9.0 BASIN SUMMARIES AND RESULTS

9.1 Blue River Basins

The Blue River basins are located in south-central Nebraska and consist of all of the surface water areas that drain into the Big Blue River and the Little Blue River and all aquifers that impact surface water flows of the basins.

The basins can be divided into two distinct areas, based on whether or not they were glaciated. In areas that were glaciated, the restrictive and complex nature of the hydrogeology does not allow for the use of stream depletion factor (SDF) methodologies. Therefore, the Department was unable to delineate the 10/50 area for the glaciated portions of the basins. In the non-glaciated portions of the Little Blue River Basin, a numerical ground water model was used to delineate the 10/50 area.

The numerical ground water model was not able to provide data on the lag impacts from ground water development; thus, no lag effects were calculated. However, because the Department determined that the near-term availability of surface water for diversion for each basin far exceeds the number of days necessary to meet 65% and 85% of the net corn crop irrigation requirement for the applicable time periods, the Department was able to reach a conclusion that no portion of the basins is fully appropriated without the lag-effect calculation. Because of the inability to calculate the lag effects of existing and future ground water development, the long-term surface water availability was not determined. Although reductions in flows may require water administration more often in the future, low flows do not cause noncompliance with the terms of the Kansas-Nebraska Big Blue River Compact.

9.2 Lower Niobrara Basin

The Lower Niobrara River Basin is located in the north-east portion of Nebraska and consists of all of the surface water areas that drain into the Niobrara River that had not previously been determined to be fully appropriated, from the Spencer Hydropower facility downstream to the confluence of the Niobrara River and the Missouri River, and all aquifers that impact surface water flows of the basin.

No sufficient numerical ground water model is available in the Lower Niobrara River Basin. Therefore, the stream depletion factor (SDF) methodology was used to determine the 10/50 area and lag impacts due to current and projected future well development. The analysis of lag effects of current development for the Lower Niobrara Basin indicates a reduction in streamflows by 21 cfs in twenty-five years. The analysis of the impacts of future development on the Lower Niobrara Basin based on current development trends indicates a reduction in streamflows of 95 cfs in twenty-five years.

The Department has reached a conclusion that no portion of the basin is fully appropriated. Estimates of future water supplies for junior irrigators could not be estimated due to minimal surface water administration during the past twenty years. Even though the future water supplies were not estimated, the current number of days in which surface water was available for diversion far exceeds the number of days necessary to meet the 65/85 rule.

9.3 Lower Platte River Basin

The Lower Platte River Basin is located in the central and eastern portions of Nebraska and consists of all the surface water areas that drain into the Platte River from its confluence with the Loup River to its confluence with the Missouri 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.

The Elkhorn-Loup Model was used to determine the 10/50 area and the future lag impacts of existing groundwater uses for the extent of the area modeled, whereas all other hydrologically connected areas were evaluated using the stream depletion factor (SDF) methodology.

The Department has reached a conclusion that no portion of the basin is fully appropriated at this time. The long term availability of surface water for diversion exceeds the number of days necessary to meet 65% and 85% of the net corn crop irrigation requirement for the rule's applicable time periods in the basin. In addition, the surface water supply available to the instream flow appropriations in the basin (the junior appropriation calling for administration in the non-irrigation season) has not been significantly eroded. Based on reasonable projections of the extent and location of future development in the basin, however, the analysis also shows that this conclusion would change to a determination of fully appropriated if no additional constraints were placed on future surface water and ground water development.

9.4 Missouri Tributary Basins

The Missouri Tributary basins are located in the north-central and eastern portions of Nebraska and consist of all of the surface water areas that drain directly into the Missouri River, with the exception of the Niobrara River and Platte River basins, and all aquifers that impact surface water flows of the basins.

No sufficient numerical ground water model is available in the Missouri Tributary basins to determine the 10/50 area. Much of the basins were glaciated, and, in those areas, the restrictive and complex nature of the hydrogeology does not allow for the use of existing methodologies. Therefore, the Department was unable to delineate the 10/50 area for the glaciated portions of the basins. The non-glaciated area surrounding the headwaters of Bazile Creek is the only portion of the basins where the principal aquifer is

both present and in hydrologic connection with the streams; therefore, the 10/50 area was delineated using SDF methodology.

The Department has reached a conclusion that no portion of the basins is fully appropriated. The near-term availability of surface water for diversion far exceeds the number of days necessary to meet 65% and 85% of the net corn crop irrigation requirement for the applicable time periods. The long-term surface water availability was not determined, due to a lack of geologic and hydrologic data and the inability to calculate the lag effects of existing and future ground water development. Even though the long-term water supplies were not estimated, the current number of days in which surface water was available for diversion far exceeds the number of days necessary to meet the 65/85 rule.

9.5 Results of Analyses

Tables 9-1 and 9-2 summarize the results of the analysis for sufficiency of water availability for irrigation in each basin. These results indicate that the water supply is sufficient to meet the requirements of the 65/85 rule in all basins evaluated. The Lower Platte River Basin is projected to have insufficient water supply to meet the 65 rule in the future if current levels of surface water and ground water development continue.

Table 9-1 Summary of comparison between the number of days required to meet 65% of the net corn crop irrigation requirement and number of days in which surface water is available for diversion, July 1 – August 31.

	Days Necessary to Meet 65% of Net Corn Crop Irrigation Requirement	**Average Number of Days Available for Diversion at Current Development**	**Average Number of Days Available for Diversion at Current Development with Twenty-Five Years of Lag Impacts**	**Average Number of Days Available for Diversion with Future Development and Twenty-Five Years of Lag Impacts**
Big Blue River Basin	23.9	54.5	54.5[1]	Not Calculated[2]
Little Blue River Basin	25.7	54.4	54.4[1]	Not Calculated[2]
Lower Platte River Basin upstream of North Bend, including the Loup River Basin	27.9	32.5	28.4	27.6
Lower Platte River Basin downstream of North Bend and upstream of Louisville including the Elkhorn River Basin	27.9	34.6	30.2	29.2
Lower Niobrara River Basin downstream of Spencer Hydropower	23.6 – 25.5	61.9	Not Calculated[3]	Not Calculated[3]
Missouri Tributary Basins	14.1 – 26.6	58.8	58.8[1]	Not Calculated[2]

[1] This number is the near-term average number of days in which surface water is available for diversion (1988–2007) without inclusion of twenty-five year lag impacts, because of the lack of geologic and hydrologic data and the inability to estimate lag depletions.

[2] This number was not estimated, because of the lack of geologic and hydrologic data and the inability to estimate future depletions.

[3] This number was not estimated, because of the lack of surface water administration in this portion of the basin.

Table 9-2 Summary of comparison between the number of days required to meet 85% of the net corn crop irrigation requirement and number of days in which surface water is available for diversion, May 1 – September 30

	Days Necessary to Meet 85% of Net Corn Crop Irrigation Requirement	**Average Number of Days Available for Diversion at Current Development**	**Average Number of Days Available for Diversion at Current Development with Twenty-Five Years of Lag Impacts**	**Average Number of Days Available for Diversion with Future Development and Twenty-Five Years of Lag Impacts**
Big Blue River Basin	31.3	145.3	145.3[1]	Not Calculated[2]
Little Blue River Basin	33.6	141.2	141.2[1]	Not Calculated[2]
Lower Platte River Basin upstream of North Bend, including the Loup River Basin	36.5	103.9	95.9	94.0
Lower Platte River Basin downstream of North Bend and upstream of Louisville Elkhorn River Basin	36.5	106.8	98.4	96.3
Lower Niobrara River Basin downstream of Spencer Hydropower	30.9 – 33.4	152.9	Not Calculated[3]	Not Calculated[3]
Missouri Tributary Basins	18.4 – 34.7	149.8	149.8[1]	Not Calculated[2]

[1] This number is the near-term average number of days in which surface water is available for diversion (1988–2007) without inclusion of twenty-five year lag impacts, because of the lack of geologic and hydrologic data and the inability to estimate lag depletions.

[2] This number was not estimated, because of the lack of geologic and hydrologic data and the inability to estimate future depletions.

[3] This number was not estimated, because of the lack of surface water administration in this portion of the basin.