SPG Meeting #5 - Meeting Minutes

***Date**: March 15, 2017*
***Location**: Holiday Inn Express & Suites – North Platte, NE*

All meeting materials and a sign-in sheet can be found online at http://upbwp.nednr.nebraska.gov/

Agenda

I. Administration
   a. Today's meeting will offer a working lunch
   b. This is an Open Meeting
   c. November Meeting Recap
      i. Meeting minutes
      ii. Key discussion / decisions
      iii. Follow-up items
   d. Review of Decision-Making Process
II. Second Increment Discussion
   a. Present survey responses
   b. Desired outcomes for the 2nd Increment
III. Background
   a. INSIGHT Analysis of Basin Supply and Demand
   b. Growth in Depletions
IV. Next Steps
V. Public Comment

I. Administration – Stephanie White

November Meeting Recap
Review of on-going parking lot of topics to include in the 2nd Increment Plan; items from the survey results have been added to the list which has been categorized into four groups:

1. Administrative
2. General Management
3. Economic, Social, Environmental
4. New / Additional Sections

The following table shows the four categories of items; text in Green text indicates new topics from the survey.

Issues to be Addressed in the 2nd Increment

Administrative • Revisit order of goals • Define FA (unknown numbers) • # of increments • Meter the whole state?	**General Management** • Oversight • Monitor progress (score sheet) • Improved model for lower reaches • Accounting for surface water appropriators • Offsets based on timing and locations
Economic, Social, Environmental • Clean food and water for future generations • Water quality • Fish, Wildlife, park lands • Check valves on wells • Economic analysis (scenarios) • Management of the Resource	**New Sections / Additional** • Drought conditions • Storage • Conjunctive Management • Hydropower

Review of SPG Decision Making Process

- The first goal is consensus.
- A majority vote is the determining factor for all sections of the plan.
- If the group cannot reach a majority, the NeDNR and the NRDs will work together to resolve the disputed issues.
- If the SPG is unable to come to consensus by June 2018, the NeDNR and the NRDs will work together to resolve the disputed issues and create a final plan by August 2018.

II. Second Increment Discussion – Stephanie White

Survey results (included in the meeting materials posted online) were reviewed and discussed; discussion focused on questions 1-3, with question 4-6 discussion taking place at the next meeting. The notes in this section reflect an open discussion among the SPG members. Statements are not necessarily attributed to any one individual nor should they be construed as conclusions as the whole group.

Q1 DISCUSSION:

Question 1 focused on the overall intent for the 2nd increment plan. The majority of responses indicated the plan should maintain what has been done to date and make more progress towards fully appropriated conditions. SPG members understand the statute intends for the plan to be reviewed every 10 years to document progress and adjust goals as necessary. Further development of the basin can occur only by maintaining a water supply that meets social and economic goals. Some SPG members feel there are unknowns that inhibit progress (such as definition of fully appropriated, and lack of real numbers and reach targets)

and that too many models are being run without definitive results. An option was brought forward for discussion that involved adding storage in order to meet demands during times of shortage. Specific comments included:

- Statute intended that the plan should be reviewed in ten years to document progress and adjust where needed to meet that goal
- There is a lot of space and variability in the term to "make more progress"
- The only way to allow further development in the basin is by meeting the goals - socially and economically
    - Perception that "model after model" is run
    - Can we maintain an inefficient conjunctive management system – we aren't getting there from the unknowns. The unknowns are:
        - Phantom numbers to meet surface water expectations
        - Reach targets for ground water baseflows
- Supply and demands: When you combine (Surface water CU demands) + (hydro power demands), it is not possible to meet all the demands even with no depletions from groundwater use. Need additional storage to maintain balance.
- May be a need for a fourth option for question response – we are done except we need to add storage to the system.

Q2: DISCUSSION

Question 2 requested SPG members provide their input on a specific target for depletion offsets to include in the plan. The majority responded that no further progress was necessary. From those that did respond with a target, the values ranged from 10,000 – 150,000 AF. The discussion focused on uncertainty in the definition of fully-appropriated with SPG members suggesting definitions ranging from consideration of balancing water supplies and demands only, to maintaining the economic viability of the basin, to a system that can hydrologically reset itself periodically – presumably during wet periods. In addition, the need for a target range rather than a specific value was discussed. Specific discussion items included:

- We do not have a definition for fully appropriated
    - Numbers are not set in stone; need a real number
    - Until there is a definition of fully appropriated Q1 and Q2 aren't relevant
- The notion that we need to fulfill every need on the river is not what a prior appropriation state is about
- A range of values is more appropriate given variability in hydrology – also is consistent with how the NRDs and NeDNR will implement the plan.
- We need to find a range that basin members are willing to work within
    - Need to find ways to get the consumption within that range
    - Need to adjust to the economics accordingly – we have no choice

Q3: DISCUSSION

Question 3 focused on the current plan's adequacy in addressing the call to maintain the economic viability of the basin. The majority of respondents indicated that they believe the current plan does maintain the basin's economic viability. Economic viability is very important to the group and considerations such as agricultural production, fish and game, hydropower, municipal and industrial development, property tax and land values, political subdivisions,

production costs, commodity prices, etc. were all identified as key factors. Some of these factors are related to water supply and some are farther removed. The group expressed concern that taking more land out of production is not viable long term – for producers as well as others that generate income and tax revenue based on agricultural production. Alternative management of conjunctive management or hydropower projects was also discussed as a means to better meet the water demands of the basin. Specific items of discussion included:

- How would you develop economic viability?
    - A lot is considered in this, ag production use, fish and game, hydro power, pumping, land values, different political subdivisions (school districts, fire districts - need to understand the political subdivisions and impacts) – seeing this affect in southern Lincoln county from NCORPE. If you don't have income producing land and projects, you don't have a tax base to support these elements
- Hydropower users understand they have a junior right. Their concern is shortages, not by being a junior appropriator, but by further shortages caused by further development.
- Concern about land values; water demands make Nebraska land less valuable than adjacent states.
- Economic viability is not the objective based on statute – "Achieve and sustain a balance" as stated in statute
    - Water should not become the obstacle to economic viability; need the balance
- We have spent millions of tax dollars purchasing water and taking it out of production to meet first increment goals; this is counter intuitive and impacts the basin and the tax base
- Establish the viability of independent systems – there are established uses and established rights that should be supported
- Conjunctive Management – managing the ground water and surface water as one resource. Can we do it a little differently so we can meet goals?
- Funding sources – where are funds going to come from and is that source sustainable?
- Can what has been done to date be economically sustainable going forward? What part does the water supply specifically play?
    - Need to be careful that what we are doing isn't hindering people from economic viability in the basin
    - There is a minimum amount of water to deliver a crop - that is a base or floor of required water supply for viable ag production.
    - Taking land out of production can't be sustained for future generations
- So many factors (production costs, commodity prices, etc) involved in the economic viability for producers that water is far removed from true economic viability
- Some stakeholders want to be allowed to keep doing what they are doing – they don't want to curb their usage any further
- Return On Investment – Cost Benefit – should a cost-benefit analysis of different uses of available supply be completed to inform 'best' use?
- It is not viable to continue to retire land from ag production.
- It is important that economic viability be geographically/spatially balanced across the entire basin.

III. Background

INSIGHT Analysis of Basin Supply and Demand – Jessie Winter

This section of these minutes includes actual speakers notes used at the meeting. The PowerPoint presentation is posted with the meeting materials.

DRAFT ANALYSIS FOR THE UPPER PLATTE RIVER ABOVE ODESSA

The following is a brief summary of the information presented at the Platte Basin Single Planning Group meeting on March 15, 2017. The water supply and water demand information presented at the meeting represents the culmination of years of work by the Nebraska Department of Natural Resources and five Upper Platte River Basin Natural Resources Districts. This effort was one of many actions called for in the basin-wide plan and integrated management plans adopted in 2009, following an initial designation by the Legislature in 2004 that the Platte River Basin upstream of the Kearney Canal (approximately Odessa, Nebraska) is overappropriated.

This water supply and water demand information will assist stakeholders and decision makers in developing management targets for the second increment of planning (2019-2029) to support implementation of various activities aimed at ensuring the sustainability of water supplies and water uses so that the economic viability, social, and environmental health, welfare, and safety of the Upper Platte River Basin can be maintained for the long-term.

METHODS USED FOR THE EVALUATION

The methods used for this evaluation were developed over the course of several years and included participation from: state and natural resources district management and staff, stakeholder input through several basin and statewide meetings, and hired consulting services.

- The concept is generally quite simple, we consider how much water comes in to the basin as streamflow supply, how much goes out through consumptive uses and how much needs to remain in the stream for areas downstream or for other non-consumptive uses such as hydropower and instream flows for supporting various species in the central Platte River.
- For this analysis, we looked at the period of 1988 – 2012 to represent naturally occurring wet and dry cycles.
- The annual data are parsed out into two seasons: June-August, which represents the peak season, when irrigation demands are highest, and September-May, which represents the non-peak season, when demands are lower.
- The goal of the method is to evaluate the balance in water supplies and water demands through the wet and dry cycles and the two seasons to identify times of shortage and times of surplus.

WATER SUPPLIES

The water supplies in this evaluation consist of estimating the amount of streamflow supply that would be available prior to uses occurring. Essentially this is how much water would be in the river before we take any out. This is accomplished by adding together the following information:

- Streamflow is the first component of the basin water supply. This is the gaged or measured streamflow at the Platte River at Odessa gage.

- The surface water consumption for irrigation generally estimated from crop irrigation demands and the acreage served by surface water within each irrigation district. These estimates come from the extensive modeling efforts (WWUM and COHYST) that have been developed for the Platte Basin.
- Evaporation from major reservoirs was determined using weather station and pan evaporation data. The reservoirs for which evaporation was considered were Lake McConaughy, Lake Maloney, Elwood Reservoir, Jeffery Reservoir, and Johnson Reservoir.
- Groundwater depletions are the final component. Depletions represent the estimate of water removed from streamflow due to groundwater pumping in the hydrologically connected area. Groundwater depletions were estimated using the COHYST and WWUM.
- The estimated total basin water supply ranges from about 1 million acre-feet during drier periods to over 2.5 million acre-feet during wet periods.
- The supply does vary through time, there are wetter times and dryer times. This is primarily driven by the streamflow component so it is naturally occurring.

WATER DEMANDS

The water demands considered in the evaluation consists of consumptive uses of surface water and groundwater, water used by large canals to deliver water to the fields in those irrigation districts, hydropower, instream flows, and water for downstream areas. The following further describes these demands.

- Surface water demands include those for irrigation and evaporation.
- Groundwater depletions include demands for irrigation and municipal needs and represent the estimate of water removed from streamflow due to groundwater pumping in the hydrologically connected area.
- The demands for net surface water loss represent the seepage loss to the aquifer during transport of surface water through canal systems and losses at the field for surface water irrigated lands. Another way to say that is, that it represents the amount of water needed to get the consumptive use portion to the field.
- Non-consumptive demands represent uses that require water to remain in the stream. The three types that exist in the Upper Platte above Odessa are hydropower, instream flows for fish and wildlife, and downstream demands for the Platte basin below Odessa.
- The total consumptive demands to meet municipal demands and all irrigation demands, including water to conveying supplies through irrigation canals averages approximately 1.5 million acre-feet.
- An additional approximately 1 million acre-feet is necessary to meet all non-consumptive demands.

BALANCES

The results of the evaluation indicate that the current volume of water permitted for use is larger than the volume of water supply that is available on an average annual basis within the Upper Platte River Basin.

- The average annual supply is generally sufficient to balance the irrigation and municipal demands, however shortages do occur and are typical during the irrigation season.
- The average annual supply is typically insufficient to meet all demands once the non-consumptive demands such as hydropower, instream flows, and downstream need are included. The average deficit is approximately 1 million acre-feet per year.

QUESTIONS AND DISCUSSION ON DRAFT ANALYSIS

The notes in this section reflect an open discussion among the SPG members on the INSIGHT analyses. Statements are not necessarily attributed to any one individual nor should they be construed as conclusions as the whole group.

- Are you overstating the non-consumptive demands in terms of hydro?
- If hydro was reduced by management, how would that affect the graph
    - Different management of hydropower would have a direct affect
    - Where would we be if we had wind power and only used the water for hydropower when we needed it?
- Net surface water loss – is this hydrologically connected and accounted for?
    - Assume that the canal loss is to seepage and baseflow gains to the river due to this seepage are reflected in surface flows at the downstream river gages.
- Surface water supplies – how was storage accounted for?
    - Change in storage during non-irrigation period was quantified and added to the supply available to meet demands during peak season.
- The surface water canal system plays an important role because seepage revitalizes the aquifers; need to keep the canal system healthy.
- How is atmospheric moisture accounted for?
- Keep in mind the goal of this is to make the resource last forever. Surface water supply varies considerably from year to year. This year all water demands are satisfied, but what if it is dry next year?
- INSIGHT analysis doesn't reflect the prior appropriation system used to manage surface water, but instead shows all existing demands on the system
- Dependency of system on return flows – smaller surface water reductions
- The INSIGHT analysis is based on historic flow conditions and existing demands, not predictive in nature.

Growth in Depletions - John Engel

This discussion centered on an 11x17 handout called 'Growth in Depletions Infographic' which can be found online: http://upbwp.nednr.nebraska.gov/Media/GrowthInDepletions_05.pdf

- Numbers are based on best available data – will be updated based on the robust review currently underway.
- Supply and Demand Balance - Shows the values taken from the Basin-Wide Supply and Demand Analysis. Moves from being in the positive to the negative incrementally as demands are added to reach total demand on the system. (annual average values illustrated)
- Growth and Depletions - This is what the modeling shows – this is developed by running a simulation with no groundwater pumping occurring and then you run the same model again with groundwater pumping occurring.
- 16,880 AF is the starting point for the second increment (Post – 1997 use depletions required by statute to be addressed in first increment)

- For a desired outcome – the chart is useful in showing what mitigation targets correspond to the desired outcome.
- The growth in depletions are not based on new uses - we have uses in place that have affects that haven't hit the stream yet
- The Statute refers to the overappropriated areas; this is the only basin in the State of Nebraska that is overappropriated
- Question - Concern about the blue line – if we maintain the aquifers and the elevation of the river is higher than the surrounding ground, do we have growth in depletions?
- When you look at the table – it compares what it would be like without pumping
- Can we tighten up 43,600 AF to 126,170 AF of estimated first increment activity benefits?

IV. Next Steps

Next Meeting: May 17, 2017

Topics will include:

- A working definition of economic viability based on the conversation today
- Continued discussion of survey questions 4-6
- Review of annotated 1st Increment Plan that shows updating progress to-date.

Action items

- Request to add assumptions on Jessie's slides
- Move resources materials up on website page
- Include a link to the resource materials in meeting invitations to SPG members
- Shift room so the front wall is open for white wall work

V. Public Comment

- Request for a summary of the data presented – Jerry Kenny

May 2017 – DRAFT

SUMMARY

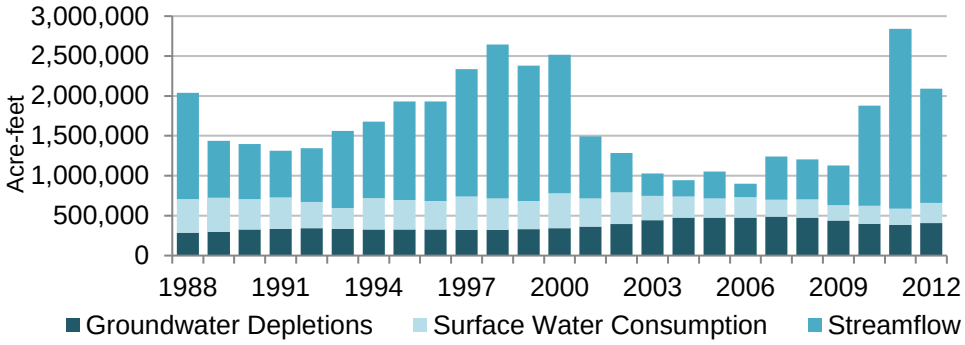
UPPER PLATTE BASIN-WIDE PLANNING PROCESS

INSIGHT WATER SUPPLY AND WATER DEMAND - **DRAFT**

SUMMARY FOR THE **UPPER PLATTE RIVER BASIN ABOVE ODESSA**[1]

Overall findings: The draft results of the evaluation indicate that the current volume of water permitted for use is larger than the volume of water supply that is available on an average annual basis within the Upper Platte River Basin.

Basin Water Supply: Annual



THE WATER SUPPLIES IN THIS EVALUATION CONSIST OF ESTIMATING THE AMOUNT OF WATER THAT WOULD BE IN THE RIVER BEFORE ANY IS TAKEN OUT.

The total water supply is determined by adding together the following components:

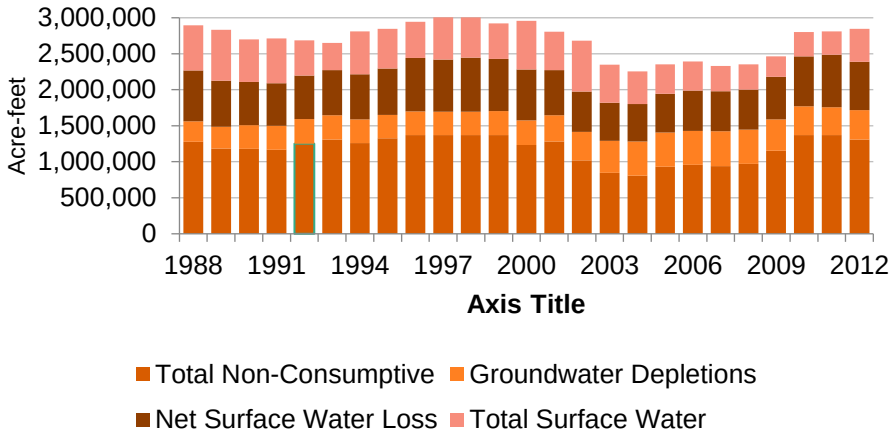
- Groundwater depletions represent the estimate of water removed from streamflow due to groundwater pumping in the hydrologically connected area.
- **S**urface water consumptive use for irrigation was estimated from crop irrigation demands and the acreage served by surface water within each irrigation district.
    - Evaporation from major reservoirs was determined using weather station and pan evaporation data. Reservoirs considered were Lake McConaughy, Lake Maloney, and Elwood, Jeffery, and Johnson Reservoirs.

[1] This is a brief summary of the DRAFT information presented at the Platte Basin Single Planning Group meeting on March 15, 2017. This information and the results of the evaluation are draft at this time and subject to change following further review.

- Streamflow is the gaged or measured streamflow at the Platte River at Odessa gage. The supply varies through time - naturally occurring wet and dry periods are reflected in the streamflow component.

Results: The estimated total basin water supply ranges from about 1 million acre-feet during drier periods to over 2.5 million acre-feet during wet periods.

Total Demand: Annual (Near-Term)



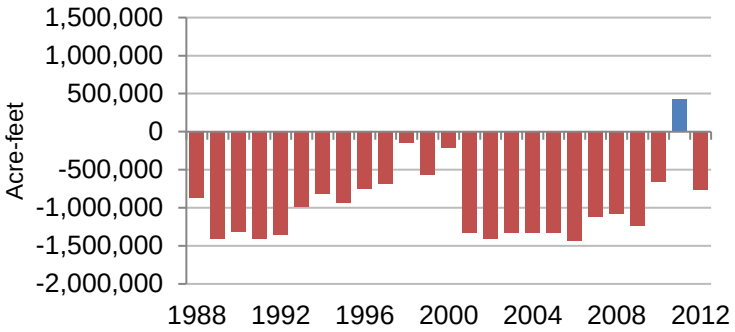
THE WATER DEMANDS IN THE EVALUATION CONSIST OF ALL CONSUMPTIVE AND NON-CONSUMPTIVE WATER USES WITHIN THE BASIN.

The total water demand is determined by adding together the following components:

- Non-consumptive demands represent uses that require water to remain in the stream. The three types that exist in the Upper Platte above Odessa are hydropower, instream flows for fish and wildlife, and downstream demands for the Platte Basin below Odessa.
- Groundwater depletions include demands for irrigation and municipal needs and represent the estimate of water removed from streamflow due to groundwater pumping in the hydrologically connected area.
- The demands for net surface water loss represent seepage loss to the aquifer during transport of surface water through canal systems and losses at the field for surface water irrigated lands.
- Surface water demands include those for irrigation and evaporation.

Results: The total consumptive demands to meet all municipal demands and irrigation demands averages approximately 1.5 million acre-feet. An additional approximately 1 million acre-feet is necessary to meet all non-consumptive demands.

Balance: Annual



THE AVERAGE ANNUAL SUPPLY IS TYPICALLY INSUFFICIENT TO MEET ALL DEMANDS. THE AVERAGE DEFICIT IS APPROXIMATELY 1 MILLION ACRE-FEET PER YEAR.

May 2017 – DRAFT

KEY ASSUMPTIONS AND METHODS
UPPER PLATTE BASIN-WIDE PLANNING PROCESS

INSIGHT WATER SUPPLY AND WATER DEMAND - **DRAFT**

KEY ASSUMPTIONS AND METHODS FOR THE **UPPER PLATTE RIVER BASIN ABOVE ODESSA**

Water Supplies

For purposes of the evaluation methodology, the water supplies consist of the summation of streamflows, surface water consumptive uses, and groundwater depletions. Water supplies were tabulated for the period of 1988 – 2012 to represent naturally occurring wet and dry cycles. Required inflows are also included in the water supplies when evaluating individual sub-basins, but not when evaluating the entire overappropriated basin. Further description of each element of the water supply is provided below.

Streamflows– streamflows are the measured streamflow of the basin with the exception that mean daily flows in excess of the five-percent exceedance probability are capped at the five-percent exceedance value (see Figure 1)[2]. The streamflows for a sub-basin are calculated by subtracting the upstream gage from the downstream gage to establish the gain/loss in streamflow for each sub-basin. The exceptions are as follows:

- Lewellen Streamflow = Uncapped Lewellen gage
- South Platte Streamflow = Capped South Platte River at North Platte gage + Historic Korty Diversion
- North Platte Streamflow Gain = Capped North Platte gage + 40 cfs – Capped Keystone gage. (This was done to prevent Lake MAC operations from influencing the analysis.)
- Odessa Streamflow Gain = Capped Odessa gage – Capped "Streamflow at Confluence" of North Platte & South Platte Rivers + Kearney Diversion where the "Streamflow at Confluence" = North Platte River at North Platte + South Platte River at North Platte + Sutherland Return

[2] Note: This is not done at Lewellen because Lake MAC does have the capacity to capture extreme events.

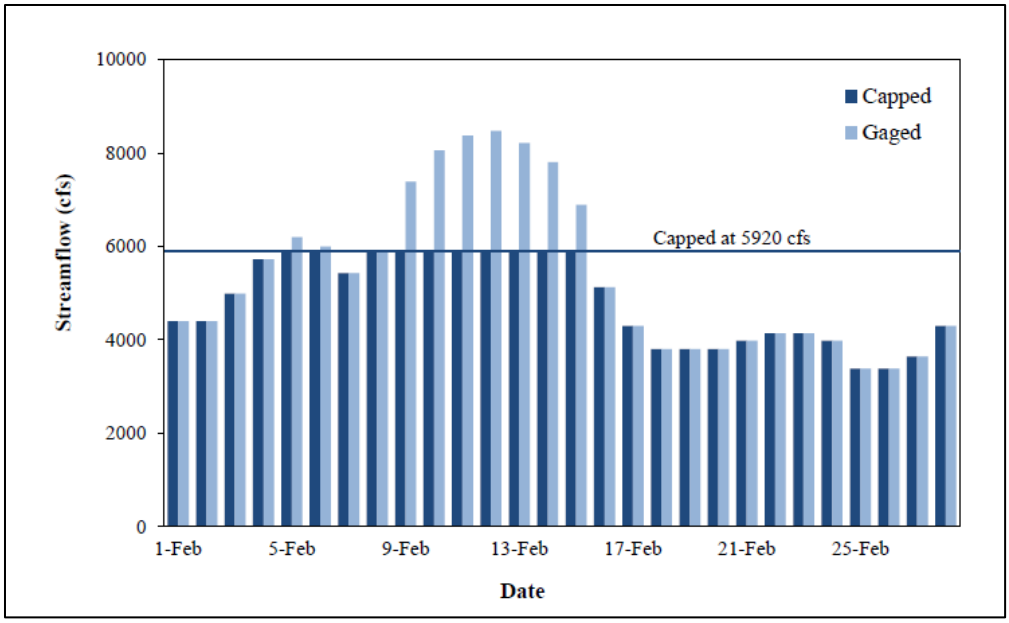


FIGURE 1: EXAMPLE OF AN EXCEEDANCE PLOT AND THE RESULT FROM CAPPING STREAMFLOWS AT THE FIVE-PERCENT EXCEEDANCE FLOW PROBABILITY (SOURCE: "INSIGHT METHODS" 2015)

Groundwater Depletions – Groundwater depletions within the overappropriated portion of the Platte River Basin were calculated using the COHYST and WWUM to estimate the total impact groundwater pumping has had on streamflows through the period of record evaluated in the analysis (1988-2012).

Historical groundwater pumping and surface water deliveries within the COHYST model area which determined based on crop demands. Groundwater was used to meet the portion of crop demand that could not be met by surface water deliveries.

Surface Water Consumptive Use[3] – The surface water consumptive use aims to identify the level of consumption that occurred as a result of surface water diversions for irrigation and evaporation from major reservoirs (Lake McConaughy, Lake Maloney, Elwood Reservoir, Jeffery Reservoir, and Johnson Reservoir). The surface water consumption that was calculated for each canal included in the analysis was generally estimated from crop irrigation demands and the acreage that is served by surface water within each irrigation district. Surface water consumption was calculated for all major canals in the overappropriated portion of the Platte River Basin with the exception of Pathfinder Irrigation District, Gering-Fort Laramie, Mitchell-Gering, and Tri-State canals that divert from the North Platte River in the proximity of the Nebraska-Wyoming state line. The surface water consumptive use from these canals was not included in the water supply calculations and was also excluded from the consumptive surface

[3] . Note: There are still three years (1993, 1995 and 1999) that the SW CU exceeds the demand in the WWUM. ARI would need more time to refine the splits for GW Pumping to CU on comingled acres versus the SW diversions to CU on comingled acres.

water demand calculations. The models used to estimate surface water consumptive use represent historic irrigation practices.

Required Inflows – Required inflows are included as part of the water supply for each sub-basin with the exception of the two sub-basins (North Platte River Stateline to Lewellen and South Platte River Stateline to North Platte) that initiate from the state line. Required inflows represent the portion of water supply that flows from upstream locations to assist in meeting a portion of demands in downstream locations. The process for determining the portion of demands that is met by required inflows is based on determining each upstream subbasins proportional contribution to the overall water supply available in the downstream subbasin.

Water Demands

For purposes of the evaluation methodology, the water demands consist of the summation of consumptive use demands for irrigation, municipal, and industrial uses that are served by groundwater or surface water, net surface water loss, hydropower, instream flows, and downstream demands. Further description of each element of the water demands is provided below.

Consumptive Surface Water Demands[4] – The demands for surface water include those for irrigation and evaporation as no significant municipal or industrial uses occur in the area. The models used to estimate surface water demands assume commingled lands are irrigated with groundwater. The demands are calculated by multiplying the surface water irrigated acres by the consumptive use estimates (irrigation requirements). Additionally, the temporal distribution of surface water demands differs from surface water consumptive use in that surface water demands that have access to water stored in reservoirs are redistributed from the peak season (June – August) to the non-peak season (September – May). SWD has been defined as the greater of either SWCU or the product of surface water irrigated acreage and the NIR for corn. The COHYST utilized the BL001 run data which assumed that comingled acres were fully met by groundwater. Also, BL001 repeats year 2005 land use post 2005.

Consumptive Demands for Hydrologically Connected Groundwater **(Long-Term Groundwater Demands)**[5] – The demands for hydrologically connected groundwater are based on consumptive use estimates (irrigation requirements) multiplied by groundwater irrigated acres and commingled acres within the hydrologically connected area (10/50 area). The COHYST utilized the BL001 run data which assumed that comingled acres were fully met by groundwater. BL001 varies land use, acreage, and climate from year-to-year through 2005. Post 2005, BL001 repeats year 2005 land use and acreage but varies climate. For the WWUM area groundwater demands were set equal to groundwater depletions since groundwater depletions

[4] In the COHYST area, SW demands for canals that may span more than one subbasin can be assigned to the point of diversion.
[5] ARI has indicated that M&I pumping has been included in the provided data. TFG has provided M&I as a separate dataset. The TFG M&I data only goes through 2005; therefore, 2005 was repeated through 2012.

were often in excess of the groundwater demands[6]. The seasonal distribution of groundwater demands assigns 70% of the demands to the non-peak season (September – May) and 30% to the peak season (June – August). The split is current condition, and may shift in the future to more peak season depletions (60/40, 50/50, etc.) in coming years as aquifers are depleted.

Lake McConaughy Change-in-Storage**-** Non-peak season change-in-storage is used to reduce peak season uses that hold storage water rights in Lake MAC. These demands are not reassigned to the non-peak season (break from INSIGHT methodology)

Demands for Net Surface Water Loss – The demands for net surface water loss represent the seepage loss to the aquifer during transport of surface water through canal systems and losses at the field for surface water irrigated lands. This loss was estimated based on the difference between modeled head-gate diversions and surface water demands (the consumptive portion of diversions)[7].

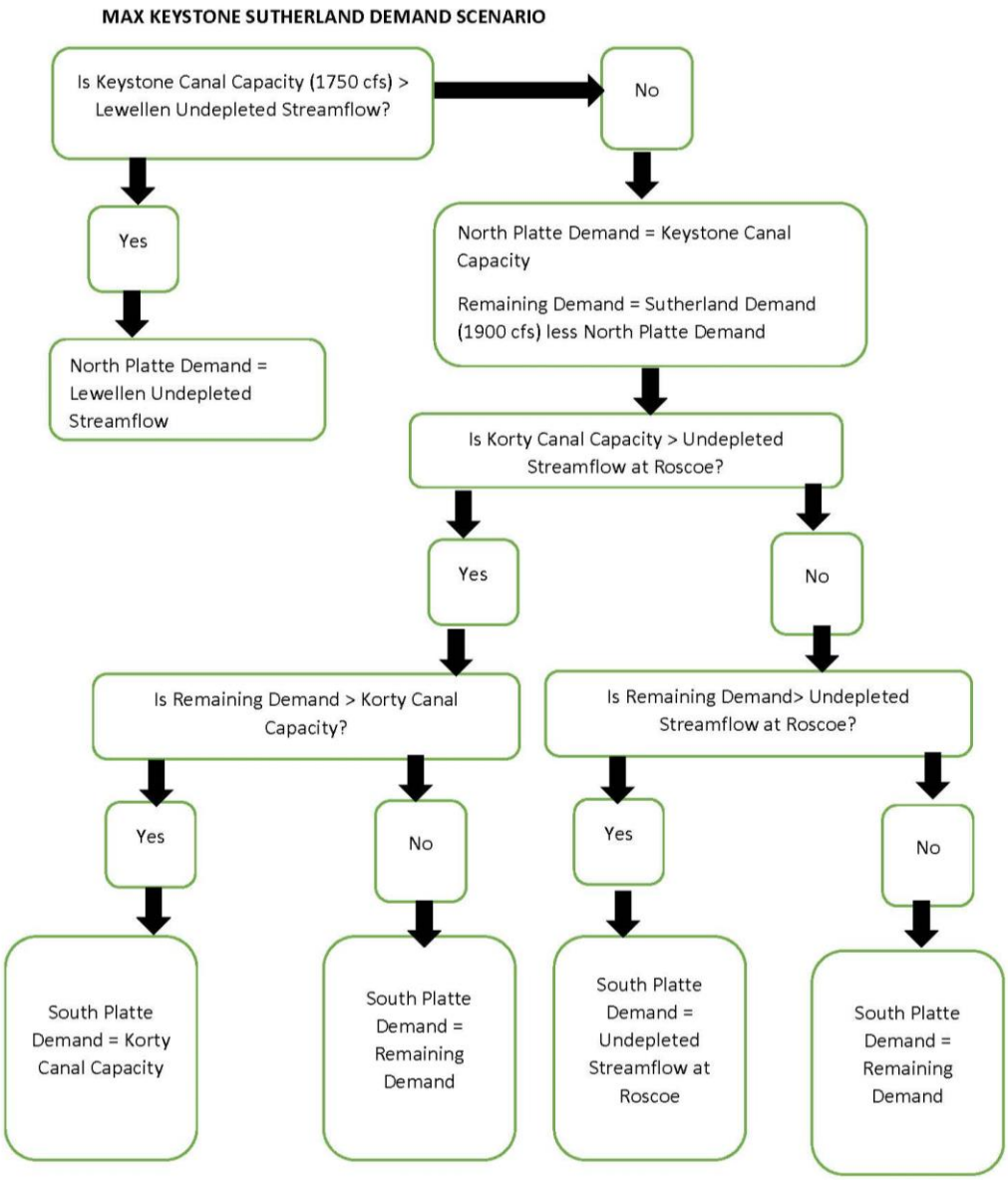
Demands for Hydropower – Hydropower demands are represented for the Sutherland hydropower facility, CNPPID hydropower facilities (Jeffery, J-1, and J-2, with the Kingsley Hydropower excluded)[8], and Kearney hydropower facility. The demands for hydropower are represented by summing the streamflow and groundwater depletions (undepleted streamflow) available at the point of diversion and comparing that value to the lesser of the canal capacity or water right. Once the lesser of the undepleted stream, canal capacity, or water right has been established, the final step in calculating the hydropower demand is to integrate the surface water irrigation demands with the hydropower demands to ensure that the combination of demands does not exceed the canal capacity. If the combined demands exceed the canal capacity then the hydropower demands are further reduced to the canal capacity.

Two Sutherland demands scenarios were considered in order to “bookend” the demands that could be placed on either the North Platte or South Platte subbasin. The Keystone demand scenario is shown below. The Korty Demand Scenario reverses this process.

[6] This was done because in some cases the GWDP > GWCU which was counterintuitive. This occurs more frequently in the WWUM area than the COHYST area. This issue could be investigated further in future analysis.

[7] Reservoir seepage was not considered as it is assumed this seepage is not a “demand” that must be satisfied in order to convey water in this System. Additionally, this seepage water returns to the System as baseflow/groundwater.

[8] Lake McConaughy is assumed to operate to satisfy the CNPPID demand; therefore, the CNPPID downstream demand was applied to the North Platte Subbasin instead of applying the full Lake McConaughy hydropower demand.



Undepleted streamflow at Lewellen = Uncapped streamflow at Lewellen gage + GWDP above Lewellen gage.

Undepleted streamflow at Roscoe = [South Platte River at Paxton] + [Reach Gain Loss from Roscoe to North Platte] + [South Platte River GWDP].

Demands for Instream Flows – Instream flow demands are represented in a similar manner to that of hydropower demands. Similar to hydropower demands the daily undepleted streamflow is calculated at the instream flow location and capped at the daily instream flow appropriation value. If the daily undepleted streamflow does not meet the instream flow appropriation, then the daily instream flow demand is capped to the undepleted streamflow. The final adjustment is to subtract the volume of consumption associated with upstream groundwater development in

place at the time the appropriation was granted (i.e., 1993) to create a final volume of instream flow demand.

Demands for Downstream Uses – Downstream demands for the overappropriated basin consist of a portion (based on the proportion of overappropriated basin water supplies relative to the water supplies at downstream locations) of downstream mainstem surface water and net surface water loss demands within the central and lower Platte River Basin plus a portion of the greater of instream flow or induced recharge appropriations located in the central and lower Platte River Basin. Downstream demands within the overappropriated basin vary based on location and the demands located downstream of that subbasin.

Tri-County Non-consumptive & Surface Water Demand Split: The Tri-County Canal serves both surface water and non-consumptive use demands. In some cases, the surface water demands are located upstream the non-consumptive use demands; therefore, it was necessary to consider the surface water and non-consumptive use demands separately for this canal. These demands were broken out as follow:

- **Full Tri-County Demand** = Minimum of [Canal losses above Brady + Max (surface water demands or CNPPID hydropower demand) OR Undepleted streamflow at Confluence of North Platte & South Platte Rivers]
- **Tri-County Non-consumptive Use Demand** = Full Tri-County Demand – Tri-County SW Demand – Tri-County Canal seepage

The Balance of Water Supplies and Water Demands

The evaluation methodology seeks to compare the water supplies and water demands for two periods throughout the year. The peak season (June – August) and non-peak season (September – May) are used to assess the balance in water supplies and water uses. These comparisons evaluate the average balance in water supplies and water demands over the most recent twenty-five year period of data (1988-2012) to assess how wet and dry cycles impact the balance in water supplies and water demands.