

# Appendix C

## **1.0 EVALUATION OF LB 483 PLANS IN THE LOWER PLATTE RIVER BASIN**

### **1.1 Summary**

On December 12, 2008, the Department reached a preliminary determination that the Lower Platte River Basin was fully appropriated. Subsequent to this determination the Department held public hearings through which testimony was provided, indicating the Department relied upon erroneous scientific methods to reach its preliminary determination. The Department reviewed the testimony and reached a final determination that the Lower Platte River Basin was not fully appropriated.

Following this reversal the Legislature passed LB 483, which, among other amendments, requires that when a basin status change occurs, natural resources districts (NRDs) adopt rules and regulations that: 1) allow a limited number of total new groundwater irrigated acres annually; 2) are created with the purpose of maintaining the status of not fully appropriated based on the most recent basin determination; 3) be for a term of not less than four years; and 4) limit the number of new permits so that total new groundwater irrigated acres do not exceed the number set in the rules and regulations.

The Department reviewed these rules and regulations adopted by the NRDs with land area in the hydrologically connected portion of the Lower Platte River Basin. The review was conducted to determine if the limits on groundwater and surface water irrigated acres for the next four years would cause the Lower Platte River Basin to be fully appropriated based on the most recent basin determination (2009 Annual Evaluation of Availability of

Hydrologically Connected Water Supplies). The results of that evaluation are summarized in this section.

## 1.2 Estimation of New Irrigated Acreage Development

The Department evaluated the effects on the most recent basin determination of increasing the irrigated acres by the lesser of 2,500 new groundwater irrigated acres or twenty percent of the historically groundwater irrigated acres in the hydrologically connected area within each NRD and by increasing surface water irrigated acres by 834 acres in each NRD located in the Lower Platte River Basin for the next four years (table C-1). These restrictions represent the rules and regulations adopted by the NRDs and allowed for in LB 483.

**Table C-1.** Estimated annual new groundwater irrigated acres and surface water irrigated acres in the hydrologically connected portion of the Lower Platte River Basin.

<b>Natural Resources District</b>	<b>Annual New Groundwater Irrigated Acres</b>	<b>Annual New Surface Water Irrigated Acres</b>
Upper Loup	2,500	834
Lower Loup	2,500	834
Upper Elkhorn	2,500	834
Lower Elkhorn	2,500	834
Lower Platte North	2,500	834
Lower Platte South	671*	834
Papio-Missouri River	2,500	834
Upper Big Blue	1,234*	N/A
Lower Niobrara	2,500	N/A
<b>Totals</b>	<b>19,405</b>	<b>5,838</b>

\* Represents twenty percent of the historically groundwater irrigated acres within the NRD. The historically groundwater irrigated acres were estimated using 2005 CALMIT landuse data and the Department's well registration database.

### 1.3 Estimated Lag Impacts

Based on the estimated acres to be developed through the next four year period in each NRD, the Department calculated the twenty-five year depletion to streamflows. The consumptive use of the irrigated acres was estimated from the net corn crop irrigation requirements utilized by the Department in its 2009 Annual Report. The depletions to streamflows were calculated using numerical modeling techniques and analytical methods. Table C-2 illustrates the estimated depletion associated with each NRD's proposal for increased irrigated acres and for the additional surface water irrigated acres through the next four year period.

**Table C-2.** Estimated depletion due to new groundwater and surface water irrigated acres in the hydrologically connected portion of the Lower Platte River Basin for the next four years.

	<b>Estimated Streamflow Depletion due to Increased Groundwater Irrigated Acres (cfs)</b>	<b>Estimated Streamflow Depletion due to Increased Surface Water Irrigated Acres (cfs)</b>	<b>Total Estimated Depletion due to both Groundwater and Surface Water Irrigated Acres (cfs)</b>
<b>Natural Resources District</b>			
Upper Loup and Lower Loup	13	12	25
Upper Big Blue	1	N/A	1
<b>Total Upstream of North Bend</b>	<b>14</b>	<b>12</b>	<b>26</b>
Lower Niobrara, Upper Elkhorn, and Lower Elkhorn	16	10	26
Lower Platte North	6	4	10
Lower Platte South	2	3	5
Papio-Missouri River	8	3	11
<b>Total Downstream of North Bend and Upstream of Louisville</b>	<b>32</b>	<b>20</b>	<b>52</b>

The estimated stream depletion in twenty-five years for the sub-basin upstream of North Bend gage (gage used for administration of the senior calling right) is 26 cfs while an

additional depletion of 52 cfs was determined for the sub-basin downstream of North Bend and upstream of Louisville for a total of 78 cfs of additional depletion at the Louisville gage (gage used for administration of the senior calling right).

The 2009 Annual Report estimated the total depletion in twenty-five years due to 2008 levels of development to be 202 cfs for the sub-basin upstream of North Bend with an additional 414 cfs for the sub-basin downstream of North Bend and upstream of Louisville for a total depletion of 616 cfs at the Louisville gage. These depletions combined with the estimated impact from the projected four years of groundwater and surface water irrigated acreage development, result in 228 cfs of lag depletion for the sub-basin upstream of North Bend and 466 cfs of lag depletion for the sub-basin downstream of North Bend and upstream of Louisville for a total of 694 cfs of estimated depletion at the Louisville gage (table C-3).

**Table C-3.** Estimate of 25-year lag impacts due current development and projected development through 2012.

<b>Gage</b>	<b>25-Year Lag Impacts Calculated in Most Recent Basin Determination (cfs)</b>	<b>Estimated 25-Year Lag Impacts from Additional Groundwater and Surface Water Irrigated Acres (cfs)</b>	<b>Total Lag Impacts Applied to Most Recent Twenty-Year Period of Streamflows (cfs)</b>
<b>North Bend</b>	202	26	228
<b>Louisville</b>	616	78	694

#### 1.4 Application of Estimated Lag Impacts to the 65/85 Rule

The total estimated lag depletions from table C-3 were applied to the twenty-year period of streamflows (1988-2007) to determine the number of days available for diversion by junior irrigation appropriations. The results indicate that for the May 1 through September 30 period (85 Rule), 94.8 days are available for diversion by junior irrigation appropriations upstream of North Bend and 97.2 days are available for diversion by junior irrigation appropriations downstream of North Bend and upstream of Louisville. Additionally, the results indicate that for the July 1 through August 31 period (65 Rule), 28.0 days are available for diversion by junior irrigation appropriations upstream of North Bend and 29.8 days are available for diversion by junior irrigation appropriations downstream of North Bend and upstream of Louisville. Comparing the number of days available for diversion to those necessary to satisfy the requirements of the 65/85 rule indicates that there is a sufficient number of days available such that the Lower Platte River Basin would not be fully appropriated based on the results of the most recent basin determination (tables C-4 and C-5).

**Table C-4.** Number of days available to satisfy the 65/85 rule upstream of North Bend.

	<b>Number of Days Necessary to Meet the 65% and 85% of the Net Corn Crop Irrigation Requirement</b>	<b>Average Number of Days Available for Diversion with Current Development</b>
<b>July 1 - August 31 (65% Requirement)</b>	27.9	28.0 (0.1 days above the requirement)
<b>May 1 - September 30 (85% Requirement)</b>	36.5	94.8 (58.3 days above the requirement)

**Table C-5.** Number of days available to satisfy the 65/85 rule downstream of North Bend and upstream of Louisville

	<b>Number of Days Necessary to Meet the 65% and 85% of the Net Corn Crop Irrigation Requirement</b>	<b>Average Number of Days Available for Diversion with Current Development</b>
<b>July 1 - August 31 (65% Requirement)</b>	27.9	29.8 (1.9 days above the requirement)
<b>May 1 - September 30 (85% Requirement)</b>	36.5	97.2 (60.7 days above the requirement)

### **1.5 Erosion of Junior Non-Irrigation Season Rights**

During the non-irrigation season, the junior water rights in the Lower Platte River Basin 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 what the instream flow permits could have expected as average monthly flow occurrence, the twenty-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. 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 tables C-6 and C-7.

**Table C-6.** Number of days North Bend instream flow appropriation expected to be met.

<b>Month</b>	<b>Number of Days Flows Met at Time of Application<sup>1</sup></b>	<b>Number of Days Flows Met With Current Development<sup>2</sup></b>	<b>Difference in the Number of Days Instream Flow Appropriation is Currently Met</b>
October	14.8	17.5	2.7
November	18.0	19.1	1.1
December	18.4	21.3	2.9
January	19.8	21.6	1.8
February	22.2	23.8	1.6
March	30.8	28.8	-2.0
April	27.7	27.3	-0.4
May	26.3	26.3	0.1
June	22.1	24.2	2.1
July	12.8	15.8	3.0
August	11.2	12.5	1.3
September	13.6	15.1	1.5

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

<b>Month</b>	<b>Number of Days Flows Met at Time of Application<sup>1</sup></b>	<b>Number of Days Flows Met With Current Development<sup>2</sup></b>	<b>Difference in the Number of Days Instream Flow Appropriation is Currently Met</b>
October	14.8	17.5	2.7
November	18.1	19.4	1.3
December	18.6	21.7	3.1
January	20.1	22.8	2.7
February	22.3	23.9	1.6
March	30.8	28.9	-1.9
April	27.8	27.4	-0.4
May	26.3	26.5	0.2
June	22.3	24.5	2.2
July	13.5	17.2	3.7
August	11.5	12.9	1.4
September	13.7	15.2	1.5

<sup>1</sup> The number of days instream flows would be expected to be met at the time of application (1974-1993) with 25-year lag effects of well development at the time of the appropriation.

<sup>2</sup> The number of days instream flows would be expected to be met at current time (1988-2007) with 25-year lag effects of current well development and new groundwater and surface water development for the next four years.

Results indicate that the North Bend instream flow appropriation would experience minor erosion after twenty-five years for the months of March (2.0 days) and April (0.4 days).

The Louisville instream flow appropriation would experience minor erosion after twenty-five years for the months of March (1.9 days) and April (0.4 days). The long-term surface water supply estimate in the basin is sufficient for the instream flow appropriations in the basin, with inclusion of the lag impacts from current levels of development and new groundwater and surface water irrigated acres developed through the next four years.

## **1.6 Sufficiency to Avoid Noncompliance with Compact, Decree, Agreement, or State and Federal Laws**

There are no interstate compacts or decrees, or other formal state contracts or agreements in the Lower Platte 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 and the federal Endangered Species Act prevent actions that could cause harmful streamflow reductions. At this time, there is sufficient water supply in the basin to comply with NNECSA and the ESA. The long-term surface water supply in the basin is sufficient given the limits on future development that are currently in place. These limits will serve to ensure continued compliance with NNECSA is achieved into the future.

## **1.7 Conclusions**

Based on this evaluation of the rules and regulations adopted by each NRD with land area in the hydrologically connected portion of the Lower Platte River Basin, the Department has concluded that the proposed limitations on new groundwater irrigated acres and surface water irrigated acres would not cause the Lower Platte River Basin to be determined fully appropriated based on the most recent basin determination. Therefore the adopted rules and regulations satisfy the requirements of Neb. Rev. Stat. § 46-714 (12)(d)(ii).