7.0 LOWER PLATTE RIVER BASIN

7.1 Summary

Based on the analysis of the sufficiency of the long-term surface water supply in the Lower Platte River Basin, the Department has reached a conclusion that the basin is not fully appropriated under the current rule. The analysis of the lag effects from current development on the Lower Platte River Basin indicates a reduction in streamflows upstream of Louisville of 337 cfs, approximately 35 cfs of which occurs due to lag impacts upstream of North Bend. The analysis of lag impacts of future development on the Lower Platte River Basin based on current development trends indicates an additional reduction in streamflows upstream of Louisville of 122 cfs in 25 years, approximately 71 cfs of which occurs due to development upstream of North Bend. The analysis of future water supplies in the Lower Platte River Basin indicates that, if no additional constraints are placed on groundwater and surface water development, and reasonable projections are made of the extent of future development, then the effects on the long-term water supply would not cause the basin to become fully appropriated in the future.

7.2 Basin Description

The Lower Platte River is defined as the reach of the Platte River from its confluence with the Loup River to its confluence with the Missouri River. The Lower Platte River Basin is defined as all surface areas that drain into the Lower Platte River, including those areas that drain into the Loup River and the Elkhorn River, and all aquifers that impact surface water flows of the basin (Figure 7-1). The total area of the Lower Platte River surface water basin is approximately 25,400 square miles, of which approximately 15,200 square miles are in the Loup River subbasin and approximately 7,000 square miles are in the Elkhorn River subbasin. NRDs with significant area in the basin are the Lower Platte South, the Lower Platte North, the Upper Elkhorn, the Lower Elkhorn, the Upper Loup, the Lower Loup, and the Papio-Missouri River NRDs.

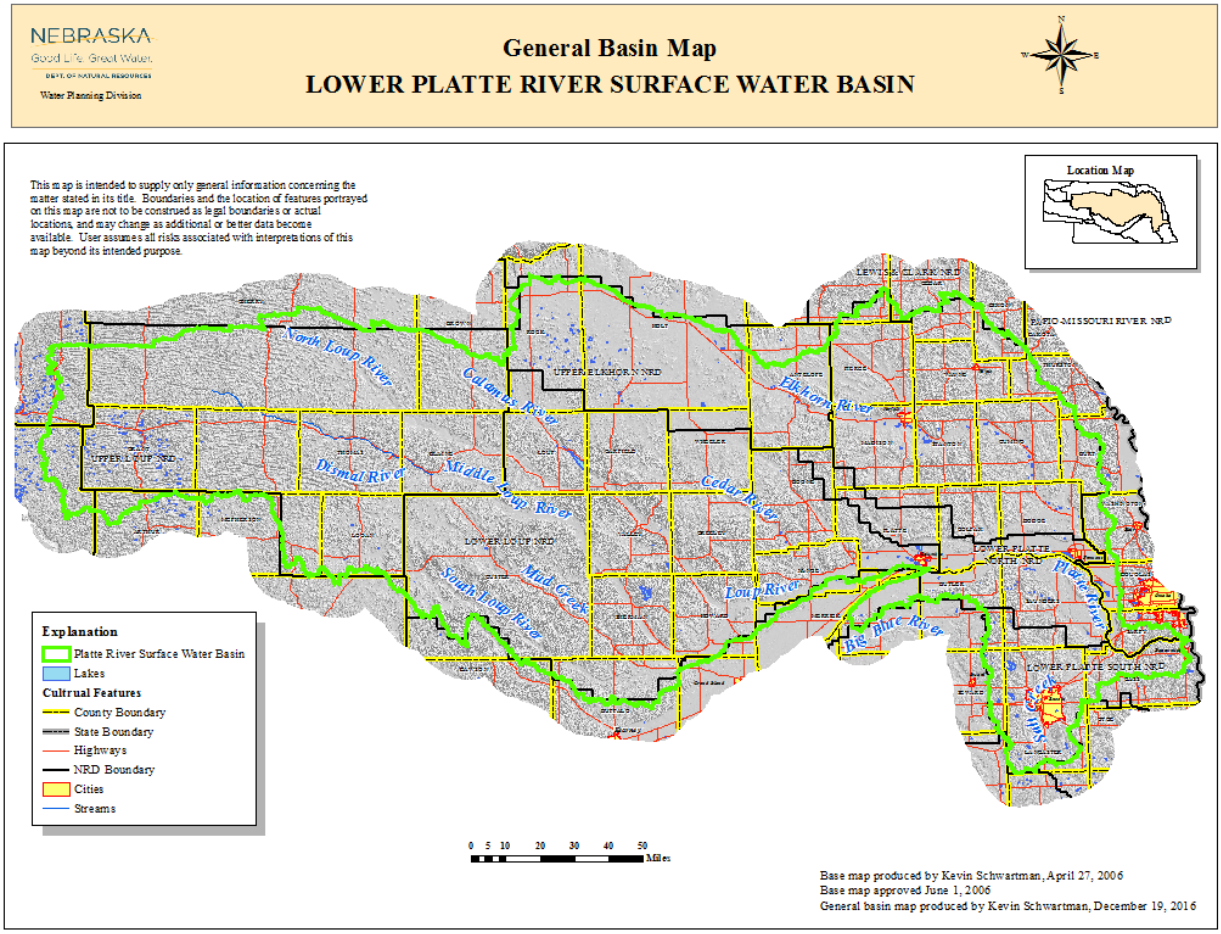

Figure 7-1. General basin map, Lower Platte River Basin.

7.3 Subbasin Relationships

When considering the Lower Platte River Basin, it is important to understand the relationship between the senior surface water appropriations and the junior surface water appropriations in the Loup and Elkhorn River subbasins with regard to appropriations in the downstream portion of the Lower Platte River Basin. In general, when a senior water right calls for water, all water rights upstream of the senior right will be shut off in order to get water to the senior appropriator. Starting with the most junior appropriators, the Department will shut off as many junior appropriators as necessary to provide water to the senior appropriator. For senior appropriations along the Lower Platte River, this includes junior appropriators in the Loup and Elkhorn River subbasins, because those subbasins provide flows to the reaches of the Lower Platte River that require administration for senior appropriators.

The senior appropriations for which water is administered in the Lower Platte River Basin are the instream flow rights. The instream flow rights have a priority date of November 30, 1993, and, when these appropriations are not being fulfilled, all surface water appropriations junior to that priority date will be closed. The instream flow appropriations are measured at the North Bend gage and the Louisville gage, although the appropriations extend to the confluence with the Missouri River. When instream flow appropriations are not met at the North Bend gage, all junior surface water appropriations above that gage, including those in the Loup River Basin, are closed to diversion (Figure 7-2). When instream flow appropriations are not met at both the North Bend and the Louisville gages, all junior surface water appropriations above both gages, including those in both the Loup and Elkhorn River subbasins, are closed to diversion. In circumstances where the instream flow appropriation is being met at the North Bend gage but not at the Louisville gage, all junior appropriations above the Louisville gage, including those in both the Loup and Elkhorn River subbasins, are closed to diversion.

Administration for the instream flow rights did not begin until 1997, when the permits were actually issued. Therefore, to evaluate a 20-year record, the Department had to determine the number of days in which administration would have occurred if the instream flow rights had been in existence for the entire period of evaluation (1996-2015). Between 1996 and 2015, the junior surface water appropriations above North Bend, including those in the Loup River subbasin, would have been closed due to the instream flow appropriations not being met during July and August (the 65 percent time period from the 65/85 rule) for a total of 396 days. The junior surface water appropriations downstream of North Bend but upstream of Louisville would have been closed due to the instream flow appropriation not being met during July and August for a total of 378 days.

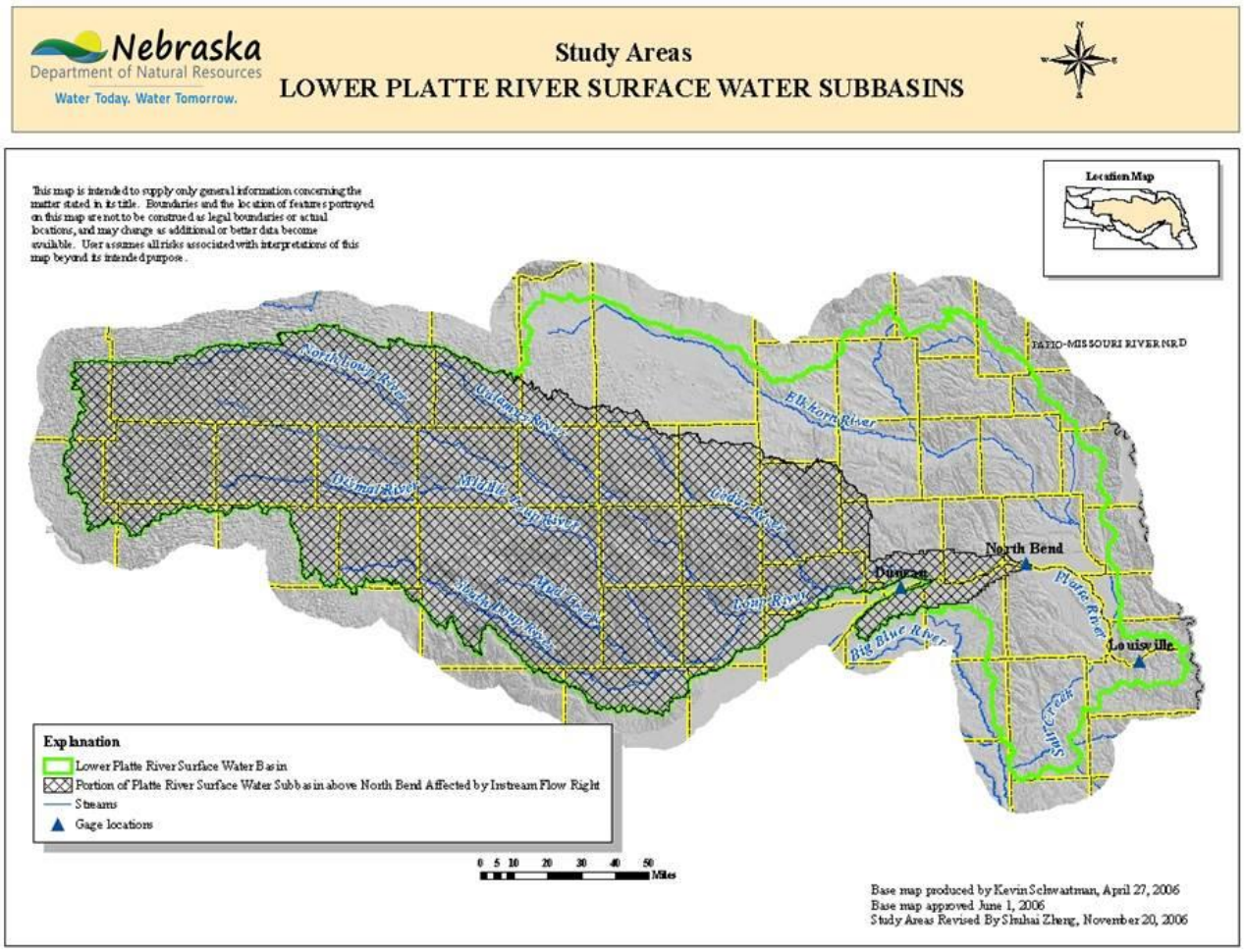

Figure 7-2. Map of the Platte River Basin highlighting the subbasin above the North Bend gage.

7.4 Nature and Extent of Water Use

7.4.1 Groundwater

Groundwater in the Lower Platte River Basin is used for a variety of purposes: domestic, industrial, livestock, irrigation, and other uses. A total of 49,092 groundwater wells had been registered within the basin as of December 31, 2015 (Department registered groundwater wells database) (Figure 7-3). The locations of all active groundwater wells can be seen in Figure 7-4.

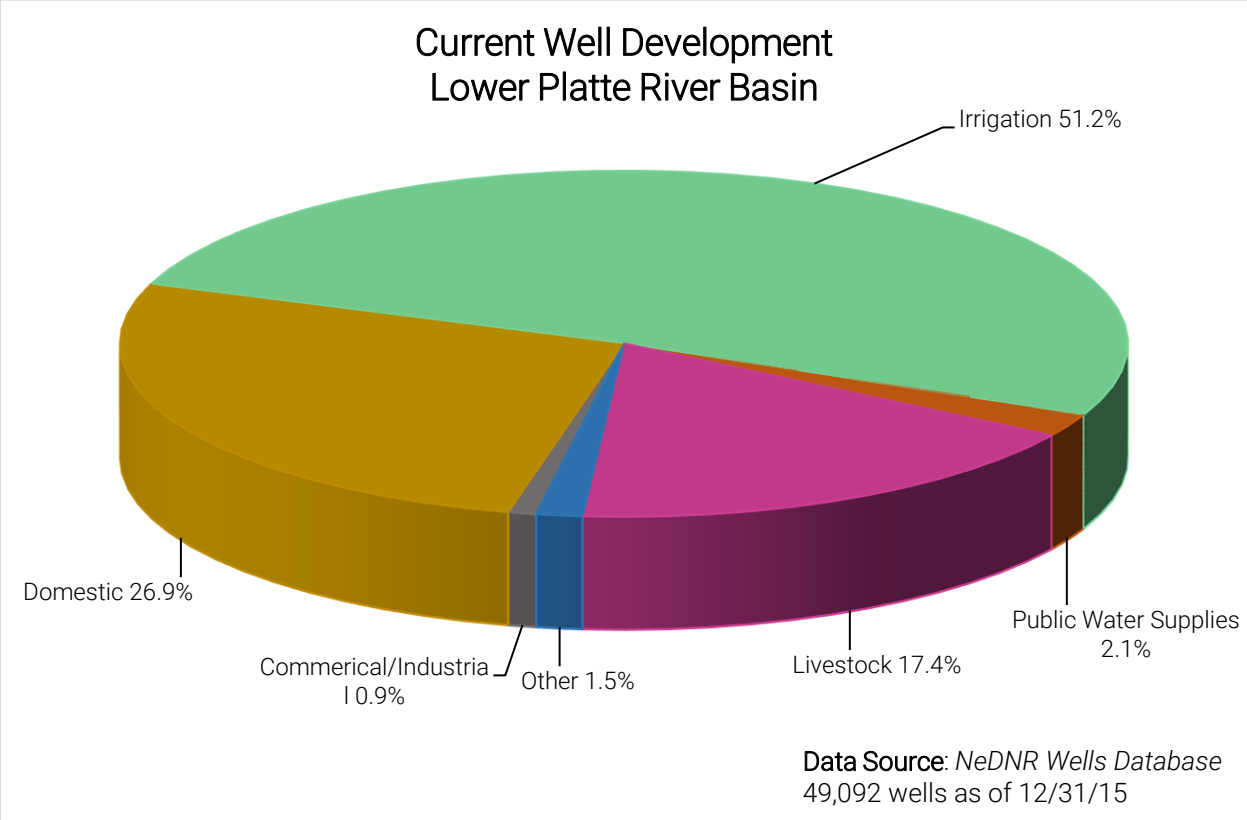

Figure 7-3. Current well development by number of registered wells, Lower Platte River Basin.

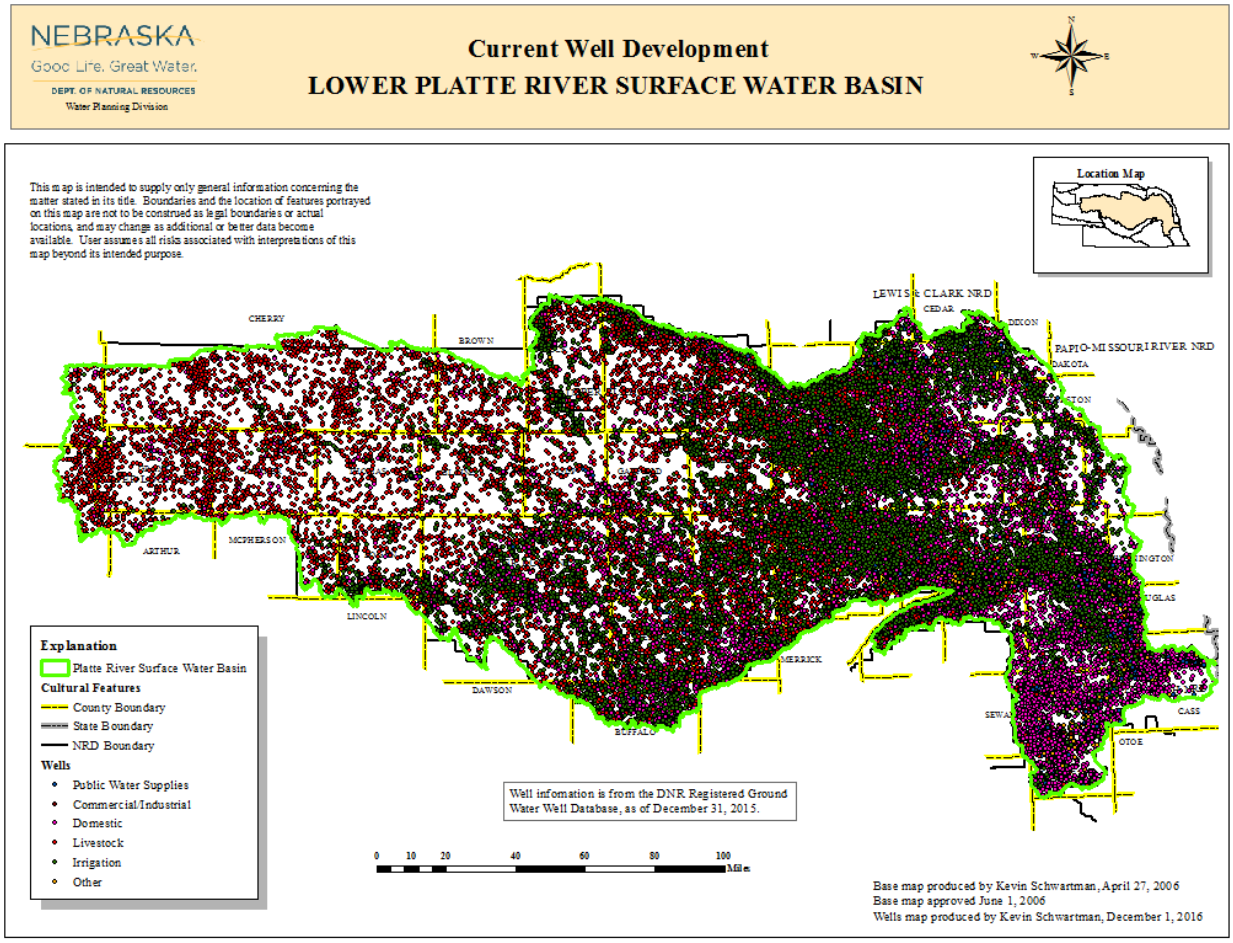

Figure 7-4. Current well locations, Lower Platte River Basin.

7.4.2 Surface Water

As of December 31, 2015, 2,250 surface water appropriations were held in the Lower Platte River Basin, issued for a variety of uses (Figure 7-5). Most of the surface water appropriations are for irrigation use and tend to be located on the major streams. In addition, two instream flow appropriations are held in the basin. The instream flow appropriations are located on the Platte River and are measured at North Bend and Louisville. The first surface water appropriations in the basin were permitted in 1890 and development has continued through the present day. The approximate locations of the surface water diversion points are shown in Figure 7-6.

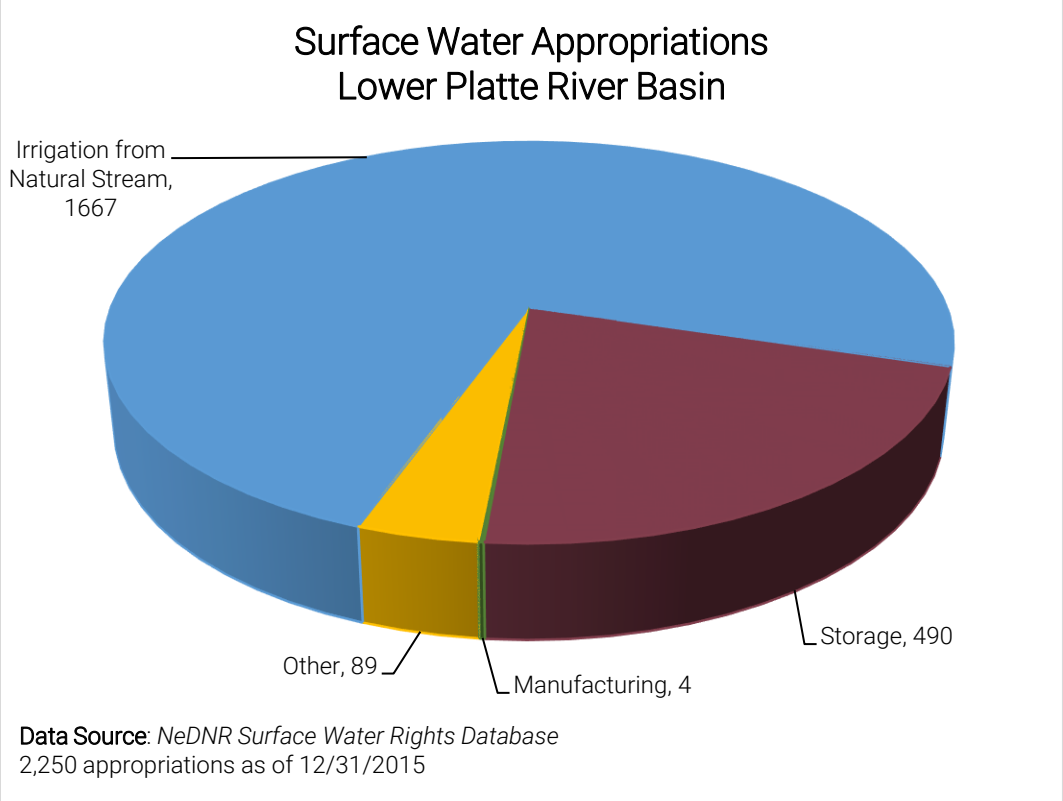

Figure 7-5. Surface water appropriations by number of diversion points, Lower Platte River Basin.

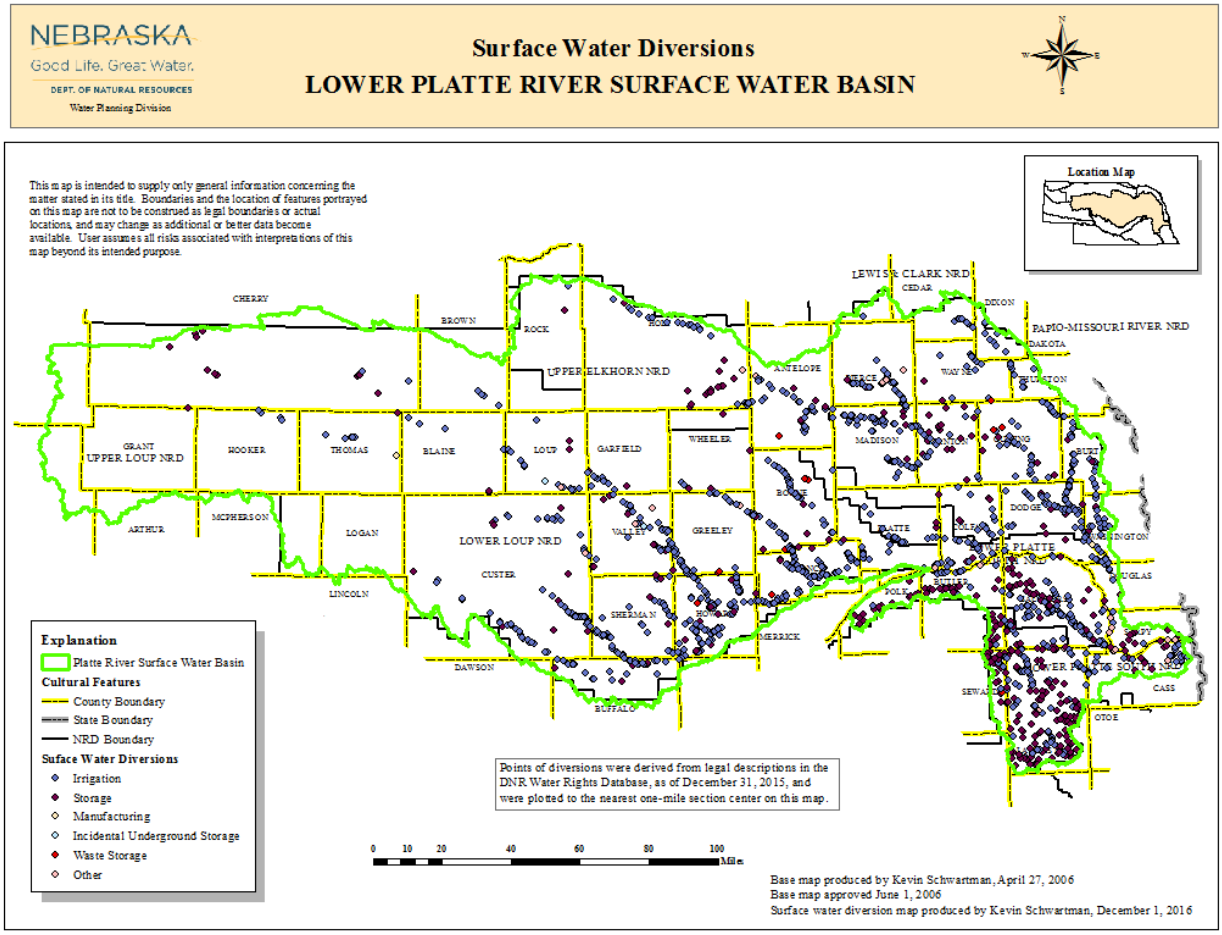

Figure 7-6. Surface water appropriation diversion locations, Lower Platte River Basin.

7.5 Hydrologically Connected Area

The Central Nebraska Model (CENEB) was used to determine the extent of the 10/50 area for the Loup River Basin and portions of the Elkhorn River Basin. In areas that were not covered by the CENEB but were considered to be hydrologically connected, the 10/50 area was determined using stream depletion factor (SDF) methodology. Figure 7-7 specifies the extent of the 10/50 area. A description of the SDF methodology used appears in Appendix C of this report.

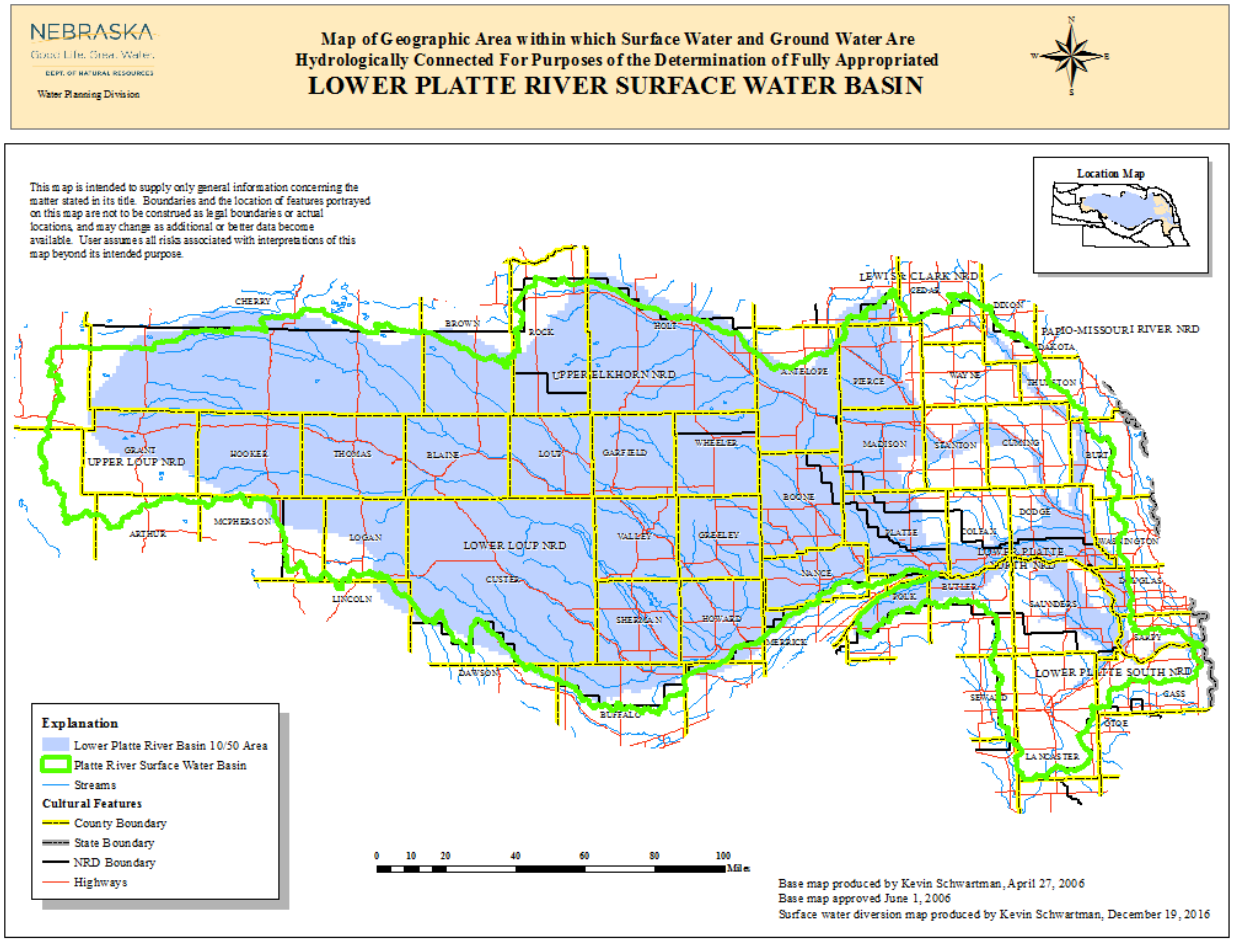

Figure 7-7. 10/50 area, Lower Platte River Basin.

7.6 Net Corn Crop Irrigation Requirement

Figure 7-8 is a map of the net corn crop irrigation requirement (NCCIR) for the Lower Platte River Basin (DNR, 2005). The NCCIR for a junior surface water appropriation above the North Bend gage is 10.52 inches. To assess the number of days required to be available for diversion, a surface water diversion rate equal to 1 cfs per 70 acres, a downtime of 10 percent, and an irrigation efficiency of 80 percent were assumed. Based on these assumptions, the most junior surface water appropriations would need 27.9 days annually to divert 65 percent of the NCCIR and 36.5 days to divert 85 percent of the NCCIR.

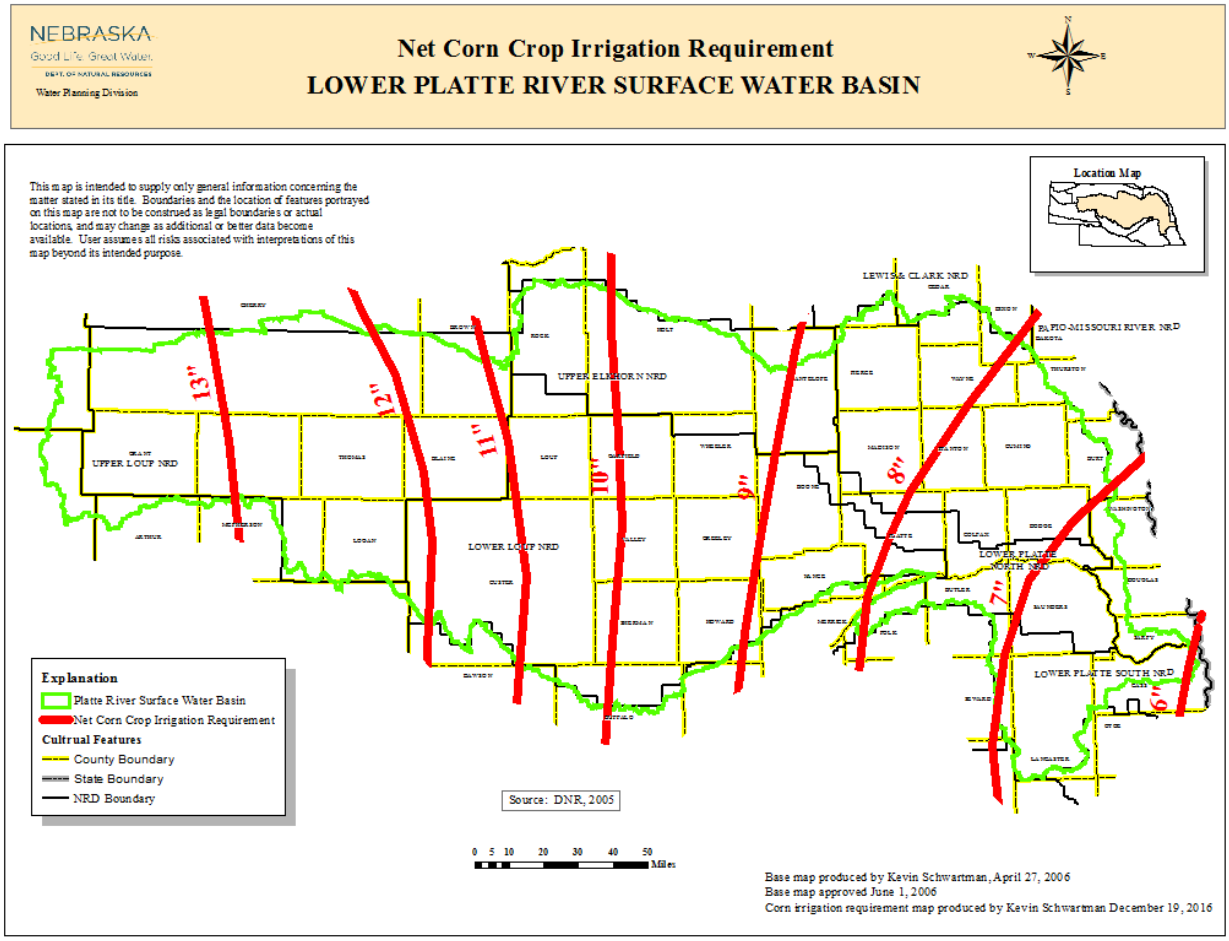

Figure 7-8. Net corn crop irrigation requirement (NCCIR), Lower Platte River Basin.

7.7 Surface Water Closing Records

Tables 7-1 and 7-2 record all surface water administration that has occurred in the basin upstream of the North Bend and Louisville gages, respectively, between 1996 and 2015.

Table 7-1. Surface water administration in the Lower Platte River Basin upstream of the North Bend gage, 1996-2015.[3]

Year	Water Body	Days	Closing Date	Opening Date
2000	Lower Platte River Basin above North Bend	53	Aug 8	Sep 30
2001	Lower Platte River Basin above North Bend	11	Aug 7	Aug 18
2002	Lower Platte River Basin above North Bend	6	Jun 6	Jun 12
2002	Lower Platte River Basin above North Bend	67	Jun 25	Aug 31
2002	Lower Platte River Basin above North Bend	24	Sep 6	Sep 30
2003	Lower Platte River Basin above North Bend	81	Jul 11	Sep 30
2004	Lower Platte River Basin above North Bend	13	May 6	May 19
2004	Lower Platte River Basin above North Bend	7	Jun 29	Jul 6
2004	Lower Platte River Basin above North Bend	58	Jul 27	Sep 23
2005	Lower Platte River Basin above North Bend	48	Jul 12	Aug 29
2005	Lower Platte River Basin above North Bend	28	Sep 2	Sep 30
2006	Lower Platte River Basin above North Bend	35	May 15	Jun 20
2006	Lower Platte River Basin above North Bend	45	Jun 26	Aug 10
2006	Lower Platte River Basin above North Bend	28	Aug 14	Sep 11
2006	Lower Platte River Basin above North Bend	22	Oct 5	Oct 27
2006	Lower Platte River Basin above North Bend	20	Oct 31	Nov 20
2007	Lower Platte River Basin above North Bend	5	Jul 9	July 14
2008	Lower Platte River Basin above North Bend	3	Aug 8	Aug 11
2008	Lower Platte River Basin above North Bend	4	Aug 25	Aug 29
2008	Lower Platte River Basin above North Bend	6	Sep 2	Sep 8
2012	Lower Platte River Basin above North Bend	103	Jun 15	Sep 30
2013	Lower Platte River Basin above North Bend	29	Jul 8	Aug 6
2013	Lower Platte River Basin above North Bend	32	Aug 29	Sep 30
2014	Lower Platte River Basin above North Bend	13	Jul 31	Aug 12

[3] Surface water administration for instream flows did not occur until 1997.

Table 7-2. Surface water administration in the Lower Platte River Basin downstream of the North Bend gage and upstream of the Louisville gage 1996-2015.

Year	Water Body	Days	Closing Date	Opening Date
2000	Lower Platte River Basin above Louisville	53	Aug 8	Sep 30
2001	Lower Platte River Basin above Louisville	11	Aug 7	Aug 18
2002	Lower Platte River Basin above Louisville	6	Jun 6	Jun 12
2002	Lower Platte River Basin above Louisville	59	Jun 25	Aug 23
2002	Lower Platte River Basin above Louisville	4	Aug 27	Aug 31
2002	Lower Platte River Basin above Louisville	24	Sep 6	Sep 30
2003	Lower Platte River Basin above Louisville	66	Jul 14	Sep 18
2004	Lower Platte River Basin above Louisville	13	May 6	May 19
2004	Lower Platte River Basin above Louisville	7	Jun 29	Jul 6
2004	Lower Platte River Basin above Louisville	58	Jul 27	Sep 23
2005	Lower Platte River Basin above Louisville	14	Jul 12	Jul 26
2005	Lower Platte River Basin above Louisville	31	Jul 29	Aug 29
2005	Lower Platte River Basin above Louisville	28	Sep 2	Sep 30
2006	Lower Platte River Basin above Louisville	35	May 16	Jun 20
2006	Lower Platte River Basin above Louisville	45	Jun 26	Aug 10
2006	Lower Platte River Basin above Louisville	28	Aug 14	Sep 11
2006	Lower Platte River Basin above Louisville	22	Oct 5	Oct 27
2006	Lower Platte River Basin above Louisville	20	Oct 31	Nov 20
2007	Lower Platte River Basin above Louisville	5	July 9	July 14
2008	Lower Platte River Basin above Louisville	4	Aug 25	Aug 29
2008	Lower Platte River Basin above Louisville	6	Sep 2	Sep 8
2012	Lower Platte River Basin above Louisville	103	Jun 19	Sep 30
2013	Lower Platte River Basin above Louisville	29	Jul 8	Aug 6
2013	Lower Platte River Basin above Louisville	32	Aug 29	Sep 30
2014	Lower Platte River Basin above Louisville	13	Jul 31	Aug 12

7.8 Evaluation of Current Development

7.8.1 Current Water Supply

The current water supply is estimated by using the most recent 20-year period (1996-2015) of flows and comparing them to the flows necessary to satisfy the senior surface water appropriation (i.e., the instream flow appropriations). The results of the analyses conducted for the Lower Platte River Basin upstream of North Bend and downstream of North Bend and upstream of Louisville, respectively, are shown in Tables 7-3 and 7-4. The results indicate that the current surface water supply in the Lower Platte River Basin upstream of North Bend provides an average of 42.2 days available for diversion between July 1 and August 31 and 119.4 days available for diversion between May 1 and September 30 (Table 7-5). The results for the Lower Platte River Basin downstream of North Bend and upstream of Louisville indicate an average of 43.1 days available for diversion between July 1 and August 31 and 120.8 days available for diversion between May 1 and September 30 (Table 7-6).

Table 7-3. Estimate of the current number of days surface water is available for diversion upstream of North Bend.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1996	62	153
1997	62	153
1998	62	153
1999	62	153
2000	39	100
2001	51	142
2002	0	56
2003	11	72
2004	22	75
2005	14	77
2006	5	45
2007	57	148
2008	55	140
2009	62	153
2010	62	153
2011	62	153
2012	15	76
2013	30	92
2014	49	140
2015	62	153
Average	42.2	119.4

Table 7-4. Estimate of the current number of days surface water is available for diversion downstream of North Bend and upstream of Louisville.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1996	62	153
1997	62	153
1998	62	153
1999	62	153
2000	39	100
2001	51	142
2002	4	60
2003	14	87
2004	22	75
2005	17	80
2006	5	45
2007	57	148
2008	58	143
2009	62	153
2010	62	153
2011	62	153
2012	19	80
2013	30	92
2014	49	140
2015	62	153
Average	43.1	120.8

Table 7-5. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion upstream of North Bend.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion with Current Development
July 1 – August 31 (65% Requirement)	27.9	42.2 (14.3 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	119.4 (82.9 days above the requirement)

Table 7-6. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion downstream of North Bend and upstream of Louisville.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion with Current Development
July 1 – August 31 (65% Requirement)	27.9	43.1 (15.2 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	120.8 (84.3 days above the requirement)

7.8.2 Water Supply

In order to complete the long-term evaluation of surface water supplies, a future 20-year water supply for the Lower Platte River Basin must be estimated. The basin's major water sources are precipitation, which runs off as direct streamflow and infiltrates into the ground to discharge as baseflow; groundwater movement into the basin, which discharges as

baseflow; and streamflow from the middle Platte River. Using methodology published in the *Journal of Hydrology* (Wen and Chen, 2005), a nonparametric Mann-Kendall trend test of the weighted average precipitation in the basin was completed. The analysis showed no statistically significant trend in precipitation ($P > 0.95$) over the past 50 years (Figure 7-9). The same type of statistical analysis of streamflow from the middle Platte River (using the Platte River at Duncan gage as inflow to the Lower Platte Basin), also showed no statistically significant trend ($P > 0.95$) for reduction of inflows (Figure 7-10). Therefore, using the previous 20 years of precipitation and streamflow data as the best estimate of the future surface water supply is a reasonable starting point for applying the lag depletions from groundwater wells.

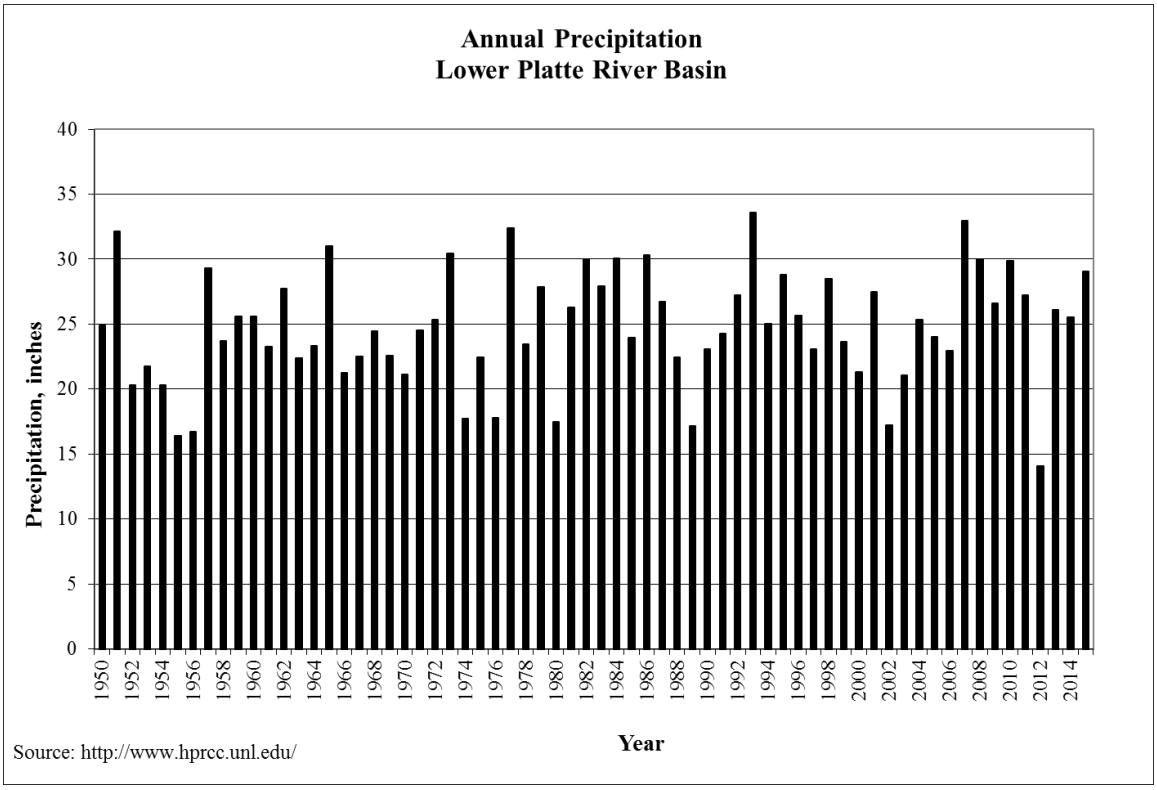

Figure 7-9. Annual precipitation, Lower Platte River Basin.[4]

[4] The results include precipitation stations covering the Loup, Elkhorn, and Platte River Basins.

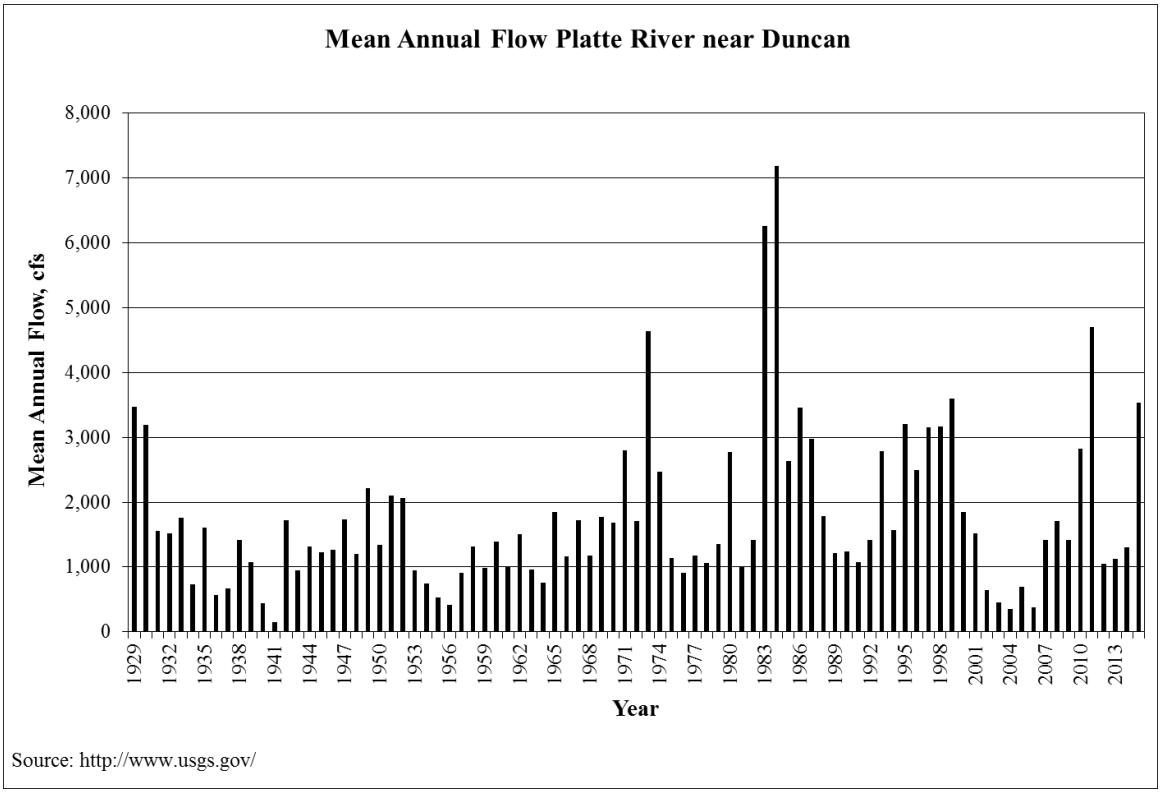

Figure 7-10. Mean annual flow, Platte River near Duncan.

7.8.3 Depletions Analysis

The future depletions due to current well development that could be expected to affect streamflow in the Lower Platte River Basin were estimated using the CENEB Model for the Loup River Basin and portions of the Elkhorn River Basin, whereas the SDF methodology was used in all other areas where data exist. The results estimate the future streamflow at North Bend to be depleted by 35 cfs in 25 years. The results estimate the future streamflow at Louisville to be depleted by 337 cfs in 25 years. The 337 cfs depletion at Louisville includes the 35 cfs at North Bend; 6 cfs calculated using the results of the CENEB Model for the Elkhorn River upstream of Norfolk; 15 cfs calculated using the Jenkins method for areas downstream of North Bend and downstream of Norfolk but upstream of the Louisville gage; 160 cfs[5] from the Metropolitan Utilities District's Platte West wellfield,

[5] This is the maximum amount of water that is permitted to be pumped from the stream by the wellfield, not the entire amount of streamflow for which the induced recharge permit was granted.

located on the Platte River upstream of the confluence of the Platte and Elkhorn Rivers; and 121 cfs[6] from Lincoln Water System's wellfield, located on the Platte River near Ashland.

7.8.4 Evaluation of Current Levels of Development against Future Water Supplies

The estimates of the 20-year average number of days available for diversion are calculated by comparing the lag-adjusted future water supply with the flows necessary to satisfy the senior calling surface water appropriations (in this case, the instream flow rights) that have caused administration of junior appropriations in the Lower Platte River Basin. The results of the analyses are shown in Tables 7-7 and 7-8. The results of the analyses as compared to the numbers of days surface water is required to be available to divert 65 percent and 85 percent of the NCCIR are detailed in Tables 7-9 and 7-10. The long-term surface water supply estimates, given current levels of development, are sufficient to meet the needs of the most junior surface water appropriations for the Lower Platte River Basin upstream of North Bend.

[6] This is the difference between the maximum amount of water permitted to be pumped from the stream by the wellfield and the best estimate of average July-August water currently being pumped from the stream by the wellfield.

Table 7-7. Estimate of days surface water is available for diversion upstream of North Bend with current development and 25-year lag impacts.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1	62	153
2	62	153
3	61	150
4	62	153
5	34	94
6	45	129
7	0	51
8	10	71
9	18	67
10	10	73
11	5	44
12	52	143
13	52	137
14	62	153
15	62	153
16	62	153
17	15	75
18	22	83
19	48	139
20	62	149
Average	40.3	116.2

Table 7-8. Estimate of days surface water is available for diversion downstream of North Bend and upstream of Louisville with current development and 25-year lag impacts.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1	62	153
2	61	152
3	62	151
4	62	153
5	35	95
6	44	128
7	3	55
8	12	85
9	17	65
10	12	75
11	4	42
12	52	143
13	52	134
14	62	153
15	62	153
16	62	153
17	19	76
18	22	83
19	47	138
20	62	153
Average	40.7	117.0

Table 7-9. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion upstream of North Bend with current development and lag impacts.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion at Current Development with 25 Years of Lag Impacts
July 1 – August 31 (65% Requirement)	27.9	40.3 (12.4 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	116.2 (79.7 days above the requirement)

Table 7-10. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion downstream of North Bend and upstream of Louisville with current development and lag impacts.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion at Current Development with 25 Years of Lag Impacts
July 1 – August 31 (65% Requirement)	27.9	40.7 (12.8 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	117.0 (80.5 days above the requirement)

7.9 Evaluation of Predicted Future Development

Estimates of the number of high capacity wells (wells pumping greater than 50 gpm) that would be completed over the next 25 years, if no new legal constraints on the construction of such wells were imposed, were calculated based on extrapolating the present-day rate of increase in well development into the future (Figure 7-11). The present-day rate of

development is based on the linear trend of the previous 10 years of development. Based on the analysis of the past 10 years of development, the rate of increase in high capacity wells is estimated to be 237 wells per year in the Lower Platte River Basin.

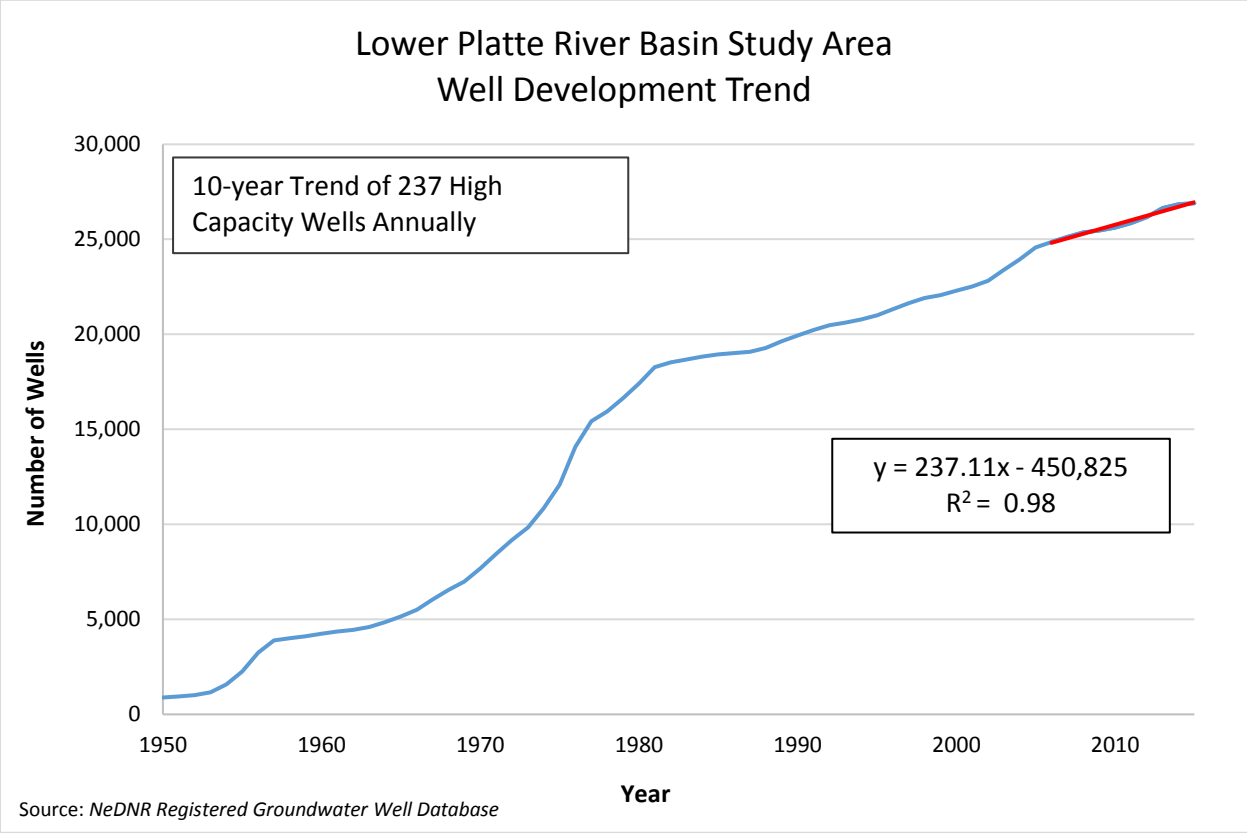

Figure 7-11. High capacity well development, Lower Platte River Basin.

The future depletions due to current and future well development that could be expected to affect streamflow in the basin were estimated using the CENEB Model and the SDF methodology. The results estimate the future streamflow at North Bend to be depleted by an additional 71 cfs in 25 years. The results estimate the future streamflow at Louisville to be depleted by an additional 122 cfs in 25 years. The Louisville estimate includes the 71 cfs of depletion due to projected future irrigation development upstream of North Bend and 51 cfs of depletion due to projected future irrigation development downstream of North Bend.

The estimate of the 20-year average number of days surface water is available for diversion with additional future development is calculated by comparing the future lag-adjusted flow with the flows necessary to satisfy the senior surface water appropriation. The results of the analyses are shown in Tables 7-11 and 7-12. The results of the analyses as compared to the numbers of days surface water is required to be available to divert 65 percent and 85 percent of the NCCIR are detailed in Tables 7-13 and 7-14. The results indicate that, based on current information, the Department's conclusion that the basin is not fully appropriated would not change if no additional constraints are placed on future development of surface water and groundwater in the basin.

Table 7-11. Estimated number of days surface water is available for diversion upstream of North Bend with current and predicted future development.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1	61	152
2	60	151
3	61	149
4	62	153
5	30	90
6	42	124
7	0	50
8	10	71
9	18	63
10	10	73
11	5	41
12	49	140
13	49	131
14	60	151
15	62	153
16	62	153
17	15	74
18	18	78
19	48	139
20	60	144
Average	39.1	114.0

Table 7-12. Estimated number of days surface water is available for diversion downstream of North Bend and upstream of Louisville with current and predicted future development.

Year	July 1 through August 31 Number of Days Surface Water is Available for Diversion	May 1 through September 30 Number of Days Surface Water is Available for Diversion
1	61	152
2	61	152
3	62	150
4	62	153
5	32	92
6	43	125
7	3	54
8	11	84
9	17	61
10	12	75
11	4	39
12	49	140
13	48	130
14	61	152
15	62	153
16	62	153
17	19	75
18	18	78
19	47	138
20	62	153
Average	39.8	115.5

Table 7-13. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion upstream of North Bend with current and predicted future development.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion with Future Development and 25 Years of Lag Impacts
July 1 – August 31 (65% Requirement)	27.9	39.1 (11.2 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	114.0 (77.5 days above the requirement)

Table 7-14. Comparison between the number of days required to meet the net corn crop irrigation requirement and number of days surface water is available for diversion downstream of North Bend and upstream of Louisville with current and predicted future development.

	Number of Days Necessary to Meet the 65% and 85% of Net Corn Crop Irrigation Requirement	Average Number of Days Available for Diversion with Future Development and 25 Years of Lag Impacts
July 1 – August 31 (65% Requirement)	27.9	39.8 (11.9 days above the requirement)
May 1 – September 30 (85% Requirement)	36.5	115.5 (79.0 days above the requirement)

7.10 Instream Flow Surface Water Appropriation Analysis

During the non-irrigation season, the junior water rights in the Lower Platte River system are the Nebraska Game and Parks Commission's instream flow rights. The purpose of these rights is to maintain habitat for the fish community. Therefore, the Department determined that an appropriate standard of interference would be to determine whether

the instream flow requirements that could be met at the time the water rights were granted can still be met today.

To calculate the average monthly flow that the instream flow permits could have expected at the time they were granted, the 20-year period prior to the permits being granted (1974-1993) was used. In conducting this analysis, the lag impacts were calculated for development through 1993 and subtracted from the daily flows (see Section 4.2.4 for more detail). The average number of days that flows were available for each month at the time the appropriations were obtained was compared with the current average number of days that flows are available for each month. The results are shown in Table 7-15 and 7-16.

Results indicate that neither the North Bend instream flow appropriation nor the Louisville instream flow appropriations are projected to experience significant erosion with inclusion of the 25 year lag-effects. Thus, the long-term surface water supply estimate in the basin is sufficient for the instream flow appropriations in the basin, based on the current level of development and the calculated 25 year lag impacts

Table 7-15. Number of days North Bend instream flow appropriation expected to be met.

Month	Number of Days Flows Met at Time of Application *	Number of Days Flows Met With Current Development °	Difference in the Number of Days Instream Flow Appropriation is Currently Met
October	16.7	20.9	4.3
November	21.8	21.8	0.0
December	20.2	22.4	2.2
January	22.5	23.6	1.2
February	24.1	23.9	-0.3
March	30.8	29.9	-0.9
April	28.5	29.3	0.9
May	27.5	28.3	0.8
June	23.3	24.9	1.6
July	13.9	17.4	3.5
August	12.7	15.6	2.9
September	14.9	17.6	2.7

Month	Number of Days Flows Met at Time of Application *	Number of Days Flows Met With Current Development °	Difference in the Number of Days Instream Flow Appropriation is Currently Met
October	16.7	21.0	4.3
November	21.9	21.9	0.0
December	20.5	22.8	2.3
January	22.8	24.3	1.5
February	24.2	24.0	-0.2
March	30.8	30.1	-0.8
April	28.5	29.3	0.8
May	27.6	28.9	1.3
June	23.5	26.2	2.7
July	14.7	18.9	4.3
August	13.4	16.5	3.1
September	15.1	18.4	3.3

* The number of days instream flows would be expected to be met at the time of application (1974-1993) with lag effects of well development at the time of the appropriation.
° The number of days instream flows would be expected to be met at current time (1996-2015) with lag effects of current well development.

Table 7-16. Number of days Louisville instream flow appropriation expected to be met.

7.11 Sufficiency to Avoid Noncompliance

There are no interstate compacts or decrees, or other formal state contracts or agreements in the Lower Platte River Basin that could be affected by reduced streamflows. There are state and federally endangered and threatened species in the Lower Platte River Basin. The requirements of the Nebraska Nongame and Endangered Species Conservation Act (NNESCA) and the federal Endangered Species Act (ESA) prevent actions that could cause harmful stream flow reductions. At this time, there is sufficient water supply in the basin to comply with NNESCA and the ESA. Because future development will be limited so as to continue compliance with NNESCA, the long-term surface water supply in the basin is sufficient.

7.12 Current Studies Being Conducted to Assist with Future Analysis

Studies of note that are currently being conducted within the Lower Platte River Basin are the Eastern Nebraska Water Resources Assessment (ENWRA) and the Elkhorn-Loup groundwater model (ELM) Phase III study. ENWRA is an effort between several agencies to categorize the aquifer characteristics and the water supply of the glaciated portion of eastern Nebraska, which includes large areas of the Lower Platte River Basin. This work may provide data for use in future reports. The ELM study is working to further refine the ELM Phase II groundwater model which covers a substantial portion of the Lower Platte River Basin and which was utilized, in part, as a starting point for development of the Department's CENEB Model. The Department will evaluate future results from this study and may utilize information from this study in future reports. The Department has completed the development of a numerical groundwater model for eastern portions of the basin. The modeling and documentation for this work has been completed and is currently undergoing peer review.

Additionally, significant progress has been made on the voluntary integrated management plans in the Lower Platte River Basin. The Upper Loup, Lower Loup Lower Platte South, and

Papio-Missouri River NRDs have completed voluntary plans with the Department and the Upper Elkhorn, Lower Elkhorn, and Lower Platte North NRDs are all in developmental phases.

The Department and the seven NRDs within the Lower Platte River Basin are working to develop a basin-wide plan to guide future development of individual integrated management plans.

7.13 Relevant Data Provided by Interested Parties

The Department published a request for relevant data from interested parties for this year's evaluation on November 23, 2016 (see Appendix B for affidavit). The Department did not receive any such information.

7.14 Conclusions

Based on the analysis of the sufficiency of the long-term surface water supply in the Lower Platte River Basin, the Department has reached a conclusion that the Lower Platte River Basin upstream of the confluence with the Missouri River is presently not fully appropriated under the current rule. The Department has also determined that if no additional legal constraints are imposed on future development of hydrologically connected surface water and groundwater, and reasonable projections are made on the extent and location of future development, this conclusion would not change to a conclusion that the basin is fully appropriated, based on current information.

Although the basin has not been be determined to be fully appropriated using the methodology of the current rule, there may be times when supplies within a subbasin are not sufficient to meet all demands within that subbasin, as is shown by the Department's INSIGHT analysis. This is important for water managers to consider when developing a basin-wide plan or voluntary integrated management plan.

Bibliography of Hydrogeologic References for Lower Platte River Basin

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