



2025 Spring Static Water Level Monitoring Program



2025 Static Water Level Summary

LLNRD staff collected static water levels (SWL) on 454 irrigation and monitoring wells from March 17 to April 4, 2025. 450 of these wells were measured in both 2024 and 2025. Compared to spring 2024, 216 wells (48%) reported a decline in water levels, with an average change of -0.89 ft. 231 wells (51.33%) had a higher water level reading compared to spring 2024, with an average change of 0.90 ft. Three wells (0.007%) reported no change from spring 2024. Overall, this is a 00.37 ft average SWL increase.

Eight counties averaged a positive SWL change and the remaining seven decreased on average. Merrick County reported a 100% increase (5/5 wells). Buffalo (18/21), Garfield (15/19), Loup (13/16), Rock (14/14), and Wheeler (24/29) Counties all showed declining SWL at 79% or greater of wells measured. No measurements were taken in Hall County while only one measurement was taken in Butler County (an increase). The LLNRD's well in Logan County, right outside of the district, decreased. The largest single well decline was -7.62 ft in Greeley County and the largest single well increase was 8.52 ft in Merrick County.

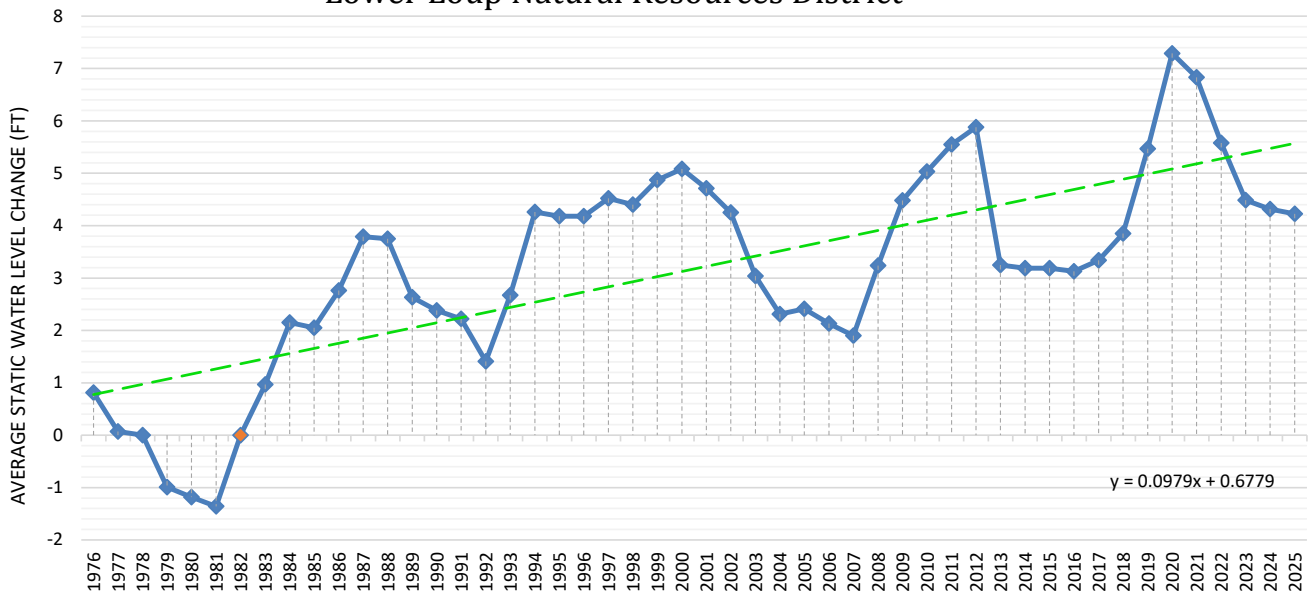
165 SWL locations measured in Spring 2025 have a historical record dating back to 1982, the baseline date for water level comparisons per the LLNRD Groundwater Management Plan. The largest concentration of decreasing water levels continues to be found south of the Loup River as well as in Buffalo and southern Custer Counties, south of the South Loup River. The largest decrease in water level between 1982 and 2025 is -10.47 ft in Custer County. Increases in water levels continue in the North Loup River Groundwater Transfer Basin where recharge from existing canals and surface water irrigation is abundant. The largest SWL increase from 1982 to 2025 is +37.85 ft in Valley County.

In the district-wide *Trend* map, SWL measurement locations that did not report at least 8 readings (Spring and Fall) in the last 5 years (Spring 2019 through Spring 2024) were not included in interpolation analyses. For both *Static Water Level Change* and *Trend* maps, the inverse distance weighted (IDW) spatial interpolation method was used with default GIS settings. IDW assumes that wells close to one another have more similarities than those that are farther apart. The area between the two measured points is assigned a value based on the trends calculated on all other wells in proximity. The software used for all maps in this report was Esri ArcGIS Pro v3.4.3 with the Spatial Analyst extension.

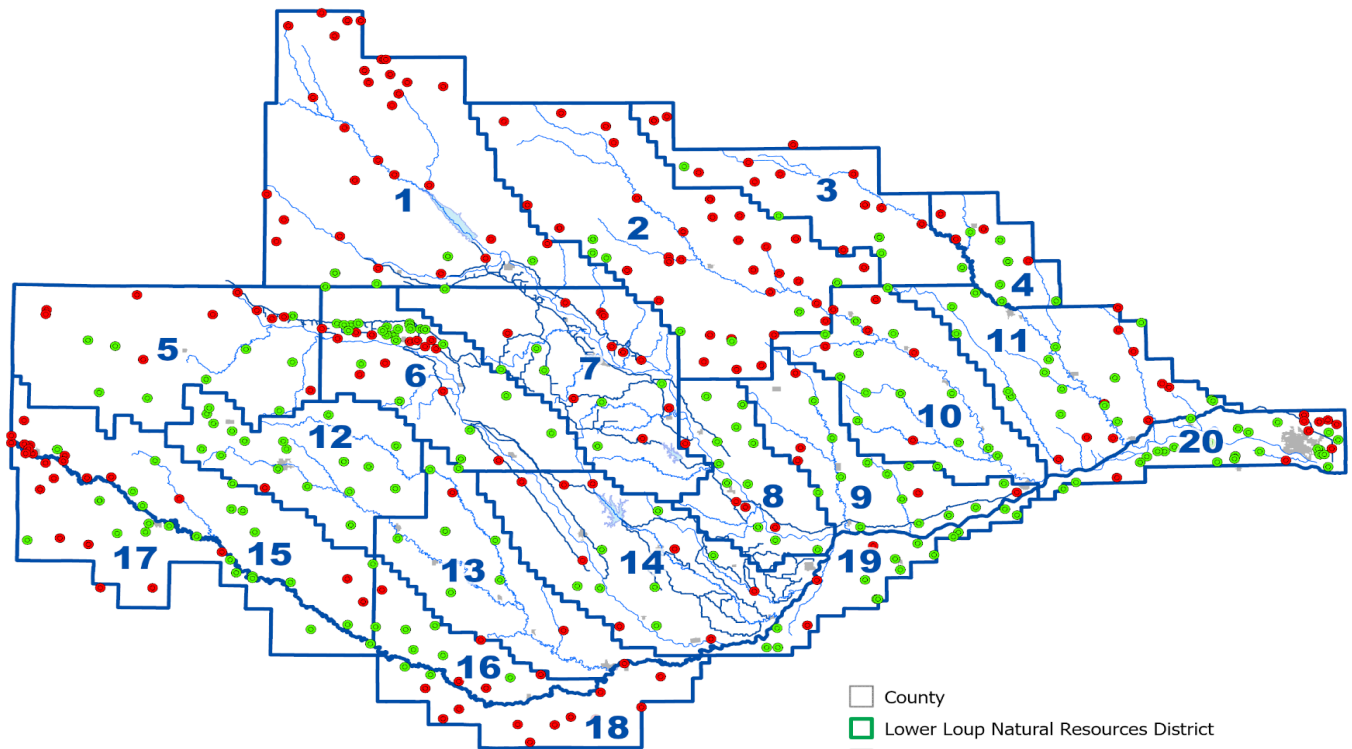
In the *Static Water Level Change [All/number] Years* maps, negative values indicate that the groundwater level has gone down. The *Static Water Level Trend All Years* map represents the linear regression coefficient from the observed depth to SWL measurements plotted back to spring 1982 as a zero-baseline or when data is first available. Negative trend values indicate a decrease in depth to water, which is an increase in water level over time. Trend values show an expected water level increase or decrease in feet.

These district-wide maps are further broken down to show change and trend by county and Quantity Area. 20 Quantity Areas were established in 2023 by the LLNRD Board of Directors from the previous 10 Groundwater Quantity Management Areas. These larger scale maps utilize all 454 measurements available in 2025 to show individual changes in measurement sites between spring 2024 and spring 2025 and trend graphs going back to the baseline 1982 measurement and earlier where data is available.

District-Wide Spring SWL Change Lower Loup Natural Resources District



The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

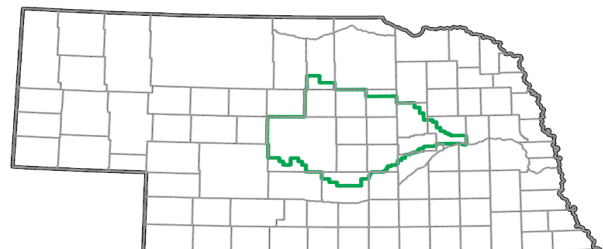


Static Water Level Change

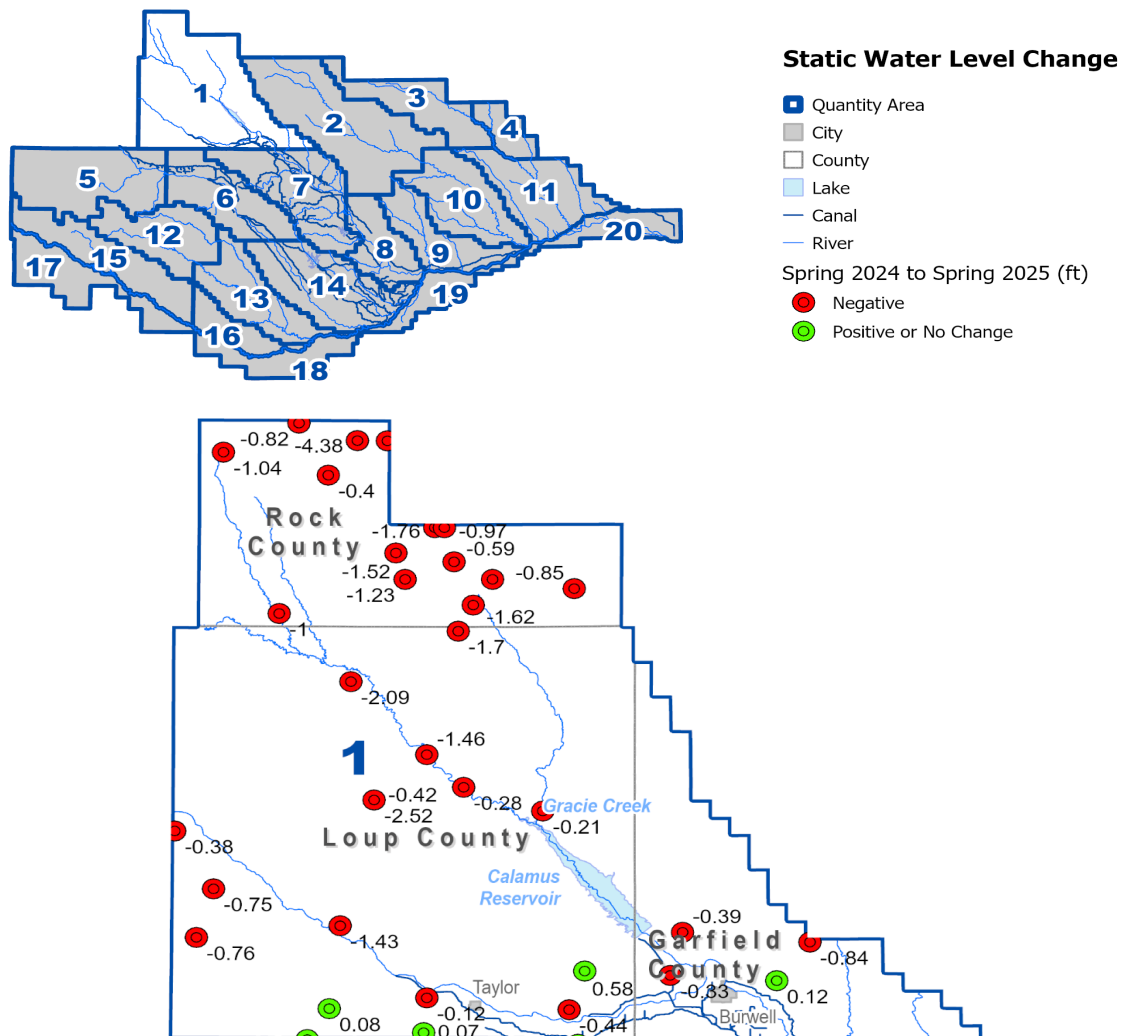
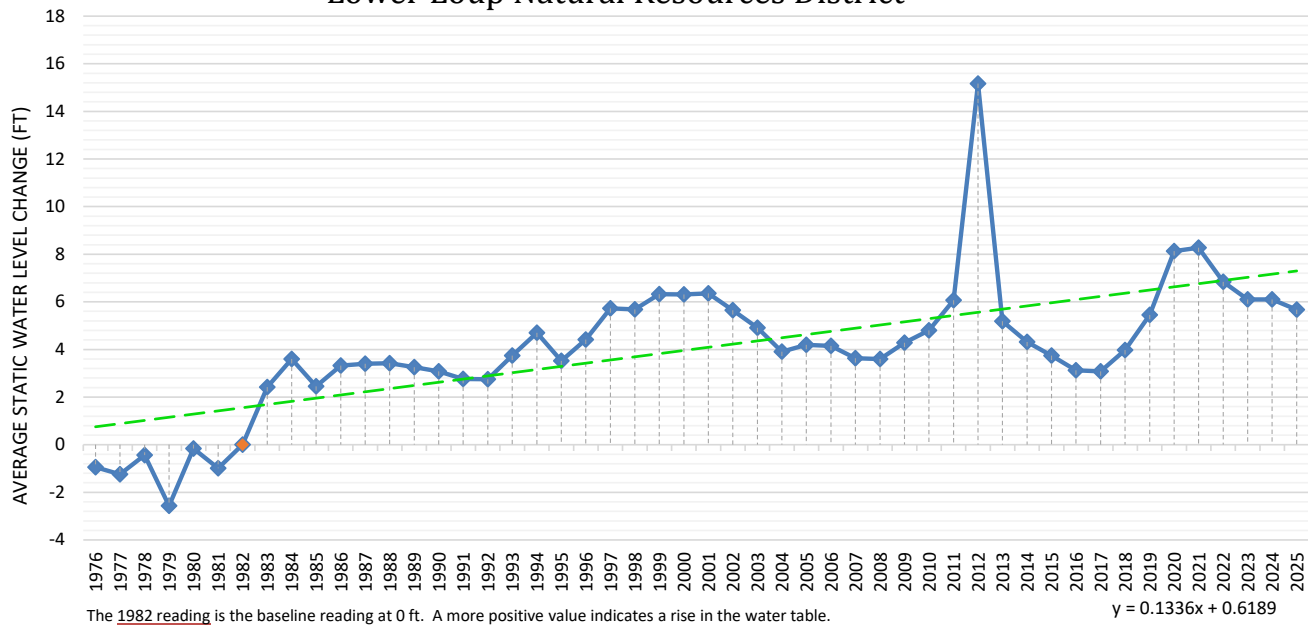
- Quantity Areas
- Lake
- Canal
- River

Spring 2024 to Spring 2025

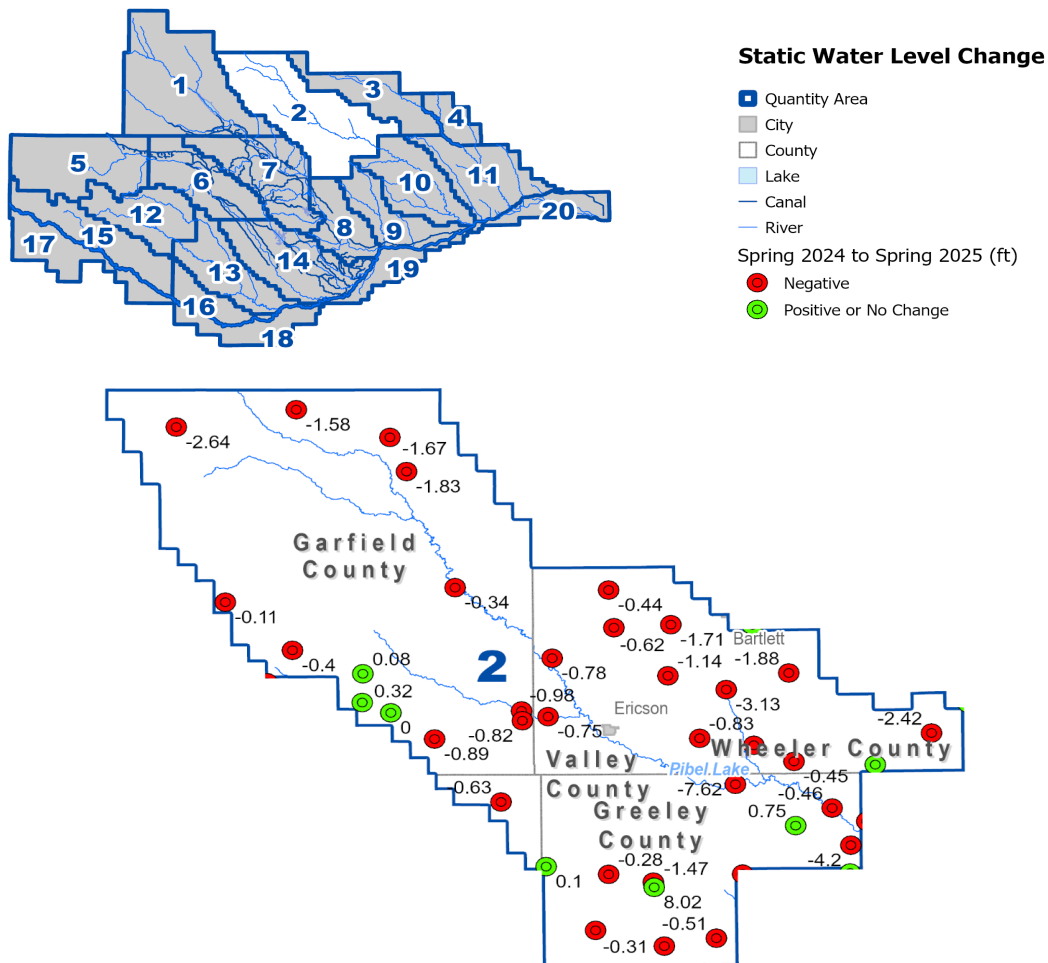
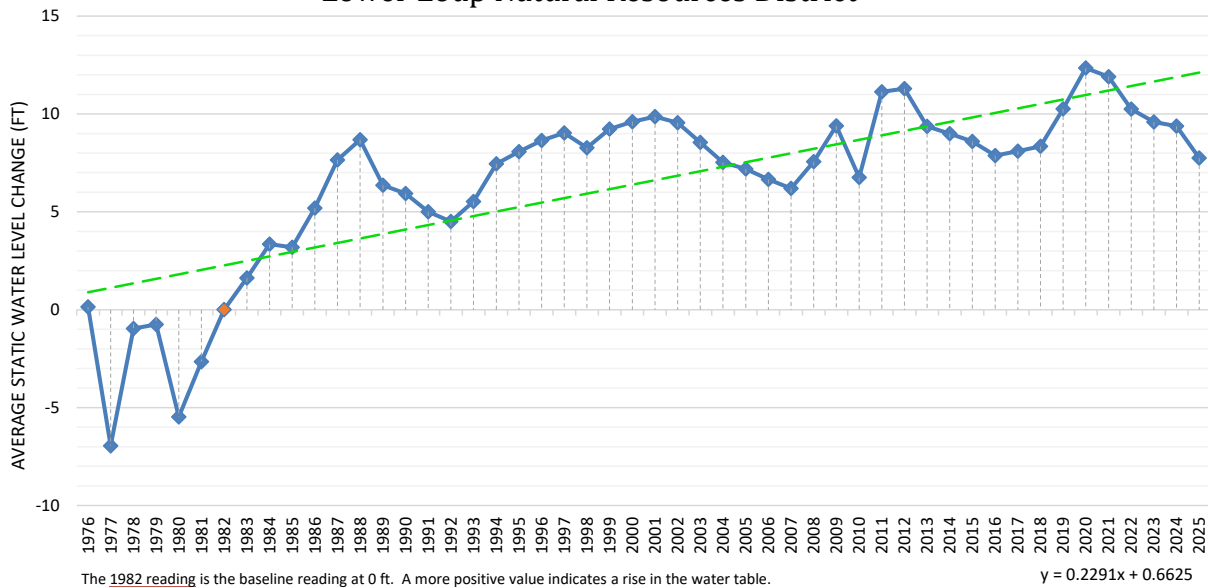
- Negative
- Positive or No Change



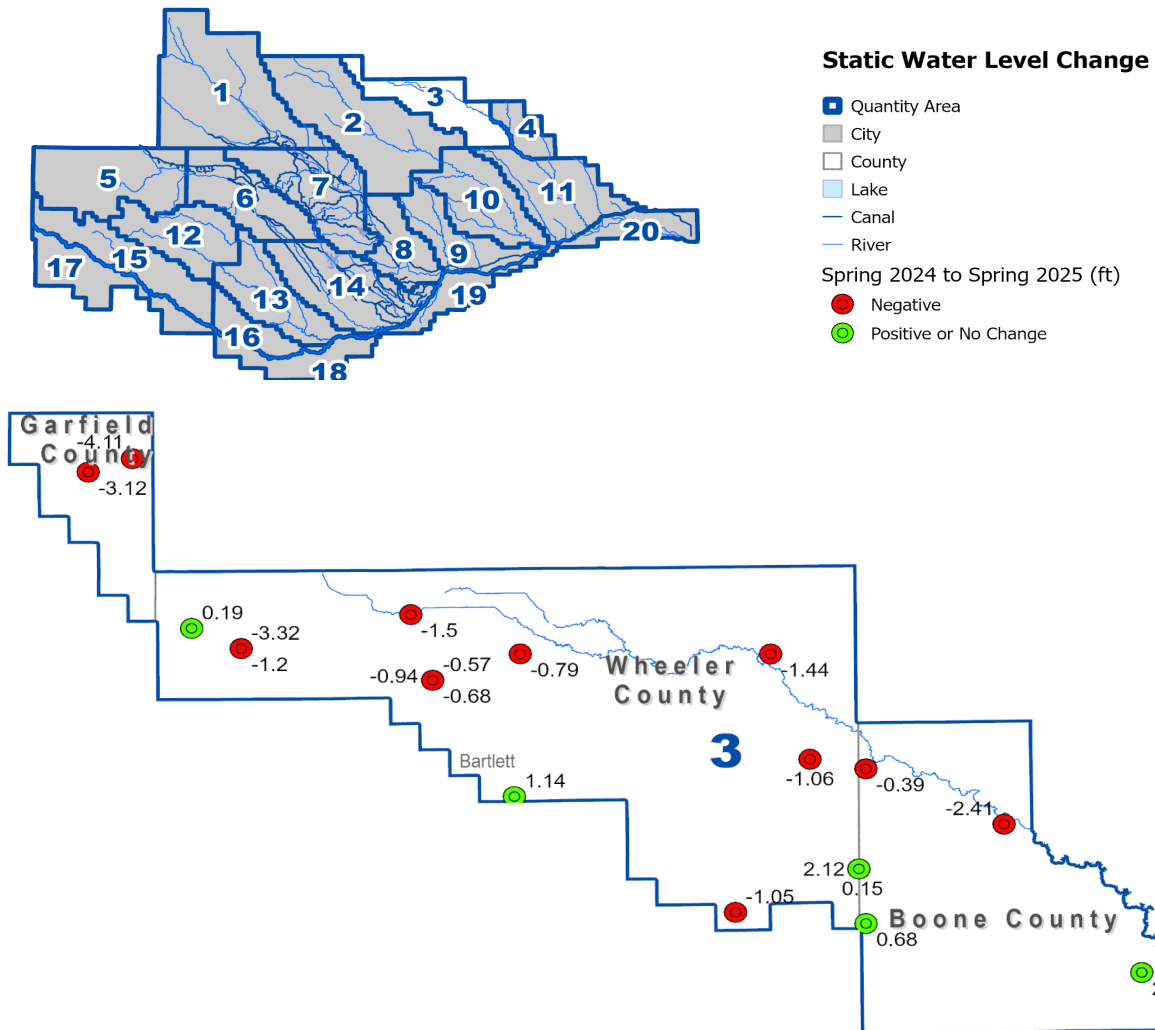
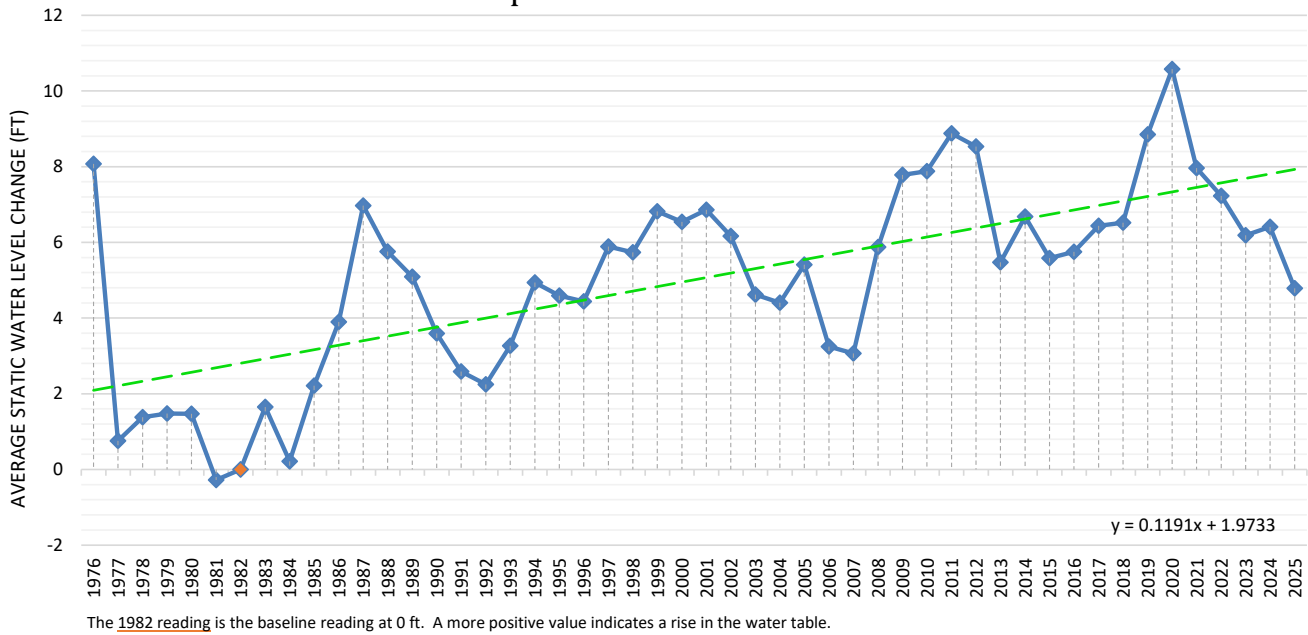
Quantity Area 1 - Spring SWL Change Lower Loup Natural Resources District



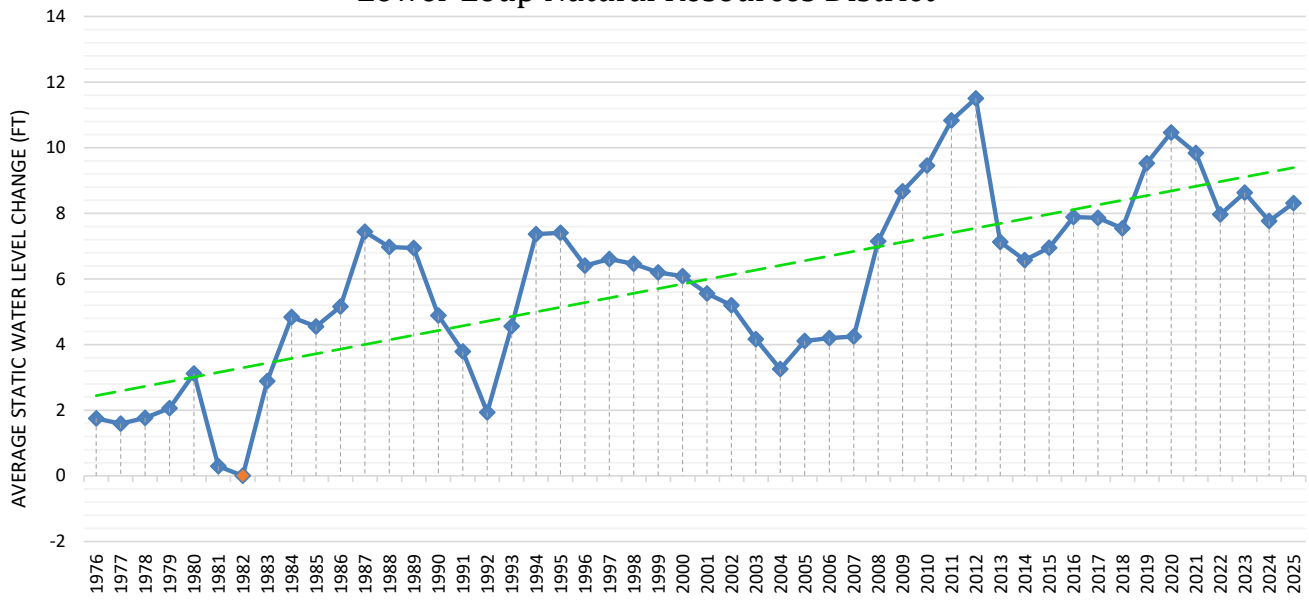
Quantity Area 2 - Spring SWL Change Lower Loup Natural Resources District



Quantity Area 3 - Spring SWL Change Lower Loup Natural Resources District

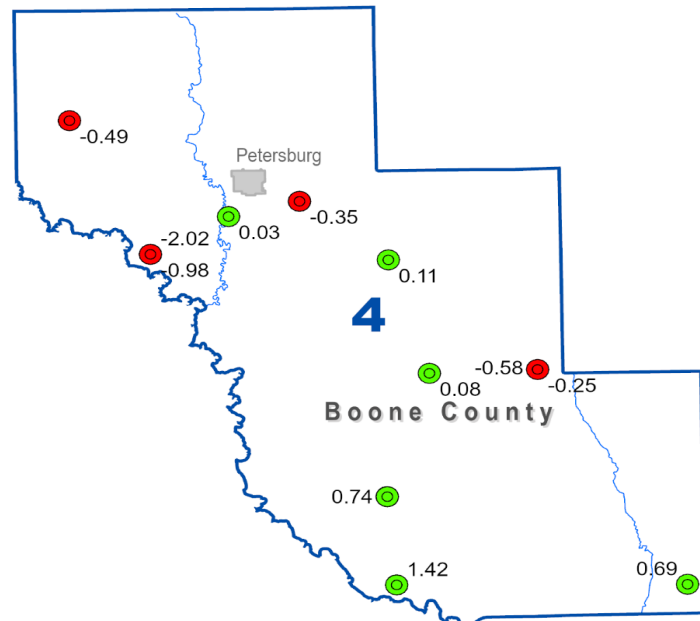
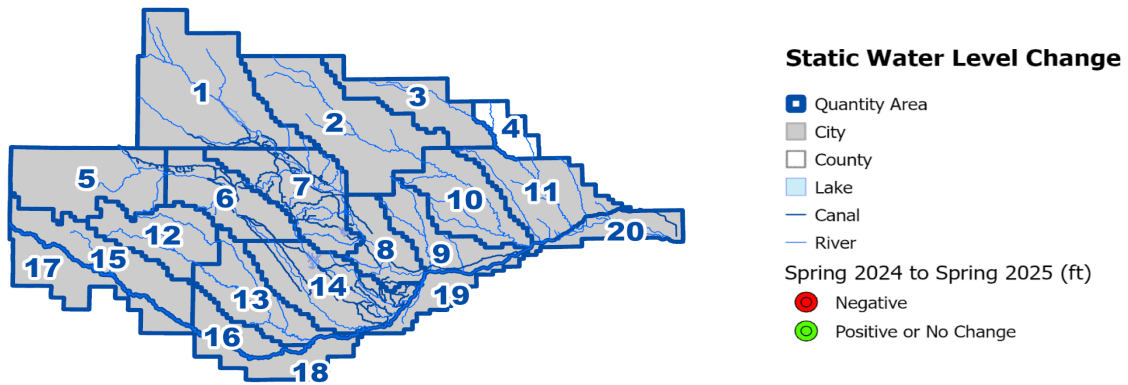


Drought Zone 4 - Spring SWL Change Lower Loup Natural Resources District

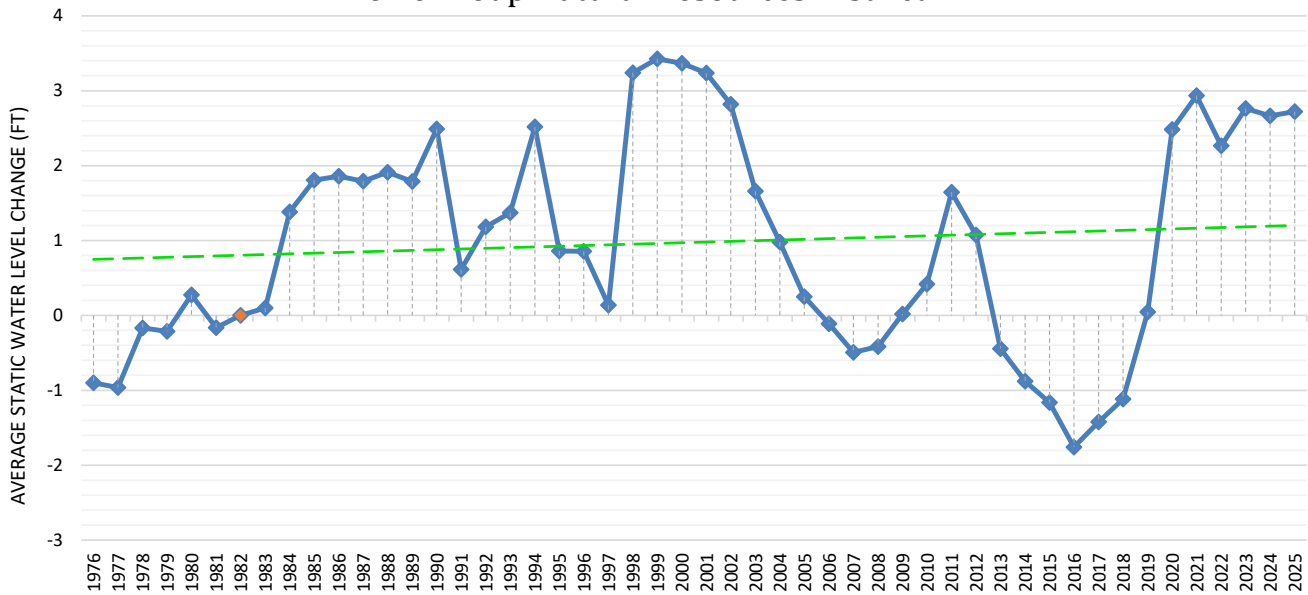


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.1418x + 2.302$$

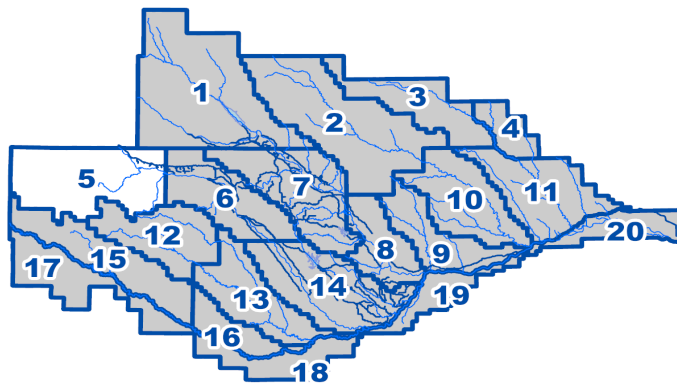


Quantity Area 5 - Spring SWL Change Lower Loup Natural Resources District



The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.0092x + 0.7389$$



Static Water Level Change

Quantity Area

City

County

Lake

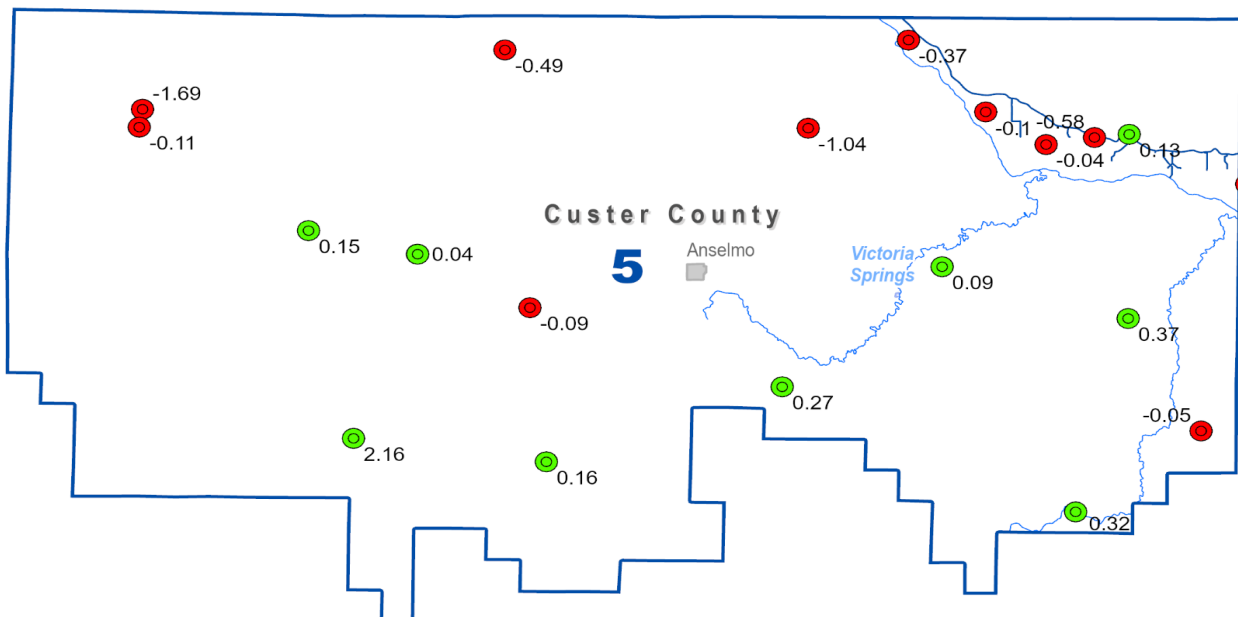
Canal

River

Spring 2024 to Spring 2025 (ft)

Negative

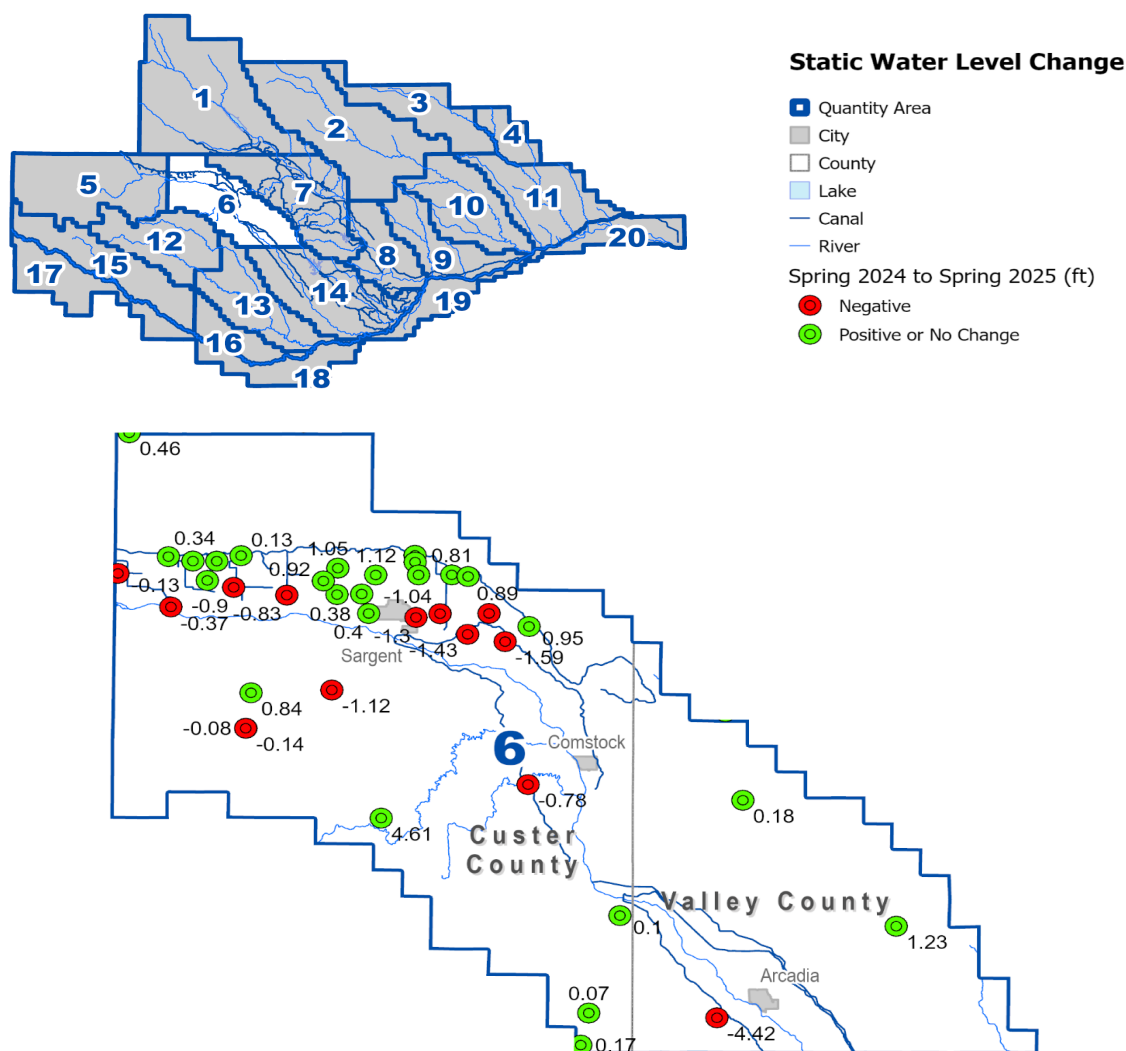
Positive or No Change



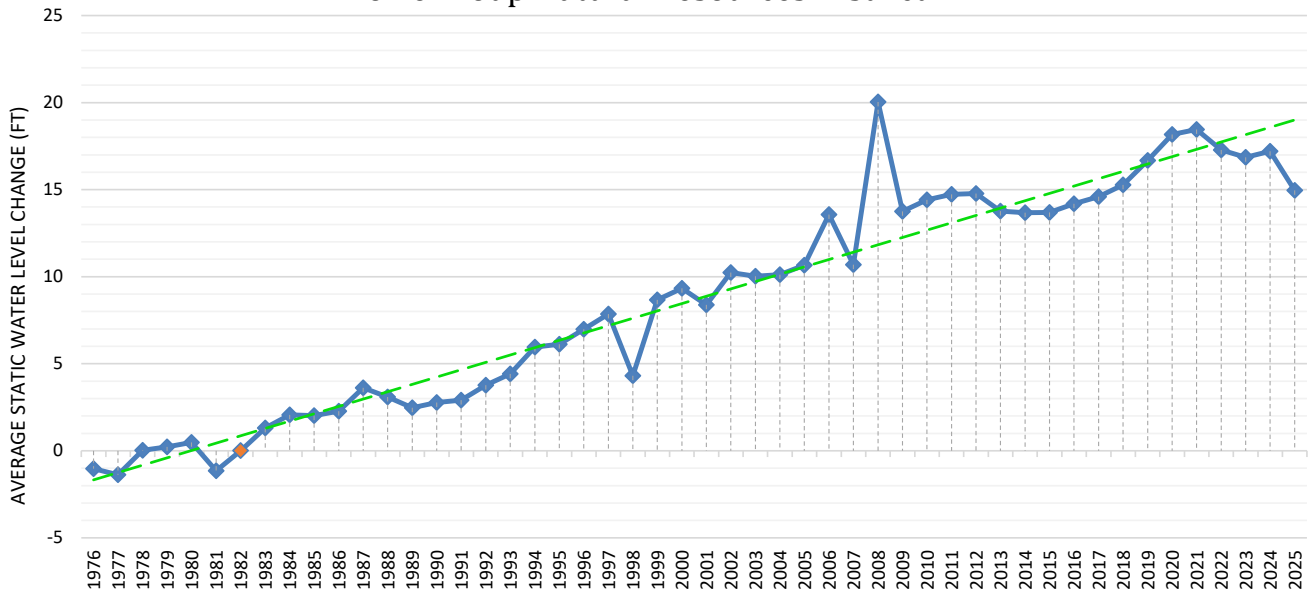
The graph displays the average static water level change in feet over a 50-year period. The blue line shows annual fluctuations, with a notable peak in 2011 and a general upward trend indicated by the green dashed line. The 1982 reading is marked as the baseline (0 ft).

Year	Average Static Water Level Change (ft)
1976	-0.5
1977	-1.0
1978	0.2
1979	-0.2
1980	0.2
1981	-1.0
1982	0.0
1983	0.8
1984	1.6
1985	0.8
1986	1.6
1987	2.0
1988	2.0
1989	1.6
1990	1.2
1991	1.2
1992	3.5
1993	1.4
1994	1.4
1995	1.8
1996	2.2
1997	2.8
1998	2.8
1999	3.0
2000	3.0
2001	3.0
2002	3.0
2003	2.0
2004	1.8
2005	1.6
2006	1.6
2007	0.5
2008	2.5
2009	3.2
2010	3.8
2011	12.2
2012	3.5
2013	2.2
2014	2.2
2015	2.2
2016	1.8
2017	2.5
2018	3.8
2019	5.0
2020	7.0
2021	7.0
2022	6.2
2023	6.6
2024	6.6
2025	7.2

Trend Line Equation: $y = 0.123x - 0.4618$

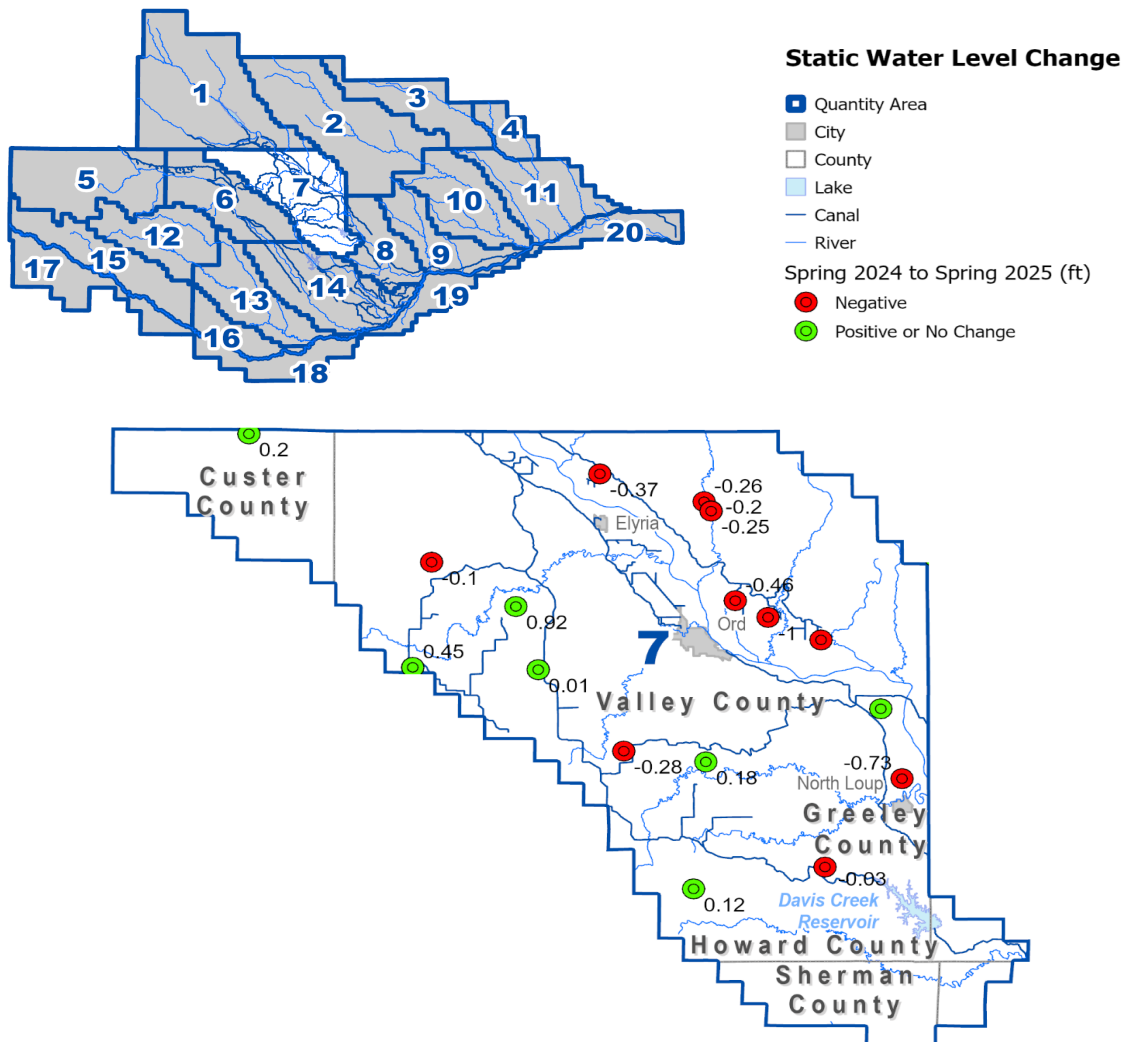


Quantity Area 7 - Spring SWL Change Lower Loup Natural Resources District

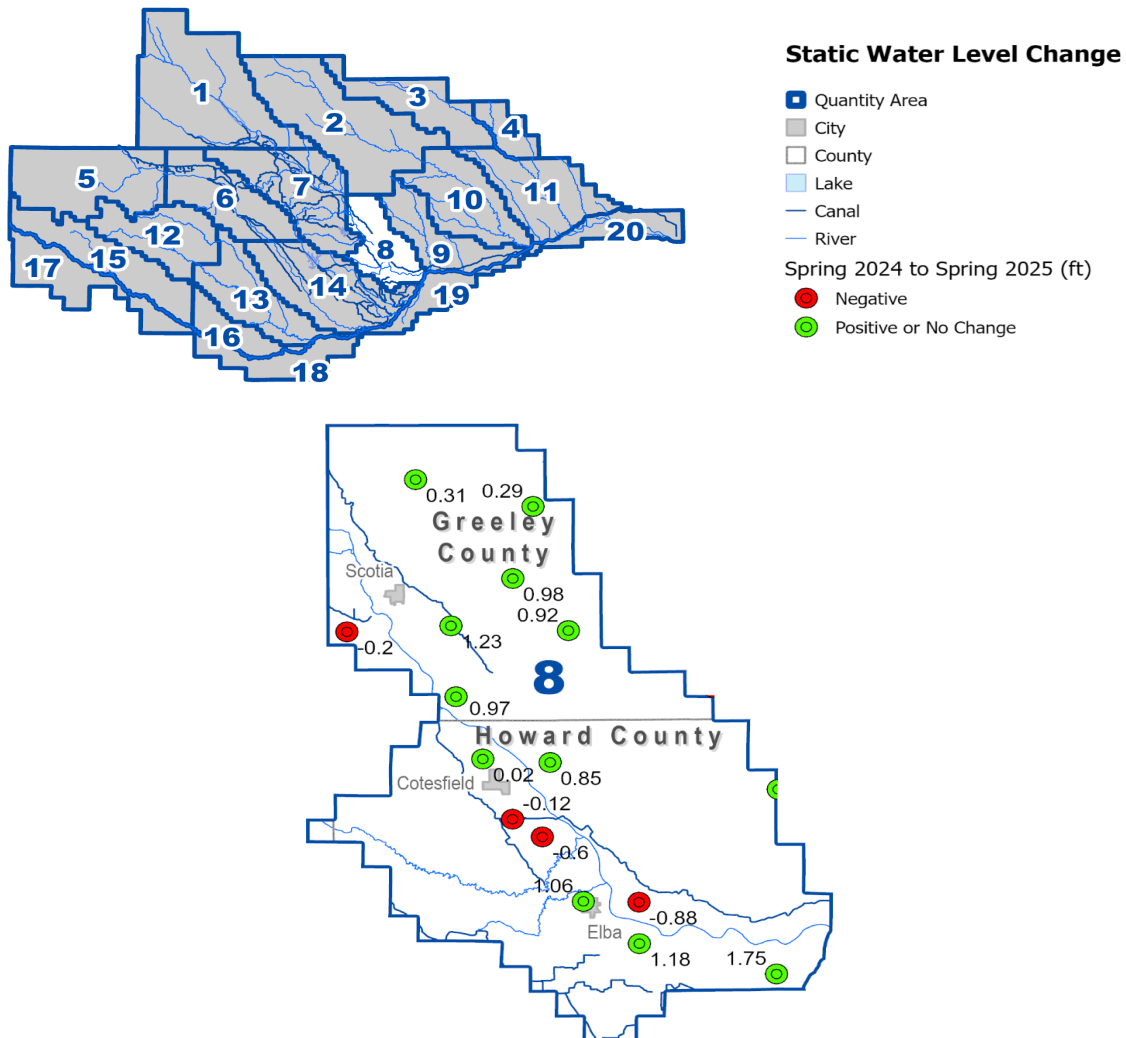
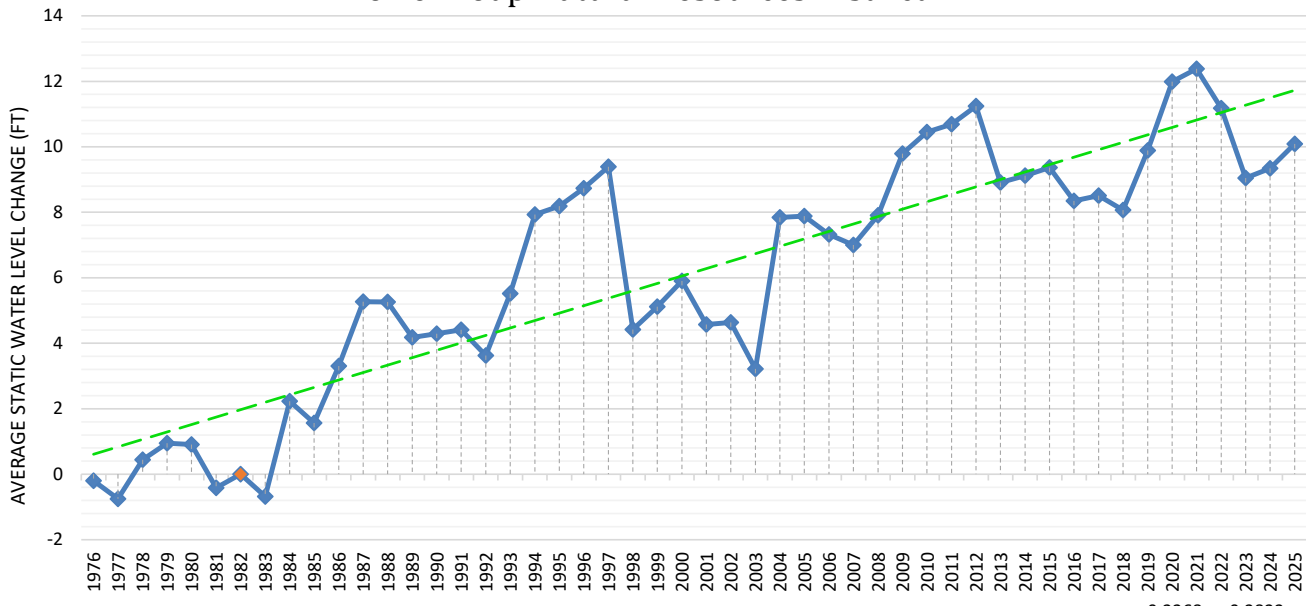


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

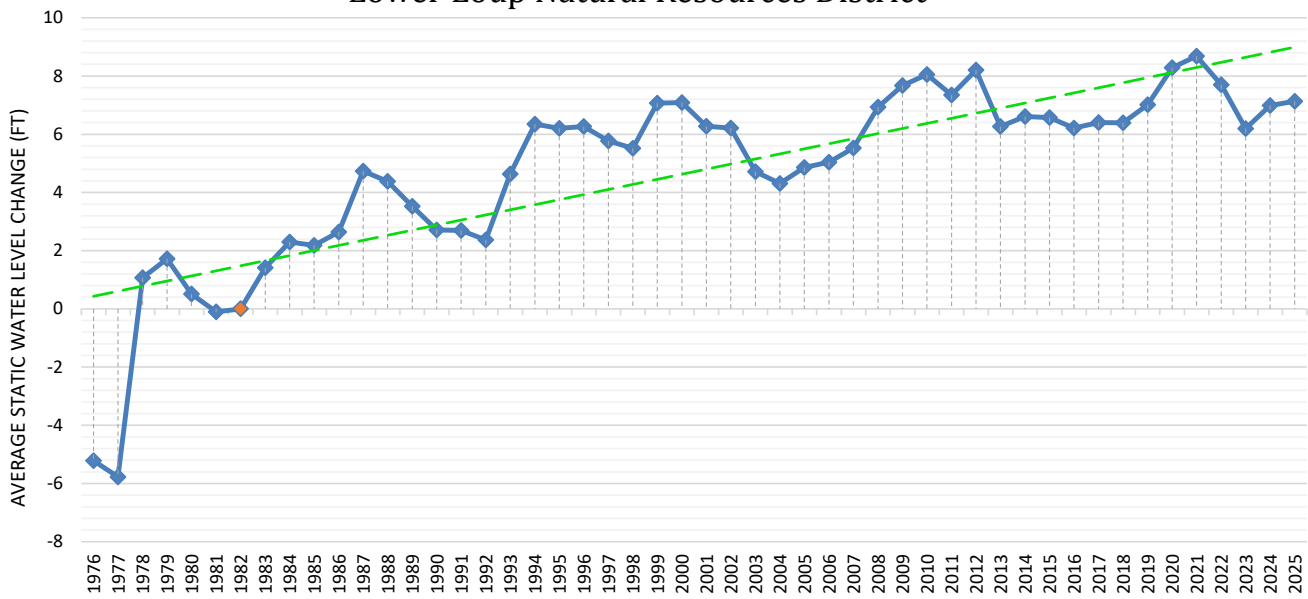
$$y = 0.4219x - 2.0931$$



Quantity Area 8 - Spring SWL Change Lower Loup Natural Resources District

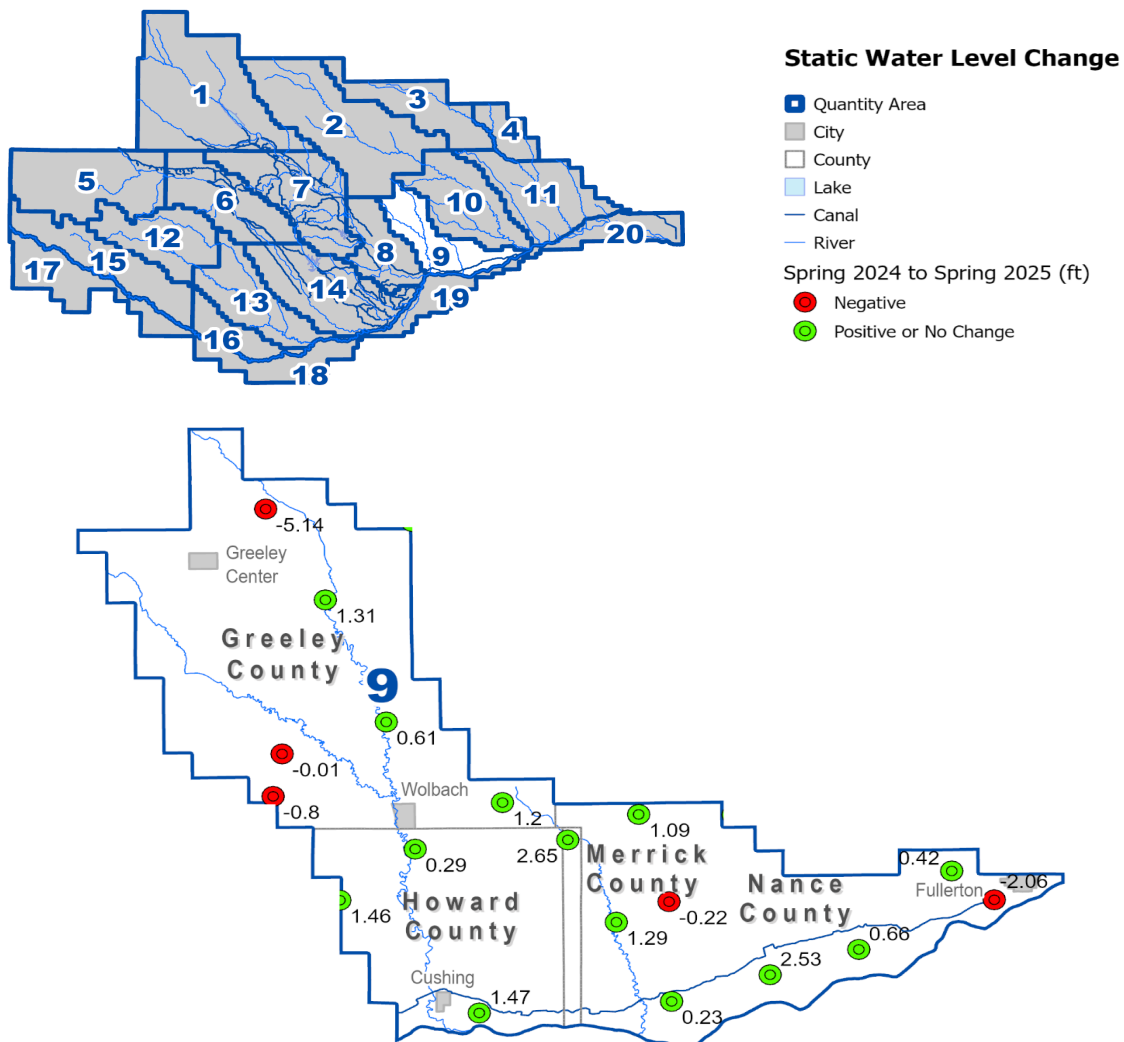


Quantity Area 9 - Spring SWL Change Lower Loup Natural Resources District



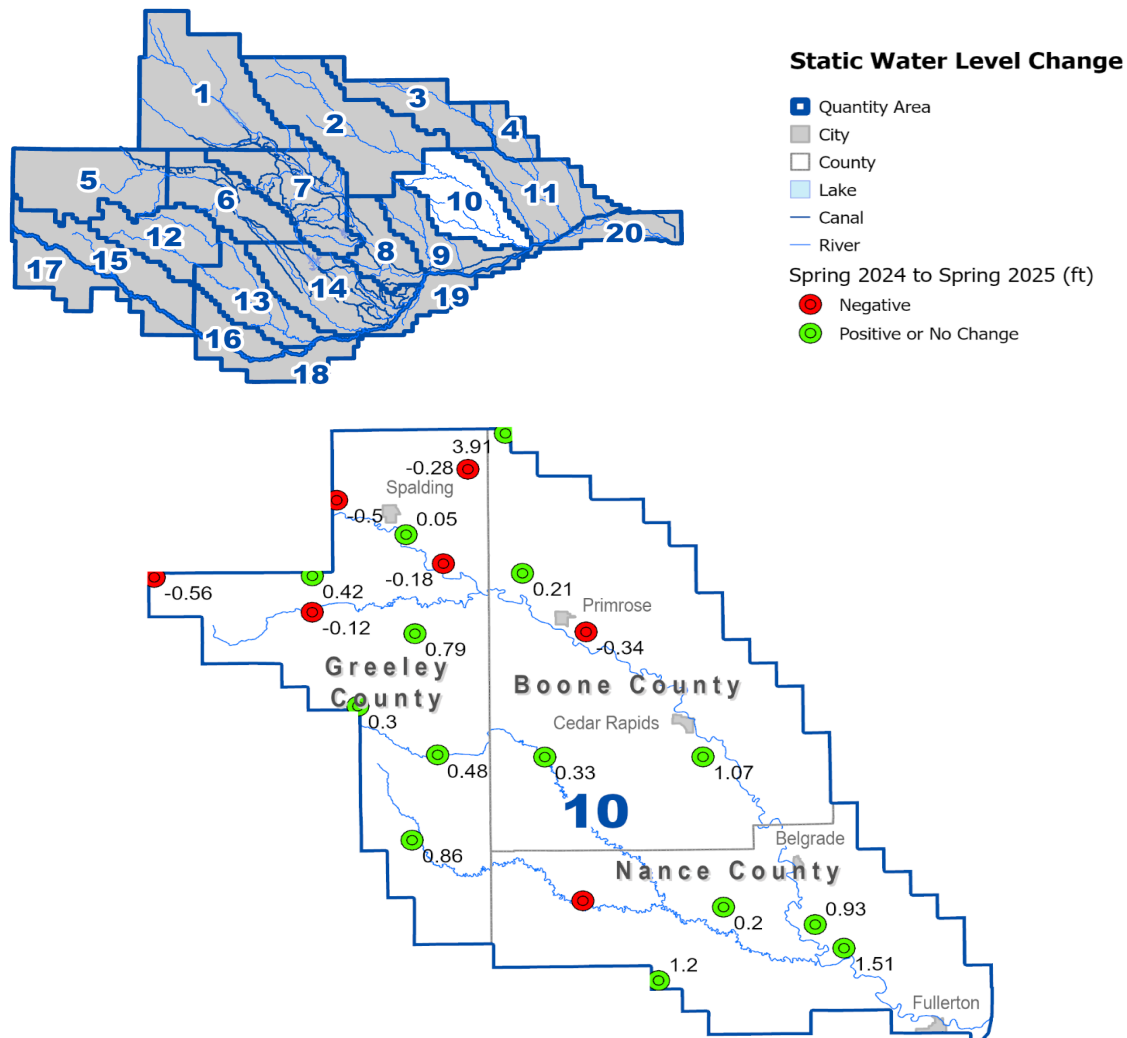
The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.1747x + 0.2585$$

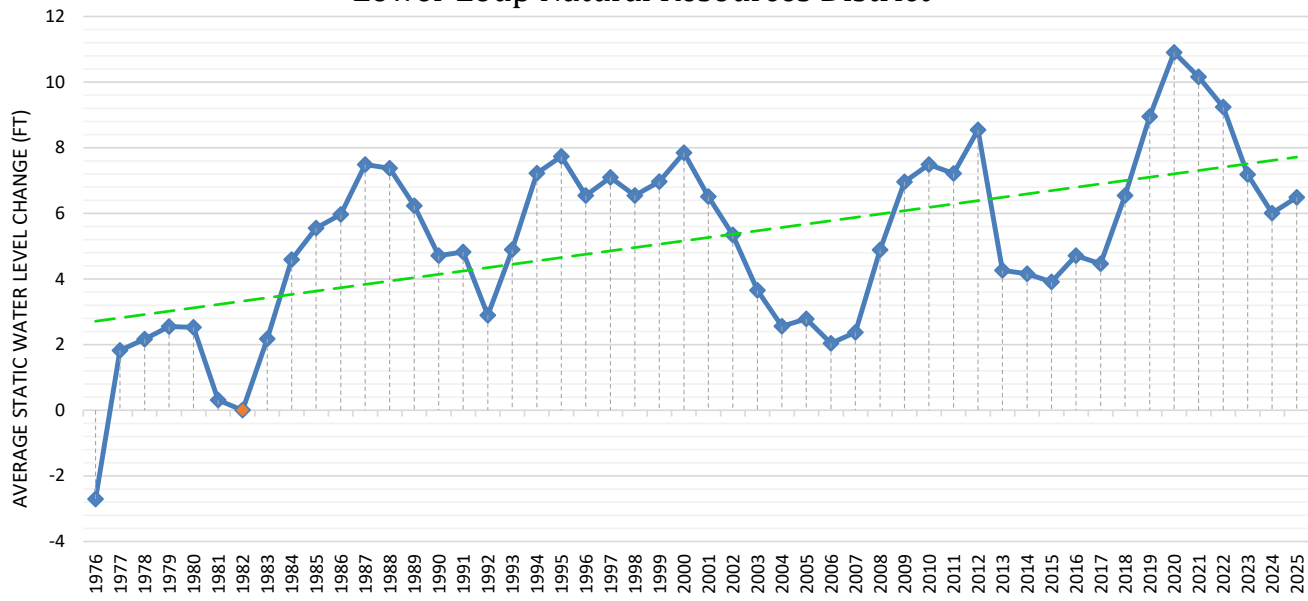


The graph displays the average static water level change in feet over a 50-year period. The blue line with diamond markers represents the annual data, while the green dashed line shows the long-term trend. The data is characterized by high inter-annual variability, with a general upward trend until the late 1990s, followed by a period of fluctuation and a sharp decline starting around 2020.

Year	Average Static Water Level Change (FT)
1976	-0.5
1977	-0.8
1978	0.6
1979	0.4
1980	-0.1
1981	-0.9
1982	0.0
1983	1.0
1984	1.9
1985	1.4
1986	1.7
1987	3.4
1988	2.6
1989	2.2
1990	1.5
1991	1.8
1992	1.0
1993	2.6
1994	3.6
1995	3.4
1996	3.1
1997	3.8
1998	3.6
1999	3.4
2000	3.4
2001	2.7
2002	2.9
2003	1.9
2004	1.8
2005	1.9
2006	1.4
2007	2.1
2008	2.5
2009	3.4
2010	3.7
2011	3.1
2012	3.6
2013	1.6
2014	1.7
2015	1.9
2016	1.6
2017	2.1
2018	1.8
2019	3.7
2020	4.1
2021	3.4
2022	2.4
2023	1.5
2024	1.2
2025	1.5

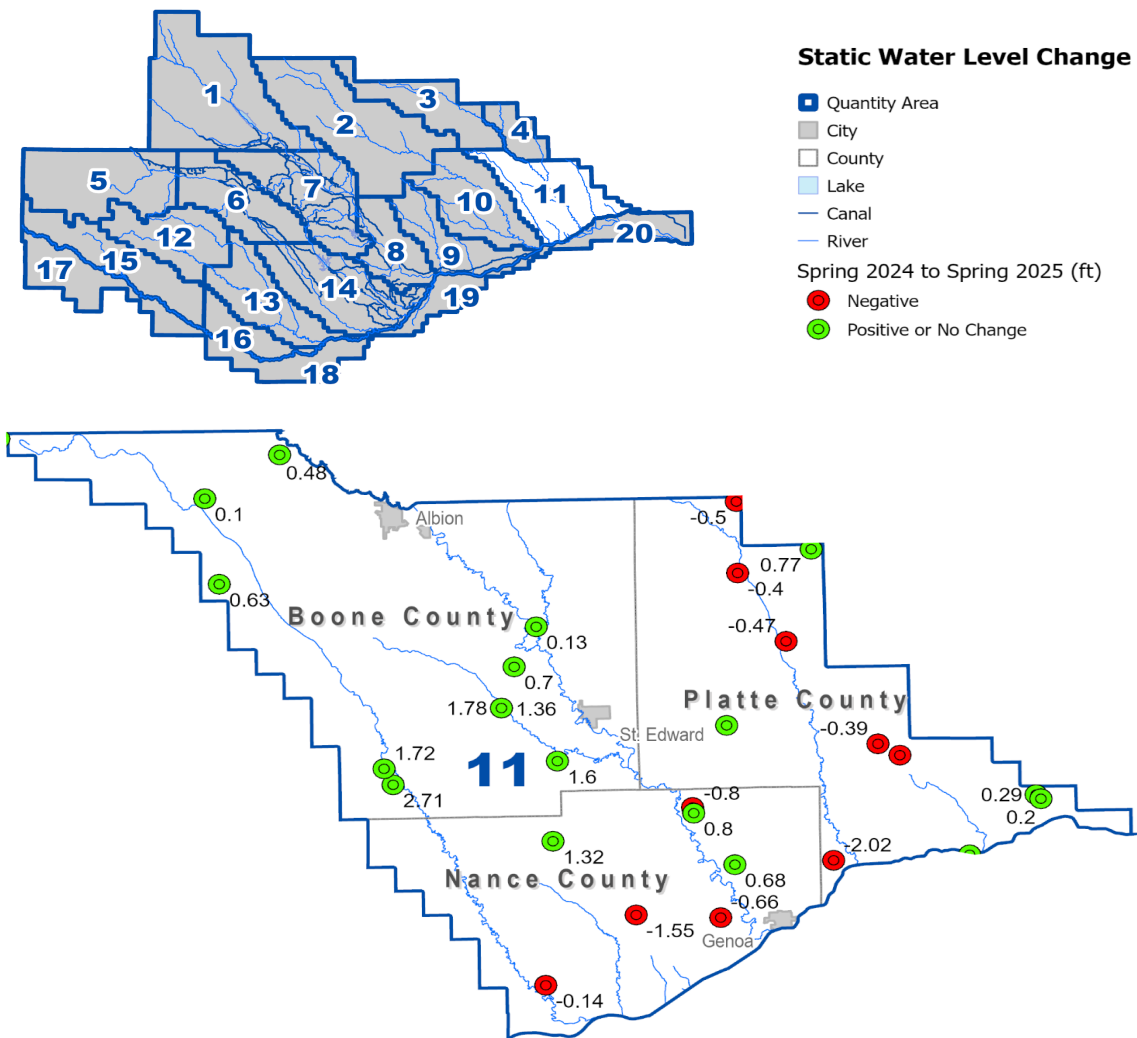
$$y = 0.0398x + 1.0554$$


Quantity Area 11 - Spring SWL Change Lower Loup Natural Resources District

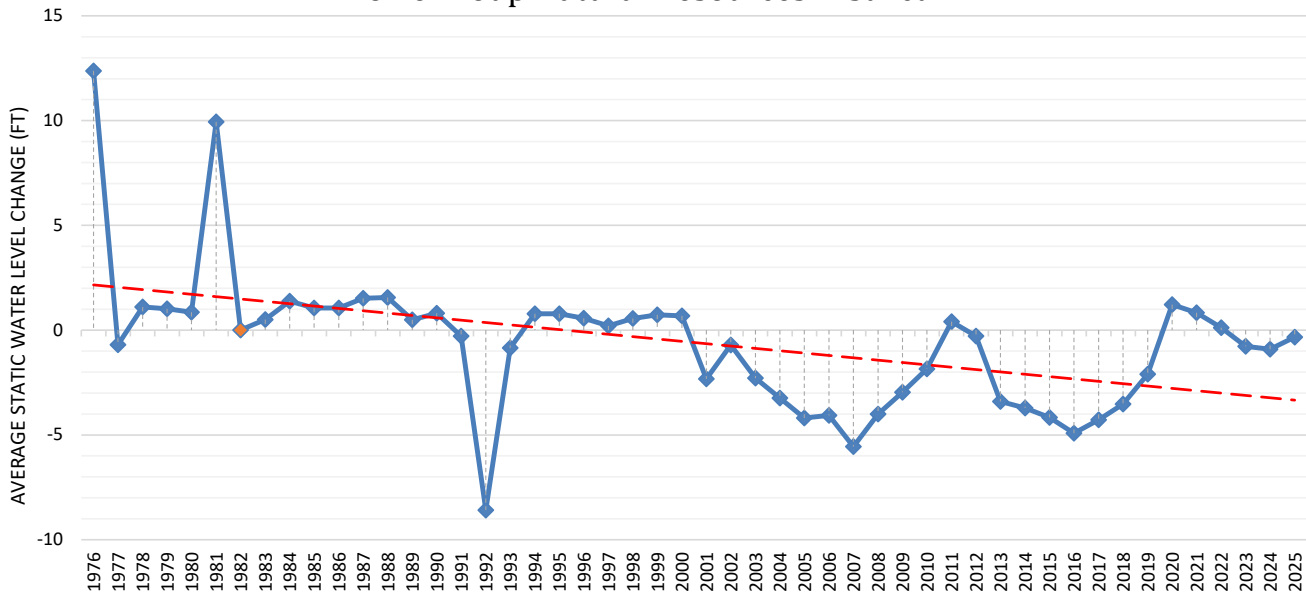


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.1021x + 2.6097$$

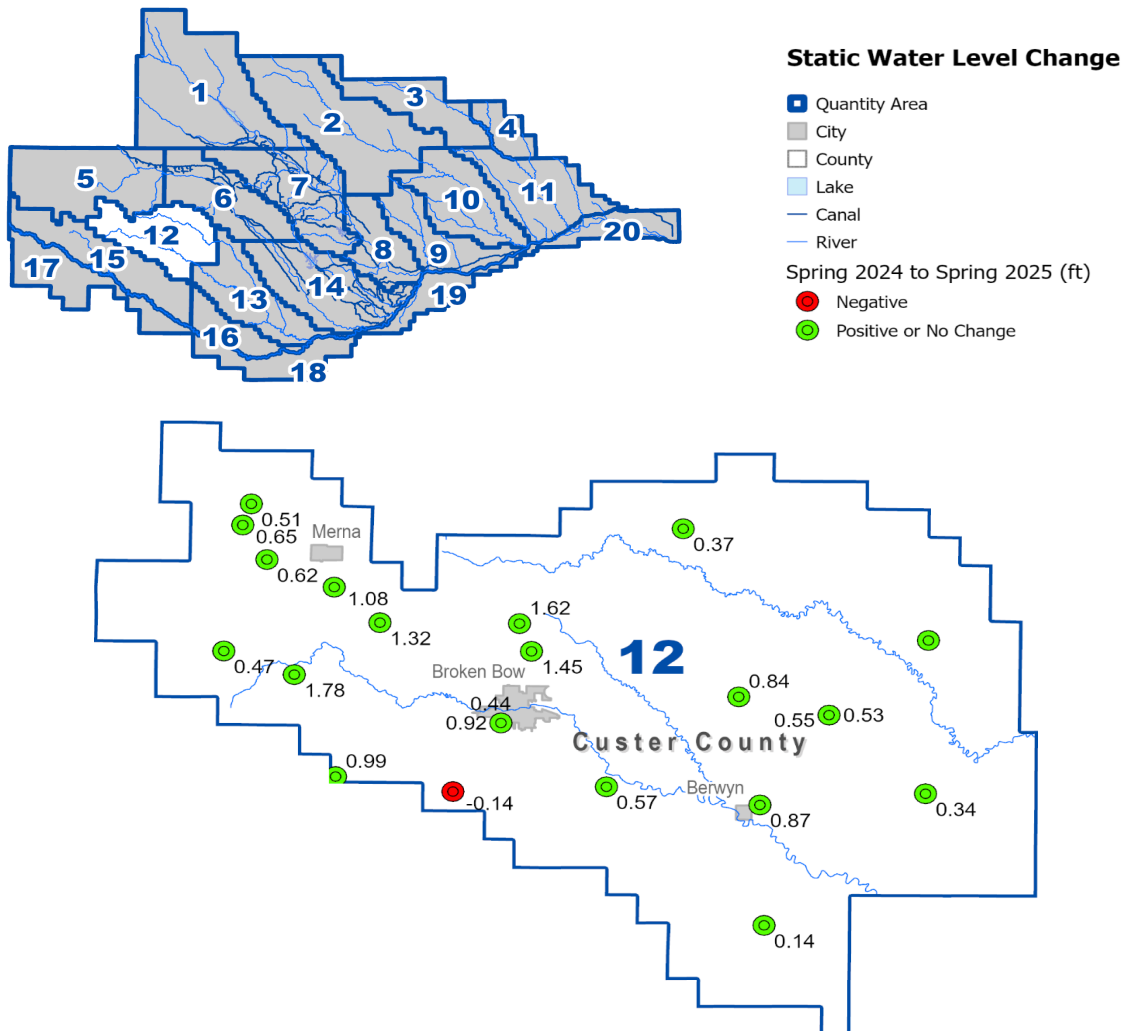


Quantity Area 12 - Spring SWL Change Lower Loup Natural Resources District

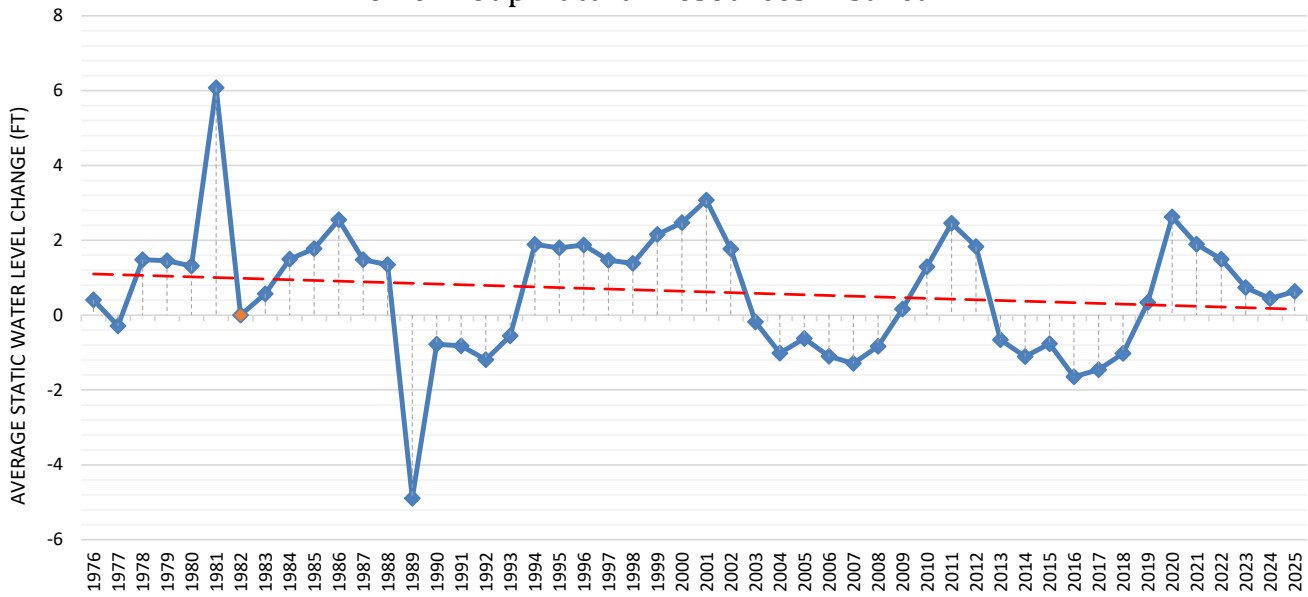


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.1122x + 2.2719$$

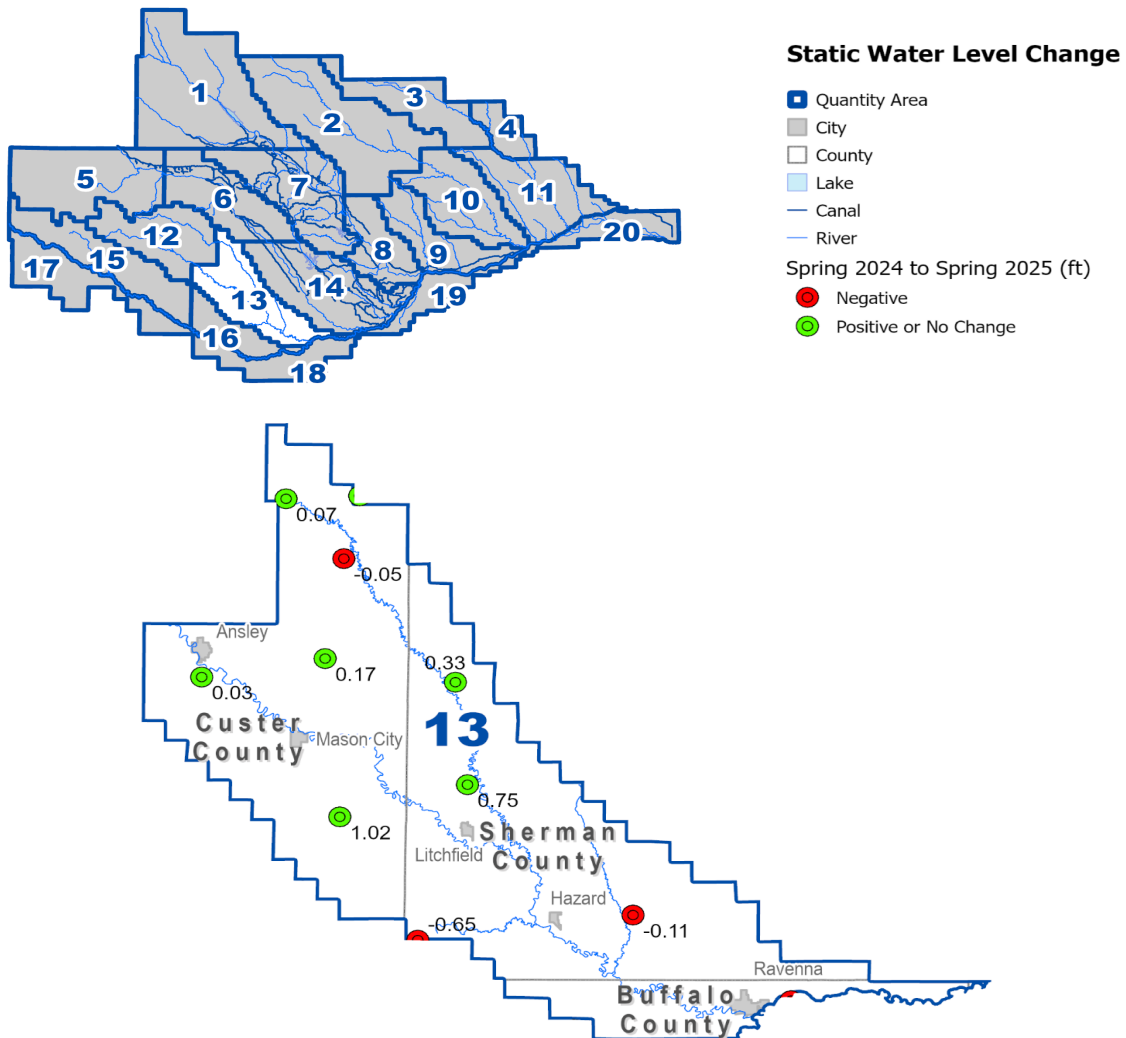


Quantity Area 13 - Spring SWL Change Lower Loup Natural Resources District

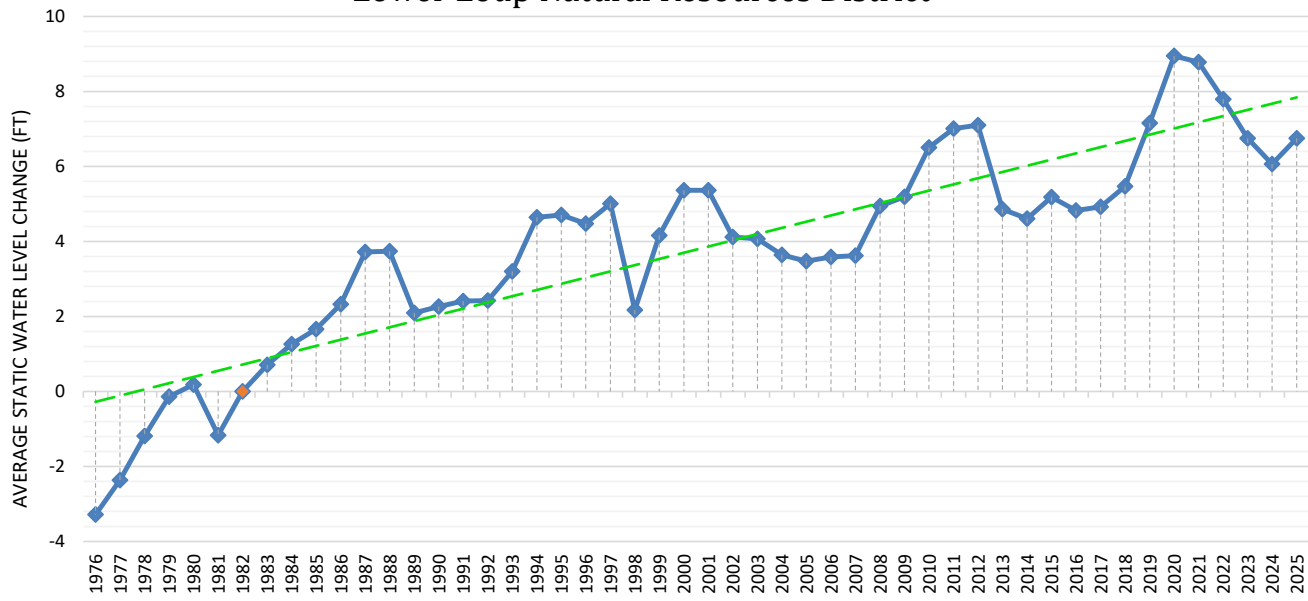


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.0192x + 1.1208$$

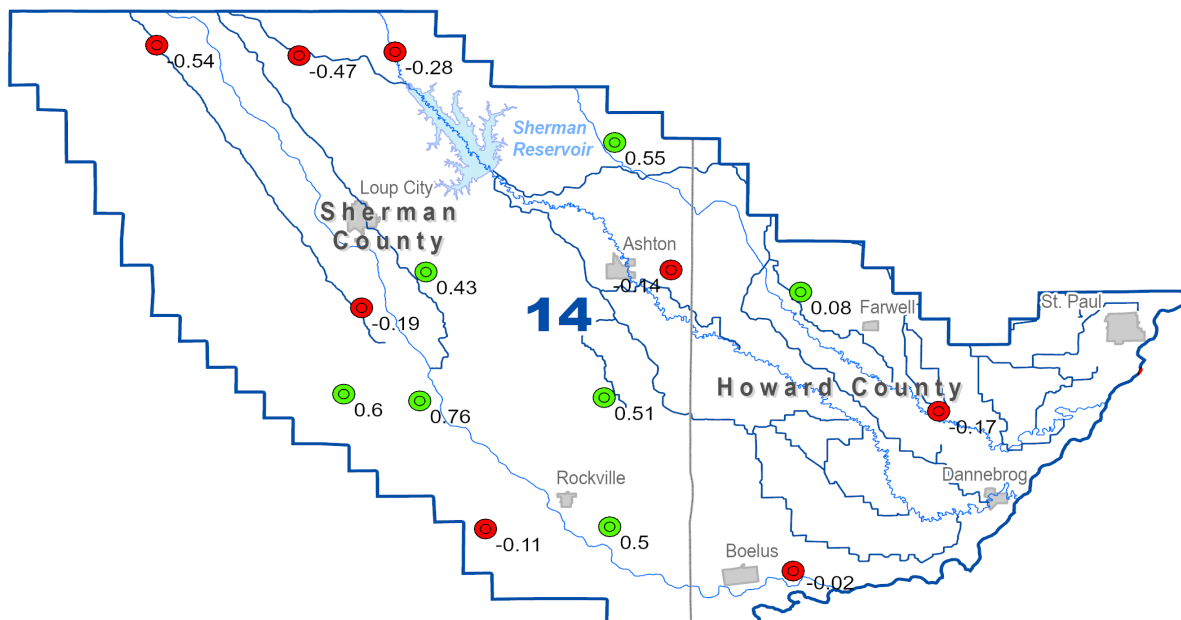
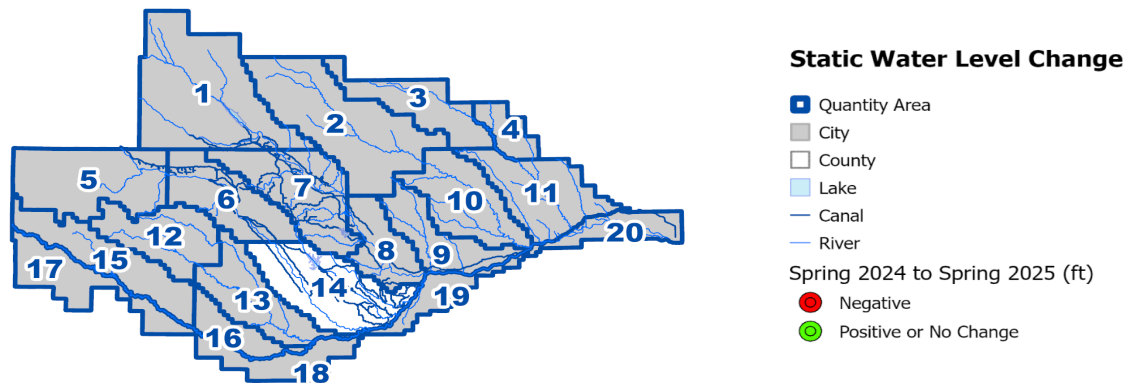


Quantity Area 14 - Spring SWL Change Lower Loup Natural Resources District

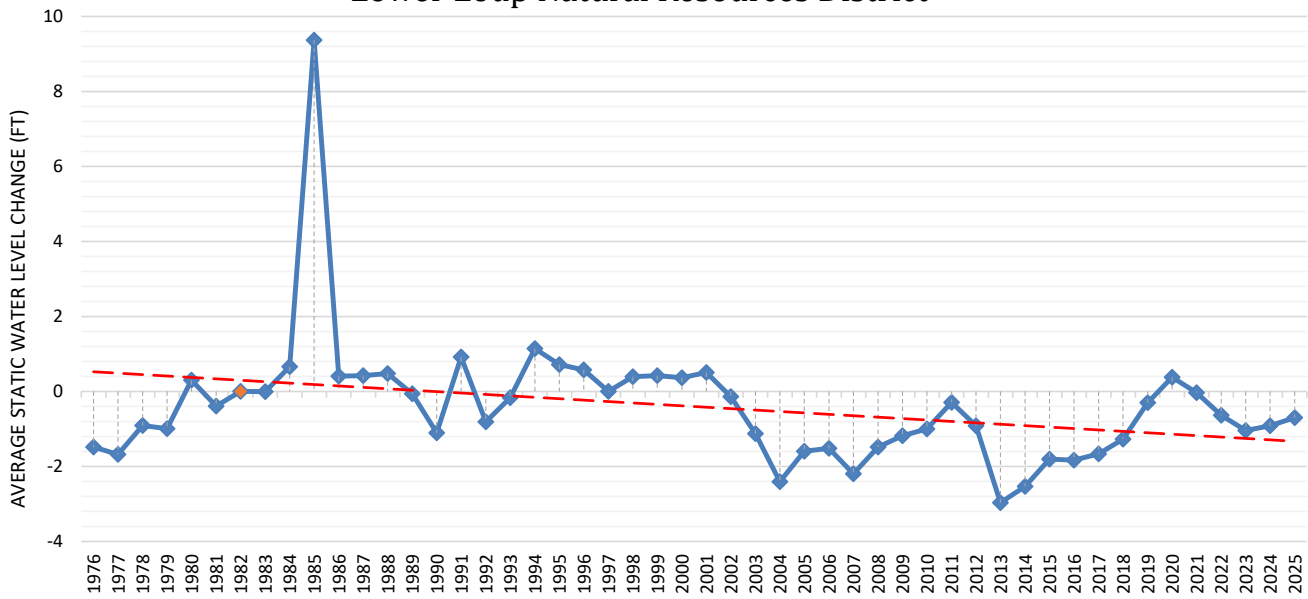


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.1656x - 0.4418$$

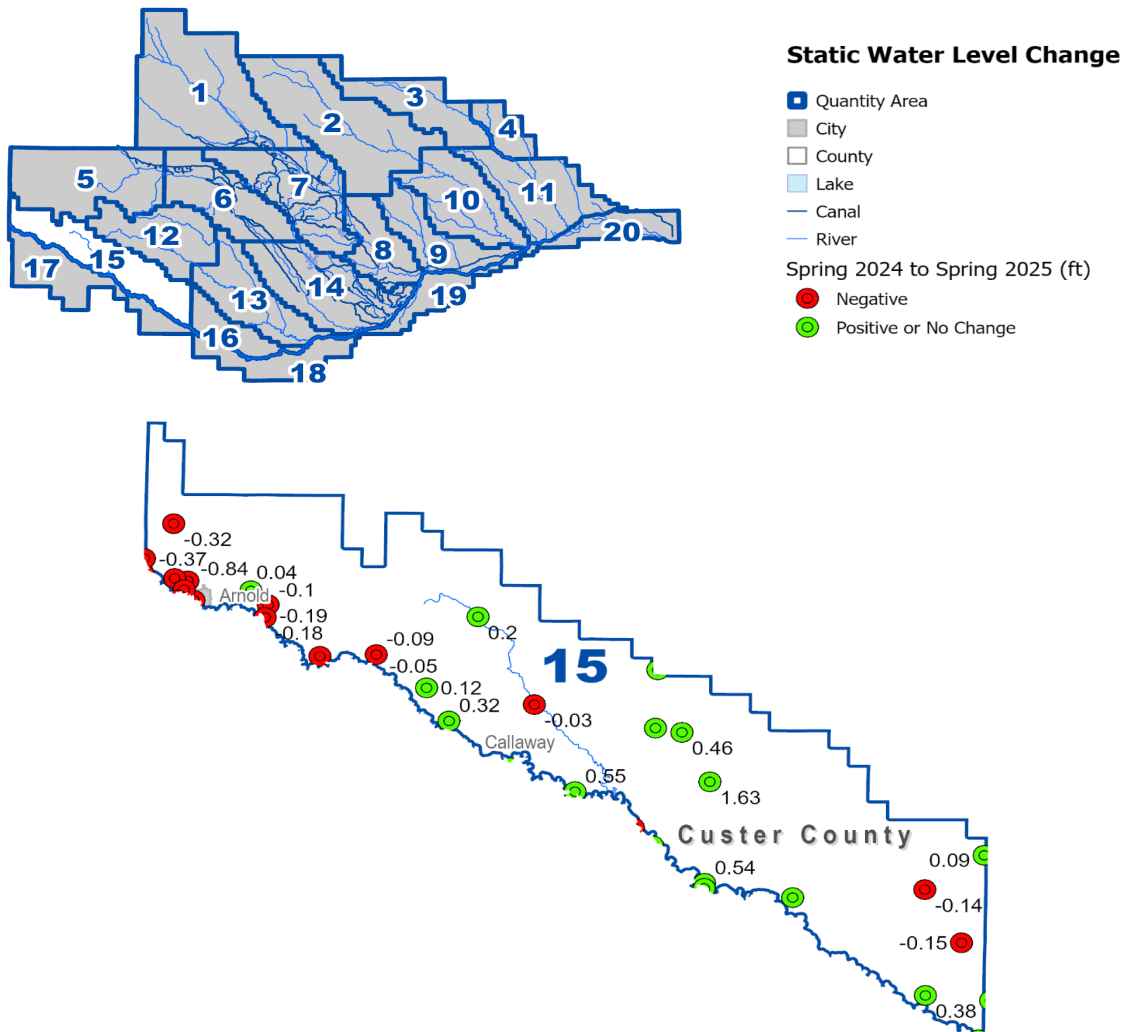


Quantity Area 15 - Spring SWL Change Lower Loup Natural Resources District

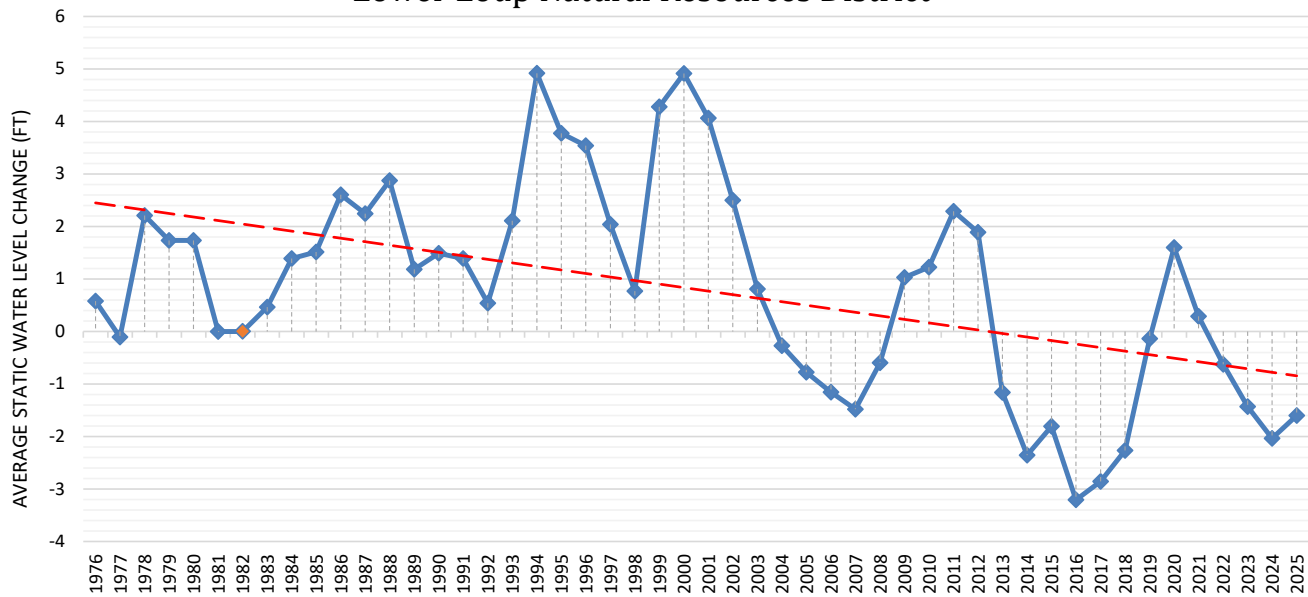


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.0378x + 0.5637$$

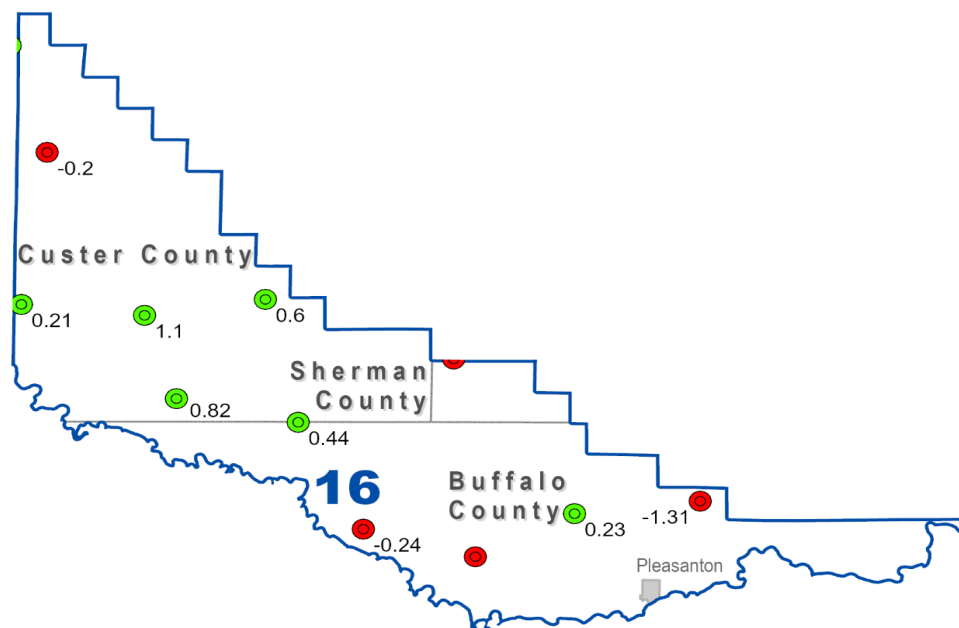
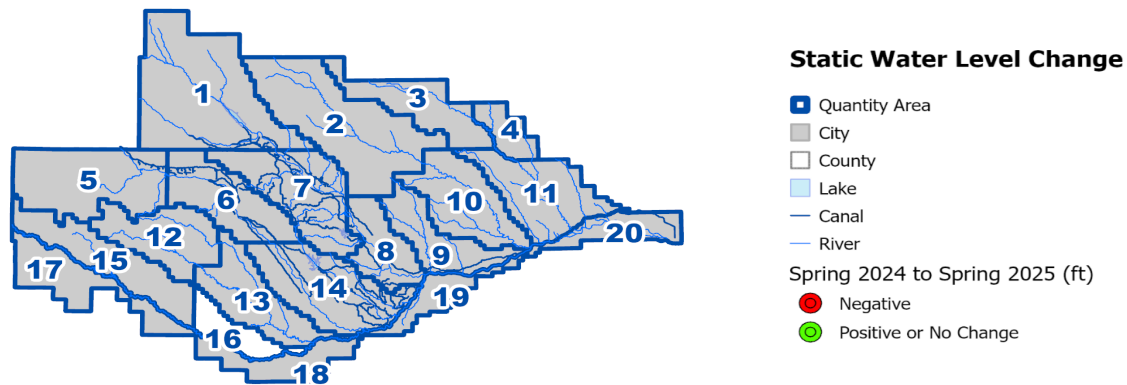


Quantity Area 16 - Spring SWL Change Lower Loup Natural Resources District

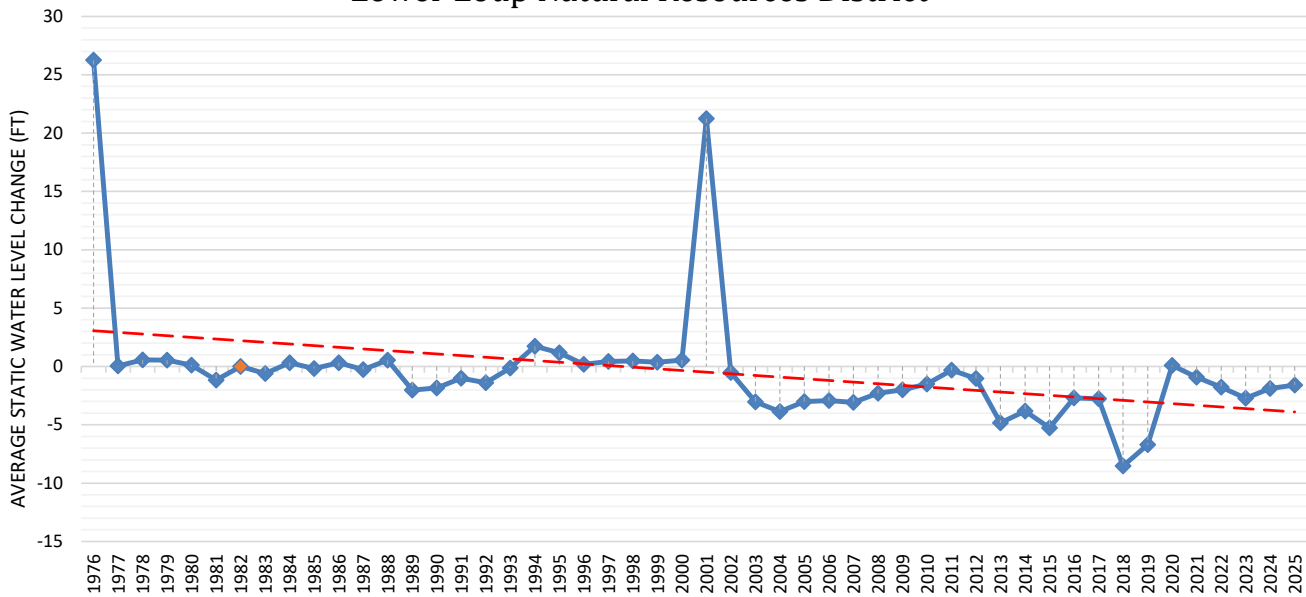


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.0672x + 2.5163$$

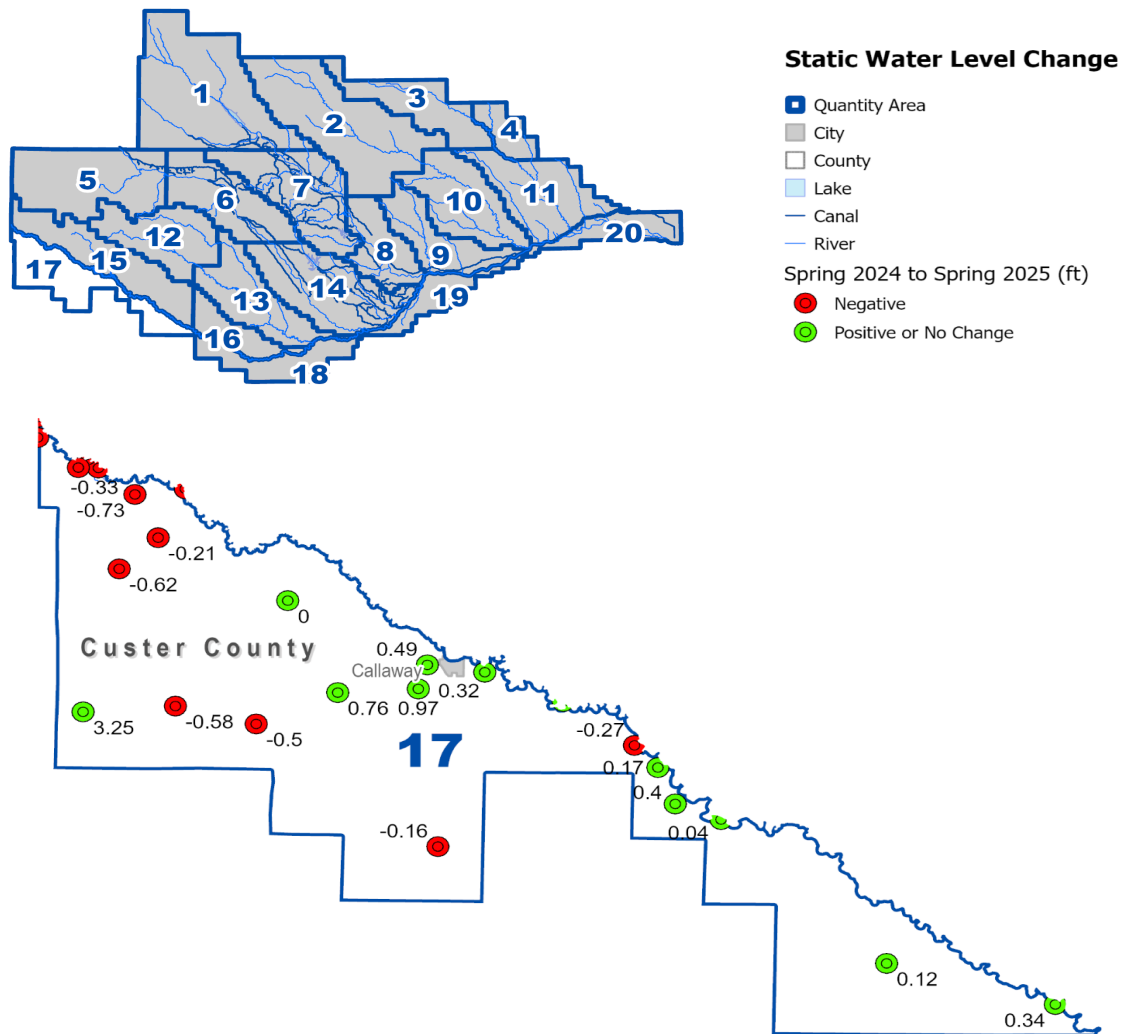


Quantity Area 17 - Spring SWL Change Lower Loup Natural Resources District

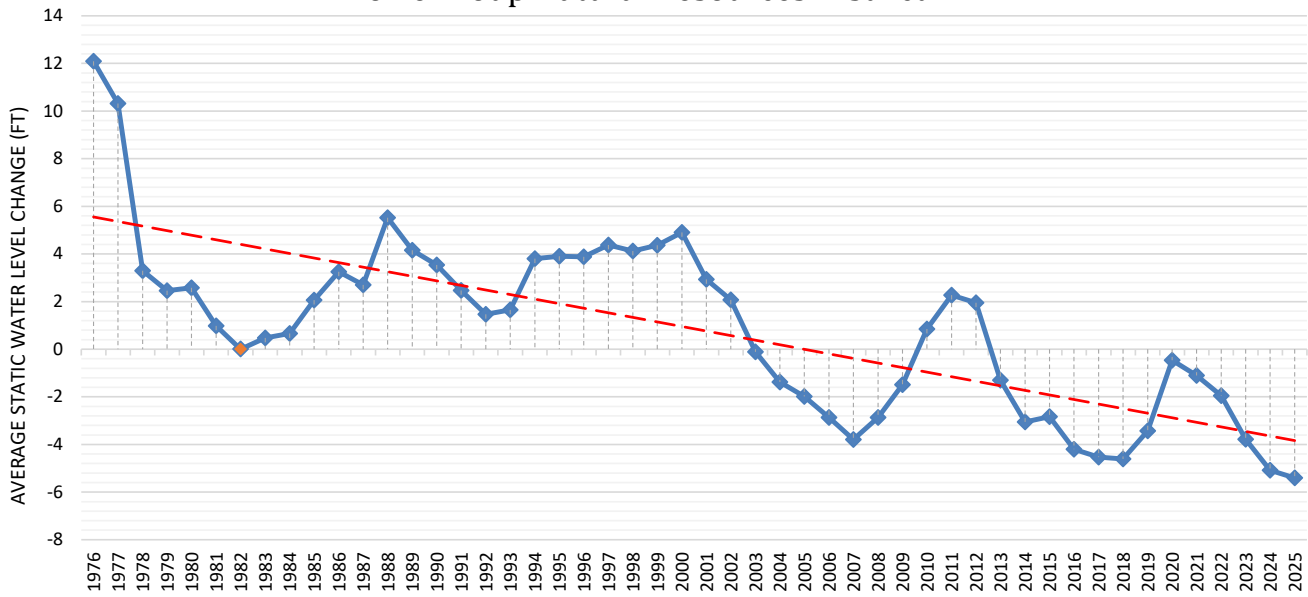


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.142x + 3.2057$$

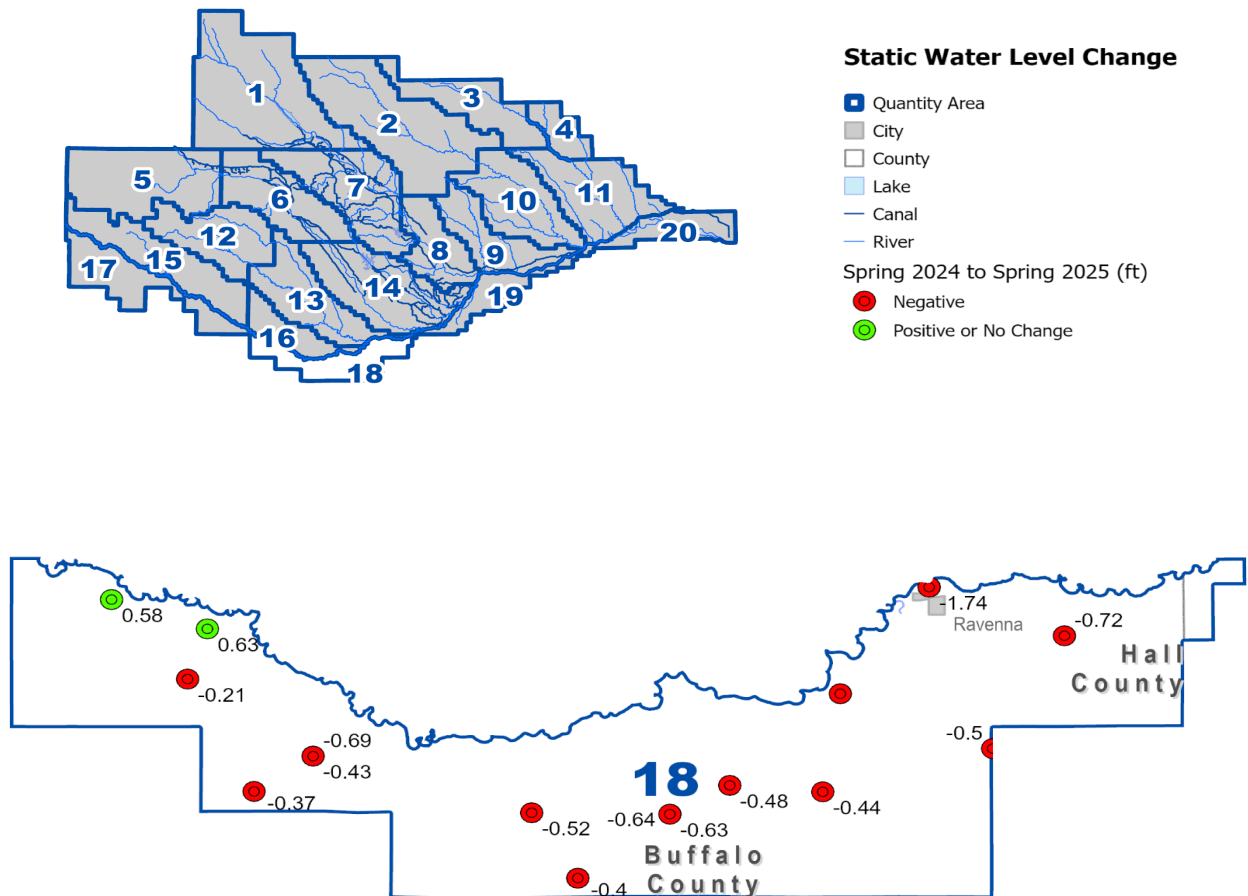


Quantity Area 18 - Spring SWL Change Lower Loup Natural Resources District

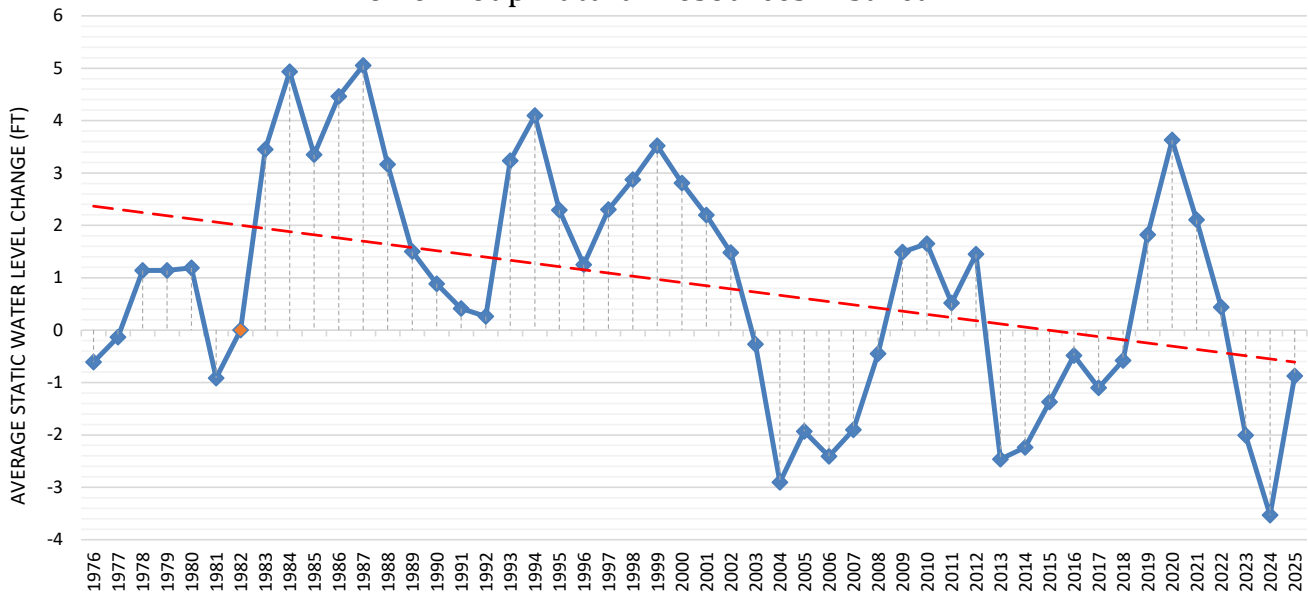


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.1916x + 5.7451$$

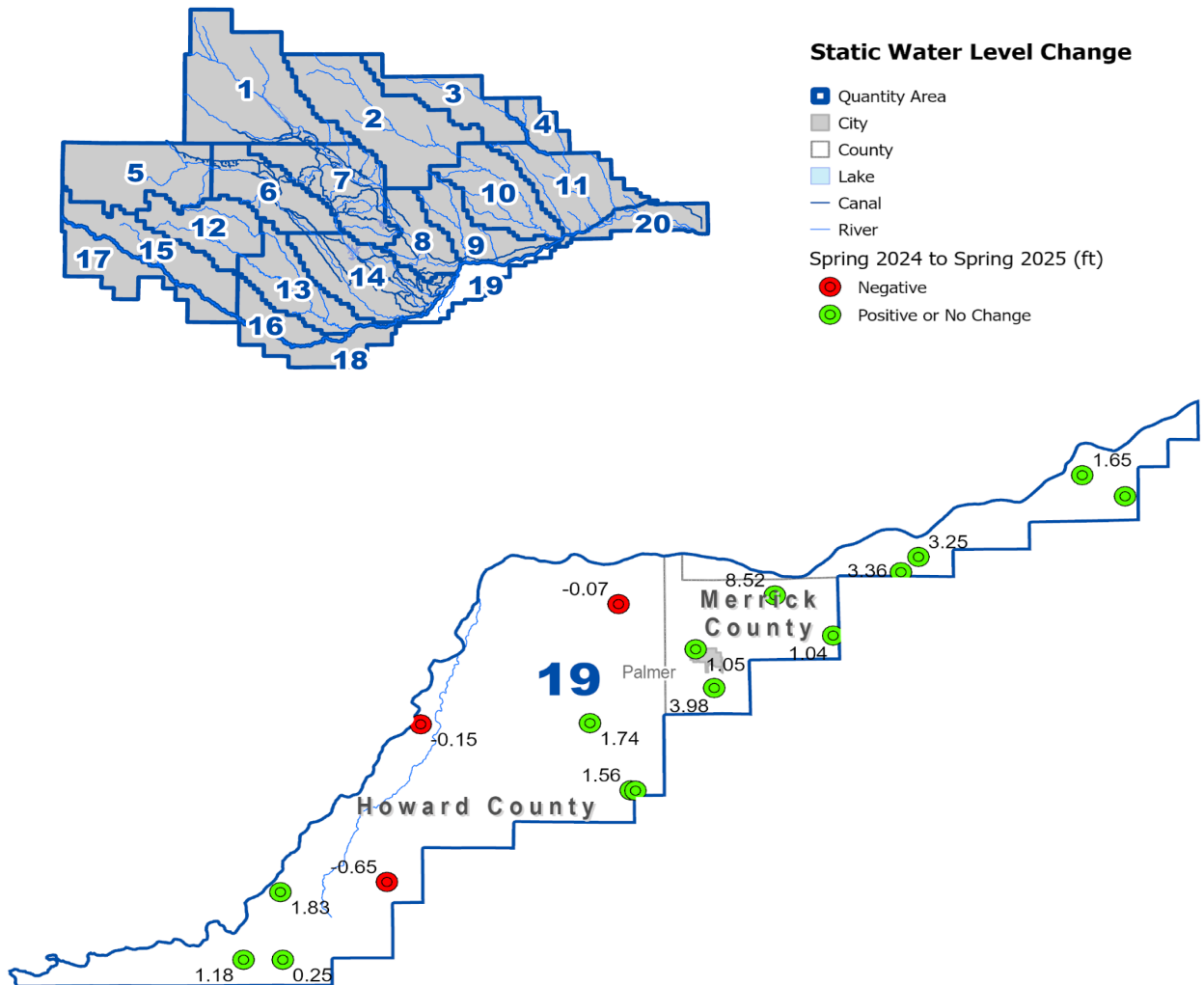


Quantity Area 19 - Spring SWL Change Lower Loup Natural Resources District

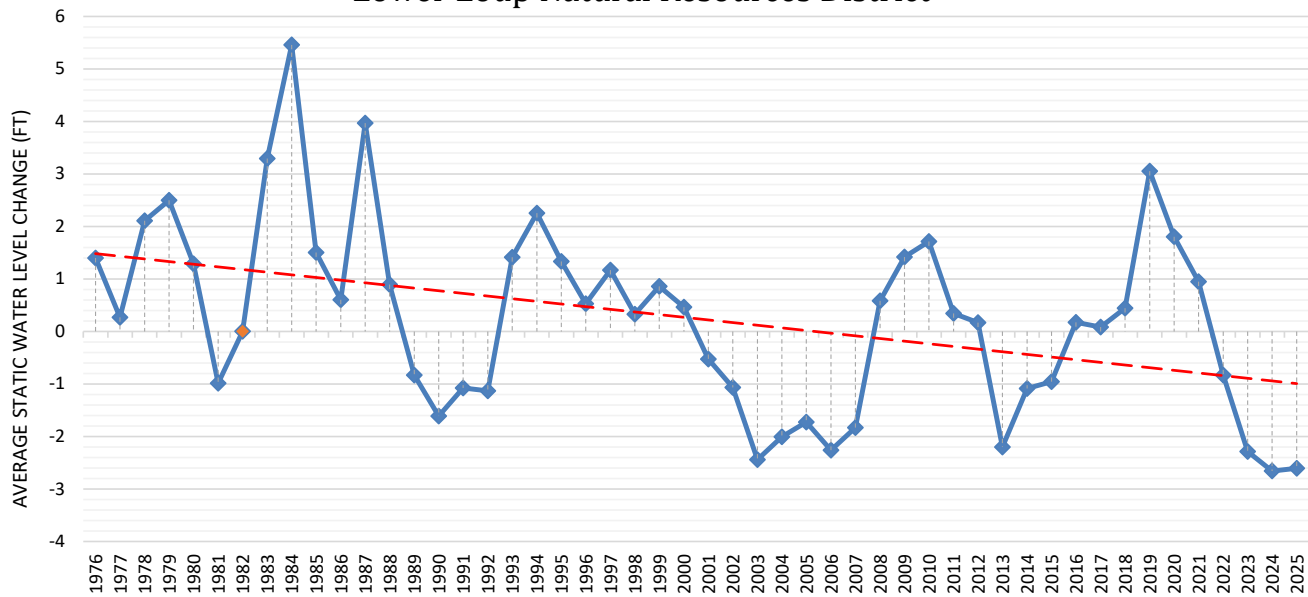


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.0607x + 2.4274$$

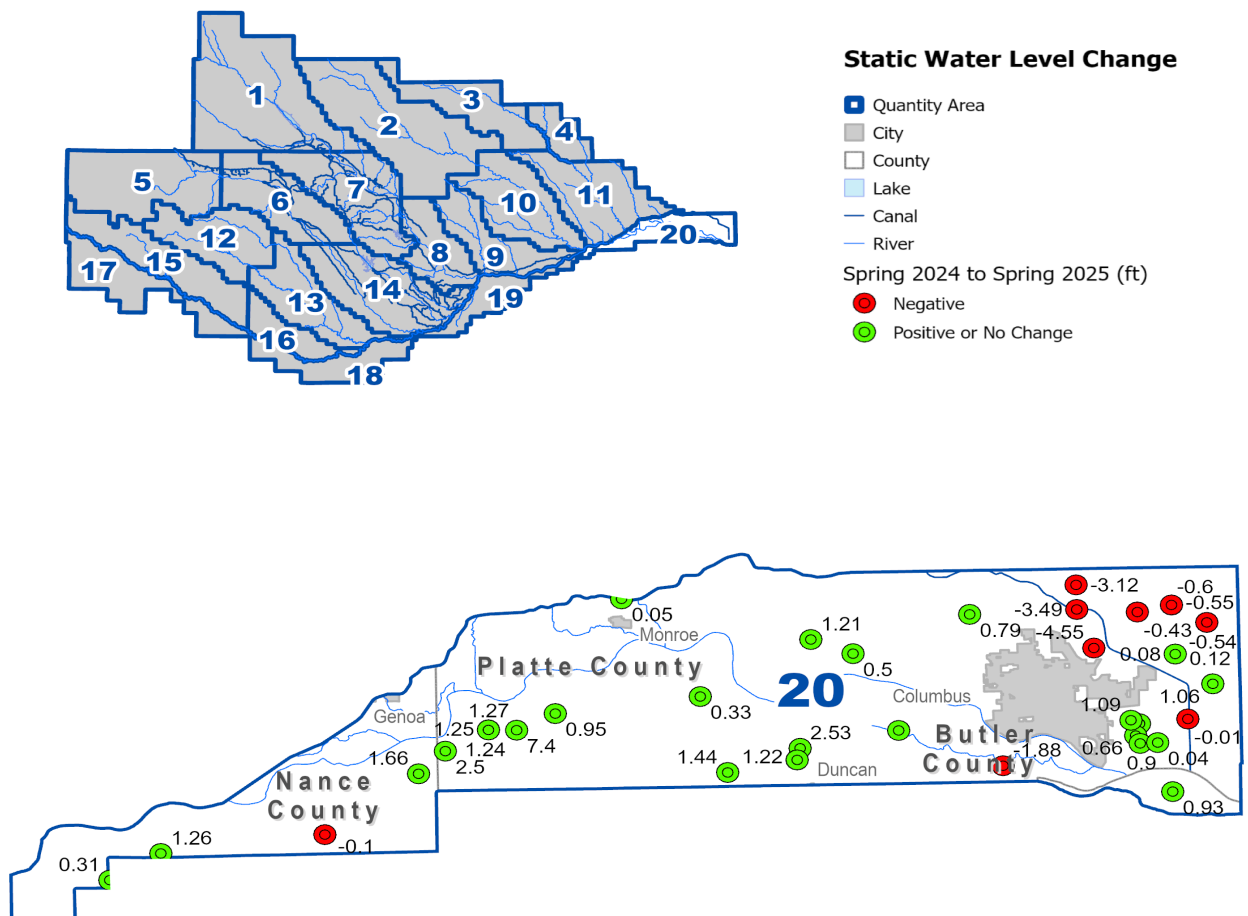


Quantity Area 20 - Spring SWL Change Lower Loup Natural Resources District



The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.0505x + 1.5334$$





● Static Water Level Measurement Location (ft)

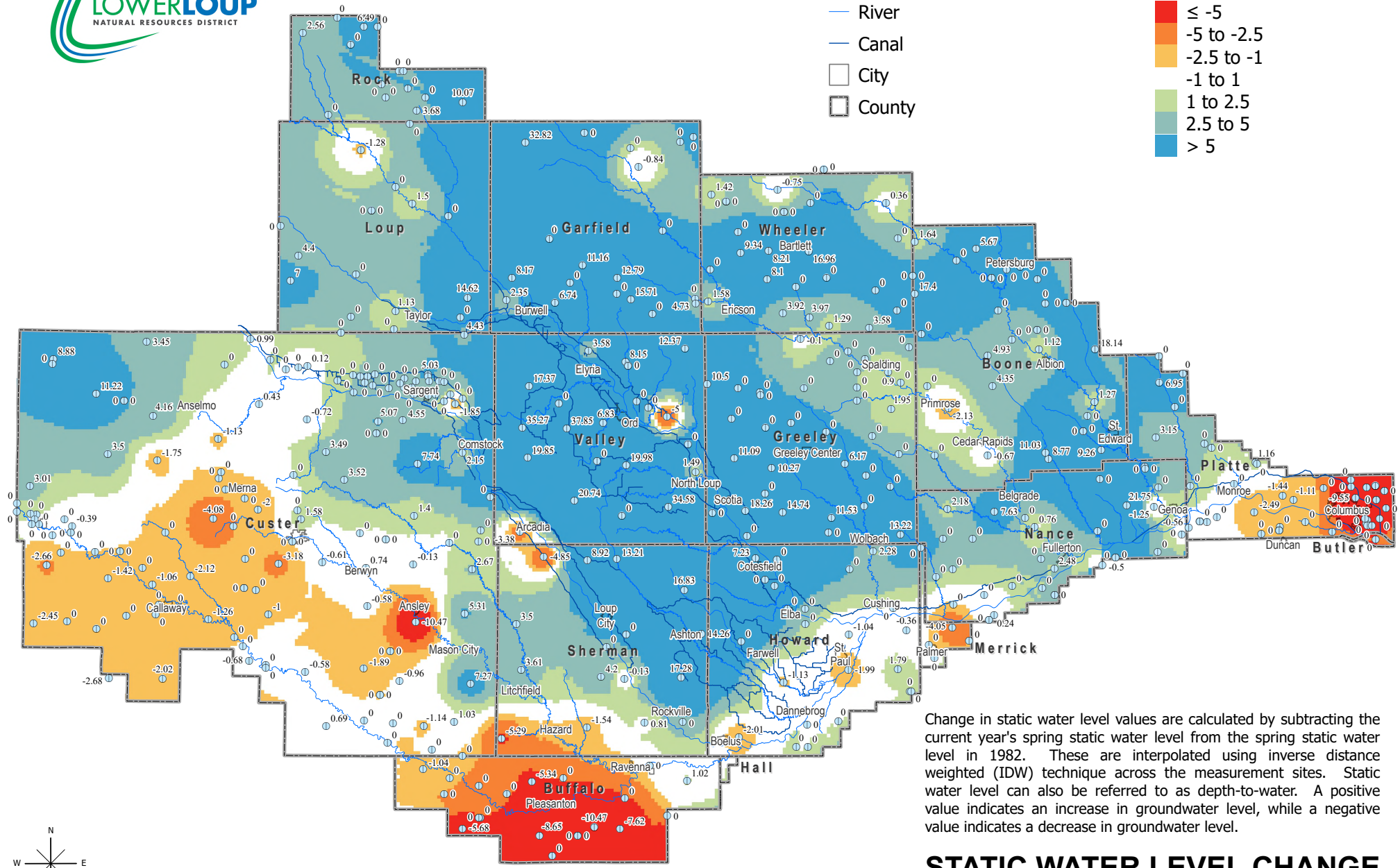
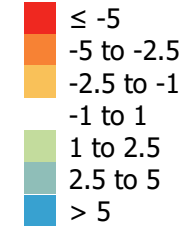
— River

— Canal

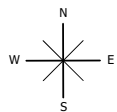
□ City

□ County

Static Water Level Change 1982 - 2025 (ft)



Change in static water level values are calculated by subtracting the current year's spring static water level from the spring static water level in 1982. These are interpolated using inverse distance weighted (IDW) technique across the measurement sites. Static water level can also be referred to as depth-to-water. A positive value indicates an increase in groundwater level, while a negative value indicates a decrease in groundwater level.

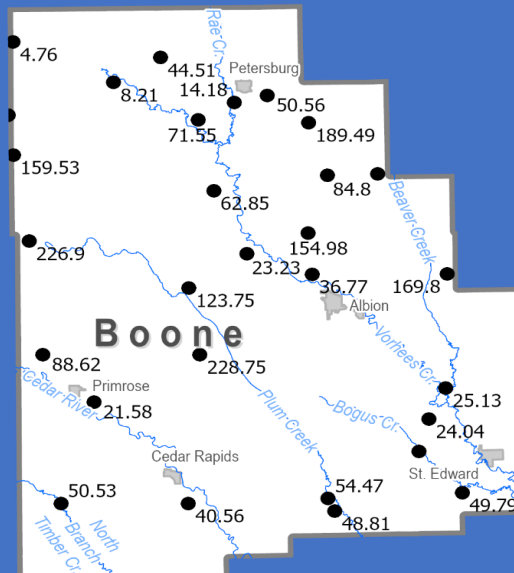
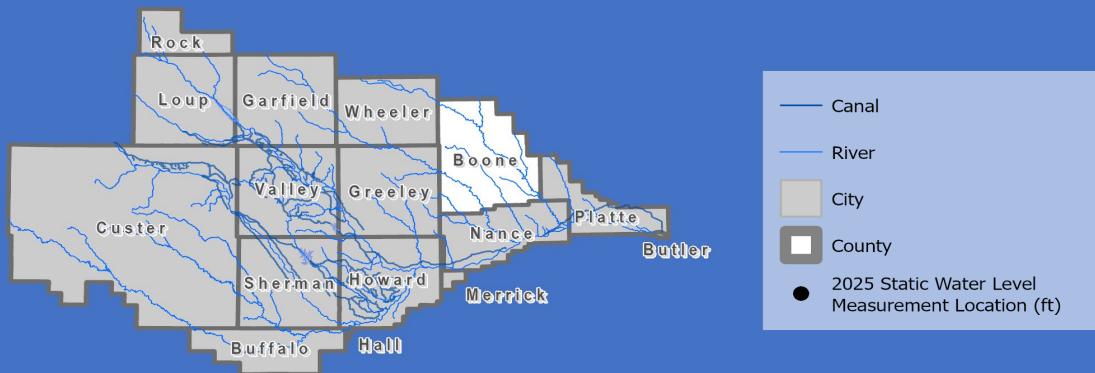
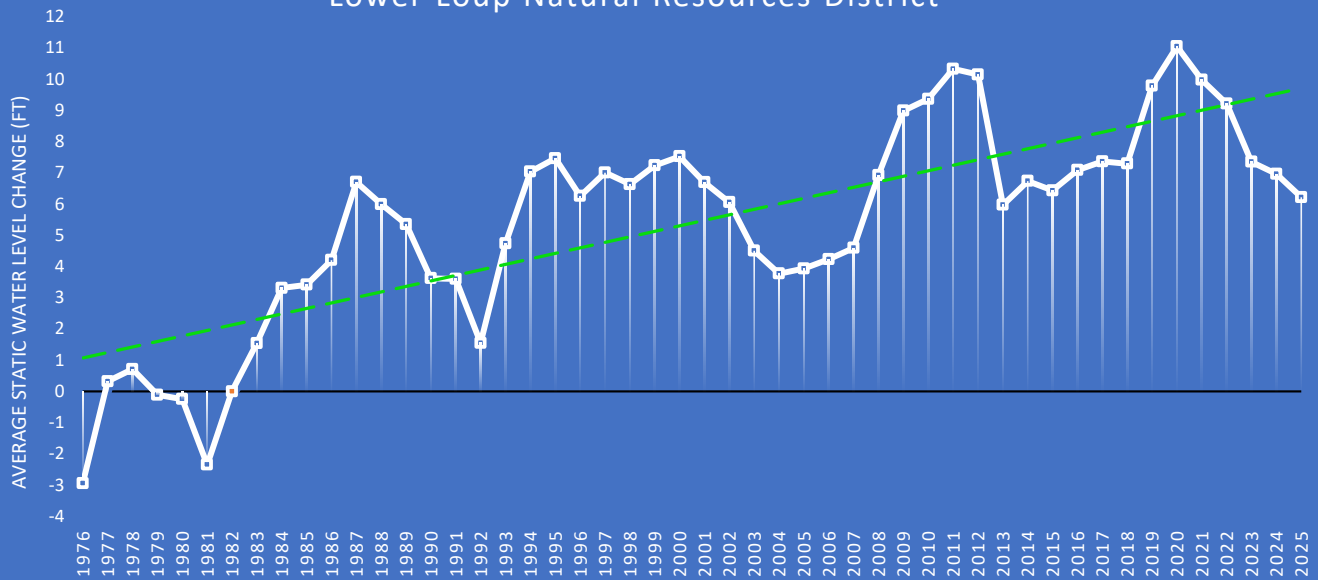


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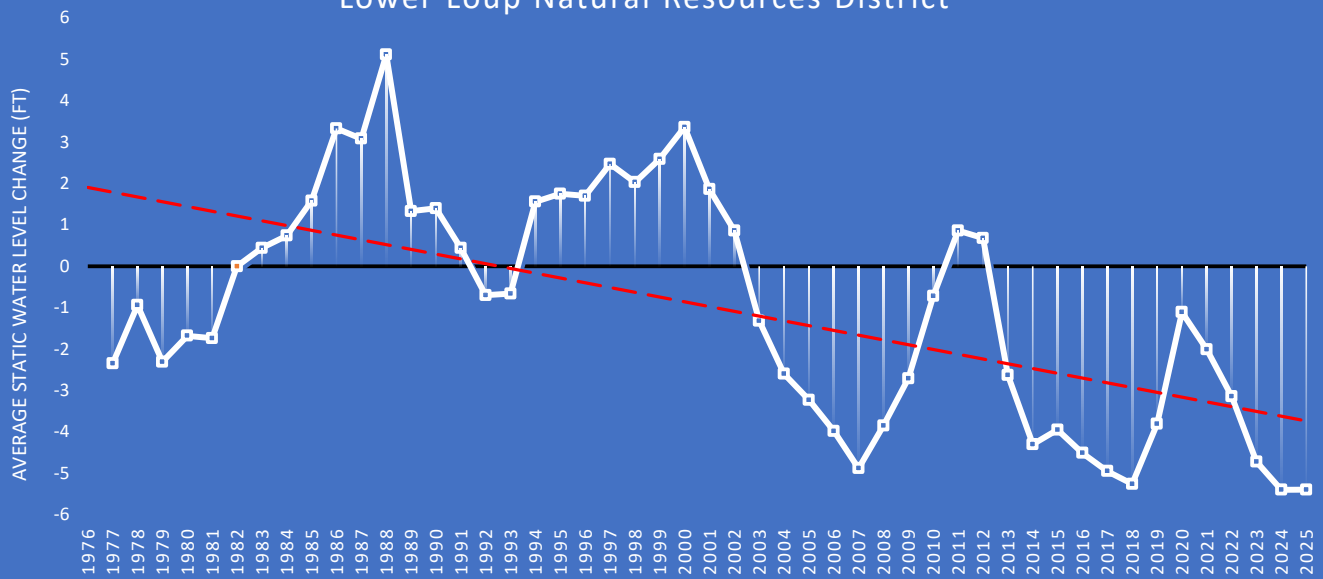


STATIC WATER LEVEL CHANGE ALL YEARS SPRING 1982 TO SPRING 2025

BOONE COUNTY - Spring SWL Change Lower Loup Natural Resources District

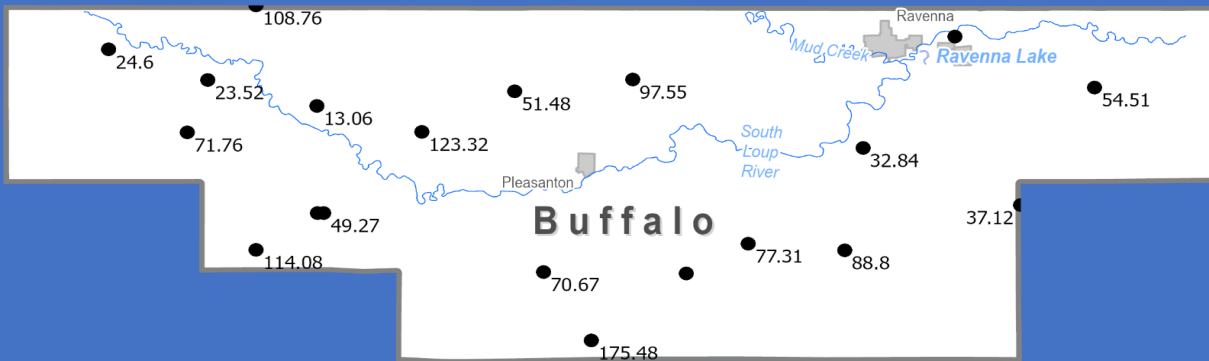
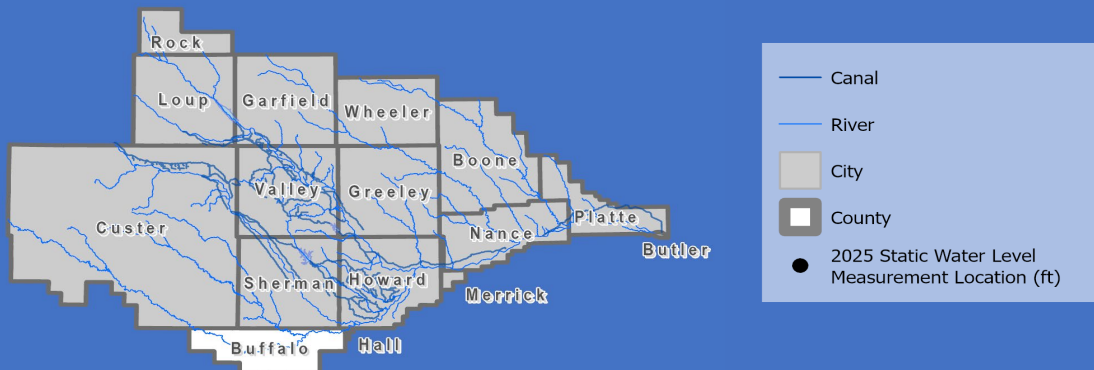


BUFFALO COUNTY - Spring SWL Change Lower Loup Natural Resources District

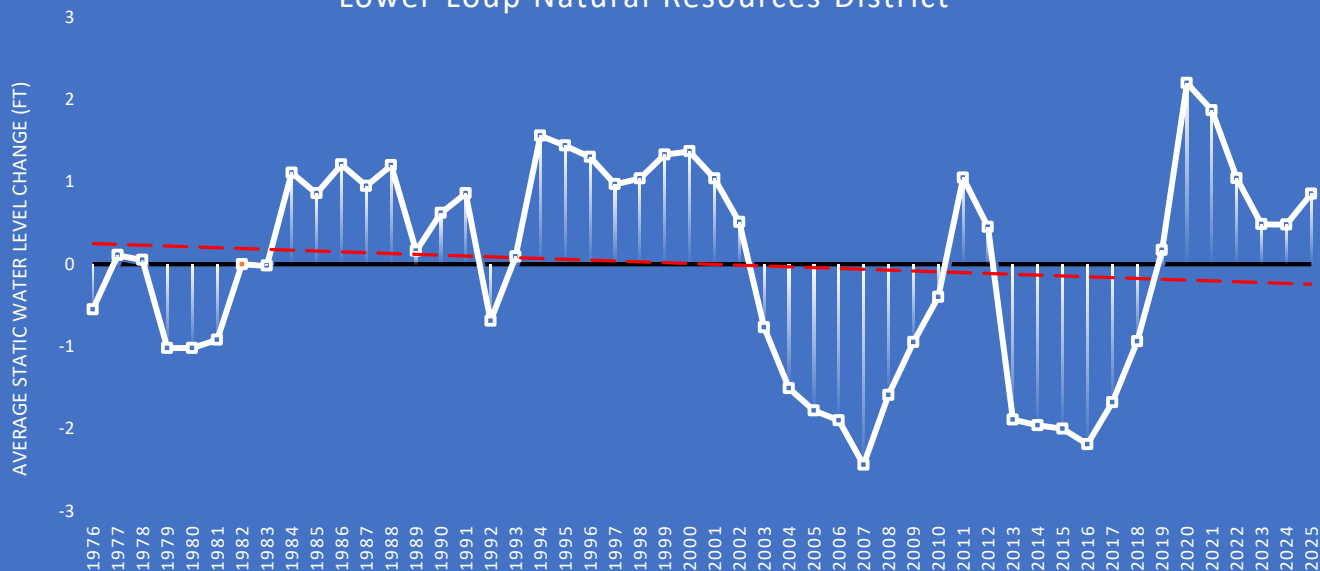


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = -0.1151x + 2.0198$$

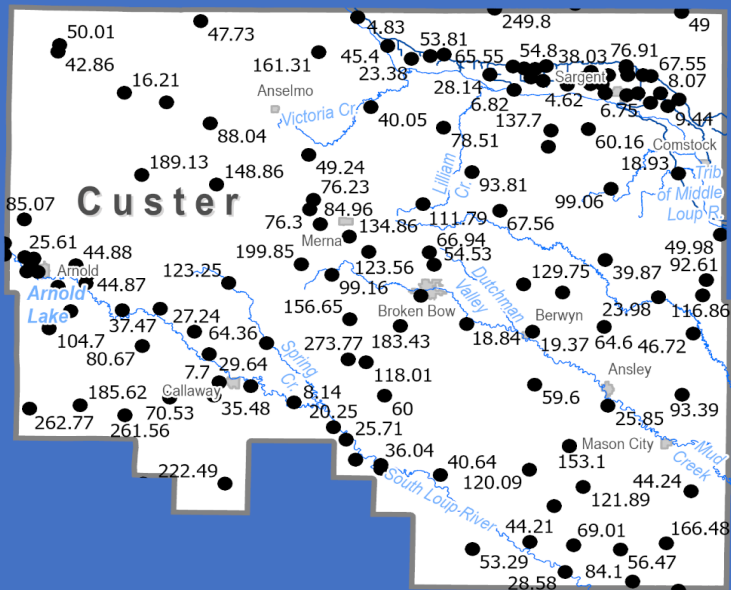
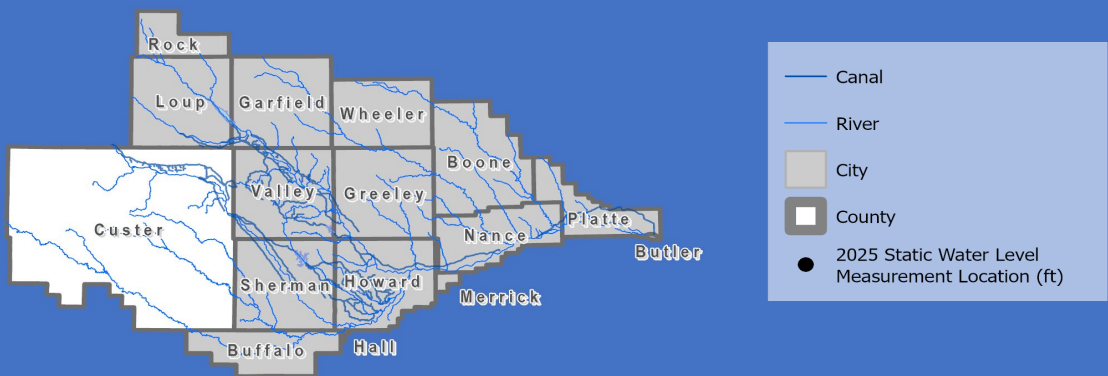


CUSTER COUNTY - Spring SWL Change Lower Loup Natural Resources District

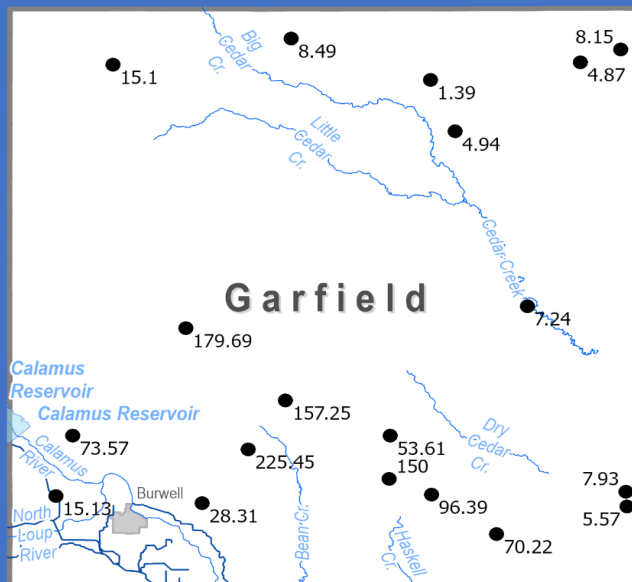
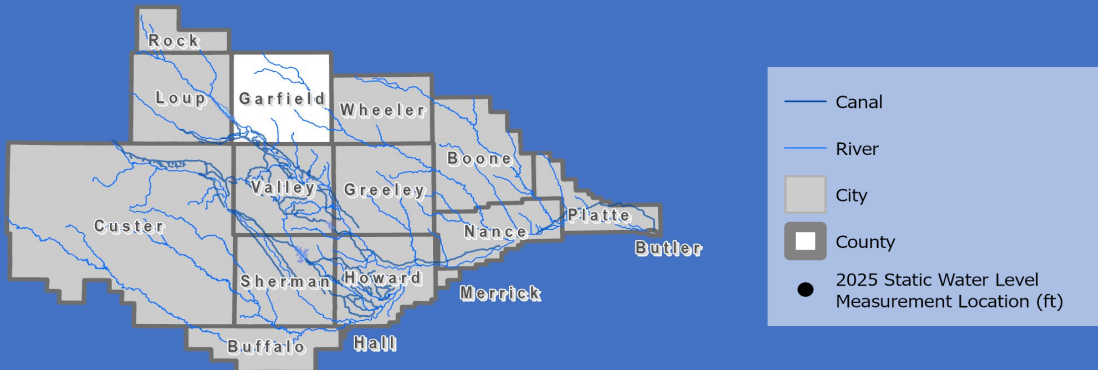
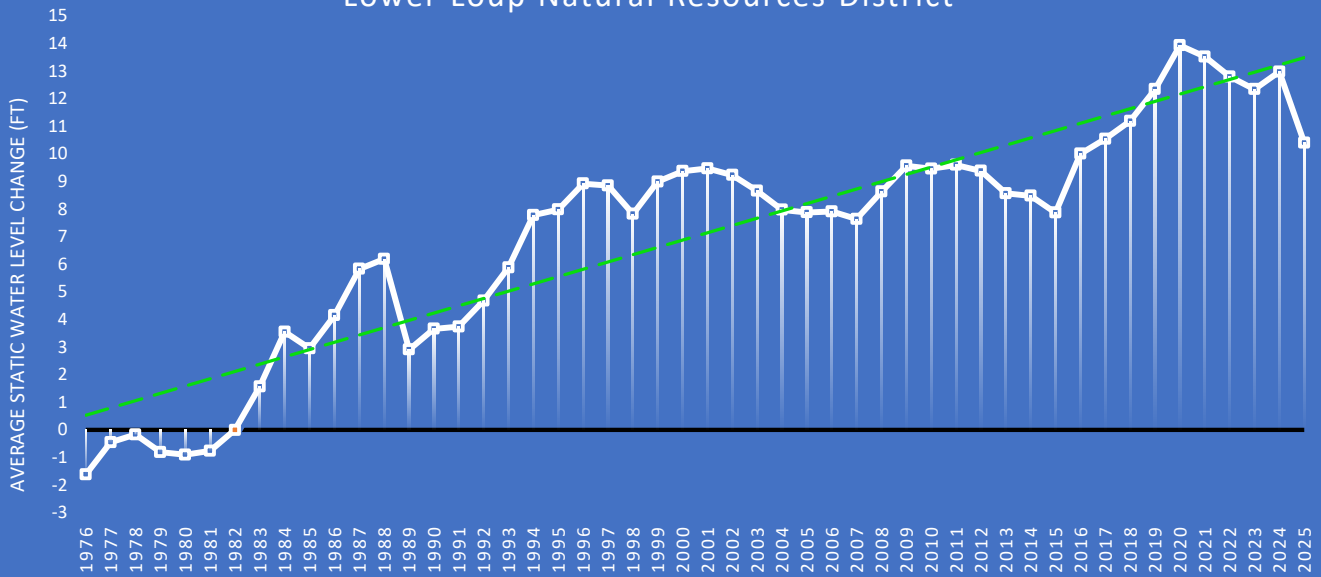


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

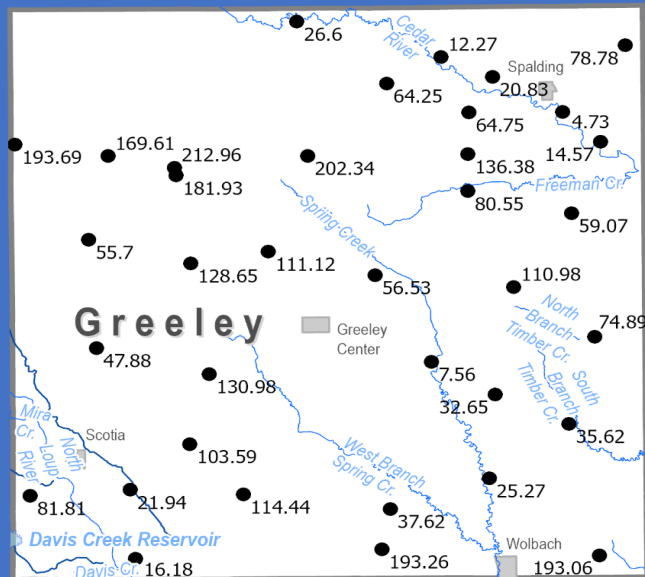
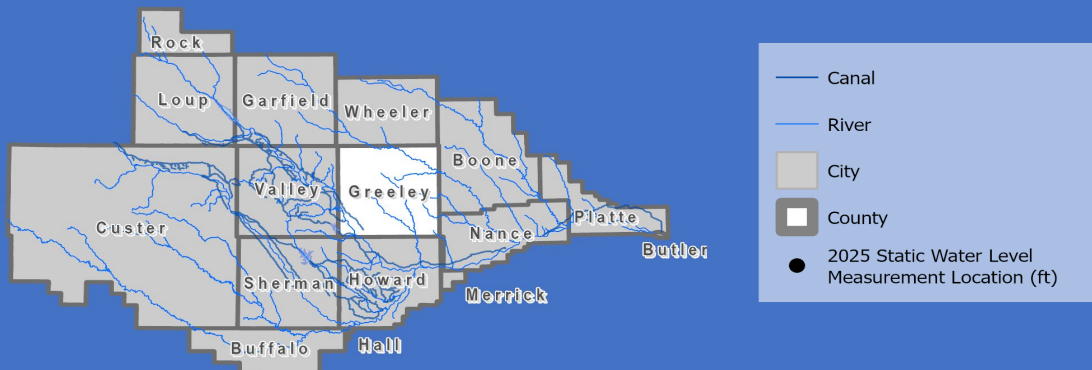
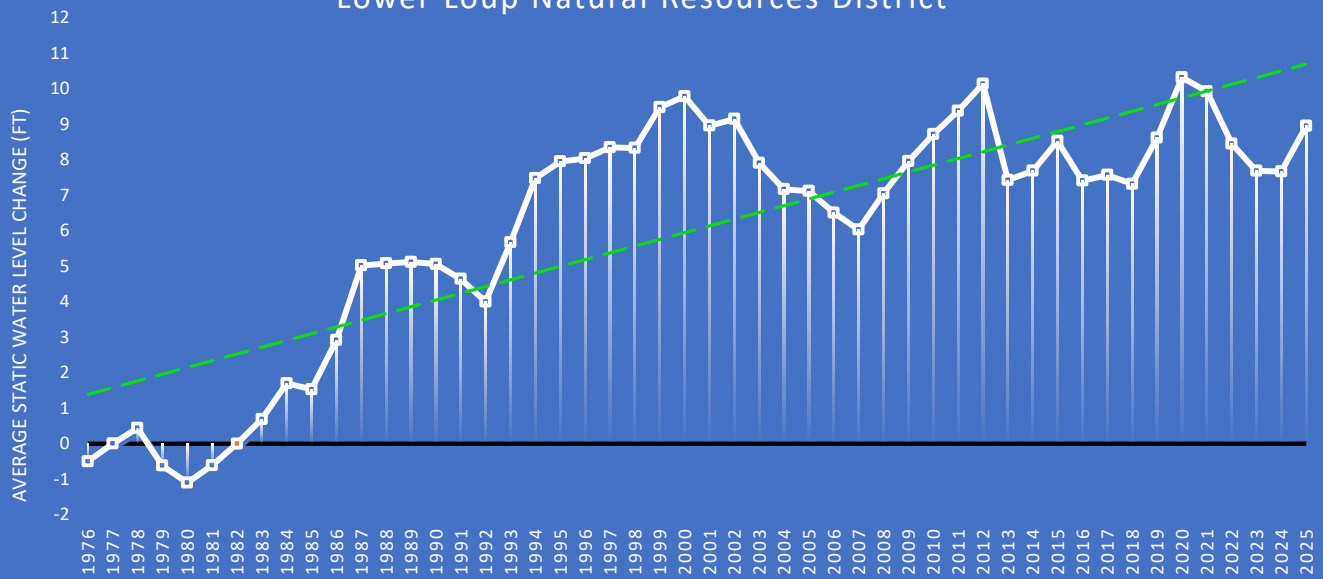
$y = -0.0101x + 0.2607$



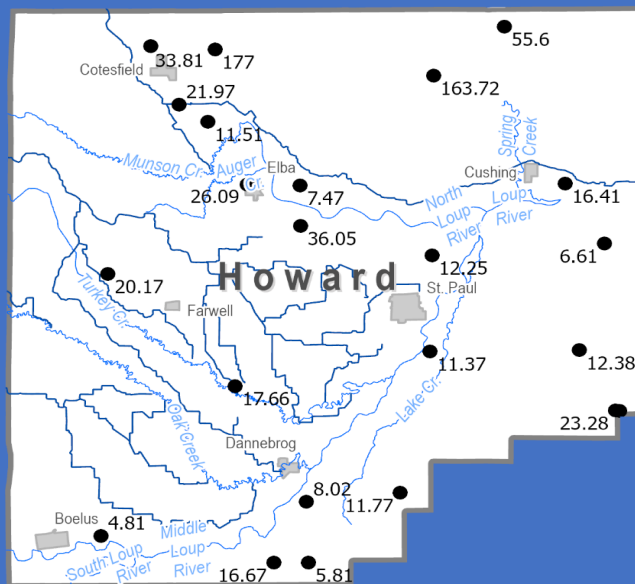
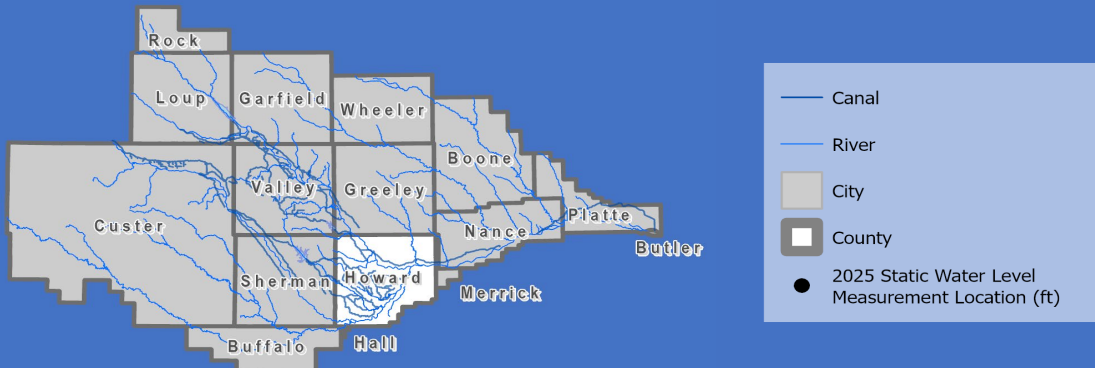
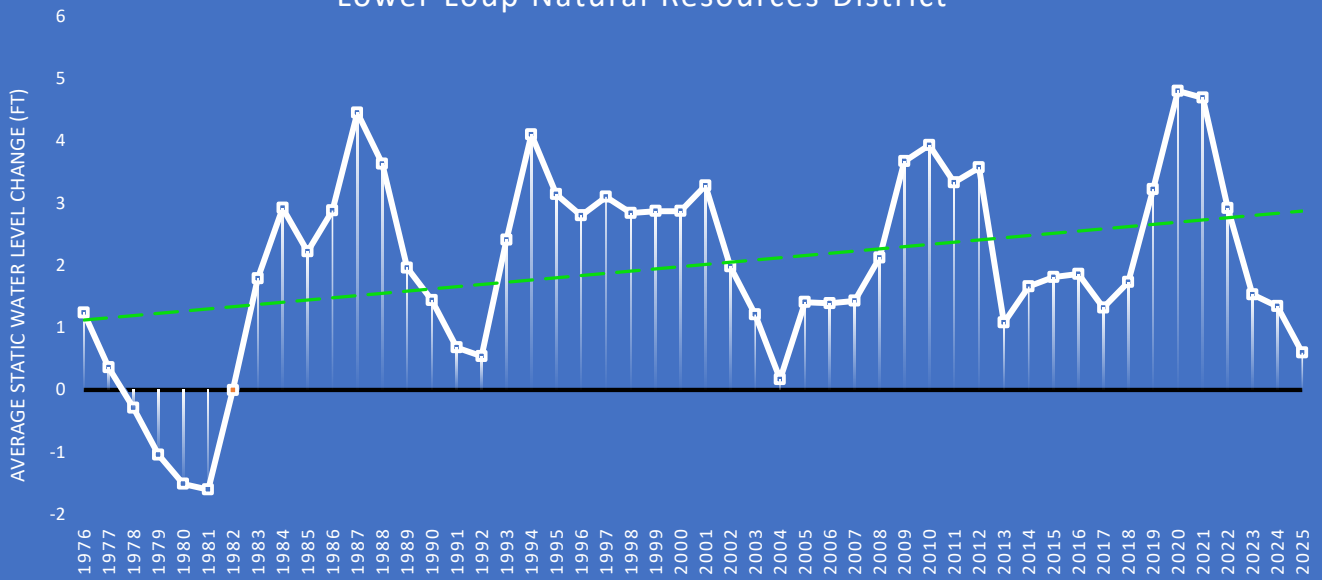
GARFIELD COUNTY - Spring SWL Change Lower Loup Natural Resources District



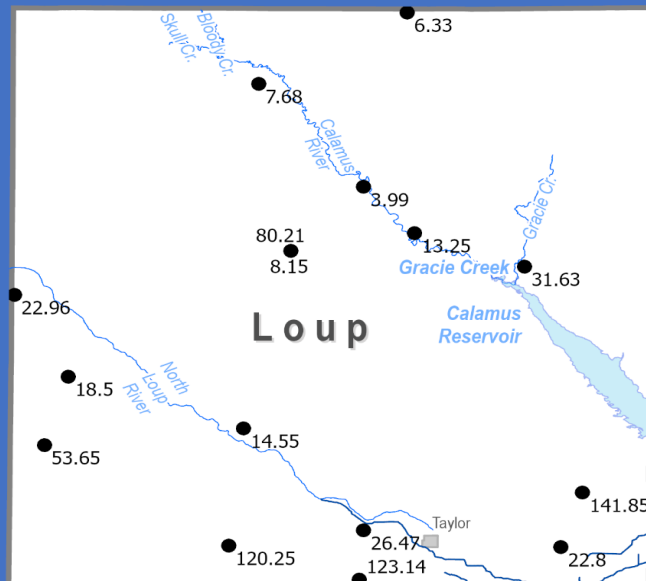
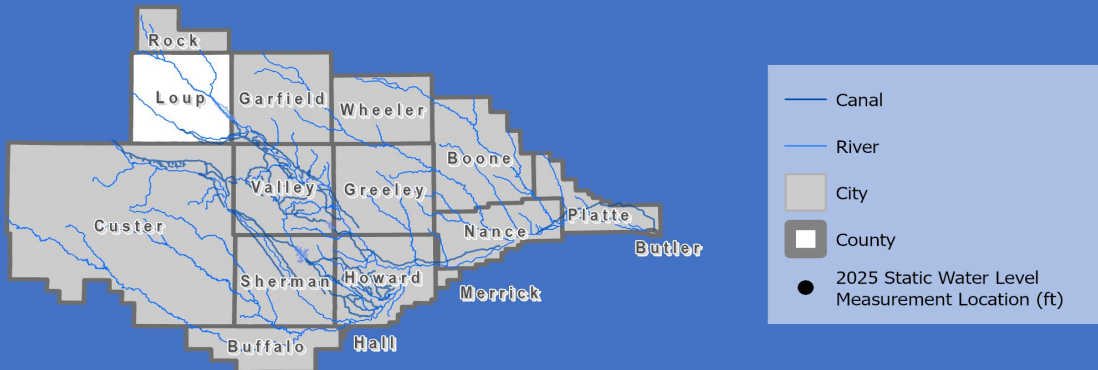
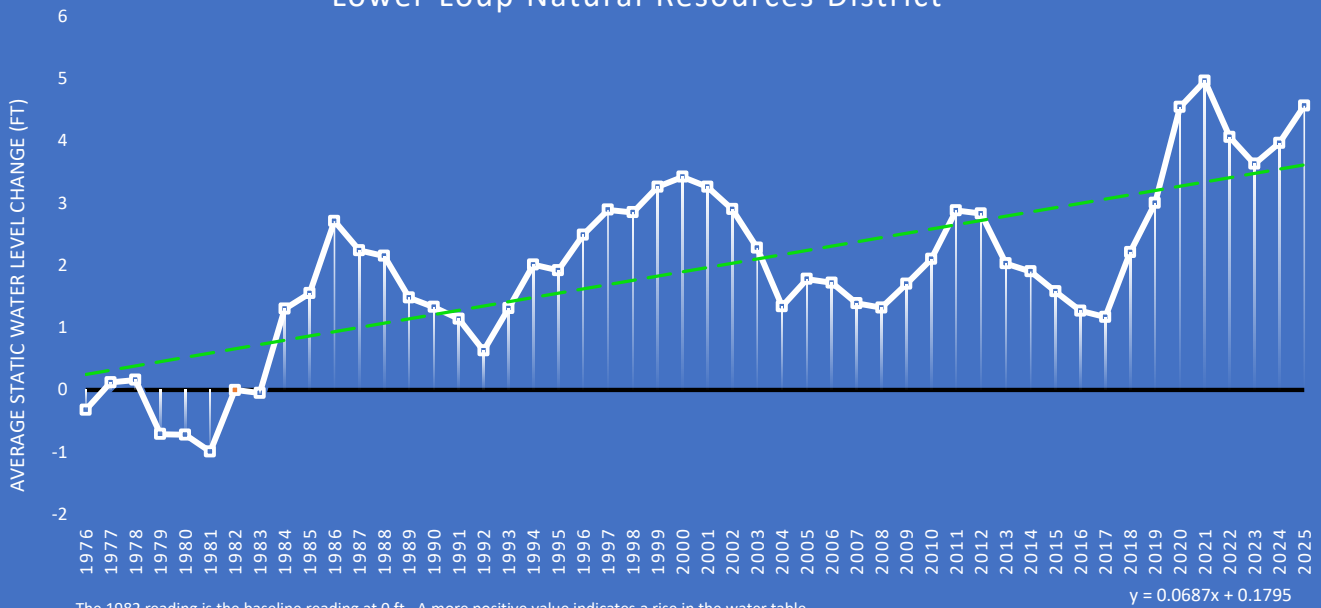
GREELEY COUNTY - Spring SWL Change Lower Loup Natural Resources District



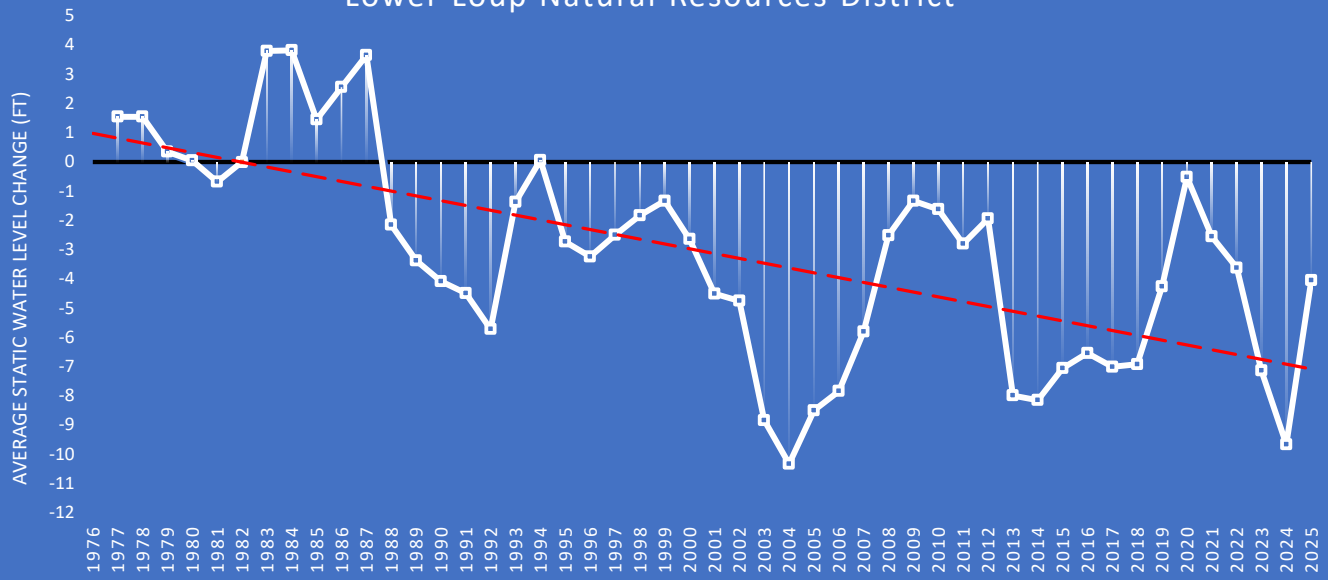
HOWARD COUNTY - Spring SWL Change Lower Loup Natural Resources District



LOUP COUNTY - Spring SWL Change Lower Loup Natural Resources District

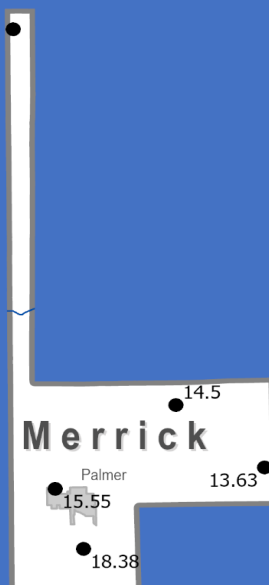
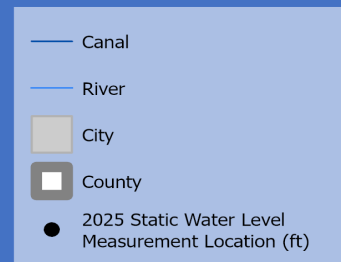
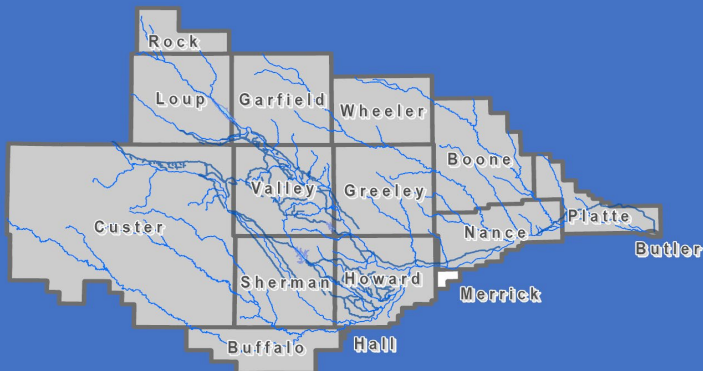


MERRICK COUNTY - Spring SWL Change Lower Loup Natural Resources District

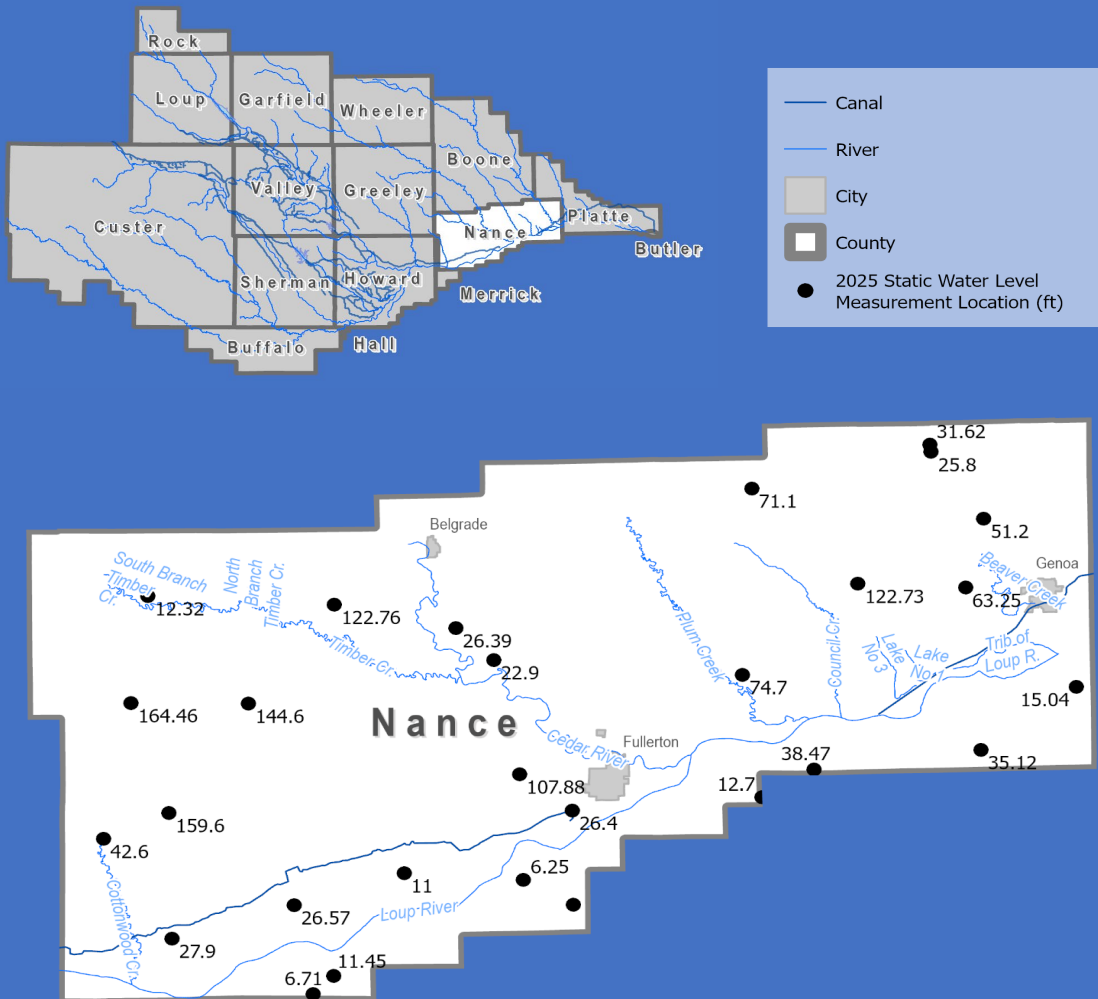
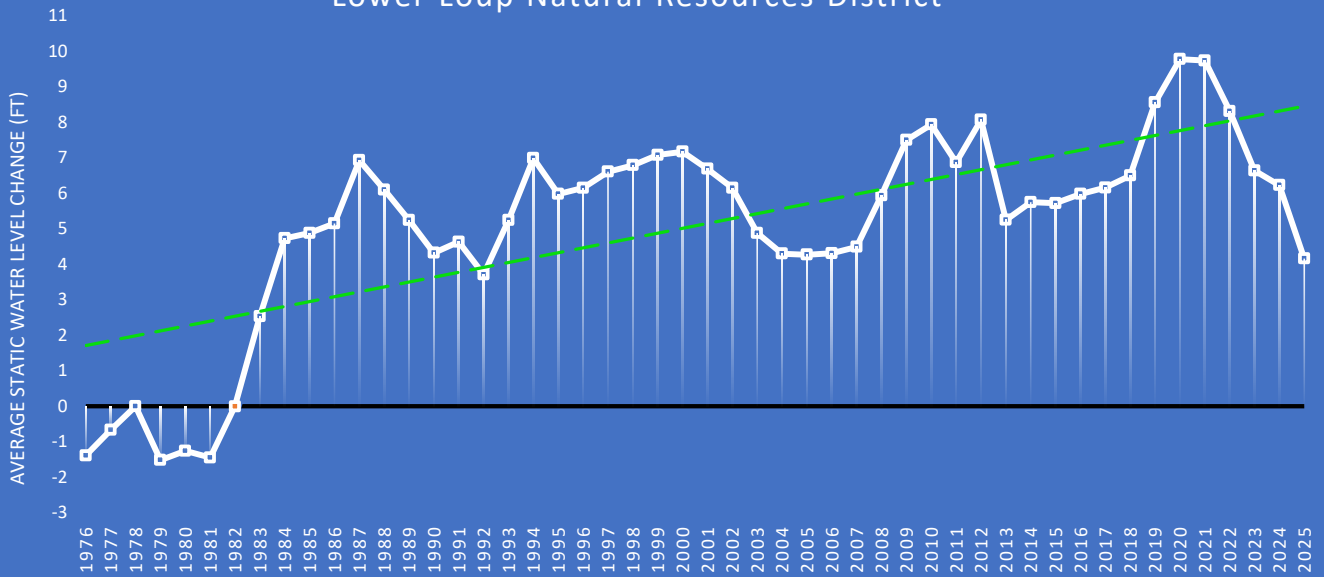


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

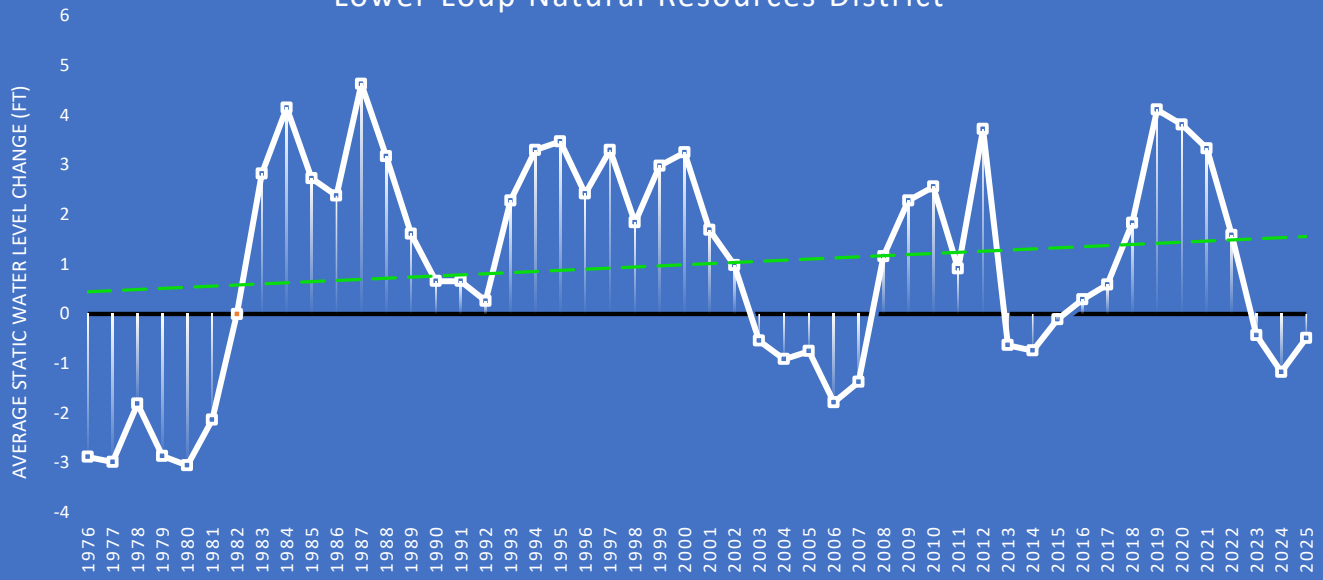
$$y = -0.1646x + 1.1452$$



NANCE COUNTY - Spring SWL Change Lower Loup Natural Resources District

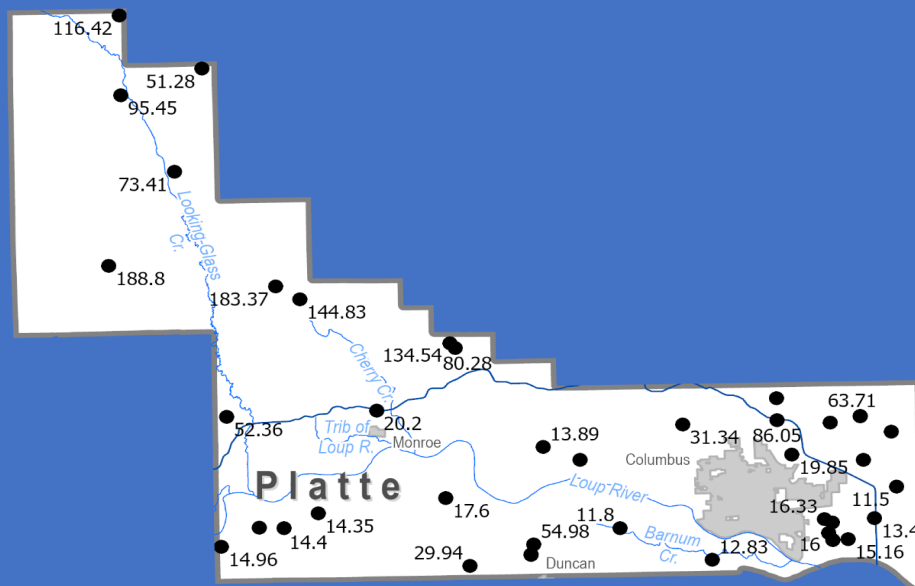
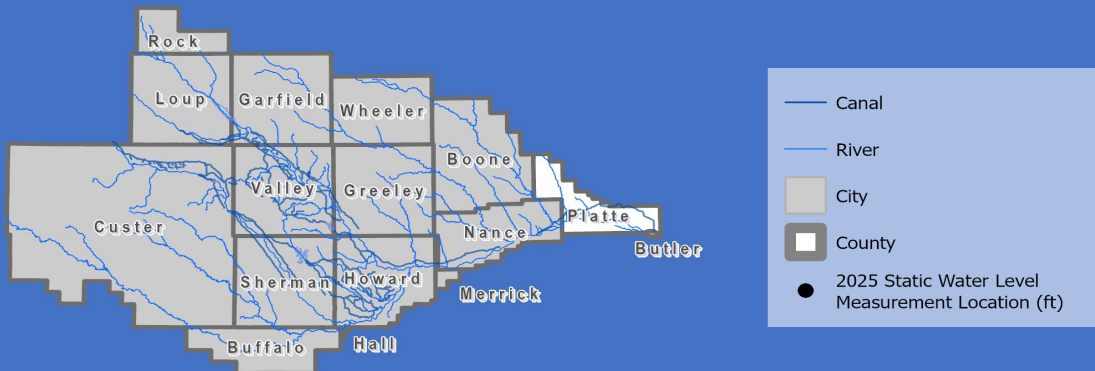


PLATTE COUNTY - Spring SWL Change Lower Loup Natural Resources District

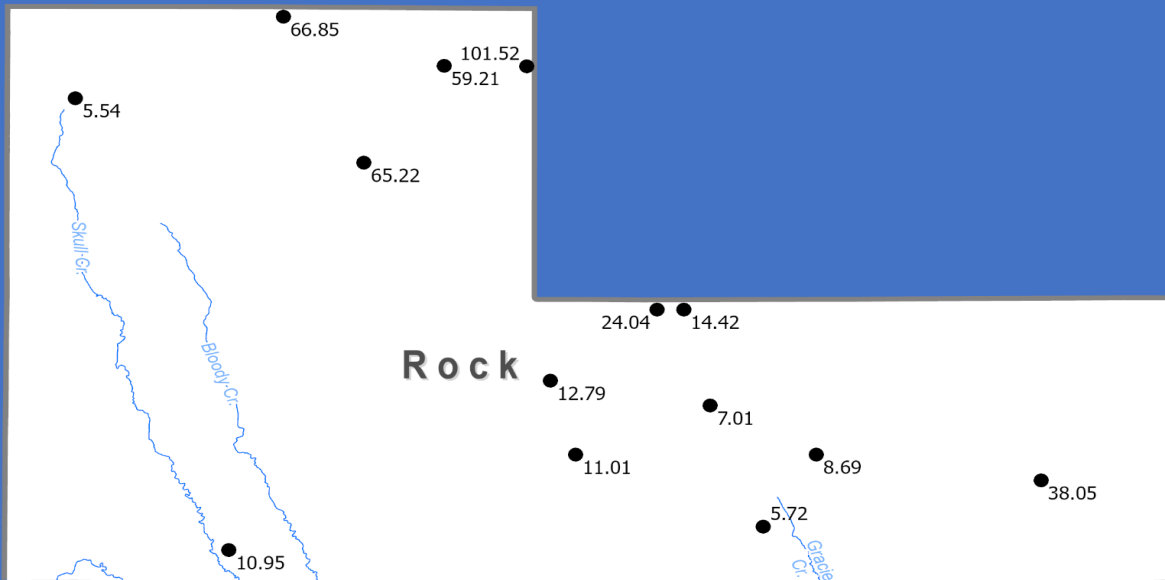
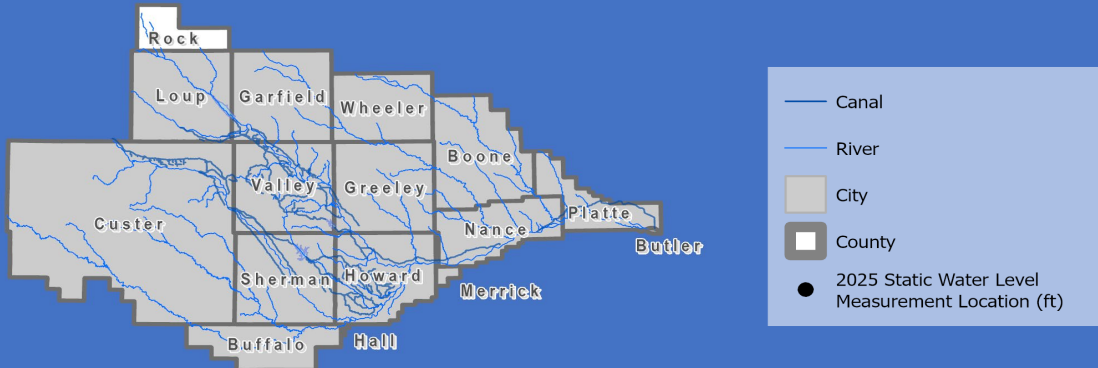
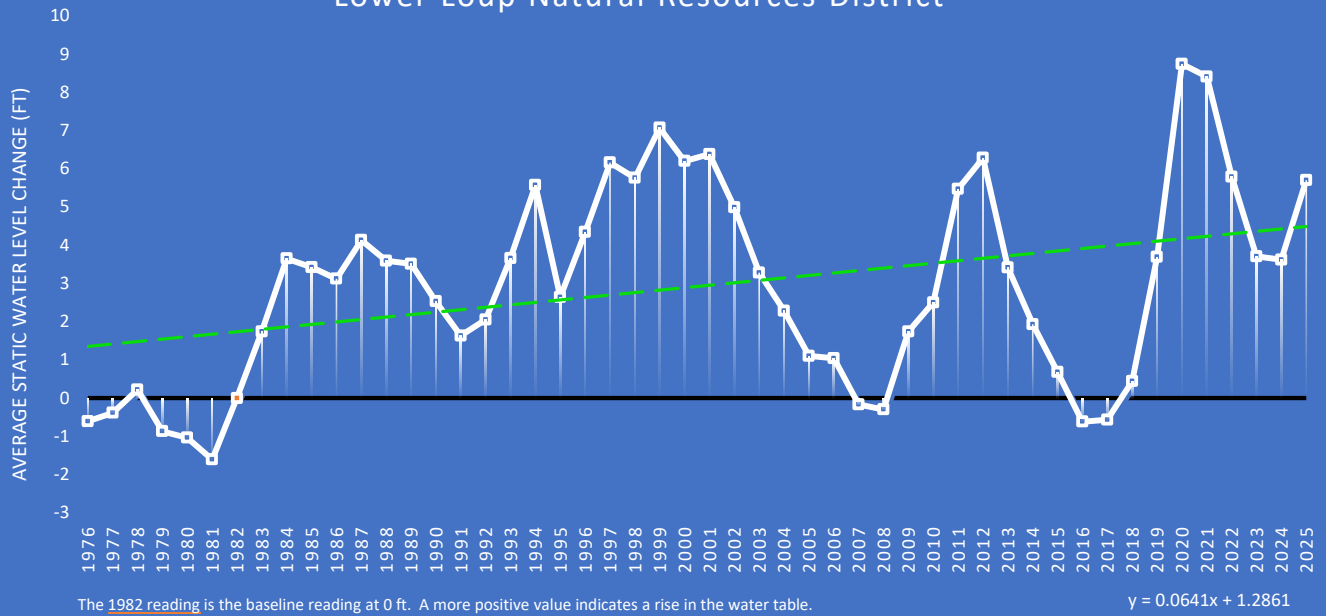


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

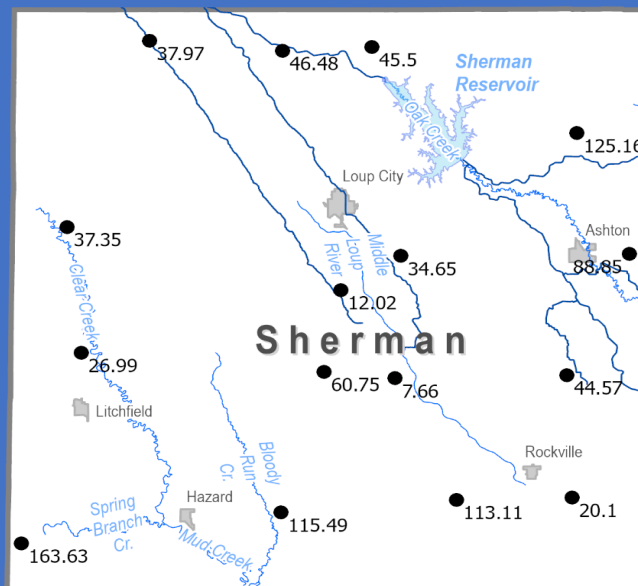
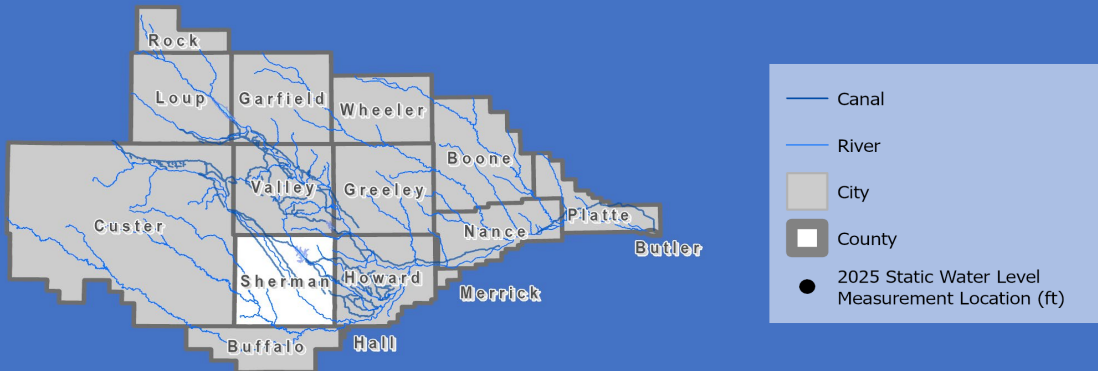
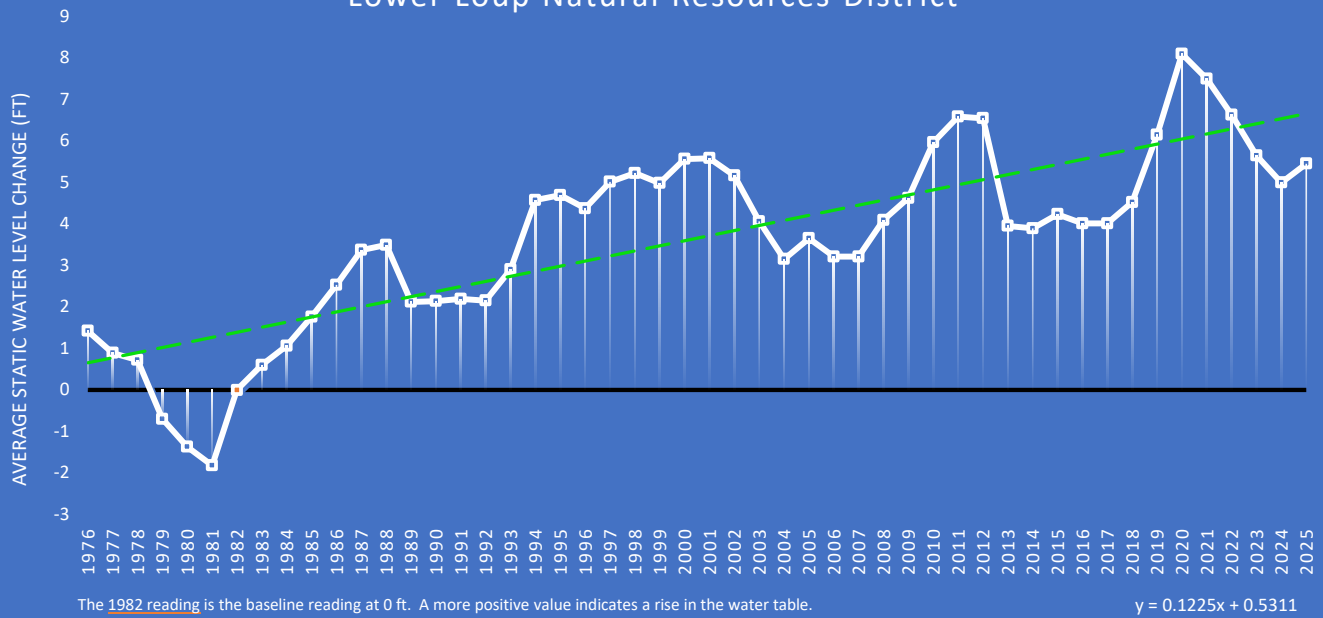
$$y = 0.0227x + 0.424$$



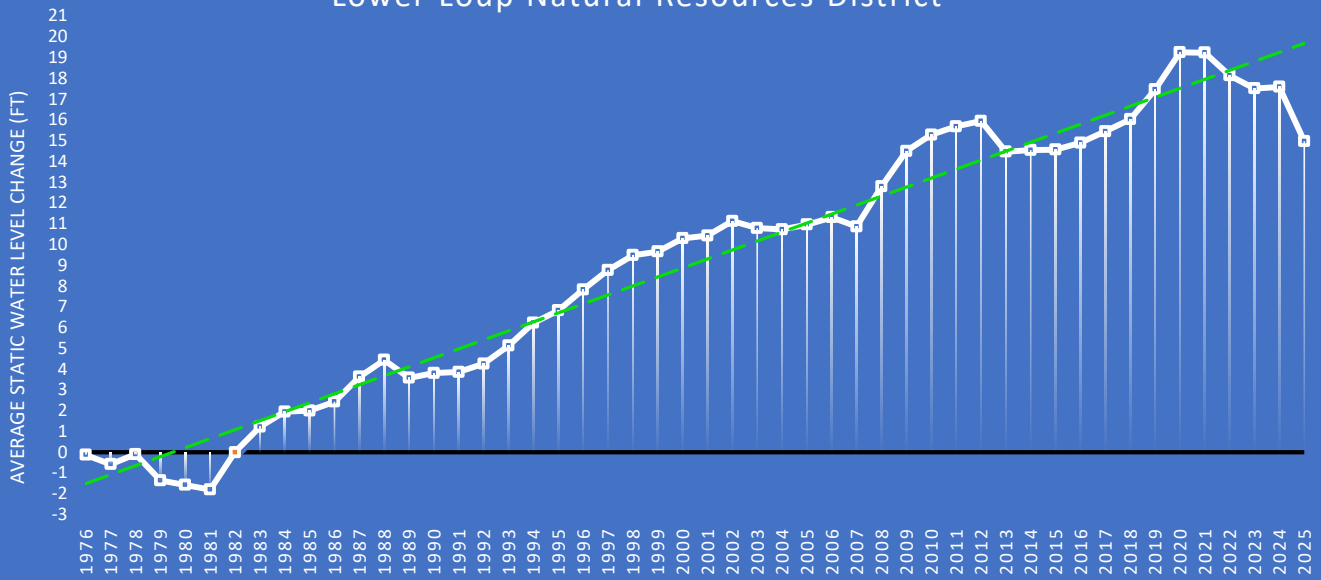
ROCK COUNTY - Spring SWL Change Lower Loup Natural Resources District



SHERMAN COUNTY - Spring SWL Change Lower Loup Natural Resources District

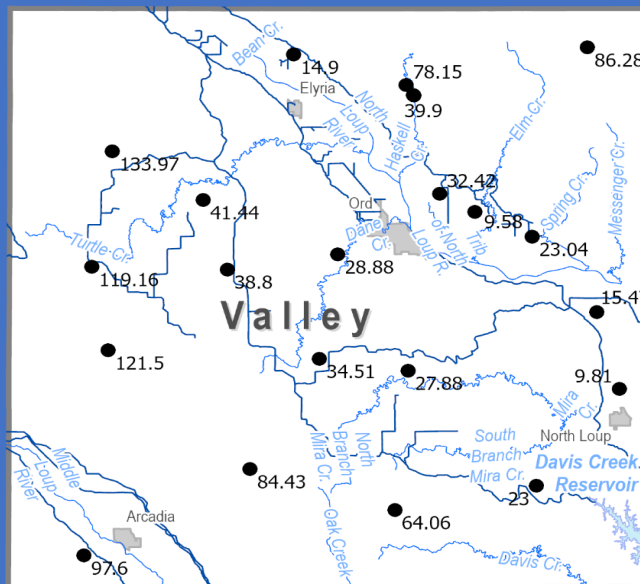
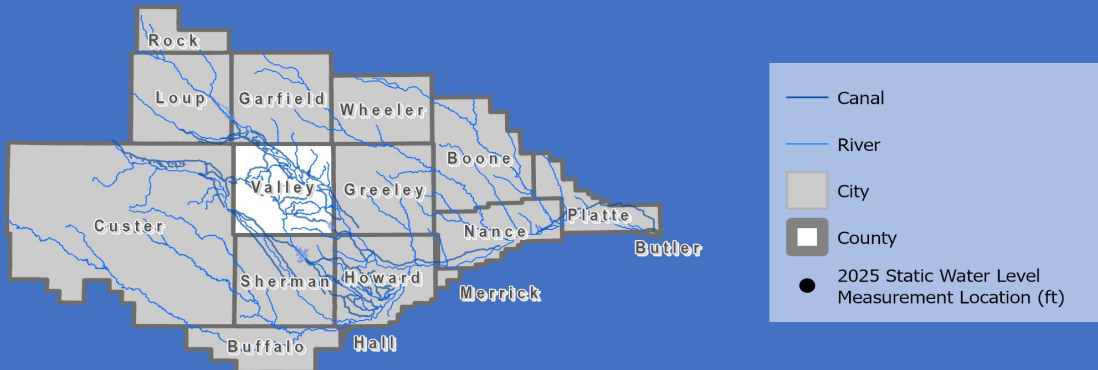


VALLEY COUNTY - Spring SWL Change Lower Loup Natural Resources District

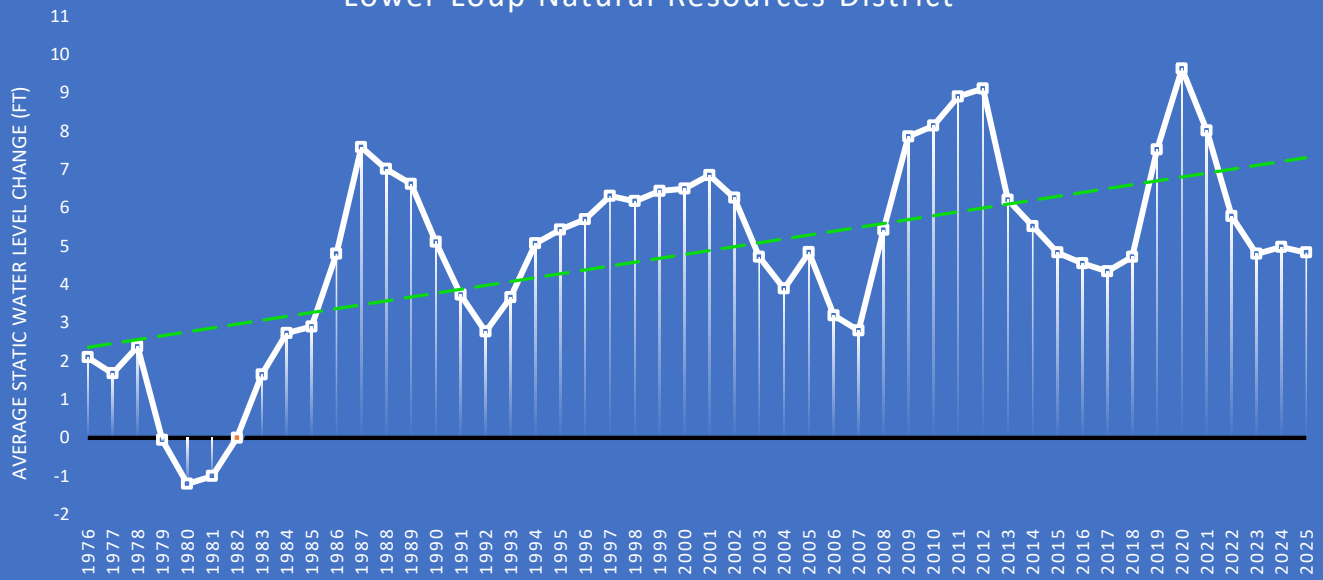


The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.4327x - 1.9444$$

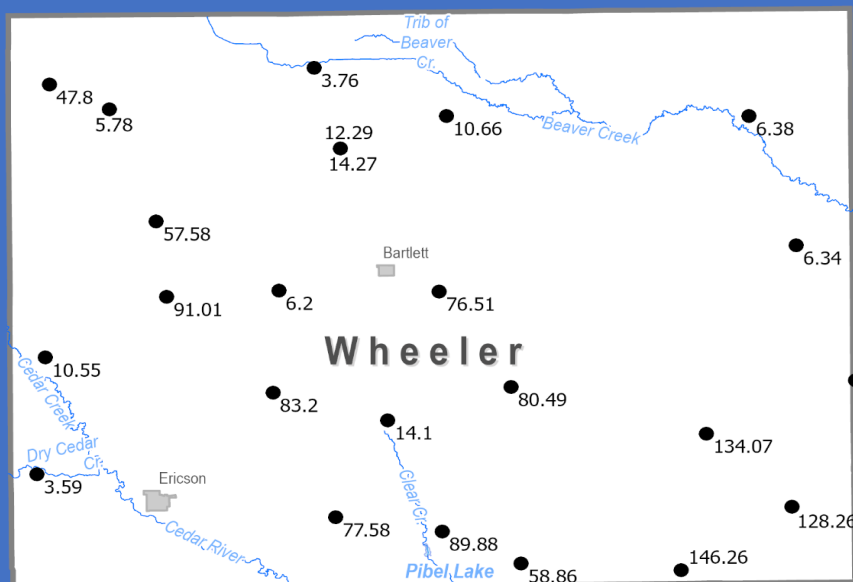
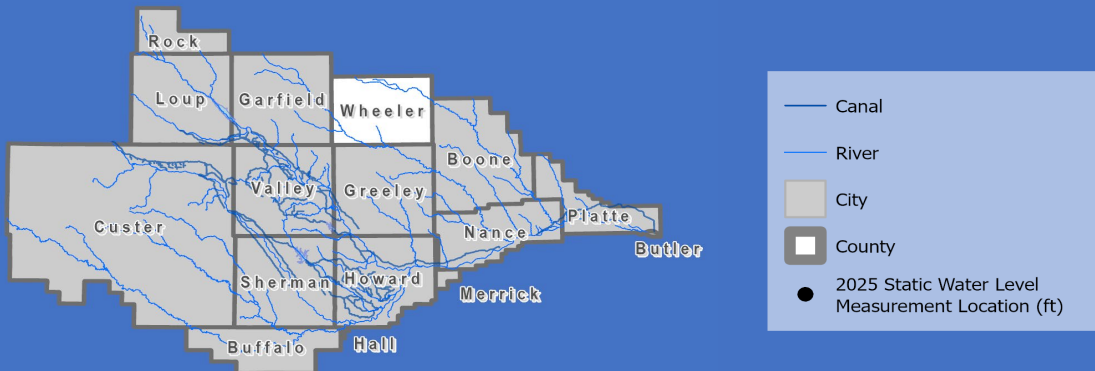


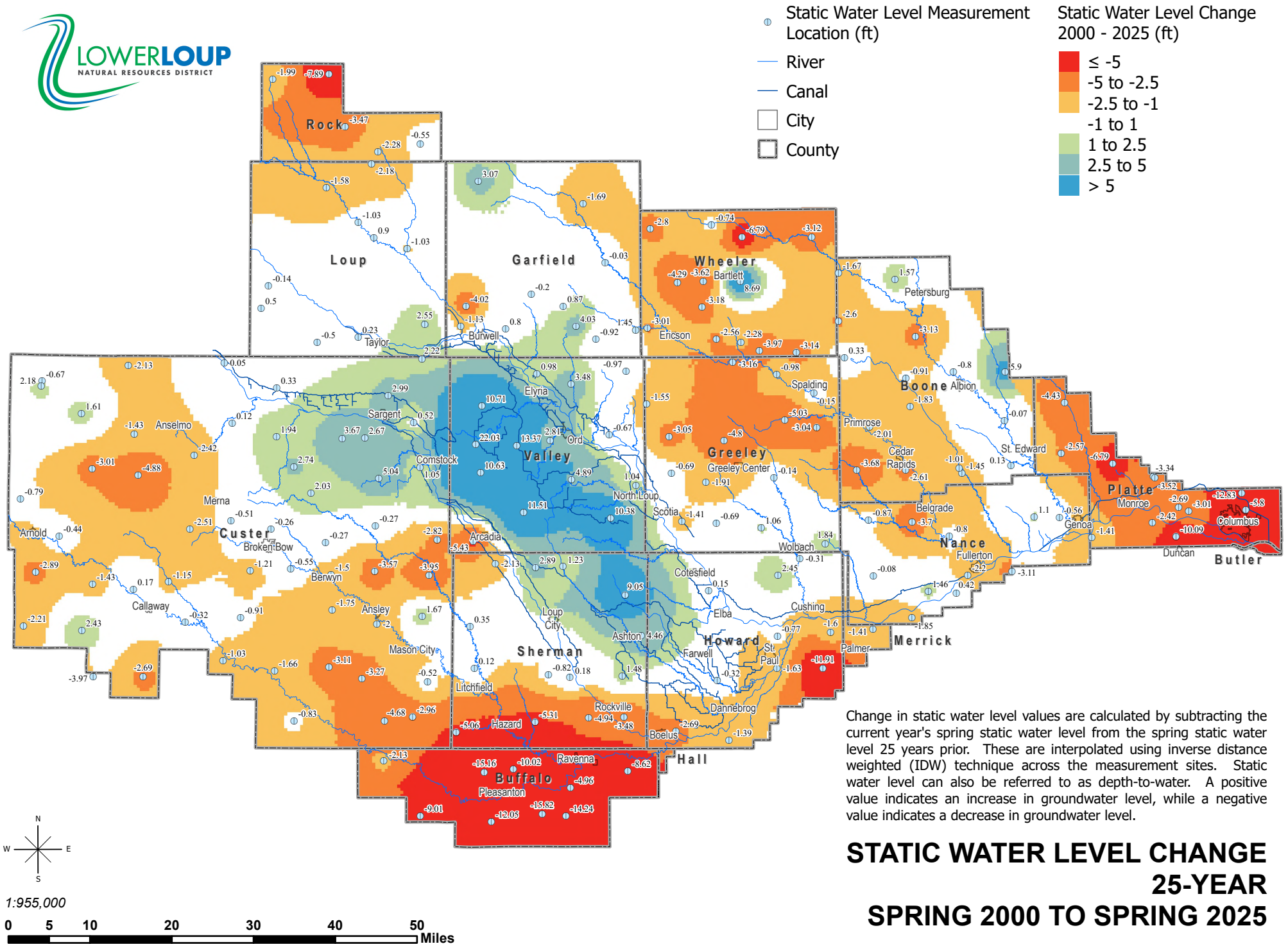
WHEELER COUNTY - Spring SWL Change Lower Loup Natural Resources District



The 1982 reading is the baseline reading at 0 ft. A more positive value indicates a rise in the water table.

$$y = 0.101x + 2.2599$$







● Static Water Level Measurement Location (ft)

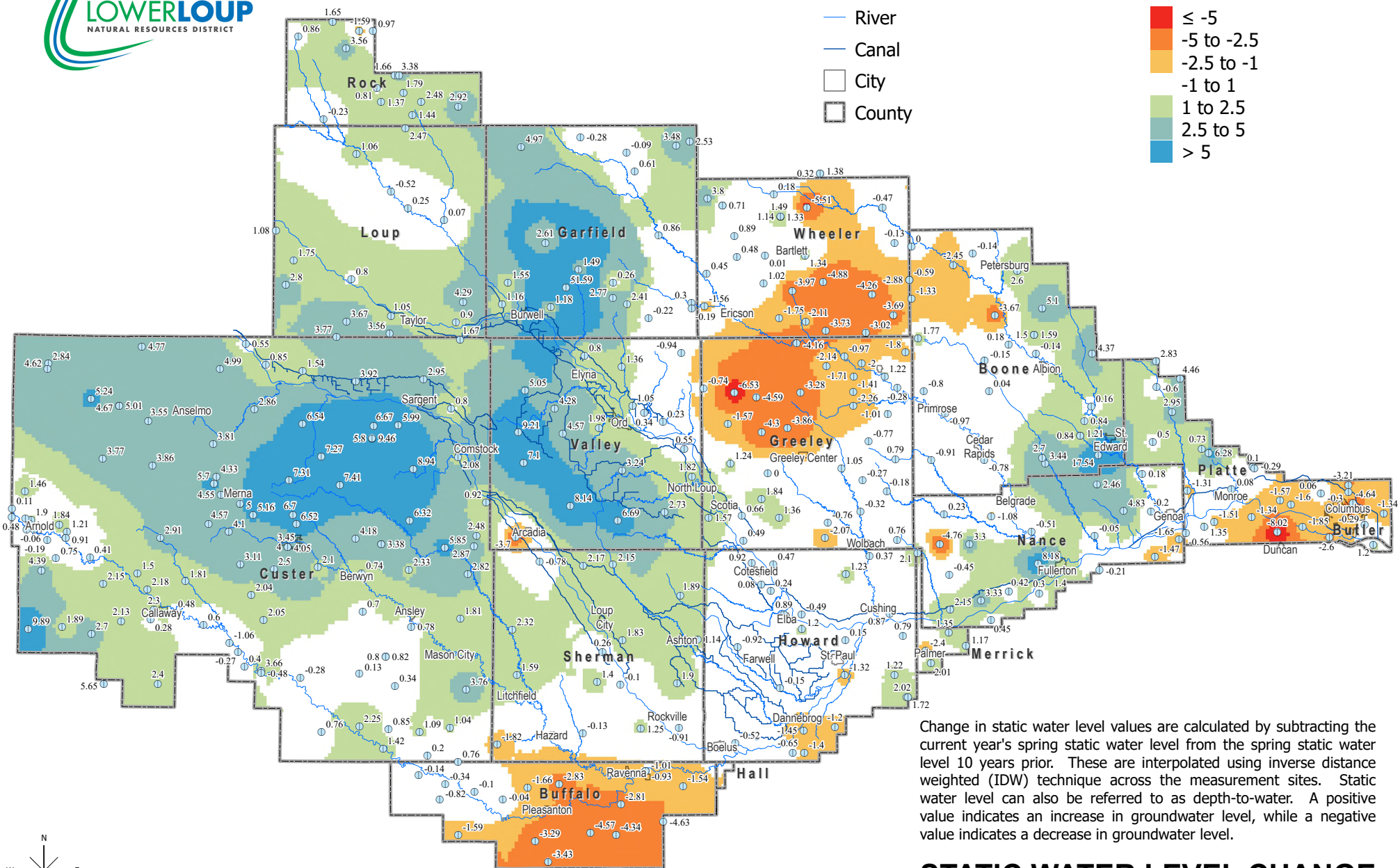
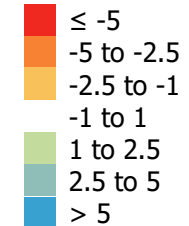
— River

— Canal

□ City

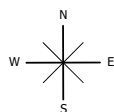
□ County

Static Water Level Change 2015 - 2025 (ft)



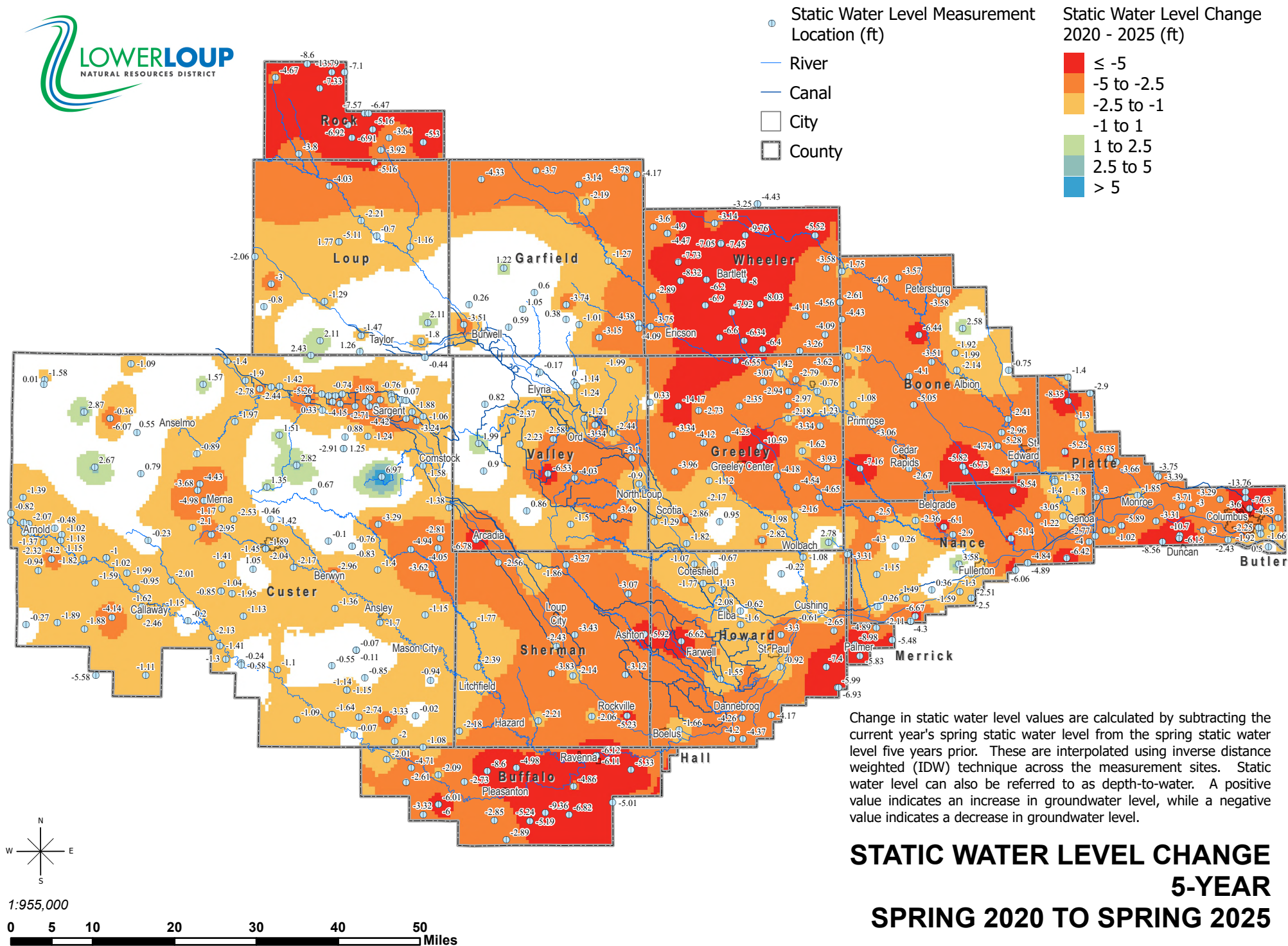
Change in static water level values are calculated by subtracting the current year's spring static water level from the spring static water level 10 years prior. These are interpolated using inverse distance weighted (IDW) technique across the measurement sites. Static water level can also be referred to as depth-to-water. A positive value indicates an increase in groundwater level, while a negative value indicates a decrease in groundwater level.

STATIC WATER LEVEL CHANGE 10-YEAR SPRING 2015 TO SPRING 2025



1:955,000

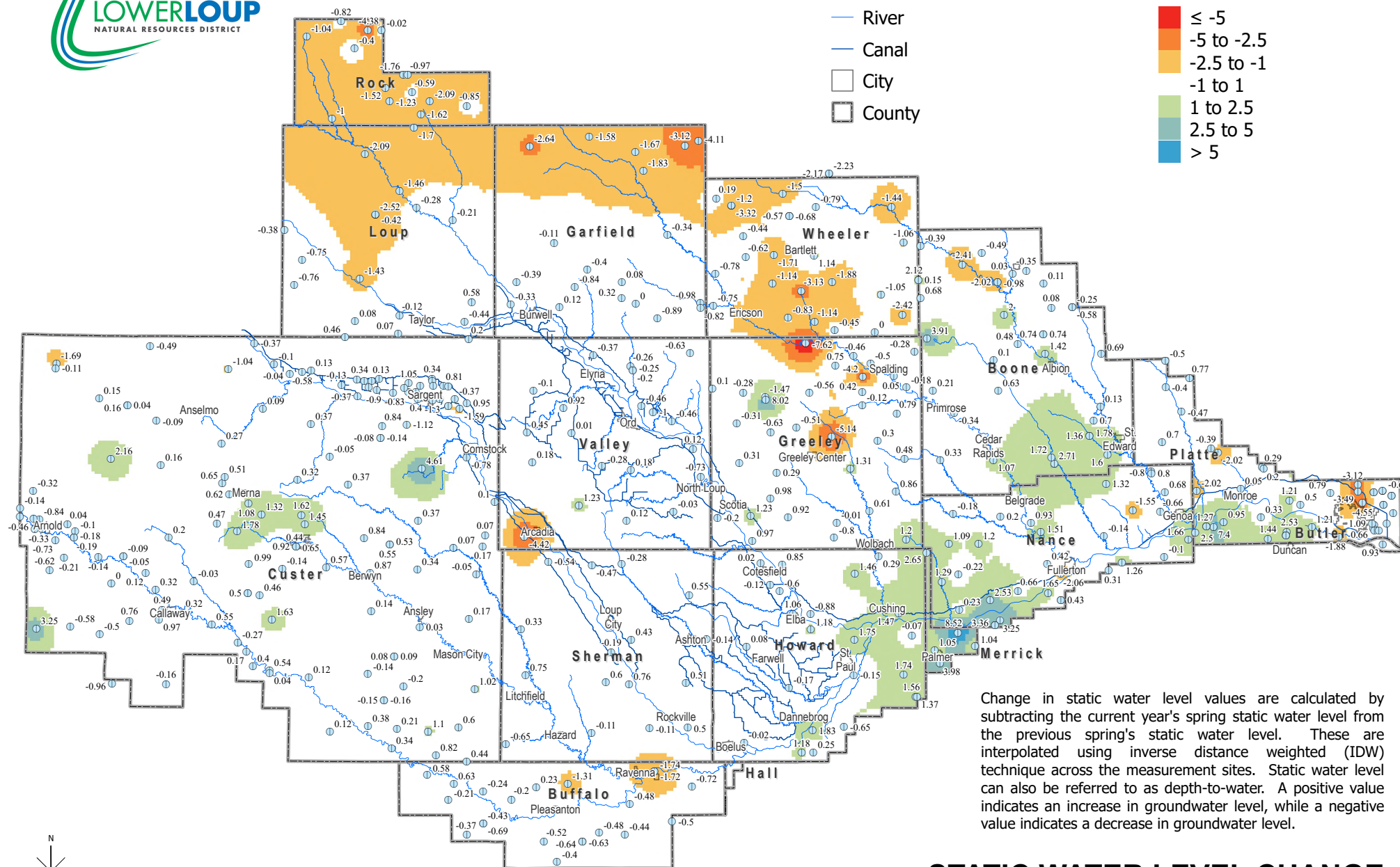
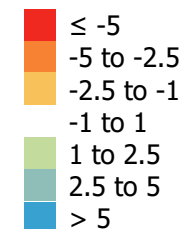




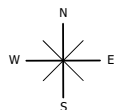


- All Static Water Level Measurement Location (ft)
- River
- Canal
- City
- County

Static Water Level Change
2024 - 2025 (ft)



Change in static water level values are calculated by subtracting the current year's spring static water level from the previous spring's static water level. These are interpolated using inverse distance weighted (IDW) technique across the measurement sites. Static water level can also be referred to as depth-to-water. A positive value indicates an increase in groundwater level, while a negative value indicates a decrease in groundwater level.



1:955,000



STATIC WATER LEVEL CHANGE 1-YEAR SPRING 2024 TO SPRING 2025

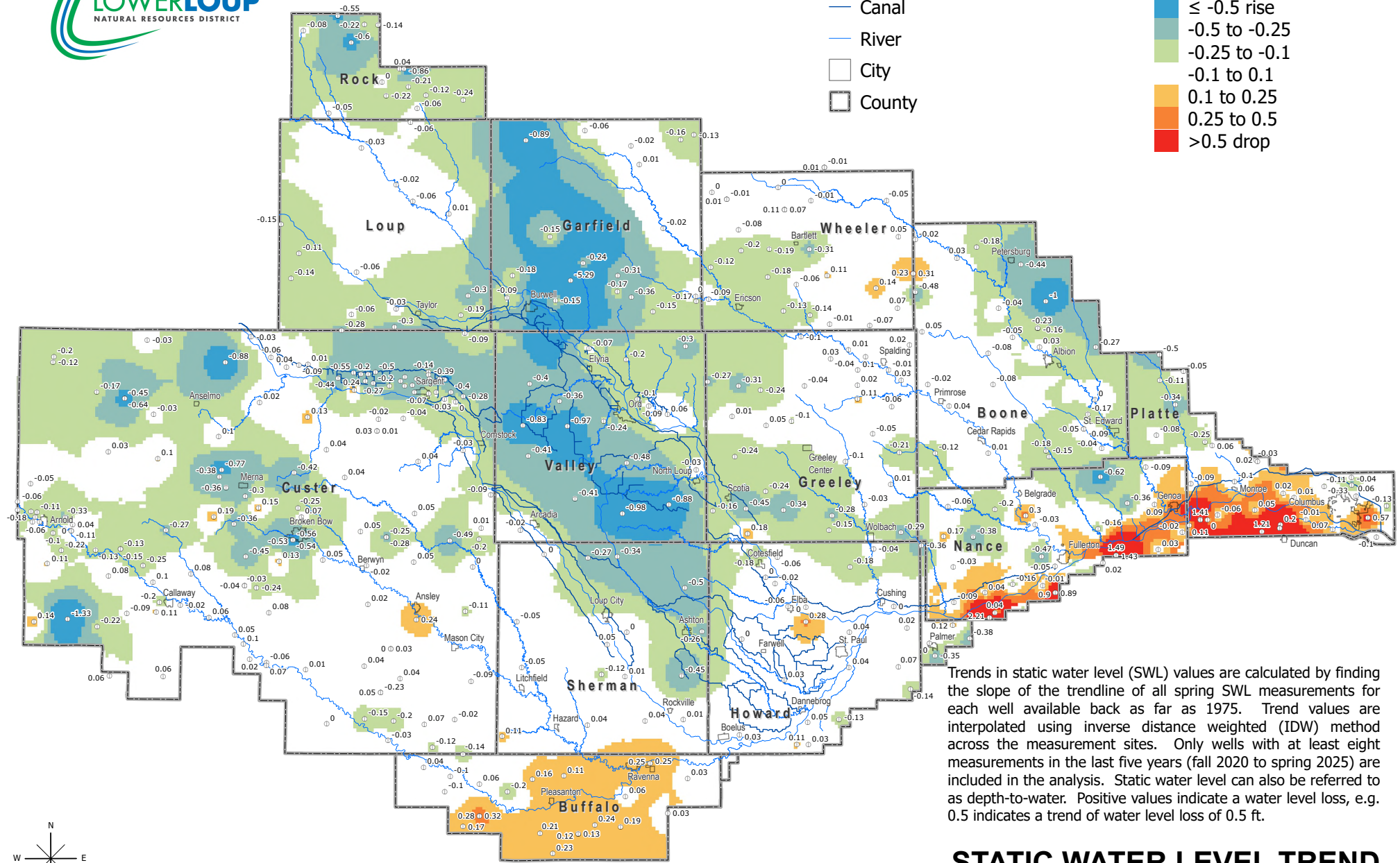


Static Water Level Trend
Location (ft)

- Canal
- River
- City
- County

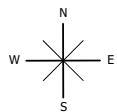
Static Water Level Trend
1975 - 2025 (ft)

- ≤ -0.5 rise
- 0.5 to -0.25
- 0.25 to -0.1
- 0.1 to 0.1
- 0.1 to 0.25
- 0.25 to 0.5
- >0.5 drop



Trends in static water level (SWL) values are calculated by finding the slope of the trendline of all spring SWL measurements for each well available back as far as 1975. Trend values are interpolated using inverse distance weighted (IDW) method across the measurement sites. Only wells with at least eight measurements in the last five years (fall 2020 to spring 2025) are included in the analysis. Static water level can also be referred to as depth-to-water. Positive values indicate a water level loss, e.g. 0.5 indicates a trend of water level loss of 0.5 ft.

STATIC WATER LEVEL TREND ALL YEARS AVAILABLE SPRING 1975 TO SPRING 2025

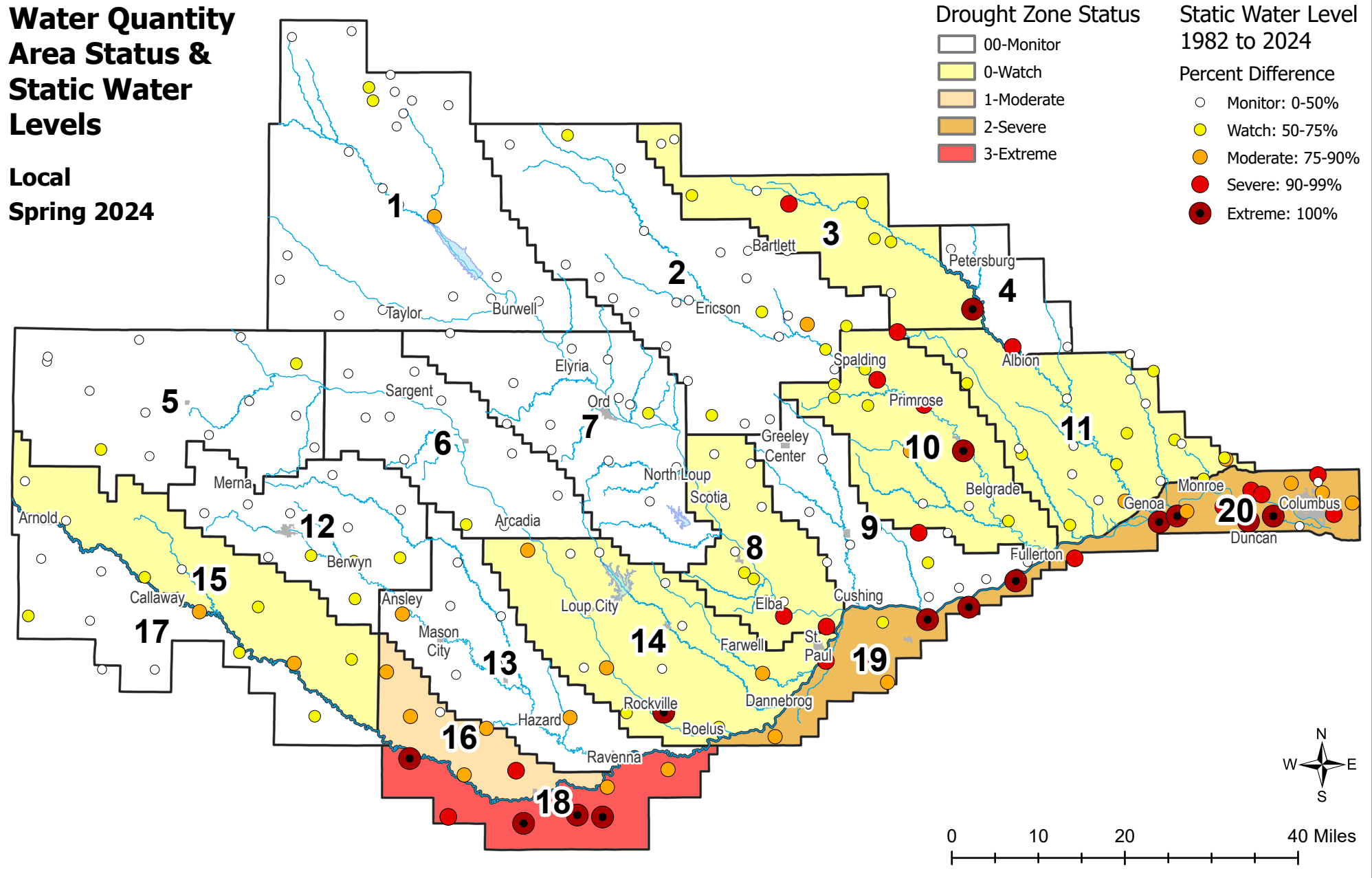


1:955,000

0 5 10 20 30 40 50 Miles

Water Quantity Area Status & Static Water Levels

Local
Spring 2024



Updated 4/11/2024



Percentage Difference is calculated as: The difference in the current year spring Static Water Level (SWL) minus the minimum spring SWL the well has on record divided by the difference in the spring maximum and minimum SWLs the well has on record.

Local Status of Drought Zones are classified using criteria outlined in the District's November 2022 Drought Management Plan. It can be found at <https://www.llnrd.org/resources/drought-management-plan>. The U.S. Drought Monitor live map is overlaid on the LLNRD Drought Zones to determine which status is most prominent in each zone during SWL measurements. The local and regional statuses are averaged to determine the final combined

Water Quantity Area Status & Static Water Levels

Local & Regional
Spring 2025

Drought Status

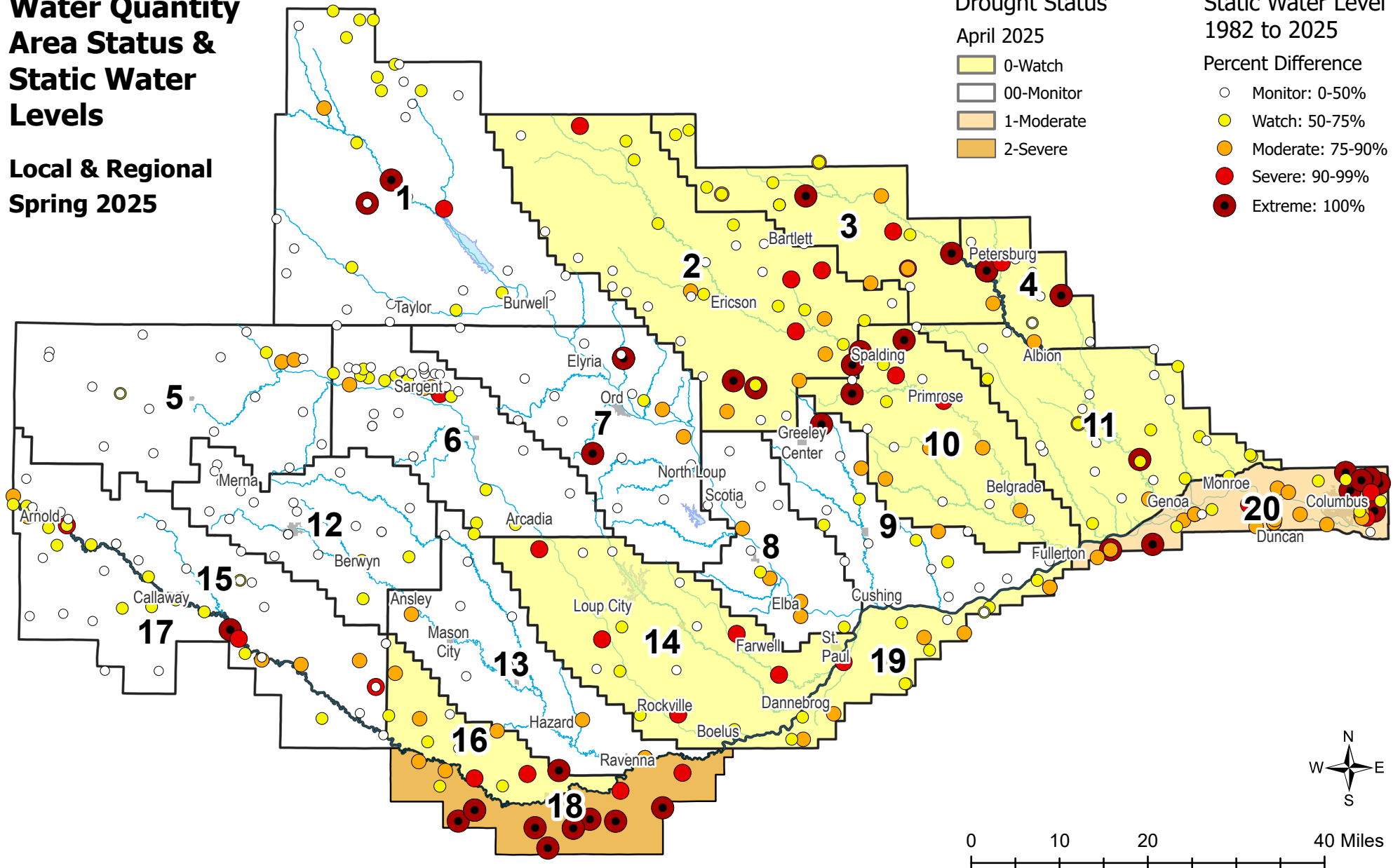
April 2025

- 0-Watch
- 00-Monitor
- 1-Moderate
- 2-Severe

Static Water Level 1982 to 2025

Percent Difference

- Monitor: 0-50%
- Watch: 50-75%
- Moderate: 75-90%
- Severe: 90-99%
- Extreme: 100%



Updated 4/10/2025



Percentage Difference is calculated as: The difference in the current year spring Static Water Level (SWL) minus the minimum spring SWL the well has on record divided by the difference in the spring maximum and minimum SWLs the well has on record.

Local Status of Drought Zones are classified using criteria outlined in the District's November 2022 Drought Management Plan. It can be found at <https://www.llnrd.org/resources/drought-management-plan>. The U.S. Drought Monitor live map is overlaid on the LLNRD Drought Zones to determine which status is most prominent in each zone during SWL measurements. The local and regional statuses are averaged to determine the final combined status.