

ANNUAL
INTEGRATED
MANAGEMENT
PLAN REPORT

2016



JOINTLY PREPARED BY THE
LOWER LOUP NATURAL
RESOURCES DISTRICT AND
THE NEBRASKA
DEPARTMENT OF
NATURAL RESOURCES

Submitted at the Lower Loup Board Meeting/IMP Annual Review
August 24, 2017

Contents

Introduction	3
Monitoring and Data Collection	4
Regulatory Actions	14
Water Inventory and Water Use/Supply Management	15
Education/Outreach	16
Collaboration with Other Entities.....	17
Figure 1: Streamgauge locations in the LLNRD.....	4
Figure 2: NeDNR pump site visits in the LLNRD in 2016.....	5
Figure 3: New surface water appropriations permitted in the LLNRD in 2016.....	6
Figure 4: Locations of static water level measurements in the LLNRD in 2016.	9
Figure 5: Irrigation well monitoring sites in the LLNRD in 2016.....	10

**2016 ANNUAL REPORT FOR LOWER LOUP NATURAL RESOURCES
DISTRICT/NEBRASKA DEPARTMENT OF NATURAL RESOURCES
INTEGRATED MANAGEMENT PLAN**

Jointly prepared by the Lower Loup NRD and the Nebraska Department of Natural Resources
Submitted on August 24, 2017

INTRODUCTION

The Lower Loup Natural Resources District (LLNRD, District) and the Nebraska Department of Natural Resources (NeDNR, Department) jointly adopted an Integrated Management Plan (IMP) which became effective on June 8, 2016, with the goal of jointly managing ground and surface waters within the LLNRD to sustain a balance between water uses and supplies for the long term. An in-depth public involvement plan that included focus groups, an eight-month stakeholder process, and outside-agency outreach were integral parts in developing goals and objectives within the IMP.

The 2016 annual report is consistent with Chapter 8 of the IMP, which outlines procedures for reviewing and potentially modifying the IMP. In May 2017, the LLNRD and NeDNR met and jointly decided no amendments to the IMP were needed at the time of the 2016 annual review. The LLNRD and NeDNR also worked together to write this joint annual report for the annual meeting held on August 24, 2017. In addition, the LLNRD distributed a public notice of the annual meeting in area newspapers on August 18, 2017; NeDNR also posted the meeting announcement on their website at this time.

This annual report covers the actions and progress made towards IMP action items for both the LLNRD and NeDNR. The IMP states (Chapter 7) that the LLNRD and NeDNR will annually report on data collected, on new groundwater or surface permits and uses, and will review progress made toward achieving the goals and objectives. As the LLNRD regulates groundwater and the NeDNR regulates surface water, some sections are written individually, but wherever possible, sections are written jointly to reflect the partnership required to successfully implement the IMP. This IMP annual report provides transparency, to each other, and to the public, of what the LLNRD and NeDNR do on a regular basis to protect existing water users while allowing for economic viability.

MONITORING AND DATA COLLECTION

SURFACE WATER MONITORING

Streamgaging

The locations of gages at which streamflow or canal measurements are made - or have been made - by the United States Geological Survey (USGS) and the Department within the LLNRD are shown in Figure 1. Monthly averages of daily streamflow measurements from the active NeDNR gages are given in Appendix 1. These data, along with data from NeDNR canals, can be acquired from the Department’s website at <https://nednr.nebraska.gov/RealTime//>.

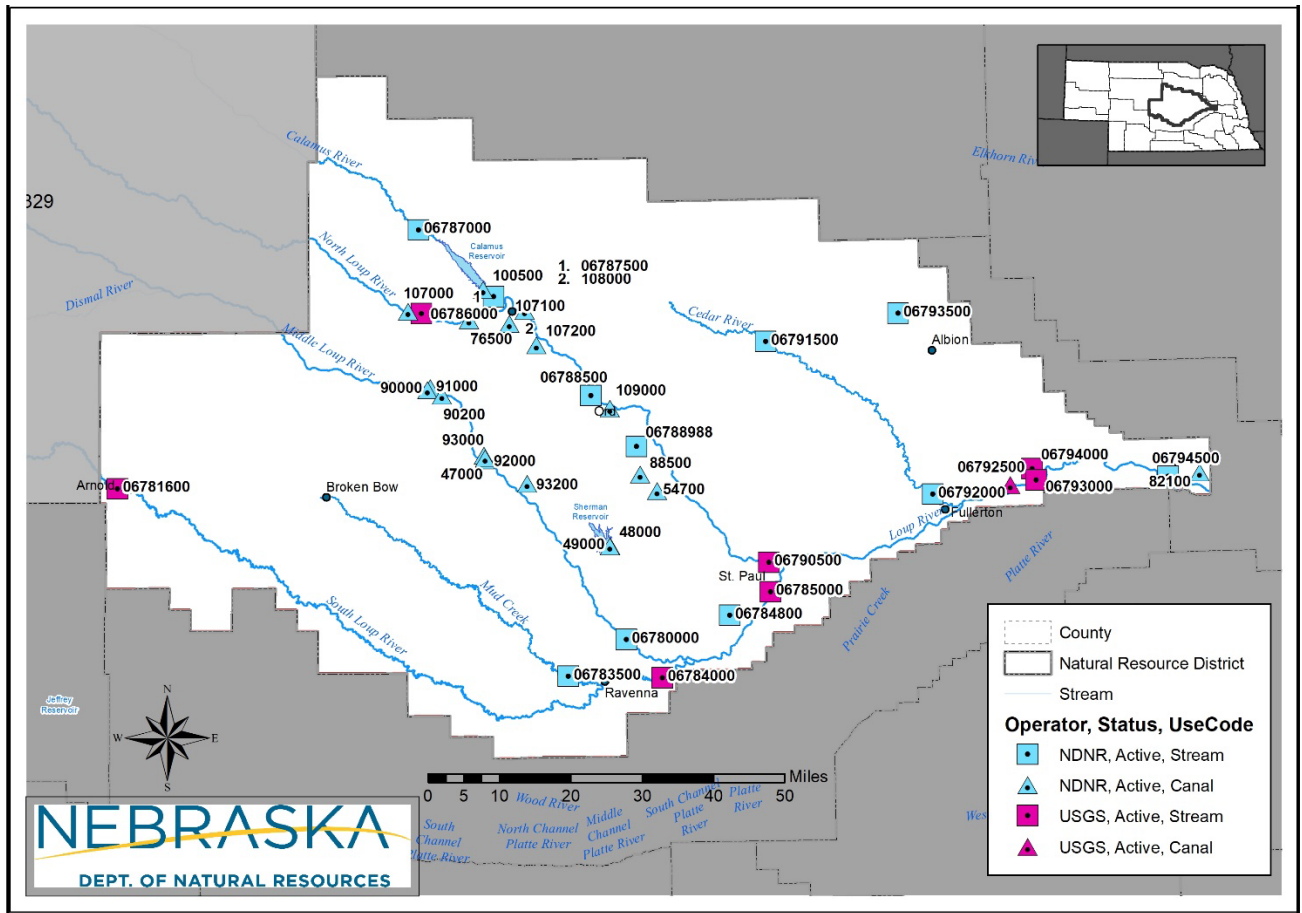


Figure 1: Streamgaging locations in the LLNRD

The LLNRD monitors stream flow in the South Loup River with a gage contracted through the United States Geological Survey (USGS). This gage was active in April of 2010 as part of a long-term drought study as well as to monitor inflows into the District in the South Loup River. Daily temperature, discharge (in cubic feet per second) and gage height in feet can be located at the USGS gage:

https://waterdata.usgs.gov/ne/nwis/uv/?site_no=06781600&PARAMeter_cd=00065,00060

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

NeDNR field staff also perform miscellaneous/one-time field measurements on streams throughout the year. NeDNR staff made a total of nine measurements at three locations in the LLNRD in 2016, which are presented in Table 1.

Table 1: Miscellaneous stream measurements in LLNRD in 2016.

Stream/location	Legal Description (S-T-RW)	Date	Flow (cfs)
Oak Creek near Ashton	NW ¼ NE ¼ 27-15-13	4/4/16	9.18
Sand Creek near Sargent	SW ¼ SE ¼ 4-19-18	8/25/16	0.18
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	5/23/16	0.40
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	6/20/16	0.15
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	7/5/16	0.054
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	7/14/16	0.013
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	8/1/16	0.032
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	8/15/16	0.005
Lillian Creek near Gates	SE ¼ SW ¼ 1-19-19	9/6/16	No flow

Pump Diversion Facility Inspections

NeDNR field staff performs surface water pump diversion facility inspections on an annual basis, to determine whether irrigation equipment is running and to identify the type and method of irrigation equipment and activity in use in the field. Figure 2 summarizes these pump diversion inspections conducted by NeDNR staff in 2016.

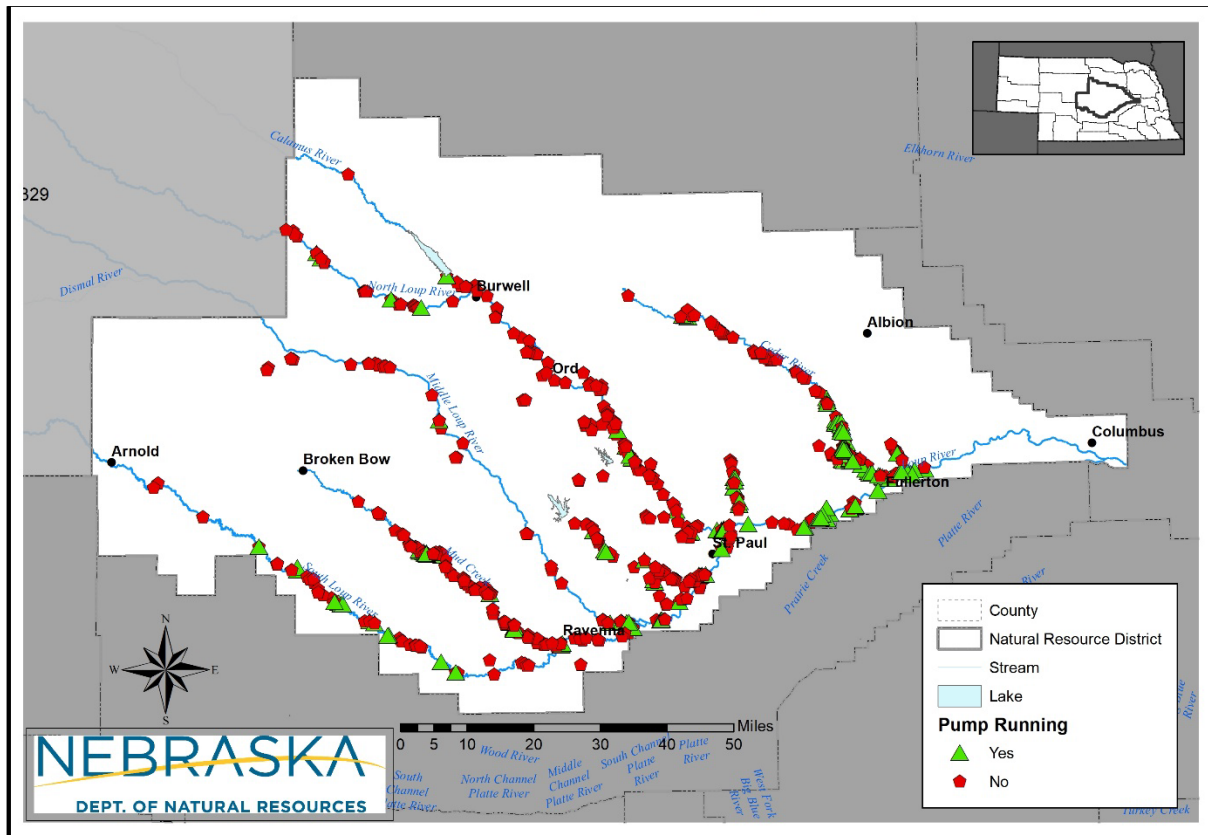


Figure 2: NeDNR pump site visits in the LLNRD in 2016.

Appropriations

In 2016, the Department approved one surface water permit application, which is listed in Table 2. This was a domestic use and resulted in adding no new irrigated agricultural acres, and 1.4 acres total. The location of this new appropriation is shown in Figure 3.

Table 2: Approved surface water applications in 2016 within the LLNRD.

Appropriation Number	Approval Date	Legal Description (S-T-RW)	Status	Use	Acres	Grant in CFS	Number of New Irrigated Acres
A-18790	4/26/16	26-18-13	Active	Domestic	1.4	0.07	1.4

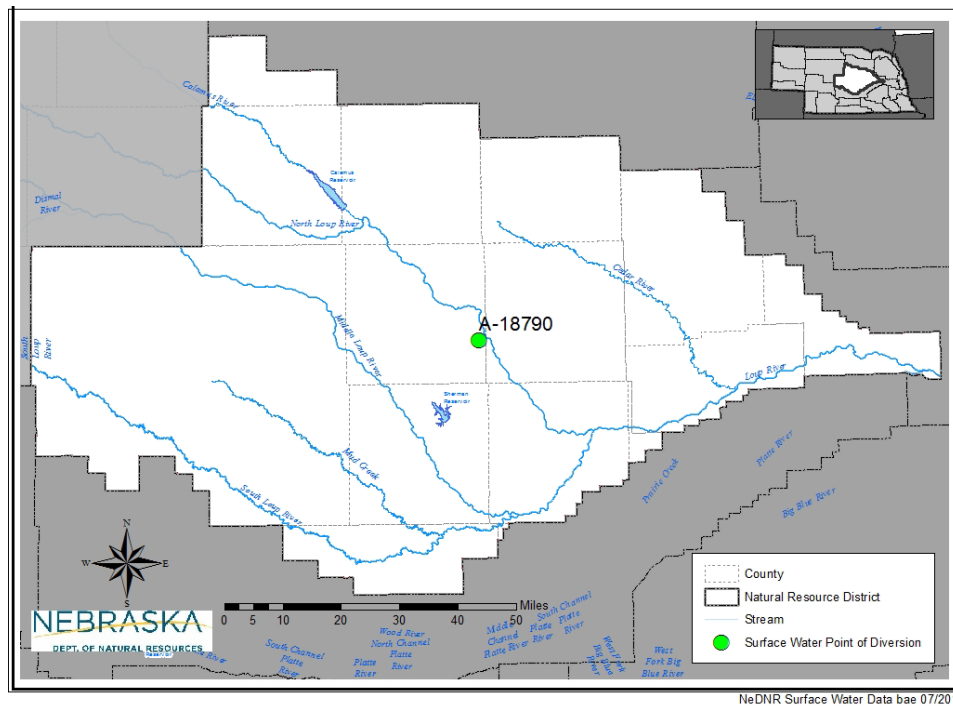


Figure 3: New surface water appropriations permitted in the LLNRD in 2016.

Ten surface water appropriations were cancelled in full during 2016, and are listed below in Table 3. These resulted in a cancellation of 341 irrigated acres. The basis for the Department’s action on each cancellation, as provided by state law, is listed below the table. One surface water permit application was dismissed in 2016 and is listed in Table 4.

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

Table 3: Surface water appropriations cancelled in full in 2016 in the LLNRD.

Appropriation Number	Cancellation Date	Legal Description (S-T-RW)	Status	Use*	Cancelled Acres	Cancelled Acre-feet	Reason
A-10810	1/25/16	26-21-7	Cancelled	IR	94.5		See Item 1
A-15623	1/25/16	26-21-7	Cancelled	IR	58.2		See Item 1
A-10233	11/18/16	4-19-18	Cancelled	IR	31		See Item 1
A-3714	3/16/16	10-18-17	Cancelled	IR	82.4		See Item 2
A-13722	4/28/16	18-14-16	Cancelled	IR	16		See Item 2
A-13031	3/16/16	6-11-16	Cancelled	IR	30.3		See Item 2; relinquished per variance agreement w/ NRD
A-10515	12/20/16	29-14-16	Cancelled	IR	28.6		See Item 2; relinquished per variance agreement w/ NRD
A-17853	11/18/16	32-17-10	Cancelled	WS		139	See Item 3
A-17854	11/18/16	32-17-10	Cancelled	WS		217	See Item 3
A-17855	11/18/16	32-17-10	Cancelled	WS		202	See Item 3

Basis for Department Actions

1. The Department found that the appropriation had not been used for more than five consecutive years, and the owner did not successfully contest the preliminary determination of nonuse.

Authority upon which the action was based: *Neb. Rev. Stat. §§ 46-229.02(1) through 46-229.02(6)*: If the Department makes a preliminary determination that an appropriation has not been used for more than five consecutive years, and the owner of said appropriation does not successfully contest the determination, the Department may cancel said appropriation in whole or part.

2. The owner signed and submitted a voluntary relinquishment of surface water appropriation.

Authority upon which the action was based: *Department Rules for Surface Water, Neb. Admin. Code. Title 457, Chapter 3*: Any appropriation, or part of any appropriation, may be voluntarily relinquished. The relinquishment shall be made on a form provided by the Department.

3. The appropriator failed to perfect the appropriation in the time allowed.

Authority upon which the action was based: *Neb. Rev. Stat. §46-229.02(7)*: A water appropriation that has not been perfected pursuant to the terms of the permit may be canceled by the department without complying with sections 46-229.01 to 46-229.04 if the owner of such appropriation fails to comply with any of the conditions of approval in the permit, except that this subsection does not apply to appropriations to which subsection (2) of section 46-237 applies.

*Uses: IR = irrigation, WS = waste storage

Table 4: Surface water appropriations dismissed in 2016 in the LLNRD.

Appropriation Number	Dismissed Date	Legal Description (S-T-RW)	Status	Use*	Dismissed Acres	Dismissed CFS	Reason
A-18945	9/27/16	10-15-11	Dismissed	ST	-	-	Project not moving forward

* Use: ST = storage

Voluntary Surface Water Use Reporting

NeDNR annually surveys surface water users statewide, who may voluntarily report their crops grown, tillage practices, acres farmed, and acres irrigated. There were 160 respondents out of 785 surveys sent in the LLNRD to the Department’s survey in 2016 (a response rate of about 20%). A total of 10,694.59 acres were reported, categorized by irrigated vs. non-irrigated and crop type. Corn was the highest-percentage crop grown on the reported irrigated acres, with soybeans second. Corn was also grown on the highest percentage of non-irrigated acres, with alfalfa and soybeans a close second and third,

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

respectively. Of the total number of acres reported, about 77% were irrigated. The reported data are show in Table 5.

Table 5: Voluntary reporting of water use within the ULNRD for 2016.

Crop Type	Total Reported Crop Acres	Crop Acres Irrigated		Crop Acres Not Irrigated	
		Acres	Percent of Reported Irrigated Acres (by Crop Type)	Acres	Percent of Reported Irrigated Acres (by Crop Type)
Alfalfa	1,811.70	1,280.7	15.5%	531	21.6%
Corn	5,582.80	4,992.3	60.6%	590.5	24.0%
Fallow	124	-	-	124	5.0%
Forage Hay/Grass	253.8	-	-	253.8	10.3%
Millet	125	25	.3%	100	4.1%
Other	322.2	41.7	.5%	280.5	11.4%
Sorghum	66.82	-	-	66.82	2.7%
Soybeans	2,408.27	1,897.58	23.0%	510.69	20.8%
Totals	10,694.59	8,237.28		2,457.31	

GROUNDWATER MONITORING

Groundwater Water Level Monitoring

The LLNRD has collected groundwater level readings by measuring depth to groundwater on an annual basis since 1972. In 2016, the LLNRD staff collected groundwater level readings at 420 sites across the District for both the spring and fall season. Overall, the average of all water table levels across the District has increased 0.22 feet. Of the 420 sites measured, 166 showed spring to spring water table declines from the 2015 samples with an average decline level of -0.62 feet below the previous reading. Groundwater level declines were scattered throughout the District; however, continued declines have been tracked in the South Loup River area in southern Custer and northern Buffalo Counties. Conversely, 227 sites showed increases when comparing 2015 readings with a mean increase of 0.84 feet above the previous reading. The largest spring to spring decline was -5.24 located in Platte County near the Loup River while the largest increase was 15.25 feet located in Garfield County in the North Loup Basin.

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

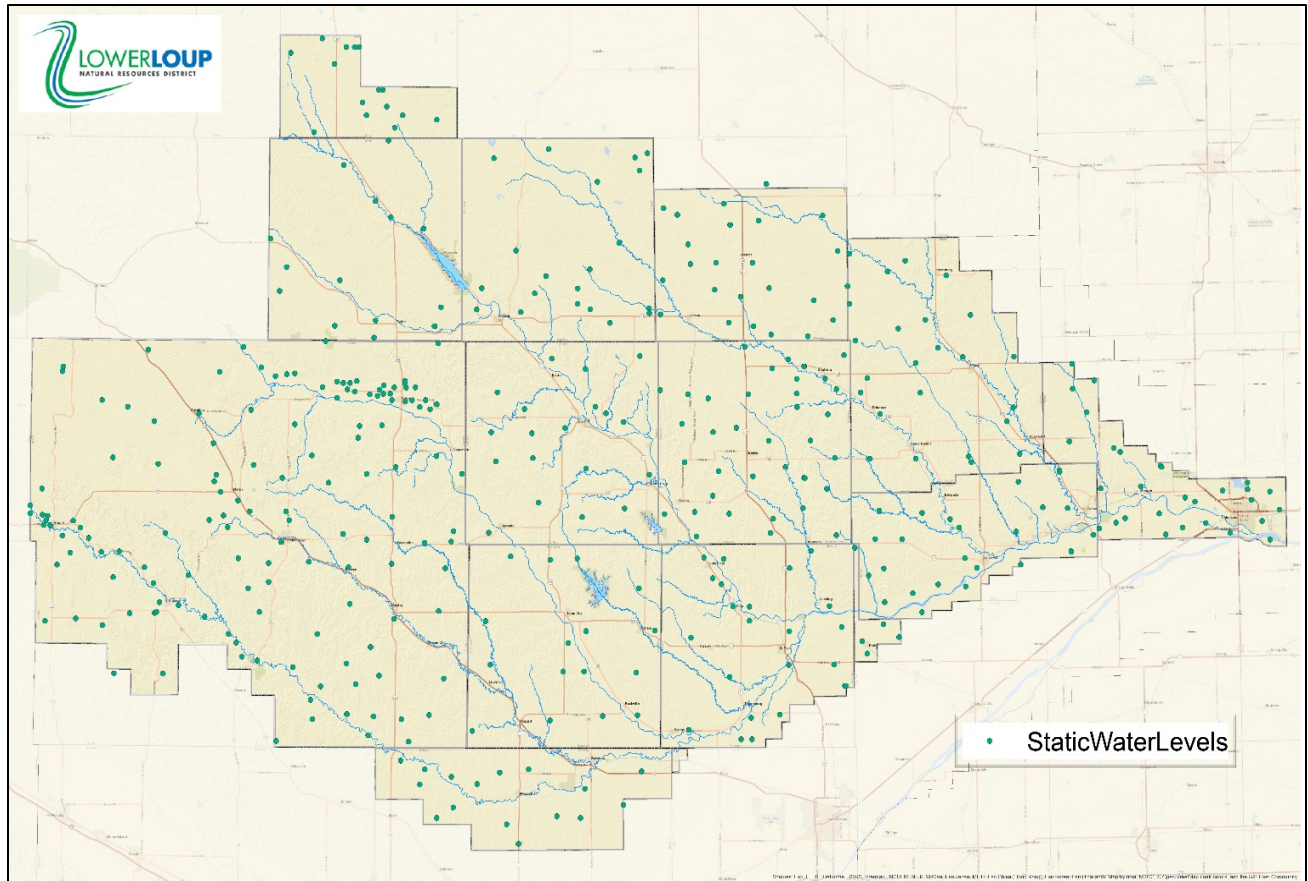


Figure 4: Locations where of static groundwater level measurements were collected in the LLNRD during 2016.

Permitting Activities

The LLNRD established a well moratorium in 2007; previous to 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. Permits are still required for all high-capacity wells and may still be issued for supplemental and replacement wells that are for non-irrigation uses. Any new high-capacity irrigation well must be previously approved through the variance process (see “Variance” portion of this report). LLNRD has approved 64 well permits in 2016 for varied uses as reported in the table below.

Table 6: Approved groundwater well permits in the LLNRD in 2016.

Groundwater Well Permit Types	Number of Permits	Average Pump Capacity (gpm)
Dewatering	8	950.00
Industrial	1	65.00
Irrigation (Total)	47	812.71
(Irrigation) Transfer	8	856.25
(Irrigation) Supplemental	12	795.80
(Irrigation) Variance	1	750.00
(Irrigation) New Acre	1	800.00
(Irrigation) Replacement	25	861.50
Livestock	3	100.00
Public Water Supply	2	600.00
Water Source Heat Pump	3	60.00
TOTAL	64	583.86

Groundwater Irrigation Water Use Reporting

The LLNRD has collected ground 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 (see Figure 5, inset) be outfitted with a flowmeter to track irrigation total withdrawals starting in 2016. LLNRD has collected records of usage from 896 irrigation sites with 788 of those sites being verified as having an actual irrigation total water volume. The District average pumping withdrawals for irrigation for the 2016 season was 9.66 inches, with the majority of the crop being irrigated constituting entirely of either corn or soybeans.

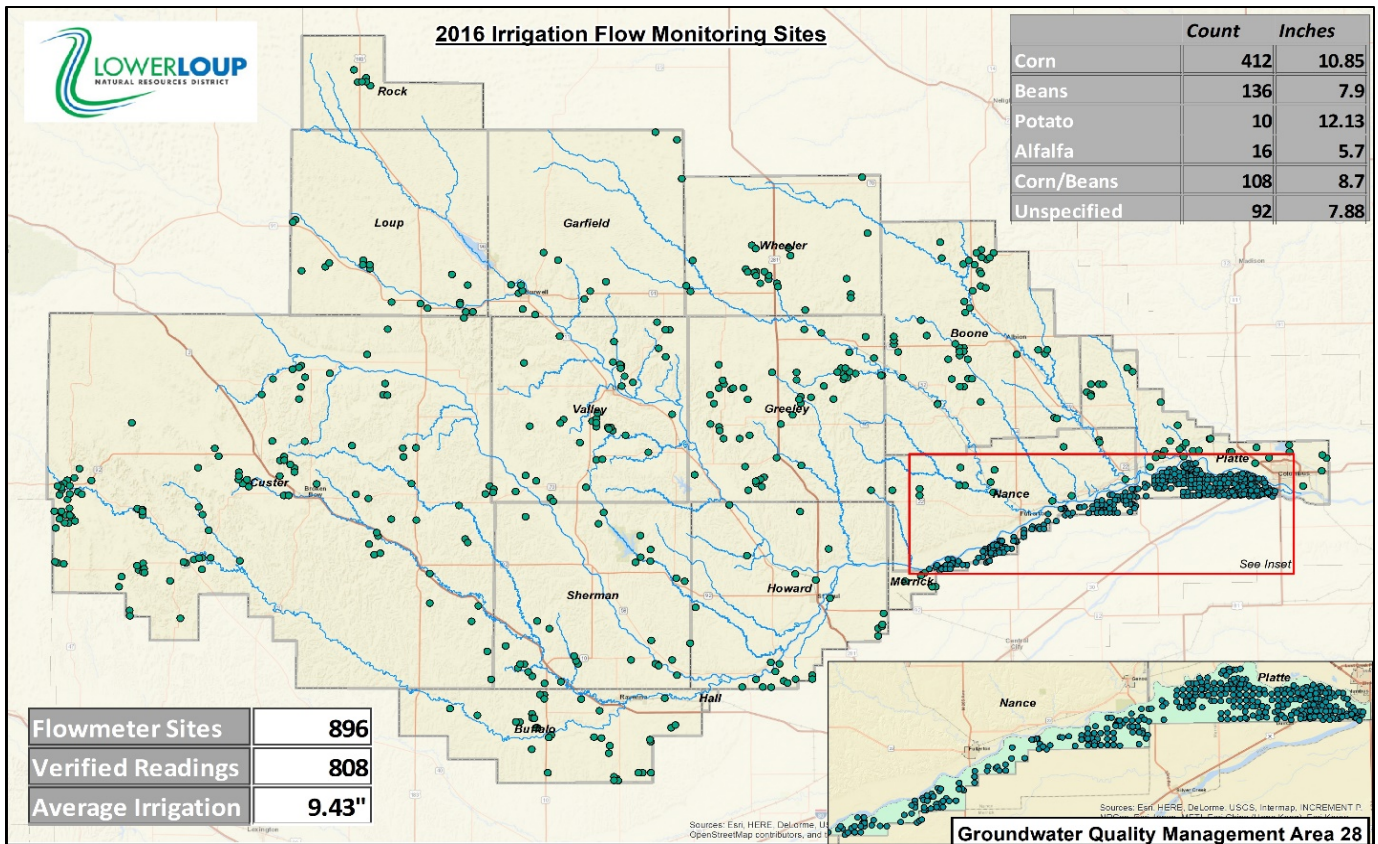


Figure 5: Irrigation groundwater well measuring and reporting sites in the LLNRD in 2016.

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

Municipal Water Use

Municipal groundwater use in the LLNRD in 2016 is summarized in Table 7.

Table 7: Municipal water use in the LLNRD in 2016.

City Name	2016 Water Pumped	Population	Gal/per capita/per day	Connections	Metered
Albion, City of	110,599,010	1,650	183.6	938	Yes
Anselmo, Village of	19,495,900	145	368.4	101	Yes
Ansley, Village of	42,087,000	441	261.5	252	Yes
Arcadia, Village of	83,865,200	311	738.8	200	No
Arnold, Village of	73,000,000	597	335.0	395	Yes
Ashton, Village of	11,766,000	196	164.5	140	Yes
Bartlett, Village of	22,837,000	122	512.8	70	No
Belgrade, Village of	18,406,900	150	336.2	77	No
Boelus, Village of	10,212,000	193	145.0	115	Yes
Broken Bow, City of					
Burwell, City of	66,530,000	1,210	150.6	701	Yes
Cairo, Village of	66,123,000	800	226.4	335	Yes
Callaway, Village of	26,086,470	537	133.1	350	No
Cedar Rapids, Village of	28,918,000	382	207.4	265	Yes
Columbus, City of	2,055,079,592	22,630	248.8	9,129	Yes
Comstock, Village of	5,848,200	110	145.7	67	Yes
Dannebrog, Village of	10,138,000	324	85.7	145	Yes
Duncan, Village of	22,722,000	359	173.4	170	Yes
Elba, Village of	17,638,000	215	224.8	128	Yes
Ericson, Village of	21,956,700	87	691.4	31	No
Farwell, Village of	9,693,800	124	214.2	80	Yes
Fullerton, City of	89,501,000	1,371	178.9	640	Yes
Genoa, City of	56,939,000	981	159.0	486	Yes
Greeley, Village of	37,098,000	431	235.8	335	Yes
Litchfield, Village of	18,514,400	262	193.6	147	Yes
Loup City, City of	355,226,000	1,029	945.8	585	Yes
Mason City, Village of	1,147,430	171	18.4	115	Yes
Merna, Village of	23,370,000	363	176.4	203	Yes
Monroe, Village of	17,095,400	284	164.9	146	Yes
*North Loup, Village of		297		153	Yes
Ord, City of	382,344,000	2,112	496.0	1,181	Yes
Palmer, Village of	18,247,000	472	105.9	230	Yes
Petersburg, Village of	25,000,000	333	205.7	200	Yes
Pleasanton, Village of	27,787,630	341	223.3	185	Yes
Primrose, Village of	15,984,000	65	673.7	35	Yes
Ravenna, City of	135,965,000	1,360	273.9	625	Yes
Rockville, Village of	4,110,700	110	102.4	48	Yes

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

Table 7: Municipal water use in the LLNRD in 2016.

City Name	2016 Water Pumped	Population	Gal/per capita/per day	Connections	Metered
Sargent, City of	52,768,530	550	262.9	338	Yes
Scotia, Village of	26,731,700	319	229.6	157	Yes
Spalding, Village of	19,541,188	487	109.9	359	Yes
St. Edward, Village of	67,473,500	705	262.2	340	No
St. Paul, City of	147,651,000	2,300	175.9	1,005	Yes
Wolbach, Village of	34,628,500	287	330.6	140	No
Total	4,280,126,750	45,213	259	21,342	

average gallons
pumped per capita
per day

*Water provided through City of Ord
-Population numbers were supplied by the municipality.

Commercial and Industrial Water Use

Given the voluntary nature of the IMP, there was not commercial or industrial water use collected by the District in 2016. However, a majority of the LLNRD’s industrial and/or commercial uses are already being included in the municipal water user table above. The LLNRD is planning to seek out and collect this data moving forward.

VARIANCES

Water Transfers

In 2016, the LLNRD approved 34 **Agreements to Transfer Certified Irrigated Acres & Right to Use Groundwater** agreements. There were no denials to any Transfer Requests. See the summary in Table 8 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).

Table 8: Approved certified irrigated acres transfers in the LLNRD in 2016.

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	3	108.9	0	52.90	.37	.31
Buffalo	3	2	127.00	2	117.90	.46	.74
Custer	4	6	147.40	2	285.46	.51	.68
Garfield	1	3	123.00	1	160.30	.89	.52
Greeley	7	0	195.49	1	0.0	.18	N/A
Howard	1	1	30.00	0	30.30	.90	.89
Platte	5	2	88.60	1	33.60	.24	.28
Rock	0	7	0.0	0	185.10	N/A	.44
Sherman	3	2	138.2	1	25.10	.46	.54
Valley	4	2	34.61	0	18.30	.53	.60
Wheeler	0	6	0.0	0	111.65	N/A	.43
Total	34	34	993.20	8	1,020.61	.39	.51

Expedited Variances

In 2016, there were a total of 15 expedited variances (Table 9) that were approved through NRD processes. 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.

Table 9: Approved expedited variances in 2016 in the LLNRD.

County	# of Supplemental Well Agreements	Permit Approved	Agreement Approved, but waiting on a Permit
Boone	3	3	
Buffalo	2	0	2
Custer	1	1	
Howard	2	1	1
Loup	1	1	
Nance	2	2	
Platte	1	1	
Sherman	1	1	
Valley	2	2	
Total	15	12	3

Well Agreements

In 2016, there were a total of 4 well agreements that were approved. These 4 well agreements were granted based on the stipulation that the landowner relinquish the existing surface water right held through the Department processes. There were no denials to any variances with a well agreement request.

Table 10: Approved well agreements in the LLNRD in 2016.

County	# of Supplemental Well Agreements	SW Agreed upon to be Relinquished	Permit Approved	SW Right Relinquishment Date
Buffalo	1	A-13031	1	3/16/2016
Howard	1	A-5198A A-6280A A-10246A	1	required to relinquish as of 6/2/17, well G-180213 registered 8/2/16
Nance	1	A-14843	0	6/8/2017
Sherman	1	A-10515	1	12/20/2016
Total	4	6	3	

Acre Rotations

In 2016, there were a total of 3 acre rotations that were approved by the LLNRD. These 3 Acre Rotation Agreements have 2 or 3 options the land owner 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. There were no denials to any acre rotation requests. Enforcement is conducted by the LLNRD through annual infrared imagery and field personnel visitation.

Table 11: Approved acre rotations in the LLNRD in 2016.

County	# of Acre Rotation Agreements Approved
Custer	2
Platte	1
Total	3

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 2016 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 2016 transfers, the LLNRD has banked a total of 638.06 groundwater-irrigated acres. Additional information regarding the ELM project can be found here: <https://pubs.er.usgs.gov/publication/sir20105149>.

REGULATORY ACTIONS

GROUNDWATER ACRES LIMITATIONS

New acre applications were accepted in the North Loup River and Beaver Creek Sub-Basins for a total of 1996.28 new irrigated acres and have been approved by the LLNRD Board of Directors. These two basins were determined by the LLNRD to have available excess flows according to information contained within the NeDNR INSIGHT database and groundwater levels. Two other basins (Lower Loup and South Loup) showed a negative balance in the INSIGHT database. The LLNRD also considered areas of downward (negative) groundwater trends and did not approve acre applications in those Water Quantity Areas. Both the INSIGHT databases and closed Water Quantity areas are indicated in the map on page 15.

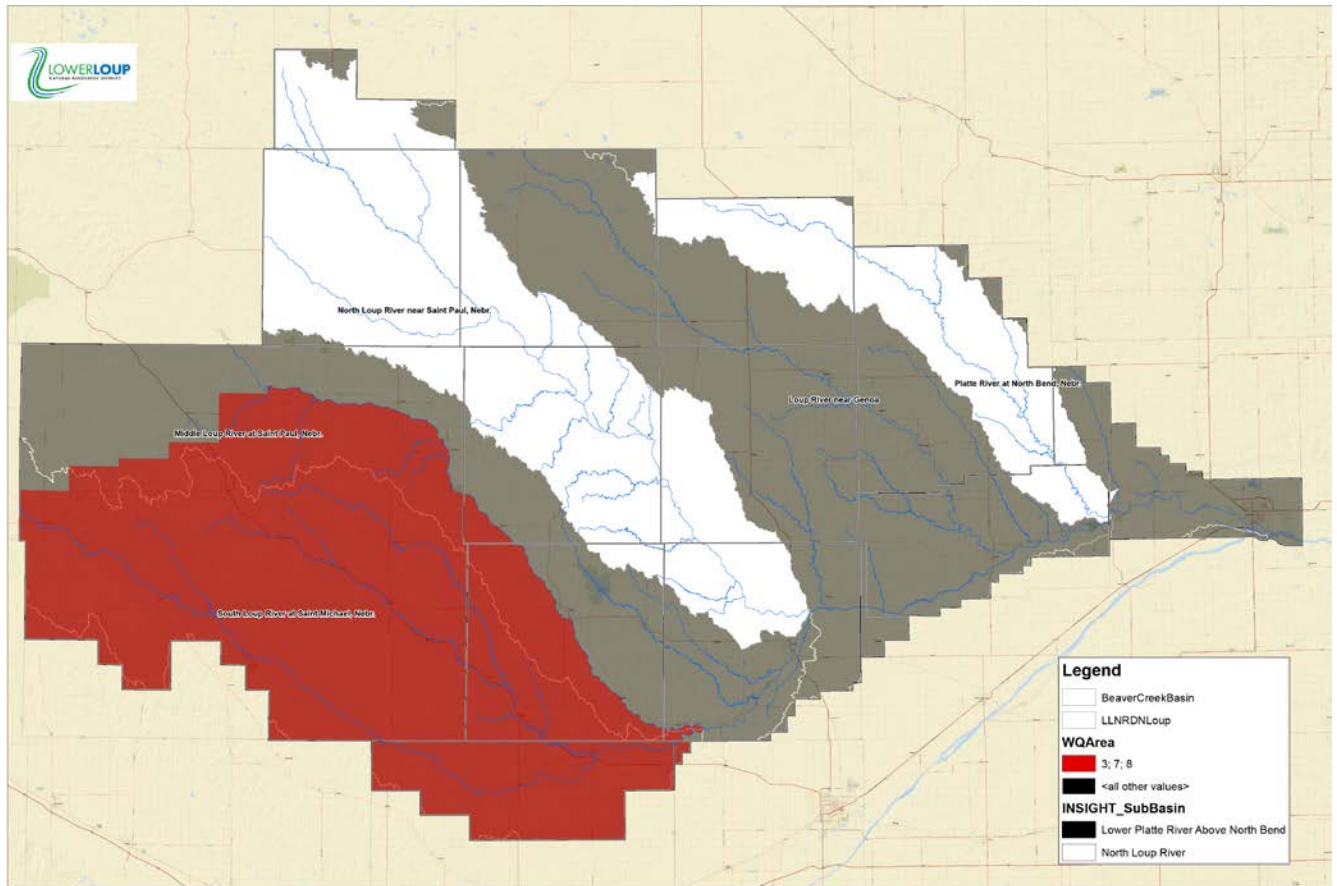
There were 65 applications for new irrigation: 35 in the North Loup River Basin and 30 in the Beaver Creek Basin. The total number of acres requested in both basins was 4,943.05. The average application size requested 74 acres and the average application ranking was 255 points, ranked by LLNRD processes.

At their meeting on October 27, 2016, the LLNRD Board of Directors unanimously approved all applications that ranked 230 points or greater. This meant approval of 20 new irrigated acre applications in the North Loup River Basin and 11 applications in the Beaver Creek Basin. There were 1,227.3 new acres approved in the North Loup and 768.9 in Beaver Creek.

Applications for new irrigation were ranked using criteria approved by the NRD Board when irrigated acres had been previously granted. The criteria include SDF, the status of groundwater and surface water, the number of acres being developed, and the soil classification.

Table 12: New groundwater-irrigated acres approved in the LLNRD in 2016.

Basin	Number of Acres Approved	Pending Wells	Average SDF
Beaver	768.89	7	61%
North Loup	1,227.30	11	42%
Total	1,996.19	18	51.5%



SURFACE WATER ACRES LIMITATIONS

IMPs must include one groundwater control and one surface water control. NeDNR’s surface water control mimics the LLNRD groundwater control, which is to restrict the number of acres available for irrigation. More specifically, under the provisions of the IMP, NeDNR will restrict the number of additional acres for surface water irrigation within the surface water areas that drain into the hydrologically connected areas (surface water control area) to no more than 1/3 of the amount of acres that LLNRD will allow for new groundwater irrigated acres. At the close of each year, NeDNR will inquire with LLNRD about their acre limitations and then set the surface water limit to 1/3 of that amount for the following year. Limitations began upon approval of the IMP.

WATER INVENTORY AND WATER USE/SUPPLY MANAGEMENT

LLNRD ACCOMPLISHMENTS

LLNRD has continued data acquisition and sharing with its partnering local, state and federal agencies, and has continually worked to improve the efficiency and usability of its in-house database. LLNRD has furthered its understanding of specific water concern areas through detailed studies. One such volumetric study of available water is the Columbus Water Resources Assessment, which features LLNRD partnering with ADM ethanol plant and the City of Columbus, with HDR acting as a consultant. The South Loup Watershed Management Plan is another study addressing both quality and quantity issues through a

holistic and conjunctive management approach along the South Loup River, with JEO acting as consultant. The LLNRD has continually taken the opportunity to partner with the various irrigation and power districts located throughout the Loup Basin to address water concerns to progressively address any potential problems. LLNRD and the Upper Loup NRD recently contracted USGS to develop thermal imagery along the North and South Loup Rivers to locate areas of high connectivity and groundwater influx to further the understanding of those reaches that are considered gaining streams. LLNRD also continued the open dialogue with public water suppliers on current and future water supplies, and supported storm water capture and reuse projects in the District. LLNRD is an active participant with the Lower Platte River Coalition and utilized Water Sustainability Funding to contract and collect aerial electromagnetic survey (AEM) with the ENWRA NRDs and Conservation Survey Division. AEM data was collected around the Columbus Area, near the confluence of the Loup and Platte Rivers as well as west up the alluvial valley of the Loup River.

NeDNR's INSIGHT

The Integrated Network of Scientific Information and Geohydrologic Tools (INSIGHT) website at <http://nednr.nebraska.gov/INSIGHT/> is an important tool for integrated water management. INSIGHT helps water managers and other interested parties to better understand current and future water demands, effectiveness of water management strategies, and critical areas of water shortage. INSIGHT was released in January 2014, and it provides a mechanism to access and review water use and water supply information as it relates to Nebraska's unique subbasins. Users can access information pertaining to precipitation, water demands (irrigation, hydropower, etc.), and view maps with associated charts that show overall water balance (current, near-term or long-term) for the subbasin. Another feature of INSIGHT is that all the datasets used to compile the water balance analyses are also stored within the web application, and are available for download.

At this time, NeDNR has compiled data for several basins and subbasins across the state, including the Lower Loup River Basin. NeDNR plans to expand the area covered by INSIGHT as additional data become available.

EDUCATION/OUTREACH

NeDNR ACTIVITIES

Each year, NeDNR dedicates a portion of staff time and resources to education and outreach efforts that promote a better understanding of integrated water management and why it is important to the state's citizens. NeDNR's outreach efforts range from informal conversations with local citizens about how we envision and strive for collaborative water management, to more complex presentations, discussions, and demonstrations about the hydrologic connection between surface and groundwater.

In 2016, NeDNR staff attended the Sandhills Ranch Expo held in Bassett, Nebraska. This event provided many people who otherwise may not have had direct contact with Department staff an opportunity to learn about NeDNR in general and the Water Planning Division's focus on integrated water management specifically. NeDNR staff operated a groundwater model showing the connection and interaction of surface water with groundwater, discussed IMPs, and fielded questions.

Many of NeDNR's efforts, such as hosting an informational booth at the Nebraska State Fair or improving the INSIGHT web portal, are broadly focused and intended to provide all interested citizens

with a better understanding of how integrated water management affects them. In 2016, NeDNR staff set up educational booths at the Nebraska State Fair, Husker Harvest Days, the Governor’s Ag Conference, and the University of Nebraska-Lincoln’s Women in Agriculture Conference. Improvements were also made to NeDNR’s website (<https://dnr.nebraska.gov/>) and the INSIGHT web portal (<https://nednr.nebraska.gov/INSIGHT/>), which will provide citizens with a more convenient and user-friendly experience when they need to access water resources related information or data.

LLNRD ACTIVITIES

In 2016, the LLNRD distributed a news release providing details on the IMP to approximately 35,500 households within the state. This newsletter, *In the Loup*, is published quarterly and features the most current information available on District activities and programs. Information on the collaborative work between NeDNR and LLNRD was publicized in the LLNRD column entitled “Loup Lines,” which is featured in all of the newspapers within the District on a monthly basis. The LLNRD Information and Education Coordinator also featured stories on the NRD’s weekly radio show, “Natural Resources Report” broadcast on KTTT in Columbus and KCNI in Broken Bow on Thursdays and KNLV in Ord on Friday mornings.

The LLNRD features a downloadable format of the finalized IMP on the District’s website, llnrd.org.

COLLABORATION WITH OTHER ENTITIES

LOWER PLATTE RIVER BASIN COALITION

Both the LLNRD and NeDNR are active participants in the Lower Platte River Basin Coalition (a group comprised of the seven Lower Platte River Basin NRDs and NeDNR). The purpose of this group is to develop a voluntary water management plan for the Lower Platte River Basin. Plan components could subsequently be incorporated into individual NRD IMPs to provide consistency in water management actions across NRD boundaries. NeDNR has representatives that serve on both the managers and technical committees. LLNRD’s General Manager serves as chair for the management committee of the coalition, LLNRD’s Assistant General Manager serves as chair for the technical committee. Two LLNRD serve as representatives on the Board of Directors.

For more information about the Coalition, please see <https://lprbc.nebraska.gov/>

2016 ANNUAL INTEGRATED MANAGEMENT PLAN REPORT

Appendix 1: Monthly averages of daily measurements from NeDNR-operated streamgages in the LLNRD, 2016.

	6780000 Middle Loup River at Rockville	6783500 Mud Creek near Sweetwater	6784800 Turkey Creek near Dannebrog	6787000 Calamus River near Harrop	6787500 Calamus River near Burwell	6788500 North Loup River at Ord	6788988 Mira Creek near North Loup	6791500 Cedar River near Spalding	6792000 Cedar River near Fullerton	82100 Loup River Power Canal Return at Columbus
January Average	810	15	11	236	256	915	8	158	270	471
February Average	1150	19	16	255	259	1005	12	188	295	1720
March Average	948	20	11	242	148	888	9	163	267	2525
April Average	1166	35	41	275	166	950	55	274	452	2240
May Average	1252	43	24	323	298	1122	55	375	634	2337
June Average	514	24	13	241	41	541	16	184	272	1642
July Average	589	*	48	227	222	846	16	166	179	1722
August Average	491	*	24	212	198	587	11	152	190	1613
September Average	604	*	26	231	223	781	7	152	199	2139
October Average	1099	*	7	238	100	748	3	153	211	2365
November Average	1071	*	9	238	48	776	6	176	244	2609
December Average	732	*	9	226	207	2213	7	344	532	1619

* Data not available for full month.