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Upper Republican NRD

INTEGRATED MANAGEMENT PLAN  
Jointly Developed by the  
DEPARTMENT OF NATURAL RESOURCES  
and the  
UPPER REPUBLICAN NATURAL RESOURCES DISTRICT

**I. Authority**

This Integrated Management Plan (IMP) was prepared by the Board of Directors for the Upper Republican Natural Resources District (URNRD) and the Nebraska Department of Natural Resources (DNR) in accordance with the Nebraska Ground water Management and Protection Act, *Neb. Rev. Stat.* §§ 46-701 to 46-754 (Cum. Supp. 2008).

**II. Background**

Commencing in 1978, the URNRD has adopted and enforced rules and regulations for the purpose of managing the ground water resources within the URNRD. On April 11, 2003, effective May 8, 2003, the URNRD, pursuant to applicable statutory rulemaking procedures and *Neb. Rev. Stat.* § 46-739 (Cum. Supp. 2008), adopted the *State of Nebraska Upper Republican Natural Resources District Amendments to Rules and Regulations for Ground water Control – Order No. 26* and the *Upper Republican Natural Resources District Technical Manual of Policies and Procedures TM-26* (the “URNRD rules” or “the rules”). In the regular meeting, on July 6, 2004, the URNRD voted to extend Order No. 26 until September 1, 2005. Rule 9A of the Rules provides for a basic allocation of ground water to certified irrigated acres within the URNRD of 72.5 acre-inches for the five (5) year period between January 1, 2003 and December 31, 2007, an annualized allocation of 14.5 acre-inches. Since their adoption, the Rules have prohibited additional allocations for ground water use and additional well permits, except under limited circumstances. In addition, among other things, the rules continued and recodified the URNRD’s practice of allowing ground water users to carryforward the unused portion of their allocation, together with any remaining unused portions of allocations from previous years, into succeeding allocation periods and permitted the URNRD to approve pooling contracts, both in accordance with the URNRD rules.

In 1943 the States of Colorado, Kansas and Nebraska entered into the Republican River Compact (the “Compact”) with the approval of the United States Congress. The Compact provides for the allocation of the “virgin water supply” of the Republican River Basin (the “basin”) between the three states. Following several years of dispute about Nebraska’s consumptive use of water within the basin, Kansas filed an original action in the United States Supreme Court against the States of Nebraska and Colorado in 1998, seeking, among other things, to include ground water in the calculation of the virgin water supply and consumptive use. The United States Supreme Court appointed a Special Master who recommended that the depletions to stream flow from the use of ground water must be included in the virgin water supply and be part of the calculation of each state’s beneficial consumptive use. The United States Supreme Court adopted the Special Master’s recommendation. Subsequent to this determination, the states entered into a Settlement



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Agreement resolving the remaining issues in the case. The Settlement Agreement was approved by the United States Supreme Court on May 19, 2003.

Both prior and subsequent to the approval of the Settlement Agreement, the DNR conducted and participated in several meetings with the URNRD, including several public meetings. During the course of those meetings the DNR explained, in order for the State of Nebraska to achieve and maintain compliance with the terms of the Settlement Agreement, it would be necessary to (1) continue the moratorium on new surface water appropriations and new ground water wells, (2) reduce all ground water pumpage from historic levels across the entire basin and (3) further reduce ground water pumping needed to comply with the Compact in water short years, to be accomplished to the extent possible through the use of incentive programs to reduce consumptive use of water. Ground water within the basin is regulated by four Natural Resource Districts: the URNRD, the Middle Republican Natural Resources District (MRNRD) and the Lower Republican Natural Resources District (LRNRD) and the Tri-Basin Natural Resources District (TBNRD) (collectively hereinafter the NRDs). Similar discussions were held between the DNR and each of the NRDs regarding the need (1) to accurately measure actual ground water pumpage and surface water diversions throughout the basin and within each NRD, (2) for the TBNRD to maintain, at sufficient levels to offset depletions to the Republican River caused by ground water pumping within the Republican River Compact area within the TBNRD, the Compact Imported Water Supply that Nebraska receives because of discharges from the "ground water mound"; and, 3) for each of the NRDs other than the TBNRD to reduce its ground water pumping from their 1998-2002 baseline pumping volumes, as defined below.

Since 1978, with adoption of its Order #1, the URNRD has required the metering, data collection and reporting of ground water use, resulting in actual pumping and use data, and has imposed allocations and regulation on ground water users within the URNRD, while the use of wells in the MRNRD and LRNRD were neither reported nor regulated during the same period. In order to estimate pumping in the MRNRD and LRNRD, other methods based on hours of operation using electrical power information and individual pumping rates were used. The DNR has determined the following pumping volumes for the period 1998-2002: 531,763 acre-feet for the URNRD, 309,479 acre-feet for the MRNRD and 242,289 acre-feet for the LRNRD. These pumping volumes are used throughout this IMP and are referenced as the "1998-2002 baseline pumping volumes." DNR, through the use of the Republican River Compact Administration Ground water Model, has also determined each NRD's depletions to stream flow for the period 1998-2002 ("1998-2002 baseline depletion"): 74,161 acre-feet for the URNRD, 52,168 acre-feet for the MRNRD and 43,954 acre-feet for the LRNRD. Those depletion numbers have resulted in the following depletion proportions: 44% for the URNRD, 30% for the MRNRD and 26% for the LRNRD. These depletion proportions are used throughout this IMP and are referenced as the "1998-2002 baseline depletion proportions." The percentage of allowable ground water depletions for each Republican River NRD were based on the proportion of the average ground water depletions caused by ground water pumping within each district that occurred during the base-line period from 1998-2002 as determined by model runs of the Republican River Compact Administration Groundwater Model with ground water pumping in each district alternated, turned off and then turned on.



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The URNRD and the DNR adopted an IMP on May 3<sup>rd</sup>, 2005, that contained ground water rules and regulations for the 2005-2007 period. The IMP provided for a ground water allocation of 13.5 inches per certified acre, continued the pooling of allocations, and the carryforward of unused allocations, among other things. The goal of the 2005 IMP was to reduce water use by 5% from the 1998-2002 baseline. The IMP was updated and revised for 2007 – 2012, with a goal of reducing water use by twenty percent (20%) from the 1998-2002 baseline.

Since that time, efforts have been taken to implement or conduct incentive programs, studies, and research to further our understanding and ability to comply with the Republican River Compact and Settlement. Although the URNRD's allowable depletions to stream flow are limited to 44% of Nebraska's allowable depletions, there were no details in the plan to describe how this would be accomplished. In 2008 Colorado, Kansas, and Nebraska entered into dispute resolution regarding a number of issues, including future compliance. In June 2009 the arbitrator issued a finding that the URNRD IMP may be adequate during years with average and above-average precipitation, but since water-short year measures were not specifically identified, the plan may not be adequate during multiple dry years, an issue addressed in this IMP

The URNRD and the DNR wish to adopt and implement a revised IMP for the regulation of water resources within the district as required by the laws of the State of Nebraska.

The URNRD has agreed to meet its responsibility under *Neb. Rev. Stat. §46-715*, including meeting the obligations under the Settlement Agreement, by adopting revised rules to implement the IMP with regulations and other augmentation programs sufficient to reduce the URNRD's depletions to stream flow to meet the district's proportional share of the requirements of the Republican River Settlement Agreement. To ensure each NRD within the Republican River Basin will be treated equitably, the DNR has agreed not to approve any plan, unless the plan would restrict the use of water by each NRD to within the allocation granted to it as determined by the 1998-2002 baseline pumping volumes and that each NRD shall be assigned its proportionate share of stream flow depletion as calculated by the 1998-2002 baseline depletion percentages.

The URNRD and the DNR agree that the IMP for the District shall keep the NRD's depletions including credits for stream flow augmentation, as determined by the Republican River Compact Administration (RRCA) ground water model (GWM) and in accordance with the RRCA Accounting Procedures to an amount within 44% of the allowable ground water depletions. Based upon its calculations, the DNR believes that at the time this IMP became effective, a 20% reduction in pumping from the 98-02 baseline would be sufficient without additional stream flow augmentation to keep the District's net depletions within the URNRD's 44% share of the allowable ground water depletions during periods of average precipitation throughout the basin. As described in sections below, during periods of low water supply additional reductions from the 98-02 pumping volume may be necessary.

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### III. Definitions

**A. Allowable Ground water Depletions** - the maximum level of depletions to stream flow from ground water pumping within the Nebraska portion of the Republican River Compact area that can be allowed without exceeding the Compact allocation, in any one year.

**B. Allowable Ground water Depletions for the URNRD** - the depletions to stream flow from ground water pumping in the URNRD that are no greater than 44% of the total allowable ground water depletions.

**C. Allowable Stream flow Depletions** – the maximum amount of stream flow depletion in the Republican River Basin that can be allowed without violating the Compact.

**D. Baseline Depletion Percentages** – the annual mean depletions to stream flow in the Republican River Basin caused by surface water and ground water use in the years 1998-2002 inclusive. The baseline depletions are 74,161 acre feet for the URNRD, 52,168 acre feet for the MRNRD, and 43,954 acre feet for the LRNRD. The percentage depletions assigned to the NRDs are: URNRD, 44%; MRNRD, 30%; and LRNRD, 26%.

**E. Baseline Pumping Volumes** – the annual mean ground water pumping from the period 1998 to 2002. The baseline pumping volumes are 531,763 acre-feet for the URNRD, 309,479 acre-feet for the MRNRD and 242,289 acre-feet for the LRNRD.

**F. Compliance Standard** – the criteria and controls that will be used to determine whether URNRD's rules, regulations, and other programs are sufficient to meet the goals and objectives of this IMP pertaining to pumping volumes and depletions.

**G. Net Depletions** – an NRD's ground water depletions less any reduction in stream flow depletions or increase in allocation resulting from stream flow augmentation projects, including surface water leases as determined by the RRCA ground water model and in accordance with the RRCA Accounting Procedures.

**H. Compact Call Year** – A year in which the Department's forecast procedures outlined in Section X.B.2.b of this IMP indicate the potential for non-compliance if sufficient surface water and ground water controls and/or management actions are not taken. Compact Call Year streamflow administration will be conducted by the Department in a manner consistent with Section X.B.2.d of this IMP. Pursuant to Article VI of the Republican River Compact, diversions into the Courtland Canal for beneficial use in the State of Kansas will not be subject to the Compact Call.



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### IV. Goals and Objectives

Pursuant to *Neb. Rev. Stat. § 46-715* (Cum. Supp. 2008) the goals and objectives of this IMP must have as a purpose “sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the river basin ... can be achieved and maintained for both the near term and the long term.” The following goals and objectives are also adopted by the URNRD and the DNR to meet the additional requirements of *Neb. Rev. Stat. §46-715*.

#### A. Goals:

1. In cooperation with the State of Nebraska and the other NRDs, maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the Settlement Agreement approved by the United States Supreme Court on May 19, 2003;
2. Ensure that water users within the URNRD assume their share, but only their share, of the responsibility to maintain compliance with the Compact;
3. Provide the URNRD's share of compliance responsibility and impact be apportioned within the URNRD in an equitable manner and to the extent possible, minimize the adverse economic, social and environmental consequences arising from compliance activities;
4. Protect ground water users whose water wells are dependent on recharge from the river or stream and the surface water appropriators on such river or stream from stream flow depletions caused by surface water uses and ground water uses begun after the date the river basin was designated as fully appropriated; and
5. Reserve any stream flow available from regulation, incentive programs, and purchased or leased surface water and ground water required to maintain Compact compliance from any use that would negate the benefit of such regulations or programs, to the extent allowed by statute and the surface water controls of this IMP.

#### B. Objectives:

1. Prevent the initiation of new or expanded uses of water, with limited exceptions, that increase Nebraska's computed beneficial consumptive use of water within the URNRD, as required for Compact compliance and by Nebraska law;
2. Ensure administration of surface water appropriations in the Basin is in accordance with the Compact and Nebraska law and the surface water controls of this IMP;
3. Reduce existing ground water use within the URNRD by 20% from the 1998-2002 baseline pumping volumes under average precipitation conditions so that, when combined with stream flow augmentation and incentive programs, the URNRD's ground water depletions are maintained within 44% of Nebraska's allowable ground water depletions as computed through use of the Republican River Compact Administration Ground water Model;

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4. Make such additional reductions in ground water use in Compact Call Years as are necessary, after taking into account any reduction in beneficial consumptive use achieved through basin-wide incentive and stream flow augmentation programs, to achieve a reduction in beneficial consumptive use in the URNRD to 44% of Nebraska's the allowable ground water depletions to stream flow above Guide Rock . Compact Call Years will be determined through the procedures outlined in Section IX of this IMP;
5. Cause the reductions in water use required for Compact compliance to be achieved through a combination of regulatory, incentive, and augmentation programs designed to reduce consumptive use. To the extent funds are available, incentive programs will be made available through targeted incentive programs;
6. Cooperate with the DNR to investigate and explore methods to manage the impact of vegetative growth on stream flow; and
7. Develop a program to provide offsets for new consumptive uses of water so that economic development in the district may continue without producing an overall increase in ground water depletions as a result of new uses.

### V. Map

The area subject to this IMP is the geographic area within the boundaries of the URNRD, (see Map 1). The Rapid Response Region is shown as a sub-area within the boundaries of the URNRD, (see Map 2).

### VI. Ground water Controls

The URNRD will utilize the ground water controls as provided by *NEB.REV.STAT.* §§ 46-715, 46-739 and 46-740 to form the Ground water Controls component of this IMP. The controls that the DNR and URNRD agree are necessary and shall be continued are: 1) ground water allocations and 2) a moratorium on new water wells and irrigated acres as are required by the Final Settlement Stipulation (FSS). In order to provide the URNRD flexibility in addressing compliance, the URNRD may implement a reduction in irrigated acres and incentive programs targeting acres with a higher stream flow depletion factor as alternatives to URNRD-wide reductions in allocation or irrigated acres. The rules shall be set forth in detail and implemented through the URNRD's Rules and Regulations and the provisions of the URNRD's Rules and Regulations shall be sufficient so as to meet the Compliance Standards and Controls set forth below.

In addition to satisfying the compliance standards, the rules and regulations adopted by the URNRD shall contain provisions that adequately ensure that no new ground water uses initiated after July 14, 2004, will adversely impact surface water appropriators or ground water users whose water wells are dependent upon recharge from the stream or river. If the Compliance Standards are met, the URNRD may amend or modify its rules and regulations without the approval of DNR, except for the rules and regulations



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pertaining to the satisfaction of the requirements of *NEB.REV.STAT.* §46-715(4)(b) and 46-715(4)(c).

**A. Compliance Standards**

**1. Purpose.**

These Compliance Standards are established by DNR and URNRD to assess whether the course of action taken by the URNRD, with the intention of providing their proportionate share of assistance to the State in order for the State to maintain compliance with the FSS and Compact, are sufficient. The action taken by the URNRD shall be evaluated in connection with the action taken by the other NRDs in the Republican River Basin and any other relevant considerations, including the information and data provided by DNR and past action by the NRD.

**2. Duration**

These Compliance Standards shall be used to assess the action taken by the URNRD. On an annual basis the DNR and URNRD shall reexamine the sufficiency and effectiveness of the Compliance Standards to determine if amendments or modifications are necessary to ensure the State's compliance with the FSS and Compact. Nothing contained herein shall prohibit or preclude any amendment or revision, at anytime, by the DNR and URNRD, when such action is necessary. Further, nothing contained in this subsection shall be construed as eliminating the review of the provisions of this IMP as required by *NEB.REV.STAT.* §46-715.

**3. Standards**

The URNRD shall adopt and implement rules and regulations which shall ensure that the following standards are met. The standards shall be effected through the procedure described in Section IX - Monitoring and Studies. Section IX specifies a forecast and resulting actions needed at the Guide Rock compliance point (during Water short years) and at the Hardy compliance point. The procedures for determining whether the compliance standards are met will be based on the RRCA Accounting Procedures, the baseline ground water pumping volumes, and the annual forecast as outlined in Section IX. The standards are:

- a. Provide for a minimum of twenty percent (20%) reduction in pumping from the 98-02 pumping volume using a combination of regulation and supplemental programs so that the average ground water pumping volume is no greater than 425,000 acre-feet over the long term. If precipitation is lower than average for any given year, the ground water pumping volume for that year may be above 425,000 acre-feet.
- b. An additional reduction in 98-02 pumping volumes of five percent (5%) during the next five year period shall be accomplished primarily through voluntary incentive programs and other means as determined by the URNRD. The necessity for continuing this annual reduction shall be reevaluated by DNR and the URNRD in 2015.

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- c. The URNRD's net depletions to stream flow shall be no greater than 44% of the allowable ground water depletions determined in accordance with RRCA Accounting Procedures using the RRCA GWM. The average shall be computed using the annual allowable ground water depletion for the same years as are used to determine the averages for Nebraska's compliance with the FSS.

**B. Other Controls and Management Activities**

The URNRD and the DNR recognize that the required reductions in water consumption could be accomplished by means other than those adopted in this IMP. The IMP and associated controls may need to be amended in the future to implement any such revisions.

1. During Compact Call Years, the URNRD will seek to implement management actions, including but not limited to, surface water leasing, ground water leasing, augmentation, etc., to ensure compliance with this IMP. These management actions will be implemented through the authorities granted by the Nebraska Ground water Management and Protection Act, *Neb. Rev. Stat.* §§ 46-701 to 46-753. Details of such management actions will be provided to DNR by January 31 of each year for evaluation. If such management actions are insufficient to ensure compliance with this IMP, the URNRD will implement additional ground water controls and regulations to make up for any expected shortfall as identified in the annual forecast and described in Section IX of this IMP. Such additional control will include curtailment of ground water pumping within the Rapid Response Region of the URNRD.
2. When necessary to ensure Compact compliance or during Compact Call Years, the URNRD may set a one year pumping allocation within the District. Such allocation will set the maximum pumping level in that year within any region or sub region.
3. Maintain requirement for metering of all ground water uses according to URNRD standards.
4. Provide for transfers according to URNRD and statutory standards.

**VII. Surface Water Controls - Department of Natural Resources**

The authority for the surface water component of this IMP is *Neb. Rev. Stat.* §§ 46-715 and 46-716 (Reissue 2004). The surface water controls that will be continued and/or begun by the DNR are as follows:

- A. The DNR will do the following additional surface water administration as required by the Settlement Agreement:



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1. To provide for regulation of natural flow between Harlan County Lake and Superior-Courtland Diversion Dam, Nebraska will recognize a priority date of February 26, 1948 for Kansas Bostwick Irrigation District, the same priority date as the priority date held by the Nebraska Bostwick Irrigation District's Courtland Canal water right.
  2. When water is needed for diversion at Guide Rock and the projected or actual irrigation supply is less than 130,000 acre-feet of storage available for use from Harlan County Lake as determined by the Bureau of Reclamation using the methodology described in Harlan County Lake Operation Consensus Plan attached as Appendix K to the Settlement Agreement, Nebraska will close junior, and require compliance with senior, natural flow diversions of surface water between Harlan County Lake and Guide Rock.
  3. Nebraska will protect storage water released from Harlan County Lake for delivery at Guide Rock from surface water diversions.
  4. Nebraska, in concert with Kansas and in collaboration with the United States, and in the manner described in Appendix L to the Settlement Agreement, will take actions to minimize the bypass flows at Superior-Courtland Diversion Dam.
- B. Metering of all surface water diversions at the point of diversion from the stream will continue to be required. For surface water canals that are not part of a Bureau of Reclamation project, farm turnouts are required to install and maintain a DNR approved measuring device by the start of the 2005 irrigation season. All measuring devices shall meet the DNR standards for installation, accuracy and maintenance. All appropriators will be monitored to ensure that neither the rate of diversion nor the annual amount diverted exceeds that allowed by the applicable permit or by statute.
- C. The DNR's moratorium on the issuance of new surface water permits was made formal by Order of the Director dated July 14, 2004. Exceptions may be granted by the DNR to the extent permitted by *Neb. Rev. Stat. § 46-714(3)* (Reissue 2004) or to allow issuance of permits for existing reservoirs that currently do not now have such permits. Such reservoirs are limited to those identified through the Settlement Agreement required inventory of reservoirs with over 15 acre-feet capacity.
- D. All proposed transfers of surface water rights shall be subject to the criteria for such transfers as found in *Neb. Rev. Stat. §§ 46-290 to 46-294.04* (Reissue 2004) and related DNR rules or the criteria found in *Neb. Rev. Stat. §§ 46-2,120 to 46-2,130* (Reissue 2004) and related DNR rules.
- E. The DNR completed adjudication of individual appropriators in the Republican River Basin upstream of Guide Rock in 2004. The results of that adjudication provided up-to-date records of the number and location of acres irrigated with surface water by such appropriators. Those records shall be used by the DNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The DNR will also be proactive in initiating subsequent



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adjudications whenever information available to the DNR indicates the need for adjudication as outlined by state statutes.

F. During Compact Call Years, as determined from the procedures and analysis set forth in Section IX below, DNR will regulate and administer surface water in the basin as necessary to ensure Compact compliance. During Compact Call Years, DNR will issue a "Compact Call" on the Republican River at Hardy or Guide Rock to carry out administration for the Compact in a manner consistent with the doctrine of prior appropriation. A "Compact Call" will result in DNR issuing closing notices on all natural flow and storage permits in the basin until such time as DNR, in consultation with the URNRD and other basin NRDs, determines that yearly administration is no longer needed to ensure Compact compliance, pursuant to Section IX.

### VIII. Augmentation and Incentive Programs

The URNRD and the DNR intend to establish and implement financial, incentive, and qualified projects as described in *Neb. Rev. Stat. §§ 2-3226.04, LB 862 (2010)*, *Neb. Rev. Stat. §§ 2-3252* or other incentive programs to reduce beneficial consumptive use of water within the URNRD. These projects include, but are not limited to (1) acquisition by purchase or lease of surface water or ground water rights, including storage water rights with respect to a river or any of its tributaries, (2) acquisition by purchase or lease or the administration and management, pursuant to mutual agreement, of canals and other works, including reservoirs, constructed for irrigation from a river or any of its tributaries, (3) vegetation management, including, but not limited to, the removal of invasive species in or near a river or any of its tributaries, and (4) the augmentation of river flows. As a condition for participation in an incentive program, water users, landowners or the URNRD may be required to enter into and perform such agreements or covenants concerning the use of land or water as are necessary to produce the benefits for which the incentive program is established. Such incentive programs may include, but shall not be limited to, any program authorized by state law and/or federal programs operated by the United States Department of Agriculture.

Any water savings generated through conservation programs, including acreage retirement or other conservation incentive programs undertaken through programs available throughout the Republican River Basin with the use of funds distributed by the State of Nebraska or the United States Government will not accrue to any specific NRD, regardless of the location or other conditions of the acreage included in the program or of the location of the effect of such water savings on the river system. Any water savings resulting from any such basin-wide programs shall be considered in the calculation of each NRD's depletions allocated to each of the NRDs based upon the 1998-2002 baseline depletion proportions.

However, should any NRD establish, fund, and implement its own such conservation program within its NRD's boundaries, the accounting of credit for the resulting water savings shall be given exclusively to that NRD. Any credit resulting from an inter-district conservation program shall be credited as agreed to by the NRDs involved. Also, if multiple NRDs cooperate in a stream flow augmentation project, the benefits shall be provided to each NRD based upon their share of the cost of the program.



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To the extent possible, it is the intent of the URNRD to provide compensation to water users that are required to forgo water use to allow the URNRD and the State to comply with the compact. This may be in addition to or as part of any other URNRD incentive or retirement program developed to facilitate compact compliance.

### IX. Monitoring and Studies

The overarching purpose of the Monitoring and Studies Section is to ensure that, in cooperation with the other Republican River Basin NRDs, the DNR and URNRD maintain compliance with the Republican River Compact as adopted in 1943 and as implemented in accordance with the FSS approved by the United States Supreme Court on May 19, 2003. The objective of the Monitoring and Studies Section of this IMP is to gather and evaluate data, information, and methodologies that could be used to increase understanding of the surface water and hydrologically connected ground water 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 URNRD and the Republican River Basin as a whole.

On an annual basis the results of monitoring and studies will typically be discussed in a basin-wide meeting which will take place prior to October 31 each year. The purpose of the meeting will be to discuss the preliminary accounting for the current year, the forecast of allowable stream flow depletions for the coming year, and potential management actions as necessary. Table 1 outlines important dates and objectives related to section IX.

Table 1. Important Dates and Objectives

Date	Objective
Prior to February 1	URNRD will provide DNR with meter reading database and GIS coverage maps to be used for the RRCA annual model update.
Prior to RRCA Annual Meeting	DNR will provide URNRD with their determination of whether the URNRD was in compliance with the compliance standards based on each previous year's annual Compact accounting.
September - October	Obtain power records and other estimates to determine pumping for T=0 ground water model run.
Prior to October 31	Discuss results of monitoring and studies, preliminary accounting for current year, and early forecast of allowable stream flow depletions.
Prior to November 15	DNR will provide correspondence to URNRD notifying them of potential Compact Call Year determination for the coming year (T+1).
November 15 – January 1	URNRD and DNR will discuss potential management alternatives in the situation that the coming year (T+1) will be a Compact Call Year.
Prior to January 1	Provide final forecast of allowable stream flow depletions and determination of Compact Call Years.
Prior to January 31	URNRD will provide DNR with details regarding existing management alternatives in lieu of additional ground water regulations or controls to make up for the expected shortfall.

#### A. Plan to Gather and Evaluate Data, Information and Methodologies

As outlined in *Neb. Rev. Stat.* §§ 46-715(2)(e) ongoing programs and new studies or other projects may become a source of information that is used to evaluate the effectiveness of controls

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adopted by the by the URNRD and the DNR. The DNR and the URNRD 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 potential studies have been identified by the DNR and the URNRD: (1) crop rotation; (2) vegetation management; (3) irrigation scheduling; (4) a survey of the type and location of irrigation systems throughout the URNRD; (5) tillage practices; and (6) conjunctive management.

### **B. Monitoring**

Part One of the Monitoring Section describes the tracking and reporting of water use activities within fully appropriated areas of the district by the URNRD and the DNR. Part Two of the Monitoring Section describes the analyses that will be utilized to annually forecast the projected depletions in each subsequent year. This accounting and the forecast in accordance with *Neb. Rev. Stat.* § 46-715(6) will serve to increase the understanding and test the validity of the conclusions and information upon which this plan is based.

Compact accounting and data exchanges among the states shall be done annually in accordance with the FSS, dated December 15, 2002, including the Republican River Compact Administration (RRCA) Accounting Procedures and Reporting Requirements which are contained in Appendix C thereof. An annual report of the RRCA is published each year. The accounting procedures, reporting requirements, and annual report of the RRCA are independent of this monitoring plan, and therefore not restated within the Monitoring Section of this plan.

#### **1. Part One: Tracking and Reporting of Water Use Activities**

The URNRD and the DNR will make all documents, reports, records, computer runs or other calculations or material necessary to determine compliance with the Compact available to each other, regardless of whether such documents are available under the Nebraska Public Records Act or otherwise, unless such materials are identified as confidential under Nebraska statutes or by a ruling of a court of competent jurisdiction. Specifically, and without limitation, the URNRD agrees to annually provide GIS coverage maps of all lands irrigated and to meter, record and provide to the DNR its ground water usage records and irrigation system details. The URNRD shall make copies of district actions taken on variances, offsets, and similar actions available to DNR.

The DNR agrees to make available to the URNRD all reports and records of the other NRDs necessary to determine their compliance with reductions, as well as all documentation and reports utilized by the DNR to determine the basin's virgin water supplies and Nebraska's compliance with the Compact.

In the event any materials are withheld by either DNR or URNRD under a claim of statutory confidentiality, the party withholding such materials shall describe the contents of the materials and reasons for the denial in accordance with *Neb. Rev. Stat.* § 84-712.04.



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### 2. Part Two: Forecast Procedures

Each year in compliance with *Neb. Rev. Stat. § 46-715(6)* the DNR in consultation with the Republican River NRDs shall forecast the maximum amount of water that may be available from stream flow for beneficial use in the short term and long term to comply with the Compact. This forecast will be used to assist the DNR and the NRDs in ensuring compliance with the Compact. DNR in conjunction with the NRDs will annually evaluate the forecast procedures and make changes as deemed necessary to reflect management actions being taken in the basin.

In order to complete the forecast, the DNR and URNRD in conjunction with the other NRDs will review available information and determine if additional controls must be implemented within any district for Compact Call Year compliance. The forecast will be completed prior to January 1 of each year, and will detail the expected shortfall within each district in the event that the coming year is a Compact Call Year. By the following January 31, if necessary, the URNRD will provide DNR with details regarding existing management alternatives (such as execution of existing surface water leases) in lieu of additional ground water regulations or controls to make up for the expected shortfall.

The procedures developed to complete the forecast will be reviewed annually by the DNR to determine if modifications are necessary. The forecast will project the next year's balance (projected Nebraska allocation plus projected Imported Water Supply less the projected Computed Beneficial Consumptive Use, or CBCU), and the projected water short year and normal year accounting balances. These balances will be utilized in conjunction with other information to determine if a Compact Call Year exists.

The DNR's calculation of allowable ground water depletions for the URNRD and determination of the necessity for additional controls will utilize additional ground water model information, estimated end-of-year information for reservoir volumes, and estimated stream flow to determine on an annual basis whether additional NRD-specific controls must be implemented.

#### a. Determination of Available Stream Flow

The forecast will typically determine the forecast values for both Guide Rock (water short year accounting point) and Hardy (normal year accounting point). The DNR's forecast values for Guide Rock will include: 1) the one-year balance (projected allocation less the projected CBCU plus the imported water supply); two-year average, and three-year average. The DNR's forecast values for Hardy will include: 1) the one-year balance (projected allocation less the projected CBCU plus the imported water supply); and 2) the five-year average. These forecasted values will be used in conjunction with sections IX.B.2.b, IX.B.2.c, IX.B.2.d and IX.B.2.e to determine when management actions or controls must be implemented. The DNR will calculate forecast values for the next year using the variables in table 2:

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Table 2. Information Used for 2010 Forecast of Allowable Depletions.

Year	Item	Information Source
T - 3		Draft; current Accounting Procedures (v. 2005)
T - 2		Draft; current Accounting Procedures (v. 2005)
T - 1		Draft; current Accounting Procedures (v. 2005)
Provisional Data for T = 0 (Current Year or Immediate Past Irrigation Season)	Pumping	Power records estimate
	Surface Water Use	Estimated from preliminary data and previous years values
	Stream Flow	Available provisional records end of year estimated
	Evaporation	T - 1 records
Forecast Year T + 1 (Coming Irrigation Season)	Ground water Consumptive Use and Imported Water Supply Credit	Average values for T = 0 and T - 1
	Surface Water Consumptive Use	Colorado: Average of T - 1 and T - 2 use Kansas: + (.1858 x HCL content) + 9,575 Nebraska: - $(4 \times 10^{-7}) \times (\text{NE lake volume})^2$ + (0.52) x (NE lake volume) - 42,000
	Stream Flow	+ (5-year average of state line flows) x 0.41 + 0.23 x HCL content - 27,450

In accordance with *Neb. Rev. Stat.* § 46-703(6), DNR, NRDs, and surface water project sponsors shall meet prior to the final forecast of allowable stream flow depletions and determination of Compact Call Years. At this meeting the involved parties will discuss the forecasted streamflow and surface water consumptive use. From these discussions, surface water project sponsors may present a plan to DNR to achieve a consumptive use that is less than forecasted consumptive use. Such a plan could allow surface water project sponsors to avoid a potential Compact Call Year. This plan must be completed and provided to the Department no later than December 1 of the current year (T=0).

The following equations will be utilized to determine the one year balance for the forecast year.

$$\begin{aligned} \text{CWS} = & + \text{SwCBCU}_{\text{NE}} + \text{SwCBCU}_{\text{KS}} + \text{SwCBCU}_{\text{CO}} \\ & + \text{GwCBCU}_{\text{NE}} + \text{GwCBCU}_{\text{KS}} + \text{GwCBCU}_{\text{CO}} \\ & + \text{Stateline Stream flow} \end{aligned}$$

$$\text{Nebraska Allocation} = \text{CWS} * 0.5$$

$$\text{CBCU}_{\text{NE}} = \text{SwCBCU}_{\text{NE}} + \text{GwCBCU}_{\text{NE}}$$



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IWS = Imported Water Supply Credit

Hardy One Year Balance = Nebraska Allocation + IWS – CBCU<sub>NE</sub>

Guide Rock One Year Balance = Hardy One Year Balance \* 0.89 – 9040

Where:

T-3 = Three years ago from the current year

T-2 = Two years ago from the current year

T-1 = One year ago from the current year

T=0 = The current year

T+1 = The upcoming year that is being forecasted

CWS = Computed Water Supply

GW CBCU<sub>NE, KS, CO</sub> = Ground water Computed Beneficial Consumptive Use for each respective state

SW CBCU<sub>NE, KS, CO</sub> = Surface Water Computed Beneficial Consumptive Use for each respective state

Nebraska Allocation = CWS x 0.5: The amount of water the State of Nebraska is allowed to use over one year

Balance = The sum of Nebraska's Allocation, plus the Nebraska Imported Water Supply, less Nebraska's Computed Beneficial Consumptive Use

The one year balance for normal year accounting (Hardy One Year Balance) and water short year accounting (Guide Rock One Year Balance) will be utilized to project the two-year and three-year average balances above Guide Rock and the five-year average balance above Hardy.

### b. Compact Call Year Evaluation

This section of the monitoring plan specifies the process that will be completed by the DNR to determine the Compact Call Years, as detailed in Attachment 1, Republican River Water Supply Evaluation and Required Actions Flowchart. This evaluation takes into account reservoir content and recent balances above Guide Rock and Hardy and the annual forecast as described above in Section IX.B.2.a. This process will be completed and provided to the URNRD by DNR prior to January 1 of each year.

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### Checklist A. Water short year Test

- 1) Is the forecast projection for the coming year's irrigation supply less than 119 kAF?
  - a. Yes. Proceed to Checklist B.
  - b. No. Proceed to Checklist C.

### Checklist B. Water short year

- 1) Is the current year's balance ( $T = 0$ ) above Guide Rock sufficient to offset the dry year forecast for next year's balance above Guide Rock minus 10 kAF<sup>1</sup>?
  - a. Yes. Proceed to Checklist D.
  - b. No. COMPACT CALL YEAR: The DNR will determine each NRD's share of any potential overuse and propose adjustments in accordance to Section IX.B.2.c. of this IMP.

Note: If it is beneficial to utilize the alternative water short year provisions from the FSS (the previous two years have a greater balance than last year alone), and an alternative water short year plan has been approved by the RRCA, then the two-year balance (for  $T = 0$ , the current year, and the prior year,  $T - 1$ ) will be substituted for the current year's balance in Checklist B.

### Checklist C. Early Warning System for Water short year Compliance

- 1) When Harlan County Lake declines from one year to the next, the December end-of-month (EOM) content is generally about 84% of what it was last year. A December EOM of 246 kAF provides a high level of confidence that the coming year ( $T+1$ ) will not be water short. Based on the current year's ( $T=0$ ) Harlan County Lake December EOM content, compute a dry-year projection for next year ( $T+1$ ) based on this relationship. Is the value greater than 246 kAF?
  - a. Yes. Proceed to Checklist D.
  - b. No. Advance to question 2.
- 2) Is the dry year forecast for next year's ( $T+1$ ) balance above Guide Rock greater than zero?
  - a. Yes. Proceed to Checklist D.
  - b. No. Advance to question 3.
- 3) Is the current year's balance ( $T = 0$ ) above Guide Rock sufficient to offset the dry year forecast for next year's balance ( $T + 1$ ) above Guide Rock minus 10 kAF<sup>2</sup>?
  - a. Yes. Proceed to Checklist D.

<sup>1</sup> In the event it is the second consecutive Compact Call Year, this value will be reduced to 5kAF. For any remaining consecutive Compact Call Years, it will be reduced to zero.

<sup>2</sup> In the event it is the second consecutive Compact Call Year, this value will be reduced to 5kAF. For any remaining consecutive Compact Call Years, it will be reduced to zero.



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- b. No. COMPACT CALL YEAR: The DNR will determine each NRD's share of any potential overuse and propose adjustments in accordance to Section IX.B.2.c. of this IMP.

### Checklist D. Normal Year Administration

- 1) Will the forecast for next year ( $T + 1$ ) result in a 5-year balance at Hardy that is greater than 50 kAF?
  - a. Yes. Analyze long term trends and additional adjustments in accordance to Section IX.B.2.e
  - b. No. Advance to question 2.
- 2) Will both the forecast for next year result in a 5 year balance at Hardy ( $T - 3$ ,  $T - 2$ ,  $T - 1$ ,  $T = 0$ , and  $T + 1$ ) that is greater than zero and the balance at Hardy of the most recent four years ( $T - 2$ ,  $T - 1$ ,  $T = 0$ , and  $T + 1$ ) be greater than zero?
  - a. Yes. Analyze long term trends and additional adjustments in accordance to Section IX.B.2.e
  - b. No. COMPACT CALL YEAR: The DNR will determine each NRD's share of any potential overuse and propose adjustments in accordance to Section IX.B.2.c. of this IMP.

### c. Calculation of Allowable Ground water Depletions for the URNRD and Determining the necessity of Additional Controls

This section of the monitoring plan specifies the calculations which will be completed by the DNR to determine the allowable ground water depletions for the URNRD in any Compact Call Year. These procedures will be utilized to indicate when additional controls must be implemented by the URNRD and DNR to ensure compliance with this IMP in the event that the DNR's forecast, provided prior to January 1 of each year, indicates a Compact Call Year. These procedures will incorporate information provided by the URNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31 of each year following a forecast that indicates a Compact Call Year. When such Compact Call Year is indicated, the DNR will implement additional surface water controls (Section VII.F of this IMP). The procedures for determining the allowable ground water depletion for the URNRD are as follows.

The Allowable ground water depletion for the URNRD =  
 $(\text{Nebraska Allocation} + \text{IWS} - \text{SWCBCU}_{\text{NE}} - \text{Other NRD CBCU}) * 0.44$

Where:

Nebraska Allocation = Nebraska available water supply under the Compact

IWS = Imported Water Supply credit

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$SWCBCU_{NE}$  = The surface water consumptive use by Nebraska, includes net evaporative losses

Other NRD CBCU = The  $GWBCU_{NE}$  calculated for the South Platte NRD, Twin Platte NRD, Tri-Basin NRD, Central Platte NRD, and Little Blue NRD

The DNR will utilize information provided by the URNRD by January 31, to evaluate the following.

### Step 1. URNRD Estimated Ground water Depletions

Ground water depletions for the URNRD will be based on the previous 2-year average (as described in Table 2 above), unless such plan provided by the URNRD indicates that additional restrictions on groundwater pumping will be imposed. If the additional restrictions would limit the pumping to be less than the previous two year average then the lower estimate will be used. In cases where that year's allocation will be less the URNRD will provide the DNR a map indicating the geographic area subject to the allocation for that year and the maximum allocation available. The DNR will utilize the information provided by the URNRD and represent such information in the RRCA GWM.

### Step 2. Potential yield from URNRD surface water leases/agreements, augmentation, etc.

The DNR will determine the potential yield from any surface water lease/agreement, augmentation, etc. entered into or provided by the URNRD. In the event that augmentation is utilized, procedures for determining the project yield must have been approved by the RRCA. This potential yield will be incorporated as NRD management actions in section IX.B.2.d.

If a Compact Call Year is reached as a result of checklist B1 or C3 the final step to determine if additional ground water and surface water controls (refer to Section VI.B.1. and VII.F of this IMP) must be implemented is as follows.

Allowable ground water depletions for URNRD (as determined above) - Forecasted URNRD's portion of  $GWBCU_{NE}$  (Step 1) + Potential yield from URNRD surface water leases/agreements, augmentation, etc. (Step 2) + Current Year's Balance ( $T = 0$ ) - 3333<sup>3</sup>.

If the resulting balance is greater than or equal to negative one hundred (-100) ac-ft, no additional ground water and surface water controls will be implemented.

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<sup>3</sup> In the event it is the second consecutive Compact Call Year, this value will be reduced to 1667. For any remaining consecutive Compact Call Years, it will be reduced to zero.



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If the resulting balance is less than negative one hundred (-100) ac-ft, the additional ground water and surface water controls (refer to Section VI.B.1. and VII.F of this IMP) must be implemented. This potential yield will be incorporated as NRD management actions in section IX.B.2.d.

Note: If it is beneficial to utilize the alternative water short year provisions from the FSS (the previous two years have a greater balance than last year alone), and an alternative water short year plan has been approved by the RRCA, then the two-year balance (for  $T = 0$ , the current year, and the prior year,  $T - 1$ ) will be substituted for the current year's balance in Checklist B.

If a Compact Call Year is reached as a result of checklist D2 the final step to determine if additional ground water and surface water controls (refer to Section VI.B.1. and VII.F of this IMP) must be implemented is as follows.

Allowable ground water depletions for URNRD (as determined above) - Forecasted URNRD's portion of GWCBCU<sub>NE</sub> (Step 1) + Potential yield from URNRD surface water leases/agreements, augmentation, etc. (Step 2) + Previous Years Balances ( $T = -3$ ,  $T = -2$ ,  $T = -1$ ,  $T = 0$  or if applicable +  $T = -2$ ,  $T = -1$ ,  $T = 0$ ).

If the resulting balance is greater than or equal to negative one hundred (-100) ac-ft, no additional ground water and surface water controls will be implemented.

If the resulting balance is less than negative one hundred (-100) ac-ft, the additional ground water and surface water controls (refer to Section VI.B.1. and VII.F of this IMP) must be implemented. This potential yield will be incorporated as NRD management actions in section IX.B.2.d.

### **d. Calculation of Compact Call Stream flow Volume**

This section of the monitoring plan specifies the calculation which will be completed by the DNR to determine the stream flow volume necessary to ensure Compact compliance in any Compact Call Year. These procedures will be utilized to indicate when additional controls must be implemented by the URNRD and DNR to ensure compliance with this IMP in the event that the DNR's forecast, provided prior to January 1 of each year, indicates a Compact Call Year. These procedures will incorporate information provided by the URNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31 of each year following a forecast that indicates a Compact Call Year. When such Compact Call Year is indicated, the DNR will implement additional surface water controls (Section VII.F of this IMP). Criteria that will be used to determine when administration for the "Compact Call" is no longer necessary will be based on ensuring sufficient stream flow volumes have been achieved at the compliance point. Determination of sufficient stream flow volumes to ensure Compact compliance will be determined through the following procedures.

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Compact Call Stream flow Volume = Forecasted Stream flow + NRD Management Actions + Surface Water Curtailment Benefit

Where:

Forecasted Stream flow = Stream flow for T+1; (5-year average of state line flows) x  $0.41 + 0.23 \times \text{HCL content} - 27,450$ .

NRD Management Actions = Actions taken by the URNRD and/or other basin NRDs to enhance stream flow. These actions may include surface water or ground water leases, augmentation, or curtailment.

Surface Water Curtailment Benefit = Actions taken by DNR to ensure compact compliance in the event that Basin NRD Management Actions are not sufficient to overcome the projected negative balance.

### **e. Additional adjustments related to long-term trends**

The DNR and URNRD in conjunction with the other basin NRDs will annually meet to consult to determine if additional reductions from the 98-02 pumping volumes may be warranted. Through this consultation, the DNR and URNRD will review expected long term (5-20 years) increases in depletions to stream flow and discuss potential mitigation measures that may be necessary.

### **f. Harlan County Lake Operations**

In the event that operations of Harlan County Lake are not in accordance with Appendix K of the Final Settlement Stipulation, the DNR will work in consultation with the NRDs to modify Sections VI, VII, and IX of this IMP until normal operations resume.

## **X. INFORMATION CONSIDERED**

Information used in the preparation and to be used in the implementation of this IMP can be found in:

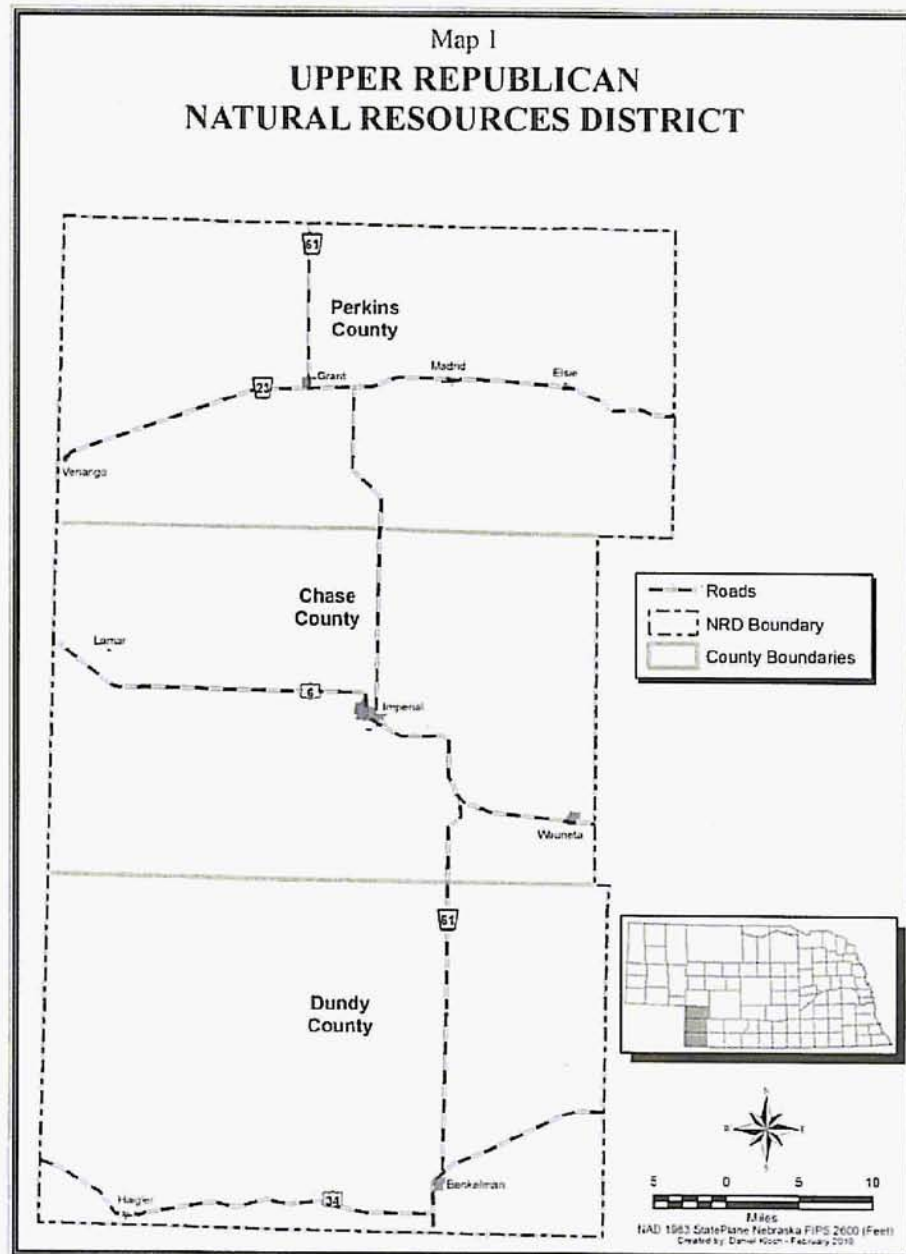
- Simulation runs of the Republican River Compact Administration Ground water Model,
- The formulae and data compliance tables of the Final Settlement Stipulation for the Compact,
- The URNRD's Rules,
- The URNRD's Ground water Management Plan,
- Arbitrator's Final Decision, Karl Dreher, June 30, 2009, and
- Additional data on file with the URNRD and the DNR.
- Nebraska statutes and case law.



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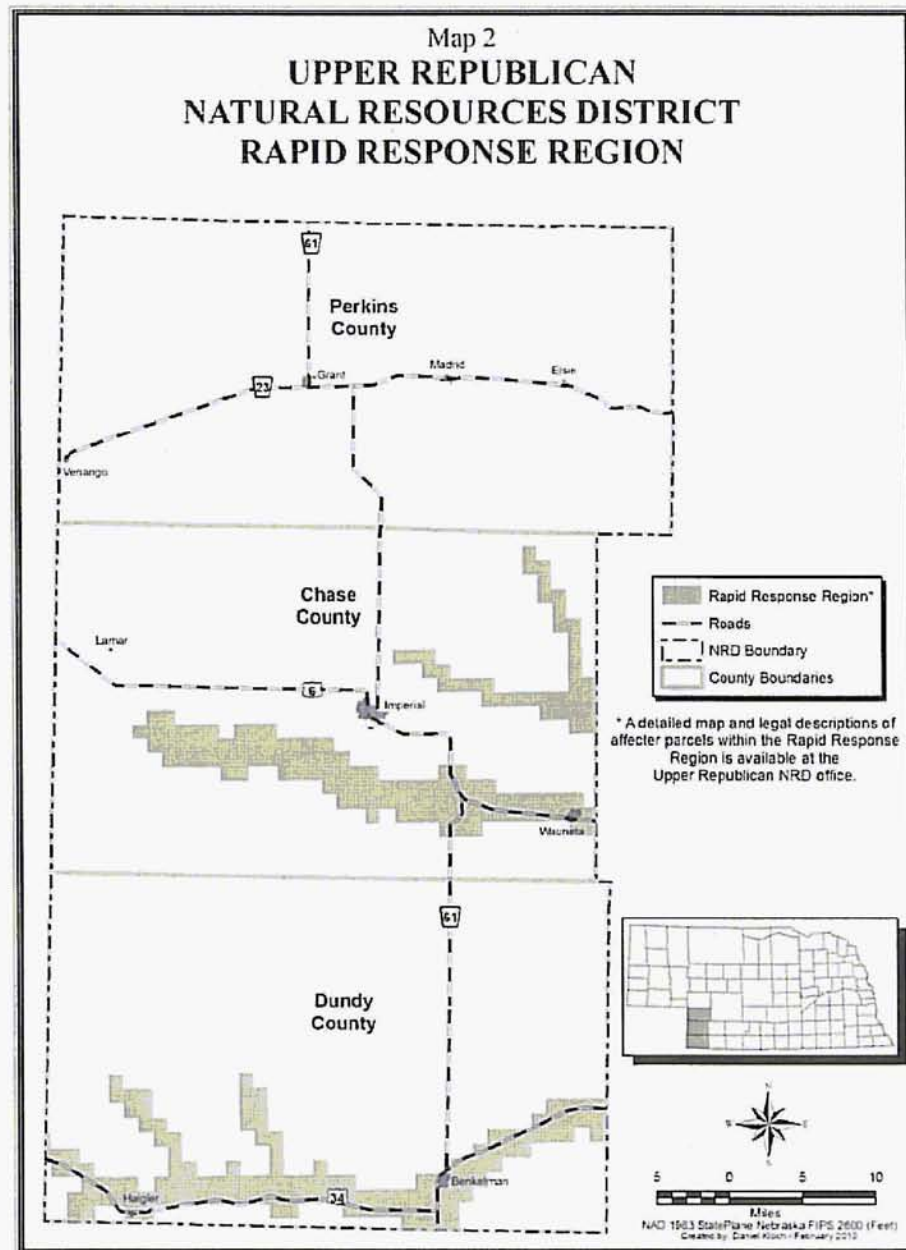
MAP 1. Upper Republican Natural Resource District



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# Upper Republican NRD

MAP 2. Upper Republican Natural Resource District Rapid Response Region

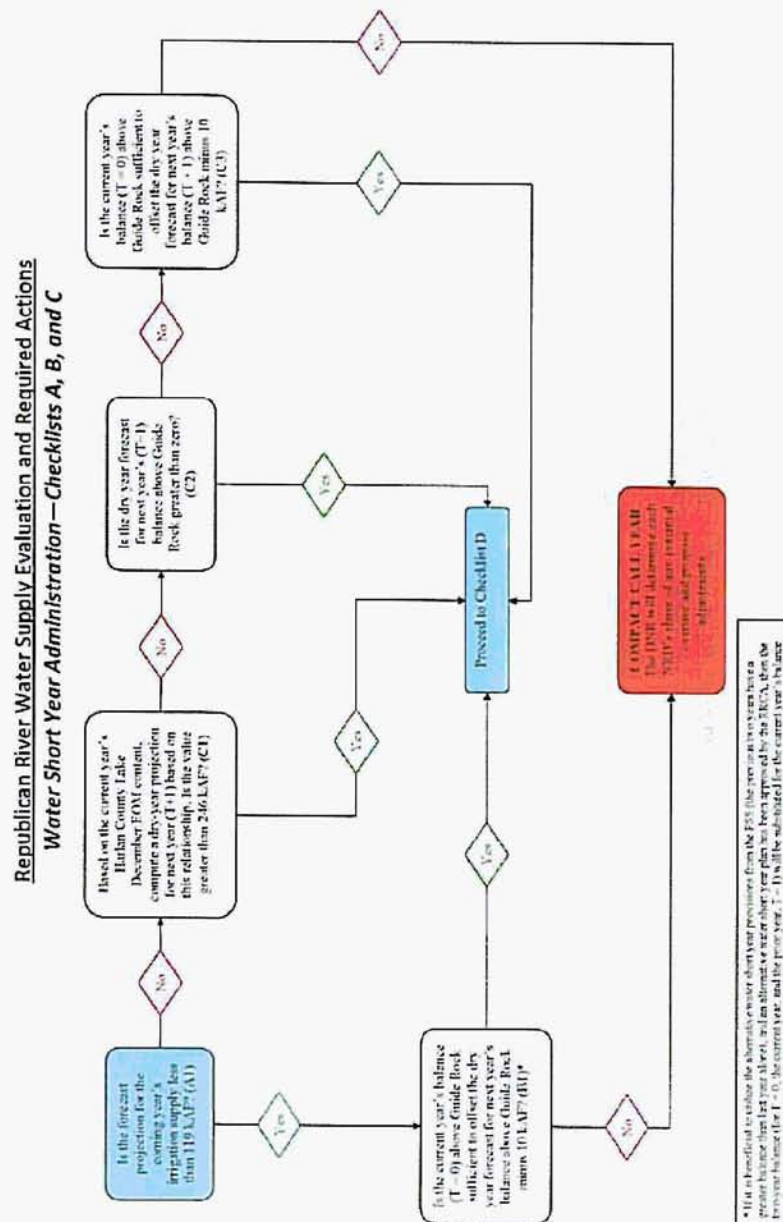




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## ATTACHMENT 1. Republican River Water Supply Evaluation and Required Actions

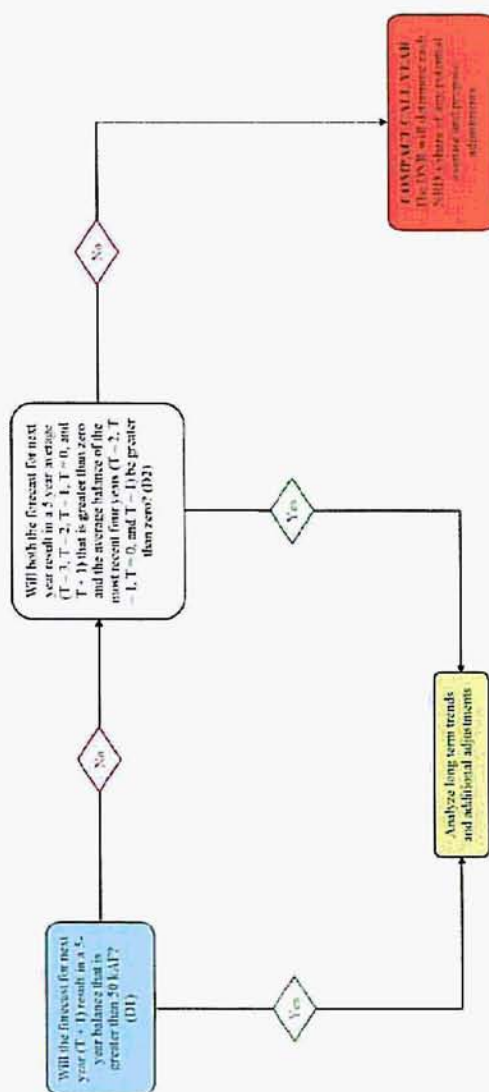


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**Republican River Water Supply Evaluation and Required Actions**  
**Normal Year Administration—Checklist D**



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