Fort Bend Subsidence District

2017 ANNUAL GROUNDWATER REPORT

(28th Annual Report)

Approved by Resolution 2018-398

Revised August 24, 2018

YEAR ENDING, DECEMBER 31, 2017

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2017 GROUNDWATER HEARING

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INTRODUCTION

Pursuant to Fort Bend Subsidence District (the District or FBSD) Resolution No. 18-396 passed on March 28, 2018, the Board of Directors held the Annual Groundwater Hearing beginning at 2:30 p.m. on May 1, 2018 at the William B. Travis building, 301 Jackson Street, sixth floor meeting room, in Richmond, Texas. The public hearing fulfills the requirements of the District's enabling legislation, which states that the Board of Directors shall hold a public hearing to take testimony concerning the effects of groundwater withdrawals on the subsidence of land within the District during the preceding year.

This report was prepared in accordance with an Inter-local Agreement between the District and the Harris-Galveston Subsidence District (HGSD). This report was prepared by Mr. Robert Thompson of the District's staff, with special assistance from Mr. Vanson Truong, Mr. Mike Chrismer, along with other's from the District staff; from Mr. Jason Ramage, from the US Geological Survey; and Dr. Guoquan "Bob" Wang of the Department of Earth and Atmospheric Sciences-University of Houston. The following findings were presented for this Groundwater Report for the year ending December 31, 2017.

Helen Stewart Truscott
Hearing Examiner

TESTIMONY AND FINDINGS

Ms. Helen Truscott, the Hearing Examiner, opened the Hearing at approximately 2:30 p.m. She stated that representatives from the Fort Bend Subsidence District and the United States Geological Survey would give testimony. She also asked that if anyone else planned to give testimony or ask questions, that they state their name and whom they were representing. The record remained open until May 8, 2018 at 5:00 pm.

In attendance at the hearing were members of the public and members of the District and USGS staffs. Those giving testimony were Mr. Robert Thompson of the District and Mr. Jason Ramage, Hydrologist, Houston Sub-district, Water Resources Division, United States Geological Survey, Department of the Interior. Mr. Thompson began by presenting ten exhibits including topics of precipitation, groundwater pumpage, and surface-water use. Mr. Ramage then presented 23 exhibits showing aquifer water-level altitudes and changes, exhibits showing extensometer compaction measurements taken in Fort Bend and neighboring counties, and exhibits summarizing the data. Mr. Thompson continued by presenting three exhibits including maps, subsidence charts/monitor site locations within Fort Bend County and one exhibit (found in the appendix) that showed the change in elevation measurements during 2017 for each of the Periodically Active Monitor Sites (PAMs), Continuously Operating Reference Stations (CORS) and Extensometers in and around Fort Bend County.

SUBSIDENCE DISTRICT TESTIMONY

Mr. Thompson presented testimony concerning monthly precipitation and groundwater withdrawals during the year 2017. The groundwater withdrawals for 2017 were compared with annual groundwater pumpage data since 1990. This data was compiled from annual groundwater pumpage reports submitted by well owners whose wells were permitted by the District at any time during the calendar year of 2017. The District's enabling legislation requires each well owner to submit water well pumpage data annually to the District. There were 1227 permitted wells in 2017. The reports, submitted as of the date of the Groundwater Hearing, represented nearly 100 percent of the pumpage within the District for the year 2017. Only 28 well reports for 2017 (estimated at 0.0 MGD) have not been received at the time of this report. The following exhibits and summaries depict Mr. Thompson's presentation.

Mr. Thompson noted that because the amount and timing of rainfall often determines the amount of irrigation (and consequently the amount of groundwater pumped) that takes place annually, he would begin his presentation with a look at the precipitation patterns in the District.

FBSD EXHIBIT NO. 1: WEATHER MONITORING SITES

Mr. Thompson presented two exhibits describing precipitation measurements for calendar year 2017 in the District. The data is reported for Sugar Land Regional Airport, a site within the City of Sugar Land. Precipitation data was collected from the NOAA National Data Center web site.

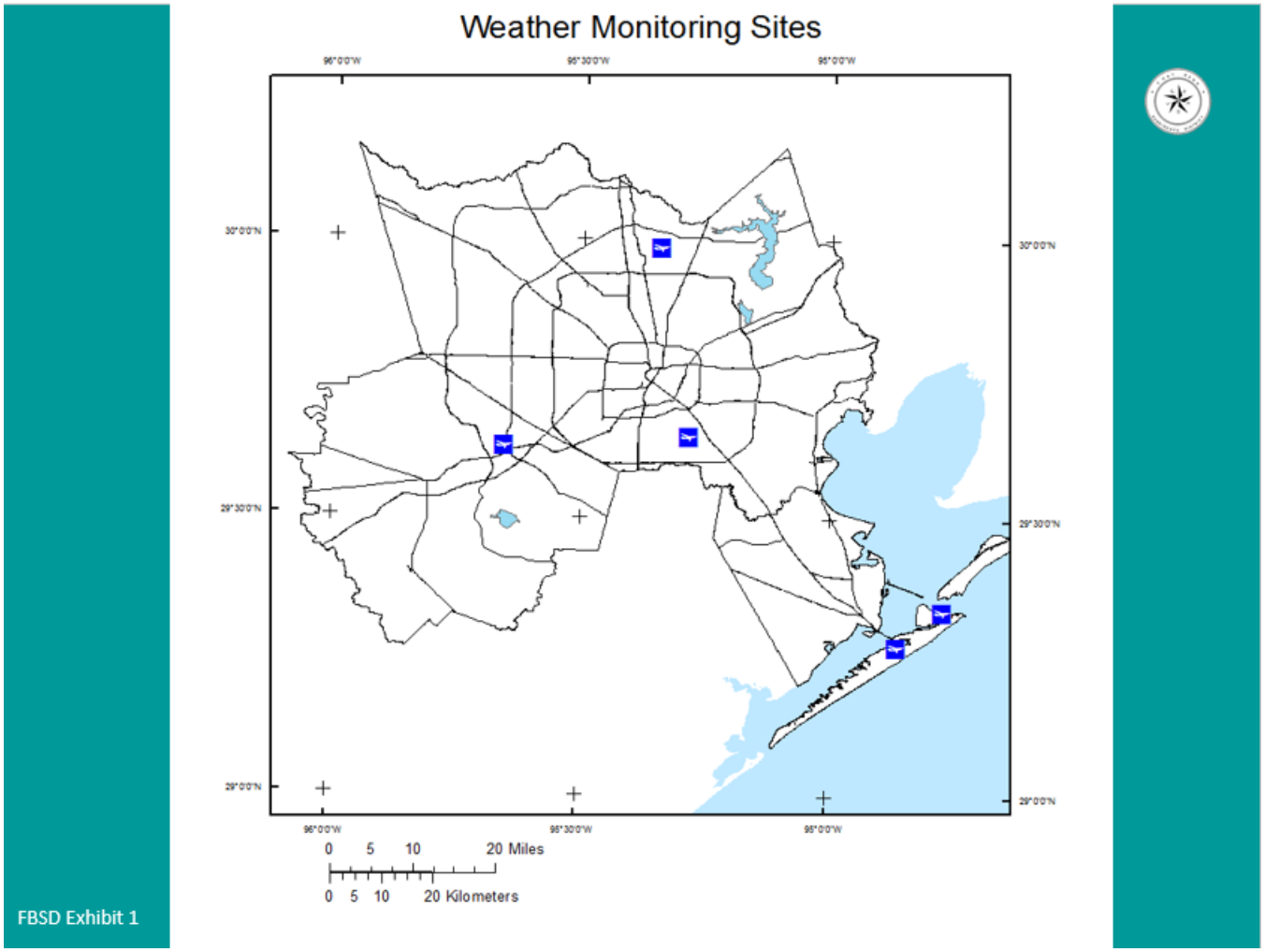
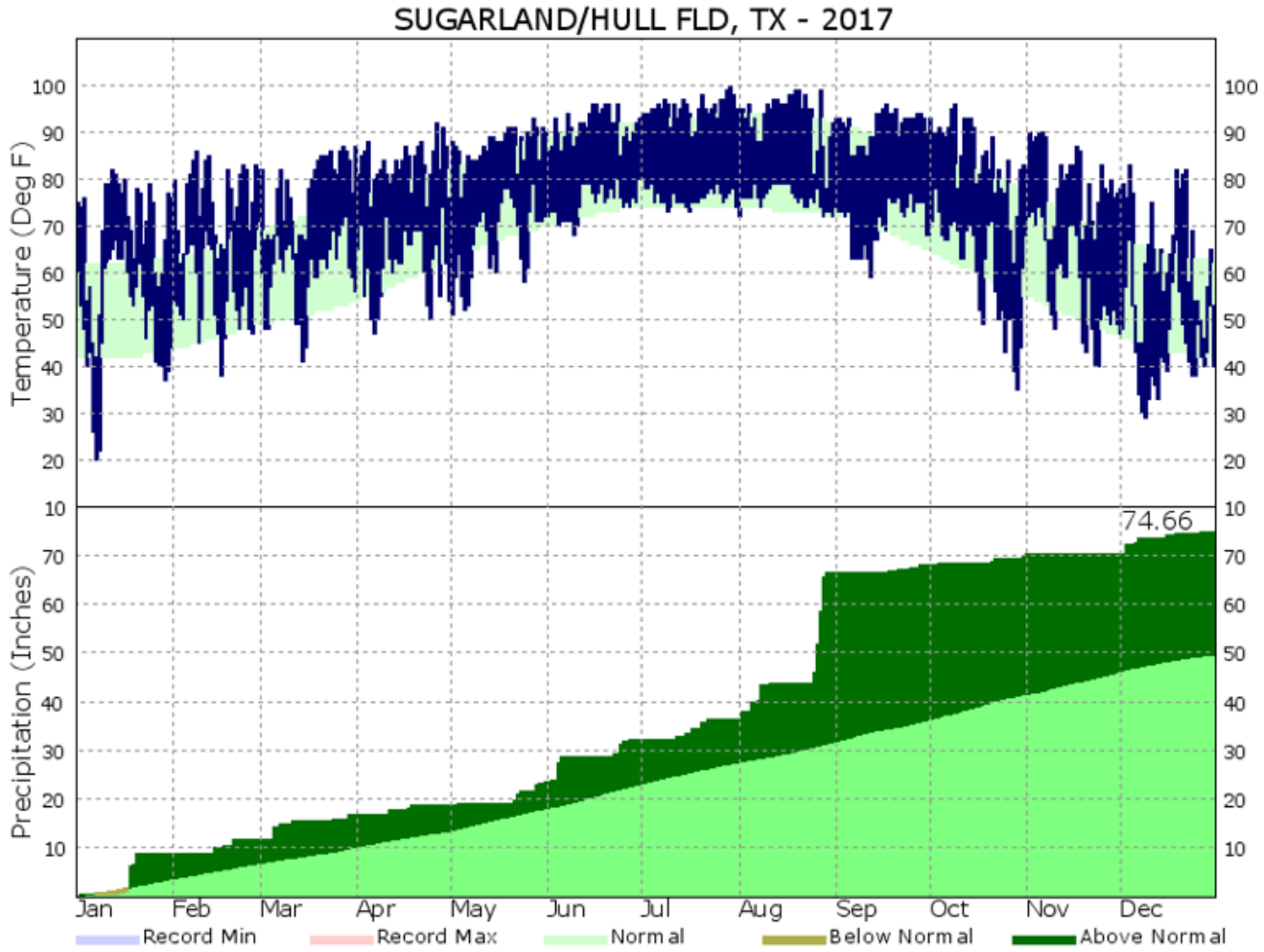


Exhibit 1: Location of weather stations across the area.

FBSD EXHIBIT NO. 2: 2017 PRECIPITATION AT SUGAR LAND AIRPORT

Monthly precipitation data for Sugar Land is shown for the year ending December 31, 2017. Normal precipitation is based on three full decades (1981-2010). The light brown color in the bottom section of the chart represents below normal and dark green is for above normal rainfall. The chart at the top displays the normal and actual temperatures for 2017.



FBSD Exhibit 2 National Oceanic and Atmospheric Administration

Total precipitation was 74.7 inches in 2017. The one-year cumulative departure from normal for Sugar Land Airport was +25.2 inches. This site was above normal for most of the year. Hurricane Harvey was responsible for 22.7 inches. The end of year amount was still above normal for the year, even without Hurricane Harvey. Mr. Thompson noted that regulations and precipitation patterns could affect the amount of groundwater that is pumped. Mr. Thompson moved on to show changes in pumpage patterns.

GROUNDWATER WITHDRAWALS AND TOTAL WATER DEMAND FOR 2017

Mr. Thompson next presented eight exhibits on water use: four exhibits depicting groundwater withdrawal within Fort Bend County broken out by regulatory area and use, one exhibit showing surface and re-use water, one exhibit showing total water demand, and two exhibits showing groundwater withdrawal for the Tri-County region of Fort Bend, Harris, and Galveston Counties. All groundwater and surface-water use is reported in million gallons per day (MGD).

As is usual, the groundwater withdrawal total was updated for the previously reported year of 2016. Subsequent data was added and corrections made after the 2016 Groundwater Report was presented in April 2017. For 2016 there was no change in the overall numbers. These changes are made during the normal permitting and reporting process as part of the exchange between the District and its permittees. The changes include updating estimated amounts with actual amounts, correction of data entry errors, and errors in the submitted data.

For comparison and as part of the continued cooperation between the Fort Bend Subsidence District and HGSD, recorded groundwater pumpage totals were included for Harris and Galveston Counties.

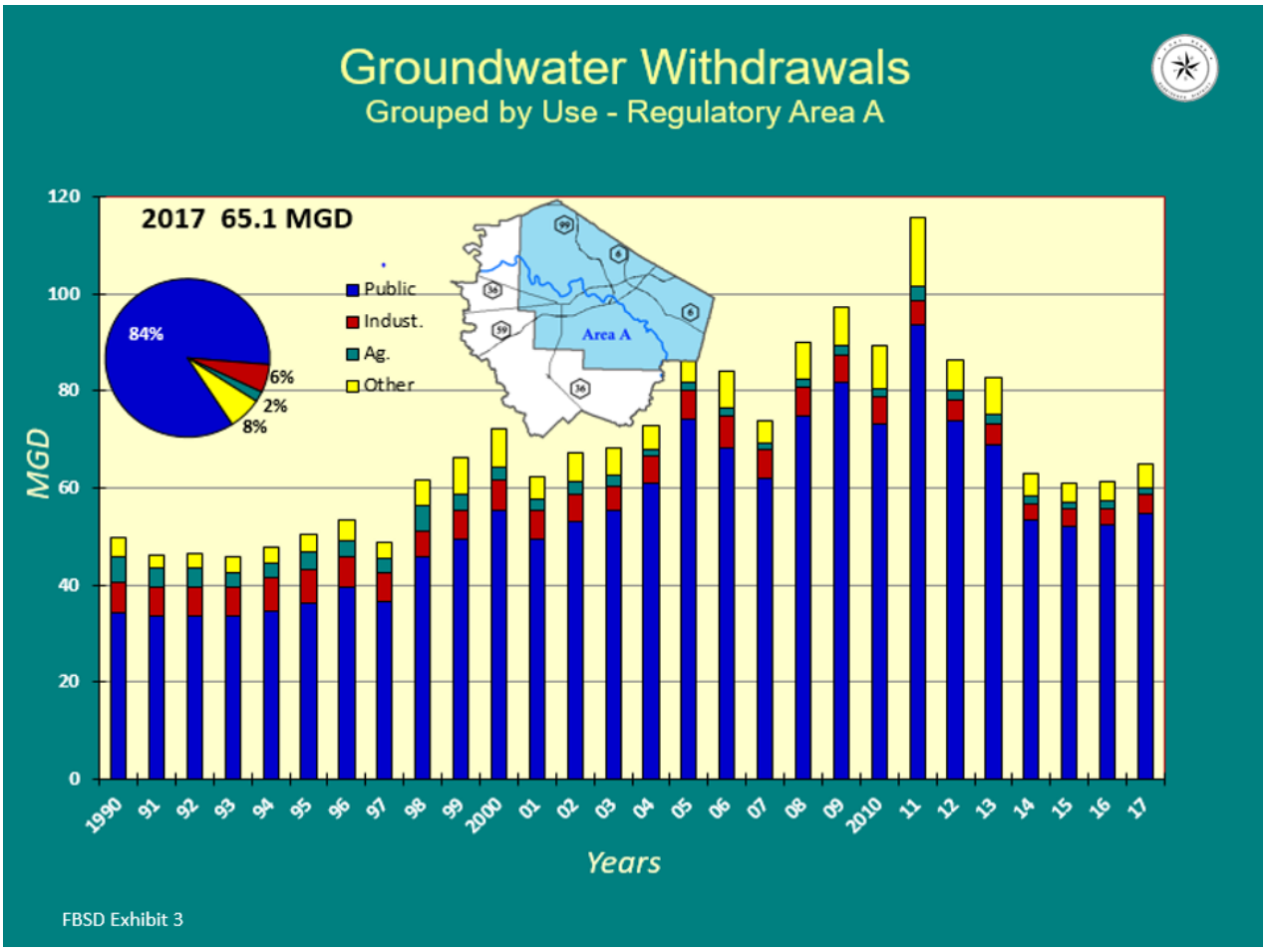
In 2013, the FBSD approved the 2013 Regulatory Plan, which divided the District into two large regulatory areas (Area A and Area B). Regulatory Area A encompasses the greatest density of population of Fort Bend County, generally the northern and eastern portions of Fort Bend County, and in the following charts is shown in blue.

Regulatory Area B encompasses the remainder of Fort Bend County, generally the far western and southern portions of the county and is shown in yellow.

FBSD EXHIBIT NO. 3: GROUNDWATER PUMPAGE – BY USE - REGULATORY AREA A

Total groundwater pumpage from Regulatory Area A was 65.1 MGD for 2017; a 6% increase from 2016. Irrigation pumpage is given as a total and as a breakout of agricultural (includes traditional farm crops plus nurseries, sod farms, tree farms, etc.) and other (includes uses for irrigation of parks, cemeteries, golf courses, common areas, and amenity lakes) irrigation.

Year	Total	% Chg	Public Supply	% Chg	Indust.	% Chg	All Irrig.	% Chg	Ag. Irrig.	% Chg	Other Irrig.	% Chg
2016	61.4	1%	52.3	4%	3.5	0%	5.6	5%	1.5	12%	4.1	2%
2017	65.1	6%	54.6	4%	4.0	13%	6.5	17%	1.3	-13%	5.3	28%

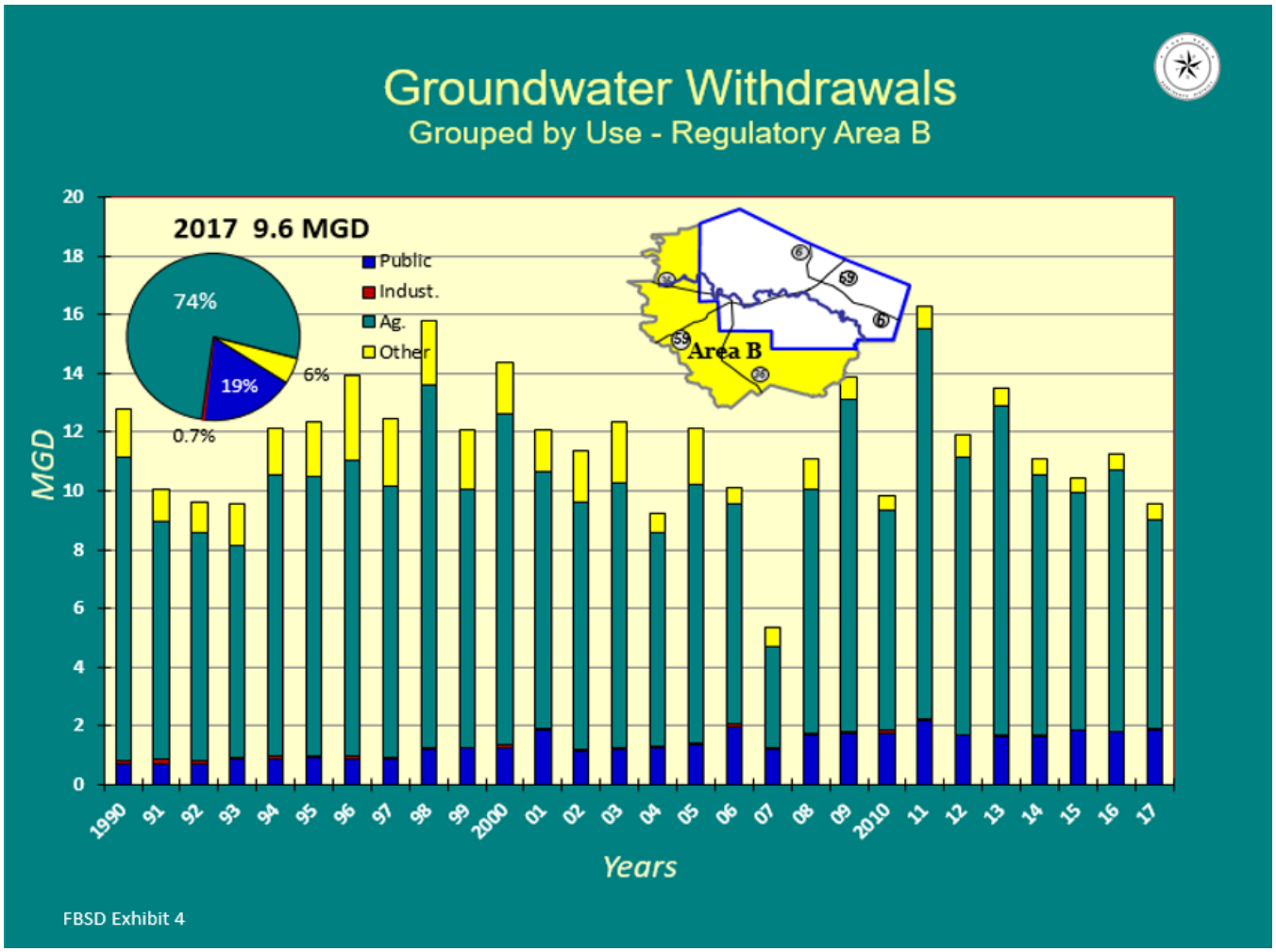


Eighty-four percent (54.6 MGD) of the total groundwater pumped (65.1 MGD) was for public supply. The next largest portion (8%, 5.3 MGD) went to other irrigation use followed by industrial (6%, 4.0 MGD). Agricultural irrigation was the smallest category, accounting for 2% (1.3 MGD) of the groundwater pumped within Regulatory Area A. During 2017, Cinco MUD 1 conducted a pump test on their well that was completed in the Jasper Aquifer. In 2017, approximately 95 MG was used.

FBSD EXHIBIT NO. 4: GROUNDWATER PUMPAGE – BY USE - REGULATORY AREA B

Total groundwater pumpage in Regulatory Area B was 9.6 MGD for 2017; a 15% decrease from 2016.

Year	Total	% Chg	Public Supply	% Chg	Indust.	% Chg	All Irrig.	% Chg	Ag. Irrig.	% Chg	Other Irrig.	% Chg
2016	11.2	7%	1.8	-4%	0.0	3%	9.4	-19%	8.9	10%	0.6	4%
2017	9.6	-15%	1.9	4%	0.1	83%	7.7	-19%	7.1	-20%	0.6	3%

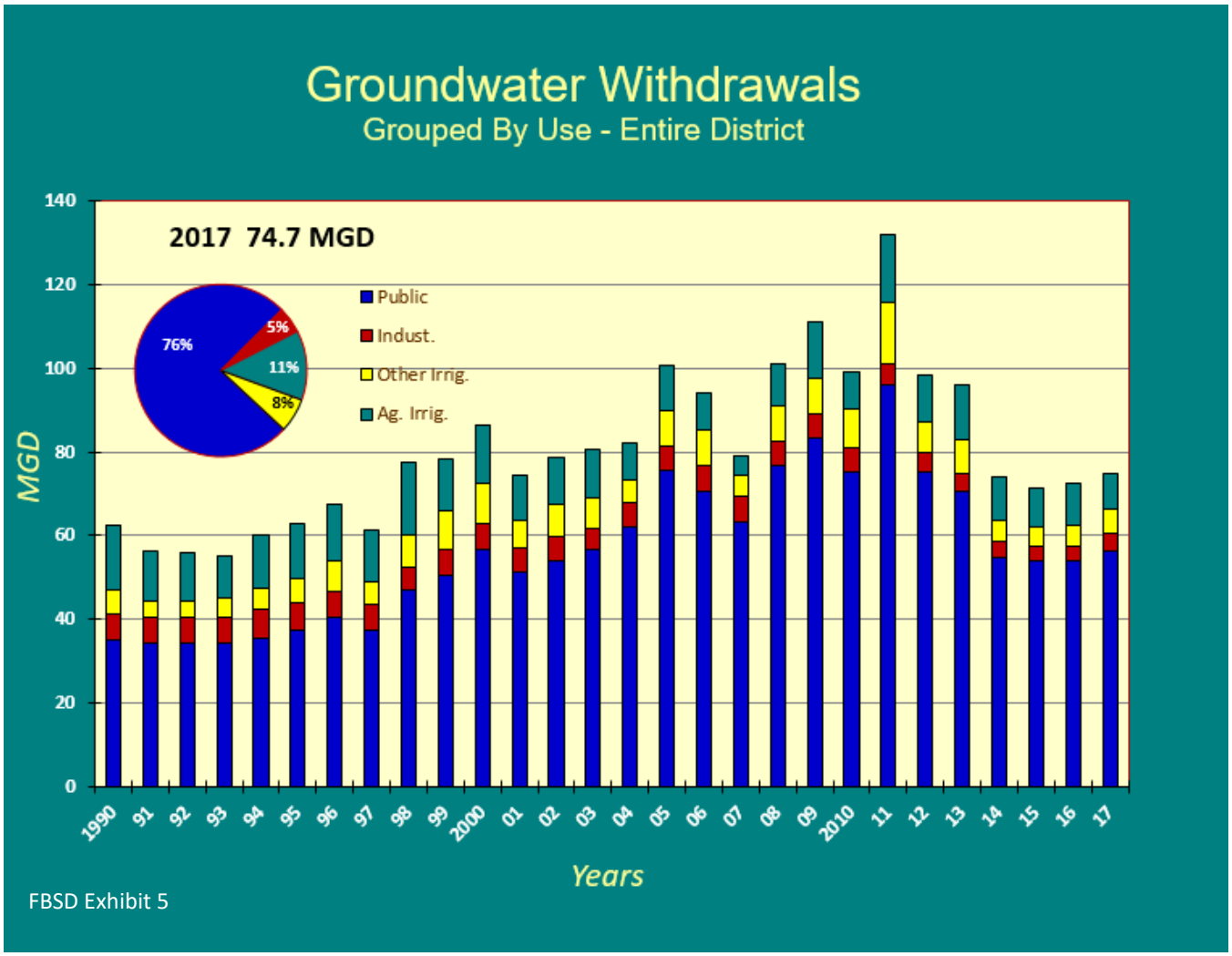


Seventy-four percent (7.1 MGD) of the groundwater pumped was for agricultural irrigation, while 19% (1.9 MGD) went to public supply. The remaining groundwater was for other irrigation (6%, 0.6 MGD) and industrial use accounted for very little.

FBSD EXHIBIT NO. 5: GROUNDWATER PUMPAGE – BY USE – FORT BEND COUNTY

Looking at the data from a District-wide perspective, total groundwater pumpage increased by 3% in 2017, from 72.7 MGD in 2016 to 74.7 MGD in 2017.

Year	Total	% Chg	Public Supply	% Chg	Indust.	% Chg	All Irrig.	% Chg	Ag. Irrig.	% Chg	Other Irrig.	% Chg
2016	72.7	2%	54.1	0%	3.5	0%	15.0	8%	10.3	11%	4.7	3%
2017	74.7	3%	56.5	4%	4.0	14%	14.2	-5%	8.4	-19%	5.8	25%

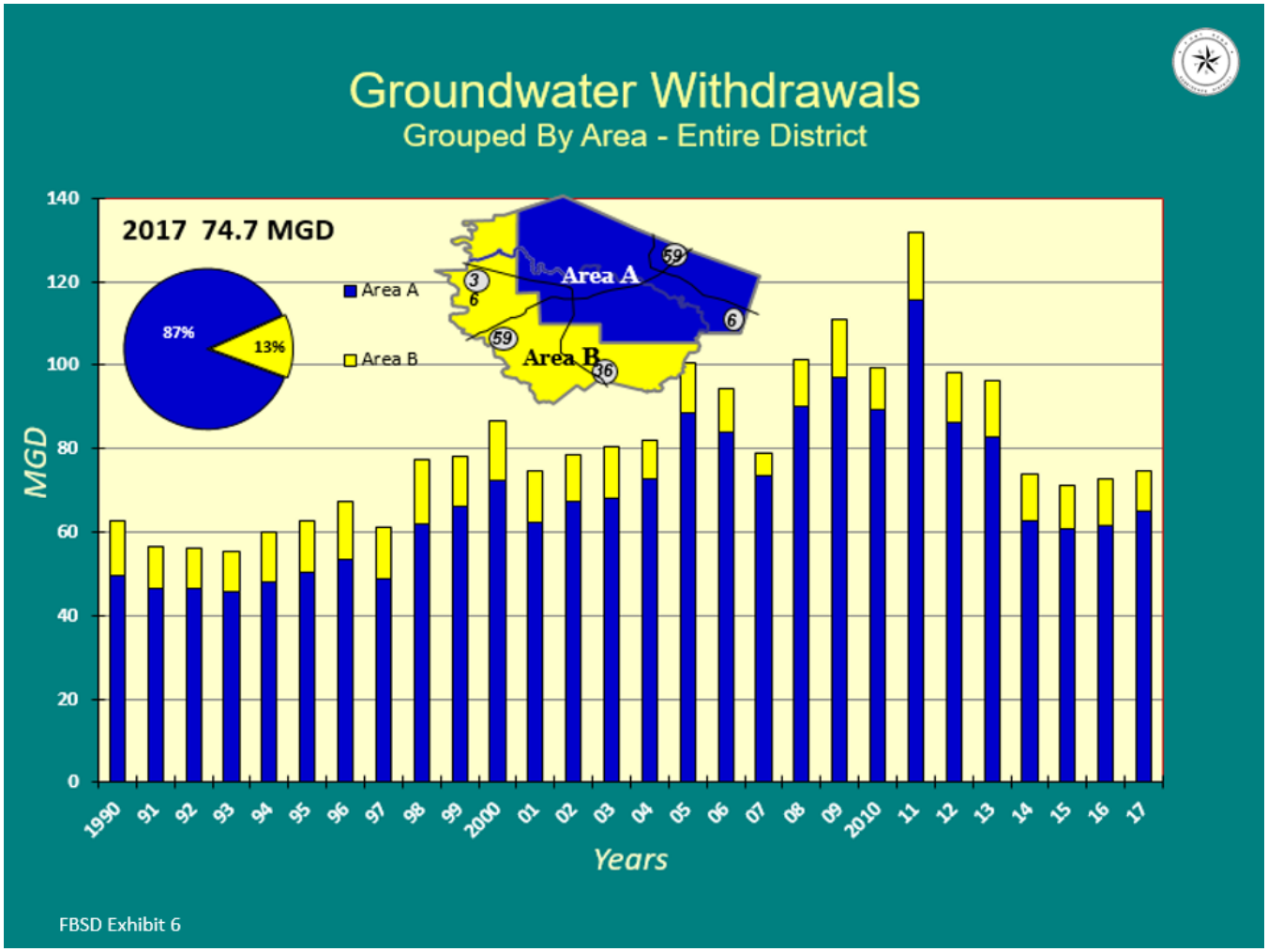


Seventy-six percent (56.5 MGD) of the groundwater pumped was used for public supply; the second largest percentage was agricultural irrigation, which accounted for 11% (8.4 MGD) of the total of 74.7 MGD. Other irrigation usage followed at 8% (5.8 MGD) with industrial usage as the smallest category of use at 5% (4.0 MGD).

FBSD EXHIBIT NO. 6: GROUNDWATER PUMPAGE – BY REGULATORY AREA – FORT BEND COUNTY

Of the 74.7 MGD total groundwater pumpage for Fort Bend County, Regulatory Area A accounted for 87% (65.1 MGD) for 2017. Regulatory Area B pumped 13% (9.6 MGD) of the total.

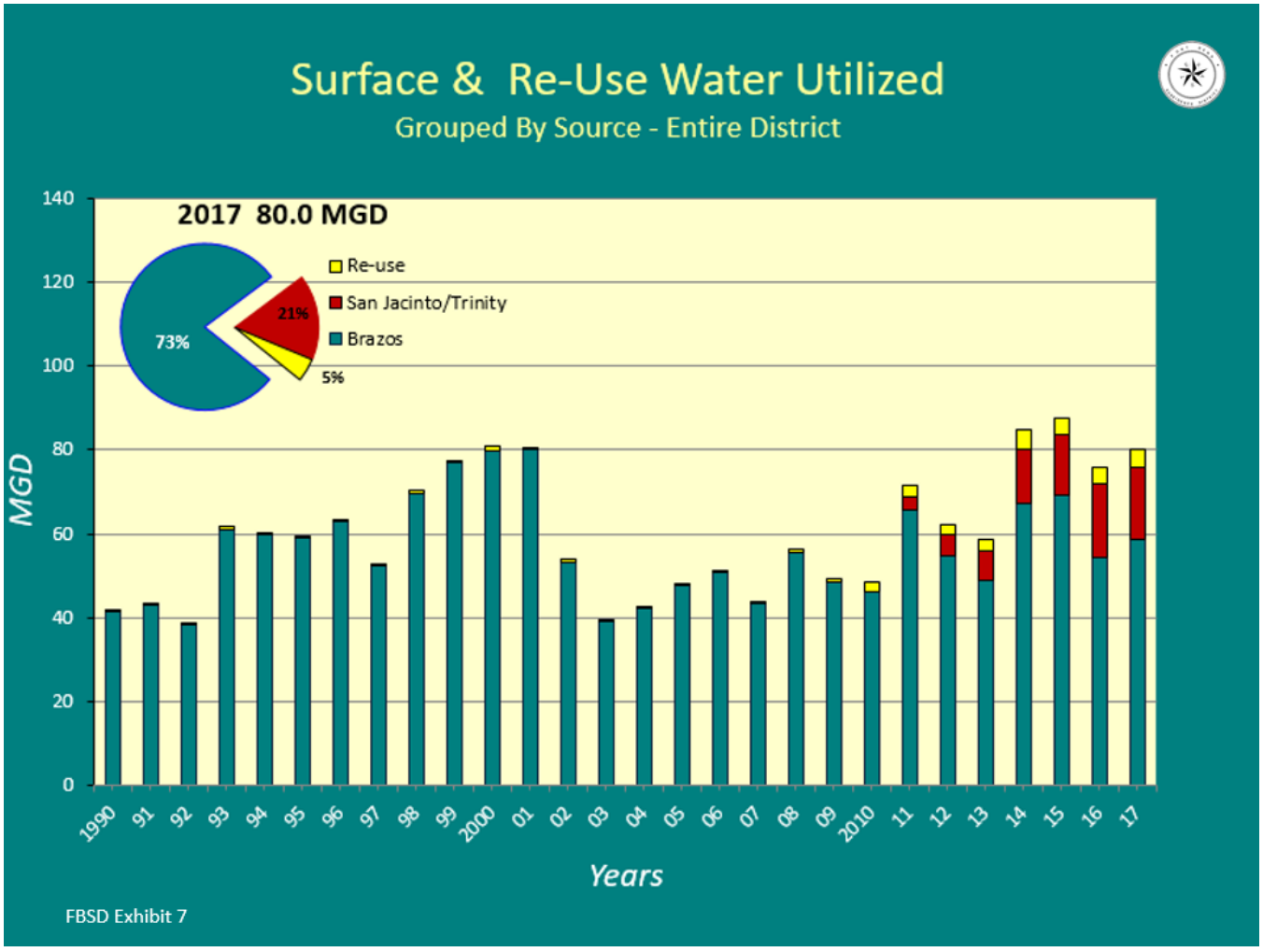
Year	Total	% Chg	Area A	% Chg	Area B	% Chg
2016	72.7	2%	61.4	1%	11.2	7%
2017	74.7	3%	65.1	6%	9.6	-15%



FBSD EXHIBIT NO. 7: ALTERNATE WATER (SURFACE AND RE-USE WATER) HISTORY

Two primary water sources are utilized within the District's boundaries; groundwater and alternate water, which is comprised of surface water and re-use water. Surface water use in 2017 increased by 5% (3.7 MGD). Re-use water remains only a small portion of the alternate water supply strategy amounting to 5% (4.1 MGD) of the alternate water total of 80.0 MGD in 2017. Surface water in Fort Bend County comes from the Brazos River 73% (58.7 MGD) and San Jacinto/Trinity Rivers 21% (17.2 MGD).

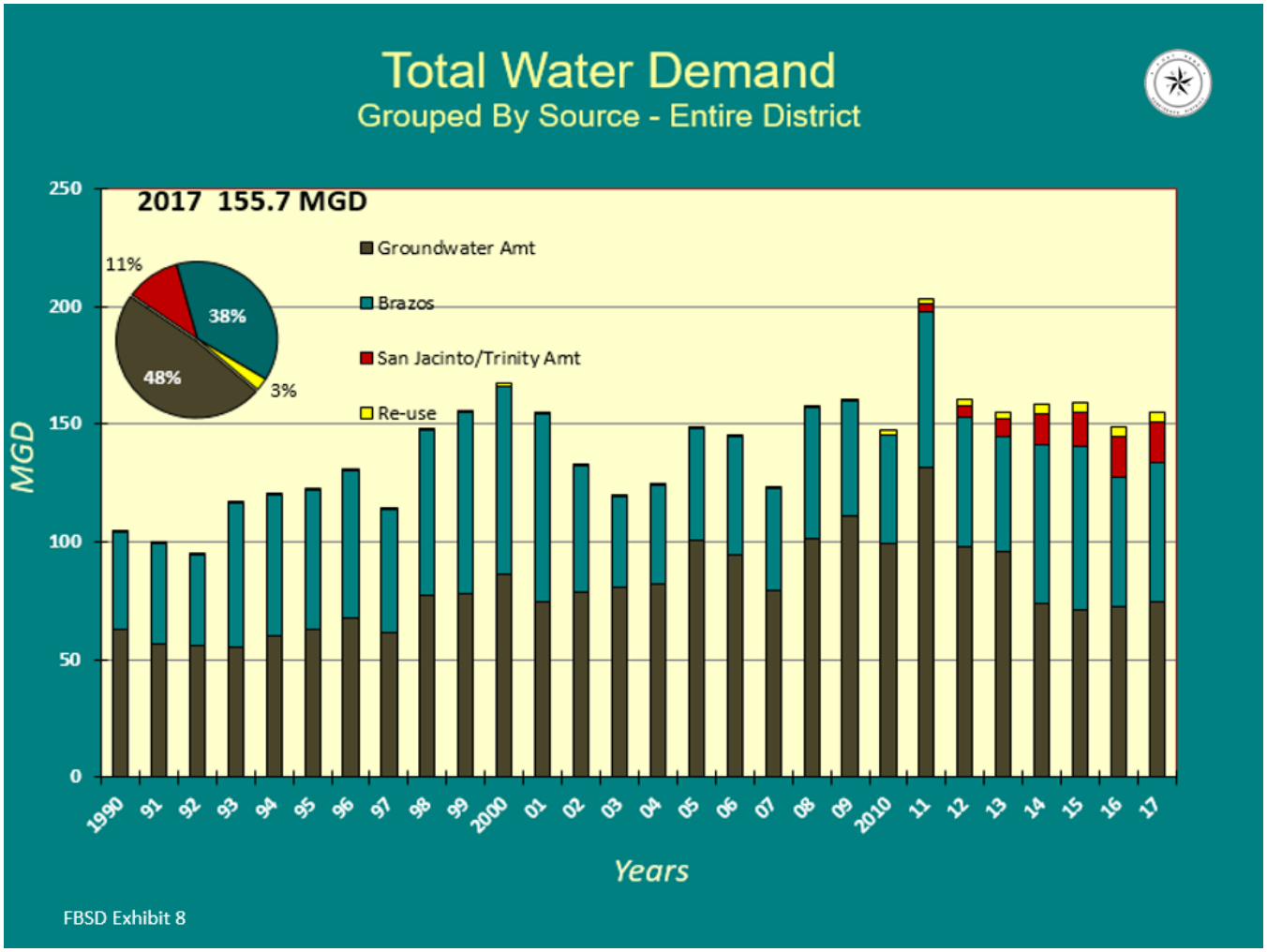
Year	Surface/ Alternate Water	% Chg	Brazos River	% Chg	San Jacinto/ Trinity	% Chg	Reuse	% Chg
2016	76.3	-13%	54.6	-21%	17.6	21%	4.1	4%
2017	80.0	5%	58.7	8%	17.2	2%	4.1	0%



FBSD EXHIBIT NO. 8: TOTAL WATER DEMAND – BY SOURCE IN FORT BEND COUNTY

In 2017, total water demand for Fort Bend County was 155.7 MGD. Groundwater pumpage constituted 48% of that amount, surface water from the Brazos River was 38%, the San Jacinto/Trinity Rivers was 11% and re-use was 3%.

Year	Total Water Demand		Ground-water		San Jacinto/ Trinity		Brazos		Re-use	
	Amt	% Chg	Amt	% Chg	Amt	% Chg	Amt	% Chg	Amt	% Chg
2016	148.9	-6%	72.7	2%	17.6	21%	54.6	-21%	4.1	4%
2017	155.7	5%	74.7	3%	17.2	-2%	58.7	8%	4.1	-0%

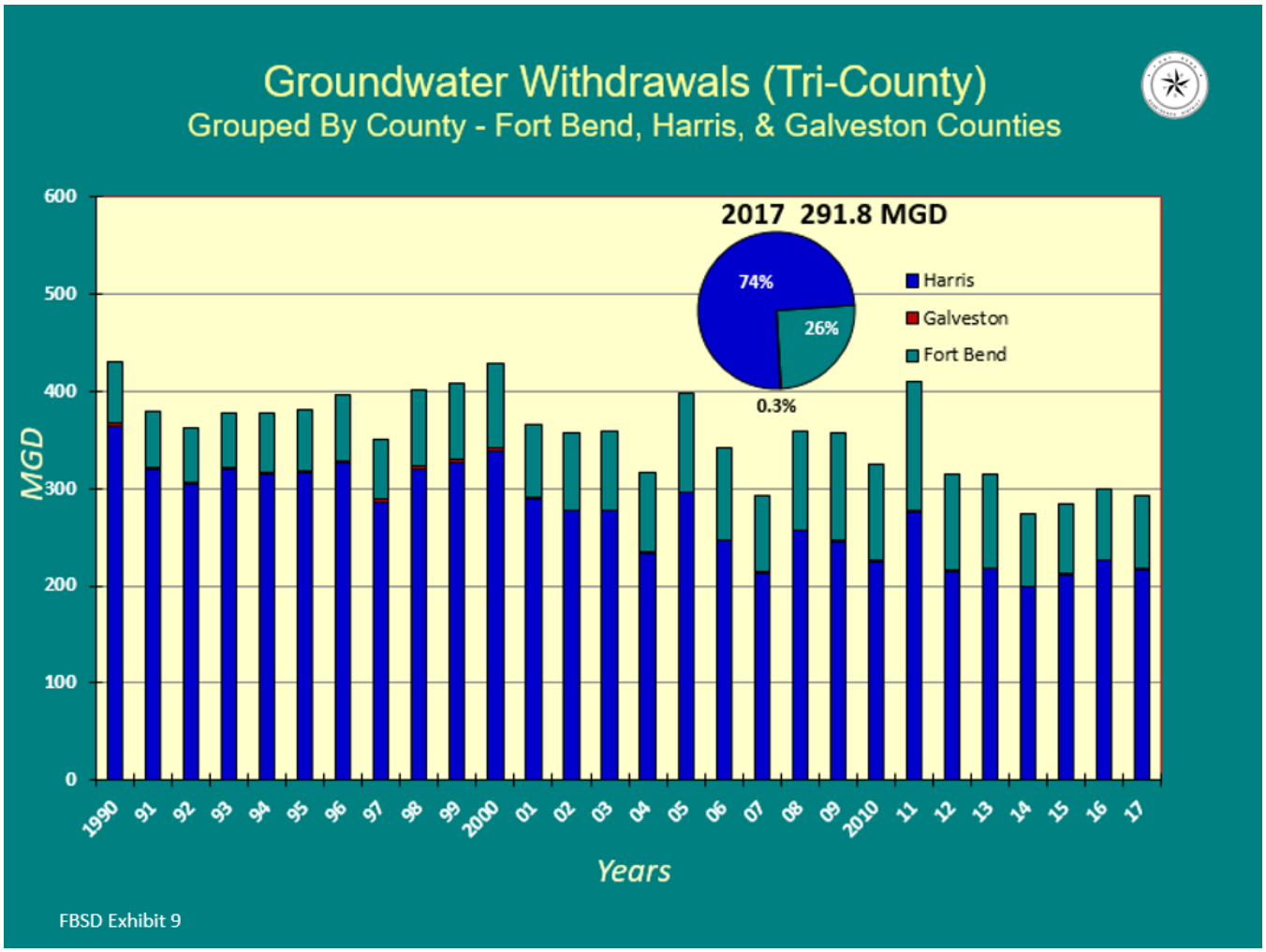


FBSD EXHIBIT NO. 9: TRI-COUNTY GROUNDWATER PUMPAGE – BY COUNTY PERCENTAGES – FORT BEND, GALVESTON AND HARRIS COUNTIES

Looking at groundwater pumping in the Tri-County region of Fort Bend, Harris and Galveston Counties, Harris County remains the largest user of groundwater at 74% in 2017. Fort Bend pumped 26% of the total groundwater. Galveston County's portion remained below 1%.

Total groundwater pumped in the Tri-County region for 2017 was 291.8 MGD.

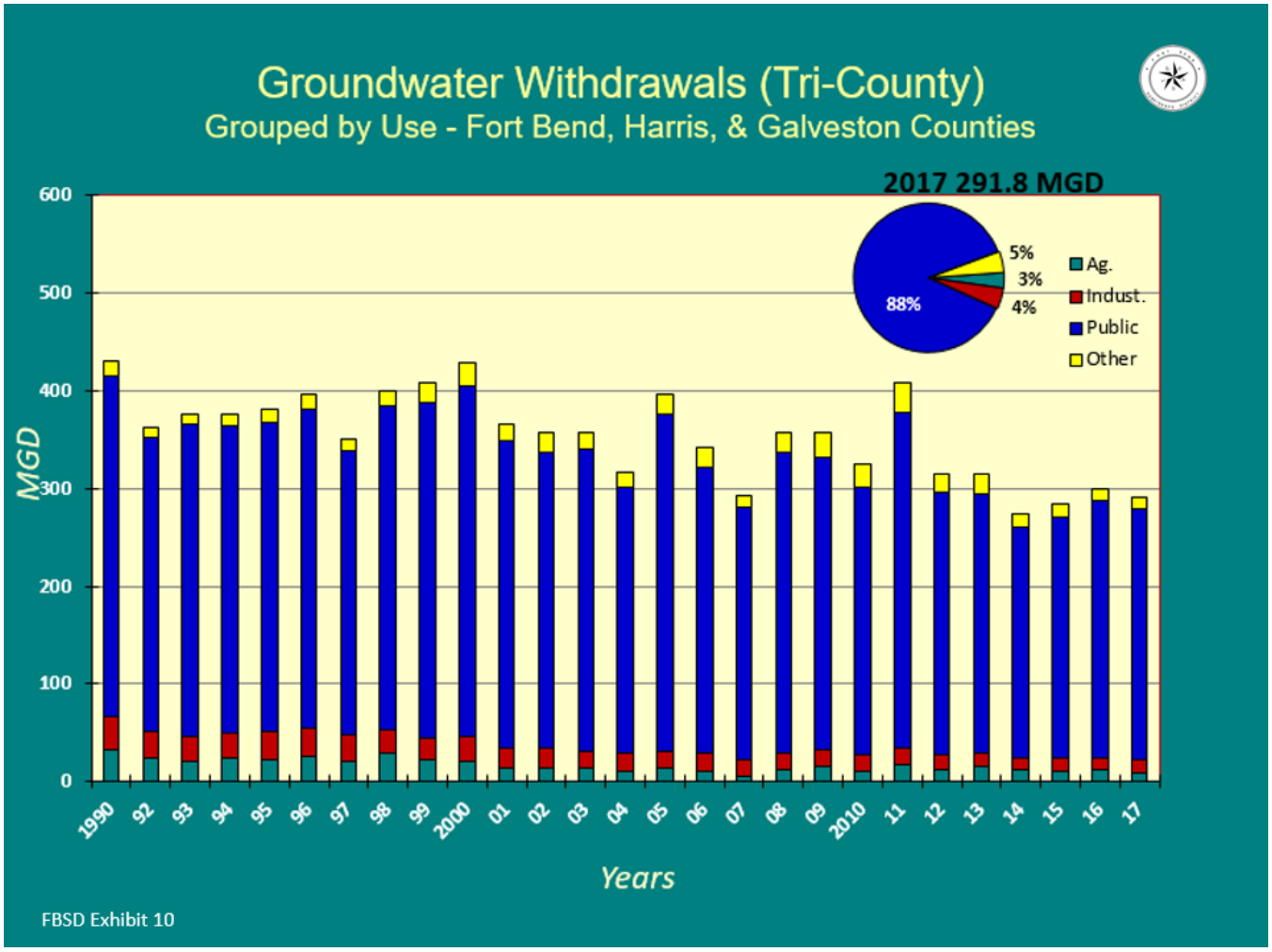
Year	Total	% Chg	Fort Bend	% Chg	Galveston	% Chg	Harris	% Change
2016	299.1	5%	72.7	2%	0.6	4%	225.8	7%
2017	291.8	-2%	74.7	3%	0.8	21%	216.4	-4%



FBSD EXHIBIT NO. 10: TRI-COUNTY GROUNDWATER PUMPAGE – BY USE – FORT BEND, GALVESTON AND HARRIS COUNTIES

In the Tri-County region, 88% of the groundwater withdrawn was used for public supply, industrial use accounted for 4%, agriculture for 3%, and 5% was for other uses.

Year	Total	% Chg	Ag	% Chg	Indust.	% Chg	Public	% Chg	Other	% Chg
2016	299.1	5%	11.7	10%	12.8	-2%	262.4	6%	12.2	-4%
2017	291.8	-2%	9.7	-17%	13.2	3%	255.5	-3%	13.4	10%



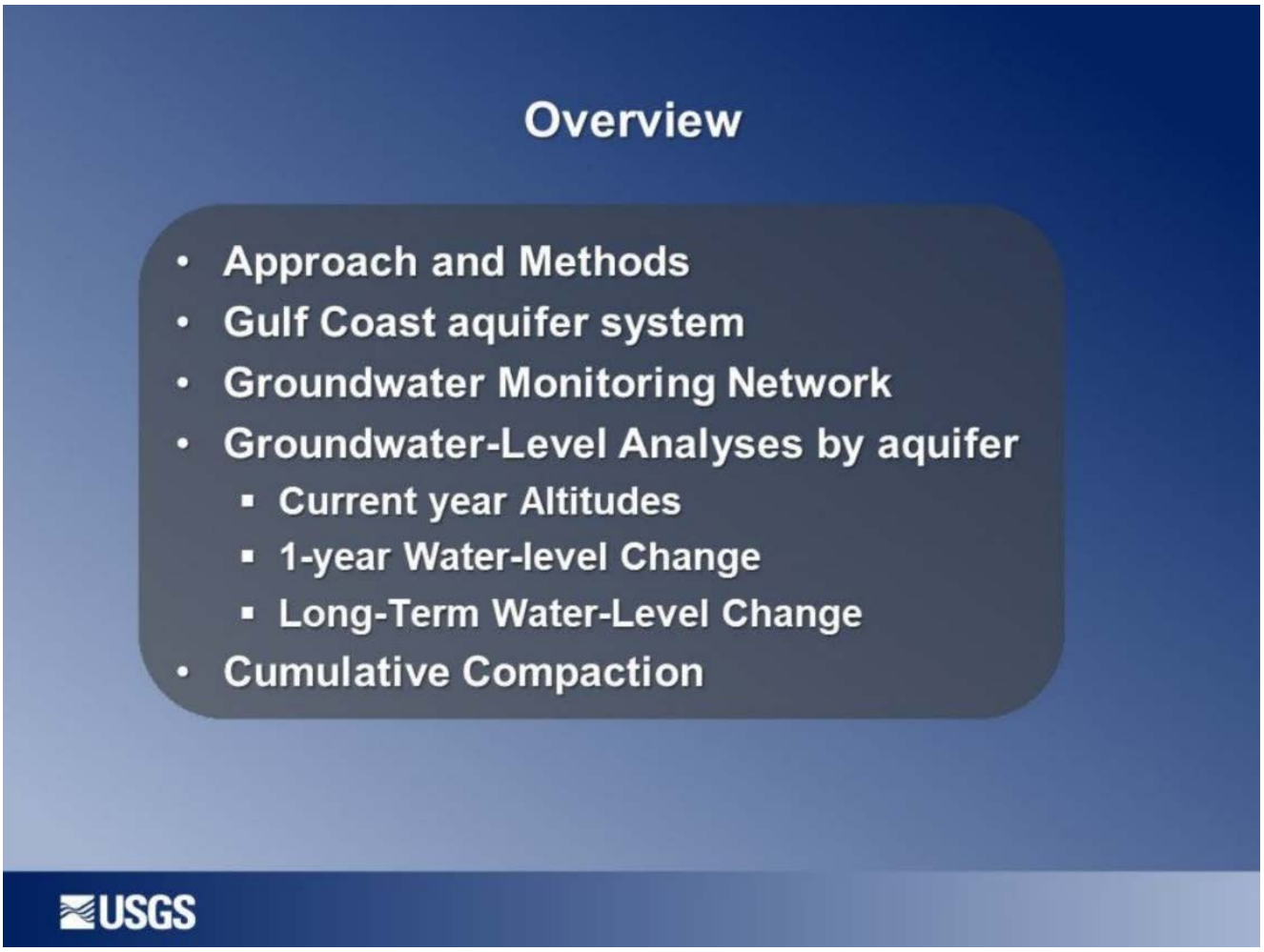
Mr. Thompson noted that groundwater withdrawal inversely affects the water levels within the aquifers. Over time, as pumpage increases, water levels decrease. The following exhibits from the United States Geological Survey look at subsidence mechanisms, changes to aquifer water levels, and the compaction that has resulted.

Mr. Thompson yielded to Mr. Ramage from the USGS.

UNITED STATES GEOLOGICAL SURVEY TESTIMONY

Mr. Jason Ramage, a Groundwater Hydrologist with the USGS, presented testimony concerning annual water-level measurements, taken in December 2017 through March 2018 and compaction measurements taken monthly from fourteen extensometer sites. The USGS collects water level and subsidence measurements as part of a joint funding agreement with the District, the Harris-Galveston Subsidence District, the City of Houston, the Brazoria County Groundwater Conservation District, and the Lone Star Groundwater Conservation District. Mr. Ramage submitted for the USGS, a total of 23 exhibit *drafts*, as part of a U.S. Department of the Interior, USGS Open File Report to be released mid-summer 2018, upon final national review.

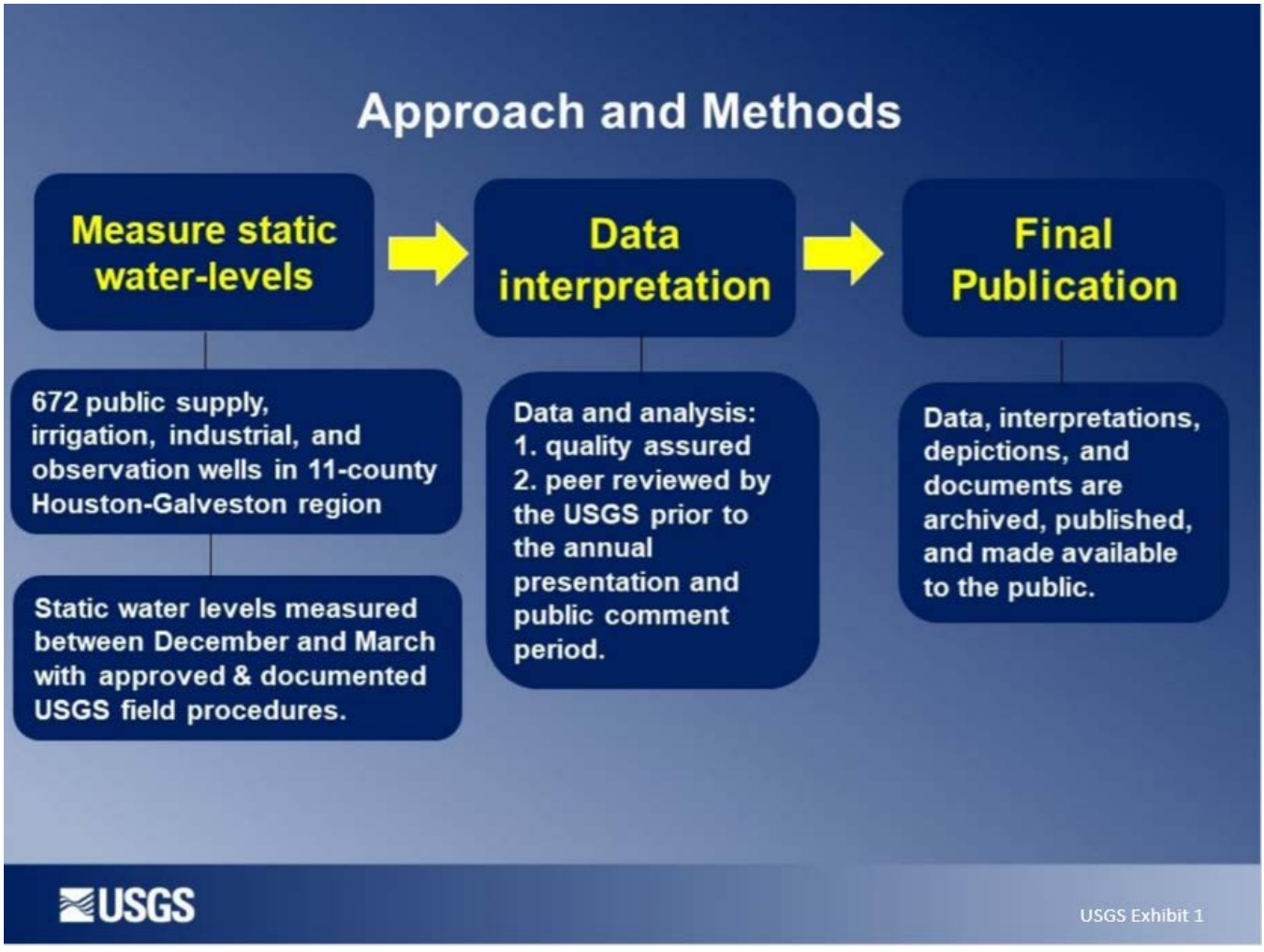
Mr. Ramage gave a brief description of the history of the USGS and an overview of the project.

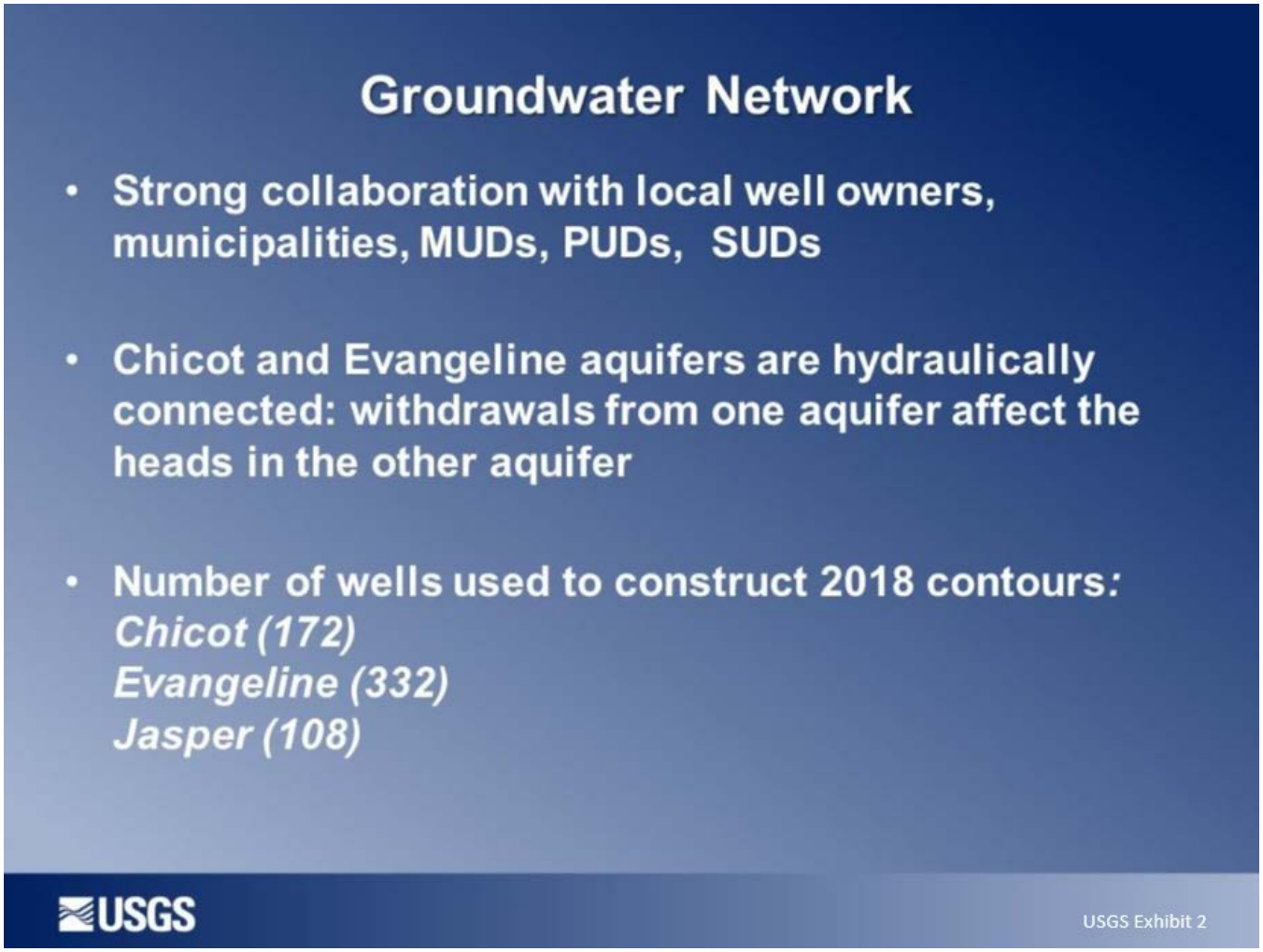


MEASURED WATER-LEVEL CHANGES IN THE CHICOT AND EVANGELINE AQUIFERS

Mr. Ramage presented 23 exhibits describing the network of monitor wells and the changes in aquifer pressures (water-level changes) which occurred from 2017 to 2018 and from 1990 to 2018, including water-level altitude maps for the Chicot and Evangeline aquifers.

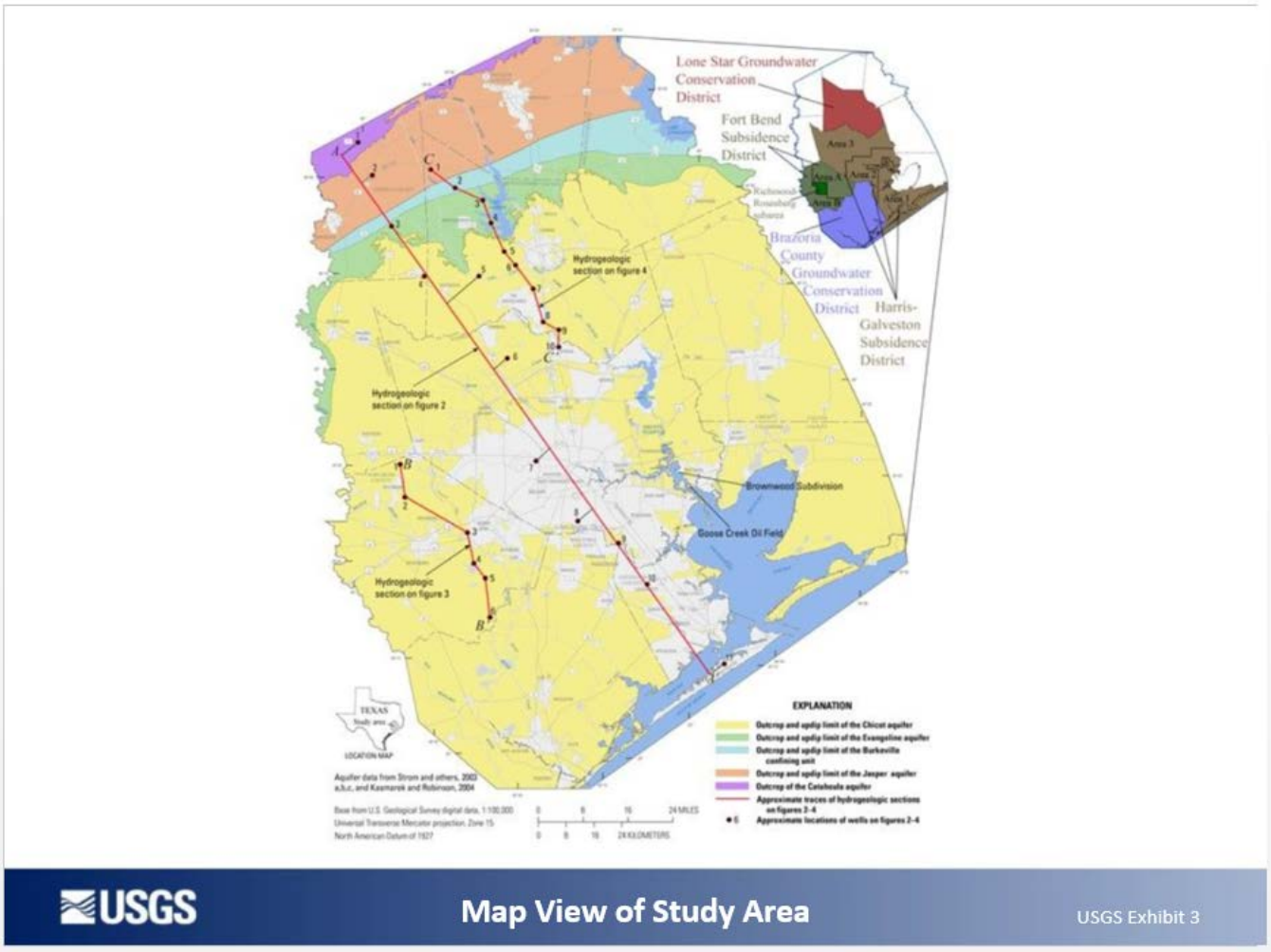
USGS EXHIBIT NO. 1: APPROACH AND METHODS




Groundwater Network
• Strong collaboration with local well owners, municipalities, MUDs, PUDs, SUDs
• Chicot and Evangeline aquifers are hydraulically connected: withdrawals from one aquifer affect the heads in the other aquifer
• Number of wells used to construct 2018 contours:
Chicot (172)
Evangeline (332)
Jasper (108)
USGS
USGS Exhibit 2

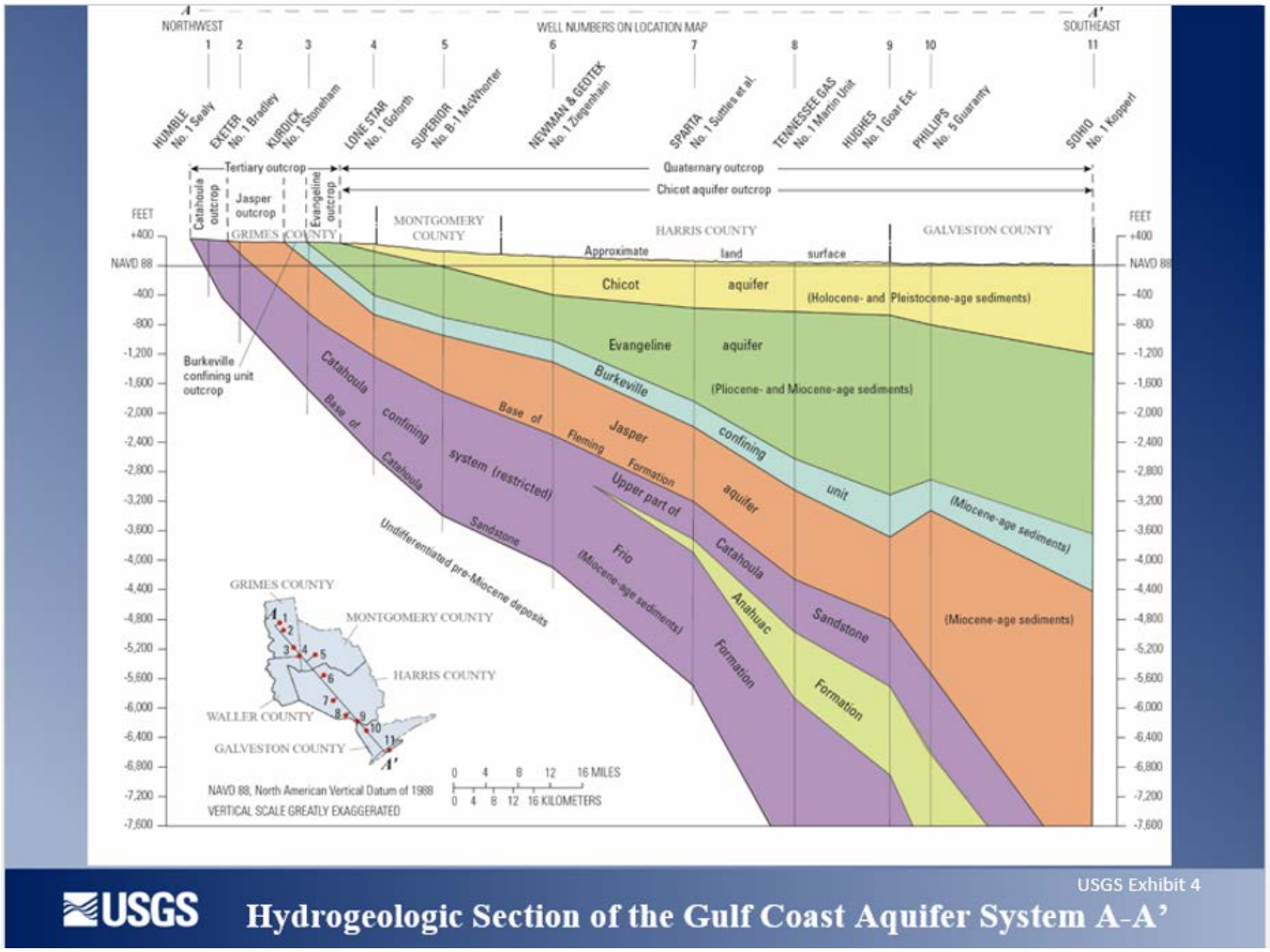
USGS EXHIBIT NO. 3: MAP OF STUDY AREA

The area involved in the ongoing study of water level-changes is depicted in the map below.



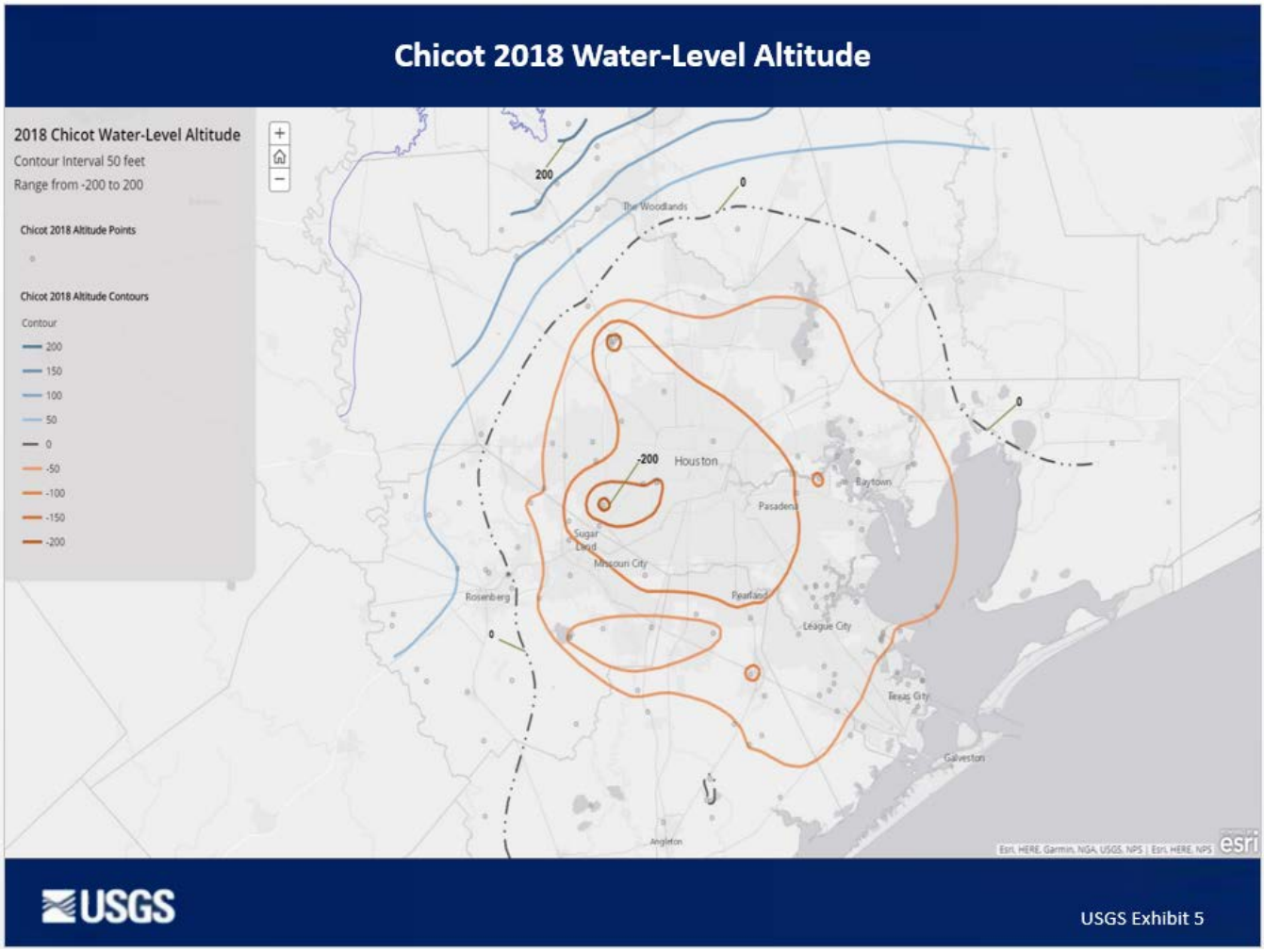
USGS EXHIBIT NO. 4: HYDROGEOLOGIC SECTION OF THE GULF COAST AQUIFER SYSTEM

The Gulf Coast Aquifer System has three main aquifers within the greater Houston area. The Chicot Aquifer is the shallowest aquifer and generally has supplied Galveston County and southern Harris County. The Evangeline Aquifer lies beneath the Chicot Aquifer and has supplied much of Fort Bend County and surrounding counties. The Jasper Aquifer lies beneath the Evangeline Aquifer, and is generally considered too salty for public consumption throughout most of the District, but has been pumped in Montgomery County and in more recent years has been pumped in northern Harris County. Currently, there is one well completed in the Jasper Aquifer in Fort Bend County, but it is not in operation at this time. The cross section depicts aquifer depths and thicknesses along a line from Grimes County to Galveston County based on recorded well logs throughout the area.



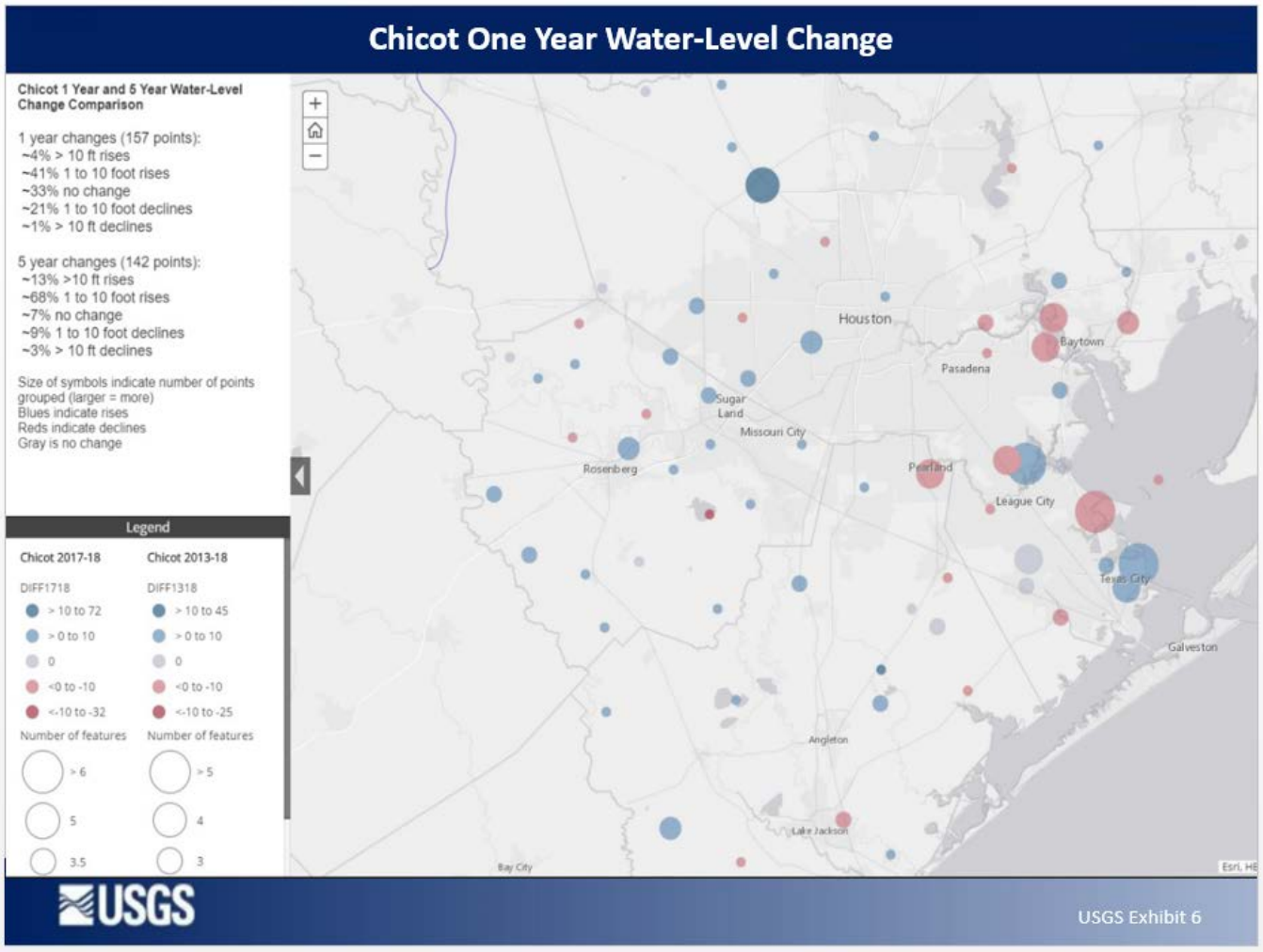
USGS EXHIBIT NO. 5: 2018 WATER-LEVEL ALTITUDES - CHICOT AQUIFER

Exhibit 5-Water-level altitudes measured in 2018 are depicted in relationship to sea level. Altitudes for the Chicot Aquifer in Fort Bend and surrounding counties were drawn based on 172 water wells screened solely in the Chicot Aquifer out of the total of 612 measurements taken. Brown shades represent elevations above mean sea level, while blue shades represent elevations below mean sea level.



USGS EXHIBIT NO. 6: 2017-2018 CHICOT AQUIFER WATER-LEVEL CHANGE

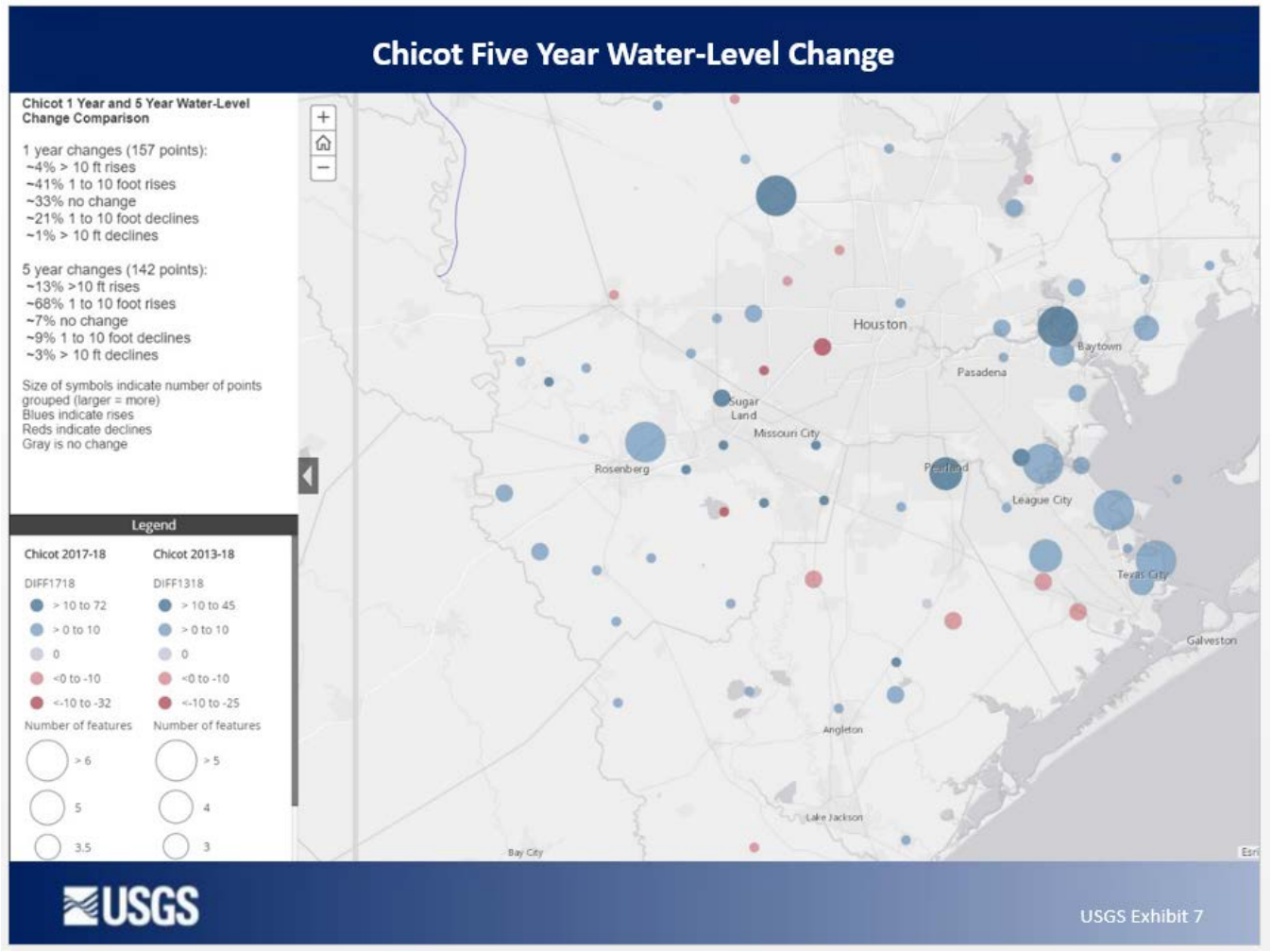
Blue shading represents water level rises, gray shading represents no change and red shading represents declines in elevation. The size of the circle represents the number of records in that location. Exhibit 6 shows the one-year water-level changes for wells in the Chicot Aquifer.



Changes in altitudes in the Chicot Aquifer in Fort Bend County ranged from a rise of 12 feet near IH 69 and the Harris County line to an area of decline of 32 feet near Smithers Lake.

USGS EXHIBIT NO. 7: 2013-2018 CHICOT AQUIFER WATER-LEVEL CHANGE

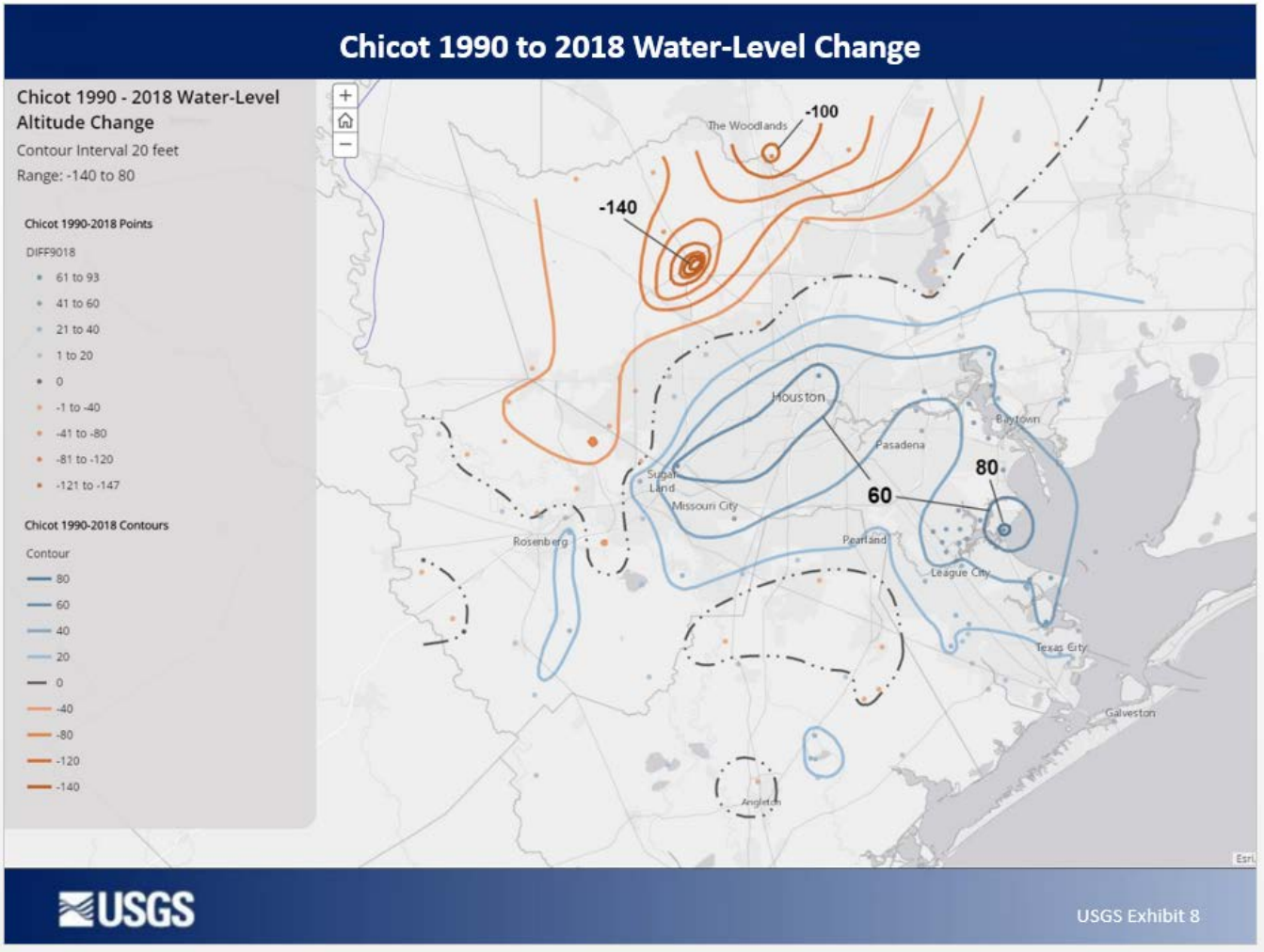
Exhibit 7 shows the water-level changes for the last five years.



Changes in altitudes in the Chicot Aquifer in Fort Bend County ranged from a rise of more than 30 feet near Sugar Land to an area of decline of 10 feet near Smithers Lake.

USGS EXHIBIT NO. 8: 1990-2018 CHICOT AQUIFER WATER-LEVEL CHANGE

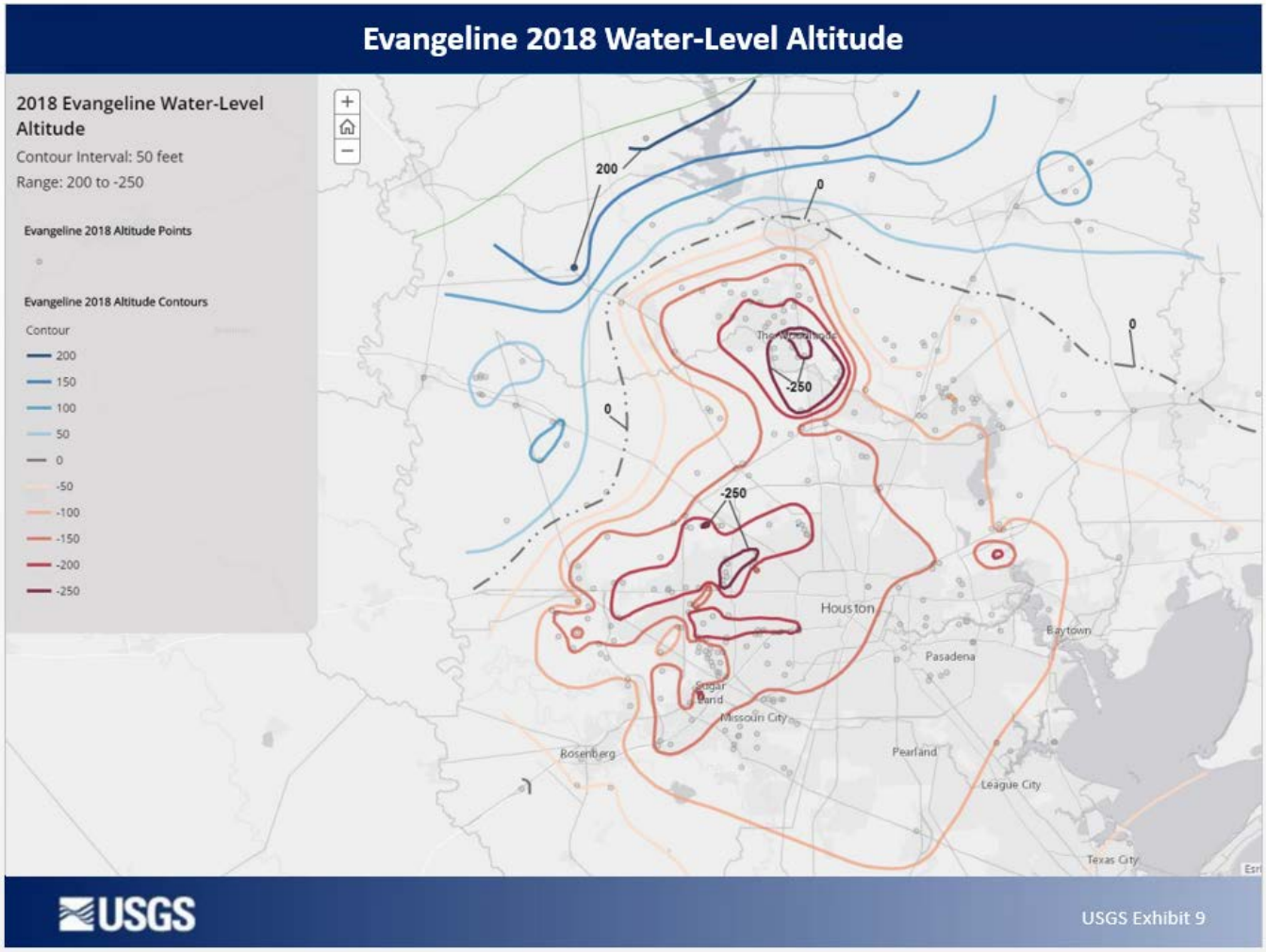
This exhibit shows the changes in water levels in the Chicot Aquifer (since the creation of the Fort Bend Subsidence District) as groundwater withdrawal regulations changed and groundwater dependence decreased.



The above map shows there has been rises of 60 feet near Sugar Land and declines of as much as 40 feet near Mission Bend in Fort Bend County.

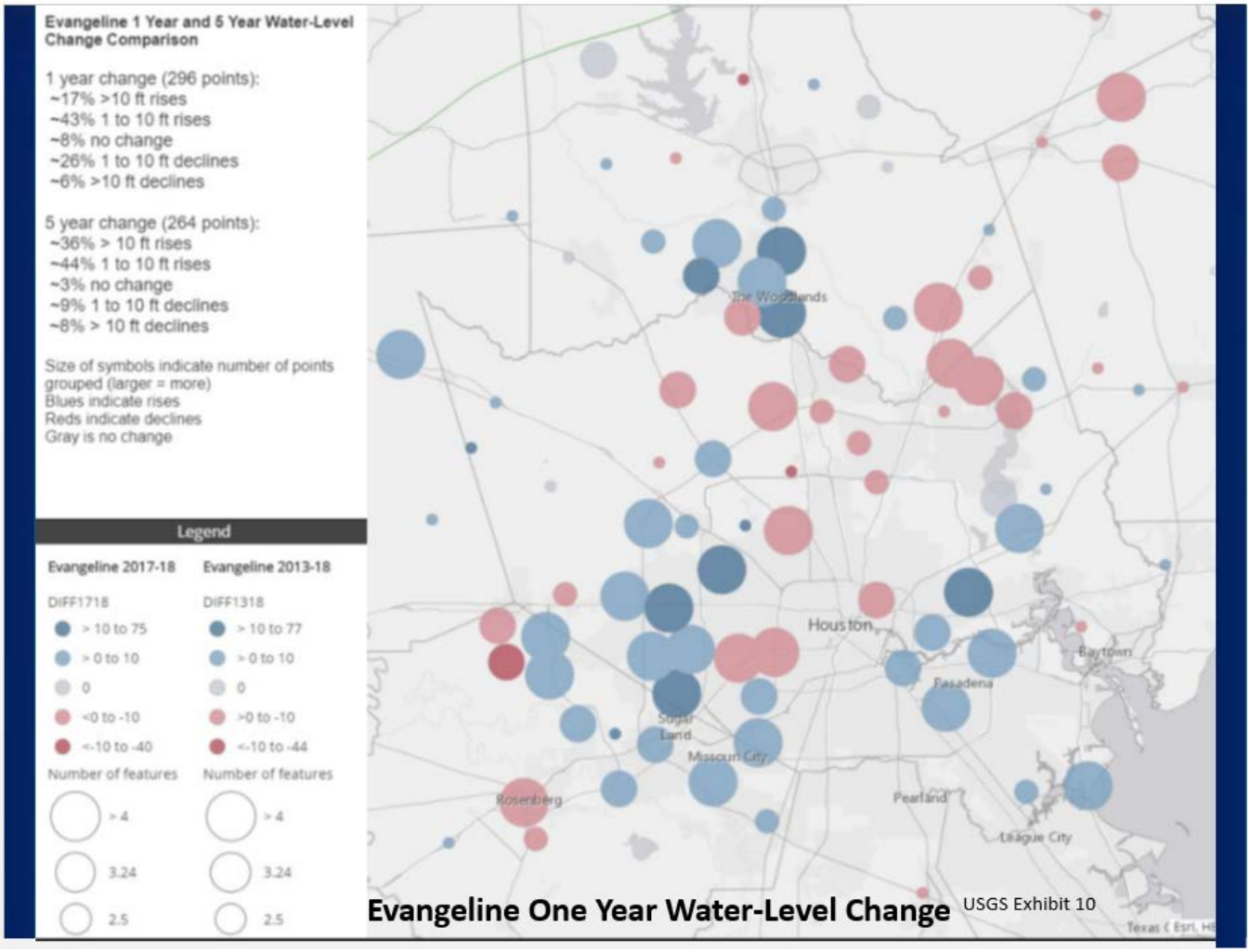
USGS EXHIBIT NO. 9: 2018 WATER-LEVEL ALTITUDES - EVANGELINE AQUIFER

Exhibit 9 shows the altitudes of the Evangeline Aquifer for 2018. Altitudes for the Evangeline Aquifer in Fort Bend and surrounding counties were drawn based on 332 water wells screened solely in the Evangeline Aquifer out of the total of 612 measurements taken.



USGS EXHIBIT NO. 10: 2017-2018 EVANGELINE AQUIFER WATER-LEVEL CHANGE

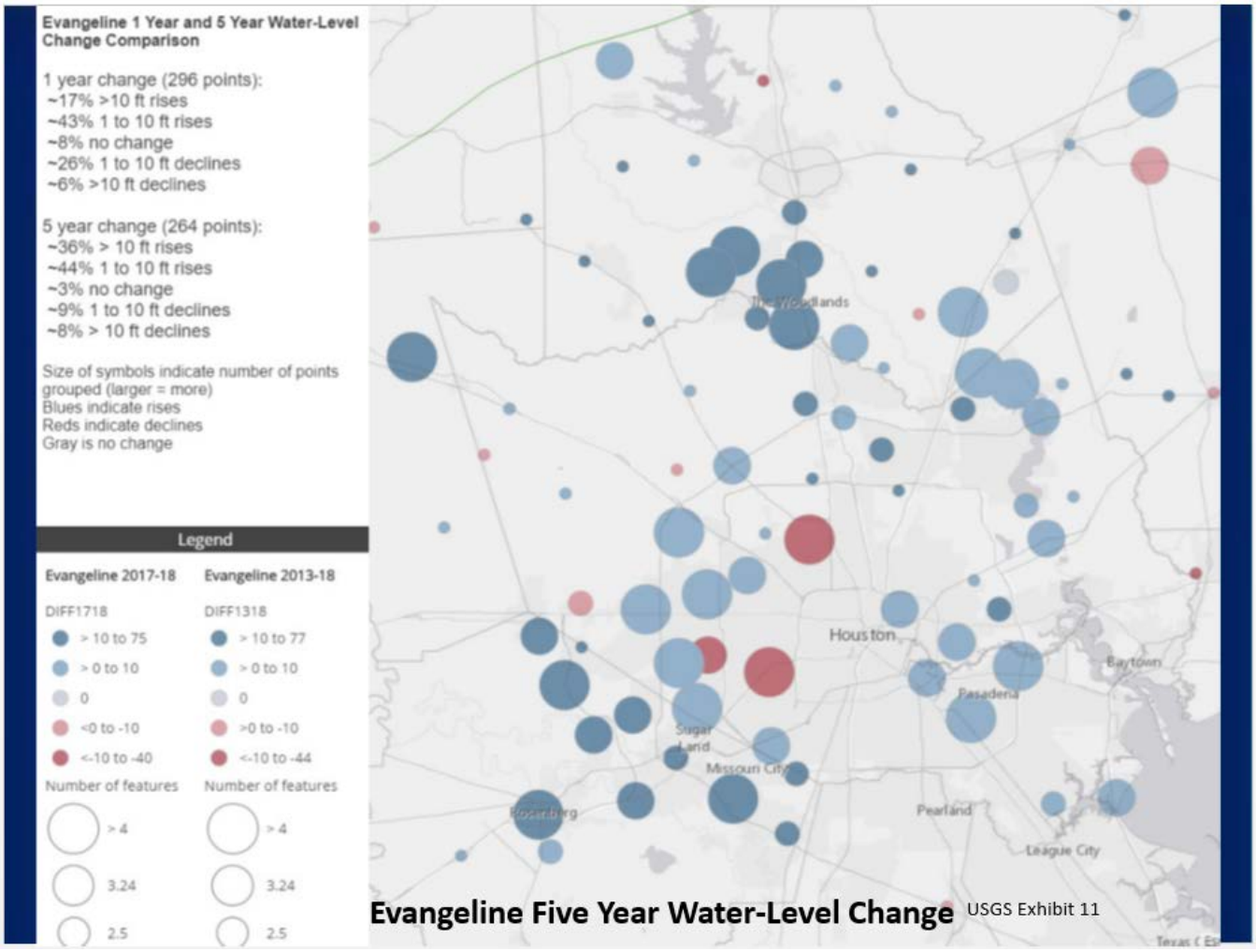
Blue shading represents water level rises, gray shading represents no change and red shading represents declines in elevation. The size of the circle represents the number of records in that location. Exhibit 10 shows the one-year water-level changes for wells in the Evangeline Aquifer.



Changes in altitudes in the Evangeline Aquifer in Fort Bend County ranged from a rise of 24 feet near Sugar Land to an area of decline of 40 feet near Fulshear.

USGS EXHIBIT NO. 11: 2013-2018 EVANGELINE AQUIFER WATER-LEVEL CHANGE

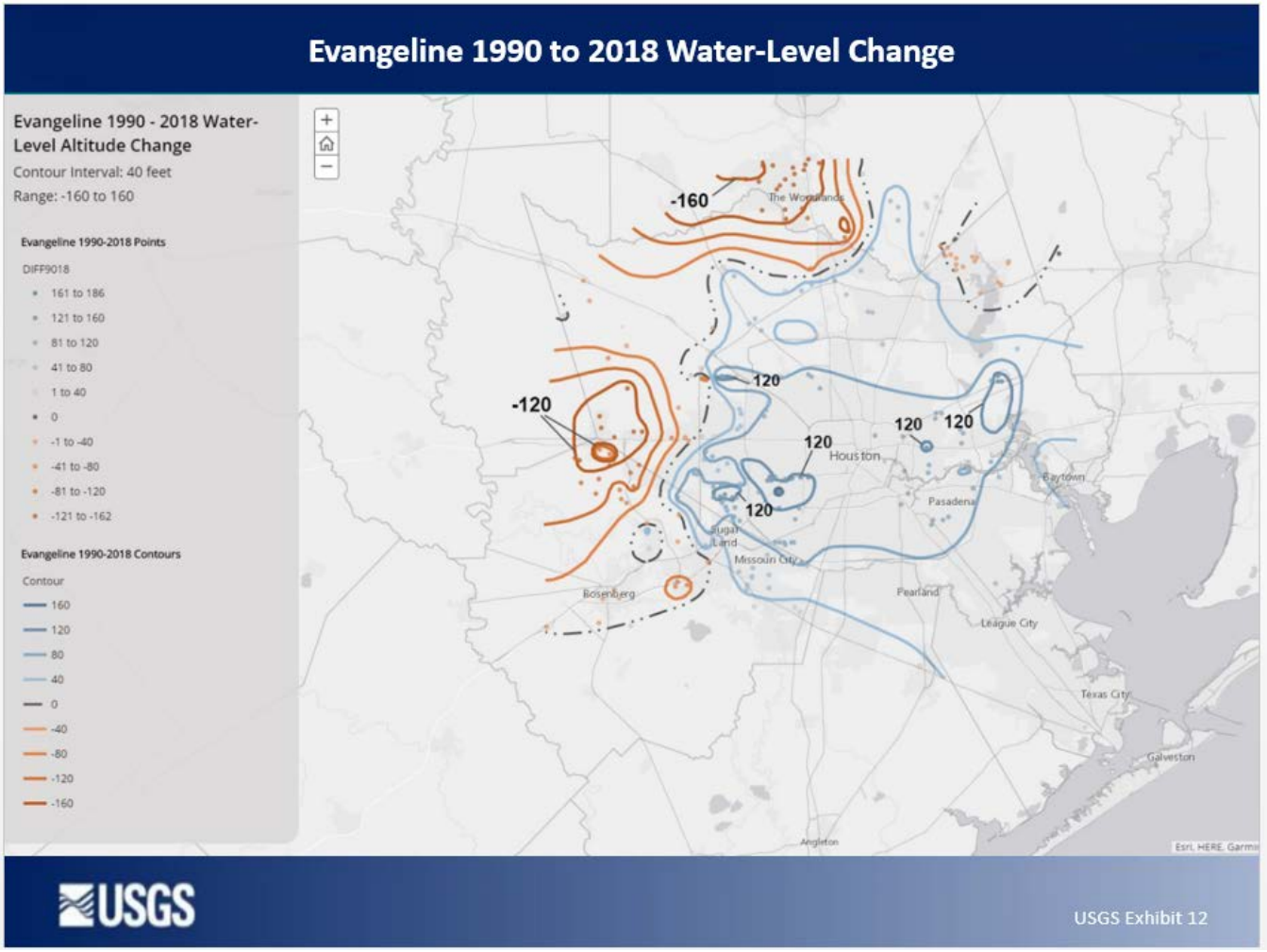
Exhibit 11 shows the water-level changes for the last five years.



Changes in altitudes in the Evangeline Aquifer shows a rise of 60 feet near the Grand Parkway and the Harris County line. There are no declines in Fort Bend County shown during this time period.

USGS EXHIBIT NO. 12: 1990-2018 EVANGELINE AQUIFER WATER-LEVEL CHANGE

This exhibit shows the changes in water levels in the Evangeline Aquifer (since the creation of the Fort Bend Subsidence District) as groundwater withdrawal regulations changed and groundwater dependence decreased.

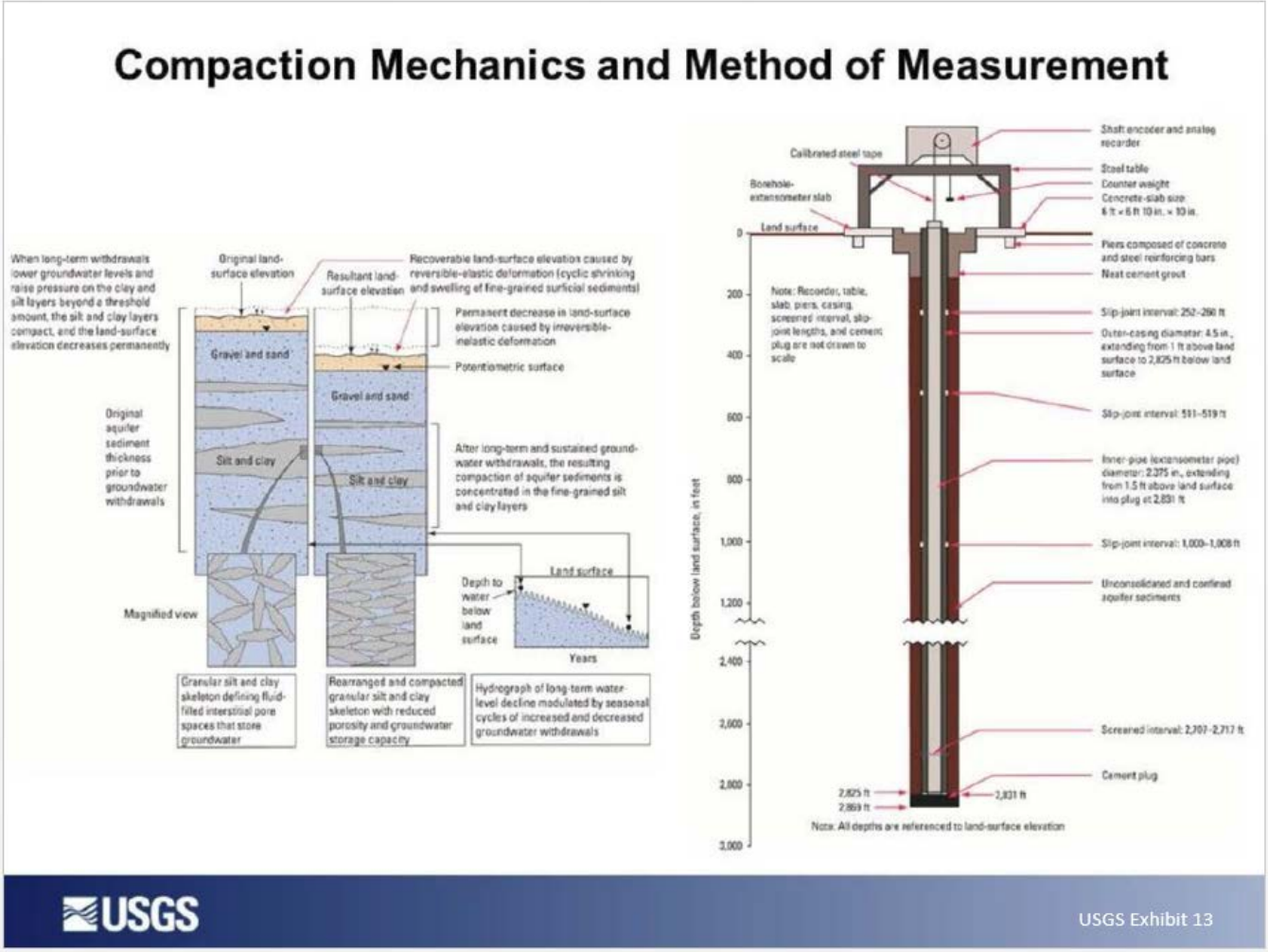


The above map shows there has been as much as 80 feet of rise near Sugar Land and declines of as much as 120 feet near Katy.

Mr. Ramage presented eight exhibits including a location map depicting the fourteen extensometers in Fort Bend, Harris and Galveston Counties, and six graphs showing the compaction measured at the extensometers. The site compaction measurements are continuously chart recorded with a modified Type F Recorder and read approximately every twenty-eight days.

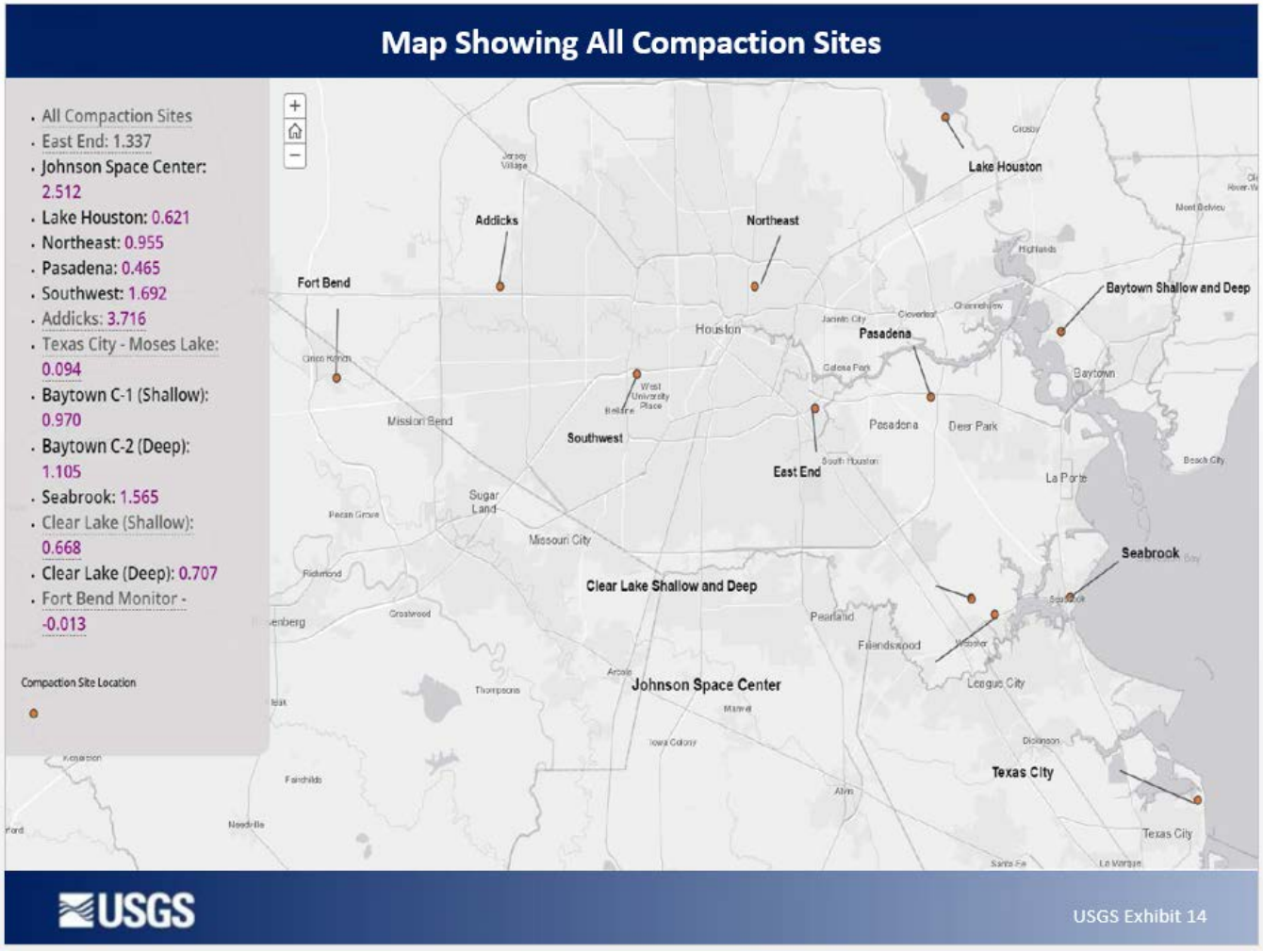
USGS EXHIBIT NO. 13: OVERVIEW OF SUBSIDENCE MECHANISMS

The diagram below depicts an overview of how groundwater withdrawal leads to the compaction that is associated with land subsidence in the region.



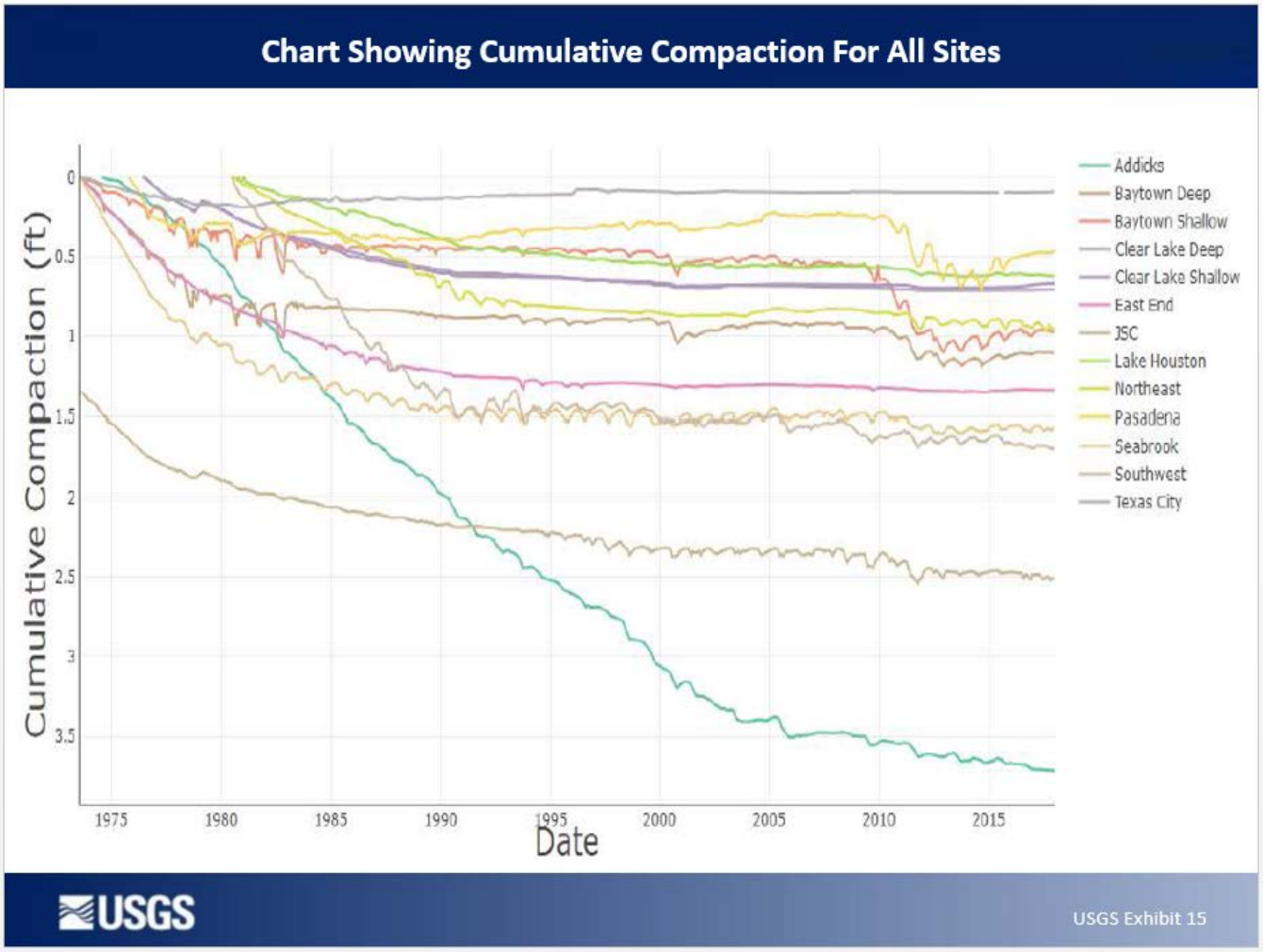
USGS EXHIBIT NO. 14: EXTENSOMETER LOCATIONS MAP

This map shows the location of the extensometer sites (two extensometers, one shallow and one deep located at both the Baytown and Clear Lake Sites); and three extensometer sites (Addicks, Northeast Houston and Lake Houston) are equipped with GPS antennas atop the extensometer's inner pipe and are included in the National Geodetic Survey Continuous Operating Reference Station (CORS) Program. The Cinco MUD Extensometer site, in Fort Bend County, is included on this map because it started collecting data January 2017.



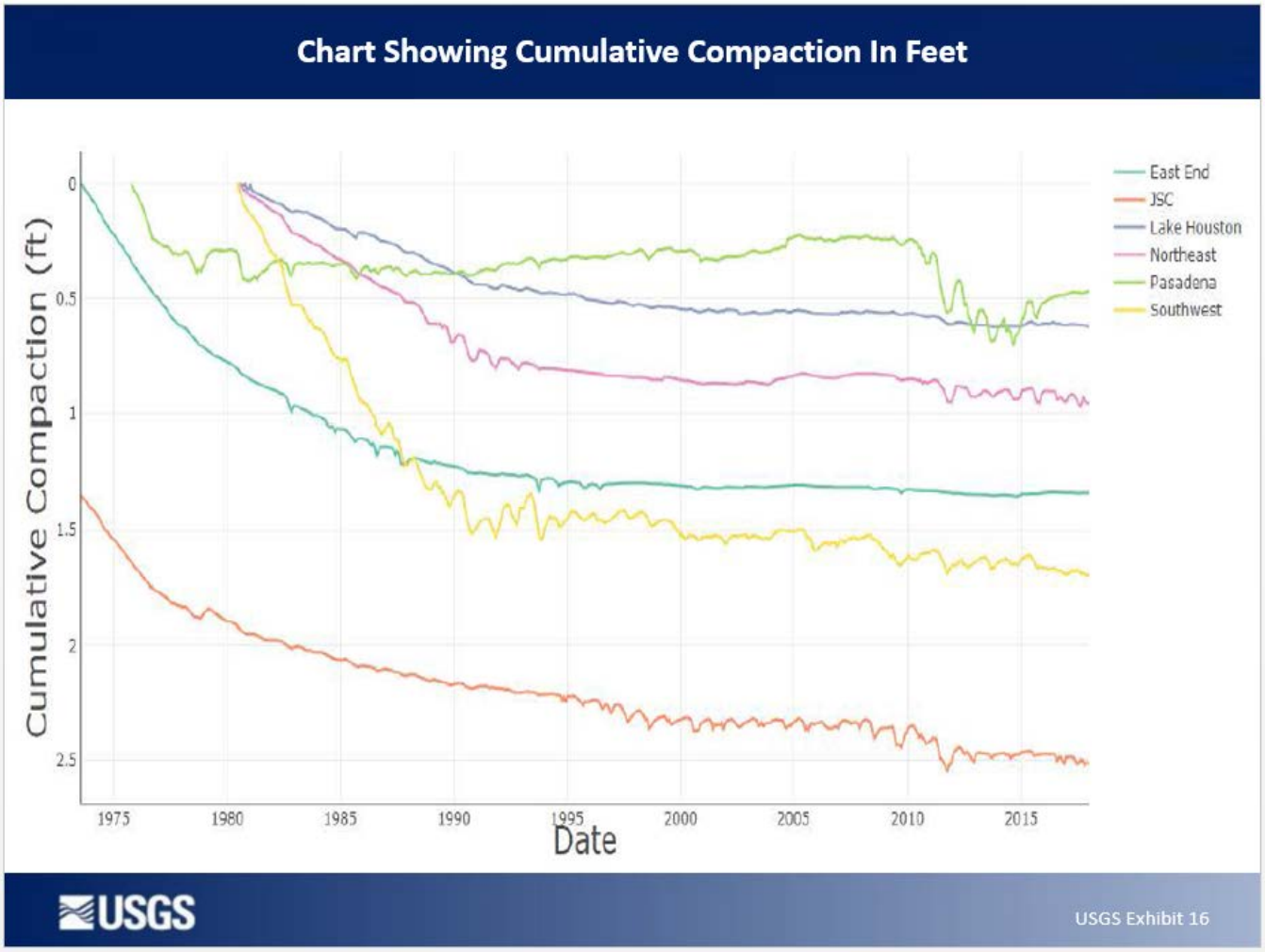
USGS EXHIBIT NO. 15: CHART SHOWING COMPACTION FOR ALL EXTENSOMETER SITES

The chart below shows the traces for all of the sites except Cinco MUD. (The chart for the Cinco MUD site is shown separately on Exhibit 20.)



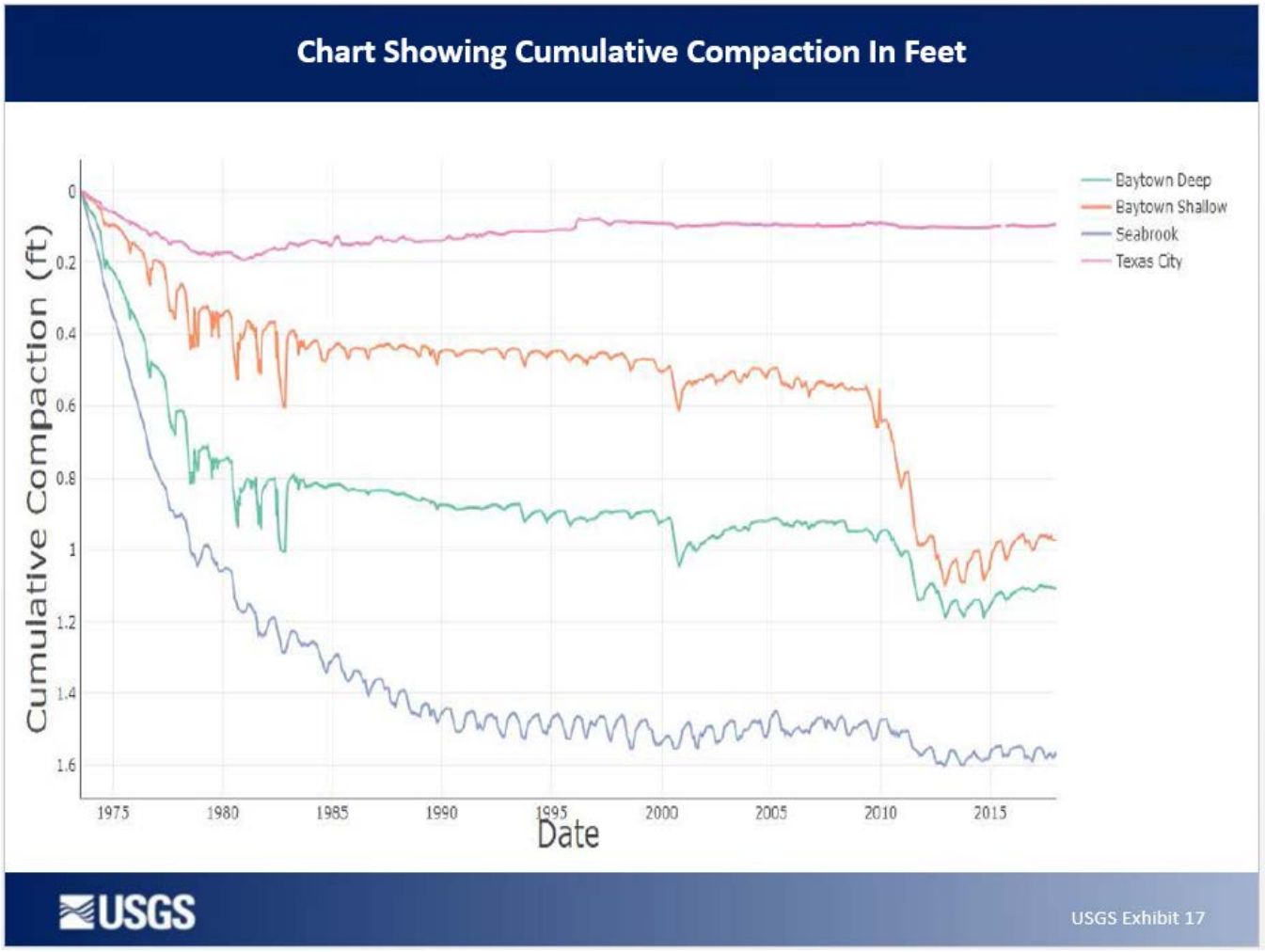
USGS EXHIBIT NO. 16: LAKE HOUSTON, NORTHEAST, EAST END, SOUTHWEST, JSC NASA AND PASADENA EXTENSOMETERS (1974 – 2017)

Exhibit 16 shows the Lake Houston (blue line), Northeast Houston (plum line), East End (blue-green line), Southwest Houston (yellow line), Johnson Space Center (brown line) and Pasadena (green line) extensometers. Scaling is in 1/2 of one-foot increments from top to bottom (0-2.5 feet) and in five-year increments, left to right (1975 to 2015).



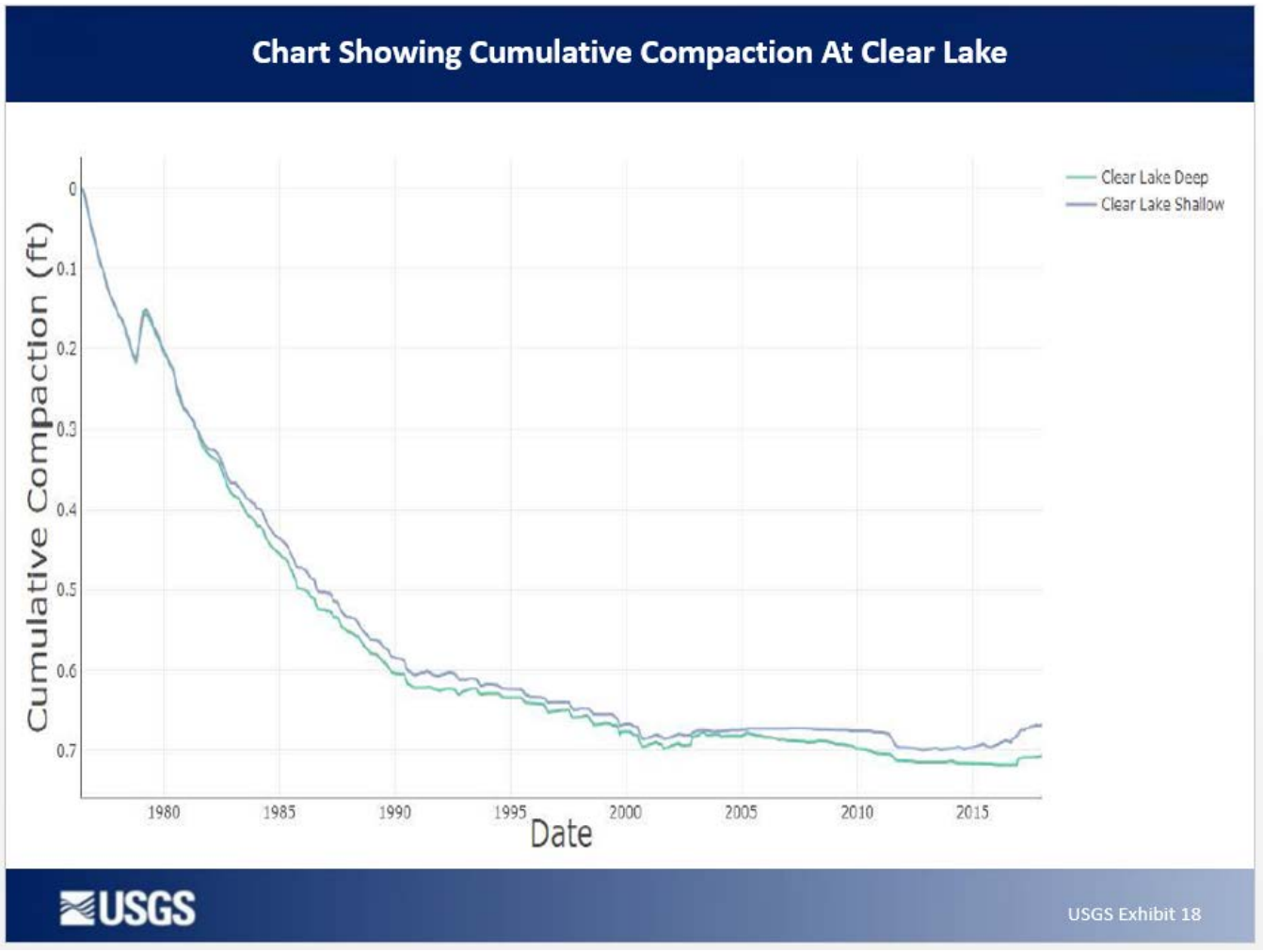
USGS EXHIBIT NO. 17: TEXAS CITY, BAYTOWN (SHALLOW AND DEEP) AND SEABROOK EXTENSOMETERS (1974 – 2017)

This graph shows the measurements for Texas City (plum line), Baytown Shallow (brown line), Baytown Deep (green line) and Seabrook (blue line) extensometers.



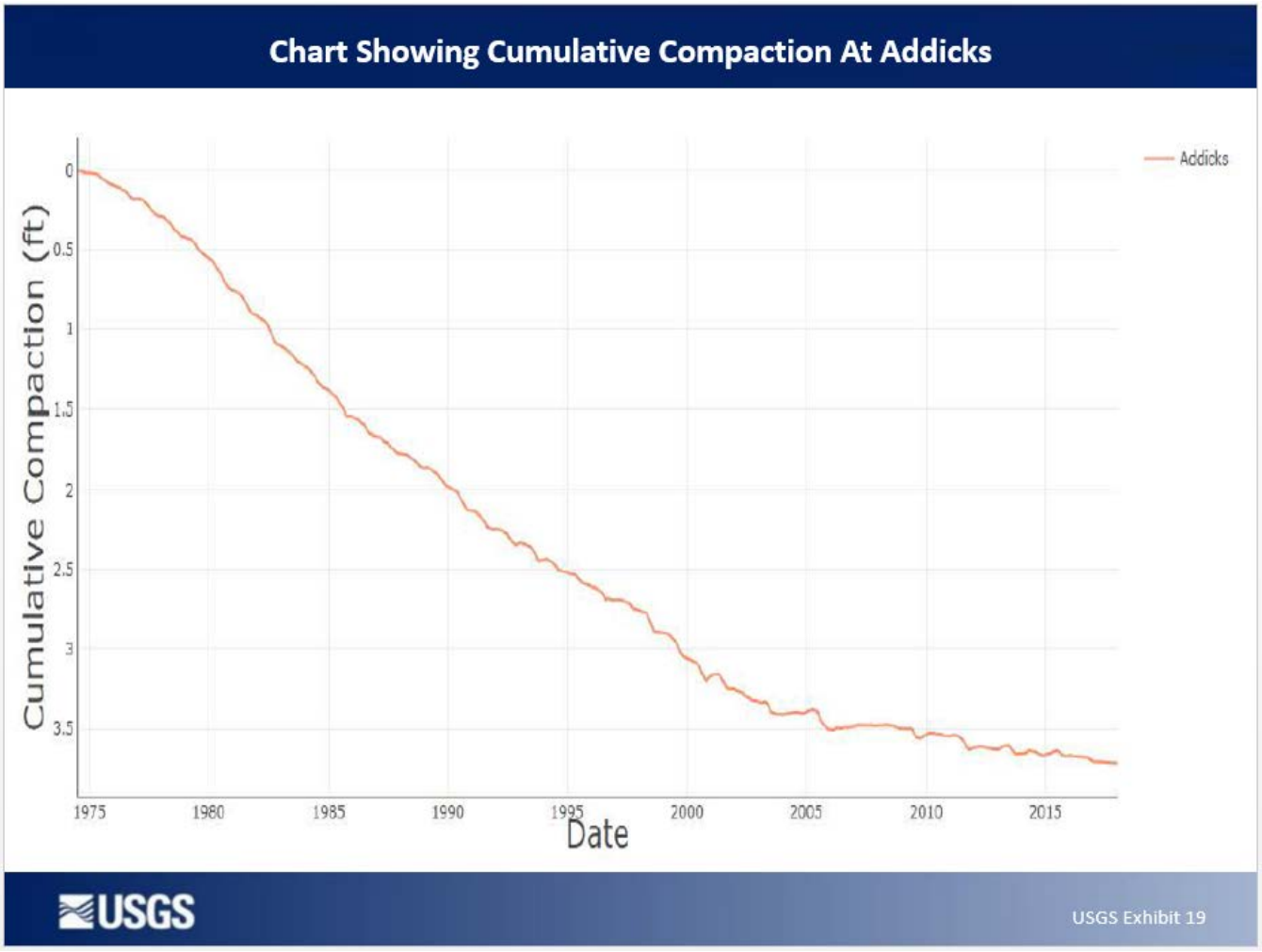
USGS EXHIBIT NO. 18: CLEAR LAKE EXTENSOMETERS (SHALLOW AND DEEP)

This graph shows the measurements for the Clear Lake Shallow (blue line) and Clear Lake Deep (green line) extensometers. They were both installed in 1977.



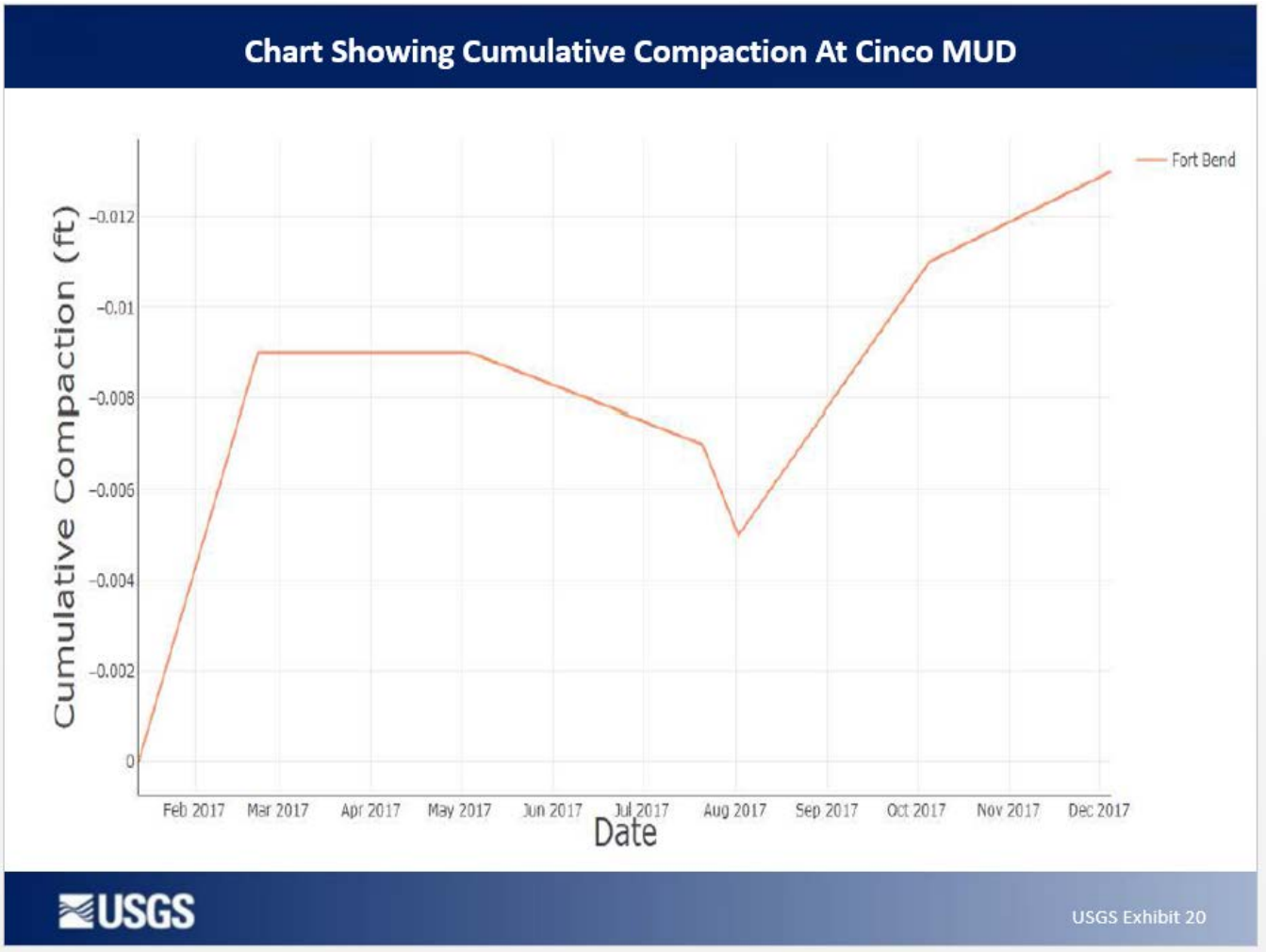
USGS EXHIBIT NO. 19: ADDICKS EXTENSOMETER

The Addicks site was installed in 1974 and has shown the most compaction of all of the extensometers. It is currently showing 3.716 feet.



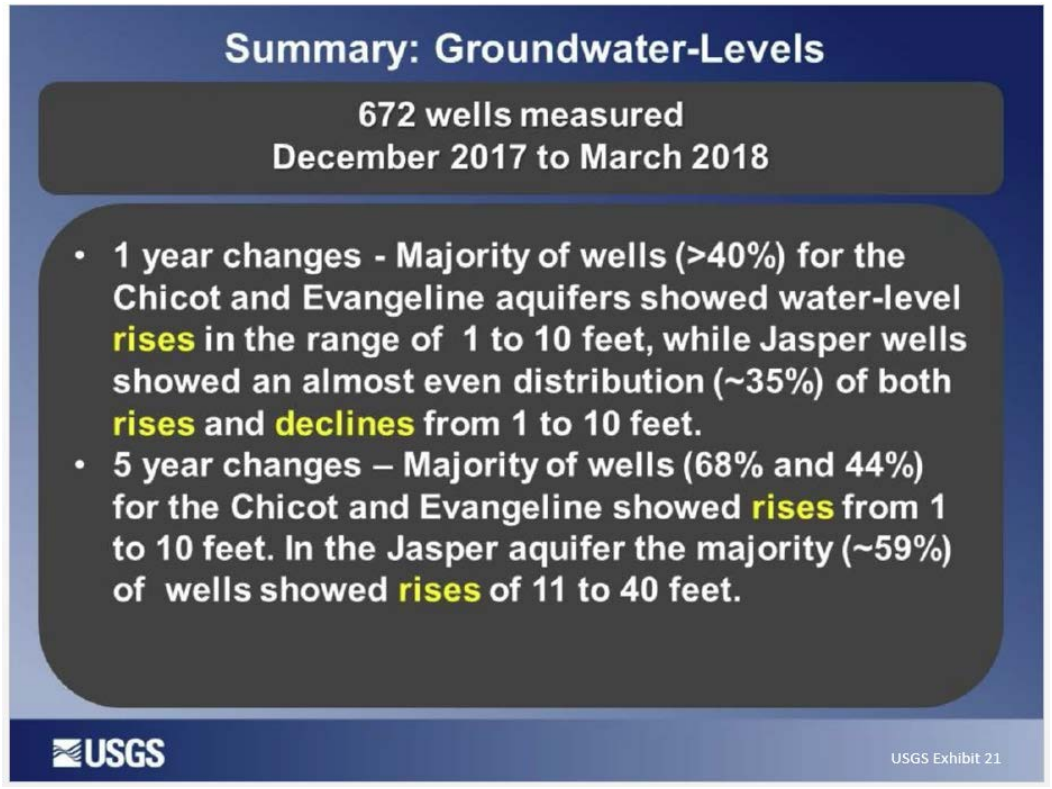
USGS EXHIBIT NO. 20: CINCO MUD EXTENSOMETER

The Cinco MUD Extensometer was installed in 2016 and started recording data in January 2017. The record shows that there has been a slight rise, or uplift, since it was installed, as a result of swelling of the clays at the surface.



USGS EXHIBIT NO. 21 TO 23: SUMMARY

Mr. Ramage summarized his comments in the final three exhibits.



Summary: Groundwater-Levels (Cont.)

672 wells measured
December 2017 to March 2018

- Long term changes in water levels since 1990 for the Chicot and Evangeline aquifers show mostly water level **rises** (73% and 65% resp.)
- Long term changes in water levels since 1977 for the Chicot aquifer show mostly **rises** (68%), while the Evangeline aquifer shows mostly **declines** (59%)
- Over the period of 2000 to 2018, all water levels in the Japer aquifer have decreased.

USGS

USGS Exhibit 22

Summary: Compaction

14 Extensometer Monitors
December 2016 to December 2017

- 8 Compaction sites recorded negative compaction ranging from -0.001 to -0.027 ft.
- 5 Compaction sites recorded positive compaction ranging from 0.001 to 0.026 ft.
- Fort Bend Extensometer – Data collection began in January 2017

USGS

USGS Exhibit 23

The water-level report by Ramage, Jason K., Braun, Chris L. & Shah, Sachin D. 2018 entitled "Groundwater-Level Altitudes and Groundwater-Level Changes in the Chicot, Evangeline, and Jasper Aquifers (2018) and Compaction in the Chicot and Evangeline Aquifers (1973-2017), Houston-Galveston Region, Texas" can be found at the following link: https://txpub.usgs.gov/houston_subsidence/home/.

The above site will also have the final report when it has been approved later this summer.

This concluded Mr. Ramage's testimony.

SUBSIDENCE DISTRICT TESTIMONY (CONTINUED) MEASURED LAND SURFACE SUBSIDENCE USING CORS, PAMS AND EXTENSOMETERS

Mr. Thompson returned to present three exhibits including two location maps and one subsidence chart. The chart shows data from three types of sites across ten counties.

Measurement Methodology and Notes

GPS heights are derived at each of the occupied sites every thirty seconds during the duration of monitoring (generally a seven-day period, every eight weeks). The data for each site is processed against the stable Houston reference frame Houston 16 and published as a daily height.

FBSD EXHIBIT NO. 11: GPS MONITORING NETWORK

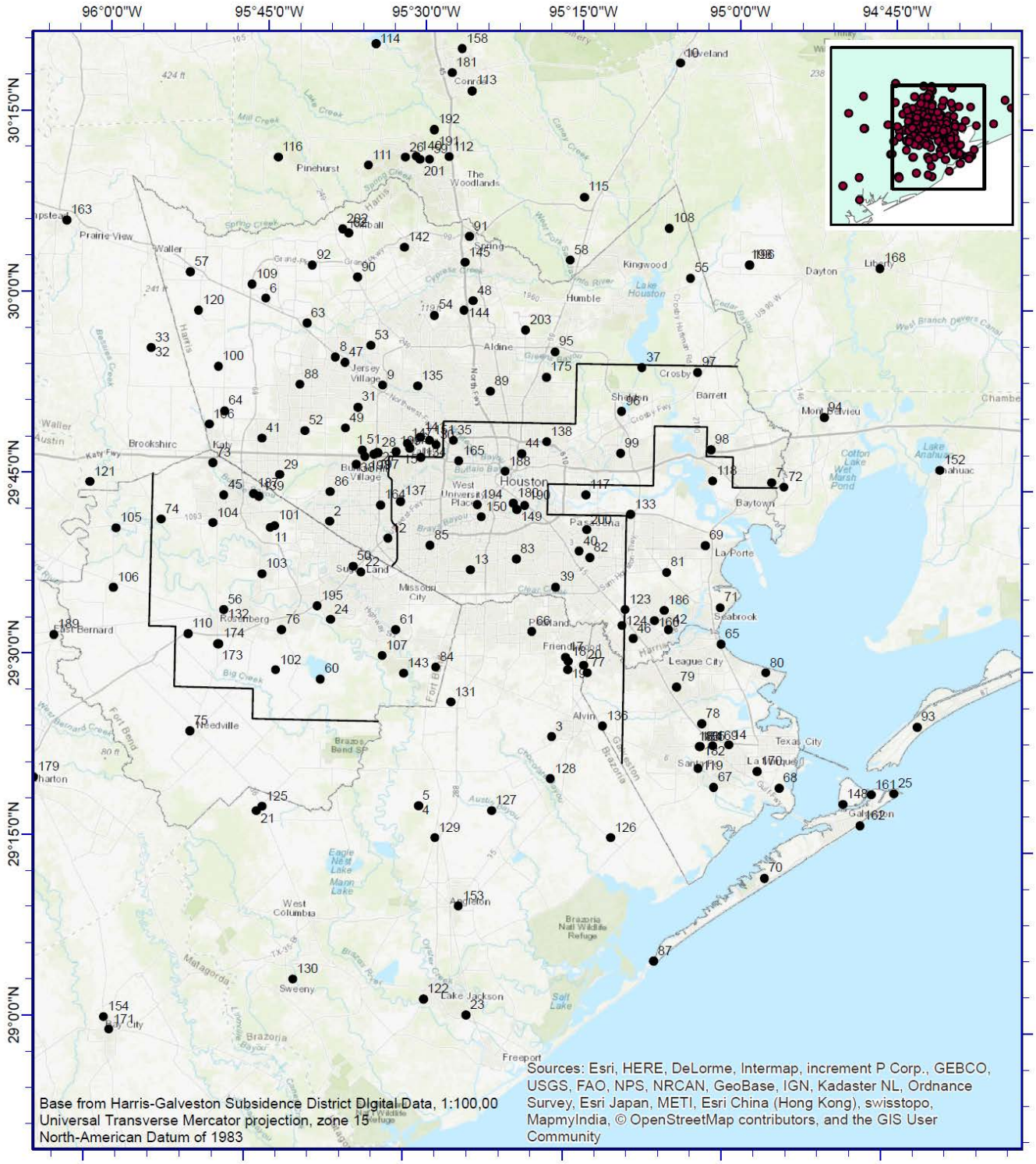
This map that shows the locations of the GPS sites within the District and the surrounding counties. There are 203 monitoring sites throughout the area.

FBSD EXHIBIT NO. 12: GPS MONITORING NETWORK IN FORT BEND COUNTY

This map shows the locations of the GPS sites throughout the area. The colored dots represent the average annual rate of vertical motion over the past five years for each site, in centimeters per year. Positive rates denote uplift or heave, and negative rates denote subsidence. Annual rates of vertical motion from network sites range from 0.59 cm/year at station UHL1 to -2.13 cm/year at station PA08 from 2013-2017. Site information and estimated rates of vertical motion can be found in Appendix 1.

FBSD EXHIBIT NO. 13: SUBSIDENCE RATES IN CENTIMETERS PER YEAR

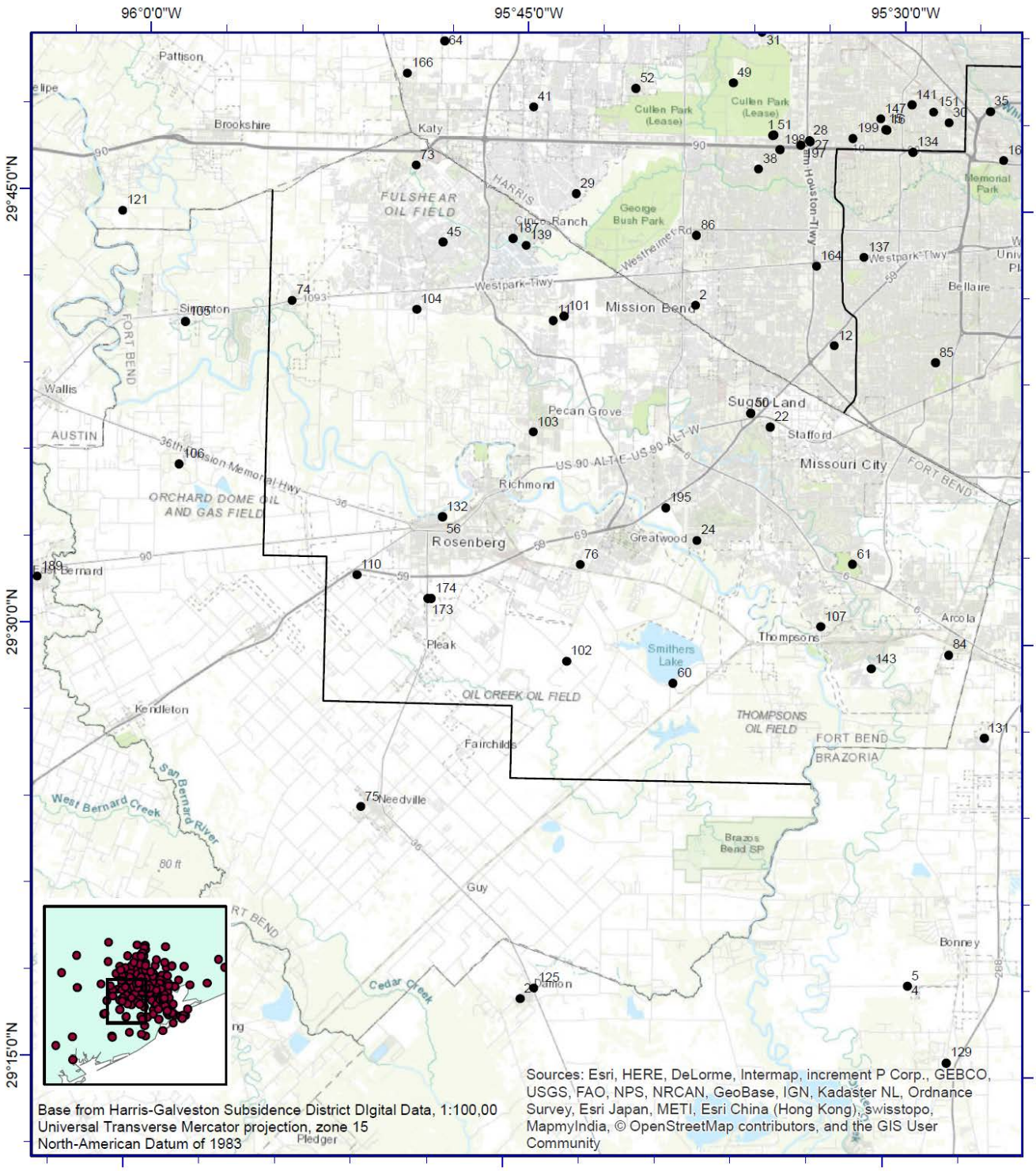
This map shows a close up of Regulatory Area A. Some of the highest rates of subsidence can be seen generally in the Katy area, which shows a rate of about seven inches per decade.



EXPLANATION

o Subsidence monitoring station and map id. (see appendix)

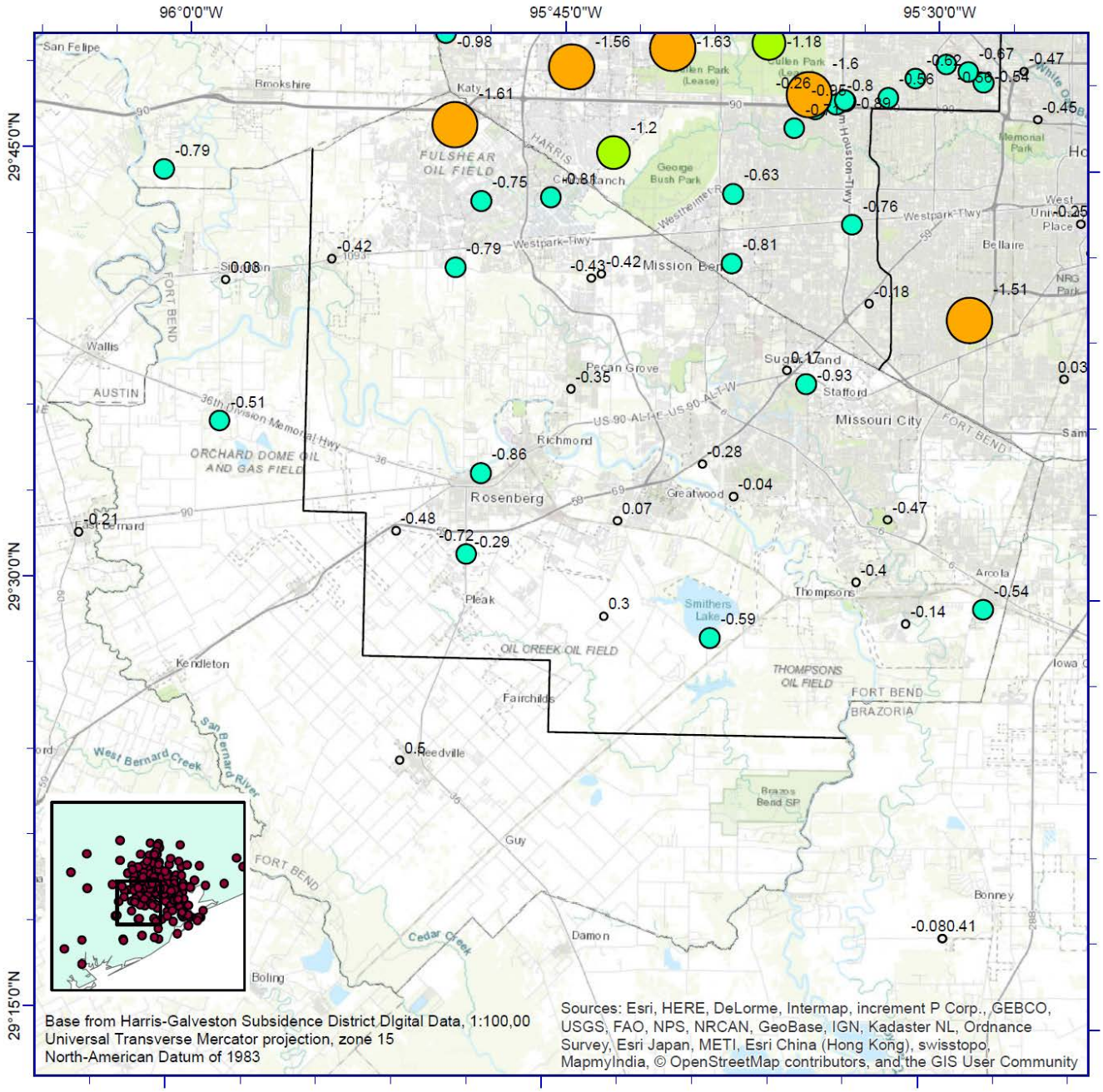
FBSD EXHIBIT 11. Subsidence monitoring network in Harris, Galveston, Fort Bend, and surrounding counties operated in cooperation with the University of Houston, Lone Star Groundwater Conservation District, and the Brazoria County Groundwater Conservation District, 2017.



EXPLANATION

o Subsidence monitoring station and map id. (see appendix)

FBSD EXHIBIT 12. Subsidence monitoring network in Harris, Galveston, Fort Bend, and surrounding counties operated in cooperation with the University of Houston, Lone Star Groundwater Conservation District, and the Brazoria County Groundwater Conservation District, 2017.



EXPLANATION

Subsidence Rate (2013-2017) cm/year

- greater than 2.0
- 1.9 - 1.5
- 1.4 - 1.0
- 0.9 - 0.5
- Subsidence rate less than 0.5 cm/year or period of record less than 3 years

0 3 6 12 18 Miles

0 5 10 20 Kilometers

FBSD EXHIBIT 13. Annual estimated subsidence rate, in centimeters per year, from GPS data measured from 2013-2017 at monitoring locations with more than three years of data.

HEARING CONCLUSION

Ms. Truscott asked for additional testimony. There was no additional testimony given.

Ms. Truscott opened it up for questions. There were no questions from the public.

WRITTEN COMMENTS

The record was left open until May 8, 2018 at 5:00 p.m. to allow for written comments and corrections.

There were no written comments or corrections.

REVISION HISTORY

August 24, 2018: Review of appendix identified an inconsistency with the period of record cumulative vertical motion and the estimated rate of subsidence. The table headers and data have been updated for consistency and estimated rates re-calculated which resulted in minor changes in the estimated rates of vertical motion values included in the appendix and depicted exhibit 13 compared to that which was presented on May 1, 2018. Exhibits 11 and 12 was modified to include all network sites.

APPENDIX: GPS ELLIPSOID MONITORING SITES CHANGE TABLE

The following table includes a list of all of the active GPS sites in the area. It shows the total vertical movement for each site and the estimated annual rate of movement.

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

Map ID (Exhibit 17)	Local Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Initial Year of Period Record (Decimal Years)	End of Period of Record (Decimal Years)	Period of Record (Decimal Years)	Number of GPS measurements over the period of record	Cumulative total vertical movement (cm)	[a]Estimated rate of vertical motion from 2013-2017 (cm/year) (Exhibit 18,19)
1	ADKS	-95.58641	29.79097	1993.5	2018.1	24.55	5640	-0.22	-0.26
2	ALEF	-95.63505	29.69183	2014.3	2018.1	3.84	1396	-2.21	-0.81
3	ALVN	-95.27762	29.40066	2012.5	2017.2	4.78	1710	-0.96	-0.09
4	ANG1	-95.48507	29.30148	2003.4	2007.9	4.41	1335	0.48	0.41
5	ANG5	-95.48508	29.30148	2007.9	2018.1	10.24	3318	-2.27	-0.08
6	AULT	-95.74466	29.99777	2015.6	2018.1	2.54	922	-2.75	--
7	BEA5	-94.93735	29.75691	2012.5	2017.1	4.69	1657	0.79	0.32
8	CFHS	-95.63193	29.91923	2015.6	2018.1	2.51	904	-4.12	--
9	CFJV	-95.55584	29.88165	2015.8	2018.1	2.33	843	-2.48	--
10	CLVD	-95.09359	30.33505	2012.7	2017.1	4.48	1603	-1.44	-0.32
11	CMFB	-95.72879	29.68136	2014.4	2018.1	3.69	1310	-1.29	-0.43
12	COH1	-95.54261	29.67034	2009.0	2017.7	8.70	2733	-3.35	-0.18
13	COH2	-95.41161	29.62853	2009.0	2018.1	9.10	2886	-2.58	0.03
14	COTM	-94.9982	29.39384	2015.1	2018.1	3.00	1090	-0.96	-0.4
15	CSTA	-95.5116	29.79587	2013.1	2015.3	2.18	747	0.12	--
16	CSTE	-95.51074	29.79564	2015.4	2018.1	2.71	985	-2.81	--
17	DEN1	-95.25801	29.51041	2011.8	2017.3	5.56	1927	0.34	-0.18
18	DEN2	-95.25396	29.50488	2011.8	2017.1	5.31	1506	0.90	0
19	DEN3	-95.25464	29.49372	2011.8	2017.3	5.56	1992	0.84	-0.07
20	DEN4	-95.22964	29.50023	2015.8	2017.3	1.51	509	-0.22	--
21	DISD	-95.74041	29.28927	2015.5	2018.1	2.62	933	-0.14	--
22	DMFB	-95.58374	29.62265	2014.8	2018.1	3.33	1210	-2.18	-0.93
23	DWI1	-95.40366	29.0136	2009.4	2018.1	8.70	2831	-1.75	0.01
24	FSFB	-95.63045	29.55618	2014.4	2018.1	3.73	1356	0.15	-0.04
25	GAL7	-94.73681	29.32988	1996.0	2003.5	7.49	2673	-3.34	-0.39
26	GSEC	-95.52809	30.1973	2015.8	2018.1	2.34	850	-1.00	--
27	HCC1	-95.56122	29.78787	2012.9	2018.1	5.19	1879	-4.41	-0.79
28	HCC2	-95.56202	29.78839	2013.1	2018.1	4.96	1640	-4.85	-0.89
29	HPEK	-95.71572	29.75488	2014.4	2018.1	3.70	1322	-4.22	-1.2
30	HSMN	-95.46962	29.80035	2013.3	2018.1	4.80	1740	-2.73	-0.54
31	KKES	-95.59493	29.85033	2015.6	2018.1	2.50	909	-2.14	--
32	KPCD	-95.92397	29.92601	2016.4	2018.1	1.66	563	-1.33	--

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

Map ID (Exhibit 17)	Local Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Initial Year of Period Record (Decimal Years)	End of Period of Record (Decimal Years)	Period of Record (Decimal Years)	Number of GPS measurements over the period of record	Cumulative total vertical movement (cm)	[a]Estimated rate of vertical motion from 2013-2017 (cm/year) (Exhibit 18,19)
33	KPCS	-95.92397	29.92597	2016.4	2018.1	1.66	582	-1.09	--
34	LCBR	-96.60192	30.18236	2010.5	2016.1	5.55	1947	-0.38	-0.15
35	LCI1	-95.4425	29.80747	2012.5	2018.1	5.64	1727	-2.33	-0.47
36	LGC1	-94.07455	30.0446	2013.5	2018.1	4.57	1660	-0.92	-0.22
37	LKHU	-95.14576	29.91346	1993.5	2018.1	24.54	6987	0.92	0.07
38	MDWD	-95.59521	29.77138	2013.3	2018.1	4.80	1702	-4.16	-0.71
39	ME01	-95.27571	29.60754	2015.5	2017.7	2.19	790	-0.22	--
40	MEPD	-95.23959	29.65808	2014.0	2018.1	4.06	1475	0.74	0.22
41	MRHK	-95.74514	29.80414	2014.4	2018.1	3.70	1261	-5.80	-1.56
42	NASA	-95.09622	29.55195	2014.2	2018.1	3.88	1316	-0.23	-0.15
43	NAV2	-96.06673	30.38162	2012.5	2017.1	4.68	1682	-0.92	-0.12
44	NETP	-95.33422	29.79116	1993.5	2018.1	15.96	5289	1.82	0.3
45	OKEK	-95.80331	29.72503	2014.6	2018.1	3.52	1213	-1.72	-0.75
46	PA00	-95.15224	29.53862	1996.0	2018.0	22.01	1481	-2.19	0.04
47	PA01	-95.61662	29.91188	1994.2	2018.0	23.89	1932	-68.95	-2.25
48	PA02	-95.41587	30.00065	1994.3	2018.1	23.78	1952	-61.28	-2.23
49	PA03	-95.61338	29.82081	1994.3	2018.0	23.70	1531	-57.93	-1.18
50	PA04	-95.59686	29.63039	1994.7	2018.1	23.42	1822	-26.60	0.17
51	PA05	-95.58591	29.79121	1996.7	2018.0	21.31	1511	-34.93	-1.6
52	PA06	-95.67779	29.81637	1997.6	2018.0	20.41	1314	-54.43	-1.63
53	PA07	-95.57665	29.9363	1999.1	2018.1	18.95	1224	-52.32	-1.19
54	PA08	-95.47627	29.97968	1999.6	2018.1	18.49	1154	-42.53	-2.31
55	PA09	-95.07147	30.03812	1999.3	2018.1	18.73	1242	-7.44	-0.46
56	PA10	-95.79918	29.56639	1999.3	2018.0	18.70	1466	-8.21	-0.86
57	PA11	-95.86522	30.03216	1999.3	2018.0	18.63	1296	-11.98	-1.08
58	PA12	-95.26307	30.0597	2000.9	2018.1	17.19	1137	-10.79	-1.07
59	PA13	-95.48999	30.19481	2000.9	2017.6	16.67	1120	-25.39	-1.16
60	PA14	-95.64411	29.47366	2000.9	2018.0	17.17	1002	-8.68	-0.59
61	PA16	-95.52724	29.54446	2000.9	2018.1	17.21	1068	-6.40	-0.47
62	PA17	-95.6153	30.09116	2000.9	2018.1	17.19	1025	-27.75	-1.19
63	PA18	-95.67823	29.96493	2000.9	2017.9	17.06	1063	-33.19	-1.03
64	PA19	-95.80535	29.84112	2000.9	2018.0	17.10	948	-15.24	-0.81

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

Map ID (Exhibit 17)	Local Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Initial Year of Period Record (Decimal Years)	End of Period of Record (Decimal Years)	Period of Record (Decimal Years)	Number of GPS measurements over the period of record	Cumulative total vertical movement (cm)	[a]Estimated rate of vertical motion from 2013-2017 (cm/year) (Exhibit 18,19)
65	PA20	-95.01324	29.53291	2002.0	2018.0	15.93	977	1.72	0.24
66	PA21	-95.31207	29.54547	2002.2	2018.0	15.83	920	-3.40	-0.32
67	PA22	-95.02071	29.33452	2002.0	2017.9	15.88	943	-4.18	-0.25
68	PA23	-94.91778	29.33508	2002.1	2018.1	16.01	1001	1.27	0.08
69	PA24	-95.04078	29.6688	2002.1	2018.0	15.90	980	2.39	0.07
70	PA26	-94.93833	29.21032	2002.2	2018.1	15.91	1226	-2.80	-0.28
71	PA27	-95.01555	29.58314	2002.4	2018.0	15.62	942	-4.43	-0.23
72	PA28	-94.91763	29.75122	2002.2	2018.0	15.86	932	-0.07	-0.2
73	PA29	-95.82219	29.76902	2007.3	2018.1	10.78	493	-16.48	-1.61
74	PA30	-95.90192	29.68925	2007.3	2018.1	10.75	480	-4.70	-0.42
75	PA31	-95.84838	29.39802	2007.3	2018.0	10.70	478	2.69	0.5
76	PA32	-95.70731	29.5406	2007.4	2018.0	10.67	502	-0.80	0.07
77	PA33	-95.22357	29.48991	2006.3	2017.9	11.57	592	-1.82	-0.24
78	PA34	-95.04167	29.42219	2010.4	2018.1	7.75	2646	-3.71	-0.31
79	PA35	-95.08244	29.47262	2006.6	2018.1	11.47	502	1.75	-0.08
80	PA36	-94.94163	29.49418	2007.0	2018.1	11.13	523	-1.99	-0.2
81	PA37	-95.10101	29.63071	2007.4	2018.0	10.64	521	3.10	0.02
82	PA38	-95.22295	29.64927	2007.4	2018.0	10.67	517	3.20	0.26
83	PA39	-95.33928	29.64525	2011.1	2018.0	6.96	329	-2.18	0.51
84	PA40	-95.4625	29.4933	2007.4	2018.1	10.71	438	-6.62	-0.54
85	PA41	-95.4755	29.66191	2007.3	2018.1	10.76	497	-7.35	-1.51
86	PA42	-95.63535	29.73249	2007.3	2018.0	10.67	494	-6.23	-0.63
87	PA43	-95.1106	29.09325	2006.5	2018.1	11.56	799	-0.64	-0.33
88	PA44	-95.68686	29.88013	2007.3	2018.0	10.73	485	-13.57	-1.38
89	PA45	-95.38545	29.8759	2007.3	2018.0	10.63	502	-3.98	-0.41
90	PA46	-95.60006	30.02997	2007.3	2018.1	10.76	522	-23.24	-1.96
91	PA47	-95.42354	30.08955	2007.3	2018.1	10.76	498	-19.77	-1.45
92	PA48	-95.67171	30.04536	2007.3	2018.1	10.78	509	-16.00	-1.95
93	PA49	-94.70153	29.42245	2006.3	2018.1	11.82	717	-4.01	-0.83
94	PA50	-94.85604	29.84834	2007.1	2018.0	10.94	523	-1.00	0.34
95	PA51	-95.2842	29.93254	2007.3	2018.0	10.65	485	-6.67	-0.28
96	PA52	-95.17674	29.85202	2007.3	2018.0	10.65	474	-0.99	0.16

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

Map ID (Exhibit 17)	Local Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Initial Year of Period Record (Decimal Years)	End of Period of Record (Decimal Years)	Period of Record (Decimal Years)	Number of GPS measurements over the period of record	Cumulative total vertical movement (cm)	[a]Estimated rate of vertical motion from 2013-2017 (cm/year) (Exhibit 18,19)
97	PA53	-95.05729	29.90803	2007.3	2018.1	10.72	488	-0.74	-0.41
98	PA54	-95.03439	29.80147	2006.8	2018.1	11.25	523	-1.52	-0.36
99	PA55	-95.1772	29.79419	2006.8	2018.0	11.21	518	2.26	-0.01
100	PA56	-95.81677	29.90262	2007.3	2018.0	10.67	484	-5.47	-1.04
101	PA57	-95.72182	29.68406	2009.1	2018.1	8.94	410	-4.18	-0.42
102	PA58	-95.71493	29.48476	2010.6	2018.0	7.43	349	-3.09	0.3
103	PA59	-95.74042	29.61666	2010.6	2018.0	7.41	349	-3.47	-0.35
104	PA60	-95.81955	29.68591	2012.1	2018.1	6.03	238	-4.08	-0.79
105	PA61	-95.97244	29.67539	2011.1	2017.9	6.82	328	-4.46	0.03
106	PA62	-95.97419	29.59329	2011.1	2018.1	6.97	304	-3.65	-0.51
107	PA63	-95.54741	29.50787	2011.4	2018.1	6.63	280	-2.32	-0.4
108	PA65	-95.10694	30.10646	2012.4	2018.1	5.65	247	-6.39	-1.45
109	PA66	-95.76665	30.01717	2011.2	2018.1	6.93	327	-11.34	-1.35
110	PA67	-95.85479	29.53177	2011.1	2018.0	6.89	311	-3.56	-0.48
111	PA68	-95.58681	30.18483	2011.8	2018.0	6.24	344	-7.62	-1.13
112	PA69	-95.45894	30.19897	2011.7	2018.1	6.32	356	-9.23	-1.16
113	PA70	-95.42432	30.29111	2011.8	2018.1	6.33	299	-4.70	-0.54
114	PA71	-95.57886	30.35301	2011.8	2018.1	6.32	357	-4.62	-0.67
115	PA72	-95.24249	30.14703	2012.0	2018.0	6.00	273	-1.03	-0.09
116	PA73	-95.73022	30.19343	2012.0	2018.0	5.98	343	-5.79	-1.07
117	PA74	-95.23121	29.73556	2012.0	2018.0	6.04	281	-2.20	0.07
118	PA75	-95.03057	29.75779	2012.4	2018.0	5.59	259	-2.67	-0.81
119	PA76	-95.04547	29.36089	2012.6	2018.1	5.43	242	-3.32	-0.68
120	PA77	-95.85037	29.97904	2013.2	2018.0	4.77	232	-4.51	-1.2
121	PA78	-96.01566	29.7387	2014.3	2018.1	3.77	190	-2.60	-0.79
122	PA79	-95.47127	29.0348	2014.8	2018.1	3.25	1067	-0.22	0.01
123	PA80	-95.16513	29.5781	2014.9	2018.1	3.24	1090	0.09	0.1
124	PA81	-95.1698	29.55577	2014.9	2018.1	3.25	1049	0.25	0.01
125	PA82	-95.73135	29.29566	2016.1	2018.0	1.86	106	-2.21	--
126	PA83	-95.18152	29.26241	2016.0	2018.0	1.99	103	-2.41	--
127	PA84	-95.3703	29.29685	2016.0	2018.1	2.01	93	-1.64	--
128	PA85	-95.27815	29.34258	2016.0	2018.0	1.99	89	-1.56	--

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

Map ID (Exhibit 17)	Local Name	Longitude (Decimal Degrees)	Latitude (Decimal Degrees)	Initial Year of Period Record (Decimal Years)	End of Period of Record (Decimal Years)	Period of Record (Decimal Years)	Number of GPS measurements over the period of record	Cumulative total vertical movement (cm)	[a]Estimated rate of vertical motion from 2013-2017 (cm/year) (Exhibit 18,19)
129	PA86	-95.45848	29.25773	2016.1	2018.1	2.01	93	-0.95	--
130	PA87	-95.67676	29.05808	2016.1	2018.1	2.01	91	-2.25	--
131	PA88	-95.43788	29.44563	2016.1	2017.8	1.72	84	-1.31	--
132	PA89	-95.79915	29.5664	2015.8	2018.0	2.20	103	-1.90	--
133	PA90	-95.15959	29.71018	2016.0	2018.1	2.10	152	0.89	--
134	PA91	-95.4932	29.78319	2016.3	2018.0	1.69	175	-1.47	--
135	PA92	-95.50076	29.8814	2016.3	2017.9	1.59	146	-1.07	--
136	PA93	-95.19742	29.41676	2017.2	2018.1	0.84	54	-1.35	--
137	PA94	-95.52398	29.7217	2017.3	2018.1	0.80	50	-1.06	--
138	PA95	-95.2944	29.80787	2017.2	2018.0	0.85	59	-0.95	--
139	PA96	-95.74814	29.72429	2017.6	2018.1	0.47	154	4.94	--
140	PWES	-95.51057	30.19899	2015.2	2018.1	2.88	1046	-4.00	--
141	RDCT	-95.49472	29.81042	2013.6	2018.1	4.54	1410	-1.94	-0.56
142	ROD1	-95.5268	30.07235	2007.0	2018.1	11.10	3749	-14.45	-0.89
143	RPFB	-95.51365	29.48417	2014.8	2018.1	3.33	1209	0.05	-0.14
144	SESG	-95.42962	29.98747	2014.7	2018.1	3.42	1243	-3.26	-0.94
145	SHSG	-95.43005	30.05361	2014.7	2018.1	3.38	1227	-3.59	-1.15
146	SISD	-96.17388	29.76219	2015.2	2018.1	2.92	1063	-1.41	--
147	SPBH	-95.51504	29.8019	2013.3	2018.1	4.80	1741	-3.57	-0.62
148	TDAM	-94.81695	29.31406	2013.4	2018.1	4.67	1587	-1.42	-0.18
149	THSU	-95.33991	29.71401	2013.0	2018.1	5.15	1774	-0.02	0.16
150	TMCC	-95.39524	29.70232	2003.3	2018.1	14.83	3153	1.40	0.35
151	TSFT	-95.47996	29.80629	2013.4	2018.1	4.72	1711	-4.48	-0.67
152	TXAC	-94.67146	29.7778	2011.1	2018.1	6.98	2487	-0.41	0.01
153	TXAG	-95.41902	29.16416	2005.6	2018.1	12.52	4519	-0.98	-0.02
154	TXBC	-95.97237	28.99981	2009.4	2018.1	8.70	3142	-2.62	-0.2
155	TXBM	-94.17971	30.16172	1996.1	2013.8	17.73	5958	-6.34	-0.52
156	TXCF	-96.57228	29.70366	2012.5	2016.0	3.50	1310	-0.19	0.14
157	TXCM	-96.57732	29.70284	2010.4	2018.1	7.66	2759	-1.35	-0.21
158	TXCN	-95.44121	30.34895	2005.6	2018.1	12.52	4549	-15.26	-0.97
159	TXED	-96.63403	28.96824	2009.4	2018.1	8.67	2491	-0.80	-0.06
160	TXEX	-95.11919	29.56366	2010.9	2018.1	7.21	2351	0.75	0.26

APPENDIX 1. Estimated rate of vertical motion from subsidence monitoring network sites with greater than 3 years of data from 2013-2017.

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161	TXGA	-94.77264	29.32787	2005.6	2018.1	12.52	4475	-2.73	-0.22
162	TXGV	-94.7893	29.28514	2007.1	2011.5	4.42	1268	-0.07	0.01
163	TXHE	-96.06349	30.09903	2005.6	2018.1	12.52	4537	-6.56	-0.36
164	TXHS	-95.55551	29.71608	2012.5	2018.1	5.64	1910	-3.75	-0.76
165	TXHU	-95.43299	29.77942	1996.0	2008.0	11.91	3320	-5.24	-0.45
166	TXKY	-95.8294	29.82202	2012.5	2017.2	4.78	1576	-4.86	-0.98
167	TXLG	-96.8483	29.91675	2010.9	2018.1	7.22	2556	-1.63	-0.14
168	TXLI	-94.77103	30.05589	2005.6	2018.1	12.52	4488	0.27	0.14
169	TXLM	-95.02369	29.39222	2005.6	2018.1	12.52	4546	-3.89	-0.18
170	TXLQ	-94.95285	29.35796	2013.1	2018.1	5.04	1811	-0.12	0.08
171	TXMG	-95.96355	28.9829	2013.3	2018.1	4.79	1394	-1.63	-0.27
172	TXPV	-96.61853	28.63818	2010.3	2018.1	7.81	2821	-0.18	0.07
173	TXRO	-95.80749	29.5191	2005.6	2011.4	5.86	2124	-3.39	-0.72
174	TXRS	-95.8053	29.5192	2011.4	2018.1	6.65	2517	-2.01	-0.29
175	TXTG	-95.29738	29.89752	2015.5	2018.1	2.63	940	-1.14	--
176	TXVA	-96.9096	28.83493	2005.1	2018.1	13.01	4692	-0.23	-0.06
177	TXWH	-96.11175	29.32462	2010.4	2018.1	7.67	2761	-2.98	-0.36
178	TXWI	-94.37147	29.80577	2015.5	2018.1	2.62	949	-0.91	--
179	TXWN	-96.09205	29.32876	2015.0	2018.1	3.10	1107	-0.12	-0.2
180	UH01	-95.3454	29.72246	2012.7	2018.1	5.36	1864	0.18	-0.05
181	UH02	-95.45715	30.31522	2015.0	2018.1	3.10	1081	-2.07	-0.55
182	UHC0	-95.04385	29.39037	2014.1	2018.1	3.96	1440	-0.80	-0.37
183	UHC1	-95.04397	29.39037	2014.2	2018.1	3.93	1440	-1.31	-0.32
184	UHC2	-95.04393	29.39037	2014.1	2018.1	3.96	1441	-1.01	-0.33
185	UHC3	-95.04389	29.39037	2014.1	2018.1	3.96	1441	-1.56	-0.45
186	UHCL	-95.10416	29.57774	2014.2	2018.1	3.86	1233	-0.05	0.1
187	UHCR	-95.75677	29.72807	2014.1	2018.1	3.98	1444	-2.34	-0.81
188	UHDT	-95.35944	29.76596	2013.6	2018.1	4.54	1648	-0.77	-0.1
189	UHEB	-96.06604	29.52631	2014.6	2018.1	3.50	1272	-0.79	-0.21
190	UHEP	-95.32712	29.71946	2014.4	2018.1	3.73	1336	-0.66	-0.12
191	UHF1	-95.4831	30.23625	2014.4	2018.1	3.71	1319	-3.12	-0.57
192	UHJF	-95.48307	30.23627	2014.4	2018.1	3.71	1226	-2.10	-0.26

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193	UHL1	-94.97846	30.05765	2014.4	2018.1	3.74	1245	2.08	0.59
194	UHRI	-95.40252	29.71923	2014.3	2018.1	3.77	1357	-1.48	-0.25
195	UHSL	-95.65154	29.57467	2014.2	2018.1	3.91	1413	-0.88	-0.28
196	UHWL	-94.97843	30.05764	2014.4	2018.1	3.74	1361	-0.47	-0.03
197	UTEX	-95.56782	29.78589	2012.5	2018.1	5.60	2040	-3.66	-0.8
198	WCHT	-95.58142	29.78283	2013.3	2018.1	4.81	1638	-6.52	-0.95
199	WDVW	-95.53307	29.79039	2013.3	2018.1	4.78	1687	-3.86	-0.56
200	WEPD	-95.22873	29.68773	2014.1	2018.1	4.02	1461	1.26	0.37
201	WHCR	-95.5054	30.19432	2014.8	2018.1	3.32	1204	-1.16	-0.4
202	WLA1	-95.62517	30.09641	2009.4	2009.6	0.20	68	0.03	--
203	ZHU1	-95.33143	29.9619	2003.0	2018.1	15.06	5209	-11.32	-0.61

[a] *"--" denotes data not available due to length of period of record less than three years.*