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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.

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:

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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.
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

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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 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

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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 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.

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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.

1. During Compact Call Years, the MRNRD will seek to implement management actions (such as surface 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

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include curtailment of ground water pumping within the Rapid Response Region of the MRNRD.

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.

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.

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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.

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.

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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.

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, alone and/or 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 these river flow enhancement projects or any other projects that result in an increase to streamflow or a decrease in ground water depletions.

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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.

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 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.

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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 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

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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.

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.

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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 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:

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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	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 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)

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

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

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

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

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

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

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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 kAF?
 - 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.

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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 kAF?
 - 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.

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

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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.

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

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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

If a Compact Call Year is reached as a result of checklist B1 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.

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

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.

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.

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

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.

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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 + 10,000 ac-ft.

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.

Note: In the event that Basin NRD Management Actions are not sufficient to overcome the projected negative balance, that remaining balance will be added to the Compact Call Stream flow Volume Calculation.

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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.

Effective
Mm Dd, 20XX

Middle Republican NRD

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MAP 1. Middle Republican Natural Resource District

MAP 2. Middle Republican Natural Resource District Rapid Response Region

MAP 3. Middle Republican Natural Resource District Quick Response Region

ATTACHMENT 1. Republican River Water Supply Evaluation and Required Actions