3/29/2023

2023 Spring Ground Water Level Report

SOUTH PLATTE NATURAL RESOURCES DISTRICT

This report summarizes the results of the spring 2023 groundwater level measurement program. Ground water levels were collected by South Platte NRD staff Chris Kaiser and Tyler Sanders. We experienced a drought during 2020, 2021, and 2022. In 2022 precipitation levels were roughly 6.6" below historical averages while ground water levels decreased -1.28 feet on average. As dry as 2022 was, 2012 was still the driest year in recent memory. Precipitation amounts during 2012 were -8.5" below historical averages. The drought of 2022 can be compared to the drought of 2002.

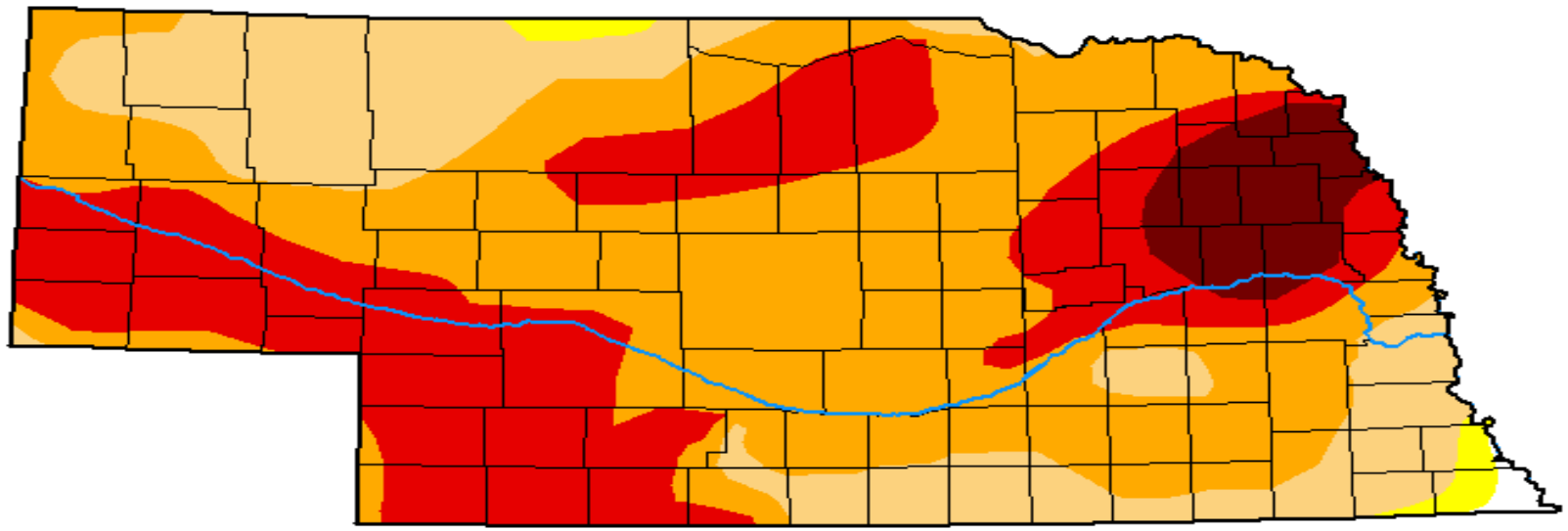
The Pine Bluff to Oliver Reservoir subarea, Buffalo Bend to Sidney, and the Sidney to Colorado subarea are comprised of the Brule formation. Because of the lack of porosity in the Brule formation (low storage capability), these areas are the quickest to show recharge after a wet year while they are also the quickest to show declines during a dry year. The Ogallala formation on the other hand, has a high degree of porosity (large storage capacity) and may not show any increases or decreases after a wet year. It also could take years before that water reaches the aquifer in the deeper portions. Districtwide, water levels decreased -1.28 feet on average based on 200 well measurements.

Attached in this report are data correlating precipitation changes from normal amounts compared to the average decline/incline in ground water levels. A map indicating allocation subareas and a map indicating how we correlate water level changes within geological boundaries. Included are one, six, fourteen, twenty-five and forty year water level difference maps. Allocations took effect in 2009 and the fourteen-year map show comparisons of where water levels have changed since the District was under a full allocation. Landowners who have NRD observation wells installed on their property, as well as landowners from whom we take irrigation well measurements are sent hydrographs of their current water level each spring. The saturated thickness map included in this report has been updated with new information that was obtained from over 700 oil and gas well logs as well as CSD testhole and NRD monitoring well data.

*Any inquiries regarding other information that is not included in this report (geology, well construction, hydrographs) can be obtained at the SPNRD office.

U.S. Drought Monitor
Nebraska

March 21, 2023
(Released Thursday, Mar. 23, 2023)
Valid 8 a.m. EDT



Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

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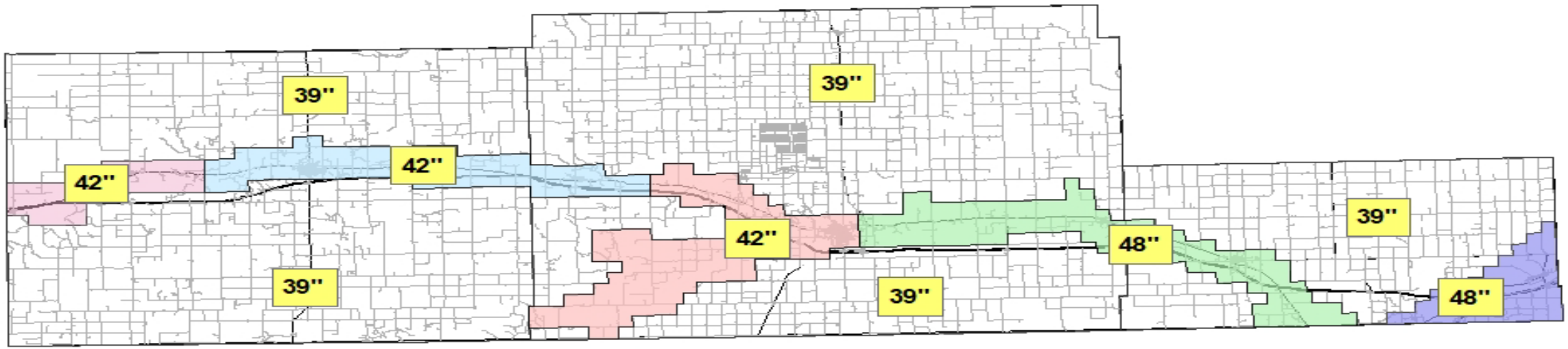
National Drought Mitigation Center

droughtmonitor.unl.edu

South Platte Natural Resources District

Allocation Subareas & Allocations (Acre-inches) for the 2022 through 2024 Allocation Period



Legend

- A - Wyoming State Line to Oliver Reservoir (RD 27)
- B - Oliver Reservoir to Buffalo Bend (RD 87)
- C - Buffalo Bend to Sidney (RD 115)
- D - Sidney to Colorado State Line
- E - South Platte Valley
- F - Tablelands

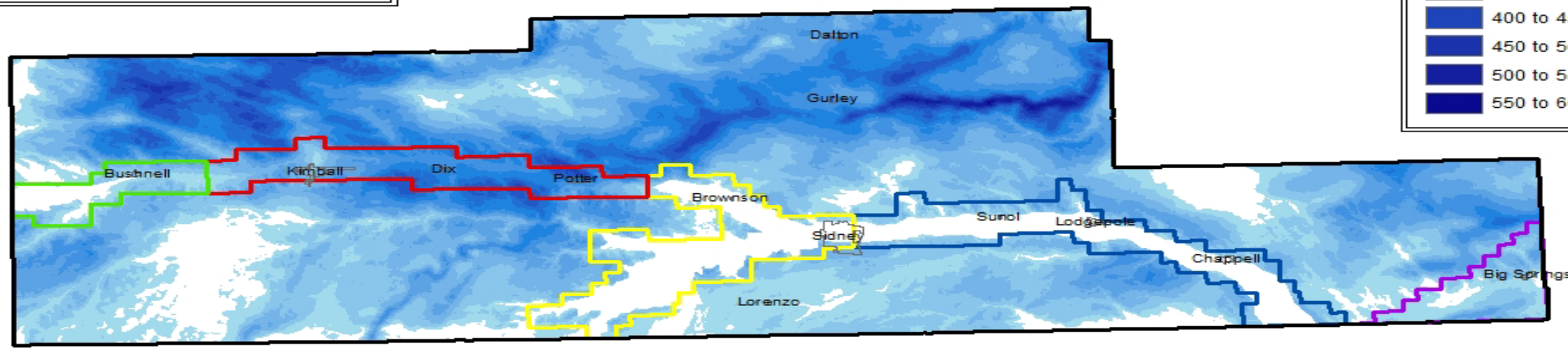
Saturated Thickness Ogallala Aquifer

Subareas

- Pine Bluffs to Oliver Reservoir
- Oliver Reservoir to Buffalo Bend
- Buffalo Bend to Sidney
- Sidney to Colorado
- South Platte Valley

Feet

- 0
- 0 to 50
- 50 to 100
- 100 to 150
- 150 to 200
- 200 to 250
- 250 to 300
- 300 to 350
- 350 to 400
- 400 to 450
- 450 to 500
- 500 to 550
- 550 to 600



0 10 20 40 60 80 Miles

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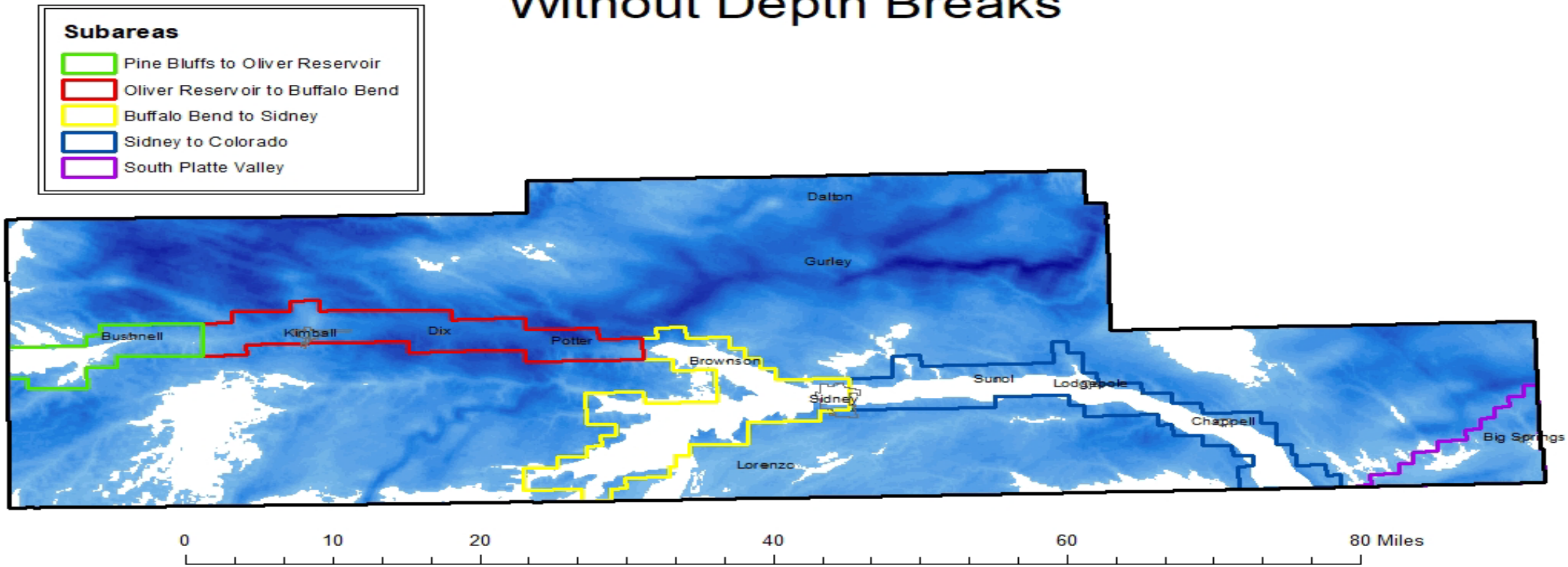
NATURAL RESOURCES DISTRICT

Saturated Thickness Ogallala Aquifer

Without Depth Breaks



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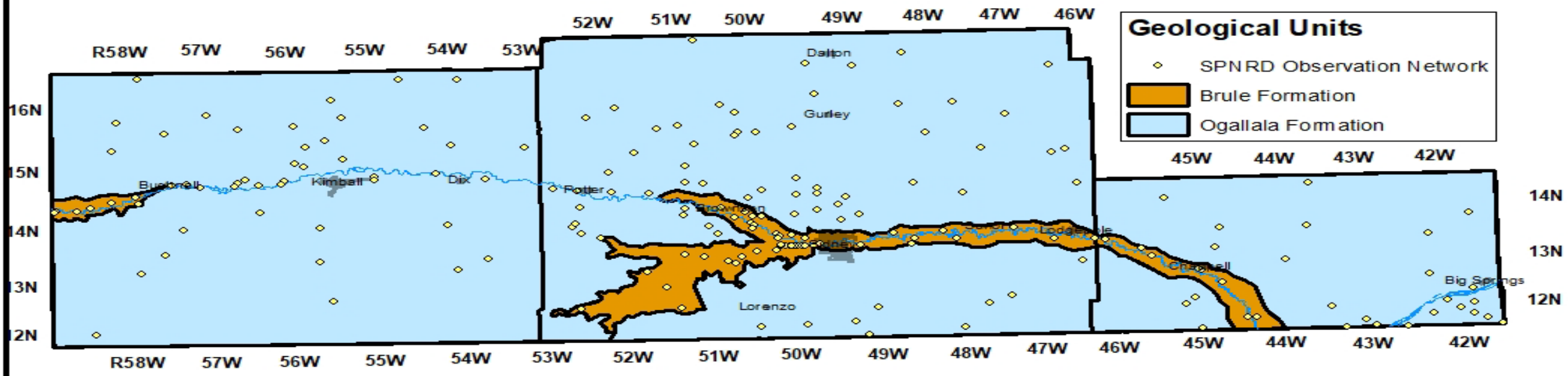
SPNRD Geological Breakdowns



All wells located within each geological unit are only influenced by wells within each sole unit. That is, wells located in the southern ogallala unit are only influenced by the wells located there. It does not "share" water, nor is it influenced with wells in the Brule Formation. As of this time, the SPNRD has determined there is no hydrologic connectivity between the brule and ogallala formations, respectively. All maps have been created in this manner. The geological units described above are derived from the Platte River Cooperative Hydrology Study (COHYST).

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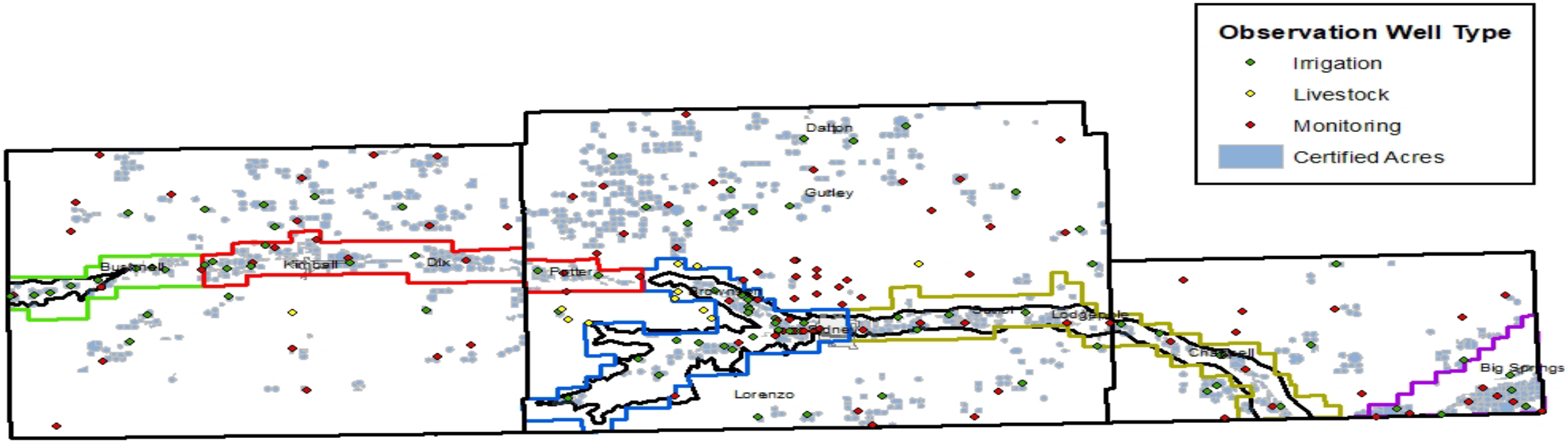
SPNRD Observation Well Network



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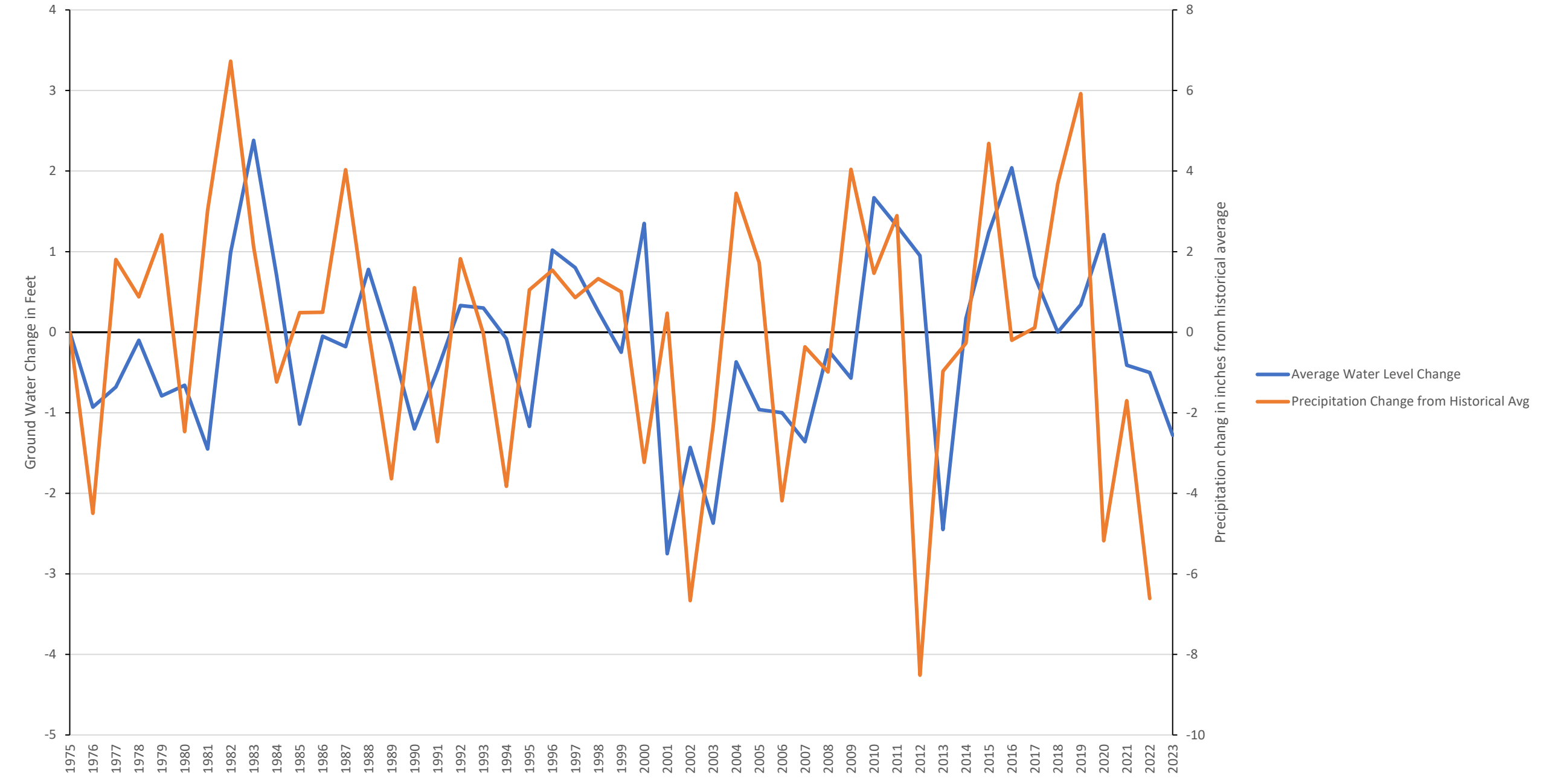
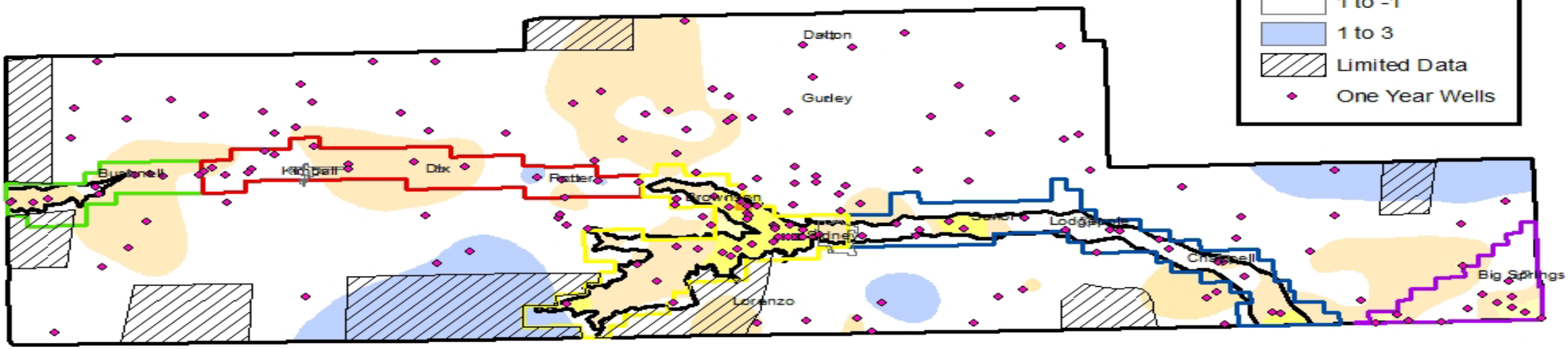
Groundwater and Precipitation Accumulation Changes 1975-2023



SPNRD 1 Year Water Level Differences



South Platte NRD 1 Year Stats by Subarea				
Subarea	**Ave.**	**Max**	**Min**	**# of Wells**
Pine Bluffs to Oliver	-1.21	0.66	-2.37	11
Oliver to Buffalo Bend	-0.85	1.54	-2.6	19
Buffalo Bend to Sidney	-3.83	-0.38	-9.19	39
Sidney to Colorado	-0.96	0.81	-4.94	17
South Platte Valley	-2.25	0.87	-6.07	13
Fully Appropriated	-0.32	2.76	-5	101
Districtwide	**-1.28**	**2.76**	**-9.19**	**200**

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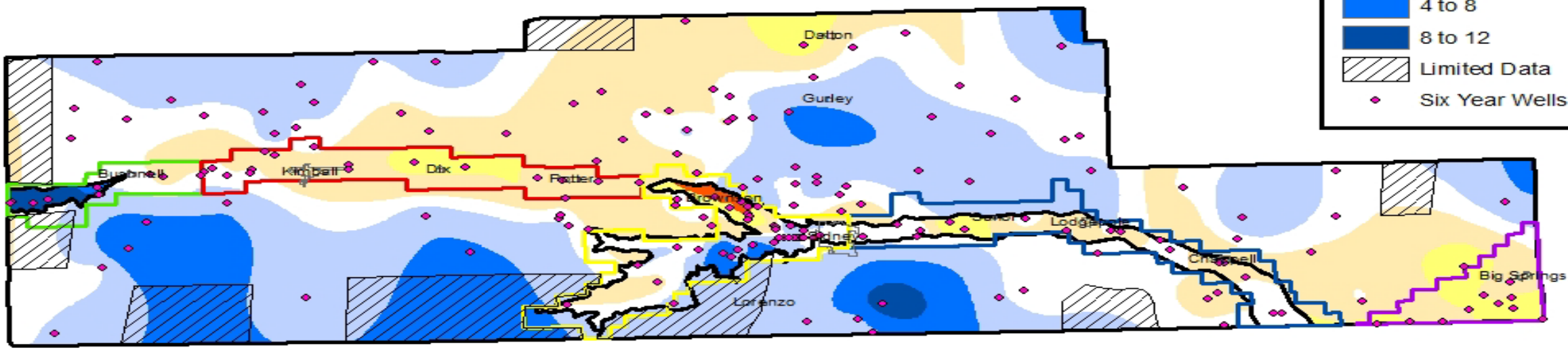
NATURAL RESOURCES DISTRICT

Spring 2022 - Spring 2023

SPNRD 6 Year Water Level Differences

***Allocations Have Remained the Same in all Subareas Since 2016**



South Platte NRD 6 Year Stats by Subarea				
Subarea	**Ave.**	**Max**	**Min**	**# of Wells**
Pine Bluffs to Oliver	6.22	11.19	-2.17	10
Oliver to Buffalo Bend	-1.77	0.5	-4.81	19
Buffalo Bend to Sidney	-0.77	8.21	-10.52	39
Sidney to Colorado	-1.7	0.38	-7.11	17
South Platte Valley	-4.04	1.11	-7.21	11
Fully Appropriated	0.77	9.9	-5.63	97
Districtwide	**0.004**	**11.19**	**-10.52**	**193**

SOUTH PLATTE
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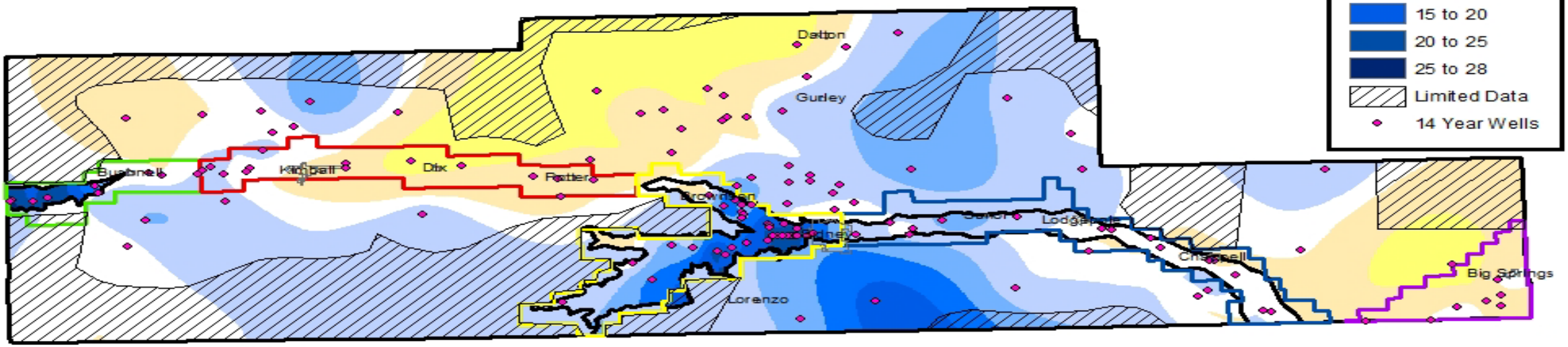
Spring 2016 - Spring 2023

SPNRD 14 Year Water Level Differences

***2009 Was the First Year all Subareas Were Under Allocation**



South Platte NRD 14 Year Stats by Subarea				
Subarea	**Ave.**	**Max**	**Min**	**# of Wells**
Pine Bluffs to Oliver	14.05	28.03	-0.69	10
Oliver to Buffalo Bend	-1.52	2.1	-6.44	14
Buffalo Bend to Sidney	15.21	24.02	-0.56	36
Sidney to Colorado	1.14	6.78	-1.42	15
South Platte Valley	-2.53	-0.58	-8.22	8
Fully Appropriated	1.27	17.08	-6.91	57
Districtwide	**5.26**	**28.03**	**-8.22**	**140**

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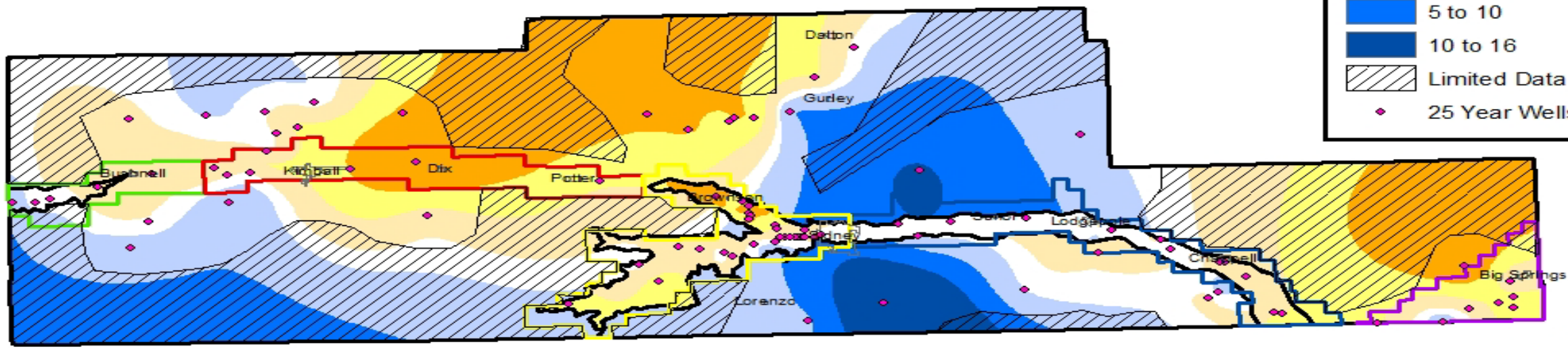
Spring 2009 - Spring 2023

SPNRD 25 Year Water Level Differences

***25 Years is a Short Term Climate Cycle NeDNR Likes to Use for Modeling Purposes**



South Platte NRD 25 Year Stats by Subarea				
Subarea	**Ave.**	**Max**	**Min**	**# of Wells**
Pine Bluffs to Oliver	0.04	4.18	-2.78	5
Oliver to Buffalo Bend	-5.52	-0.72	-16.43	7
Buffalo Bend to Sidney	-3.94	1.2	-15.22	29
Sidney to Colorado	-1.27	0.84	-4.93	12
South Platte Valley	-5.73	2.71	-16.75	8
Fully Appropriated	-1.22	16.82	-11.1	27
Districtwide	**-2.81**	**16.82**	**-16.75**	**88**

SOUTH PLATTE
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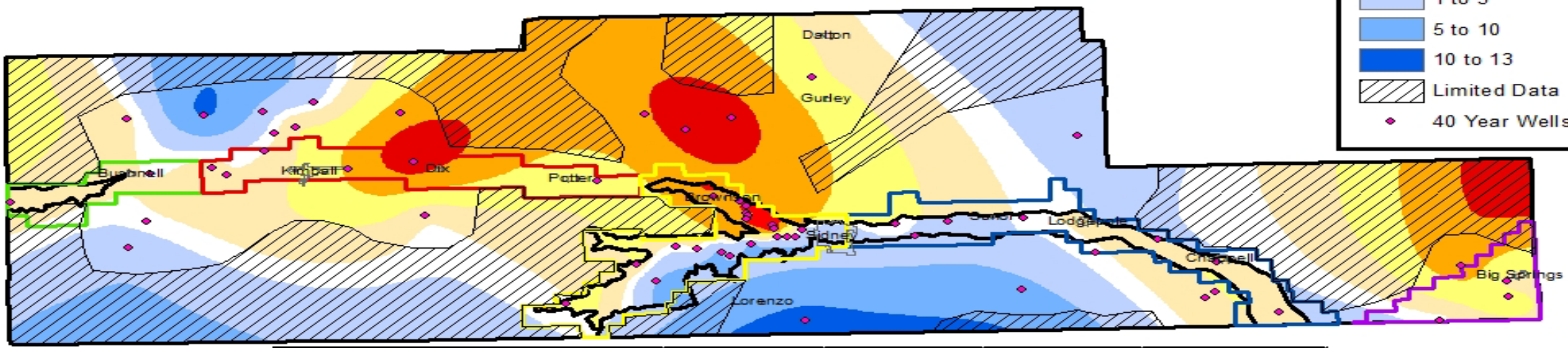
Spring 1998 - Spring 2023

SPNRD 40 Year Water Level Differences



South Platte NRD 40 Year Stats by Subarea				
Subarea	**Ave.**	**Max**	**Min**	**# of Wells**
Pine Bluffs to Oliver	-2.34	-0.85	-3.82	2
Oliver to Buffalo Bend	-6.63	-0.88	-17.48	6
Buffalo Bend to Sidney	-5.97	5.32	-19.97	20
Sidney to Colorado	-0.37	4.21	-3	7
South Platte Valley	-5.62	0.34	-12.56	4
Fully Appropriated	-2.19	12.61	-16.82	20
Districtwide	**-3.94**	**12.61**	**-19.97**	**59**

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Spring 1983 - Spring 2023