

ANNUAL  
INTEGRATED  
MANAGEMENT  
PLAN REPORT

2017



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

Submitted at the Lower Platte South Board Meeting/IMP Annual Review  
August 15, 2018



LOWER PLATTE SOUTH  
natural resources district

NEBRASKA  
DEPT. OF NATURAL RESOURCES

# TABLE OF CONTENTS

<b>LIST OF FIGURES.....</b>	<b>3</b>
<b>LIST OF TABLES.....</b>	<b>3</b>
<b>INTRODUCTION .....</b>	<b>4</b>
<b>MONITORING AND DATA COLLECTION .....</b>	<b>5</b>
<b>Surface Water Monitoring.....</b>	<b>5</b>
Streamgaging.....	5
Surface Water Permitting Actions.....	9
Voluntary Surface Water Use Reporting .....	12
Surface Water Pump-Site Visits.....	13
<b>Groundwater Monitoring .....</b>	<b>14</b>
Metering and Groundwater Level Monitoring .....	15
Groundwater Permitting Activities .....	16
Land Use and Land Cover (LULC) Monitoring and Actions .....	18
<b>2017 IMP REGULATORY ACTIONS.....</b>	<b>20</b>
LPSNRD Groundwater Acres Limitations.....	20
NeDNR Surface Water Acres Limitations.....	20
<b>STUDIES AND PLANNING .....</b>	<b>20</b>
Additional IMP Components .....	20
Stream Accretion and Depletion Calculator Expansion.....	21
Lower Platte Missouri Tributaries Model Development .....	21
<b>WATER INVENTORY AND WATER USE/SUPPLY MANAGEMENT .....</b>	<b>23</b>
LPSNRD Accomplishments.....	23
NeDNR’s INSIGHT Web Portal.....	23
<b>EDUCATION/OUTREACH.....</b>	<b>23</b>
NeDNR Activities.....	23
Statewide .....	23
LPSNRD Activities.....	24

<b>COLLABORATION WITH OTHER ENTITIES.....</b>	<b>25</b>
Eastern Nebraska Water Resources Assessment.....	25
Lower Platte River Basin Coalition.....	25
Lower Platte River Consortium.....	25
Lower Platte River Corridor Alliance.....	26
Other Collaborations.....	26
<b>JOINTLY IDENTIFIED ACTIONS FOR SUCCEEDING TWO YEARS.....</b>	<b>26</b>

**LIST OF FIGURES**

FIGURE 1: LOCATION OF STREAMGAGES IN THE LPSNRD (USGS GAGES). ....	6
FIGURE 2: HISTORICAL ANNUAL DISCHARGE FOR SALT CREEK AT ROCA, NE (SOURCE: USGS-NWIS. SOME PROVISIONAL DATA USED). ....	7
FIGURE 3: HISTORICAL ANNUAL DISCHARGE SALT CREEK AT GREENWOOD, NE (SOURCE: USGS-NWIS. SOME PROVISIONAL DATA USED). ....	7
FIGURE 4: HISTORICAL ANNUAL DISCHARGE FOR LITTLE SALT CREEK AT LINCOLN, NE (SOURCE: USGS-NWIS. SOME PROVISIONAL DATA USED). ....	8
FIGURE 5: HISTORICAL ANNUAL DISCHARGE FOR STEVENS CREEK NEAR LINCOLN, NE (SOURCE: USGS-NWIS. SOME PROVISIONAL DATA USED). ....	8
FIGURE 6: HISTORICAL ANNUAL DISCHARGE FOR THE PLATTE RIVER AT LOUISVILLE, NE (SOURCE: USGS-NWIS. SOME PROVISIONAL DATA USED).....	9
FIGURE 7: GEOGRAPHIC DISTRIBUTION OF SURFACE WATER PERMITTING ACTIONS AND AFFECTED IRRIGATED ACRES.....	10
FIGURE 8: 2017 SURFACE WATER FIELD INSPECTIONS IN LPSNRD.....	13
FIGURE 9: WATER USE IN THE HYDROLOGICALLY CONNECTED PORTION (I.E. IMP GROUNDWATER MANAGEMENT AREA) OF LPSNRD. ....	14
FIGURE 10: REGISTERED PUBLIC SUPPLY AND DOMESTIC WELLS IN THE HYDROLOGICALLY CONNECTED PORTION (I.E. IMP GROUNDWATER MANAGEMENT AREA) OF LPSNRD.....	15
FIGURE 11: 2017 GROUNDWATER LEVEL COMPARISON OF SPRING 2016 TO SPRING 2017 MEASUREMENTS. ....	16
FIGURE 12: LPSNRD GROUNDWATER WELL PERMITS APPROVED OR COMPLETED IN 2017. ....	17
FIGURE 13: ONE LPSNRD GROUNDWATER WELL PERMIT APPROVED IN THE HYDROLOGICALLY CONNECTED AREA IN 2017.....	18
FIGURE 14: 2017 HCA CERTIFIED GROUNDWATER IRRIGATED ACRES. ....	19
FIGURE 15: 2017 DISTRICT-WIDE CERTIFIED GROUNDWATER IRRIGATED ACRES. ....	19
FIGURE 16: GEOGRAPHIC AREAS OF NEDNR’S LOWER PLATTE-MISSOURI TRIBUTARIES MODELS.....	22

**LIST OF TABLES**

TABLE 1: STREAMGAGES IN THE LPSNRD (USGS GAGES). ....	5
TABLE 2: NEW SURFACE WATER APPROPRIATIONS APPROVED IN 2017. ....	10
TABLE 3: SURFACE WATER APPROPRIATIONS PARTIALLY CANCELED IN 2017.....	10
TABLE 4: SURFACE WATER APPROPRIATIONS FULLY CANCELED IN 2017. ....	11
TABLE 5: AVERAGE WELL LEVEL CHANGE BY GROUNDWATER RESERVOIR, SPRING 2016 TO SPRING 2017. ....	16
TABLE 6: LPSNRD APPROVED OR COMPLETED GROUNDWATER WELLS IN 2017.....	17

# **2017 ANNUAL REPORT FOR LOWER PLATTE SOUTH NATURAL RESOURCES DISTRICT and NEBRASKA DEPARTMENT OF NATURAL RESOURCES INTEGRATED MANAGEMENT PLAN**

Jointly prepared by the Lower Platte South NRD and the Nebraska Department of Natural Resources  
Submitted on August 15, 2018

## **Introduction**

The Lower Platte South Natural Resources District (LPSNRD) and the Nebraska Department of Natural Resources (NeDNR) jointly adopted a voluntary Integrated Management Plan (IMP). The IMP became effective on May 15, 2014, with the goal of jointly managing groundwater and surface waters within the LPSNRD in order to sustain a balance between water uses and supplies for the near and long term. An in-depth public involvement plan, which included focus groups, a 13-month stakeholder process, a virtual town hall, and outside agency outreach, was an integral part in developing goals and objectives for the IMP.

This Annual Report covers the progress made towards Voluntary IMP implementation for both the LPSNRD and NeDNR in 2017. It is consistent with Chapter 9 of the IMP, which outlines the procedures for review and potential modification of the Voluntary IMP. Here, LPSNRD and NeDNR will annually report on data collected, annually report on new groundwater or surface permits and uses, and will review progress made toward achieving the goals and objectives.

To begin the process, the LPSNRD and NeDNR staff met on July 6, 2018, to discuss progress made in 2017 towards the goals and objectives of the plan, action steps for the next two years, and whether modifications to the IMP were needed. The action steps for the next two years are included in the “Jointly Identified Actions” section at the end of this report. The LPSNRD and NeDNR jointly decided that no modifications to the IMP were needed at the time of the 2017 annual review. The LPSNRD and NeDNR will continue to discuss the need for modifications over the next year to achieve consistency between the IMP and recently adopted (October 2017) Lower Platte Basin Water Management Plan.

The LPSNRD and NeDNR worked collaboratively to write this report. Highlights from the report were presented to the LPSNRD Board and the public on August 15, 2018, at LPSNRD’s regularly scheduled Board meeting. Notice of the Board meeting was published in the Lincoln Journal Star on August 2, 2018 and a public announcement of the IMP review was posted on both the NRD and NeDNR websites one week prior to the Board meeting (August 8, 2018).

As the LPSNRD regulates groundwater and the NeDNR regulates surface water, some sections are written individually, but, wherever possible, sections are written jointly to reflect the

partnership between LPSNRD and NeDNR in integrated groundwater and surface water management. This annual report provides transparency to each other, and to the public, about the progress made by LPSNRD and NeDNR in implementing the Voluntary IMP as a means to protect interconnected groundwater and surface water resources and existing water users for the near and long term.

## Monitoring and Data Collection

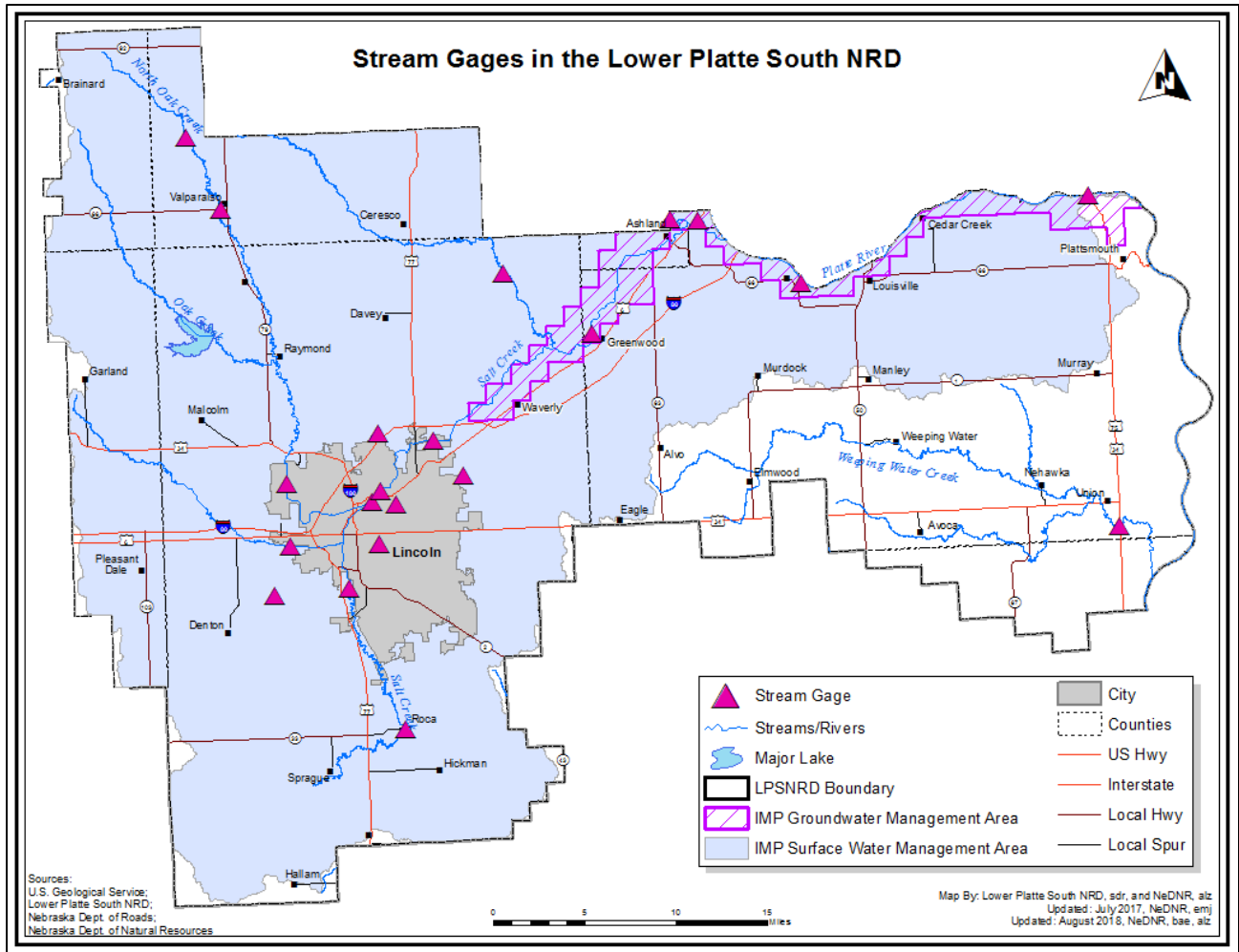
### Surface Water Monitoring

#### *Streamgaging*

The U.S. Geological Survey (USGS) owns and operates 21 streamgages in LPSNRD and all but one (Weeping Water Creek at Union, NE) are located in the IMP surface water management area (Table 1, Figure 1). A suite of streamflow data on these gages is available on the USGS’s National Water Information System (NWIS) at <http://waterdata.usgs.gov/>. NeDNR continually assesses the need for additional streamgages in the IMP area.

**Table 1: Streamgages in the LPSNRD (USGS gages).**

<b>Gage Name</b>	<b>Gage Number</b>	<b>Begin Date</b>	<b>LPSNRD assist in funding?</b>
Salt Creek at Roca, Nebr.	06803000	5/14/1951	yes
Salt Creek at Pioneers Boulevard at Lincoln, Nebr.	06803080	6/20/1994	yes
Haines Branch at SW 56th St at Lincoln, Nebr.	06803093	6/20/1994	yes
Middle Creek at SW 63rd St at Lincoln, Nebr.	06803170	6/20/1994	yes
Oak Creek at Air Park Road at Lincoln, Nebr.	06803486	5/21/1987	yes
Salt Creek at Fairgrounds at Lincoln, Nebr.	06803495	6/20/1994	no
Salt Creek at Lincoln, Nebr.	06803500	5/11/1942	yes
Little Salt Creek near Lincoln, Nebr.	06803510	5/11/1942	yes
Salt Creek at 70th Street at Lincoln, Nebr.	06803513	5/31/1994	yes
Stevens Creek near Lincoln, Nebr.	06803520	10/14/1968	yes
Rock Creek near Ceresco, Nebr.	06803530	4/1/1970	yes
Salt Creek at Greenwood, Nebr.	06803555	1/16/1952	no
Wahoo Creek at Ashland, Nebr.	06804700	2/22/1990	no
Weeping Water Creek at Union, Nebr.	06806500	1/11/1950	yes
Antelope Creek at 27th St at Lincoln, Nebr.	06803300	3/14/2012	yes
Deadman's Run at 38th Street at Lincoln, Nebr.	06803502	08/27/2014	no
Salt Creek near Ashland, Nebr.	06805000	10/01/2007	yes
North Oak Creek at Valparaiso, Nebr.	06803430	8/12/2016	yes
North Oak Creek near Touhy, Nebr.	06803420	8/12/2016	yes
Platte River near Ashland, Nebr.	06801000	8/20/1928	no
Platte River at Louisville, Nebr.	06805500	5/15/1953	no



**Figure 1: Location of streamgages in the LPSNRD (USGS gages).**

NeDNR acquired data from the USGS NWIS portal for select streamgages as a part of this report. These streamgages included two locations on the Salt Creek main stem (Roca and Greenwood), two locations on tributaries to the Salt Creek (Little Salt Creek and Stevens Creek), and one location on the Platte River (Platte River at Louisville). These locations have long periods of record (near or over 50 years) and provide general insight to the overall water supply for a given year.

Figures 2 through 6 show the total annual discharge over the period of record for the select streamgages. Total annual discharge for 2017 was at least 30 percent higher than the average period of record flows for all gages. The total annual discharge for Stevens Creek, which represents a small watershed in the south central portion of LPSNRD, represented the highest total discharge above average, nearly two and a half times that of average total discharge for the period of record. Salt Creek at Greenwood, which is downstream of Roca and the confluence with Stevens Creek, showed total annual discharge that was nearly 50 percent above average for that period of record. Of note, the higher than average total discharge for the Platte River at Louisville incorporates Platte River Basin flows from Rocky Mountain snowpack in Colorado and Wyoming.

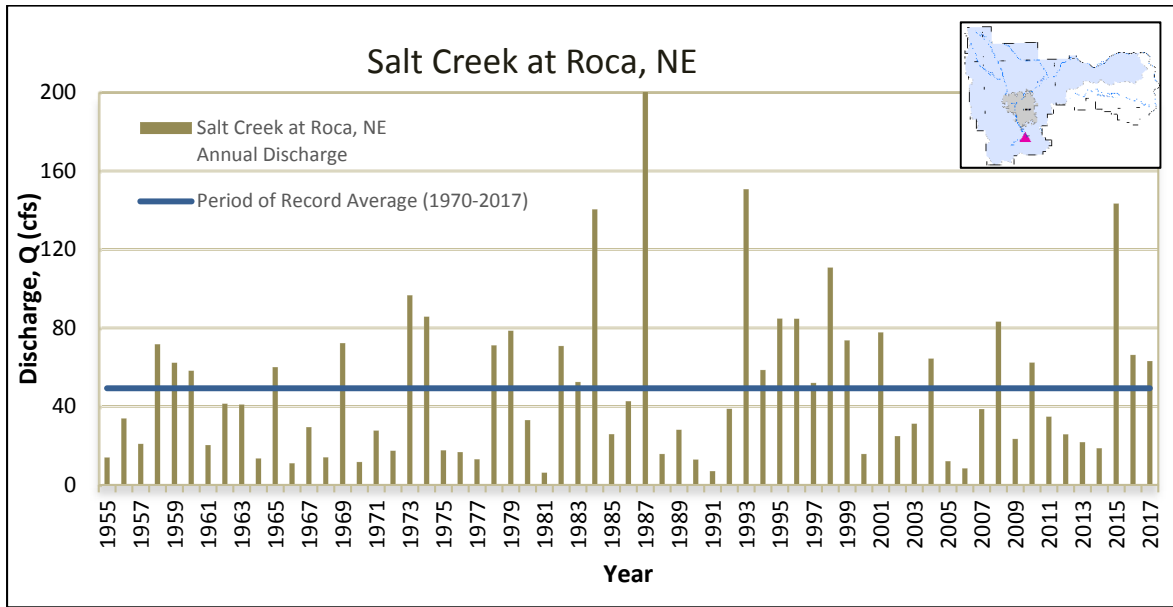


Figure 2: Historical annual discharge for Salt Creek at Roca, NE (source: USGS-NWIS. Some provisional data used).

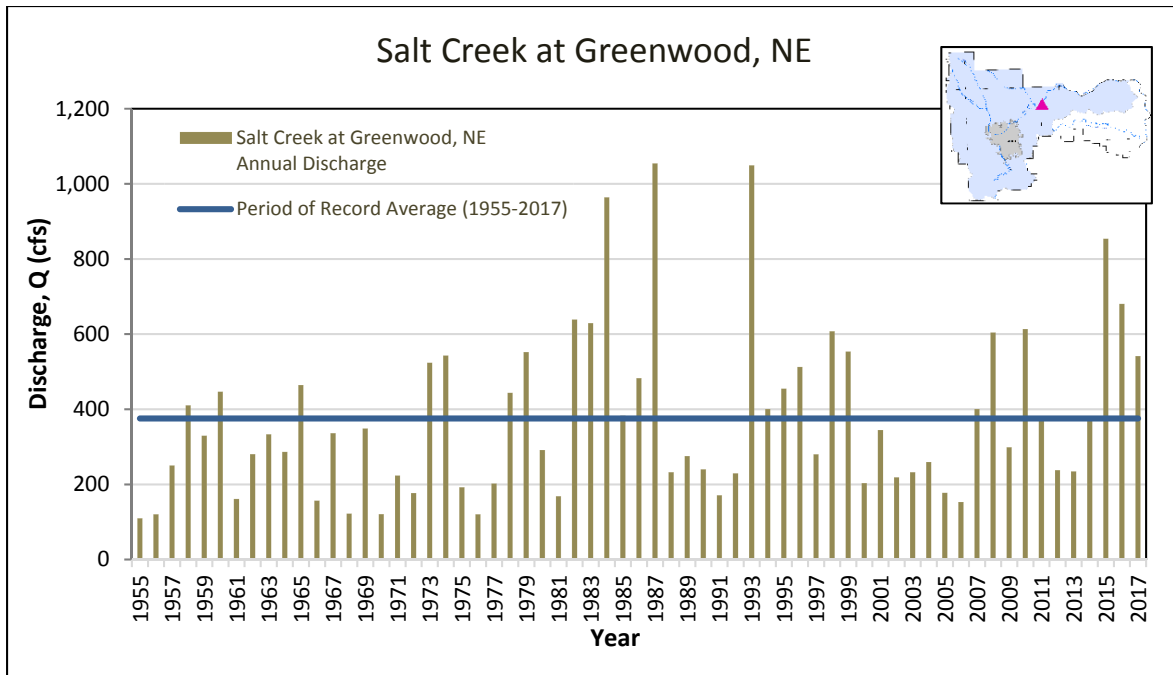
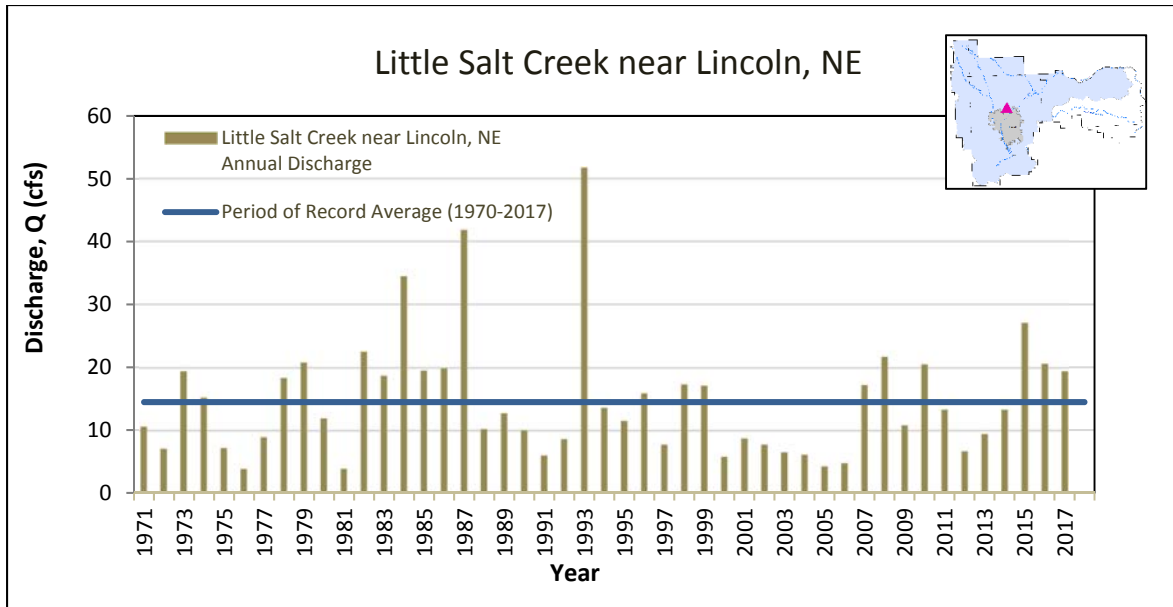
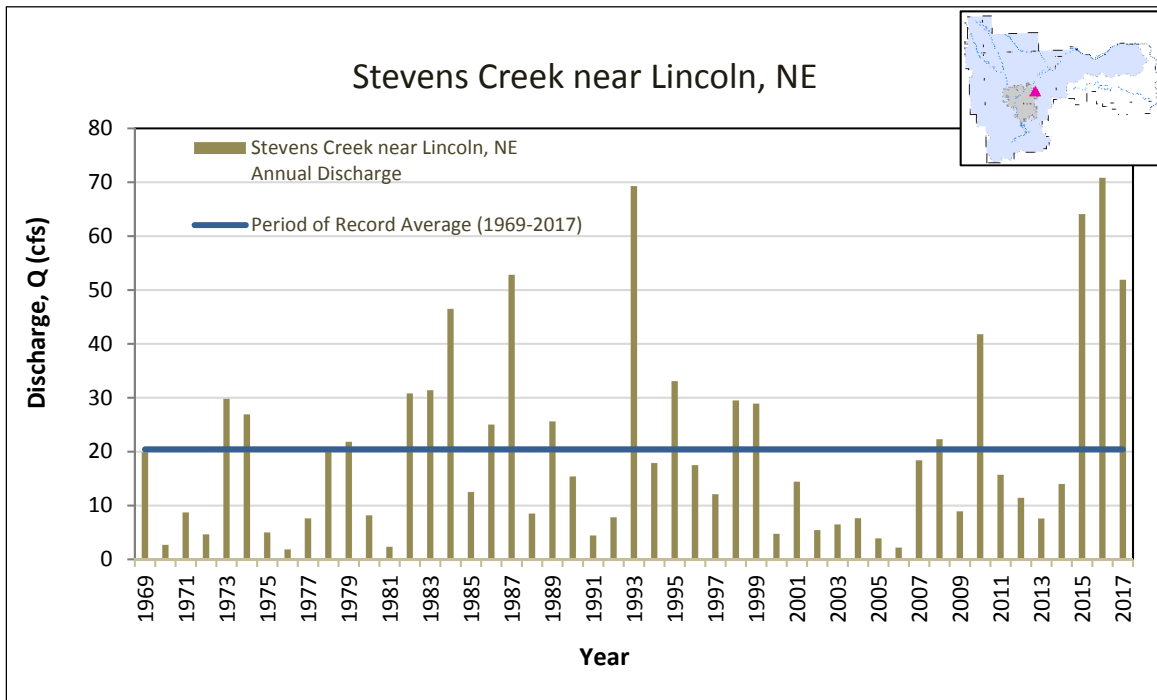


Figure 3: Historical annual discharge Salt Creek at Greenwood, NE (Source: USGS-NWIS. Some provisional data used).

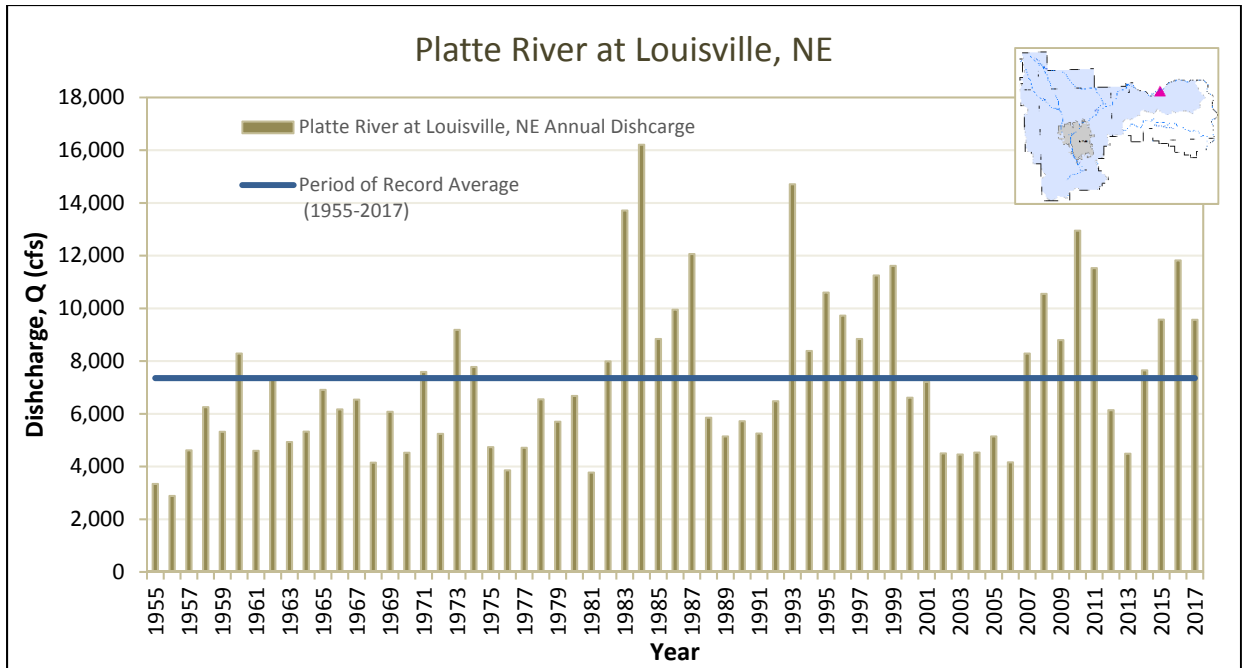


**Figure 4: Historical annual discharge for Little Salt Creek at Lincoln, NE (Source: USGS-NWIS. Some provisional data used).**



**Figure 5: Historical annual discharge for Stevens Creek near Lincoln, NE (Source: USGS-NWIS. Some provisional data used).**





**Figure 6: Historical annual discharge for the Platte River at Louisville, NE (Source: USGS-NWIS. Some provisional data used).**

***Surface Water Permitting Actions***

NeDNR continued to monitor and administer surface water appropriations and maintain records for new, canceled, or transferred rights. Figure 7 shows the geographic location of points of diversion that were affected by permitting actions and resulted in a change in surface water irrigated acres. Tables 2 through 4 provide a listing of all 2017 surface water permitting actions and include information about the type of surface water use, the area or volume of surface water associated with that permit, and the general location.

In 2017, NeDNR approved two new surface water permits for irrigation that, when combined, allowed for a total of 149.2 new surface water acres (Table 2). NeDNR partially canceled one surface water right (Table 3) and fully canceled fifteen surface water permits (Table 4). No surface rights were transferred in 2017. The cancellations included five permits for storage, three for storage with irrigation use, and seven permits to irrigate using surface water from natural flows. The irrigated acres cancellations were due to failure to file maps in the time given, non-use, or user relinquishment.

As shown in Figure 7, both of the approved surface water permits were located within the surface water management area, resulting in an increase of 149.2 surface water irrigated acres in that area. The cancellations resulted in a reduction of 1,148 surface water irrigated acres (both full and partial cancellations) district-wide; roughly half of those canceled acres were within the IMP surface water management area. All permitting actions combined resulted in a reduction of 413 surface water irrigated acres within the surface water management area and 586 surface water irrigated acres outside the surface water management area.

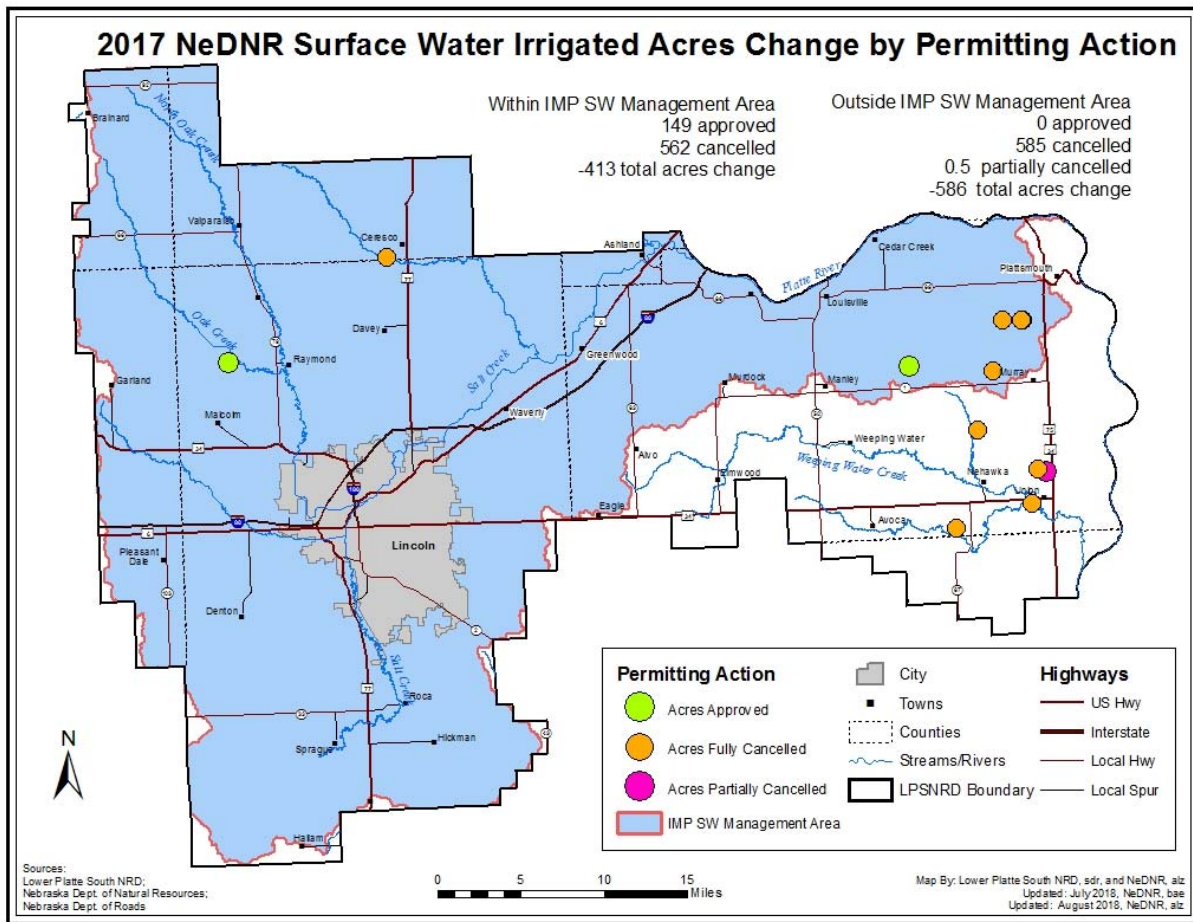


Figure 7: Geographic distribution of surface water permitting actions and affected irrigated acres.

Table 2: New surface water appropriations approved in 2017.

New Surface Water Appropriations Approved in 2017 within LPSNRD							
Appropriation Number	Approval Date	Use	Acres	Grant in cfs	Section	Township	Range
A-18581	6/15/2017	Irrigation from Natural Stream	139.0	1.99	9	11	12E
A-18603	11/15/2017	Irrigation from Natural Stream	10.2	0.15	34	12	5E

Table 3: Surface water appropriations partially canceled in 2017.

Surface Water Appropriations Partially Canceled in 2017 within LPSNRD								
Appropriation Number	Grant Canceled	Acres Canceled	Remaining Acres	Cancellation Date	Use	Section	Township	Range
A-14365R	0.01	0.5	8.0	6/15/2017	Irrigation from Natural Stream	14	10	13E

**Table 4: Surface water appropriations fully canceled in 2017.**

<b>Surface Water Appropriations Fully Canceled in 2017 within LPSNRD</b>							
<b>Appropriation Number</b>	<b>Grant Canceled</b>	<b>Acres Canceled</b>	<b>Cancellation Date</b>	<b>Use</b>	<b>Section</b>	<b>Township</b>	<b>Range</b>
<b>A-2225</b>	1.08 cfs	75.6	1/10/2017	Irrigation from Natural Stream	31	13	7E
<b>A-7789</b>	0.13 cfs	18	7/28/2017	Irrigation from Natural Stream	34	12	13E
<b>A-7790A</b>	0.16 cfs	23	7/28/2017	Irrigation from Natural Stream	34	12	13E
<b>A-14105</b>	0.18 cfs	12.9	7/25/2017	Irrigation from Natural Stream	31	11	13E
<b>A-14455</b>	4.08 cfs	285.7	7/28/2017	Irrigation from Natural Stream	14	10	13E
<b>A-14626</b>	9.8 af	NA	3/15/2017	Storage in a Reservoir	33	12	13E
<b>A-14627</b>	9.8 af	92.9	3/15/2017	Irrigation from a Reservoir	14	10	13E
<b>A-17485</b>	37 af	NA	6/26/2017	Storage in a Reservoir	14	10	13E
<b>A-18582</b>	2.29 cfs	160	6/8/2017	Irrigation from Natural Stream	21	11	7E
<b>A-19037</b>	100 af	NA	1/10/2017	Storage in a Reservoir	17	11	13E
<b>A-19038</b>	200 af	NA	1/10/2017	Storage in a Reservoir	36	10	12E
<b>A-19039</b>	100 af	NA	1/10/2017	Storage in a Reservoir	36	10	12E
<b>A-19040</b>	300 af	(375)	1/10/2017	Irrigation from a Reservoir	36	10	12E
<b>A-19041</b>	100 af	375	1/10/2017	Irrigation from a Reservoir	36	10	12E
<b>A-19267</b>	1.5 cfs	104.7	11/15/2017	Irrigation from Natural Stream	36	10	12E

### ***Voluntary Surface Water Use Reporting***

2017 was NeDNR's fourth year of implementing a voluntary water use reporting program in LPSNRD to estimate water use in areas where reporting is not currently required. To do this, NeDNR sent out postcards and letters to surface water irrigation permit holders within LPSNRD, inviting them to participate in the voluntary reporting program. Participants could submit information via a hardcopy form, an online form, or by calling in to NeDNR.

In the LPSNRD, 60 voluntary water use reports were received out of 207 surface water appropriations, resulting in 29% participation. This is up from 2016, in which 47 voluntary use reports were received out of 214 appropriations, which was only 22% participation.

One of the reasons participation increased was likely due to a simplified survey. For the 2017 survey, NeDNR removed questions about the number of acres by crop type and tillage practices in an effort to simplify the survey and increase user participation. The simplified survey seems to have worked beyond LPSNRD. Statewide, in 2017, only 1 percent of surveys were flagged as "started, but not completed"; in 2016, nearly 7.5 percent of surveys were flagged as "started, but not completed". NeDNR is committed to making the process of voluntary reporting of surface water use as useful as possible, and will continue to modify the survey and the process as needed to achieve this.

The responses provided information on the number of surface water irrigated acres, whether or not irrigation was used in 2017, crop type, and estimated use of water. These reporting activities accounted for slightly over 3,000 acres in Cass, Lancaster, Saunders, and Seward counties. Specific information gleaned from the surveys follows:

- 16 (27%) of respondents irrigated with surface water in 2017, accounting for 1,209 irrigated acres, or 28% of all reported acres.
- 40 (67%) of the respondents indicated they did not irrigate with surface water. Some reasons why producers did not irrigate with surface water included: adequate moisture, not enough water to pump, not economically feasible, no equipment, or problems with equipment.
- 7 respondents indicated they had irrigated and provided water use estimates totaling 210 acre-feet of water, or an average of 3.4" per acre.
- 9 respondents indicated they had irrigated but did not give an estimate of water used.
- 4 (6%) responded they had used groundwater.
- Major crop types reported included corn, soybeans and alfalfa.

### Surface Water Pump-Site Visits

The NeDNR Field Office staff has been conducting surface water pump-site inspections statewide, as time and staff allow, for the past 5 to 6 years. The purpose of the pump-site inspections is to gather information pertaining to use or nonuse of the surface water right, crop type, irrigation status, irrigation method (gravity vs pivot), and, if possible, a spot flow measurement. It is the goal of the field office staff to inspect each pump site at least once on a biennial basis.

In 2017, 186 surface water pump locations out of 219 total sites for LPSNRD (85%) were inspected by NeDNR Field Office staff and data pertaining to each site was collected and compiled. Of the inspected sites, 179 sites were for irrigation from a natural flow and seven sites were for irrigation from storage facilities. At the time of the inspections, there were 28 sites set up to irrigate; however, only one site was actually running, which could be due to a variety of factors including rainfall, timing of visit, etc. The locations of the surface water pump inspections are shown in Figure 8.

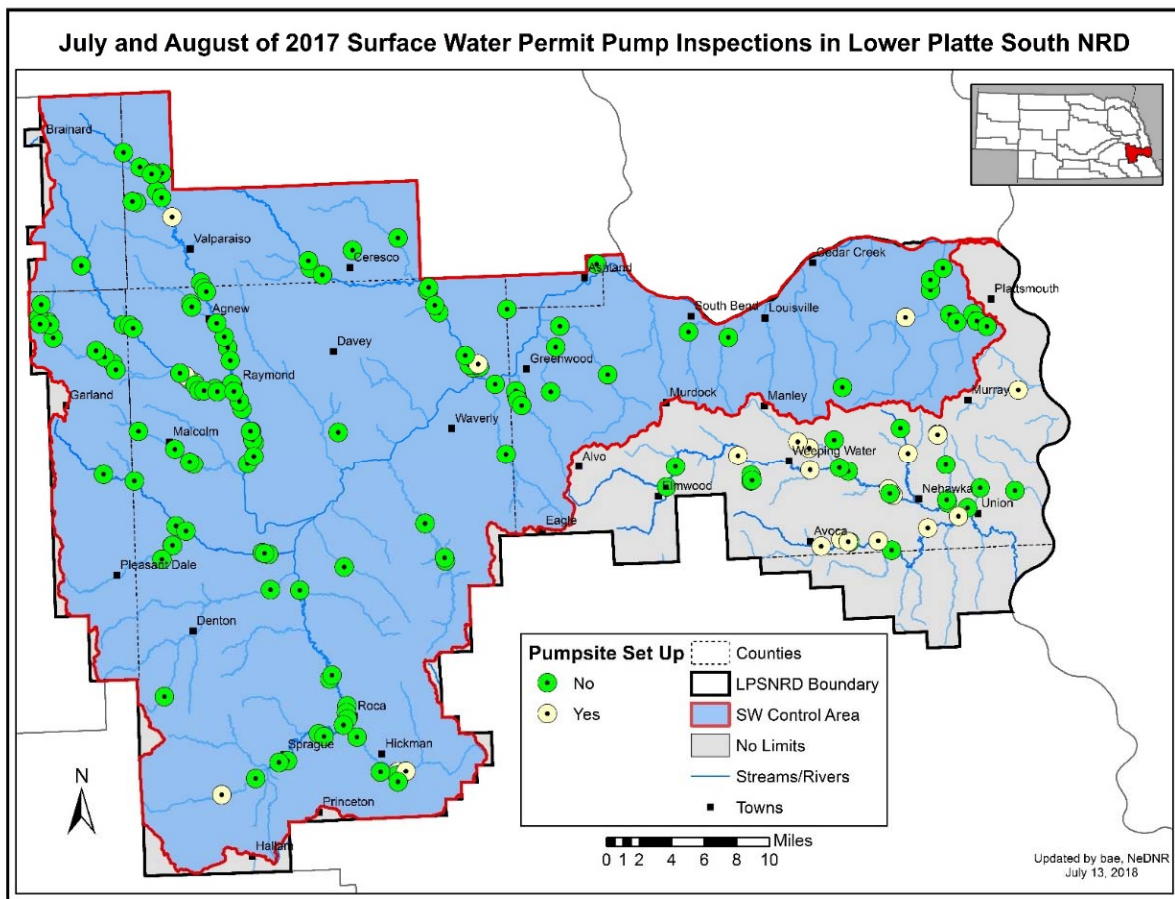
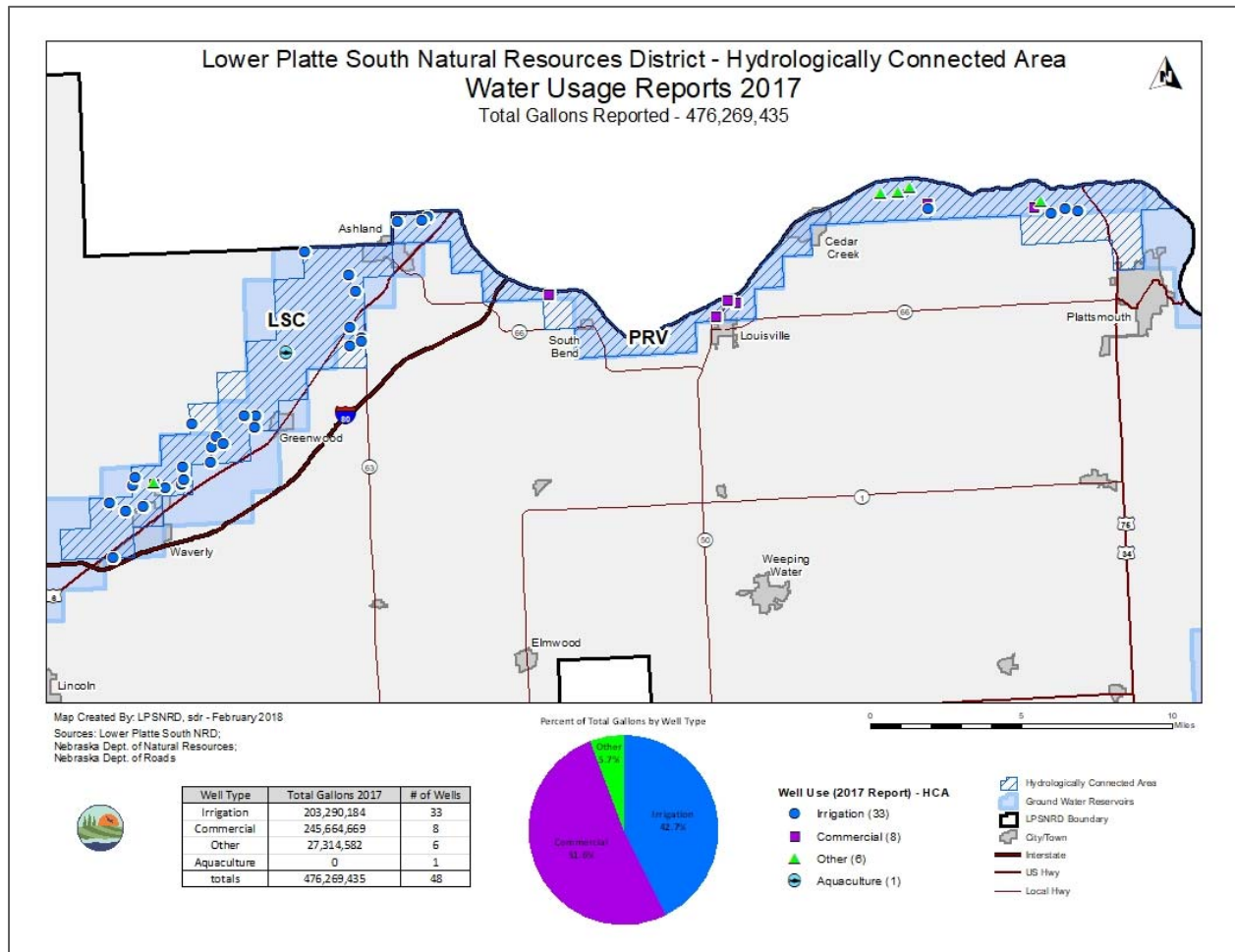


Figure 8: 2017 surface water field inspections in LPSNRD.

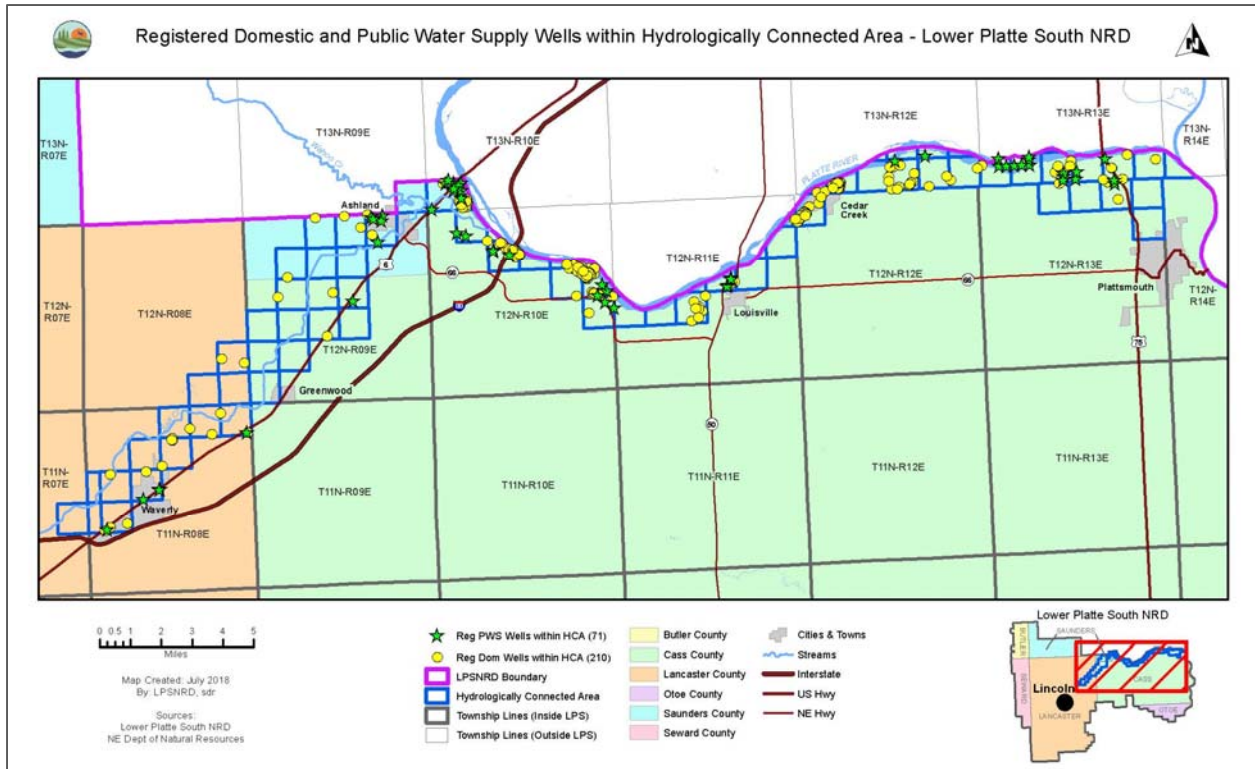
## Groundwater Monitoring

There are a total of 381 wells in the Hydrologically Connected Area (HCA). Flow measurement meters and water use reports are required for any well with the capacity to pump 50 gallons per minute or greater. Of these, there are 33 irrigation wells, 8 commercial wells, and 6 other wells which, when combined, account for 476 million gallons of groundwater pumped (Figure 9). Also in the HCA area, there are 210 registered domestic wells, 71 registered public water supply wells, and 53 unregistered domestic wells (Figure 10). Municipal water wells in the HCA include wells for Waverly, Ashland, Louisville, Lincoln, Metropolitan Utilities District, Omaha Fish & Wildlife Club, Cass SID #5, and Cass Rural Water District #1.



**Figure 9: Water use in the hydrologically connected portion (i.e. IMP groundwater management area) of LPSNRD.**





**Figure 10: Registered public supply and domestic wells in the hydrologically connected portion (i.e. IMP groundwater management area) of LPSNRD.**

### ***Metering and Groundwater Level Monitoring***

All wells with capacity to pump over 50 gallons per minute (gpm) are metered, which numbered 406 in LPSNRD at the close of 2017. LPSNRD collected records of usage from these wells and all public supply wells. The calculated total pumping for 2017 from the 406 metered wells was 3.9 billion gallons, with 316 irrigation wells accounting for 58.22 percent of the total measured pumping. This total pumping volume did not include the public supply wells. In addition, LPSNRD inspected and read 127 groundwater well meters during 2017.

LPSNRD also collected groundwater level data from 138 wells in the spring and fall of 2017 and 123 of those wells are part of LPSNRD’s official water level network. Of those, 58 wells showed declines and 72 wells showed an increase from spring 2016 to spring 2017, while one well showed no change; the maximum decline was 3.42 feet while the maximum increase was 13.94 feet, with an average static water level increase of 0.48 feet. Figure 11 shows a spatial representation of groundwater level changes. The average change by groundwater reservoir is shown in Table 5.

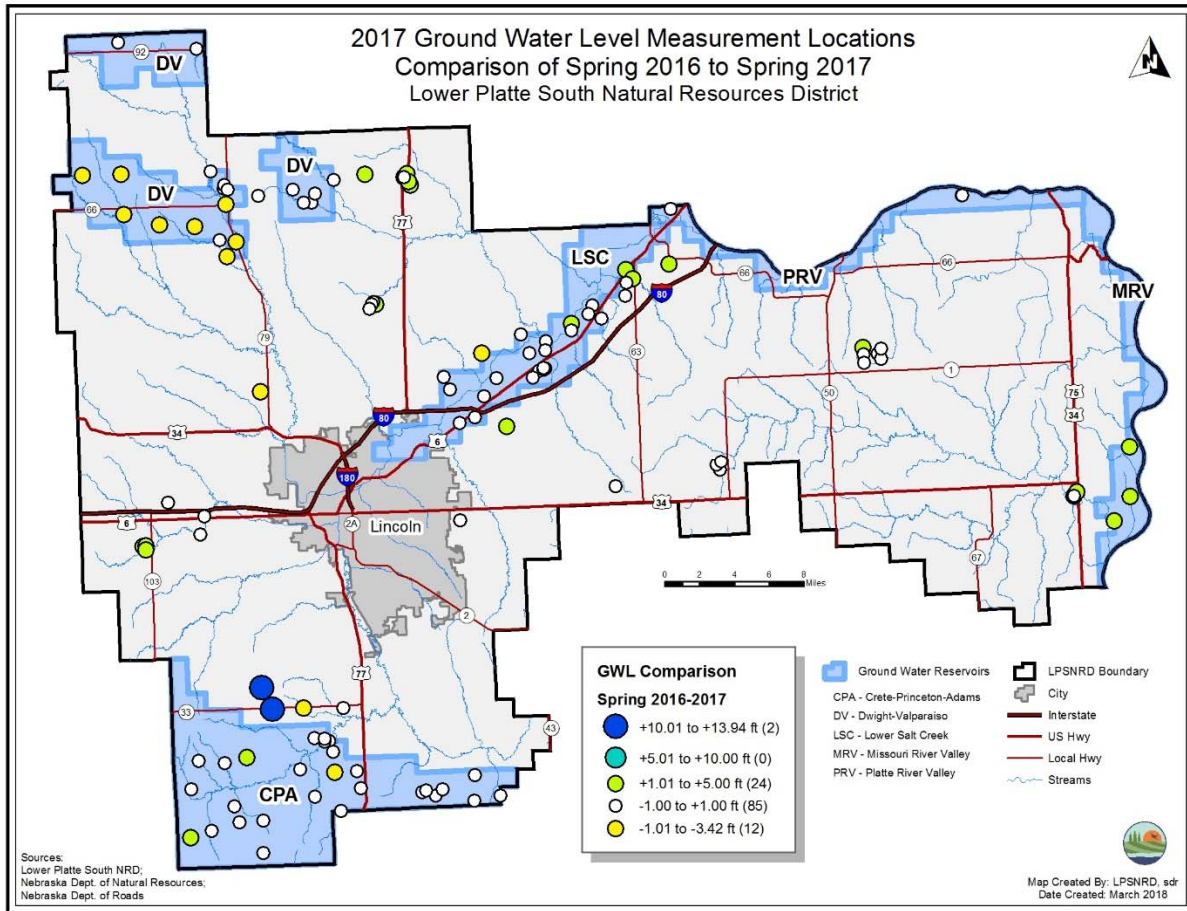


Figure 11: 2017 groundwater level comparison of spring 2016 to spring 2017 measurements.

Table 5: Average well level change by groundwater reservoir, spring 2016 to spring 2017.

Average Well Level Change by Groundwater Reservoir	
GW Reservoir	Spring '16 to Spring '17 (ft)
Crete-Princeton-Adams	0.11
Dwight-Valparaiso	-0.35
Lower Salt Creek	0.20
Missouri River Valley	1.73
Platte River Valley	0.14
Remaining Area	1.06

**Groundwater Permitting Activities**

LPSNRD issued five well permits in 2017 for varied uses, as reported in Table 6 and the locations of which are shown in Figure 12. Figure 13 shows the permitting activities for the hydrologically connected area; there, one water well permit was approved in 2017. Of all permitted wells, no wells were completed in 2017, and an additional three wells were completed from 2016 permitting activities. All statutory well-spacing minimum requirements were followed for all new and replacement wells.



Table 6: LPSNRD approved or completed groundwater wells in 2017.

Approved GW Well Permits in 2017	Number of Permits	Completed wells in 2017	
Irrigation	2		
Commercial	0	From 2016 Permits	3
Public Water Supply	0	From 2017 Permits	0
Geothermal	1		
Lake Supply	0		
Wetland	2		
<b>Total</b>	<b>5</b>	<b>Total</b>	<b>3</b>

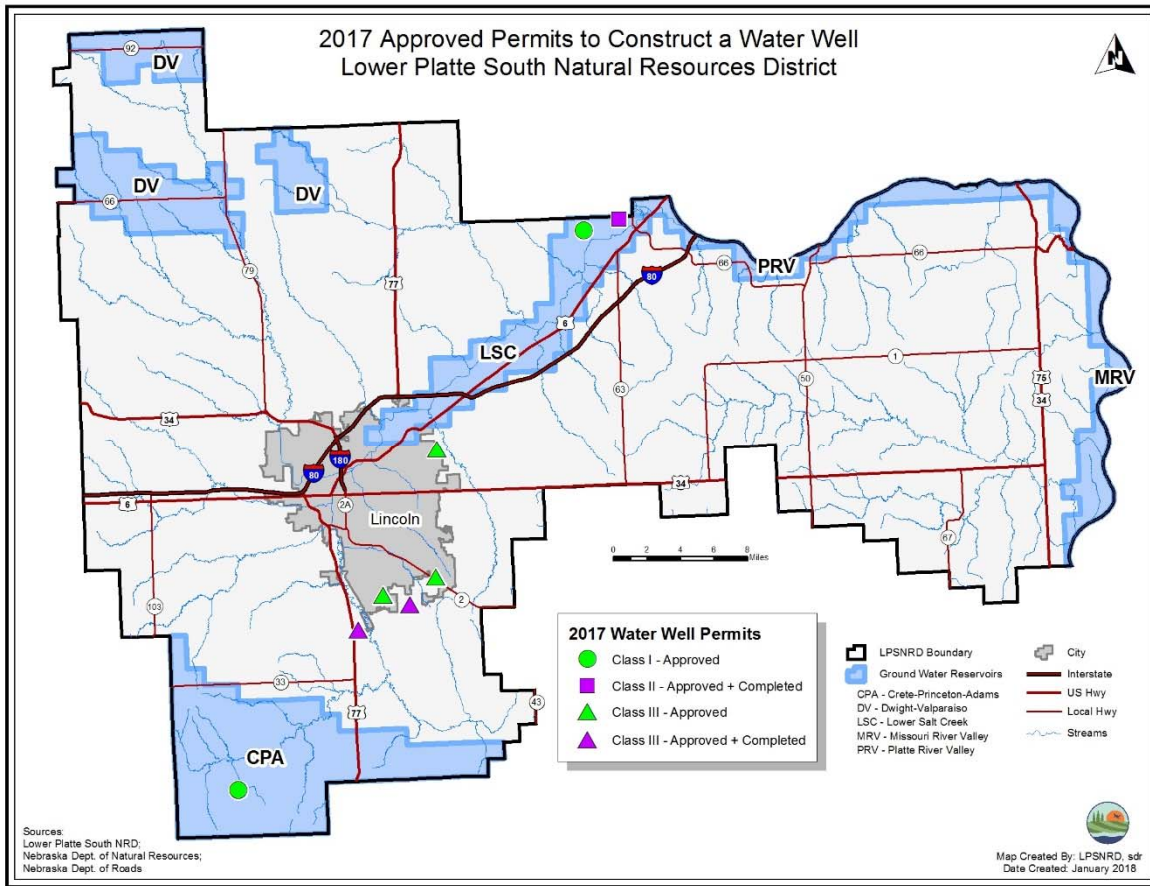
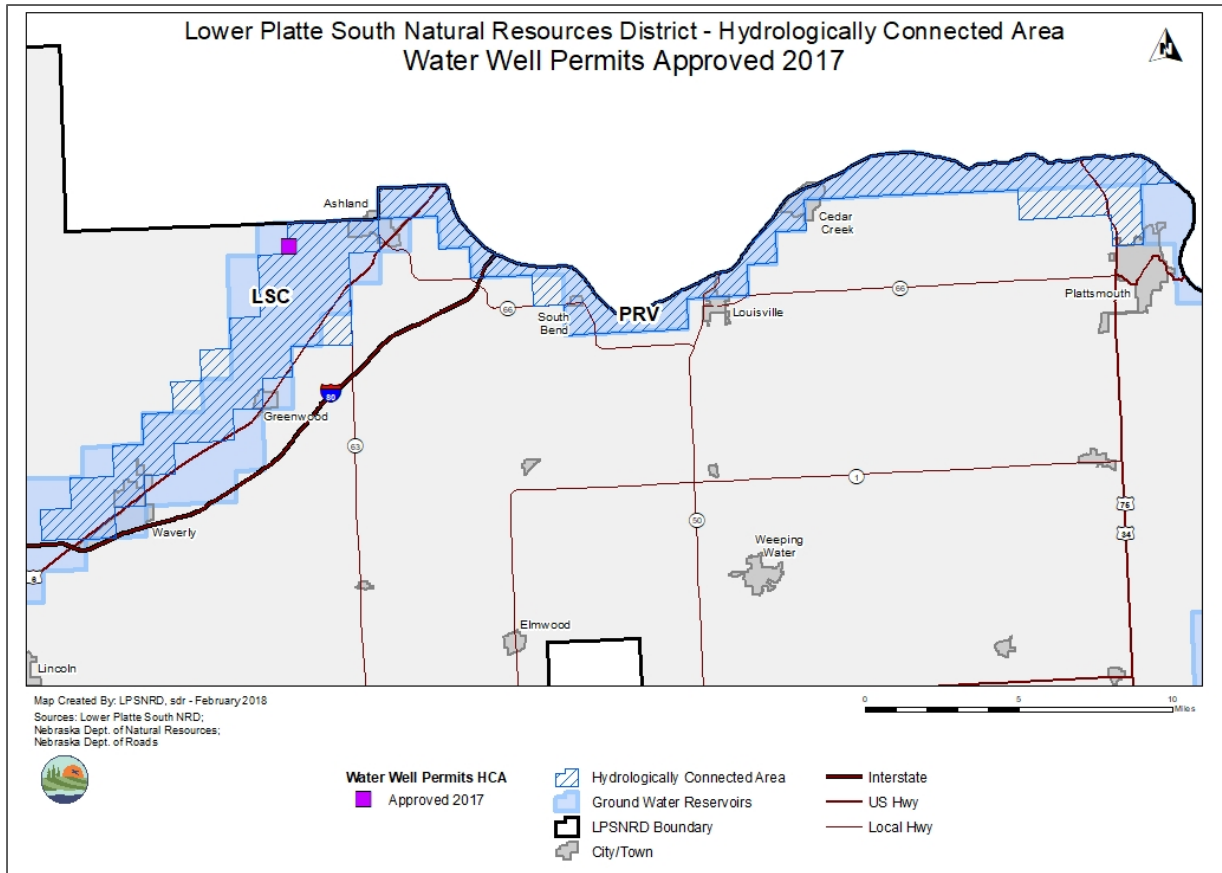


Figure 12: LPSNRD groundwater well permits approved or completed in 2017.



**Figure 13: One LPSNRD groundwater well permit approved in the hydrologically connected area in 2017.**

***Land Use and Land Cover (LULC) Monitoring and Actions***

In 2017, LPSNRD certified 61.78 additional groundwater irrigated acres within the HCA. As specified in the IMP, newly certified groundwater irrigated acres within the HCA did not exceed 20 percent (593 acres) of the total certified groundwater irrigated acres in the same area. The total number of certified acres in the HCA is 3,268 and the extent of these acres is shown in Figure 14. In the remainder of LPSNRD, an additional 211.12 groundwater irrigated acres were certified, for a total of 27,059.1 acres district-wide. The district-wide extent of certified acres is shown in Figure 15. There were no requests for variances in 2017.

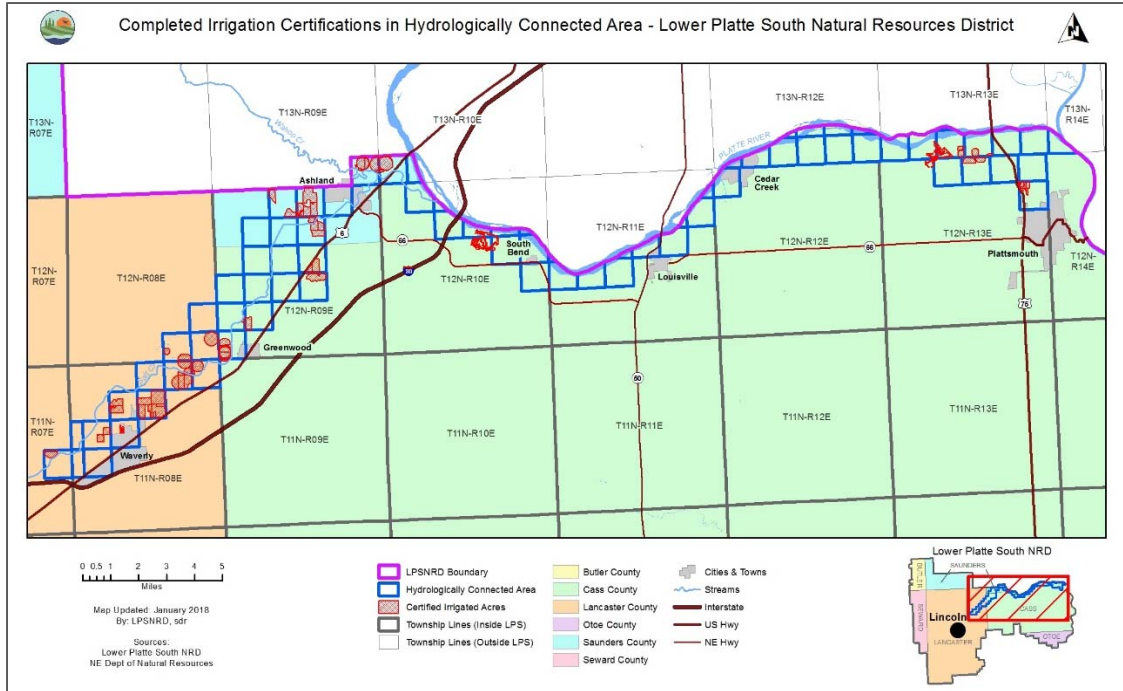


Figure 14: 2017 HCA certified groundwater irrigated acres.

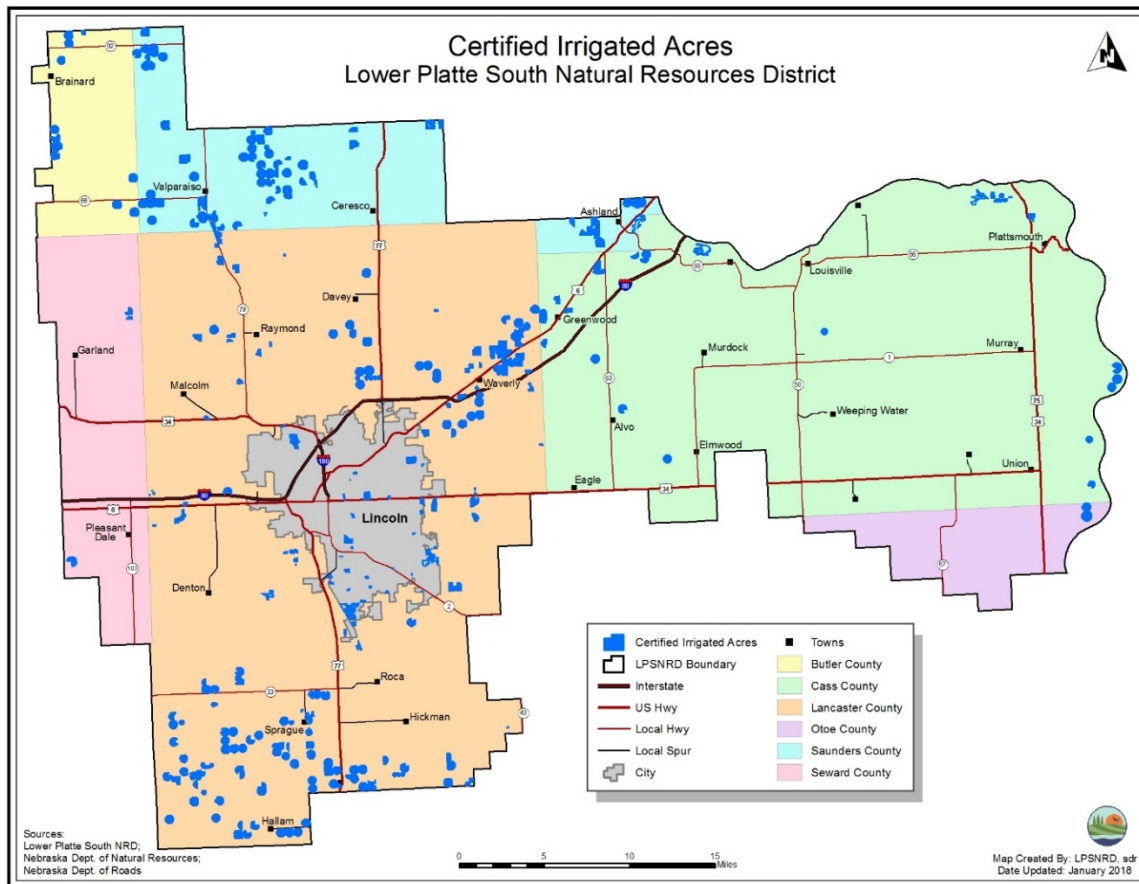


Figure 15: 2017 District-wide certified groundwater irrigated acres.

## **2017 IMP Regulatory Actions**

### **LPSNRD Groundwater Acres Limitations**

An annual limitation of 593 additional certified irrigated acres continues to be in place on hydrologically connected areas within the LPSNRD. A temporary moratorium on the Dwight-Valparaiso area was lifted in 2014 following designation of Dwight-Valparaiso-Brainard Special Management Area, but a rule continued to not allow an increase in irrigated acres (Figure 11), and pumping allocations for irrigated land also continued to be in effect.

### **NeDNR Surface Water Acres Limitations**

Pursuant to the IMP, NeDNR sets its surface water limitations to 1/3 the amount of acres that the LPSNRD allows for new groundwater irrigated acres, as of January 1 for each year. As such, a limit of 198 surface water acres has and continues to be in place for the surface water management area in LPSNRD. This limit been stayed consistent since the IMP was adopted, as the LPSNRD groundwater acres limit (593 acres) has stayed consistent throughout this time.

### **Future limits on water use**

The LPSNRD and NeDNR have been and will continue to hold discussions about the method of limiting water development, in light of the adoption of the Lower Platte Basin Water Management Plan (Basin Plan). The Basin Plan has established limits on new water development basin-wide and by individual NRD for a five-year increment that ends in 2021; these limits are based on stream depletions rather than acres limitations. The LPSNRD and NeDNR will continue to work together to ensure compliance with the Basin Plan, as well as assess the need to incorporate new language in the IMP to be consistent with the Basin Plan.

## **Studies and Planning**

The following studies were continued or completed in 2017 by the LPSNRD and NeDNR, to gather and evaluate data, information, and methodologies that could be used to increase understanding of the surface water and groundwater supplies and uses within, and, as appropriate, outside LPSNRD. These studies help to meet the goals and objectives that were developed through the IMP stakeholder process.

### **Additional IMP Components**

In 2014, LPSNRD retained HDR, Inc. to provide professional services to address the following additional components for the IMP. These specific IMP components were completed in 2015 and will be added to the IMP. In general, the tasks were to develop:

- A process to collect and record water use data from all municipalities and rural water districts and from all major non-municipal industrial water users. (LPSNRD IMP, Chapter 7: I(e)(i) and I(f)(i), page 8),
- Procedures to track depletions and gains to streamflows resulting from new, retired, or other changes to water uses within LPSNRD. (LPSNRD IMP, Chapter 8: II(d), page 11),

- An Emergency Response/Drought Mitigation Plan, which included holding a Drought Tournament, in which 30 stakeholders participated. (LPSNRD IMP, Chapter 7: V(a), page 11).

LPSNRD contracted with HDR, Inc. again in 2016 to perform additional services associated with LPSNRD’s IMP Planning Components. The purpose of the project was to build on the planning components provided in the LPSNRD IMP Planning Components Methodology Report, finalized in November of 2015. This amendment is used for developing and completing tools and recommendations from the original contract for use by the LPSNRD to help implement the IMP. These will continue to help LPSNRD to observe, quantify, and manage the water resources within LPSNRD’s boundary. Specifically, the methodologies being developed as part of this project include the following:

- Implement the GIS database recommendations made during the first phase of the project,
- Review and analyze drought response plans of the public water suppliers within LPSNRD,
- Research conservation programs for water use management, and
- Develop science-based protocols for estimating unmeasured water uses.

In addition, LPSNRD and NeDNR partnered with Lower Platte North NRD, Pappio-Missouri River NRD, Metropolitan Utilities Department (MUD), and the Lincoln Water System to form the Lower Platte River Consortium (LPRC) in 2016. The Consortium contracted with HDR, Inc. to develop a Drought Contingency Plan. The primary focus of the plan will be to further refine the Consortium’s collective understanding of drought vulnerabilities while developing more robust monitoring and forecasting tools coupled with timely triggers, new mitigation strategies and responsive actions to create a sound operational framework, and improve critical water supply needs of the area through drought periods. The planning area includes the Lower Platte River upstream of the Platte River at Louisville and downstream of the Platte River at Duncan. This Plan is expected to be completed in September 2018.

#### **Stream Accretion and Depletion Calculator Expansion**

NeDNR is planning to expand the stream accretions/depletions calculator that is currently used in the Upper Platte Basin to the Lower Platte River Basin. The calculator will use data from a soil water balance model (CROPSIM) and groundwater models to allow users to calculate changes in consumptive use resulting from land use changes and estimate the impacts to streamflow as a result of the land use change. This will provide a uniform platform for tracking water use changes and estimating streamflow and consumptive use impacts within the Lower Platte River Basin.

#### **Lower Platte Missouri Tributaries Model Development**

NeDNR has continued to work with consultants on a regional numerical model for the Lower Platte River and Missouri River Tributaries Basins. The model is divided into two parts: the upper model that covers the northern two-thirds of eastern Nebraska, and the southern model that covers the Nemaha Basin (Figure 16). This has been a multi-year process; however, final calibration of the model is currently underway and is expected to be completed by fall 2018. Nemaha model development was initiated in spring 2016; this model is expected to be completed in 2019.

When complete, these models will be used as a tool for the fully appropriated basins' annual report, for refinement of delineations of the hydrologically connected areas, and to support implementation and development of future basin-wide planning goals. Data from the models will be incorporated into the Integrated Network of Scientific Information and Geohydrologic Tools (INSIGHT) analysis (further explained in the next section) and will be made available through the INSIGHT web portal (<https://nednr.nebraska.gov/INSIGHT/>). The models will also be available as a decision support tool for the NRDs to evaluate impacts to aquifer and streamflow under various management scenarios such as irrigation development, crop type changes, etc.

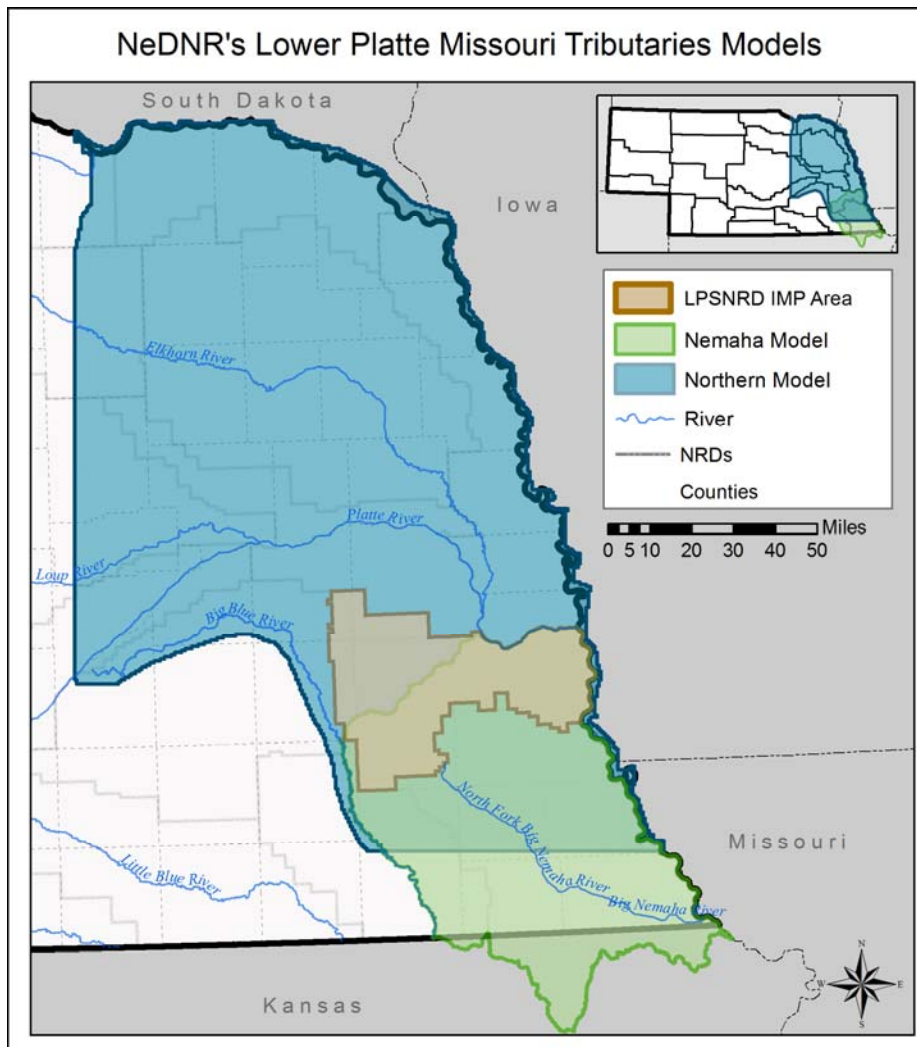


Figure 16: Geographic areas of NeDNR's Lower Platte-Missouri Tributaries models.



## **Water Inventory and Water Use/Supply Management**

### **LPSNRD Accomplishments**

LPSNRD has continued data collection and sharing of data and has worked to improve the database that houses this information. LPSNRD further reviewed groundwater well permits relative to aquifer capacity and sustainability. LPSNRD also continued the open dialogue with public water suppliers on current and future water supplies and supported storm water capture and reuse projects in LPSNRD. LPSNRD contracted with JEO to conduct a preliminary study on alternatives and estimated costs to provide a potable water supply to the Exit 426 Interchange area in Cass County, supplied by the City of Ashland wellfield. LPSNRD continued to participate with the Lower Platte River Weed Authority and the Lancaster County Weed Authority on invasive species control relative to water supply.

### **NeDNR's INSIGHT Web Portal**

The Integrated Network of Scientific Information and Geohydrologic Tools (INSIGHT) web portal at <https://nednr.nebraska.gov/INSIGHT/> is a water use, supply, and balance tool that was developed by NeDNR and was released in 2014. INSIGHT aids water managers and other interested parties in better understanding current and future water demands, effectiveness of water management strategies, and critical areas of water shortage. The user can access information pertaining to water supplies and demands (precipitation, irrigation, hydropower, etc.), as well as view maps with associated charts that show overall water balance (current, near-term, or long-term) at a subbasin scale. A valuable feature of INSIGHT is that all the datasets that are used to compile the water balance analyses are also stored within the web portal and are available for download.

NeDNR will continue to update the current INSIGHT analysis and add other basins as new data become available. At this time, NeDNR has compiled data for the Lower Platte River, from North Bend, NE, to Louisville, NE, which covers a large portion of the LPSNRD IMP area. It does not include the portion of LPSNRD that is a part of the Nemaha River Basin, but this area will be added to INSIGHT subsequent to the completion of the Lower Platte Missouri Tributaries models. In 2017, the Republican River Basin was added to the INSIGHT analysis.

## **Education/Outreach**

### **NeDNR Activities**

#### ***Statewide***

NeDNR's statewide public outreach activities are broadly focused and intended to provide all interested citizens with a better understanding of how integrated water management affects them. In 2017, NeDNR staff set up educational booths at the Nebraska State Fair, Husker Harvest Days, the Governor's Ag Conference, and UNL's Women in Agriculture Conference. In addition to the educational booth and provided materials, a hands-on groundwater model demonstration was presented at a number of these events to convey the hydrological connection between groundwater and surface water. NeDNR was also honored to host the National Association of

State Conservation Agencies' (NASCA) 2017 annual meeting in Nebraska City. This event drew approximately 200 people from around the U.S. to discuss topics related to conservation funding pass-through—a topic relevant to both NeDNR and Nebraska's NRDs.

In addition to the INSIGHT web portal, which provides citizens with a convenient and user-friendly experience for accessing water resources related information or data, NeDNR's Water Planning Division debuted the first of a series of new educational interactive apps, which can be found on the NeDNR's website at <https://dnr.nebraska.gov/water-planning/education>. There, users can explore how the relative positions of the water table and stream levels affect the direction of flow and rate of interaction between a stream and aquifer, or how soil texture affects recharge and streamflow. This app features a tutorial, as well as a description and hydrograph of the user's effect on streamflow. Users can transition between the different simulations and conditions using the drop-down menu and slider bar.

### **LPSNRD Activities**

Each February, LPSNRD compiles a *Ground Water Management Plan Review*; a report of all groundwater activities completed in the previous calendar year. The report includes results of well sampling and measuring, progress made in ongoing groundwater programs, the status of each groundwater management area, and more. The review is presented as a summary to the LPSNRD Board of Directors and the complete review is posted on LPSNRD's website, <http://www.lpsnrd.org>. The posted review is promoted on the website Home page and in LPSNRD's newsletter.

In July 2016, LPSNRD's contractor, AquaGeoFrameworks (AGF) completed additional airborne electromagnetic (AEM) flights gathering data for the eastern portion of the NRD. These flights concentrated on the Community Water System Protection Areas (CWSPAs) for the communities of Waverly, Eagle, Alvo/Cass County RWD #2, Elmwood, and Union/Lake Waconda, as well as some longer transects across Cass County and additional flights along the Lower Salt Creek. The final report for these flights was received by LPSNRD in November 2017. The complete report, appendices, and Google Earth datasets can be accessed and downloaded from the Eastern Nebraska Water Resources Assessment (ENWRA) website at [www.enwra.org/aem2016.html](http://www.enwra.org/aem2016.html). LPSNRD plans on obtaining more AEM data through additional aerial scans in 2018.

The NRD has continued to host "Test Your Well Nights" events for specific areas each year. Private well owners are able to bring water samples in to be tested for nitrates and LPSNRD worked with local FFA chapters and science students to test the water.

The LPSNRD worked with UNL Extension to implement a Certification Program for irrigators and continued to provide cost-share and educational support for irrigation best management practices. LPSNRD also promoted its groundwater activities through social media platforms Instagram and Facebook. Information was shared about groundwater levels, samples, data loggers, and monitoring wells.

The stakeholder advisory group for the Dwight-Valparaiso-Brainard Special Management Area (DVB) was kept updated on DVB activities. The group held annual meetings in December of 2014,



January of 2016, March of 2017, and in March of 2018, where they were updated by LPSNRD staff and contributed their own input. The group also met in February of 2015 to be updated on aerial electromagnetic imaging activity in DVB.

LPSNRD continually seeks to maintain public awareness to information about groundwater levels, available cost-sharing and conservation best management practices through its publications, website, and through LPSNRD media.

## **Collaboration with Other Entities**

#

### **Eastern Nebraska Water Resources Assessment**

Both LPSNRD and NeDNR participated in the Eastern Nebraska Water Resources Assessment (ENWRA) program in 2016 to cooperate on hydrogeologic data research and modeling. ENWRA's participants include six NRDs in eastern Nebraska and NeDNR. As a part of that mapping effort, NeDNR and LPSNRD continued the interlocal cooperative agreement with ENWRA to support a hydrologic framework study which involves using a helicopter based-geophysical remote sensing tool, termed Airborne Electromagnetic Survey (AEM), to determine aquifer locations and thicknesses.

In fiscal year 2017, LPSNRD cooperated with the other ENWRA NRDs to apply for a \$1.968 million Water Sustainability Fund (WSF) grant to further the AEM mapping of eastern Nebraska. This application was funded, and LPSNRD received \$510,000 of these WSF funds and budgeted \$340,000 of its own funds to complete the AEM data collection efforts in LPSNRD. This final effort will collect AEM data over the western portion of the LPSNRD, and will concentrate on CWSPAs for the communities of Ceresco, Davey, Raymond, Malcolm, Emerald, Garland, Pleasant Dale, and Denton. Additional grid transect flights will provide data on the rural areas of the western portion of LPSNRD, especially the areas around Branched Oak and Pawnee Lakes, where residential acreage development is increasing. The AEM flights are anticipated in the summer of 2018, with the final report to be issued early in 2019.

### **Lower Platte River Basin Coalition**

Both the LPSNRD and NeDNR are active participants in the Lower Platte River Basin Coalition (LPRBC), which is 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. Here, NeDNR has representatives that serve on both the managers and technical committees. For more information about the Coalition, please see <https://lprbc.nebraska.gov/>.

### **Lower Platte River Consortium**

LPSNRD and NeDNR are participating members of the Lower Platte River Consortium (LPRC). The LPRC was formed through an interlocal agreement in 2016 and also includes Lower Platte North NRD, Papio-Missouri River, MUD, and LWS as members. The Consortium is working together to

develop regional solutions to improve the water supply reliability and drought resiliency of the Lower Platte River. The Lower Platte River Drought Contingency Plan (LPRDCP) is a collaborative project among these six water management agencies, along with the Bureau of Reclamation. The LPRDCP is expected to be finalized in September of 2018 and will analyze the available water in the area and develop a plan to retain or acquire water for this part of the state and its population in years of drought.

### **Lower Platte River Corridor Alliance**

Both the LPSNRD and NeDNR are active participants in the Lower Platte River Corridor Alliance (LPRCA), which is a group comprised of the eight agencies, including the LPSNRD, Papio-Missouri River NRD, NeDNR, Nebraska Department of Environmental Quality, Nebraska Department of Health and Human Services, Nebraska Game and Parks Commission, Nebraska State Military Department, and the University of Nebraska Institute of Agriculture and Natural Resources. The LPRCA is dedicated to working with people to protect the long-term vitality of the Lower Platte River Corridor. The mission of the LPRCA is to foster the development and implementation of locally-drawn strategies, actions, and practices to protect, enhance, and restore the vitality of the Lower Platte River's resources. Created in 1996 through an interlocal agreement, the Alliance uses a variety of "tools" to assist counties, communities, governments, resource management organizations, and the general public to meet Lower Platte River Corridor management challenges. These "tools" include public awareness events, educational workshops, recreation studies, water quality studies, floodplain studies, land-use planning assistance, and a variety of other projects. For more information about the LPRCA, please see [www.lowerplatte.org](http://www.lowerplatte.org).

### **Other Collaborations**

The LPSNRD cooperated with the USGS on collection of surface water/streamflow data. In 2015, LPSNRD staff initiated contact with USGS personnel to begin identification of new streamgage locations in the Oak Creek drainage of the Dwight-Valparaiso-Brainard Special Management Area, and two new gages were installed in 2016 near the village of Valparaiso and the unincorporated community of Touhy. This effort utilized the AEM data from 2013, and will ultimately be aimed at further defining the relationship between groundwater and surface water in this area. The LPSNRD also cooperated with UNL, USGS, adjoining NRDs, and NeDNR on groundwater data sharing.

## **Jointly Identified Actions for Succeeding Two Years**

As stated in the IMP, LPSNRD and NeDNR will jointly identify action steps for the succeeding two years for implementation and these are listed below. The following actions are in addition to the continued monitoring and reporting outlined in the regulatory and non-regulatory sections of this annual report, and serve as action steps in meeting goals and objectives presented in the IMP:

1. NeDNR will continue to develop INSIGHT as a tool for water management and will expand the analysis to the east (Missouri Tributaries) as data become available.

2. Both the LPSNRD and NeDNR will continue to participate in basin-wide or regional groups such as ENWRA, the Lower Platte River Consortium, Lower Platte River Basin Coalition, and the Lower Platte River Corridor Alliance.
3. Both LPSNRD and NeDNR will continue public outreach activities related to integrated water management.
4. NeDNR will continue to monitor surface water permit sites on a rotating basis to gain a better understanding of surface water use within the LPSNRD.
5. Both the LPSNRD and NeDNR will evaluate the need for additional streamgages in or near the LPSNRD.
6. The LPSNRD will continue to monitor groundwater level changes through its network of groundwater monitoring wells.
7. The LPSNRD will continue to meter and require annual pumping reports for groundwater wells that have capacity to pump over 50 gpm, as well as public supply wells. The LPSNRD will continue to assimilate the data into a comprehensive dataset.
8. The LPSNRD will continue to collect information on municipal, rural water, and non-municipal industrial water use, land use and population changes, and climate changes.
9. The LPSNRD will continue the work through the contract with HDR, Inc. to complete the IMP component tasks identified through that contract.
10. NeDNR will continue development of the Lower Platte Missouri Tributary models, and, upon completion, will provide a presentation to the LPSNRD Board regarding the model development, results, and capabilities.
11. NeDNR will continue its voluntary water use reporting program.
12. The LPSNRD will develop recommendations for the development and management of geographic areas with limited aquifers.
13. The LPSNRD will conduct discussions with municipalities and rural water districts on coordinating services with regional systems and on water shortage action plans.
14. The LPSNRD and NeDNR will assess the need to amend the IMP to achieve consistency with the Lower Platte Basin Water Management Plan, specifically with water use limits based on stream depletion.
15. The LPSNRD and NeDNR will continue to implement action items of the Lower Platte Basin Water Management Plan (data exchanges, reporting, etc.).