# Memo

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| Date: | Wednesday, May 31, 2017 |
| Project: | Lower Platte River Basin-wide Water Management Plan |
| To: | Lower Platte River Basin Coalition |
| From: | HDR Team |
| Subject: | Evaluation of Basin-wide Accounting Methods for the Lower Platte River Basin Water Management Plan |

## 1.0 Introduction and Background

LB 962, which was adopted by the Nebraska Legislature in 2004, called for proactive management of the state's hydrologically connected groundwater and surface water. Under LB 962, the NeDNR was required to evaluate all basins annually and designate a basin fully appropriated when the current uses of hydrologically connected surface water and groundwater cause or will in the reasonably foreseeable future, cause the surface water supply to be insufficient to sustain the beneficial purposes for which natural flow, storage, or instream flow appropriations, were granted. An area may also be deemed fully appropriated when the streamflow is insufficient to sustain the long-term beneficial uses from wells constructed in aquifers dependent on recharge from the water body involved.[1] This bill laid the groundwork for Basin planning by requiring that NRDs and NeDNR participate in joint planning for areas designated as over-appropriated. Subsequent to this bill, the Nebraska Legislature adopted LB 1098 in 2014. This bill further required that certain fully appropriated river basins were to participate in joint Basin planning.

On December 12, 2008, the Nebraska Department of Natural Resources (NeDNR) reached a preliminary determination that the Lower Platte River Basin was fully appropriated. Subsequent to this determination, NeDNR reached a final determination that the Lower Platte River Basin was not fully appropriated. Following this reversal, on April 6, 2009 the Legislature passed LB 483 which requires that when a basin status change occurs, the affected NRDs must adopt rules and regulations that: 1) allow a limited number of total new ground water irrigated acres annually; 2) are created with the purpose of maintaining the status of not fully appropriated based on the most recent determination; 3) be for a term of not less than four years; and 4) limit the number of new permits so that total new ground water irrigated acres do not exceed the number set in the rules and regulations.[2]

Although the Lower Platte River Basin is no longer declared fully-appropriated, and therefore not required by statute to develop a Basin plan, the NRDs have recognized the potential benefits of Basin planning and in 2013, the Lower Platte Basin Coalition (LPBC) was formed with the specific purpose of participated in voluntary Basin planning with NeDNR. It is important

[1] http://watercenter.unl.edu/archives/Pre2004/Understanding%20the%20Ins.pdf
[2] NeDNR 2011 Annual Report, Appendix C

to note that six of the seven NRDs in the Lower Platte River Basin are also participating in joint integrated management planning with NeDNR. The integrated management planning and overarching Basin planning processes provide an improved framework to develop water management strategies that have great potential to achieve and sustain a balance between water uses and water supplies for the near and long term.[3]

The Lower Platte River Basin Coalition (Coalition) was formed through an Interlocal Cooperation Act agreement among the NeDNR and the following seven Natural Resources Districts (NRDs) that encompass the Lower Platte River Basin:

- Upper Loup Natural Resources District (ULNRD)
- Lower Loup Natural Resources District (LLNRD)
- Upper Elkhorn Natural Resources District (UENRD)
- Lower Elkhorn Natural Resources District (LENRD)
- Lower Platte North Natural Resources District (LPNNRD)
- Lower Platte South Natural Resources District (LPSNRD)
- Papio-Missouri River Natural Resources District (PMRNRD)

The Lower Platte River Basin includes the Elkhorn River, Loup River, and Lower Platte River below Duncan, as shown in Figure 1 at the end of this section.

The first action taken by the Coalition is the development of the Lower Platte River Basin Water Management Plan. In accordance with LB1098, §15[4] and Nebraska Revised Statute 46-755[5], the purpose of the Basin water management plan is to maintain a balance between current and future water supplies and demands. The HDR Team, consisting of HDR, JEO Consulting Group, Inc., and The Flatwater Group, is assisting the Coalition with this effort.

Under current statute, a basin is fully appropriated if a senior appropriator requests junior appropriators that are diverting water to be closed so often that the junior appropriators cannot divert at least 65% of the water needed during the peak irrigation season (July 1 through August 31) or 85% during the entire season (May 1 through September 30).[6] This is commonly referred to as the "65/85 Rule".

On April 8, 2013, NeDNR published its proposed rule revisions (*Draft Rules Title 457, Chapter 24*) as part of a process that was initiated in 2009 (*Timeline for Assessment and Potential Modification of Department's Rules Related to its Determination of Fully appropriated Basins, Subbasins, or Reaches*). At this time, NeDNR also released a draft of the methodologies used in making annual basin evaluations post April 2013. The draft NeDNR methodology is based on a water budget concept.

[3] Nebraska Resources Newsletter, Issue 49, Fall 2014
[4] http://nebraskalegislature.gov/FloorDocs/103/PDF/Slip/LB1098.pdf
[5] http://nebraskalegislature.gov/laws/statutes.php?statute=46-755
[6] 457 Neb. Admin. Code, Ch. 24, § 001.01A

One of the tasks of the Lower Platte River Basin Water Management Plan is to utilize the draft NeDNR methodology for evaluating basins for fully appropriated status[7] and its appropriateness as a Basin water management tool. This document describes the efforts to date to evaluate the draft NeDNR methodology as it pertains to the Lower Platte River Basin. The basin accounting analysis identifies the supplies and demands in each subbasin for an annual and seasonal period.

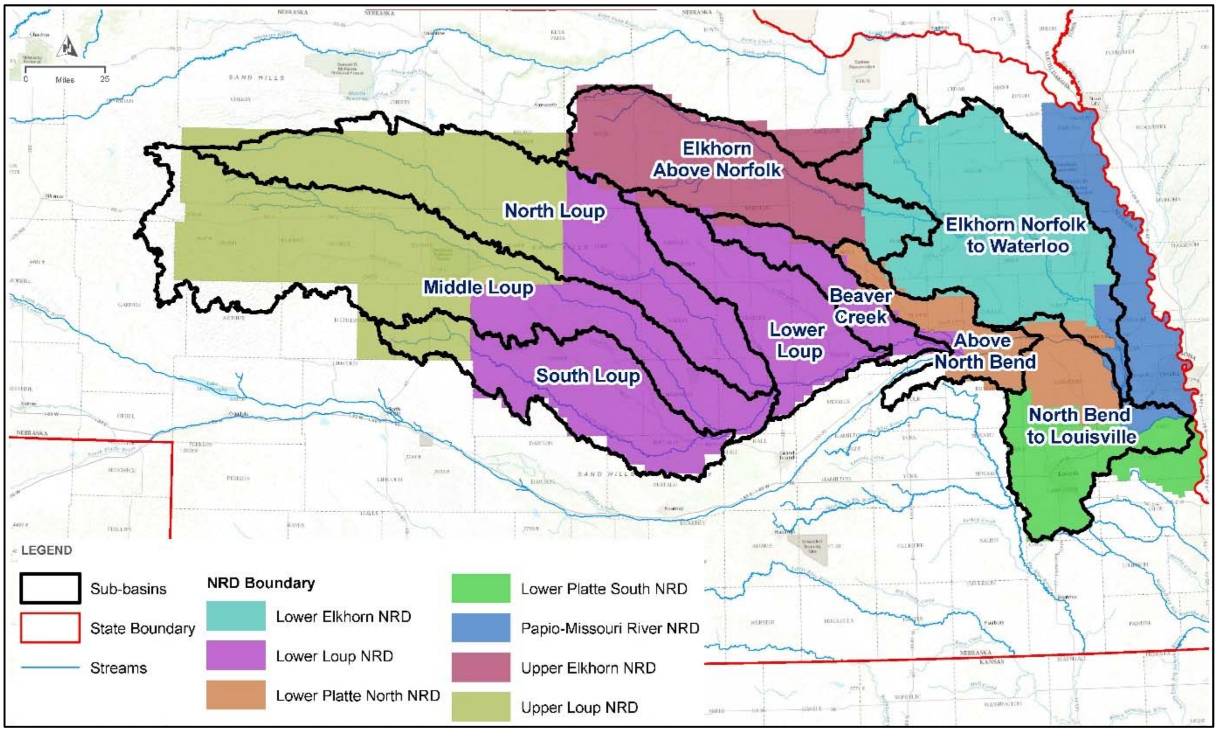
The HDR Team held 11 technical committee meetings and 11 management committee meetings (at the time of this technical memorandum) with staff of the seven member NRDs, NeDNR, and a representative from the Nebraska Association of Resources Districts (NARD) to discuss the appropriateness of using NeDNR's Integrated Network of Scientific Information and GeoHydrologic Tools (INSIGHT) data for the purposes of basin accounting in the Lower Platte River Basin. In making this determination, the HDR Team worked with the technical committee and each NRD to compile a comprehensive list of data collection efforts by each NRD as well as potential data sources that could supplement a Basin evaluation. In comparing this list to the INSIGHT database, it became evident that NeDNR has done a considerable portion of the work of compiling and consistently updating many of these data sources and that these compiled data are available to the public. Additionally, discussions with the technical committee led to a consensus that whatever Basin accounting the Coalition implements should remain consistent with (if not more conservative than) the draft NeDNR methodology that will ultimately be used to determine the Platte River Basin's fully appropriated status.

Ultimately, the technical committee concluded that NeDNR INSIGHT is an appropriate tool for the Basin accounting. The remainder of this technical memorandum will discuss ways in which the draft NeDNR methodology can be used as an accounting tool for the Lower Platte River Basin.

Basin data was obtained from the Nebraska NeDNR's INSIGHT database (https://nednr.nebraska.gov/insight). During the course of the project, the technical committee requested that alternative demand scenarios be investigated that are more conservative than the demands considered by the draft NeDNR methodology and included in INSIGHT. After considering the various demand scenarios and assessing the benefits and constraints on the individual subbasins, the management committee agreed to utilize a demand scenario that would maintain 40% of the 25-year average streamflow at Louisville (without hydropower considered) to calculate the volume of water supply within the Lower Platte River Basin that exceeds the near term demand.

[7] As of May 2017, the NeDNR has not implemented the accompanying rules that support the methodology used in this evaluation. The current methods used by NeDNR for fully appropriated evaluations rely on the 65/85 Rule.

Figure 1: INSIGHT Basins in the Lower Platte River Basin Overlaid by NRD Boundaries




# 2.0 Review of Draft NeDNR Methodology and INSIGHT

## 2.1 Nebraska Administrative Code – NeDNR Final Draft Rules

For purposes of Nebraska Revised Statute (Neb. Rev. Stat.) § 46-713(1) (b), NeDNR conducts an annual evaluation to determine fully appropriated status of each basin in Nebraska. The draft NeDNR methodology will be applied for the basin accounting to remain consistent with the NeDNR's annual evaluation. NeDNR evaluates the basin for both a seasonal and annual period. The two sub-periods within the year are the "Peak Season" (June 1 through August 31) and the "Non-peak Season" (September 1 through May 31). The basin water supply (BWS) is essentially the amount of streamflow that would occur in a basin in absence of the development of water uses.[8] If a basin's near-term demand and/or the long-term demand of hydrologically connected groundwater and surface water exceeds the BWS during either of the two sub-periods when summed over the period used in the annual evaluation[9], then a basin is deemed "fully appropriated." The geographic area within which NeDNR considers surface water and groundwater to be hydrologically connected for the purpose prescribed in Neb. Rev. Stat. §46-713(3) is the area within which pumping of a well for 50 years will deplete the river or a base flow tributary thereof by at least 10 percent of the amount pumped in that time. This area is also referred to as the 10/50 area or the hydrologically connected area.

8 DNR, Water Matters No. 3.

9 At the time of this report, the period used by the NeDNR for its annual evaluation is 1988 to 2012. This period could change in future NeDNR evaluations.

The components that make up the BWS, near-term demand, and long-term demand are described in detail in Section 2.3.

## 2.2 INSIGHT

INSIGHT is a web-based, interactive tool[10] developed by NeDNR in support of required and voluntary integrated water management planning efforts pursuant to Neb. Rev. Stat. § 46-715 as well as in support of the annual evaluation for areas of that state that are not currently fully appropriated pursuant to Neb. Rev. Stat. § 46-713. INSIGHT consolidates data from several sources, including NeDNR, the United States Geological Survey (USGS), the United States Bureau of Reclamation (USBR), and local NRDs, and provides basin- and subbasin-level summaries that include 1) streamflow water supplies available for use, 2) the current amount of demand on these supplies, 3) the long-term demand on these water supplies due to current uses, 4) the projected long-term demand on these water supplies, and 5) the balance between these water supplies and demands. Currently, INSIGHT uses a period of record of 1988 through 2012 to estimate basin supply. While the supply is estimated for each year of the analysis, it should be noted that only current level of demands are considered (appropriations do not vary year-by-year) with the 1988 through 2012 net irrigation requirement applied (to match the climatic variability represented in the supplies).

## 2.3 Intrinsic Supply

The BWS is made up of four components: 1) streamflow (or reach-gain); 2) surface water consumptive use; 3) groundwater depletions; and 4) required inflow, which is the amount of water that historically flows to downstream users from upstream basins and from which existing surface water appropriations were granted and does not represent water that is required by law or permit.[11]

The intrinsic supply is the same as the BWS but does not include the required inflow term (intrinsic supply = streamflow (or reach-gain) + surface water consumptive use + groundwater depletions). It is necessary to calculate the intrinsic supply first because the ratio of intrinsic supplies is used to proportion the supplies (the required inflow term) and demands (downstream demand term). Section 2.4.6 explains this proportioning in detail. Because of this, the required inflow term will be discussed separately in Section 2.4.7. The remainder of this section will focus on the components of the intrinsic supply.

### 2.3.1 Streamflow

The streamflow volumes represent the amount of water that originates within that particular subbasin or reach. If an upstream subbasin is present, only the streamflow gain is considered. Additionally, to recognize that extreme flow events produce water that often cannot be used or stored in reservoir systems, the draft NeDNR methodology reduces the mean daily streamflow

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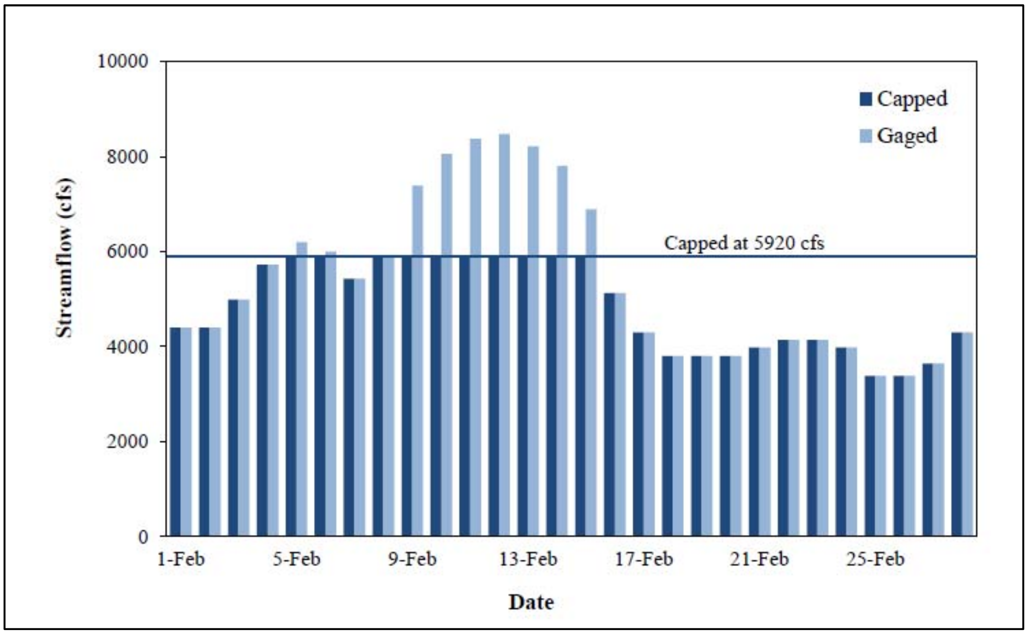
10 The INSIGHT interactive tool is available at http://nednr.nebraska.gov/INSIGHT/.

11 See *Water Matters: Integrated Water Management and the Basin Water Supply* at https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/water-matters/WaterMatters_No3.pdf for more information on the basin water supply concept.

or reach-gain values with an exceedance probability of 5% or less to the value corresponding to the 5% exceedance probability, as shown in Figure 2.[12]

**Figure 2: Example of an Exceedance Plot and the Result from Capping Streamflows at 5 percent Exceedance Flow Probability (Source: "INSIGHT Methods" 2015)**




USGS streamflow records and NeDNR streamflow records were used to determine the streamflow gain discussed. Table 1 lists the gage locations and the associated period-of-record used in this analysis. An exceedance cap was applied to these gage data consistent with the draft NeDNR methodology. NeDNR provided the capped streamflow data.

**Table 1: Stream Gage Locations**

| Gage | Gage Number | Period-of-Record Used |
|---|---|---|
| Elkhorn River at Norfolk, Nebr. | 06799000 | 1988-2012 |
| Elkhorn River at Waterloo, Nebr. | 06800500 | 1988-2012 |
| Platte River at North Bend, Nebr. | 06796000 | 1988-2012 |
| Platte River at Louisville, Nebr. | 06805500 | 1988-2012 |
| Loup River at Columbus, Nebr. | 06794500 | 1988-2012[(A)] |
| Loup River at Genoa, Nebr. | 06793000 | 1988-2012 |
| Loup River Power Canal near Genoa, Nebr. | 06792500 | 1988-2012 |
| Middle Loup River at Saint Paul, Nebr. | 06785000 | 1988-2012 |
| North Loup River near Saint Paul, Nebr. | 06790500 | 1988-2012 |
| South Loup River at Saint Michael, Nebr. | 06784000 | 1988-2012 |

*(A) The period 1988 to 2008 was synthesized from 1934 to 1978 USGS gage data. The NeDNR took over the gage in 2008 and historic data is use from 2008 to 2012.*

12 This analysis uses 5% to remain consistent with how the Department currently adjusts streamflow in INSIGHT. Specific values for each subbasin or basin may be incorporated into future evaluations. A 5-percent exceedance probability represents a high flow that has been exceeded only 5-percent of all days of the flow record.

### 2.3.2 Surface Water Consumptive Use

Surface water consumptive use is defined as water that is used directly from the stream (or other surface water body) to make full beneficial use of an existing irrigation, municipal, or industrial use, accounting for limitations on the supply available. Surface water consumptive use is transpired, evaporated, or otherwise consumed and does not return to the stream.

The draft NeDNR methodology separates the surface water consumptive use (SWCU) into four main use categories: 1) irrigation; 2) municipal; 3) industrial; and 4) evaporation from large water bodies. At the time of this report, irrigation and evaporation are the only surface water uses evaluated in the draft NeDNR methodology for the Lower Platte River Basin.[13]

INSIGHT uses diversion, surface water return, and field delivery data when available. These data were available for the Farwell Main, Central, and South canals as well as Mirdan Canal. Canal diversions were available for the Sargent Canal, Burwell-Sumter Canal, Ord-North Loup Canal, Taylor-Ord Canal, and Middle Loup Canals 1, 2, 3, and 4.

INSIGHT uses the NeDNR surface water database to determine the surface water irrigated acreage and calculates irrigation demand using the net irrigation requirement (NIR) from the Crop Simulation (CropSim) model[14] developed by the University of Nebraska–Lincoln (UNL). This demand is further adjusted by NeDNR administration records to account for shortages to junior surface water users because of administration for senior water rights during the period of analysis.[15] The administration adjustment considers the number of days a water user was closed and the difference in the consumptive use that the restricted water user was able to obtain versus the consumptive use that they would have obtained with a full water supply.

### 2.3.3 Groundwater Depletion

NeDNR conducts a groundwater depletion (GWDP) analysis for each subbasin where a numerical model was available. The Central Nebraska (CENEB) model[16] is a groundwater flow model for the Lower Niobrara, Loup, and Upper Elkhorn River Basins in Nebraska and part of southern South Dakota, as shown in Figure 3. CENEB uses CropSim to provide estimates of pumping and recharge as inputs for the CENEB model. CENEB depletion data were used in the analysis.

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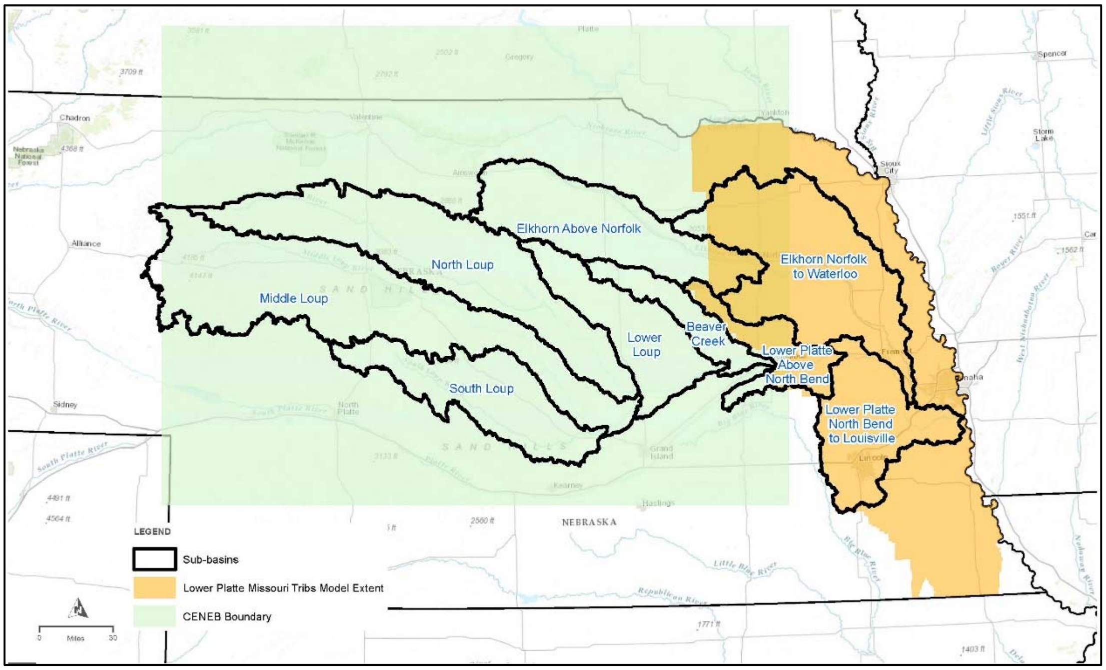
[13] Municipal water consumptive uses from the Lincoln and Omaha wellfields are included in the surface water consumptive use term. If any additional municipal or industrial uses come online in the future, they could be incorporated into the analysis. Net surface water loss is another surface water use that is considered separately.

[14] Martin, D. L., Watts, D.G., and Gilley, J.R., 1984. Model and Production Function for Irrigation Management, Biological Systems Engineering: Papers and Publications. Paper 58.

[15] The Flatwater Group, Inc., 2014, Nebraska Surface Water Administration Tool, available on the Department's website and through the INSIGHT documentation.

[16] Visit https://dnr.nebraska.gov/CENEB-Groundwater-Model for more information on the CENEB model.

**Figure 3: CENEB Groundwater Model Extents**




The depletions analysis consists of a comparison of two model runs: 1) one that represents historical pumping; and 2) another that represents the basin without pumping. The difference between these two model runs indicates the groundwater depletions to streamflow. Details regarding the analytical depletions analysis for portions of the Lower Elkhorn and Lower Platte River Basins outside the CENEB model extents are provided in HDR (2013).[17] NeDNR is in the process of finalizing the Lower Platte/Missouri Tributaries groundwater model, which will replace the analytical calculations in future evaluations.[18] The draft NeDNR methodology considers depletions from irrigation, municipal, and industrial groundwater withdrawals. Groundwater depletions are a component of BWS as well as to represent near-term demand of groundwater uses.

### 2.3.4 Period of Record

NeDNR uses the most recent period of record that represents naturally occurring wet/dry cycles to avoid bias between wet and dry periods and to accommodate non-stationarity in climate patterns. Suitability of the selected climatic period was evaluated by performing an autocovariance and Kendall Tau statistical analysis of the data.[19] NeDNR uses the period of record 1988 to 2012.

Autocorrelation describes a degree of similarity between a time series data and a lagged version of itself. In this case, autocorrelation was used to identify the presence of any prevalent pattern in the historical streamflow dataset. It can also show sinusoidal patterns of discharge

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17 HDR, 2013, Depletion Estimates for the Lower Platte River Basin, https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/lower-platte/publications/LowerPlatteRiverBasinDepletionEstimates.pdf.

18 https://dnr.nebraska.gov/Lower-Platte-Missouri-Tributaries-Groundwater-Model

19 NeDNR performed the statistical analysis internally.

cycles associated with wet and dry hydrologic cycles.   Autocorrelation analysis with a 3-year lag was performed for all of the INSIGHT streamflow gages on Minitab Statistical Software. The time series data (day) and the streamflow gage measurement (cfs) were used as inputs for the analysis. Autocorrelation analysis requires all data to be consecutive. Therefore, any time series data without any streamflow gage measurements were removed. Days on the time series where there is no flow data available due to icing as indicated with “ice” comments were also removed before analysis.

The Kendall tau statistic can be used to test the presence of statistically significant trends. The trend to be tested is defined as a monotonic change over time occurring as either an abrupt or gradual change in the discharge data. Since the Kendall tau test is nonparametric, the test variables do not need to be normally distributed and outliers or missing values do not pose any computational or theoretical problem. In essence, the Kendall tau is a measure of the correlation between the direction of change in streamflow discharge and time. Like the autocorrelation, the Kendall tau statistic was performed on Minitab Statistical Software and Excel’s Analyse-It program was used for all of the stream gages.

## 2.4 Demand Components

The total demand of water within a basin or subbasin is derived from seven main categories of water use:

1. Consumptive water demands for surface water uses
2. Consumptive water demands for hydrologically connected high capacity (greater than 50 gpm) groundwater well pumping
3. Streamflow demands for hydropower operations
4. Streamflow demands to meet instream flow demands (accounting for all development in place at the time the appropriation was granted)
5. Net surface water loss (canal seepage losses)
6. Induced groundwater recharge demands
7. Downstream demands (the proportionate amount of BWS necessary to meet demands downstream of a given basin or subbasin)[20]

### 2.4.1 Surface Water Demand

The surface water demand is calculated in a similar manner as the surface water consumptive use (SWCU) for the BWS. The only differences were that for the surface water demand calculation, the full surface water demand was accounted for (even if that demand may have been unfulfilled in certain years because of shortages to junior water users caused by administration for senior water users).

[20] Similar to required inflows, downstream demands do not represent demands that are required to be met by permit or statute, but rather water that is required under the draft NeDNR methodology and a way to provide more spatially refined evaluations.  See section 2.4.7 for how downstream demands are calculated.

### 2.4.2 Groundwater Consumptive Use Demand

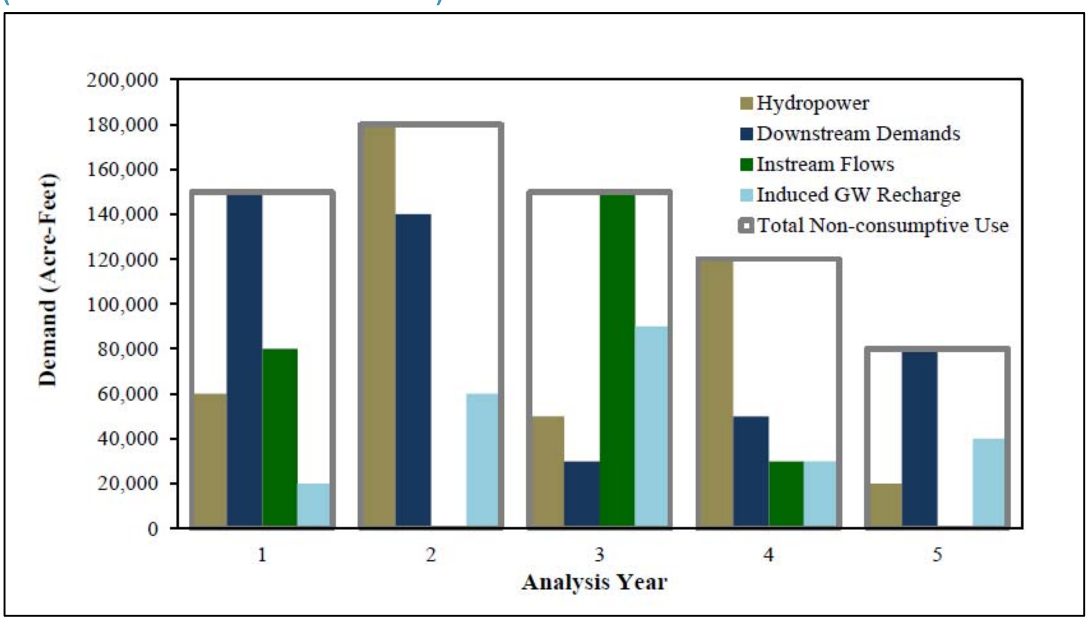
Calculation of long-term groundwater demand relied on the same information that was used to calculate groundwater depletions. The only difference was that the long-term groundwater demand considers groundwater consumption to be the total net irrigation requirement and does not account for lag-effects for the wells located within the hydrologically connected area.

Groundwater withdrawal volumes are summed on an annual basis and then were distributed 70 percent to the non-peak season and 30 percent to the peak season. The proportioning between the seasons was intended to match the observed seasonal pattern of groundwater depletions.[21]

### 2.4.3 Non-Consumptive Use Demands

Non-consumptive use demands are demands on the water supply that are available to meet other demands such as hydropower demands, instream flow, induced groundwater recharge, or downstream demands for consumptive uses. For non-consumptive use demands, the draft NeDNR methodology considers only the greater of the non-consumptive demands. For example, if hydropower exceeds instream flow demands or downstream demands, then only the hydropower demand is applied to a basin. Otherwise, if downstream demands exceed hydropower or instream flow demands, then only that portion of the downstream demand that exceeds these non-consumptive use demands is considered. Figure 4 shows a schematic of how the maximum non-consumptive use is determined on an annual basis.

**Figure 4: Example Plot Showing Maximum Non-Consumptive Use Demand (Source: "INSIGHT Methods" 2015)**



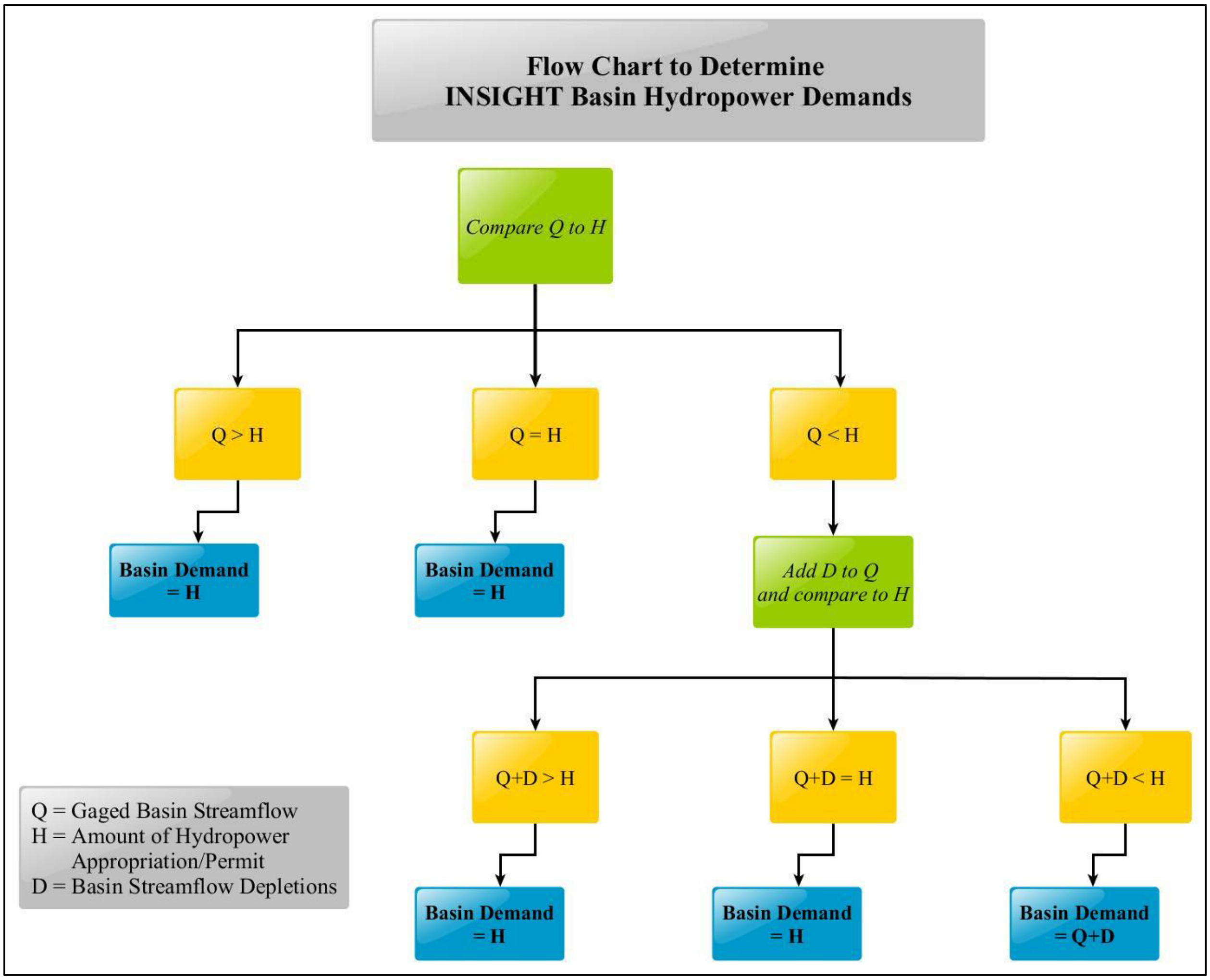

21 See *Water Matters: Stream Depletion and Groundwater Pumping Part One: The Groundwater Balance (No. 4, June 2010)* at https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/water-matters/WaterMatters_No4.pdf and *Stream Depletion and Groundwater Pumping Part Two: The Timing of Groundwater Depletions (No. 5, July 2010)* at https://dnr.nebraska.gov/sites/dnr.nebraska.gov/files/doc/water-planning/water-matters/WaterMatters_No5.pdf for more information.

#### 2.4.3.1 Hydropower Demand

The draft NeDNR methodology evaluates hydropower demands at the basin level. Hydropower demands are evaluated by comparing the daily streamflow through the hydropower plant to the permitted hydropower appropriation. If streamflow is greater than or equal to the hydropower appropriation, the demand is considered the amount of the appropriation, as that is the maximum amount of water permitted for that use. If streamflow is less than the appropriation, then streamflow depletions from groundwater pumping will also be considered in order to determine if undepleted streamflow[22] would be sufficient to meet the appropriation. The depletions are added to the daily streamflow, resulting in the undepleted streamflow. This undepleted streamflow is compared to the hydropower appropriation. If the undepleted streamflow is greater than or equal to the hydropower appropriation, the demand is considered the amount of the appropriation. In the case that the undepleted streamflow available is not adequate to meet the appropriation, the demand for the basin is equal to the undepleted streamflow. Figure 5 illustrates the process used to determine daily hydropower demands for each basin.

[22] Undepleted streamflow is a term coined by NeDNR to describe the cap used in the draft NeDNR methodology when capping a hydropower or instream flow demand.

**Figure 5: Flow Chart to Determine INSIGHT Basin Hydropower Demands (Source: "INSIGHT Methods" 2015)**




### *2.4.3.2 Instream Flow Demands*

Instream flow appropriations exist in the Duncan to North Bend and North Bend to Louisville reaches, as shown in Figure 6. The instream flow statute restricts "available" water by requiring that there be "unappropriated water available to provide the approved instream flow rate at least twenty percent of the time during the period requested."[23] Like hydropower uses, instream flows represent a non-consumptive use demand.

[23] Neb. Rev. Stat. § 46-2,115(1), http://policy.mofcom.gov.cn/GlobalLaw/english/flaw!fetch.action?id=ec383039-0b96-4274-a05a-89a836e93302&pager.pageNo=1#nebraska-chapter46-46-2_115.

**Figure 6. Total Platte River Instream Flow Appropriations (Source: NeDNR)**

Total Platte River Instream Flow Needs
For Purposes of Water Administration
All Quantities in CFS

Central Platte figures in blue (Priority date of 7-25-1990)
Game & Parks figures in red (Priority date of 11-30-1993)
Totals in black

| TIME PERIOD | OVERTON GAGE | ODESSA GAGE | GRAND ISLAND GAGE | DUNCAN GAGE | NORTH BEND GAGE | LOUISVILLE GAGE |
|---|---|---|---|---|---|---|
| January | 500 | 500 | 500 | 500 | 1,800 | 3,100 |
| February | 500 | 500 | 500 | 500 | 1,800 | 3,700 |
| March | 1,100 | 1,100 | 1,100 | 500 | 1,800 | 3,700 |
| April 1-14 | 1,300 | 1,350 (1,300 + 50) | 1,350 (1,300 + 50) | 500 | 1,800 | 3,700 |
| April 15-30 | 1,500 | 1,500 | 1,500 | 500 | 1,800 | 3,700 |
| May 1-3 | 1,500 | 1,500 | 1,500 | 500 | 1,800 | 3,700 |
| May 4-10 | 500 | 1,350 (includes 500) | 1,350 (includes 500) | 500 | 1,800 | 3,700 |
| May 11-31 | 500 | 500 | 500 | 500 | 1,800 | 3,700 |
| June 1-23 | 500 | 1,000 (500 + 500) | 1,000 (500 + 500) | 1,000 (500 + 500) | 1,800 | 3,700 |
| June 24-30 | 600 | 1,000 (600 + 400) | 1,000 (600 + 400) | 1,000 (600 + 400) | 1,800 | 3,700 |
| July 1-31 | 600 | 1,000 (600 + 400) | 1,000 (600 + 400) | 1,000 (600 + 400) | 1,800 | 3,700 |
| August 1-22 | 600 | 800 (600 + 200) | 800 (600 + 200) | 900 (600 + 300) | 1,800 | 3,500 |
| August 23-31 | 500 | 800 (500 + 300) | 800 (500 + 300) | 900 (500 + 400) | 1,800 | 3,500 |
| September | 500 | 500 | 500 | 500 | 1,800 | 3,200 |
| October 1-11 | 1,100 | 1,350 (includes 1,100) | 1,350 (includes 1,100) | 500 | 1,800 | 3,700 |
| October 12-31 | 1,500 | 1,500 | 1,500 | 500 | 1,800 | 3,700 |
| November 1-10 | 1,500 | 1,500 | 1,500 | 500 | 1,800 | 3,700 |
| November 11-30 | 500 | 500 | 500 | 500 | 1,800 | 3,700 |
| December | 500 | 500 | 500 | 500 | 1,800 | 3,700 |

Because the instream flow demand is a non-consumptive use demand, the draft NeDNR methodology compares the daily instream flow demand to the daily-undepleted streamflow similar to the way that the hydropower demands are evaluated. Consistent with the draft NeDNR methodology, if daily-undepleted streamflow is greater than the daily instream flow appropriation, the demand is capped at the daily instream flow appropriation because the demand cannot exceed what is legally permitted.[24] If the daily-undepleted streamflow does not meet the daily instream flow appropriation, then the daily instream flow demand is capped to the daily-undepleted streamflow because the stream cannot generate more water to make up that portion of demand not met.

Consistent with Neb. Rev. Stat. § 46-713(3) of the Ground Water Management and Protection Act, the draft NeDNR methodology further adjusts the instream flow demands by the level of groundwater development in place in 1993.[25] The adjustment to pre-1993 historic flows consists of reducing the observed historic flows by the consumptive use of those acres irrigated

24 Note this description only applies to the draft NeDNR methodology for evaluating demands in a river basin. This statement is not intended to reflect how surface water rights are actually administered with respect to the prior-appropriation doctrine.

25 The Nebraska Game and Parks Commission obtained instream flow appropriations for fish and wildlife purposes in 1993.

by groundwater in 1993. Conceptually, this adjustment incorporates the lag effect of groundwater irrigation in the pre-1993 period that had not yet resulted in depletions to the stream in 1993. Pre-1993 surface water development is inherently included by its ability to use water in priority.

Mathematically, the Instream Flow Demand applied in INSIGHT is as follows:

**INSIGHT Instream Demand = Instream Flow Appropriation (Capped to Undepleted Flow) less 1993 Level of Groundwater Development**

### 2.4.4 Net Surface Water Loss (Canal Seepage)

Net surface water loss is the water loss to seepage during transport. While this water can be beneficial toward recharging the aquifer, it can also represent an additional demand for water at the point of diversion to satisfy a surface water demand downstream. In conducting its evaluation, NeDNR recognized that in certain areas, a portion of this surface water loss demand was met by streamflows that were returned to the stream from upstream uses, and these streamflows were not returned to the stream within the same period (that is, peak or non-peak) or within the same year. Thus, the net surface water loss is intended to represent the difference between the water that was recharged and the water supply increase that it created. For this evaluation, it was assumed that the net surface water loss was the difference of the full diversion and the amount consumed for irrigation. Therefore, estimated canal seepage losses are included in the draft NeDNR methodology as an additional demand. At the time of this report, the draft NeDNR methodology accounts for net surface water losses for the Farwell Main, Central, and South Canals as well as the Mirdan Canal.[26]

### 2.4.5 Alternative Demand Scenarios

The basin accounting methodology described above remains consistent with NeDNR and INSIGHT. During the course of the project, the technical committee requested that alternative demand scenarios be investigated that are more conservative than the demands considered by the draft NeDNR methodology. These additional demand scenarios considered placing a demand on the Lower Platte River Basin equivalent to maintaining 40%, 60%, or 80% of the 25-year (1988-2012) average streamflow (capped to 95% exceedance probability) at Louisville. Additionally, to understand the impact that the hydropower demand has on the Loup and Lower Platte subbasins (Above North Bend and North Bend to Louisville subbasins), the technical committee requested that we evaluate each of the above demand scenarios both with and without the hydropower demand considered.

For reference, the draft NeDNR methodology demand scenario (often referred to simply as the “instream flow demand scenario” in this analysis) considers the maximum of either the induced groundwater recharge demand or the adjusted instream flow demand in the North Bend to Louisville subbasin. This adjusted instream flow demand (948,984 AF) corresponds to maintaining approximately 20% of the 25-year average streamflow in the Platte River at

[26] Due to data availability, the draft NeDNR methodology considers only net surface water losses for certain canals. It should be noted that net surface water losses for other canals could be considered in future analysis.

Louisville as shown in Table 3. The unadjusted instream flow appropriation (2,602,512 AF) corresponds to maintaining approximately 50% of the 25-year average streamflow in the Platte River at Louisville.

**Table 2: Percentage of 25-year Average Streamflow of Platte River at Louisville, Nebraska**

| 100% | 80% | 60% | 40% | 20% |
|---|---|---|---|---|
| 5,306,977 AF | 4,245,582 AF | 3,184,186 AF | 2,122,791 AF | 1,061,395 AF |

*Note: The Louisville gage record has been capped to the 95% exceedance probability prior to calculating the 25-year average streamflow.*

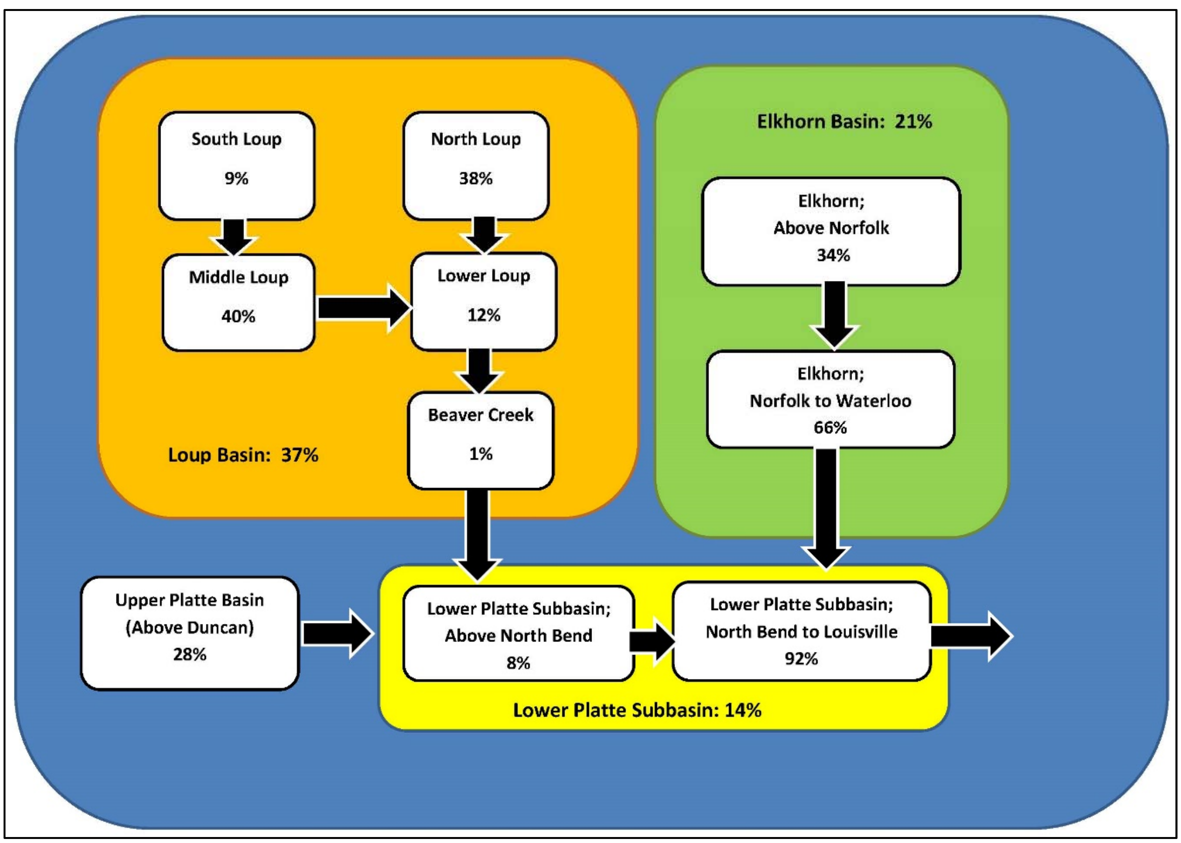
**Table 3: Adjusted and Unadjusted Instream Flow Demand**

| | Instream Flow Demand | Percentage of 25-year Average Streamflow of Platte River at Louisville, Nebraska |
|---|---|---|
| Unadjusted | 2,602,512 AF | 49% |
| Adjusted | 948,984 AF | 18% |

### 2.4.6 Proportioning Supplies and Demands

As mentioned in Section 2.3, it is necessary to calculate the intrinsic supply prior to calculating required inflows or downstream demands because the ratio of intrinsic supplies is used to proportion the supplies and demands. Figure 7 shows a simplified schematic for how basin proportioning in the Lower Platte River Basin would be calculated.

**Figure 7: Schematic of Lower Platte River Basin Intrinsic Basin Water Supply: Non-irrigation Season**



*Note: The percentages used in Figure 7 are for illustration purposes only. The basin proportioning is recalculated by peak or non-peak season for each year.*

Several steps were necessary to determine the contributing proportion of each subbasin. Table 4 shows the basin proportioning[27] for the Lower Platte River Basin. The steps for calculating contributing proportions are as follows:

> **Step 1:** Calculate the intrinsic BWS at the furthest downstream accounting point in a basin (total intrinsic BWS).
>
> **Step 2:** Calculate the intrinsic BWS at each subbasin confluence upstream.
>
> **Step 3:** Calculate the percent contribution for each subbasin relative to the total intrinsic BWS for the basin. This represents the proportion an upper basin contributes to the basin as a whole.

Table 4 shows the basin proportioning for the Lower Platte River Basin accounting. It should be noted that Table 4 displays 25-year averages for illustrative purposes. The draft NeDNR methodology calculates these percentages on an annual basis, as does this analysis.

For those alternative demand scenarios described in Section 2.4.5, the basin proportioning is adjusted slightly from the method described in this section. Because the alternative demand scenarios are theoretical demands only for purposes of this analysis and not required by statute, these demands cannot be applied to the Upper Platte River Basin. Therefore, the only downstream demands applied to the Upper Platte River Basin in the analysis are the induced groundwater recharge demand and the mainstem surface water demands.[28]

**Table 4: Proportion of Intrinsic Supply in the Lower Platte River Basin by Season (25 year average)**

| | Percentage Applied to Instream Flow Demand Scenarios | | Percentage Applied to Alternative Demand Scenarios | |
|---|---|---|---|---|
| **Subbasin** | **Non-Peak Season** | **Peak Season** | **Non-Peak Season** | **Peak Season** |
| Full Loup | 36% | 33% | 51% | 46% |
| *Beaver Creek* | *3%* | *3%* | *4%* | *4%* |
| *Lower Loup* | *12%* | *13%* | *12%* | *13%* |
| *Middle Loup* | *39%* | *36%* | *39%* | *36%* |
| *North Loup* | *37%* | *40%* | *37%* | *40%* |
| *South Loup* | *9%* | *8%* | *9%* | *8%* |
| Full Elkhorn | 21% | 23% | 29% | 32% |
| *Elkhorn Above Norfolk* | *34%* | *26%* | *34%* | *26%* |
| *Elkhorn Norfolk to Waterloo* | *66%* | *74%* | *66%* | *74%* |
| Lower Platte Combined | 14% | 18% | 20% | 22% |

27 Percentages were calculated by averaging the annual percentages over the 1988-2012 period of analysis.

28 At the time of this report, the draft NeDNR methodology does not apply instream flow demands below Duncan to the Upper Platte River Basin. This could change in future NeDNR evaluations.

| | | | | |
|---|---|---|---|---|
| *Lower Platte Above North Bend* | *8%* | *30%* | *8%* | *30%* |
| *Lower Platte North Bend to Louisville* | *92%* | *70%* | *92%* | *70%* |
| Upper Platte | 29% | 26% | *N/A* | *N/A* |

### 2.4.7 Required Inflow and Downstream Demand

The required inflow term is used to recognize the historic contribution of BWS from an upstream basin. Similarly, downstream demands are used to reflect the portion of mainstem surface water demand of a downstream subbasin that has historically been satisfied by water originating in an upstream basin. This is done because water development (issuing of rights) in a lower basin was based on BWS that was historically available at the time the surface water appropriation was granted. Because an upstream basin's water supply represents only a portion of the total downstream basin's total water supply, only a portion of the downstream basin's demand is applied to an upstream basin. The proportioning discussed in Section 2.4.6 is used to assign downstream demands to upstream basins as well as to calculate required inflow from upstream basins to downstream basins. These terms cancel out at the whole basin level.

Downstream demands are those mainstem surface water, non-consumptive use demands, and net surface water loss demands in downstream subbasins that have historically relied on water supply from an upstream basin. Downstream groundwater demands are not assigned to upstream basins. The following are the formulas used for calculating the required inflow and downstream demands in the Lower Platte River Basin.

**Middle Loup, Required Inflow**
**(% South Loup to Middle Loup) x**
**(Middle Loup Subbasin: Mainstem SW Demand + Net SW Loss)**

**Lower Loup, Required Inflow**
**(% North Loup to Lower Loup + % South Loup to Lower Loup + % Middle Loup to Lower Loup) x**
**(Lower Loup Subbasin: Mainstem SW Demand + Max Non-Consumptive Use Demand**

**Beaver Creek, Required Inflow**
**(% North Loup to Beaver Creek + % South Loup to Beaver Creek + % Middle Loup to Beaver Creek + % Lower Loup to Beaver Creek) x**
**(Beaver Creek Subbasin: Mainstem SW Demand**

**<u>Elkhorn River, Norfolk to Waterloo, Required Inflow</u>**
**(% Elkhorn Above Norfolk to Elkhorn Norfolk to Waterloo) x**
**(Elkhorn Norfolk to Waterloo Subbasin: Mainstem SW Demand)**

**<u>Lower Platte River, Duncan to North Bend, Required Inflow</u>**
**(% Upper Platte to Lower Platte Above North Bend + % Full Loup to Lower Platte Above North Bend(A)) x**
**(Lower Platte Above North Bend Subbasin: Main SW Demand) +**
**(% Full Loup to Lower Platte Above North Bend) x (North Bend Instream Flow Demand(B))**

***Note (A): The draft NeDNR methodology uses ½ times the streamflow leaving the Loup basin for the hydropower scenarios.***
***Note (B): The draft NeDNR methodology does not presently assign instream flow demands for the reach below Duncan to the Upper Platte basin.***

**<u>Lower Platte River, North Bend to Louisville, Required Inflow</u>**

**(% Upper Platte to Lower Platte North Bend to Louisville +**
**% Full Loup to Lower Platte North Bend to Louisville[(A)] +**
**% Full Elkhorn to Lower Platte North Bend to Louisville +**
**% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Main SW Demand) +**
**MAX:**
**{(% Full Loup to Lower Platte North Bend to Louisville +**
**% Full Elkhorn to Lower Platte North Bend to Louisville +**
**% Lower Platte Above North Bend to Lower Platte North Bend to Louisville ) x**
**(Louisville Instream Flow Demand[(B)]);**
**OR**
**(% Upper Platte to Lower Platte North Bend to Louisville +**
**% Full Loup to Lower Platte North Bend to Louisville +**
**% Full Elkhorn to Lower Platte North Bend to Louisville +**
**% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Induced Groundwater Recharge Demand);**
**OR**
**(% Full Loup to Lower Platte North Bend to Louisville +**
**% Full Elkhorn to Lower Platte North Bend to Louisville +**
**% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(% Streamflow at Louisville[(C)])}**

*Note (A): The draft NeDNR methodology uses ½ times the streamflow leaving the Loup basin for the hydropower scenarios.*
*Note (B): The draft NeDNR methodology does not presently assign instream flow demands for the reach below Duncan to the Upper Platte basin.*
*Note (C): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.*

**North Loup, Downstream Demand**

**(% North Loup to Lower Loup) x (Lower Loup Subbasin: Mainstem SW Demand) +**
**(% North Loup to Beaver Creek) x (Beaver Creek Subbasin: Mainstem SW Demand) +**
**(% North Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Mainstem SW Demand) +**
**(% North Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% North Loup to Lower Loup) x (Lower Loup Subbasin: Hydropower Demand) ;**
**OR**
**(% North Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Instream Flow Demand);**
**OR**
**(% North Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% North Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% North Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**<u>South Loup, Downstream Demand</u>**

**(% South Loup to Middle Loup) x (Middle Loup Subbasin: Mainstem SW Demand + Net SW Loss) +**
**(% South Loup to Lower Loup) x (Lower Loup Subbasin: Mainstem SW Demand) +**
**(% South Loup to Beaver Creek) x (Beaver Creek Subbasin: Mainstem SW Demand) +**
**(% South Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Mainstem SW Demand) +**
**(% South Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% South Loup to Lower Loup) x (Lower Loup Subbasin: Hydropower Demand) ;**
**OR**
**(% South Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Instream Flow Demand);**
**OR**
**(% South Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% South Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% South Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**Middle Loup, Downstream Demand**

**(% Middle Loup to Lower Loup) x (Lower Loup Subbasin: Mainstem SW Demand) +**
**(% Middle Loup to Beaver Creek) x (Beaver Creek Subbasin: Mainstem SW Demand) +**
**(% Middle Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Mainstem SW Demand) +**
**(% Middle Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% Middle Loup to Lower Loup) x (Lower Loup Subbasin: Hydropower Demand) ;**
**OR**
**(% Middle Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Instream Flow Demand);**
**OR**
**(% Middle Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% Middle Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% Middle Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**Lower Loup, Downstream Demand**

**(% Lower Loup to Beaver Creek) x (Beaver Creek Subbasin: Mainstem SW Demand) +**
**(% Lower Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Mainstem SW Demand) +**
**(% Lower Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% Lower Loup to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Instream Flow Demand);**
**OR**
**(% Lower Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% Lower Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% Lower Loup to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**Elkhorn River, Above Norfolk, Downstream Demand**

**(% Elkhorn Above Norfolk to Elkhorn Norfolk to Waterloo) x**
**(Elkhorn Norfolk to Waterloo Subbasin: Mainstem SW Demand) +**
**(% Elkhorn Above Norfolk to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% Elkhorn Above Norfolk to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% Elkhorn Above Norfolk to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% Elkhorn Above Norfolk to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**<u>Elkhorn River, Norfolk to Waterloo, Downstream Demand</u>**

**(% Elkhorn Norfolk to Waterloo to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% Elkhorn Norfolk to Waterloo to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% Elkhorn Norfolk to Waterloo to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% Elkhorn Norfolk to Waterloo to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

**<u>Upper Platte River (Above Duncan), Downstream Demand</u>**

**(% Upper Platte to Lower Platte Above North Bend) x**
**(Lower Platte Above North Bend Subbasin: Mainstem SW Demand) +**
**(% Upper Platte to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**(% Upper Platte to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand)**

***Note (A): The draft NeDNR methodology does not presently assign instream flow demands for the reach below Duncan to the Upper Platte basin.***
***Note (B): The demand scenarios for maintaining 40%, 60%, and 80% of streamflow at Louisville is unique to this analysis and not a requirement by statute; therefore, these terms are not included in this calculation.***

**<u>Lower Platte River, Duncan to North Bend, Downstream Demand</u>**

**(% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Mainstem SW Demand) +**
**MAX:**
**{(% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Induced Groundwater Recharge Demand);**
**OR**
**(% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: Instream Flow Demand);**
**OR**
**(% Lower Platte Above North Bend to Lower Platte North Bend to Louisville) x**
**(Lower Platte North Bend to Louisville Subbasin: % Streamflow at Louisville[(A)])}**

***Note (A): This last demand applies only to the scenarios where considering maintaining 40%, 60%, or 80% of the streamflow at Louisville.***

## 2.5 Basin Water Supply

As discussed in Section 2.3, the BWS is made up of four components: 1) streamflow (or reach-gain); 2) surface water consumptive use; 3) groundwater depletions; and 4) required inflow, which is the amount of water that is necessary to flow out of basins or subbasins upstream to a given location. Required inflow does not represent water that is required by law or permit, but rather water that is required under the draft NeDNR methodology.

The intrinsic supply is the same as the BWS but does not include the required inflow term (intrinsic supply = streamflow (or reach-gain) + surface water consumptive use + groundwater depletions). It is necessary to calculate the intrinsic supply first because the ratio of intrinsic supplies is used to calculate the required inflow and downstream demand terms, as discussed in Section 2.4.7). With all terms calculated, the BWS can now be calculated. The formula for BWS is as follows:

**BWS = Streamflow (or reach-gain) + SWCU + GWDP + Required Inflow**

**Table 5: Components of BWS by Subbasin**

| Subbasin | Streamflow/ Reach Gain | Surface water Consumptive Use | Groundwater Depletions | Required Inflow[A] |
|---|---|---|---|---|
| Lower Platte; Above North Bend | X | X | X | X |
| Lower Platte; North Bend to Louisville | X | X | X | X |
| Beaver Creek | X | X | X | X |
| Lower Loup | X | X | X | X |
| Middle Loup | X | X | X | X |
| North Loup | X | X | X | |
| South Loup | X | X | X | |
| Elkhorn; Above Norfolk | X | X | X | |
| Elkhorn; Norfolk to Waterloo | X | X | X | X |

*(A) The Upper Platte contributes to the required inflow for the Above North Bend and North Bend to Louisville sub-basins.*

## 2.6 Draft Near-Term Demand & Near-Term Balance

The draft NeDNR methodology used the BWS concept in conjunction with Total Demand (TD) to determine the balance of water supply and water use. The BWS recreates, at any defined timestep, the amount of streamflow water supply available for use, while the TD, at any defined timestep, recreates the total demand on streamflow water supplies, including those demands that may not always be met. The comparison of these two values is the basis for determining the balance of supplies and uses.

As previously discussed in Section 2.0, NeDNR evaluates the basin on both a seasonal and annual period. The two sub-periods within the year are the "Peak Season" (June 1 through August 31) and the "Non-peak Season" (September 1 through May 31). If a basin's near-term demand and/or the long-term demand of hydrologically connected groundwater and surface water exceeds the BWS during either of the two sub-periods when summed over the time period (1988 to 2012) used in the annual evaluation, then a basin is deemed fully appropriated.

The difference between the near-term and long-term demands is that the near-term demand calculation considers the groundwater depletion (current effect of wells on the stream) while the long-term calculation considers the groundwater consumption (full impact of wells on a hydrologically connected stream). The formula for the near-term demand is as follows:

**Near-term Demand = GWDP + SW Demand + Net SW Loss + Max Non-Consumptive Use Demand**

**Table 6: Components of Demand by Subbasin**

| Subbasin | Ground-water Demand | Surface Water Demand | Net SW Loss | Instream Flow Demand | Hydro-power Demand | Down-stream Demand |
|---|---|---|---|---|---|---|
| Lower Platte; Above North Bend | X | X | | X | | X |
| Lower Platte; North Bend to Louisville | X | X | | X | | |
| Beaver Creek | X | X | | | | X |
| Lower Loup | X | X | | | X | X |
| Middle Loup | X | X | X | | | X |
| North Loup | X | X | X | | | X |
| South Loup | X | X | | | | X |
| Elkhorn; Above Norfolk | X | X | | | | X |
| Elkhorn; Norfolk to Waterloo | X | X | | | | X |

With the near-term demand calculated, the near-term balance is calculated using the following formula:

**Near-term Balance = BWS – Near-term Demand**

## 2.7 Draft Long-Term Demand & Long-Term Balance

The difference between the near-term and long-term demands is that the near-term demand calculation considers the groundwater depletion (current effect of wells on the stream) while the long-term calculation considers the groundwater consumption (full impact of wells on a hydrologically connected stream). The formula for the long-term demand is as follows:

**Long-term Demand = GWCU + SW Demand + Net SW Loss + Max Non-Consumptive Use Demand**

With the long-term demand calculated, the long-term balance is calculated using the following formula:

**Long-term Balance = BWS – Long-term Demand**

# 3.0 Results

The results of the following eight demand scenarios are presented in this section:

1. Draft NeDNR methodology; Loup hydropower demand not applied
2. Draft NeDNR methodology with an additional demand equivalent to maintaining 40% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand not applied
3. Draft NeDNR methodology with an additional demand equivalent to maintaining 60% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand not applied
4. Draft NeDNR methodology with an additional demand equivalent to maintaining 80% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand not applied
5. Draft NeDNR methodology; Loup hydropower demand applied
6. Draft NeDNR methodology with an additional demand equivalent to maintaining 40% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand applied
7. Draft NeDNR methodology with an additional demand equivalent to maintaining 60% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand applied
8. Draft NeDNR methodology with an additional demand equivalent to maintaining 80% of the 1988-2012 average streamflows at Louisville; Loup hydropower demand applied

Figure 8 shows the 1988-2012 25-year average calculated supplies in the Full Lower Platte River Basin (inclusive of the Loup Basin, Elkhorn Basin, and Lower Platte Subbasins). Note that the supply does not change by demand scenario for either the Loup or the Elkhorn Subbasin. This is because required inflows are not calculated at the top of a basin. Therefore, the supply for the Loup and Elkhorn Basins is based on only the surface water consumptive uses, groundwater depletions, and streamflow gain. None of these terms will change under any of the above-described demand scenarios; therefore, the supply is static for the Loup and Elkhorn Basins.

The supply terms do change for the Lower Platte Subbasin (Above North Bend and North Bend to Louisville combined). This occurs because the Lower Platte Subbasin has the Upper Platte, Loup, and Elkhorn Basins upstream that contribute water. Because of this, the required inflow term is included for the Lower Platte Subbasin. It is the change in magnitude of this required inflow term that result in the change in the supply term for the Lower Platte Subbasin for each of the demand scenarios.

The first four bars of Figure 8 represent the supply scenarios without the hydropower demand applied upstream whereas the last four bars represent the demands where the hydropower demand upstream is included. To recognize the large volume of water exiting the Loup Basin under the hydropower scenario (a non-consumptive use that can be used for consumptive uses downstream), the draft NeDNR methodology uses the streamflow exiting the Loup Basin in lieu of calculating a required inflow into the Lower Platte Subbasin from the Loup Basin. This supply scenario corresponds to the fifth bar in Figure 8. This streamflow exiting the Loup Basin exceeds the calculated required inflow for the instream demand and the demand associated with maintaining 40% of the 25-year average streamflow in the Platte River at Louisville (comparing the first and second bars against the fifth and sixth bars). For the demand associated with maintaining 60% and 80% of the 25-year average streamflow in the Platte River at Louisville, the calculated inflow exceeds the streamflow exiting the Loup Basin under the hydropower scenario (the third and fourth bars are equal in magnitude to the seventh and eighth bars, which both exceed the fifth and sixth bars).

**Figure 8: Annual Supply Plot for the Full Lower Platte River Basin**

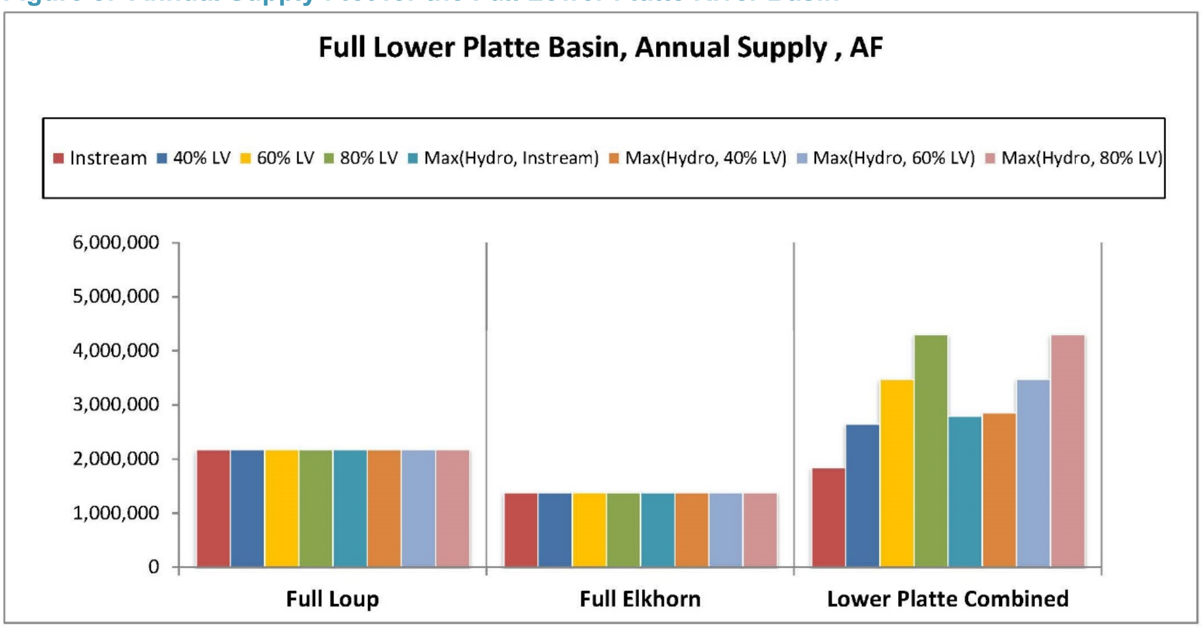
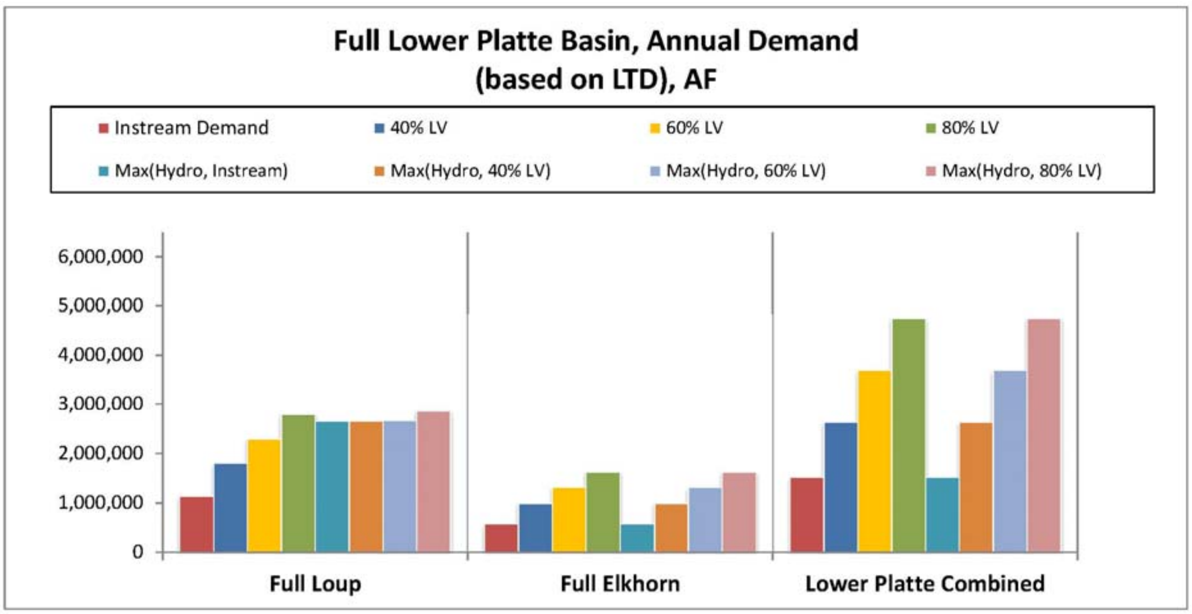



Figure 9 shows the 1988-2012 25-year average calculated long-term demands in the Lower Platte River Basin. The first four bars represent the demand scenarios without the hydropower demand applied whereas the last four bars represent the demands where the hydropower demand is included. The demand represented in INSIGHT corresponds to the fifth bar.

For the Loup Basin, the first four bars show a steadily increasing demand associated with the instream flow demand and the demand associated with maintaining 40%, 60%, and 80% of the 25-year average streamflow in the Platte River at Louisville, respectively. The fifth, sixth, and seventh bars show that the Loup hydropower demand exceeds the without hydropower demand scenarios for the instream flow demand and the demand associated with maintaining 40% and 60% of the 25-year average streamflow in the Platte River at Louisville; however, the eighth bar is equal in magnitude to the fourth bar, showing that the demand associated with maintaining 80% of the 25-year average streamflow in the Platte River at Louisville exceeds the Loup hydropower demand.

For the Elkhorn Basin and Lower Platte Subbasin, the Loup hydropower does not exist in either basin; therefore, the hydropower demand has no effect, and the first set of four bars repeats itself. Both sets are shown for completeness.

**Figure 9: Annual Long-term Demand Plot for the Full Lower Platte River Basin**




The supplies and demands (both annual and seasonal) for Figures 8 and 9 as well as each subbasin within these three basins are shown in more detail in tabular format in Attachment 1.

With the supplies and long-term demands calculated, the excess supplies were calculated as described in Section 2.7. Figure 10 shows the 1988-2012 25-year average calculated annual excess supply for the Lower Platte River Basin. Similar to the previous plots, the first four bars represent the demand scenarios without the hydropower demand applied whereas the last four bars represent the demands where the hydropower demand is included. The excess supply corresponding to the draft NeDNR methodology corresponds to the fifth bar.

For the Loup Basin, there is a surplus of supply (calculated supplies exceed calculated demands) for the demand scenarios where the instream demand or the demand associated with maintaining 40% of the 25-year average streamflow in the Platte River at Louisville when the hydropower demand is not applied. For the demand scenarios where the demand associated with maintaining 60% or 80% of the 25-year average streamflow in the Platte River is applied or for the scenarios where the hydropower demand is applied, there is a deficit in the Loup Basin.

For the Elkhorn Basin, there is a surplus of supply for the instream flow demand scenario as well as the demand scenarios where the demand associated with maintaining 40% or 60% of the 25-year average streamflow in the Platte River at Louisville is applied. There is a shortage when the demand associated with maintaining 80% of the 25-year average streamflow in the Platte River at Louisville is applied.

For the Lower Platte Subbasin, there is a surplus under the demand scenario where the instream flow demand is applied as well as the demand scenarios where the demand associated with maintaining 40% of the 25-year average streamflow in the Platte River at Louisville is applied. There is a shortage for the scenarios where the demand associated with maintaining 60% or 80% of the 25-year average streamflow in the Platte River at Louisville. The fifth bar (corresponding with what is currently used in the draft NeDNR methodology) shows a large surplus in the Lower Platte Subbasin when applying the instream flow demand and including the streamflow exiting the Loup Basin as an inflow into the Lower Platte Subbasin. This surplus greatly reduces when the demand associated with maintaining 40% of the 25-year average streamflow at Louisville is applied (sixth bar). The seventh and eighth bars reflect a deficit in the Lower Platte Subbasins when the demand associated with maintaining 60% or 80% of the 25-year average streamflow in the Platte River at Louisville is applied.

**Figure 10: Annual Excess Supply Plot for the Full Lower Platte River Basin**

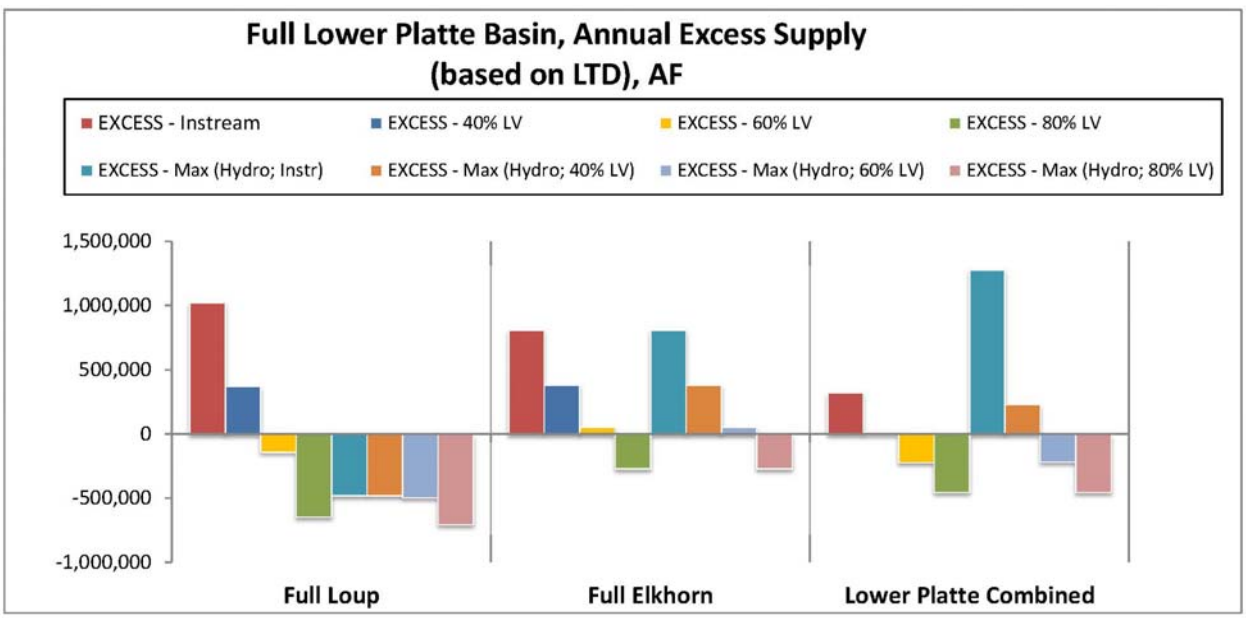



Table 7 corresponds to the annual excess supply numbers shown in Figure 10. The annual excess supply numbers for the subbasins within the Lower Platte, Elkhorn, and Loup Subbasins are shown in Tables 8, 9, and 10, respectively.

**Table 7: Annual Excess Supply by Subbasin by Demand Scenario**

| Demand Scenario | Elkhorn Subbasin | Loup Subbasin | Lower Platte Subbasin |
|---|---|---|---|
| Max(20% SF @ LV, Instream) | 810,517 | 1,022,674 | 318,432 |
| Max(40% SF @ LV, Instream) | 381,044 | 369,113 | 19,443 |
| Max(60% SF @ LV, Instream) | 56,571 | (136,377) | (218,721) |
| Max(80% SF @ LV, Instream) | (267,901) | (641,903) | (452,124) |
| Max(Hydro, 20% SF @ LV, Instream) | 810,517 | (489,937) | 1,278,596 |
| Max(Hydro, 40% SF @ LV, Instream) | 381,044 | (503,812) | 229,629 |
| Max(Hydro, 60% SF @ LV, Instream) | 56,571 | (531,363) | (215,945) |
| Max(Hydro, 80% SF @ LV, Instream) | (267,901) | (721,037) | (452,124) |

**Table 8: Annual Excess Supply for the Lower Platte Subbasins by Demand Scenario (based on long-term demand)**

| Demand Scenario | Lower Platte Above North Bend | Lower Platte North Bend to Louisville |
|---|---|---|
| Max(20% SF @ LV, Instream) | 31,695 | 286,737 |
| Max(40% SF @ LV, Instream) | 2,430 | 17,013 |
| Max(60% SF @ LV, Instream) | (25,242) | (193,480) |
| Max(80% SF @ LV, Instream) | (51,785) | (400,339) |
| Max(Hydro, 20% SF @ LV, Instream) | 124,996 | 1,153,601 |
| Max(Hydro, 40% SF @ LV, Instream) | 37,292 | 192,337 |
| Max(Hydro, 60% SF @ LV, Instream) | (24,549) | (191,396) |
| Max(Hydro, 80% SF @ LV, Instream) | (51,785) | (400,339) |

**Table 9: Annual Excess Supply for the Elkhorn Subbasins by Demand Scenario (based on long-term demand)**

| Demand Scenario | Elkhorn Above Norfolk | Elkhorn Norfolk to Waterloo |
|---|---|---|
| Max(20% SF @ LV, Instream) | 250,079 | 560,438 |
| Max(40% SF @ LV, Instream) | 115,577 | 265,467 |
| Max(60% SF @ LV, Instream) | 13,785 | 42,786 |
| Max(80% SF @ LV, Instream) | (88,007) | (179,894) |
| Max(Hydro, 20% SF @ LV, Instream) | 250,079 | 560,438 |
| Max(Hydro, 40% SF @ LV, Instream) | 115,577 | 265,467 |
| Max(Hydro, 60% SF @ LV, Instream) | 13,785 | 42,786 |
| Max(Hydro, 80% SF @ LV, Instream) | (88,007) | (179,894) |

**Table 10: Annual Excess Supply for the Loup Subbasins by Demand Scenario (based on long-term demand)**

| Demand Scenario | Lower Loup | Middle Loup | North Loup | South Loup | Beaver Creek |
|---|---|---|---|---|---|
| Max(20% SF @ LV, Instream) | 142,020 | 417,830 | 410,409 | 96,141 | (43,726) |
| Max(40% SF @ LV, Instream) | 56,885 | 168,554 | 162,556 | 38,719 | (57,601) |
| Max(60% SF @ LV, Instream) | (6,975) | (24,098) | (28,183) | (5,171) | (71,951) |

| | | | | | |
|---|---|---|---|---|---|
| Max(80% SF @ LV, Instream) | (70,834) | (216,750) | 218,921) | (49,060) | (86,338) |
| Max(Hydro, 20% SF @ LV, Instream) | (52,338) | (177,266) | (177,583) | (39,025) | (43,726) |
| Max(Hydro, 40% SF @ LV, Instream) | (52,338) | (177,266) | (177,583) | (39,025) | (57,601) |
| Max(Hydro, 60% SF @ LV, Instream) | (54,143) | (182,111) | (183,059) | (40,099) | (71,951) |
| Max(Hydro, 80% SF @ LV, Instream) | (79,228) | (249,072) | (250,573) | (55,826) | (86,338) |

The excess supply numbers for the non-peak and peak seasons for all basins are shown in more detail in tabular format in Attachment 1.

The results presented in this section thus far have represented excess supply calculations based on the long-term demand (full groundwater consumptive use). As described in Section 2.4.2, the difference between near-term and long-term demand is that the near-term demand is the groundwater term. The near-term demand uses the groundwater depletions while the long-term demand uses the full groundwater consumptive use and does not account for the lag-effects for the wells located within the hydrologically connected area. Figures 11, 12, and 13 show a comparison of the 25-year average groundwater depletions versus the 25-year average groundwater consumptive use numbers for the Loup, Elkhorn, and Lower Platte Subbasins, respectively.

**Figure 11: Loup River Basin, Lag Effect (based on 25-year averages)**

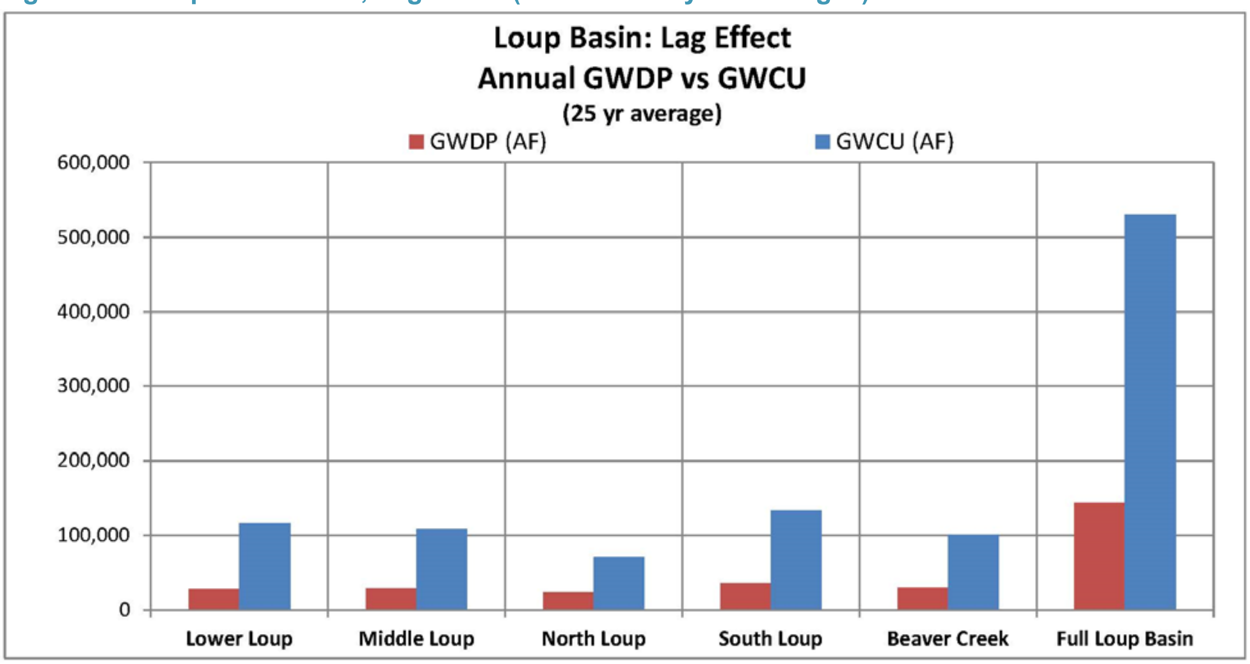


**Figure 12: Elkhorn River Basin, Lag Effect (based on 25-year averages)**

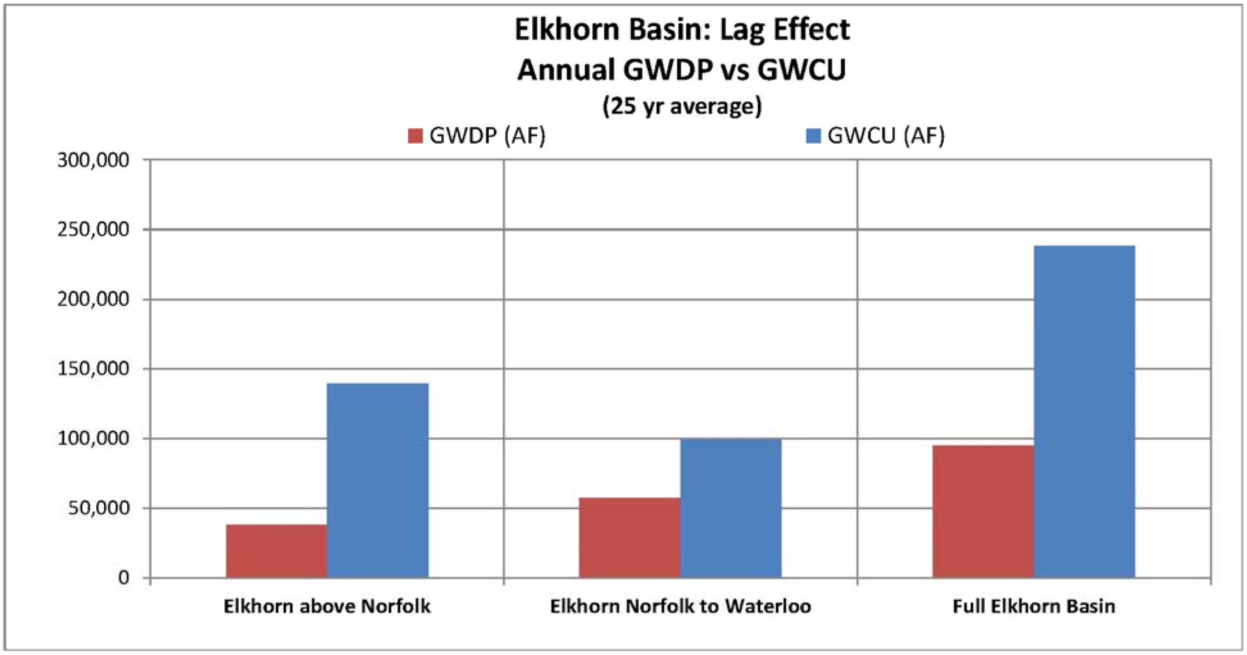
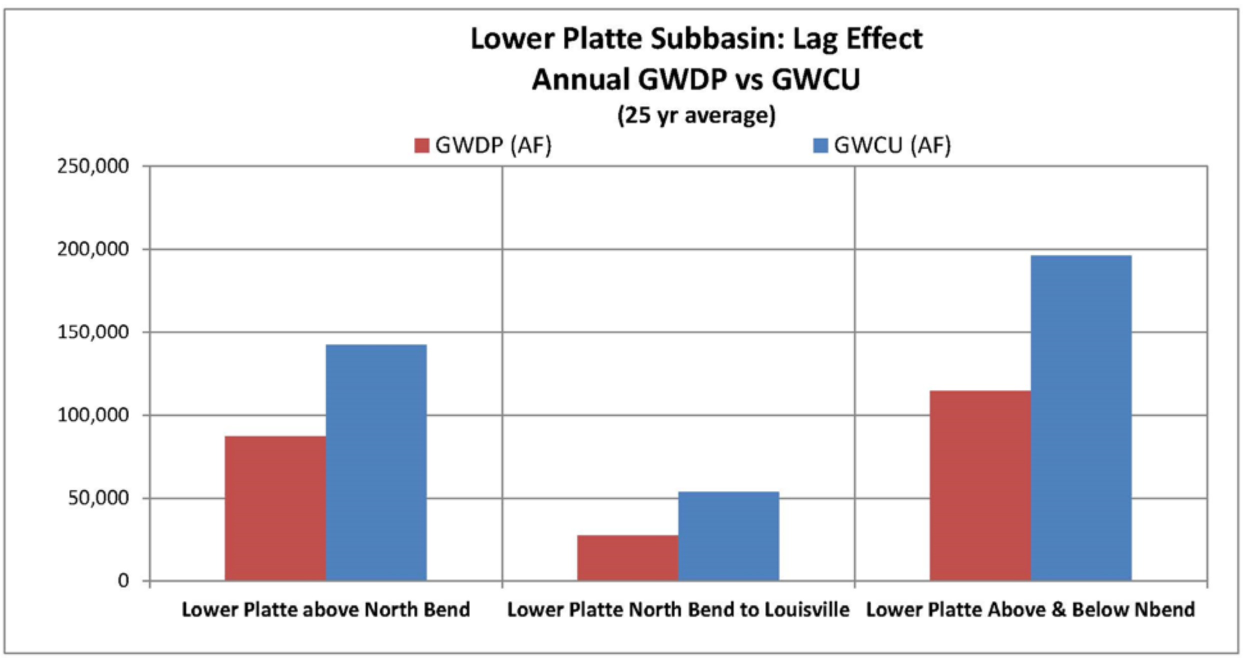



**Figure 13: Lower Platte River Subbasins, Lag Effect (based on 25-year averages)**

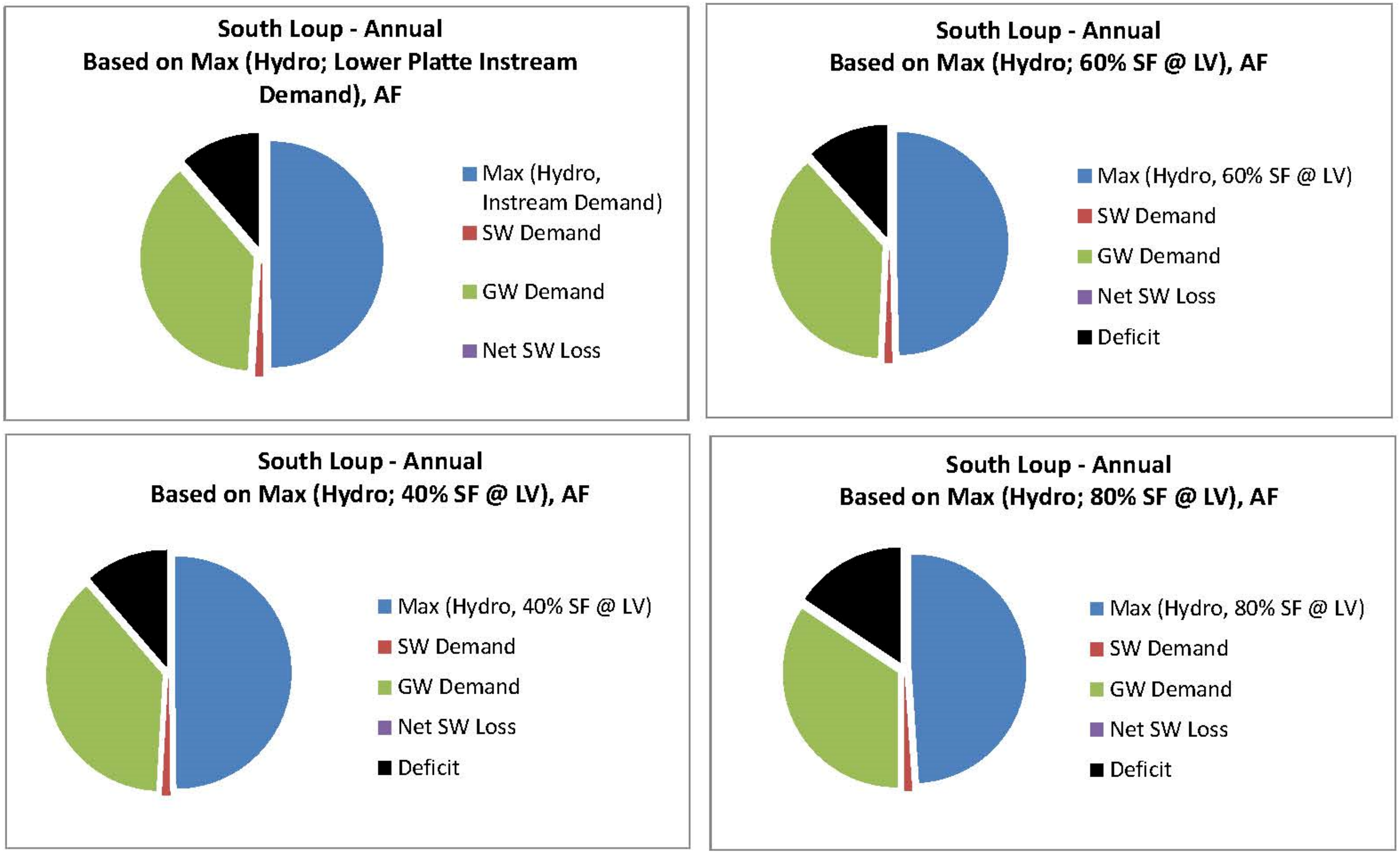



Because the only difference between near-term and long-term demands is the groundwater term, it holds that the only difference between the near-term excess supply and long-term excess supply is also the groundwater term. Therefore, the magnitude of difference between near-term and long-term demands (shown in Figures 11, 12, and 13) is the same as the magnitude of difference between the near-term and long-term excess supplies.

## 3.1 Nature and Extent of Use

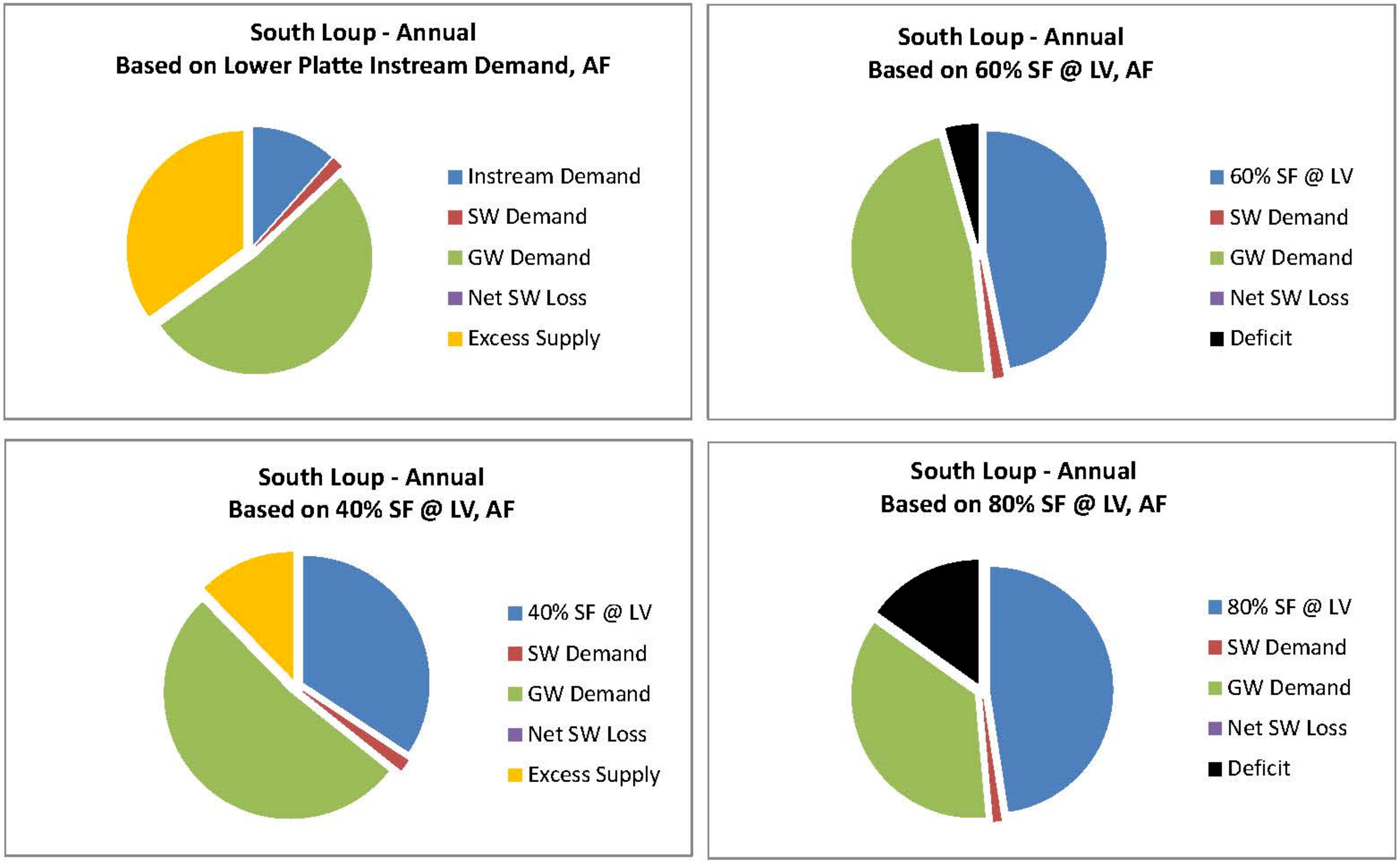
The nature and extent of use are displayed in pie charts and provide information on the general distribution of water demands for a given basin. These pie charts provide information on the relative magnitude of each demand within a subbasin and can help the NRD manager easily identify the driver of demands in a subbasin. This is another powerful informational tool as it can help the NRD target management or conservation efforts toward the demands where the biggest impact can be made. The pie charts also include apiece showing the excess supply. If the pie piece associated with the excess supply is gold in color, then the excess supply is a positive number and supplies exceed demands in the subbasin. If the pie piece associated with excess supply is black in color, then the demands exceed the supply and there is a deficit. Figures 14A through 25 show the nature and extent of use in each basin and subbasin in the Lower Platte River Basin.

**Figure 14A:  Nature and Extent of Use, Annual Plots – South Loup Sub-basin**



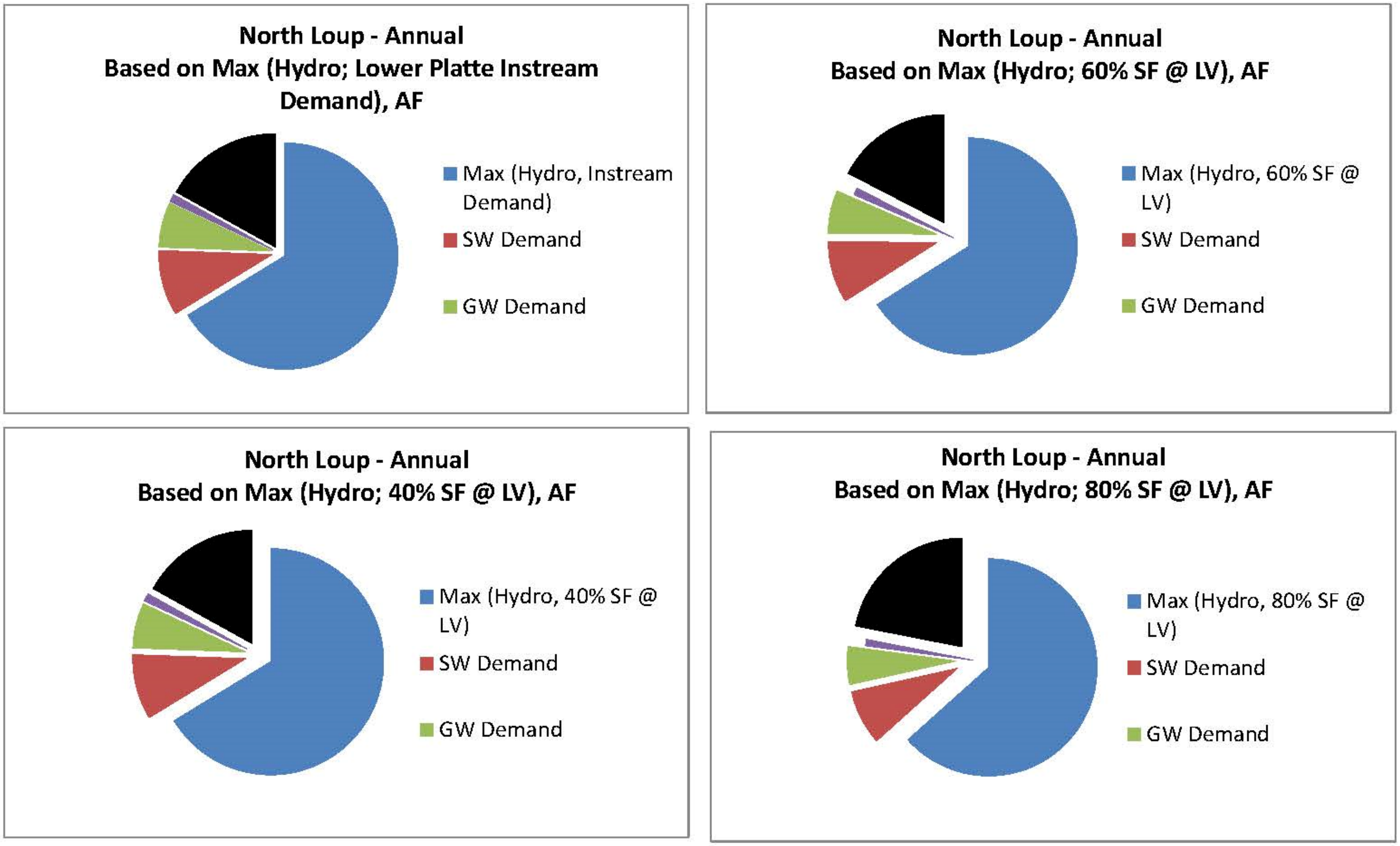

*Note: Excess supply colored yellow indicates a surplus.  Excess supply colored black denotes a deficit.*

**Figure 14B: Nature and Extent of Use, Annual Plots – South Loup Sub-basin**



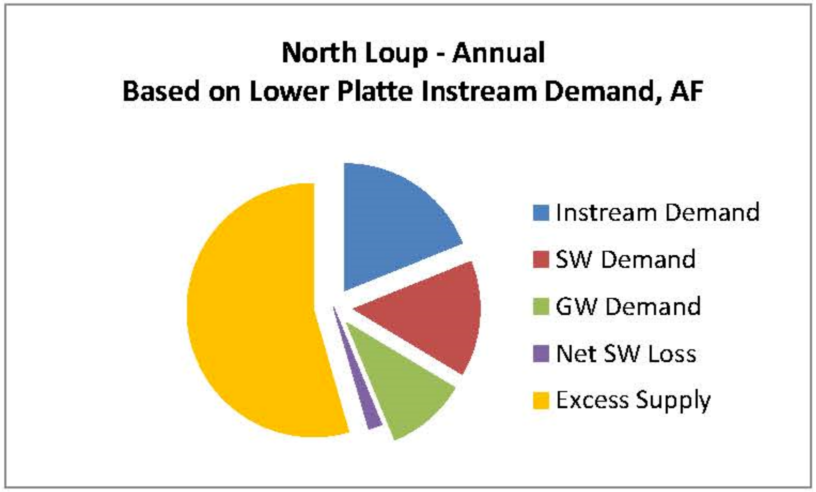

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

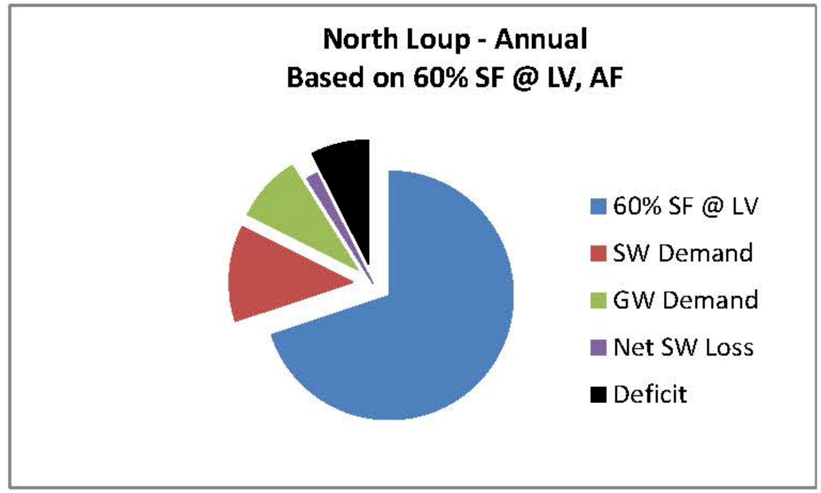
**Figure 15A: Nature and Extent of Use, Annual Plots – North Loup Sub-basin**

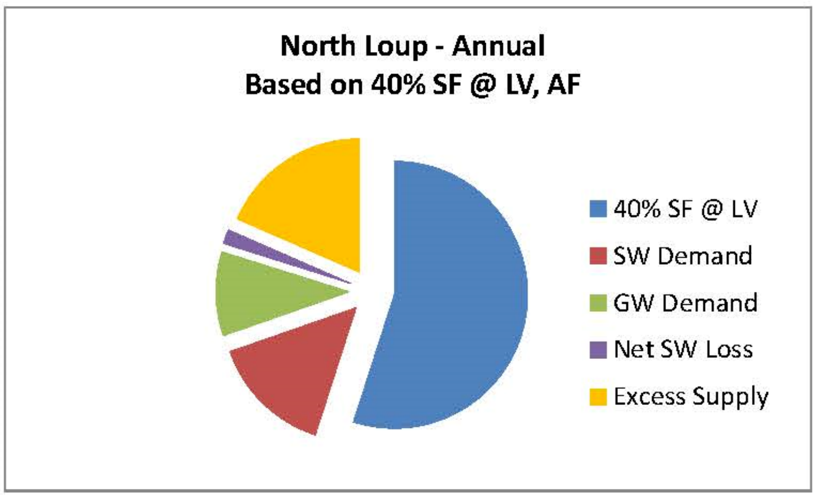


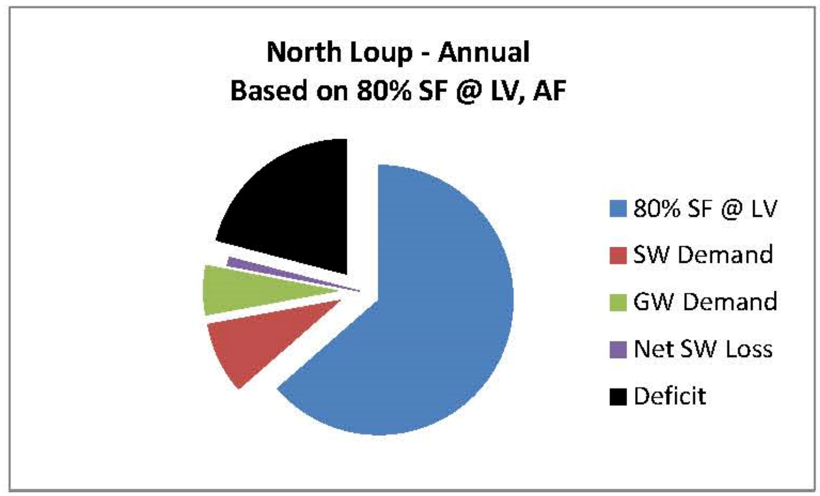

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

### Figure 15B: Nature and Extent of Use, Annual Plots – North Loup Sub-basin



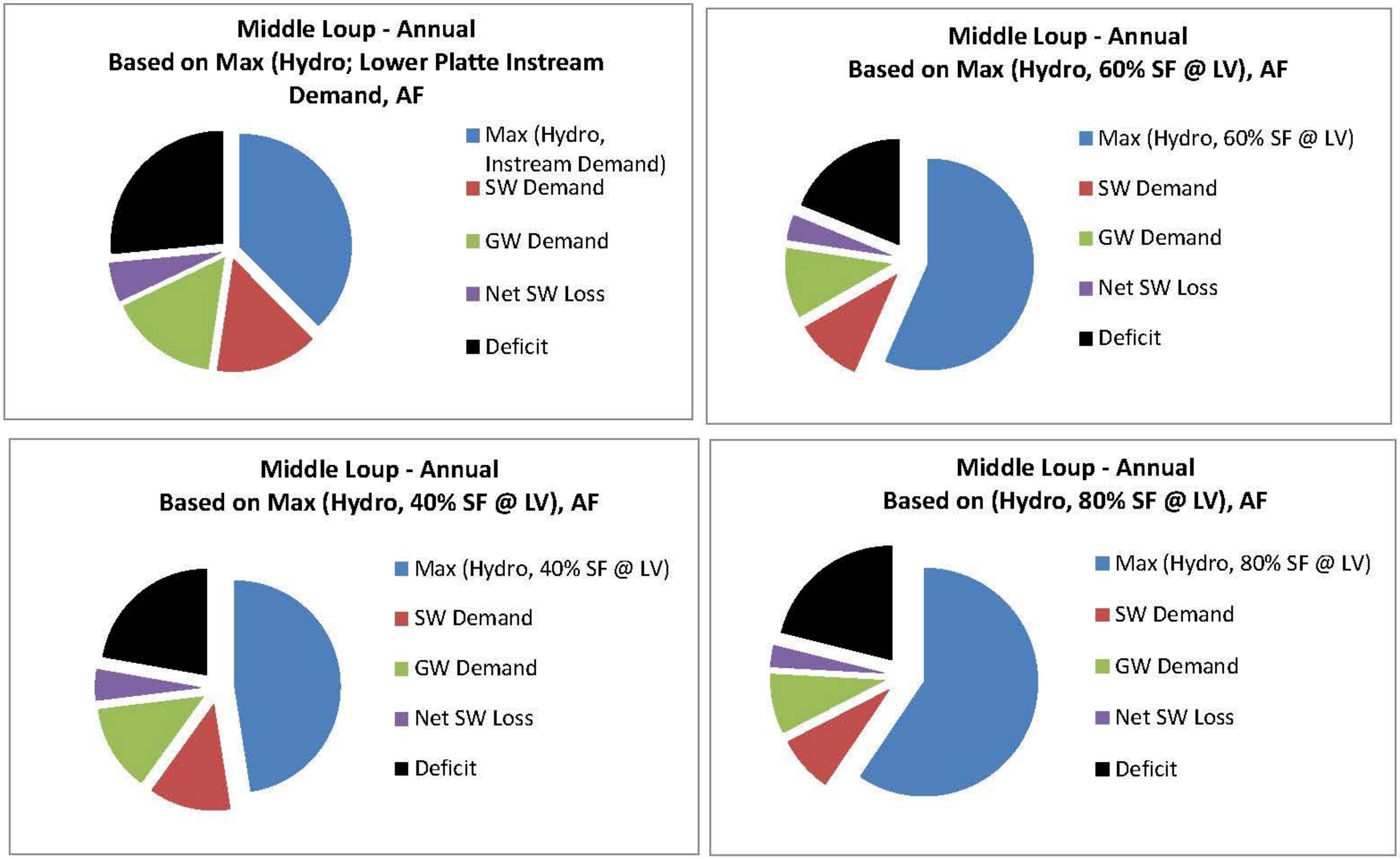



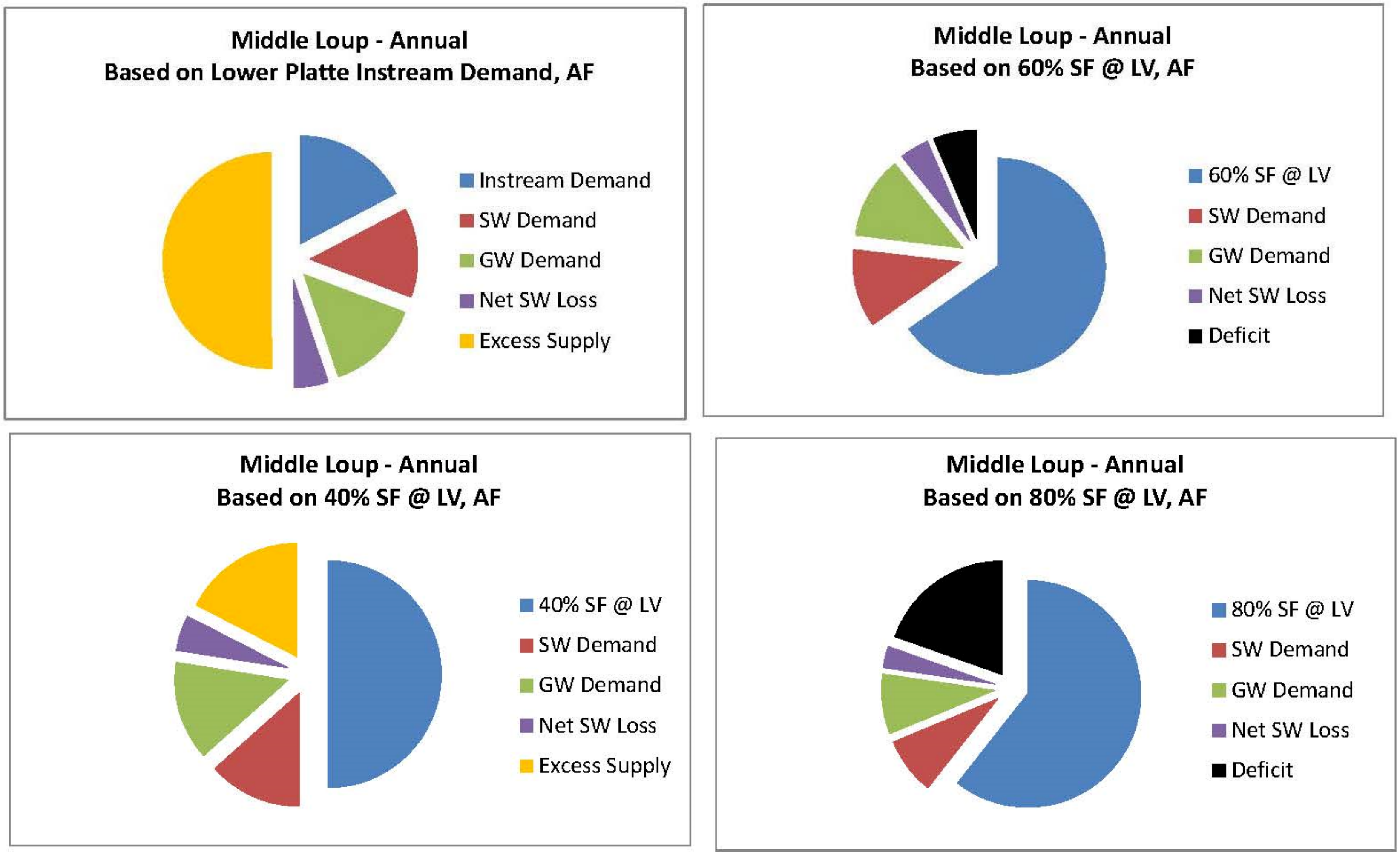

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

### Figure 16A: Nature and Extent of Use, Annual Plots – Middle Loup Sub-basin



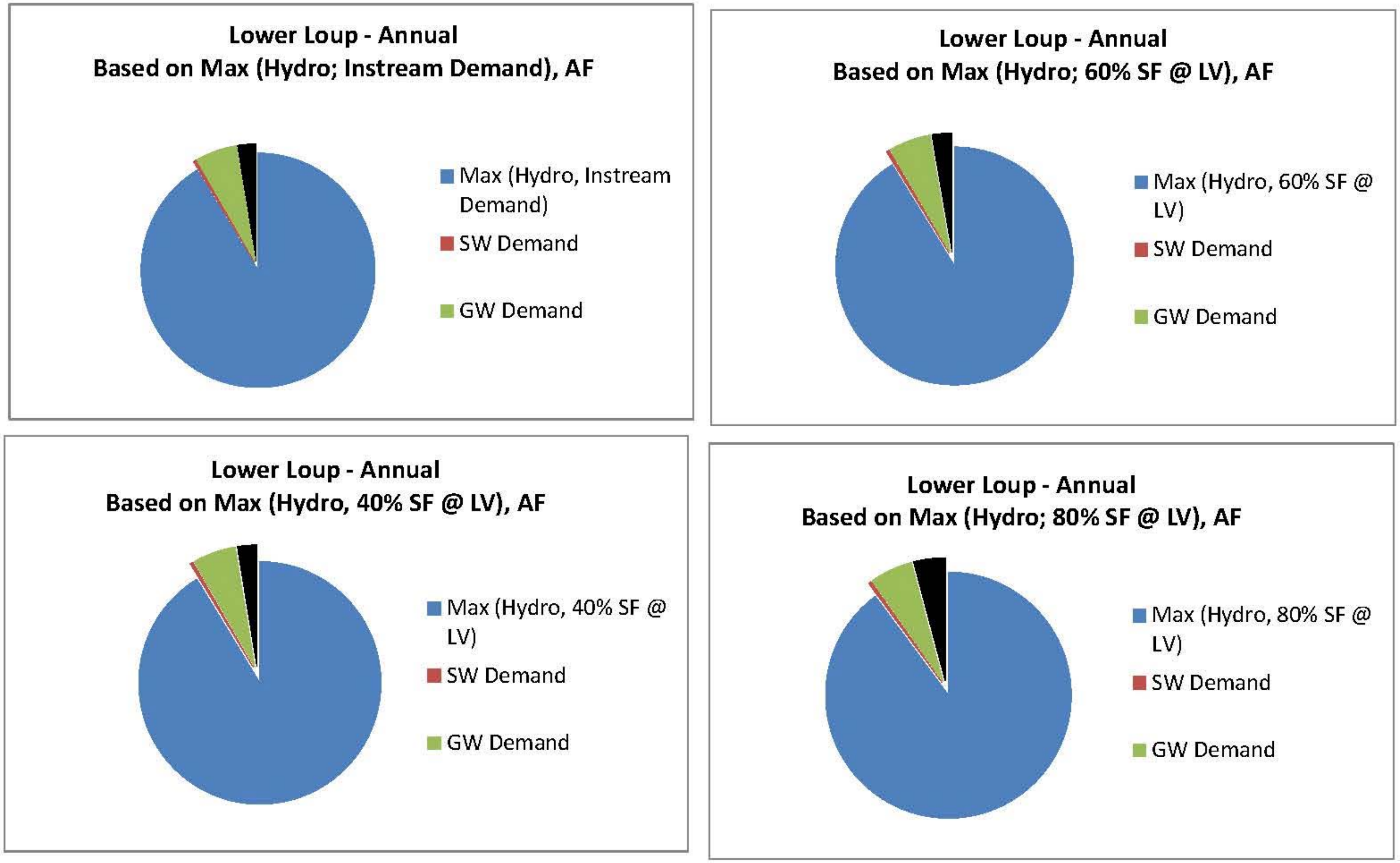

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 16B: Nature and Extent of Use, Annual Plots – Middle Loup Sub-basin**



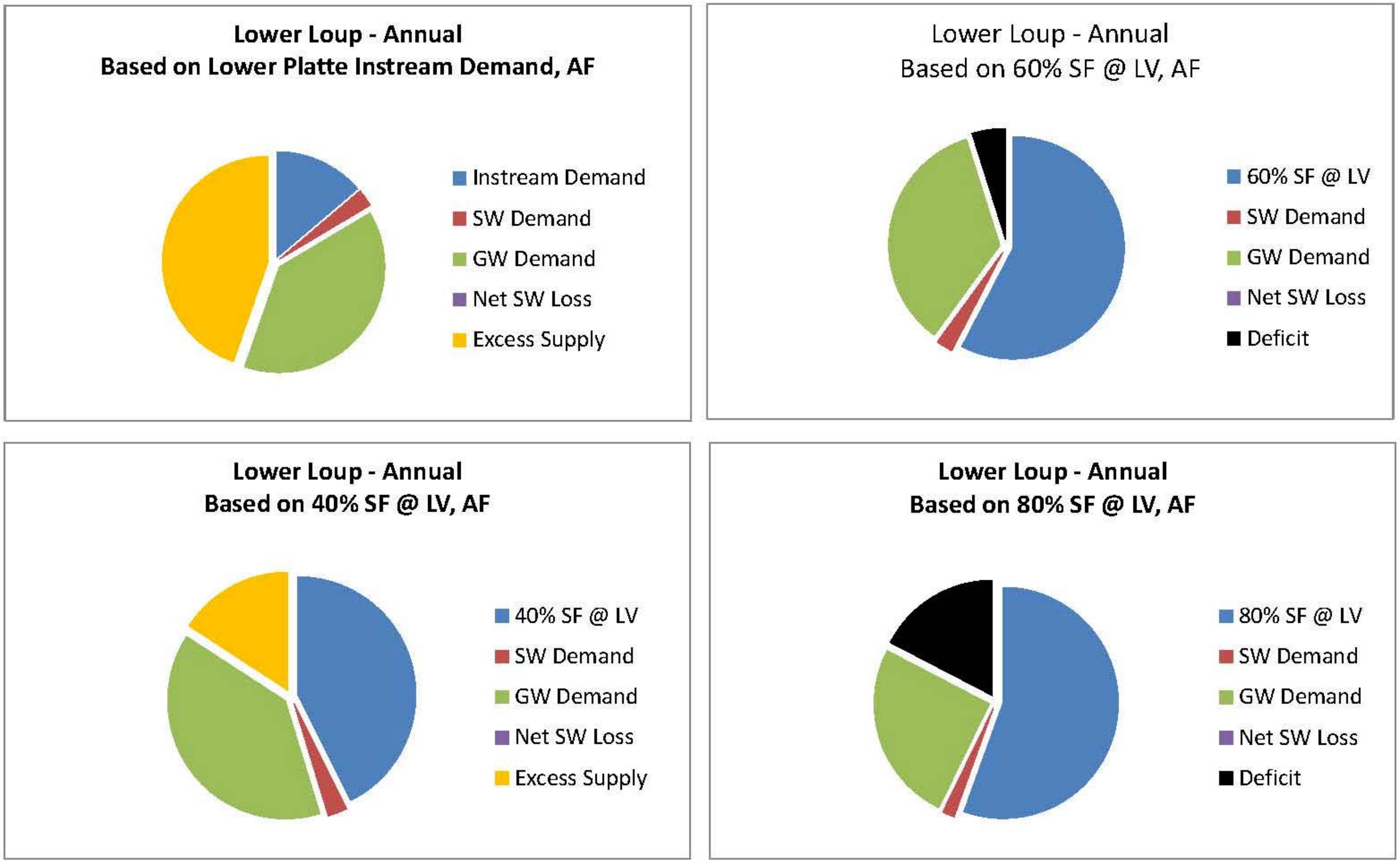

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 17A: Nature and Extent of Use, Annual Plots – Lower Loup Sub-basin**



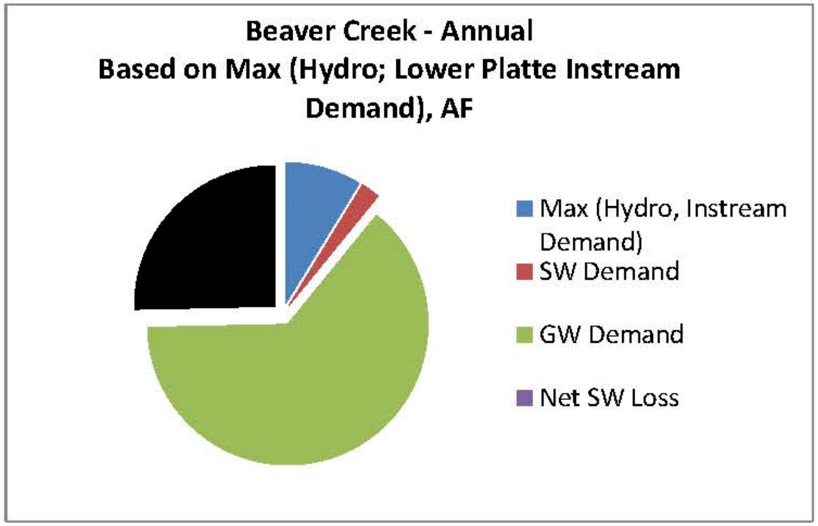

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

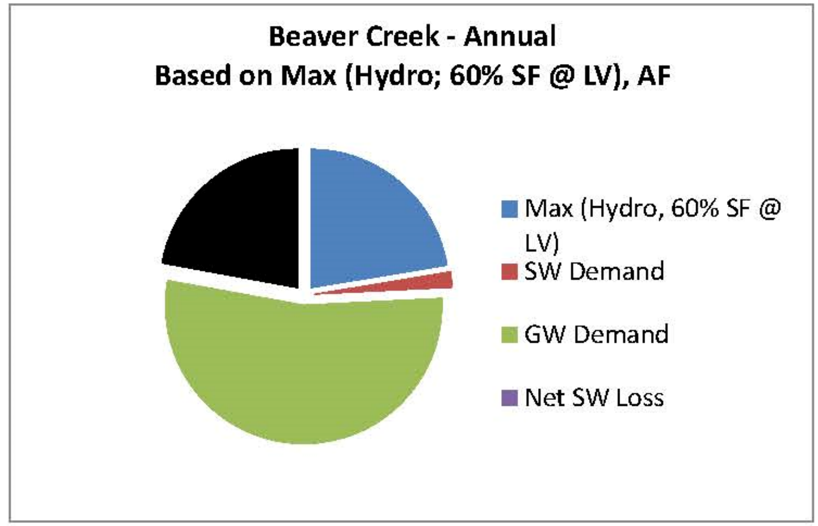
**Figure 17B: Nature and Extent of Use, Annual Plots – Lower Loup Sub-basin**

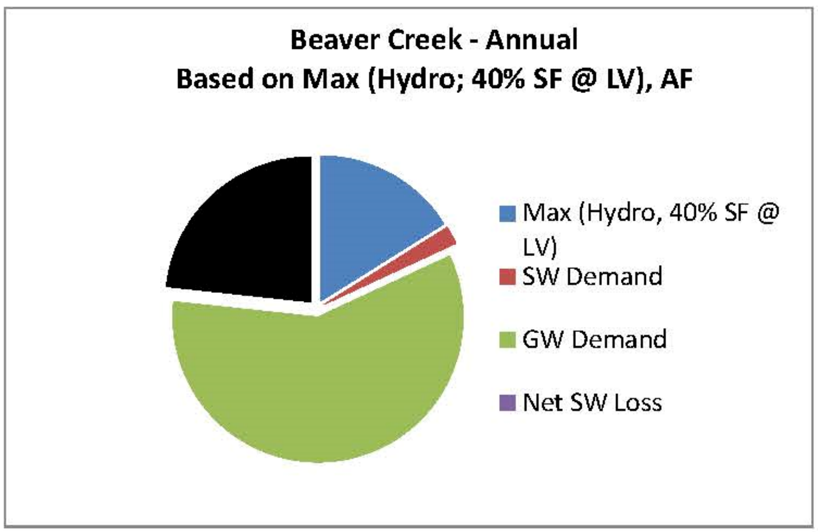


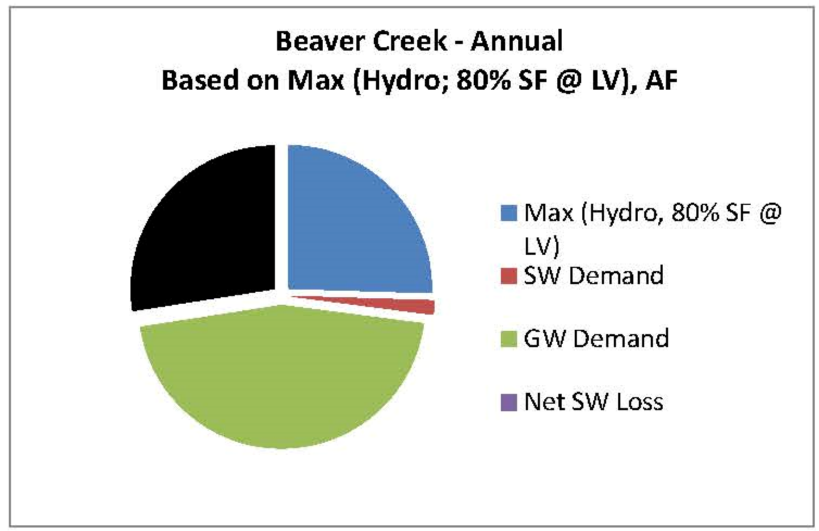

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

### Figure 18A: Nature and Extent of Use, Annual Plots – Beaver Creek Sub-basin



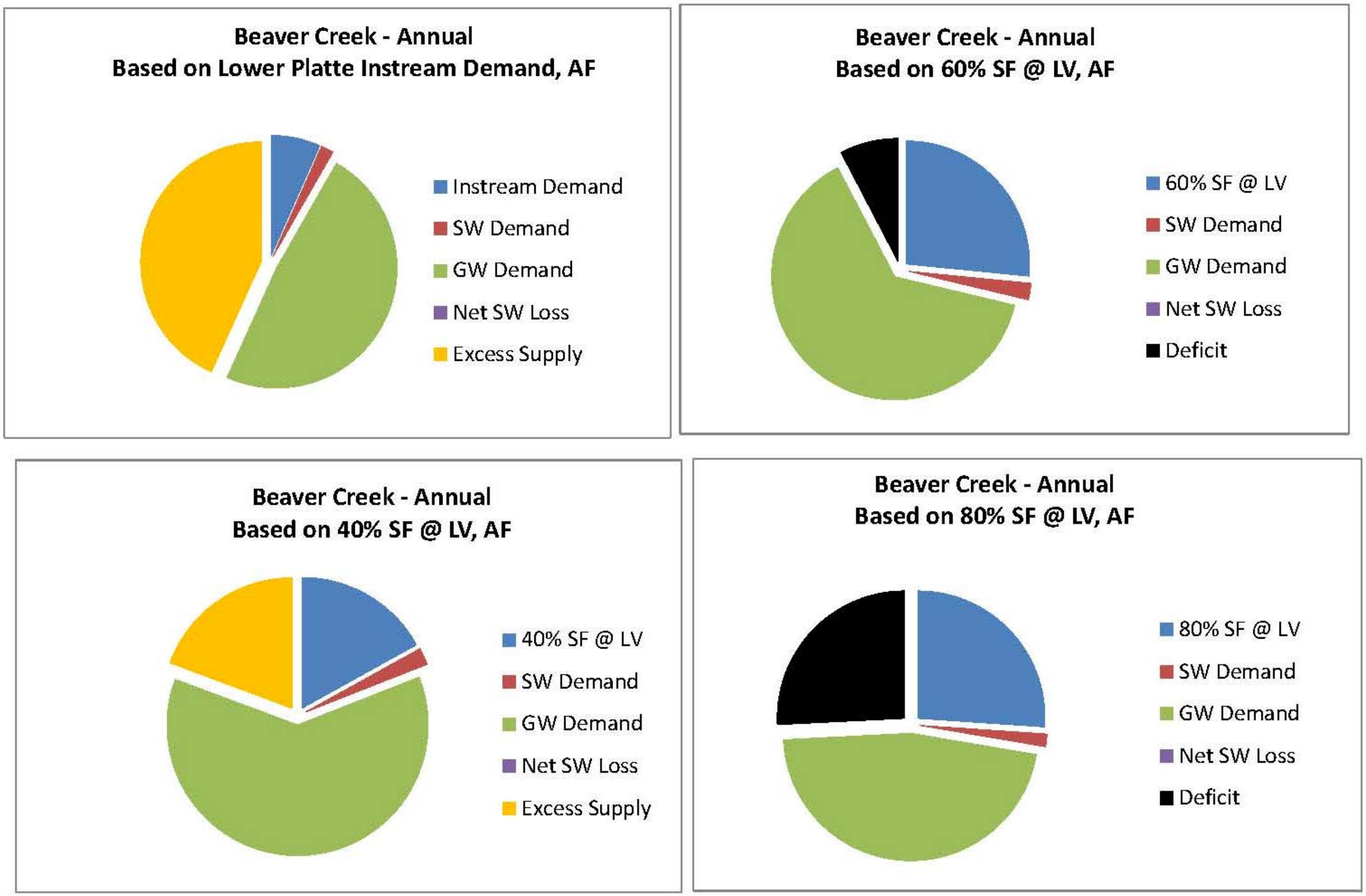



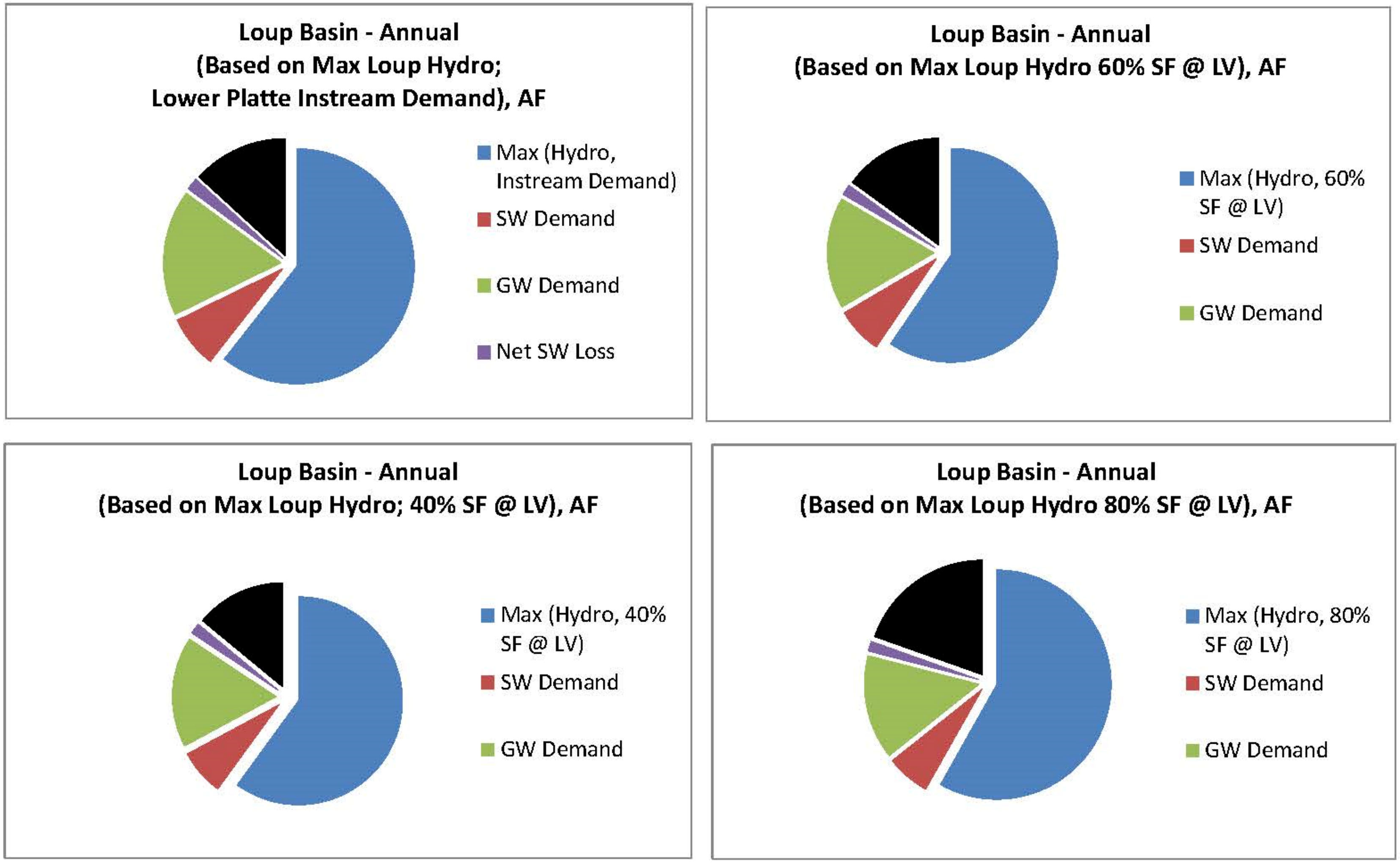

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

## Figure 18B: Nature and Extent of Use, Annual Plots – Beaver Creek Sub-basin



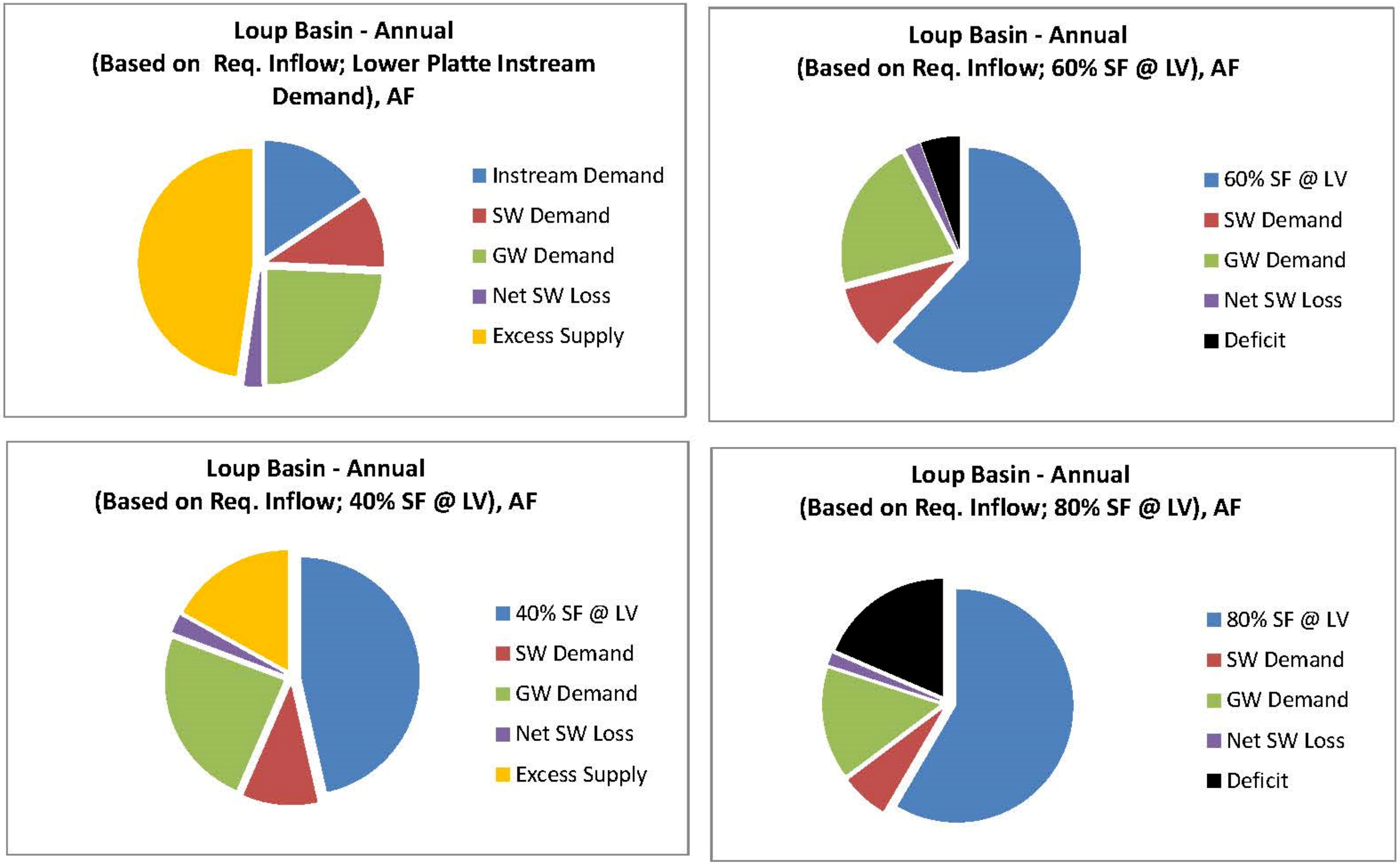

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

## Figure 19A: Nature and Extent of Use, Annual Plots – Full Loup Basin



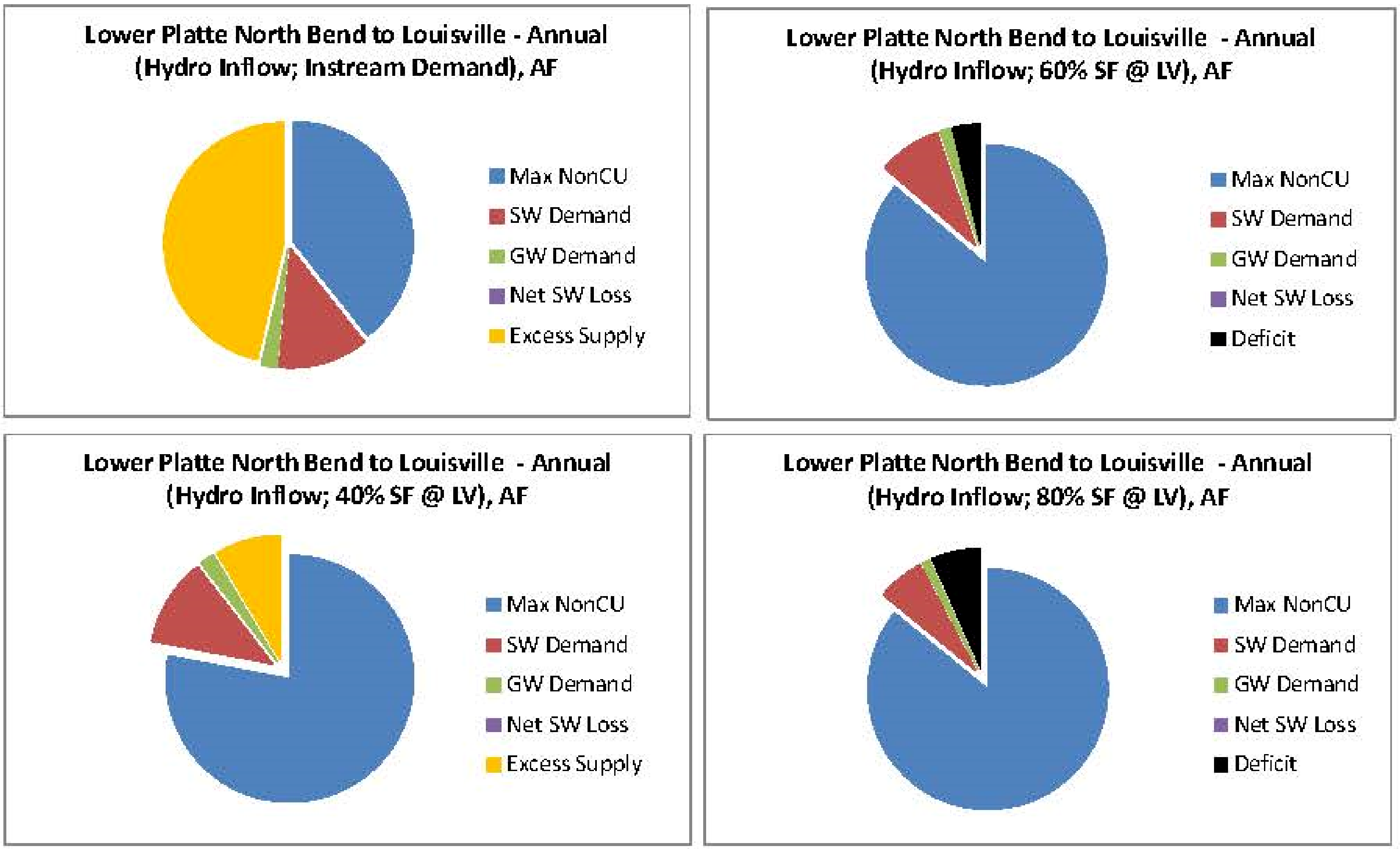

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

## Figure 19B: Nature and Extent of Use, Annual Plots – Full Loup Basin



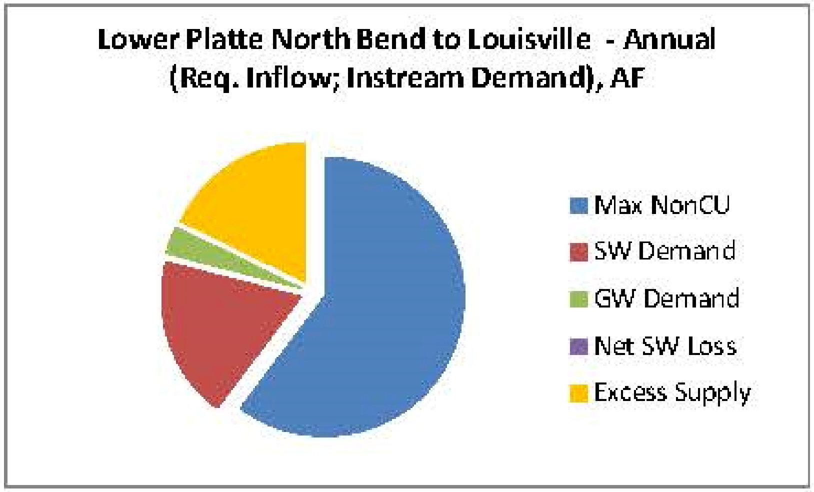

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

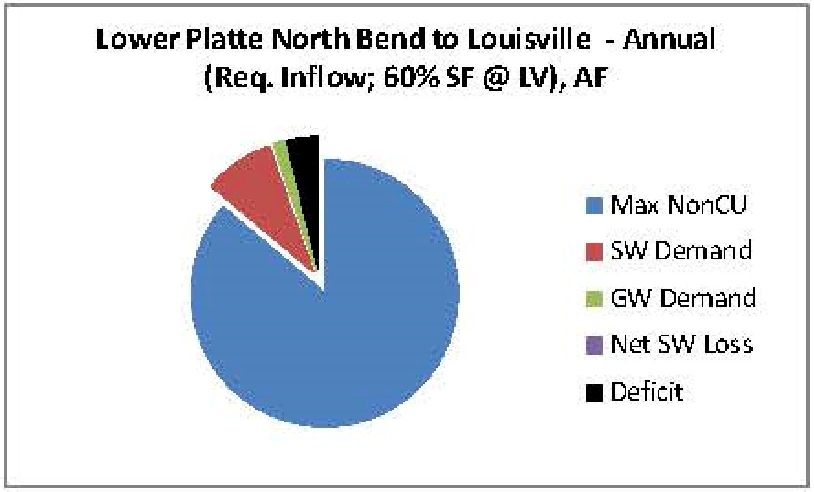
**Figure 20A: Nature and Extent of Use, Annual Plots – Lower Platte, North Bend to Louisville Sub-basin**

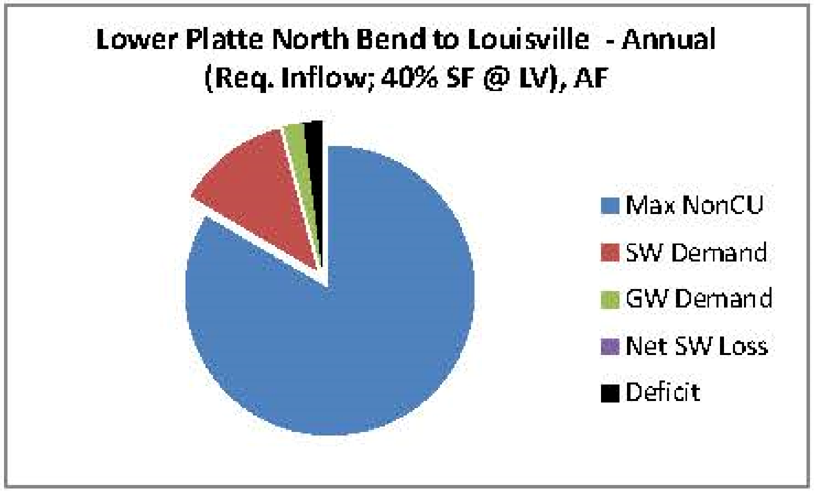


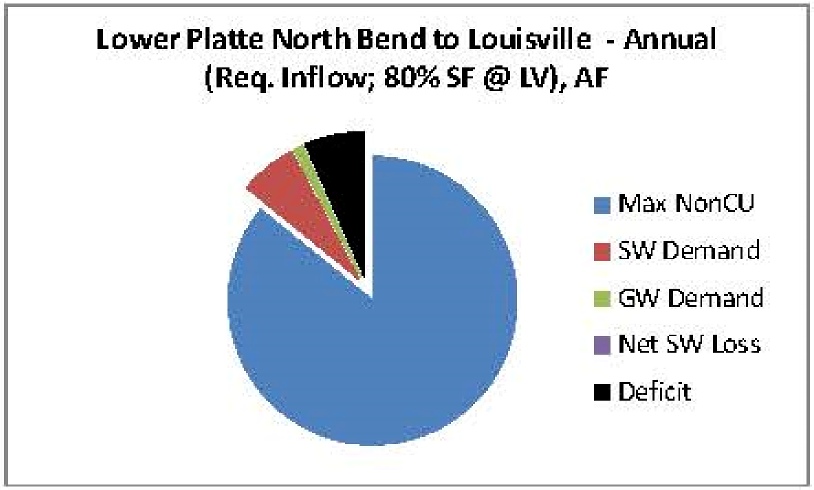

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 20B: Nature and Extent of Use, Annual Plots – Lower Platte, North Bend to Louisville Sub-basin**



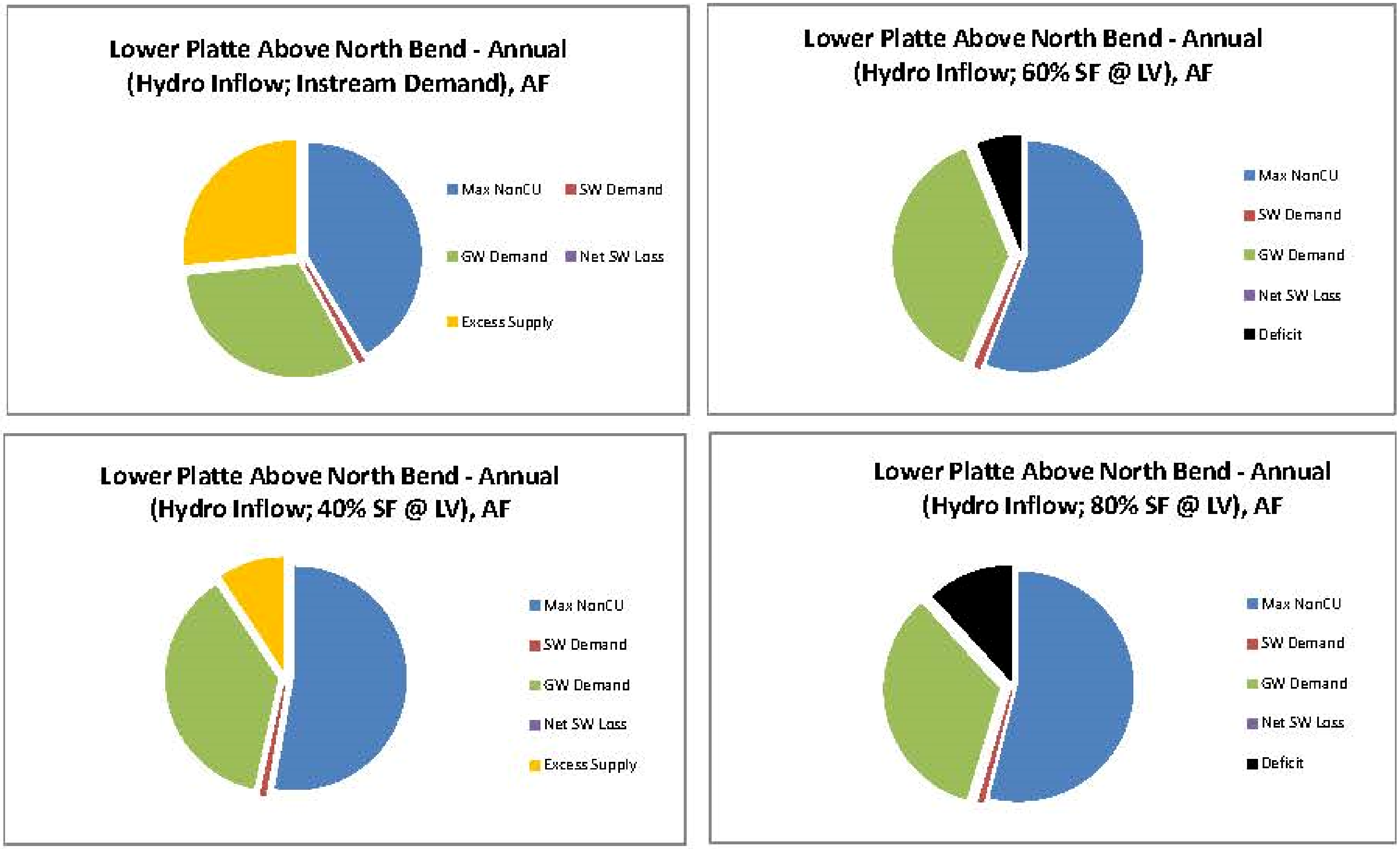



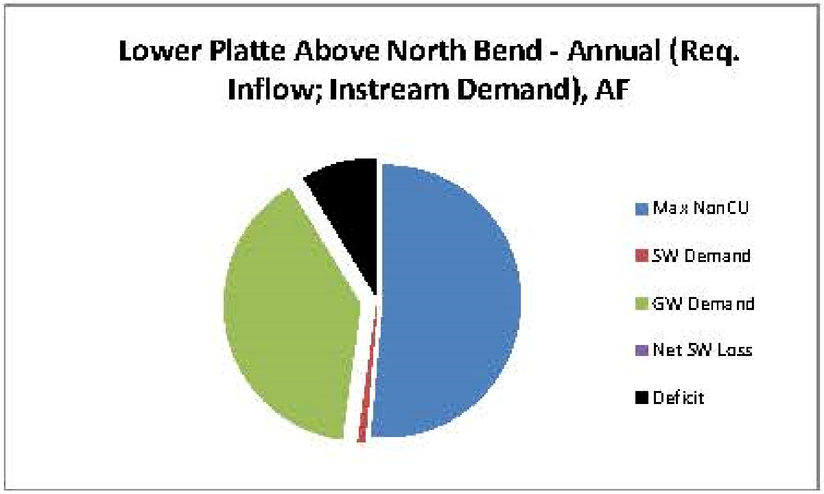

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

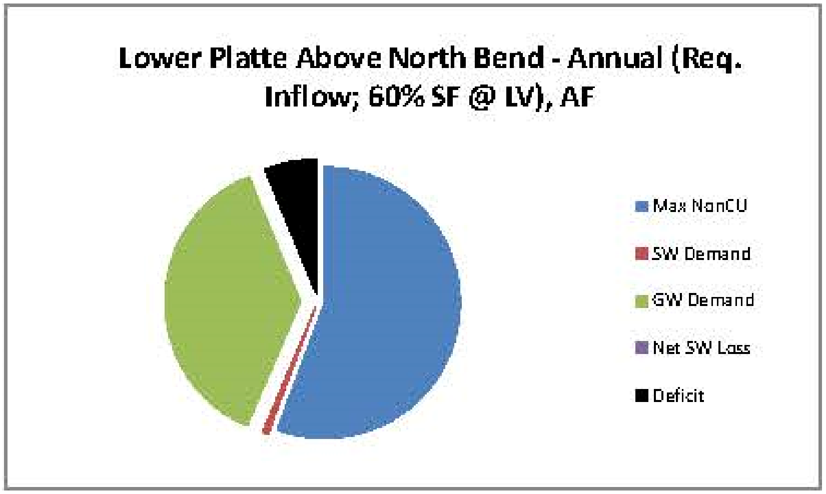
## Figure 21A:  Nature and Extent of Use, Annual Plots – Lower Platte, Above North Bend Sub-basin

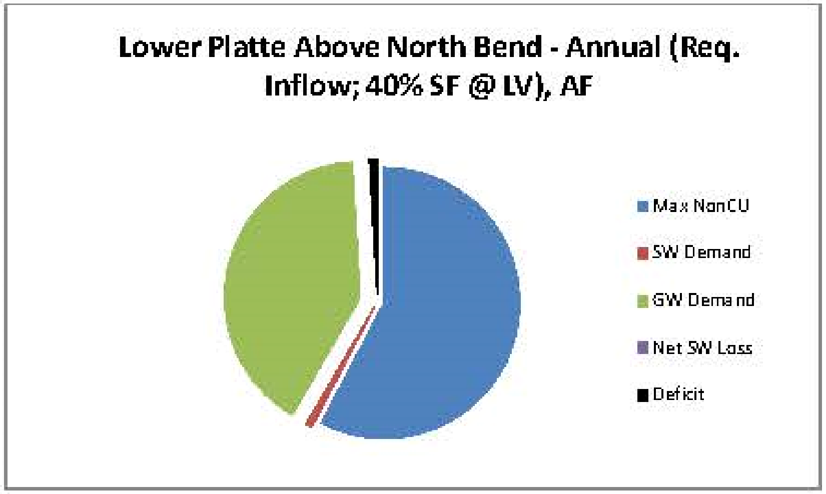


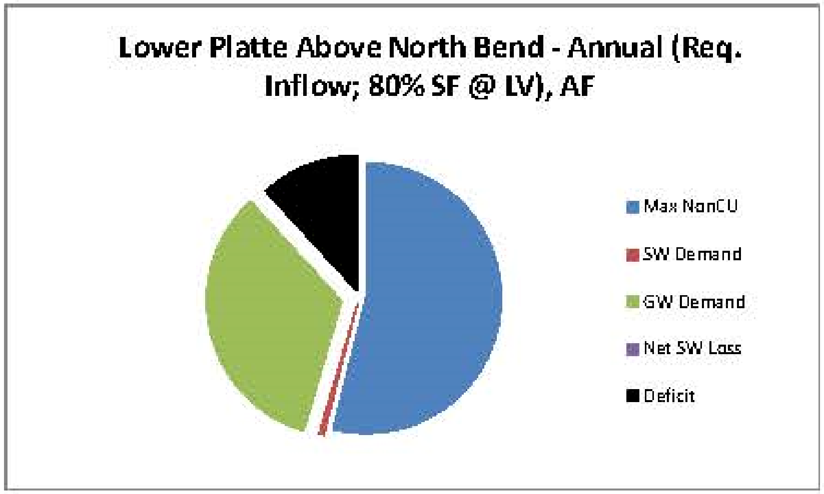

*Note: Excess supply colored yellow indicates a surplus.  Excess supply colored black denotes a deficit.*

**Figure 21B: Nature and Extent of Use, Annual Plots – Lower Platte, Above North Bend Sub-basin**



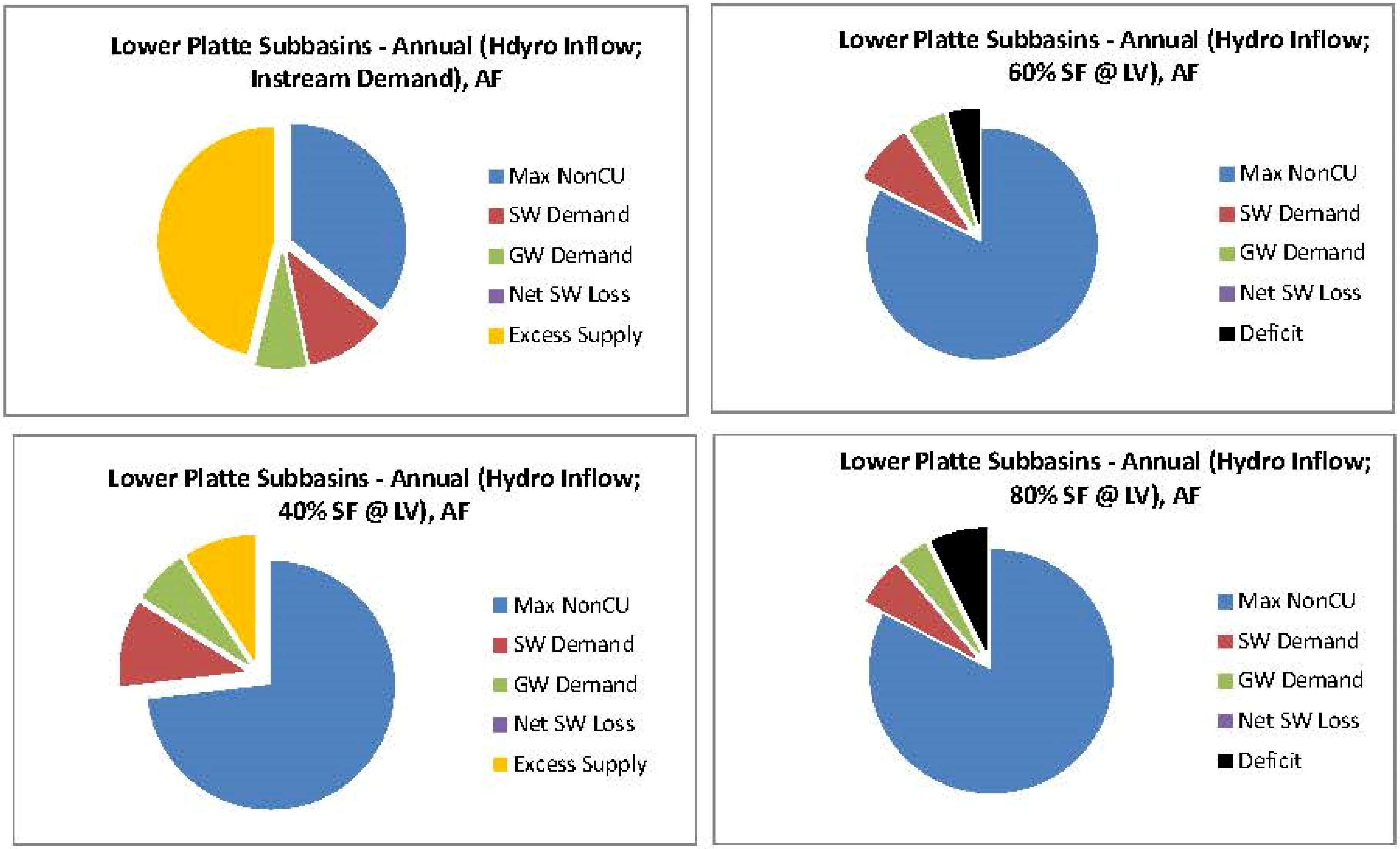



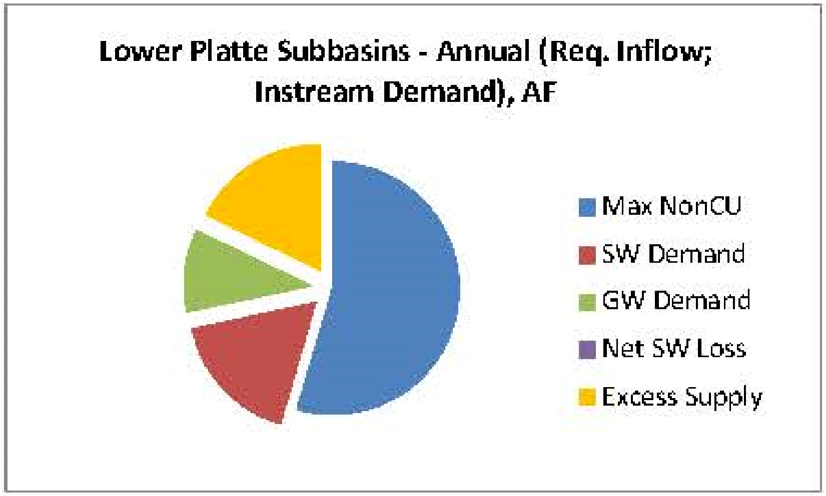

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

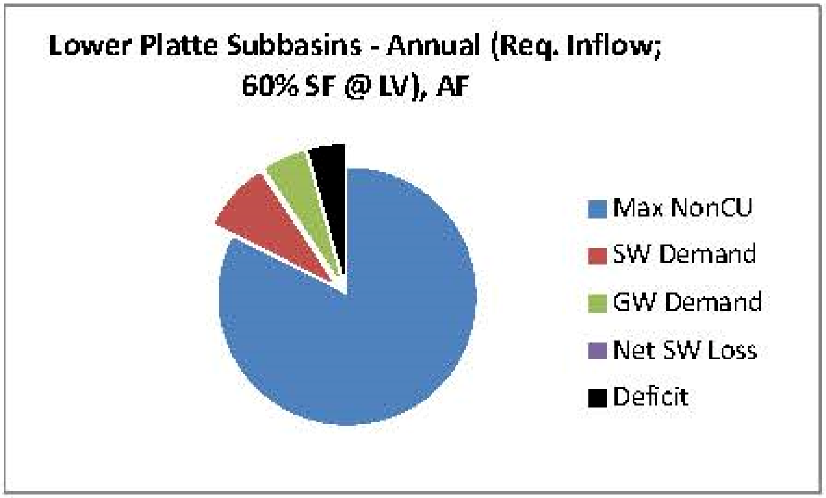
Figure 22A: Nature and Extent of Use, Annual Plots – Lower Platte Sub-basins (Above North Bend & North Bend to Louisville Combined)

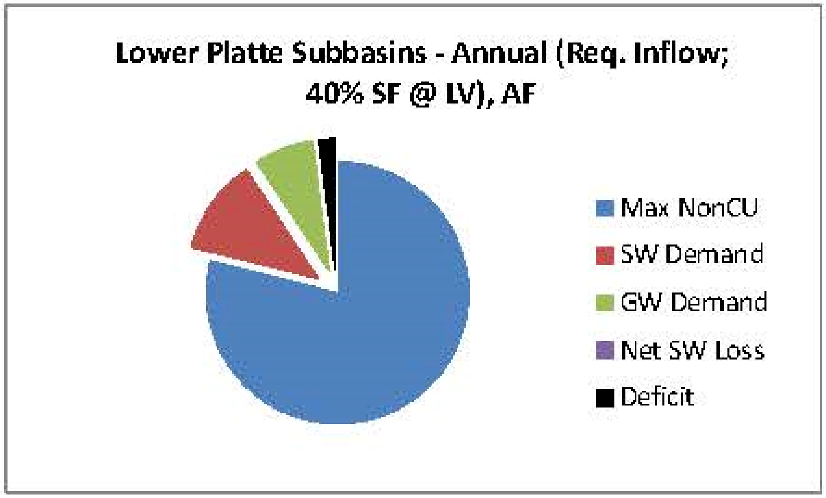


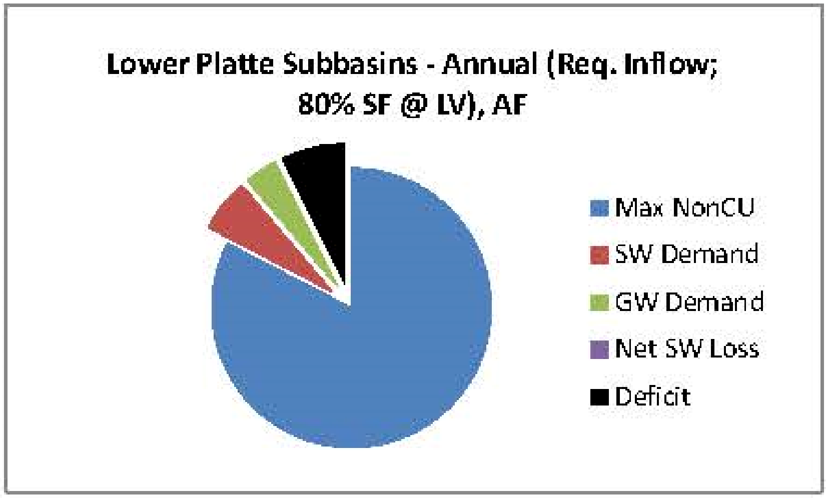

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 22B: Nature and Extent of Use, Annual Plots – Lower Platte Sub-basins (Above North Bend & North Bend to Louisville Combined)**



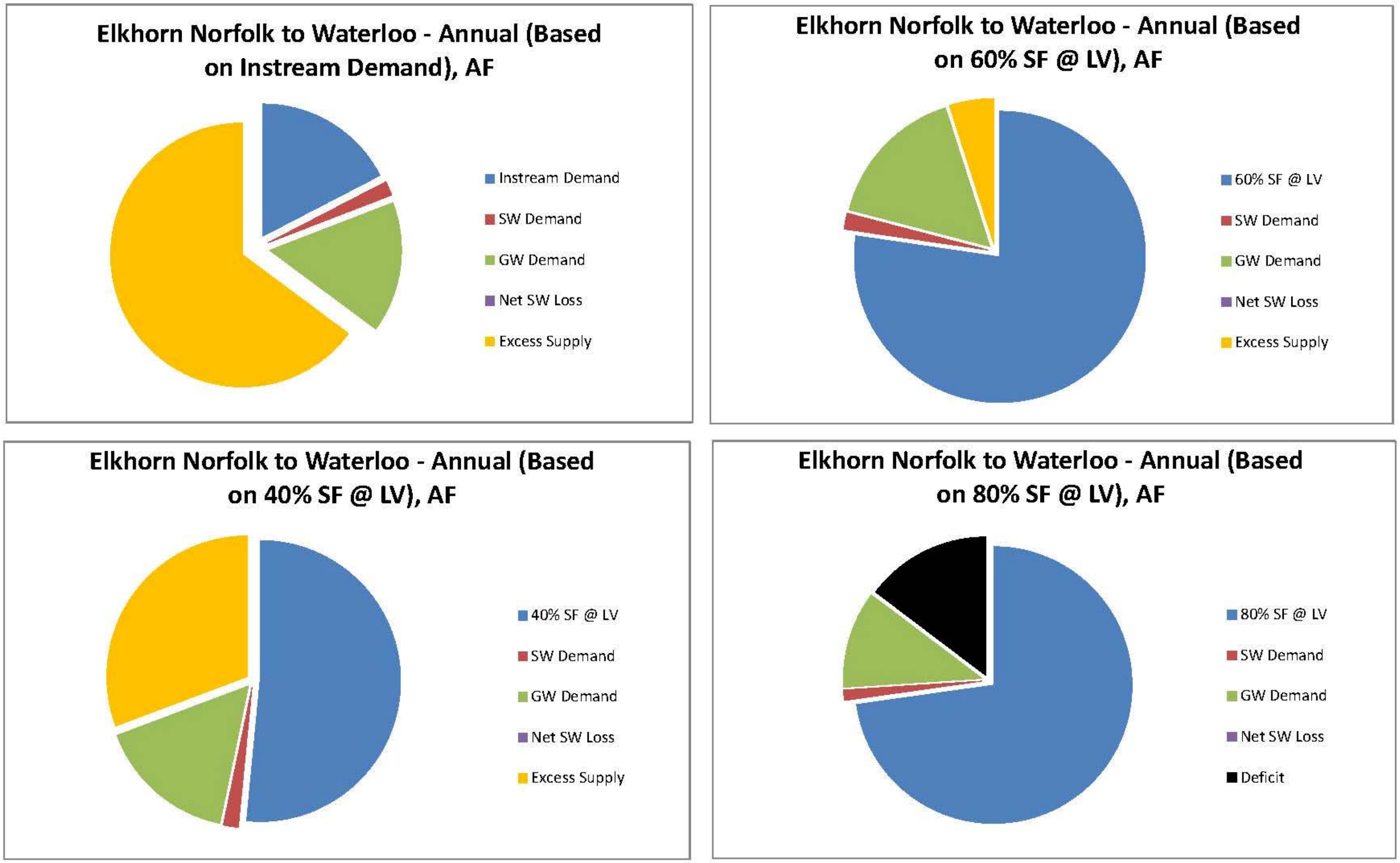



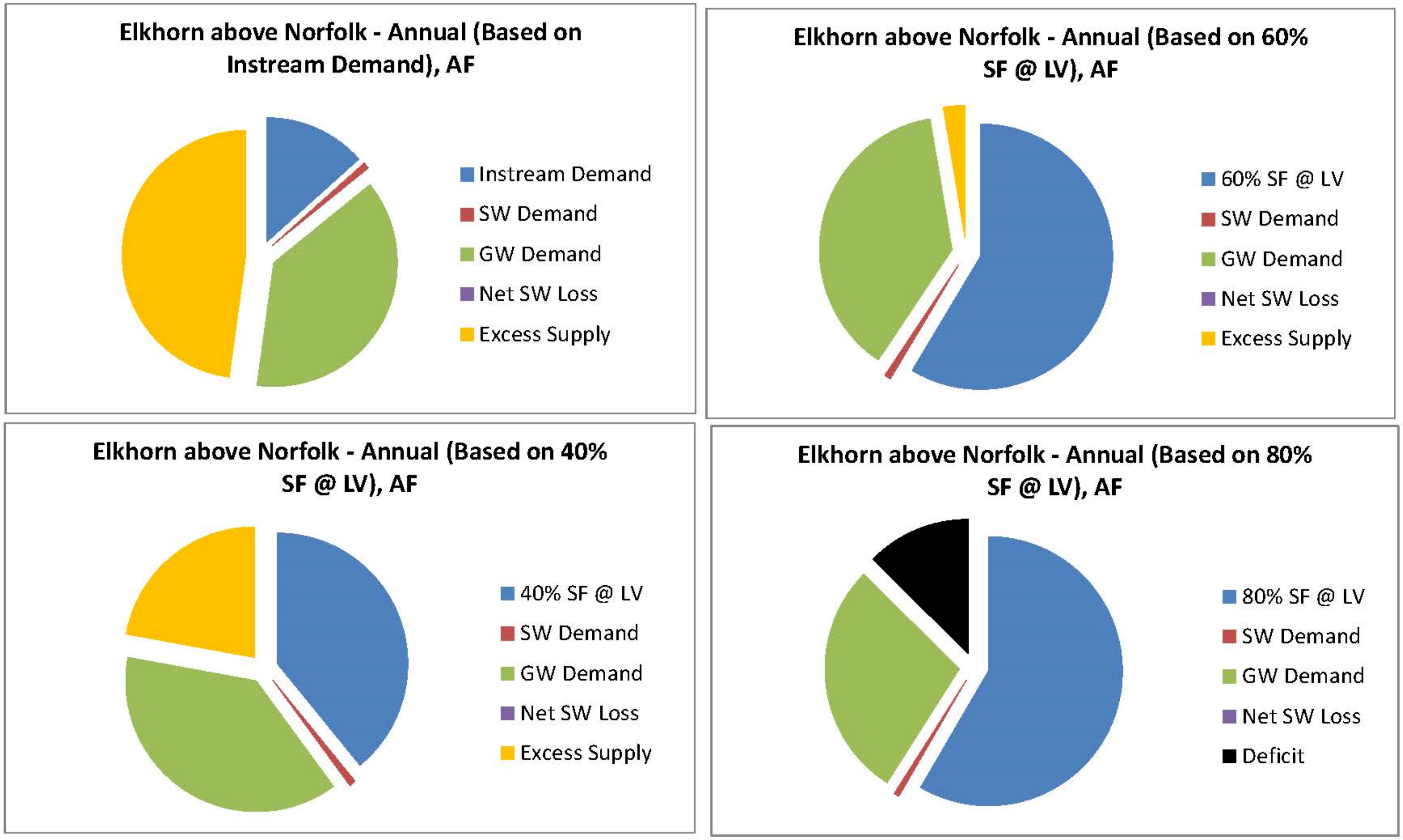

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 23: Nature and Extent of Use, Annual Plots – Elkhorn, Norfolk to Waterloo Sub-basin**



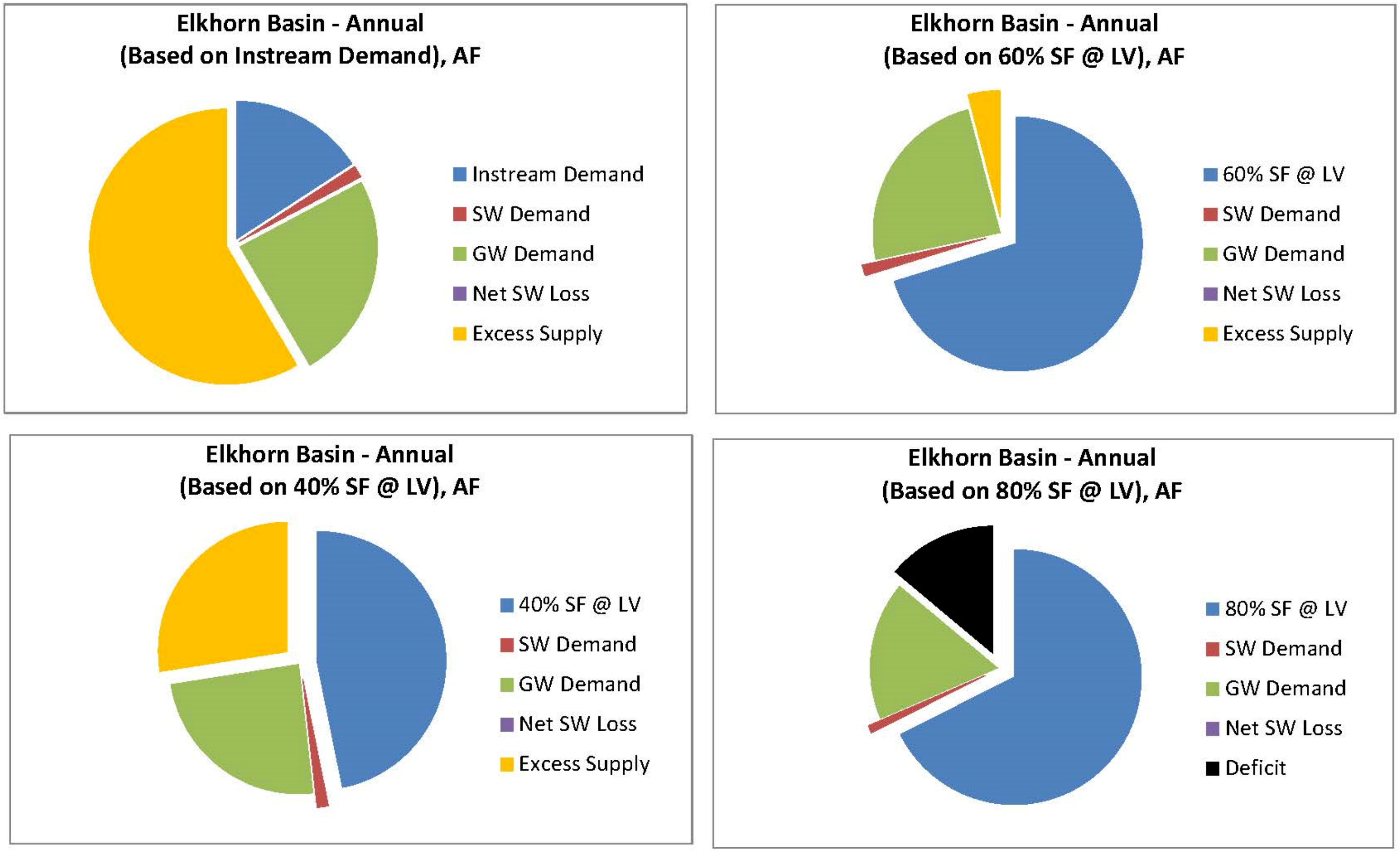

*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

**Figure 24: Nature and Extent of Use, Annual Plots – Elkhorn, Above Norfolk Sub-basin**




*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

Figure 25: Nature and Extent of Use, Annual Plots – Full Elkhorn Basin




*Note: Excess supply colored yellow indicates a surplus. Excess supply colored black denotes a deficit.*

## 4.0 Conclusions

After considering the various demand scenarios and assessing the benefits and constraints on the individual subbasins, the management committee agreed to utilize the demand scenario that would maintain 40% of the 25-year average streamflow at Louisville (without hydropower considered) to calculate the volume of water within the Lower Platte River Basin that exceeds the long term demand. This volume was then distributed to the Loup, Elkhorn, and Lower Platte subbasins by the percentage of water that each of these subbasins contributes to the whole basin. Using the 25-year average, approximately 46% of the basin water supply originates in the Loup Basin, approximately 32% originates in the Elkhorn Basin, and approximately 22% originates in the Duncan to Louisville reaches of the Platte River. These volumes represent the total estimated volume of water available for development before the basin would be declared fully appropriated. Because the goal of this Plan was to avoid fully appropriated status, the management committee recommended developing 10% of this excess supply in the first 5-year planning increment. The volume associated with this 10% is shown in Table 11.

**Table 11. Agreed upon Allowable Development; First 5-year Increment.**

| Basin | Peak Season Excess Supply (acre-feet) | First 5-year Allowable Development (acre-feet) |
|---|---|---|
| Full Lower Platte Basin | 188,073 | 18,807 |
| Loup Basin | 86,514 | 8,651 |
| Elkhorn Basin | 60,183 | 6,018 |
| Lower Platte Subbasins | 41,376 | 4,138 |

The numbers presented in Table 11 are calculated assuming there is no Loup hydropower demand in the basin (at the request of the management committee). It should be noted that the NeDNR includes the Loup hydropower in its annual evaluation and the Loup basin as a whole does not have excess flow when considering this Loup hydropower demand. Therefore, the Loup basin would need to make interference agreements with Loup hydropower before developing the above shown excess supply.

## 5.0 Benefits of Common Basin Accounting

Using a common accounting system by the Coalition member NRDs allows flexibility within the Lower Platte River Basin in that member NRDs can manage their individual supplies and demands and offset depletions within their own NRD, or they can choose to work with other member NRDs. Member NRDs could make agreements on joint (or individual) projects to store water to release at a specific time, use projects to offset depletions of the basin as a whole, or transfer water between member NRDs.

Any projects or transfer activities would require agreements between the involved member NRDs and would not be an action taken by the Coalition itself. Rather, this common basin accounting within the Lower Platte River Basin and its member NRDs would provide a framework under which these activities could operate. In order for this to be effective, each member NRD within the Coalition would need to agree to the proposed common basin accounting and the time frame used for the methodology development.[29]

An added benefit of adopting the above recommended basin accounting is that it remains consistent with the draft NeDNR fully appropriated methodology. This means that should a member NRD choose not to enter into agreements (either project or transfer) with other member NRDs now, the basin accounting proposed would allow an individual member NRD to manage uses and demands within its own NRD.

[29] Per NeDNR, as long as the transfer/projects are evaluated using a method that all NRDs in the Coalition and NeDNR agree upon and is consistent across the basin, NeDNR will "recognize" impacts of projects as credits/offsets for the basin accounting/fully-appropriated methodology.

## Attachment 1: Draft Basin Accounting Summary Tables

Required Inflow (Historic % Inflow), AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 904,703 | 904,703 | 1,809,406 |
| Hydro Inflow; 40% SF LV | 904,703 | 1,684,796 | 1,809,406 |
| Hydro Inflow; 60% SF LV | 904,703 | 2,525,933 | 2,484,137 |
| Hydro Inflow; 80% SF LV | 904,703 | 3,367,905 | 3,312,130 |
| Req. Inflow; Instream %BWS | 141,533 | 654,054 | 849,241 |
| Req. Inflow; 40% SF LV | 141,533 | 1,684,796 | 1,662,217 |
| Req. Inflow; 60% SF LV | 141,533 | 2,525,933 | 2,484,137 |
| Req. Inflow; 80% SF LV | 141,533 | 3,367,905 | 3,312,130 |

SWCU, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 2,563 | 71,951 | 74,514 |
| Hydro Inflow; 40% SF LV | 2,563 | 71,951 | 74,514 |
| Hydro Inflow; 60% SF LV | 2,563 | 71,951 | 74,514 |
| Hydro Inflow; 80% SF LV | 2,563 | 71,951 | 74,514 |
| Req. Inflow; Instream %BWS | 2,563 | 71,951 | 74,514 |
| Req. Inflow; 40% SF LV | 2,563 | 71,951 | 74,514 |
| Req. Inflow; 60% SF LV | 2,563 | 71,951 | 74,514 |
| Req. Inflow; 80% SF LV | 2,563 | 71,951 | 74,514 |

Delta

Required Inflow (Historic % Inflow), AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 714,689 | 714,689 | 1,429,378 |
| Hydro Inflow; 40% SF LV | 714,689 | 1,249,035 | 1,429,378 |
| Hydro Inflow; 60% SF LV | 714,689 | 1,873,551 | 1,873,776 |
| Hydro Inflow; 80% SF LV | 714,689 | 2,498,068 | 2,498,343 |
| Req. Inflow; Instream %BWS | 117,219 | 491,229 | 658,615 |
| Req. Inflow; 40% SF LV | 117,219 | 1,249,035 | 1,253,763 |
| Req. Inflow; 60% SF LV | 117,219 | 1,873,551 | 1,873,776 |
| Req. Inflow; 80% SF LV | 117,219 | 2,498,068 | 2,498,343 |

SWCU, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 204 | 42,236 | 42,439 |
| Hydro Inflow; 40% SF LV | 204 | 42,236 | 42,439 |
| Hydro Inflow; 60% SF LV | 204 | 42,236 | 42,439 |
| Hydro Inflow; 80% SF LV | 204 | 42,236 | 42,439 |
| Req. Inflow; Instream %BWS | 204 | 42,236 | 42,439 |
| Req. Inflow; 40% SF LV | 204 | 42,236 | 42,439 |
| Req. Inflow; 60% SF LV | 204 | 42,236 | 42,439 |
| Req. Inflow; 80% SF LV | 204 | 42,236 | 42,439 |

Required Inflow (Historic % Inflow), AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 190,014 | 190,014 | 380,027 |
| Hydro Inflow; 40% SF LV | 190,014 | 435,761 | 408,454 |
| Hydro Inflow; 60% SF LV | 190,014 | 652,382 | 610,361 |
| Hydro Inflow; 80% SF LV | 190,014 | 869,837 | 813,787 |
| Req. Inflow; Instream %BWS | 24,314 | 162,825 | 190,626 |
| Req. Inflow; 40% SF LV | 24,314 | 435,761 | 408,454 |
| Req. Inflow; 60% SF LV | 24,314 | 652,382 | 610,361 |
| Req. Inflow; 80% SF LV | 24,314 | 869,837 | 813,787 |

SWCU, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 2,359 | 29,715 | 32,073 |
| Hydro Inflow; 40% SF LV | 2,359 | 29,715 | 32,073 |
| Hydro Inflow; 60% SF LV | 2,359 | 29,715 | 32,073 |
| Hydro Inflow; 80% SF LV | 2,359 | 29,715 | 32,073 |
| Req. Inflow; Instream %BWS | 2,359 | 29,715 | 32,073 |
| Req. Inflow; 40% SF LV | 2,359 | 29,715 | 32,073 |
| Req. Inflow; 60% SF LV | 2,359 | 29,715 | 32,073 |
| Req. Inflow; 80% SF LV | 2,359 | 29,715 | 32,073 |

GWDepl, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 87,251 | 27,637 | 114,888 |
| Hydro Inflow; 40% SF LV | 87,251 | 27,637 | 114,888 |
| Hydro Inflow; 60% SF LV | 87,251 | 27,637 | 114,888 |
| Hydro Inflow; 80% SF LV | 87,251 | 27,637 | 114,888 |
| Req. Inflow; Instream %BWS | 87,251 | 27,637 | 114,888 |
| Req. Inflow; 40% SF LV | 87,251 | 27,637 | 114,888 |
| Req. Inflow; 60% SF LV | 87,251 | 27,637 | 114,888 |
| Req. Inflow; 80% SF LV | 87,251 | 27,637 | 114,888 |

Check

Streamflow (Gain), AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | (48,517) | 853,112 | 804,596 |
| Hydro Inflow; 40% SF LV | (48,517) | 853,112 | 804,596 |
| Hydro Inflow; 60% SF LV | (48,517) | 853,112 | 804,596 |
| Hydro Inflow; 80% SF LV | (48,517) | 853,112 | 804,596 |
| Req. Inflow; Instream %BWS | (48,517) | 853,112 | 804,596 |
| Req. Inflow; 40% SF LV | (48,517) | 853,112 | 804,596 |
| Req. Inflow; 60% SF LV | (48,517) | 853,112 | 804,596 |
| Req. Inflow; 80% SF LV | (48,517) | 853,112 | 804,596 |

Check

GWDepl, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 47,099 | 13,604 | 60,703 |
| Hydro Inflow; 40% SF LV | 47,099 | 13,604 | 60,703 |
| Hydro Inflow; 60% SF LV | 47,099 | 13,604 | 60,703 |
| Hydro Inflow; 80% SF LV | 47,099 | 13,604 | 60,703 |
| Req. Inflow; Instream %BWS | 47,099 | 13,604 | 60,703 |
| Req. Inflow; 40% SF LV | 47,099 | 13,604 | 60,703 |
| Req. Inflow; 60% SF LV | 47,099 | 13,604 | 60,703 |
| Req. Inflow; 80% SF LV | 47,099 | 13,604 | 60,703 |

Streamflow (Gain), AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | (84,128) | 650,514 | 566,385 |
| Hydro Inflow; 40% SF LV | (84,128) | 650,514 | 566,385 |
| Hydro Inflow; 60% SF LV | (84,128) | 650,514 | 566,385 |
| Hydro Inflow; 80% SF LV | (84,128) | 650,514 | 566,385 |
| Req. Inflow; Instream %BWS | (84,128) | 650,514 | 566,385 |
| Req. Inflow; 40% SF LV | (84,128) | 650,514 | 566,385 |
| Req. Inflow; 60% SF LV | (84,128) | 650,514 | 566,385 |
| Req. Inflow; 80% SF LV | (84,128) | 650,514 | 566,385 |

GWDepl, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 40,151 | 14,033 | 54,184 |
| Hydro Inflow; 40% SF LV | 40,151 | 14,033 | 54,184 |
| Hydro Inflow; 60% SF LV | 40,151 | 14,033 | 54,184 |
| Hydro Inflow; 80% SF LV | 40,151 | 14,033 | 54,184 |
| Req. Inflow; Instream %BWS | 40,151 | 14,033 | 54,184 |
| Req. Inflow; 40% SF LV | 40,151 | 14,033 | 54,184 |
| Req. Inflow; 60% SF LV | 40,151 | 14,033 | 54,184 |
| Req. Inflow; 80% SF LV | 40,151 | 14,033 | 54,184 |

Streamflow (Gain), AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 35,612 | 202,598 | 238,210 |
| Hydro Inflow; 40% SF LV | 35,612 | 202,598 | 238,210 |
| Hydro Inflow; 60% SF LV | 35,612 | 202,598 | 238,210 |
| Hydro Inflow; 80% SF LV | 35,612 | 202,598 | 238,210 |
| Req. Inflow; Instream %BWS | 35,612 | 202,598 | 238,210 |
| Req. Inflow; 40% SF LV | 35,612 | 202,598 | 238,210 |
| Req. Inflow; 60% SF LV | 35,612 | 202,598 | 238,210 |
| Req. Inflow; 80% SF LV | 35,612 | 202,598 | 238,210 |

BWS, AF

=Streamflow + GW Depl + SW Demand + Required Inflow

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 945,999 | 1,857,403 | 2,803,403 |
| Hydro Inflow; 40% SF LV | 945,999 | 2,637,496 | 2,803,403 |
| Hydro Inflow; 60% SF LV | 945,999 | 3,478,634 | 3,478,134 |
| Hydro Inflow; 80% SF LV | 945,999 | 4,320,605 | 4,306,127 |
| Req. Inflow; Instream %BWS | 182,830 | 1,606,754 | 1,843,238 |
| Req. Inflow; 40% SF LV | 182,830 | 2,637,496 | 2,656,214 |
| Req. Inflow; 60% SF LV | 182,830 | 3,478,634 | 3,478,134 |
| Req. Inflow; 80% SF LV | 182,830 | 4,320,605 | 4,306,127 |

=Streamflow + GW Depl + SW Demand + Required Inflow

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 677,864 | 1,421,044 | 2,098,907 |
| Hydro Inflow; 40% SF LV | 677,864 | 1,955,389 | 2,098,907 |
| Hydro Inflow; 60% SF LV | 677,864 | 2,579,906 | 2,543,304 |
| Hydro Inflow; 80% SF LV | 677,864 | 3,204,423 | 3,167,871 |
| Req. Inflow; Instream %BWS | 80,394 | 1,197,583 | 1,328,144 |
| Req. Inflow; 40% SF LV | 80,394 | 1,955,389 | 1,923,291 |
| Req. Inflow; 60% SF LV | 80,394 | 2,579,906 | 2,543,304 |
| Req. Inflow; 80% SF LV | 80,394 | 3,204,423 | 3,167,871 |

=Streamflow + GW Depl + SW Demand + Required Inflow

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 268,135 | 436,360 | 704,495 |
| Hydro Inflow; 40% SF LV | 268,135 | 682,107 | 732,922 |
| Hydro Inflow; 60% SF LV | 268,135 | 898,728 | 934,829 |
| Hydro Inflow; 80% SF LV | 268,135 | 1,116,183 | 1,138,255 |
| Req. Inflow; Instream %BWS | 102,436 | 409,171 | 515,094 |
| Req. Inflow; 40% SF LV | 102,436 | 682,107 | 732,922 |
| Req. Inflow; 60% SF LV | 102,436 | 898,728 | 934,829 |
| Req. Inflow; 80% SF LV | 102,436 | 1,116,183 | 1,138,255 |

NonCU Demand, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 187,262 | 1,012,138 | 1,012,138 |
| 40% SF LV | 201,413 | 2,124,102 | 2,124,102 |
| 60% SF LV | 212,272 | 3,184,186 | 3,184,186 |
| 80% SF LV | 228,242 | 4,245,582 | 4,245,582 |
| Instream %BWS | 187,262 | 1,012,138 | 1,012,138 |
| 40% SF LV | 201,413 | 2,124,102 | 2,124,102 |
| 60% SF LV | 212,272 | 3,184,186 | 3,184,186 |
| 80% SF LV | 228,242 | 4,245,582 | 4,245,582 |

*Note: Lower Pltte Above & Below Nbend is calling on the Maximum of the Nbend and LV*

SW Demand, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 3,000 | 314,204 | 317,204 |
| 40% SF LV | 3,000 | 314,204 | 317,204 |
| 60% SF LV | 3,000 | 314,204 | 317,204 |
| 80% SF LV | 3,000 | 314,204 | 317,204 |
| Instream %BWS | 3,000 | 314,204 | 317,204 |
| 40% SF LV | 3,000 | 314,204 | 317,204 |
| 60% SF LV | 3,000 | 314,204 | 317,204 |
| 80% SF LV | 3,000 | 314,204 | 317,204 |

NonCU Demand, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 149,658 | 778,239 | 778,239 |
| 40% SF LV | 151,031 | 1,584,168 | 1,584,168 |
| 60% SF LV | 151,954 | 2,375,923 | 2,375,923 |
| 80% SF LV | 154,054 | 3,167,897 | 3,167,897 |
| Instream %BWS | 149,658 | 778,239 | 778,239 |
| 40% SF LV | 151,031 | 1,584,168 | 1,584,168 |
| 60% SF LV | 151,954 | 2,375,923 | 2,375,923 |
| 80% SF LV | 154,054 | 3,167,897 | 3,167,897 |

*Note: Lower Pltte Above & Below Nbend is calling on the Maximum of the Nbend and LV*

SW Demand, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 243 | 200,003 | 200,214 |
| 40% SF LV | 243 | 200,003 | 200,214 |
| 60% SF LV | 243 | 200,003 | 200,214 |
| 80% SF LV | 243 | 200,003 | 200,214 |
| Instream %BWS | 243 | 200,003 | 200,214 |
| 40% SF LV | 243 | 200,003 | 200,214 |
| 60% SF LV | 243 | 200,003 | 200,214 |
| 80% SF LV | 243 | 200,003 | 200,214 |

NonCU Demand, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 37,604 | 233,899 | 233,899 |
| 40% SF LV | 50,382 | 539,934 | 539,934 |
| 60% SF LV | 60,318 | 808,264 | 808,264 |
| 80% SF LV | 74,188 | 1,077,685 | 1,077,685 |
| Instream %BWS | 37,604 | 233,899 | 233,899 |
| 40% SF LV | 50,382 | 539,934 | 539,934 |
| 60% SF LV | 60,318 | 808,264 | 808,264 |
| 80% SF LV | 74,188 | 1,077,685 | 1,077,685 |

*Note: Lower Platte Above & Below Nbend is calling on the Maximum of the Nbend and LV Instream Flow Demands; These instream flow demands are not additive; therefore, the sum of the subbasins will not equal the combined subbasin NonCU*

SW Demand, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 2,757 | 114,201 | 317,204 |
| 40% SF LV | 2,757 | 114,201 | 317,204 |
| 60% SF LV | 2,757 | 114,201 | 317,204 |
| 80% SF LV | 2,757 | 114,201 | 317,204 |
| Instream %BWS | 2,757 | 114,201 | 317,204 |
| 40% SF LV | 2,757 | 114,201 | 317,204 |
| 60% SF LV | 2,757 | 114,201 | 317,204 |
| 80% SF LV | 2,757 | 114,201 | 317,204 |

GW Demand, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 142,177 | 53,631 | 195,808 |
| 40% SF LV | 142,177 | 53,631 | 195,808 |
| 60% SF LV | 142,177 | 53,631 | 195,808 |
| 80% SF LV | 142,177 | 53,631 | 195,808 |
| Instream %BWS | 142,177 | 53,631 | 195,808 |
| 40% SF LV | 142,177 | 53,631 | 195,808 |
| 60% SF LV | 142,177 | 53,631 | 195,808 |
| 80% SF LV | 142,177 | 53,631 | 195,808 |

GWDepl, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 87,251 | 27,637 | 114,888 |
| 40% SF LV | 87,251 | 27,637 | 114,888 |
| 60% SF LV | 87,251 | 27,637 | 114,888 |
| 80% SF LV | 87,251 | 27,637 | 114,888 |
| Instream %BWS | 87,251 | 27,637 | 114,888 |
| 40% SF LV | 87,251 | 27,637 | 114,888 |
| 60% SF LV | 87,251 | 27,637 | 114,888 |
| 80% SF LV | 87,251 | 27,637 | 114,888 |

GW Demand, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 101,019 | 38,076 | 139,095 |
| 40% SF LV | 101,019 | 38,076 | 139,095 |
| 60% SF LV | 101,019 | 38,076 | 139,095 |
| 80% SF LV | 101,019 | 38,076 | 139,095 |
| Instream %BWS | 101,019 | 38,076 | 139,095 |
| 40% SF LV | 101,019 | 38,076 | 139,095 |
| 60% SF LV | 101,019 | 38,076 | 139,095 |
| 80% SF LV | 101,019 | 38,076 | 139,095 |

GWDepl, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 47,099 | 13,604 | 60,703 |
| 40% SF LV | 47,099 | 13,604 | 60,703 |
| 60% SF LV | 47,099 | 13,604 | 60,703 |
| 80% SF LV | 47,099 | 13,604 | 60,703 |
| Instream %BWS | 47,099 | 13,604 | 60,703 |
| 40% SF LV | 47,099 | 13,604 | 60,703 |
| 60% SF LV | 47,099 | 13,604 | 60,703 |
| 80% SF LV | 47,099 | 13,604 | 60,703 |

GW Demand, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 41,158 | 15,555 | 56,713 |
| 40% SF LV | 41,158 | 15,555 | 56,713 |
| 60% SF LV | 41,158 | 15,555 | 56,713 |
| 80% SF LV | 41,158 | 15,555 | 56,713 |
| Instream %BWS | 41,158 | 15,555 | 56,713 |
| 40% SF LV | 41,158 | 15,555 | 56,713 |
| 60% SF LV | 41,158 | 15,555 | 56,713 |
| 80% SF LV | 41,158 | 15,555 | 56,713 |

GWDepl, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 40,151 | 14,033 | 54,184 |
| 40% SF LV | 40,151 | 14,033 | 54,184 |
| 60% SF LV | 40,151 | 14,033 | 54,184 |
| 80% SF LV | 40,151 | 14,033 | 54,184 |
| Instream %BWS | 40,151 | 14,033 | 54,184 |
| 40% SF LV | 40,151 | 14,033 | 54,184 |
| 60% SF LV | 40,151 | 14,033 | 54,184 |
| 80% SF LV | 40,151 | 14,033 | 54,184 |

Net SW Loss, AF

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

= SW Demand + GWDepl + Net SWL + NonCU

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 277,512 | 1,353,979 | 1,444,230 |
| 40% SF LV | 291,663 | 2,465,943 | 2,556,194 |
| 60% SF LV | 302,522 | 3,526,028 | 3,616,278 |
| 80% SF LV | 318,492 | 4,587,423 | 4,677,673 |
| Instream %BWS | 277,512 | 1,353,979 | 1,444,230 |
| 40% SF LV | 291,663 | 2,465,943 | 2,556,194 |
| 60% SF LV | 302,522 | 3,526,028 | 3,616,278 |
| 80% SF LV | 318,492 | 4,587,423 | 4,677,673 |

Net SW Loss, AF

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 197,000 | 991,847 | 1,039,157 |
| 40% SF LV | 198,373 | 1,797,776 | 1,845,085 |
| 60% SF LV | 199,296 | 2,589,530 | 2,636,840 |
| 80% SF LV | 201,396 | 3,381,505 | 3,428,814 |
| Instream %BWS | 197,000 | 991,847 | 1,039,157 |
| 40% SF LV | 198,373 | 1,797,776 | 1,845,085 |
| 60% SF LV | 199,296 | 2,589,530 | 2,636,840 |
| 80% SF LV | 201,396 | 3,381,505 | 3,428,814 |

Net SW Loss, AF

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 80,512 | 362,132 | 605,287 |
| 40% SF LV | 93,290 | 668,168 | 911,322 |
| 60% SF LV | 103,227 | 936,497 | 1,179,652 |
| 80% SF LV | 117,096 | 1,205,919 | 1,449,073 |
| Instream %BWS | 80,512 | 362,132 | 605,287 |
| 40% SF LV | 93,290 | 668,168 | 911,322 |
| 60% SF LV | 103,227 | 936,497 | 1,179,652 |
| 80% SF LV | 117,096 | 1,205,919 | 1,449,073 |

= SW Demand + GWDemand+ Net SWL + NonCU

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 332,439 | 1,379,973 | 1,525,150 |
| 40% SF LV | 346,590 | 2,491,937 | 2,637,114 |
| 60% SF LV | 357,449 | 3,552,022 | 3,697,199 |
| 80% SF LV | 373,418 | 4,613,417 | 4,758,594 |
| Instream %BWS | 332,439 | 1,379,973 | 1,525,150 |
| 40% SF LV | 346,590 | 2,491,937 | 2,637,114 |
| 60% SF LV | 357,449 | 3,552,022 | 3,697,199 |
| 80% SF LV | 373,418 | 4,613,417 | 4,758,594 |

Excess Supply Near Term) = Supply - Near Term Demand

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below North Bend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 130,966 | 1,228,551 | 1,359,516 |
| Hydro Inflow; 40% SF LV | 43,262 | 267,288 | 310,550 |
| Hydro Inflow; 60% SF LV | (18,579) | (116,446) | (135,024) |
| Hydro Inflow; 80% SF LV | (45,815) | (325,388) | (371,204) |
| Req. Inflow; Instream %BWS | 37,665 | 361,688 | 399,352 |
| Req. Inflow; 40% SF LV | 8,400 | 91,964 | 100,364 |
| Req. Inflow; 60% SF LV | (19,272) | (118,529) | (137,801) |
| Req. Inflow; 80% SF LV | (45,815) | (325,388) | (371,204) |

*Note: Because the NonCU for each subbasin is not additive, the excess*

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 250,920 | 1,016,319 | 1,117,548 |
| 40% SF LV | 252,293 | 1,822,247 | 1,923,477 |
| 60% SF LV | 253,216 | 2,614,002 | 2,715,232 |
| 80% SF LV | 255,316 | 3,405,976 | 3,507,206 |
| Instream %BWS | 250,920 | 1,016,319 | 1,117,548 |
| 40% SF LV | 252,293 | 1,822,247 | 1,923,477 |
| 60% SF LV | 253,216 | 2,614,002 | 2,715,232 |
| 80% SF LV | 255,316 | 3,405,976 | 3,507,206 |

Excess Supply Near Term) = Supply - Near Term Demand

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 64,851 | 994,900 | 1,059,750 |
| Hydro Inflow; 40% SF LV | 30,821 | 232,166 | 262,988 |
| Hydro Inflow; 60% SF LV | (4,347) | (86,888) | (91,235) |
| Hydro Inflow; 80% SF LV | (15,680) | (245,263) | (260,943) |
| Req. Inflow; Instream %BWS | 17,188 | 271,799 | 288,987 |
| Req. Inflow; 40% SF LV | 6,888 | 71,318 | 78,206 |
| Req. Inflow; 60% SF LV | (4,906) | (88,630) | (93,536) |
| Req. Inflow; 80% SF LV | (15,680) | (245,263) | (260,943) |

*Note: Because the NonCU for each subbasin is not additive, the excess supply for the Lower*

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Instream %BWS | 81,518 | 363,655 | 607,816 |
| 40% SF LV | 94,296 | 669,690 | 913,851 |
| 60% SF LV | 104,233 | 938,020 | 1,182,181 |
| 80% SF LV | 118,103 | 1,207,441 | 1,451,602 |
| Instream %BWS | 81,518 | 363,655 | 607,816 |
| 40% SF LV | 94,296 | 669,690 | 913,851 |
| 60% SF LV | 104,233 | 938,020 | 1,182,181 |
| 80% SF LV | 118,103 | 1,207,441 | 1,451,602 |

Excess Supply Near Term) = Supply - Near Term Demand

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 66,115 | 233,651 | 299,766 |
| Hydro Inflow; 40% SF LV | 12,441 | 35,122 | 47,562 |
| Hydro Inflow; 60% SF LV | (14,232) | (29,557) | (43,790) |
| Hydro Inflow; 80% SF LV | (30,135) | (80,126) | (110,261) |
| Req. Inflow; Instream %BWS | 20,476 | 89,889 | 110,365 |
| Req. Inflow; 40% SF LV | 1,513 | 20,645 | 22,158 |
| Req. Inflow; 60% SF LV | (14,366) | (29,899) | (44,265) |
| Req. Inflow; 80% SF LV | (30,135) | (80,126) | (110,261) |

*Note: The excess supply for the Lower Platte Subbasins is equal to the excess supply for the whole and the %BWS is used to subdivide between the two subbasins*

Excess Supply (Long Term) = Supply - Long Term Demand

| Annual | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 124,996 | 1,153,601 | 1,278,596 |
| Hydro Inflow; 40% SF LV | 37,292 | 192,337 | 229,629 |
| Hydro Inflow; 60% SF LV | (24,549) | (191,396) | (215,945) |
| Hydro Inflow; 80% SF LV | (51,785) | (400,339) | (452,124) |
| Req. Inflow; Instream %BWS | 31,695 | 286,737 | 318,432 |
| Req. Inflow; 40% SF LV | 2,430 | 17,013 | 19,443 |
| Req. Inflow; 60% SF LV | (25,242) | (193,480) | (218,721) |
| Req. Inflow; 80% SF LV | (51,785) | (400,339) | (452,124) |

*Note: Because the NonCU for each subbasin is not additive, the excess supply for*

Excess Supply (Long Term) = Supply - Long Term Demand

| NonPeak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 59,581 | 921,778 | 981,358 |
| Hydro Inflow; 40% SF LV | 25,552 | 159,044 | 184,596 |
| Hydro Inflow; 60% SF LV | (9,616) | (160,011) | (169,627) |
| Hydro Inflow; 80% SF LV | (20,950) | (318,385) | (339,335) |
| Req. Inflow; Instream %BWS | 11,919 | 198,676 | 210,595 |
| Req. Inflow; 40% SF LV | 1,618 | (1,804) | (186) |
| Req. Inflow; 60% SF LV | (10,175) | (161,753) | (171,928) |
| Req. Inflow; 80% SF LV | (20,950) | (318,385) | (339,335) |

*Note: Because the NonCU for each subbasin is not additive, the excess supply for the Lower Platte*

Excess Supply (Long Term) = Supply - Long Term Demand

| Peak | Lower Platte above North Bend | Lower Platte North Bend to Louisville | Lower Platte Above & Below Nbend |
|---|---|---|---|
| Hydro Inflow; Instream %BWS | 65,414 | 231,823 | 297,237 |
| Hydro Inflow; 40% SF LV | 11,740 | 33,293 | 45,033 |
| Hydro Inflow; 60% SF LV | (14,933) | (31,385) | (46,318) |
| Hydro Inflow; 80% SF LV | (30,836) | (81,954) | (112,789) |
| Req. Inflow; Instream %BWS | 19,775 | 88,061 | 107,836 |
| Req. Inflow; 40% SF LV | 812 | 18,817 | 19,629 |
| Req. Inflow; 60% SF LV | (15,066) | (31,727) | (46,793) |
| Req. Inflow; 80% SF LV | (30,836) | (81,954) | (112,789) |

*Note: The excess supply for the Lower Platte Subbasins is equal to the excess supply for the whole and the %BWS is used to subdivide between the two subbasins*

Required Inflow (Historic % Inflow), AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | 801 | - |
| 40% SF LV | - | 801 | - |
| 60% SF LV | - | 801 | - |
| 80% SF LV | - | 801 | - |

SWCU, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 4,186 | 14,473 | 18,659 |
| 40% SF LV | 4,186 | 14,473 | 18,659 |
| 60% SF LV | 4,186 | 14,473 | 18,659 |
| 80% SF LV | 4,186 | 14,473 | 18,659 |

Basin Inflow (Historic % Inflow), AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | 75 | - |
| 40% SF LV | - | 75 | - |
| 60% SF LV | - | 75 | - |
| 80% SF LV | - | 75 | - |

SWCU, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 557 | 1,252 | 1,810 |
| 40% SF LV | 557 | 1,252 | 1,810 |
| 60% SF LV | 557 | 1,252 | 1,810 |
| 80% SF LV | 557 | 1,252 | 1,810 |

Basin Inflow (Historic % Inflow), AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | 726 | - |
| 40% SF LV | - | 726 | - |
| 60% SF LV | - | 726 | - |
| 80% SF LV | - | 726 | - |

SWCU, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 3,629 | 13,220 | 16,849 |
| 40% SF LV | 3,629 | 13,220 | 16,849 |
| 60% SF LV | 3,629 | 13,220 | 16,849 |
| 80% SF LV | 3,629 | 13,220 | 16,849 |

GWDepl, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 50,192 | 103,868 | 154,060 |
| 40% SF LV | 50,192 | 103,868 | 154,060 |
| 60% SF LV | 50,192 | 103,868 | 154,060 |
| 80% SF LV | 50,192 | 103,868 | 154,060 |

Streamflow (Gain), AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 375,055 | 838,219 | 1,213,274 |
| 40% SF LV | 375,055 | 838,219 | 1,213,274 |
| 60% SF LV | 375,055 | 838,219 | 1,213,274 |
| 80% SF LV | 375,055 | 838,219 | 1,213,274 |

GWDepl, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 37,643 | 57,170 | 94,814 |
| 40% SF LV | 37,643 | 57,170 | 94,814 |
| 60% SF LV | 37,643 | 57,170 | 94,814 |
| 80% SF LV | 37,643 | 57,170 | 94,814 |

Streamflow (Gain), AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 278,990 | 576,930 | 855,920 |
| 40% SF LV | 278,990 | 576,930 | 855,920 |
| 60% SF LV | 278,990 | 576,930 | 855,920 |
| 80% SF LV | 278,990 | 576,930 | 855,920 |

GWDepl, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 12,549 | 46,697 | 59,246 |
| 40% SF LV | 12,549 | 46,697 | 59,246 |
| 60% SF LV | 12,549 | 46,697 | 59,246 |
| 80% SF LV | 12,549 | 46,697 | 59,246 |

Streamflow (Gain), AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 96,065 | 261,289 | 357,354 |
| 40% SF LV | 96,065 | 261,289 | 357,354 |
| 60% SF LV | 96,065 | 261,289 | 357,354 |
| 80% SF LV | 96,065 | 261,289 | 357,354 |

BWS, AF

=Streamflow + GW Depl + SW Demand + Required Inflow

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 429,433 | 957,361 | 1,385,993 |
| 40% SF LV | 429,433 | 957,361 | 1,385,993 |
| 60% SF LV | 429,433 | 957,361 | 1,385,993 |
| 80% SF LV | 429,433 | 957,361 | 1,385,993 |

BWS, AF

=Streamflow + GW Depl + SW Demand + Required Inflow

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 317,190 | 635,428 | 952,543 |
| 40% SF LV | 317,190 | 635,428 | 952,543 |
| 60% SF LV | 317,190 | 635,428 | 952,543 |
| 80% SF LV | 317,190 | 635,428 | 952,543 |

BWS, AF

=Streamflow + GW Depl + SW Demand + Required Inflow

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 112,242 | 321,933 | 433,449 |
| 40% SF LV | 112,242 | 321,933 | 433,449 |
| 60% SF LV | 112,242 | 321,933 | 433,449 |
| 80% SF LV | 112,242 | 321,933 | 433,449 |

NonCU Demand, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 69,884 | 150,394 | 219,476 |
| 40% SF LV | 204,386 | 445,365 | 648,950 |
| 60% SF LV | 306,178 | 668,046 | 973,423 |
| 80% SF LV | 407,970 | 890,727 | 1,297,895 |

SWDemand, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 4,289 | 15,027 | 19,315 |
| 40% SF LV | 4,289 | 15,027 | 19,315 |
| 60% SF LV | 4,289 | 15,027 | 19,315 |
| 80% SF LV | 4,289 | 15,027 | 19,315 |

NonCU Demand, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 54,838 | 109,354 | 164,117 |
| 40% SF LV | 156,076 | 312,689 | 468,690 |
| 60% SF LV | 234,077 | 469,034 | 703,035 |
| 80% SF LV | 312,078 | 625,378 | 937,380 |

SWDemand, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 564 | 1,276 | 1,840 |
| 40% SF LV | 564 | 1,276 | 1,840 |
| 60% SF LV | 564 | 1,276 | 1,840 |
| 80% SF LV | 564 | 1,276 | 1,840 |

NonCU Demand, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 15,046 | 41,040 | 55,359 |
| 40% SF LV | 48,310 | 132,676 | 180,260 |
| 60% SF LV | 72,101 | 199,012 | 270,387 |
| 80% SF LV | 95,892 | 265,348 | 360,515 |

SWDemand, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 3,725 | 13,750 | 17,476 |
| 40% SF LV | 3,725 | 13,750 | 17,476 |
| 60% SF LV | 3,725 | 13,750 | 17,476 |
| 80% SF LV | 3,725 | 13,750 | 17,476 |

GW Demand, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 198,375 | 138,309 | 336,683 |
| 40% SF LV | 198,375 | 138,309 | 336,683 |
| 60% SF LV | 198,375 | 138,309 | 336,683 |
| 80% SF LV | 198,375 | 138,309 | 336,683 |

GWDepl, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 50,192 | 103,868 | 154,060 |
| 40% SF LV | 50,192 | 103,868 | 154,060 |
| 60% SF LV | 50,192 | 103,868 | 154,060 |
| 80% SF LV | 50,192 | 103,868 | 154,060 |

GW Demand, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 139,508 | 98,966 | 238,474 |
| 40% SF LV | 139,508 | 98,966 | 238,474 |
| 60% SF LV | 139,508 | 98,966 | 238,474 |
| 80% SF LV | 139,508 | 98,966 | 238,474 |

GWDepl, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 37,643 | 57,170 | 94,814 |
| 40% SF LV | 37,643 | 57,170 | 94,814 |
| 60% SF LV | 37,643 | 57,170 | 94,814 |
| 80% SF LV | 37,643 | 57,170 | 94,814 |

GW Demand, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 58,867 | 39,343 | 98,209 |
| 40% SF LV | 58,867 | 39,343 | 98,209 |
| 60% SF LV | 58,867 | 39,343 | 98,209 |
| 80% SF LV | 58,867 | 39,343 | 98,209 |

GWDepl, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 12,549 | 46,697 | 59,246 |
| 40% SF LV | 12,549 | 46,697 | 59,246 |
| 60% SF LV | 12,549 | 46,697 | 59,246 |
| 80% SF LV | 12,549 | 46,697 | 59,246 |

Net SW Loss, AF

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 124,365 | 269,288 | 392,852 |
| 40% SF LV | 258,867 | 564,259 | 822,325 |
| 60% SF LV | 360,659 | 786,940 | 1,146,798 |
| 80% SF LV | 462,451 | 1,009,621 | 1,471,271 |

Net SW Loss, AF

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 93,045 | 167,800 | 260,770 |
| 40% SF LV | 194,283 | 371,136 | 565,344 |
| 60% SF LV | 272,284 | 527,480 | 799,689 |
| 80% SF LV | 350,285 | 683,825 | 1,034,034 |

Net SW Loss, AF

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | - | - | - |
| 40% SF LV | - | - | - |
| 60% SF LV | - | - | - |
| 80% SF LV | - | - | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 31,320 | 101,488 | 132,081 |
| 40% SF LV | 64,584 | 193,123 | 256,981 |
| 60% SF LV | 88,375 | 259,460 | 347,109 |
| 80% SF LV | 112,167 | 325,796 | 437,237 |

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 272,548 | 303,729 | 575,475 |
| 40% SF LV | 407,050 | 598,701 | 1,004,949 |
| 60% SF LV | 508,842 | 821,381 | 1,329,421 |
| 80% SF LV | 610,634 | 1,044,062 | 1,653,894 |

Excess Supply based on Near Term Demand

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 305,068 | 688,073 | 993,141 |
| 40% SF LV | 170,565 | 393,102 | 563,667 |
| 60% SF LV | 68,774 | 170,421 | 239,195 |
| 80% SF LV | (33,018) | (52,260) | (85,278) |

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 194,910 | 209,596 | 404,431 |
| 40% SF LV | 296,148 | 412,932 | 709,004 |
| 60% SF LV | 374,148 | 569,276 | 943,349 |
| 80% SF LV | 452,149 | 725,621 | 1,177,694 |

Excess Supply based on Near Term Demand

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 224,145 | 467,628 | 691,773 |
| 40% SF LV | 122,907 | 264,292 | 387,199 |
| 60% SF LV | 44,906 | 107,948 | 152,854 |
| 80% SF LV | (33,094) | (48,397) | (81,491) |

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 77,638 | 94,133 | 171,045 |
| 40% SF LV | 110,902 | 185,769 | 295,945 |
| 60% SF LV | 134,693 | 252,105 | 386,072 |
| 80% SF LV | 158,485 | 318,441 | 476,200 |

Excess Supply based on Near Term Demand

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 80,923 | 220,445 | 301,368 |
| 40% SF LV | 47,658 | 128,809 | 176,468 |
| 60% SF LV | 23,867 | 62,473 | 86,340 |
| 80% SF LV | 76 | (3,863) | (3,787) |

Excess Supply based on Long Term Demand

| Annual | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 250,079 | 560,438 | 810,517 |
| 40% SF LV | 115,577 | 265,467 | 381,044 |
| 60% SF LV | 13,785 | 42,786 | 56,571 |
| 80% SF LV | (88,007) | (179,894) | (267,901) |

Excess Supply based on Long Term Demand

| NonPeak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 180,919 | 367,194 | 548,113 |
| 40% SF LV | 79,681 | 163,859 | 243,539 |
| 60% SF LV | 1,680 | 7,514 | 9,194 |
| 80% SF LV | (76,320) | (148,830) | (225,151) |

Excess Supply based on Long Term Demand

| Peak | Elkhorn above Norfolk | Elkhorn Norfolk to Waterloo | Full Elkhorn Basin |
|---|---|---|---|
| Instream %BWS | 69,160 | 193,244 | 262,405 |
| 40% SF LV | 35,896 | 101,609 | 137,505 |
| 60% SF LV | 12,105 | 35,272 | 47,377 |
| 80% SF LV | (11,687) | (31,064) | (42,751) |

Required Inflow (Historic % Inflow), AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,156,553 | 39 | - | - | - | 3,072 |
| Hydro Inflow; 40% SF LV | 1,156,553 | 39 | - | - | - | 3,072 |
| Hydro Inflow; 60% SF LV | 1,156,553 | 39 | - | - | - | 3,072 |
| Hydro Inflow; 80% SF LV | 1,156,553 | 39 | - | - | - | 3,072 |
| Req. Inflow; Instream %BWS | 2,817 | 39 | - | - | - | 3,072 |
| Req. Inflow; 40% SF LV | 2,817 | 39 | - | - | - | 3,072 |
| Req. Inflow; 60% SF LV | 2,817 | 39 | - | - | - | 3,072 |
| Req. Inflow; 80% SF LV | 2,817 | 39 | - | - | - | 3,072 |

SW CU AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Hydro Inflow; 40% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Hydro Inflow; 60% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Hydro Inflow; 80% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Req. Inflow; Instream %BWS | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Req. Inflow; 40% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Req. Inflow; 60% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |
| Req. Inflow; 80% SF LV | 7,549 | 97,235 | 75,072 | 3,749 | 183,606 | 3,179 |

Required Inflow (Historic % Inflow), AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 881,119 | 20 | - | - | - | 386 |
| Hydro Inflow; 40% SF LV | 881,119 | 20 | - | - | - | 386 |
| Hydro Inflow; 60% SF LV | 881,119 | 20 | - | - | - | 386 |
| Hydro Inflow; 80% SF LV | 881,119 | 20 | - | - | - | 386 |
| Req. Inflow; Instream %BWS | 233 | 20 | - | - | - | 386 |
| Req. Inflow; 40% SF LV | 233 | 20 | - | - | - | 386 |
| Req. Inflow; 60% SF LV | 233 | 20 | - | - | - | 386 |
| Req. Inflow; 80% SF LV | 233 | 20 | - | - | - | 386 |

SW CU AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Hydro Inflow; 40% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Hydro Inflow; 60% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Hydro Inflow; 80% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Req. Inflow; Instream %BWS | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Req. Inflow; 40% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Req. Inflow; 60% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |
| Req. Inflow; 80% SF LV | 771 | 14,856 | 14,658 | 743 | 31,030 | 402 |

Required Inflow (Historic % Inflow), AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 275,434 | 20 | - | - | - | 2,686 |
| Hydro Inflow; 40% SF LV | 275,434 | 20 | - | - | - | 2,686 |
| Hydro Inflow; 60% SF LV | 275,434 | 20 | - | - | - | 2,686 |
| Hydro Inflow; 80% SF LV | 275,434 | 20 | - | - | - | 2,686 |
| Req. Inflow; Instream %BWS | 2,584 | 20 | - | - | - | 2,686 |
| Req. Inflow; 40% SF LV | 2,584 | 20 | - | - | - | 2,686 |
| Req. Inflow; 60% SF LV | 2,584 | 20 | - | - | - | 2,686 |
| Req. Inflow; 80% SF LV | 2,584 | 20 | - | - | - | 2,686 |

SW CU AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Hydro Inflow; 40% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Hydro Inflow; 60% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Hydro Inflow; 80% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Req. Inflow; Instream %BWS | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Req. Inflow; 40% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Req. Inflow; 60% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |
| Req. Inflow; 80% SF LV | 6,778 | 82,378 | 60,414 | 3,006 | 152,576 | 2,777 |

GWDepl, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 40% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 60% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 80% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; Instream %BWS | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 40% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 60% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 80% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |

Streamflow (Gain), AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Hydro Inflow; 40% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Hydro Inflow; 60% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Hydro Inflow; 80% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Req. Inflow; Instream %BWS | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Req. Inflow; 40% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Req. Inflow; 60% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |
| Req. Inflow; 80% SF LV | 235,025 | 701,983 | 725,226 | 147,172 | 1,809,406 | 38,225 |

GWDepl, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 40% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 60% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 80% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; Instream %BWS | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 40% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 60% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 80% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |

Streamflow (Gain), AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Hydro Inflow; 40% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Hydro Inflow; 60% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Hydro Inflow; 80% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Req. Inflow; Instream %BWS | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Req. Inflow; 40% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Req. Inflow; 60% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |
| Req. Inflow; 80% SF LV | 170,865 | 583,998 | 561,346 | 113,169 | 1,429,378 | 38,715 |

GWDepl, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 40% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 60% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 80% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; Instream %BWS | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 40% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 60% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 80% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |

Streamflow (Gain), AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Hydro Inflow; 40% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Hydro Inflow; 60% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Hydro Inflow; 80% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Req. Inflow; Instream %BWS | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Req. Inflow; 40% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Req. Inflow; 60% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |
| Req. Inflow; 80% SF LV | 64,160 | 117,984 | 163,880 | 34,003 | 380,027 | (490) |

Supply, AF
=Streamflow + GW Depl + SW Demand + Basin Inflow

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,426,593 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Hydro Inflow; 40% SF LV | 1,426,593 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Hydro Inflow; 60% SF LV | 1,426,593 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Hydro Inflow; 80% SF LV | 1,426,593 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Req. Inflow; Instream %BWS | 272,857 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Req. Inflow; 40% SF LV | 272,857 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Req. Inflow; 60% SF LV | 272,857 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |
| Req. Inflow; 80% SF LV | 272,857 | 827,371 | 823,520 | 186,497 | 2,107,388 | 74,143 |

Supply, AF
=Streamflow + GW Depl + SW Demand + Basin Inflow

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,073,147 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Hydro Inflow; 40% SF LV | 1,073,147 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Hydro Inflow; 60% SF LV | 1,073,147 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Hydro Inflow; 80% SF LV | 1,073,147 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Req. Inflow; Instream %BWS | 192,261 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Req. Inflow; 40% SF LV | 192,261 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Req. Inflow; 60% SF LV | 192,261 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |
| Req. Inflow; 80% SF LV | 192,261 | 619,716 | 593,097 | 140,890 | 1,545,712 | 61,903 |

Supply, AF
=Streamflow + GW Depl + SW Demand + Basin Inflow

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 353,446 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Hydro Inflow; 40% SF LV | 353,446 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Hydro Inflow; 60% SF LV | 353,446 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Hydro Inflow; 80% SF LV | 353,446 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Req. Inflow; Instream %BWS | 80,596 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Req. Inflow; 40% SF LV | 80,596 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Req. Inflow; 60% SF LV | 80,596 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |
| Req. Inflow; 80% SF LV | 80,596 | 207,654 | 230,422 | 45,607 | 561,676 | 12,240 |

NonCU Demand, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,855,850 | 261,454 | 728,101 | 175,636 | 1,855,850 | - |
| Hydro Inflow; 40% SF LV | 1,855,850 | 396,238 | 728,101 | 175,636 | 1,855,850 | - |
| Hydro Inflow; 60% SF LV | 1,855,850 | 579,701 | 733,083 | 175,870 | 1,869,050 | - |
| Hydro Inflow; 80% SF LV | 1,855,850 | 772,076 | 797,242 | 189,707 | 2,044,337 | - |
| Req. Inflow; Instream %BWS | 42,662 | 137,497 | 135,235 | 30,661 | 343,238 | - |
| Req. Inflow; 40% SF LV | 127,797 | 386,773 | 383,087 | 88,084 | 982,924 | - |
| Req. Inflow; 60% SF LV | 191,657 | 579,424 | 573,826 | 131,973 | 1,474,064 | - |
| Req. Inflow; 80% SF LV | 255,516 | 772,076 | 764,565 | 175,863 | 1,965,204 | - |

SW Demand, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Hydro Inflow; 40% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Hydro Inflow; 60% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Hydro Inflow; 80% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Req. Inflow; Instream %BWS | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Req. Inflow; 40% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Req. Inflow; 60% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |
| Req. Inflow; 80% SF LV | 7,974 | 103,386 | 102,257 | 3,730 | 217,348 | 3,419 |

NonCU Demand, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,467,722 | 189,626 | 563,372 | 133,529 | 1,467,722 | - |
| Hydro Inflow; 40% SF LV | 1,467,722 | 307,578 | 563,372 | 133,529 | 1,467,722 | - |
| Hydro Inflow; 60% SF LV | 1,467,722 | 455,930 | 563,372 | 133,571 | 1,467,722 | - |
| Hydro Inflow; 80% SF LV | 1,467,722 | 607,863 | 605,485 | 145,385 | 1,582,639 | - |
| Req. Inflow; Instream %BWS | 32,642 | 108,265 | 103,057 | 24,353 | 268,084 | - |
| Req. Inflow; 40% SF LV | 95,186 | 303,997 | 290,900 | 69,370 | 759,220 | - |
| Req. Inflow; 60% SF LV | 142,777 | 455,930 | 436,290 | 104,040 | 1,138,805 | - |
| Req. Inflow; 80% SF LV | 190,367 | 607,863 | 581,680 | 138,711 | 1,518,389 | - |

SW Demand, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Hydro Inflow; 40% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Hydro Inflow; 60% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Hydro Inflow; 80% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Req. Inflow; Instream %BWS | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Req. Inflow; 40% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Req. Inflow; 60% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |
| Req. Inflow; 80% SF LV | 802 | 43,489 | 62,587 | 737 | 107,615 | 420 |

NonCU Demand, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 388,127 | 71,828 | 164,728 | 42,108 | 388,127 | - |
| Hydro Inflow; 40% SF LV | 388,127 | 88,660 | 164,728 | 42,108 | 388,127 | - |
| Hydro Inflow; 60% SF LV | 388,127 | 123,771 | 169,711 | 42,299 | 401,327 | - |
| Hydro Inflow; 80% SF LV | 388,127 | 164,213 | 191,757 | 44,321 | 461,698 | - |
| Req. Inflow; Instream %BWS | 10,020 | 29,232 | 32,177 | 6,308 | 75,154 | - |
| Req. Inflow; 40% SF LV | 32,611 | 82,776 | 92,187 | 18,714 | 223,704 | - |
| Req. Inflow; 60% SF LV | 48,880 | 123,494 | 137,535 | 27,933 | 335,259 | - |
| Req. Inflow; 80% SF LV | 65,149 | 164,213 | 182,884 | 37,152 | 446,815 | - |

*Note: The Loup Hydropower is applied in Lower Loup Subbasin and this hydropower demand exceeds any downstream demand scenario for the Lower Loup. This is not true when looking at the Loup Basin as a whole. The hydropower demand exceeds downstream demand for the DS Instream Demand scenario and DS 40% LV Demand Scenario but not for the DS 60% or 80% LV Demand Scenarios. This coupled with the fact that the Req. Inflow terms are not based on DS Demands, the Sum of the Subbasin NonCU less the Sum of the Subbasin Req. Inflows will never add up to the whole.*

SW Demand, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Hydro Inflow; 40% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Hydro Inflow; 60% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Hydro Inflow; 80% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Req. Inflow; Instream %BWS | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Req. Inflow; 40% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Req. Inflow; 60% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |
| Req. Inflow; 80% SF LV | 7,172 | 59,898 | 39,670 | 2,994 | 109,733 | 2,999 |

GW Demand, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Hydro Inflow; 40% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Hydro Inflow; 60% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Hydro Inflow; 80% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Req. Inflow; Instream %BWS | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Req. Inflow; 40% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Req. Inflow; 60% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |
| Req. Inflow; 80% SF LV | 116,470 | 108,878 | 70,694 | 133,437 | 429,479 | 100,663 |

GWDepl, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 40% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 60% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Hydro Inflow; 80% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; Instream %BWS | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 40% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 60% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |
| Req. Inflow; 80% SF LV | 27,466 | 28,114 | 23,221 | 35,576 | 114,377 | 29,667 |

GW Demand, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Hydro Inflow; 40% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Hydro Inflow; 60% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Hydro Inflow; 80% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Req. Inflow; Instream %BWS | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Req. Inflow; 40% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Req. Inflow; 60% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |
| Req. Inflow; 80% SF LV | 81,671 | 76,398 | 49,653 | 93,706 | 301,428 | 70,464 |

GWDepl, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 40% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 60% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Hydro Inflow; 80% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; Instream %BWS | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 40% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 60% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |
| Req. Inflow; 80% SF LV | 20,392 | 20,842 | 17,092 | 26,978 | 85,304 | 22,401 |

GW Demand, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Hydro Inflow; 40% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Hydro Inflow; 60% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Hydro Inflow; 80% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Req. Inflow; Instream %BWS | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Req. Inflow; 40% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Req. Inflow; 60% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |
| Req. Inflow; 80% SF LV | 34,799 | 32,480 | 21,041 | 39,731 | 128,051 | 30,199 |

GWDepl, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 40% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 60% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Hydro Inflow; 80% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; Instream %BWS | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 40% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 60% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |
| Req. Inflow; 80% SF LV | 7,074 | 7,272 | 6,128 | 8,598 | 29,072 | 7,266 |

Net SW Loss, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | - | 38,976 | 11,946 | - | 50,923 | - |
| Hydro Inflow; 40% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |
| Hydro Inflow; 60% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |
| Hydro Inflow; 80% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |
| Req. Inflow; Instream %BWS | - | 38,976 | 11,946 | - | 50,923 | - |
| Req. Inflow; 40% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |
| Req. Inflow; 60% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |
| Req. Inflow; 80% SF LV | - | 38,976 | 11,946 | - | 50,923 | - |

= SW Demand + GWDepl + Net SWL + NonCU

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,891,290 | 431,931 | 865,525 | 214,943 | 2,238,498 | 33,086 |
| Hydro Inflow; 40% SF LV | 1,891,290 | 566,715 | 865,525 | 214,943 | 2,238,498 | 33,086 |
| Hydro Inflow; 60% SF LV | 1,891,290 | 750,178 | 870,507 | 215,176 | 2,251,698 | 33,086 |
| Hydro Inflow; 80% SF LV | 1,891,290 | 942,553 | 934,667 | 229,013 | 2,426,985 | 33,086 |
| Req. Inflow; Instream %BWS | 78,102 | 307,974 | 272,659 | 69,968 | 725,886 | 33,086 |
| Req. Inflow; 40% SF LV | 163,237 | 557,250 | 520,511 | 127,390 | 1,365,572 | 33,086 |
| Req. Inflow; 60% SF LV | 227,097 | 749,901 | 711,250 | 171,280 | 1,856,712 | 33,086 |
| Req. Inflow; 80% SF LV | 290,956 | 942,553 | 901,989 | 215,170 | 2,347,852 | 33,086 |

Net SW Loss, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | - | 2,915 | 5,110 | - | 8,025 | - |
| Hydro Inflow; 40% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |
| Hydro Inflow; 60% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |
| Hydro Inflow; 80% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |
| Req. Inflow; Instream %BWS | - | 2,915 | 5,110 | - | 8,025 | - |
| Req. Inflow; 40% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |
| Req. Inflow; 60% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |
| Req. Inflow; 80% SF LV | - | 2,915 | 5,110 | - | 8,025 | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,488,916 | 256,872 | 648,162 | 161,243 | 1,668,667 | 22,821 |
| Hydro Inflow; 40% SF LV | 1,488,916 | 374,824 | 648,162 | 161,243 | 1,668,667 | 22,821 |
| Hydro Inflow; 60% SF LV | 1,488,916 | 523,176 | 648,162 | 161,285 | 1,668,667 | 22,821 |
| Hydro Inflow; 80% SF LV | 1,488,916 | 675,110 | 690,275 | 173,100 | 1,783,584 | 22,821 |
| Req. Inflow; Instream %BWS | 53,836 | 175,511 | 187,847 | 52,067 | 469,028 | 22,821 |
| Req. Inflow; 40% SF LV | 116,380 | 371,243 | 375,690 | 97,084 | 960,165 | 22,821 |
| Req. Inflow; 60% SF LV | 163,971 | 523,176 | 521,080 | 131,755 | 1,339,749 | 22,821 |
| Req. Inflow; 80% SF LV | 211,561 | 675,110 | 666,470 | 166,425 | 1,719,333 | 22,821 |

Net SW Loss, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | - | 36,061 | 6,837 | - | 42,898 | - |
| Hydro Inflow; 40% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |
| Hydro Inflow; 60% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |
| Hydro Inflow; 80% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |
| Req. Inflow; Instream %BWS | - | 36,061 | 6,837 | - | 42,898 | - |
| Req. Inflow; 40% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |
| Req. Inflow; 60% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |
| Req. Inflow; 80% SF LV | - | 36,061 | 6,837 | - | 42,898 | - |

Near Term Demand (+NonCU), AF
= SW Demand + GWDepl + Net SWL + NonCU

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 402,373 | 175,059 | 217,363 | 53,700 | 569,831 | 10,265 |
| Hydro Inflow; 40% SF LV | 402,373 | 191,891 | 217,363 | 53,700 | 569,831 | 10,265 |
| Hydro Inflow; 60% SF LV | 402,373 | 227,002 | 222,345 | 53,891 | 583,031 | 10,265 |
| Hydro Inflow; 80% SF LV | 402,373 | 267,444 | 244,392 | 55,913 | 643,401 | 10,265 |
| Req. Inflow; Instream %BWS | 24,266 | 132,463 | 84,812 | 17,900 | 256,858 | 10,265 |
| Req. Inflow; 40% SF LV | 46,857 | 186,007 | 144,821 | 30,306 | 405,407 | 10,265 |
| Req. Inflow; 60% SF LV | 63,126 | 226,725 | 190,170 | 39,525 | 516,963 | 10,265 |
| Req. Inflow; 80% SF LV | 79,395 | 267,444 | 235,519 | 48,744 | 628,519 | 10,265 |

= SW Demand + GWDemand+ Net SWL + NonCU

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,980,294 | 512,695 | 912,998 | 312,804 | 2,553,600 | 104,082 |
| Hydro Inflow; 40% SF LV | 1,980,294 | 647,479 | 912,998 | 312,804 | 2,553,600 | 104,082 |
| Hydro Inflow; 60% SF LV | 1,980,294 | 830,942 | 917,981 | 313,037 | 2,566,800 | 104,082 |
| Hydro Inflow; 80% SF LV | 1,980,294 | 1,023,317 | 982,140 | 326,874 | 2,742,087 | 104,082 |
| Req. Inflow; Instream %BWS | 167,107 | 388,738 | 320,132 | 167,829 | 1,040,989 | 104,082 |
| Req. Inflow; 40% SF LV | 252,242 | 638,013 | 567,985 | 225,251 | 1,680,674 | 104,082 |
| Req. Inflow; 60% SF LV | 316,101 | 830,665 | 758,723 | 269,141 | 2,171,814 | 104,082 |
| Req. Inflow; 80% SF LV | 379,961 | 1,023,317 | 949,462 | 313,031 | 2,662,954 | 104,082 |

Excess Supply Based on Near Term Demand, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (14,348) | (53,098) | (51,948) | (11,716) | (131,109) | 27,270 |
| Hydro Inflow; 40% SF LV | (14,348) | (53,098) | (51,948) | (11,716) | (131,109) | 13,395 |
| Hydro Inflow; 60% SF LV | (16,153) | (53,098) | (51,948) | (11,716) | (131,109) | (956) |
| Hydro Inflow; 80% SF LV | (41,238) | (124,903) | (124,938) | (28,517) | (319,596) | (15,342) |
| Req. Inflow; Instream %BWS | 180,010 | 541,998 | 536,043 | 123,451 | 1,381,502 | 27,270 |
| Req. Inflow; 40% SF LV | 94,875 | 292,722 | 288,191 | 66,028 | 741,816 | 13,395 |
| Req. Inflow; 60% SF LV | 31,015 | 100,070 | 97,452 | 22,139 | 250,677 | (956) |
| Req. Inflow; 80% SF LV | (32,844) | (92,581) | (93,287) | (21,751) | (240,463) | (15,342) |

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 1,550,195 | 312,427 | 680,722 | 227,971 | 1,884,790 | 70,884 |
| Hydro Inflow; 40% SF LV | 1,550,195 | 430,380 | 680,722 | 227,971 | 1,884,790 | 70,884 |
| Hydro Inflow; 60% SF LV | 1,550,195 | 578,732 | 680,722 | 228,014 | 1,884,790 | 70,884 |
| Hydro Inflow; 80% SF LV | 1,550,195 | 730,665 | 722,835 | 239,828 | 1,999,707 | 70,884 |
| Req. Inflow; Instream %BWS | 115,115 | 231,067 | 220,407 | 118,796 | 685,152 | 70,884 |
| Req. Inflow; 40% SF LV | 177,659 | 426,799 | 408,250 | 163,813 | 1,176,288 | 70,884 |
| Req. Inflow; 60% SF LV | 225,250 | 578,732 | 553,640 | 198,483 | 1,555,872 | 70,884 |
| Req. Inflow; 80% SF LV | 272,840 | 730,665 | 699,030 | 233,154 | 1,935,456 | 70,884 |

Excess Supply Based on Near Term Demand, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (14,303) | (49,534) | (47,909) | (11,208) | (122,954) | 28,122 |
| Hydro Inflow; 40% SF LV | (14,303) | (49,534) | (47,909) | (11,208) | (122,954) | 16,813 |
| Hydro Inflow; 60% SF LV | (14,303) | (49,534) | (47,909) | (11,208) | (122,954) | 5,687 |
| Hydro Inflow; 80% SF LV | (29,691) | (94,968) | (91,404) | (21,808) | (237,871) | (5,444) |
| Req. Inflow; Instream %BWS | 135,063 | 430,900 | 412,498 | 98,223 | 1,076,684 | 28,122 |
| Req. Inflow; 40% SF LV | 72,518 | 235,169 | 224,655 | 53,206 | 585,548 | 16,813 |
| Req. Inflow; 60% SF LV | 24,928 | 83,235 | 79,265 | 18,535 | 205,964 | 5,687 |
| Req. Inflow; 80% SF LV | (22,663) | (68,698) | (66,125) | (16,135) | (173,621) | (5,444) |

Long Term Demand (+NonCU), AF
= SW Demand + GWDemand+ Net SWL + NonCU

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | 430,099 | 200,267 | 232,276 | 84,832 | 668,810 | 33,197 |
| Hydro Inflow; 40% SF LV | 430,099 | 217,099 | 232,276 | 84,832 | 668,810 | 33,197 |
| Hydro Inflow; 60% SF LV | 430,099 | 252,210 | 237,258 | 85,024 | 682,010 | 33,197 |
| Hydro Inflow; 80% SF LV | 430,099 | 292,651 | 259,305 | 87,046 | 742,380 | 33,197 |
| Req. Inflow; Instream %BWS | 51,992 | 157,671 | 99,725 | 49,033 | 355,837 | 33,197 |
| Req. Inflow; 40% SF LV | 74,582 | 211,215 | 159,734 | 61,439 | 504,386 | 33,197 |
| Req. Inflow; 60% SF LV | 90,852 | 251,933 | 205,083 | 70,658 | 615,942 | 33,197 |
| Req. Inflow; 80% SF LV | 107,121 | 292,651 | 250,432 | 79,877 | 727,498 | 33,197 |

Excess Supply Based on Near Term Demand, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (44) | (3,564) | (4,039) | (508) | (8,155) | (852) |
| Hydro Inflow; 40% SF LV | (44) | (3,564) | (4,039) | (508) | (8,155) | (3,418) |
| Hydro Inflow; 60% SF LV | (1,850) | (8,409) | (9,515) | (1,582) | (21,355) | (6,643) |
| Hydro Inflow; 80% SF LV | (11,547) | (29,935) | (33,534) | (6,709) | (81,725) | (9,898) |
| Req. Inflow; Instream %BWS | 44,947 | 111,097 | 123,545 | 25,228 | 304,818 | (852) |
| Req. Inflow; 40% SF LV | 22,357 | 57,553 | 63,536 | 12,823 | 156,269 | (3,418) |
| Req. Inflow; 60% SF LV | 6,087 | 16,835 | 18,187 | 3,603 | 44,713 | (6,643) |
| Req. Inflow; 80% SF LV | (10,182) | (23,883) | (27,162) | (5,616) | (66,843) | (9,898) |

*Note: The excess supply for the Loup Subbasins are equal to the excess supply for the whole and the %BWS is used to subdivide between the five subbasins*

Excess Supply Based on Long Term Demand, AF

| Annual | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (52,338) | (177,266) | (177,583) | (39,025) | (446,212) | (43,726) |
| Hydro Inflow; 40% SF LV | (52,338) | (177,266) | (177,583) | (39,025) | (446,212) | (57,601) |
| Hydro Inflow; 60% SF LV | (54,143) | (182,111) | (183,059) | (40,099) | (459,412) | (71,951) |
| Hydro Inflow; 80% SF LV | (79,228) | (249,072) | (250,573) | (55,826) | (634,699) | (86,338) |
| Req. Inflow; Instream %BWS | 142,020 | 417,830 | 410,409 | 96,141 | 1,066,400 | (43,726) |
| Req. Inflow; 40% SF LV | 56,885 | 168,554 | 162,556 | 38,719 | 426,714 | (57,601) |
| Req. Inflow; 60% SF LV | (6,975) | (24,098) | (28,183) | (5,171) | (64,426) | (71,951) |
| Req. Inflow; 80% SF LV | (70,834) | (216,750) | (218,921) | (49,060) | (555,566) | (86,338) |

Excess Supply Based on Long Term Demand, AF

| NonPeak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (40,095) | (136,163) | (131,951) | (30,869) | (339,078) | (19,941) |
| Hydro Inflow; 40% SF LV | (40,095) | (136,163) | (131,951) | (30,869) | (339,078) | (31,250) |
| Hydro Inflow; 60% SF LV | (40,095) | (136,163) | (131,951) | (30,869) | (339,078) | (42,376) |
| Hydro Inflow; 80% SF LV | (55,482) | (181,597) | (175,447) | (41,469) | (453,995) | (53,507) |
| Req. Inflow; Instream %BWS | 109,271 | 344,271 | 328,456 | 78,562 | 860,561 | (19,941) |
| Req. Inflow; 40% SF LV | 46,727 | 148,540 | 140,613 | 33,545 | 369,424 | (31,250) |
| Req. Inflow; 60% SF LV | (864) | (3,393) | (4,777) | (1,126) | (10,160) | (42,376) |
| Req. Inflow; 80% SF LV | (48,454) | (155,327) | (150,167) | (35,796) | (389,744) | (53,507) |

Excess Supply Based on Long Term Demand, AF

| Peak | Lower Loup | Middle Loup | North Loup | South Loup | Loup Above Genoa | Beaver Creek |
|---|---|---|---|---|---|---|
| Hydro Inflow; Instream %BWS | (12,243) | (41,103) | (45,631) | (8,156) | (107,134) | (23,785) |
| Hydro Inflow; 40% SF LV | (12,243) | (41,103) | (45,631) | (8,156) | (107,134) | (26,351) |
| Hydro Inflow; 60% SF LV | (14,048) | (45,948) | (51,108) | (9,230) | (120,334) | (29,575) |
| Hydro Inflow; 80% SF LV | (23,746) | (67,475) | (75,126) | (14,357) | (180,704) | (32,831) |
| Req. Inflow; Instream %BWS | 32,748 | 73,558 | 81,953 | 17,580 | 205,839 | (23,785) |
| Req. Inflow; 40% SF LV | 10,158 | 20,014 | 21,943 | 5,174 | 57,290 | (26,351) |
| Req. Inflow; 60% SF LV | (6,111) | (20,704) | (23,405) | (4,045) | (54,266) | (29,575) |
| Req. Inflow; 80% SF LV | (22,380) | (61,423) | (68,754) | (13,264) | (165,822) | (32,831) |

*Note: The excess supply for the Loup Subbasins are equal to the excess supply for the whole and the %BWS is used to subdivide between the five subbasins*

## Attachment 2: NeDNR INSIGHT Data Sources

## Elkhorn River above Norfolk

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Elkhorn River at Norfolk, Nebr.<br>o Gage number 06799000 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn)<br>o Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model | 1988-2012 |
| | **Required Inflow** | N/A – no upstream basins | ----- | ----- |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments<br>Municipal & Industrial Pumping | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data<br>TFG | <br>1988-2012<br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Instream Flow Demand** | N/A – no instream flow permits in basin | ----- | ----- |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | Demands from Elkhorn Norfolk to Waterloo & Lower Platte | DNR Methodology | 1988-2012 |

CROPSIM = Crops Simulation Model, developed by UNL, computes daily water balance for crops
DNR = Department of Natural Resources
N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District
TFG = The Flatwater Group, consulting firm
USGS = United States Geological Survey

## Elkhorn River Norfolk to Waterloo

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Elkhorn River at Waterloo, Nebr.<br>○ Gage number 06800500 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn)<br>○ Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model<br>Analytical Methods (HDR) | 1988-2012<br>1988-2012 |
| | **Required Inflow** | Inflow from Elkhorn above Norfolk | DNR Methodology | 1988-2012 |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>○ Groundwater Irrigated Acres<br>○ Net Crop Irrigation Requirement<br>○ Crop Type Adjustments<br><br>Municipal & Industrial Pumping | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data<br><br>TFG | <br>1988-2012<br>1988-2012<br>1988-2012<br><br>1988-2012 |
| | **Instream Flow Demand** | N/A – no instream flow permits in basin | ----- | ----- |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | Demands from Lower Platte | DNR Methodology | 1988-2012 |

CROPSIM = Crops Simulation Model, developed by UNL, computes daily water balance for crops
DNR = Department of Natural Resources
HDR = consulting firm
N/A = not applicable
NASS = National Agricultural Statistics Service
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## Lower Platte River above North Bend

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Platte River at North Bend, Nebr.<br>○ Gage number 06796000 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn)<br>○ Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model<br>Cooperative Hydrologic Study (COHYST) 2010<br>HDR (Analytical Methods) | 1988-2012<br>1988-2012<br>1988-2012 |
| | **Required Inflow** | Inflow from Upper Platte & Loup | DNR Methodology | 1988-2012 |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>○ Groundwater Irrigated Acres<br>○ Net Crop Irrigation Requirement<br>○ Crop Type Adjustments<br>Municipal & Industrial Pumping | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data<br>TFG | <br>1988-2012<br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Instream Flow Demand** | Streamflow<br>○ Platte River at North Bend, 06796000<br>GW Depletions<br>Instream Flow Appropriation<br>GW Consumptive Use for 1993 acres<br>○ Groundwater Irrigated Acres<br>○ Net Crop Irrigation Requirement<br>○ Crop Type Adjustments | USGS<br><br>CENEB, COHYST, & analytical methods<br>DNR Surface Water Permits Database<br><br>NRD Certified Acres & DNR Land Use<br>TFG (CROPSIM)<br>NASS County Level Crop Data | 1988-2012<br><br>1988-2012<br>1988-2012<br><br>1993<br>1988-2012<br>1988-2012 |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | Demand from Lower Platte North Bend to Louisville | DNR Methodology | 1988-2012 |

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DNR = Department of Natural Resources
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HDR = consulting firm
N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District
USGS = United States Geological Survey
TFG = The Flatwater Group, consulting firm

## Lower Platte River North Bend to Louisville

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Platte River at Louisville, Nebr.<br>o Gage number 06805500 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn)<br>o Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | HDR (Analytical Methods) | 1988-2012 |
| | **Required Inflow** | Inflow from Upper Platte, Lower Platte above North Bend, Loup, & Elkhorn | DNR Methodology | 1988-2012 |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | | Municipal & Industrial Pumping | TFG, Lincoln & MUD Records, DNR Permit Data | 1988-2012 |
| | **Instream Flow Demand** | Streamflow<br>o Platte River at Louisville, 06805500 | USGS | 1988-2012 |
| | | GW Depletions | Analytical Methods | 1988-2012 |
| | | Instream Flow Appropriation | DNR Surface Water Permits Database | 1988-2012 |
| | | GW Consumptive Use for 1993 acres<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments | <br>NRD Certified Acres & DNR Land Use<br>TFG (CROPSIM)<br>NASS County Level Crop Data | <br>1993<br>1988-2012<br>1988-2012 |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | N/A – no downstream basins | ----- | ----- |

CROPSIM = Crops Simulation Model, developed by UNL, computes daily water balance for crops
DNR = Department of Natural Resources
GW = Groundwater
HDR = consulting firm
MUD = Metropolitan Utilities District
N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District
USGS = United States Geological Survey
TFG = The Flatwater Group, consulting firm

## Lower Loup River

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Loup River at Genoa, Nebr.<br>○ Gage number 06793000 | USGS | 1988-2012 |
| | | Loup River Power Canal near Genoa, Nebr.<br>○ Gage number 06792500 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn)<br>○ Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model | 1988-2012 |
| | **Required Inflow** | Inflow from North, South, & Middle Loup | DNR Methodology | 1988-2012 |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>○ Surface Water Irrigated Acres<br>○ Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>○ Groundwater Irrigated Acres<br>○ Net Crop Irrigation Requirement<br>○ Crop Type Adjustments | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | | Municipal & Industrial Pumping | TFG | 1988-2012 |
| | **Instream Flow Demand** | N/A – Hydropower Demand exceeds any instream flow demand | ----- | ----- |
| | **Hydropower Demand** | Streamflow<br>○ Loup River at Genoa, 06793000<br>○ Loup River Power Canal, 06792500 | <br>USGS<br>USGS | <br>1988-2012<br>1988-2012 |
| | | GW Depletions | Central Nebraska (CENEB) Model | 1988-2012 |
| | | Hydropower Appropriation | DNR Permits Database | 1988-2012 |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | N/A – Hydropower Demand exceeds any downstream demand | ----- | ----- |

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GW = Groundwater
N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District
TFG = The Flatwater Group, consulting firm
USGS = United States Geological Survey

## Middle Loup River

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | Middle Loup River at Saint Paul, Nebr.<br>o Gage number 06785000 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 1: Canal Diversions, Direct Surface Water Returns, Field Delivery<br>o Farwell Main, Central, & South Canals | Bureau of Reclamation<br>o Loup Basin Reclamation District | 1988-2012 |
| | | Irrigation, Type 4: Canal Diversions<br>o Sargent Canal (Farwell Irr. District)<br>o Canal 1, 2, 3, & 4 (Middle Loup PPID) | DNR Databank<br>DNR WISKI Database | 9/1/1987-9/30/2004<br>10/1/2004-8/31/2012 |
| | | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn)<br>o Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model | 1988-2012 |
| | **Required Inflow** | Inflow from South Loup | DNR Methodology | 1988-2012 |
| Total Demand | **Surface Water Demand** | Irrigation, Type 1: Canal Diversions, Direct Surface Water Returns, Field Delivery<br>o Farwell Main, Central, & South Canals<br>o Reservoir Storage (Sherman Reservoir) | Bureau of Reclamation<br>o Loup Basin Reclamation District<br>DNR | 1988-2012<br><br>1988-2012 |
| | | Irrigation, Type 4: Canal Diversions<br>o Sargent Canal (Farwell Irr. District)<br>o Canal 1, 2, 3, & 4 (Middle Loup PPID) | DNR Databank<br>DNR WISKI Database | 9/1/1987-9/30/2004<br>10/1/2004-8/31/2012 |
| | | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | | Evaporation (Sherman Reservoir) | Pan Evaporation & Reservoir Area | 1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | | Municipal & Industrial Pumping | TFG | 1988-2012 |
| | **Instream Flow Demand** | N/A – no instream flow permits in basin | ----- | ----- |
| | **Hydropower Demand** | N/A – no hydropower operations in subbasin | ----- | ----- |
| | **Net Surface Water Loss** | Canal Loss<br>o Farwell Main, Central, & South Canals | Bureau of Reclamation<br>o Loup Basin Reclamation District | 1988-2012 |
| | **Proportionate Downstream Demand** | Demands from Lower Loup & Lower Platte | DNR Methodology | 1988-2012 |

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DNR = Department of Natural Resources
GW = Groundwater
N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District
WISKI = Water Information System
USGS = United States Geological Survey
TFG = The Flatwater Group, consulting firm

## North Loup River

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | North Loup River near Saint Paul, Nebr.<br>o Gage number 06790500 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 1: Canal Diversions, Direct Surface Water Returns, Field Delivery<br>o Mirdan Canal | Bureau of Reclamation<br>o Twin Loups Irrigation District | 1988-2012 |
| | | Irrigation, Type 4: Canal Diversions<br>o Burwell-Sumter Canal<br>o Ord-North Loup Canal<br>o Taylor-Ord Canal | DNR Databank<br>DNR WISKI Database | 9/1/1987-9/30/2004<br>10/1/2004-8/31/2012 |
| | | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn)<br>o Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model | 1988-2012 |
| | **Required Inflow** | N/A – no upstream basins | ----- | ----- |
| Total Demand | **Surface Water Demand** | Irrigation, Type 1: Canal Diversions, Direct Surface Water Returns, Field Delivery<br>o Mirdan Canal<br>o Reservoir storage (Calamus & Davis Creek) | Bureau of Reclamation<br>o Twin Loups Irrigation District | 1988-2012 |
| | | Irrigation, Type 4: Canal Diversions<br>o Burwell-Sumter Canal<br>o Ord-North Loup Canal<br>o Taylor-Ord Canal | DNR Databank<br>DNR WISKI Database | 9/1/1987-9/30/2004<br>10/1/2004-8/31/2012 |
| | | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn) | DNR Surface Water Database<br>TFG (CROPSIM) | 1988-2012<br>1988-2012 |
| | | Evaporation (Calamus & Davis Creek) | Bureau of Reclamation | 1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | | Municipal & Industrial Pumping | TFG | 1988-2012 |
| | **Instream Flow Demand** | N/A – no instream flow permits in basin | ----- | ----- |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | Canal Loss<br>o Mirdan Canal | Bureau of Reclamation<br>o Twin Loups Irrigation District | 1988-2012 |
| | **Proportionate Downstream Demand** | Demands from Lower Loup | DNR Methodology | 1988-2012 |

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DNR = Department of Natural Resources
GW = Groundwater

N/A = not applicable
NASS = National Agricultural Statistics Service
NRD = Natural Resources District

USGS = United States Geological Survey
TFG = The Flatwater Group, consulting firm
WISKI = Water Information System

## South Loup River

| | Component | Dataset | Source | Timeframe |
|---|---|---|---|---|
| Basin Water Supply | **Streamflow** | South Loup River at Saint Michael, Nebr.<br>o Gage number 06784000 | USGS | 1988-2012 |
| | **Surface Water Consumptive Use** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn)<br>o Surface Water Administration | <br>DNR Surface Water Database<br>TFG (CROPSIM)<br>DNR Administration Records | <br>1988-2012<br>1988-2012<br>1988-2012 |
| | **Groundwater Depletions** | Groundwater Depletions to Streamflow | Central Nebraska (CENEB) Model | 1988-2012 |
| | **Required Inflow** | N/A – no upstream basins | ----- | ----- |
| Total Demand | **Surface Water Demand** | Irrigation, Type 5:<br>o Surface Water Irrigated Acres<br>o Net Crop Irrigation Requirement (corn) | <br>DNR Surface Water Database<br>TFG (CROPSIM) | <br>1988-2012<br>1988-2012 |
| | **Groundwater Consumptive Use** | Irrigation:<br>o Groundwater Irrigated Acres<br>o Net Crop Irrigation Requirement<br>o Crop Type Adjustments<br><br>Municipal & Industrial Pumping | <br>NRD Certified Acres & DNR Land Use Datasets<br>TFG (CROPSIM)<br>NASS County Level Crop Data<br><br>TFG | <br>1988-2012<br>1988-2012<br>1988-2012<br><br>1988-2012 |
| | **Instream Flow Demand** | N/A – no instream flow permits in basin | ----- | ----- |
| | **Hydropower Demand** | N/A – no hydropower operations in basin | ----- | ----- |
| | **Net Surface Water Loss** | N/A – no large surface water irrigation projects in basin | ----- | ----- |
| | **Proportionate Downstream Demand** | Demands from Middle & Lower Loup | DNR Methodology | 1988-2012 |

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N/A = not applicable
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NRD = Natural Resources District
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