

DRAFT INTEGRATED MANAGEMENT PLAN

Cooperatively Developed by the North Platte Natural Resources District and the Nebraska Department of Natural Resources



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Table of Contents

1.0 EFFECTIVE DATE 1

2.0 AUTHORITY 1

3.0 BACKGROUND 1

4.0 MAPS AND MANAGEMENT AREA BOUNDARIES 1

5.0 VISION STATEMENT 2

6.0 FUNDING 3

7.0 SCIENCE AND METHODS 4

 7.2 Best Available Science, Methods, Data, and Tools, to Be Used in Ongoing Increments.... 6

 7.3 Information Considered in Developing this IMP 7

8.0 FIRST INCREMENT ACCOMPLISHMENTS 8

 8.1 Studies Conducted and Information Obtained in First Increment 8

 8.2 Summary of Management Actions Taken During First Increment 13

 8.3 Assessment of the First Increment (Robust Review)..... 14

 8.4 Assessment of Fully Appropriated..... 18

 8.5 Basin-Wide Cooperation in First Increment 23

9.0 GOALS AND OBJECTIVES 24

 Goal 1: Reach and Maintain Fully Appropriated Condition..... 25

Draft for Board Approval 6/13/2019

Goal 2: Interstate Compliance 28

Goal 3: Consistency, Communication, and Updates..... 29

10.0 ACTION ITEMS 29

10.1 Information and Education Programs 29

10.2 Incentive Programs 30

10.3 Water Banking 32

10.4 Conjunctive Management 33

10.5 Drought Planing 34

10.6 Controls and Triggers..... 36

10.7 Monitoring and Evaluation 50

10.8 Studies to be Completed in the Current Increment 60

10.9: Review of and Modifications of the IMP 62

List of Appendices

APPENDIX A Glossary of Terms

APPENDIX B Letters exchanged between NPNRD and NeDNR agreeing to develop the second increment IMP

APPENDIX C Stakeholder Advisory Committee Process, Members, and Meeting Dates

APPENDIX D Order Declaring Formal Moratoriums (7/14/2004)

APPENDIX E Order Designating Overappropriated River Basins, Subbasins, or Reaches, and Describing Hydrologically Connected Geographic Area (9/15/2004)

APPENDIX F Order of Final Determination of River Basins, Subbasins, or Reaches as Fully Appropriated and Describing Hydrologically Connected Geographic Area (9/30/2004)

*Draft for Board Approval 6/13/2019***List of Figures**

Figure 1	Map of Fully Appropriated Area
Figure 2	Map of Overappropriated Area
Figure 3	Map of Pumpkin Creek Basin Groundwater Management Sub Area
Figure 4	Stream Reach Map
Figure 5	Graph: Modeled Impacts to the North Platte River
Figure 6	Modeled Stream Depletions
Figure 7	Diagram: Basin Wide Supply and Demand Balance
Figure 8	Diagram: Mitigation Measures and Robust Review Timeline

List of Tables

Table 1	Modeled accretions to the North Platte River for short term target
Table 2	Modeled accretions to the North Platte River for long term target

Draft for Board Approval 6/13/2019

List of Acronyms

AF	Acre-Feet or Acre-Foot
BWP	Basin-wide Plan
COHYST	Cooperative Hydrology Study
CPNRD	Central Platte Natural Resources District
CREP	Conservation Reserve Enhancement Program
EPIC	Encouraging Producer Innovation through Conservation
EQIP	Environmental Quality Incentives Program
ESA	Endangered Species Act
ET	evapotranspiration
ILCA	Interlocal Cooperative Agreement
IMP	Integrated Management Plan
INSIGHT	Integrated Network of Scientific Information and GeoHydrologic Tools
M&I	Municipal and industrial
NeDNR	Nebraska Department of Natural Resources
NET	Nebraska Environmental Trust
NNPD	Nebraska New Depletion Plan
NPNRD	North Platte Natural Resources District
NRCS	Natural Resources Conservation Service
NRD	Natural Resources District
PBC	Platte Basin Coalition
PRRIP	Platte River Recovery Implementation Program
SPNRD	South Platte Natural Resources District
TBNRD	Tri-Basin Natural Resources District
TPNRD	Twin Platte Natural Resources District
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WRCF	Water Resources Cash Fund
WWUMM	Western Water Use Management Model

Draft for Board Approval 6/13/2019

1.0 EFFECTIVE DATE

This second increment Integrated Management Plan (IMP) was adopted by the North Platte Natural Resources District on _____, 2019, and by the Nebraska Department of Natural Resources on _____, 2019. **This IMP became effective on September ____, 2019.**

2.0 AUTHORITY

This IMP was prepared by the Board of Directors of the North Platte Natural Resources District (NPNRD or District) and the Nebraska Department of Natural Resources (NeDNR) in consultation and collaboration with the NPNRD Stakeholders Group in accordance with *Neb. Rev. Stat. §§ 46-715 through 46-720*.

3.0 BACKGROUND

On August 13, 2009, the NPNRD and NeDNR adopted the first increment Integrated Management Plan, which became effective September 14, 2009. In accordance with Chapter 8, Section II. B. of the first increment IMP, the NeDNR initiated a technical analysis to determine whether the measures adopted in the first increment IMP were sufficient to offset depletions due to water uses initiated after July 1, 1997 (also referred to as post-1997 depletions), , and whether the measures adopted in the first increment IMP have returned the NPNRD to a fully appropriated condition.

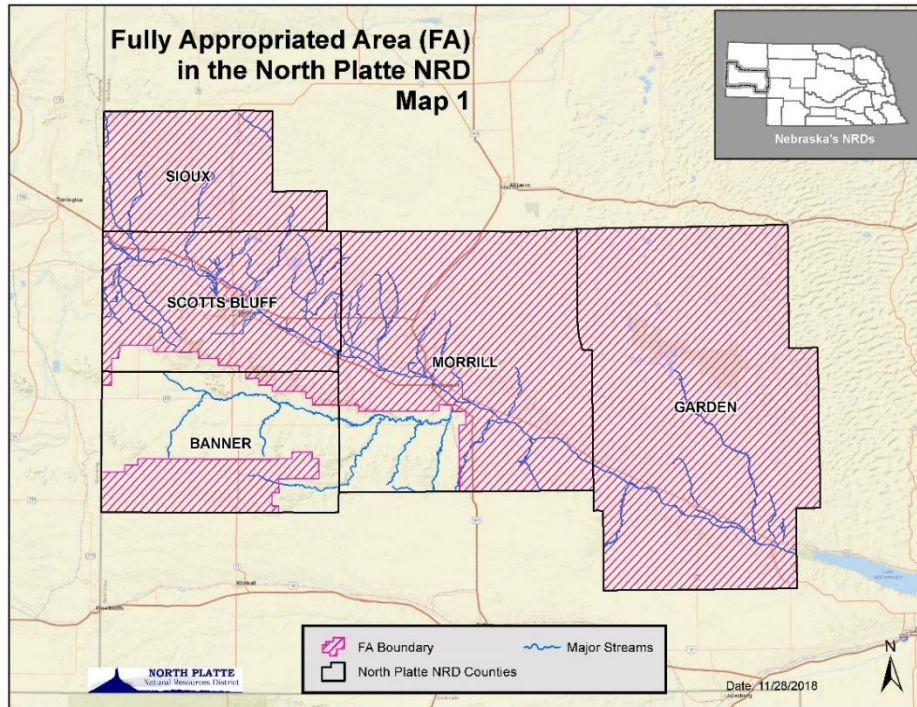
Based on the results of this technical analysis, a subsequent ten year increment is required in accordance with *Neb. Rev. Stat. §46-715(5)(d)(iv)* to achieve the goals and objectives of the first increment IMP. As such, the NPNRD and NeDNR arranged and held multiple stakeholder meetings with representatives from irrigation district, reclamation districts, public power and irrigation district, mutual irrigation companies, canal companies, municipalities and landowners to consult and collaborate with these entities and individuals on the development of a second increment IMP. This stakeholder group met periodically between July 2018 and February 2019, but was unable to reach a consensus on the language of the draft second increment IMP; therefore, the NPNRD and NeDNR continued to work on the draft second increment IMP until _____, 2019, when agreement was reached between the NPNRD and NeDNR. A hearing was subsequently scheduled for the approval of this second increment IMP.

4.0 MAPS AND MANAGEMENT AREA BOUNDARIES

The area subject to this IMP is the entire geographic area of the District. The goals, objectives, and action items described in this plan pertain to the entire District. The area designated as fully appropriated is the entire geographic area of the NPNRD with the exception of the Pumpkin Creek Basin Ground Water Management Sub-Area as depicted on Figure 1. The

Draft for Board Approval 6/13/2019

area designated as overappropriated by the NeDNR on September 15, 2004, is depicted on Figure 2, which includes the Pumpkin Creek Basin Ground Water Management Sub-Area and is



depicted on Figure 3. The stratigraphic boundaries subject to this IMP include all sediments from ground level downward through all aquifer units.

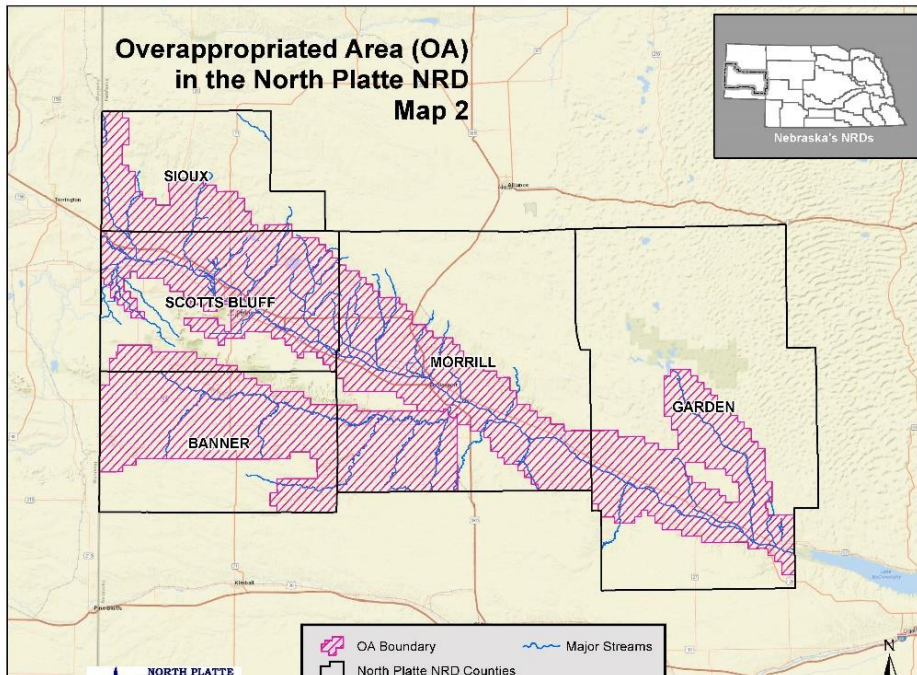


Figure 2. Map of Overappropriated Area of NPNRD

Draft for Board Approval 6/13/2019

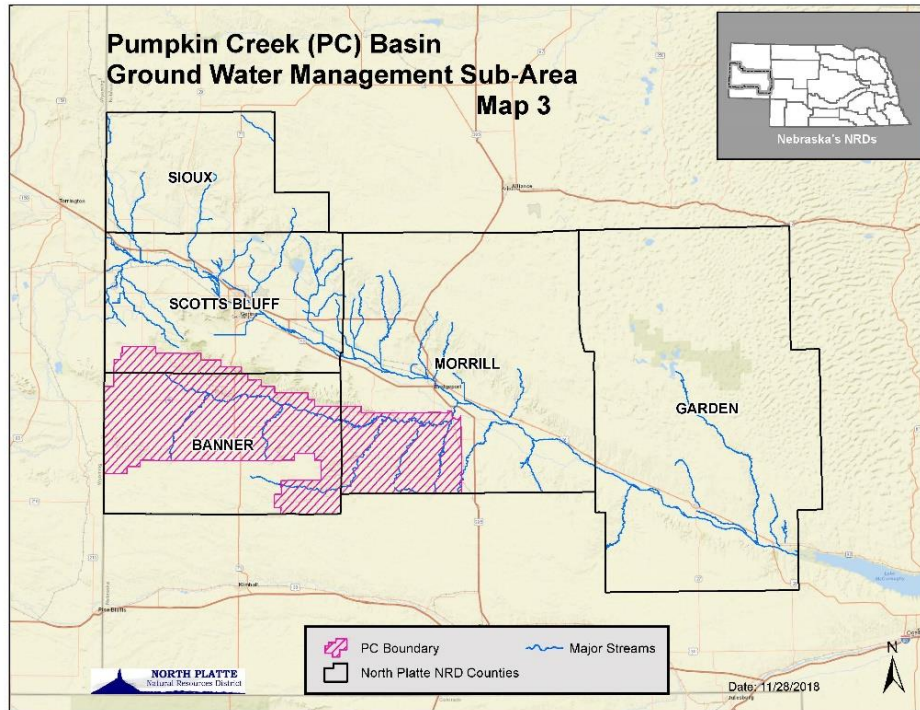


Figure 3. *Map of the Pumpkin Creek Basin Ground Water Management Sub-Area*

5.0 VISION

The joint goals of NPNRD and NeDNR are to (1) manage water resources in the NPNRD in a manner to balance water use and water supply while optimizing economic, social, and environmental benefits for the near and long term; (2) protect to the extent possible existing users, local economy, environmental health, and recreational uses; (3) manage total water supply in the NPNRD to achieve sustainability of supply and use while allowing for growth and changes in use, and (4) recognize there are multiple causes of streamflow depletion and to the extent possible distribute mitigation responsibilities appropriately.

To do this, NPNRD and NeDNR will provide educational programs related to integrated water management for the NPNRD, provide opportunities for water banking and transfers, and explore new sources of water and currently used water for offsets, such as unappropriated river flows and transfers of existing water appropriations or certified groundwater uses.

6.0 FUNDING

The NeDNR and NPNRD will use available funds and actively pursue new funding opportunities to cost effectively offset depletions as well as to develop, maintain, and update data and analytical tools needed to implement this plan. Funding for the regulatory and non-regulatory activities described in this plan will come from several funding sources.

Draft for Board Approval 6/13/2019

The NeDNR receives funds appropriated by the Nebraska Legislature for water resources management and administration. The NPNRD has revenue sources including the occupation tax provided in *Neb. Rev. Stat. §2-3226.05*, funds granted to the NPNRD by the State or Federal government, or the levy authority authorized by *Neb. Rev. Stat. §2-3225*. The NeDNR and NPNRD intend to utilize qualified projects described in *Neb. Rev. Stat. §2-3226.04* to provide river-flow enhancement to achieve the goals and objectives of the NPNRD and to achieve the goals and objectives of the State under the Platte River Recovery Implementation Program (PRRIP) and the requirements of the Ground Water Management and Protection Act which would be funded using one or more of the revenue sources listed above.

In addition to NeDNR and NPNRD contributions, both entities may also seek out and utilize grants from various federal, state, local and private partners. For example, the Nebraska Environmental Trust (NET) has been a supporter of water management activities in the Upper Platte River Basin.

Funding priorities identified in the action items include:

- Reductions in consumptive use
- Enhancement of water supplies
- Maintenance of existing projects and implementation of proposed projects to meet goals of this plan
- Data acquisition and maintenance, and model improvements for plan implementation

The ability of the NeDNR and NPNRD to implement the goals, objectives, and action items for this IMP, including their ability to meet the implementation timeline and intermediate deadlines set forth herein, may be limited by the availability of resources, including (but not limited to) funding or staff resources.

If limited resources prohibit completion or initiation of a specific management action, or if they delay the ability of the NeDNR or NPNRD to complete a task by an established deadline, such limitations and delays will be discussed by the NeDNR and the Upper Platte River Basin NRDs. If such a delay results in the need for revisions to this plan, the necessary revisions will be made following the procedures set forth in Chapter 10 of this IMP.

7.0 SCIENCE AND METHODS

NeDNR and the Central Platte NRD, North Platte NRD, South Platte NRD, Tri-Basin NRD, and Twin Platte NRD (Upper Platte River Basin NRDs) will use the best readily available science, data,

Draft for Board Approval 6/13/2019

and methods when implementing and reviewing the Upper Platte Basin second increment IMPs. This maintains consistency with state statute and the first increment processes and methodologies. Consistency in the science, data, and methods used to evaluate water management actions across the basin is paramount to provide a consistent basis for comparison of the effectiveness of various water management actions, regardless of location. Statutes and prudent scientific practices call for clear and transparent procedures to track depletions and accretions. The NeDNR and Upper Platte River Basin NRDs will jointly develop and agree to all of the data, science, and methods used for the implementation, review, and evaluation of this IMP. The methodologies may be revised upon review of any new information, data, and science by the NeDNR and Upper Platte River Basin NRDs. The action items in Chapter 10 reference actions outlined within this Chapter that are instrumental to the implementation and review of the IMP. This Chapter briefly overviews the data, science, and methods used in the first increment and describe how this will continue into the current increment.

7.1 Best Available Science, Methods, Data, and Tools Used in the First Increment

The first increment and associated implementation of the NNDP used the Cooperative Hydrology Study (COHYST)¹ model as the best available tool to determine both groundwater depletions and set mitigation targets for each NRD. The analysis used to determine the targets for the first increment is described in the 2008 COHYST report². This analysis set the basis for the procedures for the Upper Platte River Basin NRDs and NeDNR to perform consistent, ongoing analysis throughout the first increment. Consistency in evaluation is crucial in order to compare the results from the analysis used to determine targets with the results of the analysis to determine how particular management actions meet those targets.

The Upper Platte River Basin NRDs and the NeDNR developed an annual protocol to evaluate IMP progress³ toward the targets using analytical methods coupled with COHYST 2010 model data to assess annual changes in permit activity regarding changes in consumptive use and streamflow depletions. The annual protocol methods are consistent with the 2008 IMP targets to provide a valid comparison. The annual process was used each year and results of those analyses can be found on the NeDNR website⁴.

Evaluation of the initial COHYST model led to two major areas of scientific understanding. First, the massive expanse of the COHYST model area would be best modelled as two separate areas,

¹ More information on the COHYST 2010 model is available at <https://cohyst.nebraska.gov/>

² Luckey, R.R. (2008). *Estimated Stream Baseflow Depletion by Natural Resources District in the Nebraska Platte Basin due to Gained and Lost Groundwater Irrigated Land after July 1, 1997*. [referred to in this IMP as the 2008 COHYST report] Aurora, CO: High Plains Hydrology, LLC. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>. [In this IMP, this report is referred to as the “2008 COHYST report”] COHYST Report (2008).

³ The protocol document, *Basin-wide Technical Committee Guidance Document – Procedures for Annual Accounting Review and Robust Review to Assist Integrated Management Planning and Facilitate Reporting to the Platte River Recovery Implementation Program*, can be found at <https://dnr.nebraska.gov/water-planning/other-upper-platte-river-documents>

⁴ Annual reports for the Upper Platte River Basin can be found at <https://dnr.nebraska.gov/water-planning/upper-platte-basin-wide-meetings-and-annual-reports>

Draft for Board Approval 6/13/2019

the Western Water Use Management (WWUM) Model area and the COHYST 2010 Model area, due to distinct and significant differences in geology, climate, land use, and water management that require a difference in the approach to modelling in the two areas. Second, splitting the COHYST model area required a reconstruction and recalibration of the groundwater models. This fundamental reorganization and rebuilding of the models means that neither model is currently consistent with the original 2008 COHYST report modeling analysis and results. Therefore, these models are not an appropriate tool to use as a direct comparison with the targets as described within the first increment IMP. Modifications to the original 2008 COHYST report analysis are necessary to redefine the targets for a true comparison.

7.1.1 WWUM Model

The WWUM Model covers the Upper Platte Basin from upstream of Lake McConaughy to the Wyoming and Colorado state lines. This model is used for the NPNRD and South Platte NRD (SPNRD). It provides a detailed and holistic view of water resources in the region. The purpose of the effort is to provide a set of crop consumptive use, groundwater, and surface water modeling tools to aid in management of river, stream, and aquifer systems within the modeling area. The goal of WWUM Model is to create data centered decision support information to assist the NPNRD, SPNRD, and the NeDNR

The revised models improve the overall understanding of basin hydrology during implementation of the first increment IMP. The first increment Robust Review used this updated understanding and science for all aspects of the analysis. Application of these tools and understanding resulted in refined estimates of post-1997 depletions that are typically greater than the original estimates included in the first increment IMP. The Robust Review also provided estimates of the first increment offsets achieved by each of the NRDs. A description of the Robust Review can be found in Chapter 10 of this IMP.

7.2 Best Available Science, Methods, Data, and Tools, to be Used in Ongoing Increments

There are several basin-wide tenets regarding best available science, data, and methods that the Upper Platte River Basin NRDs and the NeDNR will follow while implementing their respective IMPs. NeDNR and the NRDs will:

1. Maintain, improve, or acquire data and modeling tools, such as the WWUM Model, land-use, climate data, and other programs or projects needed to implement and assess the progress of this IMP.
2. Use the models or data and tools derived from the COHYST 2010 model and/or the WWUM model to analyze potential management actions, conduct an annual review of progress of the IMP, perform the next Robust Reviews, and carry out any relevant studies identified in this IMP or the Basin-Wide Plan.
3. Use conceptually consistent methods uniformly across the basin for IMP and BWP compliance-based analysis, such that stream depletion estimates or calculations performed in one area of the basin are comparable to stream depletion estimates or calculations in

Draft for Board Approval 6/13/2019

another area of the basin. The concept 'uniformly across the basin' in this IMP means using consistency in analysis, and is not intended to dictate that the same methods be used throughout the basin. Rather, the intention is to indicate methodologies must be scientifically based and proven as conceptually consistent equivalents through either the scientific literature or independent evaluation of NeDNR and the Upper Platte River Basin NRDs.

4. Use methods consistent with the analysis and tools used to develop the IMP targets when evaluating progress toward achieving current IMP targets. If necessary, new tools will be used to re-evaluate targets as well as progress toward those targets; in either case both the targets and the values estimating progress will be developed in a conceptually consistent manner so that they can be compared.
5. Maintain and expand model applications through collaboration with other model users.
6. Agree to substantial changes to the model before using those changes to evaluate the IMP and management actions. Such changes may include hydrologic properties or refinements of model grids.
7. Periodically review the accretion and depletion estimates and the methodology used in the analysis that generates these estimates. Understanding of the basin hydrology will continue to evolve as new supporting data and information are gathered and evaluated. Due to the improved data, information and tools, it is anticipated that, through agreement by NeDNR and the Upper Platte River Basin NRDs, the values for depletions or accretions from the Robust Review may change.
8. Share advances or updates to data, models, analysis tools, or hydrological understanding with the public. Methods, tools, and data used will be made available to the stakeholders and the public, as described in the Basin-Wide Plan. The process for incorporating new information and results into this IMP and/or supporting appendices will include a public hearing, as discussed in Section 10.9 of this IMP.

7.3 Information Considered in Developing this IMP

Information used in the preparation of this IMP and to be used in the subsequent implementation of this IMP can be found in the list below. These materials can be obtained by contacting the NPNRD or the NeDNR.

- The Order Declaring Formal Moratoriums in the Matter of the Platte River Basin above the Mouth of the Loup River, the North Platte River Basin, and the South Platte River Basin, et. al. Dated July 14, 2004. (Appendix D)
- The Order Designating Overappropriated River Basins, Subbasins, or Reaches, and Describing Hydrologically Connected Geographic Area in the Matter of the Platte River Basin upstream of the Kearney Canal Diversion, the North Platte River Basin, and the South Platte River Basin. Dated September 15, 2004. (Appendix E)

Draft for Board Approval 6/13/2019

- The Order of Final Determination of River Basins, Subbasins, or Reaches as Fully Appropriated, and Describing Hydrologically Connected Geographic Area in the Matter of the Portion of the Platte River Basin Upstream of the Loup River Confluence, the North Platte River Basin, and the South Platte River Basin within the South Platte Natural Resources District, the Twin Platte Natural Resources District, and the Central Platte Natural Resources District. Dated September 30, 2004. (Appendix F)
- The NPNRD *Ground Water Management Plan*
- The NPNRD *Rules and Regulations for the Enforcement of the Nebraska Ground Water Management and Protection Act*
- The *Integrated Management Plan Jointly Developed by the North Platte Natural Resources District and the Nebraska Department of Natural Resources*, with an effective date of September 14, 2009, revised May 11, 2013 (first increment IMP)
- The *Basin-Wide Plan for Joint Integrated Water Resources Management of Overappropriated Portions of the Platte River Basin, Nebraska*, with an effective of September 11, 2009 (first increment Basin-Wide Plan)
- The second Increment Upper Platte River Basin-Wide Plan
- COHYST, COHYST 2010, and WWUM Models
- The Upper Platte River Basin 2019 Robust Review Analysis
- The Upper Platte River Basin Total Depletions Analysis
- The Upper Platte River Basin INSIGHT Analysis
- The Nebraska New Depletion Plan of the Platte River Recovery Implementation Program
- Information developed by and data collected for the Platte River Recovery Implementation Plan
- Applicable Nebraska Revised Statutes
- *Department of Natural Resources Rules for Ground Water, Title 456, Neb. Admin. Code*
- *Department of Natural Resources Rules for Surface Water, Title 457, Neb. Admin. Code*
- The items listed in *Department of Natural Resources Rules for Process and Procedures, Title 454, Neb. Admin. Code*
- Additional data on file with the NPNRD and the NeDNR.

8.0 FIRST INCREMENT ACCOMPLISHMENTS

8.1 Studies Conducted and Information Obtained in First Increment

The Upper Platte River Basin NRDs and NeDNR conducted several studies in the first increment, which were specifically identified by the IMPs. Large amounts of information and data were

Draft for Board Approval 6/13/2019

collected and used in these studies and other analyses. The purpose was to help evaluate the potential effectiveness of various strategies in achieving the goals and objectives of that IMP and to help gage progress during the first increment.

8.1.1 Assessing Available Water**8.1.1.1 Surface Water**

A study of unappropriated surface water, its availability in time and location, was conducted during the first increment; see reports by HDR and The Flatwater Group, Inc. (2010⁵, 2013⁶). A list of existing surface water appropriations within the basin was compiled as part of the study of unappropriated surface water (HDR and The Flatwater Group, Inc. 2010). It was determined that there are times when unappropriated surface water is available in the basin for relocation or retiming projects. Specifically, the NeDNR determined that between 1954 and 2008 there were excess flows available in some years. Most excess flow events occurred in May and June, and some events were in excess of 30,000 AF. A planning tool was developed to estimate amount, duration, and frequency of excess flow by reach.

8.1.1.2 Groundwater

To assist in assessing available groundwater, all groundwater uses in the NPNRD are certified. The NPNRD has compiled a list of certified groundwater uses within the NPNRD:

- Aquaculture Certification
- Commercial Certification
- Feedlot Certification
- Irrigation Certification
- Municipal Certification
- Non-Municipal Certification (Public Water Supplier)
- Wildlife Certification

To assist in assessing changes in available groundwater, NPNRD tracked all consumptive use changes due to transfers, variances, offsets, and expanded municipal and industrial uses.

⁵ HDR and The Flatwater Group, Inc. (2010). *Evaluation of Historic Platte River Streamflow in Excess of State Protected Flows and Target Flows*. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>

⁶ HDR and The Flatwater Group, Inc. (2013). *Evaluation of Historic Platte River Streamflow in Excess of State Protected Flows and Target Flows, Technical Memorandum*. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>

Draft for Board Approval 6/13/2019

To also aid in the assessment of available groundwater, meters were used to measure the amount of groundwater being withdrawn to track water usage under allocations. NPNRD staff collected data and it was then incorporated into the WWUM model.

8.1.2 Conservation Measures Study**8.1.2.1 Phase I**

The Flatwater Group, Inc. completed Phase I of a conservation study in 2013 and provided the results in a Final Technical Memorandum⁷. The purpose of the Phase I study was to assess which conservation measures⁸ the Platte Basin Coalition should consider implementing and also to assess potential methods for developing basin-wide estimates of impacts to streamflow of the conservation measures in the fully appropriated and overappropriated areas of the basin.

Phase I provided a matrix which assessed the assumed magnitude of impact to streamflow of varying intensity for each conservation measure, as well as the required resources and cost of each method. The matrix also provided information on the effect to overland runoff, recharge, and net effect on evapotranspiration (ET) of each conservation measure of varying intensity. Conservation measures assessed included structural (e.g., terraces, dams, canals, etc.) and non-structural (e.g., tillage, irrigation management and efficiency, crop rotation, soil monitoring, buffers, etc.) measures.

8.1.1.1 Phase II

From the Phase I study, two conservation measures, 1) changes in tillage practices, and 2) improvements in irrigation efficiency, were identified and were subsequently assessed in the Phase II study for their impacts on surface water and groundwater⁹. To analyze the effects that the two conservation measures had on both surface water and groundwater, each conservation measure was modeled and results were compared to a baseline model scenario. Two scenarios were developed for each conservation measure, a low and high bookend of their potential effects, using historical tillage practices and low irrigation efficiencies, and using no-tillage practices and high irrigation efficiencies, respectively.

⁷ The Flatwater Group, Inc. (2013). *Final Technical Memorandum of Conservation Study*. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>

⁸ The Final Technical Memorandum defines conservation measures as “practices designed to control or prevent soil erosion, enhance the beneficial use of precipitation and irrigation water, or reduce non-beneficial water consumption.”

⁹ INSERT PROPER CITATION FOR THE POAC Area Conservation Measures Study – Irrigation Efficiency and Tillage Strategy. (2017) compilation of Wilson Water Group and Adaptive Resources, Inc.

Draft for Board Approval 6/13/2019

A. Changes in Tillage Practices

In the surface water model scenarios, the no-tillage scenario resulted in a reduced net irrigation requirement (NIR), corresponding to reduced river diversions, upstream storage releases, and co-mingled pumping, but overall minimal impact on the streamflow at the Lewellen gage. In the groundwater model scenarios, no-tillage resulted in increased baseflow and increased recharge.

B. Changes in Irrigation Efficiency

In the surface water models, the high efficiency scenario reduced NIR by approximately 30 percent, significantly increased crop consumptive use (as expected in water short systems), and reduced return flow. The increased consumptive use is often met by more efficient use of river diversions, and a significant reduction in upstream releases and co-mingled pumping. The low efficiency scenario resulted in higher streamflow due to reduced crop consumptive use and increased return flows during the non-irrigation season. The conservation measures caused the greatest impact on streamflow during dry years.

The groundwater models found that the effects of each practice varied between Upper Platte River Basin NRDs. North Platte NRD saw an increase in baseflow as a result of low efficiency irrigation, likely due to additional recharge from surface water diversions/canals along the North Platte River. The other Upper Platte Basin NRD's saw an increase in baseflow as a result of high efficiency irrigation, likely due to reduced groundwater withdrawals. High efficiency irrigation decreased recharge for all the Upper Platte River Basin NRDs.

Overall, relatively minor net surface water supply benefits result from increasing irrigation efficiency, primarily due to additional crop consumption and that in areas the reliant on surface water for delivery of irrigation supplies the increased efficiency of water delivery may have negative impacts on the water supply. High efficiency irrigation resulted in reduced groundwater pumping but also reduced groundwater recharge in all five Upper Platte River Basin NRDs. No-tillage practices resulted in reduced groundwater pumping and increased groundwater recharge in all five Upper Platte River Basin NRDs. As a result of these findings, additional ongoing efforts to evaluate the impacts of tillage practices are underway. It is expected that these updated findings will be integrated into future technical evaluations.

8.1.3 Conjunctive Management Study

In 2011, HDR and The Flatwater Group, Inc. published the Conceptual Design of a Conjunctive Management Project Study¹⁰. The objectives of this study were to identify

¹⁰ HDR and The Flatwater Group, Inc. (2011). *Conceptual Design of a Conjunctive Management Project*. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>

Draft for Board Approval 6/13/2019

general elements, potential approaches, and constraints necessary for planning and evaluation of conjunctive management projects. Findings were then used to evaluate several hypothetical projects involving the Western Canal to illustrate the application of these concepts. Although the Western Canal, a 20-mile canal that diverts from the South Platte River, is located in South Platte and Twin Platte NRDs, the concepts from this case study are applicable basin-wide.

Conjunctive management¹¹ involves managing surface and groundwater together to maximize storage, timing, and use of the resource. For successful conjunctive management projects, identification and quantification of surface water and groundwater supplies is essential. Projects generally include three components, 1) diversion of surface water, 2) recharge facilities, and 3) use of the water. Project impacts (e.g., water yield, water quality, economics, the environment, etc.) and alternatives must be considered, as well as legal constraints. A monitoring plan should also be developed to assess project performance. All of these components were then used in a case study to evaluate several hypothetical conjunctive management projects on the Western Canal.

8.1.4 Inventory of Sandpits and Small Reservoirs

As part of Nebraska's commitment to PRRIP, the NeDNR has been charged with estimating the cumulative impacts of new or expanded, unregulated surface water activities. Therefore, in 2013, the NeDNR conducted an inventory and analysis of sandpits and reservoirs with capacity below 15 AF throughout Upper Platte River Basin¹². This analysis used multi-temporal aerial imagery from 2005 and 2010, and implemented remote sensing techniques to delineate and compare the number, size, and distribution of these water bodies. Baseline data generated from 2005 imagery were compared to 2010 imagery in order to identify changes in the overall surface areas of these unregulated water bodies within the basin. Once these new or expanded water bodies were identified, the Natural Resources Conservation Service ET calculator was used to estimate the resulting change in consumptive use due to ET.

The inventory component of the study was extremely labor intensive and required approximately 2,500 labor hours to identify, measure, and categorize over 13,000 remotely sensed features. After comparing data from both years, the study found 94 new or expanded sandpits and 9 new reservoirs. New and expanded sand pits represented a

¹¹ The Conjunctive Management Study defines conjunctive management as "the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various water needs."

¹²Zoller, A. (2014). *2005 – 2010 Consumptive Use of Small Man-made Water Bodies in the Platte Surface Water Basin Above Columbus* [PowerPoint Presentation]. Retrieved from <https://dnr.nebraska.gov/water-planning/upper-platte-river-publications>

Draft for Board Approval 6/13/2019

cumulative increase in open water surface area of 728 acres and new reservoirs were responsible for a cumulative increase of 19 acres for a total of 747 new acres of unregulated surface water throughout the basin from 2005 to 2010.

Once the change in open water acreage attributed to unregulated surface water was determined, the NRCS calculator was used to estimate the resulting change in consumptive use due to ET. The results of the NRCS analysis found a pronounced decrease in consumptive use due to ET during the growing season with a modest increase in consumptive use during the non-growing season. Additionally, the NRCS analysis identified a very slight increase in consumptive use due to new reservoirs, which was consistently distributed across all months. Ultimately, the NRCS analysis estimated that the increase in unregulated surface water acreage from 2005 to 2010 resulted in a net decrease in consumptive use of 678 AF per year throughout the basin. The results of this study were presented to the PRRIP Water Advisory Committee on May 6, 2014.

8.2 Summary of Management Actions Taken During First Increment

- The NeDNR continued the formal moratorium on all new surface water appropriations for the North Platte River Basin including the NPNRD.
- The NPNRD and NeDNR conducted several conjunctive management projects in cooperation with irrigation districts. Excess streamflows were diverted into irrigation canals, pits, and reservoirs for groundwater recharge to retime and augment baseflow.
- The NPNRD entered into voluntary agreements with surface water appropriators to lease consumptive use from affiliated lands.
- Additionally, the first increment IMP called for several administrative actions regarding groundwater, which were carried out by the NPNRD.
- The NPNRD assisted groundwater users in signing up for incentive programs.
- The NPNRD entered into short-term and permanent leases and retirements of groundwater.
- The NPNRD entered into agreements with groundwater irrigators to “buy down” allocations to ensure deficit irrigation and provide for a set-aside program for idling marginal farm lands in geographically advantageous areas.
- Allocations. Allotments of a specified quantity of groundwater were granted for a specific use and are measured and monitored with permanently installed flow meters. This was done for groundwater irrigation, municipal groundwater use, and industrial groundwater use.
 - In the Overappropriated Area, the allocation for irrigation was originally set at 56 acre-inches over four years, which is an average of 14 acre-inches per year. In 2013, the NPNRD added 1 water year and an additional 14 acre-inches to the original allocation. In the Pumpkin Creek Basin, the allocation

Draft for Board Approval 6/13/2019

for irrigation was initially set at 36 acre-inches over three years, for an average of 12 acre-inches per year, but in 2013, the NPNRD modified that allocation to its current 60 acre-inches over 5 years or 12 acre-inches per year. These levels were determined to be a deficit level of irrigation for the crop mix in the NPNRD, and were thereby instituted to ensure a reduction in consumptive use. An analysis, described in Section 10.7.3, was conducted to assess the effectiveness of the control and possible need to modify the allocation.

- **Metering.** Meters were used to measure the amount of groundwater being withdrawn from certain regulated wells in order to track water usage under allocations.
- **Moratorium.** The NPNRD implemented a moratorium on the issuance of water well construction permits and on new or expanded groundwater uses. The NPNRD granted a variance from the moratorium if there was an offset for any new or expanded use, or if there was no increase in consumptive use due to the new or expanded use.
- **Certification of Irrigation Uses.** All groundwater irrigation uses were certified by the NPNRD. The NPNRD has a process in which modifications to certified acres may be sought.
- **Large User Permits.** A Large User Permit were required for a public water supplier, with the exception of municipalities, who desires to modify or expand their consumptive use of water.
- **Variations.** The NPNRD granted variations for good cause shown for any of the controls in this IMP or within the NPNRD's rules and regulation.
- **Transfers.** Transfers permits within the NPNRD were required to transfer the location of a certified groundwater use, the point of groundwater withdrawal from a regulated well, the purpose of a certified groundwater use, to add a new use to an existing certified groundwater use, or any combination thereof.

8.3 Assessment of the First Increment (2019 Robust Review)

8.3.1 Robust Review

As required by statute, NeDNR and the Upper Platte River Basin NRDs conducted a Robust Review, finalized in 2019, of the progress being made toward achieving the goals and objectives following the process outlined in the first increment IMP. The previous IMP outlined the process for the Robust Review in order to compare the results of that analysis with the 2008 COHYST report (Section 7.1). The 2019 Robust Review was an update of that study. The evaluation used data and information from the annual reports and updates developed in support of the Upper Platte River Basin-Wide Plan and NNDP implementation.

This evaluation provides summarized estimates of the streamflow impacts resulting from gained and lost irrigated land, controls (allocations and transfers), expansion and

Draft for Board Approval 6/13/2019

contraction of municipal and industrial uses, managed groundwater recharge, stream augmentation, and permitted uses that occurred through 2013. The 2019 Robust Review is a synthesis of all of these efforts and provides summarized updates of new targets that will be used to guide second increment planning goals and objectives.

The 2019 Upper Platte River Basin Robust Review report outlines the methods, limitations, and results of the most recent Robust Review and represents the best available science to support second increment planning. The general method for conducting the Robust Review can be found in Section 10.7.3.2. Figure 5 below illustrates the results for the NPNRD for the period of 2014-2063 from this most recent Robust Review conducted by the NeDNR. Positive values for stream flow impacts indicate accretions and negative values indicate depletions. The charts display the modeled post-1997 impacts of groundwater-only irrigation, municipal and industrial development, allocations, groundwater irrigated acres retirements, and groundwater recharge activities within the NPNRD for each of the stream reaches impacted by the NPNRD, as shown in Figure 4. Again, the impacts of changes, activities, and actions taken through 2013 are reflected in the results but any changes, activities, or actions occurring after 2013 were not analyzed in this Robust Review and are therefore not shown in the data. A linear trend line has been added to the modeled impacts from 2014 through 2063, and the interannual variability range of modeled impacts across the trend shown by the grey band.

Draft for Board Approval 6/13/2019

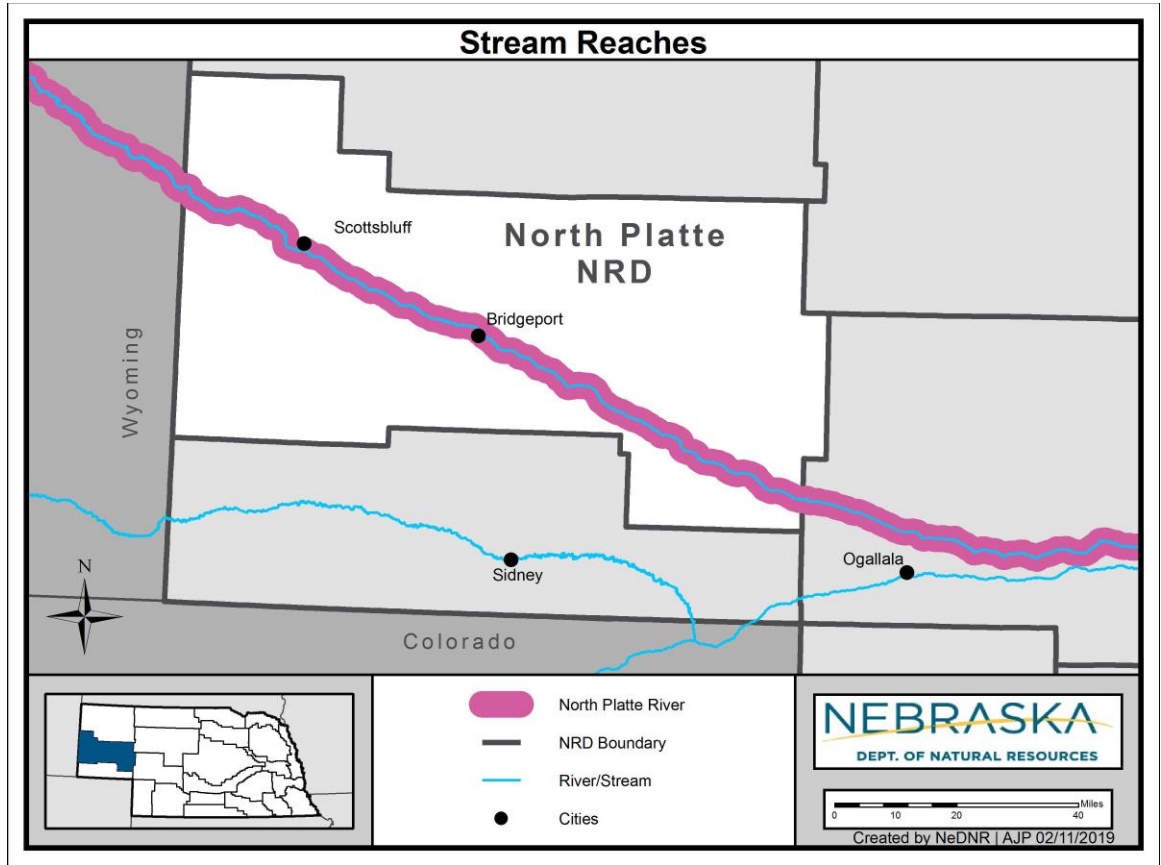


Figure 4. Stream Reach for Robust Review analysis. The data in Figure 5 corresponds to this reach.

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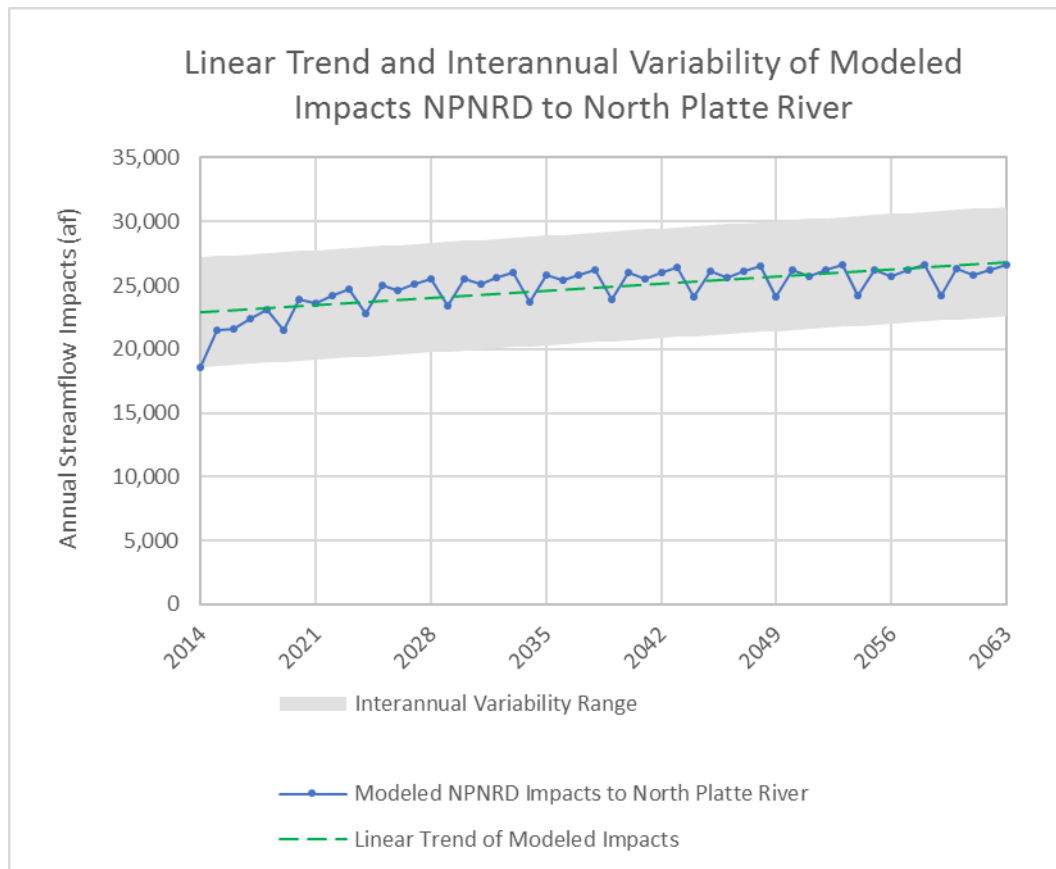


Figure 5. Modeled NPNRD Post-1997 impacts to the North Platte River, the linear trend line of the modeled impacts from 2014-2063, and the interannual variability range of modeled impacts across the trend.

Potential future offsets are impacted by the variability in climate, therefore the trend line is shown to smooth out the potential future effects of climate variability and the grey interannual variability band encapsulates a potential range of impacts.

It is recognized that while they were not analyzed during this 2019 Robust Review, several canal diversions for recharge occurred after 2013 during the first increment that would also provide accretions to the stream. Other projects, such as the EPIC allocation buy down program started in 2017 and surface water leases, provided additional accretions but were not part of this 2019 Robust Review analysis. This will be considered when evaluating the progress toward second increment goals and objectives in Chapter 9 and when performing the next Robust Review.

8.3.2 Allocation analyses for the Robust Review

Draft for Board Approval 6/13/2019

To determine the effectiveness of the allocations in the NPNRD, an annual modeling analysis using the WWUM Model was conducted. Meter data collected from groundwater-only irrigation wells was used to update the historic model. A modified version of the model was created in which the metered pumping records were replaced with estimated pumping simulating full irrigation crop consumptive use of the crops. The stream baseflow of the two model runs were then compared to assess the amount of additional flow in the streams that resulted from the allocations and the subsequent reduction in consumptive use. This additional flow is an offset to depletions caused by post-1997 uses and has helped provide further offsets beyond that level. This analysis is described in more detail in section 10.7.3, which outlines the Robust Review process. This analysis continues to be conducted at regular intervals by the NPNRD to assist in evaluating the effectiveness of the set allocations.

8.4 Assessment of Fully Appropriated

There are several factors that play a role in assessing the difference between the current level of development and a fully appropriated conditions in the Upper Platte River Basin. Identifying this difference is critical in tracking progress toward a fully appropriated condition. The *Nebraska Ground Water Management and Protection Act* requires that determination of the difference between current and fully appropriated levels of development account for: (1) cyclical supply, including drought; (2) the portion of the difference that is due to conservation measures; (3) the portion of the overall difference due to water uses initiated prior to July 1, 1997; and (4) the portion of the overall difference due to water uses initiated or expanded on or after July 1, 1997. A more complete description of all of the factors that are used to assess the difference between current levels of development fully appropriated conditions are outlined in Appendix 1 of the Total Depletions Report¹³. Several publications have been developed to support evaluation of these components (see conservation measures study, Robust Review, INSIGHT analysis) and are further described below.

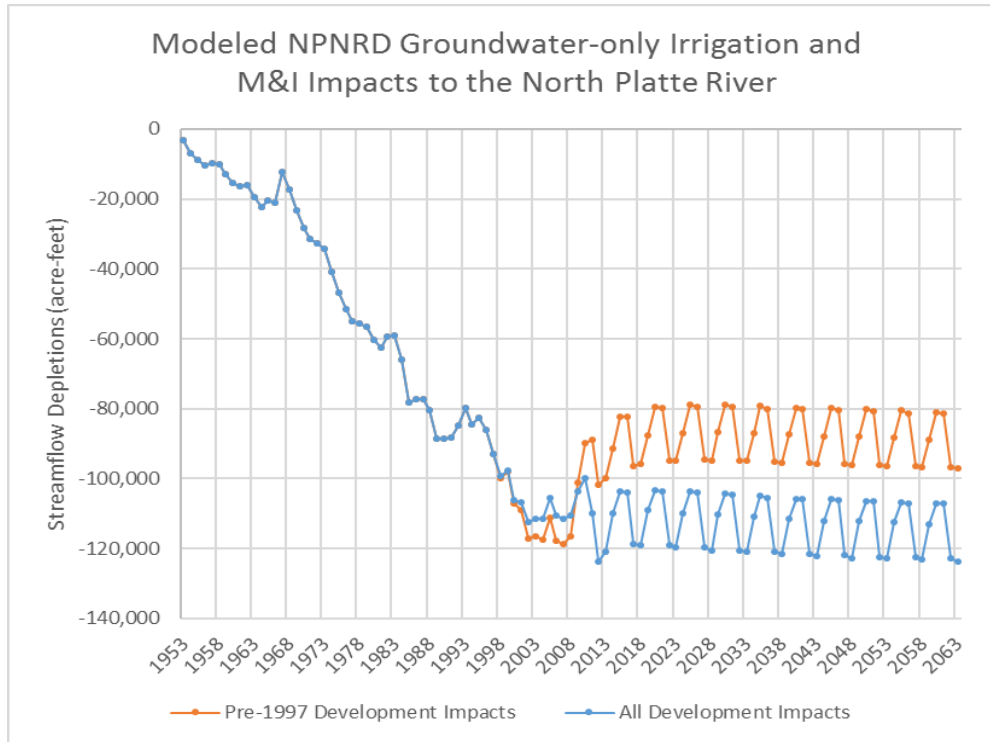
8.4.1 Streamflow Impacts from Uses Initiated prior to July 1, 1997, and after July 1, 1997 (Total Depletions)

This evaluation provides summarized estimates of the streamflow impacts resulting from development of groundwater-only irrigated lands prior to July 1, 1997, and from development through 2013 within each Upper Platte River Basin NRD, for the reaches upstream of Elm Creek. The 2019 Robust Review report provides a separate evaluation of the streamflow impacts resulting from gained and lost irrigated land, controls (allocations and transfers), municipal and industrial expansion and contraction, managed recharge, stream augmentation, and permitted uses initiated or expanded on or after July 1, 1997, within each Upper Platte River Basin NRD.

¹³ (Need citation)

Draft for Board Approval 6/13/2019

The projections of future stream baseflow effects will be reviewed and updated through the course of the second increment, with future evaluations guiding any necessary refinements and modifications to the planning goals, objectives, actions, and controls.



In figure 6, the modeled streamflow impacts to the North Platte River from all groundwater-only irrigation and municipal and industrial development within the District with offsetting management actions, including allocations, groundwater irrigated acre retirements, and recharge projects on the North Platte River, are shown. Also shown are the modeled streamflow impacts from all groundwater-only irrigation and municipal and industrial development prior to 1997. The difference between the two lines is the impact from post-1997 activities.

Draft for Board Approval 6/13/2019

Figure 6. *Modeled NPNRD streamflow impacts to the North Platte River from all groundwater-only irrigation and municipal and industrial (M&I) development with offsetting management actions and the streamflow impacts from development pre-1997*

8.4.2 Conservation Measures

As previously noted in Section 8.1, significant effort has been focused on developing an approach to assessing the impacts of conservation measures. The first phase of this work focused on identifying conservation measures thought to be most impactful on water supplies and use. This phase resulted in the development of a matrix which assessed the assumed magnitude of impact to streamflow of varying intensity for each conservation measure, as well as the required resources and cost of methods that could be used to support further quantification. The matrix also provided information on the effect to overland runoff, recharge, and net effect on evapotranspiration (ET) of each conservation measure of varying intensity. Conservation measures assessed included structural (e.g., terraces, dams, canals, etc.) and non-structural (e.g., tillage, irrigation management and efficiency, crop rotation, soil monitoring, buffers, etc.) measures.

The second phase of this effort focused on further quantifying the impacts resulting from changes in tillage practices and irrigation efficiencies. The results of this work were presented to the basin-wide stakeholders with the general conclusions as follows:

- Relatively minor net water supply benefits result from increasing efficiency, primarily due to additional crop consumption and that in areas the reliant on surface water for delivery of irrigation supplies the increased efficiency of water delivery may have negative impacts on the water supply.
- Increased implementation of minimum tillage practice can reduce on-farm ET and increase recharge, but will likely result in decreased runoff off contributions to streams. Overall increasing the practice of minimum tillage can have a net water supply benefit of approximately 1-3 inches per acre depending on the location and existing farming practices.

As a result of the second phase findings additional ongoing efforts to evaluate the impacts of tillage practices changes are underway. It is expected that these updated findings will be integrated into future technical evaluations.

8.4.3 Evaluation of Cyclical Supplies and Demands (INSIGHT)

The INSIGHT methodology is an approach to assessing the balance between water supplies and water demands within a basin. INSIGHT consolidates data from several sources,

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including NeDNR, the United States Geological Survey, the United States Bureau of Reclamation, and local NRDs. That hydrologic data is used to conduct an analysis of the following items at the basin- and subbasin-level:

- 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, and
- 4) The balance between these water supplies and demands.

The overall concept was to examine basin water supplies and total water demands to estimate the water availability within the basin. The INSIGHT analysis used data from 1988 – 2012 and took into account basin water supply, total demands, and the effects of timing of uses, lag impacts, and water storage.

A balance in the basin occurs when water supply equals water demand. There are times when supply exceeds demand, and when demand exceeds supply. If demand exceeds supply, there may not be enough water supply to sustain demands over the long term.

Basin Water Supply is the amount of water available in the basin before any human use occurs. This is represented by adding streamflow, surface water consumptive use, and streamflow depletions caused by groundwater pumping. This supply fluctuates according to wet and dry years and also vary throughout the year

Total demand includes surface water and groundwater demands for irrigation and municipal and industrial uses, net surface water loss (also called canal seepage) and non-consumptive demands such as instream flows or hydropower. These demands vary throughout the year.

Figures 7 and 8 below shows the basin water supply and total demands the basin for the period of 1988-2012 for the Upper Platte Basin, upstream from Odessa, NE. Each component of the supply and demand is shown on the charts. The final chart (Figure 9) show the annual balance, which is the supply minus the demand. When all demands in the basin are considered, the demands outweigh the supplies in most years. This means that there times when the supplies are not adequate to meet all the demands.

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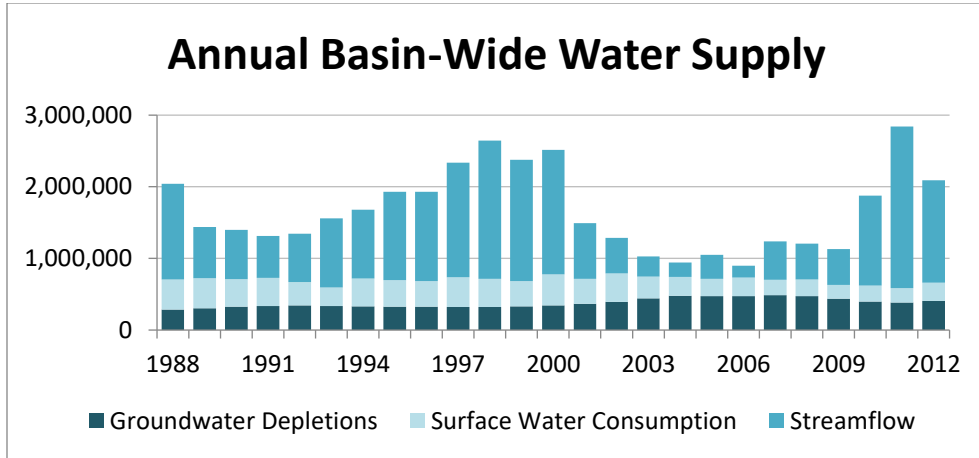


Figure 7. Upper Platte River Basin Annual Basin-Wide Water Supply before any human use occurs.

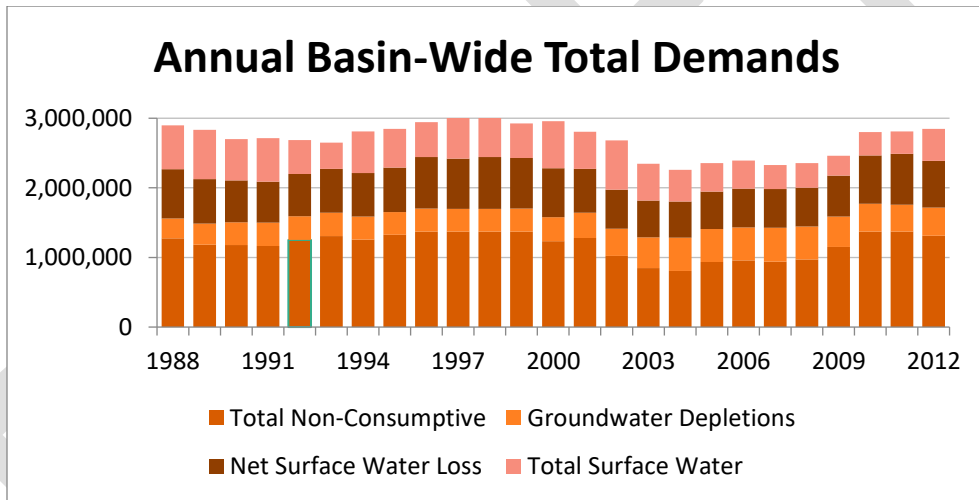


Figure 8. Upper Platte River Basin Annual Basin-Wide Total Demands for surface water and groundwater demands

Draft for Board Approval 6/13/2019

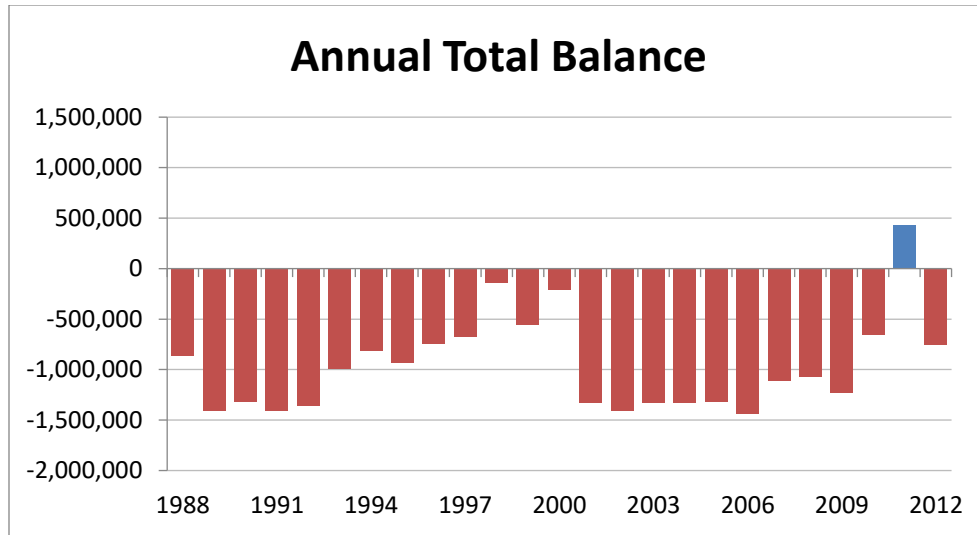


Figure 9. Upper Platte River Basin Annual Basin-Wide Total Balance, supply minus demand.

8.5 Basin-Wide Cooperation in First Increment

The first increment IMP called for the development of a list of criteria to evaluate the potential to use available surface water and groundwater supplies as management projects to meet the goals and objectives of the IMP. In order to create a unified approach across the basin the NeDNR and the Upper Platte River Basin NRDs established an interlocal cooperative agreement (ILCA).

8.5.1 Interlocal Cooperative Agreement (Platte Basin Coalition)

The Platte Basin Coalition (PBC or Coalition) is the ILCA the Upper Platte River Basin NRDs and the NeDNR established. The Coalition serves as a venue for obtaining funding, project evaluation criteria, and technical support, in order to assess incentive programs aimed at reducing consumptive use within the overappropriated portion of the Upper Platte River Basin.

8.5.1.1 Protocols

Through the Coalition, the Upper Platte River Basin NRDs and NeDNR have developed a protocol to follow when evaluating potential projects, including the retirement of water uses and the implementation of other offset projects. This protocol provides a means to evaluate potential projects to assess the appropriate amount of funding that will be allocated toward that project from the Coalition. The evaluation incorporates data from the COHYST 2010 and WWUM models and tools, which include consideration of cyclical water supplies, to evaluate the potential impact of the project on streamflow. Projects with a greater or quicker impact on the stream are given preference over those, which do not have as much an impact. Project costs, benefits, permitting and regulatory constraints are also considered.

8.5.1.2 Funding

Draft for Board Approval 6/13/2019

The ILCA is partially financed by the Water Resources Cash Fund (WRCF). This fund receives monies from both the general fund and the Nebraska Environmental Trust (NET). Under statute, the WRCF may be used in overappropriated or fully appropriated areas for projects to study, develop, and implement management actions that result in reduction of consumptive use of water, enhancement of streamflows, or enhancement of groundwater recharge. Funding of projects through the PBC is shared between the Upper Platte River Basin NRDs and the NeDNR. Coalition members approve all project and study budgets as well as expenditures for studies. The Coalition will simultaneously seek outside sources of funding to increase the leveraging ability of the local dollars spent on projects. More on funding for this IMP is discussed in Chapter 6 above.

8.5.1.3 Technical Work

The five Upper Platte River Basin NRDs and NeDNR have a technical working group to address technical issues and statutory aspects of the Basin-Wide Plan and IMPs. The Upper Platte River Basin NRD managers and NeDNR will agree to technical analyses prior to beginning any work, and the PBC will approve any reimbursed expenditures for technical work.

The technical working group evaluates all aspects of analysis, including the conceptual design, data evaluation, analysis, and evaluation of the results. It is then the responsibility of the technical group to translate the results of any analyses to the administrators for either incorporation into this IMP or evaluation towards meeting plan goals.

During this increment, the technical group will evaluate various aspects of data and models that may include the effects of conservation measures on depletion results, more efficient methods to track changes regarding irrigated lands, or areas where analyses may be simplified. The technical group will follow the basic tenets outlined in Section 7.2 while carrying out any work necessary for the implementation of this IMP.

9.0 GOALS AND OBJECTIVES

The NeDNR and the five Upper Platte River Basin NRDs conducted a Robust Review as part of the actions required in the first increment. This Analysis provided each Upper Platte River Basin NRD with the information necessary to assess their progress in meeting the goals and objectives of their individual first increment IMPs as well as the progress for the Upper Platte Basin. The outcome of the Robust Review showed that the NPNRD exceeded their IMP targets as defined for the first increment. The Robust Review also indicated that a second increment would be necessary to continue to meet the goals and objectives. The Robust Review results have provided IMP targets for this second increment.

Actions to support the successful implementation of the Goals and Objectives in this Chapter can be found in Chapter 10, Action Items. Refer to Figure 3 in Section 8.3 for a map of the planning reach described within these Goals and Objectives.

Draft for Board Approval 6/13/2019

Goal 1: Reach and Maintain a Fully Appropriated Condition

To incrementally achieve and sustain a fully appropriated condition while maintaining economic viability, social and environmental health, safety, and welfare of the basin.

Objective 1.1: Within the current increment of this IMP, implement measures to address impacts of streamflow depletions to surface water appropriations and water wells constructed in aquifers dependent upon recharge from streamflow to the extent those depletions are due to water use initiated after July 1, 1997.

Since this objective was part of the first increment IMP, NPNRD has already taken several actions to achieve it. A summary of these actions can be found in section 8.2 of this IMP. The results of the Robust Review indicate that NPNRD has achieved offsetting Post-1997 depletions. Therefore, the NPNRD will need to maintain the progress they have made in the first increment. This is covered in Objective 1.2.

If future analysis shows that depletions from post-1997 use are greater than previously estimated and have not been fully offset, NeDNR and NPNRD will discuss how to address the remaining depletions within this increment.

Objective 1.2: Maintain previous increment mitigation progress.

This objective applies to both the near and long term. Within the current ten-year increment, the NPNRD and NeDNR will maintain current levels of accretions to the Platte, and seek opportunities to further reduce impacts to Platte streamflows for the period 2059-2063.

NeDNR and the NPNRD will keep policies, projects, and practices in place, as appropriate that provide offsets or supply equivalent offsets so that the current level of accretions is maintained. A summary of offset actions taken during the first increment can be found in Section 8.2 of this plan.

It is recognized that some actions undertaken in the first increment are temporary projects, which may end during the current increment. Funding may limit additional offset opportunities. Best efforts must be made to find new projects or ways of providing offsets for projects that are not permanent.

A. Targets

To track progress toward meeting Objective 1.2, targets are set based on the trend line of the Robust Review modeled results (Section 8.3) for the short term and long term. These are the values that are to be maintained through this increment. Future management actions and changes in water use will be analyzed using the technical tools available (according to the tenets in section 7.2). In addition to technical analysis, the policies, projects, and practices continued or implemented will be taken into account. It is recognized that current model projections will be different from model results from analyses that incorporate actual future conditions therefore the technical analysis must

Draft for Board Approval 6/13/2019

account for variability and the actual practices and projects being implemented must be considered. The methodology for evaluating the targets and a description of triggers used to maintain current progress can be found in Chapter 10, Action Items.

1. Short-term planning target

Table 1.

NPNRD Short-Term Target

NPNRD Annual Short-Term Accretion Target	
Year	North Platte River (AF)
2019	23,300
2020	23,400
2021	23,500
2022	23,500
2023	23,600
2024	23,700
2025	23,800
2026	23,900
2027	23,900
2028	24,000
2029	24,100

The values shown in Table 1, given in acre-feet (AF), are the best estimate of accretion targets for the next increment of the IMP from the trend line of modeled accretions from the most recent Robust Review, which analyzed

Draft for Board Approval 6/13/2019

groundwater only irrigation development after 1997, expansion of municipal and industrial uses after 1997, and management activities through 2013 in NPNRD. The methods used to develop these targets for the NPNRD are described in the Robust Review Report and in Chapter 8. A graph of the complete Robust Review Results can be found in Chapter 8. Using the trend line values as the targets recognizes the variability in the modeled Robust Review results. Since the variability is primarily caused by the climate used to simulate the future, it is not expected that the observed conditions will match the modeled conditions; therefore any future analysis used to compare to these targets must also account for this variability and be adjusted accordingly with an updated trend line and interannual variability range. The accretion amounts shown in Table 1 and these targets are subject to change based upon the most current Robust Review (described in Section 10.7.3.2), which will use the best scientific data and information available. The process for revising the IMP, if the targets change, is outlined in Section 10.9.

2. Long-term planning target

Table 2.
NPNRD Long-Term Target

NPNRD Annual Long-Term Accretion Target	
Year	North Platte River (AF)
2059-2063 Average	26,700

The long term targets are shown in table 2. These are the average accretions for the five-year period of 2059-2063 from the most recent Robust Review modeled results trend line. A graph of the complete Robust Review Results can be found in Chapter 8. Using the trend line values as the targets recognizes the variability

Draft for Board Approval 6/13/2019

in the modeled Robust Review results. Since the variability is primarily caused by the climate used to simulate the future, it is not expected that the observed conditions will match the modeled conditions; therefore any future analysis used to compare to these targets must also account for this variability and be adjusted accordingly. These rates are the current best estimates and are subject to change based upon the most current Robust Review (described in Section 10.7.3.2), which will use the best scientific data and information available. The process for revising the IMP, if the targets change, is outlined in Section 10.9.

Objective 1.3: Make progress toward a fully appropriated condition.

Impacts of streamflow depletions to surface water appropriations and water wells constructed in aquifers dependent upon recharge from streamflow to the extent those depletions are due to water use initiated prior to July 1, 1997, may be addressed prior to a subsequent increment with the intent of achieving a fully appropriated condition.

During the first increment, two analyses were performed to estimate the balance of water supplies and demands within the Upper Platte Basin. This included an estimate of all groundwater depletions to streamflow (Total Depletions) and the INSIGHT analysis. Both are described in Chapter 7.

Continue to evaluate total depletions.

Continue to evaluate water supply and demands.

Continue to develop an estimate for a fully appropriated condition.

Objective 1.4: Review the implementation of this IMP to ensure that the IMP provisions are adequate to sustain progress toward and/or maintain a fully appropriated condition.**Objective 1.5:** Once a fully appropriated condition is achieved, maintain such condition through the implementation of the IMP.**Goal 2: Interstate Compliance**

Prevent or mitigate human-induced reductions in the flow of a river or stream and ensure that no act or omission of the NPNRD or NeDNR would cause noncompliance by Nebraska with any interstate decree, compact, or other formal state contract or agreement pertaining to any groundwater or surface water use or supplies.

Objective 2.1: Prevent human-induced streamflow depletions and ensure that no act or omission of the NPNRD or NeDNR would cause noncompliance by Nebraska with the NNDP included within PRRIP, for as long as PRRIP exists.

Draft for Board Approval 6/13/2019

- Objective 2.2:** Ensure that the groundwater and surface water controls adopted in the individual NRD IMPs are sufficient to ensure that the state will remain in compliance with the Nebraska New Depletion Plan.
- Objective 2.3:** Collectively, as defined in the Nebraska New Depletion Plan, offset the new depletions caused by new uses within the Upper Platte River Basin NRDs.
- Objective 2.4:** Ensure that for post-1997 new or expanded uses, including irrigation, municipal, industrial, rural domestic and other new water related activities are assessed and offset for compliance with the NNDP. This assessment will be part of the Robust Review, explained in Section 10.7.3.2 of this IMP.

Goal 3: Consistency, Communication, and Updates

Keep the IMP current, maintain consistency with the Basin-Wide Plan, and keep water users informed.

- Objective 3.1:** Amend this IMP as needed to remain consistent with the Basin-Wide Plan.
- Objective 3.2:** Participate in basin-wide planning activities
- Objective 3.3:** Improve information sharing with interested parties.
- Objective 3.4:** Conduct planning for subsequent increments of the IMP, as necessary.
- Objective 3.5:** If appropriate and necessary, follow the dispute resolution process in the Basin-Wide Plan.

10.0 ACTION ITEMS

Chapter 10 contains the action items that will be carried out to accomplish the goals and objectives of the IMP. The action items described in this section are intended to be consistent with the requirements of *Neb. Rev. Stat. § 46-715(3)*.

These actions range from ongoing non-regulatory actions such as information and education efforts, to maintenance of current regulatory actions, and the potential for future increased controls if certain triggers cannot be achieved through the other actions taken by the NPNRD or NeDNR. As described within this Chapter, more details on the statutes or rules followed by the NPNRD or NeDNR can be found at the offices of each respective agency. For purposes of transparency/simplicity, the full length of those documents are not repeated herein, so the reader is directed to each agency to read the full details on how any particular action item may be carried out.

10.1 Information and Education Programs

The NPNRD and the NeDNR will provide educational materials to the public and/or carry out educational activities that may include, but not be limited to, the following:

- The fully appropriated determination

Draft for Board Approval 6/13/2019

- The overappropriated designation
- The IMP
- The Nebraska New Depletion Plan (NNDP)
- The Platte River Recovery and Implementation Program (PRRIP)
- Hydrologically connected groundwater and surface water
- Invasive species management
- Conversion of irrigated acres to dryland agriculture or wildlife habitat
- Limited irrigation cropping systems
- Soil residue and tillage management
- Alternative crops
- Allocations
- Water use measurement techniques
- Eco-tourism, crop diversification, changes in land use, to support diversity in revenue streams of water users within the basin, as a means of maintaining economic viability
- Incentive programs and funding sources for programs that enhance water supply
- Educational programs to support the implementation of Incentive Programs

These educational materials and/or activities may include, but not be limited to, joint public meetings, pamphlets, and website information.

10.2 Incentive Programs

The NeDNR and/or the NPNRD intend to establish, implement, and/or continue financial or other incentive programs to reduce consumptive use of water within the NPNRD to meet the goals and objectives of this IMP.

- 10.2.1 Incentive programs include any program authorized by state law and/or federal programs such as the EPIC program, 10/30 program, alternative cropping, cost share, surface water leasing, groundwater retirements, the Conservation Reserve Enhancement Program (CREP), and the Environmental Quality Incentive Program (EQIP).

10.2.2 Other State or NRD Programs

The NPNRD and the NeDNR may investigate opportunities to reduce the consumptive use of water in order to enhance water supply as well as other water supply improvement projects. The NPNRD and the NeDNR may develop an incentive-based program if such an opportunity exists.

All projects and programs will:

Draft for Board Approval 6/13/2019

- Use the best science readily available. This will follow the basin-wide tenets outlined in Section 7.2. These will be consistently evaluated according to the protocol developed by the PBC. Benefits will be assessed using the agreed upon methods and tools.
- Enhance groundwater quantity, groundwater quality, and recognition of the value of return flows.
- Remain in compliance with any state or federal laws, contracts, interstate compacts, or decrees that govern the water use of the irrigation districts

10.2.3 The general process will be:

- For existing surface water appropriations, contact the appropriators to determine willingness to cooperate, lease and/or sell those appropriations. If willing, develop and execute contract(s) with appropriator(s).
- Working with irrigation districts, not just individual landowners served by the irrigation district, when potential projects affect the operation of the irrigation district.
- Retirement of surface water rights (either a permanent or a temporary restriction of use). An active surface water right that is under a state or federal program that does not allow use, qualifies under statute for extended non-use periods. While typically a surface water right which has not been used for more than five years may be cancelled due to nonuse, under *Neb. Rev. Stat. § 46-229.04*, if the appropriation is not being used because it is part of an acreage reserve program, or other state or federal program, there is sufficient cause for nonuse and the right is still valid. If the land is no longer under a program, this applies for up to 15 years as long as there are not more than five consecutive years of nonuse while the land is not under a program.
- For existing groundwater uses, contact the landowner(s) to determine willingness to cooperate with the proposed project(s). If willing, develop and execute contract(s) with such landowner(s).
- Submit permit application(s) if required by Nebraska statutes.
- Implement the approved projects.

10.2.4 Other identified potential programs

At this time, the specific other programs that have been identified are:

- Potential purchase or lease of surface water irrigation district appropriations in order to transfer those appropriations to groundwater recharge or intentional recharge appropriations;
- Surface water leases;

Draft for Board Approval 6/13/2019

- Groundwater retirements; and
- EPIC contracts for allocation buy downs
- Cost Share programs to enhance irrigation efficiency on groundwater only acres.

10.3 Water Banking

10.3.1 NPNRD will establish a water bank. The NPNRD will purchase or otherwise acquire certified groundwater irrigated acres or other groundwater uses or surface water use appropriations. The NPNRD will hold the water in its water bank for the purposes of:

- Offsetting new or expanded consumptive uses
- Saving water to meet statutory requirements or interstate agreement obligations
- Saving water to meet future incremental targets toward achieving a fully appropriated condition
- Future sales to individuals as offsets for development of new consumptive uses of groundwater within the NPNRD

10.3.2 The NPNRD and the NeDNR will follow the basin-wide tenets from Section 7.2 while implementing the water bank.

- The NPNRD will contact the NeDNR prior to purchasing or acquiring surface water appropriations for deposit in the water bank. The NeDNR will conduct a field investigation of the surface water appropriation and notify the NPNRD of the results of that investigation within 90 days. The NPNRD will work collaboratively with the NeDNR in performing the analysis to evaluate the bankable volume of water resulting from the retirement of the surface water appropriation. The NPNRD will follow the appropriate statutes, and rules and regulations of the NeDNR for approval if the surface water appropriation is to be transferred to another use.
- The NPNRD will obtain and maintain permanent easements, lease agreements or other agreements on all property from which surface water or groundwater uses have been retired for purposes of the water bank.
- The NPNRD shall annually report all water-banking deposits, withdrawals, and other activities according to the specifications described in Section 10.7 of this IMP.
- When carrying out any water banking activity, the NPNRD shall follow the procedures for any groundwater regulatory action (e.g. transfers,

Draft for Board Approval 6/13/2019

certification, or municipal and non-municipal industrial accounting) applicable to such activity. When carrying out any surface water related water banking activity, the NPNRD shall follow the appropriate state statute and NeDNR rules and regulations.

10.4 Conjunctive Management

Conjunctive management projects¹⁴ allow for the optimum use of hydrologically connected surface water and groundwater supplies, so that the variability seen in surface water supplies can be smoothed out over time, allowing water users to wisely store water during periods of surplus and, in a managed fashion, withdraw that stored water in times of shortage, overall increasing the available supply through time. Conjunctive management projects can also create benefits such as, mitigating groundwater level declines, reducing flood flows, and offsetting depletions. The NeDNR and the NPNRD will identify conjunctive management opportunities and implement such projects with the purpose of meeting the goals and objectives of this IMP.

Conjunctive Management may include, but is not limited to, the following:

- Transfer existing surface water appropriations or apply for new appropriations for groundwater recharge or intentional recharge, and recovery when appropriate, in existing canals during the irrigation or non-irrigation season; temporary permits can be issued for the diversion of flows in excess of existing appropriations, which would occur outside of the irrigation season
- Develop new infrastructure (e.g. dams or canals) that may include groundwater recharge or intentional recharge projects, and recovery when appropriate
- Temporarily transfer existing surface water appropriations within the NRD to streamflow augmentation, instream flow appropriations, or an instream use¹⁵
- Develop other groundwater projects for the purpose of providing net accretions to the river
- Facilitate contractual agreements between water users

¹⁴ See Chapter 8.1.3 Conjunctive Management Study for more information and a definition of “conjunctive management.”

¹⁵ *Nebraska Revised Statute* § 46-290(5) states that “For any transfer or change approved [to augment flow in a specific stream reach for any instream use,] the Department shall be provided with a report at least every five years [...] to indicate whether the beneficial instream use for which the flow is maintained or augmented continues to exist”. Title 457 of the *Department of Natural Resources Rules for Surface Water* Chapter 9 Section 002.01 states “For purposes of 46-290(5) R.R.S. 1943, as amended, beneficial use for instream uses shall include a. Water Quality Maintenance b. Water necessary for compliance with compacts, decrees or other state contracts.”

Draft for Board Approval 6/13/2019

- Reduce consumptive use by permanently or temporarily retiring irrigated land. Explore other options.

The Upper Platte River Basin NRDs and NeDNR will mutually develop procedures for conducting conjunctive management projects. These procedures may include details on communicating when and where excess flows are available; permitting, contracting, and payment processes; tracking projects and maintaining data records; sharing data; cooperating with other entities wishing to utilize excess flows; and methods for determining benefits from projects (annually for IMP/Basin-Wide Plan/PRRIP reporting and for Robust Review purposes). Techniques which can be actively managed and returned to the stream do have benefits that are different from those that are passive (timing and volume of return is uncontrolled, unmanaged, unknown).

Conjunctive management projects can be passively managed or actively managed. Actively managed projects, such as storage of excess water, can be returned to the stream at a specific time in controlled volumes. Passively managed projects, such as recharge of groundwater through excess flow diversions, return to the stream gradually over time and the rate and volume depends on the underlying aquifer material and proximity to the stream.

The ability to capture and use excess flows is dependent on advanced notice of the availability of excess flows. NeDNR will develop a protocol for assessing, predicting, and communicating 1) the potential of excess flows to basin water users, and 2) notice of actual availability of excess flows. The NPNRD and NeDNR will work collaboratively to record the excess flows diverted, the excess flows diverted into recharge sites, and the amount of water returning to the river at canal return flow structures. Additionally, NPNRD and NeDNR will collaboratively review and analyze the data from the excess flow diversions to determine the amount of recharge that occurred during the event within the canal and recharge pits. Data on canal recharge and conjunctive management projects will be shared as part of the annual reporting process, described in Section 10.7.1. The recharge will be analyzed in future Robust Review or other analyses.

In order to optimize the implementation of various conjunctive management projects where diversions of excess streamflow will occur, operational plans for each project should be developed. These operational plans should include enhanced monitoring and flow of information and data to effectively manage and utilize any available water. These operational plans will provide the NeDNR with objective criteria by which various projects may be prioritized in order to most effectively utilize available excess flows in the Platte River Basin. The public interest will be best served when the most effective projects are selected for diversion during excess flow periods. In addition, such plans and operational attributes will be useful in establishing good cause and passing public interest tests when petitions and applications are filed with the NeDNR.

10.5 Drought Planning

The basin drought contingency plan will serve as a guide for plans developed by each individual NRD. District-level mitigation measures and response actions corresponding to the drought conditions will be identified and implemented at the individual NRD level. The basin-wide drought plan is to be completed within the first three to five years of the increment. The NPNRD

Draft for Board Approval 6/13/2019

will continue the implementation of its drought plan and update as necessary for consistency with the basin-wide drought plan.

The NPNRD will focus on the following key areas in implementing drought-mitigation and drought-response strategies:

10.5.1 Education

- A. Educate the entire community on droughts and its effects, emergency management, and sustainable conservation practices.
 - Include youth and adult audiences.
 - Leverage existing partnerships and resources to communicate drought information.
 - Provide information on NPNRD website.

10.5.2 Drought Monitoring

- A. Monitor meteorological, hydrologic, and other tools to assess current and projected conditions for the region
- B. Develop informational materials and recommendations to public and decision-makers based on information assessed.

10.5.3 Impacts and Vulnerabilities

- A. Municipal water use
- B. Encourage municipalities within the NPNRD to restructure water rates to incentivize conservation and to implement water use restrictions, with enforcement provisions, in times of drought.
- C. Preparedness
- D. Engage in community emergency-preparedness activities to determine strengths and weaknesses of existing emergency-response plans.
- E. Water quality
- F. Maintain or improve surface water and groundwater quality during drought.
- G. Water quantity
- H. Identify strategies to address streamflow variability.
- I. Consider further temporary reductions in water use during severe, multi-year droughts, keyed to the geography, magnitude, and timing of shortages in the local and regional hydrologic system (e.g., reduced groundwater levels).
- J. Vulnerability: Soil health and land cover

Draft for Board Approval 6/13/2019

- Educate NPNRD communities on maintaining and improving soil health during drought.
- Implement and promote cost-share programs targeting soil-health measures that increase drought resilience.

10.5.4 Drought Strategy Implementation

- A. Establish and foster the local and regional partnerships needed to implement drought-management strategies.
- B. Seek out potential funding opportunities for drought-strategy implementation.
- C. Adapt management strategies to reflect lessons learned from drought situations as they occur.

10.6 Controls and Triggers**10.6.1 Groundwater Regulatory Actions (Controls)**

The NPNRD will periodically review the controls being implemented to carry out the goals and objectives of this IMP. The NPNRD may adjust, modify, expand, or add controls, based on the annual reviews of the progress being made toward achieving the goals of this IMP, and pursuant to *Neb. Rev. Stat. 46-715(5)(d)(ii)*. No controls may be removed, however, unless and until the NPNRD and the NeDNR amend this IMP. The controls may not be modified in such a manner as to conflict with the goals and objectives of this IMP.

The action items described in this section are intended to be consistent with the requirements of *Neb. Rev. Stat. §46-715(3)*.

All actions permitted or otherwise carried out by the NPNRD will prevent adverse impacts on existing groundwater or surface water users as well as use the methodology for calculating depletions and accretions consistent with the other Upper Platte River Basin NRDs to ensure that the criteria for compliance with PRRIP, including the timing, location and amount of the depletion and corresponding offset, are met.

The NPNRD will consider the timing, location and amount of the depletion for all actions in order to prevent adverse impacts on existing groundwater and surface water users. Actions include, but are not limited to, these controls: moratorium variances, certified acre modifications, transfers, large user permits, municipal and industrial permits, variances, or modifications, and other variances. The evaluation criteria for a control or other action include, but are not limited to, the following:

- (1) whether the action will cause an impact to existing groundwater or surface water users;
- (2) whether the action will cause an increase in depletions to the river;
- (3) whether the action will cause an increase in consumptive use;

Draft for Board Approval 6/13/2019

- (4) the amount, location and timing of any changes in depletions or accretions to the river due to the action;
- (5) whether the action will cause any adverse effects on the state's ability to comply with PRRIP;
- (6) whether the action is consistent with the purpose of the IMP; and
- (7) whether the action will protect the public interest and public welfare.

The NeDNR and the NPNRD will coordinate with the Central Platte NRD, Tri-Basin NRD, South Platte NRD, and Twin Platte NRD to continue applying a consistent method of calculating depletions or accretions to the stream, following the basin wide tenets outlined in Section 7.2, when such calculations are necessary to implement groundwater regulatory actions. Any actions taken by the NPNRD will be documented and shared with the NeDNR pursuant to Chapter 10. The NPNRD will work with the well owner to update the water well registration to reflect the permitted actions to reflect the new or additional use. The NPNRD will update a water well registration to reflect actions taken by the NPNRD through a permitting action and must be changed to reflect the new or additional use.

The NPNRD is currently implementing the following controls throughout their District, as authorized by *Neb. Rev. Stat. § 46-739*, and will continue to do so in the future. These controls apply to the fully appropriated and overappropriated areas of the NPNRD. The specifics of the all of the processes for all of these controls, including the evaluation criteria, can be found in the NPNRD's Ground Water Management Area Rules and Regulations.

10.6.1.1 Metering

Meters are used to measure the amount of groundwater being withdrawn from regulated wells receiving an allocation in order to track water usage. At the completion of the water year, NPNRD staff collect data on groundwater certified acres, by physical inspection or inspection using telemetry equipment. Water used on those acres is then calculated and reported back to the landowner to ensure compliance with the allocation.

10.6.1.2 Allocations

Allotments of a specified quantity of groundwater are granted for a specific use and are measured and monitored with permanently installed flow meters. Starting in water year 2020, the NPNRD will implement a 14 acre-inch allocation per year on the overappropriated area (OA) of the NPNRD. This will be a 5-year allocation with a total availability of 70 acre-inches over 5 years. A yearly allocation of 12 acre-inches will implemented on acres within the boundaries of the Pumpkin Creek Basin. This will also be a 5-year allocation with a total availability of 60 acre-inches over 5 years. These levels were determined to be a deficit level of irrigation for the crop mix in the NPNRD and will be

Draft for Board Approval 6/13/2019

instituted to ensure a reduction in consumptive use. An annual analysis, described in Section 10.7.3, will be conducted to assess the effectiveness of the control and the need to modify the allocation.

10.6.1.3 Moratorium

The NPNRD has implemented a moratorium on the issuance of water well construction permits and on new or expanded groundwater uses. The NPNRD may grant a variance from the moratorium if there is an offset for any new or expanded use, or if there will be no increase in consumptive use due to the new or expanded use.

10.6.1.4 Certification of Irrigation Use

All groundwater irrigation uses have been certified by the NPNRD. The NPNRD may grant modifications to certified acres. The NPNRD has compiled a list and definitions of the certified groundwater uses within the NPNRD, which can be found in the NPNRD Rules and Regulations.

10.6.1.5 Large User Permits

A Large User Permit will be required for a public water supplier, with the exception of municipalities, who desires to modify or expand their consumptive use of water.

10.6.1.6 Variances

The NPNRD may grant a variance for good cause shown for any of the controls in this IMP or within the NPNRD's rules and regulations.

10.6.1.7 Transfers

Transfers within the NPNRD are required to transfer the location of a certified groundwater use, the point of groundwater withdrawal from a regulated well, the purpose of a certified groundwater use, to add a new use to an existing certified groundwater use, or any combination thereof.

General Guidelines for Groundwater Transfers:

- A. The purpose of a groundwater transfer is to allow for the consumptive use of groundwater to be changed either in location or purpose
- B. The NPNRD may permit, regulate, or take action on the following types of groundwater transfers: (1) physical transfer of groundwater off of the overlying land; (2) transfer of the type of use or addition of use; (3) transfer of certified irrigated acres; (4) physical transfer of groundwater and transfer of certified

Draft for Board Approval 6/13/2019

irrigated acres between the NPNRD and an adjoining NRD; (5) municipal transfer permit (if the applicant does not have a municipal transfer permit from the NeDNR); (6) industrial transfer permit (if the applicant does not have an industrial municipal transfer permit from the NeDNR); and (7) transfers out of state.

- C. A transfer permit from the NPNRD shall be required before any transfer as identified above may be allowed.

10.6.1.8 Guidelines for Types of Groundwater Transfers. The following types of groundwater transfers involve coordination communication between the NeDNR and the NPNRD when issuing a permit.

- A. Municipal Transfer Permits – transfers without a municipal and rural domestic transfer permit from the NeDNR will require a transfer permit from the NPNRD;
- B. Industrial Transfer Permits – transfers without an industrial transfer permit from the NeDNR will require a transfer permit from the NPNRD;
- C. Transfer Out of State – (1) The NeDNR will consult with the NPNRD when considering applications filed to transfer groundwater out of state, pursuant to *Neb. Rev. Stat. §46-613.01*. The NPNRD will take action to approve or deny the transfer request based on the same criteria that the NeDNR uses prior to issuing a transfer permit; and (2) a water well construction permit shall not be issued unless and until the board of the NPNRD has granted a variance to the moratorium on the issuance of water well construction permits and has approved the transfer permit.

10.6.1.9 Municipal and Industrial Accounting required for the calculations of baselines and the determination of allocations

- A. As described within Goal 2, objective 2.3 of this IMP, for purposes of compliance with the NNDP, the NPNRD will calculate a baseline consumptive use for each municipality in the NPNRD based on historic consumptive use data for the interval August 1, 2001, through July 31, 2006, or if unavailable through those dates, then a 5-year average beginning on the date of flowmeter installation. Consumptive use will be determined from groundwater pumping volumes and, where applicable, wastewater discharge volumes, and converted to a per capita volume. The baseline per capita volume, plus the annual population growth estimated by the Nebraska

Draft for Board Approval 6/13/2019

Department of Economic Development and/or U.S. Census Bureau will be used to determine annual increases and decreases in consumptive uses. These annual changes in consumptive use will be tracked annually for each municipality through a reporting and database system administered by the NPNRD.

- B. Once each five years, and more often if requested by the NeDNR or as determined by the NPNRD, the NPNRD will recalculate the per capita consumptive use based upon similar, but updated, data described in NPNRD's Rules, and make any necessary adjustments to their per capita offset requirements.
- C. Each year until January 1, 2026, the NPNRD will be responsible for offsetting all increases from the baseline consumptive use as estimated by population growth except under either of the following events: (1) a municipality's water use exceeds the amount of groundwater authorized by a permit that was issued pursuant to the *Municipal and Rural Domestic Ground Water Transfers Permit Act*; or (2) the increase is related to any new or expanded single commercial/industrial consumptive uses of more than twenty-five million gallons per year. After January 1, 2026, the NPNRD will opt out of this requirement and will no longer be responsible for offsetting this amount.
- D. Each year until January 1, 2026, the municipality shall be responsible for reporting to the NPNRD and offsetting to the river, any groundwater use that exceeds the amount authorized by a permit that was issued pursuant to the *Municipal and Rural Domestic Ground Water Transfers Permit Act*, and any new or expanded single commercial/industrial consumptive use if that new or expanded consumptive use is greater than twenty-five million gallons per year.
- E. Any permanent reduction in consumptive use of water associated with municipal growth including governmental, industrial, and commercial growth (e.g., by taking irrigated acres out of production), between July 14, 2006, and January 1, 2026, shall accrue to the NPNRD's water bank to be used in whole or in part to offset increased consumptive use within the NPNRD. Acres taken out of production must be decertified and transferred to the NPNRD's water bank.

Draft for Board Approval 6/13/2019

10.6.1.10 Non-Municipal Industrial Use and Accounting

- A. The NPNRD will calculate baseline consumptive use for each non-municipal commercial/ industrial user in the NPNRD based on historic consumptive use data for the interval of August 1, 2001, through July 31, 2006, or if unavailable through those dates, then a five-year average beginning on the date of flowmeter installation. Consumptive use will be determined from groundwater pumping volumes and, where applicable, wastewater discharge volumes. The baseline will be used to determine changes in consumptive use annually.
- B. These changes in consumptive use will be tracked for each non-municipal commercial/ industrial user annually through a reporting and database system administered by the NPNRD.
- C. If the new or expanded single commercial/industrial use is less than or equal to twenty-five million gallons per year, the NPNRD will be responsible for offsetting the entire new or expanded use below the amount granted in the industrial transfer permit, if applicable. After January 1, 2026, the NPNRD will opt out of this requirement and will no longer be responsible for offsetting this amount.
- D. If the new or expanded non-municipal commercial/industrial use exceeds twenty-five million gallons per year and they do not have a transfer permit, the user will be responsible for offsetting all new or expanded consumptive uses. If the new or expanded non-municipal commercial/industrial use has a transfer permit, the user is responsible for offsetting all new or expanded uses above the amount granted in the industrial transfer permit up until January 1, 2026.
- E. Any permanent reduction in consumptive use of water associated with a new non-municipal commercial or industrial use of less than twenty-five million gallons (e.g., by taking irrigated acres out of production), between July 14, 2006, and January 1, 2026, shall accrue to the NPNRD's water bank to be used in whole or in part to offset increased consumptive use within the NPNRD. Acres taken out of production must be decertified and transferred to the NPNRD's water bank.

10.6.2 Triggers

In order to determine whether additional groundwater regulatory actions are needed, the annual stream accretion amounts shown in Table 1 under Goal 1 Objective 1.2 will be

Draft for Board Approval 6/13/2019

compared to the stream accretions resulting from the ongoing and future actions taken by NPNRD and any new depletions resulting from new uses and increased depletions resulting from existing uses. Based on the information shown in Table 1, the stream accretions from existing management actions, projects, or programs have been provided in amounts necessary to obtain a net sum of accretions of greater than or equal to zero in the current increment. Based on the current targets that show post-1997 depletions have been offset, additional regulatory actions will not be required as long as either: 1) the annual net sum of the accretions resulting from the actions taken by NPNRD are greater than or equal to the most recent Robust Review trend line values shown in Table 1; or 2) if the annual net sum of the accretions is not greater than the most recent Robust Review trend line values, the NPNRD maintains their current policies, projects, and practices (i.e. allocations, groundwater acre retirements, excess flow recharge projects) that resulted in the Robust Review trend line. As previously stated, the trend line is the average of the Robust Review results that vary due to the model inputs used for the future simulations. The results of analyses of future conditions and actions taken are not expected to match the Robust Review results. Any analysis of future conditions must take into account the variability of actual future climate conditions. If new analysis indicates there are still post-1997 depletions that need to be offset, the NeDNR and NPNRD will discuss what needs to be done to address those depletions. Post-1997 depletions must be offset by the end of this increment. . At this time, it is anticipated that annual progress and maintenance will be measured using an analytical accounting method, similar to that described in the guidance document developed by the Upper Platte River Basin NRDs and the NeDNR¹⁶ to estimate of new accretions and depletions as compared to the values in the Table 1 in Chapter 9 of this IMP.

The NeDNR and NPNRD recognize the potential for implementation of voluntary programs, incentive measures, or other projects to provide stream accretions that will help maintain post-1997 depletions and accretions to a net sum of greater than or equal the values shown in Table 1 in the next increment, and will work diligently to implement measures to provide additional stream accretions in a timely manner. The NeDNR and NPNRD also recognize that the current Robust Review results have limitations which will be addressed throughout the IMP increment and that as Robust Review results are updated to address those limitations that the target values described within the IMP section 10.7 below may need to be updated which will result in the need to update future trigger values. A net sum of accretions and depletions of greater than or equal to the Robust Review results must be maintained. The following indicator and triggers will determine regular progress.

¹⁶ The protocol document, *Basin-wide Technical Committee Guidance Document – Procedures for Annual Accounting Review and Robust Review to Assist Integrated Management Planning and Facilitate Reporting to the Platte River Recovery Implementation Program*, can be found at <https://dnr.nebraska.gov/water-planning/other-upper-platte-river-documents>

Draft for Board Approval 6/13/2019

10.6.2.1 To determine if an accretion to the river equal to or exceeding the values in Table 1 has been sustained and to determine progress toward meeting the goals and objectives of this IMP, the NeDNR and the NPNRD will jointly perform a new Robust Review analysis in 2023 and 2027 to evaluate the overall effects to streamflow. Any analysis to compare future actions with these triggers must take into account the variability of actual future climate conditions and make a comparison using trended results. The New Robust Review analyses may change the values found in Table 1 under Goal 1 Objective 1.2 and therefore may change the target values the indicator and triggers. The process for revising the IMP, if the targets and triggers change based on the next Robust Review, is outlined in Section 10.9. When evaluating the indicator and triggers, the new and continued policies, projects, and practices implemented to provide offsets will also be considered. Figure 8 displays a timeline of the evaluation of the indicator and triggers with the values from the current Robust Review shown.

1. **Indicator:** If, by the end of 2023, an accretion to the river equal to or exceeding the values in Table 1 throughout the first ten-year increment has not been sustained, the NeDNR and NPNRD will jointly determine whether any additional regulatory actions will need to be put in place by the beginning of the 2025 irrigation season.
2. **Trigger 1:** If, by the end of 2027, an accretion to the river equal to or exceeding the annual values resulting from the most recent Robust Review that year and every year thereafter throughout the ten-year increment has not been met, the NeDNR and NPNRD will jointly determine what steps need to be taken to ensure that the agreed upon regulatory actions will be in place by the beginning of the 2028 irrigation season.
3. **Trigger 2:** By the end of 2027, measures will be in place to achieve an accretion to the river equal to or exceeding an annual rate of the 50-year long-term planning target. If this trigger has not been met, the NeDNR and NPNRD will jointly determine what steps need to be taken to ensure that the agreed upon regulatory actions will be in place by the beginning of the 2028 irrigation season.

Chapter 10.7 describes how progress toward achieving the indicator and triggers will be measured. The indicator and triggers values from Table 1 come from the 2019 Robust Review analysis results trend line through the model data. The trend line is the average of the model results that vary due to climate inputs. It is not expected that the future modeled data will match the 2019 Robust Review analysis results exactly due to differences in the

Draft for Board Approval 6/13/2019

model inputs used for the analysis and future observed conditions. Any analysis to compare future actions with these triggers must take into account the variability of actual future climate conditions and make a comparison using trended results.

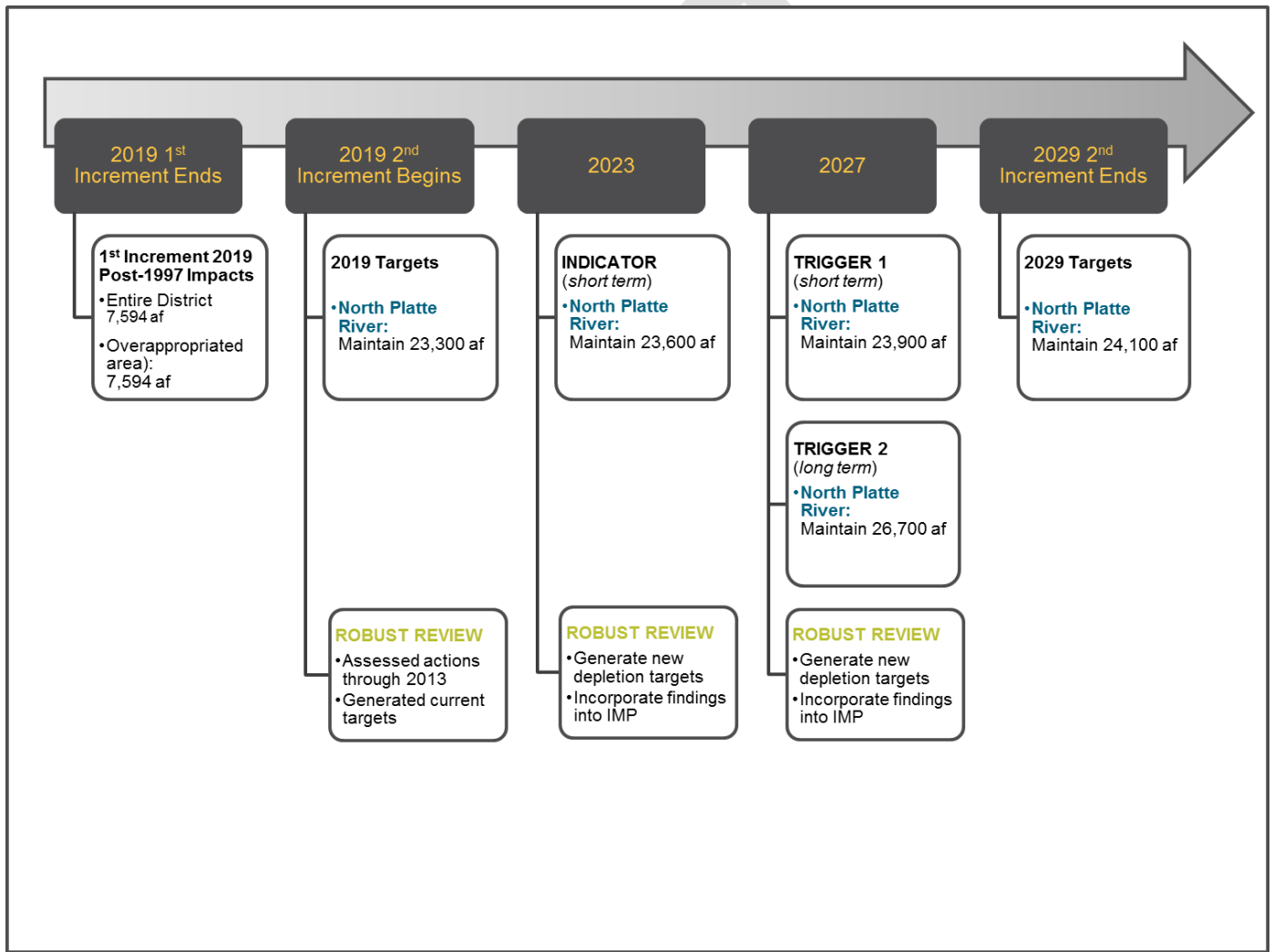


Figure 8. Timeline of Robust Review Analysis during the Current Increment

10.6.2.2 Groundwater Controls in Response to Triggers

Draft for Board Approval 6/13/2019

At this time, the NeDNR and the NPNRD have identified the following groundwater controls as potential regulatory actions that may be implemented in response to triggers.

Prior to implementation of any of the groundwater controls listed below, the NPNRD and the NeDNR will agree to the method of implementation and the methods used to measure the success of the control(s) in reaching the goals and objectives of Chapter 9 of this IMP.

In order to reach these goals and objectives, a limit on the amount of consumptive use on certified irrigated acres within the boundaries of the NPNRD have been implemented. The methods by which a further limit on the amount of consumptive use would be implemented include, but are not limited to, the following:

A. Alternative Crop Mixes (*Neb. Rev. Stat. § 46-739(b)*)

Alternative crop mix would mean planting a mix of crops over a specified period of years for the certified irrigated acres within the overappropriated area for which there would be an upper limit on the consumptive use allowed. The amount of consumptive use allowed would be determined by the NPNRD after consultation with the NeDNR

B. Reduction of Certified Irrigated Acres

A reduction of certified irrigated acres would mean a set percentage reduction in certified irrigated acres within the overappropriated area. The amount of the reduction would be determined by the NPNRD after consultation with the NeDNR.

10.6.3 Surface Water Regulatory Actions

10.6.3.1 The following surface water controls as authorized by *Neb. Rev. Stat. § 46-716* will be implemented and/or continued by the NeDNR. The NeDNR will periodically review the controls being implemented to carry out the goals and objectives of this IMP. The NeDNR may adjust, modify, expand, or add controls, based on the annual reviews of the progress being made toward achieving the goals of this IMP, and pursuant to *Neb. Rev. Stat. § 46-715(5)(d)(ii)*. No controls may be removed, however, unless and until the NPNRD and the NeDNR amend this IMP. The controls may not be modified in such a manner as to conflict with the goals and objectives of this IMP.

- A. The NeDNR will continue the moratorium on new surface water appropriations in the portion of the Upper Platte River Basin within

Draft for Board Approval 6/13/2019

the boundaries of the NPNRD, unless a variance is granted by the NeDNR according to its rules.

- B. Transfers of surface water appropriations will be in accordance with statutes and NeDNR rules.
- C. The NeDNR shall continue to administer surface water appropriations according to the provisions of the permit, statute, NeDNR rules and regulations, and any applicable interstate compact decree or agreement.
- D. The NeDNR shall continue to monitor the use of surface water to prevent unauthorized uses.
- E. For conjunctive management projects as described in Chapter 10 Section 4, the NeDNR may, via the permit approval process, require additional monitoring, measurements, and reporting of diversions, returns, seepage, and/or evapotranspiration.
- F. Except as provided in (i) below, the NeDNR will not require surface water appropriators to apply or use conservation measures.
 - i. If, at some point in the future, the NeDNR requires surface water appropriators to apply or use conservation measures, in accordance with *Neb. Rev. Stat. § 46-716(2)*, the surface water appropriators will be allowed a reasonable amount of time, not to exceed one hundred eighty (180) days unless extended by the NeDNR, to identify conservation measures to be applied or used and to develop a schedule for such application and use.
- G. Except as provided in (i) and (ii) below, the NeDNR will not require any other reasonable restrictions on surface water use.
 - i. If, at some point in the future, the NeDNR requires other reasonable restrictions on surface water use, such restrictions must be consistent with the intent of *Neb. Rev. Stat. § 46-716* and the requirements of *Neb. Rev. Stat. § 46-231*.
 - ii. If, at some point in the future, the NeDNR requires other reasonable restrictions on surface water use, in accordance with *Neb. Rev. Stat. § 46-716(2)*, the surface water appropriators will be allowed a reasonable amount of time, not to exceed one hundred eighty (180) days unless extended by the NeDNR, to comment on the proposed restrictions.

10.6.3.2 Summary of Variance, Application, and Transfer Process Considerations

Draft for Board Approval 6/13/2019

The following are summaries of the NeDNR's variance process, application review process, and transfer process. For full details of these processes, please refer to the applicable statutes and NeDNR rules.

A. Variance Process for new surface water appropriations

- i. *Department of Natural Resources Rules for Surface Water, Title 457*, provides a process in which a person may request permission to file an application for a new surface water right in a moratorium area.
- ii. Prior to filing an application in a moratorium area, a person must first petition the NeDNR for leave (request permission) to file an application in a moratorium area. These petitions are called a "variance," or a "variance petition."
- iii. Because the Platte River Basin is currently undergoing integrated management for the purposes of reducing depletions to streamflow, any new consumptive use or retiming of stream base flow must be examined for its potential effects on extant surface and groundwater users and upon all matters of significant public interest and concern. This includes assessing both positive and negative impacts on the State's ability to comply with interstate agreements, programs, decrees and compacts, including PRRIP. Thus, any proposed project must be scrutinized to prevent conflict with (a) the goals and actions necessary to implement the IMPs adopted by the Upper Platte River Basin NRDs and the NeDNR and (b) the water needs of projects that will be implemented under PRRIP. Applications for potential beneficial uses that are not clearly non-consumptive will be presumed to be at least partially consumptive.
- iv. Therefore, an analysis of the effects of a proposed new diversion on existing uses and responsibilities is required in order to determine whether sufficient good cause exists to grant a variance to apply for a new use.
- v. Within the process for granting a variance the NeDNR shall review the information provided with the petition and shall make a determination as to whether it is sufficient to indicate good cause for allowing further consideration of the application.
- vi. Nebraska Revised Statute § 46-706 defines "good cause shown" as, "a reasonable justification for granting a variance for a consumptive use of water that would otherwise be prohibited by rule or regulation and which the granting agency, district, or organization reasonably and in good faith believes will provide

Draft for Board Approval 6/13/2019

an economic, environmental, social, or public health and safety benefit that is equal to or greater than the benefit resulting from the rule or regulation from which a variance is sought;”

- vii. The goals and objectives of this IMP will be considered when examining applications for new diversions of excess flows (unappropriated water) in the Platte River Basin. In fully appropriated and overappropriated areas, projects designed to meet the goals and objectives of the IMP are of primary importance. In addition to showing good cause in support of the goals and objectives, the effectiveness of each project will be considered. Operational plans that demonstrate effective use of water along with measuring and monitoring will be prioritized. In assessing the public interest and whether a new project should receive an appropriation, the NeDNR must consider how the project will support the goals of the Basin-Wide Plan and IMPs within the Platte River Basin and reasonable conditions that will need to be imposed on prospective appropriations to ensure that over the long term the best use continues to be made of the limited water resources in the basin. Administering new appropriations that are issued for the purpose of achieving these goals and objectives may require other excess flow diversion projects to be limited or curtailed. These requirements will be clearly established within each new appropriation when issued.
- viii. If the NeDNR grants the variance petition, the petitioner may then file the application for the project. The decision to grant the petition shall not bind the Director to approve any application to which it relates, or in any way be used as evidence of prejudice for the Director’s future decisions concerning the specific approval requirements of such an application. The NeDNR will specify the conditions under which an application may be filed in order to protect the public interest.

B. Application Review Process

- i. The NeDNR’s application review process is driven by Nebraska statutes, including but not limited to *Neb. Rev. Stat. § 46-233 to 46-235*. The following is not an exhaustive list of all factors used to reach a decision on approval or denial of an application.
- ii. There must be unappropriated water available in the source of supply and the requirements of a variance petition approval must be met and agreed upon by the applicant.

Draft for Board Approval 6/13/2019

- iii. The proposed use must be determined to be beneficial.
- iv. An appropriation must not be detrimental to the public welfare.
- v. Denial of the application is not demanded by the public interest.
- vi. If the application will be approved, the NeDNR will impose conditions to protect other appropriators and the public interest.

C. Transfer Review Process

- i. Using criteria set out in *Nebraska Revised Statutes*, Chapter 46, regarding transfers, the Director shall review an application for a transfer proposing a change in the location of use; type of appropriation; and or purpose of use, including but not limited to the following:
 - ii. The proposed use of water after the transfer or change will be a beneficial use of water;
 - iii. A request to transfer the location of use is within the same river basin;
 - iv. The change will not diminish the supply of water available or otherwise adversely affect any other water appropriator;
 - v. The quantity of water that is transferred for diversion or other use at the new location may be the historic consumptive use;
 - vi. The appropriation is not subject to termination or cancellation;
 - vii. If the transfer is to be permanent the preference category may not change;
 - viii. If the transfer is to be temporary, it will be for no less than one year;
 - ix. The transfer or change will not be inconsistent with any applicable state or federal law and will not jeopardize the state's compliance with any applicable interstate water compact or decree or cause difficulty in fulfilling the provisions of any other formal state contract or agreement;
- x. The transfer will be in the public interest.
- xi. Consistent with *Neb. Rev. Stat. § 46-294*, the director's considerations relative to the public interest shall include, but not be limited to, (1) the economic, social, and environmental impacts of the proposed transfer or change and (2) whether and under what conditions other sources of water are available for

Draft for Board Approval 6/13/2019

the uses to be made of the appropriation after the proposed transfer or change.

- xii. Transfers subject to *Department of Natural Resources Rules for Surface Water, Title 457, Neb. Admin. Code, Chapter 9, § 002*, are required to be determined to be in the public interest, "... the Director shall determine whether the benefits of the proposed transfer outweigh any adverse impacts that might occur giving consideration to the economic, social and environmental impacts and whether and under what conditions other sources of water are available for the uses to be made of the appropriation after the proposed transfer or change."
- xiii. The director may impose any reasonable conditions deemed necessary to protect the public interest.

10.7 Monitoring and Evaluation

The overarching purpose of the monitoring and evaluation section of this IMP is to ensure that the NPNRD reach and/or maintain a fully appropriated condition. The objective of the monitoring and evaluation section is to gather and evaluate data, information, and methodologies that could be used to increase understanding of the surface water and hydrologically connected groundwater system; to test the validity of the conclusions and information upon which this IMP is based; and to assist decision makers in properly managing the water resources within the NPNRD. The described monitoring actions and evaluations are also important in ensuring the state remains in compliance with the NNDP and in keeping the IMP current.

Various methods will be employed to monitor and evaluate the implementation and progress of this IMP. Sections 10.7.1 and 10.7.2 describe the tracking and reporting of water use activities within the District by NPNRD and the NeDNR. The rest of Section 10.7 describes the analyses that will evaluate the progress that has been made toward: addressing streamflow depletions due to new uses begun subsequent to July 1, 1997, (Section 10.7.3); reaching a fully appropriated condition (Section 10.7.4); maintaining a fully appropriated condition (Section 10.7.5); and evaluating whether a subsequent increment is necessary to meet the goals and objectives of this IMP (Section 10.7.6). Statute describes both an annual review (*Neb. Rev. Stat. § 46-715(5)(d)(ii)*) and a second more Robust Review of new and expanded uses and associated mitigation actions (*Neb. Rev. Stat. § 46-715(5)(d)(iii)*), covered in Section 10.7.3.2.

10.7.1 Data and Tracking of Water Use Activities

Data from the five Upper Platte River Basin NRDs will be reported in a consistent format across the basin and from year to year to simplify the process of compiling data for the

Draft for Board Approval 6/13/2019

annual review and the Robust Review. A database will be developed to house this data. This database will facilitate the updating of model datasets.

Occasionally, actions for which permits are issued may not actually be implemented. For example, a well permit may be issued but the well not actually drilled. Because of this, in order to maintain accurate records of actual land use, annual permit and land use data should be updated within the database at the end of the next calendar year to reflect which actions did and did not take place. This includes NeDNR sharing information on any surface water permits cancelled in the calendar year (including temporary permits that expired one year after they are issued). This will help in creating yearly land use datasets when it is time to conduct the Robust Review. Ideally, the permit data should reflect an annual snapshot of changes in land use for that year. This will help update annual land use datasets for the models, which will be used for the Robust Review.

10.7.1.1 NRD Tracking

The NPNRD will be responsible for annually tracking and sharing information with the NeDNR on the following activities within the District:

- A. Certification of groundwater uses and any changes to these certifications;
- B. Approved transfers, including all of the information provided with the application and used in the approval of the transfer, the location of the land area or well that is being transferred, and the location of the land area or well that will replace the original;
- C. Relevant flow meter data collected by NPNRD staff on groundwater certified acres, by physical inspection or inspection using telemetry equipment and calculated water used on those acres; data is collected at the end of the water year so reporting may not align with other annual tracking;
- D. Any water well construction permits issued;
- E. Any other permits issued by the NPNRD;
- F. Any conditions associated with any permits issued;
- G. Information gathered through the municipal and non-municipal industrial accounting process;
- H. Any variances issued, including the purpose, the location, any required offset, the length of time for which the variance is applicable, and the reasoning behind approval of the variance;
- I. Any retirements of irrigated acres or other activities by the NPNRD for the purpose of returning to a fully appropriated condition;
- J. Information related to any water banking transactions;

Draft for Board Approval 6/13/2019

- K. Offsets provided for depletions resulting from increased consumptive use related to the above listed items;
 - a. This includes reporting on offsets and mitigation activities for addressing post-1997 depletions and for the purpose of sustaining previous increment progress and reaching a fully appropriated condition. Such activities to be reported include canal diversions for the purpose of groundwater recharge, operation of stream augmentation projects, and irrigated acre retirements.
- L. Summary of available conservation plans of municipalities and industries within the basin including strategies that could be applied to other municipalities in the basin (at annual meeting).
- M. Annual allocation analysis for monitoring the effectiveness of the allocations implemented.
- N. Data collected on commingled acres to identify, quantify, and proportion the source and quantity of water used on acres irrigated with both surface water and groundwater.

10.7.1.2 NeDNR Tracking

The NeDNR will be responsible for annually tracking and sharing with the NPNRD information on the following activities within the NPNRD:

- A. Any surface water permits issued;
- B. Any dam safety permits issued;
- C. Any groundwater permits issued; and
- D. The associated offsets for any new permits issued.
- E. Any retirements of irrigated acres or other activities by the NeDNR for returning to a fully appropriated condition.

As new data would show a need for further analysis and to the extent that NPNRD meter data or other methods of estimation are not available to determine the consumptive use of water due to livestock, human water use, sandpits and reservoirs less than 15 AF, the NeDNR will be responsible for tracking and reporting on the following activities within the NPNRD in the current increment:

- National Agricultural Statistics Service livestock data;
- US Census Bureau population data;
- Inventory of sandpits;
- Inventory of reservoirs of less than 15 AF;

Draft for Board Approval 6/13/2019

- Any necessary offsets provided for depletions resulting from increased consumptive use related to the above listed items.

10.7.2 Reporting

- 10.7.2.1 An annual review of the progress being made toward achieving the goals and objectives of the ten-year increment will include annual reporting by the NeDNR and the NPNRD of the information being shared as described above. The reports from the NPNRD and the NeDNR should include information on the location, amount and timing of the depletions caused by each permitted new or expanded water use, as well as the associated offset and the location, amount and timing of the offset's accretions to the river. The depletions and/or the accretions should be reported for each year throughout the ten-year increment.
- 10.7.2.2 These reports should be made available at least four weeks prior to each Basin-Wide Annual Meeting. The format of the reports will be standardized as agreed to by the NeDNR and the Upper Platte River Basin NRDs.
- 10.7.2.3 Data from all the Upper Platte River Basin NRDs and the NeDNR will be analyzed by the NeDNR to assess the collective amount, timing, and locations of the depletions to streamflow resulting from new or expanded uses and the collective amount, timing, and locations of all mitigations put in place. This will involve an analysis of impacts to streamflow resulting from permitted changes, which will not require model runs. These analyses will be done using the agreed upon methods and tools. Methods and tools used will be available to the stakeholders and the public the data collected will then be trimmed to the relevant Platte River Recovery Implementation Program area, analyzed, and used for required annual and periodic reporting for the Nebraska New Depletion Plan, helping facilitate Nebraska's compliance with the Nebraska New Depletion Plan. The NeDNR will generate these reports and will coordinate with the NPNRD to ensure the accuracy of data within any final report.
- 10.7.2.4 The data and the analysis will be presented at the Basin-Wide Annual Meeting. The reported information will be used as appropriate in the evaluation process as described below.

Draft for Board Approval 6/13/2019

10.7.3 Evaluation: Measuring the Success of Meeting the Goals and Objectives of this IMP.

Measuring the success of this IMP in addressing streamflow depletions due to new uses begun subsequent to July 1, 1997, and maintaining current progress (Goal 1 from Chapter 9).

10.7.3.1 Annual Review.

In order to meet the requirements of *Neb. Rev. Stat. § 46-715(5)(d)(ii)*, the data contained in the annual reports submitted by the NPNRD and the NeDNR will be reviewed and analyzed annually to assess the progress being made toward achieving the goals and objectives of Chapter 9 of this IMP for the current ten-year increment. The annual review will consider both the near-term and long-term effects of any permitted new consumptive uses. A 50-year stream depletion curve may be used to assess the impacts of any new uses contained within the annual reports to show the long-term potential impacts of annual changes.

10.7.3.2 Robust Review.

In addition to the annual review, a more Robust Review of the progress being made toward achieving the goals and objectives of Chapter 9 of this IMP for the current ten-year increment will be carried out periodically. This study will be developed to meet the requirements of reporting for the NNDP as well as *Neb. Rev. Stat § 46-715(5)(d)(iii)* to determine whether the measures adopted in this IMP are sufficient to offset depletions due to post-July 1, 1997, water uses and sustain progress toward a fully appropriated level of water use (Robust Review). The process for this review is described below. The previous Robust Review will also serve as guidance for conducting the next one.

The general method for conducting the Robust Review will be as follows:

- A. The groundwater models used for this process will be calibrated to streamflow/baseflow and groundwater levels in the area with the ability to assess the impacts on a monthly basis. The groundwater models will be updated periodically to simulate the management practices that have been implemented to date. The evaluation period of these models will be 50 years into the future.
- B. The following groundwater model runs will be conducted to measure the success toward reaching Objective 1.2:
 - i. **The 1997 Development Level Run.** A model run that simulates

Draft for Board Approval 6/13/2019

holding the number of irrigated acres and crop types or mix in 1997 constant through the current date and the fifty-year projection period. Unless more accurate data is available, to estimate 1997 levels of consumptive use, it will assume the full crop irrigation requirement for the crop types or mix. The run will be conducted using climate data through the current date and will include a fifty-year projection using an agreed to climate pattern.

- ii. **The Historical Run.** A model run that simulates the actual annual changes of the irrigated acres, excess flow recharge events, retirements, allocation effects, augmentation projects, and other water management regulations or projects throughout the evaluation period starting in 1997 through the current date and the fifty-year projection period. The fifty-year projection period will repeat an agreed to land use, regulation, or project dataset. The model will use available flow meter data or, in the absence of flow meter data, assume the full crop irrigation requirement was met at all times. The run will be conducted using data through the current date and will include a fifty-year projection using an agreed to climate pattern.
- iii. **Difference between the 1997 Development Level Run and the Historical Run.** The simulated output from each model run will be compared to determine the difference in the streamflow/baseflow that has resulted from post-1997 development. Effects on streamflow/baseflow from the combination of allocations and land use changes are reflected in this comparison as both the meter data and land use changes are incorporated to determine groundwater pumping.
- iv. **Other Management Actions Analyses not covered by the Models.** If other management actions are taken to offset streamflow depletions due to new uses begun subsequent to July 1, 1997, accretions resulting from those actions will be determined using agreed upon methodologies. This would include conjunctive management activities that are not otherwise captured in the models.
- v. **Evaluation Results.** For Objective 1.2 to be considered achieved, the results of combining the difference between the 1997 Development Level Run and the Historical Run with the addition of other management action accretions not covered

Draft for Board Approval 6/13/2019

by the models must be greater than or equal to zero.

$$(Q_h - Q_d) + (S_a) = D_{net}$$

Where:

Q_h = Simulated streamflow/baseflow from the Historical Run

Q_d = Simulated streamflow/baseflow from the 1997 Development Level Run

S_a = Management Action Accretions

D_{net} = Net Depletions

**Note: In equation above, streamflow/baseflow is a positive*

- C. An additional groundwater model run will be conducted to measure total depletions. This will be the Pre-Development Run. The Pre-Development Run will compare the Historical Model Run with a simulation of no groundwater development to determine the total depletions associated with all groundwater only land use development. The run will be conducted using climate data through the current date and will include a fifty-year projection using the Historical Run's agreed to climate pattern.

- i. Total Depletions Evaluation.

$$(Q_h - Q_p) = D_t$$

Where:

Q_h = Simulated streamflow/baseflow from the Historical Run

Q_p = Simulated streamflow/baseflow from the 1997 Development Level Run

D_t = Total Depletions

**Note: In equation above, streamflow/baseflow is a positive*

Draft for Board Approval 6/13/2019

- D. If integrated models are used to assess impacts to the total streamflow, the methods to be used will be developed jointly between NeDNR and the Upper Platte River Basin NRDs to properly design and constrain those analyses so that the results can be used to assess progress toward the goals and objectives of the IMP.
- E. Municipal, Industrial, Domestic and Livestock use will be evaluated as part of the Robust Review
 - i. Data will continue to be collected on the water use of municipalities and industries within the basin.
 - 1. Gather information on total pumping, consumptive use, and timing of any return flows and collect data on water use efficiency and conservation methods being employed.

10.7.3.4 Allocations analysis

- A. While the effects of the allocations at offsetting post-97 depletions and providing additional accretions is captured in the Robust Review modeling described above, the NPNRD conducts an allocations analysis annually for the purpose of assessing the effectiveness of the allocations. This will allow the NPNRD to closely monitor whether their allocation continues to be effective. The general outline for the analysis is:
 - 1. Incorporate meter data
 - 2. Conduct historical model run, which includes the groundwater only metered pumping records,
 - 3. Conduct modified run, which replaces the groundwater only metered pumping records with estimated pumping simulating full irrigation crop consumptive use of the crops grown on each parcel or certification.
 - 4. Compare the stream baseflow of the historical model to the stream baseflow of a modified version. The comparison in stream baseflow between the two model runs estimated the additional flow that is present in the North Platte River and tributaries because of the allocations and the subsequent reduction in consumptive use.
 - i. For planning purposes, the model is run for 50 years into the future by repeating an average or another representative climate pattern.

Draft for Board Approval 6/13/2019

- ii. In the current increment variations of this analysis may also be completed to determine if there are any potential benefits from the allocations on commingled lands or other appropriate model runs. The evaluation of commingled lands may also require consideration of changes in surface water diversions and deliveries.

10.7.4 Evaluation: Measuring the Success of Reaching a Fully Appropriated Condition

A technical analysis to support and evaluate effectiveness of IMP and adequacy in sustaining progress toward a fully appropriated level of water use must be conducted.

- 10.7.4.1 Because a fully appropriated condition is not currently determined, the NeDNR and the NPNRD will continue to work on outlining the fully appropriated condition once that condition has been determined. The NeDNR and NPNRD will continue to refine the methodology used to determine the difference between the current and fully appropriated levels of development in each of the Upper Platte River Basin NRD.
- 10.7.4.2 The evaluation of the difference between current and fully appropriated levels of development is tied to Statute and the current rules of the NeDNR for declaring a basin fully appropriated. Statute requires that this evaluation will:
 - Take into account cyclical supply, including drought
 - Identify the portion of the overall difference that is due to conservation measures
 - Identify the portion of the overall difference that is due to water use initiated prior to July 1, 1997
 - Identify the portion of the overall difference that is due to water use initiated or expanded on or after July 1, 1997.

The current NeDNR rules for determining fully appropriated status includes evaluation of the most junior appropriator's access to water, adjustments for lag effect of groundwater depletions and accretions on water supplies, and consideration of instream flows, among other guidance for conducting the analysis. The rules also provide flexibility for NeDNR to "...utilize a standard of interference appropriate for the use, taking into account the purpose for which the appropriation was

Draft for Board Approval 6/13/2019

granted...."¹⁷ for uses which are not defined in the rule. These include storage and hydropower appropriations, which are significant appropriators in the Upper Platte River Basin. NeDNR and the Upper Platte River Basin NRDs have and will continue to work with impacted water users on the process for determining the difference between the current and fully appropriated condition of the basin.

The assessment of total depletions and the INSIGHT analysis of supplies and demands are examples of approaches that may be used to assist in this evaluation.

10.7.5 Evaluation: Measure the Success of Maintaining a Fully Appropriated Condition.

Because a fully appropriated condition is not currently determined, the NeDNR and the NPNRD will work on outlining the process that will measure the success of maintaining a fully appropriated condition once that condition has been determined. If during this increment it is determined that a fully appropriated condition has been reached, the NPNRD and NeDNR will continue to monitor the actions taken in the plan to ensure that all plan goals and objectives are maintained.

10.7.6 Evaluating the Need for a Subsequent Increment

- 10.7.6.1 The NeDNR and the NPNRD will carry out the studies and the technical analysis as specified in *Neb. Rev. Stat. § 46-715(5)(d)(iii)* to determine whether or not a subsequent ten-year increment is necessary. This will include a process to test the validity of the conclusions and information upon which this IMP is based, as required by *Neb. Rev. Stat. § 46-715(2)(e)*.
- 10.7.6.2 Within the ten-year increment, the NeDNR and the NPNRD will continue to refine the estimation methodology used to calculate the difference between the current and fully appropriated levels of development in accordance with *Neb. Rev. Stat. §46-715(5)(c)*. Fully appropriated levels of development will be determined through the following process:
- A. Determine the changes in recharge from surface water diversions and the impacts of those changes on streamflow using readily available data.
 - B. Determine the changes in groundwater irrigation, municipal, industrial, domestic, livestock and other uses and the

¹⁷ Title 457, Chapter 24, Section 001.01B of the Nebraska Administrative Code, dated June 27, 2008.

Draft for Board Approval 6/13/2019

streamflow depletions caused by those changes using readily available data.

- C. Determine the effects of conservation measures on streamflow.
- D. Determine the timing and location of the net changes in streamflow.
- E. Determine when streamflow changes impact existing users, taking into account the effects of cyclical supply (e.g. drought).
- F. Evaluation of the existing balance of water uses and water supplies and associated economic viability, social and environmental health, safety, and welfare of the basin.
- G. The NeDNR and the NPNRD will review other data and/or methodologies relevant or significant to the process.

10.7.6.3 The process described above in Section 10.7.6.2 will focus on uses initiated prior to July 1, 1997, and their impacts on hydrologically connected streamflow. All uses initiated subsequent to July 1, 1997, will be evaluated using the process described in Section 10.7.3.

10.8 Studies to be Completed in the Current Increment

10.8.1 Priority studies

The Basin-Wide Plan calls for several studies and collection of information within the basin. Those studies and information are also critical to the successful implementation of this IMP. The studies include:

- Collect data on commingled acres to identify, quantify, and proportion the source and quantity of water used on acres irrigated with both surface water and groundwater. Gather data on water use on such lands (both why and when irrigators use surface water or groundwater).
- Conduct a study that identifies water users that are affected during cyclical variations in water supply. This hydrologic element analysis will be conducted by NeDNR and the Upper Platte River Basin NRDs by evaluating data such as stream gage and diversion records, and well hydrograph data. Focused surveys of, as well as meetings with basin water users can be used to build on stakeholder input gathered throughout the planning process. Once impacted water users who are hydrologically affected by water supply variability are identified, economic impacts can be estimated.
- NeDNR and the Upper Platte River Basin NRDs will collaborate with impacted water users and other entities to gather relevant economic data. Potential partners

Draft for Board Approval 6/13/2019

include economists and other subject matter experts familiar with the economic drivers of the basin who can help identify data needs and formulate the tools and methodologies for assessing economic impacts. The tools and methodologies will be used to not only evaluate impacts of supply variability, but also evaluate human-made depletion impacts, management actions, regulatory actions, and potential projects or other activities considered during implementation that may affect water availability.

- Study economic impacts of drought, which will be a component of the drought plan.
- Study potential for developing markets and transfer protocols for annual surface water and groundwater supplies.
- Study management options of storage water (both surface water reservoirs and aquifer storage, including existing and potential new storage) to provide flexibility and increase resiliency of water supplies.
- Continue to refine the estimation methodology used to calculate the difference between the current and fully appropriated levels of development using an allocation analysis.

10.8.2 Potential Studies

There are many other factors that have the ability to impact streamflow. It is important to investigate these things to assess their potential effectiveness in achieving the goals and objectives of this IMP and identify new potential management actions. Pursuit of these studies will be contingent upon budget and staff resources.

The NeDNR and the NPNRD will jointly pursue and/or evaluate studies, contingent upon budget and staff resources, to evaluate their potential effectiveness in achieving the goals and objectives of this IMP. The following studies have been identified, initiated or completed by the NeDNR and the NPNRD:

- Stream depletions due to the use of groundwater wells that are commingled with surface water and commingled pumping impacts;
- Irrigation scheduling;
- Robust Review;
- Post-1997 depletion increases 3-fold;
- Conservation practices study;
- Run-off impacts from land use changes;
- Model co-efficient zones;
- Land use updates (acre and crop updates)

Draft for Board Approval 6/13/2019

- Crop rotation;
- Vegetation management;
- A survey of the type and location of irrigation systems throughout the NPNRD;
- Tillage practices;
- Other best management practices;
- Conjunctive management;
- Water budget analysis;
- Invasive species; and
- Conservation measures.

10.9: Review and Modification of the IMP**10.9.1 IMP Revisions**

During implementation of the IMPs, NeDNR and the Upper Platte River Basin NRDs will monitor IMP actions consistent with the analyses and methods contained in the Basin-Wide Plan and amend the IMP if activities are determined by the parties to not be capable of meeting goals. If NeDNR and an Upper Platte River Basin NRD determine that management actions have not provided or maintained the offsets required to meet the goals of the Upper Platte River Basin-Wide Plan, they will agree to increase offset activities to the extent possible and revise the individual district's IMP if necessary. These revisions may include additional controls to meet goals of the IMP.

- A. The NPNRD and the NeDNR will jointly determine whether amendments to this IMP are necessary. Any proposed modifications will be discussed at the annual basin-wide meeting. Situations that may prompt revision or modification of this IMP are described below.
 - i. The NPNRD and the NeDNR may amend this IMP after the annual review of progress being made toward achieving the goals and objectives of Chapter 9 of this IMP.
 - ii. If the Robust Review indicates annual depletion or accretion values different from those in Goal 1 Table 1, revisions may be necessary. For example, the IMP may be revised to attach the results of a future Robust Review including updated targets and triggers.
 - iii. NeDNR and the NPNRD may amend this IMP as more data and information become available, as provided in *Neb. Rev. Stat. §46-715(5)(d)(ii)*.

Draft for Board Approval 6/13/2019

- iv. If the Basin-Wide Plan is revised and therefore this IMP needs to be revised for consistency, this IMP will be revised in accordance with *Neb. Rev. Stat. §46-715(5)*.
- B. An advisory or stakeholder group may be convened for input on proposed IMP changes, at the discretion of the NPNRD and NeDNR.
- C. If the NPNRD and NeDNR agree on revisions to this IMP, then a hearing will be held to solicit formal comment. Revisions to this IMP shall be provided to all other NRDs in the overappropriated basin for comment before revisions are approved.

10.9.2 Basin-Wide Plan Disputes

- A. If a dispute is presented at the annual meeting as described in the Basin-Wide Plan, the Upper Platte River Basin NRDs and the NeDNR will determine whether or not the dispute has hydrologic impact. If it is determined that the dispute does have hydrologic impact, then the Upper Platte River Basin NRDs and the NeDNR will determine whether the dispute pertains to all of the Upper Platte River Basin NRDs or just to individual NRD(s).
- B. If the dispute pertains to all of the Upper Platte River Basin NRDs, the Upper Platte River Basin NRDs will conduct an investigation and the NeDNR to determine what management actions will address the dispute(s) in the Basin-Wide Plan and/or the IMPs. If the management action pertains to this IMP, it will be revised accordingly.
- C. If the dispute is not a basin-wide issue, but pertains to the NPNRD, the NeDNR, the NPNRD, and any other affected Upper Platte River Basin NRD(s), working with the affected water user(s), shall develop management solutions as appropriate to address the issue(s).
- D. Disputes related to the implementation of the IMP will also be discussed

10.9.3 Additional Ten-Year Increment

Based on the results of the technical analyses described in Section 10.7.3, the NPNRD and the NeDNR will evaluate the need for a subsequent increment. This includes determining whether post-July 1, 1997, depletions have been offset and the progress made toward achieving a fully appropriated condition or maintaining such a condition.

If it is determined from this technical analysis that a subsequent ten-year increment is needed to meet the goals and objectives of this IMP, then pursuant to *Neb. Rev. Stat. §46-715(5)(d)(iv)*, the goals and objectives for the subsequent ten-year increment will be developed using the consultative and collaborative process described in *Neb. Rev. Stat. §46-715(5)(b)*. The subsequent ten-year increment shall be completed, adopted and take effect not more than ten years after adoption of this IMP.

Draft for Board Approval 6/13/2019

NeDNR and the individual NRDs will engage stakeholders in a collaborative process in the development of goals and objectives for subsequent increments of the individual IMPs if necessary. The need for subsequent increments will be determined through the Robust Review process completed at the end of the second increment and described in section 10.7. Should a subsequent increment be necessary, the planning process will be initiated by NeDNR and each NRD developing a public participation plan that outlines the stakeholder engagement process for the NRD's IMP, including identification of participants/parties, definition of roles, decision making protocols, planning processes, and timelines. This public participation plan serves as a reference guide for participants as well as the public throughout the planning process. This effort is analogous to the basin-wide collaborative process described in the Basin-Wide Plan, but focused on the individual NRD stakeholder collaboration. The public participation plan developed for the second increment Basin-Wide Plan development can be found as an appendix to the second increment Upper Platte River Basin-Wide Plan.