

Appendix A

Action Plan

Little Blue River Basin – Five Year Action Plan

1 - INTRODUCTION

The purpose of the Five Year Action Plan is to provide an initial set of implementation targets and action items that will direct resource managers in meeting long-term water management goals and objectives. If priorities arise during the implementation of the action plan that are not identified in the plan, a revision will be completed to include those activities/projects. The first Five Year Action Plan was focused on the following:

- ✓ Increase the adoption of management practices that will reduce the threat on nitrate contamination to groundwater.
- ✓ Increase the adoption of management practices to control erosion and runoff from irrigated and non-irrigated crop ground, pasture ground, and livestock operations.
- ✓ Collecting data and information necessary to evaluate and address nitrate threats to community groundwater supplies.
- ✓ Facilitate the construction of structural recharge practices.
- ✓ Enhance riparian areas along perennial streams to improve wildlife habitat, filter pollutants, and encourage development of aquatic habitat.
- ✓ Provide information and necessary outreach to producers and stakeholders.

Through the planning process, the NRDs identified priority activities, projects, and programs for the first five years. As more information becomes available for individual efforts, estimated costs, necessary actions, timeframes, and overall priority may change. Action items identified below pertain to water resource planning, inventory, evaluation, and practice/project implementation. Actions listed below are in addition to the current conservation measures and programs offered by each NRD. The intent of the action items listed below is to continue or enhance current NRD programs. Current conservation measures listed in Table 6-1 will be utilized within targeted sub-watersheds during plan implementation.

For planning purposes, cost estimates have been provided, but prior to initiating project planning cost estimates will need to be refined. Also, additional information or study may be required before proceeding with certain projects. In known cases, an additional action has been added to the Action Plan below.

2 - Groundwater Projects and Programs

2.1 Conservation Practices

Rangeland Management and Invasive Species Removal

The LBNRD would like to provide equipment to land managers to promote rangeland management through invasive species removal. Outreach to promote rangeland management will occur immediately in addition to supporting other agencies such as the Twin Valley Weed Management Authority.

Estimated Cost:	\$25,000-50,000
Estimated Timeframe:	Short (Years 2 & 3)
Potential Funding Sources:	NDEQ Section 319, NET

Continuous No-Till and Low-Tillage Farming Practices: Current No-Tillage, Tillage, and Agronomic Practices Survey

The NRDs would like to increase basin wide adoption of no-till or minimum-till farming due to its multiple benefits for surface water quality and groundwater recharge potential. In order to facilitate these efforts, current adoption rates in the Basin need to be determined. In 1996 a Big/Little Blue Farming Practices Study was conducted by UNL, which was funded through a grant received from the EPA to the Department of Agriculture. A follow-up survey was conducted in 2006 but was only in the Lower Big Blue River Basin. A follow-up study will be conducted in the Little Blue River Basin to determine farming tillage practices, including the current no-till and minimum-till adoption rate in addition to document changes in agronomic practices since the initial study. The survey would expand from previous surveys to include information regarding soil sampling, reporting, and general agronomic practices. Additionally, the NRDs will initiate an education component on benefits of no-till and to promote further adoption of no-till practices.

Estimated Cost:	\$10,000-20,000
Estimated Timeframe:	Short (Year 1)
Potential Funding Sources:	NDEQ Section 319, UNL, NET

2.2 Groundwater Recharge

Evaluation of Existing Structures: Recharge Efficiency Monitoring

Very little is known about the recharge efficiency of various types of existing structures. In order to develop the most cost effective recharge approach several questions need to be answered. Currently, the TBNRD plans to monitor recharge efficiency on the future Sand Creek Recharge Reservoir, while LBNRD plans to monitor recharge on Dam Site #40. Information from each of these efforts will be used to support future projects anticipated after Year 6.

Estimated Cost:	\$10,000-15,000
Estimated Timeframe:	Short (Years 2-3)
Potential Funding Sources:	NET, NDNR

Utilization of Existing Structures and Landscape Features

Streambank Stabilization and Renovation

Recently in Washington County, Kansas, just south of Jefferson County, several bendway weirs were installed to stabilize the streambank. This method has multiple-benefits, including aquatic habitat, reduced sedimentation, restoration of the riparian corridor, and increased biodiversity. The LBNRD will install similar type structures along the Little Blue River where stream banks are currently unstable. Potential project locations have been identified within the stream assessment GIS, or will be based upon request from property owners.

Estimated Cost:	\$100,000-150,000
Estimated Timeframe:	Short (Years 2-5)
Potential Funding Sources:	NDEQ Section 319, NET

Stream Channel Reconnection Feasibility Study

Several areas exist along the Little Blue River, or its major tributaries, to reconnect effectively relic oxbows to high flow events through diversion from the river or tributary. Stream channel reconnection has multiple benefits, including sediment trapping, groundwater recharge, wetland enhancement, aquatic habitat improvement, and filtering of pollutants to reduce transport of contaminants to groundwater supplies. The LBNRD will evaluate potential sites using existing information within this plan and proceed with a pilot project at one site within two years. The feasibility study will include up to 50% design of up to four locations, detailed cost estimates, pollutant reduction estimates, property owner coordination, and groundwater recharge estimates. The feasibility study will be used to obtain funding for final design and construction.

Estimated Cost:	\$35,000-50,000
Estimated Timeframe:	Short (Year 1)
Potential Funding Sources:	NDEQ Section 319, NET

Stream Channel Reconnection Project

Based upon findings within the reconnection feasibility study, several relic oxbows will be developed into projects. The LBNRD will proceed with final design and construction of up to four sites.

Estimated Cost:	\$300,000-400,000
Estimated Timeframe:	Short (Years 4-5)
Potential Funding Sources:	NDEQ Section 319, NET

Pilot Projects

Within the implementation strategy, several pilot projects are discussed to evaluate recharge concepts using dams, modifying existing structures, in-stream weirs, or off-channel diversion/temporary off-season storage. Additional planning and discussion between staff the Board will be necessary to select which type of project to use as a pilot, but LBNRD expressed interest in moving forward within the first 5 years of implementation.

Estimated Cost:	\$100,000-150,000
Estimated Timeframe:	Long (Years 6-8)
Potential Funding Sources:	NET, NDNR, WSF, NDEQ 319

New Recharge Structures: Sand Creek Recharge Reservoir

The TBNRD has been planning to construct a recharge structure approximately 6 miles east of Minden since 2010. The intent of the structure is to recharge an area with known groundwater declines. Net recharge is estimated at 400 to 500 acre feet per year.

Estimated Cost:	\$1,800,000-2,000,000
Estimated Timeframe:	Short (Years 1-3)
Potential Funding Sources:	WSF, TBNRD, NDEQ 319

Recharge Potential Map: Groundwater Recharge Feasibility Study

Opportunities exist throughout the Basin to capture seasonal high flows and runoff that can be used to recharge groundwater aquifers. Using existing information, such as the Hydrogeologic Study and

Artificial Recharge Opportunity Maps, a feasibility study will be completed to identify locations for new structures, or modifications to existing structures, to promote groundwater recharge.

Estimated Cost:	\$25,000-35,000
Estimated Timeframe:	2016 (Year 1)
Potential Funding Sources:	NET, NDNR, WSF

2.3 Groundwater Policy Recommendations

Voluntary Integrated Management Plan

Currently a Voluntary Integrated Management Plan (V-IMP) has not been established for the Little Blue River Basin. This water management plan would be developed jointly by the NDNR and an NRD. In order to qualify for WSF a V-IMP must be complete or underway at the time of any project applications.

Estimated Cost:	\$25,000-50,000
Estimated Timeframe:	Current (2015)
Potential Funding Sources:	NRDs

Modify District Phase Areas or Phase Area Requirements

NRD staff and boards would determine the extent of the Phase II area and implement appropriate changes to the Groundwater Rules and Regulations. Additional costs associated with expanding the Phase Areas or modifying requirements of various Phase Areas come from additional NRD monitoring and outreach efforts. Examples of new requirements include further quality testing or installation of flowmeters. These modifications become effective after the proper hearing process.

Estimated Cost:	\$5,000-10,000
Estimated Timeframe:	Short (Years 4-5)
Potential Funding Sources:	NRDs

Agronomic Soil Sampling and Reporting Requirement

Soil sampling provides agricultural producers with information regarding soil properties and health that can influence decisions regarding the types and amounts of chemicals applied to fields. This type of knowledge can allow agricultural producers to apply fewer chemicals, such as fertilizers to corn and soybean fields. The reporting component of the program will allow the NRDs to determine areas that could benefit from additional sampling and target those areas of the Basin. The cost and resources that the NRDs are willing to contribute to this program will determine the sampling density and reporting requirements. The main cost of this program will be staff time to track reports and maintain the database. Continued monitoring through other Action Plan items, including the Vadose Zone Monitoring will determine the effectiveness of agronomic soil sampling efforts on producer behavior.

Estimated Cost:	\$5,000-10,000
Estimated Timeframe:	Short (Years 4-5)
Potential Funding Sources:	NRDs

Expand Groundwater Monitoring Program

The current groundwater-level monitoring network is not evenly dispersed throughout the Basin. Adding monitoring wells in areas with known declines, conflicts, near WHPAs, or in areas not geographically represented in the current network will increase the understanding of groundwater level changes in the Basin. A small assessment may be necessary to determine well locations.

Estimated Cost:	\$10,000-15,000
Estimated Timeframe:	Short (Years 4-5)
Potential Funding Sources:	NDEQ, NET

Alternative Crop Management Programs

Alternative crop management relies upon changing agricultural producer behavior from choosing mainly corn and soybeans to farm operations that plan a wider range of crops. Alternative crop education would focus on reducing the number of acres in continuous corn production and transitioning to crop rotations with 3 or more crops. NRD staff could provide the training or partner with local UNL extension offices.

Estimated Cost:	\$2,000-5,000
Estimated Timeframe:	Short (Years 2-3)
Potential Funding Sources:	NRDs

Vadose Zone Monitoring Program

Vadose monitoring has been recommended in areas with elevated nitrate concentrations, such as WHPAs and GWMA. The NRD will need to determine areas and frequency of sampling. Shallow vadose sampling sites that were sampled in 2013 and 2014 should be revisited after 5 years, while deep sample sites should be revisited after 10 years.

Estimated Cost:	\$30,000-50,000
Estimated Timeframe:	Short (Year 5)
Potential Funding Sources:	NDEQ, NET

2.4 Municipal Water System Assistance/Source Water Protection

Public Relations Campaign

Increase communication with Basin communities through outreach and survey methods to gage community understanding of nitrate issues and willingness to address those issues. This increase in communication will help Basin NRDs to develop partnerships when necessary.

Estimated Cost:	\$1,000-3,000
Estimated Timeframe:	Short (Years 2-4)
Potential Funding Sources:	NRD, NDEQ, NET

Expand Current Programs

Completion of the public relations campaign will allow Basin NRDs to identify target communities to develop partnerships or ILCAs to address nitrate issues. These partnerships will allow Basin NRDs and partnering communities to expand current municipal water assistance and source water protection programs.

Estimated Cost:	\$5,000-10,000
Estimated Timeframe:	Short (Years 3-4)
Potential Funding Sources:	NRD, NDEQ, NET

2.5 Detailed Hydrogeologic and Nitrate Assessment

Well Screen Depth Assessment

Depth of well screens is often an unknown within the current groundwater nitrate sampling program. The distribution of groundwater nitrate concentrations indicate that nitrate levels are highly variable, even in close proximity, which can be contributed to differences in well screening. Using GIS and NDNR well logs, LBNRD will evaluate well screen intervals for to determine if this relationship exists between the depth of the screened interval and the observed nitrate concentrations. In situations where this data is key to management decisions, such as siting a new municipal well, video equipment may be used to determine well screening if the data is not available.

Estimated Cost:	\$15,000-25,000
Estimated Timeframe:	Short (Years 4-5)
Potential Funding Sources:	NDEQ, NET

3 - Surface Water Projects and Programs

3.1 Lake and Reservoir Water Quality Improvement

Crystal Lake Water Quality Renovation

Crystal Lake, located northwest of the Village of Ayr, is current listed on the impaired waters list for 'Aquatic Life'. The lake levels are supplemented by a well, and pumping is required to maintain a fishery. The lake is owned by the Village of Ayr, who would be the project sponsor. In 2015, the NGPC approved funding for a renovation through the Aquatic Habitat Program. Additionally, a bathymetric survey and water quality monitoring of the well and surface water occurred in 2015. A project implementation plan would need to be prepared to serve as a basis for outside funding applications.

Estimated Cost:	\$200,000-300,000
Estimated Timeframe:	Short (Year 1)
Potential Funding Sources:	NGPC, NDEQ Section 319, NET

Liberty Cove Water Quality Investigation

Prior to launching a project to renovate Liberty Cove, it's first recommended to conduct a small study to identify alternatives for weed management and to complete a bathymetric survey.

Estimated Cost:	\$10,000 – \$15,000
Estimated Timeframe:	Short (Years 3-5)
Potential Funding Sources:	NGPC, NDEQ Section 319, NET

Liberty Cove Water Quality Renovation

Liberty Cove, located near Lawrence, is currently on the impaired waters list for Aquatic Life - nutrients. This lake also suffers from massive vegetation issues (pond weed) and is shallow in areas near the dam.

The lake is owned by the LBNRD and is not in the NGPC’s aquatic habitat plan. A bathymetric survey is scheduled for completion by the end of 2015 or early in 2016. Prior to renovation planning, it is recommended that a water quality investigation be performed to identify the best alternatives for nutrient reduction and removal of pond weed. As part of the project planning, an assessment of current watershed conditions including pollutant loads and conservation measure needs will be conducted.

Estimated Cost: \$200,000-300,000
Estimated Timeframe: Short (Years 3-5)
Potential Funding Sources: NGPC, NDEQ Section 319, NET

Augmentation

Significant effort is necessary prior to building structures for stream augmentation purposes. Possible reservoir locations, such as Rose Creek would require installing stream gages to determine flow volumes, determining volumes necessary to augment streamflow, determining location area, and feasibility studies. Due to the effort necessary to building new augmentation structures, actual building or implementation is a longer-term goal.

Estimated Cost: \$3,000,000-6,000,000
Estimated Timeframe: Long (Years 8-10)
Potential Funding Sources: NGPC, NDEQ Section 319, NET

3.2 Wetlands

Seasonal Wetland Habitat Improvement Projects

The Rainwater Basin Wetlands (RBW) are a high quality resource, and also a target area for wetland restoration. The lead agency is the RWBJV, in partnership with the NRDs, will promote installation of Seasonal Wetland Habitat Improvement Projects within previously identified target areas. The intent is to improve habitat for waterfowl, promote groundwater recharge, and reduce nutrient and sediment pollutant loading to streams.

Estimated Cost: \$5,000/structure with annual payments determined based on the acres and landuse. Payments will be \$50/acre/year for flooded cropland and \$25/acre/year for grasslands and/or pasture.
Estimated Timeframe: Continuous Program Enrollment with 10 year program contract
Potential Funding Sources: RWBJV, NDEQ 319, NET, NGPC, USFWS

4 - Staffing

It is anticipated that additional staffing will be needed to adequately develop, implement, track, and report on projects and activities listed in the Action Plan. Staffing needs will be assessed by adding part or full time temporary staff.

Estimated Cost:	TBD
Estimated Timeframe:	Short (Years 2-3)
Potential Funding Sources:	NDEQ, NET

5 - Monitoring

Streamflow Measurement

Data provided by stream gaging has several benefits for both surface and groundwater management including integrated resource management, planning water resource projects, monitoring environmental conditions, tracking trends in surface water flows, etc. Several sub-basins are lacking equipment to perform monitoring of surface water flows as identified in Section 6 including Spring Creek near Hebron, Rose Creek near Endicott, and Little Sandy near Fairbury. The cost of additional stream gaging sites is dependent upon the number of new stream gaging locations and the type of data collection needed. If the new stream gages are used for calculating flow volumes, the cost of each gaging point is significantly cheaper than stream gages for administration purposes. Coordination with other agencies such as NDNR and USGS is recommended.

Estimated Cost:	\$30,000-50,000
Estimated Timeframe:	Short (Years 2-3)
Potential Funding Sources:	NET, NDNR

