



Groundwater-level altitudes and changes in the Chicot, Evangeline, and Jasper Aquifers (2020) and compaction in the Chicot and Evangeline Aquifers (1973-2019)

For the Houston-Galveston Region, Texas



Pumping well turbine, Montgomery County, Texas

U.S. Department of the Interior
U.S. Geological Survey

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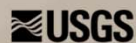
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Houston Branch*

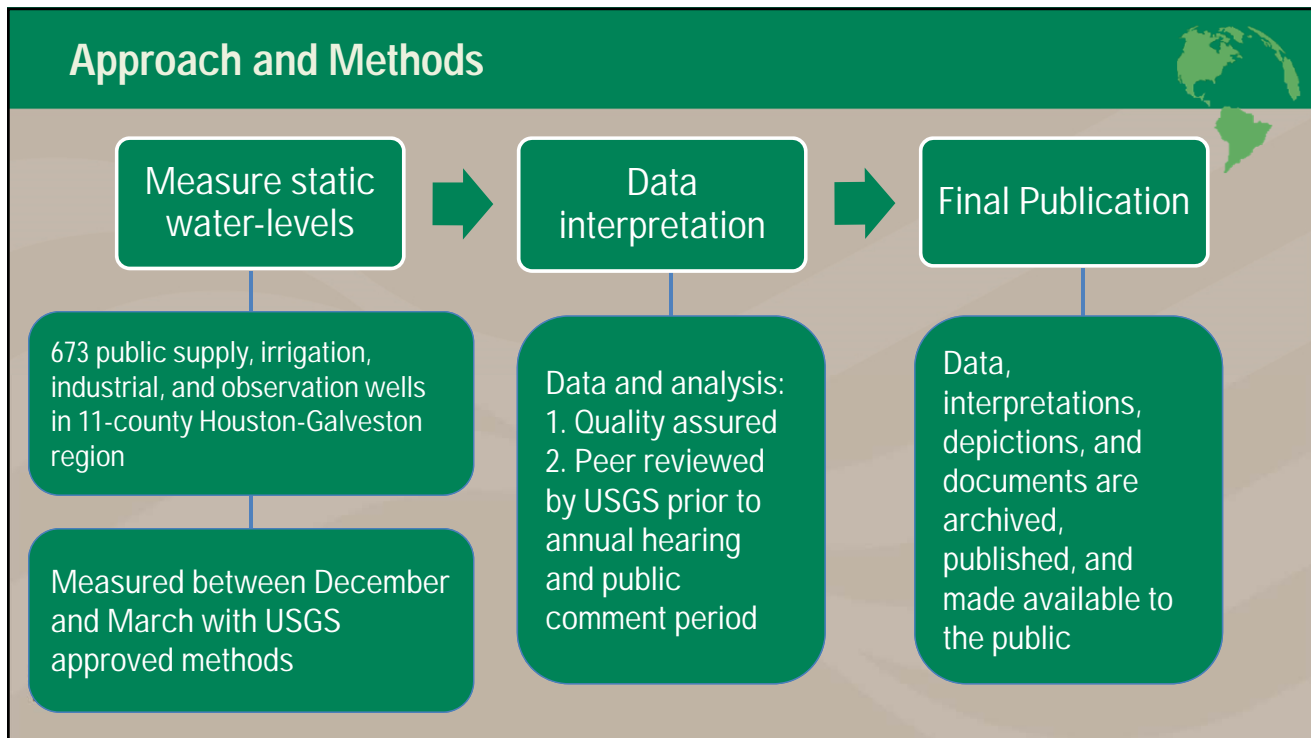


Overview

- Approach and Methods
- Gulf Coast Aquifer System
- Groundwater Monitoring Network
- Groundwater-Level Maps by Aquifer
 - Current water-level altitudes
 - 1-year and 5-year water-level change
 - Long term water-level altitude change
- Cumulative Compaction

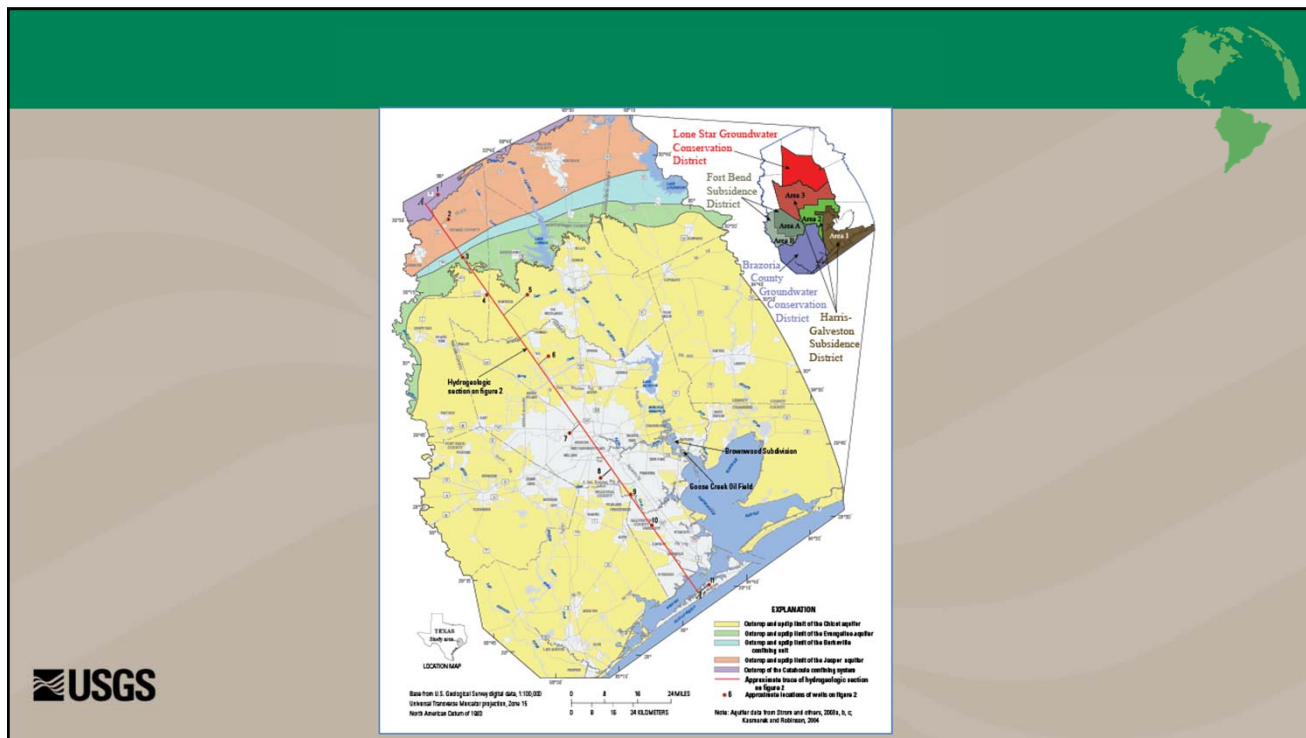


Approach and Methods

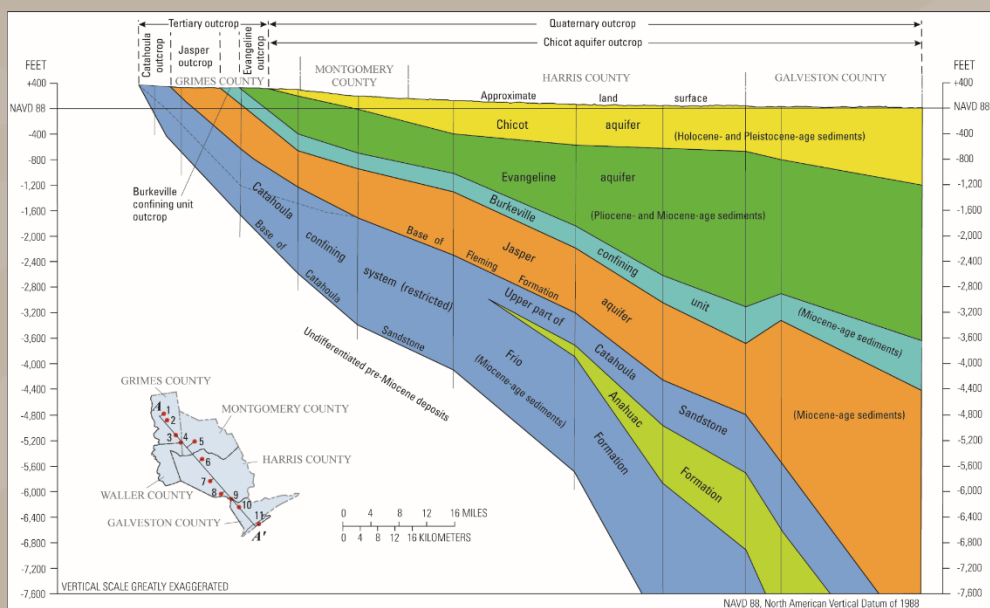


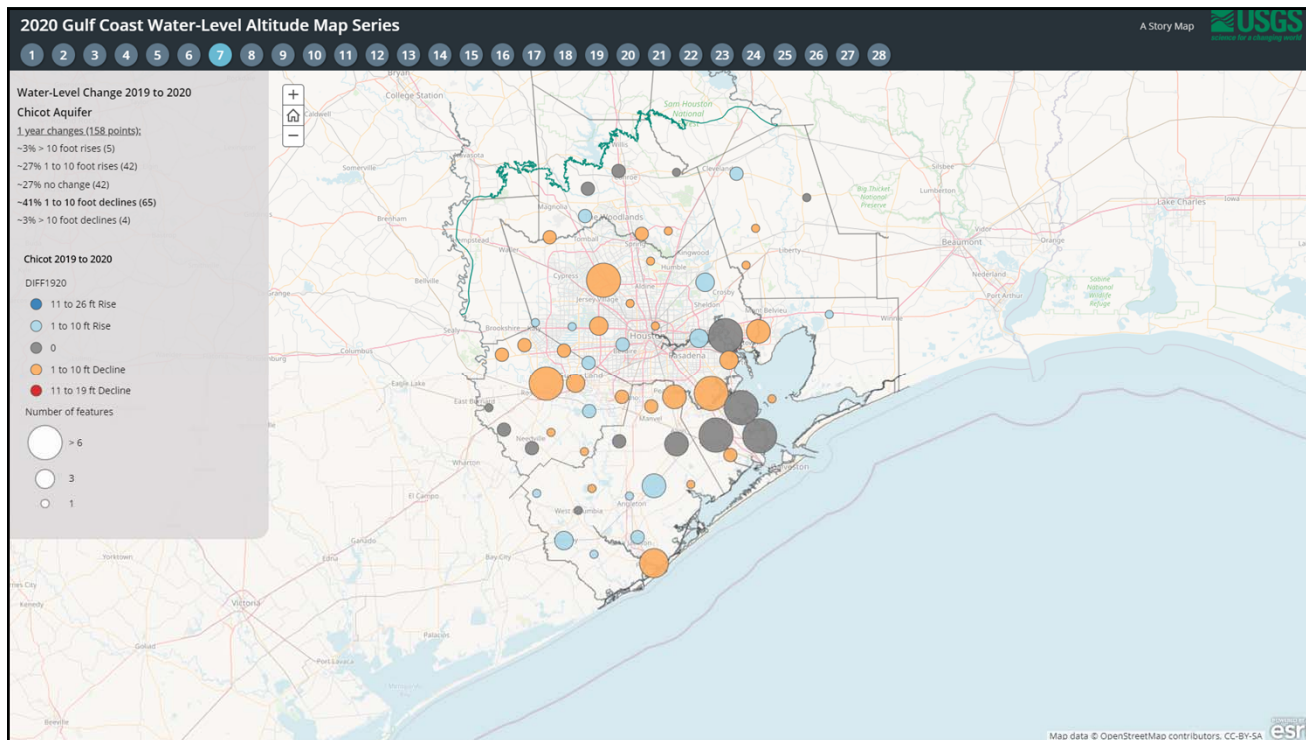
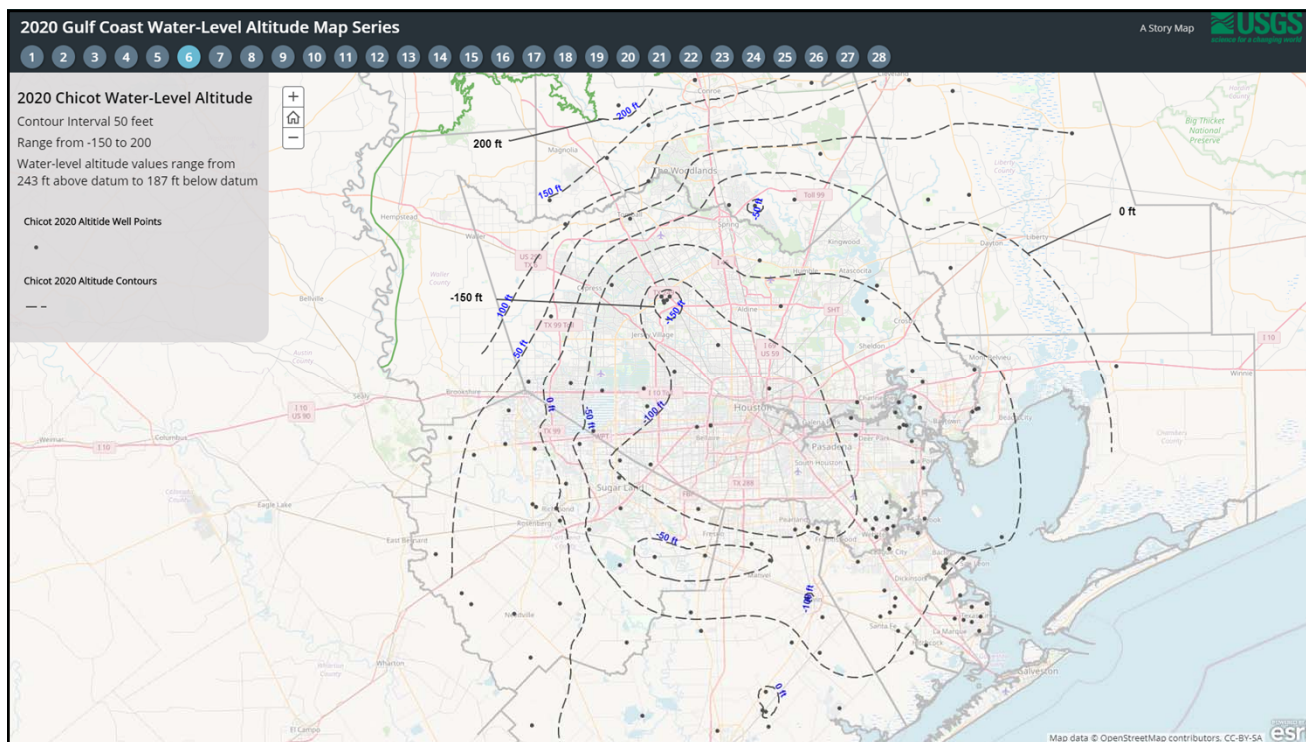
Groundwater Network

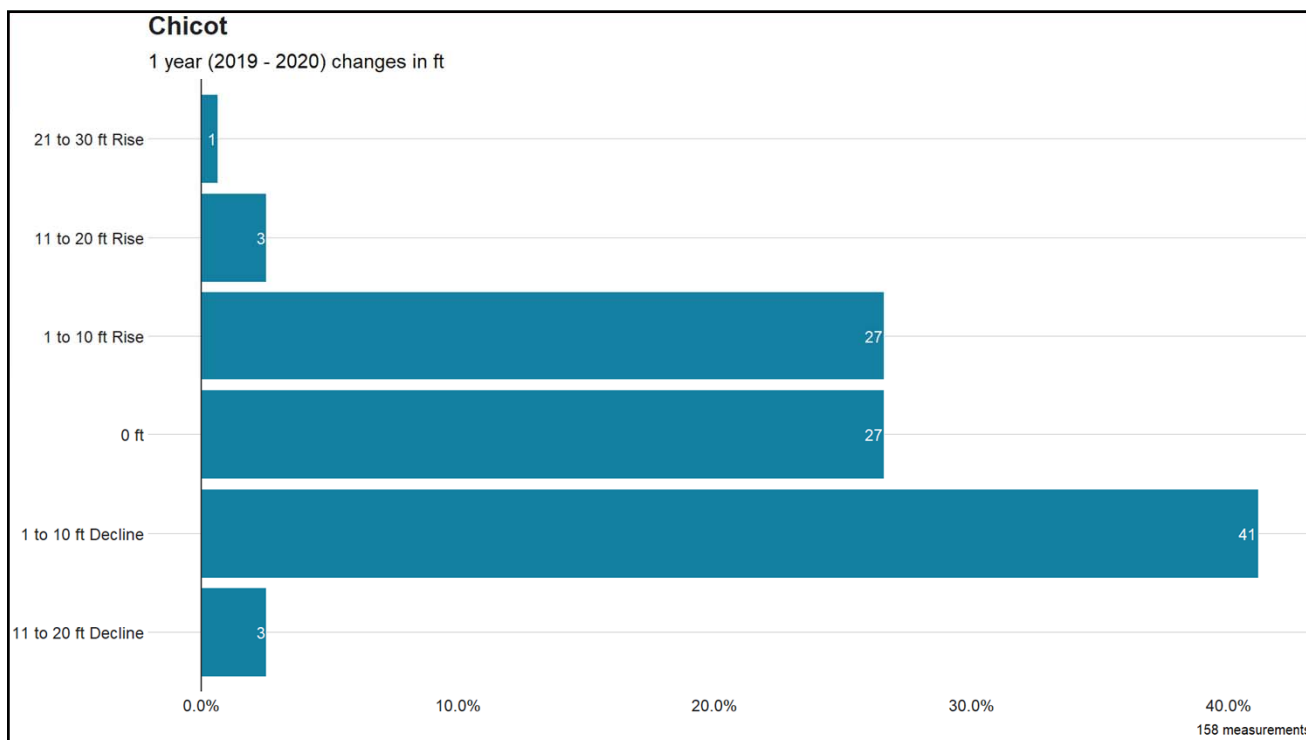
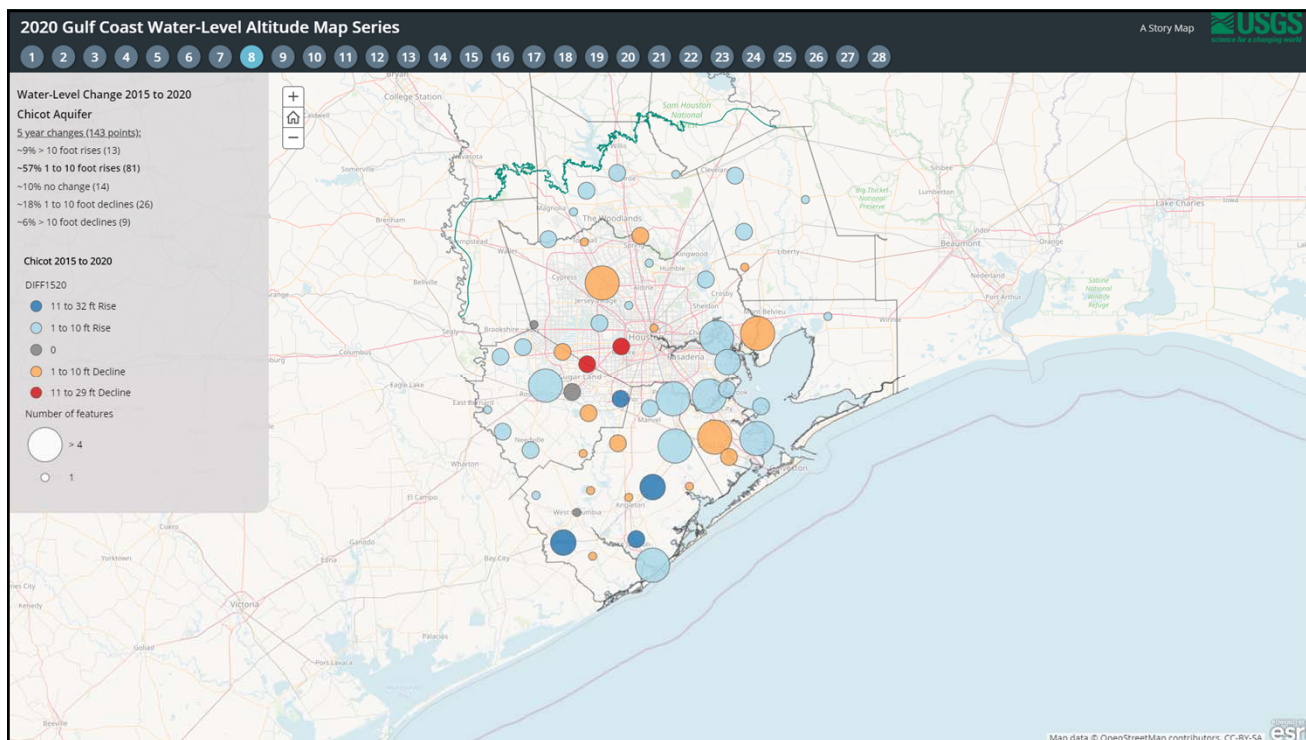
- Strong collaboration with local well owners, municipalities, MUDs, PUDs, SUDs
- Chicot and Evangeline aquifers are hydraulically connected: withdrawals from one aquifer can affect heads in the other
- Number of wells used to construct 2020 contours:
 - Chicot (173)
 - Evangeline (326)
 - Jasper (112)

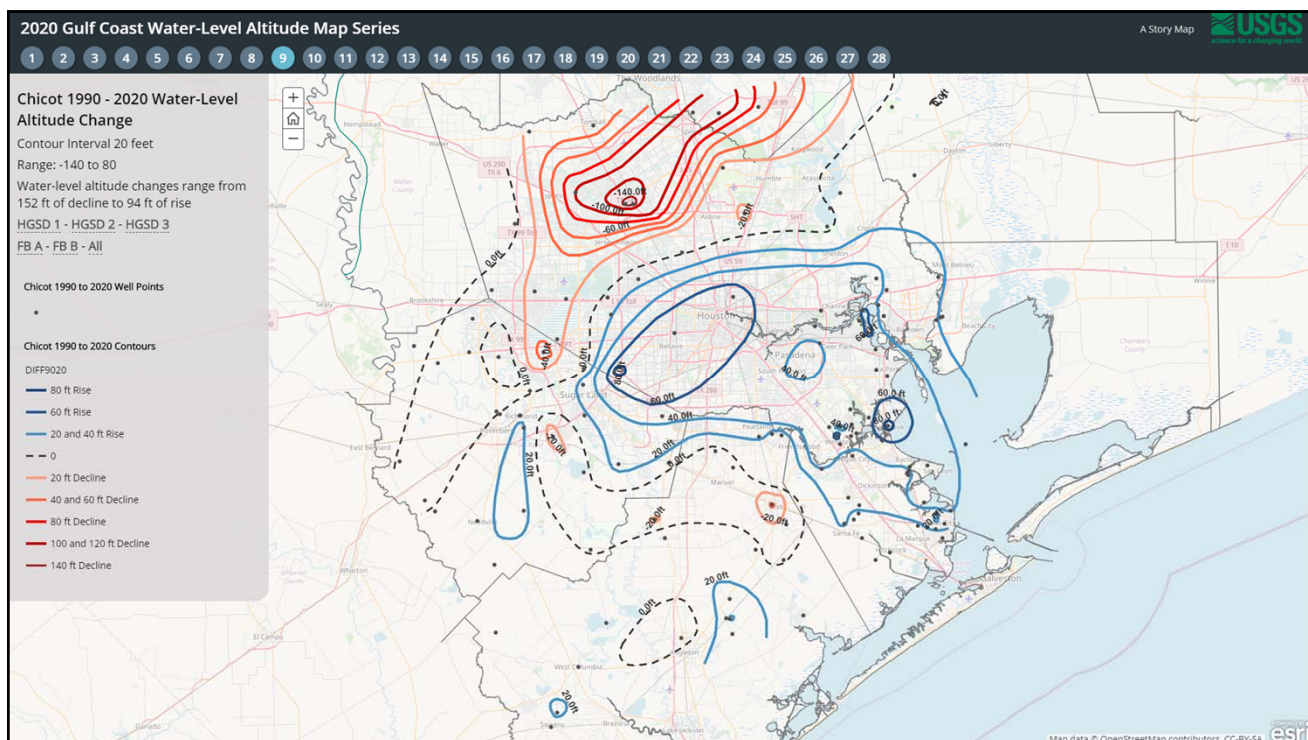
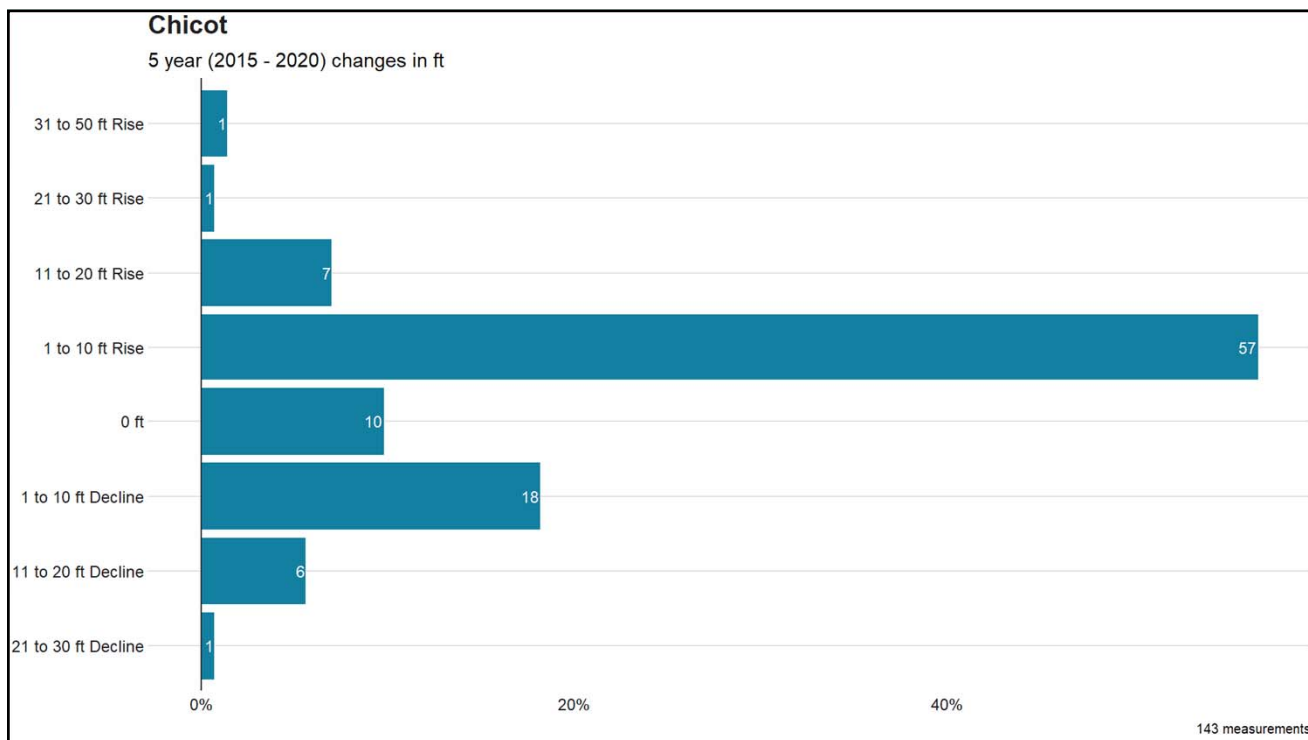


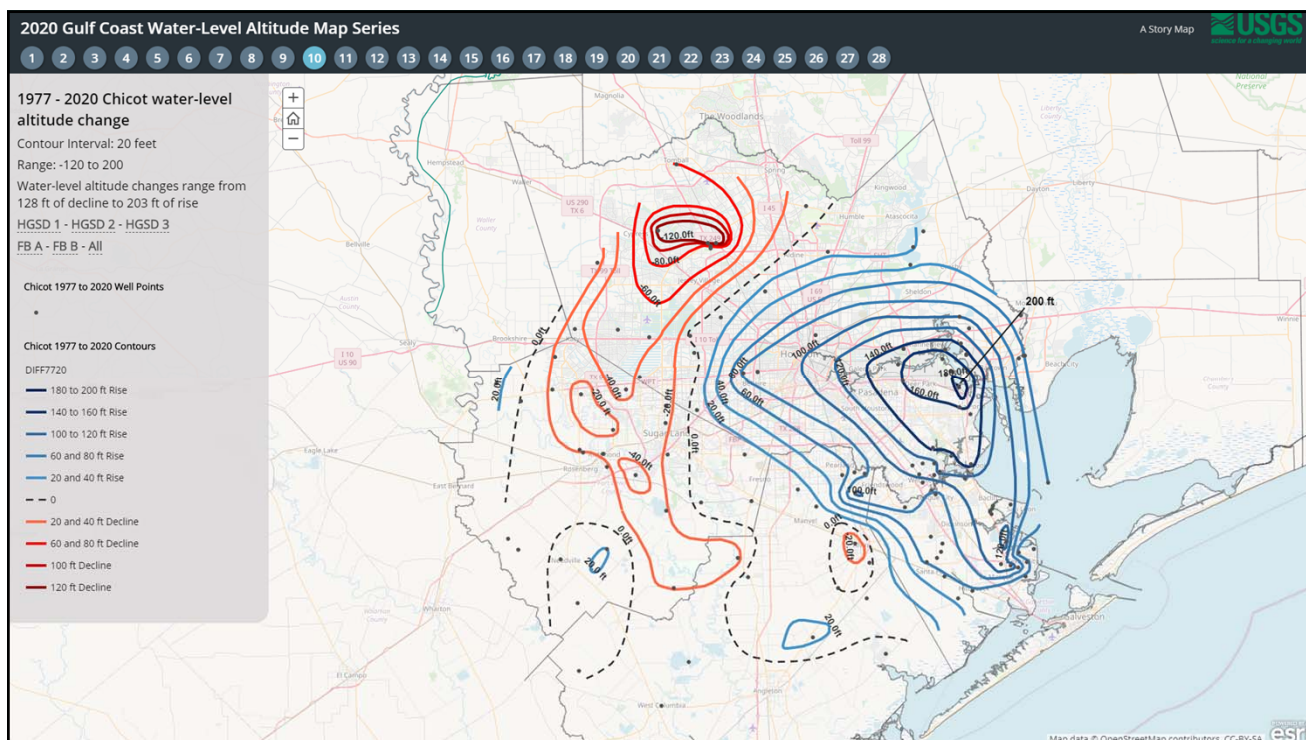
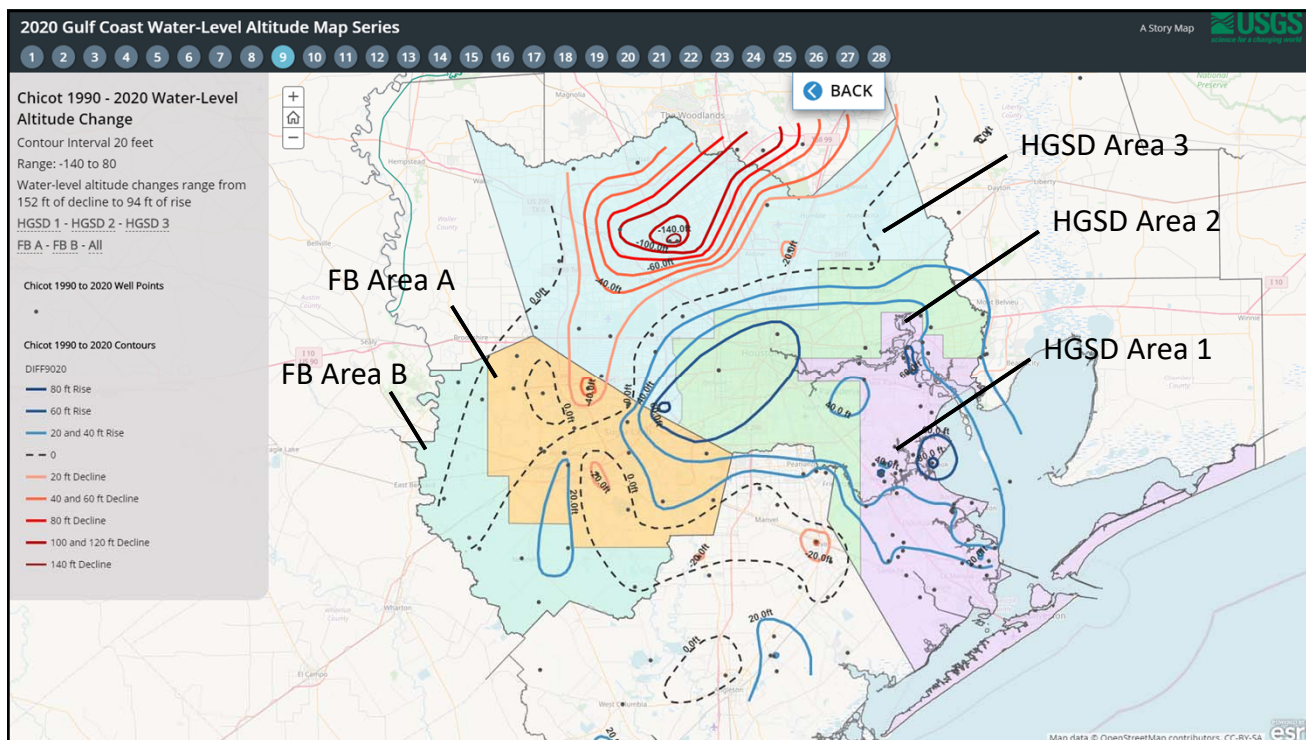
Hydrologic section of the Gulf Coast aquifer system

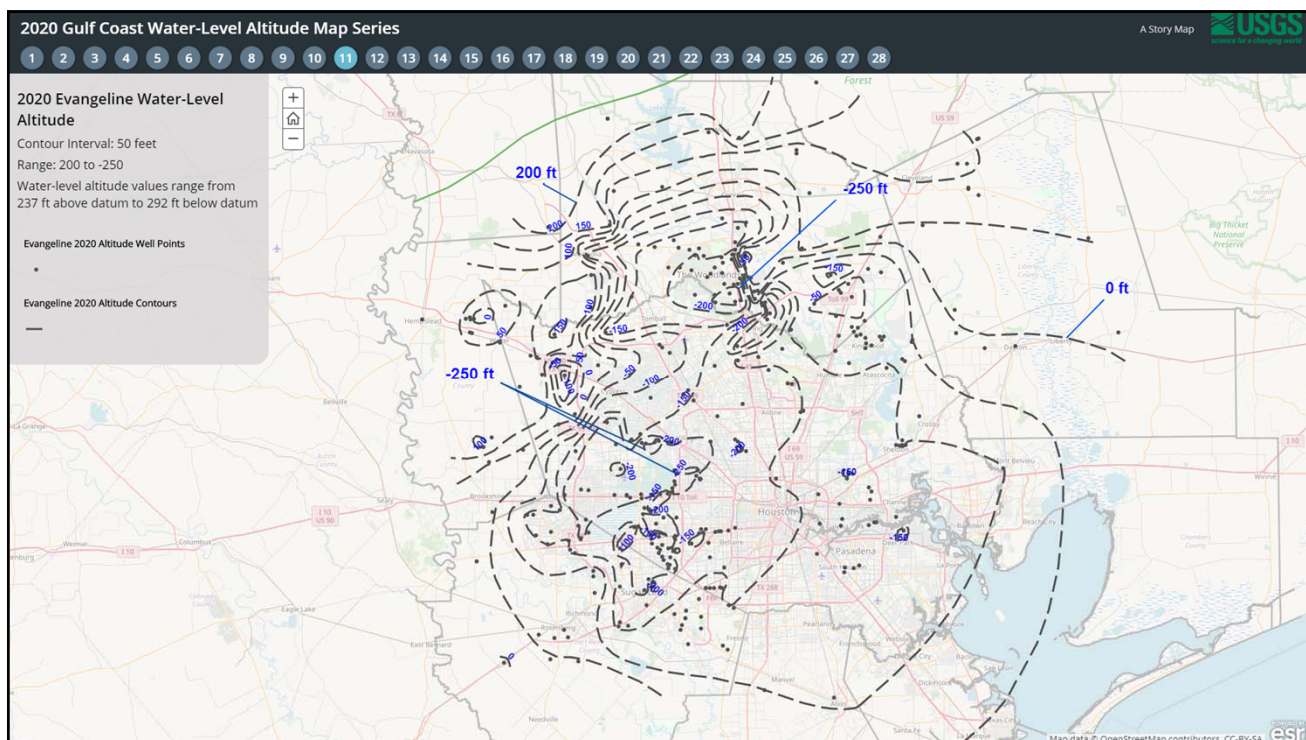
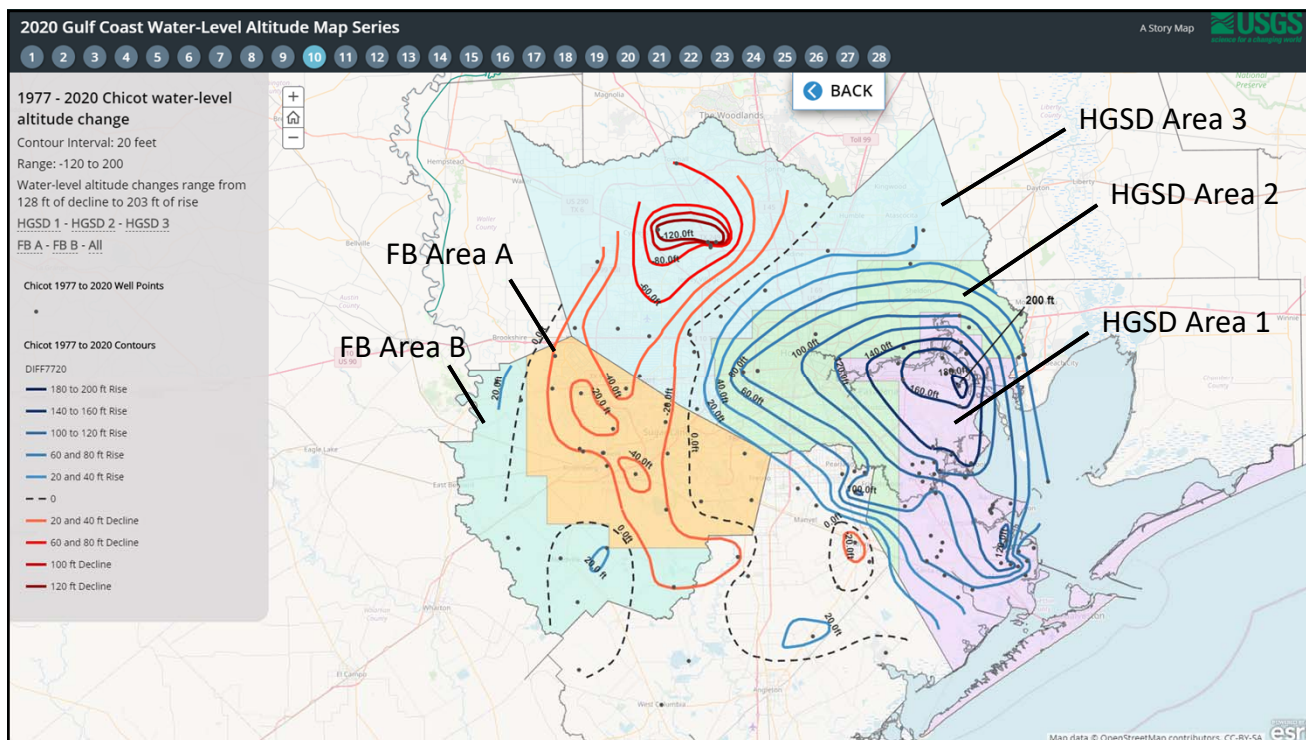


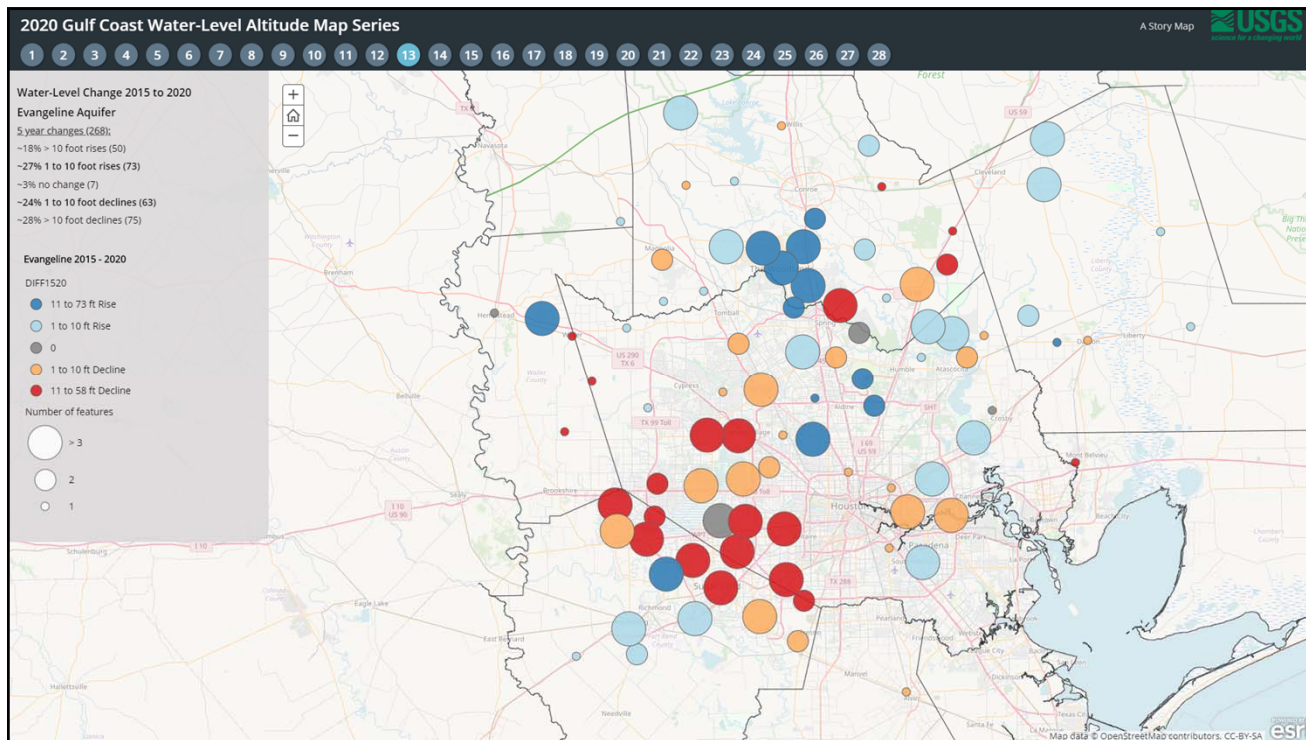
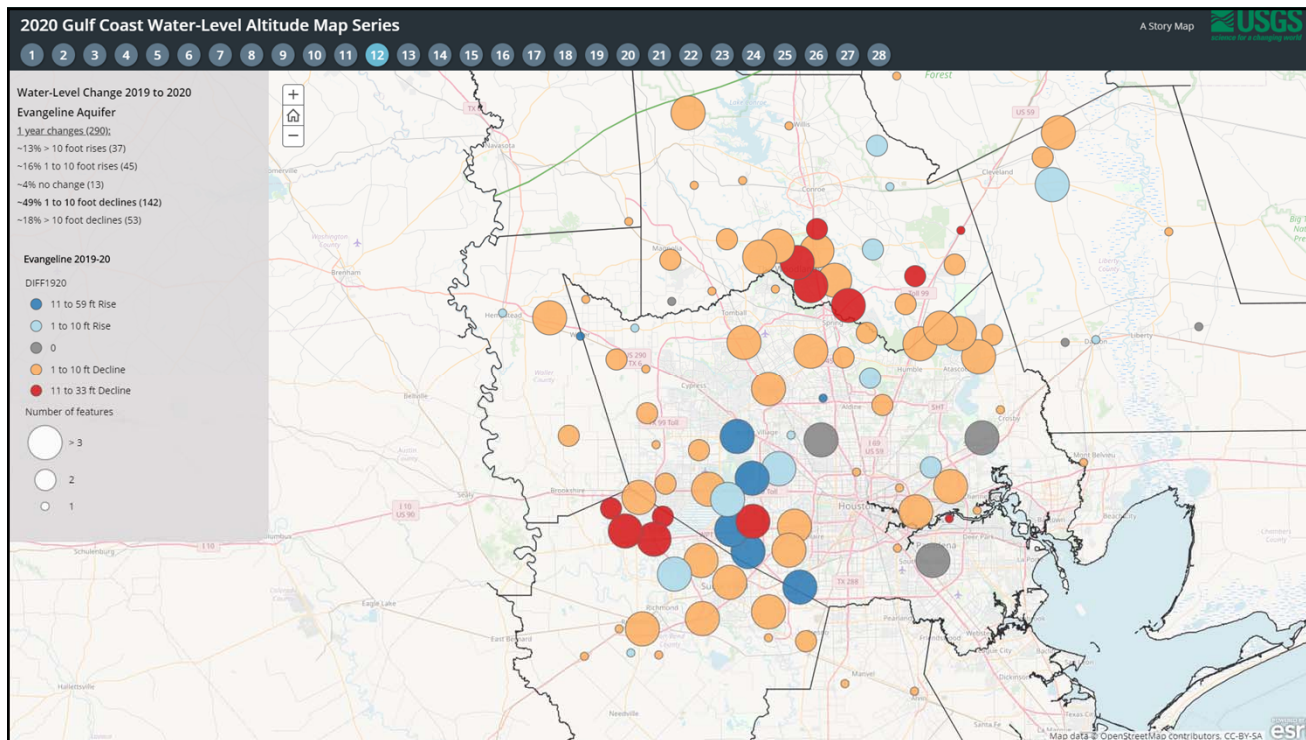


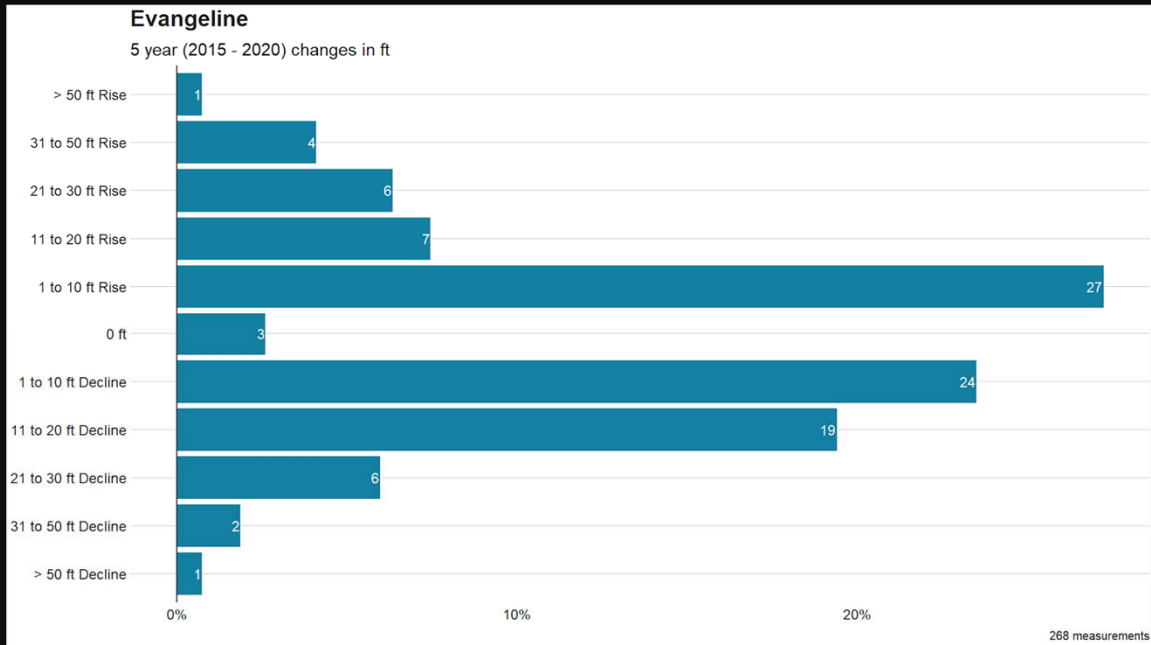
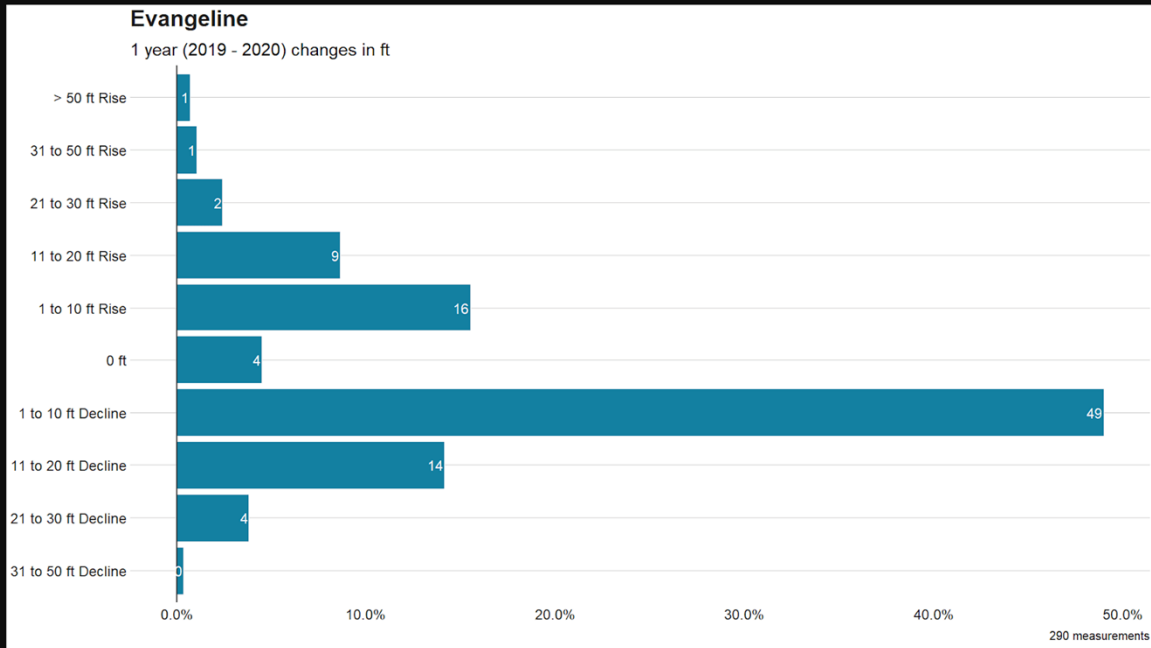


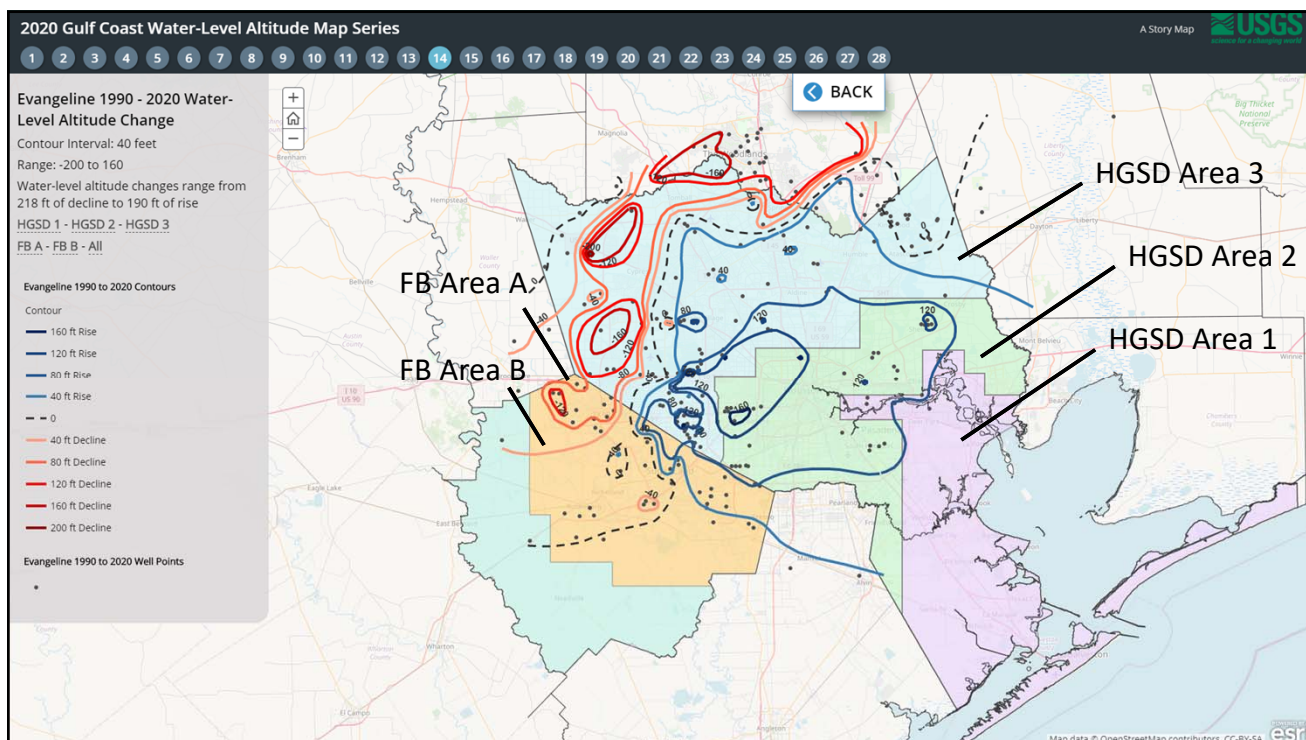
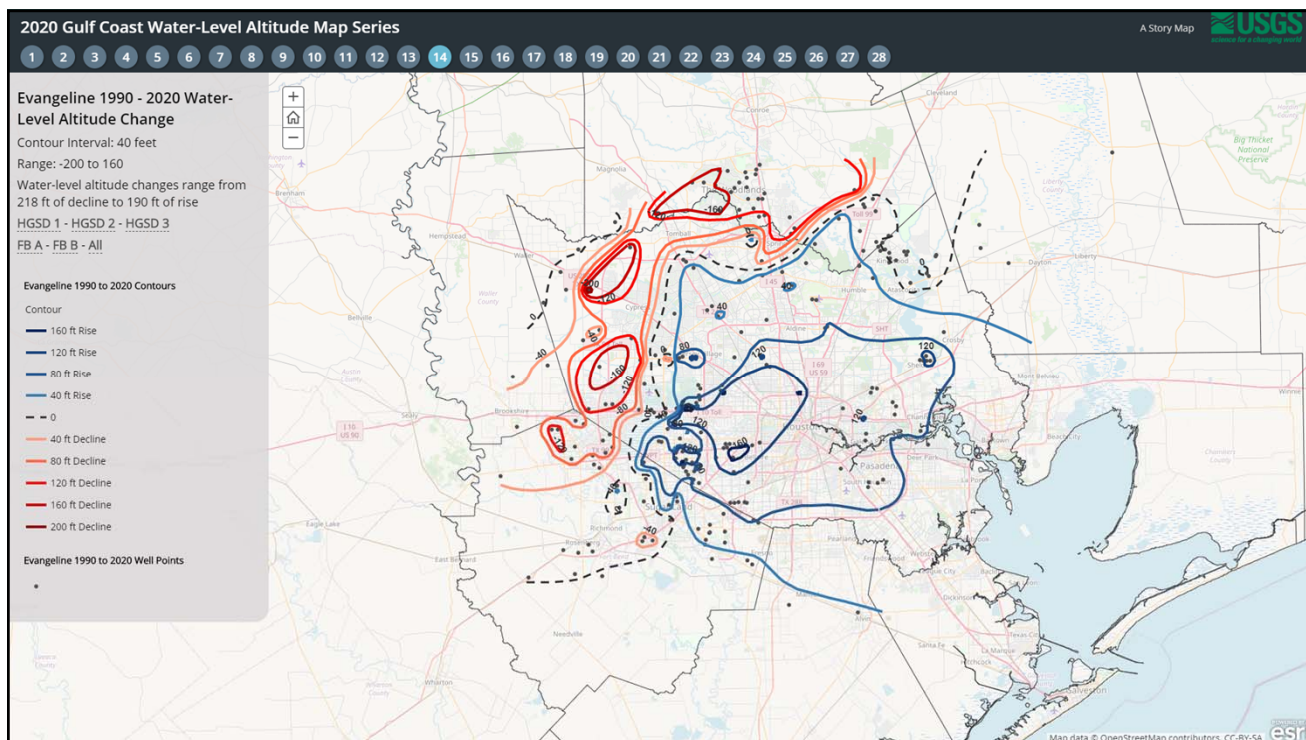


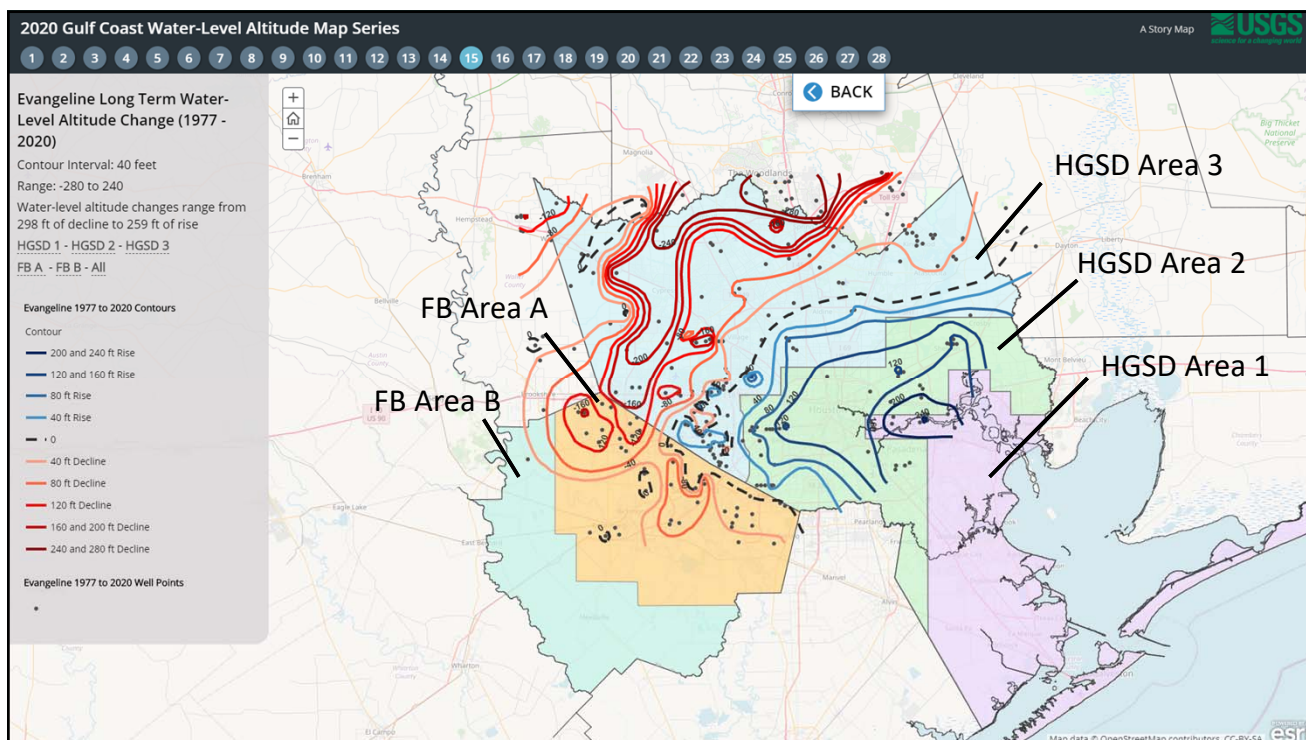
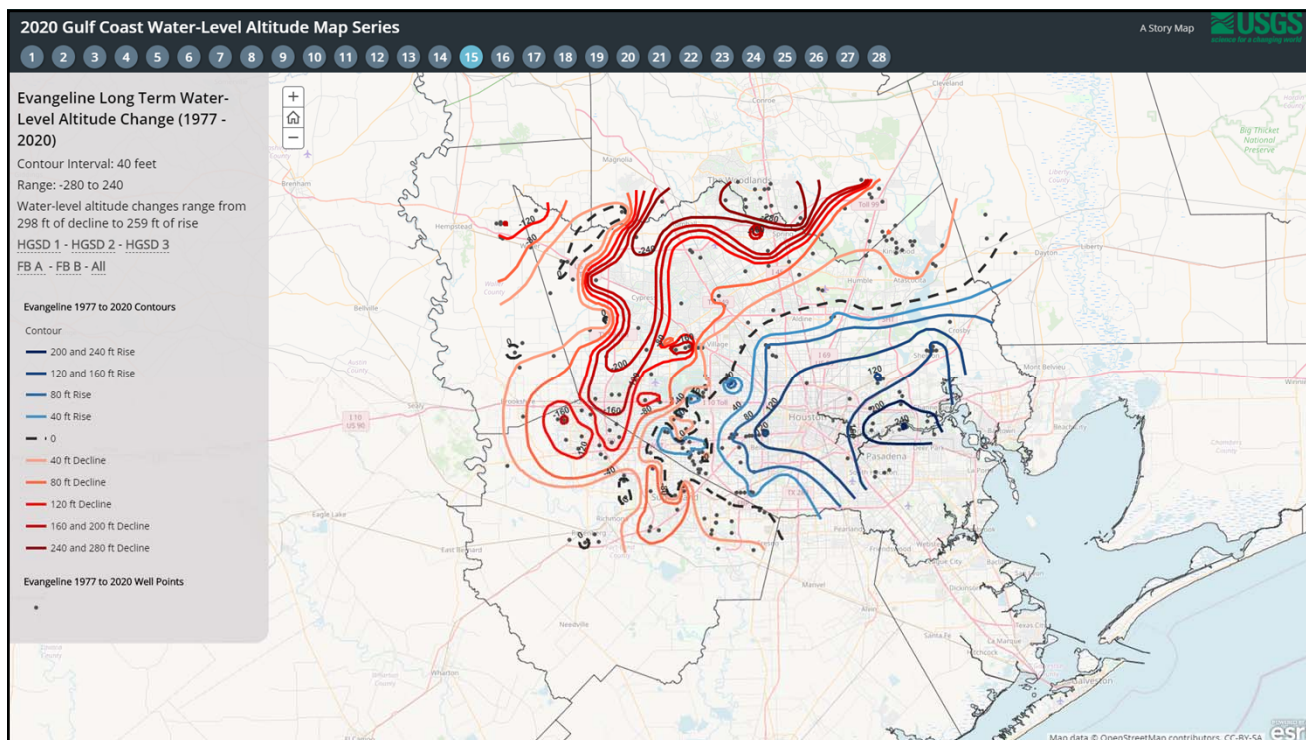


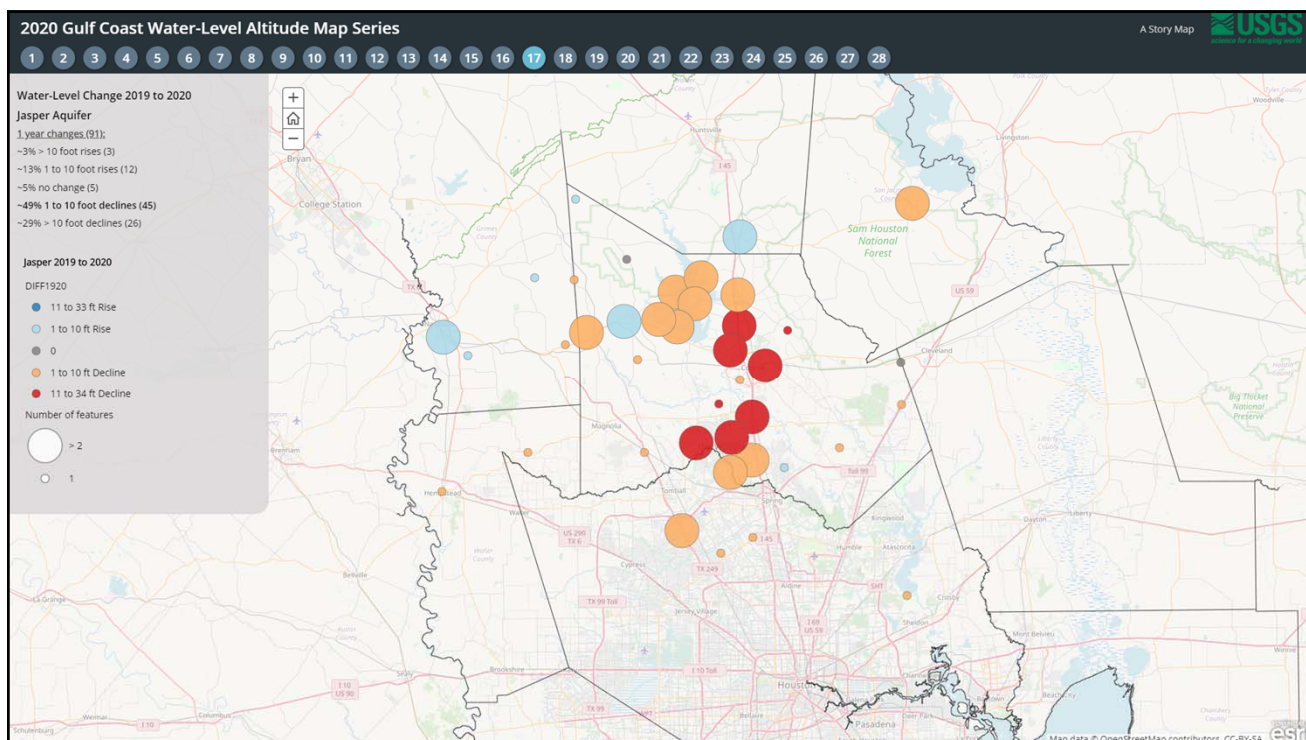
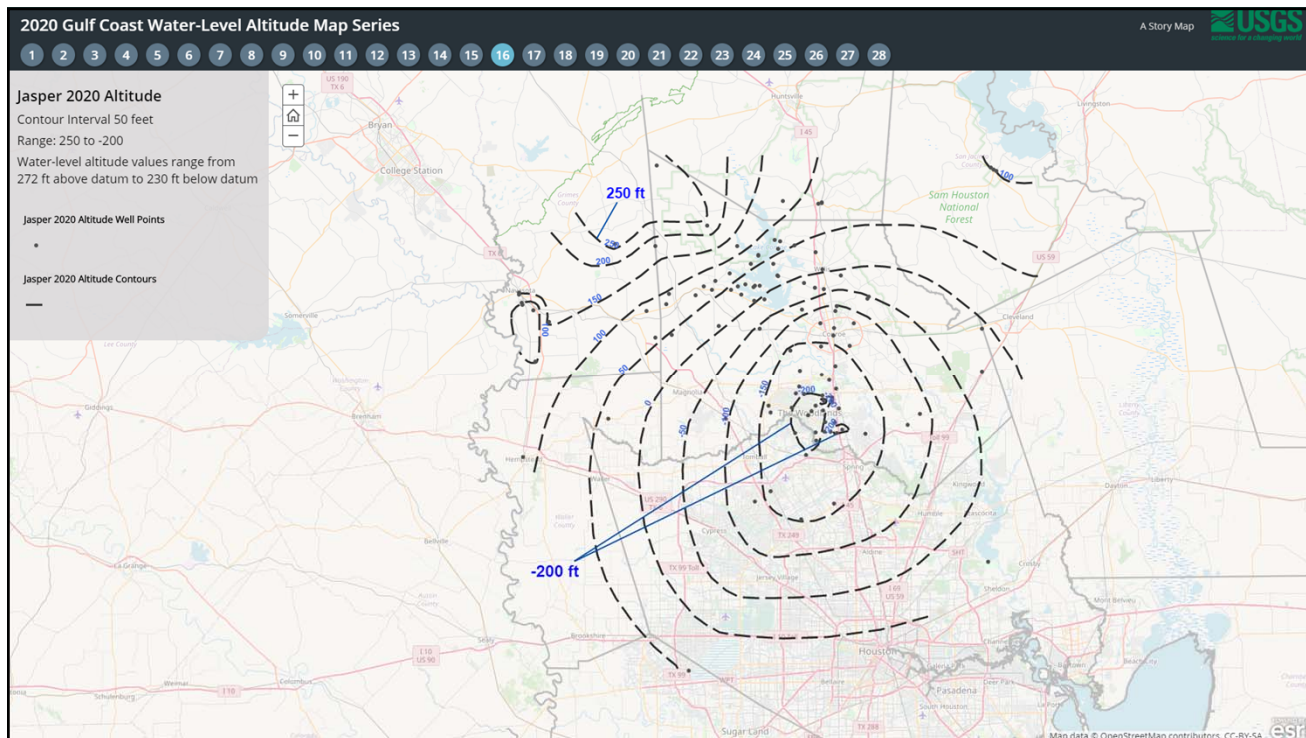


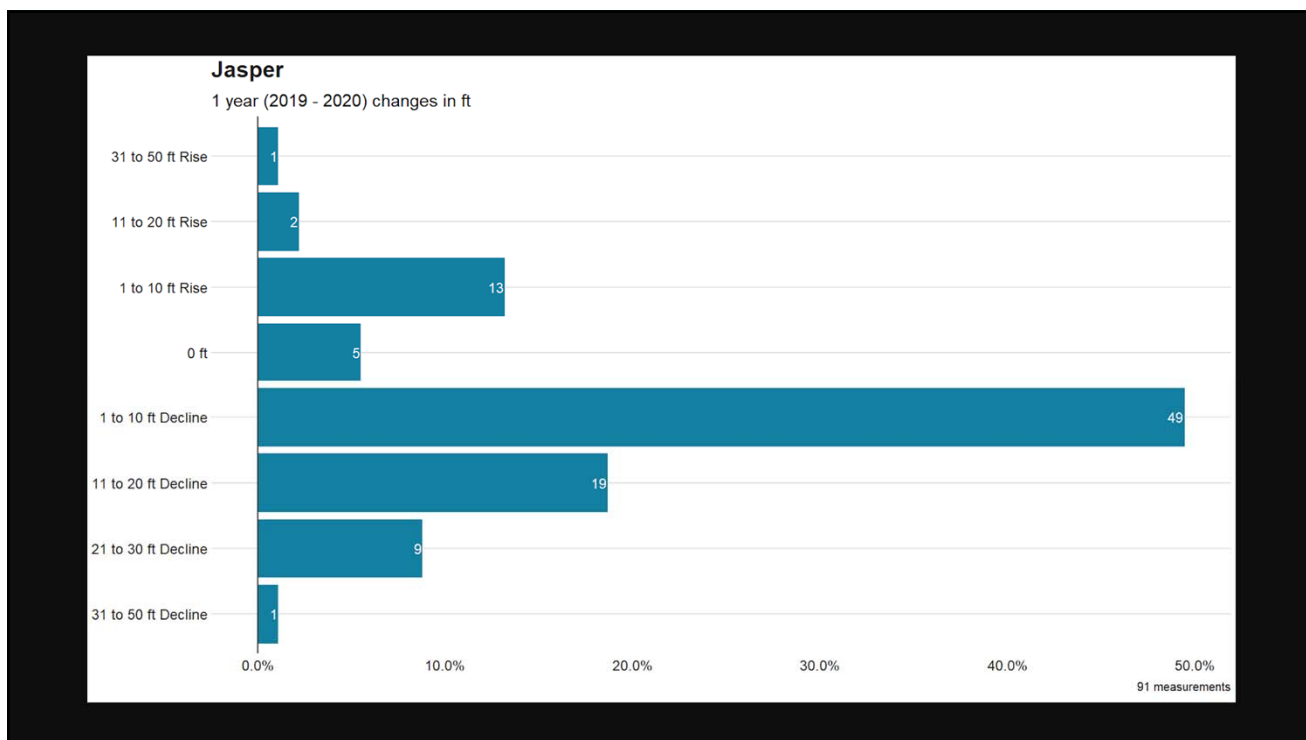
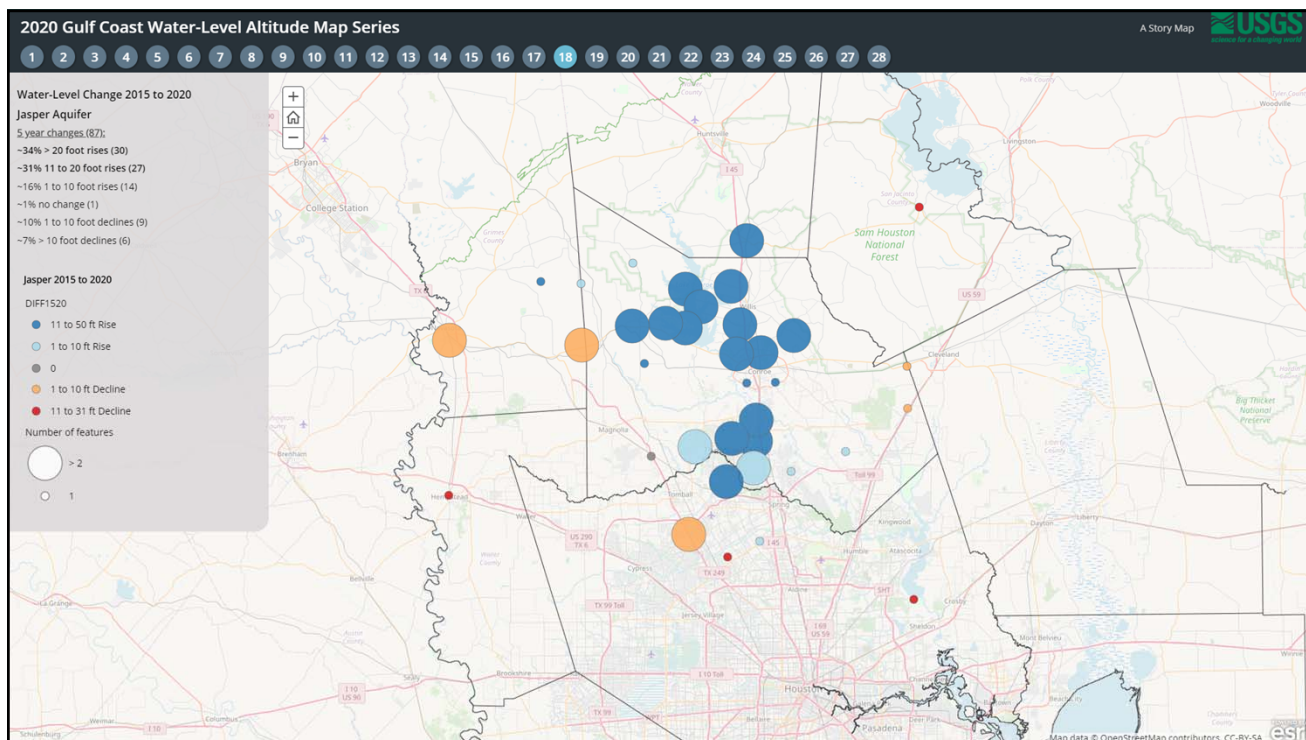


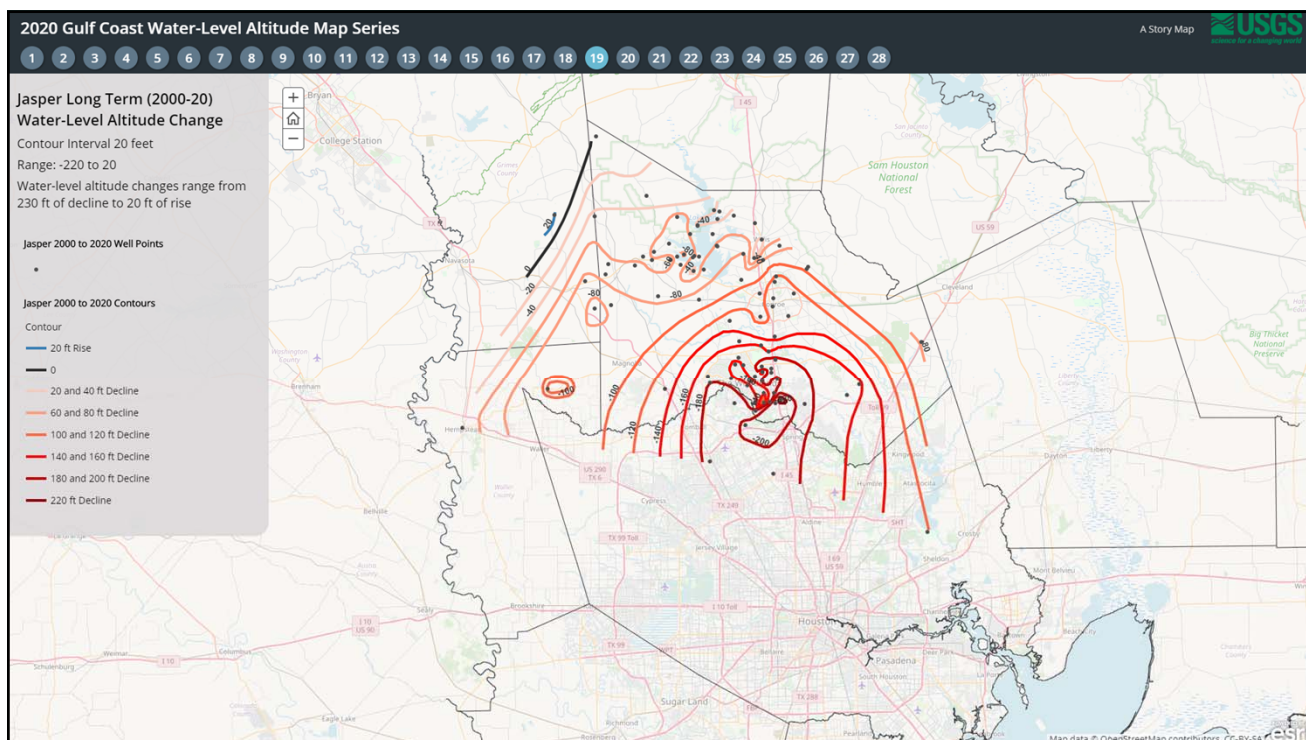
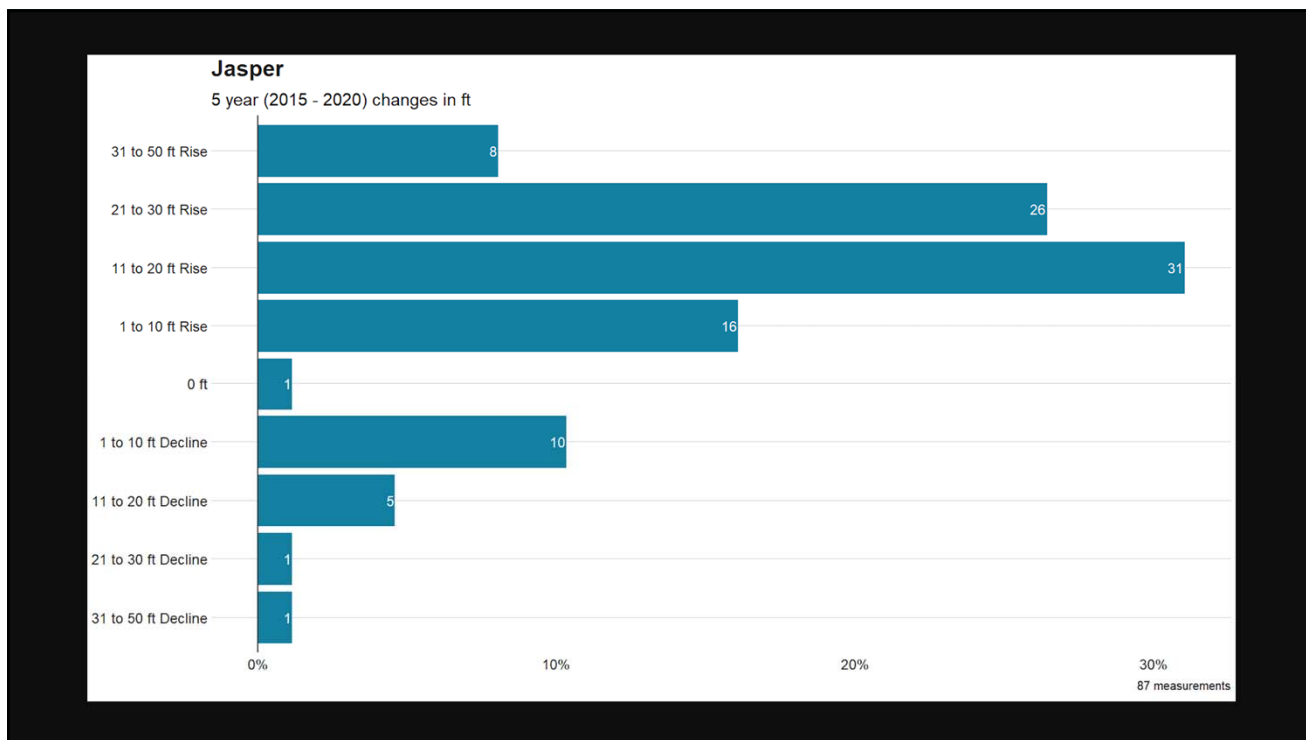












Summary: Groundwater levels



1 year changes (2019 to 2020)

- *Chicot*: about 41% **declines** in the 1 to 10 ft range
- *Evangeline*: about 49% **declines** in the 1 to 10 ft range
- *Jasper*: about 49% **declines** in the 1 to 10 ft range

5 year changes (2015 to 2020)

- *Chicot*: about 57% **rises** in the 1 to 10 ft range
- *Evangeline*: about 27% **rises** in the 1 to 10 ft range and about 24% **declines** in the 1 to 10 ft range
- *Jasper*: about 65% greater than 10 feet of **rise**



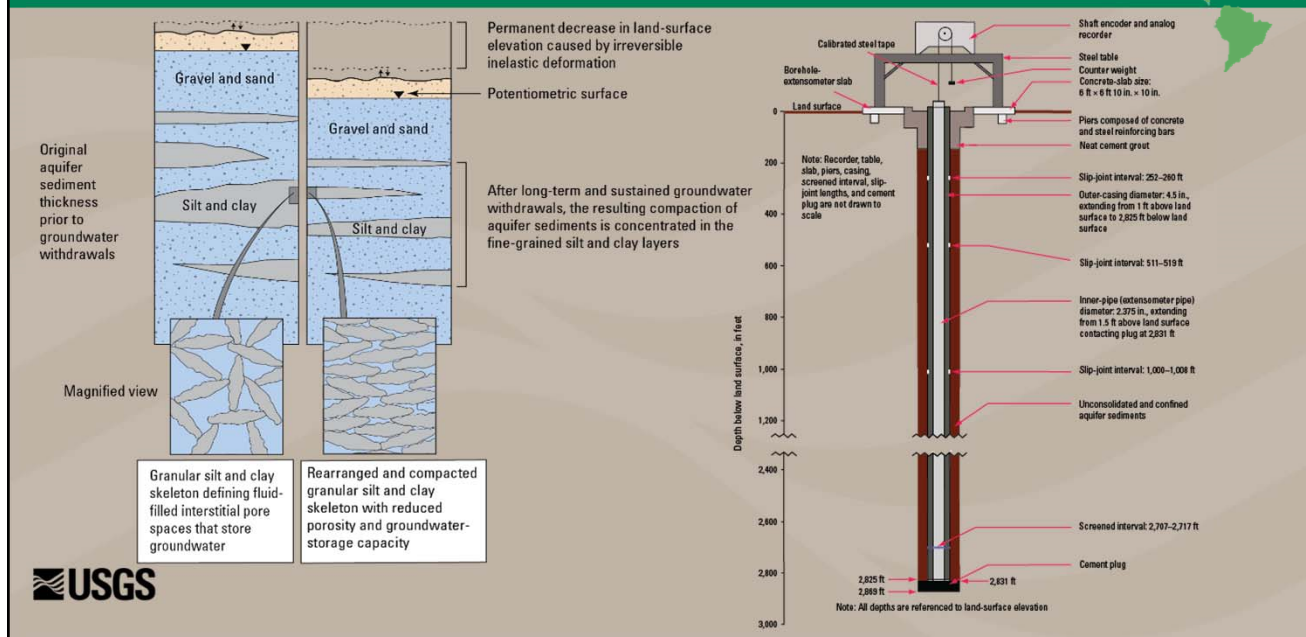
Summary: Groundwater levels (cont.)



- Chicot water-level altitudes since 1990 and 1977 show mostly **rises** (~64% and ~64%)
- Evangeline water-level altitudes since 1990 indicate mostly **rises** – (~62%)
- Evangeline water-level altitudes since 1977 indicate mostly (~66%) **declines**
- Over the period of 2000 to 2020, about 99% of water-level altitudes in the Jasper aquifer have **declined**.



Mechanism of Compaction and Method of Measurement



2020 Gulf Coast Water-Level Altitude Map Series

A Story Map



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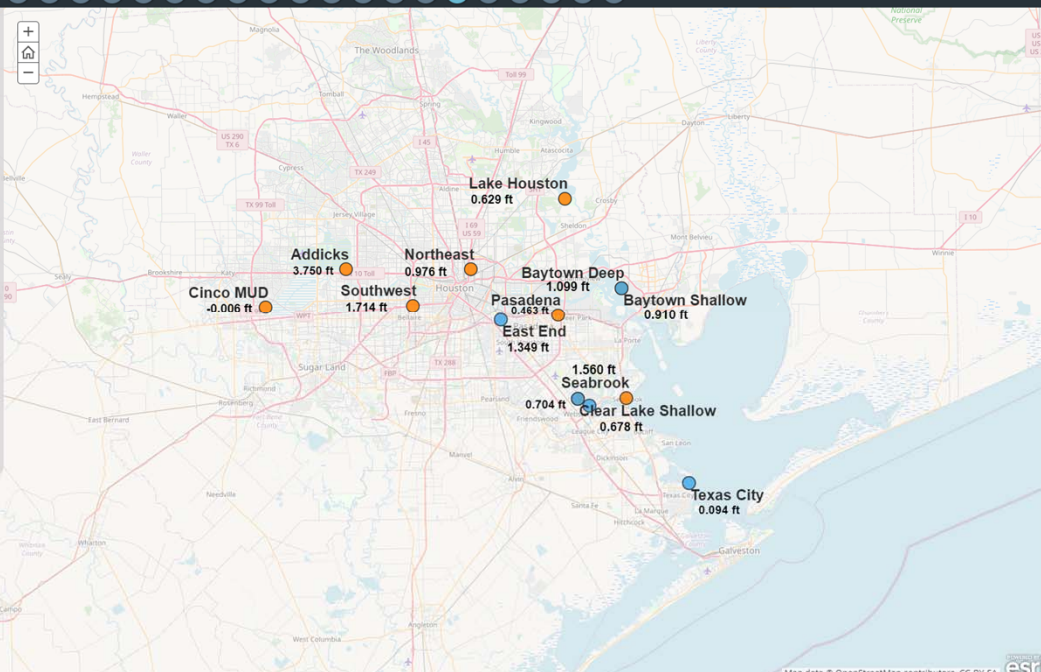
Cumulative compaction values in feet

- Addicks - 3.750
- Baytown Deep - 1.100
- Baytown Shallow - 0.910
- Clear Lake Deep - 0.704
- Clear Lake Shallow - 0.678
- East End - 1.350
- Johnson SC - 2.570
- Lake Houston - 0.629
- Northeast - 0.976
- Pasadena - 0.463
- Seabrook - 1.560
- Southwest - 1.710
- Texas City - 0.094
- Cinco MUD - -0.006

Chicot Compaction Monitors

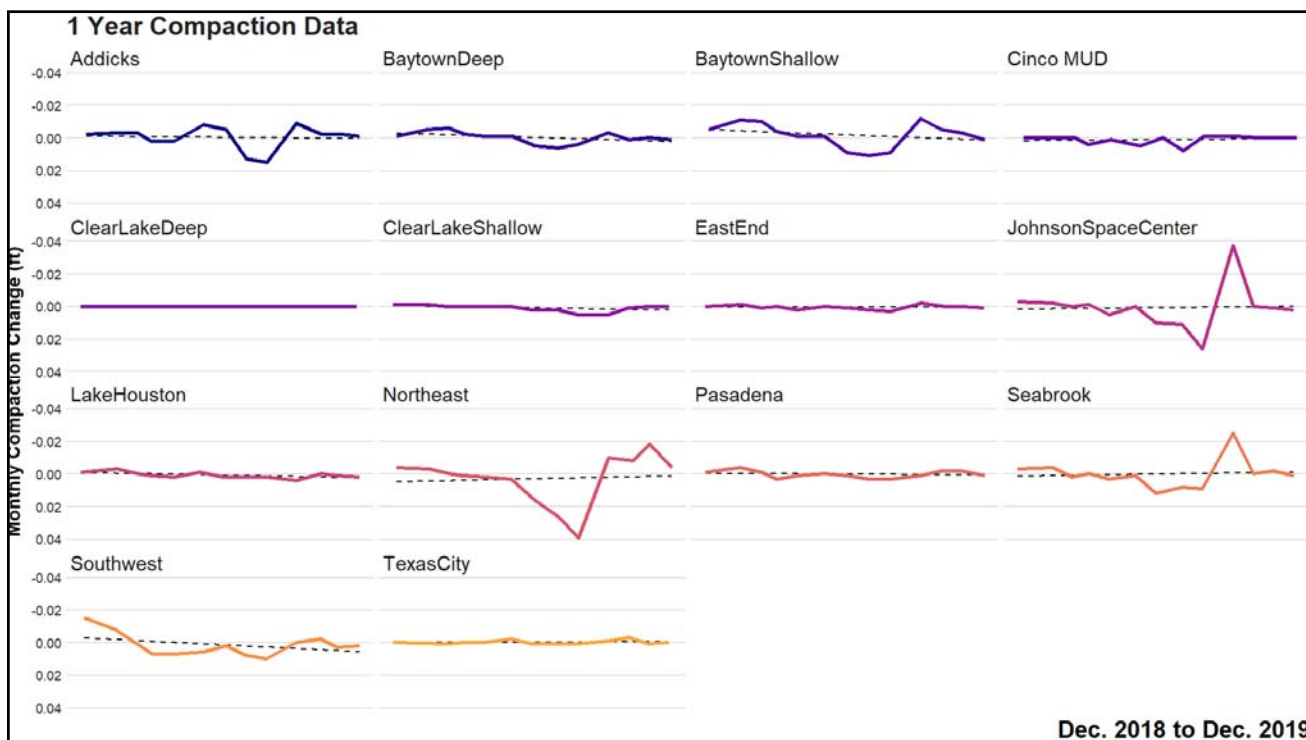
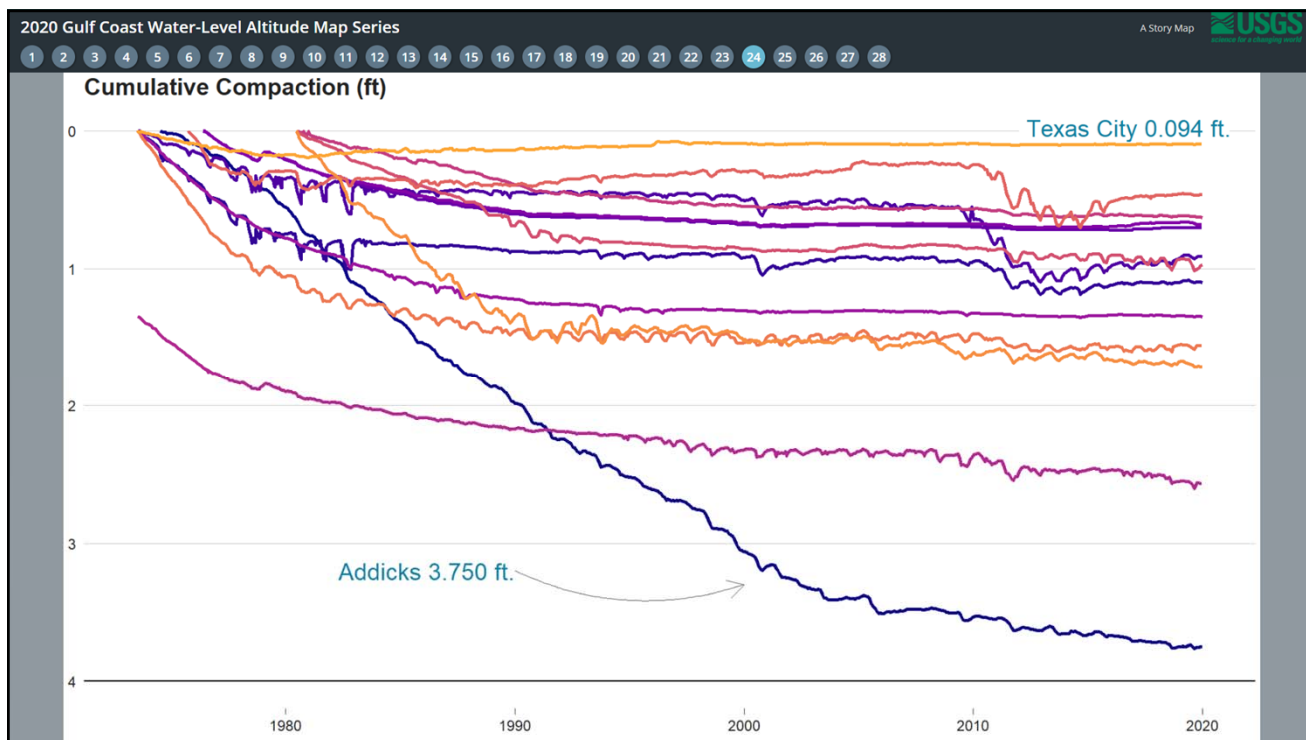


Chicot and Evangeline Compaction Monitors



Map data © OpenStreetMap contributors, CC-BY-SA







Summary: Compaction

For the Period December 2018 through December 2019

- Four (4) sites recorded uplift ranging from 0.001 ft to 0.017 ft.
- Nine (9) sites recorded compaction ranging from 0.004 ft to 0.044 ft.
- One (1) compaction site recorded no change



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