

Voluntary Integrated Management Plan

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1.0 INTRODUCTION

The citizens of the Papio-Missouri River Natural Resources District (P-MRNRD) depend on abundant, clean water in their homes for domestic use, on their farms for agricultural production, and for their industries to maintain economic viability. Wildlife that live and migrate through the P-MRNRD depend on clean water for sustenance and habitat. Furthermore, human inhabitants of the District use water in rivers and lakes for recreation including fishing, hunting, boating, and swimming. Without available water, our ancestors would not likely have settled here on the prosperous lands adjacent to the Platte, Elkhorn and Missouri Rivers.

Both rural and urban inhabitants along the Lower Platte River from the Elkhorn to the Missouri River have relied on the abundant water resources of the area and over time their water use has increased. Following the drought of 2012, it was clear to leaders at the P-MRNRD and citizen stakeholders within this area that a water use plan needed to be developed to provide a framework for how to wisely manage water resources so that they are available now and in the future.



Confluence of the Platte and Missouri Rivers

For these reasons, water management planning was voluntarily initiated by the P-MRNRD in collaboration with the Nebraska Department of Natural Resource (NDNR). This plan, called an Integrated Management Plan (IMP) is a water planning document that provides a framework for how the P-MRNRD and the NDNR will work collaboratively to manage groundwater and surface water use across an area where the two are hydrologically connected. The IMP was initiated voluntarily by the P-MRNRD in part to avoid future determinations by NDNR that the area is fully appropriated.

Not only did the P-MRNRD volunteer to initiate a IMP, numerous local stakeholders volunteered to represent the wide array of water interests and provide invaluable input during the planning process. These stakeholders truly shared the insight and discussions necessary to not only develop a plan, but to carry it forward into the future. We are grateful for all their time and energy!

1.1 BACKGROUND AND PURPOSE

On January 9, 2004, Nebraska Legislative Bill (LB) 962 was passed, which requires the NDNR and the NRDs to collaborate on the management of groundwater and surface water as a single, integrated, resource. LB 962 requires the development of an IMP if a river basin, subbasin, or reach is determined to be fully appropriated by the NDNR. Each year, because of this legislation, NDNR produces a report called the "Annual Evaluation of Availability of Hydrologically Connected Water Supplies" (Annual Report). This Annual report provides the results of NDNR's



Agricultural Irrigation

evaluation of the expected long-term availability of hydrologically connected water supplies for both existing and new surface water uses and existing and new groundwater uses in each of the state's river basins.

On December 16, 2008, NDNR made a preliminary determination that the Lower Platte River Basin was fully appropriated. A basin is considered fully appropriated when certain conditions for hydrologically connected surface water and groundwater are met under Neb. Rev. Stat. §46-713(3). The statute states that a basin is fully appropriated when current uses of hydrologically connected surface water and groundwater cause or will, in the reasonably foreseeable future, cause:

- the surface water supply to be insufficient to sustain over the long term the beneficial or useful purposes for which existing natural-flow or storage appropriations were granted and the beneficial or useful purposes for which, at the time of approval, any existing instream appropriation was granted;
- the streamflow to be insufficient to sustain over the long term the beneficial uses from wells constructed in aquifers dependent on recharge from the river or stream involved;
- reduction in the flow of a river or stream sufficient to cause noncompliance by Nebraska with an interstate compact or decree, other formal state contract or agreement, or applicable state or federal laws.

The preliminarily determined area included portions of the P-MRNRD, Lower Platte South, Lower Platte North, Lower Elkhorn NRDs and nearly the entire Upper Loup, Lower Loup and Upper Elkhorn NRDs. Prior to making a final determination, NDNR held a public hearing in early 2009.

Through this hearing, new information was made available that resulted in NDNR reversing the preliminary determination.

Although the fully appropriated status determination had been reversed, in May 2012, the Board of Directors of the P-MRNRD adopted a motion to inform NDNR that P-MRNRD intended to develop a voluntary IMP for a portion of the district and requested NDNR's participation. NDNR approved P-MRNRD's request the same month.

This IMP was developed jointly by the P-MRNRD and NDNR with the express purpose to manage the hydrologically connected portions of the P-MRNRD to achieve and sustain a balance between water uses and water supplies for the long term. The IMP provides the regulatory background as well as the detailed goals, objectives, and action items that were developed with stakeholder involvement. This IMP was developed with the understanding that the Lower Platte River Basin is not fully appropriated; should that designation change, the IMP would have to be reevaluated.

As this IMP is being entered into on a voluntary basis, the IMP area is not currently fully appropriated. The methodology utilized by NDNR to assess the available supplies and uses in the Annual Report will be used to track depletions and gains to streamflow from changes in availability and use. Current supplies are greater than the current level of use and therefore methods to identify water supplies to be used as offsets or for mitigation purposes or an identification de minimis effects are not included in this IMP. Additionally, the IMP area is not subject to any interstate compact or decree, or any other formal contract or agreement pertaining to surface water or groundwater use or supplies.

1.2 AUTHORITY

This IMP was prepared for and adopted by the Board of Directors of the P-MRNRD and the NDNR in consultation with the P-MRNRD Stakeholder Advisory Committee. As stated in Neb. Rev. Stat. § 46-715(1)(b) a natural resources district encompassing a river basin, subbasin, or reach that has not been designated as overappropriated or has not been finally determined to be fully appropriated may, jointly with the department, develop an integrated management plan for such river basin, subbasin, or reach located within the district.

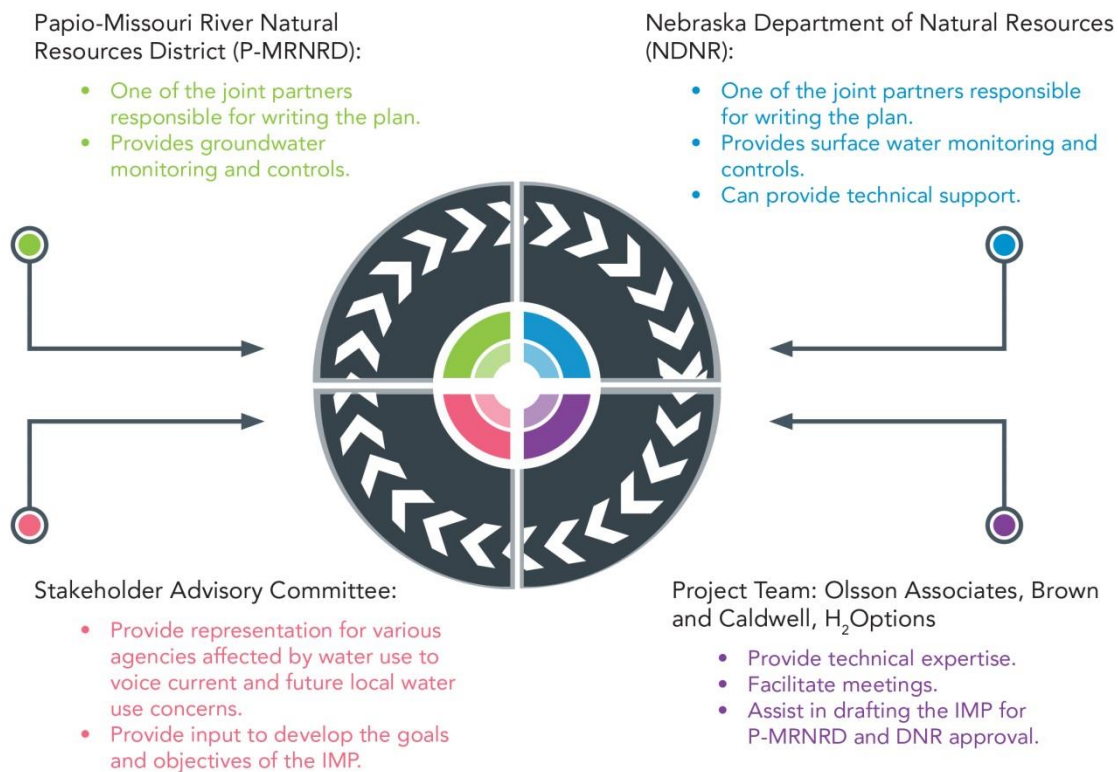
As part of the requirements, the P-MRNRD is to notify the department of its intention to develop an IMP. A copy of the letters of intent are included in Appendix A. NDNR approved the request and this IMP was developed and adopted according to Neb. Rev. Stat. §46-715 to 46-717 and subsections (1) and (2) of section 46-718.

1.3 INTEGRATED MANAGEMENT PLANNING PROCESS

The IMP planning process is an adaptive management approach to managing Nebraska’s hydrologically connected groundwater and surface water. The integrated management planning process allows for a more complete inventory of all water supplies and water uses; increases collaboration between the entities that manage water resources; enhances public awareness of water resources issues; and increases opportunities to provide input on short- and long-term management of the water resources. An IMP works toward attaining or maintaining a balance of the hydrologic system. This IMP may be altered as the affected area or subarea changes and more data becomes available to accommodate changing circumstances including hydrology, economics, water demands, and water supplies.

In accordance with Neb. Rev. Stat. §46-717(2) this IMP was developed collaboratively by the P-MRNRD and the NDNR, in consultation with the Papio-Missouri River Stakeholder Advisory Committee. The Stakeholder Advisory Committee consisted of a variety of water users representing the following general interest groups: agriculture, industry, municipal water supply, environmental, recreation, county, city, and technical advisors (see Appendix B for a complete list of participants). The agricultural and industrial group consisted of representatives

Who is participating?



Participants and IMP Development Roles and Responsibilities

from incorporated farms, industrial manufacturers, and sand and gravel companies. Municipal water supply members represented the Metropolitan Utilities District and Lincoln Water Supply. Environmental and recreational group members represented the Lower Platte River Corridor Alliance, Nebraska Game and Parks Commission, the Nebraska Airboaters Association, and the U.S. Fish and Wildlife Service. Representatives from Douglas, Sarpy, and Washington Counties participated in the Stakeholder Advisory Committee. Various cities, also representing municipal water supplies, included the cities of Gretna, Lincoln, Fremont, Papillion, Springfield, Valley, and the Village of Waterloo. Technical advisory members for the Stakeholder Advisory Committee included representatives from the University of Nebraska Lincoln, U.S. Geological Survey (USGS), and the Natural Resources Conservation Service.

The Stakeholder Advisory Committee met seven times throughout 2013 and 2014. These meetings helped create and develop the goals, objectives, and action items of this IMP. An open house was held at the P-MRNRD office on March 6, 2014 to present the ideas developed by the Stakeholder Advisory Committee and to solicit input from the public on the goals, objectives and action items. The Draft Voluntary IMP was made available to the public for review and comment for 30 days starting on May 08, 2014.

Revisions to the Draft IMP were made based on public comment and the P-MRNRD Board of Directors approved the IMP on July 10, 2014. The NDNR and P-MRNRD reached joint agreement on the IMP in August 2014. The effective date of the IMP is August 31, 2014.

2.0 MAP AND DESCRIPTION OF THE INTEGRATED MANAGEMENT PLAN AREA

As part of the process used to develop this IMP, a water balance study was completed to develop data and information to help the P-MRNRD inventory and understand the full spectrum of water supplies and water uses in the IMP Area. The information provided in the water balance study was presented to the stakeholders and used throughout the IMP development process, and portions of the study are presented in this section describing the water resources of the IMP Area. The full report entitled, "Papio-Missouri River Natural Resources District Water Balance Study", dated October 29, 2013 is available upon request from the P-MRNRD.

2.1 MAP OF THE INTEGRATED MANAGEMENT PLAN AREA

The P-MRNRD is located in eastern Nebraska and includes Sarpy, Douglas, and Washington Counties as well as portions of Burt, Thurston, and Dakota Counties. Figures 1 and 2 illustrate the boundaries of the area included in this IMP. The IMP Area includes areas designated by the NDNR to have alluvial aquifers that are hydrologically connected to the Platte and Elkhorn Rivers. The IMP Area includes not only hydrologically connected areas, but also portions of the P-MRNRD that contribute surface water runoff to the Elkhorn and Platte Rivers. The IMP Area does not include the entire P-MRNRD.

As defined by NDNR, a hydrologically connected area is an area where a well pumped for 50 years will deplete the river or a base flow tributary by at least 10 percent of the amount pumped in the 50 year period (the 10/50 area). Hydrologically connected areas are published by the NDNR in the "Annual Evaluation of Availability of Hydrologically Connected Water Supplies Report". Approximately eight percent of the P-MRNRD is hydrologically connected and an additional twelve percent is included in the watersheds that contribute to the hydrologically connected area. Therefore, the IMP Area includes approximately twenty percent of the entire P-MRNRD.

The IMP Area is bounded on the southern and western sides by the Platte River. The eastern boundary of the IMP Area is the drainage boundary between the Papio Creek drainage area and the Platte and Elkhorn River drainages. The northern part of the IMP Area is bounded by the Lower Elkhorn and Lower Platte North NRDs.

2.2 LAND USE



Urban Landscape Irrigation

The lands within the IMP Area are largely agricultural but include pasture and grasslands, forests, open water, wetlands, and urbanized areas. The IMP Area covers 228,000 acres within the P-MRNRD. Current land uses in the IMP Area consist of dryland crops (56 percent), pasture and grassland (15 percent), irrigated crops (11 percent), forested areas (9 percent), urbanized areas (5 percent), and open water, wetlands, and other land uses (4 percent). Although only 5% of the IMP Area in the P-MRNRD is urbanized, municipal water supplies along the Lower Platte River serve nearly 790,000 people in Lincoln, Omaha and surrounding communities.

2.3 LOCAL HYDROLOGY

Average annual precipitation amounts vary greatly across Nebraska ranging from less than 16 inches per year in western Nebraska to over 34 inches per year in the southeastern part of the state. The IMP Area receives approximately 30 inches of precipitation per year on average (based on 1949 through 2012 records). The amount of average annual precipitation is fairly uniform across the IMP Area. The precipitation that the IMP Area receives is generally adequate to reliably raise agricultural crops. However, local precipitation amounts can vary significantly within the growing season and from year to year. Seasonal dry periods and periodic droughts have led some agricultural producers to acquire surface water rights for irrigation or to drill irrigation wells in parts of the IMP Area that have adequate groundwater resources.

Precipitation serves to replenish the water supplies in the IMP area. A portion of precipitation in the IMP area recharges aquifers which recharges groundwater supplies. Precipitation also serves to refill local reservoirs in the area. A portion of stream flow is derived from direct runoff of precipitation events within the IMP area. It is important to note, however, that the majority of the baseflow in the Platte and Elkhorn Rivers comes from precipitation and runoff occurring outside the IMP area.

2.4 SURFACE WATER

The IMP Area is at the downstream terminus of the Platte River system, which drains over 85,000 square miles in Nebraska, Wyoming, and Colorado. Put in relative terms, the IMP Area only makes up less than one percent of the total drainage area of the Platte River system. Large volumes of surface water generated from upstream sources are conveyed to the western boundary of the IMP Area and are transmitted via the Platte River along the western and southern boundaries of the IMP Area.

The Elkhorn River, a tributary of the Platte River, is another significant river system that drains approximately 6,900 square miles in Nebraska. The Elkhorn River enters the northern boundary of the IMP Area and joins the Platte River in the southwestern part of the IMP Area. Like the Platte River, the Elkhorn River delivers and conveys large volumes of surface water through the IMP Area.

In addition to these significant waterways, there are a number of smaller tributaries that discharge runoff from the IMP Area into the Platte and Elkhorn Rivers. Stream flow generated within the IMP Area that is discharged by the by these creeks is of much smaller magnitude than stream flows in the Platte and Elkhorn Rivers.



Illustration of the Platte River Basin

2.5 GROUNDWATER

Numerous studies of the hydrogeologic characteristics of the aquifers underlying the P-MRNRD have been conducted. Studies by the USGS concerning water quality (Verstraeten and Ellis, 1994) and the altitude, age, and quality of groundwater in the P-MRNRD (McGuire, et al., 2012) provided descriptions of P-MRNRD aquifers.

Five principal aquifers underlie the P-MRNRD – the Elkhorn Valley, Missouri River Valley, Platte River Valley, Upland area alluvial aquifers, and the Dakota aquifer. McGuire, et al. (2012) provided a brief description of each aquifer as presented below:

- *Elkhorn River Valley alluvial aquifer:* The Elkhorn River Valley alluvial aquifer is located beneath and adjacent to the Elkhorn River and the Platte River in the central part of the IMP Area. It is an unconfined aquifer with wells generally yielding between 700 and 1,200 gpm. The depth to water ranges from 5 feet to 30 feet, and saturated thickness ranges from 50 to 90 feet.
- *Platte River Valley alluvial aquifer:* The Platte River Valley alluvial aquifer is located beneath and adjacent to the Platte River in the southern part of the IMP Area. It is an unconfined aquifer with wells generally yielding between 900 and 2,000 gpm. The depth to water ranges from 5 feet to 15 feet, and saturated thickness ranges from 60 to 100 feet.
- *Upland area alluvial aquifer:* The Upland area alluvial aquifer consists of confined or partially confined, discontinuous beds of saturated sand and gravel. It is generally located beneath lands that are outside of the Elkhorn and Platte River valleys. Wells drilled into this aquifer generally yield between 10 to 300 gpm. Depth to water varies between 10 to 170 feet and the saturated thickness of sand and gravel beds is less than 20 feet.
- *Dakota aquifer:* The Dakota aquifer underlies the alluvial aquifers described above. The aquifer is confined or partially confined. Wells drilled into this formation generally yield between 10 to 600 gpm depending on the thickness of saturated sandstones that make up the aquifer. Depths to water generally range from 5 to 200 feet, and sandstone thicknesses range from 1 to 300 feet.
- *Missouri River Valley aquifer:* The Missouri River Valley aquifer consists of discontinuous beds of saturated sand and gravel. It is located within the Missouri River Valley and is usually unconfined but locally may be partially confined. Most wells yield 600 to 1,200 gpm. Depth to water ranges from about 5 to 40 feet. Saturated thickness ranges from 70 to 100 feet.

As described in Section 2.1, the Platte River Valley and Elkhorn River Valley are the only aquifers that are hydrologically connected to surface streams in the IMP Area. The Upland area alluvial aquifer and Dakota aquifer are included in the P-MRNRD Groundwater Management Plan but are not hydrologically connected and are therefore not included in this IMP. Similarly, the

Missouri River Valley aquifer includes a very small portion of the IMP area at the confluence of the two rivers and therefore is not included in this IMP.

The Platte River Valley and Elkhorn River Valley aquifers provide groundwater supplies for both irrigation and municipal uses. The importance of these alluvial aquifers is further illustrated by the two major metropolitan areas and numerous smaller communities that rely on this resource for drinking water supplies. The Metropolitan Utilities District, which serves the City of Omaha and other adjacent communities, operates wellfields that withdraw water from the Platte River Valley alluvial aquifer in the western and southern portion of the IMP Area. The City of Lincoln's Ashland wellfield is also drilled into and pumps water from the Platte River Valley alluvial aquifer. Additionally, the Cities of Fremont, Valley, Gretna and Papillion derive their water supplies from the Platte River Valley alluvial aquifer.

3.0 GOALS AND OBJECTIVES

The purpose of an IMP is to manage the hydrologically connected portions of the P-MRNRD to achieve and sustain a balance between water uses and water supplies for the long term. As described previously, the Stakeholder Advisory Committee, working with the P-MRNRD and NDNR, developed an appropriate set of goals, objectives and action items for the IMP that will facilitate sustainable water management in the IMP Area. Before the goals and objectives were developed, the Stakeholder Advisory Committee discussed and approved the following definitions of goals, objectives, and action items:

- Goals are general statements of broad direction or intent with no time limit. Goals set the stage for meaningful objectives.
- Objectives define the measurable results that a group seeks to accomplish. Generally, an objective is a statement of what will be accomplished.
- Actions items are the specific tasks that the P-MRNRD and NDNR will undertake to achieve the goals and objectives.

The four goals and corresponding objectives developed by the P-MRNRD and NDNR, in consultation with the Stakeholder Advisory Committee, include implementing water policies that enable sustainable water management, developing a comprehensive water inventory of water supply and demand, developing educational programs that promote conservation, and cooperating with upstream NRDs on water management plans for the entire Lower Platte Basin.

The four goals developed for the IMP are to be implemented simultaneously. As new information is gathered about the water supply and water demands in the IMP Area, the goals and objectives may be modified as discussed in Chapter 8. The goals and objectives listed below are supported by detailed action items as presented in Chapter 4.

GOAL 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Objectives

- 1.1. Utilize existing policies and authorities of P-MRNRD and NDNR to address water quantity issues.
- 1.2. Minimize invasive vegetation encroachment in the river channels.
- 1.3. Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

GOAL 2 - Develop and maintain a water supply and use inventory based on the best available data and analysis.

Objectives

- 2.1. Develop and implement a data gathering and monitoring plan that provides relevant scientific information to support NDNR's annual evaluation.
- 2.2. Monitor and track precipitation, consumption, inflows, and outflows.
- 2.3. Coordinate with water suppliers and other water users to understand and project future water demands.

GOAL 3 - Develop and implement water use educational programs that encourage conservation and effective water use.

Objectives

- 3.1. Promote water use education that addresses both rural and urban water conservation efforts.
- 3.2. Work with other entities on education and conservation programs.
- 3.3. Explore opportunities to reuse water, where feasible.

GOAL 4 - Work with upstream NRDs and other relevant organizations to collectively develop a water management plan for the Platte River Basin that maintains a balance between current and future water supplies and demands.

Objectives

- 4.1. Actively participate in Lower Platte River Basin water management planning activities.
- 4.2. Identify and evaluate potential conjunctive management projects and activities within the Lower Platte River Basin.
- 4.3. Identify and evaluate additional water resource supplies.
- 4.4. Coordinate with other entities in the entire Platte River Basin on water management planning and activities.
- 4.5. Work with the appropriate agencies to identify streamflow necessary to protect and maintain public water supply, fish and wildlife, and public recreation.

4.0 ACTION ITEMS

Action items were developed by the P-MRNRD and the NDNR with input from the Papio-Missouri River Stakeholder Advisory Committee. Action items provide a listing of the direct tasks to be performed as a part of this plan. They are the steps necessary to implement the plan. Action items help accomplish the objectives and move toward completion of the goals. For this reason, all but two of the action items are presented in this subsection following the goals and objectives they were written to help accomplish.

There are two specific action items that were written in order to comply with Neb. Rev. Stat. § 46-715 (2) as the regulatory groundwater and surface water action items (or controls). These two action items are presented first with further description as to their applicability across the district. In accordance with the statute, the regulatory action items (or controls) shall:

- Be consistent with the goals and objectives of the plan
- Be sufficient to ensure that the state will remain in compliance with applicable state and federal laws and with any applicable interstate water compact or decree or other formal state contract or agreement pertaining to surface water or ground water use or supplies.

Groundwater Action Item (Control)

1. Establish a limit on the expansion of groundwater-irrigated acres.

Groundwater regulatory action items (or controls) implemented by the P-MRNRD are set forth in Neb. Rev. Stat. § 46-739 and apply to the groundwater control area as shown in Figure 2 and as listed in Appendix C. The groundwater regulatory action item will work in combination with P-MRNRD's Groundwater Management Plan and Rules and Regulations. The District's Rules and Regulations will contain procedural details for the control listed in this IMP. Persons desiring to apply for new groundwater irrigated acres or to increase existing groundwater irrigated acres should contact the P-MRNRD to ensure compliance with this IMP. The limit established on the expansion of groundwater irrigated acres is for agricultural production land irrigated from a new groundwater source, typically an irrigation well, and does not include other types of irrigation use (for example, lawn watering at golf courses and ball fields), municipal use, or industrial use.

Surface Water Action Item (Control)

1. Establish a limit on the expansion of surface water-irrigated acres.

Surface water regulatory action items (or controls) implemented by the NDNR are set forth in Neb. Rev. Stat. § 46-716 and apply to the surface water control area as shown in Figure 2. NDNR will establish an annual limit on the expansion of surface water-irrigated acres. The limit on the expansion of surface water-irrigated acres shall be a maximum of one-third of the amount the P-MRNRD will allow for the expansion of groundwater-irrigated acres. NDNR will utilize the number of additional groundwater irrigated acres in place in the IMP area as of January 1 of each year for determining the number of additional acres for surface water irrigated on each

calendar year. The limit established on the expansion of surface water irrigated acres is for agricultural production land irrigated from a new surface water appropriation and does not include other types of irrigation use, municipal use, or industrial use.

This limit will only apply to land within the Surface Water Control Area illustrated in Figure 2. Should P-MRNRD issue a moratorium on any increase in groundwater-irrigated acres, NDNR will issue a similar moratorium to limit development of additional acres for surface water irrigation.

The NDNR is the State agency authorized by Nebraska statutes to regulate surface waters. All diversions of surface water require a State permit that is granted through the NDNR. To obtain a surface water permit, applicants apply through their local NDNR office.

4.1 ACTION ITEMS FOR GOAL 1

GOAL 1 - Develop and implement water use policies and practices that contribute to the protection of existing surface and groundwater uses while allowing for future water development.

Goal 1 is designed to provide for additional water resources development opportunities while protecting the existing surface and groundwater uses. To achieve the three objectives of Goal 1, the following action items will be implemented by the P-MRNRD and NDNR. The action items relate to reviewing and potentially implementing new groundwater use permitting requirements, evaluating opportunities for funding water management programs or projects, and initiating studies for additional tools such as water banking for use within the IMP Area.

OBJECTIVE 1.1 - Utilize existing policies and authorities of P-MRNRD and NDNR to address water quantity issues.

The P-MRNRD and NDNR intend to work together to ensure that they are using their authorities appropriately to manage the groundwater and surface water resources in the IMP area. Throughout this section, either the P-MRNRD or NDNR are listed as the lead for completion of the action item in parenthesis at the end of the action item. Where they are working together, the lead is listed as "Both". As water development continues, there may be a need for additional permitting requirements, for example, to avoid well conflicts that may arise should wells be located in aquifers with limited capacity. There also may be opportunities for water banking and other revenue sources to help develop the water resources while working to avoid conflicts between water users in the future.

- Action Item 1.1.1 Review and evaluate the P-MRNRD's Groundwater Management Plan relative to the goals and objectives of the IMP. (P-MRNRD)
- Action Item 1.1.2 Evaluate the need for a ranking system for new groundwater irrigation wells or expanded groundwater irrigated acres. (P-MRNRD)
- Action Item 1.1.3 Evaluate the need to require proposed new groundwater well field expansions and new large groundwater uses to perform an impact analysis. (P-MRNRD)

- Action Item 1.1.4 Assess the need to further study the Lower Platte aquifer properties, extents, and connectivity to surface water. (Both)
- Action Item 1.1.5 Assess the need for additional revenue sources to be used to fund programs and projects resulting from this IMP. (P-MRNRD)
- Action Item 1.1.6 Identify and study opportunities for the development of transfers, variances, water banking, and other actions of water management to potentially be used in the IMP Area. (Both)

OBJECTIVE 1.2 - Minimize invasive vegetation encroachment in the river channels.

Invasive species can reduce channel capacity and inhibit scouring flows that would otherwise create and improve the necessary habitat of the native species of the Platte River. Invasive species also reduce the availability of the water resources to the native plant communities through elevated evapotranspiration. Removal of invasive vegetation helps to maintain the health of the Lower Platte Basin for the benefit of native species.

- Action Item 1.2.1 Provide financial and administrative support to weed management activities in river channels. (P-MRNRD)
- Action Item 1.2.2 Encourage removal of invasive species to improve channel conveyance. (P-MRNRD)

OBJECTIVE 1.3 - Identify and evaluate potential conjunctive management projects and activities within the IMP Area.

The P-MRNRD and NDNR may examine the potential for conjunctive management opportunities. Conjunctive management is an adaptive process that utilizes the connection between surface water and groundwater to maximize water use, while minimizing impacts to streamflow and groundwater levels. Conjunctive management is undertaken to manage the overall water supply to a region and improve the reliability of that supply.

- Action Item 1.3.1 Evaluate the potential for conjunctive management programs or project opportunities to protect existing users or mitigate new uses such as water rights leases, interference agreements, augmentation projects, conjunctive use management, or use retirement. (Both)

4.2 ACTION ITEMS FOR GOAL 2

GOAL 2 - Develop and maintain a water supply and use inventory based on the best available data and analysis.

Goal 2 is designed to provide valuable water supply and use information to the P-MRNRD and NDNR. NDNR may use the inventory information gathered to support the annual evaluation for the Lower Platte River Basin. Additionally, P-MRNRD may use this information to enhance the understanding of the water supplies and uses within the IMP Area.

OBJECTIVE 2.1 - Develop and implement a data gathering and monitoring plan that provides relevant scientific information to support NDNR's annual evaluation.

Pursuant to Neb. Rev. Stat. § 46-713(1)(a) the NDNR is required to report annually its evaluation of the expected long-term availability of hydrologically connected water supplies. This evaluation will be used to monitor the effects of the action items on the IMP Area. The P-MRNRD and NDNR may collect information relative to consumptive water use, land use changes, surface water levels, groundwater levels, and hydrogeologic data to enhance the understanding of water supply and use in the IMP Area.

- Action Item 2.1.1 Identify important data components to monitor in order to ensure the best available datasets are used in the NDNR's annual evaluation. (Both)
- Action Item 2.1.2 Estimate consumptive water use utilizing the best available data and analysis tools. (Both)
- Action Item 2.1.3 Assess the need for additional monitoring and ensure information on land use changes are evaluated with respect to water use utilizing the best available data and tools. (Both)
- Action Item 2.1.4 Continue to monitor changes in streamflow and groundwater levels. (Both)
- Action Item 2.1.5 Continue to gather and analyze hydrogeologic data. (Both)

OBJECTIVE 2.2 - Monitor and track changes in precipitation, consumption, inflows, and outflows.

To best manage water supplies, a thorough understanding of the entire water cycle and how it impacts water supplies and demands is needed. Documenting water supply and use is complicated and there may need to be enhancements to the monitoring networks currently being used by the P-MRNRD and NDNR. The P-MRNRD and NDNR may collect additional information about precipitation, consumption, inflows, and outflows to enhance the hydrologic understanding of the IMP Area.

- Action Item 2.2.1 Develop or maintain a comprehensive spatial/tabular water inventory database that includes measurements or estimates of components of the water budget. (Both)
- Action Item 2.2.2 Develop or maintain science-based protocols for estimating unmeasured water uses. (Both)
- Action Item 2.2.3 Establish a system to better monitor and evaluate changes in surface water and groundwater supplies and uses. (Both)
- Action Item 2.2.4 Track variability in water use and supply by regularly evaluating data from existing surface water, groundwater, and weather monitoring networks. (Both)
- Action Item 2.2.5 Recommend changes to the Groundwater Management Plan as necessary. (P-MRNRD)

OBJECTIVE 2.3 - Coordinate with water suppliers and other water users to understand and project future water demands.

Coordination with water suppliers and users will enhance the understanding of the present and future water demand within the IMP Area. This may allow the P-MRNRD and NDNR to better anticipate future conditions that the IMP Area may experience. The data collected from water suppliers and users may also be used to refine the NDNR's annual evaluation of the expected long-term availability of hydrologically connected water supplies.

- Action Item 2.3.1 Obtain short- and long-term water use projections from municipalities. (Both)
- Action Item 2.3.2 Develop online water use form for reporting annual water use. (Both)
- Action Item 2.3.3 Investigate the need for metering for annual reporting of irrigation and other large water uses. (Both)
- Action Item 2.3.4 Evaluate the need to expand existing or develop new rural water systems (Improvement Project Areas). (P-MRNRD)
- Action Item 2.3.5 Develop estimates of water use from private, domestic, and other unmetered wells. (P-MRNRD)

4.3 ACTION ITEMS FOR GOAL 3

GOAL 3 - Develop and implement water use educational programs that encourage conservation and effective water use.

Goal 3 is designed to increase the knowledge of water conservation and effective use within the P-MRNRD. The P-MRNRD currently has education and informational programs in place and any new initiatives developed to achieve Goal 3 will be coordinated with the current programs. Some of the important educational programs include outdoor classrooms, festivals, water works, envirothon, geocaching and kids activities. Along with their own programs, the P-MRNRD may work with other organizations to help implement the educational effort. To achieve the three objectives of Goal 3, the following action items will be implemented by the P-MRNRD.

OBJECTIVE 3.1 - Promote water use education that addresses both rural and urban water conservation efforts.

The P-MRNRD may supply water conservation information through media releases, newsletters, websites, and public service announcements. The P-MRNRD will continue to support school environmental education programs that focus on wise water use. This may include providing financial support or educational materials about water use.

- Action Item 3.1.1 Continue to use existing and develop additional information and education programs that promote wise water use and conservation. (Both)
- Action Item 3.1.2 Evaluate the need for additional cost-share programs or projects to promote wise water use and conservation. (P-MRNRD)

- Action Item 3.1.3 Collaborate with schools and other agencies to develop curriculum on water supplies and water conservation measures for use in classrooms. (P-MRNRD)

OBJECTIVE 3.2 - Work with other entities on education and conservation programs.

Although the P-MRNRD has successful educational programs, this objective identifies ways to work with other entities to reach a larger audience for education and conservation programs.

- Action Item 3.2.1 Coordinate with public water systems to develop or expand educational materials and programs on water supplies, water quality, and best conservation practices. (P-MRNRD)
- Action Item 3.2.2 Continue to coordinate with cities, counties, and others as they develop long-term planning activities. (P-MRNRD)
- Action Item 3.2.3 Continue to coordinate with industries, cities, and agricultural producers to promote the use of best management practices for stormwater management. (P-MRNRD)
- Action Item 3.2.4 Continue to coordinate with cities, counties, and others to encourage water education and conservation. (P-MRNRD)
- Action Item 3.2.5 Evaluate the potential for programs or projects that support the use of best management practices related to agricultural crop water management. (P-MRNRD)
- Action Item 3.2.6 Evaluate implementing urban cost-share incentive programs to encourage indoor and outdoor water conserving technology or landscaping. (P-MRNRD)

OBJECTIVE 3.3 - Explore opportunities to reuse water, where feasible.

One way to conserve water is to reuse it. Effective methods of water reuse will need to be evaluated and viable opportunities may involve collaboration with public water supply systems.

- Action Item 3.3.1 Evaluate the positive and negative effects of capturing and using waste water. (P-MRNRD)
- Action Item 3.3.2 Cooperate with public water systems to identify potential applications for reuse of treated waste water. (P-MRNRD)

4.4 ACTION ITEMS FOR GOAL 4

GOAL 4 - Work with upstream NRDs and other relevant organizations to collectively develop a water management plan for the Platte River Basin that maintains a balance between current and future water supplies and demands.

Goal four is designed to direct the P-MRNRD and NDNR to participate in water management plans for the Lower Platte River Basin and the Upper Platte River basin. The Lower Platte River basin includes all of the surface water drainage of the Loup and Elkhorn Rivers as well as their

tributaries and the tributaries of the Platte River downstream of the Loup River. The Upper Platte River basin is considered to be the entire surface drainage of the Platte River and all of its tributaries upstream of the confluence with the Loup River in Columbus. To achieve the five objectives of Goal 4, the following action items will be implemented.

OBJECTIVE 4.1 - Actively participate in Lower Platte River Basin water management planning activities.

The P-MRNRD and NDNR will continue to be involved with the activities of the Lower Platte River Basin Water Management Plan Coalition (Lower Platte Coalition). The Lower Platte Coalition is charged with developing a basin wide water management plan for the Lower Platte River. Basin wide planning provides for the sharing of water use and supply data and analysis and can improve and coordinate the activities of all IMPs in the Lower Platte river. The need also exists for basin wide studies and information to improve understanding of the hydrogeology and ensure the best available data, information, and science are utilized in the planning efforts.

- Action Item 4.1.1 Cooperate on water management studies and planning with the Lower Platte River Basin Water Management Plan Coalition. (Both)
- Action Item 4.1.2 Continue to support the efforts and initiatives of the Eastern Nebraska Water Resources Assessment. (Both)

OBJECTIVE 4.2 - Identify and evaluate potential conjunctive management projects and activities within the Lower Platte River Basin.

Conjunctive management is an adaptive process that utilizes the connection between surface and groundwater to maximize water use, while minimizing impacts to streamflow and groundwater levels. Conjunctive management is undertaken to manage the overall water supply for a region and improve the reliability of that supply. The P-MRNRD and NDNR may seek out interagency partners to collaborate in studies for potential storage opportunities.

- Action Item 4.2.1 Review and analyze existing studies of water storage opportunities in the Lower Platte River Basin and conduct additional multi-agency studies as appropriate. (Both)
- Action Item 4.2.2 Evaluate the potential for conjunctive management programs or project opportunities to mitigate new uses such as water rights leases, interference agreements, augmentation projects, conjunctive use management, or use retirement. (Both)
- Action Item 4.2.3 Assess federal or statewide funding opportunities to further the goals and objectives of the IMP. (Both)

OBJECTIVE 4.3 - Identify and evaluate additional water resource supplies.

The P-MRNRD, NDNR, and other entities may jointly examine the need for required elements related to water use transfers, variances, banking, or other actions for the Platte River Basin. These actions may be considered on a case-by-case basis as the opportunities present

themselves. These types of projects could be used to help provide growth in the basin without increasing the impact to water resources.

- Action Item 4.3.1 Coordinate with other entities to identify and study opportunities for the development of transfers, variances, water banking, and other actions of water management to potentially be used across the entire Platte River Basin. (Both)

OBJECTIVE 4.4 - Coordinate with other entities in the Upper Platte River Basin on water management planning and activities.

The P-MRNRD and NDNR may work with other entities in the Upper Platte River Basin, such as the Platte River Recovery Implementation Program (PRRIP). The PRRIP is an implementation program for the Upper Platte River Basin that focuses on water, land, and adaptive management. The program has three main elements; increasing stream flows in the central Platte River during relevant time periods, enhancing, restoring and protecting habitat lands for the target bird species, and accommodating certain new water-related activities. The PRRIP area is designed to provide Endangered Species Act compliance for existing and certain new water related activities throughout the Platte River basin upstream of the Loup River confluence.

- Action Item 4.4.1 Work with the Platte River Recovery and Implementation Program on water management planning activities, as necessary. (Both)

OBJECTIVE 4.5 - Work with the appropriate agencies to identify streamflow necessary to protect and maintain public water supply, fish and wildlife, and public recreation.

The P-MRNRD and NDNR may work with various entities to identify minimum flow rates required by municipal, environmental, or recreational uses. Additional beneficiaries from instream flow protection may also be identified.

- Action Item 4.5.1 Review and assess the benefits from instream flow protection. (Both)

5.0 INCENTIVE PROGRAMS

The P-MRNRD will evaluate the implementation of cost-share incentive programs that promote water conservation practices. For example, P-MRNRD will explore cost-share incentives for voluntary installation of flow meters on all high-capacity wells. Incentive programs may include any program authorized by state law or federal programs. 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. Furthermore, the P-MRNRD will explore grant opportunities to supplement the annual budgeting process for funding action items. Educational and training, programs may be included with the cost-sharing and grant-funding sources.

6.0 MONITORING PLAN

The P-MRNRD and NDNR have agreed to accomplish the following actions in accordance with Neb. Rev. Stat. § 46-715 (2)(e):

- Gather and evaluate data, information, and methodologies that could be used to accomplish the purpose of this IMP
- Increase understanding of the surface water and hydrologically connected groundwater system
- Test the validity of the conclusions and information upon which the IMP is based

NDNR will be responsible for collecting, tracking, evaluating, and reporting the following activities within the IMP Area on an annual basis:

- NDNR stream gage measurements
- Surface water permits issued, cancelled or denied
- Irrigation water use data collected
- Annual water use by the Metropolitan Utilities District and Lincoln Water System

P-MRNRD will be responsible for collecting, tracking, evaluating, and reporting the following activities within the IMP Area on an annual basis:

- Groundwater level measurements
- Municipal, commercial, and industrial annual water use
- Irrigation water use
- Well registrations approved, cancelled or denied (or well permitting if well permitting requirements are implemented)
- Variances granted, cancelled or denied
- Water transfer permits granted, cancelled, or denied
- Water banking transactions (if a water banking system is established)

The NDNR and P-MRNRD will compare annual water use data to historically reported water usage data to evaluate the impacts of new water users on existing water users within the IMP Area. P-MRNRD will issue an annual report summarizing the data collected for the IMP Area. The reports presented will be in standardized format as agreed upon by the P-MRNRD and NDNR.

NDNR has developed a methodology, in conjunction with several of the Platte River Basin NRDs, to quantitatively assess the hydrologically connected groundwater and surface water of the state for use in the Annual Evaluation of Hydrologically Connected Water Supplies. This methodology will be used to monitor the balance of water supplies within the IMP Area. This methodology will be updated with the best available data and analysis as provided by P-MRNRD and NDNR. Any

updates to the methodology will also be used to expand the understanding of the hydrologically connected area, and if necessary, refine the boundary of that area.

7.0 MODIFICATIONS TO THE INTEGRATED MANAGEMENT PLAN

P-MRNRD and NDNR will hold an annual review to evaluate the IMP. Action items undertaken by the P-MRNRD and NDNR will be reviewed to determine if these items are fulfilling the goals and objectives of the IMP. The NDNR and P-MRNRD will jointly determine if amendments to the IMP are necessary. Amendments to the IMP will require an agreement by both parties. If amendments to the IMP are necessary, the P-MRNRD and NDNR will hold a joint hearing and issue the pertinent orders to formally adopt the revised IMP.

8.0 INFORMATION CONSIDERED IN DEVELOPMENT OF THIS PLAN

The following were sources of information used in the preparation of this IMP:

- Historic data on streamflows in the P-MRNRD and adjoining NRDs
- Past and present surface water use within and bordering the P-MRNRD
- Data on groundwater supplies and groundwater uses within and bordering the P-MRNRD
- Data on recharge rates within the P-MRNRD and adjoining NRDs
- Records on climate and precipitation trends within the P-MRNRD and adjoining NRDs
- Records on land use within the P-MRNRD and adjoining NRDs
- Community Involvement Plan for the P-MRNRD, 2012
- Rules and Regulations for groundwater management within the P-MRNRD
- The Papio-Missouri River Natural Resources District Water Balance Study, 2013
- McGuire, V.L., Ryter, D.W., and Flynn, A.S., 2012. Altitude, Age, and Quality of Groundwater, Papio-Missouri River Natural Resources District, Eastern Nebraska, 1992 to 2009. USGS Scientific Investigation report 2012-5036.

9.0 -GLOSSARY OF TERMS

Action Item – A specific task that the P-MRNRD or NDNR will undertake to achieve the goals and objectives of the Integrated Management Plan.

Aquifer - An underground geological formation of sand, soil, gravel and rock able to store and yield water. Alluvial aquifers are comprised of unconsolidated materials such as sand and gravel. Bedrock aquifers are comprised of rock.

Appropriation – A permit to use water that has been perfected in accordance with terms stipulated by the NDNR.

Conjunctive management – An adaptive process that utilizes the connection between surface and groundwater to maximize water use, while minimizing impacts to streamflow and groundwater levels.

Fully Appropriated – A determination made by the NDNR that a river basin, subbasin, or reach has reached a point where water uses are equal to water supplies.

Goal – A general statement of broad direction or intent with no time limit.

Groundwater – Water which occurs in or moves, seeps, filters, or percolates through ground under the surface of the land.

Groundwater Control Area - That portion of the P-MRNRD where groundwater is hydrologically connected to surface water (See Figure 2).

Groundwater management plan – The P-MRNRD’s plan that identifies the water quantity and quality characteristics, supplies, uses, data collection methods, management objectives, and management areas of groundwater supplies within an NRD.

Hydrologically connected – An area where groundwater and surface water are interconnected and withdrawals from one can affect the other. To determine if an area is hydrologically connected (as defined in Nebraska State Statute), one calculates if a well pumped for 50 years will deplete the river or a base flow tributary by at least 10 percent of the amount pumped in the 50 year period (the 10/50 area).

Integrated Management Plan – A document to manage a river basin, subbasin, or reach to achieve and sustain a balance between water uses and water supplies for the long term.

NDNR – The Nebraska Department of Natural Resources, a state agency.

NRD – Natural Resources District, a political subdivision of the state

Objective – A statement that defines the measurable results that a group seeks to accomplish.

P-MRNRD – The Papio-Missouri River Natural Resources District, a political subdivision of the state.

River basin – The land area that is drained by a river and its tributaries.

SAC – Stakeholder Advisory Committee. Representatives from various interest groups and professional fields who provide consultation on aspects of the Integrated Management Plan.

Surface water – Water that is on the Earth’s surface, such as a stream, river, lake, or reservoir.

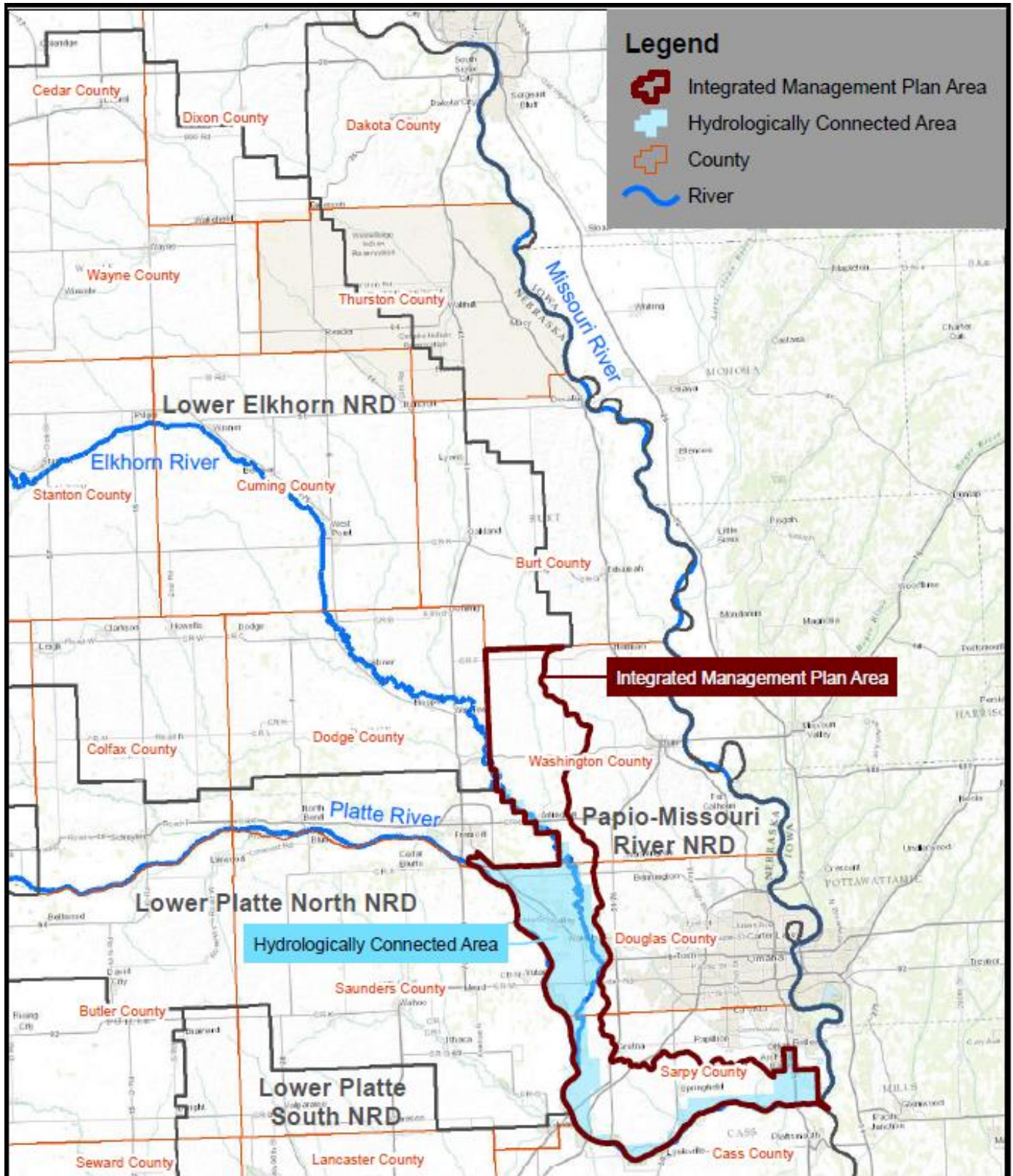
Surface Water Control Area – That portion of the P-MRNRD that drains to the Platte River (see Figure 2).

Subbasin – A portion of a river basin that is drained by a waterway.

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FIGURES

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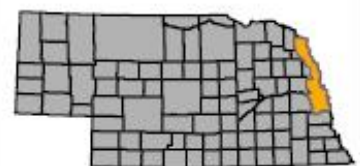


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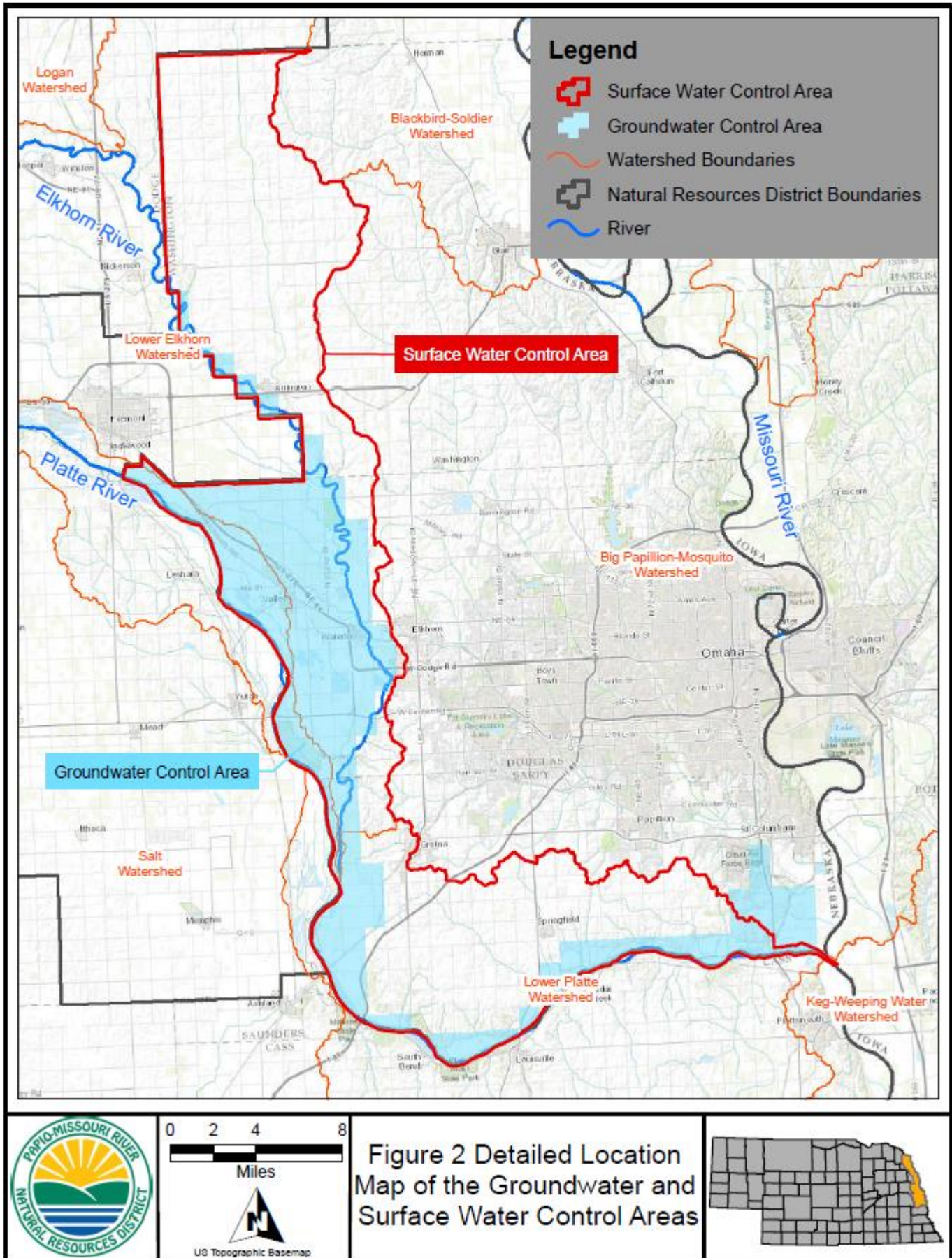


US Topographic Basemap

Figure 1 General Location Map of the Integrated Management Plan Area



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APPENDIX A
Letters Initiating the IMP Process

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**PAPIO-MISSOURI RIVER
NATURAL
RESOURCES
DISTRICT**



8901 S. 154th Street
Omaha, NE 68138-3621
402-444-6222
www.papionrd.org

November 15, 2011

Brian Dunnigan
Nebraska Department of Natural Resources
301 Centennial Mall South, 4th Floor
P.O. Box 94676
Lincoln, Nebraska 68509-4676

RE: Voluntary Integrated Management Plan

Dear Brian Dunnigan,

This letter is to inform you that the Papio-Missouri River NRD (District) Board of Directors has voted to develop a voluntary Integrated Management Plan (IMP) for the portion of the District within the Lower Platte River Basin. This letter serves as the District's official notice to the Nebraska Department of Natural Resources (Department) of our intent to enter into the formal process of developing an IMP.

Both the Lower Platte South and the Lower Platte North NRDs have provided notice of their intent to begin IMP development with the Department. The District expects that some level of coordinated effort for these IMP's would benefit the Districts and the Department and improve the overall planning process. Lower Platte North NRD has requested a November meeting with the Department and intends to invite the other basin NRD's. The District will have representatives at that meeting and we can further discuss the next steps at that time.

Highest Regards,

John Winkler

General Manager

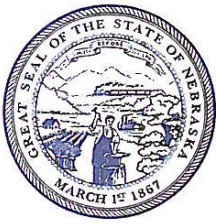
Papio-Missouri River Natural Resources District

Cc: Marlin Petermann & Brian Henkel, Papio-Missouri River NRD

Papio – Missouri River Natural Resource District Board of Directors

Larry Bradley Fred Conley John Conley Tim Fowler Scott Japp David Klug
Rick Kolowski Dorothy Lanphier Gus Erickson Richard Tesar Jim Thompson
John Winkler, General Manager

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Dave Heineman
Governor

STATE OF NEBRASKA

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

November 17, 2011

IN REPLY TO:

Richard Kolowski
PMRNRD Board Chairperson
8901 S 154th Street
Omaha, NE 68138-3621

Mr. Kolowski,

The Department is pleased to receive the Papio-Missouri River Natural Resources District's November 15, 2011, letter stating the District's intent to develop a voluntary integrated management plan (IMP), pursuant to *Neb. Rev. Stat. 46-715(1)(b)*. The Department agrees with the District that multi-district coordinated efforts would greatly enhance the planning process.

Department staff will be contacting your District to discuss details and the next steps in the integrated management planning process. The Department looks forward to developing the IMP with the District, in addition to furthering the effective working relationship between the District and the Department.

Sincerely,

Brian P. Dunnigan, P.E.
Director

NOV 21 2011

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APPENDIX B
Stakeholder Advisory Committee

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Papio-Missouri River Natural Resources District Voluntary Integrated Management Plan Stakeholder Advisory Committee*

First Name	Last Name	Affiliation
Frank	Albrecht	Nebraska Game and Parks Commission
Larry	Andreasen	City of Fremont Department of Utilities
Joel	Christensen	Metropolitan Utilities District
Toby	Churchill	Sarpy County EDC
Dana	Divine	University of Nebraska-Lincoln
Bruce	Fountain	Sarpy County
Jocelyn	Golden	City of Lincoln
Ken	Grimm	City of Valley
Brad	Harris	Layne Christensen Company
Steve	Hilgenkamp	Hilgenkamp Farms Incorporated
Kent	Holm	Douglas County Environmental Services
Steve	Huggenberger	City of Lincoln
Neil	Jensen	Natural Resources Conservation Service
Scott	Keep	Metropolitan Utilities District
John	Knapp	Sarpy County Farm Bureau
Jeff	Kooistra	City of Gretna
Rick	Lee	City of Springfield
Marty	Leming	City of Papillion
Bill	Rhea	Rhea Realty Company
Jeff	Runge	Fish and Wildlife Service
Meghan	Sittler	Lower Platte River Corridor Alliance
Darrell	Starks	Nebraska Airboaters Assoc.
Bill	Taylor	Valmont Industries
Jeffrey	Thompson	City of Papillion
Kevin	Tobin	Metropolitan Utilities District
Carol	White	Lyman-Richey Corporation
Rick	Wilson	U.S. Geological Survey
Tanna	Wirtz	Resident of Washington County
Gene	Zuerlein	Nebraska Game and Parks Commission

* This list only includes those attendees present at one or more meetings.

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APPENDIX C

List of Hydrologically Connected Groundwater Sections

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List of Hydrologically Connected Groundwater Areas

Dodge County: Township 17 North, Range 08 East, Sections 25, 35, 36; Township 17 North, Range 09 East, Section 31

Douglas County: Township 14 North , Range 09 East, Section 01; Township 14 North, Range 10 East, Sections 03, 04, 05, 06, 07, 08, 09; Township 15 North, Range 09 East, Sections 01, 02, 03, 11, 12, 13, 24, 25, 36; Township 15 North, Range 10 East, Sections 02 ,03,04, 05, 06, 07, 08, 09, 10, 11, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 26, 27, 28, 29, 30, 31, 32, 33, 34; Township 16 North, Range 08 East, Section 01; Township 16 North, Range 09 East, Sections 01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 12, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 33, 34, 35, 36; Township 16 North, Range 10 East, Sections 04, 05, 06, 07, 08, 09, 10, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 31, 32, 33, 34

Sarpy County: Township 12 North, Range 10 East, Sections 03, 04, 05, 09, 10, 11, 12, 13; Township 12 North, Range 11 East, Sections 01, 02, 10, 11, 12, 14, 15, 16, 17, 18, 19, 20, 21; Township 12 North, Range 12 East, Sections 06; Township 13 North, Range 10 East, Sections 03, 04, 05, 08, 09, 10, 15, 16, 17, 18, 19, 20, 21, 22, 27, 28, 29, 30, 32, 33; Township 13 North, Range 11 East, Sections 25, 36; Township 13 North, Range 12 East, Sections 25, 26, 27, 28, 29, 30, 31, 32, 33; Township 13 North, Range 13 East, Sections 03, 10, 13, 14, 15, 16, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36; Township 13 North, Range 14 East, Sections 30, 31; Township 14 North, Range 10 East, Sections 16, 17, 20, 21, 28, 29, 32, 33;

Washington County: Township 17 North, Range 09 East, Sections 02, 03, 11, 12, 13; Township 17 North, Range 10 East, Sections 18, 20, 29, 32, 33; Township 18 North, Range 09 East, 05, 08, 17, 20, 28, 29, 33, 34.