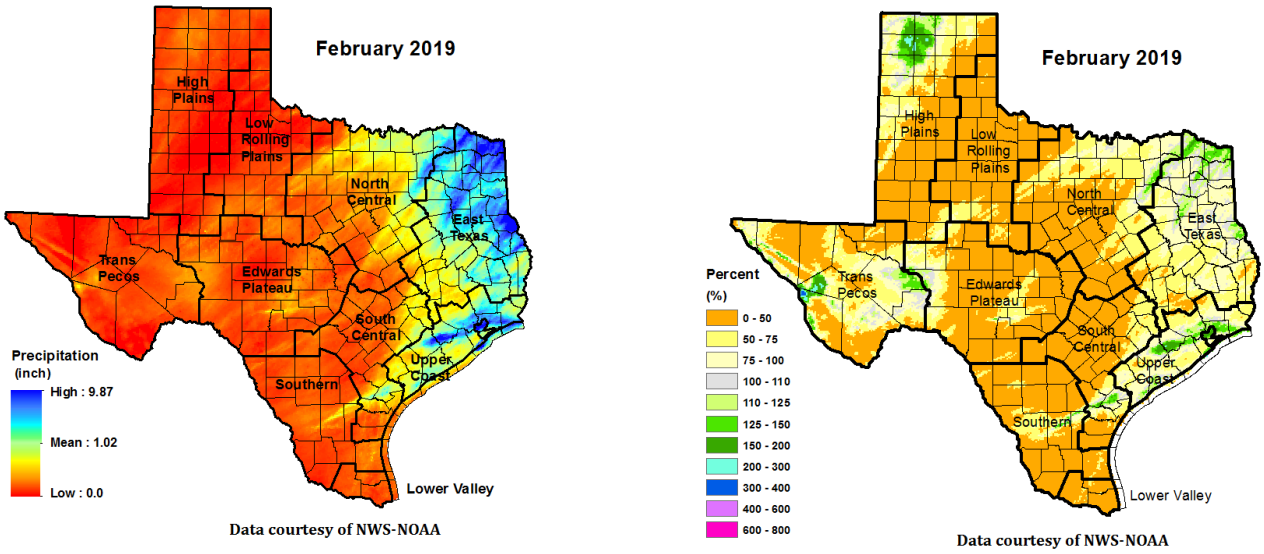

Figure 1: (a) Monthly accumulated rainfall, and (b) Percent of normal rainfall for February 2019

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RESERVOIR STORAGE

At the end of February 2019, total conservation storage* in 118 of the state's major water supply reservoirs plus Elephant Butte Reservoir in New Mexico was 27.01 million acre-feet or 84 percent of total conservation storage capacity (Figure 2). This is approximately 1.2 million acre-feet less than a month ago and 0.05 million acre-feet less than end-February 2018.

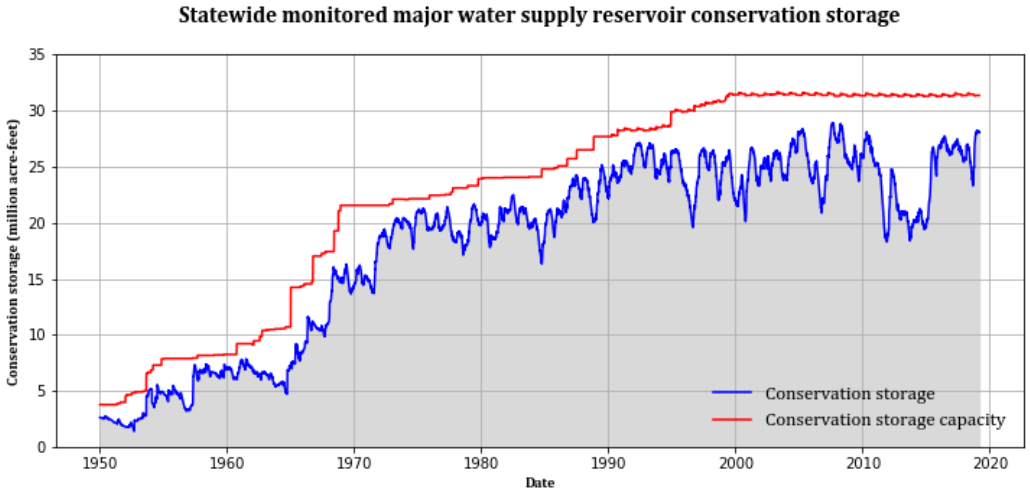


Figure 2: Statewide reservoir conservation storage

Out of 118 reservoirs in the state, 73 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 23 were above 90 percent full. These high storage reservoirs are in the North, Central, and East Texas climate divisions. However, Palo Duro Reservoir was only 1 percent full and another five reservoirs [Mackenzie (12 percent full), O. C. Fisher (14 percent full), White River (15 percent full) Greenbelt (20 percent full), and E. V. Spence (27 percent full)] remained below 30 percent full. There were 12 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 9 percent full, which is a 2-percentage point increase over storage in January.

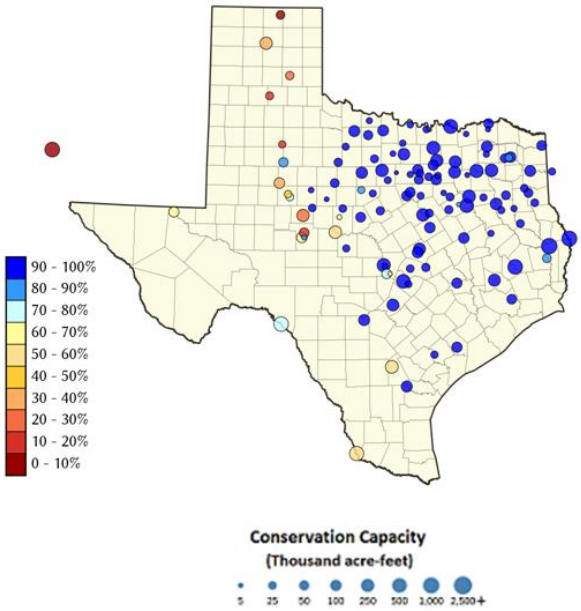


Figure 3: Reservoir conservation storage expressed as percent full (%)

*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 (98.5 percent full), East Texas (99.3 percent full), North Central (99.1 percent full), South Central (99.9 percent full), and Low Rolling Plains (75.2 percent full) regions (Figure 3). The High Plains (31.6 percent full) and Trans-Pecos (17.2 percent full) regions had the lowest storage. 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 is normal to high (>70 percent full). The Upper/Mid Rio Grande had extremely low storage, 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.

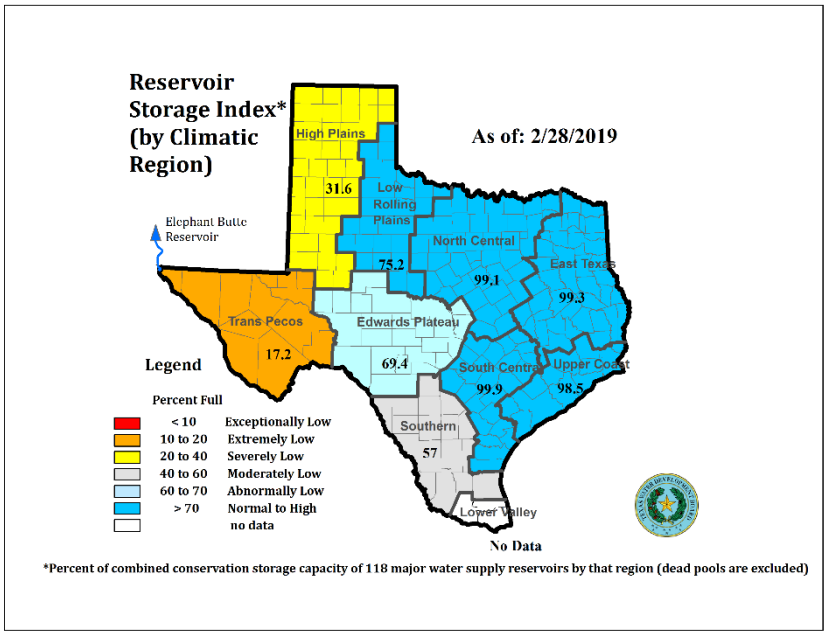


Figure 3: Reservoir Storage Index by climate division at 2/28/2019

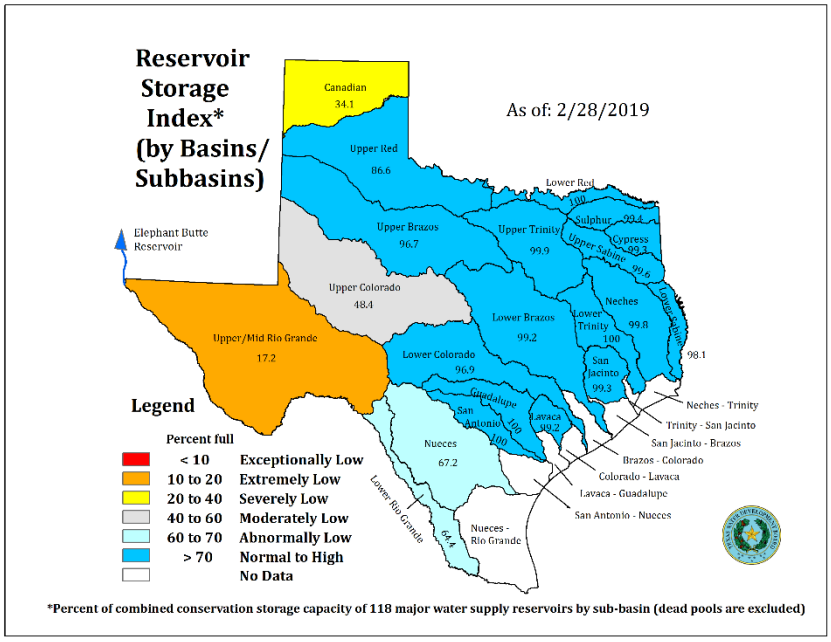


Figure 4: Reservoir Storage Index by river basin/sub-basin at 2/28/2019

*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-February		Storage change from end-January 2019		Storage change from end-February 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Abilene, Lake	7,900	7,775	98	-125	-2	3,441	44
Alan Henry Reservoir	96,207	81,370	85	-1,329	-1	909	1
*Amistad Reservoir (Texas & Mexico)	1,840,849	1,396,343	76	17,830	1	6,664	0
*Amistad Reservoir (Texas)	3,275,532	1,991,398	61	26,733	1	-27,370	-1
Amon G Carter, Lake	19,266	19,266	100	0	0	0	0
Aquilla Lake	43,243	43,243	100	0	0	0	0
Arlington, Lake	40,188	39,938	99	-116	0	-250	-1
Arrowhead, Lake	230,359	227,613	99	-2,602	-1	26,847	12
Athens, Lake	29,503	29,503	100	0	0	0	0
*Austin, Lake	23,972	22,972	96	-310	-1	246	1
B A Steinhagen Lake	66,961	60,668	91	-201	0	-1,622	-2
Bardwell Lake	46,122	46,122	100	0	0	0	0
Belton Lake	435,225	435,225	100	0	0	30,921	7
Benbrook Lake	85,648	85,648	100	0	0	0	0
Bob Sandlin, Lake	192,417	192,417	100	0	0	0	0
Bonham, Lake	11,027	11,027	100	74	1	0	0
Brady Creek Reservoir	28,808	28,808	100	0	0	12,687	44
Bridgeport, Lake	366,236	366,236	100	0	0	18,121	5
*Brownwood, Lake	128,839	128,839	100	0	0	21,841	17
Buchanan, Lake	860,607	802,612	93	-14,292	-2	31,738	4
Caddo, Lake	29,898	29,898	100	0	0	0	0
Canyon Lake	378,781	378781	100	0	0	29997	8
Cedar Creek Reservoir in Trinity	644,686	644,686	100	327	0	0	0
Champion Creek Reservoir	41,580	29,673	71	-180	0	10,470	25
Cherokee, Lake	40,094	40,094	100	0	0	0	0
Choke Canyon Reservoir	662,820	361,684	55	-1,238	0	165,329	25
*Cisco, Lake	29,003	24,213	83	-158	-1	186	1
Coleman, Lake	38,075	37,751	99	-216	-1	3,862	10
Colorado City, Lake	31,040	31,040	100	0	0	2,906	9
*Coleto Creek Reservoir	30,758	15,177	49	-204	-1	2,988	10
Conroe, Lake	410,988	410,988	100	0	0	0	0
Corpus Christi, Lake	256,062	256,062	100	0	0	19,836	8
Crook, Lake	9,195	9,164	100	21	0	-31	0
Cypress Springs, Lake	66,756	66,756	100	0	0	0	0
E. V. Spence Reservoir	517,272	140,016	27	64	0	76,338	15
Eagle Mountain Lake	179,880	179,880	100	0	0	0	0
Elephant Butte Reservoir (Texas)	852,491	73,375	9	11,644	1	-135,266	-16
Elephant Butte Reservoir (Total Storage)	1,973,358	169,849	9	26,954	1	-313,115	-16
*Falcon Reservoir (Texas & Mexico)	1,551,007	789,602	51	1,918	0	-52,269	-3
*Falcon Reservoir (Texas)	2,646,817	1,019,544	39	11,262	0	-391,708	-15
Fork Reservoir, Lake	605,061	598,990	99	262	0	-6,071	-1
Fort Phantom Hill, Lake	70,030	70,030	100	0	0	8,035	11
Georgetown, Lake	36,823	36,823	100	0	0	11,603	32
Graham, Lake	45,288	45,165	100	-123	0	2,317	5
Granbury, Lake	132,949	132,949	100	0	0	734	1

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-February		Storage change from end-January 2019		Storage change from end-February 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	0	0
Greenbelt Lake	59,968	12,192	20	-37	0	-2,899	-5
*Halbert, Lake	6,033	5,411	90	55	1	-173	-3
Hords Creek Lake	8,443	5,621	67	-24	0	301	4
Houston County Lake	17,113	17,113	100	0	0	0	0
Houston, Lake	120,686	117,164	97	-3,522	-3	-3,522	-3
Hubbard Creek Reservoir	313,298	313,298	100	0	0	47,828	15
Hubert H Moss Lake	24,058	24,058	100	97	0	0	0
Inks, Lake	13,962	13,066	94	181	1	219	2
J. B. Thomas, Lake	199,931	69,882	35	-2,177	-1	-22,546	-11
Jacksonville, Lake	25,670	25,670	100	0	0	0	0
Jim Chapman Lake (Cooper)	260,332	260,332	100	0	0	0	0
Joe Pool Lake	175,358	170,266	97	-2,657	-2	-5,092	-3
Kemp, Lake	245,307	245,307	100	0	0	23,564	10
Kickapoo, Lake	86,345	86,345	100	0	0	14,055	16
Lavon Lake	406,388	406,388	100	0	0	0	0
Leon, Lake	27,762	27,447	99	-140	-1	3,813	14
Lewisville Lake	563,228	563,228	100	0	0	0	0
Limestone, Lake	203,780	203,780	100	0	0	41,167	20
*Livingston, Lake	1,785,348	1,785,348	100	719	0	0	0
*Lost Creek Reservoir	11,950	11,912	100	-38	0	-38	0
Lyndon B Johnson, Lake	115,249	110,575	96	21,995	19	-61	0
Mackenzie Reservoir	46,450	5,674	12	-54	0	-1,061	-2
Marble Falls, Lake	6,901	3,912	57	84	1	-2,881	-42
Martin, Lake	75,726	75,677	100	99	0	1,869	2
Medina Lake	254,823	254,702	100	-121	0	95,418	37
Meredith, Lake	500,000	190,869	38	-71	0	-11,813	-2
Millers Creek Reservoir	26,768	26,768	100	0	0	2,507	9
*Mineral Wells, Lake	5,273	5,273	100	0	0	0	0
Monticello, Lake	34,740	30,577	88	441	1	-2,617	-8
Mountain Creek, Lake	22,850	22,850	100	0	0	0	0
Murvaul, Lake	38,285	38,285	100	0	0	0	0
Nacogdoches, Lake	39,522	39,522	100	0	0	88	0
Nasworthy	9,615	8,506	88	-151	-2	359	4
Navarro Mills Lake	49,827	49,827	100	0	0	6,310	13
New Terrell City Lake	8,583	8,583	100	0	0	0	0
Nocona, Lake (Farmers Crk)	21,444	21,444	100	0	0	0	0
North Fork Buffalo Creek Reservoir	15,400	15,256	99	-144	-1	3,900	25
O' the Pines, Lake	241,363	241,363	100	0	0	0	0
O. C. Fisher Lake	119,445	17,003	14	-157	0	5,363	4
*O. H. Ivie Reservoir	554,340	297,185	54	7,083	1	191,881	35
Oak Creek Reservoir	39,210	39,210	100	0	0	20,275	52

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-February		Storage change from end-January 2019		Storage change from end-February 2018	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Palestine, Lake	367,303	367,303	100	0	0	0	0
Palo Duro Reservoir	61,066	332	1	no data		-185	0
Palo Pinto, Lake	26,766	26,744	100	-22	0	2,367	9
Pat Cleburne, Lake	26,008	26,008	100	0	0	0	0
*Pat Mayse Lake	113,683	113,683	100	0	0	0	0
Possum Kingdom Lake	538,139	538,139	100	358	0	19,078	4
Proctor Lake	54,762	54,762	100	0	0	9,038	17
Ray Hubbard, Lake	439,559	438,724	100	836	0	-835	0
Ray Roberts, Lake	788,167	788,167	100	0	0	0	0
Red Bluff Reservoir	151,110	99,669	66	449	0	-13,269	-9
Richland-Chambers Reservoir	1,087,839	1,087,839	100	0	0	52,874	5
Sam Rayburn Reservoir	2,857,077	2,857,077	100	0	0	0	0
Somerville Lake	147,104	147,104	100	0	0	0	0
Squaw Creek, Lake	151,250	151,250	100	0	0	0	0
Stamford, Lake	51,570	51,570	100	0	0	4,158	8
Stillhouse Hollow Lake	227,771	227,771	100	0	0	23,700	10
Striker, Lake	16,934	16,934	100	0	0	0	0
Sweetwater, Lake	12,267	12,267	100	0	0	9,905	81
*Sulphur Springs, Lake	17,747	15,192	86	213	1	-2,555	-14
Tawakoni, Lake	871,685	871,685	100	0	0	0	0
Texana, Lake	159,566	158,281	99	1,006	1	26,107	16
Texoma, Lake (Texas & Oklahoma)	1,258,113	2427384	97	-96323	-3	-164316	-7
Texoma, Lake (Texas)	2,525,281	1213689	97	-44424	-3	-44424	-3
Toledo Bend Reservoir (Texas & Louisiar	2,236,450	2,193,482	98	-42,968	-2	-42,968	-2
Toledo Bend Reservoir (Texas)	4,472,900	4,391,064	98	-119,368	-3	-230,564	-5
Travis, Lake	1,113,348	1,113,348	100	0	0	214,120	19
Twin Buttes Reservoir	182,454	115,747	63	4,746	3	103,275	57
Tyler, Lake	72,073	72,073	100	0	0	0	0
Waco, Lake	189,418	189,418	100	0	0	18,458	10
Waxahachie, Lake	10,780	10,780	100	0	0	0	0
Weatherford, Lake	17,812	17,649	99	65	0	119	1
White River Lake	29,880	4,496	15	-184	-1	-1,066	-4
Whitney, Lake	553,344	537,810	97	-7,836	-1	40,506	7
Worth, Lake	33,495	32,574	97	-170	-1	-921	-3
Wright Patman Lake	122,593	122,593	100	0	0	0	0
STATEWIDE TOTOL							
STATEWIDE TOTAL	**32,198,346**	**27,016,731**	**84**	**-1,179,580**	**-4**	**-53,047**	**-1**

* 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 last month or last year, respectively.

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 February 2019 show that much of the state had near normal streamflow (25–75th percentile, green shading in Figure 6), A couple of sub-basins in the Lower Red, Upper and Lower Brazos, Upper and Lower Neches, and the Upper Nueces river basins had above-normal (76–90th percentile, light blue shading in Figure 6) or much above normal (> 90th percentile, dark blue shading in Figure 6) streamflow. A few sub-basins the Canadian and the Upper Red had below normal streamflow (10–24th percentile, light brown shading in Figure 6).

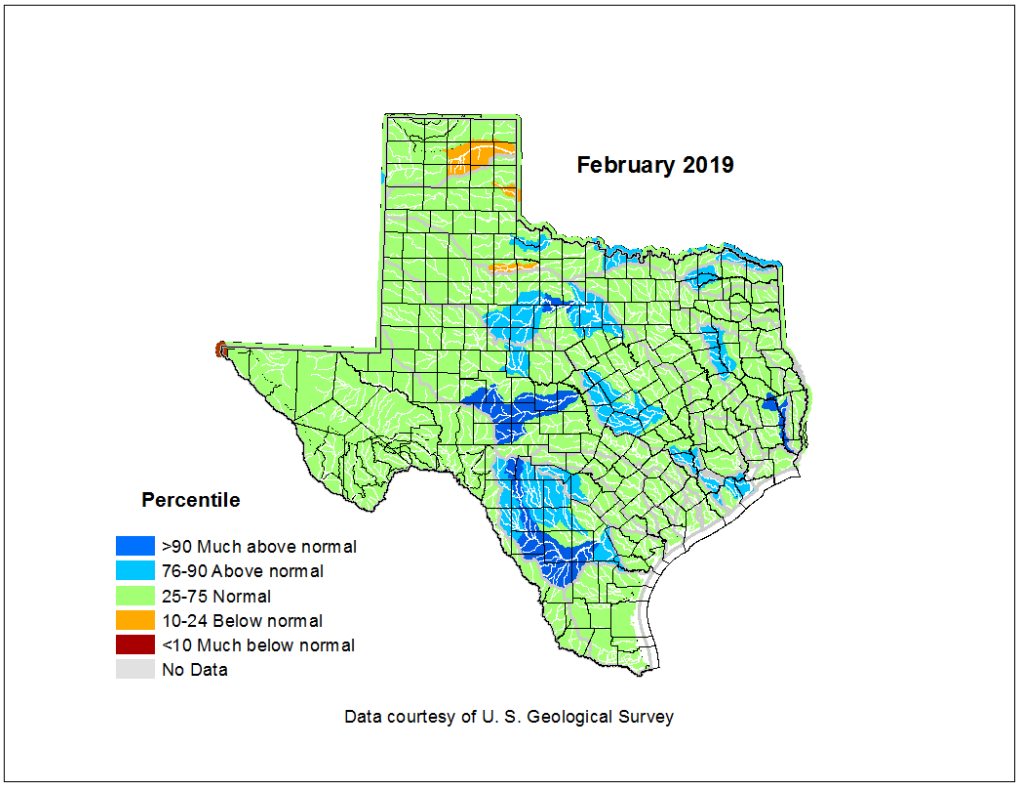
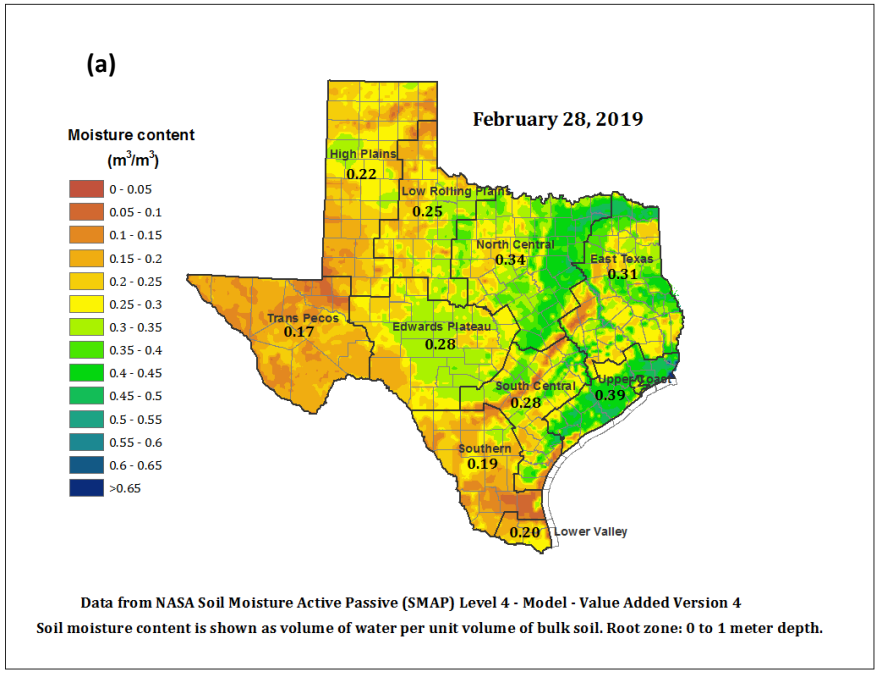


Figure 6: Runoff percentiles by the U.S. Geological Survey's Hydrologic Unit Codes

SOIL MOISTURE CONDITIONS

Soil moisture at the end of February 2019 **[**Figure 7(a)] was mostly moderate [> 0.20 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in all climate divisions of the state except the Trans Pecos where the area averaged soil moisture was 0.17 m^3/m^3. On a regional basis, and compared to conditions at the end of January 2019, soil moisture content decreased (brown shading in Figure 7(b)]in the Edwards Plateau, North Central, South Central, northern regions of the Southern, southeastern Trans Pecos, Lower Valley, and northern Upper Coast climate divisions. Soil moisture content increased [green and blue sharing in Figure 7(b)] in the High Plains, Low Rolling Plains, southern regions of the Southern, central Upper Coast, and East Texas climate divisions. The greatest decrease in soil moisture content was in the Edwards Plateau and the South Central climate divisions. The greatest increase in soil moisture content was along the central Upper Coast and northern East Texas climate divisions.



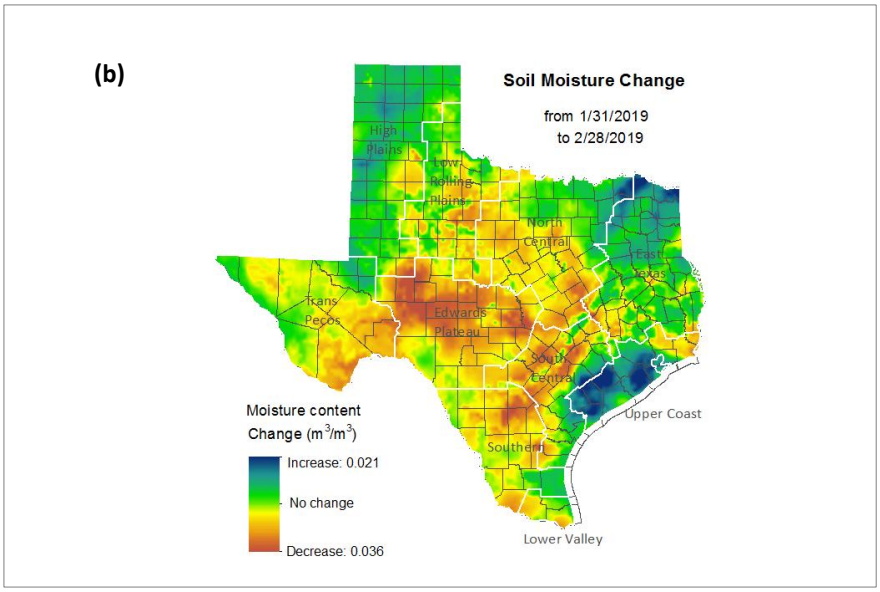
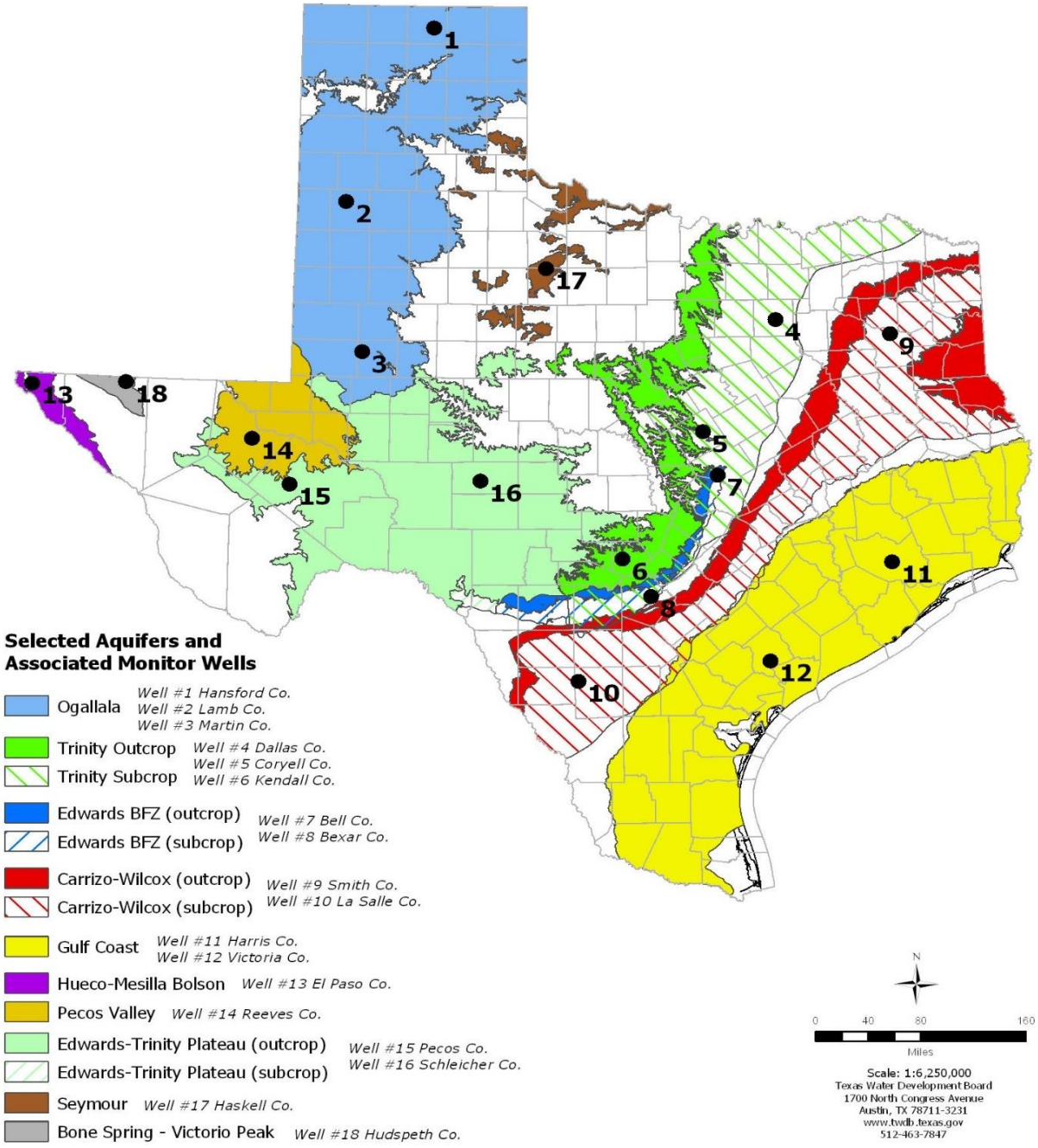


Figure 7: Root zone soil moisture conditions on February 28, 2019 (a) and the difference in root zone soil moisture from end-January 2019 and end-February 2019 (b)

February 2019 GROUNDWATER LEVELS IN OBSERVATION WELLS

Water-level measurements were available for all 18 key monitoring wells in the state. Water levels rose in 13 monitoring wells since the beginning of February, ranging from an increase of 0.11 feet in the Victoria County Gulf Coast Aquifer well (#12 on map) to 15.39 feet in the La Salle County Carrizo-Wilcox Aquifer well (#10 on map). Water levels declined in 5 monitoring wells, ranging from a decline of -0.12 feet in the Hansford County Ogallala Aquifer well (#1 on map) to -2.30 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 46.80 feet below land surface or 683.80 feet above mean sea level. Water levels are 24.20 feet above the Stage 1 critical management level for the San Antonio portion of the Edwards (Balcones Fault Zone) Aquifer.

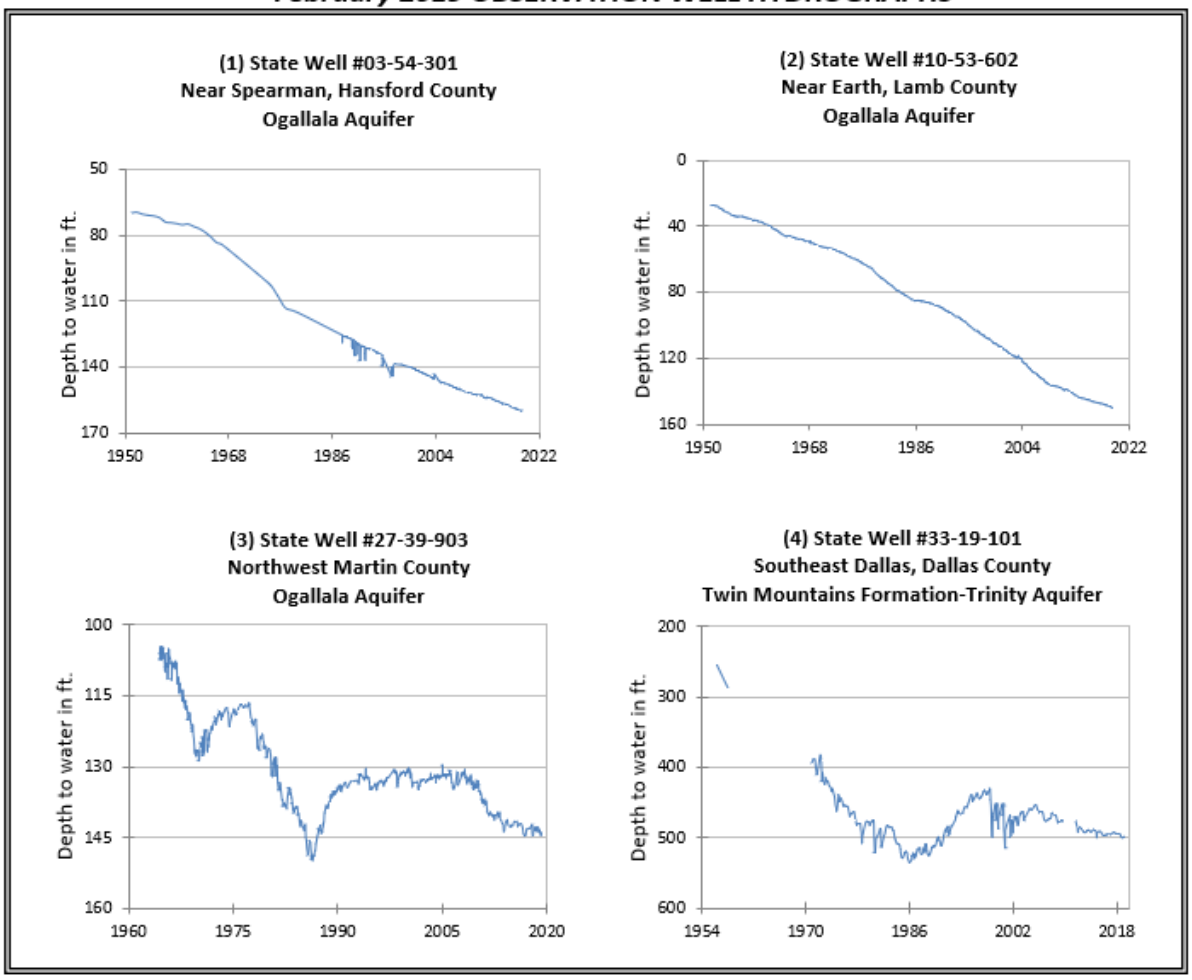


***Well numbers used in this publication on the aquifer map to indicate the monitoring well location (numbers 1 - 18) are different than the TWDB's seven-digit state well number.**

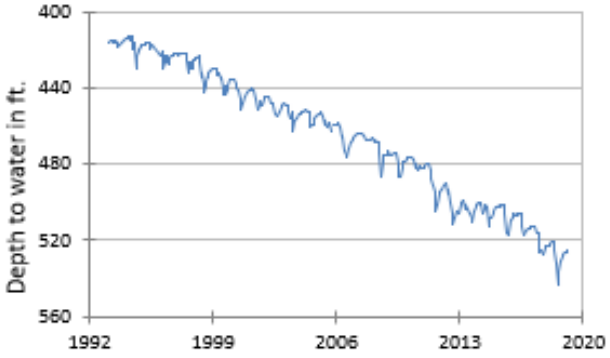
Monitoring Well	February	January	Month Change	Year Change	Historical Change	First Measured
(1) Hansford 0354301	159.93	159.81	-0.12	-0.94	-89.81	1951
(2) Lamb 1053602	149.96	149.70	-0.26	-1.65	-121.79	1951
(3) Martin 2739903	144.10	144.73	0.63	-0.91	-39.21	1964
(4) Dallas 3319101	497.55	498.30	0.75	-3.77	-275.55	1954
(5) Coryell 4035404	524.82	526.22	1.40	-3.09	-232.82	1955
(6) Kendall 6802609	116.84	121.32	4.48	8.68	-56.84	1975
(7) Bell 5804816	118.97	119.35	0.38	5.22	4.54	2008
(8) Bexar 6837203	46.80	44.50	-2.30	17.11	-0.16	1932
(9) Smith 3430907	433.57	434.31	0.74	-1.76	-133.57	1977
(10) La Salle 7738103	498.13	513.52	15.39	-0.39	-245.06	2003
(11) Harris 6514409	189.06	189.37	0.31	3.25	-53.56*	1947**
(12) Victoria 8017502	34.80	34.91	0.11	-2.43	-0.80	1958
(13) El Paso 4913301	295.55	295.22	-0.33	-1.03	-63.65	1964
(14) Reeves 4644501	163.14	166.52	3.38	-2.58	-71.05	1952
(15) Pecos 5216802	177.70	180.51	2.81	9.06	69.18	1976
(16) Schleicher 5512134	267.66	266.49	-1.17	42.83	34.24	2003
(17) Haskell 2135748	45.65	45.90	0.25	0.95	-2.65	2002
(18) Hudspeth 4807516	139.36	140.52	1.16	0.23	-35.44	1966

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

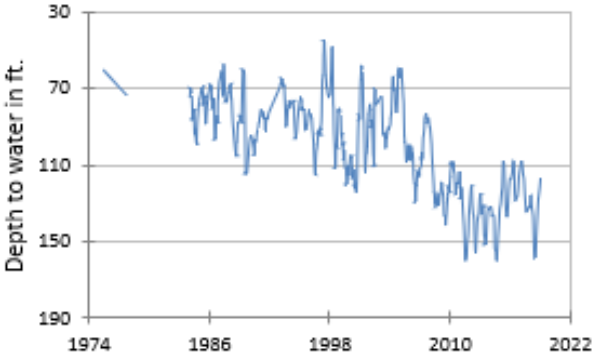
February 2019 OBSERVATION WELL HYDROGRAPHS



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

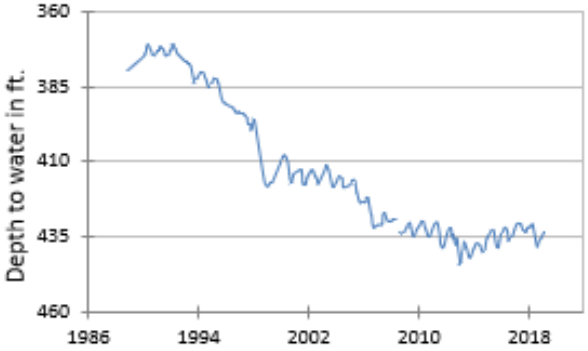


(6) State Well #68-02-609
Waring, Kendall County
Cow Creek Formation-Trinity Aquifer



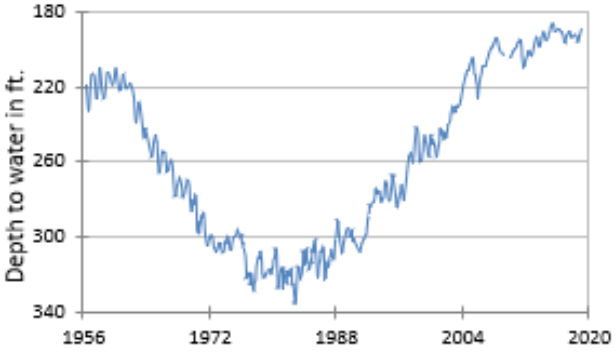
(7) State Well #58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer

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

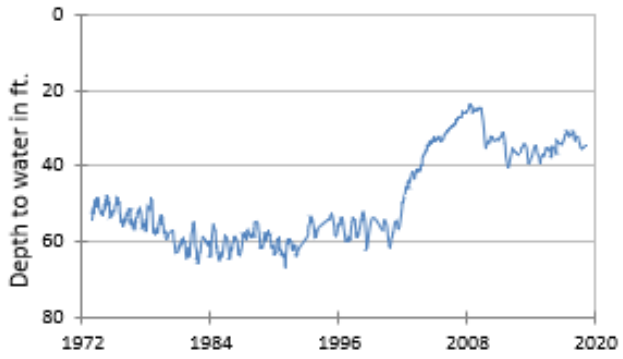


(10) State Well #77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer

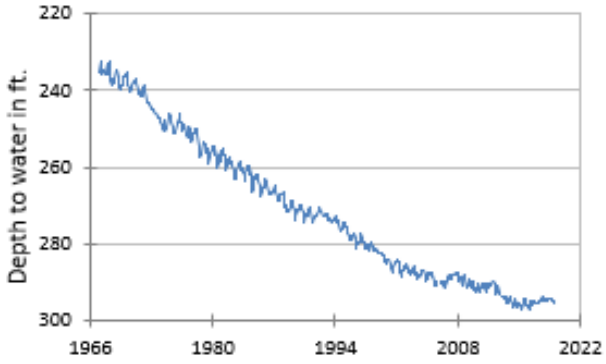
(11) State Well #65-14-409
Alief, Harris County
Evangeline Formation-Gulf Coast Aquifer



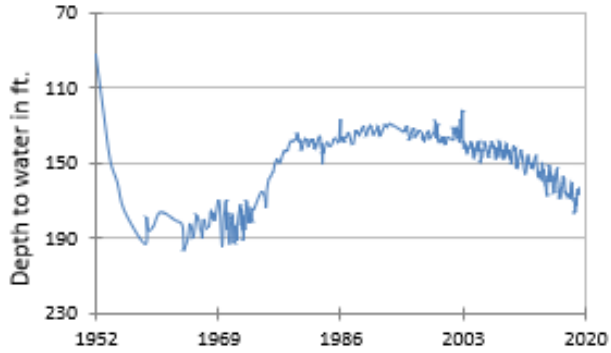
(12) State Well #80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



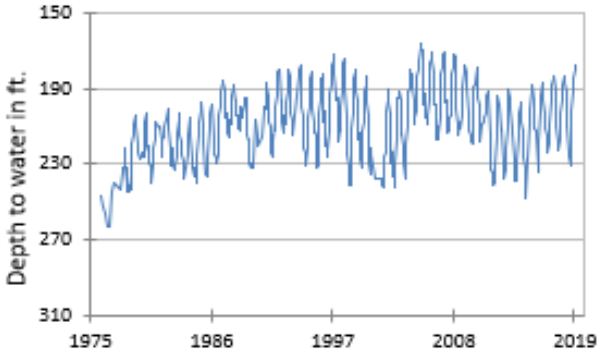
(13) State Well #49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolson Aquifer



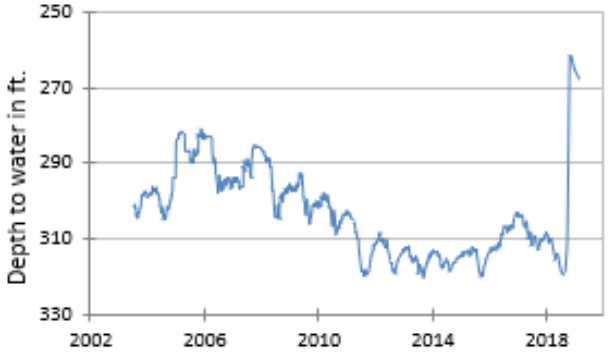
(14) State Well #46-44-501
Near Pecos, Reeves County
Pecos Valley Aquifer



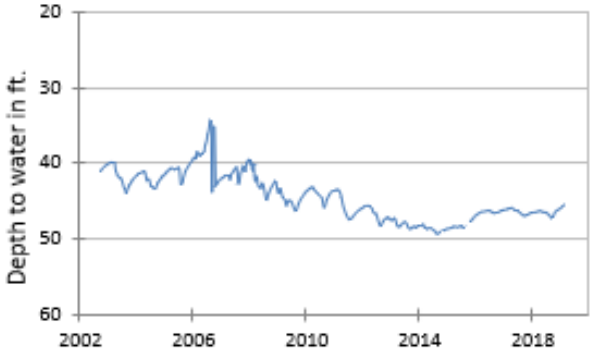
(15) State Well #52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



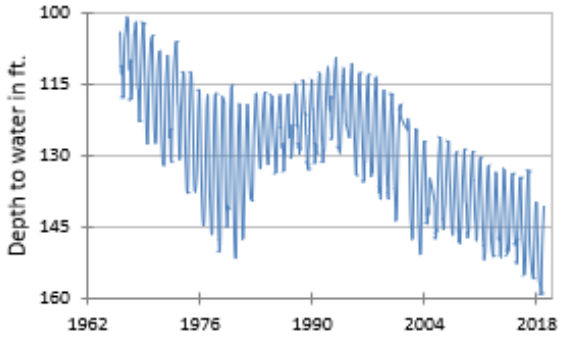
(16) State Well #55-12-134
Eldorado, Schleicher County
Trinity Aquifer



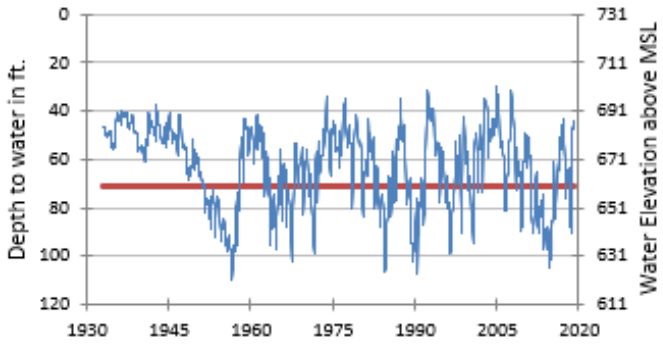
(17) State Well #21-35-748
Near O'Brien, Haskell County
Seymour Aquifer



(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 February water-level measurement in this Edwards (Balcones Fault Zone) Aquifer well, elevation 731 feet above mean sea level, was 46.80 feet below land surface, or 683.80 feet above mean sea level. This was 2.30 feet below last month's measurement, 17.11 feet above last year's measurement and 0.16 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.

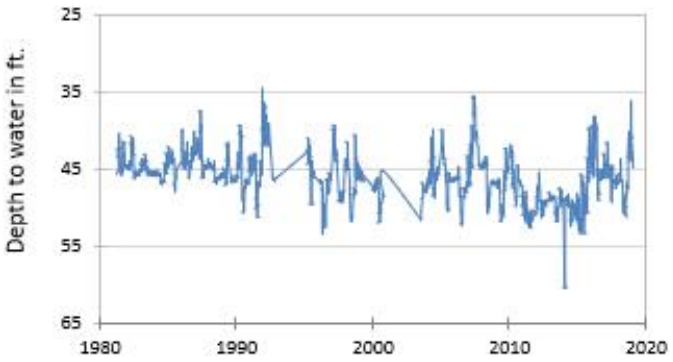
HYDROGRAPH OF THE MONTH

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

Carrizo-Wilcox Aquifer

The Carrizo-Wilcox Aquifer is a major aquifer extending from the Louisiana border to the border of Mexico in a wide band adjacent to and northwest of the Gulf Coast Aquifer. It consists of the Wilcox Group and the overlying Carrizo Formation of the Claiborne Group. The aquifer is primarily composed of sand locally interbedded with gravel, silt, clay, and lignite. The Carrizo-Wilcox Aquifer reaches 3,000 feet in thickness, with the freshwater saturated thickness of the sands averages 670 feet. In the deeper subsurface portions of the aquifer, high iron and manganese exceed secondary drinking water standards. The groundwater, although hard, is generally fresh and contains less than 500 milligrams per liter of total dissolved solids in the outcrop, whereas softer groundwater with total dissolved solids of more than 1,000 milligrams per liter of total dissolved solids. More than half the water usage in the aquifer is designated for irrigation, while municipal supply accounts for another 40 percent.

Well #59-11-621, 232 feet deep
unused, Milam County



The initial measurement of 46.65 feet below land surface was recorded by the Texas Water Development Board in April of 1981. In late May, 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 an average decline in water-level accompanied with seasonal fluctuations. The most recent water-level was 44.79 feet below land surface. This is 2.74 feet below last month's measurement, 1.36 feet above last year's measurement and 1.86 feet above the initial measurement recorded in 1981.

Far away (left), and close-up (right) images of well #59-11-621.