

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

I. Authority

This Integrated Management Plan (IMP) was prepared by the Board of Directors of the Lower Republican Natural Resources District (LRNRD) and the Nebraska Department of Natural Resources (DNR) in accordance with the Nebraska Ground Water Management and Protection Act, *Neb. Rev. Stat.* § 46-701 et seq., and the Republican River Compact.

II. Background

In 1943 the states of Colorado, Kansas and Nebraska entered into the Republican River Compact (Compact) with the approval of the United States Congress. The Compact provides for the equitable apportionment of the "virgin water supply" of the Republican River Basin. In 1998, 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 (Court) against the states of Nebraska and Colorado, seeking, among other things, to include ground water in the calculation of the virgin water supply and consumptive use. After several rulings by the Court and its Special Master (including a recommendation that the depletions to streamflow from the use of ground water be included in the virgin water supply and be included in the calculations of each state's beneficial consumptive use), and several months of negotiation, the three states entered into a comprehensive Final Settlement Stipulation (FSS). That FSS was approved by the Supreme Court on May 19, 2003, and the Special Master's final report approving the Republican River Compact Administration (RRCA) Ground Water Model (GWM) developed by the three states for use in computing streamflow depletions resulting from ground water use was submitted to the Court on September 17, 2003.

Ground water use within the Republican River Basin is regulated by four natural resources districts: the Lower Republican Natural Resources District (LRNRD), the Upper Republican Natural Resources District (URNRD), the Middle Republican Natural Resources District (MRNRD), and the Tri-Basin Natural Resources District (TBNRD) (collectively referred to below as the NRDs). Both prior and subsequent to the approval of the FSS, the DNR conducted and participated in several meetings with the LRNRD during which it explained that in order for the state of Nebraska to achieve and maintain compliance with the terms of the FSS and the Compact it would be necessary to undertake the following: (1) to continue the moratorium on new surface water appropriations and new ground water wells, (2) to reduce all ground water pumpage from historic levels across the entire basin, and (3) to further reduce ground water pumping to comply with the Compact in water short years. The foregoing steps were to be accomplished to the extent possible through the use of incentive programs to reduce consumptive use of water. Similar discussions were held between the DNR and each of the other 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 the

Effective
October 1, 2011

Lower Republican NRD

Compact Imported Water Supply that Nebraska receives because of discharges from the "ground water mound" at sufficient levels to offset depletions to the Republican River caused by ground water pumping within the Republican River Compact area within TBNRD, and 3) for each of the NRDs other than the TBNRD to reduce their ground water pumping from their "1998-2002 baseline pumping volumes," which the DNR has defined as follows:

URNRD - 531,763 acre-feet

MRNRD - 309,479 acre-feet

LRNRD - 242,289 acre-feet

The DNR, through the use of the Republican River Compact Administration Ground Water Model, determined each NRD's depletions to streamflow for the 1998-2002 period (referred to below as the "1998-2002 baseline depletion") and the related depletion proportion (referred to below as the "1998-2002 baseline depletion proportion"):

URNRD - 74,161 acre-feet (44% of the depletions)

MRNRD - 52,168 acre-feet (30% of the depletions)

LRNRD - 43,954 acre-feet (26% of the depletions)

The percentage of allowable ground water depletions for each NRD was based on the proportion of the average ground water depletions caused by ground water pumping within each NRD that occurred during the baseline period from 1998- 2002 as determined by model runs of the Republican River Compact Administration Ground Water Model, with ground water pumping within each NRD alternated between being turned off and then being turned on. The percentage of allowable ground water depletions may be altered in the future if concurrence on a new methodology can be reached amongst all of the basin NRDs.

On June 24, 2005, the first Integrated Management Plan (2005 IMP) adopted by the LRNRD and the DNR became effective. That 2005 IMP described the ground water Rules and Regulations for the 2005-2007 period. Among other things, that 2005 IMP provided for a base ground water allocation of 12 acre-inches per year (36 acre-inches for the allocation period) for all regulated wells located west of U.S. Highway 183, and a base ground water allocation of 11 acre-inches per year (33 acre-inches for the allocation period) for all regulated wells located east of U.S. Highway 183. The 2005 IMP also allowed the landowners to carry forward unused base allocations.

Since adoption of the 2005 IMP, there have been efforts to implement incentive programs, studies, and research to further our understanding and ability to comply with the Republican River Compact and FSS. The LRNRD and the DNR now seek to adopt and implement a revised IMP for the regulation of water resources within the LRNRD as required by the laws of the state of Nebraska, specifically the Ground Water Management and Protection Act. A subsequent IMP was adopted by LRNRD and DNR in 2008, with additional changes during 2009.

During 2008 Colorado, Kansas, and Nebraska entered into dispute resolution regarding a number of issues, including future compliance. In June 2009 the arbitrator, Karl Dreher, issued a finding that the LRNRD IMP may be adequate during years with average and above-average precipitation, but may not be adequate during dry years. Although the LRNRD's allowable depletions to streamflow are limited to 26% of Nebraska's allowable depletions, there were no details in the plan to describe how this would be accomplished. These additional details have been added to this 2011 version of the IMP.

The LRNRD will meet its responsibility under *Neb. Rev. Stat. § 46-715* of the Ground Water Management and Protection Act, including meeting the obligations under the FSS, by adopting revised Rules and Regulations to implement the this IMP. The LRNRD understands that the URNRD and the MRNRD have also revised their IMPs, and have chosen to adopt a "compliance standard" whereby they have agreed that their use of ground water shall be within the allocation granted to them as determined by the 1998-2002 baseline pumping volumes, reduced by a certain percentage. They have also agreed that they will be assigned their proportionate share of streamflow depletions as calculated by the 1998-2002 baseline depletion percentages. The failure of any one NRD to adopt, implement or enforce IMPs adequate to meet their proportionate share of the responsibility to achieve and maintain Nebraska's compliance with the Compact and the FSS shall not itself require any additional action by the other NRDs.

III. Limitations for Certain Purposes

To the extent provisions of this IMP relate to and accommodate or provide for water short year regulatory action intended to achieve compliance with this Compact, this IMP applies to portions of the Republican River Basin lying in the Nebraska counties of Furnas, Harlan, Franklin, Webster, and Nuckolls, lying upstream of Guide Rock, Nebraska: those areas within the basin lying west of a line proceeding north from the Nebraska-Kansas state line and following the western edge of Webster County, Township 1, Range 9, Sections 34, 27, 22, 15, 10, and 3 through Webster County, Township 2, Range 9, Sections 34, 27 and 22; then proceeding west along the southern edge of Webster County, Township 2, Range 9, Sections 16, 17 and 18; then proceeding north following the western edge of Webster County, Township 2, Range 9, Sections 18, 7 and 6, through Webster County, Township 3, Range 9, Sections 31, 30, 19, 18, 7, and 6 to its intersection with the northern boundary of Webster County.

IV. Goals and Objectives

The LRNRD and the DNR have adopted the following Goals and Objectives:

A. Goals:

1. Ensure that ground water and surface water users within the LRNRD assume their share of the responsibility to keep Nebraska in compliance with the Republican River Compact.

2. Provide that LRNRD's share of that responsibility be distributed in an equitable manner and to minimize adverse economic, social and environmental consequences to the extent possible.
3. To sustain a balance between water uses and water supplies within the LRNRD so that the economic viability, social and environmental health, safety, and welfare of the LRNRD can be achieved and maintained for both the near and long term.

B. Objectives:

1. With limited exceptions, prevent the initiation of new or expanded uses of water that increase Nebraska's computed beneficial consumptive use of water within the LRNRD, as required for Compact compliance and by Nebraska law.
2. Achieve the required reductions in water use through a combination of regulatory and incentive programs designed to reduce beneficial consumptive use.
3. The DNR shall ensure that administration of surface water appropriations in the basin is in accordance with the Compact and in full compliance with Nebraska law.
4. After taking into account any reduction in beneficial consumptive use achieved through basin-wide incentive and streamflow augmentation programs, make such additional reductions in ground water use in Compact Call Years as are necessary to achieve a reduction in beneficial consumptive use in the LRNRD to 26% of the allowable ground water depletions in such years. Compact Call Years will be determined through the procedures outlined in Section IX of this IMP.
5. The LRNRD and the DNR will continue to investigate and explore augmentation projects that would add to or retime the water supply within the basin. Such augmentation and retiming projects include, but are not necessarily limited to, the following:
 - a. Leasing or purchasing surface water and/or ground water;
 - b. Augmentation wells, both within and outside of the Republican River Basin;
 - c. Exploring trans-basin diversion projects;
 - d. Conjunctive management of surface water irrigation projects.
6. The LRNRD's net depletions shall not exceed its appropriate allocation (26%) of the state's allowable ground water depletions as determined by the Republican River Compact Administration Ground Water Model

V. Map

Except as noted in Section III above, the area subject to this IMP is the geographic area within the boundaries of the LRNRD (see Map 1). The Rapid Response Region is shown as a sub-area within the boundaries of the LRNRD (see Map 2).

VI. Ground Water Controls

The authority for the ground water component of this IMP is the Nebraska Ground Water Management and Protection Act, *Neb. Rev. Stat. § 46-701 et seq.* The ground water controls in this IMP will be implemented in the LRNRD Ground Water Management Rules and Regulations. The Rules and Regulations may be modified in a manner consistent with this IMP from time to time hereafter by the LRNRD, and shall be sufficient so as to meet the Compliance Standards and controls set forth below.

A. Compliance Standards

1. Purpose

These compliance standards are established by DNR and LRNRD to assess whether the course of action taken by the LRNRD, 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, is sufficient. The action taken by the LRNRD 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 LRNRD.

2. Duration

On an annual basis the DNR and LRNRD shall reexamine the sufficiency and effectiveness of the compliance standards to determine if amendments or revisions to this IMP 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 any time by the DNR and LRNRD 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 LRNRD shall adopt and implement rules and regulations which shall ensure that the following standards are met. The standards shall be affected 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 Republican River Compact Administration (RRCA) Accounting Procedures, the baseline depletion percentage, and the annual forecast as outlined in Section IX. The standards are:

- a. Provide for a minimum 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 194,000 acre-feet over the

long term. If precipitation is lower than average for any given year, the ground water pumping volume for any single year may be above 194,000 acre-feet.

b. An additional five percent (5%) reduction in 98-02 pumping volumes during the next five-year period shall be accomplished primarily through voluntary incentive programs and other means as determined by the LRNRD. The necessity for continuing this annual reduction shall be reevaluated by DNR and the LRNRD in 2015.

c. The LRNRD's net depletions to streamflow shall average no greater than 26% 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 Ground Water Controls and Management Activities

The LRNRD 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 LRNRD will seek to implement management actions (such as 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 31st of each year for evaluation. If such management actions are insufficient to ensure compliance with this IMP, the LRNRD will in the alternative to management actions, implement additional ground water controls and regulations to make up for its proportionate share of any expected shortfall as identified in the annual forecast and described in Section IX of this IMP. Such additional control will include, but not be limited to, restriction or curtailment of ground water pumping within the Rapid Response Region of the LRNRD and restrictions on ground water pumping in all other sub areas of the district.
2. When necessary to ensure compliance with this IMP during Compact Call Years, the LRNRD 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 LRNRD standards.
4. Provide for transfers according to LRNRD standards

VII. Surface Water Controls - Department of Natural Resources

The authority for the surface water component of this IMP is the Nebraska Ground Water Management and Protection Act, *Neb. Rev. Stat.* § 46-701 et seq. The surface water controls that will be continued and/or begun by the DNR are as follows:

- A. DNR shall continue to administer surface water under the prior appropriation system.
- B. The DNR shall implement the following additional surface water administration as required by the FSS:
 1. To provide for regulation of natural flow between Harlan County Lake (HCL) 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 the Harlan County Lake Operation Consensus Plan attached as Appendix K to the FSS, 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 FSS, will take actions to minimize the bypass flows at the Superior- Courtland Diversion Dam.
- C. 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. All measuring devices shall meet 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.
- D. The DNR's moratorium on the issuance of new surface water permits was made formal by an Order of the Director dated July 14, 2004. Exceptions may be granted by the DNR to the extent permitted by statute or to allow issuance of permits for existing reservoirs that currently do not have such permits. Such reservoirs are limited to those identified through the FSS required inventory of reservoirs with over 15 acre-feet capacity.
- E. 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 and related DNR Rules or the criteria found

in *Neb. Rev. Stat.* §§ 46-2,120 to 46-2,130 and related DNR Rules in effect as of January 1, 2010.

F. The DNR completed the adjudication process within the LRNRD upstream of Guide Rock for the individual appropriators in the Republican River Basin 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 will be used by the DNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The DNR shall also be proactive in initiating subsequent adjudications whenever information available to the DNR indicates the need for adjudication as outlined by state statutes.

G. The DNR reserves the right to request, in the future, that this IMP be modified to require any such additional measures. In the event such a request is made, the DNR shall "allow the affected surface water appropriators and surface water project sponsors a reasonable amount of time, not to exceed one hundred eighty (180) days, unless extended by the DNR, to identify the conservation measures to be applied or utilized, to develop a schedule for such application and utilization, and to comment on any other proposed restrictions." *Neb. Rev. Stat.* § 46-716(2).

H. 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 LRNRD and other basin NRDs, determines that yearly administration is no longer needed to ensure Compact compliance, pursuant to Section IX.

VIII. Incentive Programs

The LRNRD and DNR, alone or in cooperation with other parties, intend to establish and implement financial, incentive, and qualified projects as described in *Neb. Rev. Stat.* § 2-3226.04 to reduce beneficial consumptive use of water within the LRNRD. 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 or landowners and the LRNRD 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 any program authorized by state law and/or federal programs such as, but not limited to, the Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP) operated by the U.S. Department of Agriculture.

Any reductions in depletions to streamflow generated through supplemental programs, funded entirely by the state of Nebraska and/or the United States Government, including acreage retirement or other incentive programs undertaken through programs available throughout the Republican River Basin 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 reductions in depletions to streamflow resulting from any such basin-wide programs shall be considered, in the calculation of each NRD's compliance with the 98-02 depletion percentages. This calculation is outlined in Section IX.B.2.c of this IMP.

However, should any NRD establish, fund partially or in total, and implement its own such conservation program, available only for acreage within such district, the accounting of credit for the resulting water savings shall be given exclusively to that NRD.

With agreement of the NRDs involved, the benefits from a supplemental program may be allocated to each NRD based upon their share of the cost of the program.

To the extent possible, it is the intent of the LRNRD to provide compensation to water users that are required to forgo water use to allow the LRNRD and the state to comply with the compact. This may be in addition to or as part of any other LRNRD 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 LRNRD 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 LRNRD 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 31st each year. The purpose of the meeting will be to discuss the preliminary accounting for the current year, the forecast of allowable streamflow 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	LRNRD 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 LRNRD with their determination of whether the LRNRD 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 streamflow depletions.
Prior to November 15	DNR will provide correspondence to LRNRD notifying them of potential Compact call determination for the coming year (T + 1).
November 15 – January 1	LRNRD and DNR will discuss potential management alternatives in the situation that the coming year (T + 1) will be a Compact Call Year.
Prior to December 1	Surface water project sponsors may present a plan to DNR to achieve a consumptive use that is less than forecasted consumptive use.
Prior to January 1	Provide final forecast of allowable streamflow depletions and determination of Compact Call Years.
Prior to January 31	LRNRD 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 adopted by the LRNRD and the DNR. The LRNRD and DNR 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 LRNRD: (1) crop rotation, (2) vegetation management, (3) irrigation scheduling, (4) a survey of the type and location of irrigation systems throughout the LRNRD, (5) tillage practices, and (6) conjunctive management.

B. Monitoring

Part One of this Monitoring Section describes the tracking and reporting of water use activities within fully appropriated areas of the district by the LRNRD and the DNR. Part Two of this Monitoring Section describes the analyses that will be utilized to annually forecast the projected depletions in each subsequent year. This accounting and 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 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 are not restated within the Monitoring Section of this plan.

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

The LRNRD 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 LRNRD 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 LRNRD shall make copies of district actions taken on variances, offsets, and similar actions available to DNR.

The DNR agrees to make available to the LRNRD 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 LRNRD 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.

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 streamflow 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 LRNRD 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 1st 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 31st, if

necessary, the LRNRD 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 LRNRD 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 streamflow to determine on an annual basis whether additional NRD-specific controls must be implemented.

a. Determination of Available Streamflow

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.

Table 2. Information Used for 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
	Streamflow	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: $+ (.1858 \times \text{HCL content}) + 9,575$ Nebraska: $- (4 \times 10^{-7}) \times (\text{NE lake volume})^2 + (0.52) \times (\text{NE lake volume}) - 42,000$
Streamflow	$+ (5\text{-year average of state line flows}) \times 0.41 + 0.23 \times \text{HCL content} - 27,450$	

In accordance with *Neb. Rev. Stat.* § 46-703(6), DNR, the NRDs, and surface water project sponsors shall meet prior to the final forecast of allowable streamflow 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 avoid a potential Compact Call Year. This plan must be completed and provided to the DNR no later than December 1st of the current year (T = 0).

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

$$\begin{aligned} \text{CWS} = & + \text{SwCBCU}_{\text{NE}} + \text{SwCBCU}_{\text{KS}} + \text{SwCBCU}_{\text{CO}} \\ & + \text{GwCBCU}_{\text{NE}} + \text{GwCBCU}_{\text{KS}} + \text{GwCBCU}_{\text{CO}} \\ & + \text{State Line Streamflow} \end{aligned}$$

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

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

$$\text{IWS} = \text{Imported Water Supply Credit}$$

$$\text{Hardy One-Year Balance} = \text{Nebraska Allocation} + \text{IWS} - \text{CBCU}_{\text{NE}}$$

$$\text{Guide Rock One-Year Balance} = \text{Hardy One-Year Balance} * 0.89 - 9040$$

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

$\text{GwCBCU}_{\text{NE, KS, CO}}$ = Ground Water Computed Beneficial Consumptive Use for each respective state

$\text{SwCBCU}_{\text{NE, KS, CO}}$ = 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 LRNRD by DNR prior to January 1st of each year.

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 kAF¹?
 - 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 $T - 1$, the prior year) will be substituted for the current year's balance in Checklist B.

¹ In the event it is the second consecutive Compact Call Year, this value will be reduced to 5k AF. For any remaining consecutive Compact Call Years, it will be reduced to zero.

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 kAF²?
 - 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.

Checklist D. Normal Year Administration

- 1) Will the forecast for next year ($T + 1$) result in a 5-year average at Hardy that is greater than 10 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 average at Hardy ($T - 3$, $T - 2$, $T - 1$, $T = 0$, and $T + 1$) that is greater than zero and the average 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.

² In the event it is the second consecutive Compact Call Year, this value will be reduced to 5k AF. For any remaining consecutive Compact Call Years, it will be reduced to zero.

c. Calculation of Allowable Ground Water Depletions for the LRNRD 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 LRNRD in any Compact Call Year. These procedures will be utilized to indicate when additional controls must be implemented by the LRNRD and DNR to ensure compliance with this IMP in the event that the DNR's forecast, provided prior to January 1st of each year, indicates a Compact Call Year. These procedures will incorporate information provided by the LRNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31st of each year following a forecast that indicates a Compact Call Year. The procedures for determining the allowable ground water depletion for the LRNRD are as follows.

The allowable ground water depletion for the LRNRD =

$$(\text{Nebraska Allocation} + \text{IWS} - \text{SwCBCU}_{\text{NE}} - \text{Other NRD CBCU}) * 0.26$$

Where:

Nebraska Allocation = Nebraska available water supply under the Compact

IWS = Imported Water Supply credit

SwCBCU_{NE} = The surface water consumptive use by Nebraska, including net evaporative losses

Other NRD CBCU = The GwCBCU_{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 LRNRD by January 31st, to evaluate the following.

Step 1. LRNRD Estimated Ground Water Depletions

Ground water depletions for the LRNRD will be based on the previous 2-year average (as described in table 2 above), unless such plan provided by the LRNRD indicates that additional restrictions on ground water pumping will be imposed. If the additional restrictions would cause 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 LRNRD 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 LRNRD and represent such information in the RRCA GWM.

Step 2. Potential yield from LRNRD 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 LRNRD. 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 B.1 or C.3 the final step to determine if additional ground water and surface water controls (refer to Section VI.B.1. and VII.H of this IMP) must be implemented is as follows.

Allowable ground water depletions for LRNRD (as determined above) - Forecasted LRNRD's portion of GwCBCU_{NE} (Step 1) + Potential yield from LRNRD surface water leases/agreements, augmentation, etc. (Step 2) + Current Year's Balance (T = 0) - 3333³.

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

If the resulting balance is less than negative one-hundred (-100) acre-feet, the additional ground water and surface water controls (refer to Section VI.B.1. and VII.H 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 D.2 the final step to determine if additional ground water and surface water controls (refer to Section VI.B.1. and VII.H of this IMP) must be implemented is as follows.

Allowable ground water depletions for LRNRD (as determined above) - Forecasted LRNRD's portion of GwCBCU_{NE} (Step 1) + Potential yield from LRNRD 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) acre-feet, no additional ground water and surface water controls will be implemented.

³ 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.

If the resulting balance is less than negative one-hundred (-100) acre-feet, the additional ground water and surface water controls (refer to Section VI.B.1. and VII.H 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 Streamflow Volume

This section of the monitoring plan specifies the calculation which will be completed by the DNR to determine the streamflow volume necessary to ensure Compact compliance in any Compact Call Year. If DNR's forecast, provided prior to January 1st of each year, indicates a Compact Call Year, then these calculations will be made incorporating information provided by the LRNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31st of each year following a forecast that indicates a Compact Call Year. The result of these calculations will be utilized to indicate when additional controls must be implemented by the LRNRD and DNR to ensure compliance with this IMP. When such a Compact Call Year is indicated, the DNR will implement additional surface water controls (refer to Section VII.H 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 streamflow volumes have been achieved at the compliance point. Determination of sufficient streamflow volumes to ensure Compact compliance will be determined through the following procedures.

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

Where:

Forecasted Streamflow = Streamflow for T + 1; (5-year average of state line flows) x 0.41 + 0.23 x HCL content - 27,450.

NRD Management Actions = Actions taken by the LRNRD and/or other basin NRDs to enhance streamflow. 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 LRNRD 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 LRNRD will review expected long term (5 to 20 year) increases in depletions to streamflow 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. Modifications to the Integrated Management Plan

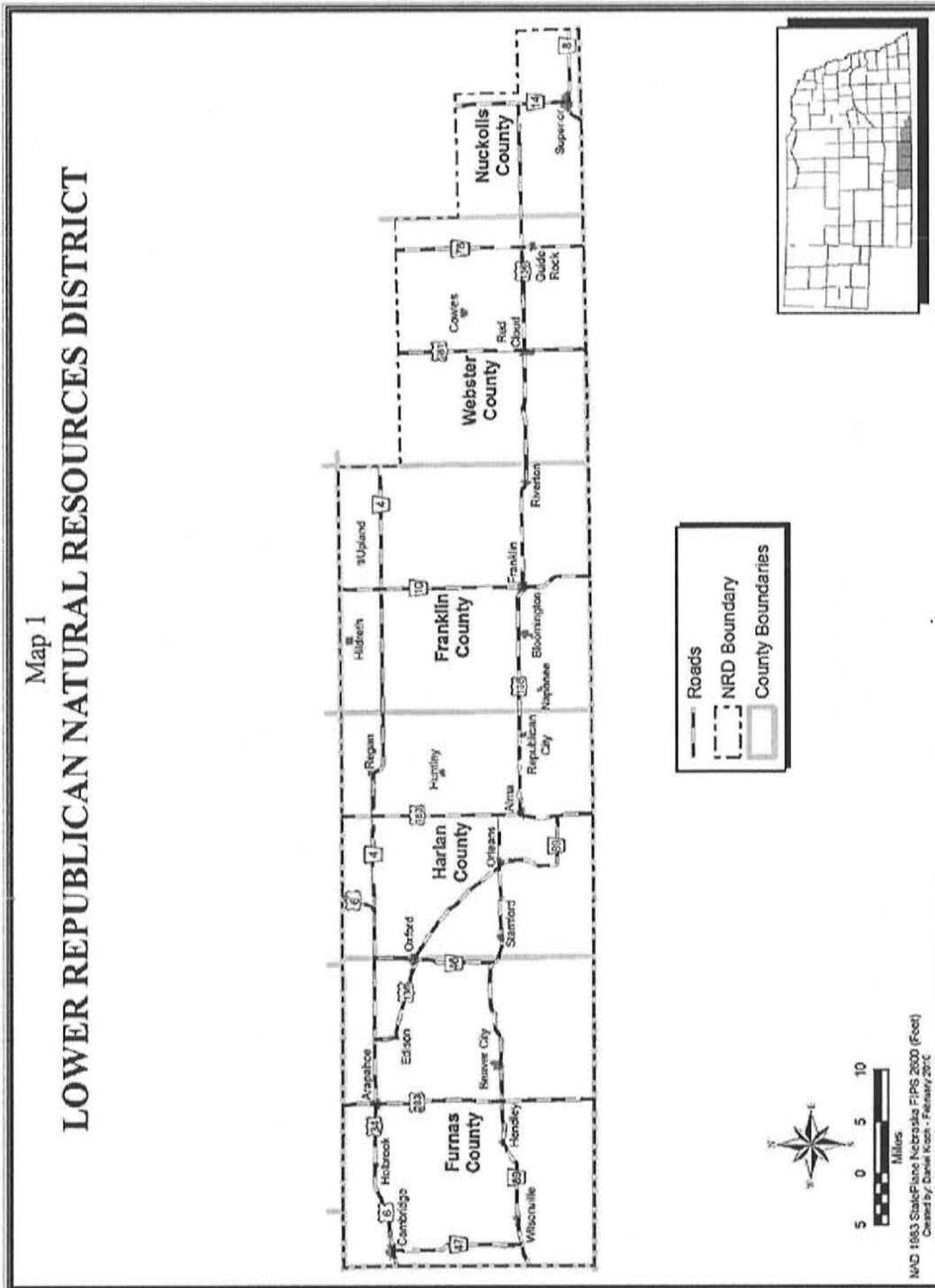
Except as provided herein, modifications to this Integrated Management Plan including the Rules and Regulations contained within this IMP shall require mutual agreement by both the LRNRD and the DNR as to the proposed changes and shall be effective when signed by both LRNRD and DNR after all legally required hearing procedures and publication requirements have been satisfied. After the proposed changes have been agreed to, a joint hearing on those changes will be required. Following the joint hearing, the LRNRD and the DNR shall issue an order reflecting the decision made.

XI. Information Considered

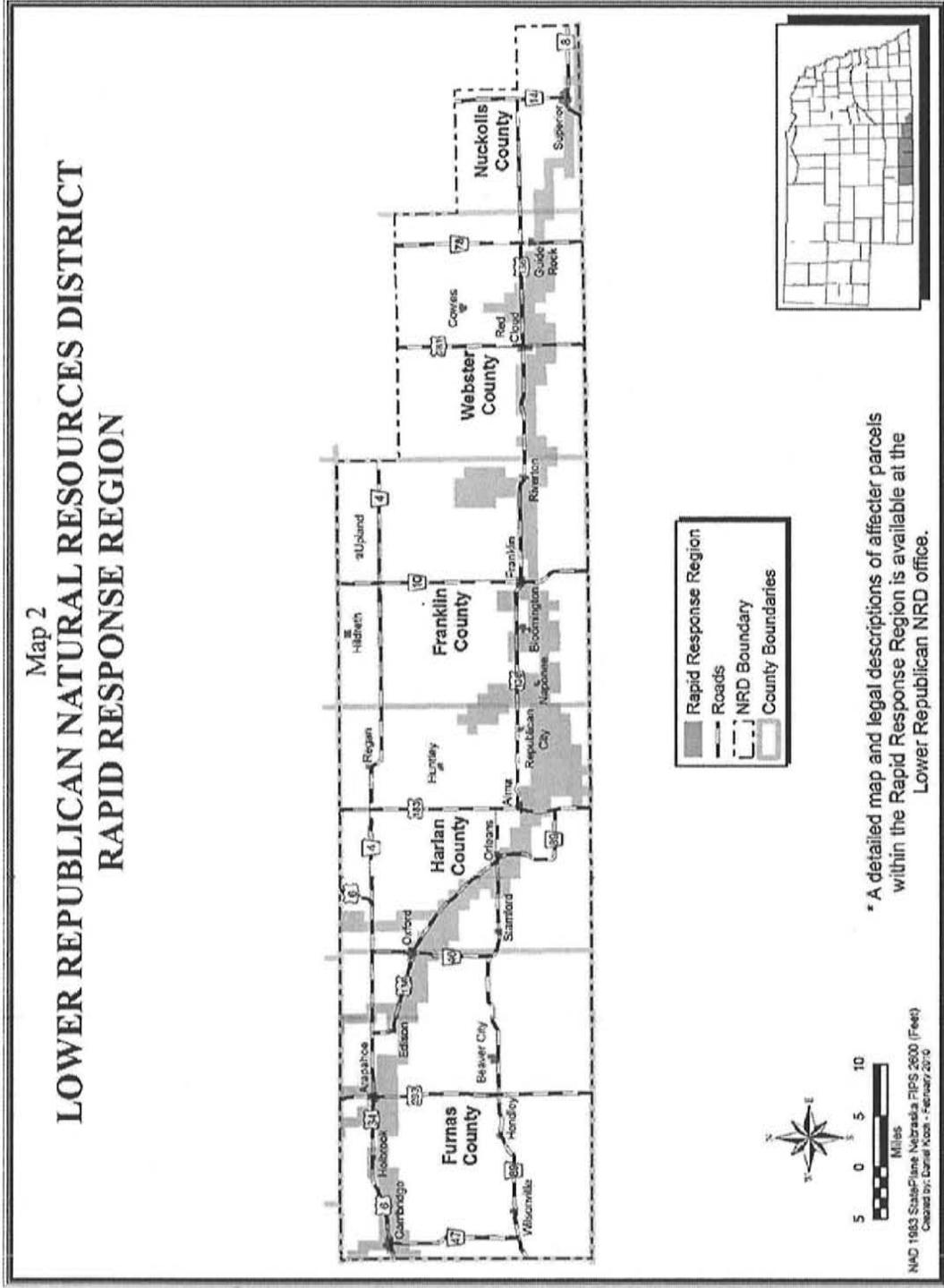
Information used in the preparation and to be used in the implementation of this IMP can be found in:

- The simulation runs of the Republican River Compact Administration Ground Water Model,
- The data tables of the FSS for the Republican River Compact,
- Chapters 3, 6 and 7 of the 1994 Lower Republican NRD Ground Water Management Plan,
- *Arbitrator's Final Decision*, Karl Dreher, June 30, 2009, and
- Additional data on file with the LRNRD and the DNR.

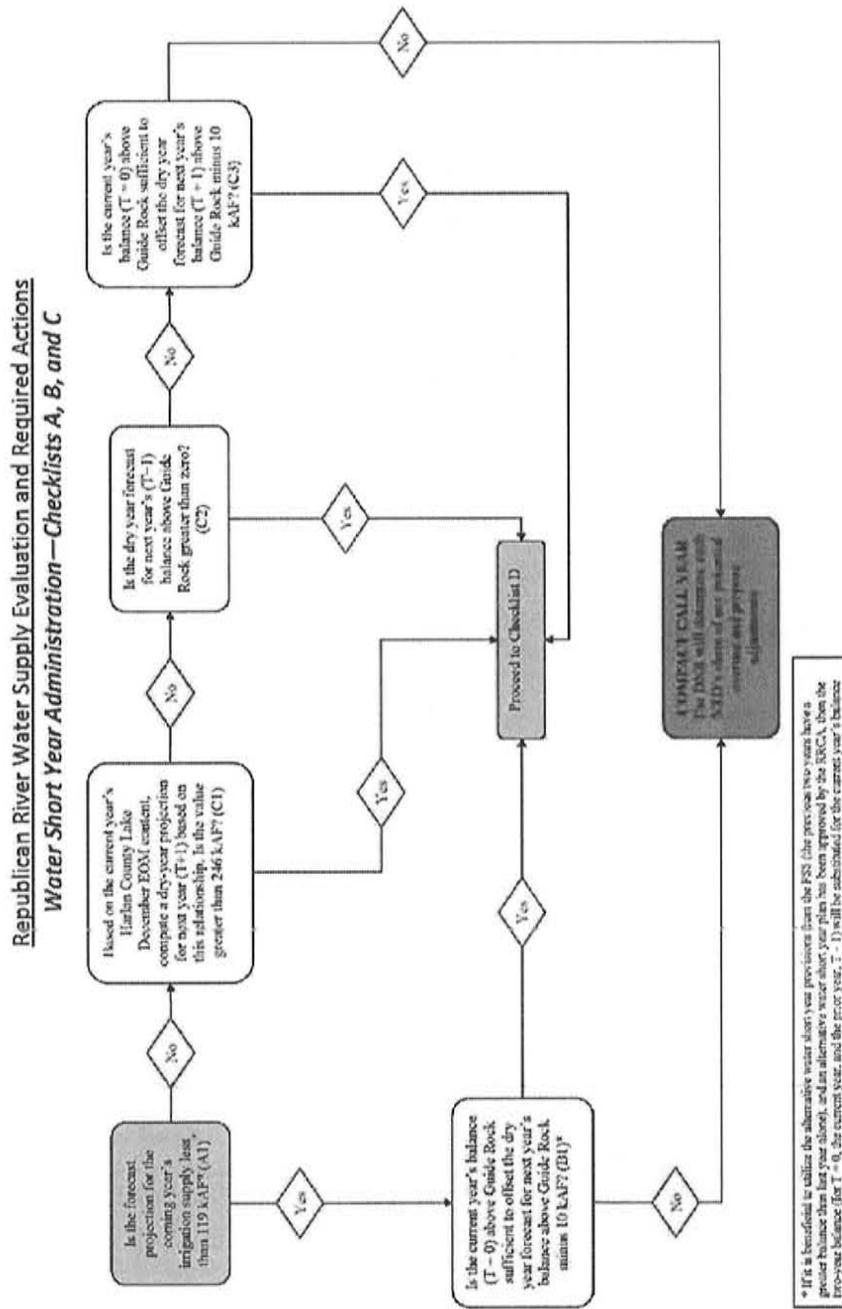
Map 1. Lower Republican Natural Resources District.



Map 2. Lower Republican Natural Resources District Rapid Response Region.



Attachment 1. Republican River Water Supply Evaluation and Required Actions Flowchart.



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

