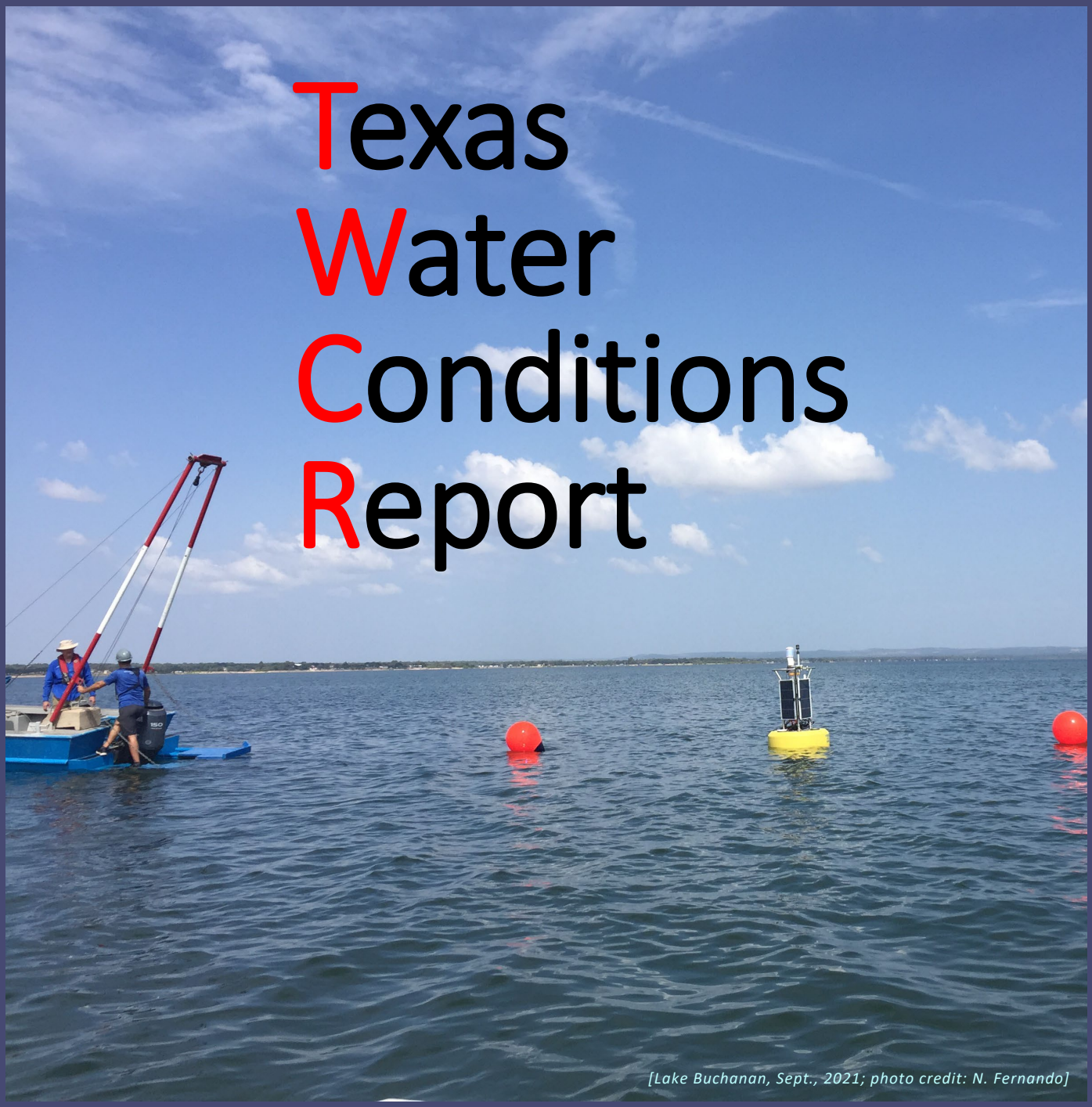
Texas Water Conditions Report



[Lake Buchanan, Sept., 2021; photo credit: N. Fernando]

November 2021

Water News:

In November, the TWDB launched an evaporation buoy on Choke Canyon Reservoir (Nueces River Basin), which will provide improved datasets with daily estimates of evaporative water loss. This is the fourth buoy to be launched this year on as many reservoirs. For more information, please visit our Texas Water Newsroom. https://texaswaternewsroom.org/videos/lake_evaporation_buoys.html

RAINFALL

This month little to no rain [yellow, orange, and red shading, Figure 1(a)] fell over the northwestern portions of the state, while some areas of Texas received much above average rainfall, reaching 8.85 inches in the southern and eastern portions of the state [dark blue shading, Figure 1(a)]. Some rainfall [light blue and dark blue shading, Figure 1(a)] was recorded in southern and eastern North Central, eastern Edwards Plateau, southern Southern, much of the Lower Valley, South Central, East Texas, and Upper Coast climate divisions.

Monthly rainfall for November was below average, compared to historical data from 1981–2010, for much of the state [yellow and orange shading, Figure 1(b)], although above average rainfall [green and light blue shading, Figure 1(b)] was seen in areas of northern North Central, northern and southern Edwards Plateau, southern Southern, central Lower Valley, western Upper Coast, and southwestern South Central climate divisions. Three-to-eight-times the average rainfall [dark blue, purple, and pink shading, Figure 1(b)] was seen in southern portions of the Southern climate division, as well as western Lower Valley climate division.

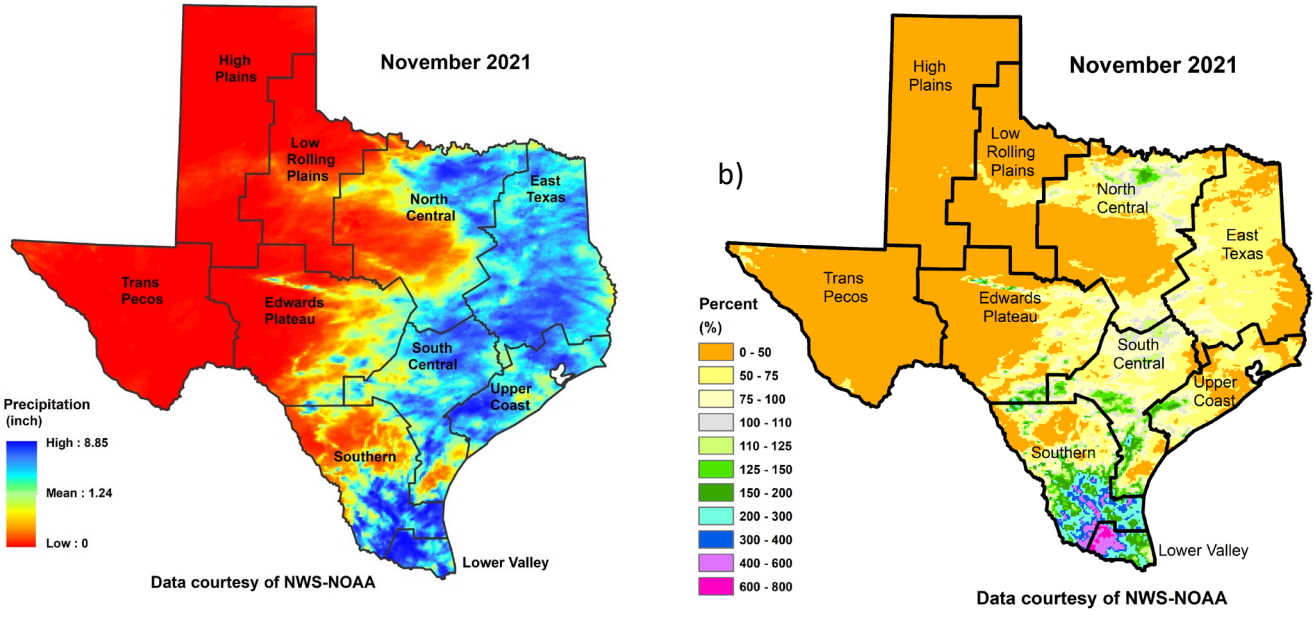


Figure 1: (a) Monthly accumulated rainfall and (b) Percent of normal rainfall

RESERVOIR STORAGE

At the end of November 2021, total conservation storage* in 122 of the state's major water supply reservoirs was 24.88 million acre-feet or 77 percent of total conservation storage capacity (Figure 2). This is approximately 0.21 million acre-feet less than a month ago and approximately 0.19 million acre-feet less than at the end of November 2020.

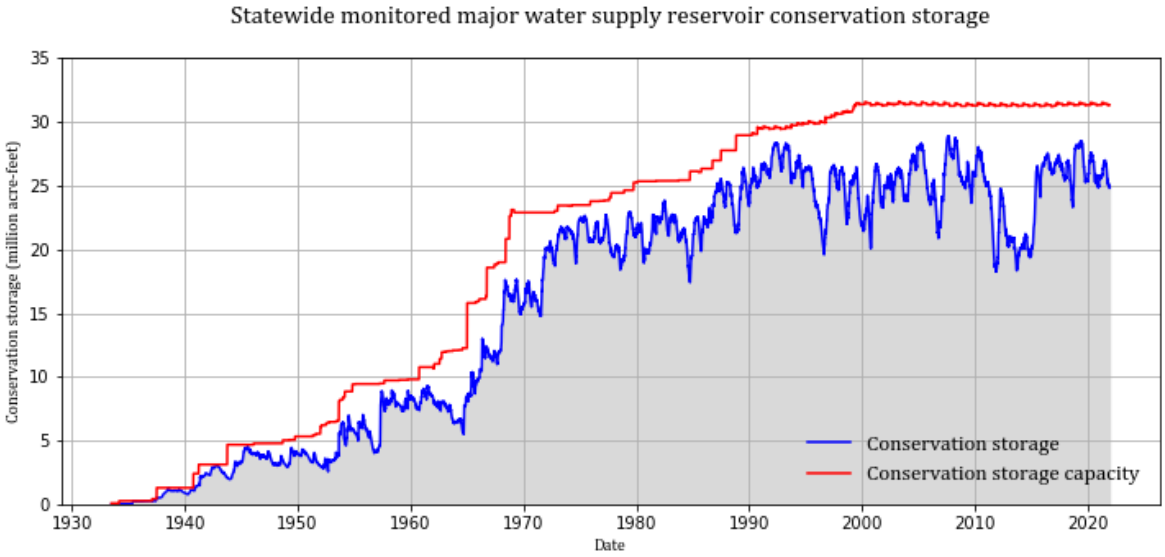


Figure 2: Statewide reservoir conservation storage

Out of 122 reservoirs in the state, 14 reservoirs held 100 percent of conservation storage capacity (Figure 3). Additionally, 50 were at or above 90 percent full. Eight reservoirs remained below 30 percent full: E.V. Spence (25 percent full), Greenbelt (17 percent full), Mackenzie (8 percent full), O. C. Fisher (6 percent full), Palo Duro Reservoir (1 percent full), Falcon (21 percent full), Medina Lake (27 percent full), and White River (21 percent full). Elephant Butte Reservoir (located in New Mexico) was 7 percent full.

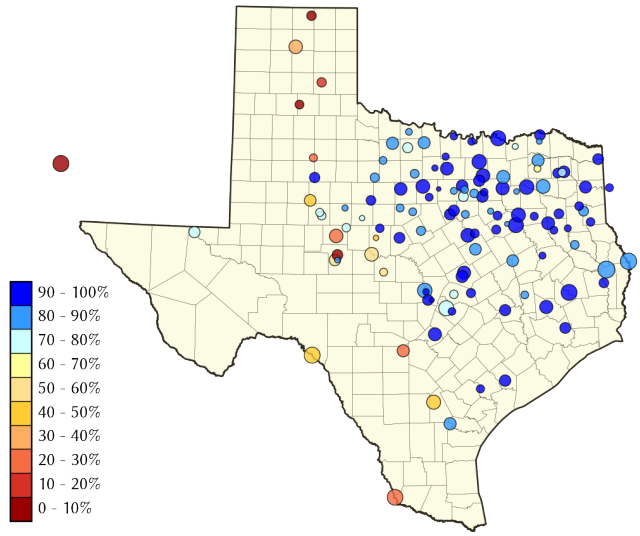


Figure 3: Reservoir conservation storage at end-November expressed as percent full (%)

*Storage is based on end of the month data in 122 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 Low Rolling Plains (75.8 percent full), East Texas (89.9 percent full), North Central (93.3percent full), South Central (74.7 percent full), and Upper Coast (99.0 percent full) climate divisions (Figure 4). The Edwards Plateau climate division had moderately low conservation storage (57.4 percent full). The High Plains (29.7 percent full) and Southern (33.5 percent full) climate divisions had severely low storage, and Trans Pecos climate division (16.0 percent full) had extremely low storage (Figure 4).

Combined conservation storage by river basin or sub-basin showed normal to high (>70 percent full, Figure 5) conservation storage in the Upper and Lower Red, Sulphur, Cypress, Upper and Lower Sabine, Upper and Lower Trinity, Upper and Lower Brazos, San Jacinto, Lower Colorado, Guadalupe, and Lavaca river basins. The Upper Colorado and Nueces river basins had moderately low conservation storage (40–60 percent full, Figure 5), and the San Antonio and Lower Rio Grande river basins had severely low conservation storage (20–40 percent full, Figure 5). The Upper/Mid Rio Grande river basin had extremely low conservation storage (10–20 percent full, Figure 5).

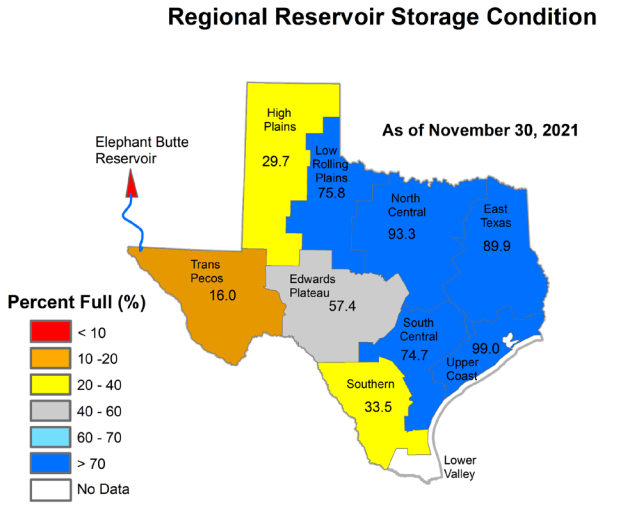


Figure 4: Reservoir Storage Index* by climate division at 11/30/2021

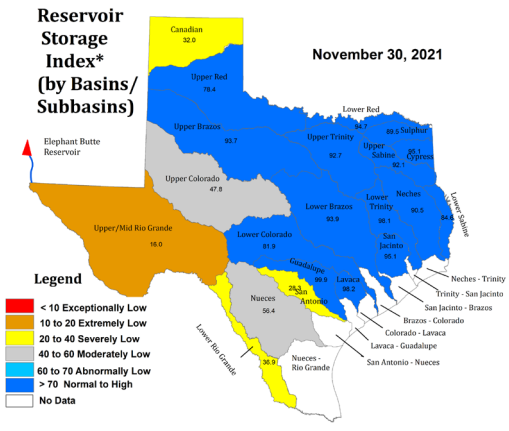


Figure 5: Reservoir Storage Index* by river basin/sub-basin at 11/30/2021

*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-November 2021		Storage change from end-Oct 2021		Storage change from end-Nov 2020	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Abilene, Lake	7,900	6,259	79	-306	-4	531	7
Alan Henry Reservoir	96,207	87,891	91	-1,746	-2	1,891	2
*Amistad Reservoir (Texas & Mexico)	3,275,532	1,120,598	34	-20,290	0	-121,714	-4
*Amistad Reservoir (Texas)	1,840,849	915,384	50	-25,646	-1	-278,802	-15
Amon G Carter, Lake	19,266	19,266	100	0	0	1,019	5
Aquilla Lake	43,243	40,305	93	-1,349	-3	621	1
Arlington, Lake	40,157	33,568	84	92	0	1,912	5
Arrowhead, Lake	230,359	201,976	88	-2,702	-1	-23,911	-10
Athens, Lake	29,503	29,503	100	258	1	0	0
*Austin, Lake	23,972	22,926	96	77	0	15	0
B A Steinhagen Lake	69,186	66,157	96	2,459	4	3,717	5
Bardwell Lake	46,122	45,496	99	311	1	1,179	3
Belton Lake	435,225	412,499	95	-6,272	-1	-12,836	-3
Benbrook Lake	85,648	63,678	74	3,507	4	-8,096	-9
Bob Sandlin, Lake	192,417	177,418	92	-1,285	0	-7,340	-4
Bonham, Lake	11,027	8,437	77	-93	0	-1,824	-17
Brady Creek Reservoir	28,808	16,748	58	-378	-1	-3,199	-11
Bridgeport, Lake	366,236	333,138	91	-7,005	-2	7,957	2
*Brownwood, Lake	130,868	123,126	94	-2,639	-2	9,101	7
Buchanan, Lake	860,607	757,726	88	-2,962	0	31,998	4
Caddo, Lake	29,898	29,898	100	0	0	no data	
Canyon Lake	378,781	378,534	100	164	0	38,105	10
Cedar Creek Reservoir in Trinity	644,686	596,540	93	-4,368	0	-22,022	-3
Champion Creek Reservoir	41,580	29,520	71	-372	0	4,949	12
Cherokee, Lake	40,094	36,842	92	508	1	-2,129	-5
Choke Canyon Reservoir	662,820	294,952	44	-7,220	-1	55,689	8
*Cisco, Lake	29,003	25,649	88	-392	-1	2,438	8
Coleman, Lake	38,075	36,210	95	-642	-2	3,237	9
Colorado City, Lake	31,040	31,040	100	0	0	10,590	34
*Coleto Creek Reservoir	30,758	23,140	75	-462	-2	11,772	38
Conroe, Lake	410,988	388,875	95	3,896	1	9,608	2
Corpus Christi, Lake	256,062	209,638	82	-6,813	-3	71,783	28
Crook, Lake	9,195	8,081	88	132	1	-884	-10
Cypress Springs, Lake	66,756	62,332	93	-94	0	-2,020	-3
E. V. Spence Reservoir	517,272	131,348	25	-3,386	0	12,546	2
Eagle Mountain Lake	179,880	166,957	93	-2,499	-1	3,561	2
Elephant Butte Reservoir (Texas)	852,491	58,215	7	7,913	1	15,077	2
Elephant Butte Reservoir (Total Storage)	1,985,900	134,758	7	18,316	1	34,900	2
*Falcon Reservoir (Texas & Mexico)	2,646,817	417,554	16	16,333	1	-114,135	-4
*Falcon Reservoir (Texas)	1,551,007	333,021	21	21,972	1	-145,457	-9
Fork Reservoir, Lake	605,061	533,139	88	-12,196	-2	-14,653	-2
Fort Phantom Hill, Lake	70,030	66,828	95	-1,221	-2	4,112	6
Georgetown, Lake	36,823	26,306	71	779	2	4,808	13
Gibbons Creek Reservoir	25,721	21,188	82	770	3	901	4
Graham, Lake	45,288	39,894	88	-605	-1	-3,026	-7
Granbury, Lake	132,949	128,669	97	-2,330	-2	-3,059	-2

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS

Name of lake or reservoir	Storage capacity	Storage at end-November 2021		Storage change from end-Oct 2021		Storage change from end-Nov 2020	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Granger Lake	51,822	51,822	100	0	0	6,186	12
Grapevine Lake	163,064	156,589	96	1,268	1	-3,337	-2
Greenbelt Lake	59,968	10,014	17	-374	0	48	0
*Halbert, Lake	6,033	5,171	86	103	2	-141	-2
Hords Creek Lake	8,109	3,571	44	-76	0	-946	-12
Houston County Lake	17,113	17,113	100	322	2	0	0
Houston, Lake	130,147	130,147	100	0	0	0	0
Hubbard Creek Reservoir	313,298	283,199	90	-5,777	-2	882	0
Hubert H Moss Lake	24,058	22,821	95	-11	0	-391	-2
Inks, Lake	13,962	13,035	93	120	1	135	1
J. B. Thomas, Lake	199,931	82,624	41	-2,587	-1	52,536	26
Jacksonville, Lake	25,670	25,381	99	367	1	-289	-1
Jim Chapman Lake (Cooper)	260,332	216,469	83	-7,007	-3	26,995	10
Joe Pool Lake	175,800	169,306	96	-2,730	-2	4,486	3
Kemp, Lake	245,307	210,163	86	-26,202	-11	3,661	1
Kickapoo, Lake	86,345	66,305	77	-1,774	-2	-4,774	-6
Lavon Lake	406,388	336,184	83	1,829	0	-30,469	-7
Leon, Lake	27,762	24,891	90	-540	-2	-1,004	-4
Lewisville Lake	563,228	525,029	93	-1,566	0	-18,138	-3
Limestone, Lake	203,780	181,643	89	-3,790	-2	-10,990	-5
*Livingston, Lake	1,741,867	1,736,955	100	27,017	2	819	0
*Lost Creek Reservoir	11,950	11,681	98	-84	0	390	3
Lyndon B Johnson, Lake	115,249	111,187	96	490	0	61	0
Mackenzie Reservoir	46,450	3,621	8	-65	0	-607	-1
Marble Falls, Lake	6,901	6,858	99	114	2	27	0
Martin, Lake	75,726	65,222	86	-685	0	3,142	4
Medina Lake	254,823	68,030	27	-4,211	-2	-42,827	-17
Meredith, Lake	500,000	175,787	35	-3,447	0	-4,208	0
Millers Creek Reservoir	26,768	23,727	89	-575	-2	-3,041	-11
*Mineral Wells, Lake	5,273	5,203	99	-70	-1	-70	-1
Monticello, Lake	34,740	26,737	77	-276	0	-1,325	-4
Mountain Creek, Lake	22,850	22,850	100	0	0	0	0
Murvaul, Lake	38,285	36,348	95	135	0	838	2
Nacogdoches, Lake	39,522	34,917	88	-379	0	1,141	3
Nasworthy	9,615	8,073	84	0	0	-135	-1
Navarro Mills Lake	49,827	44,949	90	-1,223	-2	-2,274	-5
New Terrell City Lake	8,583	7,728	90	-25	0	-25	0
Nocona, Lake (Farmers Crk)	21,444	19,307	90	-425	-2	-698	-3
North Fork Buffalo Creek Reservoir	15,400	12,707	83	-788	-5	-1,792	-12
O' the Pines, Lake	241,363	236,103	98	-3,675	-2	-1,572	0
O. C. Fisher Lake	115,742	7,345	6	-213	0	-85	0
*O. H. Ivie Reservoir	554,340	306,175	55	-5,576	-1	-31,050	-6
Oak Creek Reservoir	39,210	27,538	70	-688	-2	-3,274	-8

CONSERVATION STORAGE DATA FOR SELECTED MAJOR TEXAS RESERVOIRS							
Name of lake or reservoir	Storage capacity	Storage at end-November 2021		Storage change from end-Oct 2021		Storage change from end-Nov 2020	
	(acre-feet)	(acre-feet)	(%)	(acre-feet)	(%)	(acre-feet)**	(%)
Continued							
Palestine, Lake	367,303	352,245	96	4,040	1	-9,996	-3
Palo Duro Reservoir	61,066	472	1	-92	0	-606	0
Palo Pinto, Lake	26,766	26,288	98	-282	-1	2,336	9
Pat Cleburne, Lake	26,008	21,106	81	-754	-3	-1,231	-5
*Pat Mayse Lake	113,683	103,940	91	-2,121	-2	-9,743	-9
Possum Kingdom Lake	538,139	521,853	97	-5,975	-1	-8,272	-2
Proctor Lake	54,762	48,246	88	-1,455	-3	-4,051	-7
Ray Hubbard, Lake	439,559	417,258	95	7,232	2	13,224	3
Ray Roberts, Lake	788,167	772,107	98	6,143	1	8,370	1
Red Bluff Reservoir	151,110	110,873	73	243	0	40,625	27
Richland-Chambers Reservoir	1,087,839	1,001,331	92	-13,233	-1	-27,788	-3
Sam Rayburn Reservoir	2,857,077	2,500,787	88	-60,858	-2	105,257	4
Somerville Lake	150,293	150,293	100	113	0	27,817	19
Squaw Creek, Lake	151,250	151,250	100	0	0	0	0
Stamford, Lake	51,570	46,264	90	-1,004	-2	-5,306	-10
Stillhouse Hollow Lake	227,771	218,932	96	-2,961	-1	-8,839	-4
Striker, Lake	16,934	16,934	100	612	4	0	0
Sweetwater, Lake	12,267	9,912	81	-125	-1	-237	-2
*Sulphur Springs, Lake	17,747	10,760	61	-459	-3	-1,514	-9
Tawakoni, Lake	871,685	809,581	93	-9,216	-1	-7,084	0
Texana, Lake	159,566	158,556	99	1,737	1	2,101	1
Texoma, Lake (Texas & Oklahoma)	2,487,601	2,382,304	96	14,337	1	-9,319	0
Texoma, Lake (Texas)	1,243,801	1,191,152	96	7,169	1	-4,659	0
Toledo Bend Reservoir (Texas & Louisiana)	4,472,900	3,763,137	84	-25,806	0	-105,833	-2
Toledo Bend Reservoir (Texas)	2,236,450	1,879,518	84	-12,904	0	-52,917	-2
Travis, Lake	1,113,348	798,294	72	-6,358	0	40,572	4
Twin Buttes Reservoir	182,454	95,374	52	-2,489	-1	-2,925	-2
Tyler, Lake	72,073	68,965	96	546	1	-2,169	-3
Waco, Lake	189,418	169,808	90	-5,795	-3	-8,766	-5
Waxahachie, Lake	10,780	8,930	83	-177	-2	261	2
Weatherford, Lake	17,812	15,095	85	-270	-2	-859	-5
White River Lake	29,880	6,127	21	-283	0	no data	
Whitney, Lake	553,344	506,319	92	-4,036	0	9,845	2
Worth, Lake	24,419	20,853	85	-132	0	1,701	7
Wright Patman Lake	122,593	122,593	100	-12,476	-10	0	0
STATEWIDE TOTAL							
STATEWIDE TOTAL	**32,168,837**	**24,880,858**	**77**	**-210,839**	**-0.9**	**-187,109**	**-0.8**

*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.

STREAMFLOW CONDITIONS

Much of the state had near normal to much above normal streamflow in November 2021 (25–75th percentile, green shading , Figure 6). Below normal streamflow (10–24th percentile, orange shading in Figure 6) was recorded in the Upper and Lower Red, Lower Trinity, Lower Brazos, Upper and Lower Colorado, Guadalupe, San Antonio, Nueces, Nueces-Rio Grande, and the Pecos river basins. Much below normal streamflow (< 10th percentile, dark red shading in Figure 6) was recorded in the Canadian, Upper and Lower Red, Upper Colorado, and Pecos river basins. A record low (bright red shading in Figure 6) was seen in the Upper Brazos river basin.

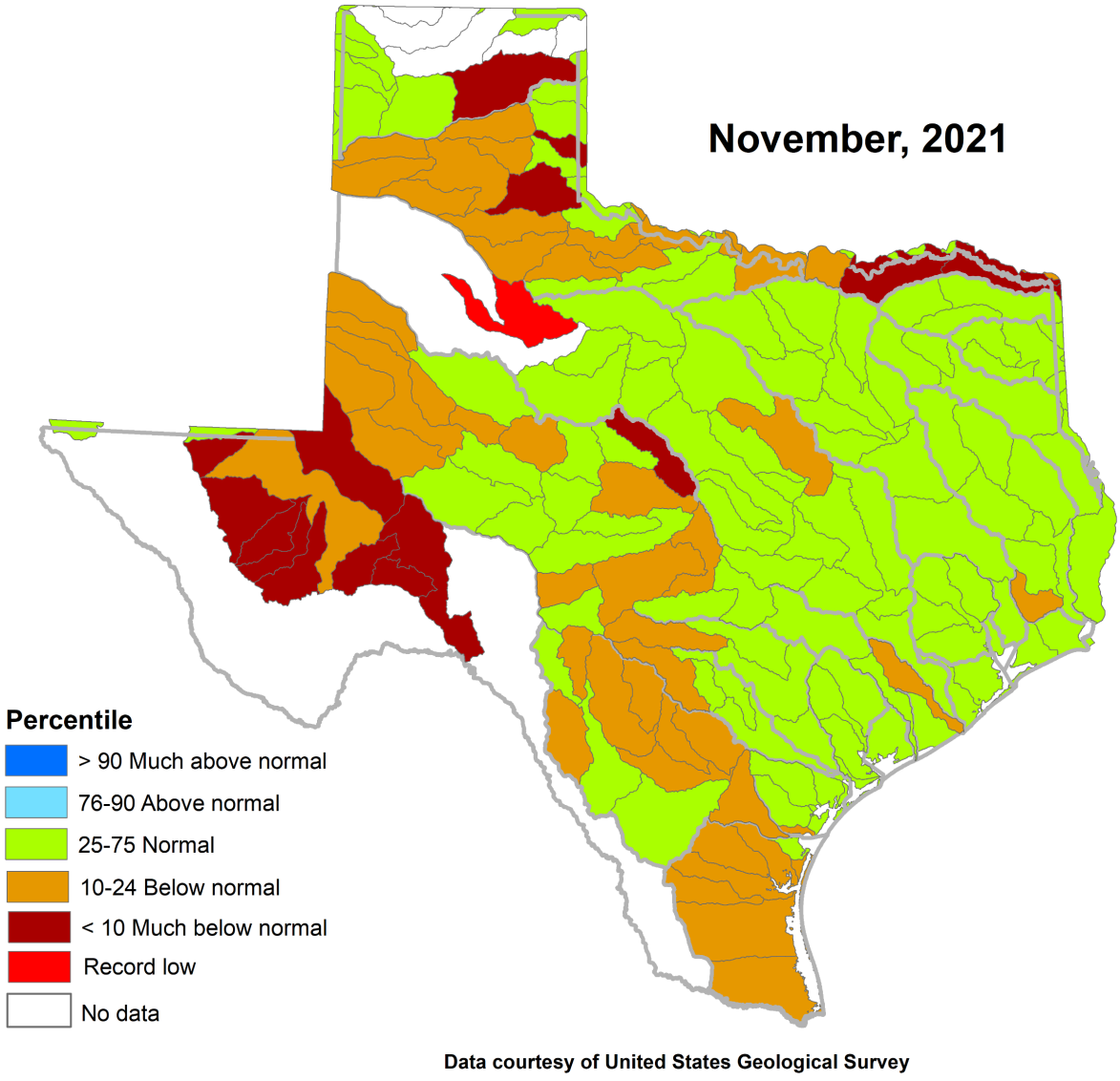


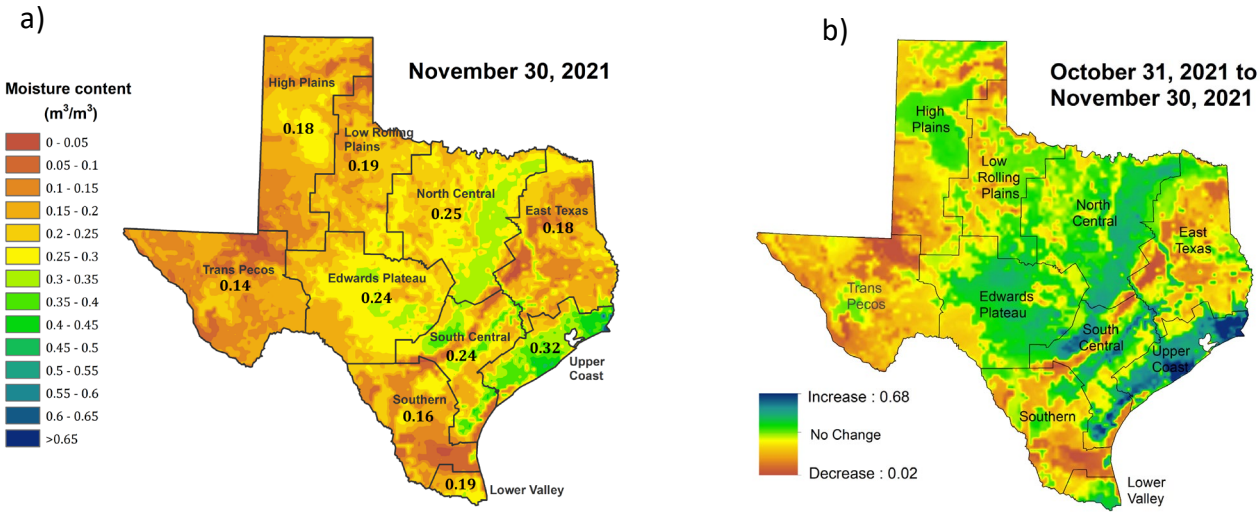
Figure 6: Runoff percentiles by the U.S. Geological Survey's Hydrologic Unit Code

SOIL MOISTURE

Root zone soil moisture at the end of November 2021 [Figure 7(a)] was moderate [> 0.20 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in much of the state. There were areas of low soil moisture [< 0.15 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in portions of the High Plains, Low Rolling Plains, Trans Pecos, Edwards Plateau, Southern, Lower Valley, East Texas, North Central, southwestern Upper Coast, central and southern South Central, and stretching across the climate division from the northwest to the northeast.

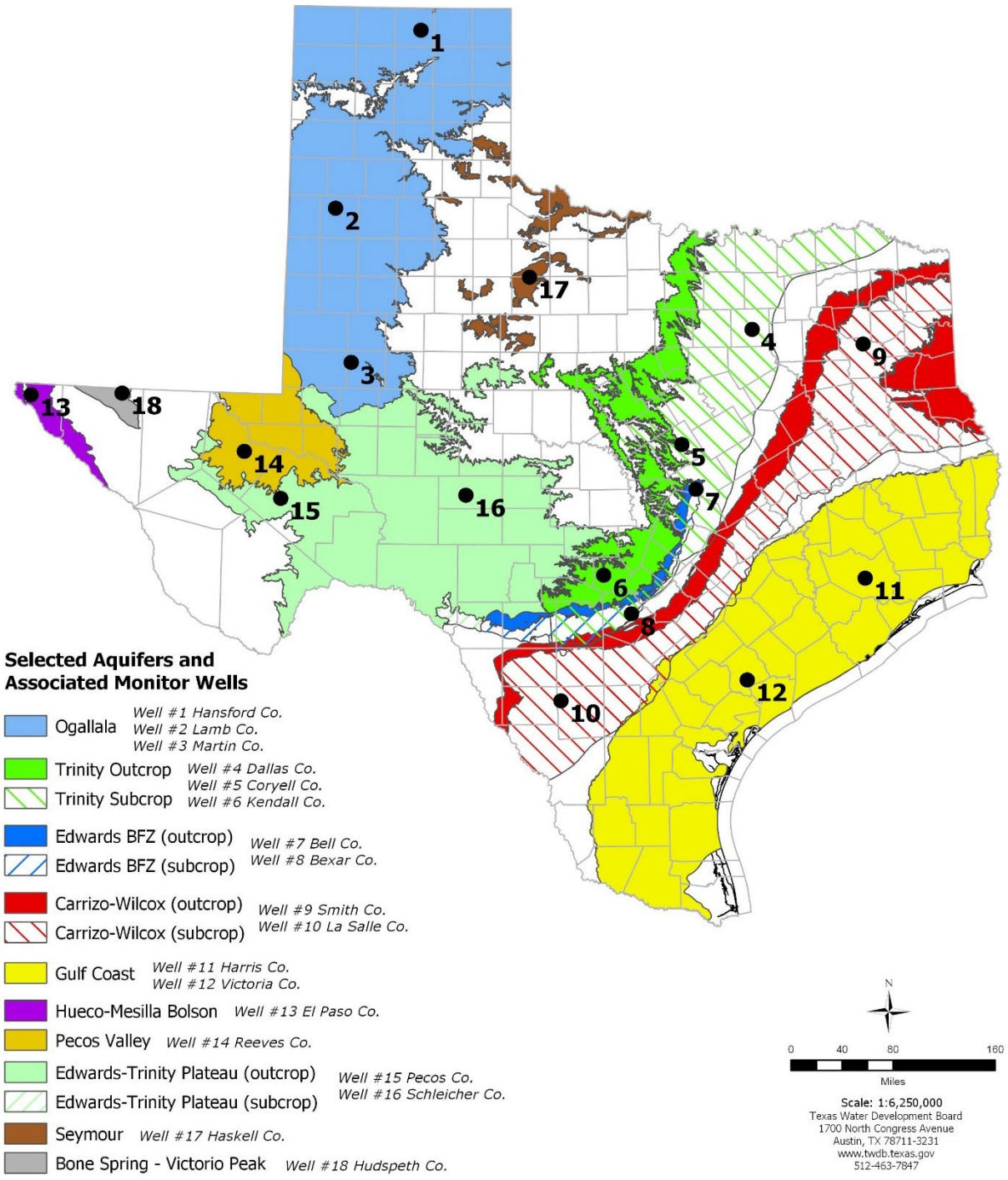
Soil moisture was high [> 0.3 cubic meters of water per bulk cubic meter soil (m^3/m^3)] in areas of central Edwards Plateau, eastern North Central, northern and southern South Central, southeastern Southern, south central Lower Valley, and much of the Upper Coast climate divisions. Very high soil moisture [> 0.6 cubic meters of water per bulk cubic meter soil (m^3/m^3)] was found in portions of eastern Upper Coast [Figure 7(a)].

Compared to conditions at the end of October 2021, soil moisture content increased [green to blue shading in Figure 7(b)] in portions of all climate divisions. Soil moisture content decreased [yellow, orange, and brown shading in Figure 7(b)] in the northern and southern High Plains, areas of the Trans Pecos, northern and central Low Rolling Plains, East Texas, Southern, northern Lower Valley, northern and southern South Central, and southwestern Upper Coast climate divisions.



Data from NASA Soil Moisture Active Passive (SMAP) Level 4 - Model - Value Added Version 4
Soil moisture content is shown as volume of water per unit volume of bulk soil. Root zone: 0 to 1 meter depth.

Figure 7: (a) Root zone soil moisture conditions in November 2021 and (b) the difference in root zone soil moisture between end-October 2021 and end-November 2021



November 2021 GROUNDWATER LEVELS IN MONITORING WELLS

Water-level measurements were available for 15 key monitoring wells in the state. Recorders in 3 wells (#1, #14, and #18 on map) were temporarily offline and scheduled for repair. Water levels rose in 6 monitoring wells since the beginning of November, ranging from an increase of 0.08 feet in the Lamb County Ogallala Aquifer well (#2 on map) to 1.85 feet in the Pecos County Edwards-Trinity Plateau Aquifer well (#15 on map). Water levels declined in 9 monitoring wells, ranging from a decline of -0.03 feet in the Martin County Ogallala Aquifer well (#3 on map) to -1.20 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 65.30 feet below land surface or 665.70 feet above mean sea level. Water levels are 5.70 feet above the Stage I 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	November (depth to water, feet)	October (depth to water, feet)	Month Change	Year Change	Historical Change*	First Measured (year)
(1) Hansford 0354301	NA	NA	**NA**	**NA**	***-91.74***	1951
(2) Lamb 1053602	152.40	152.48	***0.08***	***-0.92***	***-124.23***	1951
(3) Martin 2739903	144.45	144.42	***-0.03***	***0.67***	***-39.56***	1964
(4) Dallas 3319101	495.53	495.39	***-0.14***	***-5.53***	***-273.53***	1954
(5) Coryell 4035404	532.97	533.45	***0.48***	***-3.51***	***-240.97***	1955**
(6) Kendall 6802609	149.01	148.15	***-0.86***	***9.64***	***-89.01***	1975
(7) Bell 5804816	121.91	121.58	***-0.33***	***2.89***	***1.60***	2008
(8) Bexar 6837203	65.30	64.10	***-1.20***	***4.20***	***-18.66***	1932
(9) Smith 3430907	440.18	439.75	***-0.43***	***-3.79***	***-140.18***	1977**
(10) La Salle 7738103	503.76	503.35	***-0.41***	***17.14***	***-250.69***	2003
(11) Harris 6514409	186.28	186.43	***0.15***	***2.64***	***-50.78****	1947**
(12) Victoria 8017502	31.42	31.61	***0.19***	***3.54***	***2.58***	1958**
(13) El Paso 4913301	298.81	298.90	***0.09***	***-1.49***	***-66.91***	1964**
(14) Reeves 4644501	NA	158.02	**NA**	**NA**	***-65.93***	1952
(15) Pecos 5216802	217.43	219.28	***1.85***	***-14.92***	***29.45***	1976
(16) Schleicher 5512134	279.90	279.52	***-0.38***	***5.36***	***22.00***	2003
(17) Haskell 2135748	45.31	45.03	***-0.28***	***-0.62***	***-2.31***	2002
(18) Hudspeth 4807516	NA	NA	**NA**	**NA**	***-50.79***	1966

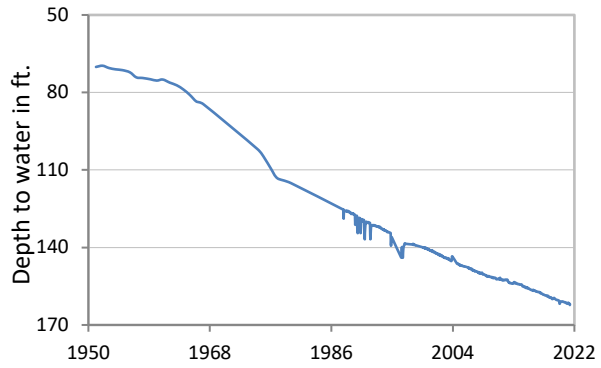
*** Change since the original measurement taken on the date indicated in the last column. The historical changes shown for recorder wells #1, #14, and #18 are based off the most recent water level records from May, October, and June 2021, respectively.**

**** Measurement not shown on the hydrograph.**

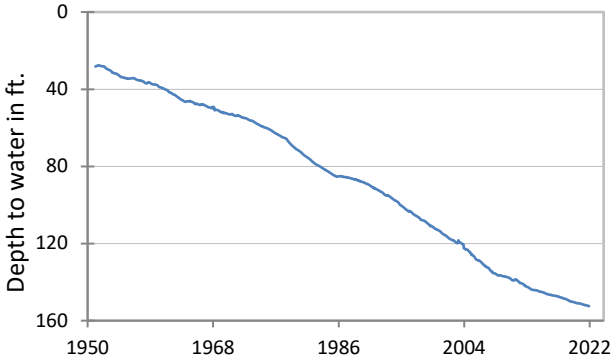
NA (not available)

November 2021 MONITORING WELL HYDROGRAPHS

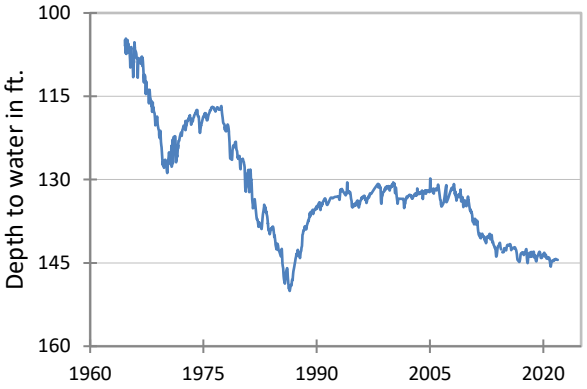
***(1) State Well #03-54-301**
Near Spearman, Hansford County
Ogallala Aquifer



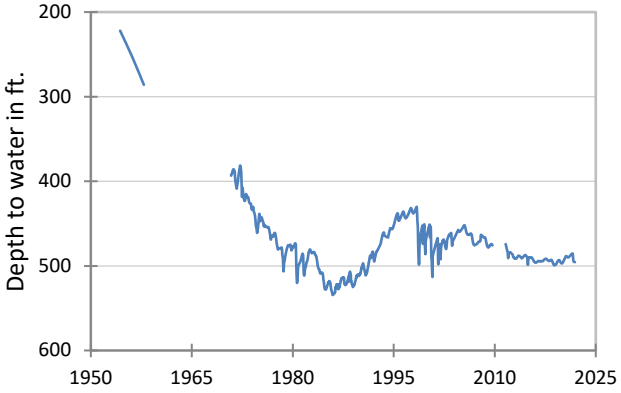
(2) State Well #10-53-602
Near Earth, Lamb County
Ogallala Aquifer



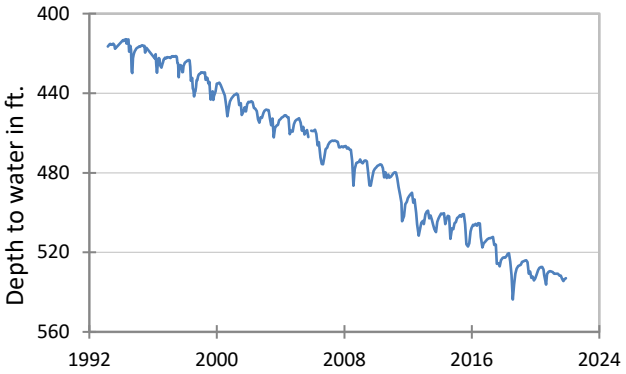
(3) State Well #27-39-903
Northwest Martin County
Ogallala Aquifer



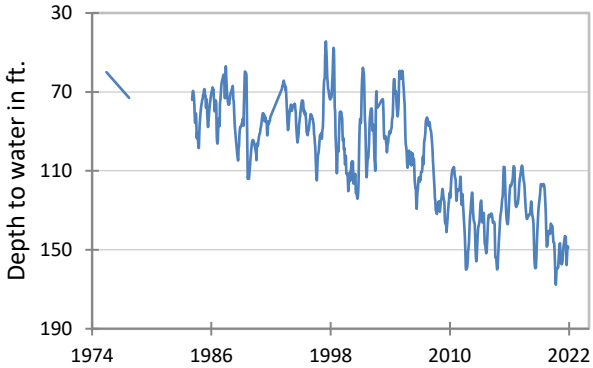
(4) State Well #33-19-101
Southeast Dallas, Dallas County
Twin Mountains Formation-Trinity Aquifer



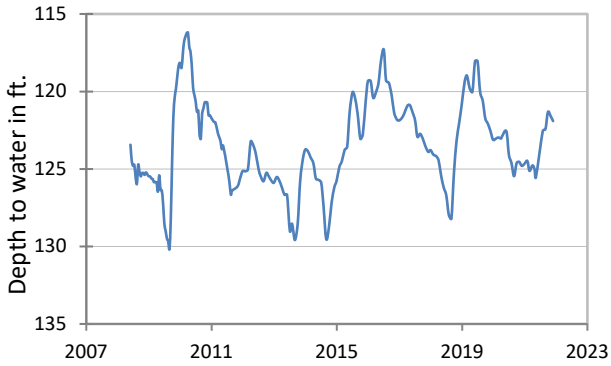
(5) State Well #40-35-404
Gatesville, Coryell County
Hosston Formation-Trinity Aquifer



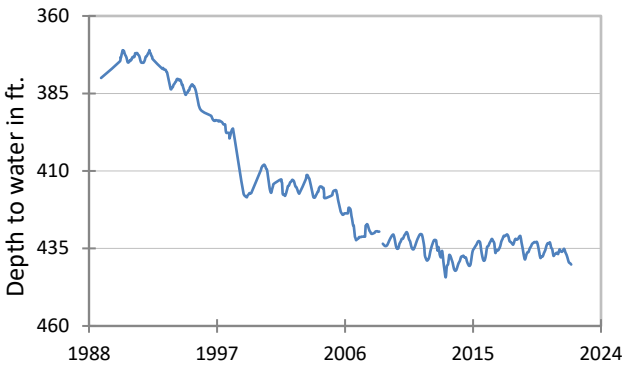
(6) State Well #68-02-609
Waring, Kendall County
Travis Peak Formation-Trinity Aquifer



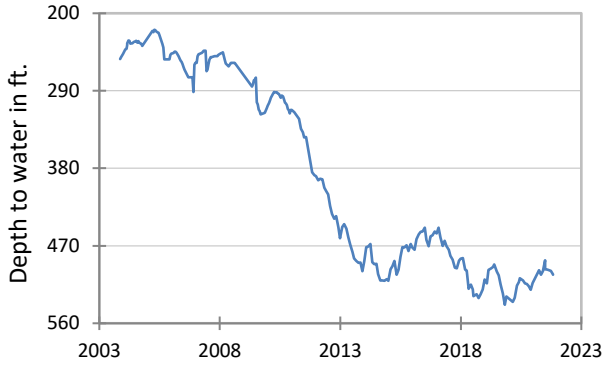
(7) State Well #58-04-816
Near Salado, Bell County
Edwards (Balcones Fault Zone) Aquifer



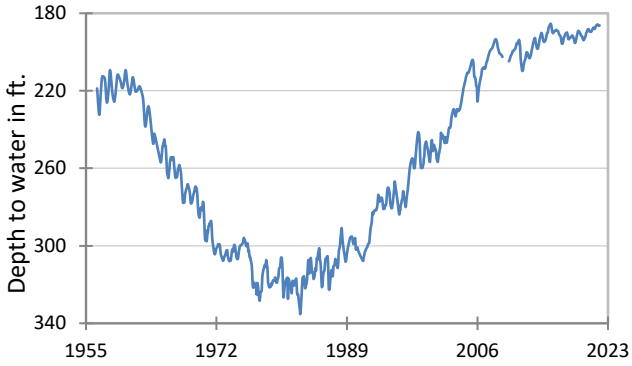
(9) State Well #34-30-907
Red Springs, Smith County
Carrizo-Wilcox Aquifer



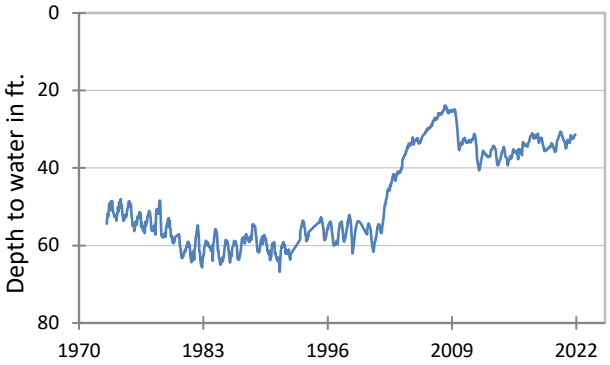
(10) State Well #77-38-103
Near Cotulla, La Salle County
Carrizo-Wilcox Aquifer



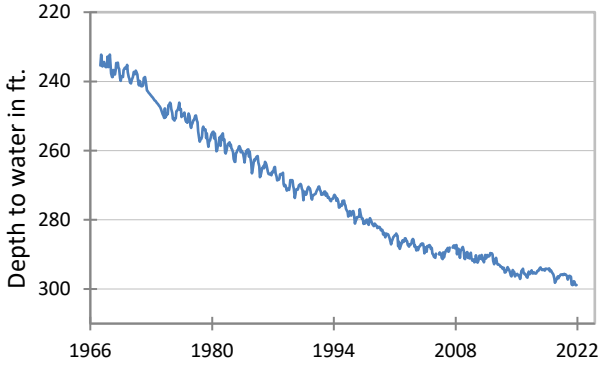
(11) State Well #65-14-409
North Houston, Harris County
Evangeline Formation-Gulf Coast Aquifer



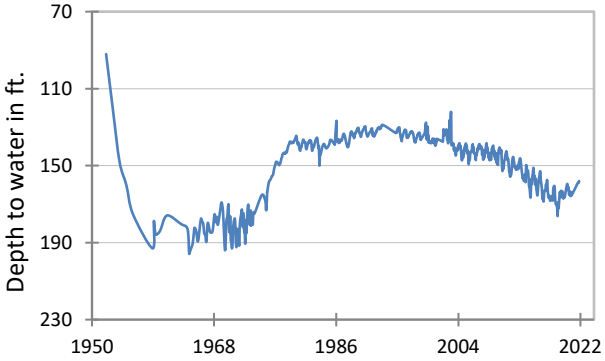
(12) State Well #80-17-502
Near Bloomington, Victoria County
Lissie Formation-Gulf Coast Aquifer



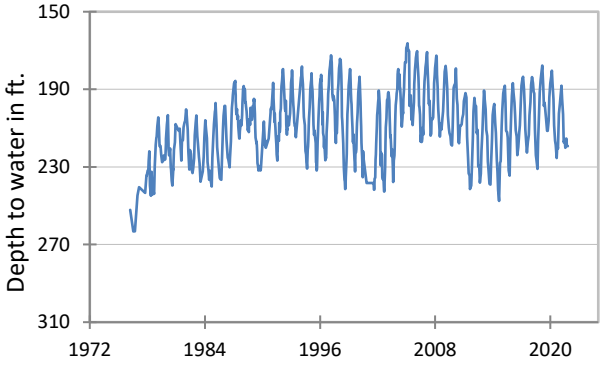
(13) State Well #49-13-301
El Paso, El Paso County
Hueco-Mesilla Bolsons Aquifer



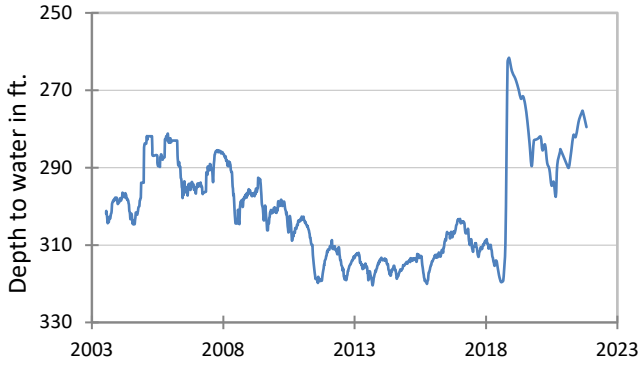
***(14) State Well #46-44-501**
Near Pecos, Reeves County
Pecos Valley Aquifer



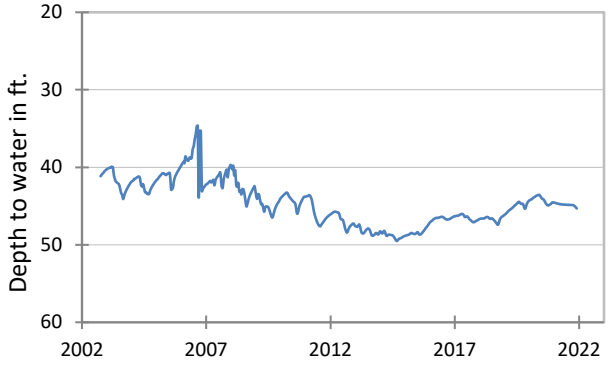
(15) State Well #52-16-802
Fort Stockton, Pecos County
Edwards-Trinity (Plateau) Aquifer



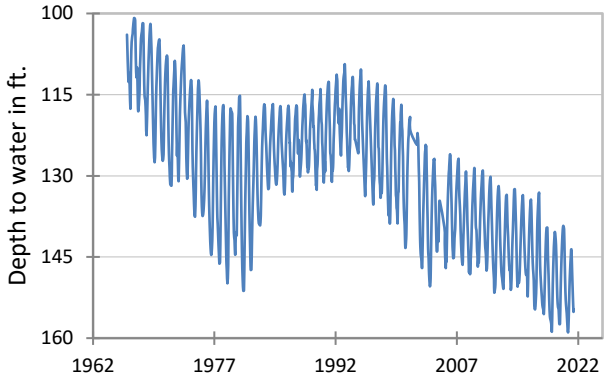
(16) State Well #55-12-134
Eldorado, Schleicher County
Edwards-Trinity (Plateau) Aquifer



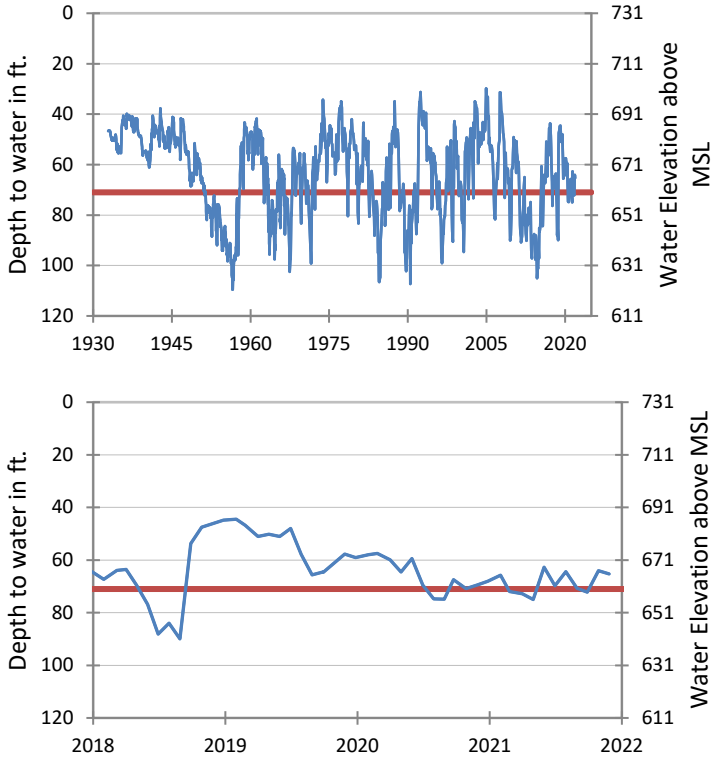
(17) State Well #21-35-748
Near O'Brien, Haskell County
Seymour Aquifer



***(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

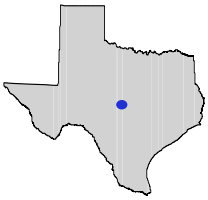


The late November water-level measurement in this Edwards (Balcones Fault Zone) Aquifer well, located at an elevation of 731 feet above mean sea level, was 65.30 feet below land surface, or 665.70 feet above mean sea level. This was 1.20 feet below last month's measurement, 4.20 feet above last year's measurement and 18.66 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. In November 2021, Stage 1 drought restrictions were not in effect because the aquifer remained above the Stage 1 critical management level.

***Recorder wells #1, #14, and #18 were temporarily offline in November 2021 and did not record data.**

HYDROGRAPH OF THE MONTH

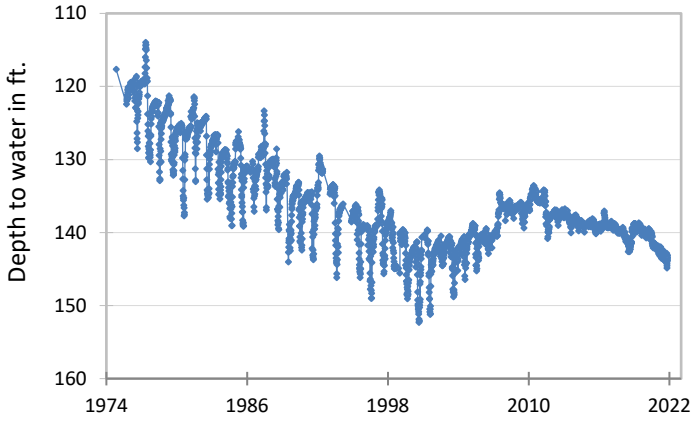


Each month this space features a new hydrograph (marked with the • symbol on the map) depicting different aquifers and their conditions in Texas.

Hickory Aquifer

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

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. Although the groundwater is generally fresh, with a total dissolved solids concentration of less than 1,000 milligrams per liter, the upper portion of the aquifer typically contains iron in excess of the state's secondary drinking water standards. Additionally, naturally occurring radioactivity is of concern and 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.



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 and a steady decline 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, the water level is on an average decline roughly equal to -0.55 ft/yr.

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