



4/7/2020

2020 Spring Ground Water Level Report



Chris Kaiser
SOUTH PLATTE NATRUAL RESOURCES DISTRICT

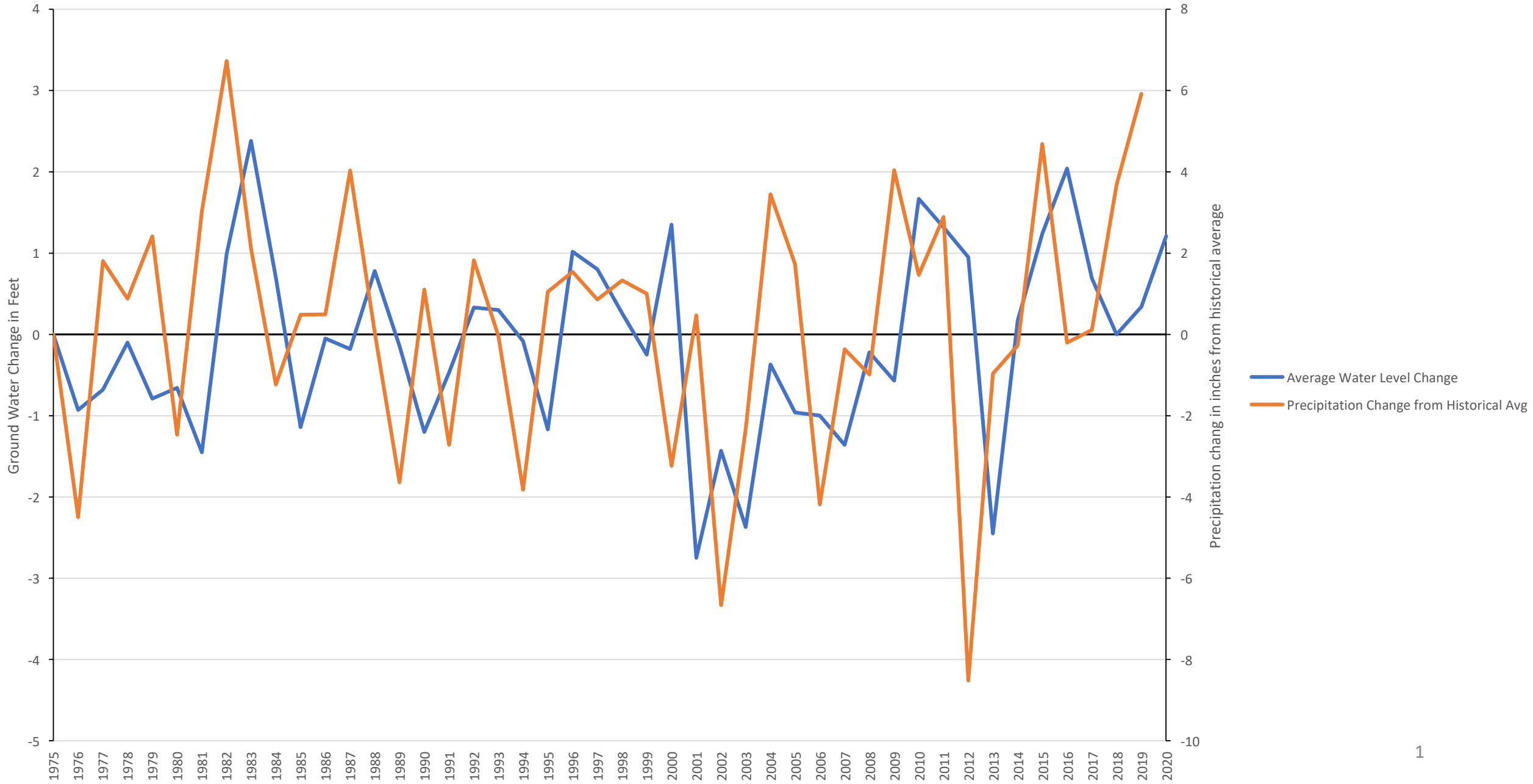
This report summarizes the results of the spring 2020 groundwater level measurement program. Groundwater levels were collected by South Platte NRD staff Chris Kaiser and Tyler Sanders. During 2019, rainfall events were much higher on average for precipitation amounts in Kimball, Cheyenne, and Deuel Counties averaging 5.92" above historical averages. 2019 was one of the wettest years on record in the southern panhandle. One-year water level increases were observed in parts of the Kimball county tablelands, the northern part of the Deuel county tablelands, and the majority of the Buffalo Bend to Sidney subarea. The Buffalo Bend to Sidney subarea is 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. 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. Two wells showed major decreases compared to last year. Those two wells are in the northern part of Cheyenne county. Both wells showed decreases of 3-4 feet. Districtwide, water levels increased 1.21 feet on average based on 204 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 are also attached. Included are one, five, ten, twenty, and thirty-year water level difference maps. Allocations took effect in 2009 and the ten-year map show comparisons of where water levels have changed since the District was under a full allocation. Random selections of wells are graphed showing long term data trends. Landowners who have NRD observation wells installed on their property, as well as landowners from whom we take irrigation 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.

The SPNRD added one new monitoring well in the fully appropriated subarea in northern Deuel County in 2018. We budget for one monitoring well a year. The main criteria we look for in placing new monitoring wells are locations where we don't have any hydrogeological data. We are always looking for willing landowners who would allow us to take well measurements to use in this report or to install monitoring wells on their property. If you're interested in allowing the NRD to use your irrigation or livestock well for monitoring water levels, please let us know. A deep paleo-channel has been interpreted from the oil and gas well logs starting at the Colorado border south of Dix and runs approximately ¼ - ½ mile wide before it weakens the closer it gets to Potter. We hope to drill a monitoring well somewhere in this channel in 2021 to determine if the interpretations from the oil and gas logs are correct. All hydrographs and some of the model runs have been uploaded to the web and can be accessed here: <https://spnrd-well-app.herokuapp.com/>

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

Groundwater and Precipitation Accumulation Changes 1975-2020



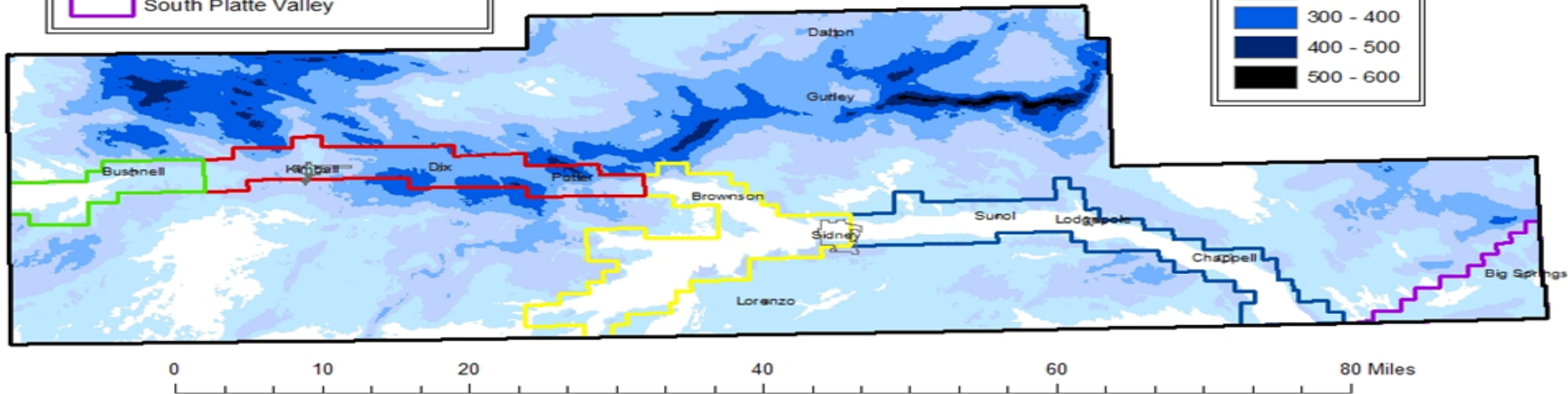
Saturated Thickness Ogallala Aquifer

Subareas

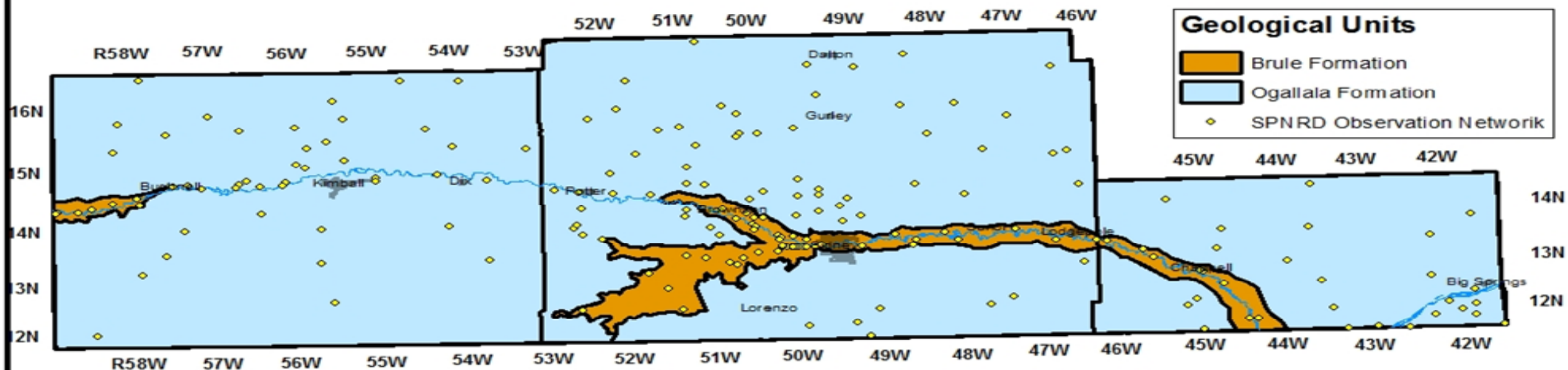
- Pine Bluffs to Oliver Reservoir
- Oliver Reservoir to Buffalo Bend
- Buffalo Bend to Sidney
- Sidney to Colorado
- South Platte Valley

Feet

- 0
- 0 - 100
- 100 - 200
- 200 - 300
- 300 - 400
- 400 - 500
- 500 - 600

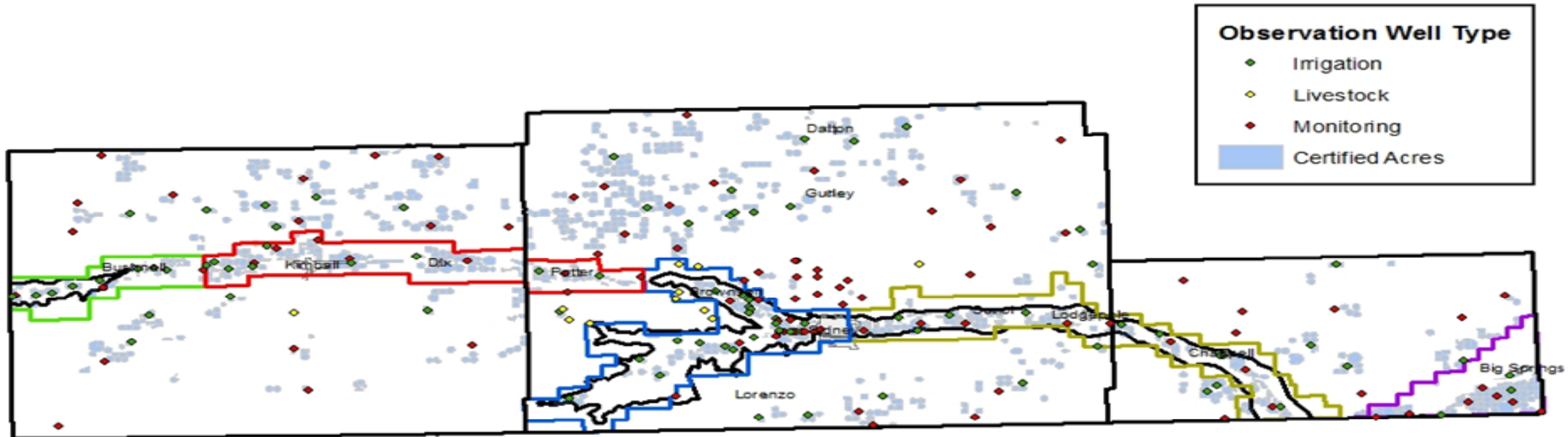


SPNRD Geological Breakdowns

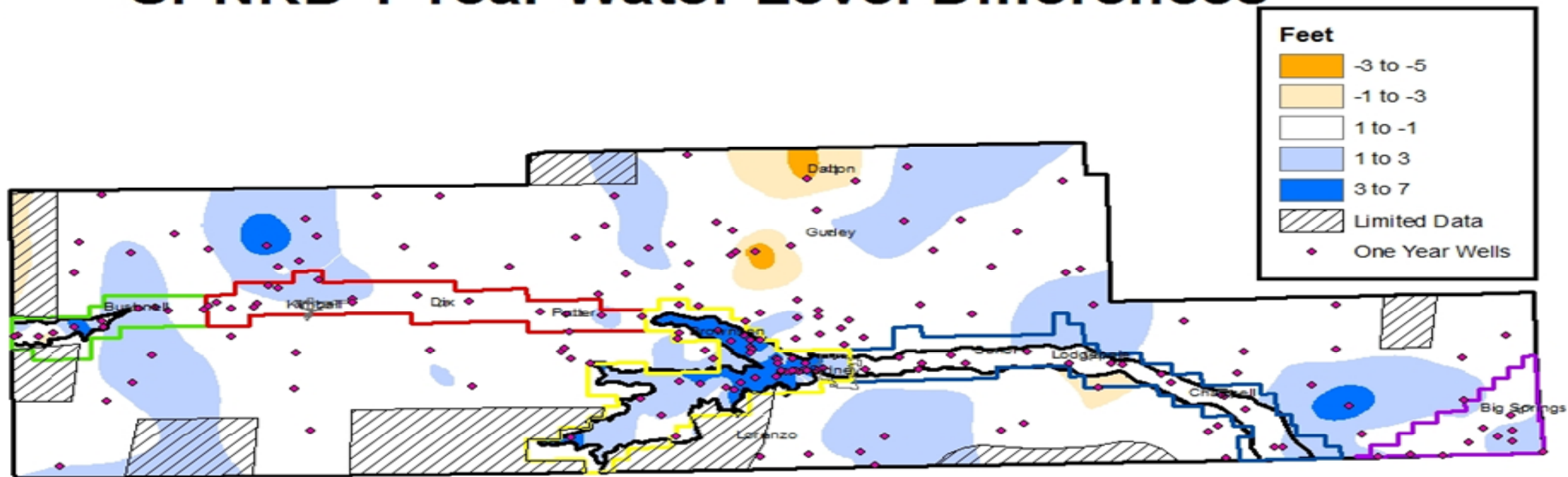


All wells located within each geological unit are only influenced by wells within each sole unit. That is, wells located in the southern ogallala unit are only influenced by the wells located there. It does not "share" water, nor is it influenced with wells in the Brule Formation. As of this time, the 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).

SPNRD Observation Well Network



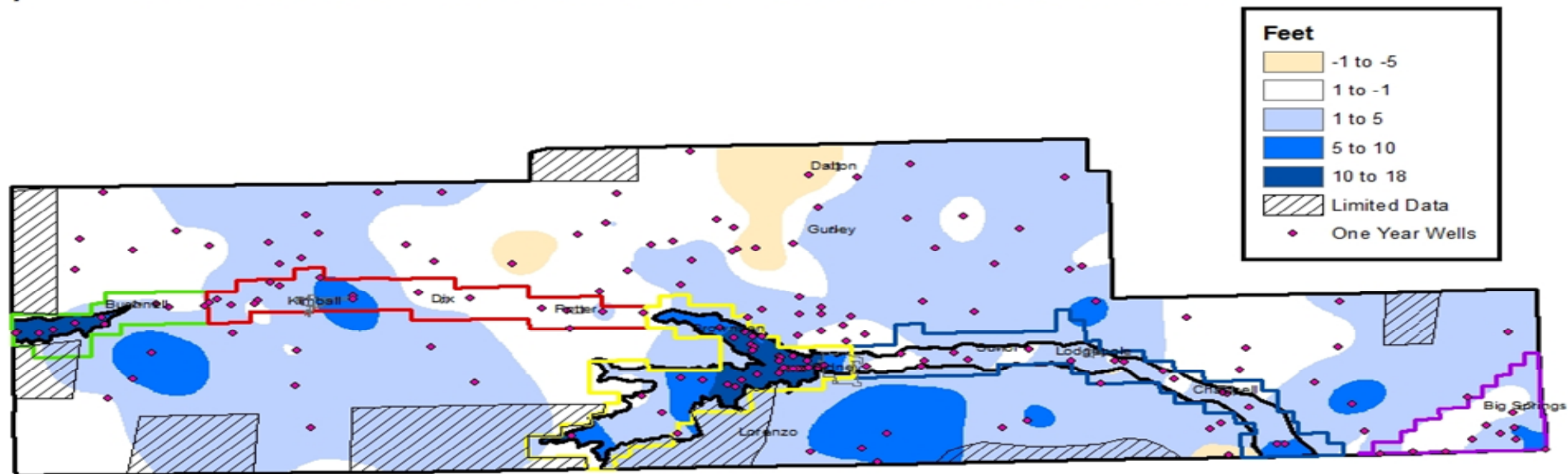
SPNRD 1 Year Water Level Differences



South Platte NRD 1 Year Stats by Subarea

Subarea	Ave.	Max	Min	Count	Decline	%Decline
Pine Bluffs to Oliver	1.13	4.31	-1.19	12	3	25%
Oliver to Buffalo Bend	0.7	2.65	-0.75	19	4	21%
Buffalo Bend to Sidney	3.62	6.18	0.04	40	0	0%
Sidney to Colorado	0.1	1.46	-0.5	17	4	24%
South Platte Valley	1.1	2.77	-0.73	11	2	18%
Fully Appropriated	0.6	4.34	-4.31	105	13	12%
Districtwide	1.21	6.18	-4.31	204	26	13%

SPNRD 5 Year Water Level Differences

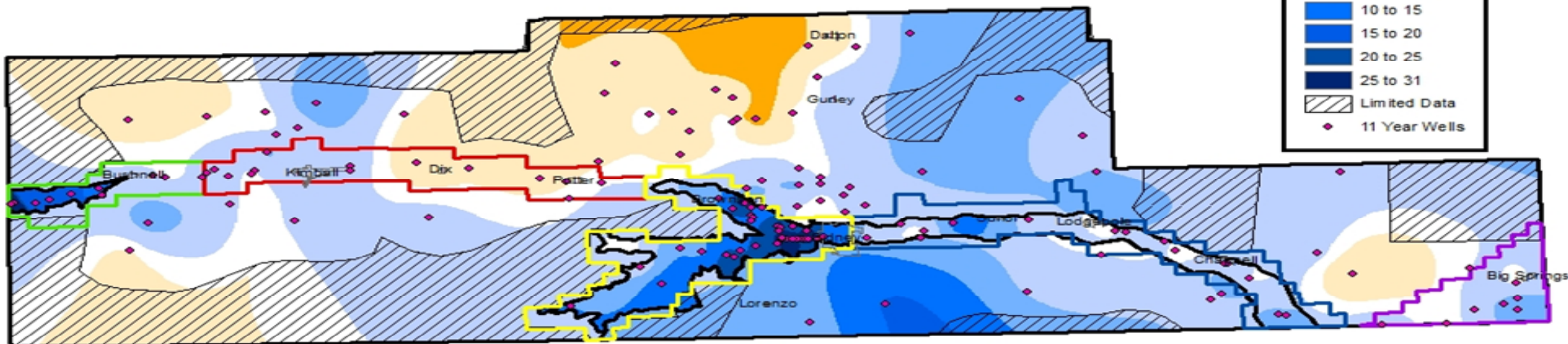


South Platte NRD 5 Year Stats by Subarea

Subarea	Ave.	Max	Min	Count	Decline	%Decline
Pine Bluffs to Oliver	10.24	17.12	0.41	11	0	0%
Oliver to Buffalo Bend	2.2	7.96	-0.25	19	3	16%
Buffalo Bend to Sidney	12.1	17.59	-0.21	37	1	3%
Sidney to Colorado	2.4	5.46	0.51	17	0	0%
South Platte Valley	2.36	6.21	2.36	11	1	9%
Fully Appropriated	1.7	9.46	-4.36	95	16	17%
Districtwide	4.37	17.59	-4.36	190	21	11%

SPNRD 11 Year Water Level Differences

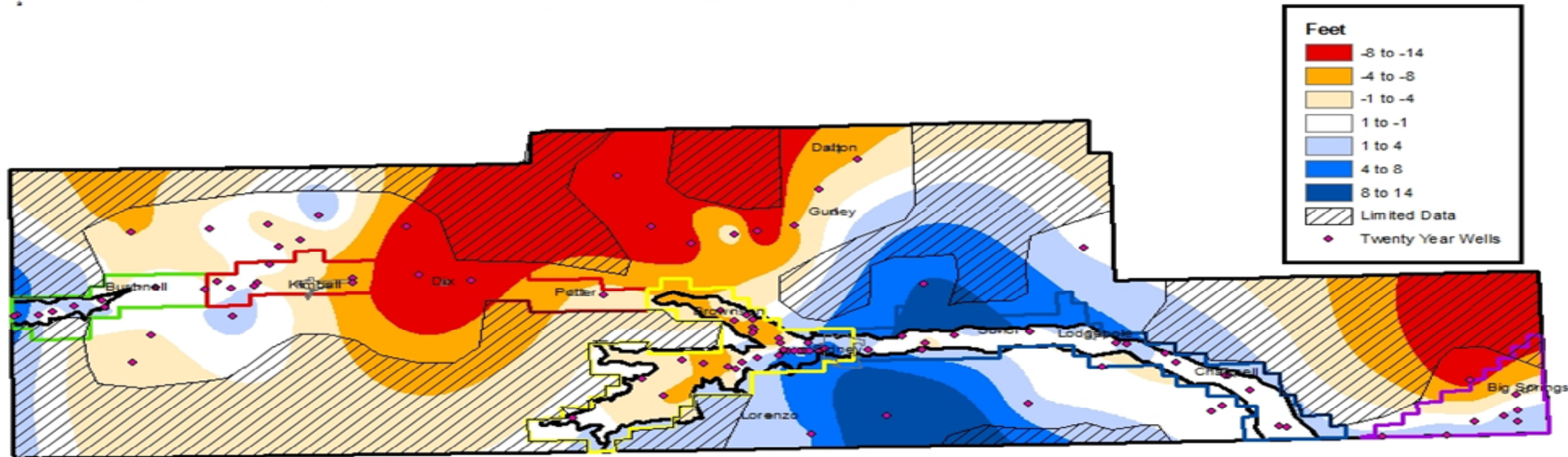
*2009 WAS THE FIRST YEAR ALL SUBAREAS WERE UNDER AN ALLOCATION



South Platte NRD 11 Year Stats by Subarea

Subarea	Ave.	Max	Min	Count	Decline	%Decline
Pine Bluffs to Oliver	15.51	30.81	0.75	11	0	0%
Oliver to Buffalo Bend	0.94	5.12	-3.07	14	5	36%
Buffalo Bend to Sidney	21.28	30.04	1.31	36	0	0%
Sidney to Colorado	3.31	11.78	0.36	15	0	0%
South Platte Valley	3.17	6.32	-0.07	8	1	14%
Fully Appropriated	1.58	15.27	-6.13	61	20	33%
Districtwide	7.73	30.81	-6.13	145	26	18%

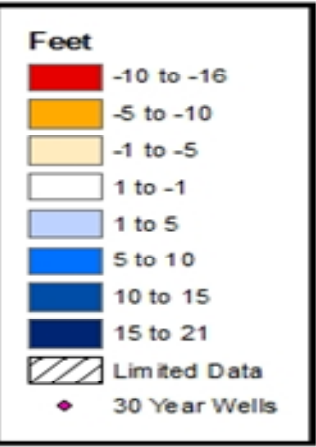
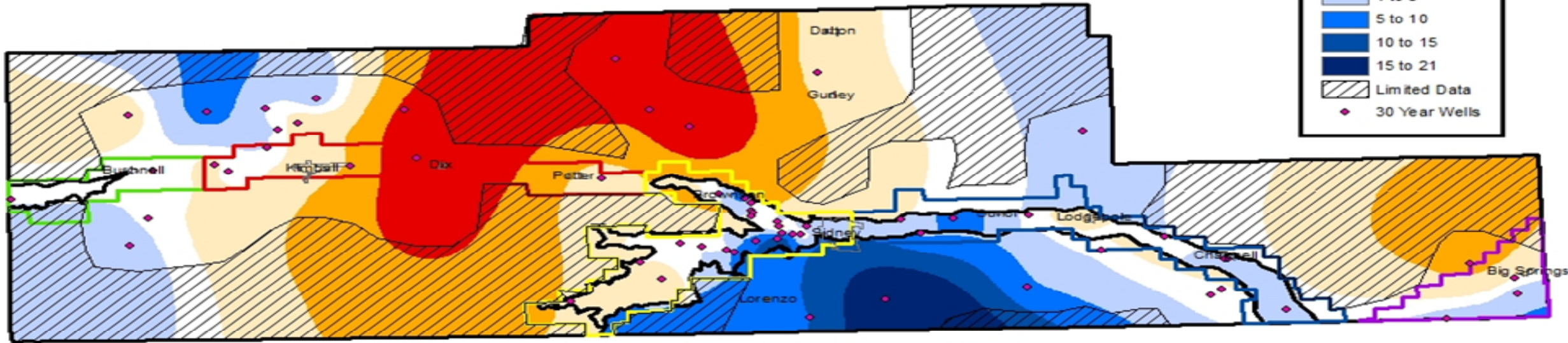
SPNRD 20 Year Water Level Differences



South Platte NRD 20 Year Stats by Subarea

Subarea	Ave.	Max	Min	Count	Decline	%Decline
Pine Bluffs to Oliver	2.48	7.61	-0.85	10	1	10%
Oliver to Buffalo Bend	-3.91	0.74	-13.94	10	7	70%
Buffalo Bend to Sidney	-0.16	6.92	-6.54	31	17	55%
Sidney to Colorado	0.59	6.92	-6.54	15	2	13%
South Platte Valley	-0.24	3.02	-9.65	8	2	25%
Fully Appropriated	-1.85	13.87	-11.7	26	19	73%
Districtwide	-0.6	13.87	-13.94	100	48	48%

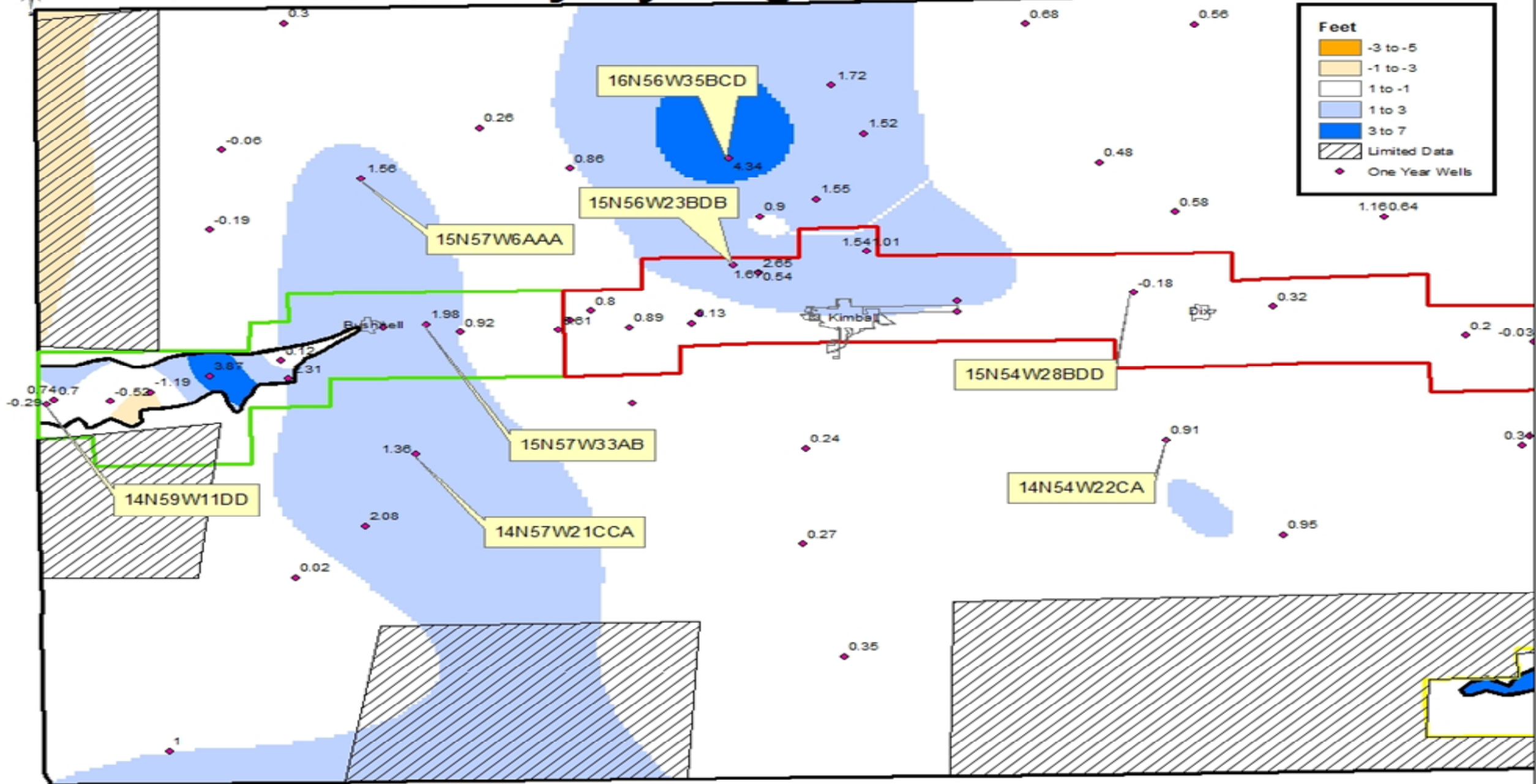
SPNRD 30 Year Water Level Differences



South Platte NRD 30 Year Stats by Subarea

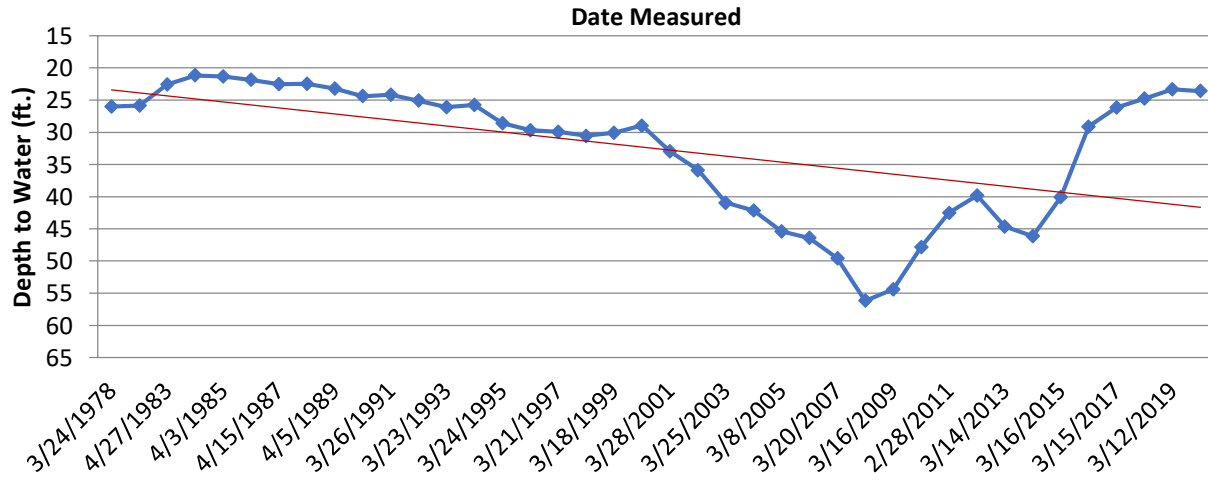
Subarea	Ave.	Max	Min	Count	Decline	%Decline
Pine Bluffs to Oliver	0.85	0.9	0.79	2	0	0%
Oliver to Buffalo Bend	-4.14	0.85	-15.21	6	5	83%
Buffalo Bend to Sidney	2.08	13.9	-2.94	21	7	33%
Sidney to Colorado	2.15	6.67	0.04	8	0	0%
South Platte Valley	-0.73	2.6	-7.05	4	2	50%
Fully Appropriated	-0.41	20.29	-14.01	20	9	45%
Districtwide	0.44	20.29	-15.21	61	23	38%

Kimball County Hydrograph Locations



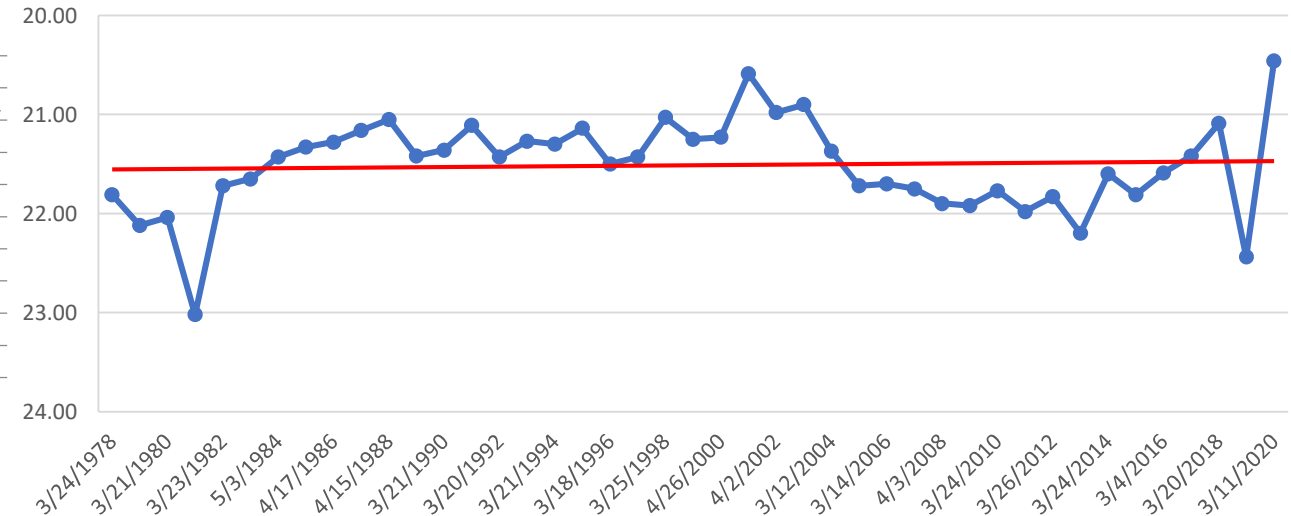
14N 59W 11DD

NE/WY Stateline 1 East of Pine Bluffs
Brule Formation
Pine Bluffs to Oliver Reservoir Subarea



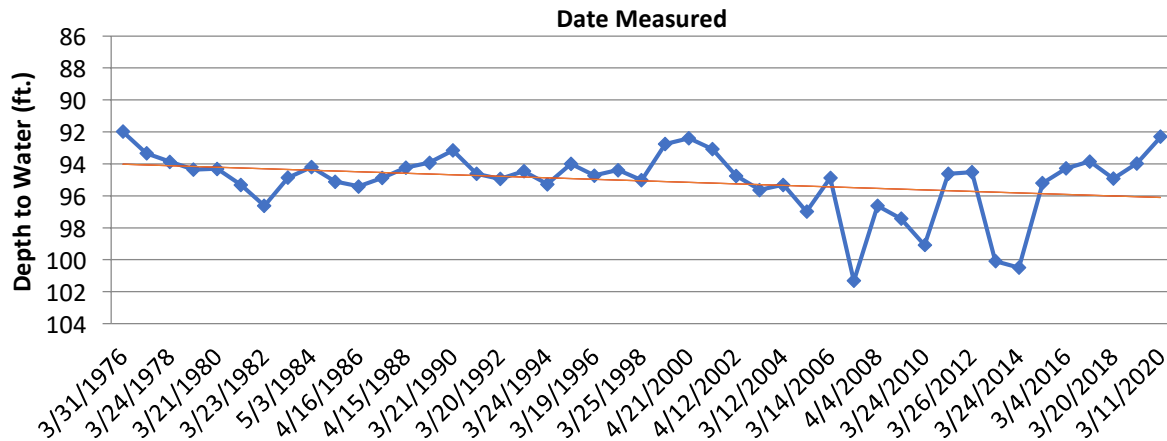
15N 57W 33AB

1 East of Bushnell
Ogallala Formation
Pine Bluffs to Oliver Reservoir Subarea



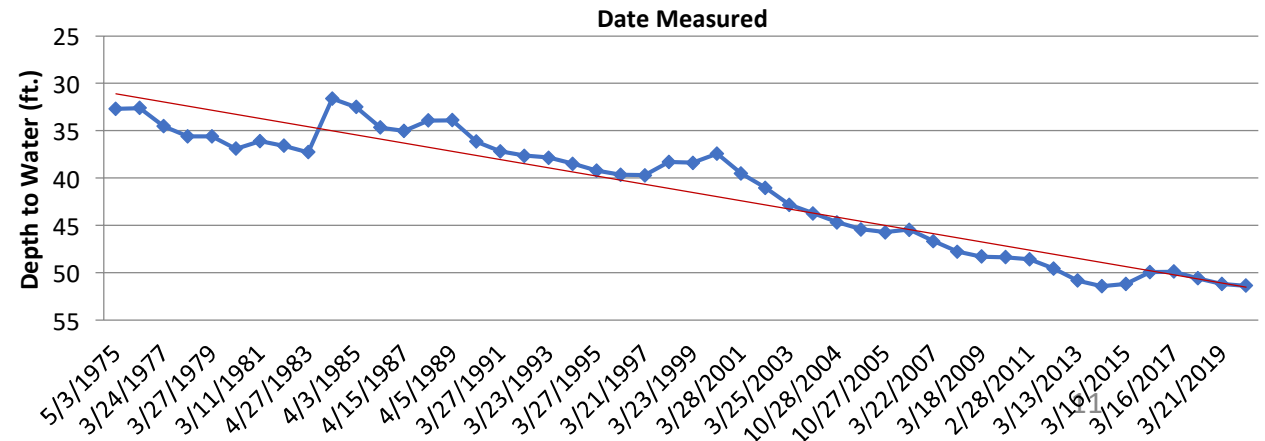
15N 56W 23BDB

3 West 2 North of Kimball
Ogallala Formation
Oliver Reservoir to Buffalo Bend Subarea

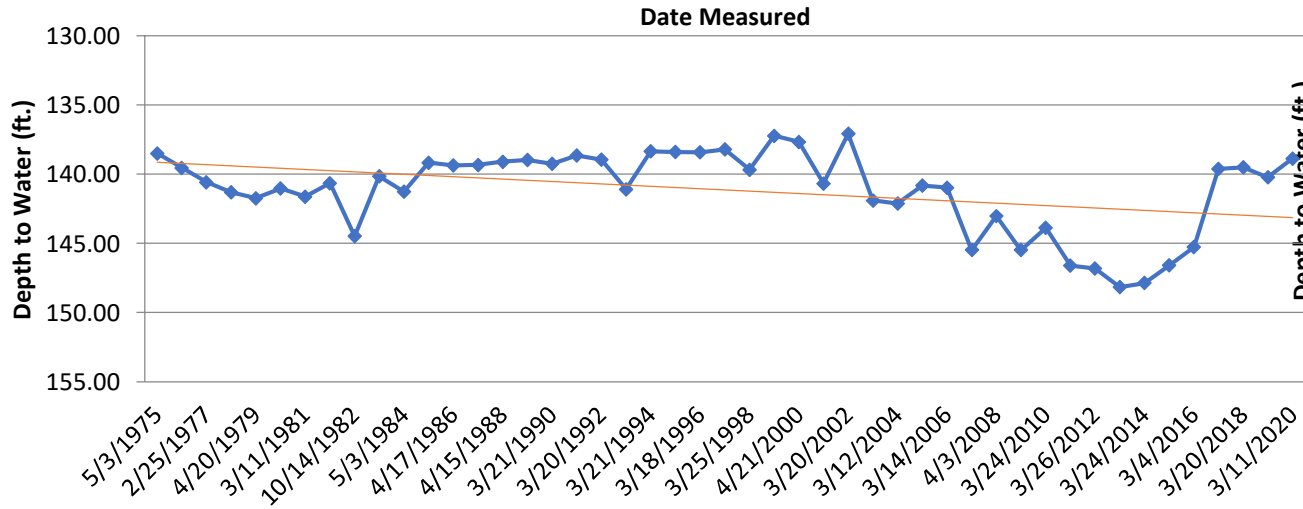


15N 54W 28BDD

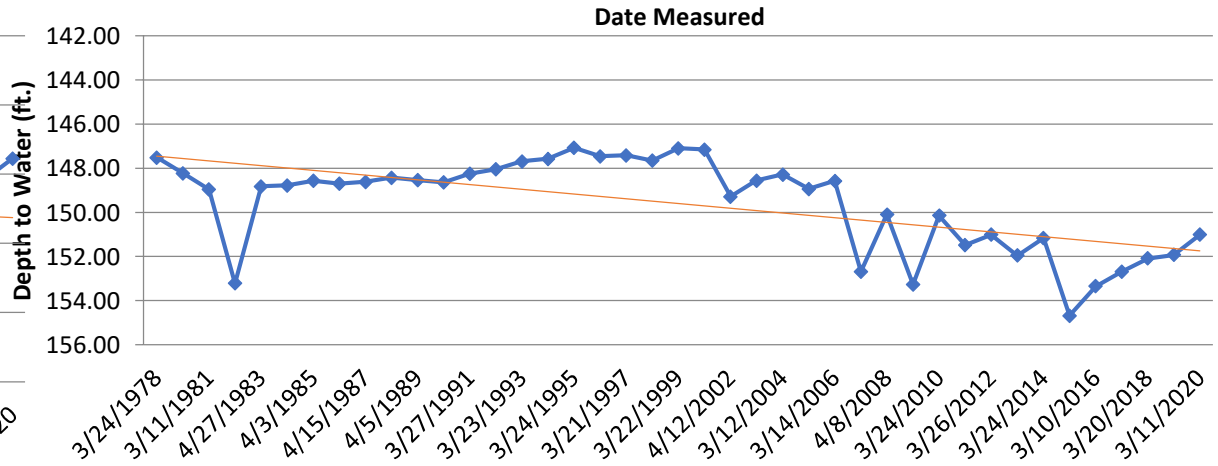
1.5 West of Dix
Ogallala Formation
Oliver Reservoir to Buffalo Bend Subarea



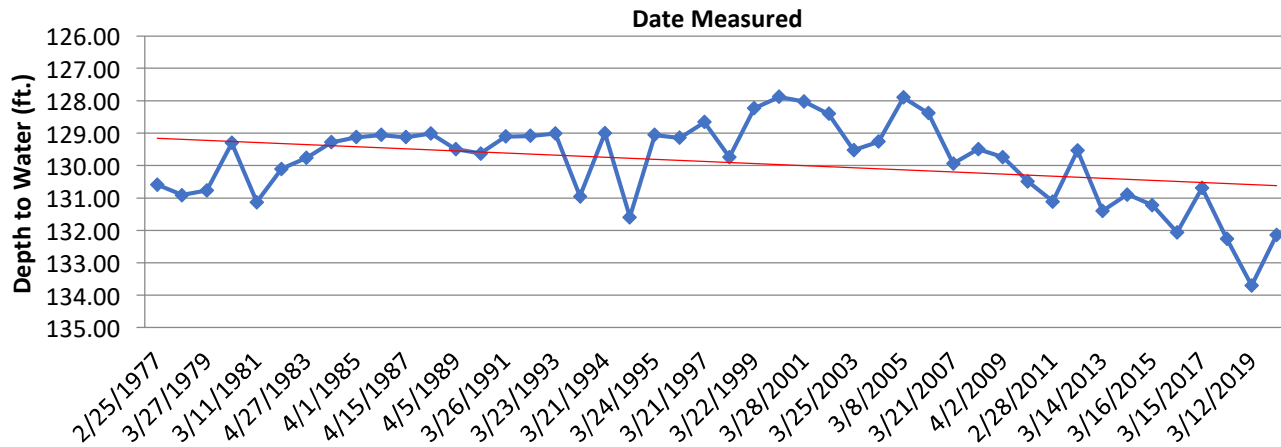
14N 57W 21CCA
5 South 1 East of Bushnell
Ogallala Formation
Fully Appropriated Subarea



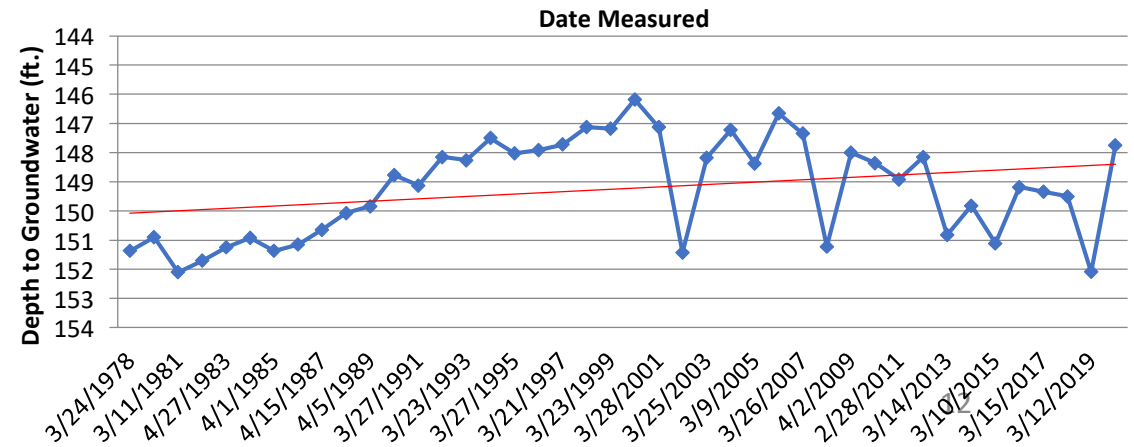
14N 54W 22CA
4 South 1 West of Dix
Ogallala Formation
Fully Appropriated Subarea



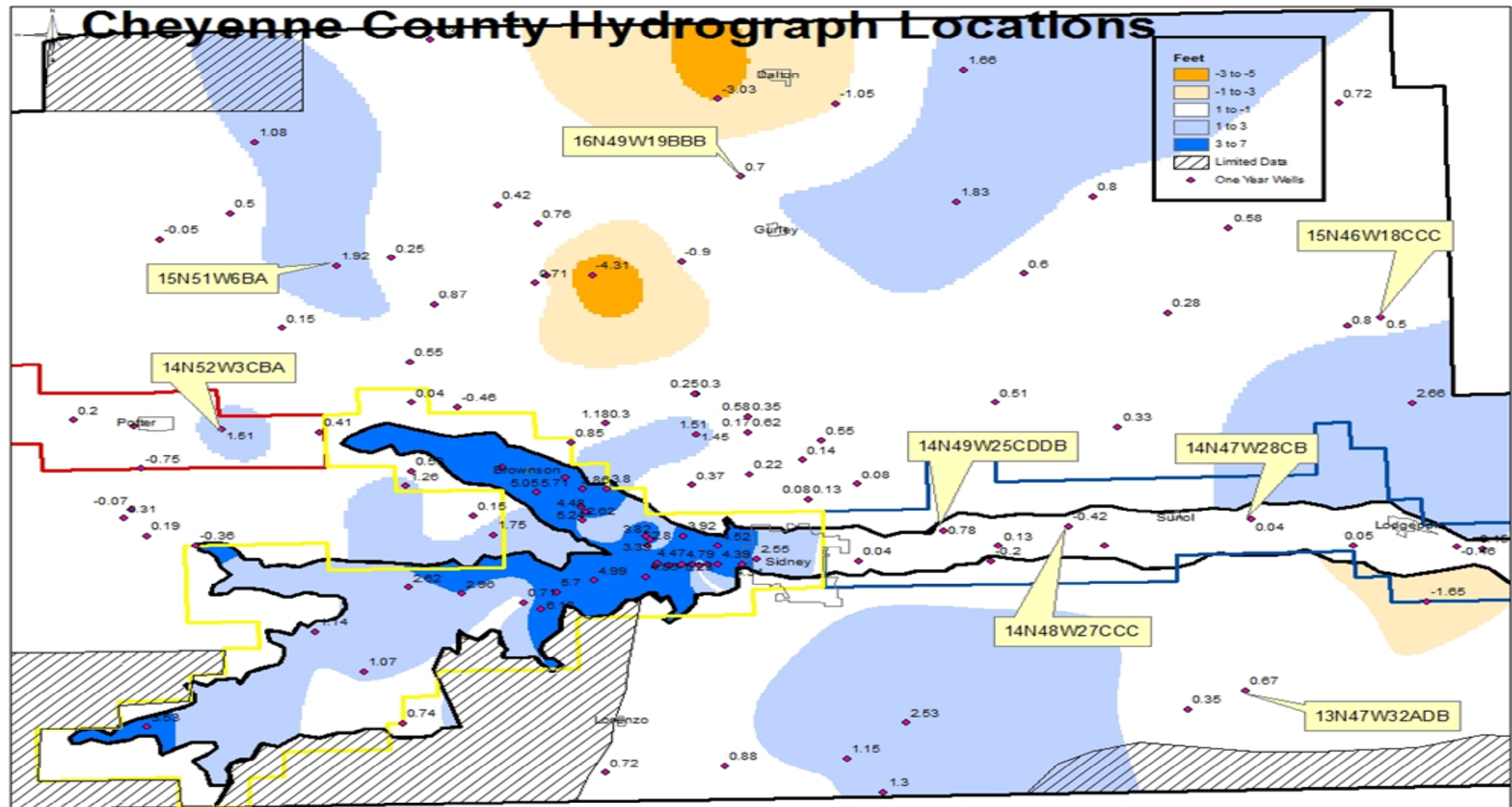
15N 57W 6AAA
5 North of Bushnell
Ogallala Formation (North Table)
Fully Appropriated Subarea



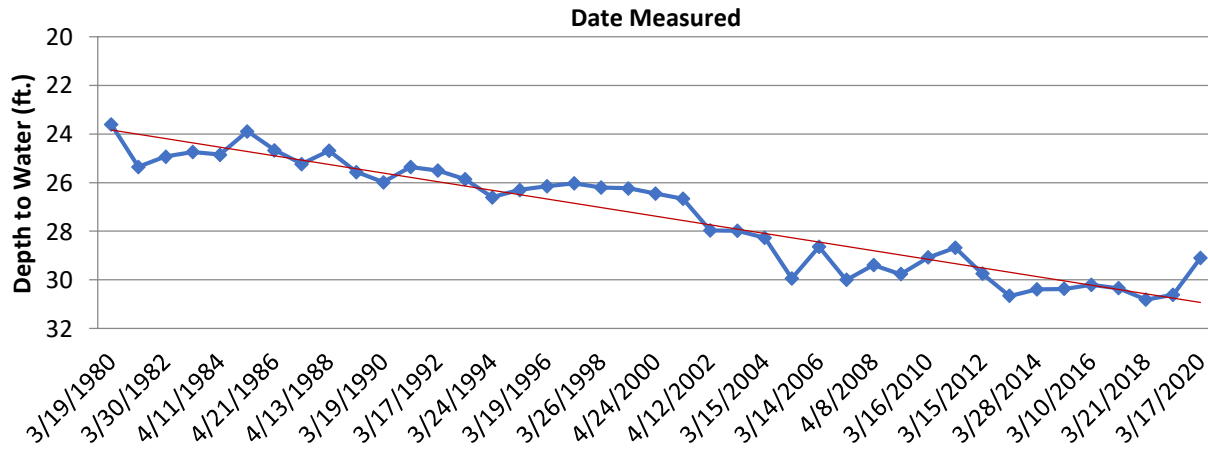
16N 56W35BCD
6 North 3 West of Kimball
Ogallala Formation
Fully Appropriated Subarea (North Table)



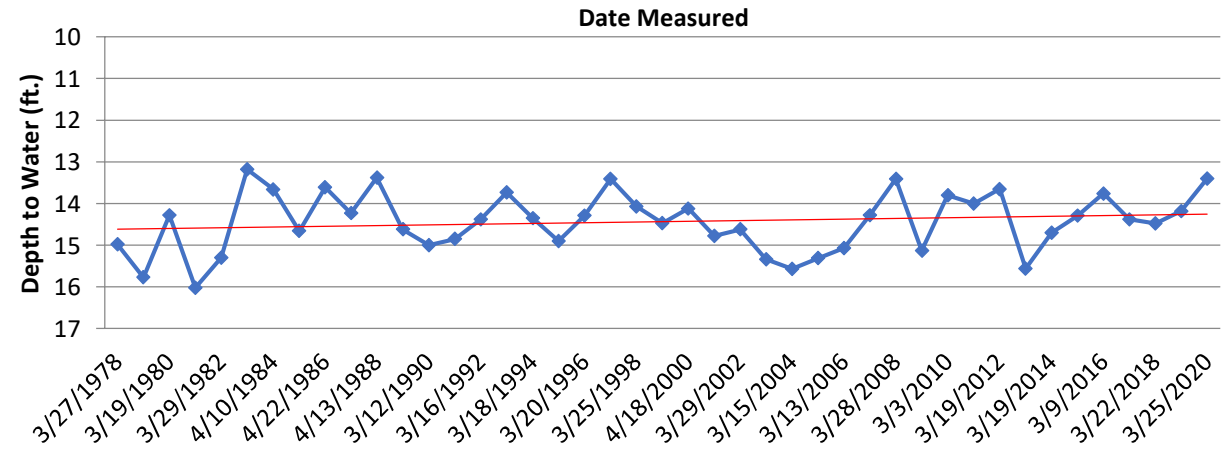
Cheyenne County Hydrograph Locations



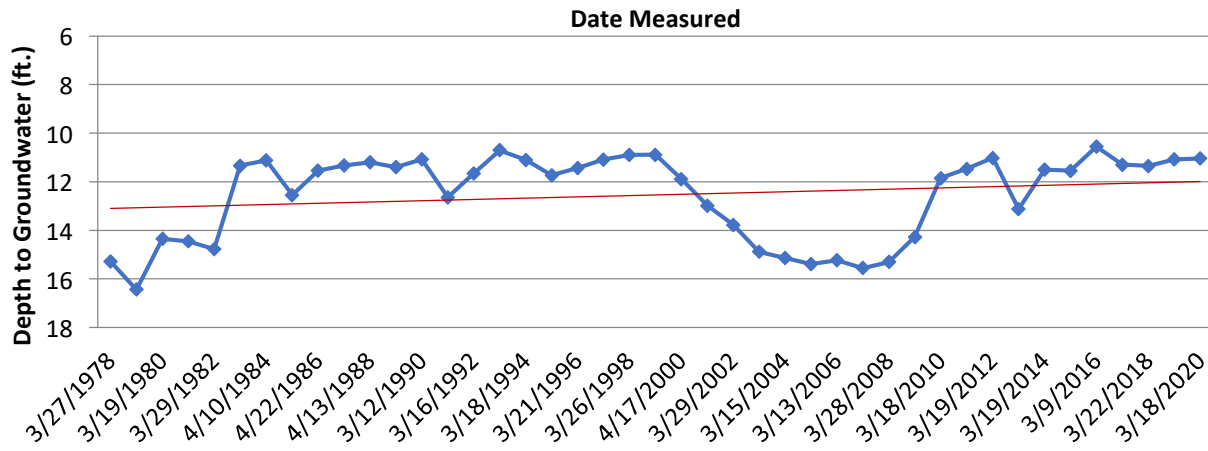
14N 52W 3CBA
2 East of Potter
Ogallala Formation
Oliver Reservoir to Buffalo Bend subarea



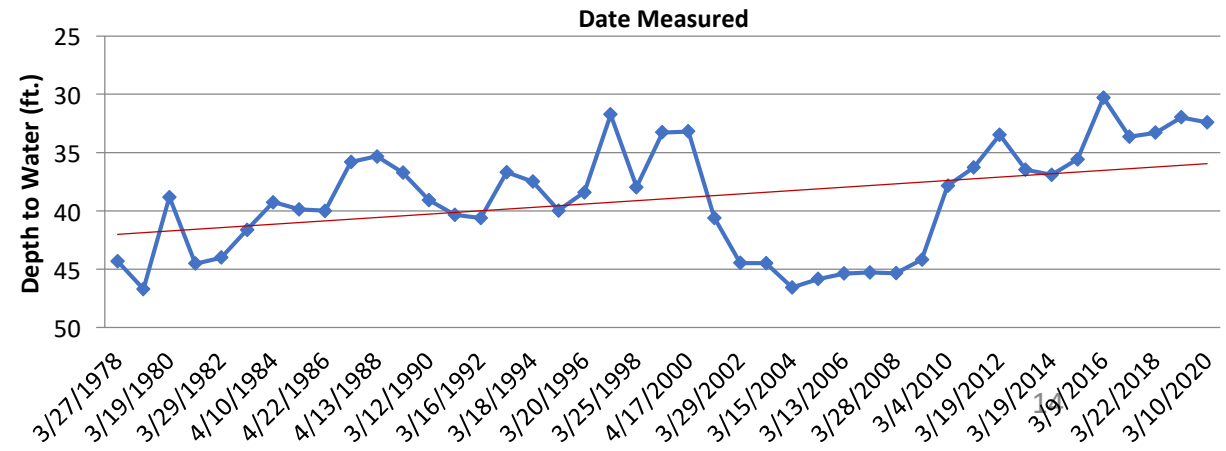
14N 49W 25CDDB
7 East 1 North of Sidney
Brule Formation
Sidney to Colorado Subarea



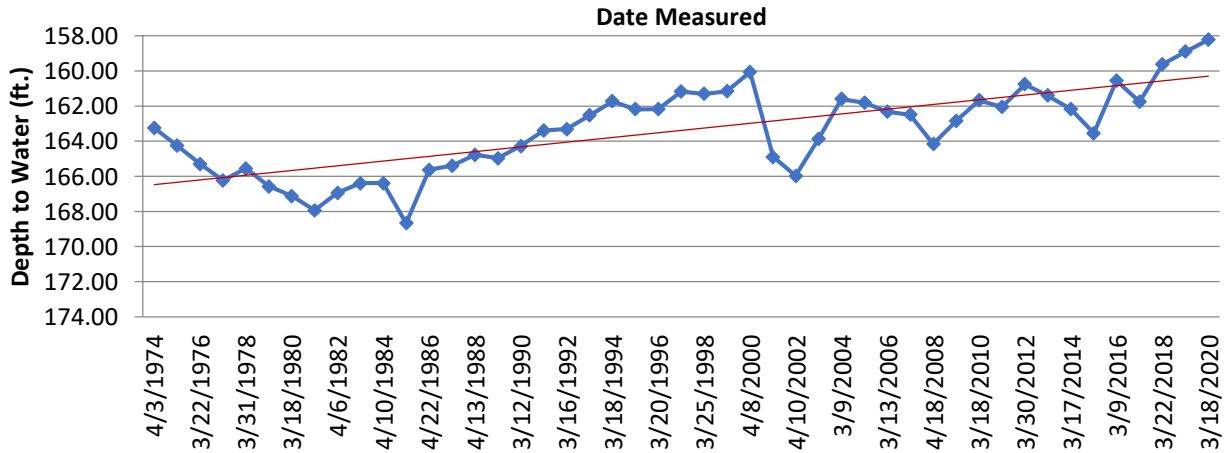
14N 47W 28CB
2 East of Sunol
Brule Formation
Sidney to Colorado Subarea



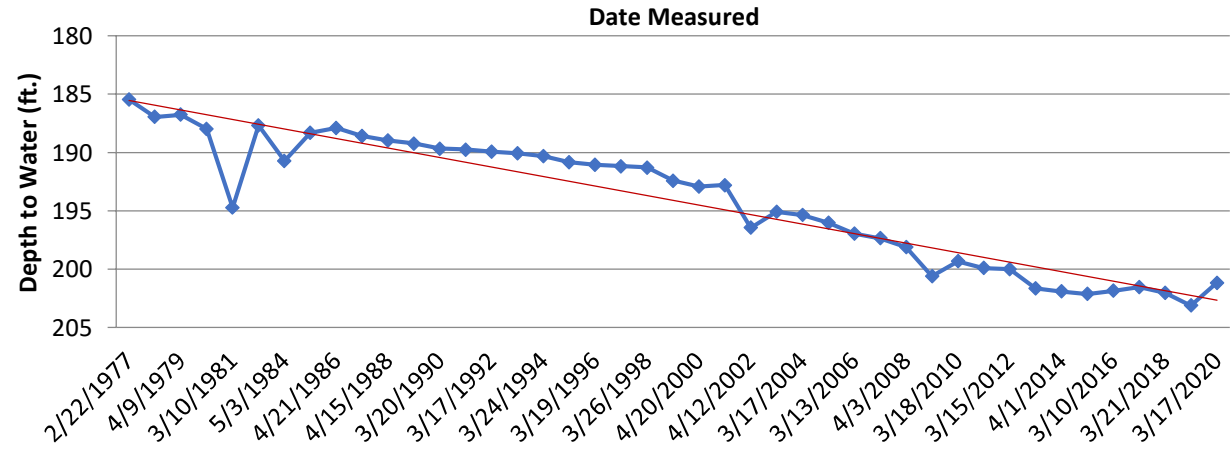
14N 48W 27CCC
2 West of Sunol
Brule Formation
Sidney to Colorado Subarea



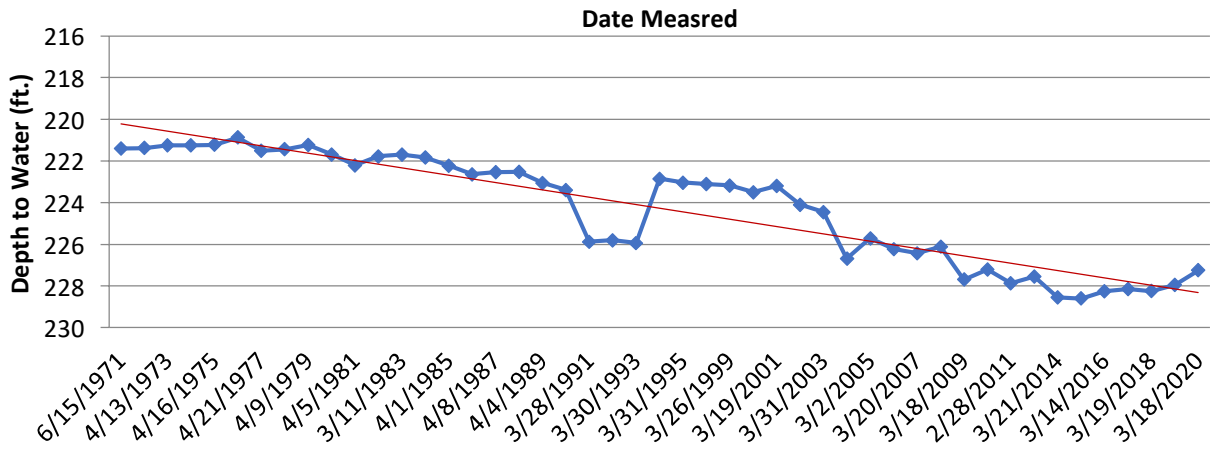
13N 47W 32ADB
6 South 4 West of Lodgepole
Ogallala Formation
Fully Appropriated Subarea (South Table)



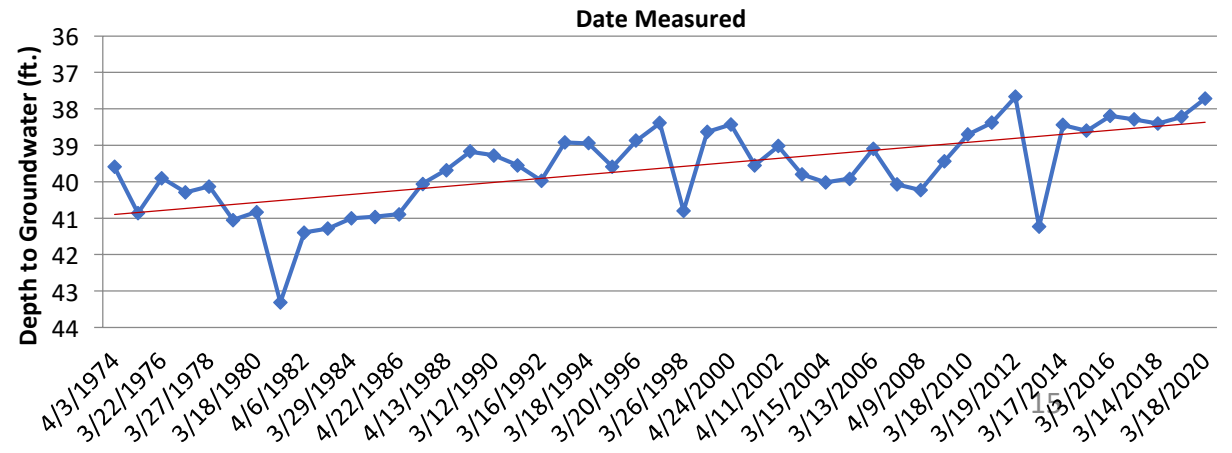
15N 51W 6BA
6 North 5 East of Potter
Ogallala Formation
Fully Appropriated Subarea (North Table)



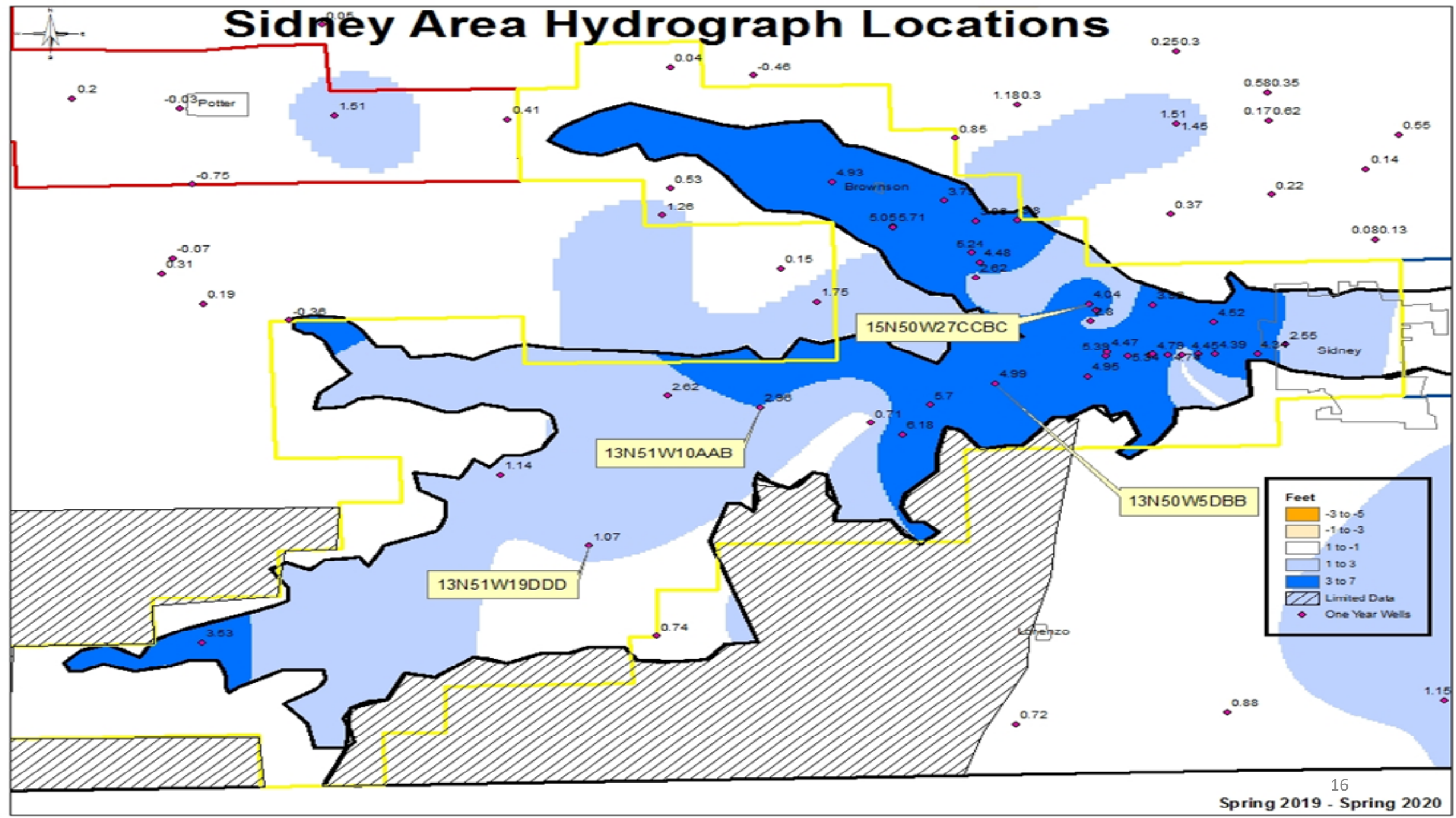
16N 49W 19BBB
2 North 1 West of Gurley
Ogallala Formation
Fully Appropriated Subarea (North Table)



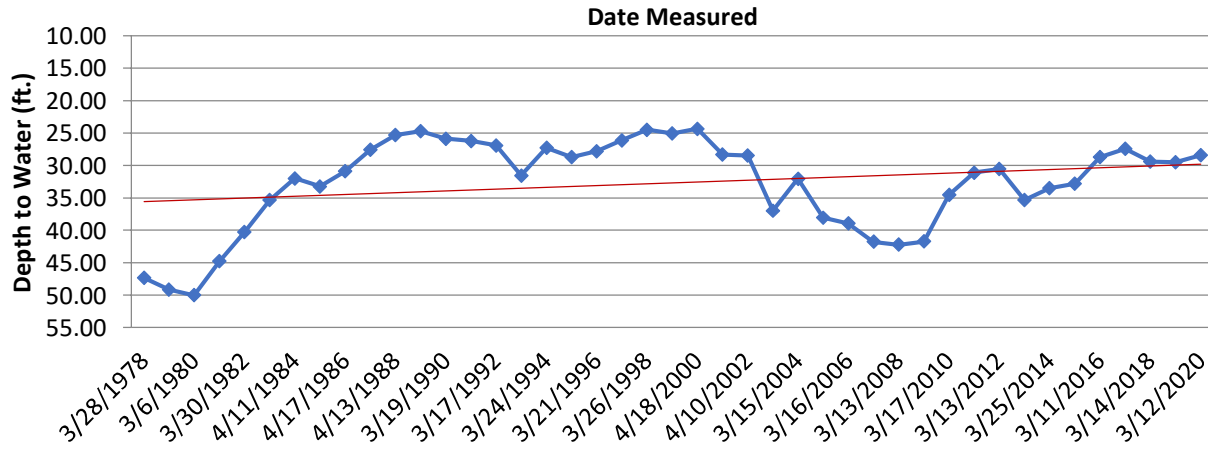
15N 46W 18CCC
8 North 1 West of Lodgepole
Ogallala Formation
Fully Appropriated (North Table)



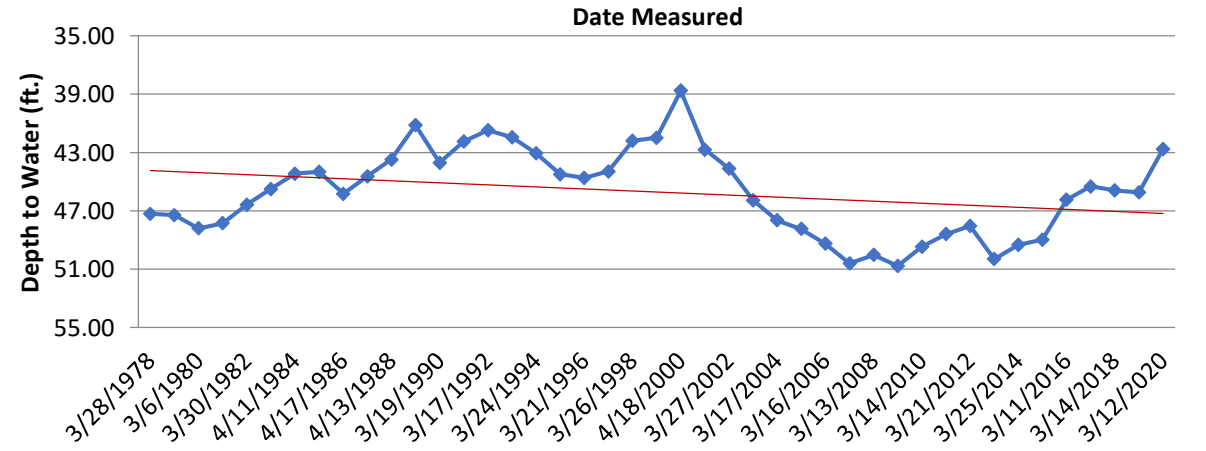
Sidney Area Hydrograph Locations



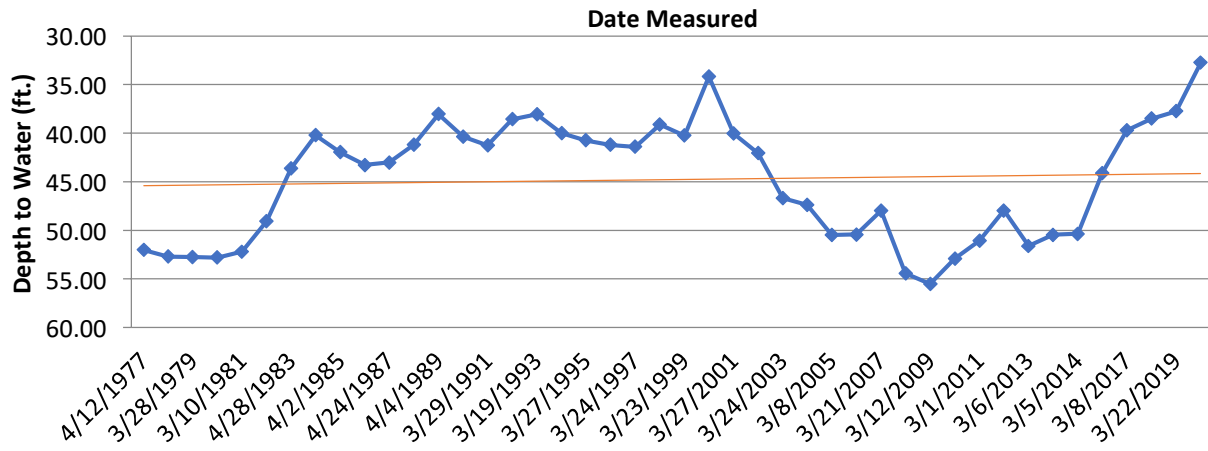
13N 51W 19DDD
4 South 11West of Sidney
Brule Formation
Buffal Bend to Sidney Subarea



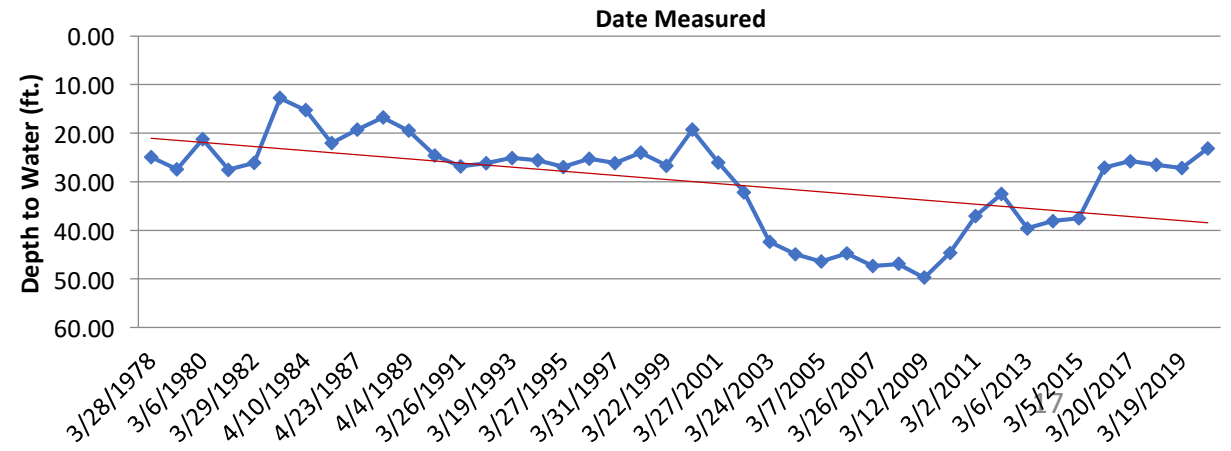
13N 51W 10AAB
1 South 8 West of Sidney
Brule Formation
Buffalo Bend to Sidney Subarea



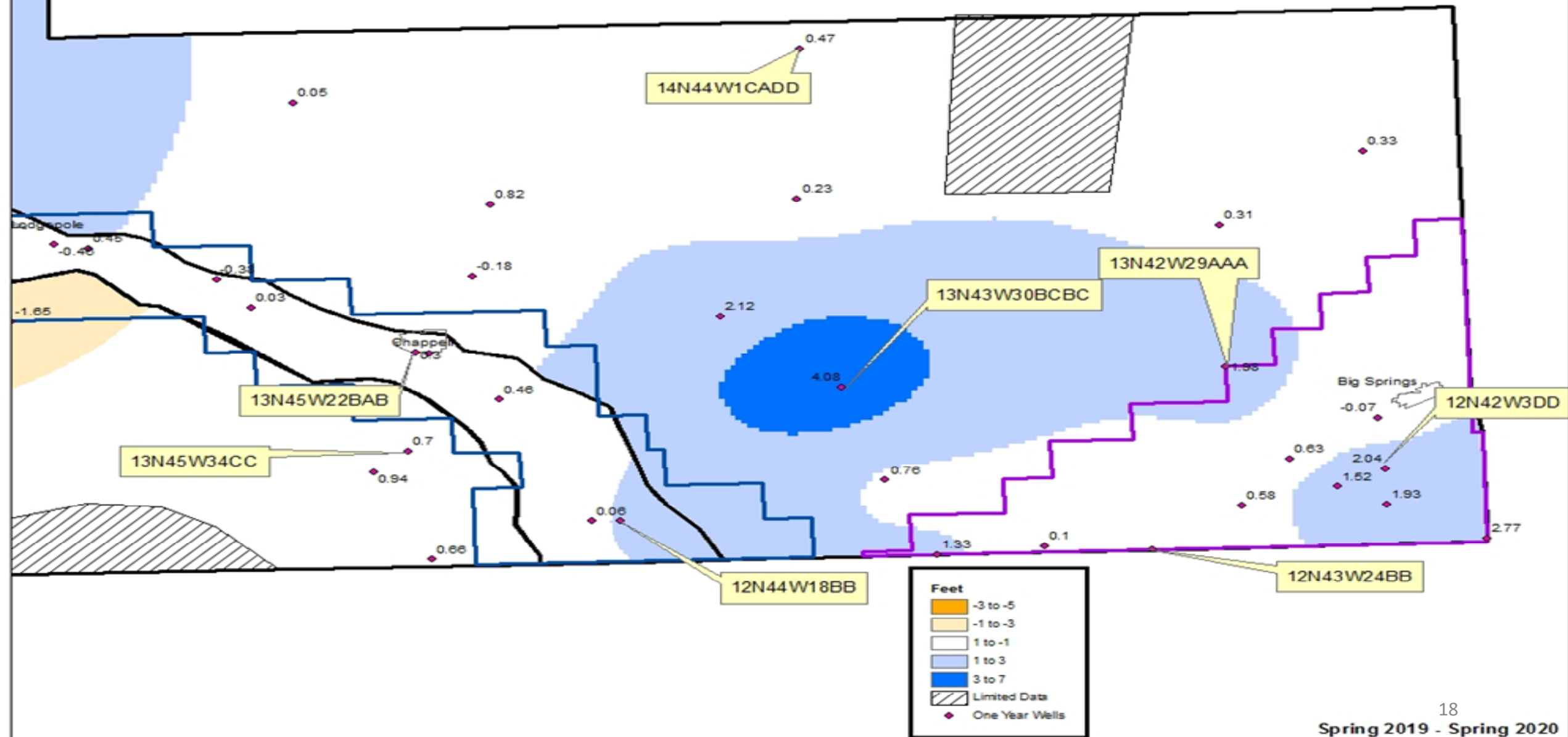
13N 50W 5DBB
4.5 West of Sidney
Brule Formation
Buffalo Bend to Sidney Subarea



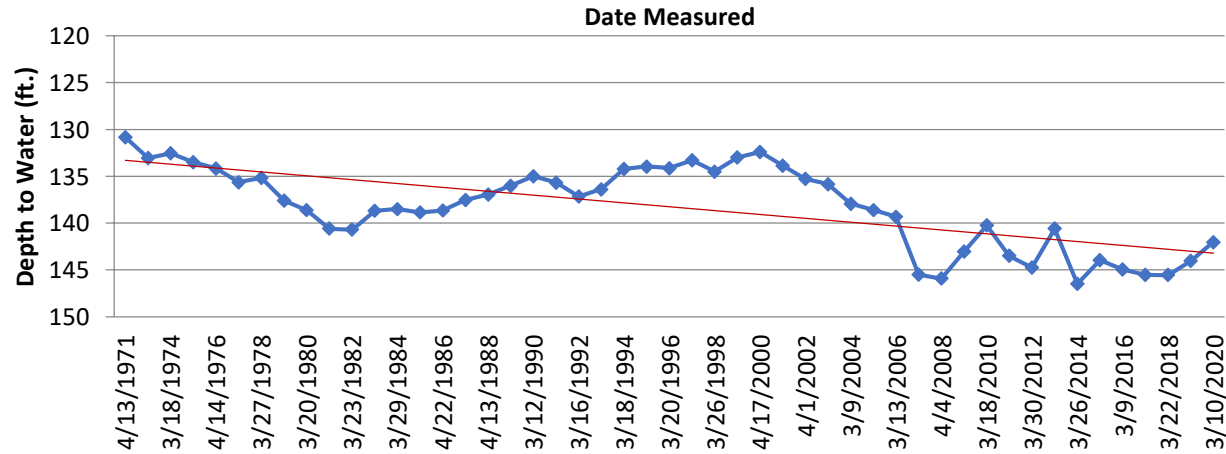
14N 50W 27CCBC
3 West of Sidney
Brule Formation
Buffalo Bend to Sidney Subarea



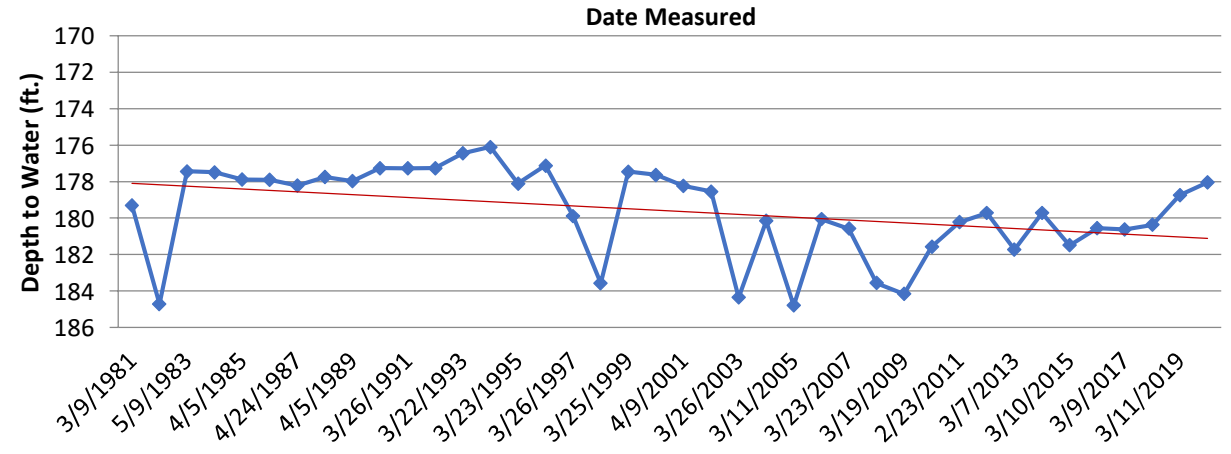
Deuel County Hydrograph Locations



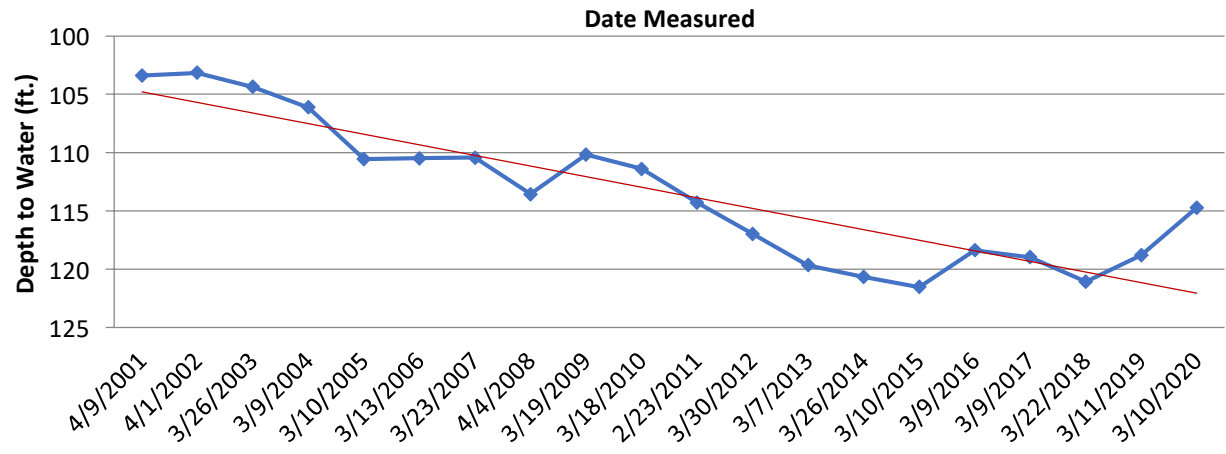
13N 42W 29AAA
4 West 1 North of Big Springs
Ogallala Formation
South Platte Valley Subarea



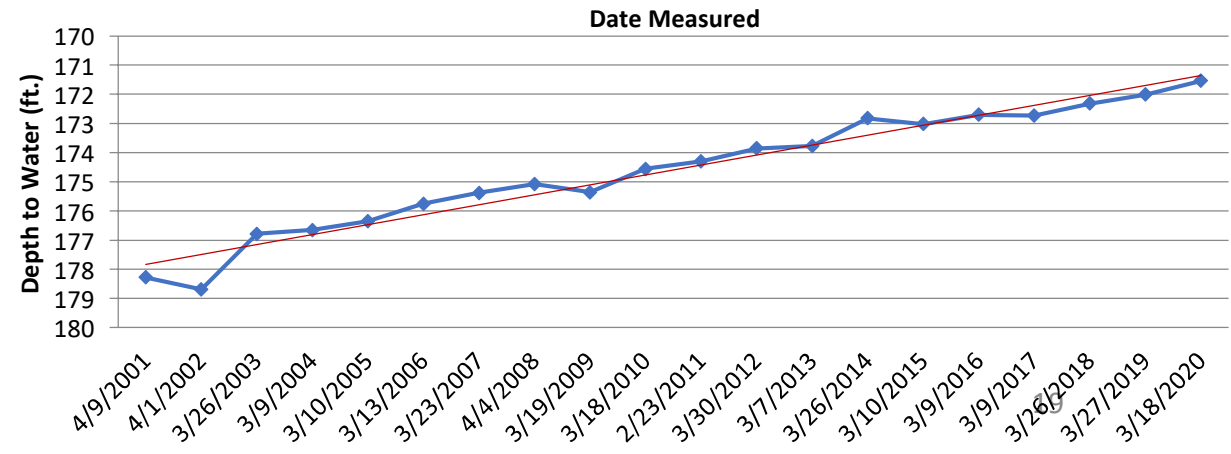
13N 45W 34CC
3 South of Chappell
Ogallala Formation
Full Appropriated Subarea (South Table)



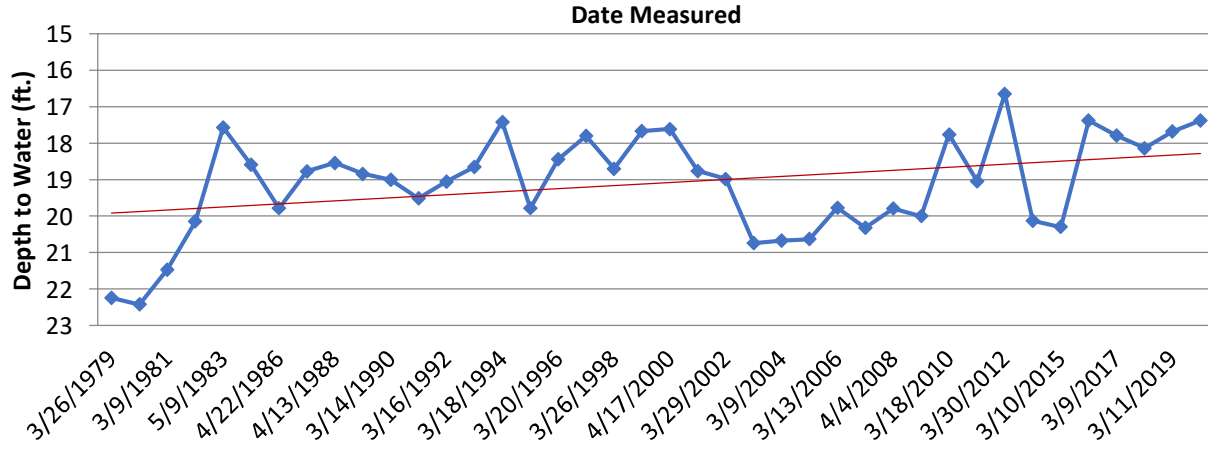
13N43W30BCBC
8 East 1 South of Chappell
Ogallala Formation
Fully Appropriated Subarea (North Table)



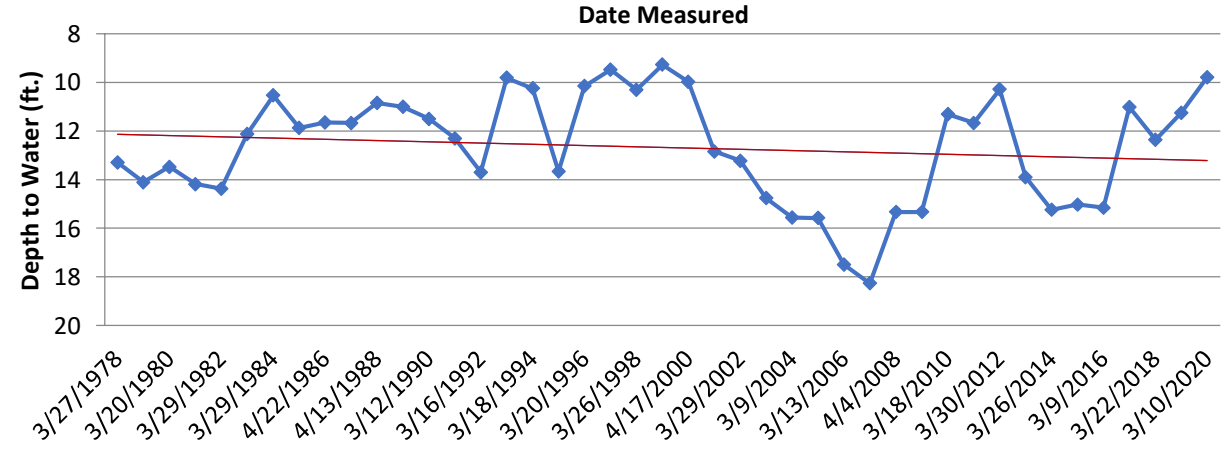
14N44W1CADD
9 North 7 East from Chappell
Ogallala Formation
Fully Appropriated Subarea (North Table)



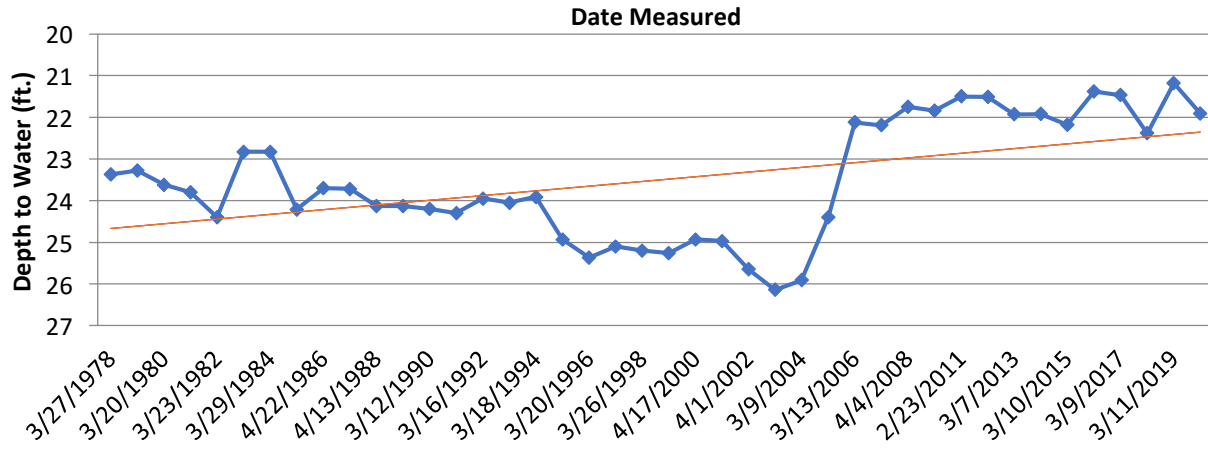
13N 45W 22BAB
in Chappell by viaduct
Brule Formation
Sidney to Colorado Subarea



12N 44W 18BB
1 North of CO/NE State Line
Brule Formation
Sidney to Colorado Subarea



12N 43W 24BB
4 South 6 West of Big Springs
Alluvium/Ogallala Formations
South Platte Valley Subarea



12N 42W 3DDD
2 South 1 West of Big Springs
Alluvium/Ogallala Formations
South Platte Valley Subarea

