



Upper Elkhorn

Natural Resources District

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

Reporting Dates: 01/01/2018 – 12/31/2018

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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 second report compiled by UENRD and covers the dates January 1, 2018 to December 31, 2018. 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 sections outside the Lower Platte River Basin (LPRB).

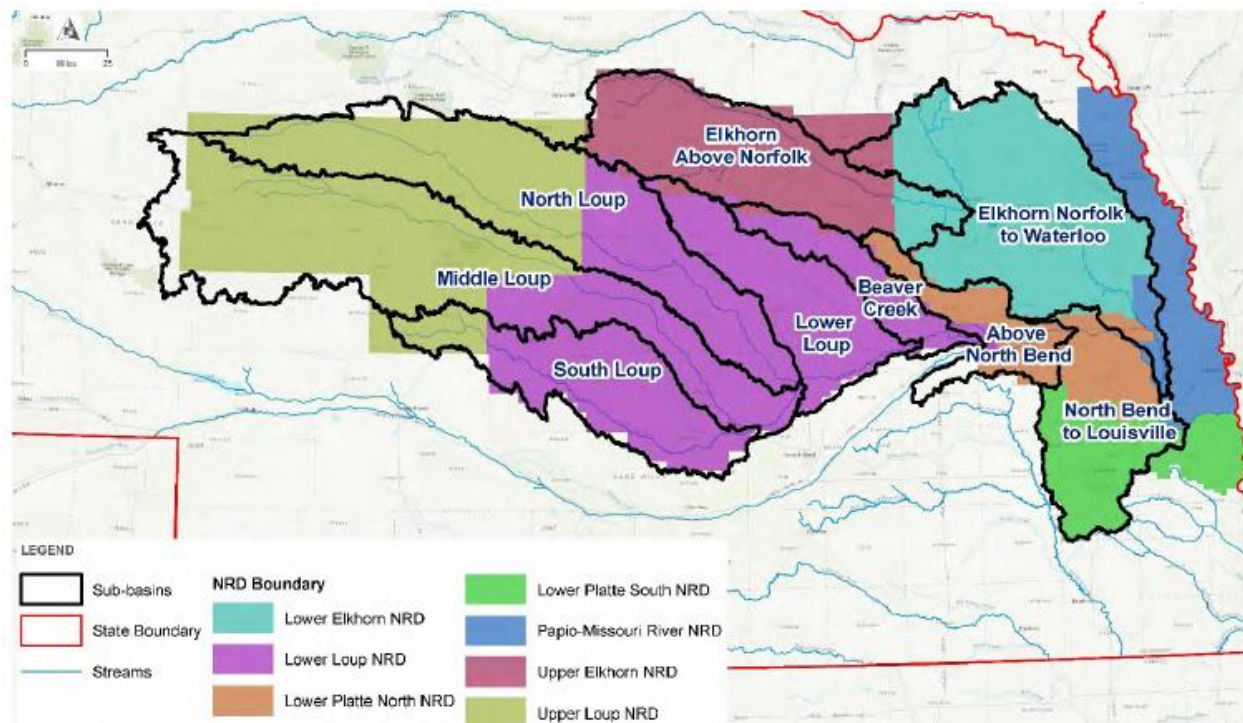


Figure 1: Boundary of the Lower Platte River Basin. From the Lower Platte River Basin Coalition Basinwide Water Management Plan, 2017.

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 if there is any possibility of future irrigation. Acres that were historically irrigated in the Lower Niobrara River Basin prior to 2003, Lower Platte River Basin prior to 2004, and previously undesignated area 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:** 474,154 acres (as of 02/26/2019)
- **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 01/01/2018 – 12/31/2018 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 (I) and livestock (L) uses.

NEW CONSUMPTIVE USES**Expansion of Groundwater Irrigated Acres**

UENRD opened up groundwater irrigated acre expansion for the 2019 growing season, held in the fall of 2018. For the 2019 expansion, 13 applications were approved totaling 793 acres within the LPRB, an estimated groundwater depletion of 51.99 acre-feet. See **Appendix C**.

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

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

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 01/01/2018 and 12/31/2018.

TRANSFERS

UENRD approved 17 transfers between 01/01/2018 and 12/31/2018, totaling 234.01 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 3.17 acre-feet.

ANNUAL REPORT OF WATER USE IN THE UPPER ELKHORN NRD

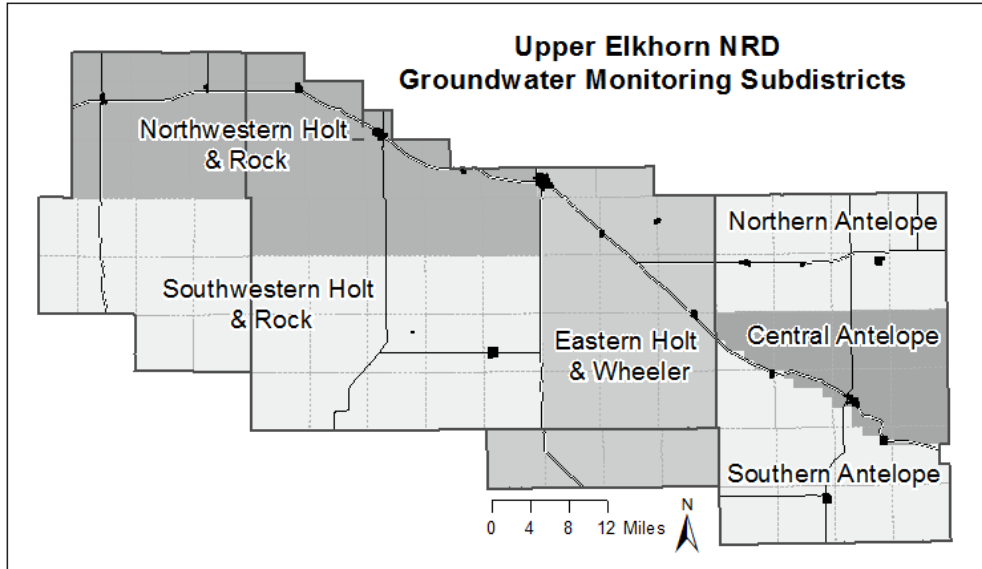
	Number of Acres	Transfer FROM	FROM Depletion Estimate (AF)	Transfer TO	TO Depletion Estimate (AF)	Change in Depletion
	2	SW 22-25-5	0.22	NW NE 21-25-5	0.21	0.00
	7	SW 22-25-5	0.75	SW 21-25-5	0.74	-0.02
	6	NE 10-23-6	0.73	NW 10-23-6	0.73	0.00
	2	W1/2 SW 22-23-6	0.15	E1/2 NW 31-23-5	0.06	-0.10
	11	NW 6-23-5	1.00	SW 6-23-5	1.00	0.00
	1	SW 26-28-6	0.11	N1/2 NW 34-28-6	0.06	-0.05
	12	NW NW 35-28-6	0.93	NE 34-28-6	0.70	-0.23
	19.65	SW 8-26-8	3.80	NW SE 8-26-8	3.80	0.00
	10.5	NW 8-26-8	2.03	NW SE 8-26-8	2.03	0.00
	6.2	NW 27-25-8	0.95	SW 27-25-8	0.95	0.00
	6.8	SE 27-25-8	1.04	SW 27-25-8	1.04	0.00
	0.5	SE 27-25-8	0.08	NE 27-25-8	0.08	0.00
	31.55	W1/2 NE & W1/2 SE 27-28-5	3.38	SW NE & NW 36-28-6	3.71	0.33
	6.35	SW 32-28-5	0.68	SW NE & NW 36-28-6	0.75	0.07
	89.66	SW NE & NW 36-28-6	8.65	NW & N1/2 SW 22-28-6	5.88	-2.77
	15	E1/2 NE 35-28-6	1.16	NW & N1/2 SW 22-28-6	0.98	-0.18
	7	N1/2 SW 36-28-6	0.68	NW & N1/2 SW 22-28-6	0.46	-0.22
TOTAL	234.01					-3.17

WELL CONSTRUCTION PERMITS

UENRD issued 18 well construction permits for groundwater wells within the LPRB between 01/01/2018 and 12/31/2018, 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 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 (2006 – 2015) inches pumped are below:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	AVG
NW Holt & Rock		14.79	15.88	12.46	12.10	16.51	21.15	14.99	11.79	13.09	14.75
SW Holt & Rock			4.98	12.13	18.15	22.48	17.41	12.19	5.56	4.44	12.17
Eastern Holt & Wheeler	8.58	11.81	13.91	13.82	12.58	15.48	22.52	16.57	13.85	10.82	13.99
Northern Antelope	7.93	9.01	8.12	10.59	7.13	12.79	17.03	11.14	6.46	8.51	9.87
Central Antelope			7.45	8.24	6.98	10.10	20.38	16.31	5.88	7.21	10.32
Southern Antelope		10.33	9.87	9.85	10.9	10.88	23.96	15.47	8.19	7.52	11.89

WATER BANKING ACTIVITIES

UENRD performed no formal water banking activities between 01/01/2018 and 12/31/2018. 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 474,154 certified groundwater irrigated acres, of which 40,616 are historic groundwater irrigated acres. Of those 40,616, 95% are certified as historical groundwater

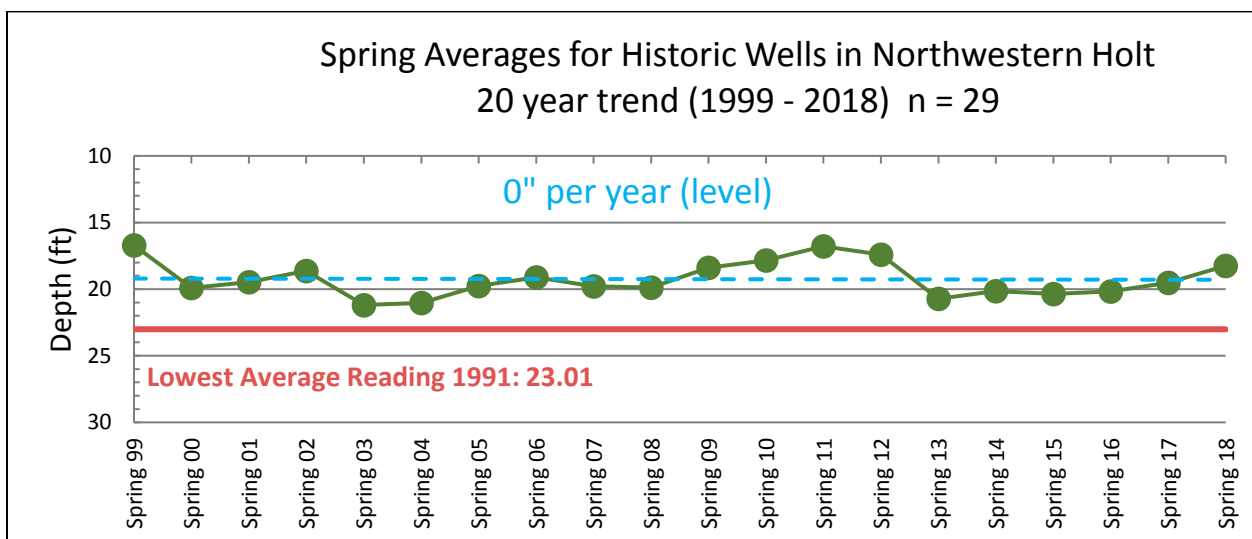
irrigated acres (38,585 acres), and 5% are banked acres (2,031 acres; see below). UENRD has not determined the future management implications or uses of the 5% of historical groundwater irrigated acres which have been banked, but they may be used to offset new groundwater uses in the future.

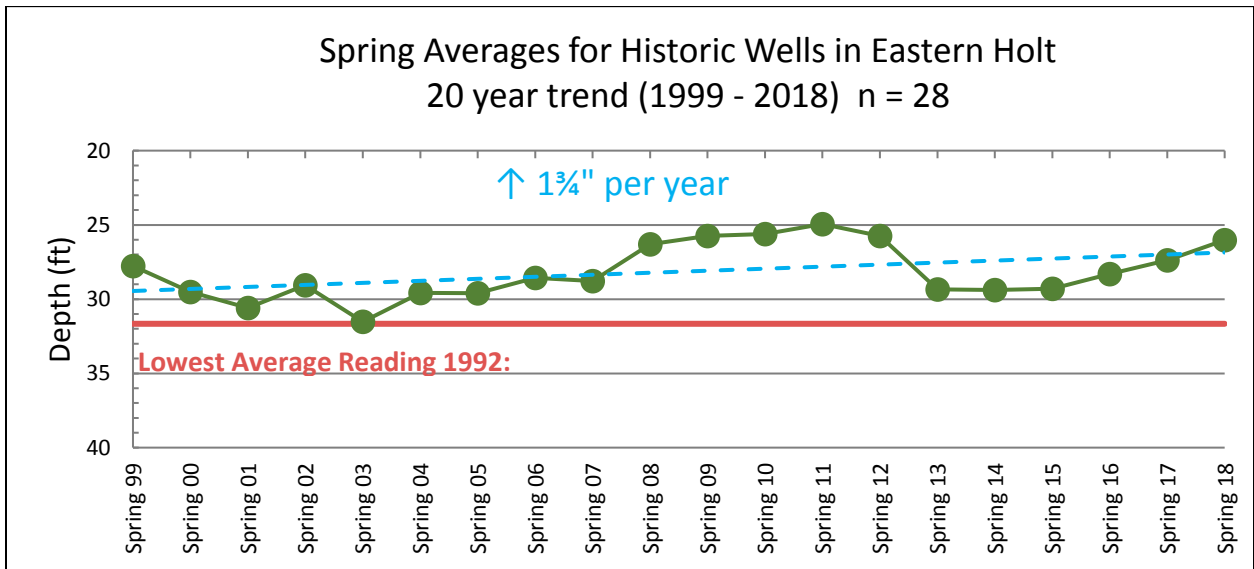
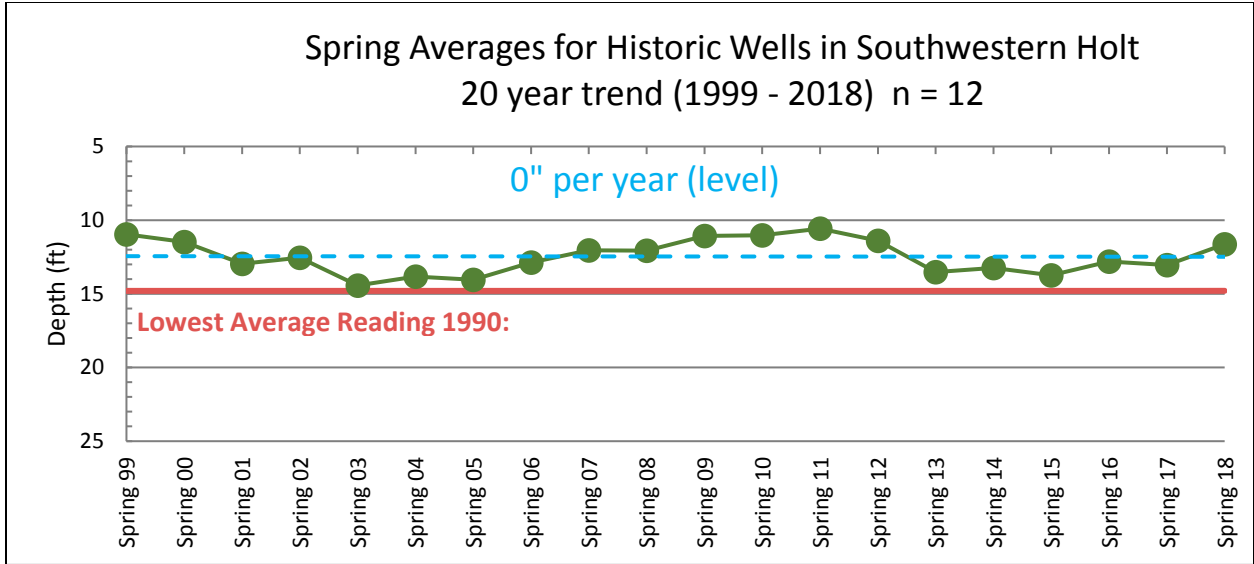
- 40,616 historic acres x 95% = 38,585 certified historical acres
- 40,616 historic acres x 5% = 2,031 banked acres (as of 02/26/2019)

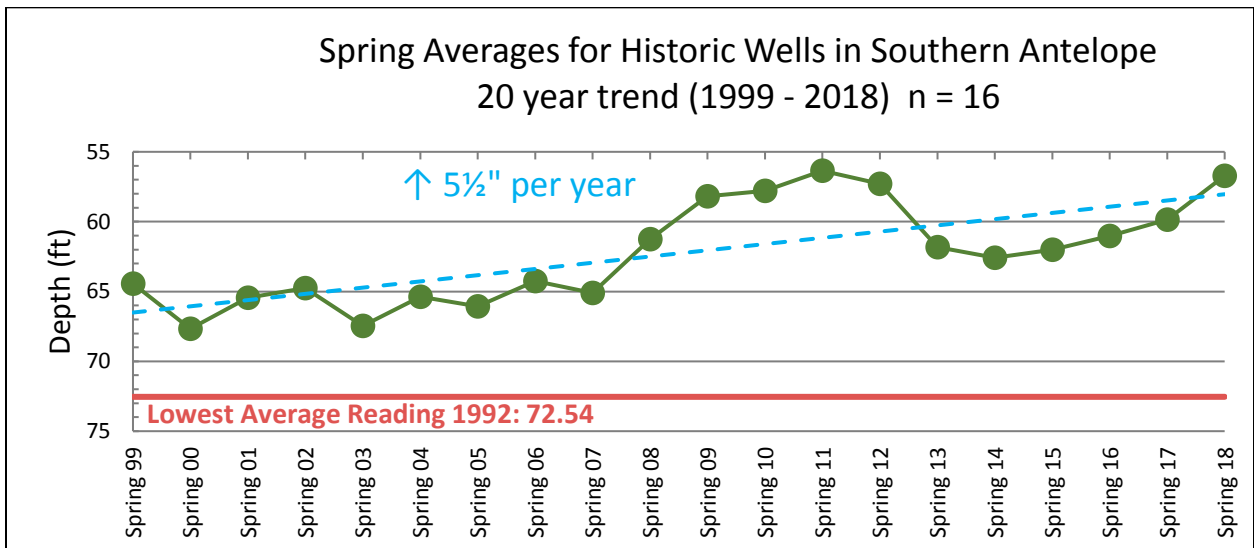
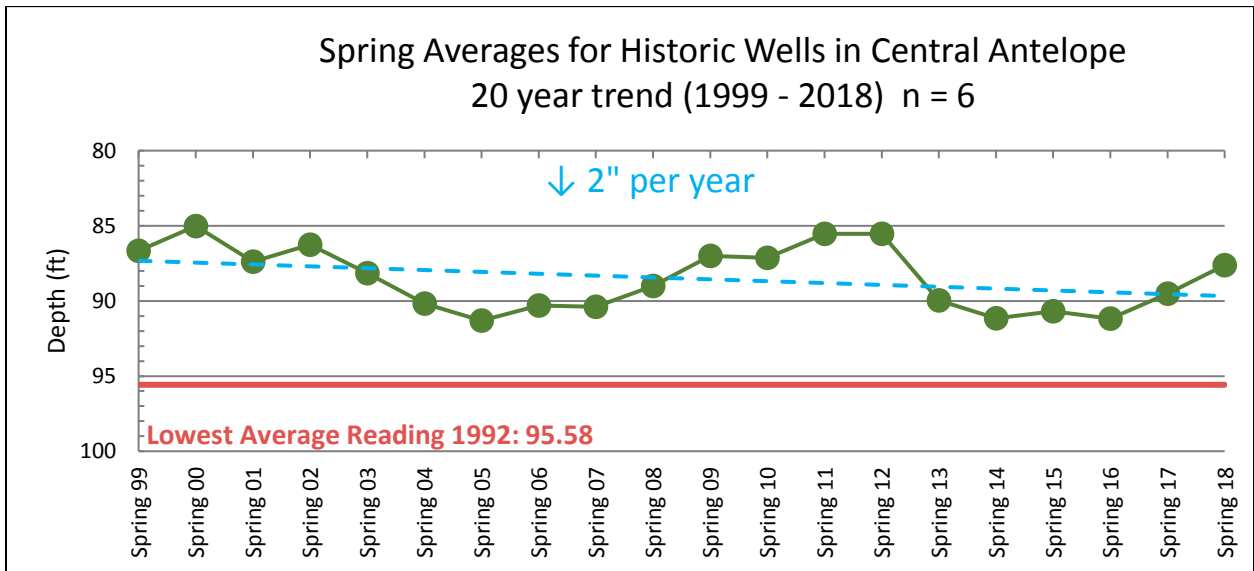
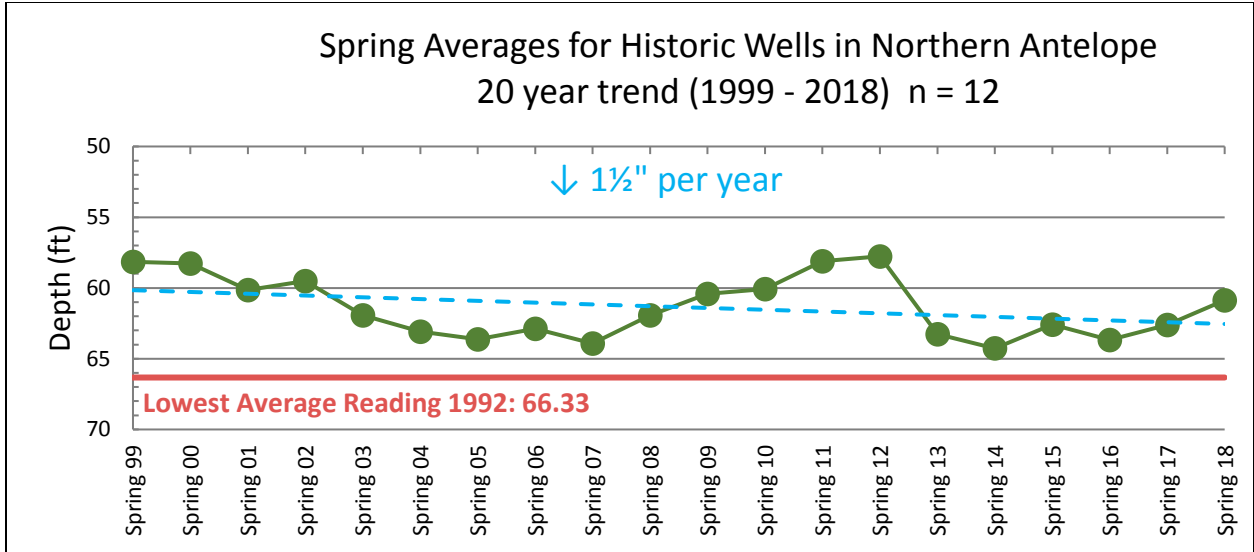
GROUNDWATER ELEVATION DATA

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, 55 District monitoring wells, and 199 new irrigation wells added in 2015. Depth to groundwater readings are collected every spring and fall and the data collected is used by the District to recognize changes in groundwater levels over time and better interpret the status of the aquifer. See “NRD REGULATIONS/MANAGEMENT ACTIVITIES” on Page 12 for information on UENRD’s new Rule to address static groundwater level management. 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 two subdistricts are decreasing (Northern Antelope and Central Antelope), two subdistricts are relatively stable (NW Holt & Rock and SW Holt & Rock), and two subdistricts are increasing (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:







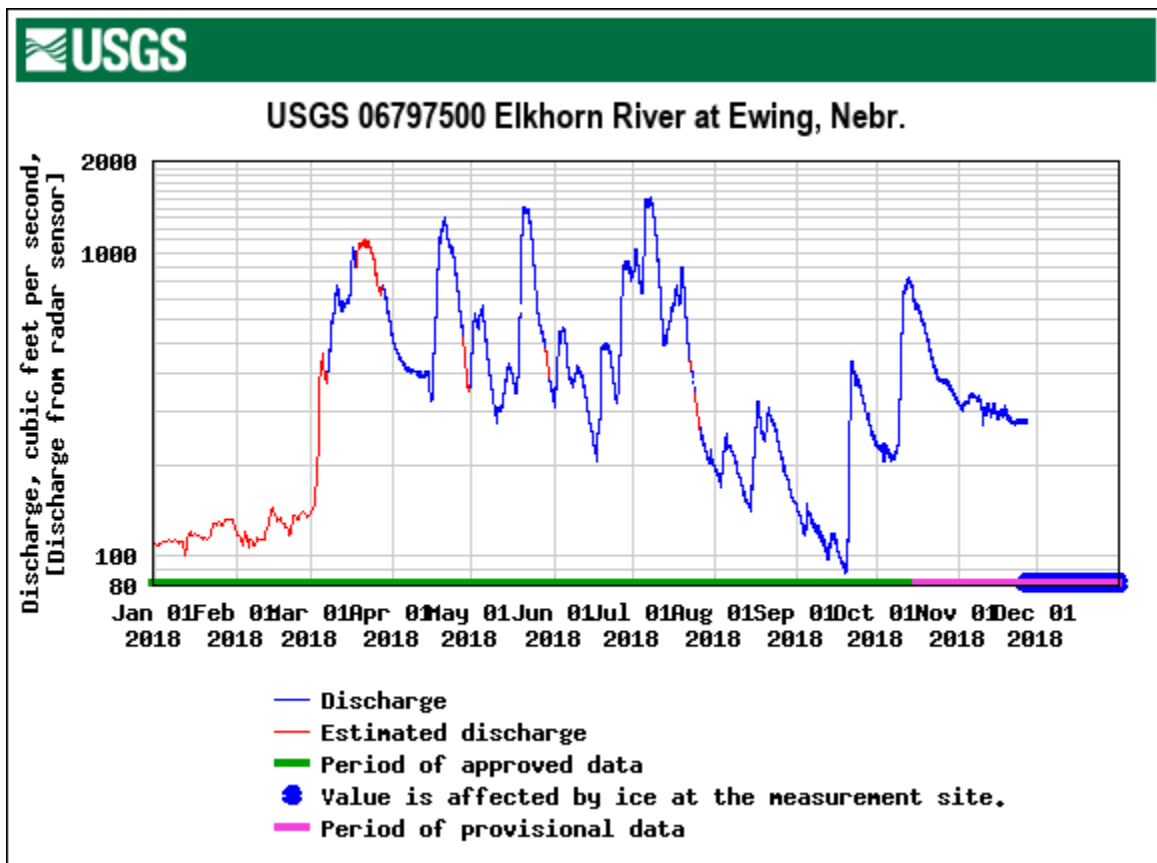
STREAM FLOW ACCRETION ACTIVITIES

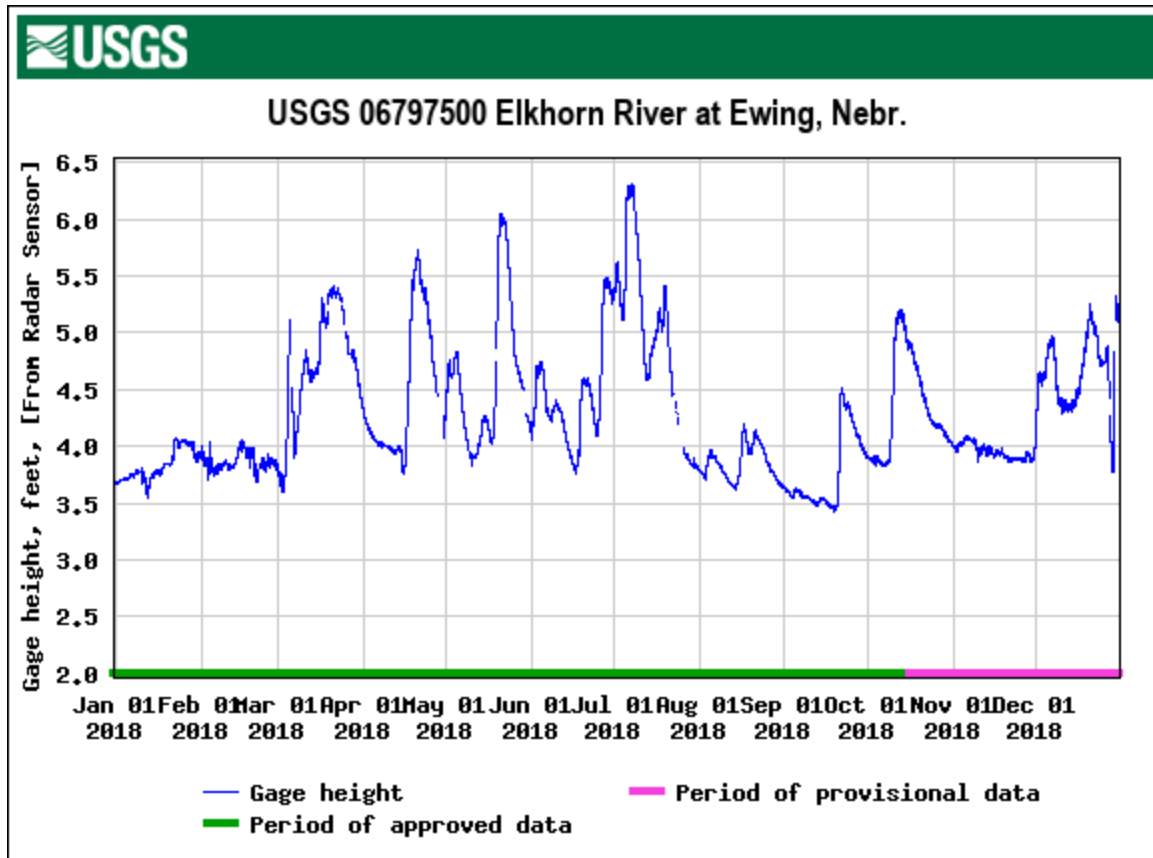
UENRD performed no stream flow accretion activities between 01/01/2018 and 12/31/2018.

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 01/01/2018 to 12/31/2018, as well as the gage height in feet.

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



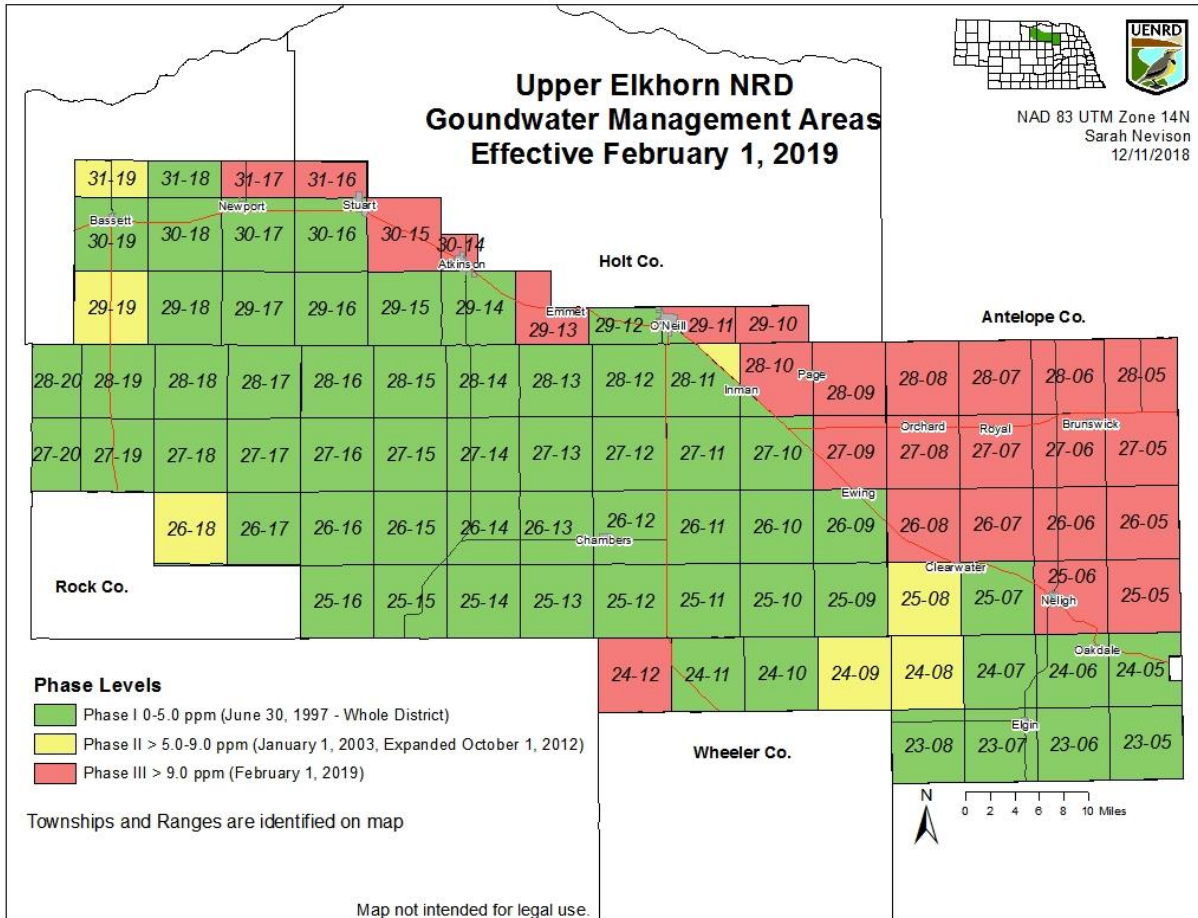


NRD REGULATIONS/MANAGEMENT ACTIVITIES

- 1) UENRD has designated Groundwater Quality Management Areas, so-called 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 growing seasons) and the supplementation from transfers.

- UENRD has approximately 1,345 acre-feet in allowable depletions for the remaining three 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
1,345.3 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	1/1/18 - 12/31/18 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	90,647,000	199.34	1,245	1,245	98,922,370	218	3
Bassett	43,400,000	191.96	619	619	54,020,000	239	3
Chambers	Working on it ¹			268		-	
Clearwater	16,369,279 ²	106.96 ²	419	419	NA ²	NA ²	3
Elgin	39,779,000	159.82	661	661	NA ³	NA ³	2
Ewing	21,238,600	150.25	387	387	41,170,250	291	3
Neligh	77,502,000	130.90	1,621	1,599	NA ⁴	NA ⁴	4
Newport	4,499,000	153.97	80	97	NA ¹	NA ¹	2
Oakdale	Working on it ¹			322		-	
O'Neill	202,168,000	149.43	3,705	3,705	233,851,800	173	5
Page	Working on it ¹			166		-	
Stuart	41,090,000	190.68	590	590	67,884,530	315	3

Per Capita Use was estimated using 01/01/2018 – 12/31/2018 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 pumping data to UENRD: Chambers, Newport, Oakdale, and Page.

² Clearwater was only able to provide partial data at this time for 2018 and did not have consecutive annual pumping data, so a baseline pumping rate was unable to be calculated.

³ Elgin's data only went back to 2009, so an average annual baseline pumping rate (2006 – 2015) was unable to be calculated.

⁴ Neligh is still working on data prior to 2018, so a baseline pumping rate 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	L	100
G-136694	Agriliance LLC	2	24	6	I	100
G-086547	Antelope County Partners	2	25	5	L	72
G-086548		2	25	5	L	72
G-186075	Atkinson Fertilizer Inc	30	30	14	I	95
G-073323	Bassett Golf Course	18	30	19	I	450
G-096381	Betty L Schwager	18	24	7	L	300
G-043333	Bruce Forbes	6	25	5	L	900
G-033138	Calvin Barthel	20	25	15	L	900
G-094434	Central Farmers Coop	12	23	5	I	90
G-073246	Central Valley Ag	32	29	11	I	100
G-088467	Charles Sargent Irrigation Company Inc	30	25	6	I	800
G-148010	Elkhorn River Holdings LLC	1	28	11	I	600
G-094916	Glen Larson	22	24	5	L	90
G-092054	Glenn Harpster	27	26	9	L	300
G-146271	Green Plains Atkinson LLC	25	29	12	I	600
G-143983		4	29	14	I	530
G-053742		4	29	14	I	800
G-174310	Highway 20 Washout	24	30	15	I	100
G-081681	James E Wilson	2	27	12	L	300
G-088085	Jennell Suhr	7	24	8	L	300
G-064726	Jim D Jarman	2	26	12	I	400
G-137716	Lawrence & Sharon Hinrichsen Sand & Gravel	1	26	9	I	200
G-091894	Leroy Behnk	15	25	8	L	300
G-085807	Louis E Sidak	18	28	12	L	110
G-089661	Maschhoffs LLC	15	26	10	L	100
G-123842		15	26	10	L	90
G-182536	Matt & Stacy Klabenes	20	26	7	L	300
G-080121	Nebraska Board of Educational Lands & Funds	36	26	12	L	300
G-046339	Nebraska Game & Parks Commission	26	25	11	I	1,250
G-097213	Niewohner Brothers Inc	8	23	7	L	300
G-071104	Olson Industries Inc	4	29	14	I	80
G-112729	Rick Schindler	29	25	6	I	400
G-087843	Stanley Sojka	10	25	10	L	300
G-081007		32	25	10	L	300
G-089669	Sunshine Ranch Company	13	26	5	L	75
G-177969	Thiele Dairy	14	25	8	L	600
G-128917	Tinsley Grain	18	25	8	I	65
G-091102	William C & Mary E Kaczor	36	26	9	L	300

APPENDIX C – 2019 Growing Season Acre Expansion

Approved expansion groundwater irrigated acres for the 2019 growing season within the LPRB.

- 793 acres, 51.99 acre-feet depletion (see formula on Page 5)

Legal	Number of Acres	NIR (ft)	SDF %	% Depletion	Depletion Estimate (AF)
E ½ SW 30-23-05	2	0.59	0.19	0.3	0.07
W ½ SW 30-23-05	5	0.59	0.19	0.3	0.17
NENW 32-24-07	32	0.80	0.25	0.3	1.90
N ½ SE 32-23-06	79	0.61	0.23	0.3	3.25
S ½ SE 32-23-06	79	0.61	0.23	0.3	3.25
NE 15-24-05	96	0.60	0.90	0.3	15.60
NE SW NW SE 30-23-07	10	0.64	0.30	0.3	0.57
SE 30-23-07	7	0.64	0.30	0.3	0.40
NW 35-23-05	136	0.59	0.17	0.3	4.00
SE 27-23-06	128	0.59	0.29	0.3	6.48
W ½ NE 35-23-05	61	0.59	0.17	0.3	1.80
SW 2-23-05	106	0.59	0.44	0.3	8.18
SW 10-23-06	52	0.60	0.68	0.3	6.33
TOTAL	793				51.99

APPENDIX D – Well Construction Permits

UENRD well construction permits for groundwater wells within the LPRB between 01/01/2018 and 12/31/2018, 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-18-001	G-184709	David Beckman	E ½ NW 31-23-05	75	850	01-12-18	New well
UE-18-002<R>	G-038030	Oak Creek Ranch	NE ¼ 21-24-06	128.25	550	01-16-18	Replacement well
UE-18-003	G-184615	Matthew D. Beckman	SW 24-24-06	132	800	01-16-18	New well
UE-18-004	G-184614	Matthew D. Beckman	NW 30-23-05	152	925	01-16-18	New well
UE-18-005<R>	G-027731	NVW Farm Partnership	NW ¼ 11-25-09	134.23	900	03-02-18	Replacement well
UE-18-006	G-184874	Scott Holtgrew	SWNW 12-29-14	64.98	800	03-05-18	New well
UE-18-007<R>	G-137277	Thiele Dairy	NW 24-25-08	146.55	900	03-12-18	Replacement well
UE-18-008	G-184710	Frank & Lynn Morrison	SE 21-27-07	80	800	03-23-18	New well
UE-18-009	G-187983	Paul Vandersnick	NE-30-26-09	68.28	900	04-05-18	New well
UE-18-010<R>	G-062828	Ted D. Jr. & Marlene R. Olson	SW 22-31-19	136.08	900	05-01-18	Replacement well
UE-18-011<R>	G-017155	Peggy Galyen et al	NE 12-24-05	53.95	500	06-01-18	Replacement well
UE-18-012	G-186933	Lemoyne & Dianne Ahlers	SW 22-25-08	80	750	06-01-18	New well
UE-18-013	G-186075	Atkinson Fertilizer Inc.	SESE 30-30-14	-	95	09-07-18	Commercial/Industrial
UE-18-014	G-186355	Brian J. Frey	NE 28-24-05	132	850	10-16-18	New well
UE-18-015<R>	G-050339	Gilbert Kelly	SW 04-28-09	125.61	750	11-02-18	Replacement well
UE-18-016<R>	G-065463	Joseph W. Harte	SE 17-28-10	99.12	700	11-13-18	Replacement well
UE-18-017<R>	G-133425	Danielski Harvesting & Farming	NW 25-28-10	133.1	900	11-19-18	Replacement well
UE-18-018	G-186584	John Beckman	SE -32-23-06	150	1000	12-06-18	New well