



2020

LOWER PLATTE RIVER BASIN COALITION ANNUAL REPORT



March 1, 2021

TABLE OF CONTENTS

CERTIFIED IRRIGATED ACRES.....	2
MUNICIPAL AND INDUSTRIAL GROUNDWATER USE	3
NEW GROUNDWATER CONSUMPTIVE USE – WELL CONSTRUCTION PERMITS GRANTED.....	4
APPROVED WATER TRANSFERS	5
WATER BANKING.....	6
EXPEDITED VARIANCES	6
NRD MANAGEMENT: WELL AGREEMENTS	6
NRD MANAGEMENT: ACRE ROTATIONS	6
FLOWMETER DATA.....	7
GROUNDWATER ACRES ALLOCATIONS.....	8
NEW GROUNDWATER ACRES ALLOCATIONS DEPLETION IMPACT	9
DEPLETION ACCOUNTING	11
SURFACE WATER ALLOCATION CONVERSION TO GROUNDWATER USE	12
GROUNDWATER ELEVATION DATA.....	13
NEW DATA COLLECTED OR MODEL/STUDY RESULTS	14
NON-ACTION/REPORTING ITEMS	14

**2020 ANNUAL DOCUMENTATION OF WATER USE ACTIVITIES IN THE LOWER LOUP NRD
REQUIREMENT OF LOWER PLATTE RIVER BASIN COALITION (LPRBC)
BASINWIDE WATER MANAGEMENT PLAN**

CERTIFIED IRRIGATED ACRES

The Lower Loup Natural Resources District (LLNRD or District) began the process of irrigated acres certification in 2006 and it was completed January 1, 2008. The District required that both groundwater and surface water irrigated acres be certified through its processes. The acres to be certified must be capable of receiving groundwater or surface water through irrigation works, mechanisms or facilities at the time. The certification must include a completed District certification form, an assessor document with a raised seal, and FSA aerial photo with irrigated fields delineated. A Geographic Information System (GIS) dataset of the field boundary was created using GIS software to allow accounting and compliance reviews.

Subsequent to January 1, 2008, to certify a property as being irrigated, a landowner must show proof of irrigation at least 2 out of the 10 years for the period from 1997 – January 1, 2008. Certification is constantly tracked through GIS, and field boundary adjustments take place as needed. Additionally, the entire District is flown and filmed for active chlorophyll measurements recorded through infrared photography. Irrigation totals are measured and policed to prevent deviation from the original certification by NRD staff. The 4-band imagery is collected in late August into early September to ensure crop maturity and further differentiate between those areas impacted by irrigation and those without.

Detailed data regarding amount and water source of certified irrigated acres in the period between January 1, 2018, and December 31, 2020, can be found in **TABLE 1. Certified Acres** below. The LLNRD GIS has been synched with its data management system to allow for more accurate drawings and better database access through the District program. This process assists with identification of duplicates and erroneously drawn fields and allows staff to regularly “clean” the database.

TABLE 1. CERTIFIED ACRES 2018 THROUGH 2020

Year	Total Acres Certified	Acres of Groundwater	Acres of Surface Water	Acres of Co-Mingled
2020	1,225,343.3	1,025,409.78	154,023.50	45,910.02
2019	1,222,623.19	1,021,728.46	153,680.81	47,213.92
2018	1,220,592.42	1,018,792.98	153,789.92	48,009.51

MUNICIPAL AND INDUSTRIAL GROUNDWATER USE

The LLNRD is in the fifth year of collecting municipal water use data. Developing and maintaining a comprehensive inventory of the location and source of the District's current and future water supplies, water uses, and outflows was Objective 1.1 of the Integrated Management Plan developed by the NRD and the Nebraska Department of Natural Resources. To collect this data, a Municipal Accounting Form was developed and sent to the water operators of each community.

As of 2/17/2021, 42 out of 43 public water supplies have sent in their water accounting information for 2020. The Village of Merna failed to report, so an estimate was included in the 2020 data chart. Each year, the NRD calculates the daily use per person. This year, due to a drier end to summer and the growing season, overall use was up to 253 gallons, per capita, per day being used compared to 212 gallons in 2019.

To comply with the implementation of *Rule 15, Commercial or Industrial Use and Accounting* that was adopted into the LLNRD's Groundwater Management Area Rules & Regulations, letters were sent to any owners/operators that had registered commercial/industrial wells. This includes high-capacity livestock wells (pump 50 gallons per minute or more). The LLNRD is in its second year collecting this type of well use information.

TABLE 2: 2020 WELL USAGE (IN GALLONS) FOR LLNRD COMMUNITIES

City Name	Annual Water Pumped	Population	Gal/per capita/per day	Connections
City of Albion	108,786,461	1650	180.6	850
City of Broken Bow	372,156,744	3559	286.5	1600
City of Burwell	65,500,000	1210	148.3	602
City of Columbus	1,972,220,878	22111	244.4	9048
City of Fullerton	65,337,000	1307	137.0	635
City of Genoa	69,952,000	1003	191.1	475
City of Loup City	72,510,000	1029	193.1	560
City of Ord*	428,385,000	2112	555.7	1334
City of Ravenna	122,213,000	1360	246.2	625
City of Saint Edward	77,383,680	705	300.7	340
City of Saint Paul	132,573,000	2290	158.6	1019
City of Sargent	37,166,000	525	194.0	392
Village of Anselmo	27,731,900	145	524.0	100
Village of Ansley	43,049,100	441	267.4	262
Village of Arcadia	44,002,300	311	387.6	200
Village of Arnold	89,000,000	597	408.4	388
Village of Ashton	13,654,000	194	192.8	140
Village of Bartlett	19,122,800	117	447.8	70
Village of Belgrade	17,000,000	126	369.7	82
Village of Boelus	10,524,000	189	152.6	108
Village of Cairo	66,357,000	785	231.6	325
Village of Callaway	84,908,233	539	431.6	353

2020 LLNRD Lower Platte River Basin Report

Village of Cedar Rapids	30,647,000	382	219.8	265
Village of Comstock	6,225,000	93	183.4	61
Village of Dannebrog	10,086,000	303	91.2	154
Village of Duncan	22,300,000	351	174.1	171
Village of Elba	11,071,500	215	141.1	125
Village of Ericson	31,583,200	92	940.5	32
Village of Farwell	17,984,000	122	403.9	60
Village of Greeley Center	40,655,000	466	239.0	235
Village of Litchfield	9,998,100	262	104.6	160
Village of Mason City	15,292,000	171	245.0	115
Village of Merna**	22,381,800	365	168.0	205
Village of Monroe	21,888,000	284	211.2	139
Village of North Loup*	0	297	0.0	0
Village of Palmer	25,258,000	472	146.6	239
Village of Petersburg	24,817,000	333	204.2	220
Village of Pleasanton	27,397,000	341	220.1	188
Village of Primrose	5,971,000	61	268.2	43
Village of Rockville	5,317,700	106	137.4	48
Village of Scotia	26,266,260	318	226.3	150
Village of Spalding	16,616,559	487	93.5	255
Village of Wolbach	19,985,000	283	193.5	188

*City of Ord provides water for the Village of North Loup and Green Plains Inc. Ethanol Plant

**Village of Merna annual water pumped estimated

-Population numbers were supplied by the municipality

TABLE 3: AVERAGE USAGE NUMBERS CALCULATED FOR ALL LLNRD COMMUNITIES

Lower Loup Natural Resources District	
<u>Year</u>	<u>Gallons/per capita/per day</u>
2016	265.0
2017	260.1
2018	230.3
2019	211.8
2020	252.6
5 Year Average	244.0

NEW GROUNDWATER CONSUMPTIVE USE – WELL CONSTRUCTION PERMITS GRANTED

The LLNRD established a well moratorium in 2007. Before this date, all high-capacity wells (greater than 50 gallons per minute) were required to be permitted via a certified well permit issued by the LLNRD as dictated by the Groundwater Management Plan. New well permits are still required for all high-capacity wells and may still be issued for supplemental and replacement wells. Any new high-capacity irrigation well must be previously

2020 LLNRD Lower Platte River Basin Report

approved through the variance process (see “Variance” portion of this report). LLNRD has approved 49 well permits in 2020 for varied uses as reported in the table below.

LLNRD affirms that any new water well or replacement well that is constructed after May 09, 2016, may be subject to additional restrictions as the Board of Directors deems reasonable and necessary in light of hydrologic conditions within the District.

TABLE 4: APPROVED GROUNDWATER WELL PERMITS IN THE LLNRD IN 2020

Groundwater Well Permit Types	Number of Permits	Average Pump Capacity (gpm)
Domestic	1	110.00
Commercial	1	550.00
Other	1	250.00
Irrigation (Total)	42	830.60
(Irrigation) Transfer	5	760.00
(Irrigation) Supplemental	3	850.00
(Irrigation) Variance	3	869.00
(Irrigation) New Acre	11	841.00
(Irrigation) Replacement	20	833.00
Livestock	4	1075.00
Total	49	682.00

APPROVED WATER TRANSFERS

The LLNRD Rules and Regulations allow any person to transfer groundwater irrigation rights from one location to another if the acres are certified by the District. Transfers can only occur downstream or to the adjacent section and cannot have a net increase impact on any stream based on the most recent stream depletion factor from the best groundwater model available. Acre transfers are only allowed to occur once per year. The deadline for application for transfer is March 1 of each year. In 2020, the LLNRD approved 22 **Agreements to Transfer Certified Irrigated Acres & Right to Use Groundwater**. There were no denials to any transfer requests. See the summary in Table 4 below. Transfer agreements are classified both by landowners who are moving their irrigated acre rights (off) and those that are receiving the rights in another location (in). Wells resulting from an approved transfer may not be reflected in the “Well Permit Granted” table under the current year.

TABLE 5: APPROVED CERTIFIED IRRIGATED ACRES TRANSFERS IN THE LLNRD IN 2020

County	# of Agreements Receiving Land owners	# of Agreements Transferring Land owners	Acres Transferred in	# New wells resulting from Transfer	Acres Transferred off	Avg Transferred In SDF	Avg Transferred Off SDF
Boone	6	5	224.90	2	16.13	.71	.62
Buffalo	2	2	8.93	0	10.40	.85	.76
Custer	1	1	22.18	0	22.18	.44	.77
Garfield	0	3	0	0	190.80	na	.39
Greeley	8	4	155.10	3	42.80	.29	.69
Howard	1	1	14.67	1	14.67	.61	1.0
Nance	1	0	6.40	0	0.00	.44	Na
Platte	2	2	6.8	0	6.80	.83	.83
Valley	0	2	0	0	27.00	.83	.83
Wheeler	1	2	24.58	1	162.48	.43	.56
Total	22	22	463.56	7	493.26	.54	.64

WATER BANKING

The LLNRD requires that all transfers result in no new net increase in depletions to any stream utilizing the most current stream depletion number extracted from each section. The section number is averaged from the best available groundwater/surface water model for use by LLNRD. The 2020 section-assigned stream depletion factor (SDF) was utilized using the USGS Elkhorn-Loup Model (ELM) in its Phase 3 capacity. Any transferring of irrigated acre rights from a low to a higher SDF requires an offset. Acres transferred from a higher SDF to a lower SDF are only allowed at a 1:1 ratio, with the LLNRD banking the remaining difference. As a result of the 2020 transfers, the LLNRD has banked a total of **141.88** groundwater-irrigated acres. Additional information regarding the ELM project can be found here:

<https://pubs.er.usgs.gov/publication/sir20185106>

EXPEDITED VARIANCES

The LLNRD Board of Directors has designated a set of conditions under which specific requests for a variance may be approved by methods other than the Variance Committee process. An expedited variance is a variance that meets LLNRD Board pre-approved conditions and as such does not need to be reviewed by the NRD Variance Committee. These expedited variances all have a Supplemental Well Agreement. There were no denials to any expedited variance requests. In 2020, there were a total of 2 expedited variances (Table 5) that were approved through NRD processes.

TABLE 6: APPROVED EXPEDITED VARIANCES IN 2020 IN THE LLNRD

County	# of Supplemental Well Agreements	Permit Approved	Agreement Approved, but waiting on a Permit
Boone	1	1	0
Merrick	1	1	0
Total	2	2	0

NRD MANAGEMENT: WELL AGREEMENTS

In 2020, there was 1 well agreement approved. This well agreement was granted based on the stipulation that the landowner relinquish all or part of the existing surface water right held through the Department of Natural Resources processes. There were no denials to any variances with a well agreement request. See “SURFACE WATER ALLOCATION CONVERSION TO GROUNDWATER USE” later in the report.

TABLE 7: APPROVED WELL AGREEMENTS IN THE LLNRD IN 2020

County	# of Well Agreements	SW Agreed upon to be Relinquished: full or partial	Permit Approved	SW Right Relinquishment Date
Custer	1	A-10635	0	4/1/2020
Total	1		0	

NRD MANAGEMENT: ACRE ROTATIONS

Acre rotations are agreements set forth by a participating landowner and the LLNRD, which allows a landowner options to choose how they distribute certified acres over a tract of land. In 2020, there were six acre rotations approved by the LLNRD. Acre Rotation Agreements have 2 or 3 options the landowner can choose in one calendar year. After an option is selected, the landowner notifies the LLNRD in writing prior to May 1st of that

calendar year, before any irrigation is authorized. Enforcement is conducted by the LLNRD through annual infrared imagery and field personnel visitation.

TABLE 8: APPROVED ACRE ROTATIONS IN THE LLNRD IN 2020

County	# of Acre Rotation Agreements Approved
Boone	1
Custer	1
Greeley	1
Nance	1
Platte	1
Valley	1
Total	6

FLOWMETER DATA

The LLNRD has collected groundwater and surface water use information for irrigation on an annual basis since 2010. Flowmeters have been cost-shared across the District on a voluntary basis since 2009. However, the LLNRD required that all high-capacity irrigation wells in Groundwater Management Area 28 be outfitted with a flowmeter to track irrigation total withdrawals starting in 2016. The District has designated two new groundwater quality management areas, SubAreas 29 and 30, which will require flowmeters in all irrigation wells by 2022.

In 2020, LLNRD collected records of usage from 975 irrigation sites with 940 of those sites being verified as having an actual irrigation total water volume. The District average pumping withdrawals for irrigation for the 2020 season was 9.93 inches, up from 3.79 inches in 2019. The potato crop was the highest consumer of irrigation water with an average of 18.22 inches/acre pumped in 2020, with corn crop averaging 11.17 inches/acre. Butler County recorded the least average irrigation at 3.62 inches/acre pumped, and Platte County had the highest irrigation rates at 12.70 inches/acre applied mostly to corn and soybean crops.

2020 LLNRD Lower Platte River Basin Report

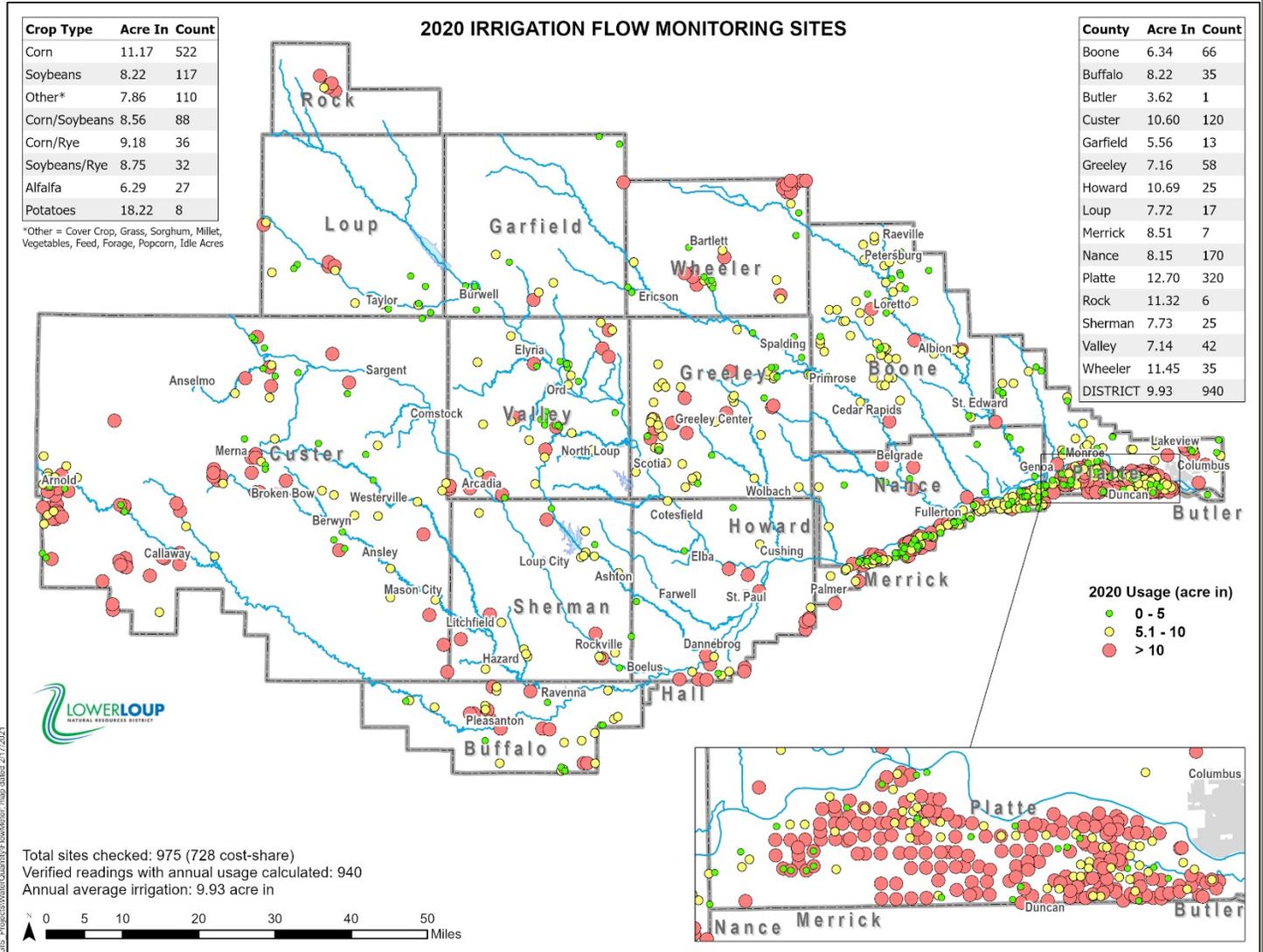


FIGURE 1: IRRIGATION MEASURING AND REPORTING SITES IN THE LLNRD IN 2020

GROUNDWATER ACRES ALLOCATIONS

The LLNRD has the option to issue additional groundwater acre allocations each year based on the conditions of water resources in the District. New acres applications are accepted from September 1-20 when the Board authorizes additional development. In 2020, new acres applications were accepted in the North Loup River, Beaver Creek, and Middle Loup Sub-Basins for a total of 2,015.62 new irrigated acres and have been approved by the LLNRD Board of Directors. The North Loup and Beaver Creek basins continued to show upward or stable trends in both surface and groundwater resources (static water levels and stream gages). The Middle Loup River Basin, while showing upward trends in the stream gages, has had downward static water levels measured in the vicinity, especially south of the river. The criteria includes Stream Depletion Factors, the status of nearby groundwater and surface water resources, the size of applications being applied for, and the soil classification. In 2019, additional points were awarded to applications located in the designated groundwater increase area.

2020 LLNRD Lower Platte River Basin Report

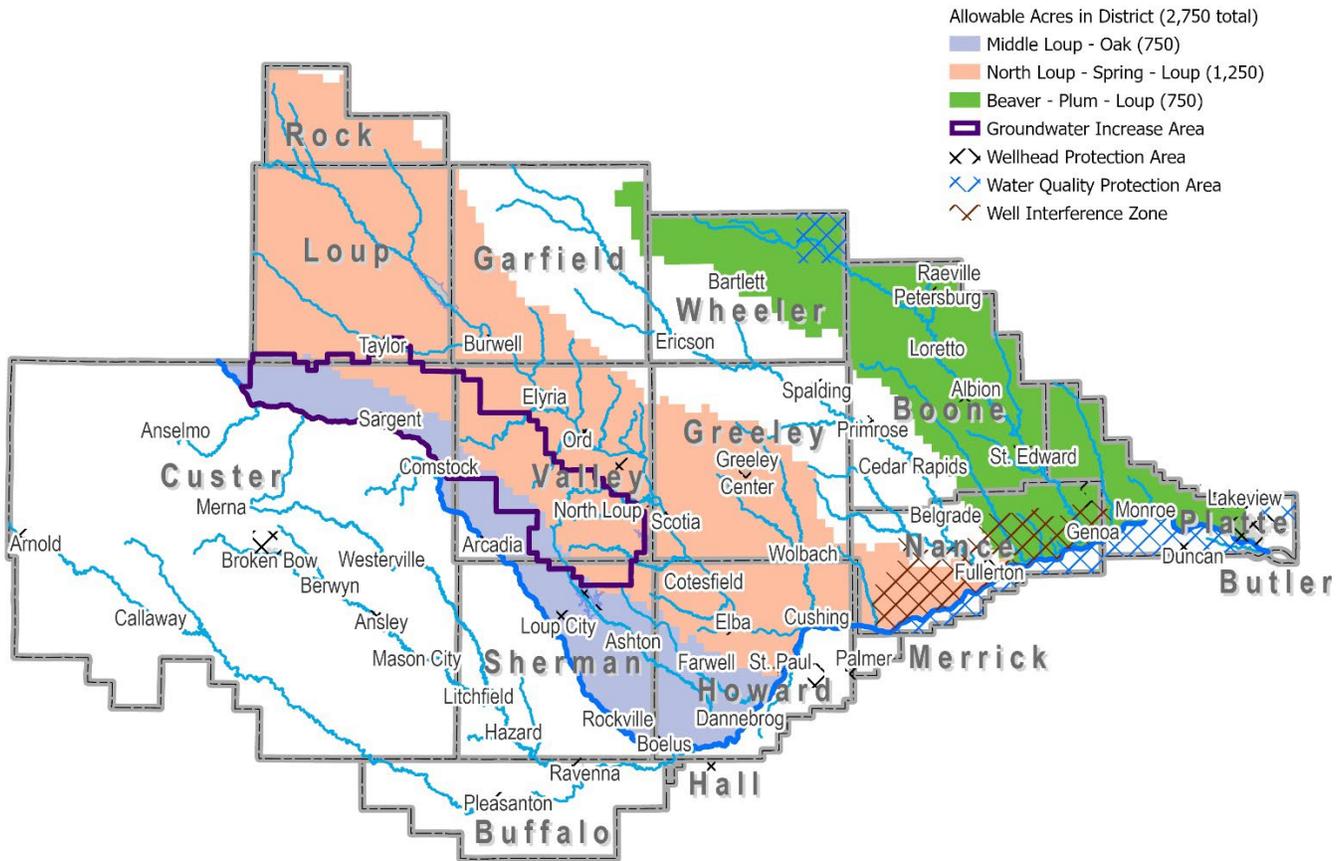


FIGURE 2: MAP OF ALLOWABLE CERTIFIED IRRIGATED ACRES IN THE LLNRD IN 2020

There were 49 applications for new irrigation: 21 in the North Loup River Basin, 16 in the Beaver Creek Basin, and 12 in the Middle Loup River Basin. The total number of acres requested in all three basins was 2015.62. The average application size requested 41.05 acres and the average application ranking was 260 points, ranked by LLNRD processes. At their meeting on October 22, 2020, the LLNRD Board of Directors unanimously approved all applications that ranked 225 points or greater.

TABLE 9: NEW GROUNDWATER-IRRIGATED ACRES APPROVED IN THE LLNRD IN 2020

Basin	Number of Acres Approved	Pending Wells	Average SDF
North Loup	852.98	9	49.70
Beaver	689.31	7	51.15
Middle	473.33	9	42.89
Total	2015.62		47.91

NEW GROUNDWATER ACRES ALLOCATIONS DEPLETION IMPACT

As part of the agreement to the Coalition planning effort, the associated Districts developed new depletion limits for the basin to evaluate basin water supplies moving forward. The Lower Platte River Basin Coalition approved a methodology for determining the impact of individual allocations as well as accounting for the total amount of acre-feet (AF) impact moving forward. For agricultural uses, allowable number of irrigated acres in the hydrologically connected area can be determined by multiplying the number of acres, times the net

2020 LLNRD Lower Platte River Basin Report

irrigation requirement in feet, times the SDF as a decimal, times 30% depletions occurring during peak season. The Lower Loup NRD, being primarily encompassed by the Loup Basin, has agreed to 5,883 AF of allowable development over a five-year period.

After applying the agreed-upon methodology to the 2020 allowed irrigated acres, the AF impact was 217.99 AF of agriculture depletions. Table 9 has a breakdown of the numbers associated with the 49 applications.

TABLE 10: NEW GROUNDWATER-IRRIGATED ACRES DEPLETIONS CALCULATED FROM THE 2020 ALLOCATION

Application	Legal	Basin	Acres	ELM3 SDF	NIR (ft)	Depletion (acre-ft)
BAUDA1	SE-07-19-10W	North - Spring - Loup	8.14	36.33	0.91	0.81
BEIJU1	SW-33-20-06W	Beaver - Plum - Loup	24.31	65.41	0.59	2.83
BENRO1	NW-27-19-04W	Beaver - Plum - Loup	9.94	37.16	0.63	0.69
BLUDA1	NW-36-19-14W	North - Spring - Loup	24.92	83.37	0.90	5.59
BOYBR1	NE-29-17-15W	Middle - Oak	70.35	54.72	0.75	8.62
BROSA1	NE-04-17-06W	Beaver - Plum - Loup	5.44	48.55	0.65	0.52
BROSA2	NW-04-17-06W	Beaver - Plum - Loup	53.02	48.55	0.65	5.04
DOZRA1	NE-15-22-07W	Beaver - Plum - Loup	144.39	47.44	0.62	12.66
FARCK1	SE-34-20-07W	Beaver - Plum - Loup	24.15	48.72	0.61	2.16
FARCK2	NW-34-20-07W	Beaver - Plum - Loup	14.98	48.30	0.61	1.33
FOSMI1	NW-30-18-10W	North - Spring - Loup	7.01	11.21	0.75	0.18
GORMA1	NE-34-17-13W	North - Spring - Loup	24.94	23.03	0.71	1.23
GRAFR1	SW-18-22-15W	North - Spring - Loup	149.25	44.27	0.84	16.55
HANGA1	NW-27-18-12W	North - Spring - Loup	45.71	51.27	0.74	5.21
HARDE1	NE-27-21-18W	North - Spring - Loup	50.38	88.61	0.84	11.25
HOSRI1	SE-24-18-16W	Middle - Oak	24.91	34.07	0.77	1.96
JENDO1	SW-20-15-10W	North - Spring - Loup	92.74	81.45	0.70	15.75
JONJO1	SE-31-16-12W	North - Spring - Loup	72.59	8.22	0.70	1.26
JONJO2	NW-06-15-12W	Middle - Oak	61.56	8.14	0.70	1.05
JONJO3	NE-06-15-12W	Middle - Oak	50.40	8.14	0.70	0.86
KOVDU1	SE-28-20-14W	North - Spring - Loup	21.13	71.12	0.80	3.59
KOVLU1	NW-34-20-14W	North - Spring - Loup	82.92	69.11	0.80	13.68
KOVLU2	SW-27-20-14W	North - Spring - Loup	25.39	69.11	0.80	4.19
KURHA1	SW-03-19-04W	Beaver - Plum - Loup	36.18	22.21	0.62	1.48
KUSDE1	NW-16-14-13W	Middle - Oak	24.92	48.91	0.70	2.56
LASKE1	NE-33-18-06W	Beaver - Plum - Loup	9.69	43.55	0.65	0.82
MIKME1	NE-31-18-01W	Beaver - Plum - Loup	43.39	81.13	0.57	6.00
PARIN1	NE-16-17-15W	Middle - Oak	9.48	38.36	0.75	0.82
PETMA1	NE-26-18-14W	North - Spring - Loup	9.50	30.81	0.77	0.68
PETTY1	SW-27-16-10W	North - Spring - Loup	78.29	52.06	0.69	8.46
PETTY2	SE-27-16-10W	North - Spring - Loup	59.34	52.06	0.69	6.41
PETTY3	SW-28-16-10W	North - Spring - Loup	9.90	47.84	0.69	0.98
RANGE1	SE-06-20-07W	Beaver - Plum - Loup	66.84	50.96	0.63	6.46

2020 LLNRD Lower Platte River Basin Report

REISC1	SW-06-18-10W	North - Spring - Loup	24.94	17.22	0.92	1.19
RILJA1	NW-27-15-14W	Middle - Oak	21.81	65.24	0.71	3.01
SCHDO1	SW-27-20-14W	North - Spring - Loup	9.98	69.11	0.80	1.65
SEDTY1	SE-34-22-07W	Beaver - Plum - Loup	44.78	75.49	0.61	6.23
SIMAN1	NW-29-17-15W	Middle - Oak	91.54	54.72	0.88	13.24
SKIDA1	NW-13-15-14W	Middle - Oak	45.91	39.80	0.70	3.86
SKIDA2	SE-14-15-14W	Middle - Oak	24.22	45.20	0.71	2.32
SKIKI1	SW-30-15-13W	Middle - Oak	24.95	45.19	0.70	2.38
STEJO1	NE-11-13-13W	Middle - Oak	23.28	72.22	0.69	3.47
STUBR1	NE-12-22-07W	Beaver - Plum - Loup	9.66	26.81	0.61	0.47
SUERA1	NE-29-19-04W	Beaver - Plum - Loup	21.57	50.54	0.62	2.04
URBDE1	SE-30-21-14W	North - Spring - Loup	19.14	48.87	0.81	2.26
WINMI1	SE-19-20-13W	North - Spring - Loup	5.75	48.39	0.78	0.65
WONDA1	SW-35-22-07W	Beaver - Plum - Loup	70.56	61.77	0.61	8.03
WONDA2	SE-35-22-07W	Beaver - Plum - Loup	110.41	61.77	0.61	12.51
ZIEWI1	NE-31-21-13W	North - Spring - Loup	31.02	40.28	0.80	3.00
Total Acres			2,015.62	Total Depletions		217.99

DEPLETION ACCOUNTING

As mentioned in “Approved Water Transfers,” LLNRD Rules and Regulations allow any person to transfer irrigation rights from one location to another if they meet the criteria set forth by the District. Because of the established criteria of not allowing any new net increase in depletions to any stream, the net amount of acre-foot impact should be either relatively similar by a transfer or decreased due to any transferring of irrigated acre rights to a higher SDF, which would require an offset in acres. Transfers from a higher SDF to a lower SDF are only allowed at a 1:1 ratio. The same agricultural methodologies used to apply towards groundwater acre application was applied to transfers. Both the transferring location, where the acres were removed, and the newly developed acres, where the right was transferred to, were assessed. Table 10 represents the net effect of these transfers in acre-feet for the year 2020.

From the 2020 transfers, the sum impact of the transferred depletions removed was 61.60 AF on 22 total transfer agreements, while the impact of the receiving acres with new development was 41.62 AF. The difference and beneficial impact was 19.98 AF back to the basin as a positive gain.

Due to LLNRD Rules and Regulations on transferring irrigated acres, an overall beneficial gain to the Loup Basin in five years of transfers totals 217.04 AF according to LPRBC methodology. This is sufficient proof that LLNRD has taken the correct course for allowing transfers, and the water banking process is working. The LLNRD will continue to reassess the banking process to find ways to improve the efficiency and streamline reporting through both the IMP and Coalition requirements.

Some minor adjustments were made to Table 11 in this year’s report. The 2019 New Irrigated Acres depletion value was updated to 245.48 AF from 246.07 AF. This change was a result of 1 application not being certified for all the acres that were allowed. A total of 135.87 acres were allowed, but only 123.87 acres were certified. The

certification of the application occurred after the 2019 annual report was finalized, which is why it is being reported in this year's report.

TABLE 11: SUMMARY OF ALLOWABLE DEPLETION IMPACT

Lower Loup Natural Resources District	
Project	5,883.00 AF
2016 New Irrigated Acres	-204.52
2016 Transfers	+69.66 ^a
2017 New Irrigated Acres	-164.65
2017 Transfers	+40.88 ^a
2018 New Irrigated Acres	-275.30 ^b
2018 Transfers	+66.67 ^a
2019 New Irrigated Acres	-245.48 ^c
2019 Transfers	+19.85
2020 New Irrigated Acres	-217.99
2020 Transfer	+19.98
2020 Variance	-29.30
2016-2020 SW/GW Conversion	+558.15
Allowable Depletion Total	5,520.95 AF

^a revised February 2020; corrections made to some transfers for 2016, 2017, and 2018

^b revised June 2019; not all approved acres were certified by applicants in 2018

^c revised August 2020; not all approved acres were certified by applicants in 2019

SURFACE WATER ALLOCATION CONVERSION TO GROUNDWATER USE

As surface water rights are either converted to groundwater acres or completely retired, the LLNRD has initiated a tracking mechanism that incorporates the basin-wide depletion accounting and its effect on the available acre-feet of depletions. According to the LLNRD and consultants who developed the tracking mechanism for depletions, an overall credit can be claimed to the affected basin for the unused depletions and applied to the existing allowable acre-foot depletion balance if proper procedures are met. These procedures are enacted when surface water rights are fully relinquished and converted to groundwater acres, if those surface water rights are located along stream reaches impacted by baseflow and are not associated with irrigation district water rights. Credit is being claimed by the LLNRD for these surface water retirements. Appropriate credit is determined by subtracting the difference of the full depletion amount of the surface water right from the groundwater impacts using stream depletion, net irrigation requirement in feet and number of acres associated with the conversion. The LLNRD can provide historical evidence of irrigation through infrared photography collected since 2006. The NeDNR is expected to provide field inspection reports and adhere to the adjudication process defined by Nebraska Revised Statutes.

The following table showcases all credits from surface water conversion to groundwater use:

TABLE 12: SUMMARY OF SURFACE WATER ALLOCATIONS CONVERTED TO GROUNDWATER

YEAR	RightID	Date	SDF	NIR	NIR/12	ACRES	SW_DEP	GW_DEP	GW_SW Diff
2016	A-10515	1/18/65	0.815	8.61	0.72	28.6	20.52	5.02	15.50
2016	A-10810, A-15623		0.8263	11.03	0.92	125.9	115.72	28.69	87.04
2017	A-14843	3/23/77	0.7852	7.68	0.64	96	61.44	14.47	46.97
2018	A-10641R	6/3/65	0.812	8.61	0.72	17.2	12.34	3.01	9.33
2018	A-1871A	11/8/26	0.913	8.68	0.72	33.2	24.01	6.58	17.44
2019	A-10344	4/7/64	0.5176	9.08	0.76	72	54.72	8.50	46.22
2019	A-1945, A- 1845B, D- 213B, A- 2023	7/23/27	0.7949	10.68	0.89	198.8	176.93	42.19	134.74
2019	A-3912A, A-13352A	6/5/46	0.7429	8.69	0.72	175.4	126.29	28.15	98.14
2019	A-6280, A- 5198A, A- 10246A	9/13/63	0.9233	9.82	0.82	89.8	73.49	20.35	53.13
2019	D-210	3/17/1894	0.7705	11.64	0.97	50	48.50	11.21	37.29
2020	A-10635	5/25/65	0.57	8.76	0.73	20.4	14.89	2.55	12.35
Acre- Foot Credit:									+558.15

GROUNDWATER ELEVATION DATA

One of the LLNRD's primary responsibilities since its inception in 1972 has been collecting groundwater elevation data. Each year, District personnel measure groundwater elevations in both the spring and fall to compare against historical levels. Spring levels are used to report the status of groundwater, whether increasing or decreasing, and to determine if potential changes are needed in the District. Fall levels are used as an indicator of stress that has been placed on the aquifer during the irrigation season. The District has employed the use of pressure transducers to get continual monitoring. To date, the LLNRD has 61 active transducers across the District recording water levels every 8 hours. Additionally, the District implemented a real-time transducer network in the Columbus vicinity as part of the recharge project. Dedicated monitoring wells contain telemetry equipment that collects an hourly reading on 3 monitoring well sites, as well as an artificial lake in the area that will be used as part of the recharge basin.

In 2020, the LLNRD staff collected groundwater level depths on 445 sites which includes both dedicated monitoring and irrigation wells. The District average increased from 2019 readings by 1.82 feet. The District average still maintains a level well above the 1982 levels by 6.86 feet. The 1982 level is used by the Lower Loup NRD's Groundwater Management Plan as the keystone level to implement additional management action.

NEW DATA COLLECTED OR MODEL/STUDY RESULTS

The LLNRD partnered with the USGS and Upper Loup NRD to assess groundwater and drought resiliency of the South Loup River by determining the age of springs discharging into the river. Water was sampled at specific focal points along identified springs and a collection of specific environmental tracer samples were examined to help estimate the previous atmospheric exposure, thereby deducing when the recharge of the groundwater took place. Environmental tracers sampled include sulfur hexafluoride (SF6), tritium (3H), carbon-14 (C-14), and dissolved noble gases from approximately 20 springs. A report from the USGS is anticipated by summer 2021.

The LLNRD obtained a Water Sustainability Grant to develop a Drought Management Plan. The plan was original designed to take input from various interests across the District to analyze what constitutes a drought and assess potential impacts to the various industries utilizing both surface and groundwater. The plan would also recommend contingencies that the NRD could enact to help offset and assuage the impacts from a drought. Due to COVID-19 restrictions, no public meetings were allowed. The project is on hold until meetings can reconvene.

NON-ACTION/REPORTING ITEMS

The Coalition members are responsible for reporting on a number of items that are currently not included as part of the LLNRD day-to-day operations. These Items include:

- Retirement of Groundwater Consumptive Uses
 - The LLNRD does not have a need for wide scale retirement of groundwater consumptive use.
- Groundwater Recharge Activities
 - Columbus Recharge Project has gone out to bid and construction is anticipated to be completed by Fall 2021. Operations could occur at that time and potential groundwater augmentation will be tracked through a series of pumping totals, infiltration rates, and shallow monitoring wells.
- Stream Flow Accretion Activities
 - Transfers allowed by the NRD do not have a negative net impact on the stream and theoretically result in neutral or positive effects on streamflow, see “APPROVED WATER TRANSFERS” above.
 - Under “NRD MANAGEMENT: WELL AGREEMENTS” the LLNRD is taking proactive measures to reduce surface water allocations, switching those primary sources to groundwater which would result in an immediate reduction to streamflow impacts and likely cause accretion to flows in the impacted stream.
- Stream gage measurements on NRD maintained gages
 - LLNRD has no stream gages under its operational jurisdiction at this time; however, the LLNRD is a partner with both the NeDNR and USGS in the operations of various streams across the Loup Basin.