Upper Elkhorn Natural Resources District

Annual Report for the Lower Platte River Basin Coalition Basinwide Water Management Plan

Reporting Dates: 01/01/2019 – 12/31/2019

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INTRODUCTION

This report was prepared to review activities within the Upper Elkhorn Natural Resources District (UENRD or District) in accordance with the Lower Platte River Basin Coalition Basinwide Water Management Plan. This is the third report compiled by UENRD and covers the dates January 1, 2019 to December 31, 2019. This report covers only activities within the Lower Platte River Basin (thick black line) of UENRD (in pink), see map below; thus eliminating part of Northern Antelope County and other sections outside the Lower Platte River Basin (LPRB).

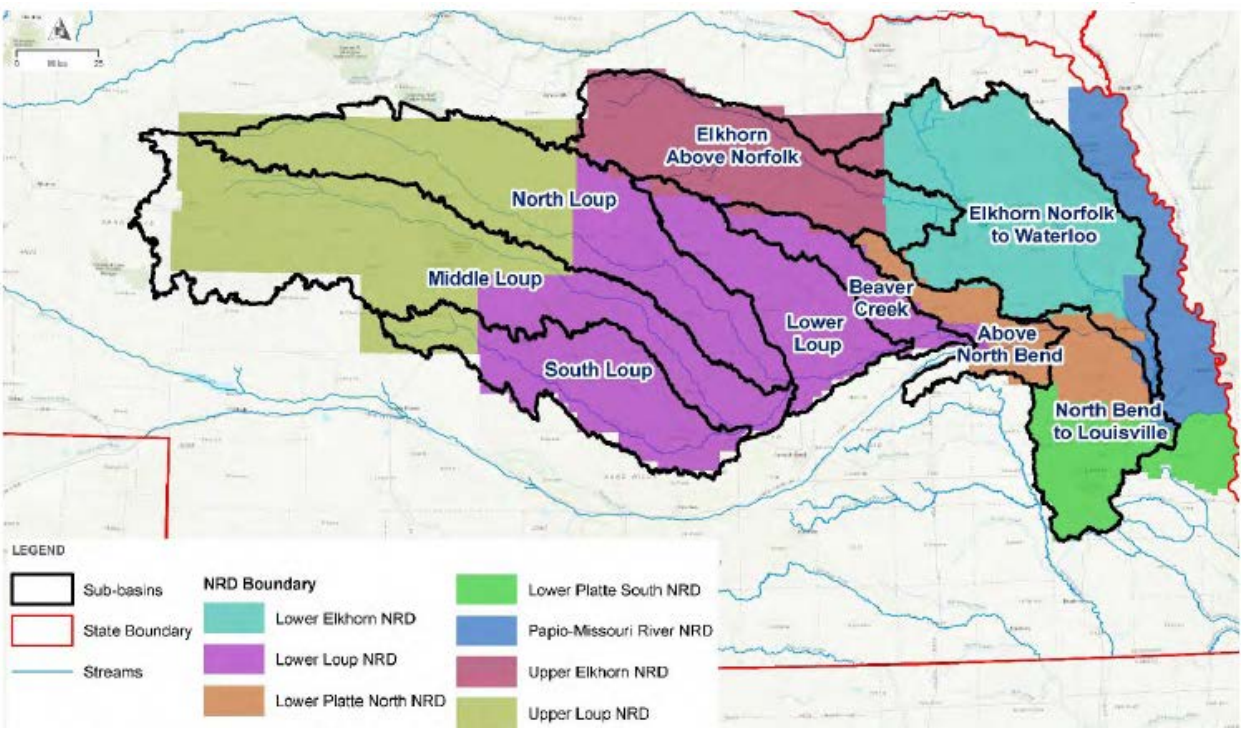


Figure 1: Boundary of the Lower Platte River Basin. From the Lower Platte River Basin Coalition Basinwide Water Management Plan, 2017.

CERTIFIED IRRIGATED ACRES

The UENRD has begun Groundwater Irrigated Acre Certification. Acre certification is based off of 2010 County Assessor data. Landowners who paid irrigated tax during 2010 received a certification letter for each parcel listed as irrigated. Once the landowner received their letter, they needed to compile documentation showing the amount of irrigated acres for that legal. Documentation could either be in the form of a FSA form 578 or county assessor tax records.

Due to the three different designated areas within the Upper Elkhorn NRD, landowners were instructed in their certification letter as to which years their documentation should include. Landowners with groundwater irrigated acres that have been irrigated at least once within the Lower Niobrara River Basin

fully appropriated designation during the calendar years of 2003 through October 16, 2007; the Lower Platte River Basin designation between the calendar years of 2004 and December 16, 2008; and the previously undesignated area of Holt and Northern Antelope Counties between the years of 2008 through October 1, 2012 will be certified at 100% with proper documentation.

Historically groundwater irrigated acres currently enrolled in the Conservation Reserve Program, Conservation Reserve Enhancement Program, Environmental Quality Incentive Program or other federal, state or local conservation program or irrigated prior to the basin designations must also be certified in order to irrigate in the future. Acres that were historically irrigated in the Lower Niobrara River Basin prior to 2003, Lower Platte River Basin prior to 2004, and previously undesignated areas of Holt and Northern Antelope Counties prior to 2008 and have proper documentation may receive 95% certification for the total amount of irrigated acres (see "WATER BANKING ACTIVITIES" on Page 7), should the landowner decide to reactivate a field for irrigation purposes. Any irrigated acres that are not certified prior to the certification deadline will not be allowed to have groundwater applied to them for any purpose.

- **Current Certified Groundwater Irrigated Acres**: 478,544 acres (as of 02/11/2020)
- **Total Certified Groundwater Irrigated Acres**: Unknown until the certification is complete, but estimated at roughly 500,000 acres.

MUNICIPAL AND INDUSTRIAL/LIVESTOCK USES

1) Municipal Use

UENRD contacted municipalities within the LPRB of the District for annual pumping data. Municipal baseline data and pumping rates had not previously been recorded by the District, as such, not all municipality data is available in this report. **Appendix A** has 01/01/2019 – 12/31/2019 gallons pumped, per capita use, population served, baseline pumping rates, and number of wells per municipality (Atkinson, Bassett, Chambers, Clearwater, Elgin, Ewing, Neligh, Newport, Oakdale, O'Neill, Page, and Stuart.)

2) Industrial/Livestock Use

UENRD does not track water usage of industries or livestock operators within the District. **Appendix B** shows all registered wells which have the capacity to pump ≥ 50 gallons per minute (GPM) for commercial/industrial (C) and livestock (S) uses.

NEW CONSUMPTIVE USES

Expansion of Groundwater Irrigated Acres

UENRD opened up groundwater irrigated acre expansion for the 2020 growing season, held in the fall of 2019. For the 2020 expansion, 7 applications were approved totaling 275 acres within the LPRB, an estimated groundwater depletion of 26.32 acre-feet. See **Appendix C**.

The depletion estimate in acre-feet (AF) was estimated using the following formula:

$$Depletion\ Estimate = Number\ of\ Acres * NIR * SDF * \%\ Depletion$$

Where:

NIR = net irrigation requirement in feet, based on the Department of Natural Resources' INSIGHT data for corn irrigation requirements

SDF = stream depletion factor percent, based on the Department of Natural Resources' CENEB stream depletion values for the Loup River and upper portions of the Elkhorn River Basins

% Depletion = 0.30 (30 %) for all groundwater irrigated farmland

RETIREMENT OF CONSUMPTIVE USES

UENRD did not retire any consumptive groundwater uses between 01/01/2019 and 12/31/2019.

TRANSFERS

UENRD approved 12 transfers in the Lower Platte River Basin between 01/01/2019 and 12/31/2019, totaling 424.50 acres, all irrigated farmland. The depletion estimate in acre-feet (AF) was estimated using the Depletion Estimate Formula above (see "NEW CONSUMPTIVE USES"). The change in depletion was calculated by subtracting the depletion estimate of the "FROM" location from the "TO" location. Overall, UENRD reduced our depletion of groundwater by 7.12 acre-feet.

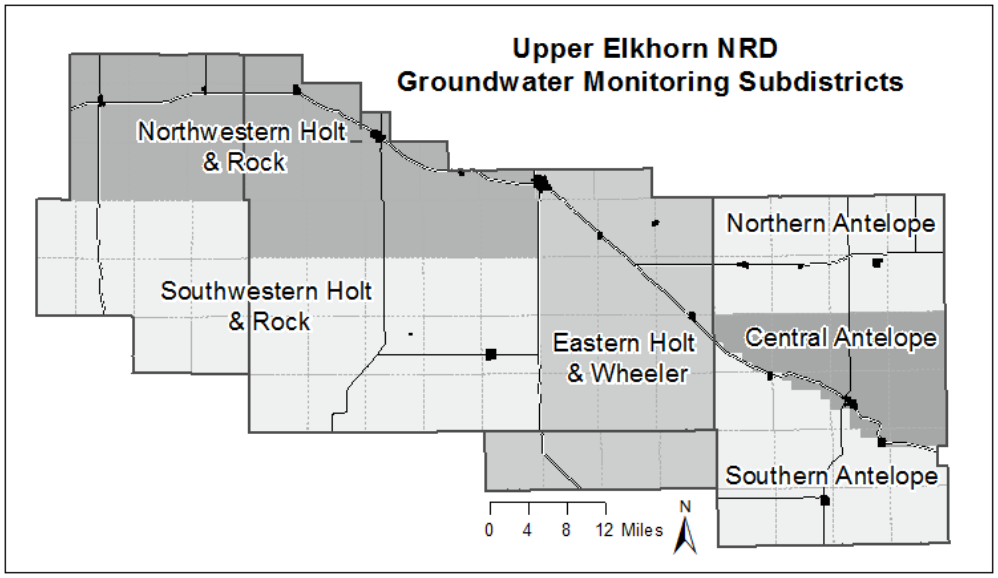
	Number of Acres	Transfer FROM	FROM Depletion Estimate (AF)	Transfer TO	TO Depletion Estimate (AF)	Change in Depletion
	6.24	NW 23-26-5	0.61	NE 31-27-5	0.18	-0.43
	2.26	SW 23-26-6	0.18	NE 31-27-5	0.07	-0.11
	8.5	SE 27-25-5	1.03	NE 20-25-5	0.92	-0.11
	56	NE 34-25-5	8.43	SE 30-25-5	7.63	-0.79
	7	NW 10-24-7	0.77	SE 23-24-7	0.55	-0.22
	27	NW 14-24-6	4.54	SW 14-24-6	4.54	0.00
	5	SW 21-23-7	0.21	SW Corner of NW 21-23-7	0.21	0.00
	8.5	SE 27-25-5	1.03	NE 20-25-5	0.92	-0.11
	52	SW 10-25-6	5.77	NE 20-25-5	7.01	1.23
	56	NE 34-25-5	8.43	NE 20-25-5	6.04	-2.39
	72	SW 10-25-6	7.99	SE 20-25-5	7.77	-0.22
	124	NE 6-25-8	23.04	SW 10-25-6	13.76	-9.28
TOTAL	**424.50**					**-7.12**
The transfers highlighted in yellow involved acres either coming into or moving out of the LPRB.						

WELL CONSTRUCTION PERMITS

UENRD issued 17 well construction permits for groundwater wells within the LPRB between 01/01/2019 and 12/31/2019. See **Appendix D**. UENRD requires a permit for all new, helper, replacement, commercial/industrial, municipal, or livestock wells that pump ≥ 50 GPM. Permits are issued in accordance with the UENRD Groundwater Management Plan Rules and Regulations.

FLOWMETER DATA

Since October 2010, flowmeters have been required on all new wells (new, helper, transfer, or replacement) permitted in the UENRD which pump ≥ 50 GPM. Designated flowmeters are checked annually by UENRD staff. Flowmeter data is analyzed within UENRD Subdistricts, see map below.



Average inches pumped per year and 10 year average (2010 – 2019) inches pumped are below:

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2018	AVG
NW Holt & Rock	12.10	16.51	21.75	15.62	12.90	12.89	14.68	14.64	9.19	6.59	**13.69**
SW Holt & Rock	18.15	22.48	17.32	9.53	4.53	6.55	9.53	11.17	9.55	4.17	**11.30**
Eastern Holt & Wheeler	12.58	15.48	21.29	16.05	12.72	10.95	12.49	13.93	7.46	7.32	**13.03**
Northern Antelope	7.13	12.79	17.76	10.94	5.95	9.25	10.70	11.44	5.02	7.67	**9.87**
Central Antelope	6.98	10.10	14.42	11.39	5.77	6.73	8.38	8.65	3.92	4.87	**8.12**
Southern Antelope	10.9	10.88	23.51	15.39	8.92	8.10	9.35	11.84	6.14	7.01	**11.20**

WATER BANKING ACTIVITIES

UENRD performed no formal water banking activities between 01/01/2019 and 12/31/2019. However, in conjunction with our Acre Certification, UENRD is certifying historically groundwater irrigated acres at 95% should the landowner decide to reactivate a field for irrigation purposes, and "banking" the 5% (see "CERTIFIED IRRIGATED ACRES" on Pages 3-4). UENRD is still in the processes of completing acre certification. Currently, UENRD has 478,544 certified groundwater irrigated acres, of which 40,616 are historic groundwater irrigated acres. Of those 40,616, 95% are certified as historical groundwater

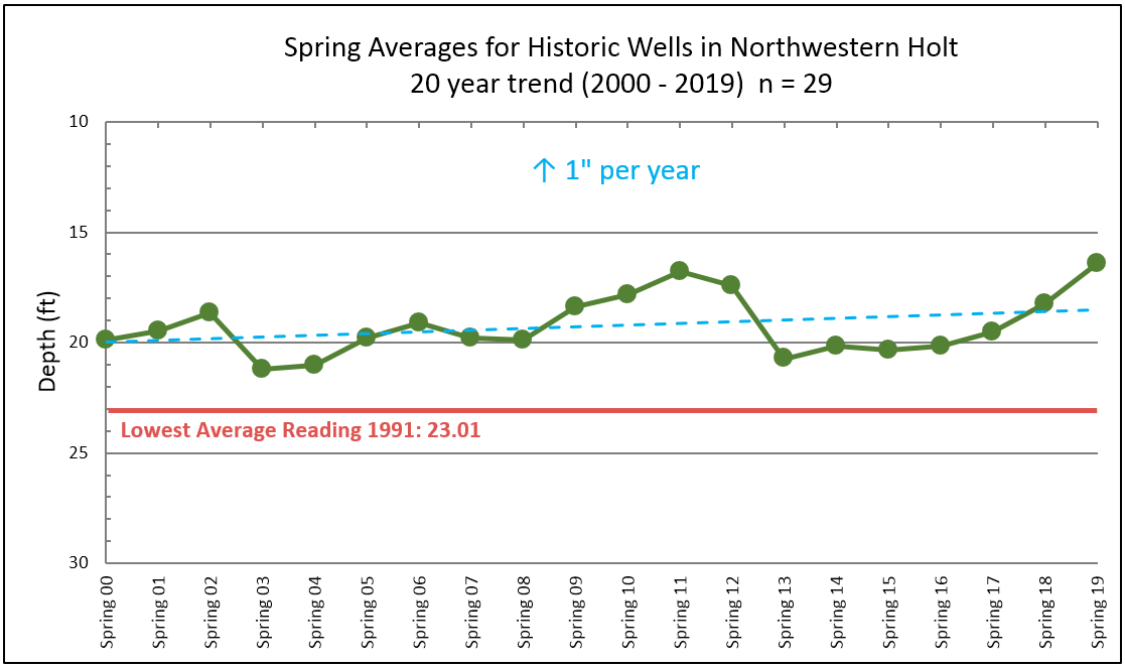
irrigated acres (38,585 acres), and 5% are banked acres (2,031 acres; see below). UENRD has not determined the future management implications or uses of the 5% of historical groundwater irrigated acres which have been banked, but they may be used to offset new groundwater uses in the future.

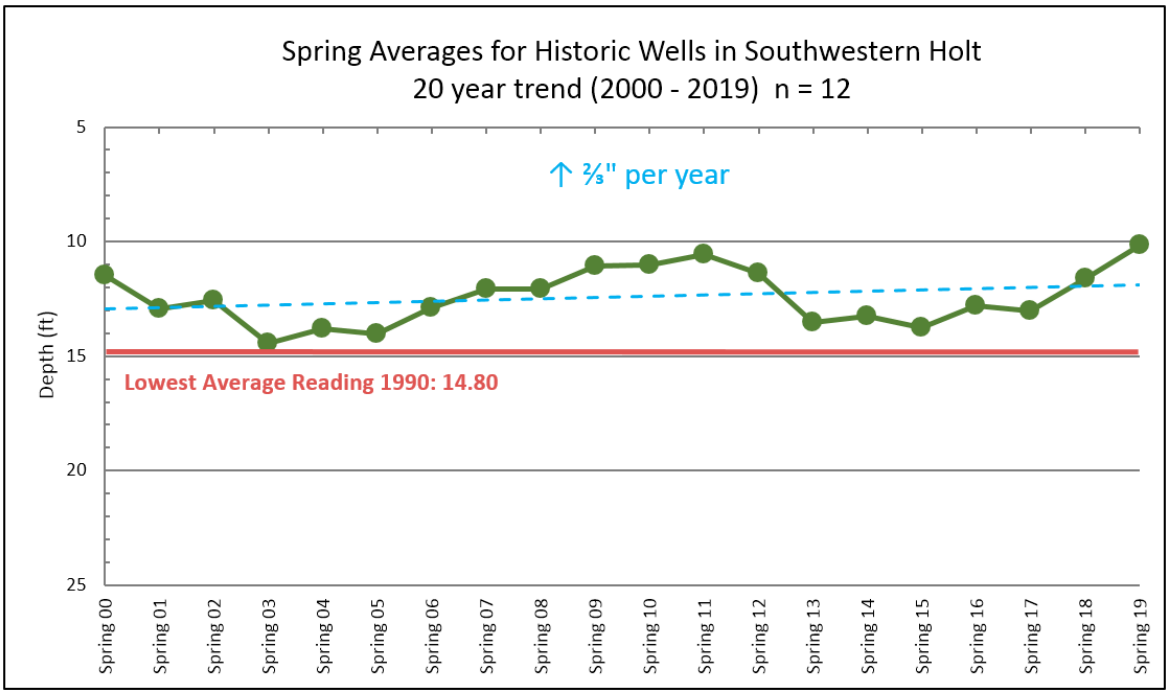
- 40,616 historic acres x 95% = 38,585 certified historical acres
- 40,616 historic acres x 5% = 2,031 banked acres (as of 02/11/2020)

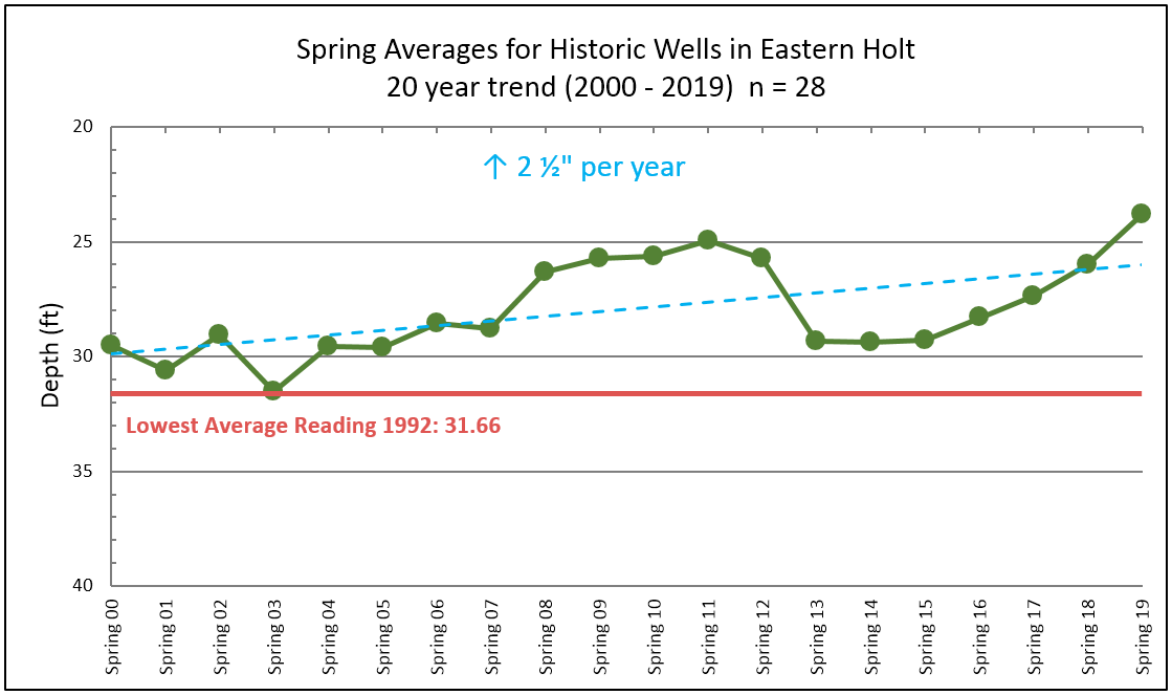
GROUNDWATER ELEVATION DATA

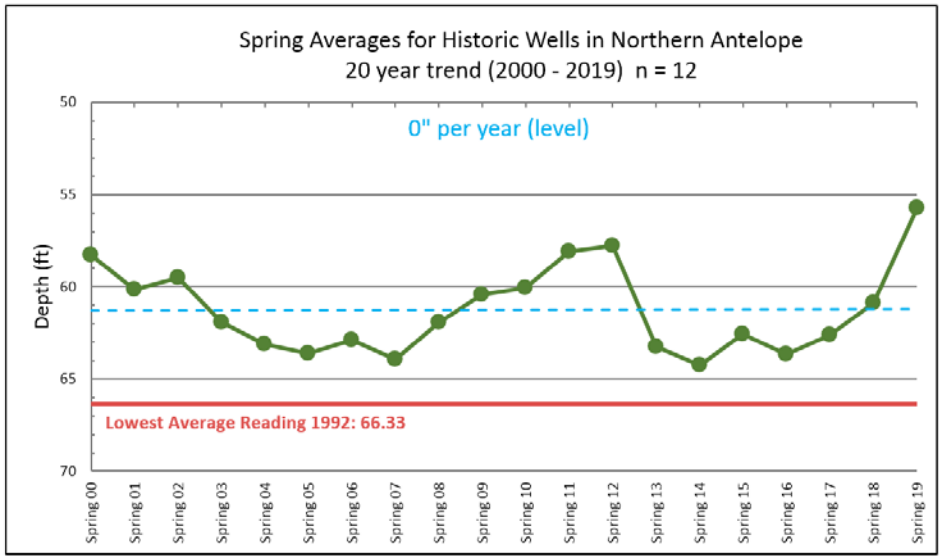
The UENRD has maintained a static groundwater level monitoring program since 1975. This program has expanded to include 358 wells: 104 long-term historical irrigation wells, 62 District monitoring wells, and 199 new irrigation wells added in 2015. Depth to groundwater readings are collected every spring and fall and the data is used by the District to recognize changes in groundwater levels over time and better interpret the status of the aquifer. Static water levels and trends are analyzed by UENRD Subdistricts. See map on Page 7.

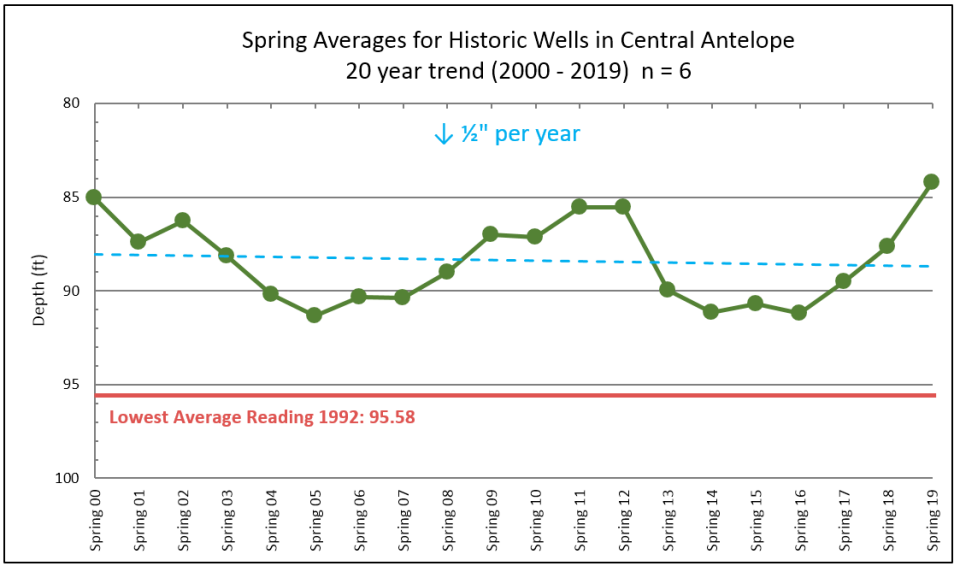
Only spring readings from historic irrigation wells are used to manage groundwater levels in UENRD. In general, the 20-year static groundwater level trendlines show that one subdistrict is decreasing (Central Antelope), one subdistrict is relatively stable (Northern Antelope), and four subdistricts are increasing (NW Hold & Rock, SW Holt & Rock, Eastern Holt & Wheeler, and Southern Antelope) in depth to groundwater. Data from the past 20 years, as well as 20-year trendlines are provided by subdistrict in the following graphs:

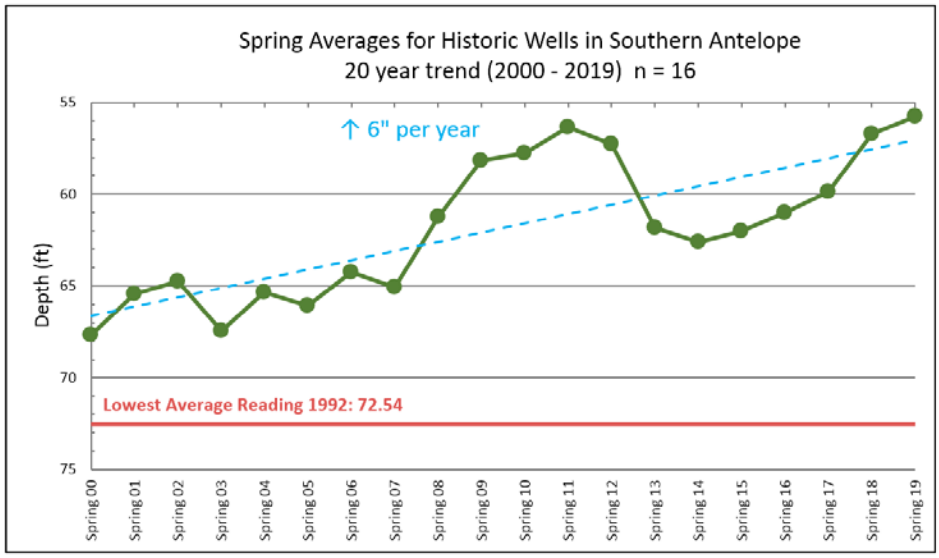



Spring Averages for Historic Wells in Southwestern Holt
20 year trend (2000 - 2019) n = 12
↑ ⅔" per year
Lowest Average Reading 1990: 14.80
Depth (ft)
5
10
15
20
25
Spring 00
Spring 01
Spring 02
Spring 03
Spring 04
Spring 05
Spring 06
Spring 07
Spring 08
Spring 09
Spring 10
Spring 11
Spring 12
Spring 13
Spring 14
Spring 15
Spring 16
Spring 17
Spring 18
Spring 19


Spring Averages for Historic Wells in Eastern Holt
20 year trend (2000 - 2019) n = 28
↑ 2 ½" per year
Lowest Average Reading 1992: 31.66
Depth (ft)
20
25
30
35
40
Spring 00
Spring 01
Spring 02
Spring 03
Spring 04
Spring 05
Spring 06
Spring 07
Spring 08
Spring 09
Spring 10
Spring 11
Spring 12
Spring 13
Spring 14
Spring 15
Spring 16
Spring 17
Spring 18
Spring 19


Spring Averages for Historic Wells in Northern Antelope
20 year trend (2000 - 2019) n = 12
0" per year (level)
Depth (ft)
50
55
60
65
70
Lowest Average Reading 1992: 66.33
Spring 00
Spring 01
Spring 02
Spring 03
Spring 04
Spring 05
Spring 06
Spring 07
Spring 08
Spring 09
Spring 10
Spring 11
Spring 12
Spring 13
Spring 14
Spring 15
Spring 16
Spring 17
Spring 18
Spring 19


Spring Averages for Historic Wells in Central Antelope
20 year trend (2000 - 2019) n = 6
↓ ½" per year
Depth (ft)
80
85
90
95
100
Lowest Average Reading 1992: 95.58
Spring 00
Spring 01
Spring 02
Spring 03
Spring 04
Spring 05
Spring 06
Spring 07
Spring 08
Spring 09
Spring 10
Spring 11
Spring 12
Spring 13
Spring 14
Spring 15
Spring 16
Spring 17
Spring 18
Spring 19


Spring Averages for Historic Wells in Southern Antelope
20 year trend (2000 - 2019) n = 16
↑ 6" per year
Depth (ft)
55
60
65
70
75
Lowest Average Reading 1992: 72.54
Spring 00
Spring 01
Spring 02
Spring 03
Spring 04
Spring 05
Spring 06
Spring 07
Spring 08
Spring 09
Spring 10
Spring 11
Spring 12
Spring 13
Spring 14
Spring 15
Spring 16
Spring 17
Spring 18
Spring 19

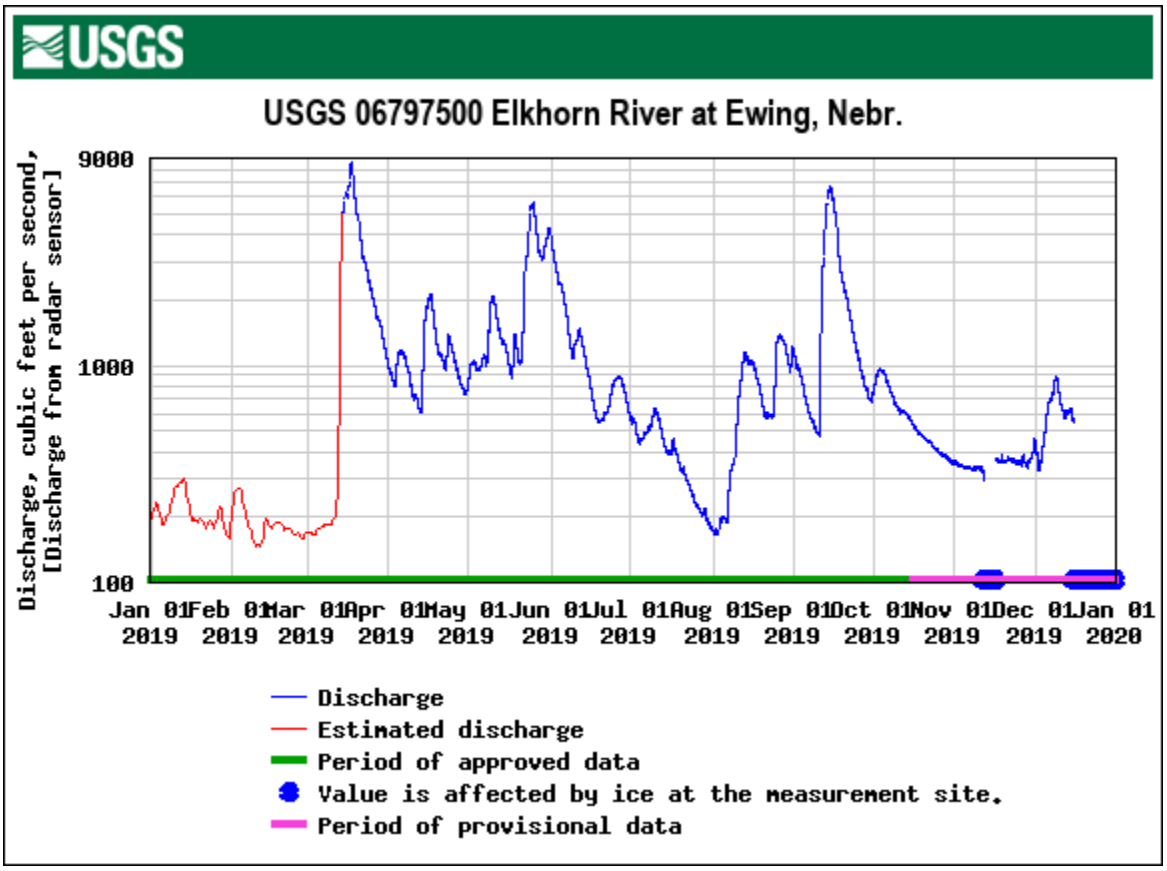
STREAM FLOW ACCRETION ACTIVITIES

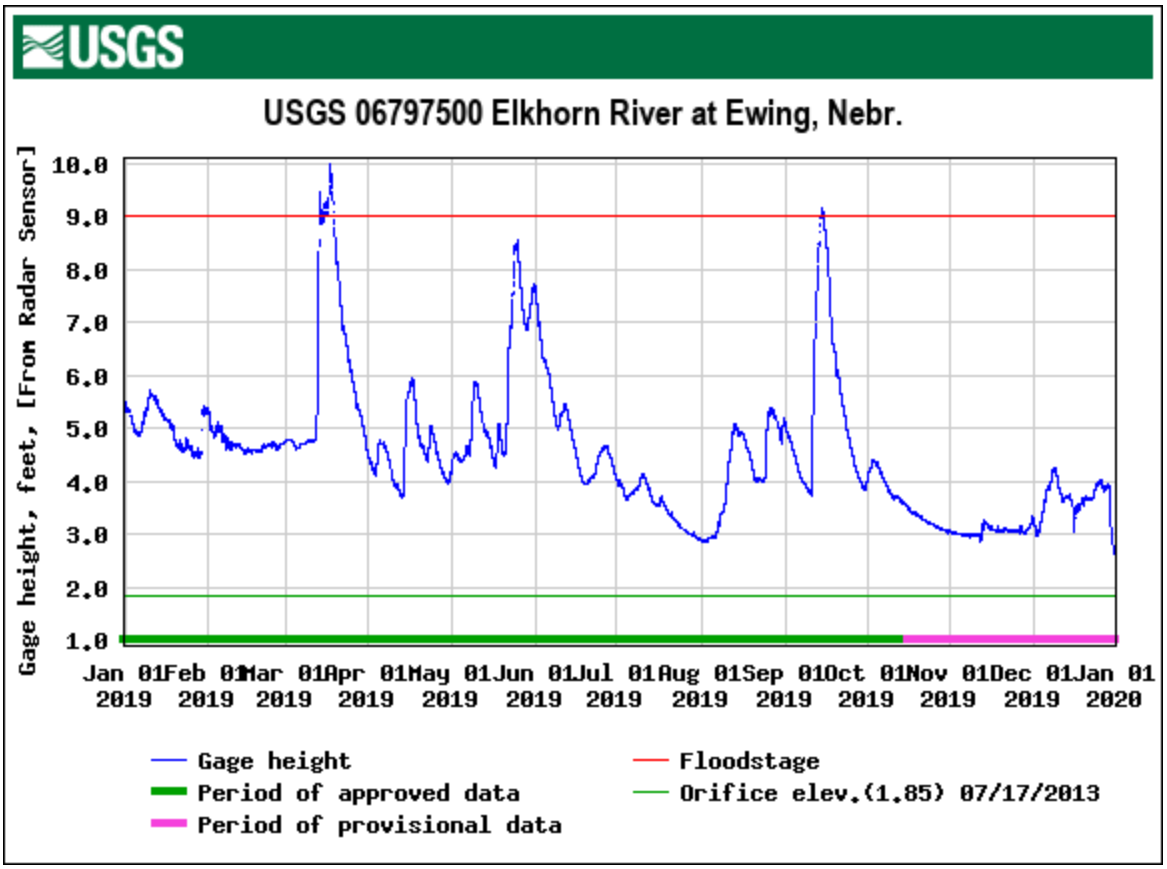
UENRD performed no stream flow accretion activities between 01/01/2019 and 12/31/2019.

STREAM GAGE MEASUREMENTS

UENRD provides funding for the USGS Gaging Station at Ewing, NE on the Elkhorn River. Below are two graphs showing the discharge in cubic feet per second from 01/01/2019 to 12/31/2019, as well as the gage height in feet.

Data found at: https://nwis.waterdata.usgs.gov/ne/nwis/current/?type=flow.





NRD REGULATIONS/MANAGEMENT ACTIVITIES

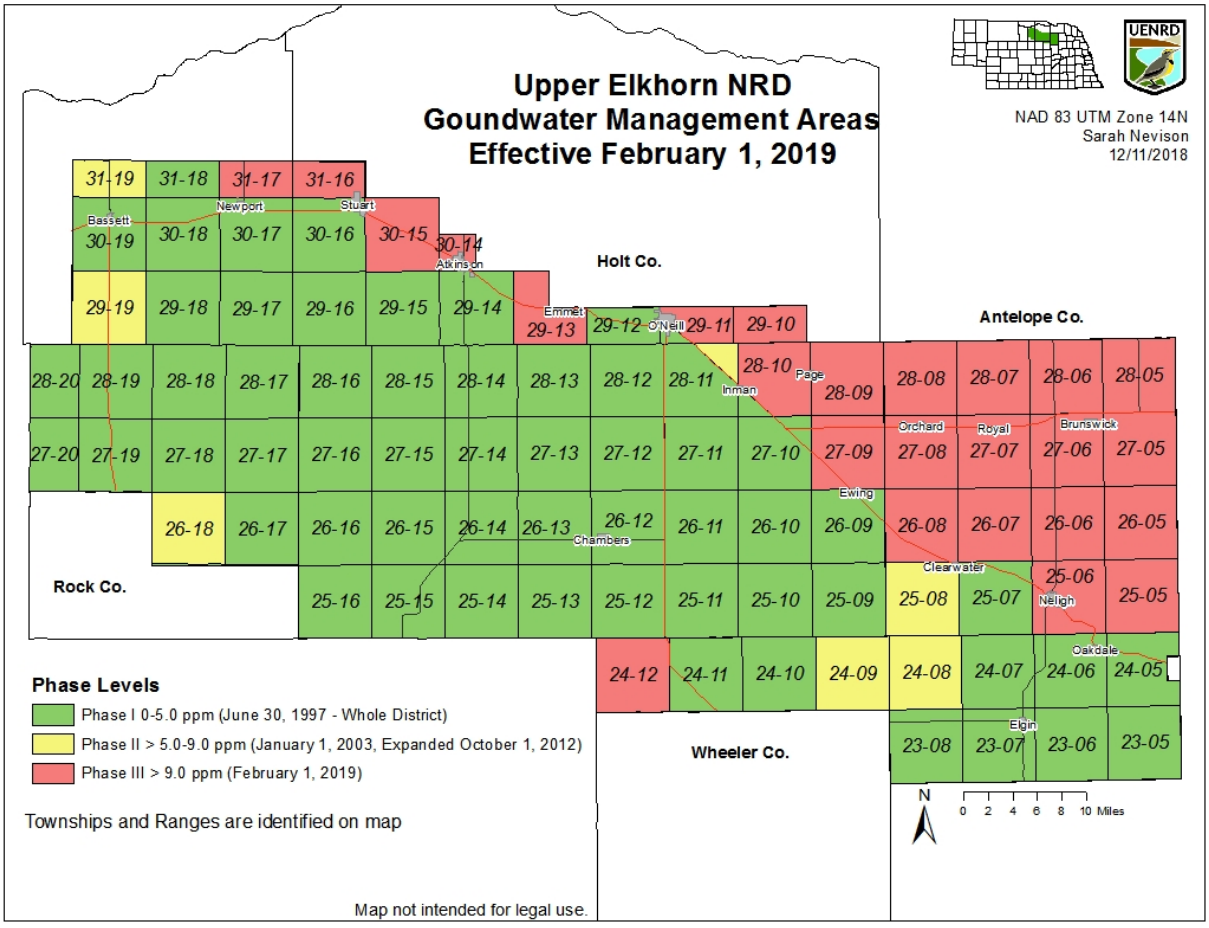
1) UENRD has designated Groundwater Quality Management Areas, known as Phase I, Phase II, and Phase III, to address groundwater nitrate contamination throughout the District. Phase I, Phase II, and Phase III designations can be viewed on the following map. Phase I includes areas where the average groundwater concentration of nitrate-nitrogen is 0.0 – 5.0 ppm. Phase II includes areas where the average groundwater concentration of nitrate-nitrogen is > 5.0 – 9.0 ppm. Phase III includes areas where the average groundwater concentration of nitrate-nitrogen is > 9.0 ppm.

- Phase I was initiated 06/30/1997 and encompasses the entire District. Phase I requires anyone who makes nitrogen application decisions (of more than 50 lbs of nitrogen per acre and on more than 1 acre) to be Nitrogen Certified through UENRD or a neighboring NRD every four years. Additionally, all irrigation water wells must be sampled every 4 years and the nitrate-nitrogen results submitted to UENRD.

- Phase II was first designated on 01/01/2003 and encompassed the "Page Triangle" near Page, NE in Holt County, and Crawford Township in Antelope County. Additional Phase II Areas were designated 10/01/2012 (see map). Phase II requirements include all Phase I requirements and in addition require annual deep soil samples, Phase II Reporting Form submission (for fields > 40

acres and where > 50lbs of nitrogen was applied/acre), and Best Management Practices (BMPs) are strongly encouraged.

- Phase III was designated 02/01/2019. The Board of Directors approved the rules and regulations at the December 17, 2018 board meeting. Twenty-five whole or partial townships were designated as Phase III (see map). Phase I and II rules and regulations will remain in effect unless modified or negated by Phase III requirements. Phase III requirements include soil sampling to identify fields, which are larger than 40 acres with more than 50 lbs/ac of actual nitrogen applied, with high residual soil nitrate-nitrogen.



NEW DEPLETIONS ACCOUNTING REPORT

The Lower Platte River Basin Coalition Basinwide Water Management Plan has designated the first 5-year increment allowable development by Basin and by NRD. UENRD is allowed to develop (deplete) 1,504 acre-feet for the first 5-year period, 50% for surface water and 50% for groundwater. Below is our accounting report of depletions (groundwater irrigated acre expansion for the 2017, 2018, 2019, & 2020 growing seasons) and the supplementation from transfers.

- UENRD has approximately 1,326 acre-feet in allowable depletions for the remaining two years of the first 5-year increment, less any surface water depletions.

1,504 AF	**Starting Allowable Depletion**
- 60.63 AF	2017 Acre Expansion
- 50.20 AF	2018 Acre Expansion
+ 0.95 AF	2016 & 2017 Transfers
-51.99 AF	2019 Acre Expansion
+ 3.17 AF	2018 Transfers
-26.32 AF	2020 Acre Expansion
+ 7.12 AF	2019 Transfers
1,326.10 AF	**Remaining Allowable Depletion**

NEW DATA COLLECTED OR MODEL/STUDY RESULTS

No new models or studies were conducted within UENRD which directly benefitted the Lower Platte River Basin Coalition. However, in July of 2016 aerial electromagnetic (AEM) surveys were flown and data was collected in the Bazile Groundwater Management Area, which covers Northern Antelope County in UENRD, and parts of Pierce and Knox Counties in Lower Elkhorn, Lewis and Clark, and Lower Niobrara NRDs. These surveys provided insight into the hydrogeology of the area, including 3D profiles, water storage capabilities, and recharge areas in the Bazile Groundwater Management Area. More information can be found at https://www.enwra.org/coop.html.

In June 2017, the UENRD Board of Directors voted to discontinue funding the Nebraska Mesonet weather stations in Elgin, Newport, Brunswick, and Chambers, NE. These weather stations were maintained through the Nebraska State Climate Office at the University of Nebraska and provided data to local, state, regional, and national organizations. Stations in O'Neill and Elgin are still funded through Mesonet/UNL. UENRD no longer has ET data from the Newport, Chambers, and Brunswick stations.

APPENDIX A – Municipal Water Use

Municipality	1/1/19 - 12/31/19 Gallons Pumped	Per Capita Use (gals/person/day)	Population Served	2010 Census Data	2006 - 2015 Average Annual Gallons Pumped	Baseline Pumping Rate	Number of Wells
Atkinson	89,498,140	195.87	1251	1,245	98,922,370	218	3
Bassett	38,200,000	168.96	619	619	54,020,000	239	3
Chambers	11,521,600	105.15	300	268	NA[1]	NA[1]	3
Clearwater	22,750,500	148.66	419	419	NA[1]	NA[1]	2
Elgin	36,767,000	152.29	661	661	NA[2]	NA[2]	2
Ewing	18,649,200	131.93	387	387	41,170,250	291	3
Neligh	72,753,671	124.49	1,600	1,599	NA[1]	NA[1]	4
Newport	3,972,000	135.93	80	97	NA[1]	NA[1]	2
Oakdale	6,614,700	53.26	340	322	NA[1]	NA[1]	2
O'Neill	192,600,000	142.32	3,705	3,705	233,851,800	173	5
Page	3,704,400	61.10	166	166	NA[1]	NA[1]	2
Stuart	34,934,000	162.11	590	590	67,884,530	315	3

Per Capita Use was estimated using 01/01/2019 – 12/31/2019 gallons pumped, divided by the population served in that period, divided by 365.25 days (1 year). Baseline Pumping Rates was estimated using 2006 – 2015 (10 year) average annual gallons pumped, divided by the 2010 Census Data, divided by 365.25 days. All data provided by municipalities.

[1] Several municipalities are still working on getting previous years pumping data to UENRD: Chambers, Clearwater, Neligh, Newport, Oakdale, and Page.

[2] Elgin's data only went back to 2009, so an average annual baseline pumping rate (2006 – 2015) was unable to be calculated.

APPENDIX B – Industrial/Livestock Water Use

Well Registration #	Name	Legal			Use	GPM
		S	T	R		
G-092895	A C P A Nebraska General Partnership	2	25	5	S	100
G-136694	Agriliance LLC	2	24	6	C	100
G-086547	Antelope County Partners	2	25	5	S	72
G-086548		2	25	5	S	72
G-186075	Atkinson Fertilizer Inc	30	30	14	C	95
G-094434	Central Farmers Coop	12	23	5	C	90
G-073246	Central Valley Ag	32	29	11	C	100
G-088467	Charles Sargent Irrigation Company Inc	30	25	6	C	800
G-148010	Elkhorn River Holdings LLC	1	28	11	C	600
G-094916	Glen Larson	22	24	5	S	90
G-146271	Green Plains Atkinson LLC	25	29	12	C	600
G-143983		4	29	14	C	530
G-053742		4	29	14	C	800
G-174310	Highway 20 Washout	24	30	15	C	100
G-064726	Registered to: Jim D Jarman (deceased) Owner: Anthony & Rebecca Emme	2	26	12	C	400
G-137716	Lawrence & Sharon Hinrichsen Sand & Gravel	1	26	9	C	200
G-089661	Maschhoffs LLC	15	26	10	S	100
G-123842		15	26	10	S	90
G-182536	Matt & Stacy Klabenes	20	26	7	S	300
G-046339	Nebraska Game & Parks Commission	26	25	11	C	1,250
G-097213	Niewohner Brothers Inc	8	23	7	S	300
G-071104	Olson Industries Inc	4	29	14	C	80
G-116635	Randall/Deborah G Shinn & Steward	17	29	17	S	100
G-112729	Rick Schindler	29	25	6	C	400
G-177969	Thiele Dairy	14	25	8	S	600
G-128917	Tinsley Grain	18	25	8	C	65

APPENDIX C – 2020 Growing Season Acre Expansion

Approved expansion groundwater irrigated acres for the 2020 growing season within the LPRB.

- 275 acres, 26.32 acre-feet depletion (see formula on Page 5)

Legal	Number of Acres	NIR (ft)	SDF %	% Depletion	Depletion Estimate (AF)
SE 27-23-6	7	0.59	0.29	0.3	0.35
NW 25-26-6	11	0.61	0.27	0.3	0.55
NE 35-23-5	60	0.59	0.17	0.3	1.77
NE 20-25-5	15	0.60	0.60	0.3	1.62
E 1/2 NE 4-24-7	85	0.62	0.78	0.3	12.25
NE SE 4-24-7	7	0.62	0.78	0.3	1.01
SW 28-24-5	90	0.59	0.55	0.3	8.78
TOTAL	**275**				**26.32**

APPENDIX D – Well Construction Permits

UENRD well construction permits for groundwater wells within the LPRB between 01/01/2019 and 12/31/2019, over 50 GPM. Permits are issued in accordance with the UENRD Groundwater Management Plan Rules and Regulations.

UENRD Permit Number	Well Registration #	Name	Location	Number of Acres	GPM	Date Permit Approved	Classification Type
UE-19-001	G-187463	Bruce Staub	NW 35-23-5	136	850	1/3/2019	New well
UE-19-002	G-187462	Bruce Staub	NE 35-23-5	61	850	1/3/2019	New well
UE-19-003	G-187165	John & Keith Dittrich	NW 15-24-5	96	800	1/3/2019	New well
UE-19-004	G-187209	Helen Henn	SE 27-23-6	128	800	1/3/2019	New well
UE-19-005	G-187167	James Kahland %Scott Watson	SW 1-23-5	106	850	1/3/2019	New well
UE-19-007	NA[1]	Village of Oakdale	SW 12-24-6	0	NA[1]	3/1/2019	New well
UE-19-008	G-187445	Andy & Loretta Frey	SE 20-25-5	130	800	4/4/2019	New well
UE-19-009	G-187447	Andy & Loretta Frey	NE 20-25-5	132	700	4/4/2019	New well
UE-19-011 <R>	NA[1]	Robert C. & Elenor J. Ita	NE 13-26-10	134.9	NA[1]	6/24/2019	Replacement well
UE-19-012 <R>	G-137276	Thiele Dairy	SE 24-25-8	200	1050	7/1/2019	Replacement well
UE-19-014 <R>	G-019586	Jason & Sarah Rittscher	NE 1-24-8	129.23	800	7/19/2019	Replacement well
UE-19-015 <R>	G-084875	Thiessen LLC	NE 36-25-8	130.38	700	7/30/2019	Replacement well
UE-19-016	NA[1]	William Becker	NE 32-23-5	132.3	NA[1]	8/23/2019	New well
UE-19-017	G-031571	David Troester	NW 27-29-10	132.34	1000	10/24/2019	New well
UE-19-019 <R>	NA[1]	Elkhorn River Holdings, LLC	SW 26-29-11	129.23	NA[1]	11/12/2019	Replacement well
UE-19-020 <R>	G-187463	Kottman Farms LLC	SE 9-28-10	96.66	850	12/11/2019	Replacement well

[1] As of report completion date, wells had not been completed & well registration number not assigned.