

**Comprehensive Study Of  
Water Quality Monitoring  
In Nebraska**

**LB 1234  
PHASE II REPORT**

**Prepared For:**

**Natural Resources Committee  
Nebraska Legislature**

**Prepared By:**

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# Foreword And Acknowledgements

This Phase II report was prepared for the Natural Resources Committee of the Nebraska Legislature pursuant to Legislative Bill 1234 (LB1234), passed in 2000. LB1234 required the Nebraska Department of Environmental Quality (NDEQ) to conduct a comprehensive study of ground and surface water quality monitoring in Nebraska and prepare a report for each of the two study phases. The applicable sections of LB1234 pertaining to the comprehensive monitoring study are shown in Appendix A. The Phase I report of this study was submitted to the Natural Resources Committee on December 1, 2000, and consisted of an assessment of Nebraska's current ground and surface water quality monitoring efforts and an analysis of what the existing system does well and what it fails to do or does inadequately. A summary of the Phase I report is presented in Appendix B.

The purpose of this Phase II report is to provide the Natural Resources Committee with a detailed description of the changes required to establish a comprehensive, integrated statewide water quality monitoring system in Nebraska, including preferred alternatives if multiple options exist. In developing this report, the NDEQ worked and consulted with an advisory group called the Water Quality Monitoring Advisory Committee which consisted of designees from each of the following organizations: American Consulting Engineers Council of Nebraska (ACECN), Central Platte Natural Resources District (CPNRD), Lincoln-Lancaster County Health Department (LLCHD), League of Nebraska Municipalities (LNM), Nebraska Association of Resources Districts (NARD), Nebraska Department of Agriculture (NDA), Nebraska Department of Natural Resources (NDNR), Nebraska Department of Health and Human Services Regulation and Licensure (NHHS R&L), Nebraska Game and Parks Commission (NGPC), North Platte Natural Resources District (NPNRD), Nebraska Public Power District (NPPD), Nebraska Wildlife Federation (NWF), University of Nebraska (UN), University of Nebraska Water Sciences Laboratory (UNWSL), United States Army Corps of Engineers (USACOE), United States Environmental Protection Agency (USEPA), and United States Geological Survey (USGS).

The following individuals served as representatives for their respective organizations on the Committee during Phase II and made important contributions to this report:

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USGS	Bob Joseph	USGS	Jennifer Stanton

We are especially grateful to all of the monitoring coordinators and managers in Nebraska and surrounding states who completed the monitoring questionnaires and provided us with information about their monitoring programs.

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# EXECUTIVE SUMMARY

LB 1234 required the Nebraska Department of Environmental Quality (NDEQ) to conduct a two-phase comprehensive study of ground and surface water quality monitoring in Nebraska. The Phase I report was submitted to the Legislature's Natural Resources Committee on December 1, 2000, and consisted of an assessment of Nebraska's current ground and surface water quality monitoring efforts, and an analysis of what the existing system does well and what it fails to do or does inadequately. The purpose of this Phase II report is fulfill legislative requirements to identify monitoring needs to determine water quality trends in Nebraska. To meet the goal of determining statewide trends, the state would need to develop a more comprehensive, integrated statewide monitoring system.

In developing this report, the NDEQ worked with an advisory group called the Water Quality Monitoring Advisory Committee. A list of organizations participating on this advisory committee can be found on page ii. This report is based primarily on three sources of information: data collected and analyzed by NDEQ, recommendations and data gathered by the advisory committee; and responses from surveys that were distributed to all known organizations in Nebraska that conduct water quality monitoring programs.

Although some regions of the state have excellent monitoring coverage, such as ground water monitoring in the North Platte and Central Platte Natural Resources Districts, survey responses indicated that many monitoring programs would benefit from greater regional or statewide coverage of monitoring locations, collection of more samples, additional parameter analyses, and coordinated quality assurance/quality control (QA/QC) programs and monitoring strategies.

The report identifies seven main areas of focus: lake monitoring; stream fixed-site monitoring; ground water fixed-site monitoring; TMDL monitoring; information sharing; the development of periodic reports; and questionnaire responses regarding local and regional monitoring. Below is a brief description of the current situation, potential actions, and costs involved.

## LAKE FIXED-SITE MONITORING NETWORK

**Current situation** – Nebraska's lakes are heavily used for outdoor recreation activities such as fishing, boating, swimming and camping, and adequate water quality must be maintained and protected in these lakes in order to support these recreational uses. Protection of lake water quality is also important because expenditures related to outdoor recreation provide significant benefits to Nebraska's economy. Although DEQ and the University have on-going programs to monitor the quality of various lakes, there currently is not a fixed-site approach which would provide information related to water quality trends at lakes.

**Potential actions** – In order to assess trends, the state could establish a statewide lake fixed site monitoring network at Nebraska's highest public use lakes, including city lakes, to characterize the existing water quality of these lakes, and to determine if water quality is changing over time. A network of 25 lake monitoring locations would constitute about 5% of the 514 "publicly owned or open to the public" lakes in Nebraska.

**Cost of the plan** – \$75,000 annually. This includes the costs of collecting and analyzing monthly samples from May through September at 25 lakes for physical/chemical parameters.

## **STREAM FIXED-SITE MONITORING NETWORK**

**Current situation** –A small statewide stream fixed-site monitoring network was established by NDEQ in 2000. This network consists of 29 stream locations at flow gaging stations. Since there are more than 16,000 miles of perennial streams in Nebraska, statewide trends in stream water quality cannot adequately be represented by these 29 sites. In addition, the state currently conducts monthly analysis of physical/chemical parameters at 14 coldwater streams and samples trout populations annually at 30 coldwater streams.

**Potential actions** -- In order to better assess trends, the state could install an additional 71 fixed-sites on streams at continuous flow gaging stations for a total of 100 fixed-sites. Each of these 100 stream sites would be sampled monthly for the same parameters analyzed in the existing ambient stream network. The state would need to install new continuous flow gaging stations at approximately 22 of the proposed 100 stream locations. A list of potential sampling sites and continuous flow gaging stations within each river basin is presented on page 10.

**Cost of the plan** – One-time costs for establishing of stream sites would be approximately \$220,000. Annual costs, including sampling, analysis, operation and maintenance, would be approximately \$800,000.

## **GROUND WATER FIXED-SITE MONITORING NETWORK**

**Current situation** – The state does not have a statewide ground water fixed-site monitoring network in place currently, but there are considerable existing ground water monitoring locations throughout the state, primarily through NRDs and Groundwater Management Areas. Currently, there is significant variability in well types, well depths, sample schedules, parameters, and analytical methods used among the organizations conducting ground water monitoring in Nebraska.

**Potential actions** -- In order to better assess trends, the state could develop a statewide ambient ground water fixed-site monitoring network to characterize the water quality of aquifers throughout the state and determine if water quality is changing over time. In addition, standardized collection, reporting and laboratory procedures should be established. In certain areas, there is inadequate regional coverage of wells. It is estimated that installation of an additional 200 dedicated monitoring wells would be necessary to provide adequate regional and statewide coverage of ground water quality. We estimate a statewide network would consist of 1,000 wells sampled twice per year for nitrates, pesticides and other parameters.

**Cost of the plan** -- One-time costs to install approximately 200 dedicated monitoring wells would be approximately \$700,000. Annual costs for implementation are estimated to be about \$296,000.

## TMDL Monitoring

**Current situation** -- One of the most important surface water issues facing Nebraska is the collection of water quality data for development of Total Maximum Daily Loads (TMDLs). Nebraska has a federal statutory obligation to develop TMDLs for all surface waters listed on its EPA-approved Section 303(d) list of impaired waters. The collection of detailed water quality monitoring data is important so that accurate TMDLs can be developed and used to reduce pollution loads to acceptable levels. Also, adequate monitoring data is important in listing water bodies on the Section 303(d) list of impaired waters.

**Potential actions** – In 1999, NDEQ staff conducted an analysis which established TMDL goals and defined what activities would be needed to attain these goals. The goals relevant to this report would be to collect adequate water quality monitoring data for the 114 waterbodies on the Nebraska Section 303(d) list. (*The TMDL information can be found in the 1999 NDEQ report, “Strategic Plan for Developing Total Maximum Daily Loads and Addressing Waterbodies Included on the 1998 Nebraska Section 303(D) List”*).

**Cost of plan** – The collection of adequate monitoring data at these sites would cost approximately \$360,000 annually.

## INFORMATION SHARING

**Current situation** – One of the biggest surprises of this study was the number of organizations that were unaware of the monitoring programs being conducted by others. This information could potentially be used by other organizations if state mechanisms for sharing information existed.

**Potential actions** – To promote the exchange of statewide water quality data and monitoring information among organizations, two mechanisms would be needed: 1) the establishment of ground water and surface water monitoring technical advisory committees; and 2) the development of a centralized database for storage and public access to Nebraska ground water and surface water information. The advisory committees would help ensure the existing programs are well coordinated and that monitoring information is exchanged between organizations on a regular basis. A list of proposed organizations and suggested duties for the advisory committees are listed on **pages 18 and 19**.

To promote data sharing and “one-stop shopping” for all water quality data collected in Nebraska, the state could store all Nebraska ground water and surface water data in a centralized database. There was almost unanimous support by survey respondents for establishment of a centralized database for all ground water and surface water quality monitoring data collected in Nebraska. The existing Agrichemical Contaminant Database or “Clearinghouse Database” on the Nebraska Department of Natural Resource’s web site was recently established in Nebraska for nitrate and pesticide ground water quality data. This database could be expanded to include all ground water and surface water quality data collected in Nebraska including internet links to other databases that hold Nebraska water quality data.

**Cost of the plan** – There should be no additional costs associated with establishment of these technical advisory committees as these costs can likely be assumed within existing monitoring program budgets. The estimated cost to expand this database to include the storage of Nebraska surface water quality monitoring data and internet links to other water quality databases is an estimated \$150,000 annually. The current cost of maintaining the ground water database is \$75,000 annually, so a centralized database for storage of all

ground and surface water data in Nebraska is estimated to cost approximately \$225,000 annually.

## REPORTS TO THE LEGISLATURE

**Current situation** – A total of \$50,000 was recently appropriated by the Nebraska Legislature in LB329, passed in 2001, for development of an annual ground water quality report to the Legislature. There currently is no funding for this type of report for surface water issues.

**Potential actions** – In conjunction with the implementation of ambient fixed-site ground and surface water monitoring networks, NDEQ could develop periodic ground and surface water quality reports to the Nebraska Legislature. These reports would provide the Legislature with concise, reader-friendly updates of the status and trends of ground and surface water quality in Nebraska and would be valuable in facilitating water quality management and policy decisions. In addition, these reports would be made available to the public and should be useful in improving public awareness of Nebraska water quality issues.

**Cost of plan** -- The estimated costs of developing and publishing ground and surface water quality reports are approximately \$100,000 annually (\$50,000 per report). Or, an alternative would be to use the existing \$50,000 allocated through LB 329 to have the agency submit ground water and surface water reports on alternating years.

## QUESTIONNAIRE RESPONSES

*The results of this portion of the report are based on questionnaires that were distributed to all known organizations in Nebraska that conduct water quality monitoring programs.*

**Current situation** – According to questionnaire responses, most individual ground and surface water monitoring programs in Nebraska have a local or regional focus and often were developed in response to statutory or regulatory requirements. Most of these monitoring objectives are in addition to the statewide monitoring objectives. The questionnaire responses indicated that these local and regional objectives are not being attained.

**Potential actions** – Attainment of the other local and regional monitoring program objectives could be considered part of a comprehensive, integrated statewide monitoring system in Nebraska.

**Cost of plan** – Based on the questionnaire results and extrapolating these figures to account for missing NRD questionnaires, it is estimated that an additional \$1,550,000 (ground water) and \$400,000 (surface water) would provide funding needs identified from surveys.



# **COMPREHENSIVE STUDY OF WATER QUALITY MONITORING IN NEBRASKA**

## **PHASE II REPORT**

### **Introduction**

Legislative Bill 1234 (LB1234) directed the Nebraska Department of Environmental Quality (NDEQ) to conduct a comprehensive study of surface and ground water quality monitoring in Nebraska. This study was conducted in two phases. During Phase I of the study, NDEQ worked with and consulted an advisory committee consisting of the following organizations: American Consulting Engineers Council of Nebraska (ACECN), Nebraska Department of Agriculture (NDA), Nebraska Health and Human Services Regulation and Licensure (NHHS R&L), Nebraska Department of Natural Resources (NDNR), League of Nebraska Municipalities (LNM), Nebraska Association of Resources Districts (NARD), Nebraska Game and Parks Commission (NGPC), United States Geological Survey (USGS), University of Nebraska (UN), and Nebraska Wildlife Federation (NWF). The advisory group for Phase II included the organizations from Phase I and the following organizations that were found by the NDEQ to be significant stakeholders in the water quality area: Central Platte Natural Resources District (CPNRD), North Platte Natural Resources District (NPNRD), University of Nebraska Water Sciences Laboratory (UNWSL), Nebraska Public Power District (NPPD), Lincoln-Lancaster County Health Department (LLCHD), U.S. Army Corps of Engineers (USACOE), and U.S. Environmental Protection Agency (USEPA). A description of the applicable sections of LB1234 pertaining to the comprehensive study of water quality monitoring in Nebraska is in Appendix A.

As required in LB 1234 “Phase II of the study shall utilize the information gathered during Phase I and shall consist of a detailed description of the changes required in the current system to establish a comprehensive, integrated statewide water quality monitoring system, including preferred alternatives if multiple options exist.” LB1234 instructs the Water Quality Monitoring Committee to address issues which are detailed in Parts 2 and 4 of this report.

The Water Quality Monitoring Advisory Committee was established during August of 2000. In order to assess the status of ground and surface water quality monitoring programs in Nebraska, monitoring questionnaires were developed by the Advisory Committee and distributed to all organizations in the state and surrounding states with potential to conduct water quality monitoring programs. The Advisory Committee first developed a brief monitoring questionnaire to identify major ongoing monitoring programs in Nebraska. A summary of the Phase I report findings and conclusions is presented in Appendix B. A more comprehensive detailed questionnaire was then developed and submitted to all identified major ongoing monitoring programs in Nebraska in an attempt to obtain information that could be used to address the Phase II requirements.

Part 1 of this report will provide a summary of existing surface and ground water programs being implemented and subsequent sections will focus on the questions posed in LB 1234. Part 2 will respond to Issues A through F posed in LB 1234 relating to establishing a statewide monitoring system which can identify water quality trends. Part 3 addresses additional considerations relevant to LB 1234. In response to Issue G of LB 1234, Part 4 of this report identifies potential costs of developing an integrated, statewide water quality monitoring network to assess water quality trends.

# Part 1: Existing Surface and Ground Water Quality Programs

## Current Ground Water Programs

Statewide collection of ground water quality data in Nebraska has been accomplished through the monitoring programs of several organizations including the 23 NRDs, NDEQ, NHHS R&L, USGS, UN Conservation and Survey Division, UN Water Center, and county health departments. These organizations collect ground water monitoring data for a variety of purposes ranging from one-time studies to ongoing monitoring over a large area. Samples are taken from a wide range of well types. Based on responses to the monitoring questionnaires, the following numbers of monitoring programs have collected samples from each of the following types of wells: monitoring wells (41 programs), domestic wells (39 programs), irrigation wells (38 programs), municipal wells (28 programs), and industrial wells (13 programs).

Since much of Nebraska is characterized by intense cropping and irrigation practices, the majority of the ground water quality data collected in Nebraska has been for the purpose of documenting nitrate-nitrogen and pesticide concentrations in the ground water and evaluating the relationship of these compounds to agricultural land use practices. To further this effort, the Nebraska Departments of Environmental Quality, Agriculture and Natural Resources have collaborated with the University of Nebraska Water Sciences Laboratory to develop and maintain a statewide database of ground water nitrate and pesticide data called the Agrichemical Contaminant Database or “Clearinghouse Database.” Ground water sampling results are provided to scientists at the Water Sciences Laboratory, who review the practices used in obtaining and analyzing the samples. The Water Sciences Laboratory then assigns a numerical rating from 1 to 5 for individual results, with “1” representing the most basic quality assurance/quality control (QA/QC) practices, and “5” representing the most advanced QA/QC. These quality “flags,” along with the sample results, are provided in database form to the Nebraska Department of Natural Resources which places the information on its website. In this way, the results of many years of ground water sampling are made readily available to the public, and these results are also presented in a format that allows the user to know the level of QA/QC inherent in each sample.

The Clearinghouse Database records extend from approximately 1976 to the present. As would be expected, the majority of samples are from areas that are heavily farmed, but a considerable number of samples have also been collected from wells in more pristine areas of the state, such as the Sand Hills. For information on specific well locations, please refer to the Clearinghouse Database, which can be accessed at “<http://dnr.state.ne.us>” on the NDNR web site.

A wide variety of ground water monitoring approaches are used across the state. The most common ground water monitoring approaches are:

- Long term fixed station ambient monitoring,
- Rotating random well monitoring,

- Mass well sampling,
- Compliance monitoring,
- Special studies,
- Investigative monitoring, and
- Other monitoring.

**Long Term Fixed Station Ambient Monitoring** -- Many NRDs have a network of wells that are monitored on a set schedule. Many of the wells in these networks are irrigation, domestic, stock, or dedicated monitoring wells. Wells may be sampled annually or once every two to four years. Data collected from these wells are used to identify potential ground water problems, identify trends, make Ground Water Management Area boundary and “phase trigger” decisions, and make recommendations on controls and best management practices in a particular area. The majority of samples collected with this monitoring approach are analyzed for nitrate-nitrogen. A more limited number of samples are analyzed for pesticides or major chemical constituents.

**Rotating Random Well Monitoring** -- Many NRDs randomly sample different types of wells across their district each year. This approach is conducted to identify potential ground water quality problems, make Ground Water Management Area boundary and “phase trigger” decisions, and make recommendations on controls and best management practices in a particular area. Most samples are analyzed for nitrate-nitrogen, but some NRDs also analyze for pesticides or major chemical constituents.

**Mass Well Sampling** -- Some NRDs sample all existing wells (or as many as possible) in a given area. The area sampled may be as large as the entire NRD, but is often limited to a particular geologic province, county, or watershed. This approach is conducted to identify potential ground water quality problems, make Ground Water Management Area boundary and “phase trigger” decisions, and make recommendations on controls and best management practices in a particular area. The majority of samples are analyzed for nitrate-nitrogen. A fewer number of samples are analyzed for pesticides and major chemical constituents.

**Compliance monitoring** -- NDEQ requires and does significant compliance ground water monitoring in the state. Compliance monitoring is required at many livestock waste control facilities, landfills, remediation sites, and permitted facilities. Monitoring may be done by NDEQ or the facility and decisions concerning compliance and remediation are made from the data. The monitoring occurs annually, semi-annually, monthly, or on other prescribed schedules. Monitoring may be conducted for a wide range of parameters, depending on the particular facility. For example, if ground water monitoring is required at livestock waste control facilities, monitoring for nitrate as nitrogen, chloride, and ammonia is conducted. At a hazardous waste facility, however, monitoring may be required for a various synthetic compounds.

NHHS R&L requires all public water supply systems to monitor their ground water sources for approximately 83 constituents over a six year schedule. This schedule may vary based on the past concentrations of parameters found, the population served, and other factors. Monitoring results are used to help protect public drinking water quality and to ensure compliance of the public water supply system with the drinking water limits imposed in the federal Safe Drinking Water Act.

**Special studies** -- Special ground water monitoring studies are sometimes conducted by NRDs, NDEQ, NHHS R&L, USGS, USEPA, and others. Usually these studies are a one-time event to meet a specific objective. An example of a special study is the Ground Water Management Area program implemented by NDEQ under Title 196 (Rules and Regulations Pertaining to the Ground Water Management Areas). NDEQ's studies usually involve one-time sampling of approximately 10 to 20 percent of the existing registered wells in a particular area of interest. The purpose of this monitoring is to help decide if a Ground Water Management Area is necessary in these areas. In the case of an existing NRD Ground Water Management Area, the NDEQ can assist the NRD in boundary or "phase trigger" decisions, or require additional controls.

**Investigative monitoring** -- Investigative monitoring is typically initiated in response to the occurrence of a significant pollution event, spill, or public complaint. This type of sampling may be conducted to define the extent and impact of the pollution event, determine if remedial actions should be implemented for public health or environmental protection, identify possible pollution sources and/or responsible parties, or determine if state rules and regulations have been violated. The type of sampling that is conducted for investigative purposes is highly specific to the situation under investigation.

**Other monitoring** -- Monitoring may also be conducted for educational or other purposes. For example, a homeowner with a private domestic well may take a ground water sample to a lab or NRD to find out what the nitrate level is. The analysis of "other" monitoring samples is usually done as a public service and will not meet the specific quality assurance procedures of most monitoring programs in the state.

## **Current Surface Water Programs**

Surface water monitoring programs vary significantly among organizations in Nebraska, ranging from volunteer monitoring programs with little or no costs, to large sophisticated monitoring programs that cost several hundred thousand dollars annually. In general, statewide chemical water quality monitoring programs in Nebraska are conducted primarily by three organizations; the NDEQ, USGS, and U.S. Army Corps of Engineers (USACOE). The NDEQ conducts statewide stream, lake, and wetland monitoring programs. Several special studies are also conducted in cooperation with other organizations. The USGS conducts monitoring programs in river basins throughout the state and also conducts special studies in cooperation with local organizations. The ACOE conducts water quality sampling in flood control reservoirs it has constructed in Nebraska.

In addition to these statewide monitoring programs, a multitude of program-specific monitoring programs are conducted throughout Nebraska by federal, state, and local organizations. Some of these monitoring efforts are coordinated with other organizations, but many are conducted to meet specific program objectives with little or no collaboration. Many organizations target surface water quality monitoring within specific river basins or watersheds. The NDEQ collects most of its surface water quality data in conjunction with a rotating basin

monitoring strategy. Two or three river basins are sampled each year and all 13 river basins are sampled within a five-year period. Figure 1, (page 40) shows the locations of the 13 river basins in Nebraska.

Statewide biological monitoring programs are conducted primarily by two organizations; the NDEQ and NGPC. The NDEQ collects fish and macroinvertebrate community data at randomly selected stream sites using a probabilistic sample design (random sample site selection approach) in two to three river basins each year. The NDEQ also collects fish throughout Nebraska for its fish tissue monitoring program. The NGPC collects fish community data from the Missouri River and its tributaries, and from selected lakes and perennial streams throughout Nebraska.

Federal agencies and state agencies that use EPA grant funds (e.g., NDEQ) are required to store their surface water monitoring information on the EPA STORET national database. Since 1972, surface water quality monitoring data has been collected at a large number of sites in Nebraska. However, few of these sites have been continuously monitored. Water quality data collected by federal agencies and state agencies that use EPA funds can be accessed at “<http://dnr.state.ne.us>” on the NDNR web site. However, this is only a partial list of the historical surface water locations where water quality data has been collected in Nebraska.

Surface water monitoring programs in Nebraska collect samples from a number of different types of surface waters. Based on responses received from the monitoring questionnaires, the following numbers of monitoring programs collected samples from each the following types of surface waters: perennial streams (46 programs), lakes/reservoirs (27 programs), intermittent streams/drainages, waterways (16 programs), wetlands (10 programs), and other surface waters (14 programs). The “other” surface waters listed included effluents, runoff water, canals, reuse pits, and sandpits. (See Figure 1, page 40 – Locations of the 13 River Basins.)

A number of different approaches are used in Nebraska for monitoring surface waters. Examples of these monitoring approaches are listed below.

### **General Surface Water Quality Monitoring Approaches**

Surface water quality monitoring approaches can generally be characterized as either source monitoring or ambient monitoring. Source monitoring usually involves collecting samples from a point source discharge (i.e., effluent discharged from a pipe) or the receiving water below the discharge. Ambient monitoring refers to all types of monitoring conducted in waters outside of the immediate influence of point source discharges. The main approaches to source and ambient surface water quality monitoring include:

#### **Source Monitoring:**

- **Self-monitoring of effluents** by industrial and municipal dischargers to evaluate compliance with permit conditions.

- **Compliance sampling inspections** by the NDEQ or USEPA to provide an independent evaluation of the compliance of industrial and municipal dischargers with their permit conditions.
- **Effluent characterization studies** to measure the chemical constituents of the effluent and/or the characteristics of the stream where the effluent mixes with the receiving water.

**Ambient Monitoring:**

- **Networks of “fixed stations”** are monitored to evaluate water quality conditions and trends at locations where water samples are systematically collected over time.
- **Intensive surveys** are conducted to collect detailed water quality data for specific monitoring objectives such as calculating pollution loads or identifying sources of pollution. These studies are often conducted using a rotating basin monitoring approach.
- **Statistically-designed special studies** usually involve randomly selected sampling locations within a given geographic area. These studies allow statements to be made about the water quality of a given area with a known level of confidence.

## Part 2: Response to LB 1234 Issues A through F

This portion of the report presents NDEQ's findings in response to A through F of following excerpt of LB 1234. Item G will be addressed in Part 4 of this report. LB 1234 states:

*"The proposed monitoring system shall include, but not be limited to, the following:*

- (a) Recommended monitoring site locations;*
- (b) A description of acceptable monitoring techniques;*
- (c) The institutional flexibility to allow contaminants to be monitored on a statewide or regional basis as needed;*
- (d) Procedures to determine when coordinated monitoring between state and local entities is needed and policies for directing such monitoring;*
- (e) Provisions for the development of long-term trend lines for problem contaminants, for the inclusion of new contaminants, and for elimination of contaminants no longer requiring monitoring;*
- (f) Mechanisms to determine the best locations to monitor water quality for different types of contaminants and how to define local or regional problem areas; and*
- (g) An estimate of funding necessary to implement the recommendations of the study."*

### **A) Recommended Monitoring Site Locations**

The advisory committee and agency could not develop a complete set of site specific locations for this report, but they have established recommendations that the proposed future advisory committees (see page 18) could pursue. Specifically, in order to assess trends and develop comprehensive, integrated ground and surface water quality monitoring systems in Nebraska, the state could:

#### **I. Develop a statewide ambient fixed-site ground water monitoring network**

A fixed-site ground water monitoring network would characterize the water quality of aquifers throughout the state and determine if water quality is changing over time. In addition, standardized collection, reporting and laboratory procedures should be established. In certain areas, there is inadequate regional coverage of wells. It is estimated that installation of an additional 200 dedicated monitoring wells will be necessary to provide adequate regional and statewide coverage of ground water quality. We estimate a statewide network would consist of approximately 1,000 wells.

Specific monitoring site locations be determined in the future by the recommended Ground Water Monitoring Technical Advisory Committee (see page 18) after specific monitoring objectives have been established. General regions where ground water contamination has been documented will likely receive the most attention for the selection of monitoring sites. These regions are described in (f) in this chapter. Some criteria or mechanisms that may be helpful in choosing the best specific monitoring locations are also described in (f). There are many important factors to be considered in developing a ground water monitoring network and it will take time to consider these issues and select appropriate monitoring locations.



This network can consist of different types of wells, but should include a consistent sampling procedure and schedule. Factors such as natural vulnerability, land use, ground water use, administrative factors, well type, etc, should be considered in the selection of site locations. Following are other factors which should be considered in establishing the statewide ground water fixed-site monitoring network.

- Detailed information must be available for all wells chosen for the network (e.g., details on construction, depth, age, screen placement, location).
- Existing wells should be utilized, as available.
- Where existing irrigation, public, domestic, or monitoring wells are not available or inadequate, dedicated monitoring wells should be installed. As stated, this could involve as many as 200 new monitoring wells. These wells would most likely be installed using a phased approach.
- Wells should be sampled annually, twice a year, once every two years, or on some other fixed frequency schedule as determined by the Ground Water Monitoring Technical Advisory Committee.
- At a minimum, wells should be sampled for nitrates.
- Wells should also be sampled for pesticides, volatile organic compounds (VOCs), and major anions and cations. The schedule for monitoring of these parameters should be the same or less often as that of nitrates.
- Quality assurance/quality control samples (e.g. duplicates and blanks) should be taken at a minimum rate of 10% of all samples collected.
- Standardized sampling and lab analysis methods consistent with federal and state regulations should be used.

The recommended statewide ambient fixed-site ground water monitoring network should consist of approximately 1,000 wells that should each be sampled twice per year for nitrates, pesticides, and other parameters (volatile organic compounds (VOCs), major anions and cations). The rationale for an ambient network of 1,000 wells is that this represents approximately 1% of the 115,313 registered wells in the state and 1,000 wells would allow between 40 to 50 of the best well locations to be selected within each of the 23 NRDs.

## **II. Install Additional Fixed Sites on Streams**

In order to assess trends on a statewide basis, additional fixed site monitoring would be necessary. The state could install an additional 71 fixed-sites on streams at continuous flow gaging stations for a total of 100 fixed-sites. It is estimated that approximately 100 stream sites could be sampled monthly for the same parameters analyzed in the existing ambient stream network. For effective trend analysis, continuous flow gaging stations are necessary at the sites. Potential sampling sites and continuous flow gaging stations within each river basin are listed on the next page.

There are many important factors that need to be considered in developing monitoring networks. In addition, reconnaissance visits to potential sites should be conducted before the monitoring locations are selected.

The following factors should be considered in the preliminary selection of monitoring site locations for a statewide ambient fixed-site surface water monitoring network:

- Comprehensive coverage of all surface waters should be considered, but, at a minimum, statewide ambient fixed-site surface water monitoring networks should include streams and lakes.
- Spatial stratification (headwaters, middle reaches, lower reaches) of larger perennial streams.
- Indicator sites representative of ecoregions or specific land use practices (e.g., agricultural or urban development).
- Integrator sites at the lower reaches of the largest streams in each river basin.
- Impaired waters or waters in areas of known contamination.
- Locations above and below major tributaries and metropolitan areas.
- Reference sites for physical and chemical water quality data and biological condition.
- Locations on important waters entering and leaving the state or border waters (e.g., interstate waters, river compacts, Missouri River).
- Additional criteria or mechanisms that may be helpful in choosing the best monitoring locations are also described in (f) below.

If an expanded statewide ambient fixed-site stream monitoring network is implemented it should, at a minimum, include the existing ambient stream network of 29 stream sites at flow gaging stations and 30 coldwater stream sites. Active monitoring sites of other organizations should be considered and wherever possible, existing flow gaging stations should be used so that instantaneous and average daily flows can be obtained with all water quality samples collected. Historical stream monitoring sites should also be considered. Figure 2 (page 41) shows the locations of all active stream gaging and ambient fixed-site stream water quality monitoring locations in Nebraska.

A list of the recommended number of additional stream sites and new continuous flow gaging stations within each river basin for the recommended 100 site ambient stream monitoring network are listed below:

- Big Blue River Basin: 2 additional sites on the Big Blue River, 2 additional sites on major tributaries; 0 new flow gaging stations.
- Elkhorn River Basin: 2 additional sites on the Elkhorn River, 4 additional sites on major tributaries; 0 new flow gaging stations.
- Little Blue River Basin: 0 additional sites on the Little Blue River, 1 additional site on a major tributary; 0 new flow gaging stations.
- Loup River Basin: 0 additional sites on the Loup River, 10 additional sites on major tributaries, 0 new flow gaging stations.
- Lower Platte River Basin: 1 additional site on the Platte River, 5 additional sites on major tributaries, 1 new flow gaging station.
- Middle Platte River Basin: 2 additional sites on the Platte River, 2 additional sites on major tributaries, 1 new flow gaging stations.
- Missouri Tributaries River Basin: 2 additional sites on the Missouri River, 5 additional sites on major tributaries, 4 new flow gaging stations.

- Nemaha River Basin: 1 additional site on the Big Nemaha River, 1 additional site on a major tributary, 2 new flow gaging stations.
- Niobrara River Basin: 1 additional site on the Missouri River, 1 additional site on the Niobrara River, 7 additional sites on major tributaries, 5 new flow gaging stations.
- North Platte River Basin: 2 additional sites on the North Platte River, 7 additional sites on major tributaries, 5 new flow gaging stations.
- Republican River Basin: 2 additional sites on the Republican River, 5 additional sites on major tributaries, 0 new flow gaging stations.
- South Platte River Basin: 1 additional site on the South Platte River, 1 additional site on a major tributary, 2 new flow gaging stations.
- White River-Hat Creek River Basin: 1 additional site on Hat Creek, 1 additional site on a major tributary to the White River, 3 new flow gaging stations.

### **III. Establish a Stream Fixed-Site Biological Monitoring Network**

Establishment of an ambient fixed-site stream biological monitoring network is recommended to determine if significant changes in stream biological populations are occurring over time. Biological monitoring is important because it provides a direct measure of the health of the assigned aquatic life beneficial uses. It is recommended that an ambient network of approximately 30 fixed-site biological reference sites be established in Nebraska's Level III and Level IV ecoregions (shown in Figures 3-4, on pages 42 and 43).

Ecoregions are ecological regions that reflect relatively homogeneous physical characteristics (such as climate, geology, soils, vegetation, biology, and land use.) Ecoregions have been defined in four categories: Levels I and II are on a broad, continental scale; Level III is more specific and used for national applications, and Level IV is the most specific breakdown of these regions, and it is used for state-level applications. Nebraska has six Level III ecoregions and 29 Level IV ecoregions.

Approximately one reference site should be selected from each of the 29 Level IV ecoregions in Nebraska or five reference sites should be selected in each of the six Level III ecoregions in Nebraska.

### **IV. Establish a Statewide Lake Fixed Site Monitoring Network**

The state could establish a lake fixed site monitoring network at Nebraska's highest public use lakes, including city lakes, to characterize the existing water quality of these lakes, and to determine if water quality is changing over time. An ambient network of 25 lake monitoring locations would constitute about 5% of the 514 "publicly owned or open to the public" lakes in Nebraska.

## **B) A Description of Acceptable Monitoring Techniques**

The University of Nebraska Water Sciences Laboratory has developed screening criteria for the acceptance of nitrate and pesticide ground water quality data in the Agrichemical Contaminant Database. As the first step, the "Clearinghouse" process "assesses" submitted data with quality flags from 1 to 5 (5 having the highest level of quality assurance). Data are assessed

according to the data collection technique, method analysis, well information available, locational information available, and the existence of written Quality Assurance Project Plans, Sampling and Analysis Plans and/or Standard Operating Procedures (SOPs). “Clearinghouse” data are submitted to NDNR for inclusion on the agency’s web site as the Agrichemical Contaminant Database.

The Advisory Committee recognized the importance of consistent and reliable sampling and analysis methods, but also recognized that every entity gathering data has their own purposes for that data. Different monitoring purposes may necessitate different data gathering techniques. The critical factor is that information (metadata) on the data itself, which states how the data was collected, is readily available. In that way, the user can be assured that they are using comparable data.

The following is recommended with regard to acceptable monitoring techniques:

- Encourage or require all ground water data be collected and analyzed with written acceptable Quality Assurance Project Plans, Sampling and Analysis Plans and/or Standard Operating Procedures. The Ground Water Monitoring Committee would be responsible for publishing guidance for such plans and procedures and for arranging for periodic Quality Assurance training.
- Encourage that all ground water quality data used in decision-making and policy development be taken from wells with detailed information available for type of construction, depth, age, screen placement, location, etc. Detailed well information should be required for all wells used in the ambient ground water quality monitoring network.
- Provide or expand statewide training for selecting wells and well locations and developing acceptable sampling and quality assurance techniques in conjunction with the University of Nebraska Cooperative Extension and Water Sciences Laboratory, the Nebraska Well Drillers Association, the Nebraska Association of Resources Districts, and other organizations.
- Encourage use of national standards and information to standardize data parameters, collection methods, and laboratory analysis methods. In the future, data comparability issues between states may become more important.
- Develop procedures for collecting and analyzing surface water quality samples. Whenever possible, these procedures should be consistent with national standards and methods so that sample data from Nebraska can be compared with data from other states.
- Provide assistance in the development of written procedures for collecting and analyzing surface water samples, such as standard operating procedures and quality assurance project plans.

## **C) The Institutional Flexibility to Allow Contaminants to be Monitored on a Statewide or Regional Basis as Needed:**

### **Ground Water Institutional Flexibility**

The State's 23 Natural Resources Districts (NRDs) are heavily involved in monitoring nonpoint source contaminants of concern for their particular land use and geologic conditions. NRDs were formed as local agencies with the flexibility and ability to make local decisions. This local control has always been a natural and accepted method of ground water management in Nebraska. Overall, good cooperation exists between NRDs and State and Federal Agencies on ground water monitoring efforts, therefore institutional flexibility to address a variety of ground water concerns already exists. The Advisory Committee believes that this cooperation can and will result in effective monitoring for a wide variety of concerns.

NDEQ and the Advisory Committee recommends the following be considered, with respect to institutional flexibility to monitor contaminants regionally or statewide, as needed:

- A Ground Water Monitoring Technical Advisory Committee could provide monitoring recommendations for particular contaminants of concern. For example, if the Nebraska Department of Agriculture must sample statewide due to new pesticide registration requirements, the Ground Water Monitoring Technical Advisory Committee could help organize the endeavor. Likewise, as new contaminants of concern arise, the Committee would serve as a guiding body and resource for development of strategies to deal with these issues.
- The Committee should maintain a current inventory of current monitoring activities to share with interested parties. This inventory would also be useful in coordinating and prioritizing monitoring activities.
- The Committee should act as a moderator in situations where conflicts concerning ground water monitoring issues occur between local and/or state agencies. This committee should help negotiate an amiable solution to these problems.

### **Surface Water Institutional Flexibility**

The following provisions should be considered:

- A Surface Water Technical Advisory Committee could coordinate all statewide surface water quality monitoring programs and ensure that sample collection personnel are not prevented from sampling at the selected sample locations by any institutional restrictions such as city, county, NRD, or tribal boundaries.
- Annual reviews and updates of statewide Quality Assurance Project Plans by the Committee should include considerations of the parameters to be added or deleted from the parameter lists of each ambient surface water quality monitoring program due to national, statewide, or regional issues, concerns, or statutory requirements.
- Staff sharing agreements and contracts could be developed by the NDEQ as lead agency of the Surface Water Technical Advisory Committee with NRDs and other

organizations to insure that ambient monitoring can be conducted in all areas of the state where water quality samples are recommended.

- Memorandum of Understanding (MOU) documents could be developed as necessary between organizations to address any monitoring disputes that may arise and help ensure institutional flexibility occurs.

## **D) Procedures to Determine When Coordinated Monitoring Between State and Local Entities is Needed and Policies for Directing Such Monitoring:**

### **Ground Water Procedures**

Procedures for coordinating monitoring should be determined by the recommended Ground Water Monitoring Technical Advisory Committee. Methods to prioritize local concerns and problem areas versus statewide concerns should also be developed.

NDEQ and the Advisory Committee recommends that the following factors should be considered when procedures are established for coordinating ground water monitoring:

- The amount and source of funding available.
- The purpose of the ground water monitoring (e.g., Are there concerns about nitrate in drinking water?; Is ground water quality impacting surface water or vice versa?; Is the concern a gasoline additive such as MTBE?; Is there a natural public drinking water contaminant such as arsenic that should be investigated?).
- The particular aquifer or portions of aquifers that are of concern (shallow vs. deep; alluvial vs. upland; dryland vs. irrigated; rural vs. urban). Understanding the geology and geography is crucial to the selection of monitoring locations and parameters.
- Surface and ground water interaction issues. These issues may determine if monitoring plans for either ground water or surface water should be developed.
- The severity, physical extent, and urgency of a particular problem, as necessary to determine sampling and analysis schemes.

### **Surface Water Procedures**

The following factors should be considered:

- The Surface Water Technical Advisory Committee should be charged with coordinating monitoring between organizations and developing policies.
- The Advisory Committee should review quality assurance project plans annually and incorporate any changes that would improve coordination between organizations.

## **E) Provisions for the Development of Long-Term Trend Lines for Problem Contaminants, for the Inclusion of New Contaminants, and for Elimination of Contaminants No Longer Requiring Monitoring:**

### **Ground Water Provisions**

Long-term trend lines must be developed from data gathered over many years. To date, the only long-term ground water data being gathered is from NRDs (primarily nitrate and limited pesticide data) and the public water supply wells across the state.

NDEQ and the Advisory Committee recommends that the following factors should be considered:

- Continue the Agrichemical Contaminant Database (use the University of Nebraska Water Sciences Laboratory for the “clearinghouse” component of the State ground water quality database) with a source of financial support that is reliable. Currently, \$75,000 is the minimum annual cost to maintain the Clearinghouse Database for only the parameters of nitrate and selected pesticides. The database is currently funded by year-to-year federal grants that may not continue.
- The Ground Water Monitoring Technical Advisory Committee should determine contaminants of concern and changes necessary to monitoring programs, based on changing state and federal regulations.
- Encourage or require all nitrate and pesticide ground water quality data be submitted to the “Clearinghouse” for inclusion in the Agrichemical Contaminant Database (see (b) above).
- Evaluate the costs and importance to establish a ground water database similar to the Agrichemical Contaminant Database for all other kinds of ground water monitoring data collected in the state, such as ground water monitoring data from landfills, livestock waste control facilities, leaking underground storage tank sites, Superfund sites, etc. Examples of new contaminants include MTBE, arsenic, sulfate, and Volatile Organic Compounds (VOCs) such as TCE or benzene.

### **Surface Water Provisions**

The following provisions should be considered:

- National guidance should be examined to ensure that national pollutants of concern are considered in Nebraska’s monitoring strategy.
- Procedures should be developed by the Surface Water Monitoring Advisory Committee for including and deleting contaminants.
- The Advisory Committee should review and update the list of contaminants, as necessary, in the annual quality assurance project plans.

## **F) Mechanisms To Determine The Best Locations To Monitor Water Quality For Different Types Of Contaminants And How To Define Local Or Regional Problem Areas:**

### **Ground Water Mechanisms**

The best locations for ground water quality monitoring wells may vary greatly, depending on several factors, including the decisions to be made with the monitoring information. A Ground Water Monitoring Technical Advisory Committee should determine a list of questions or criteria to help make decisions about locations of monitoring wells (new or existing) and contaminants to monitor for. This list will be a good start for an ambient ground water monitoring network, as well as a guidance for various programs across the state. General regions where ground water contamination has been documented should be considered in determining the best monitoring locations. These regions are shown in Figures 5-7 on pages 44-49.

Some of the following factors should also be considered:

- Funding and personnel available for new wells, and additional sample collection, data manipulation, and data management.
- Relative priority or importance of the ground water concerns (public drinking water supply, domestic water supply, discharge to critical or endangered watersheds, etc.)
- Vulnerability of ground water to contamination (depth to water, types of soils and vadose zone sediments).
- Land use (e.g., intensive row crop, pasture, urban, irrigated crop, dryland crop).
- Types of contaminants being monitored (natural contaminants such as arsenic and uranium, or man-made contaminants such as pesticides or VOCs).
- Use of the monitoring data. What decisions will be made from the data? Will local land use decisions or statewide/legislative decisions be made?
- Types of irrigation used (e.g., furrow irrigated or sprinkler).
- Geologic and topographic conditions (alluvial vs. upland; sloping vs. flat land, etc.).
- Nonpoint source contaminants (nitrate and pesticides) vs. point source contaminants (benzene, carbon tetrachloride, MTBE, TCE, other Volatile Organic Compounds (VOCs)).
- Existing monitoring locations.
- Existing ground water monitoring data.
- Existing monitoring efforts at the federal, state, and local levels and methods for coordinating monitoring in the most efficient and effective manner possible.

### **Surface Water mechanisms**

The following factors should be considered:

- The Surface Water Monitoring Technical Advisory Committee should determine the mechanisms to be used in determining the best locations for monitoring water quality and how to define water quality problem areas.



- Existing and historic ambient fixed-site stream monitoring locations and USGS gaging stations should be used to the maximum extent possible. Figure 5 above shows the active stream gaging stations and ambient fixed-site stream monitoring locations in Nebraska.
- Geographic Information Systems (GIS) data overlay maps should be used to help select monitoring sites. Suggested mechanisms that should be considered by the Surface Water Monitoring Technical Advisory Committee are land use, topography, soils, beneficial uses assigned, locations of point sources, livestock density, interstate waters, ecoregions, areas of ground water level declines, and identified impaired waters. Figures 6, 7, 8, 9, and 10 show the locations of Level III ecoregions, Level IV ecoregions, municipal and industrial NPDES facilities, state resource waters, and interstate and border waters, respectively.

## Part 3: Other Considerations

One of the most important considerations identified is the establishment of a Ground Water Monitoring Technical Advisory Committee and a Surface Water Technical Advisory Committee to address water monitoring issues and facilitate statewide coordination of water monitoring programs. Additional guidance for establishing advisory committees is presented below.

### **Ground Water Monitoring Technical Advisory Committee**

The Ground Water Monitoring Technical Advisory Committee should be a multi-organization technical advisory committee with representation from state, local, and federal organizations dealing with ground water quality and quantity issues. State representatives should include the Nebraska Department of Environmental Quality (NDEQ), Nebraska Health and Human Services – Regulation and Licensure Drinking Water Program (NHHS-R&L), Nebraska Department of Agriculture (NDA), Nebraska Department of Natural Resources (NDNR), University of Nebraska Conservation and Survey Division (UNCSD), University of Nebraska Water Sciences Lab (UNWSL), and the Nebraska Association of Resources Districts (NARD). Local representatives should include the 23 Natural Resources Districts and county health departments. Federal representation should include the United States Geological Survey (USGS) and the United States Environmental Protection Agency (USEPA). As other significant stakeholders are identified, they should be added to the Advisory Committee. The NDEQ should be the lead agency of the Advisory Committee. This committee should meet on an as needed basis with regular meetings held at least annually or semiannually. The Advisory Committee should contact other states that have implemented coordinated statewide monitoring approaches and attempt to learn from their experiences. Any costs associated with establishing a Ground Water Technical Advisory Committee and holding meetings will be met within existing monitoring program budgets.

The Advisory Committee should develop State Ground Water Quality Monitoring Goals to guide future ground water monitoring efforts in Nebraska. The Advisory Committee should consider including the following goals when the State Ground Water Quality Monitoring Goals are developed.

- Collect the data necessary to credibly assess ground water quality conditions and trends statewide and in specific regions.
- Collect data necessary to ensure the safety of drinking water supplies for public water systems relying on ground water.
- Collect the data necessary to identify potential problem areas for specific contaminants where further monitoring may be necessary.
- Collect the data necessary to ensure compliance in various regulatory programs, including but not limited to ground water monitoring at livestock waste control facilities, landfills, remediation sites, and permitted facilities.
- Collect data necessary to make Ground Water Management Area boundary and “phase trigger” decisions.

- Collect data necessary to make management decisions on particular controls and best management practices necessary in Ground Water Management Areas.
- Conjunctive use and other issues involving ground water/surface water interactions should be coordinated between the Ground Water Monitoring Technical Advisory Committee and the Surface Water Monitoring Technical Advisory Committee.

### **Surface Water Monitoring Technical Advisory Committee**

State organization representatives on the Surface Water Monitoring Technical Advisory Committee should include the Nebraska Department of Environmental Quality (NDEQ), Nebraska Health and Human Services – Regulation and Licensure (NHHS-R&L), Nebraska Department of Agriculture (NDA), Nebraska Department of Natural Resources (NDNR), University of Nebraska (UN), Nebraska Game and Parks Commission (NGPC), and the Nebraska Association of Resources Districts (NARD). Local organization representatives should include the 23 Natural Resources Districts. The Nebraska Wildlife Federation (NWF) should represent private environmental organizations in the state. Federal representation should include the United States Geological Survey (USGS), U.S. Army Corps of Engineers (USACOE), and the United States Environmental Protection Agency (USEPA). As other significant stakeholders are identified, they should be added to the SWMTAC. Any costs associated with establishing a Surface Water Monitoring Technical Advisory Committee and holding meetings should be covered within existing monitoring program budgets.

The Advisory Committee should develop state surface water quality monitoring goals to guide future surface water quality monitoring efforts. The Advisory Committee should consider the following goals:

- Collect the data necessary to assess surface water quality conditions and trends statewide.
- In accordance with the federal Clean Water Act, prepare a Section 303(d) list, based on data that identifies waterbodies impaired or threatened by surface water pollution.
- Collect the data necessary to develop water quality-based effluent limitations where Total Maximum Daily Loads (TMDLs) are not established.
- Collect the data necessary to develop credible surface water quality management plans (i.e., Basin Management Plans, Watershed Management Plans, and TMDLs).
- Collect the data necessary to determine if regulated entities are in compliance with specified permit conditions regarding surface water discharges.
- Collect the data necessary to determine if implemented water pollution control measures effectively improved or protected surface water quality.
- Develop water quality criteria for the protection of surface water quality in Nebraska.
- Collect data to support enforcement actions regarding surface water quality regulations.

- The Surface Water Monitoring Technical Advisory Committee should coordinate conjunctive use issues and other issues involving ground water/surface water interactions with the Ground Water Monitoring Technical Advisory Committee.

## **Database Development**

If statewide ground water quality trends or decisions are to be made from ground water monitoring data, the data must be readily available. A good start at this effort is the Agrichemical Contaminant Database, now on the Nebraska Department of Natural Resources internet site ([www.dnr.state.ne.us](http://www.dnr.state.ne.us)). This project is funded by federal grants through the Nebraska Department of Agriculture and the Nebraska Department of Environmental Quality (both using USEPA grant money) and state match funding on an annual basis. The University of Nebraska Water Sciences Laboratory coordinates and assesses nitrate and pesticide ground water data from agencies and organizations across the state into a “Clearinghouse” and in turn, passes it to the Department of Natural Resources for placement on the internet, where it is available as the Agrichemical Contaminant Database. This data management effort is just as important as the expansion of monitoring locations and parameter analyses, as additional ground water quality information is of little value if it cannot be easily accessed and used in making decisions or policies.

Considerations should be made to expand this existing database to include surface water data in Nebraska.

This data management effort is just as important as the expansion of monitoring locations and parameter analyses, as additional collection of surface water quality information is of little value if it cannot be easily accessed and used in making decisions or policies. Assessing and storing surface water quality data compared to ground water quality data is more complex due to the much larger numbers of parameters that are measured in surface water.

## **Annual Reports**

A total of \$50,000 was recently appropriated by Nebraska Legislature in LB329, passed in 2001, for development of an annual ground water quality report to the Nebraska Legislature. There currently is no funding for this type of report for surface water issues.

In conjunction with the implementation of ambient fixed-site ground and surface water monitoring networks, NDEQ could develop periodic ground and surface water quality reports to the Nebraska Legislature. These reports would provide the Nebraska Legislature with concise, reader-friendly updates of the status and trends of ground and surface water quality in Nebraska and would be valuable in facilitating water quality management and policy decisions. In addition, these reports would be made available to the public and should be useful in improving public awareness of Nebraska water quality issues.

The estimated costs of developing and publishing ground and surface water quality reports are approximately \$100,000 annually (\$50,000 per report). Or, an alternative would be to use the

existing \$50,000 allocated through LB 329 to have the agency alternate ground water and surface water reports.

## **TMDL Monitoring**

One of the most important surface water issues facing Nebraska is the collection of water quality data for development of Total Maximum Daily Loads (TMDLs). Nebraska has a federal statutory obligation to develop TMDLs for all surface waters listed on its EPA-approved Section 303(d) list of impaired waters. The collection of detailed water quality monitoring data is important so that accurate TMDLs can be developed and used to reduce pollution loads to acceptable levels. Also, adequate monitoring data is important in listing water bodies on the Section 303(d) list of impaired waters.

Up until this point, the state has been using existing information collected during Basin Management Assessment and Planning surveys and Nonpoint Source Watershed Assessment surveys to develop TMDLs.

In 1999, NDEQ staff conducted an analysis which established TMDL goals and defined what activities would be needed to attain these goals. Primary activities relevant to this report would be to collect adequate water quality monitoring data for the 114 waterbodies on the Nebraska Section 303(d) list. (*The TMDL information can be found in the 1999 NDEQ report, "Strategic Plan for Developing Total Maximum Daily Loads and Addressing Waterbodies Included on the 1998 Nebraska Section 303(D) List"*).

## **Questionnaire Responses**

In order to assess the status of ground and surface water quality monitoring programs in Nebraska, the LB 1234 Water Quality Monitoring Advisory Committee first developed a brief monitoring questionnaire. A summary of the Phase I report findings and conclusions is presented in Appendix B. A more comprehensive detailed questionnaire was then developed and submitted to all identified major ongoing monitoring programs in Nebraska in an attempt to obtain information that could be used to address Phase II requirements. Coordination between these major monitoring programs could be considered a component in developing a comprehensive, integrated statewide water quality monitoring system in Nebraska.

According to questionnaire responses, most individual ground and surface water monitoring programs in Nebraska have a local or regional focus and often were developed in response to statutory or regulatory requirements. Most of these monitoring objectives are in addition to the statewide monitoring objectives. The questionnaire responses indicated that many local and regional objectives are not being attained.

Attainment of the other local and regional monitoring program objectives could be part of a comprehensive, integrated statewide monitoring system in Nebraska.

## Part 4: Response to LB 1234 Issue G: Funding Necessary to Implement the Recommendations of the Study

This portion of the report presents NDEQ’s findings in response to Issue G of LB 1234: An estimate of funding necessary to implement the recommendations of the study. The chart below provides an overall summary of potential costs of all categories, and lists the pages where narrative explanations can be found for each item listed.

<b>Summary of Potential Costs</b>		
<b>Category</b>	<b>One-time costs</b>	<b>Annual costs</b>
Ground Water Fixed Site Network (Page 8)	\$700,000	\$300,000
Surface Water Fixed Sites for Streams and Lakes (Page 9, 10)	\$220,000	\$720,000
Surface Water, TMDL Monitoring (Page 21)		\$360,000
Periodic Reports (Page 20)		\$50,000
Centralized Data Base (Page 20)		\$150,000
<b>SUBTOTAL</b>	<b>\$920,000</b>	<b>\$1,580,000</b>
Questionnaire Responses:		
Ground Water Local, Regional Survey Requests (Page 21)		\$1,550,000
Surface Water Local, Regional Survey Requests (Page 21)		\$400,000
<b>TOTAL</b>	<b>\$920,000</b>	<b>\$3,530,000</b>

### Ground Water Activities

In order to establish a comprehensive, integrated statewide ground water monitoring system in Nebraska, each of the following potential activities should be considered:

- Development of a statewide ambient fixed-site ground water monitoring network to characterize existing water quality in Nebraska and determine if water quality is changing over time;
- Establishment of a Ground Water Monitoring Technical Advisory Committee to provide recommendations on statewide monitoring issues, coordinate statewide monitoring projects and sharing of data and resources, develop standardized approaches for collecting and analyzing data, assist organizations in developing quality assurance/quality control programs and sound monitoring approaches, and develop contracts with organizations for available pass-through funds associated with statewide monitoring projects;

- A centralized database to provide for storage and “one-stop shopping” access to all ground water quality data collected in Nebraska; and
- A periodic ground water quality report to the Nebraska Legislature and citizens of Nebraska.

## **Surface Water**

In order to establish a comprehensive, integrated statewide surface water monitoring system in Nebraska, the following potential activities should be considered:

- Development of a statewide ambient fixed-site surface water monitoring network to characterize existing surface water quality in Nebraska and determine if water quality is changing over time;
- Establishment of a Surface Water Monitoring Technical Advisory Committee to provide recommendations on statewide monitoring issues, coordinate statewide monitoring projects and sharing of data and resources, develop standardized approaches for collecting and analyzing data, assist organizations in developing quality assurance/quality control programs and sound monitoring approaches, and develop contracts with organizations for available pass-through funds associated with statewide monitoring projects;
- A centralized database to provide for storage and “one-stop shopping” access to all surface water quality data collected in Nebraska; and
- A periodic surface water quality report to the Nebraska Legislature and citizens of Nebraska.

## LITERATURE CITED

Nebraska Department of Environmental Quality. 2001. Surface Water Quality Monitoring Strategy. CPP Document Number 2.1. Water Quality Division. Nebraska Department of Environmental Quality. March 2001. 65 pp.

National Research Council. 2001. Assessing the TMDL Approach to Water Quality Management. Committee to Assess the Scientific Basis of the Total Maximum Daily Load Approach to Water Pollution Reduction. Water Science and Technology Board. National Research Council. 90 pp.

InsideEPA.com 2001. Environmental Policy Alert. Date: July 11, 2001. Issue: Vol. 18, No. 14. Inside Washington Publishers.

Nebraska Department of Environmental Quality. 1999. Strategic Plan for Developing Total Maximum Daily Loads and Addressing Waterbodies Included on the 1998 Nebraska Section 303(d) List.



## APPENDIX A

### APPLICABLE SECTIONS OF LB1234

Sec. 18. The Legislature finds that (1) existing monitoring of ground water quality performed by natural resources districts is excellent and deserves recognition, (2) substantial efforts have been undertaken by the Department of Environmental Quality to monitor surface water quality, and (3) it is within the state's capacity to develop a comprehensive, integrated statewide water quality monitoring system.

Sec. 19. The Department of Environmental Quality shall conduct a comprehensive study of water quality monitoring in Nebraska pursuant to section 20 of this act. In preparing Phase I of the study, the department shall work with and consult an advisory committee consisting of a designee from each of the following: The American Consulting Engineers Council of Nebraska, the Department of Agriculture, the Nebraska Natural Resources Commission, the Department of Health and Human Services Regulation and Licensure, the Department of Natural Resources, the League of Nebraska Municipalities, the Nebraska Association of Resources Districts, the Game and Parks Commission, the United States Geological Survey, and the University of Nebraska. The advisory group for Phase II of the study shall include the members listed in this section for Phase I and be expanded to include all groups found by the Department of Environmental Quality to be significant stakeholders in the water quality area. Phase I of the study shall be presented to the Natural Resources Committee of the Legislature on or before December 1, 2000, and Phase II shall be presented to the committee on or before June 30, 2001.

Section 20. (1) The study required by section 19 of this act shall consist of two phases. Phase I of the study shall consist of an assessment of Nebraska's current water quality monitoring efforts and shall address, but not be limited to, the following:

- (a) A detailed description of all current water quality monitoring efforts at the state and local levels, including scope, location, timing, procedure, number of personnel, state agency or local government involved, and funding; and
- (b) An analysis of current water quality monitoring efforts, indicating what the existing system does well and fails to do or does inadequately. The analysis shall address, but not be limited to, the following questions:
  - (i) Is the current number of monitoring sites sufficient to provide accurate information on water quality in all regions of the state;
  - (ii) Is the current frequency of monitoring efforts sufficient to provide an accurate measurement of changes in water quality over time;
  - (iii) Are the current methods of sample collection and analysis scientifically sound and is the collection of samples and subsequent testing conducted in a manner which reasonably assures accurate measurements;
  - (iv) Is the current reporting process timely and does it present information to policymakers in an understandable and usable form;
  - (v) Is the current coordination of monitoring efforts between the Department of Environmental Quality, natural resources districts, and county or local governments sufficient; and

- (vi) Does the current system provide a mechanism ensuring statewide or regional coordination of water quality monitoring efforts when desirable.
- (2) Phase II of the study shall utilize the information gathered during Phase I and shall consist of a detailed description of the changes required in the current system to establish a comprehensive, integrated statewide water quality monitoring system, including preferred alternatives if multiple options exist. The proposed monitoring system shall include, but not be limited to, the following:
  - (a) Recommended monitoring site locations;
  - (b) A description of acceptable monitoring techniques;
  - (c) The institutional flexibility to allow contaminants to be monitored on a statewide or regional basis as needed;
  - (d) Procedures to determine when coordinated monitoring between state and local entities is needed and policies for directing such monitoring;
  - (e) Provisions for the development of long-term trend lines for problem contaminants, for the inclusion of new contaminants, and for elimination of contaminants no longer requiring monitoring;
  - (f) Mechanisms to determine the best locations to monitor water quality for different types of contaminants and how to define local or regional problem areas; and
  - (g) An estimate of funding necessary to implement the recommendations of the study.

## **APPENDIX B**

### **SUMMARY OF PHASE I REPORT**

A summary of the findings and conclusions from the Phase I report is presented below. The brief questionnaire was submitted to 195 organizations including environmental groups, natural resources districts, irrigation districts and ditch companies, cities with populations of 5,000 or more, county health departments, universities and colleges, and state and federal agencies in Nebraska and the states of Colorado, Iowa, Kansas, Missouri, South Dakota, and Wyoming. A total of 76 organizations responded to the brief questionnaire.

#### **Phase I Brief Questionnaire Responses**

##### **Responses by Organizations and Monitoring Programs to the Brief Monitoring Questionnaire**

A total of 76 of 195 (39%) organizations responded to the brief monitoring questionnaire. A copy of the brief questionnaire is listed in Appendix A. Information was received on 117 water quality monitoring programs. Seventeen of the 76 organizations that responded to the brief questionnaire reported that they did not conduct water quality monitoring programs. Eleven of these 17 organizations were small irrigation districts and ditch companies. A total of 92 of the 117 surface and ground water monitoring programs were listed as ongoing programs. Sixty-nine (69) of these 92 ongoing programs were conducted by 13 organizations. The Nebraska Department of Environmental Quality reported the most ongoing monitoring programs (24).

##### **Types of Water Quality Data Collected**

The most common types of water quality data collected for surface and ground water monitoring programs were chemical (106); followed by physical (77); biological, including bacteriological (61); and radiological (29).

##### **Ancillary Data Collected or Used with Water Quality Data**

The most common types of ancillary data collected or used with water quality monitoring data were stream flow, lake level, global positioning system (GPS), and geographic information system (GIS) information for surface water monitoring programs; and ground water level, GPS, and GIS information for ground water monitoring programs.

##### **Uses of Water Quality Data**

The most common uses of monitoring data collected by surface and ground water monitoring programs were to “describe water quality conditions” (87), followed by “water quality trends” (80), “identify and prioritize water quality problems” (80), and “regulatory compliance” (52).

## **Funding Sources**

Monitoring programs in Nebraska are supported by a number of different funding sources, with multiple sources of funding used in many programs. The most common sources of funding are state (65), local (57), federal (53), private (10), and none (6). The “none” category included volunteer monitoring and donation of lab analysis costs.

## **Willingness to Share Water Quality Monitoring Data**

A total of 112 of the 117 surface and ground water monitoring programs stated that they were willing to share monitoring data with other organizations and the public. The other five programs did not respond to this question. Responses to this question show almost unanimous support for the sharing of monitoring data.

## **Support/Concerns for a State Clearinghouse Database**

A total of 84 of 87 programs (97%) stated that their organization supported the concept of a state clearinghouse database. However, 30 programs did not respond to this question. This low response rate may indicate that these programs were unfamiliar with the concept of a state clearinghouse database. Comments received about the state clearinghouse database included concerns about additional workloads and costs associated with a centralized state database such as standardization of data collections, data entry, data quality reviews, and recoding of existing data. Concerns were also expressed about the disclosure of landowner and other confidential information and possible misuse or misinterpretation of data by the public or non-governmental organizations.

## **Data Storage Methods**

The data storage methods reported by the 117 monitoring programs included paper files (112) and electronic files (92). These results indicate that most monitoring programs use both paper files and electronic files to store their water quality monitoring data. Spreadsheets were the most common type of electronic files used to store data (70) followed by databases (56).

## **Internet Access**

Access to water quality data is generally not available on the internet web sites of organizations that collect water quality data in Nebraska. Only 9 of 114 organizations (8%) reported that water quality data could be accessed on their organization’s web site. Two of these organizations stated that some, but not all, of their data was available. Conversely, 105 organizations (92%) reported that the water quality data they collect could not be accessed on their web site. Several organizations stated that they do not yet have a web site. Many organizations reported that data accessibility on their web sites was a goal and they were planning to implement this in the future.

## **Periods of Record**

The periods of record for water quality monitoring programs in Nebraska vary significantly. The NGPC's fish community sampling program dates back to the early 1900's, the public water system monitoring program began more than 50 years ago, and a few ongoing monitoring programs began in the 1970's. However, most current monitoring programs in Nebraska began in the 1980's or 1990's. Information was received for 92 ongoing surface and ground water monitoring programs. In addition, information was also received on 17 discontinued monitoring programs.

## **Quality Assurance/Quality Control**

Overall, the quality assurance/quality control (QA/QC) procedures used by water quality monitoring programs in Nebraska are very good. A total of 85 of 107 programs (79%) reported that they collect water quality data in accordance with a quality assurance program that includes written methods and procedures. Copies of many standard operating procedures (SOPs) were received and most collection methods used by Nebraska organizations for surface and ground water monitoring are comparable. The major differences are that some organizations use much more rigorous scientific approaches in their collection methods and collect more samples, including quality control samples, than others to ensure the representativeness of their samples. Some organizations currently not using written procedures stated that they were concerned about the costs of initiating and maintaining a quality assurance program. Some organizations also indicated that they would like assistance with their QA/QC programs, sample collection methods, and monitoring networks.

## **Phase I Conclusions**

Section 20. (1) The study required by section 19 of this act shall consist of two phases. Phase I of the study shall consist of an assessment of Nebraska's current water quality monitoring efforts and shall address, but not be limited to, the following:

(a) A detailed description of all current water quality monitoring efforts at the state and local levels, including scope, location, timing, procedure, number of personnel, state agency or local government involved, and funding; and

**The brief monitoring questionnaire was submitted to 195 organizations including environmental groups, natural resources districts, irrigation districts and ditch companies, cities with populations of 5,000 or more, county health departments, universities and colleges, and state and federal agencies in Nebraska and the states of Colorado, Iowa, Kansas, Missouri, South Dakota, and Wyoming. A total of 76 organizations (39%) responded to the brief questionnaire. Based on the responses to the brief questionnaires, detailed surface and ground water questionnaires were submitted to organizations with major ongoing monitoring programs. At the time of this report, 49 detailed questionnaires had been returned. Please refer to the Water Quality Monitoring Program section of this report, beginning on page 2, for a description of all current water quality monitoring efforts in Nebraska at the federal, state, and local levels, and detailed descriptions of the scope, location, timing, procedure, number of personnel, state agency or local government**

**involved, and funding for several surface and ground water monitoring programs.**

(b) An analysis of current water quality monitoring efforts, indicating what the existing system does well and fails to do or does inadequately. The analysis shall address, but not be limited to, the following questions:

(i) Is the current number of monitoring sites sufficient to provide accurate information on water quality in all regions of the state;

**No, the current number of sites is not sufficient. Many regions of the state are currently not monitored for surface water quality data including streams, lakes, and wetlands. Some areas of the state with limited numbers of registered wells have not been adequately monitored for ground water quality. Most monitoring programs stated that the number of monitoring locations were not adequate.**

(ii) Is the current frequency of monitoring efforts sufficient to provide an accurate measurement of changes in water quality over time;

**No, the current frequency of monitoring efforts is not sufficient to provide an accurate measurement of changes in water quality over time. Several organizations collect monitoring data for the purpose of determining trends, but may not adequately account for spatial and temporal variability in the waters being sampled. Many programs do not collect any trend data and there is no trend data available in many areas of the state.**

(iii) Are the current methods of sample collection and analysis scientifically sound and is the collection of samples and subsequent testing conducted in a manner which reasonably assures accurate measurements;

**The current methods of sample collection and analysis used by most organizations are scientifically sound and conducted in a manner that reasonably assures accurate measurements. However, several organizations still collect water quality data without the use of written procedures or quality assurance project plans. Differences in lab analytical methods, lab method detection limits, and the parameters measured affect the comparability of data and affect data usage by some organizations.**

(iv) Is the current reporting process timely and does it present information to policymakers in an understandable and usable form;

**The current reporting process is timely for most organizations and information is presented to policymakers in an understandable and usable form. Several programs identified a need to increase the use of global positioning systems (GPS) and geographical information systems (GIS) in order to improve geo-referencing of data and facilitate the display of data for reports.**

Is the current coordination of monitoring efforts between the Department of Environmental Quality, natural resources districts, and county or local governments sufficient; and

**The current coordination of monitoring efforts between the NDEQ, NRDs, and county or local governments appears to be sufficient, but could be improved. Coordination of ground water monitoring is especially well coordinated. Good coordination exists between the NDEQ and several NRDs in the monitoring of lakes and streams. However, limited or no coordination exists between many federal, state, local, and private surface water quality monitoring programs. Many organizations were unaware of the number of other organizations collecting surface water quality data in the state.**

(vi) Does the current system provide a mechanism ensuring statewide or regional coordination of water quality monitoring efforts when desirable.

**No, there is currently no formal mechanism in place to ensure statewide or regional coordination of water quality monitoring efforts or to encourage the ongoing exchange of monitoring needs or sharing of monitoring resources.**

## APPENDIX C

### Summary of Ground Water Detailed Questionnaire Responses and Updates

**Name of organizations that responded (and acronym):**

- Central Platte Natural Resources District (CPNRD)
- Douglas County Health Department (DCHD)
- Lewis & Clark Natural Resources District (LCNRD)
- Little Blue Natural Resources District (LBNRD)
- Lower Big Blue Natural Resources District (LBBNRD)
- Lower Elkhorn Natural Resources District (LENRD)
- Lower Loup Natural Resources District (LLNRD)
- Lower Niobrara Natural Resources District (LNNRD)
- Lower Platte North Natural Resources District (LPNNRD)
- Lower Platte South Natural Resources District (LPSNRD)
- Middle Niobrara Natural Resources District (MNNRD)
- Nebraska Health & Human Services Regulation & Licensure (NHHS R&L)
- Nebraska Department of Environmental Quality (NDEQ)
- Nebraska Game and Parks Commission (NGPC)
- Nemaha Natural Resources District (NNRD)
- North Platte Natural Resources District (NPNRD)
- South Platte NRD (SPNRD)
- Twin Platte Natural Resources District, TPNRD
- U.S. Geological Survey (USGS)
- Upper Big Blue Natural Resources District (UBBNRD)
- Upper Elkhorn Natural Resources District (UENRD)
- Upper Loup Natural Resources District (NRD)
- Upper Niobrara-White Natural Resources District (UNWNRD)

(Note: Responses were received from 23 organizations and 31 monitoring programs (18 NRDs, 1 county health department, 3 state agencies, 1 federal agency). Some agencies responded more than once for different monitoring programs)

**Years that data have been collected**

- 1976 to present

**Number and type of wells reported to be sampled per year (approximate)**

	Irrigation	Domestic	Stock	Public	Monitoring	Industrial	Other
	3326	1971	47	731	1106	9	1

**Total = 7191**

**Type of ground water samples/parameters collected**



- **Field parameters (pH, conductivity, temperature)**
- **nitrates**
- **pesticides**
- **bacteria**
- **major anions and cations**
- **Halogenated aliphatics**
- **Ethers**
- **Monocyclic aromatics**
- **Nitrosamines and other nitrogen-containing compounds**

**Data submitted to Clearinghouse (University of Nebraska -Water Sciences Lab)**

**14 of 31 programs currently submit data to the University of Nebraska Water Sciences Laboratory, which acts as a Clearinghouse for the data, and assesses and flags the quality of the data, and then submits it to Nebraska Department of Natural Resources for storage.**

(Note: There are over 90,000 entries (nitrates and pesticides) in the Agricultural Contaminant Database ([www.dnr.state.ne.us](http://www.dnr.state.ne.us)), with 22,116 entries from NRDs, 4,715 entries from NDEQ, and 45,236 entries from NHHS (CDC study)).

**Number of FTEs involved in ground water monitoring:**

- **26.61 FTEs**

(Note: This number represents ONLY time spent collecting samples by those organizations responding to questionnaires. No FTE estimates were obtained for the public water systems)

**Estimated current annual costs of monitoring programs:**

- **\$3,154,212**

\*\* Note: The 18 NRDs reporting estimated \$1,186,603 for current annual cost of ground water monitoring programs. If this amount is extrapolated to all 23 NRDs, the cost is estimated to be \$1,516,215. Public water system monitoring required under the federal Safe Drinking Water Act currently costs \$1,433,997 annually for lab analysis. After adding in the \$79,000 reported from other programs (non-NRD, non-public water system), \$75,000 for maintenance of the Clearinghouse Database, and \$50,000 for developing an annual report to the Nebraska Legislature, the total current estimated annual cost of ground water monitoring programs in Nebraska is **\$3,154,212**.

**Sources of funding for current programs:**

- **11% federal**
- **19% state**
- **70% local**

## APPENDIX D

### Summary of Surface Water Detailed Questionnaire Responses and Updates

#### Name of organizations that responded (and acronym):

- ☛ Cedar Knox Rural Water
- ☛ Lower Platte North Natural Resources District (LPNNRD)
- ☛ Nebraska Department of Environmental Quality
- ☛ Nebraska Game and Parks Commission (NGPC)
- ☛ Nemaha Natural Resources District (NENRD)
- ☛ Nebraska Public Power District (NPPD)
- ☛ North Platte Natural Resources District (NPNRD)
- ☛ Twin Platte Natural Resources District (TPNRD)
- ☛ University of Nebraska (UN)
- ☛ Upper Elkhorn Natural Resources District (UENRD)
- ☛ Upper Niobrara White Natural Resources District (UNWNRD)
- ☛ U.S. Geological Survey (USGS)

(Note: Responses were received from 13 organizations in Nebraska, 2 in Kansas, 1 in Iowa, and a total of 30 monitoring programs (6 NRDs, 6 state agencies, 1 federal agency). The organizations responding from Nebraska are listed above. Some agencies responded more than once for different monitoring programs)

#### Years that data have been collected

- ☛ 1967 to present

#### Types of surface water sampled:

- ☛ Streams and rivers
- ☛ Lakes
- ☛ Wetlands
- ☛ Effluent discharge

#### Types of “media” sampled:

- ☛ Water column – physicochemical and bacteria
- ☛ Sediment
- ☛ Fish flesh
- ☛ Plankton community
- ☛ Fish community
- ☛ Macroinvertebrate community
- ☛ Habitat

#### Estimated FTEs of current programs:

- 26.84 FTEs

(Note: this number represents ONLY time spent collecting samples by those organizations responding to questionnaires)

**Estimated annual costs of current programs:**

- \$1,668,075

**Sources of funding for current programs:**

- 75% federal
- 23% state
- 2% local
- <1% private

## APPENDIX E

### CURRENT ANNUAL EXPENDITURES OF GROUND WATER MONITORING PROGRAMS IN NEBRASKA

Name of Organization	Annual Cost	Sources of Funding	Federal	State	Local
Central Platte Natural Resources District (CPNRD)	\$38,500	100% Local	\$0	\$0	\$38,500
Douglas County Health Department (DCHD)	\$10,000	100% Local	\$0	\$0	\$10,000
Lewis & Clark Natural Resources District (LCNRD)	\$25,000	70% State, 30% Local	\$0	\$17,500	\$7,500
Little Blue Natural Resources District (LBNRD)	\$38,800	95% Local, 5% Federal	\$1,940	\$0	\$36,860
Lower Big Blue Natural Resources District (LBBNRD)	\$40,000	50% State, 50% Local	\$0	\$20,000	\$20,000
Lower Elkhorn Natural Resources District (LENRD)	\$156,182	75% State, 25% Local	\$0	\$117,137	\$39,046
Lower Niobrara Natural Resources District (LNNRD)	\$50,000	67% State, 33% Local	\$0	\$33,500	\$16,500
Lower Loup Natural Resources District (LLNRD)	\$81,600	100% Local	\$0	\$0	\$81,600
Lower Platte North Natural Resources District (LPNNRD)	\$62,530	80% Local, 20% State	\$0	\$12,506	\$50,024
Lower Platte South Natural Resources District (LPSNRD)	\$105,000	55% Federal, 45% State	\$57,750	\$47,250	\$0
Middle Niobrara Natural Resources District (MNNRD)	\$9,000	80% State, 20% Local	\$0	\$7,200	\$1,800
Nebraska Department of Environmental Quality (NDEQ) - GWMA program	\$40,000	50% Federal, 50% State	\$20,000	\$20,000	\$0
Nebraska Health & Human Services Regulation & Licensure (NHHS R&L) Public Water System Sample Analysis Costs	\$1,433,997	100% Local	\$0	\$0	\$1,433,997
Nebraska Game and Parks Commission (NGPC)	\$1,000	75% Federal, 25% State	\$750	\$250	\$0
Nemaha Natural Resources District (NNRD)	\$5,000	70% Federal, 20% State, 10% Local	\$3,500	\$1,000	\$500
North Platte Natural Resources District (NPNRD)	\$150,000	25% Federal, 25% State, 50% Local	\$37,500	\$37,500	\$75,000
South Platte NRD (SPNRD)	\$7,000	30% Federal, 60% State, 10% Local	\$2,100	\$4,200	\$700
Twin Platte Natural Resources District (TPNRD)	\$78,534	54% Federal, 28% State, 18% Local	\$42,408	\$21,990	\$14,136
Twin Platte Natural Resources District (TPNRD)	\$44,134	54% Federal, 28% State, 18% Local	\$23,832	\$12,358	\$7,944

<b>Name of Organization</b>	<b>Annual Cost</b>	<b>Sources of Funding</b>	<b>Federal</b>	<b>State</b>	<b>Local</b>
Twin Platte Natural Resources District (TPNRD)	\$22,713	54% Federal, 28% State, 18% Local	\$12,265	\$6,360	\$4,088
Twin Platte Natural Resources District (TPNRD)	\$20,300	54% Federal, 28% State, 18% Local	\$10,962	\$5,684	\$3,654
U.S. Geological Survey (USGS)	\$26,000	50% Federal, 50% State	\$13,000	\$13,000	\$0
U.S. Geological Survey (USGS)	\$24,000	50% Federal, 50% State	\$12,000	\$12,000	\$0
U.S. Geological Survey (USGS)	\$18,000	50% Federal, 50% State	\$9,000	\$9,000	\$0
Upper Big Blue Natural Resources District (UBBNRD)	\$30,000	60% State, 40% Local	\$0	\$18,000	\$12,000
Upper Big Blue Natural Resources District (UBBNRD)	\$7,500	60% State, 40% Local	\$0	\$4,500	\$3,000
Upper Elkhorn Natural Resources District (UENRD)	\$38,280	100% State	\$0	\$38,280	\$0
Upper Elkhorn Natural Resources District (UENRD)	\$16,030	100% State	\$0	\$16,030	\$0
Upper Niobrara-White Natural Resources District (UNWNRD)	\$95,000	60% Federal, 40% Local	\$57,000	\$0	\$38,000
Upper Niobrara-White Natural Resources District (UNWNRD)	\$60,000	75% State, 25% Local	\$0	\$45,000	\$15,000
Upper Loup Natural Resources District (ULNRD)	\$5,500	100% Local	\$0	\$0	\$5,500
<b>Totals:</b>	<b>\$2,739,600*</b>		<b>\$304,008</b>	<b>\$520,243</b>	<b>\$1,915,349</b>
<b>Sources of Funding</b>			<b>11%</b>	<b>19%</b>	<b>70%</b>

\*Note: The total of \$2,739,600 does not include the current estimated costs for 5 NRDs, \$75,000 for the cost of maintaining the Agrichemical Contaminant Database, or \$50,000 for development of an annual ground water quality report to the Nebraska Legislature.  
(Source: Detailed Monitoring Questionnaire Responses and Recent Updates)

## APPENDIX F

### CURRENT ANNUAL EXPENDITURES OF SURFACE WATER MONITORING PROGRAMS IN NEBRASKA

<b>Name of Organization:</b>	<b>Ann. Cost:</b>	<b>Sources of funding:</b>	<b>Federal</b>	<b>State</b>	<b>Local</b>	<b>Private</b>
Cedar Knox Rural Water	\$10,000	100% Federal	\$10,000	\$0	\$0	\$0
Lower Platte Natural Resources District (Lower Platte NRD)	\$23,700	60% Federal, 40% Local	\$14,220	\$0	\$9,480	\$0
Nebraska Department of Environmental Quality (NDEQ) Ambient Bacteria/Pesticide	\$182,562	60% Federal, 40% State	\$109,537	\$73,025	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) Ambient Fixed-Site Stream Network	\$234,352	60% Federal, 40% State	\$140,611	\$93,741	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) Ambient Wetlands	\$33,530	75% Federal, 25% State	\$25,148	\$8,383	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) Fish Kill/Citizen Complaints Section 106	\$14,465	60% Federal, 40% State	\$8,679	\$5,786	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) Fish Tissue	\$26,127	60% Federal, 40% State	\$15,676	\$10,451	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) Joint State Atrazine	\$22,374	95% Federal, 5% Private	\$21,255	\$0	\$0	\$1,119
Nebraska Department of Environmental Quality (NDEQ) R-EMAP Biological Monitoring	\$89,234	100% Federal	\$89,234	\$0	\$0	\$0
Nebraska Department of Environmental Quality (NDEQ) NPS Studies - Lakes, NPS Runoff Studies in 2 watersheds, GPS sediment basin studies	\$118,322	60% Federal, 40% State	\$70,993	\$47,329	\$0	\$0
Nebraska Game and Parks Commission (NGPC)	\$190,000	70% Federal, 30% State	\$133,000	\$57,000	\$0	\$0
Nebraska Game and Parks Commission (NGPC)	\$25,000	70% Federal, 30% State	\$17,500	\$7,500	\$0	\$0
Nebraska Game and Parks Commission (NGPC)	\$10,000	50% Federal, 50% State	\$5,000	\$5,000	\$0	\$0
Nebraska Public Power District (NPPD)		100% Private				
Nemaha Natural Resources District (NNRD)	\$7,000	50% Federal, 10% State, 40% local	\$3,500	\$700	\$2,800	\$0
North Platte Natural Resources District (NPNRD)		25% Federal, 25% State, 50% Local				

<b>Name of Organization:</b>	<b>Ann. Cost:</b>	<b>Sources of funding:</b>	<b>Federal</b>	<b>State</b>	<b>Local</b>	<b>Private</b>
Twin Platte Natural Resources District (TPNRD)	\$8,222	54% Federal, 28% State, 18% Local	\$4,440	\$2,302	\$1,480	\$0
U.S. Environmental Protection Agency (USEPA) REMAP	\$90,737	100% Federal	\$90,737	\$0	\$0	\$0
U.S. Environmental Protection Agency (USEPA) RAFTMP Fish Tissue	\$68,450	100% Federal	\$68,450	\$0	\$0	\$0
U.S. Geological Survey (USGS)	\$300,000	100% Federal	\$300,000	\$0	\$0	\$0
U.S. Geological Survey (USGS)	\$28,000	100% Federal	\$28,000	\$0	\$0	\$0
U.S. Geological Survey (USGS)	\$11,000	50% Federal, 50% Local	\$5,500	\$0	\$5,500	\$0
University of Nebraska-Lincoln (UNL) Lake Classification Study - Contractual Section 319	\$150,000	60% Federal, 40% State	\$90,000	\$60,000	\$0	\$0
Upper Elkhorn Natural Resources District (UENRD)	\$15,000	100% State	\$0	\$15,000	\$0	\$0
Upper Niobrara White Natural Resources District (UNWNRD)	\$10,000	100% Local	\$0	\$0	\$10,000	\$0
<b>Totals</b>	<b>\$1,668,075</b>		<b>\$1,251,480</b>	<b>\$386,216</b>	<b>\$29,260</b>	<b>\$1,119</b>
<b>Source of Funding:</b>			<b>75%</b>	<b>23%</b>	<b>2%</b>	<b>&lt;1%</b>

(Source: Detailed Monitoring Questionnaire Responses and Recent Updates)