



Dave Heineman
Governor

STATE OF NEBRASKA
DEPARTMENT OF NATURAL RESOURCES
Brian P. Dunnigan, P.E.
Director

July 30, 2012

IN REPLY TO:

David Barfield
Kansas Commissioner, RRCA
Kansas State Engineer
Division of Water Resources
109 SW 9th Street, 2nd Floor
Topeka, KS 66612-1283

Dick Wolfe
Colorado Commissioner, RRCA
Colorado State Engineer
Colorado Division of Water Resources
1313 Sherman Street, Room 818
Denver, CO 80203

RE: Submittal of Alternative Water-Short Year Plan for Consideration and Approval by the Republican River Compact Administration (RRCA)

Dear Commissioners Barfield and Wolfe:

Nebraska has completed a third generation of Integrated Management Plans (IMPs) and corresponding controls for the Natural Resources Districts in the Republican River Basin. These IMPs provide for various management actions aimed at reducing long-term consumptive uses and additional actions during periods which are identified as "Compact Call Years." Thus, pursuant to the terms of Appendix M of the Final Settlement Stipulation, Nebraska is respectfully submitting an Alternative Water-Short Year Plan for consideration and approval by the Republican River Compact Administration (RRCA).

Appendix M provides for a review period for both Kansas and Colorado through November 1st of the same year in which Nebraska submits a plan prior to August 1st. Nebraska is seeking approval of this plan and understands that, if approved, this plan would expire on January 1, 2016, thus requiring additional future approvals for the plan to be effective beyond January 1, 2016. Thank you in advance for your consideration of this plan.

Sincerely,

A handwritten signature in blue ink that reads "Brian P. Dunnigan".

Brian P. Dunnigan, P.E.
Director

Attachment

**State of Nebraska's Plan for Reduction of
Computed Beneficial Consumptive Uses
under Alternative Water-Short Year
Administration**

**Submitted to the Republican River Compact Administration
on July 30, 2012**

I. Introduction and Background on Alternative Water-Short Year Administration Planning Provisions

Appendix M of the Final Settlement Stipulation (FSS) allows the State of Nebraska to submit one or more plans under Alternative Water-Short Year Administration to the Republican River Compact Administration (RRCA). Under Paragraph 1 of Appendix M, Nebraska may elect to implement an RRCA-approved “Plan for Reduction of Computed Beneficial Consumptive Uses” (Plan) when the projected water supply within Harlan County Reservoir is less than 130,000 acre-feet. When implemented, the Plan would permit Nebraska to use a three-year running average in lieu of the two-year requirements established in Subsection V.B.2.e.i of the FSS.

Pursuant to the terms of Appendix M of the FSS, Nebraska will provide notice prior to April 1st of each year that it intends to implement a Plan. Nebraska could not implement a Plan in any year if in the previous year, Water-Short Year Administration was in effect pursuant to Subsection V.B.1.b. and Nebraska failed to elect the Alternative Water-Short Year Administration in that year. Additionally, for any year that an approved Plan is implemented, such Plan shall be in effect for the remainder of the year unless the projected supply rises above 130,000 Acre-feet. At such time, Nebraska may revoke the Plan by notifying the RRCA. If Nebraska revokes a Plan, the provisions of Subsection V.B.2.e.i., if applicable, shall be in effect. If Nebraska revokes a Plan during the year, it may not resume the Plan in that year.

The terms of Appendix M of the FSS require that each Plan submitted by Nebraska indicate two items:

1. The actions which Nebraska will undertake to reduce its Computed Beneficial Consumptive Uses (CBCU) from the base condition
2. The amount of expected CBCU reduction to result from those actions

The Plan’s designed reductions in CBCU are to be evaluated by the RRCA using methods consistent with the RRCA Accounting Procedures and the RRCA Groundwater Model.

Once Nebraska elects to implement an approved Plan, Nebraska will provide notice to the RRCA by April 1st of its intention to implement a Plan for that year. Following any such notice, a three-year running average of the compact balances above Guide Rock for the current year plus the previous two years will be used to assess Nebraska’s compact compliance in Water-Short Year Administration. Notwithstanding compliance under the provisions of a three-year running average, the two year sum of Nebraska’s current and previous year’s CBCU in excess of its Allocation above Guide Rock, pursuant to Subsection V.B.2. of the Stipulation, shall not exceed the amount of CBCU that the Plan was designed to reduce above Guide Rock.

II. Plan for Reduction of Computed Beneficial Consumptive Uses under Alternative Water-Short Year Administration

As described in Section I of this document, Nebraska must indicate the actions it would take to reduce its CBCU from the base condition (condition at the time of settlement, December 15, 2002) and the amount of expected reduction in CBCU resulting from those actions taken under this Plan. This evaluation is to be conducted in a manner consistent with the RRCA Accounting Procedures and the RRCA Groundwater Model. The following sections will describe Nebraska's intended actions under this Plan and the calculations to determine the expected reductions in Nebraska's CBCU resulting from those actions.

A. Actions undertaken by Nebraska to reduce its Computed Beneficial Consumptive Use from the Base Condition

Since the signing of the FSS, Nebraska has progressively worked to manage its CBCU. Several actions to reduce CBCU have been implemented and/or identified by Nebraska through its Integrated Management Planning (IMP) process. For the purposes of this Plan, Nebraska's actions to reduce CBCU will involve the implementation of Compact Call Year provisions for groundwater curtailments and surface water administration (details explained in attached IMPs). Under the Compact Call Year provisions of the IMPs, alternative management actions may be implemented in lieu of the prescribed groundwater curtailments. These may include:

1. Retirement of irrigated acreage
2. Leasing of surface water CBCU
3. Allocations of groundwater pumping
4. Augmentation of streamflows

In other words, Nebraska will rely on the implementation of the Compact Call Year provisions to serve as the foundation of its actions that it will take to reduce CBCU under this Plan. However, the other management actions (listed above) may be used in lieu of the Compact Call Year provisions if those management actions are determined to be hydrologically equivalent. If Nebraska elects to implement this plan, Nebraska will indicate in its notice to the RRCA (due by April 1) if any alternate management actions will be taken in lieu of the groundwater curtailment.

B. Expected Reduction in Computed Beneficial Consumptive Use Resulting from Nebraska Reductions

Nebraska will seek to maximize the utilization of its Compact allocation while ensuring that the planned reductions in CBCU will be sufficient to ensure compliance with the Compact in each year that this Plan is implemented. The expected reductions in CBCU resulting from Nebraska's actions under this Plan will vary for each time that it is implemented due to previous years Compact accounting balances and fluctuations in

Nebraska's projected allocation, projected CBCU, and projected Imported Water Supply Credit.

For each occasion on which Nebraska informs the RRCA that it intends to utilize this Plan it will be necessary to calculate the expected reduction in CBCU. This calculation of expected CBCU reduction is only necessary to ensure conformance with one of the tests¹ implemented under Alternative Water-Short Year Administration. The expected CBCU reduction is not used to calculate compliance with the three-year average under Alternative Water Short Year Administration.

As explained in Section II.A Nebraska will utilize the Compact Call Year provisions to serve as the foundation for expected CBCU reduction under this Plan. Furthermore, the CBCU reduction resulting from implementation of the Compact Call Year groundwater curtailment has previously been evaluated and provided by Nebraska (Schneider, 2012²). The Nebraska analysis indicates that the first year in which a Compact Call Year groundwater curtailment is implemented the expected CBCU reduction would be 15,089 acre-feet with a second consecutive year yielding an expected CBCU reduction of 38,515 acre-feet. Therefore, the CBCU reduction that this Plan will yield is 0 to 15,089 acre-feet in the first year and 0 to 38,515 in a second consecutive year. For any year that Nebraska intends to implement this Plan, Nebraska will indicate in its notice to the RRCA the expected CBCU reduction required for that year (this value will fall within the ranges specified above).

¹ This test requires that the sum of the previous year and current year deficits above Guide Rock are not greater than the expected decrease in Computed Beneficial Consumptive Use under the plan.

² Nebraska Responsive Expert Report Concerning Nebraska's Future Compliance, James C. Schneider, Ph.D., March 15, 2012 (see spreadsheet titled Table 5 Figure ES1 and Figure 5.xlsx)

III. Methods to Determine Expected CBCU Reductions and Compact Compliance Under this Plan

The scope of the actions taken by Nebraska will be guided by ensuring compliance with the two tests outlined in Section III.J of the RRCA Accounting Procedures and Reporting Requirements (August 12, 2010). This section of the Accounting Procedures provides the analytical approach to be used to assess Nebraska's compliance with the Compact once a Plan has been implemented. Section III.J states:

Nebraska will be within compliance with the Compact as long as the three-year running average difference in Column 8 is positive and the sum of the previous year and current year deficits above Guide Rock are not greater than the expected decrease in Computed Beneficial Consumptive Use under the plan.

Thus, in plain language, when Nebraska implements a Plan it shall be determined to be in compliance with the Compact if it meets two tests. Test One is that Nebraska's two-year sum (previous year plus current year) cannot be negative by more than the expected reduction in CBCU under the Plan and Test Two is that Nebraska achieves a positive three-year running average.

To evaluate Compact compliance under Test One, the expected CBCU reduction must be calculated. Due to the timeframe by which the expected CBCU reduction will need to be calculated and the fact that Nebraska intends to maximize its utilization of its allocation, it will be necessary to develop estimates of the previous year's Compact balance and a projection of the current year's Compact balance. Nebraska has developed and tested methods to achieve this purpose. These methods are contained in the Monitoring and Studies Section of the IMPs for the Lower Republican Natural Resources District, Middle Republican Natural Resources District, and Upper Republican Natural Resources Districts IMPs (see attached).

The value for the expected reduction in CBCU that is necessary under Test One would be calculated by the following equation.

Equation 1: Calculation of expected CBCU reduction when Nebraska implements this Plan

$$0.5 \times |\text{Year}_{-1} \text{CB} + \text{Projected Year}_0 \text{CB}| = \text{Expected CBCU Reduction}$$

Where:

Year₋₁CB = Nebraska's Compact balance for the previous year

Projected Year₀CB = Nebraska's projected Compact balance for the current year if no additional management actions were taken

An example of the equation used to assess compliance with Test One is illustrated in Equation 2 and Table 1. If the Test One balance calculated in Equation 2 is greater than or equal to zero, then Nebraska will be in compliance with Test One.

Equation 2: Calculation of compliance with Test One

$$[\text{Year}_{-1} \text{CB} + \text{Year}_0 \text{CB} + \text{Expected CBCU Reduction (result of Equation 1)}] = \text{Test One Balance}$$

Where:

Year₀CB = Nebraska's Compact balance for the current year

Table 1. Test One Example Data

Test One	
Year	Compact Balance Above Guide Rock (acre-feet)
Previous Year (Year ₋₁ CB)	1,000
Expected CBCU Reduction	7,000
Current Year (Year ₀ CB)	-8,000
Two Year Sum – Expected Decrease in CBCU	0

$$[1,000 + (-8,000) + 7,000] = 0$$

Thus, one can see that for purposes of Test One that the sum of Nebraska's annual Compact balances for the current year and previous year are able to be negative in an amount equal to the expected reduction in CBCU.

In addition to satisfying the requirements of Test One, Nebraska will provide, as necessary, additional reductions in CBCU such that the three-year running average would result in a value greater than or equal to zero (compliance with Test Two). Providing additional reductions of the expected CBCU would only be necessary if the three-year running average were to result in a negative value even after the CBCU reductions used to satisfy the requirements of Test One were implemented. The quantity of additional reductions in the expected CBCU that may be necessary to comply with Test Two would be calculated by the following equation.

Equation 3: Calculation of expected additional CBCU reduction

$$\text{Year}_{-2\text{CB}} + \text{Year}_{-1\text{CB}} + \text{Projected Year}_{0\text{CB}} + \text{Expected CBCU Reduction} = \text{Additional Expected CBCU Reduction}$$

Where:

$\text{Year}_{-2\text{CB}}$ = Nebraska's Compact balance for the year prior to previous year

$\text{Year}_{-1\text{CB}}$ = Nebraska's Compact balance for the previous year

$\text{Projected Year}_{0\text{CB}}$ = Nebraska's projected Compact balance for the current year if no additional management actions were taken

Expected CBCU Reduction = the results from Equation 1, inserted as a positive value

If the additional expected CBCU reduction calculated in Equation 3 is greater than or equal to zero, then no additional CBCU reductions will be necessary. If the value is negative then additional CBCU reductions will be implemented in conjunction with those which may have been identified in Test One.

The expected CBCU reductions and additional expected CBCU reductions are not used in assessing Compliance with Test Two. Compliance with Test Two will be determined by averaging the final Compact balances for the appropriate three years ($\text{Year}_{-2\text{CB}}$, $\text{Year}_{-1\text{CB}}$, and $\text{Year}_{0\text{CB}}$).

ATTACHMENTS

INTEGRATED MANAGEMENT PLANS

**LOWER
REPUBLICAN
NATURAL RESOURCES
DISTRICT**

**INTEGRATED
MANAGEMENT PLAN
(IMP)
OCTOBER 1, 2011**

Effective
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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

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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.

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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.

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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).

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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

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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

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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

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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.

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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.

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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

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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

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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.

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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 x HCL content) + 9,575 Nebraska: - (4x10 ⁻⁷) x (NE lake volume) ² + (0.52) x (NE lake volume) - 42,000
	Streamflow	+ (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, 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).

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

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

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

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

IWS = 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

GwCBCU_{NE, KS, CO} = Ground Water Computed Beneficial Consumptive Use for each respective state

SwCBCU_{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

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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.

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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.

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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.

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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.

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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.

$$\text{Compact Call Streamflow Volume} = \text{Forecasted Streamflow} + \text{NRD Management Actions} + \text{Surface Water Curtailment Benefit}$$

Where:

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

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.

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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

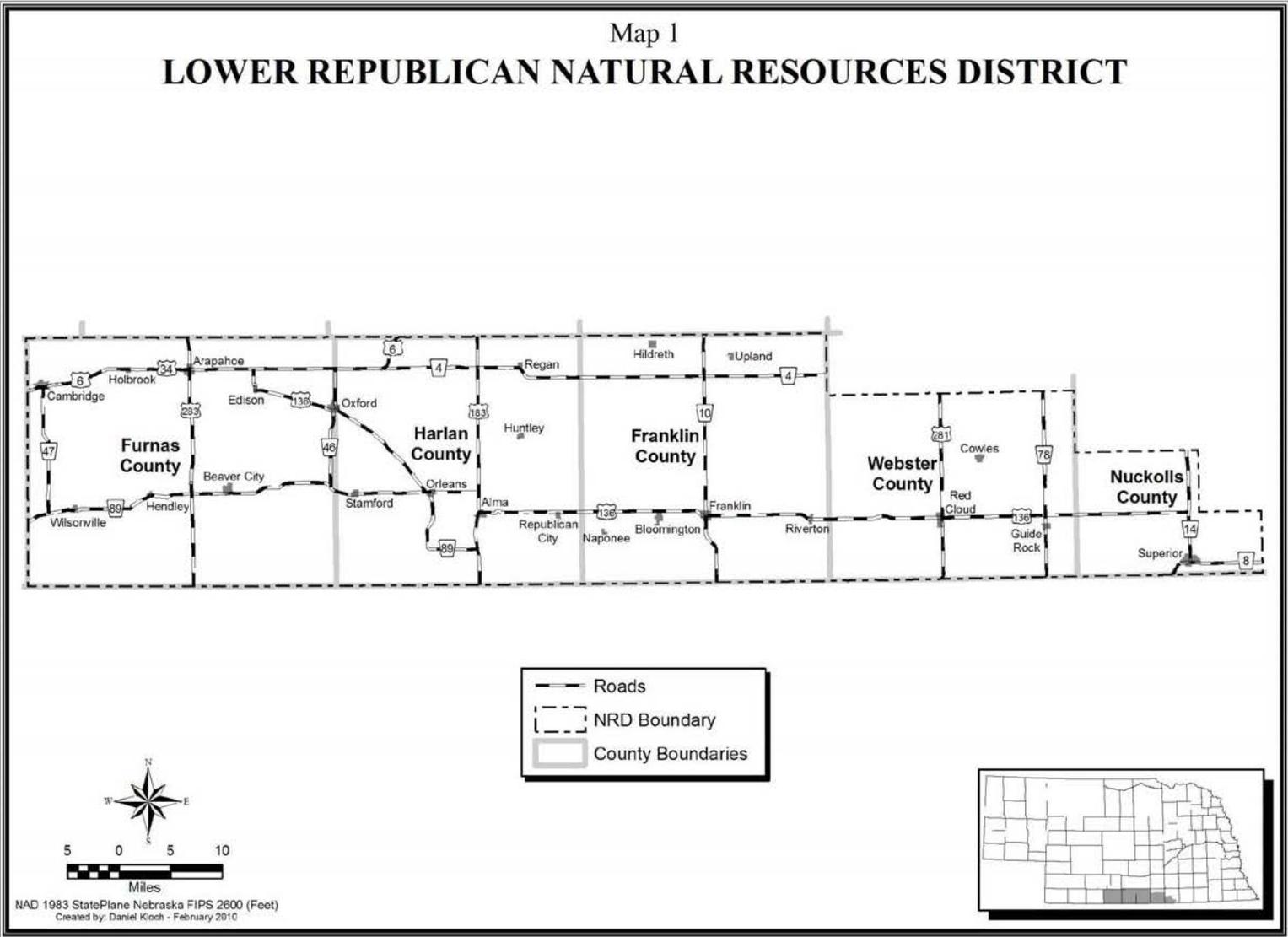
Information used in the preparation and to be used in the implementation of this IMP can be found in:

- 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.

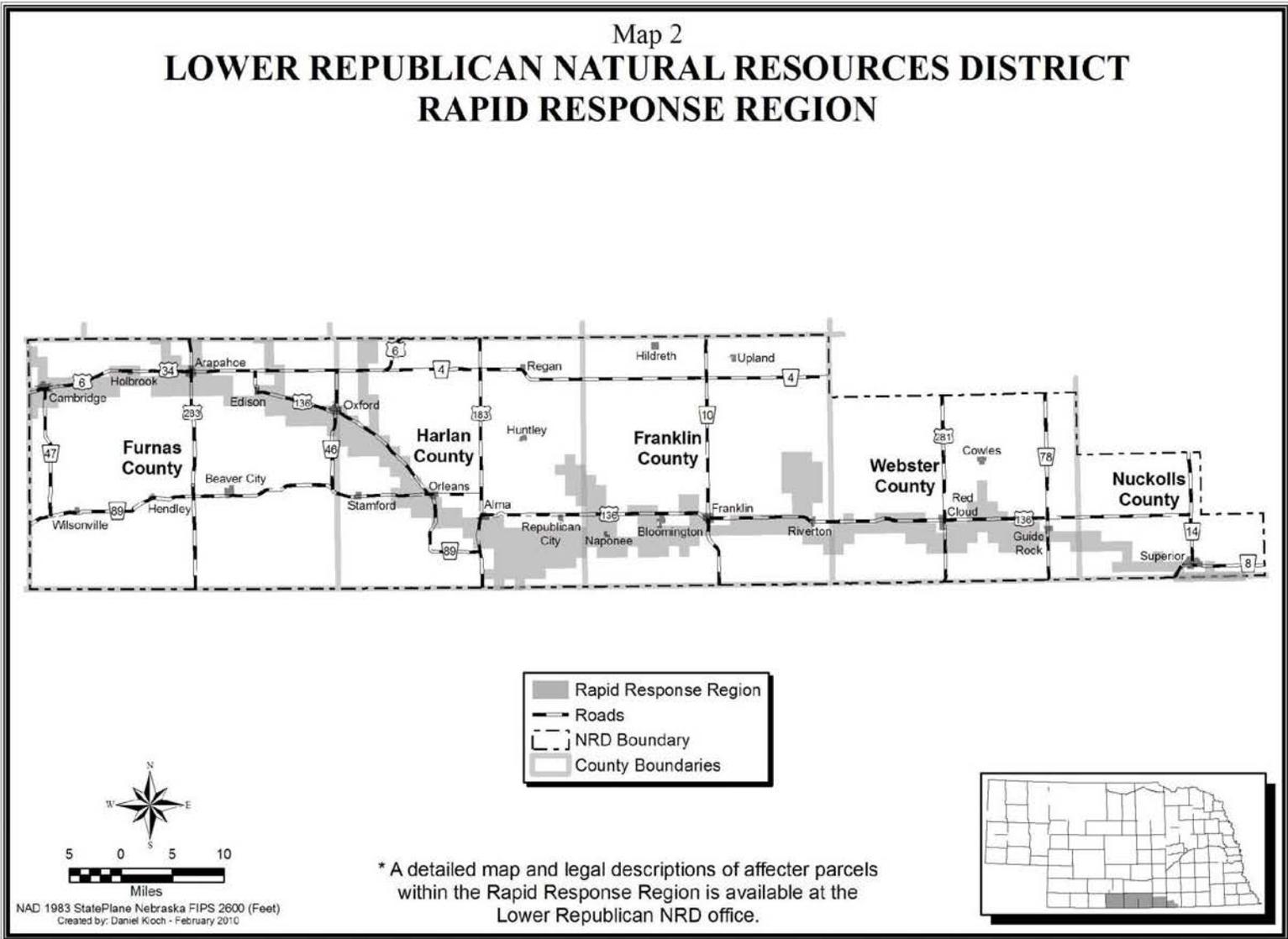
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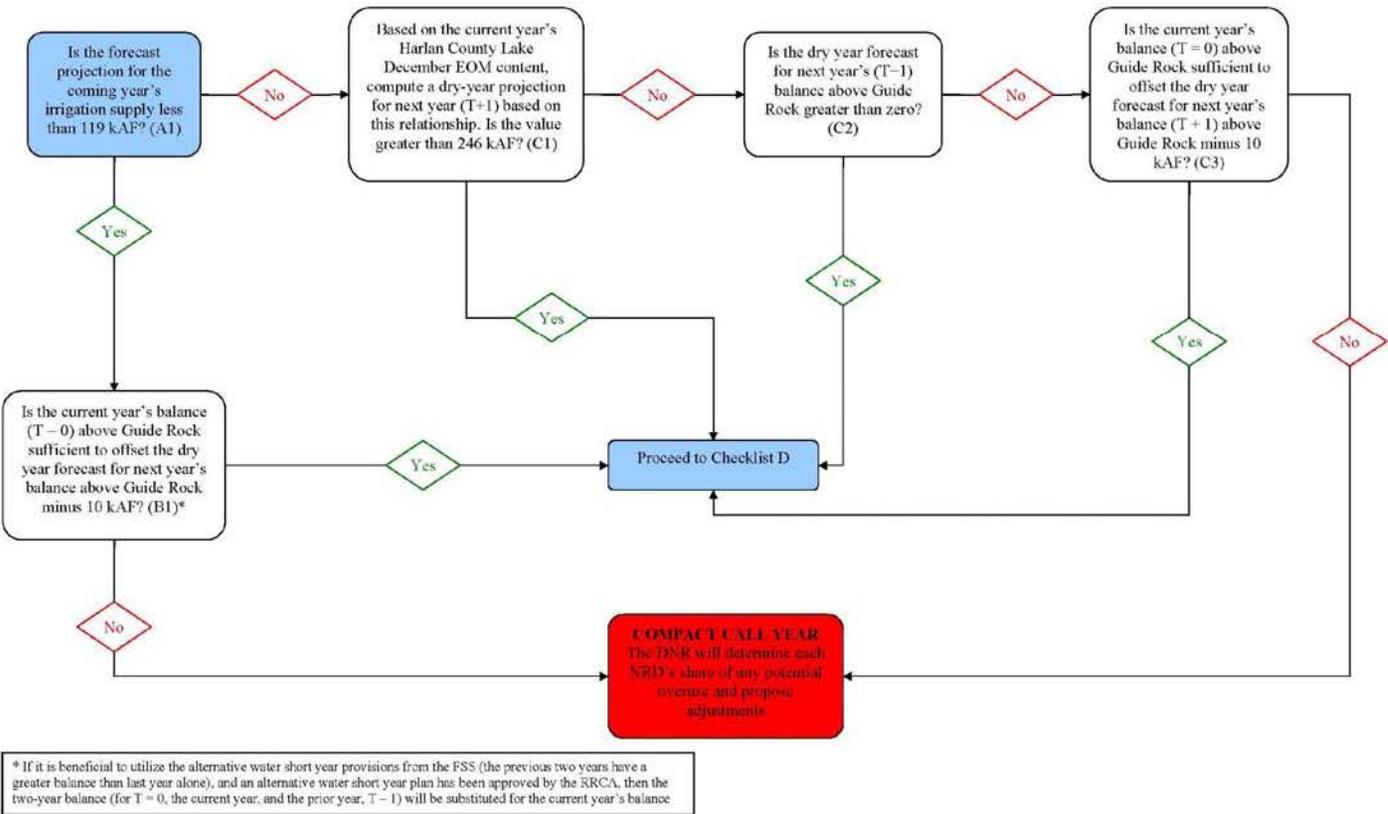
Map 1. Lower Republican Natural Resources District.



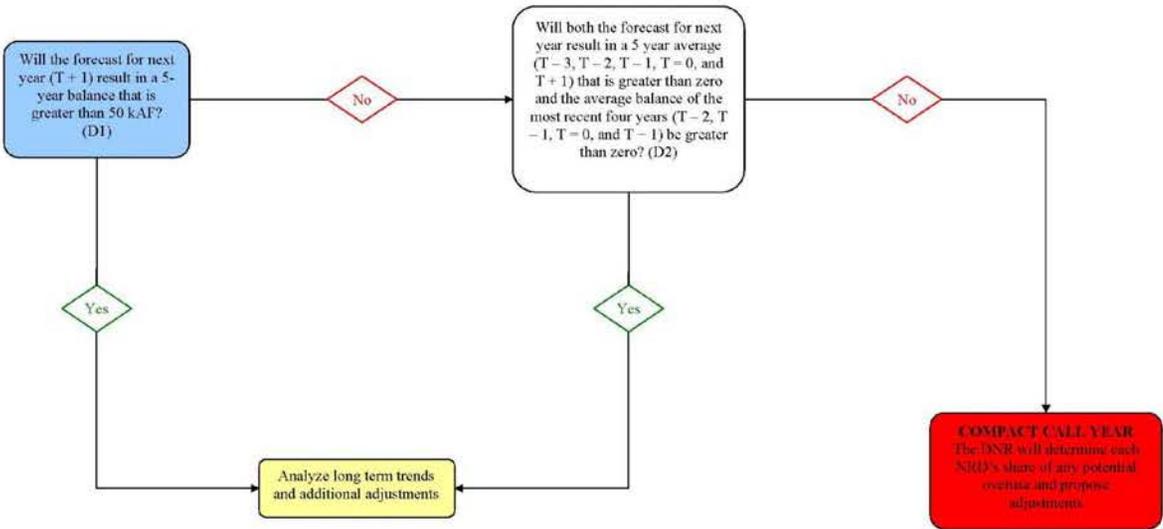
Map 2. Lower Republican Natural Resources District Rapid Response Region.



Republican River Water Supply Evaluation and Required Actions
Water Short Year Administration—Checklists A, B, and C



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



**MIDDLE
REPUBLICAN
NATURAL RESOURCES
DISTRICT**

**INTEGRATED
MANAGEMENT PLAN
(IMP)
NOVEMBER 1, 2010**

Effective
November 1, 2010

Middle Republican NRD

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

I. Authority

This integrated management plan (IMP) was prepared by the Board of Directors of the Middle Republican Natural Resources District (MRNRD) 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 46-753* (Reissue 2004).

II. Background

In 1943 the States of Colorado, Kansas and Nebraska entered into the Republican River Compact (Compact) with the approval of Congress. The Compact provides for the equitable apportionment of the “virgin water supply” of the Republican River Basin. 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 in 1998. After several rulings by the Court and its Special Master and several months of negotiation, all three states entered into a comprehensive agreement known as the Final Settlement Stipulation (FSS). The FSS was approved by the Court on May 19, 2003, and the Special Master’s final report approving the Joint Ground Water Model developed by all three states for use in computing stream flow depletions resulting from ground water use and for computing the imported mound credit was submitted to the Court on September 17, 2003.

In July, 1996, the MRNRD and the other three natural resources districts (NRDs) in the Republican River Basin, pursuant to then Section 46-656.28 of the Nebraska statutes, initiated a joint action planning process with the Department of Water Resources (DWR), the predecessor agency to DNR. In accordance with that process, DWR first made a preliminary determination in 1996 that “there was reason to believe that the use of hydrologically connected ground water and surface water resources is contributing to or is in the reasonably foreseeable future likely to contribute to disputes over the Republican River Compact.” When the studies required by Section 46-656.28 had been completed, DNR issued its conclusions on May 20, 2003, in the form of a report entitled: “Republican River Basin, Report of Preliminary Findings.” Those conclusions included the following determination:

Pursuant to Section 46-656.28 and the preliminary findings in this report, the Department determined that present and future Compact disputes arising out of the use of hydrologically connected ground water and surface water

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resources in the Republican River Basin could be eliminated or reduced through the adoption of a joint action plan.

Following four hearings on that report, DNR made final the preliminary conclusions in the report and the four basin NRDs were so informed. The MRNRD and the other three NRDs each then adopted orders to proceed with developing a joint action plan for integrated management of hydrologically connected surface water and ground water resources in the Basin; preparation of a joint action plan for the MRNRD began soon thereafter.

The Nebraska Legislature adopted LB962 in April of 2004 and it was signed by Governor Johanns on April 15, 2004, and became operative on July 16, 2004. That bill repealed Section 46-656.28 and replaced it with legislation providing for a revised process for addressing hydrologically connected surface water and ground water resources. In order to avoid the need to begin anew the integrated management planning processes that had been commenced but not completed under Section 46-656.28, LB962 provided for the transition of those ongoing planning processes into the newly enacted process now codified as Sections 46-713 to 46-719. The MRNRD and DNR agreed that preparation of a joint action plan had not been completed prior to July 16, 2004; therefore, subsection (3) of what is codified as Section 46-720, governs that transition. Completion of this plan proceeded under the new process and this plan was adopted in accordance with Section 46-718.

The MRNRD and the DNR adopted an IMP effective January 1, 2005, that contained ground water rules and regulations for the 2005-2007 period. That IMP established an average ground water allocation of thirteen (13) inches per certified acre, certified all uses and included several other controls. A goal of the 2005 IMP was to reduce water use by five percent (5%) from the 1998-2002 baseline. The IMP was updated and revised for 2008 – 2012, with a goal of reducing water use by twenty percent (20%) from the 1998-2002 baseline.

Although the MRNRD's allowable depletions to stream flow are limited to 30% 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 MRNRD 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

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 the FSS.

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III. Agreements

The MRNRD 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 MRNRD and the DNR agree that the IMP for the district shall keep the district's average net depletions to an amount within thirty percent (30%) of the State's average allowable ground water depletions. Based upon its calculations the DNR believes that at the time this IMP became effective, a twenty percent (20%) reduction from the 98-02 pumping volume would be sufficient, without additional stream flow augmentation, to keep the district's average net depletions within the MRNRD's thirty percent (30%) share of the State's allowable ground water depletions. As described in sections below, during periods of low water supply additional reductions from the 98-02 pumping volume may be necessary.

The DNR has determined pumping volumes, depletion volumes, and depletion percentages for the period 1998-2002 defined as "1998-2002 Baselines". The pumping volumes are used throughout this IMP and are referenced as the "98-02 pumping volume". DNR, through the use of the Republican River Compact Administration Ground Water Model, has also determined each District's impact on stream flow for the baseline period and those impacts are defined as "98-02 depletion volume". Those depletion volumes have resulted in depletion percentages used throughout this IMP and defined as "98-02 depletion percentages."

The failure of any District to adopt, implement, or enforce an IMP adequate to meet their proportionate share of the responsibility to achieve and maintain Nebraska's compliance with the Compact shall not by itself require any additional action by the other Districts. Neither the MRNRD nor DNR will require the IMP to be amended solely for the purpose of changing the responsibility of water users within the MRNRD based on the failure of the other Basin NRDs to implement or enforce an IMP to meet their share of the responsibility to keep Nebraska in compliance with the Republican River Compact.

IV. Definitions

- A. 1998-2002 Baselines** - The depletions to stream flow, in the Nebraska portion of the Republican River Basin, as a result of ground water uses in the years 1998-2002 inclusive.

98-02 Pumping Volume:

URNRD-531,763 AF, MRNRD-309,479 AF, LRNRD-242,289 AF

98-02 Depletion Volume:

URNRD-74,161 AF, MRNRD-52,168 AF, LRNRD-43,954 AF

98-02 Depletion Percentage:

URNRD-44%, MRNRD-30%, LRNRD-26%

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- B. Allowable Stream flow Depletions** - the maximum amount of stream flow depletion in the Republican River Basin that can occur in a given year without Nebraska exceeding its allocation. Allowable stream flow depletions are the sum of the allowable ground water depletions and the allowable surface water depletions.
- C. Allowable Ground Water Depletions** - the maximum level of depletions to stream flow that may occur as a result of ground water pumping of wells within the Republican River Basin that can occur in a given year without Nebraska exceeding its allocation.
- D. Allowable Ground Water Depletion for the MRNRD** - the annual mean depletions to stream flow resulting from the impact of ground water pumping in the MRNRD. These depletions shall average no greater than 30% of the allowable ground water depletion. The average shall be computed using the allowable annual ground water depletion for the same years as are used to determine the averages for Nebraska's compliance with the FSS.
- E. Supplemental Programs** – as used in this plan, refers to, but is not limited to; surface water or ground water augmentation projects, river flow enhancement projects, incentive programs, riparian management projects and other projects that may reduce the District's net depletions to stream flow.
- F. Compliance Standard** - the criteria that will be used to determine whether the controls of this IMP and the MRNRD'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 Depletion** – the actual ground water depletion for the MRNRD less any reduction in stream flow depletions or increase in accretions to the stream resulting from supplemental projects 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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V. Goals and Objectives

Pursuant to *Neb. Rev. Stat. § 46-715* (Reissue 2004), the goals and objectives of this IMP must have a purpose of “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 MRNRD will meet its responsibility under *Neb. Rev. Stat. § 46-715*, including meeting the obligations under the FSS, by adopting revised rules to implement the IMP with regulations and other supplemental programs.

The following goals and objectives are adopted by the MRNRD and the DNR to achieve the purpose stated above:

A. Goals:

1. In cooperation with the other basin NRDs and the Nebraska Department of Natural Resources, maintain compliance with the Compact as adopted in 1943 and as implemented in accordance with the FSS approved by the United States Supreme Court on May 19, 2003.
2. Ensure that ground water and surface water users within the MRNRD assume their share, but only their share, of the responsibility to keep Nebraska in compliance with the Compact.
3. Provide that MRNRD’s share of compliance responsibility and impacts to stream flow be apportioned within the MRNRD in an equitable manner and by minimizing, to the extent possible, adverse economic, social, and environmental consequences.
4. Reserve and protect any increases to stream flow available from regulation or supplemental programs, enacted or implemented to maintain Compact compliance, from any use that would negate the benefit of such regulation or programs, to the extent allowed by statute and the surface water controls of this IMP.
5. 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.

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 MRNRD.

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2. Ensure that administration of surface water appropriations in the basin is in accordance with the Compact and in full compliance with Nebraska law and the surface water controls of this IMP.
3. Achieve, on average, a twenty percent (20%) reduction in 98-02 pumping volume under average precipitation conditions.
4. Maintain, on average, the MRNRD net depletions at or below thirty percent (30%) of the allowable ground water depletion.
5. After taking into account any reduction in beneficial consumptive use achieved through district or basin-wide supplemental projects and other projects developed at the basin or district level with the expressed purpose or result of reducing consumptive use or increasing stream flow, 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 MRNRD to 30% of Nebraska's allowable ground water depletions to stream flow in such years. Compact Call Years will be determined through the procedures outlined in Section X of this IMP.
6. Achieve the required reductions in water use through a combination of regulatory and supplemental programs designed to reduce beneficial consumptive use. To the extent funds are available, incentive programs will be made available to as many MRNRD water users as possible.
7. The MRNRD and the DNR will investigate or explore methods to manage the impact of vegetative growth on stream flow.
8. Develop a procedure to provide offsets for new consumptive uses of water so that economic development in the MRNRD may continue without producing an overall increase in ground water depletions as a result of new uses.

VI. Map

The area subject to this IMP is the geographic area within the boundaries of the MRNRD (see Map 1). The Rapid Response Region is shown as a sub-area within the boundaries of the MRNRD, (see Map 2). The Quick Response region is shown as a sub-area within the boundaries of the MRNRD, (see map 3).

VII. Ground Water Controls

In accordance with *Neb. Rev. Stat.* § 46-715, one or more of the ground water controls authorized by *Neb. Rev. Stat.* § 46-739 and *Neb. Rev. Stat.* § 46-740 shall be adopted for the purpose of implementing this plan. Other authorities, provided for in the Ground Water Management and Protection Act, may be used to supplement

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these controls. These controls, along with any applicable supplemental programs, shall be consistent with the goals and objectives of this plan and be sufficient to meet the compliance standards set forth below, ensure that the state will remain in compliance with the Compact, and protect the 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 depletion caused by surface and ground water uses begun after July 16, 2004, the date the river basin was designated as fully appropriated, in accordance with *Neb. Rev. Stat.* §§ 46-720 and 46-713-46-715,

The Rules and Regulations – Ground Water Management Area in the Middle Republican Natural Resources District contains the rules for implementation of controls required by the FSS and other controls needed for the effective administration of a ground water management subarea for integrated management. The actions proposed by the FSS were rules and regulations for transfers, meters, and certification of acres. In addition, a well drilling moratorium and a ban on the increase of irrigated acres were also implemented. The compliance standard and management activities listed below will be or have been implemented to achieve and maintain Compact compliance.

Amendments to the MRNRD rules and regulations dealing with the requirements of *Neb. Rev. Stat.* §46-715(4)(b), and §46-715(4)(c) shall have the concurrence of DNR. The MRNRD may otherwise amend those regulations without the approval of the DNR so long as the compliance standards listed below are met.

The Determination of whether the MRNRD is in compliance with the compliance standards shall be made prior to the regular annual meeting of the RRCA and shall be based on each year's annual Compact accounting.

A. Compliance Standards

1. Purpose

These Compliance Standards are established by DNR and MRNRD to assess whether the course of action taken by the MRNRD, with the intention of providing a proportionate share of assistance to the State, is sufficient for the State to maintain compliance with the FSS and the Compact. The action taken by the MRNRD 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 district.

2. Duration

On an annual basis the DNR and MRNRD shall examine the sufficiency and effectiveness of the Compliance Standards to determine if amendments or

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revisions to this IMP are necessary to ensure the State's compliance with the FSS and the Compact. Nothing contained herein shall prohibit or preclude any amendment or revision, at anytime, by the DNR and MRNRD, 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 allowed by *Neb. Rev. Stat. §46-715*.

3. Standards

The MRNRD 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 X - Monitoring and Studies. Section X 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 depletion percentage, and the annual forecast as outlined in Section X. The standards are

- a. 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 247,580 acre-feet over the long term. The ground water pumping volume for any single year may be above 247,580 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 MRNRD. The necessity for continuing this annual reduction shall be reevaluated by DNR and the MRNRD in 2015.
- c. The district's net depletions to stream flow shall average no greater than thirty percent (30%) of the State of Nebraska's allowable ground water depletions as computed using the RRCAGWM. 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 MRNRD 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.

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1. During Compact Call Years, the MRNRD 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 31 of each year for evaluation. If such management actions are insufficient to ensure compliance with this IMP, the MRNRD 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 X 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 MRNRD 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 MRNRD 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 a moratorium on new uses with the exceptions noted in the FSS.
4. Limit or prevent the expansion of irrigation uses.
5. Maintain requirement for metering of all ground water uses according to MRNRD standards.
6. Provide for transfers according to NRD standards.
7. The MRNRD shall make available to DNR copies of NRD actions taken on variances and consult with DNR to minimize or eliminate any impact, relating to Compact compliance, that may arise as a result of a variance granted by the district.
8. DNR will consult with the MRNRD when considering applications for permits under the Municipal and Rural Domestic Ground Water Transfers Permit Act, the Industrial Ground Water Regulatory Act or other such permitting actions by the DNR that will have an impact on water supplies of the Republican River Basin.
9. The MRNRD will work with DNR to achieve the maximum amount of benefit in the accounting of leased or purchased water, augmentation projects or in similar projects.

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VIII 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*. The surface water controls that will be continued and/or begun by the DNR are as follows:

- A. DNR will do the following additional surface water administration as required by the FSS:
 - 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 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 will take actions to minimize the bypass flows at Superior-Courtland Diversion Dam in concert with Kansas and in collaboration with the United States, and in the manner described in Appendix L to the FSS.
- 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 also will be required to be metered. All meters shall have a totalizer and shall meet DNR standards for installation, accuracy and maintenance. All appropriators will be monitored closely 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, and will be continued. Exceptions may be granted to the extent permitted by statute 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 FSS required inventory of over fifteen (15) acre-feet capacity reservoirs.

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- 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 and related DNR rules or the criteria found in *Neb. Rev. Stat.* §§46-2,120 to 46-2,130 and related DNR rules.
- E. The DNR completed the adjudication process for 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 will be used by the DNR to monitor use of surface water and to make sure that unauthorized irrigation is not occurring. The DNR also will be proactive in initiating subsequent 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 X 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 MRNRD and other basin NRDs, determines that yearly administration is no longer needed to ensure Compact compliance, pursuant to Section X.

IX. Augmentation and Incentive Programs

The MRNRD 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 MRNRD. 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 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 the Conservation Reserve Enhancement Program (CREP) and Environmental Quality Incentives Program (EQIP) operated by the U.S. Department of Agriculture.

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Projects that have a net effect of reducing consumptive use or increasing stream flow can originate from many sources. The MRNRD will initiate these types of projects when possible and participate in projects sponsored by other groups within their capabilities.

The MRNRD, through the Republican River Basin Coalition, intends to establish and implement river flow enhancement projects.

The MRNRD, alone, and/or through the Republican River Basin Coalition, may use any or all available funding authorities to establish and implement river flow enhancement projects or any other projects that result in an increase to streamflow or a decrease in ground water depletions.

Any reductions in depletions to stream flow 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 stream flow 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 X.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 MRNRD to provide compensation to water users that are required to forgo water use to allow the MRNRD and the State to comply with the compact. This may be in addition to or as part of any other MRNRD incentive or retirement program developed to facilitate compact compliance.

X. 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 MRNRD 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

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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 MRNRD 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 X.

Table 1. Important Dates and Objectives

Date	Objective
Prior to February 1	MRNRD 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 MRNRD with their determination of whether the MRNRD 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 MRNRD notifying them of potential Compact call determination for the coming year (T+1).
November 15 – January 1	MRNRD 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 stream flow depletions and determination of Compact Call Years.
Prior to January 31	MRNRD 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 by the MRNRD and the DNR. The DNR and the MRNRD will jointly pursue and/or evaluate studies, contingent upon budget and

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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 MRNRD: (1) crop rotation; (2) vegetation management; (3) irrigation scheduling; (4) a survey of the type and location of irrigation systems throughout the MRNRD; (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 MRNRD 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 MRNRD 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 MRNRD 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 MRNRD shall make copies of district actions taken on variances, offsets, and similar actions available to DNR.

The DNR agrees to make available to the MRNRD 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.

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In the event any materials are withheld by either DNR or MRNRD 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 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 MRNRD 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 MRNRD 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 MRNRD 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

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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 X.B.2.b, X.B.2.c, X.B.2.d and X.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 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	Ground water Consumptive Use and Imported Water Supply Credit	Average values for T = 0 and T - 1
T + 1 (Coming Irrigation Season)	Surface Water Consumptive Use	Colorado: Average of T - 1 and T - 2 use Kansas: + (.1858 x HCL content) + 9,575 Nebraska: - (4x10 ⁻⁷) x (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

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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 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.

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

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

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

IWS = 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

GW CBCU_{NE, KS, CO} = Ground Water Computed Beneficial Consumptive Use for each respective state

SW CBCU_{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

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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 X.B.2.a. This process will be completed and provided to the MRNRD by DNR prior to January 1 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 X.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.

¹ 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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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 X.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 X.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 X.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 X.B.2.c. of this IMP.

² 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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c. Calculation of Allowable Ground water Depletions for the MRNRD 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 MRNRD in any Compact Call Year. These procedures will be utilized to indicate when additional controls must be implemented by the MRNRD 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 MRNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31 of each year following a forecast that indicates a Compact Call Year. The procedures for determining the allowable ground water depletion for the MRNRD are as follows.

The Allowable ground water depletion for the MRNRD =
(Nebraska Allocation + IWS – SWCBCU_{NE} – Other NRD CBCU) * 0.30

Where:

Nebraska Allocation = Nebraska available water supply under the Compact

IWS = Imported Water Supply credit

SWCBCU_{NE} = The surface water consumptive use by Nebraska, includes 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 MRNRD by January 31, to evaluate the following.

Step 1. MRNRD Estimated Ground water Depletions

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

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Step 2. Potential yield from MRNRD 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 MRNRD. 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 X.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 VII.B.1. and VIII.F of this IMP) must be implemented is as follows.

Allowable ground water depletions for MRNRD (as determined above) - Forecasted MRNRD's portion of GWCBCU_{NE} (Step 1) + Potential yield from MRNRD 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) 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 VII.B.1. and VIII.F of this IMP) must be implemented. This potential yield will be incorporated as NRD management actions in section X.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 VII.B.1. and VIII.F of this IMP) must be implemented is as follows.

Allowable ground water depletions for MRNRD (as determined above) - Forecasted MRNRD's portion of GWCBCU_{NE} (Step 1) + Potential yield from MRNRD 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)

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.

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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 negative, the additional ground water and surface water controls (refer to Section VII.B.1. and VIII.F of this IMP) must be implemented. This potential yield will be incorporated as NRD management actions in section X.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. If DNR's forecast, provided prior to January 1 of each year, indicates a Compact Call Year, then these calculations will be made incorporating information provided by the MRNRD (contracts for water leasing, augmentation, etc.) to the DNR by January 31 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 MRNRD and DNR to ensure compliance with this IMP. When such Compact Call Year is indicated, the DNR will implement additional surface water controls (Section VIII.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.

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 x HCL content - 27,450

NRD Management Actions = Actions taken by the MRNRD 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.

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e. Additional adjustments related to long-term trends

The DNR and MRNRD 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 MRNRD 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 VII, VIII, and X of this IMP until normal operations resume.

XI. Information Considered

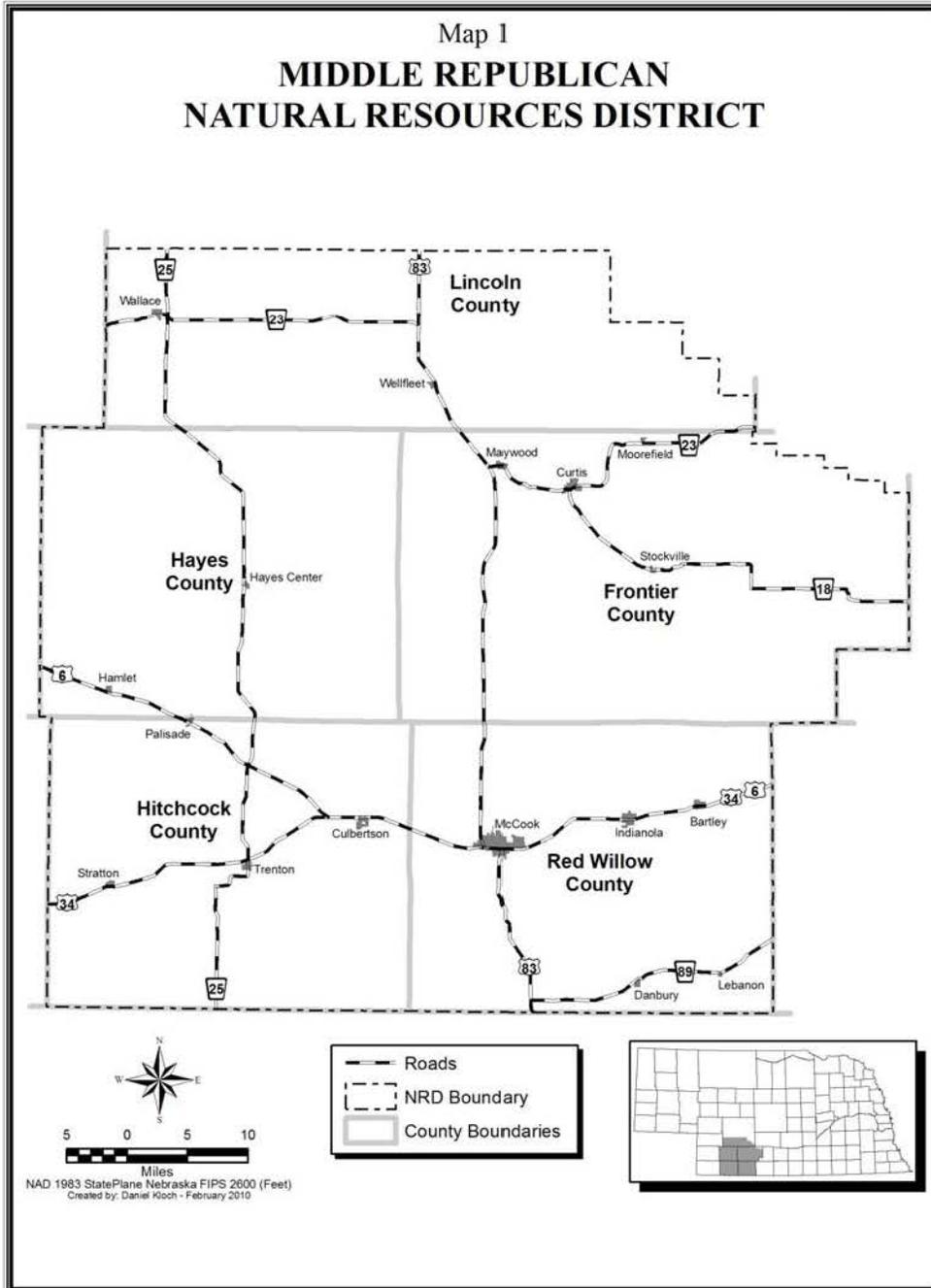
Information used in the preparation and to be used in the implementation of this IMP can be found in:

- Simulation runs of the Republican River Compact Administration Ground Water Model,
- Data tables of the Final Settlement Stipulation for the Republican River Compact,
- Chapters 2 and 3 of the 1994 Middle Republican NRD Ground Water Management Plan,
- Arbitrator's Final Decision, Karl Dreher, June 30, 2009, and
- Additional data on file with the MRNRD and the DNR.

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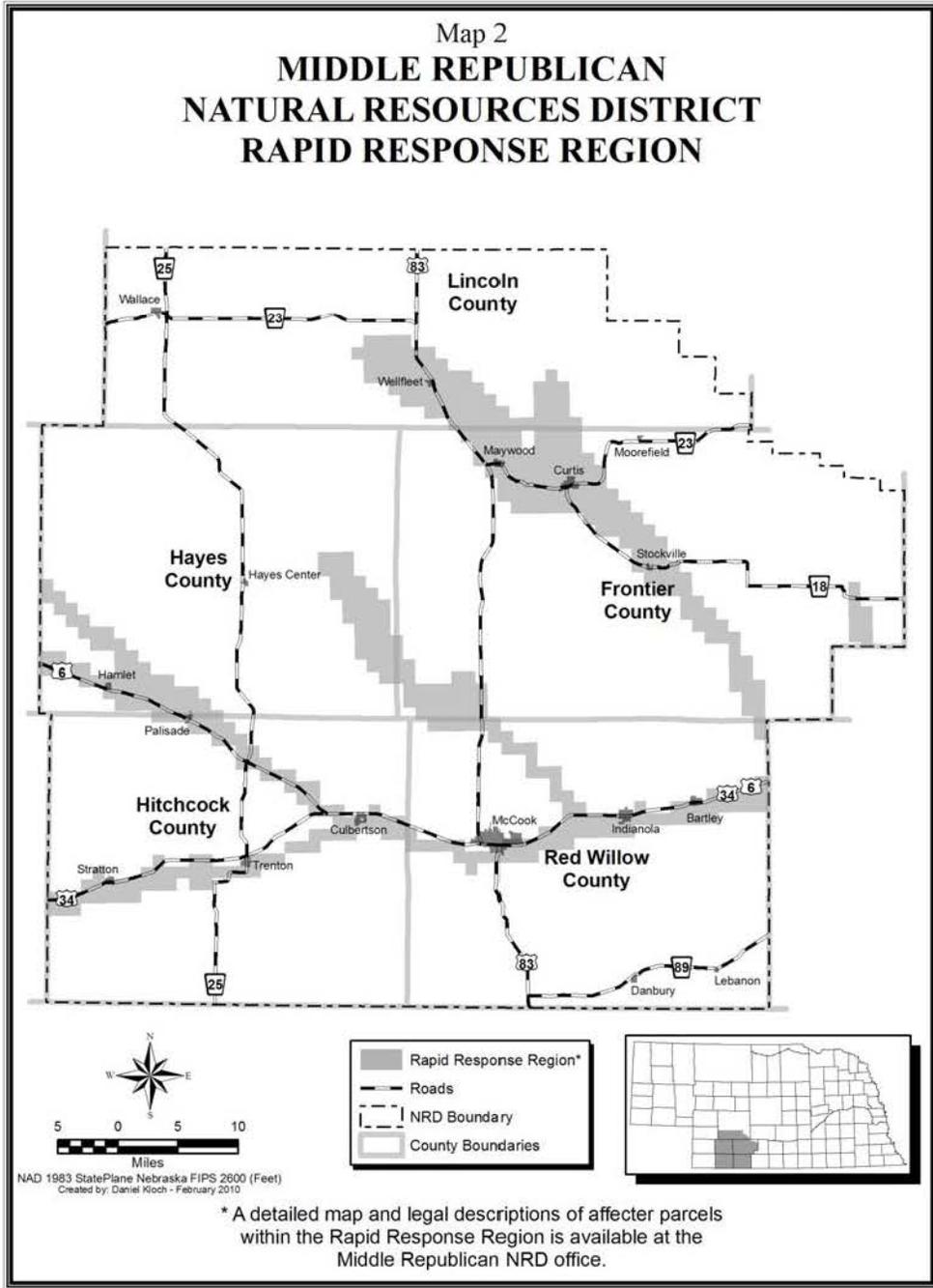
MAP 1. Middle Republican Natural Resource District



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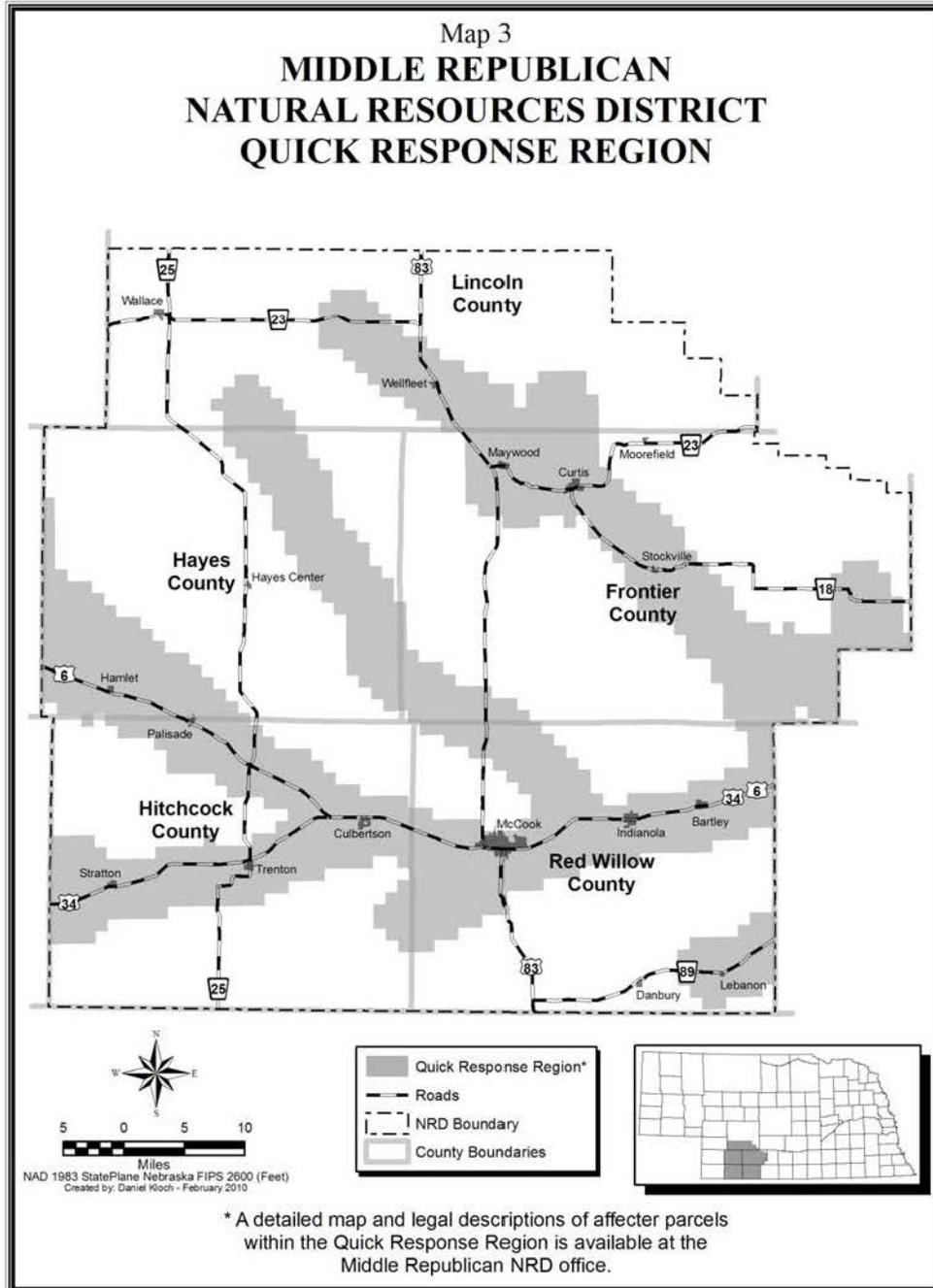
MAP 2. Middle Republican Natural Resource District Rapid Response Region



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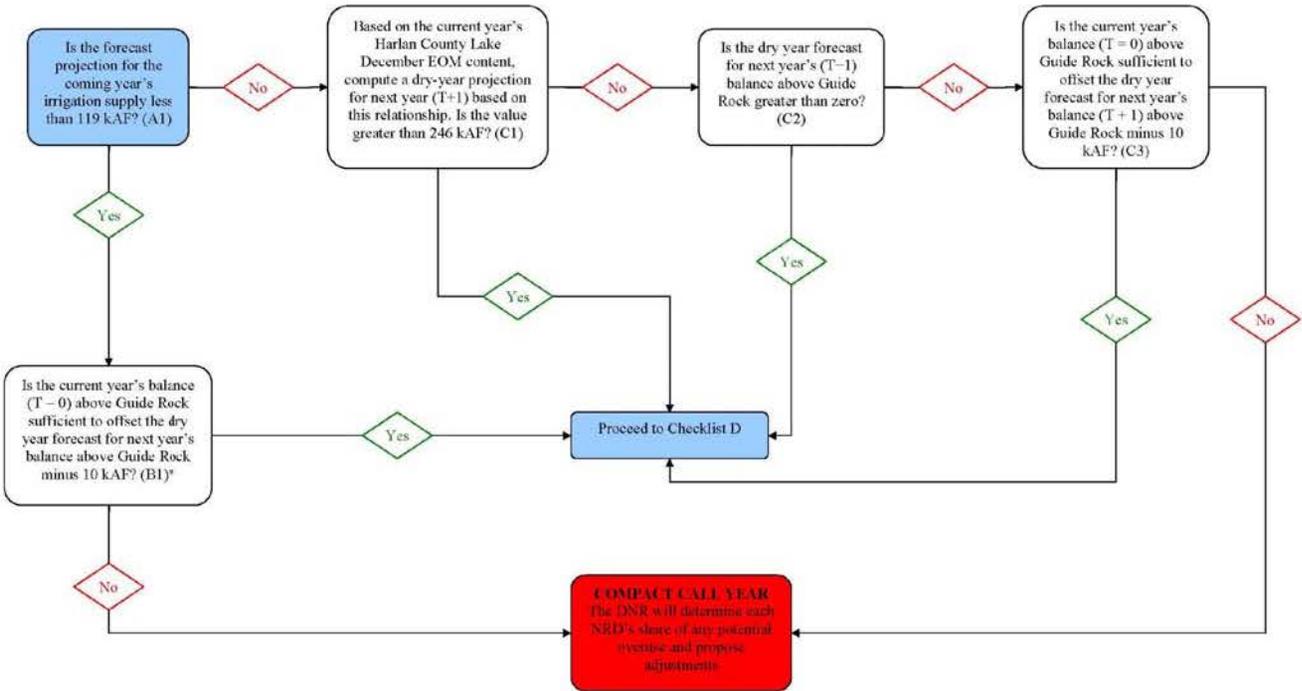
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MAP 3. Middle Republican Natural Resource District Quick Response Region



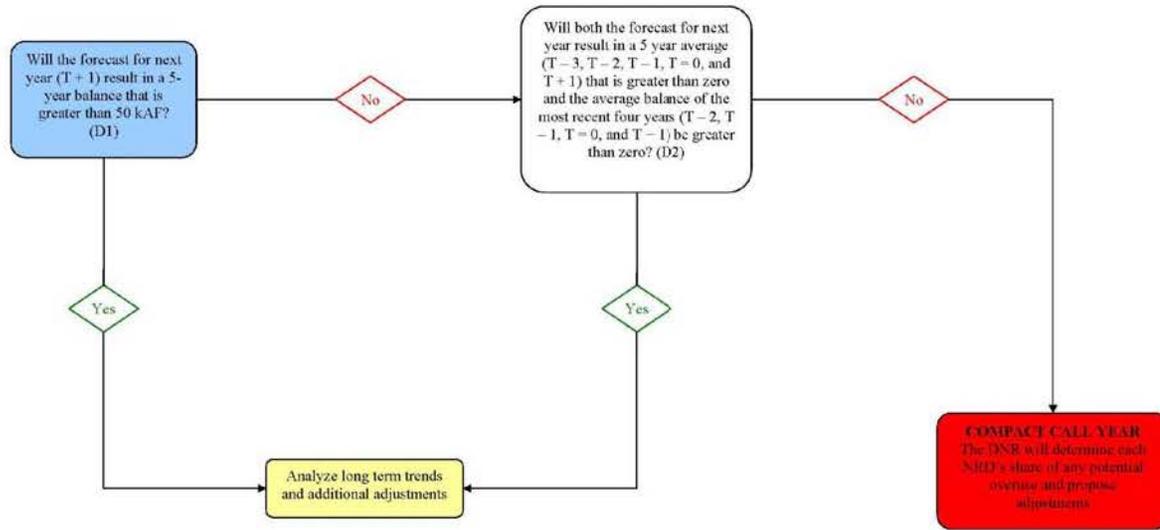
ATTACHMENT 1. Republican River Water Supply Evaluation and Required Actions

Republican River Water Supply Evaluation and Required Actions
Water Short Year Administration—Checklists A, B, and C



* 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

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



**UPPER
REPUBLICAN
NATURAL RESOURCES
DISTRICT**

**INTEGRATED
MANAGEMENT PLAN
(IMP)
NOVEMBER 1, 2010**

Effective
November 1, 2010

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 3rd, 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: - (4x10 ⁻⁷) x (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.

$$CWS = + SwCBCU_{NE} + SwCBCU_{KS} + SwCBCU_{CO} + GwCBCU_{NE} + GwCBCU_{KS} + GwCBCU_{CO} + \text{Stateline Stream flow}$$

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

$$CBCU_{NE} = SwCBCU_{NE} + GwCBCU_{NE}$$

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IWS = Imported Water Supply Credit

Hardy One Year Balance = Nebraska Allocation + IWS – CBCU_{NE}

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_{NE, KS, CO} = Ground water Computed Beneficial Consumptive Use for each respective state

SW CBCU_{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 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 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 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 kAF²?
 - a. Yes. Proceed to Checklist D.

¹ 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.

² 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 =
(Nebraska Allocation + IWS - SWCBCU_{NE} - 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 $GWCBCU_{NE}$ 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 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 $GWCBCU_{NE}$ (Step 1) + Potential yield from URNRD 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) ac-ft, 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.

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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_{NE} (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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Upper Republican NRD

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 x 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

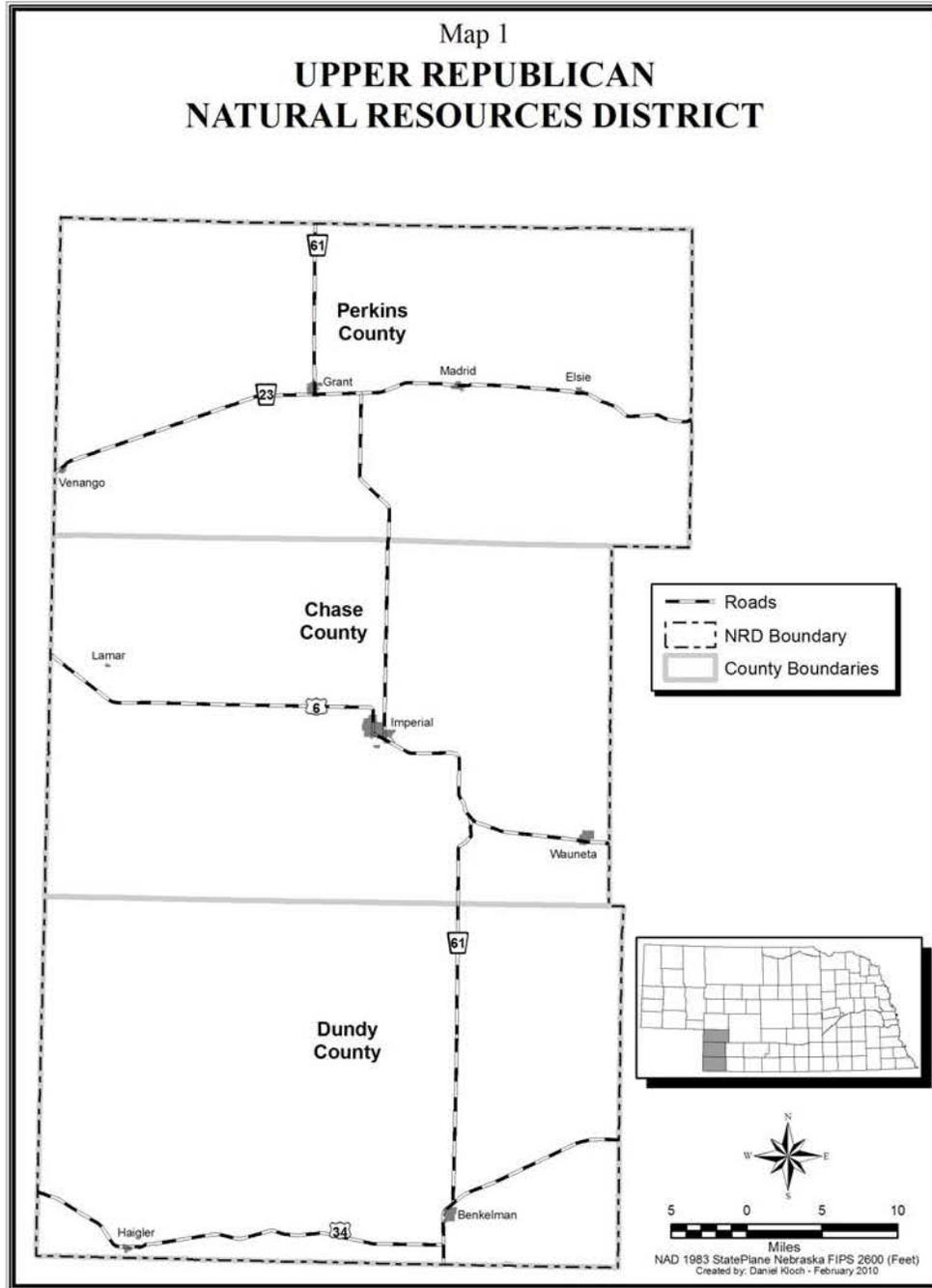
Information used in the preparation and to be used in the implementation of this IMP can be found in:

- 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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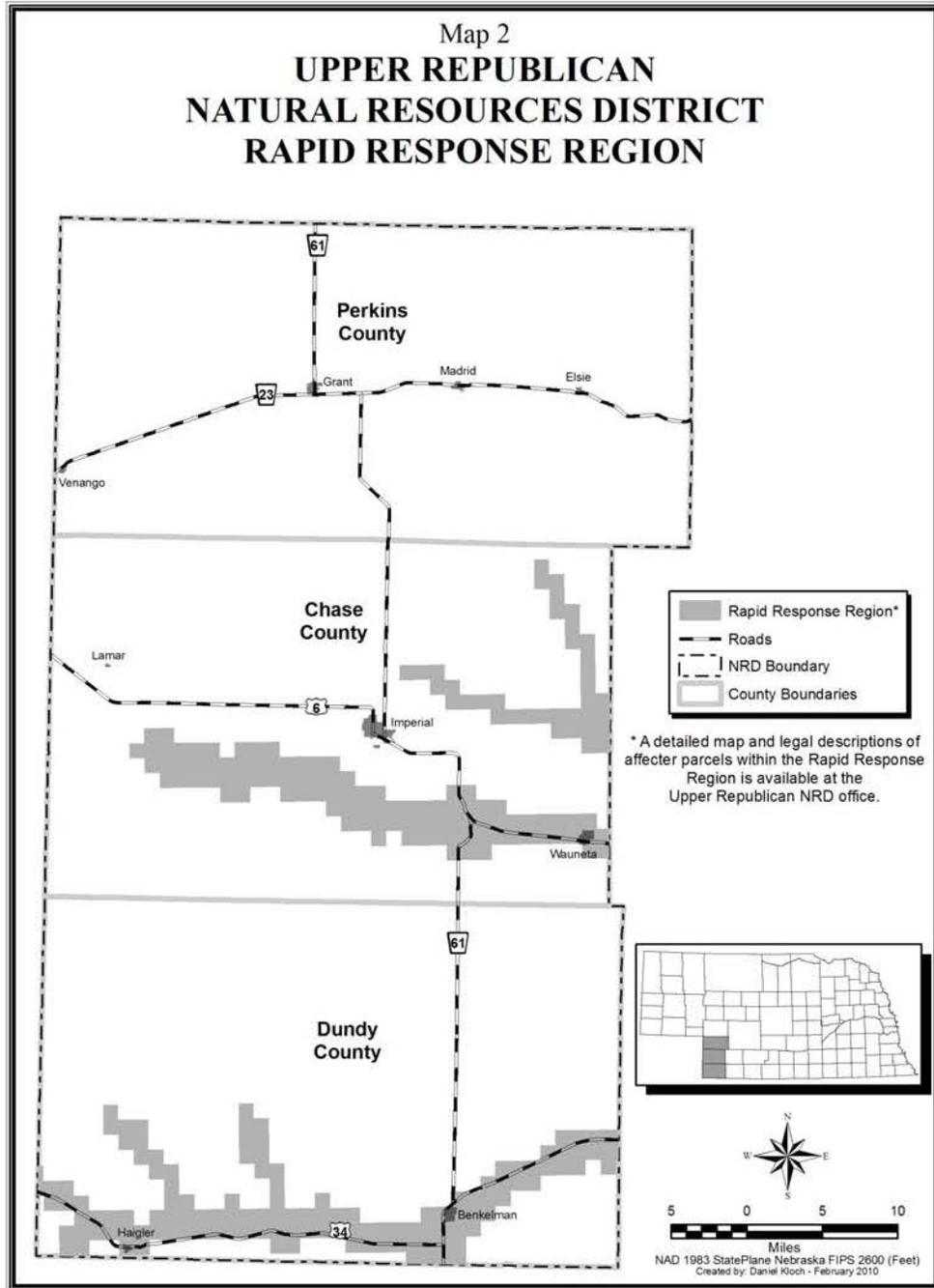
MAP 1. Upper Republican Natural Resource District



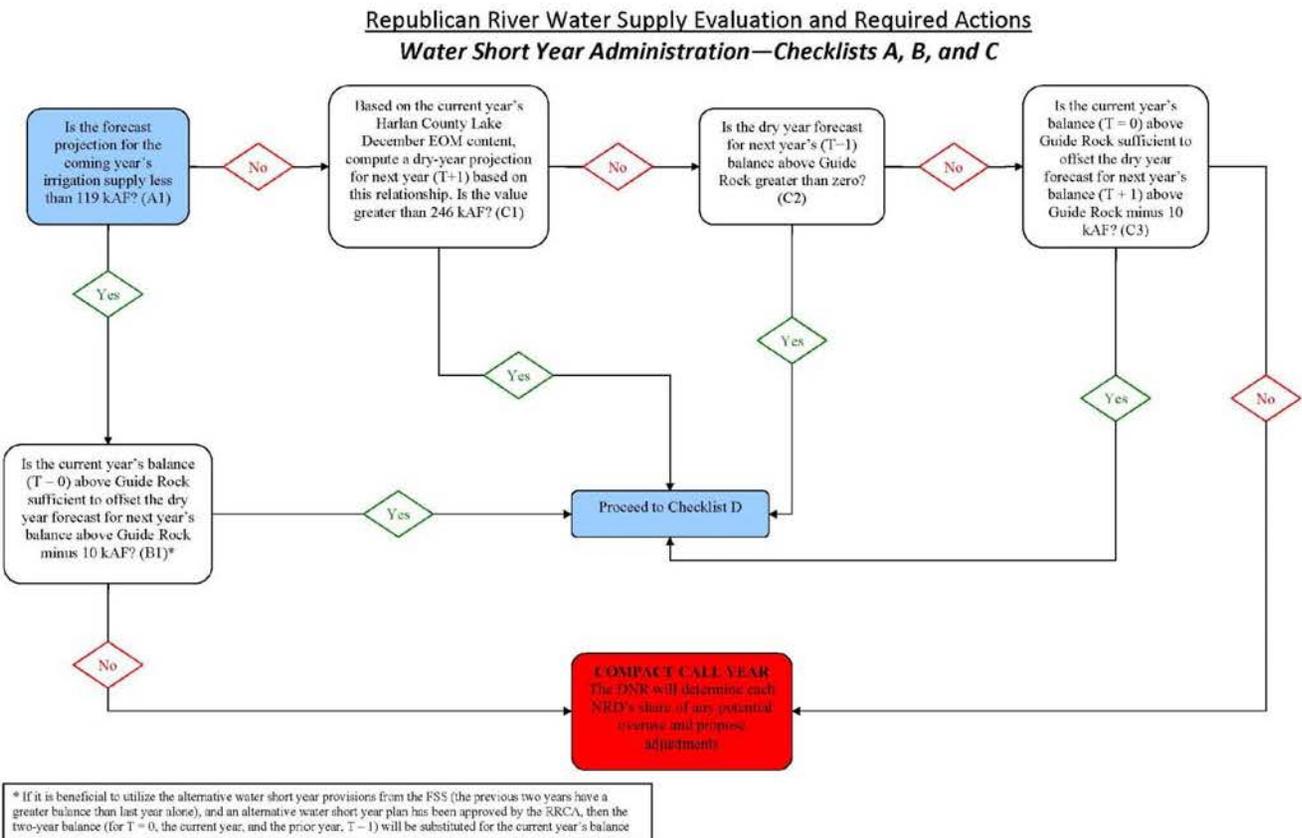
Effective
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Upper Republican NRD

MAP 2. Upper Republican Natural Resource District Rapid Response Region

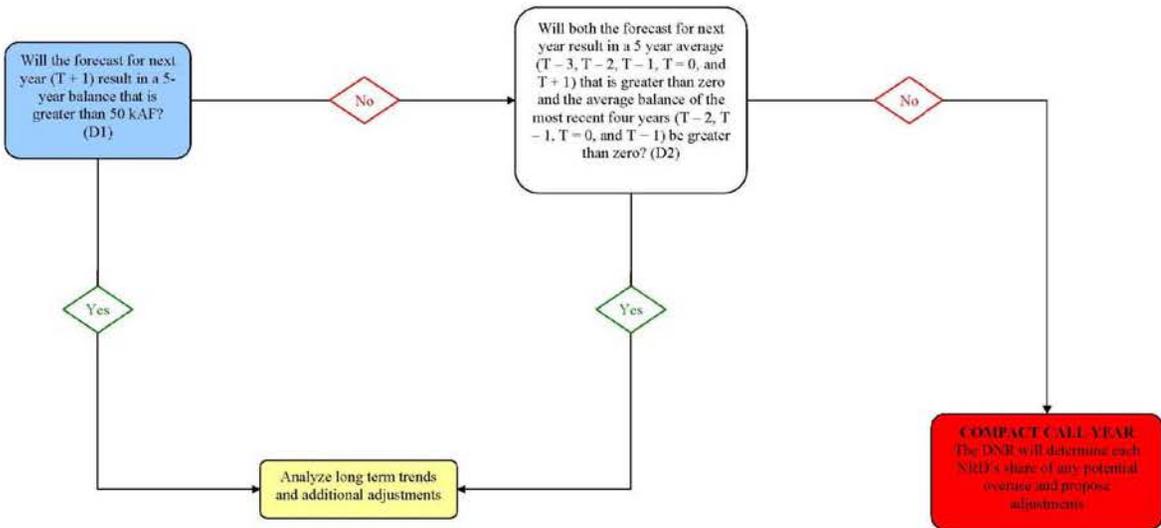


ATTACHMENT 1. Republican River Water Supply Evaluation and Required Actions



August 5, 2010

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



August 5, 2010