

# Lower Elkhorn Natural Resources District

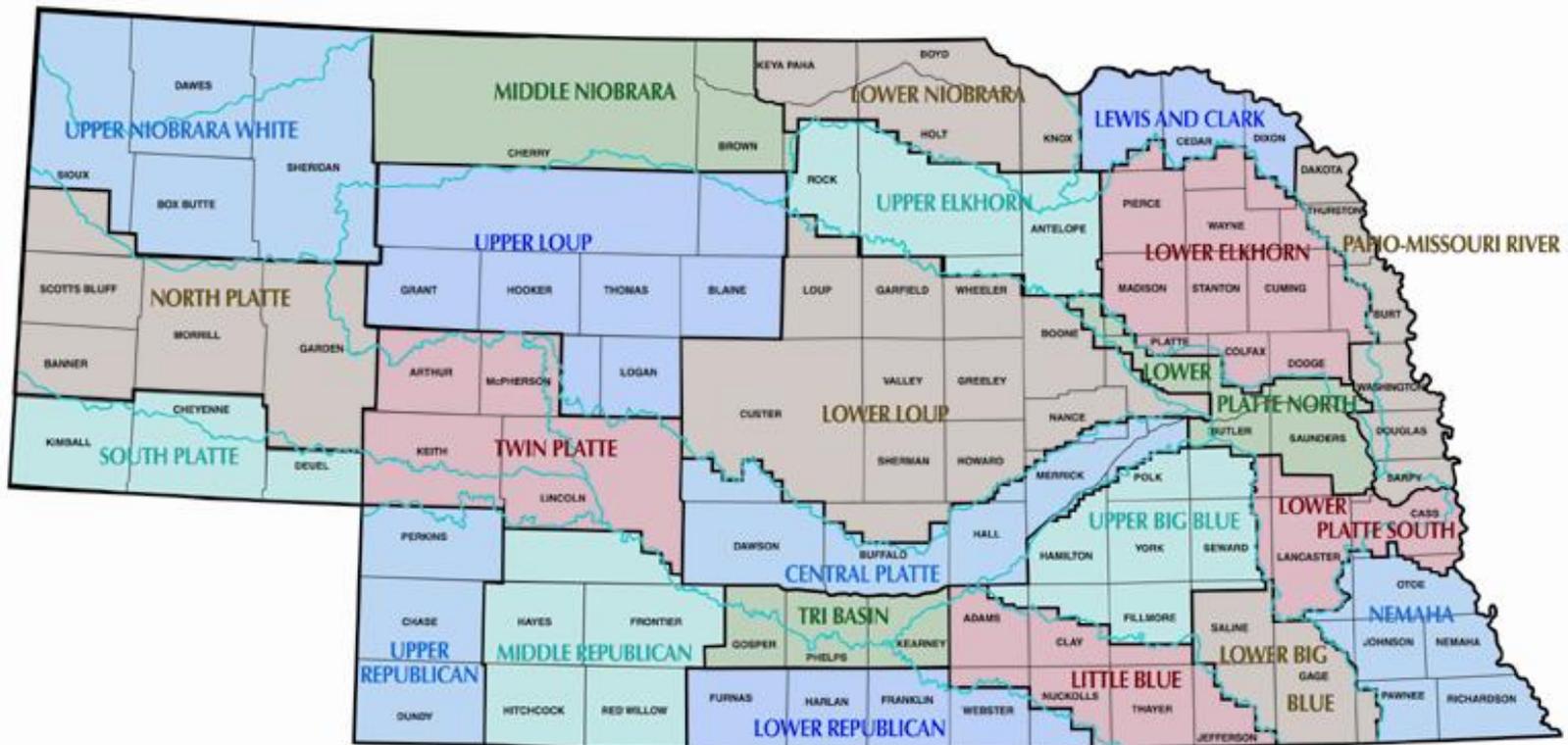


*Protecting Lives - Protecting Property - Protecting the Future*

# NRDs are unique in the nation

- The Nebraska Legislature enacted laws in 1972 to combine 154 special purpose entities into 23 NRDs.
- These Districts are unique in the nation as Nebraska is the only state that has NRDs.
- NRDs are local government units with broad responsibilities to protect our natural resources.
- Major Nebraska river basins form the boundaries enabling Districts to respond best to local needs.

# Nebraska's 23 Natural Resources Districts



**The Lower Elkhorn Natural Resources District (LENRD) serves the people in all or parts of 15 counties in northeast Nebraska.**



# Lower Elkhorn Natural Resources District-Subdistrict Boundaries

*Protecting Lives, Protecting Property, Protecting the Future*



**Mike Krueger**  
Subdistrict 1



**William Meyer**  
Subdistrict 1



**Chris Carlson**  
Subdistrict 2



**Kenneth Peitzmeier**  
Subdistrict 2



**Rod Zessin**  
Subdistrict 4



**Tim Tighe**  
Subdistrict 4



**Robert Huntley**  
Subdistrict 3



**Marion Shafer**  
Subdistrict 3



**Garry Anderson**  
Subdistrict 5



**Joel Hansen**  
Director at Large



**Edd Riley**  
Subdistrict 5



**Danny Kluthe**  
Subdistrict 6



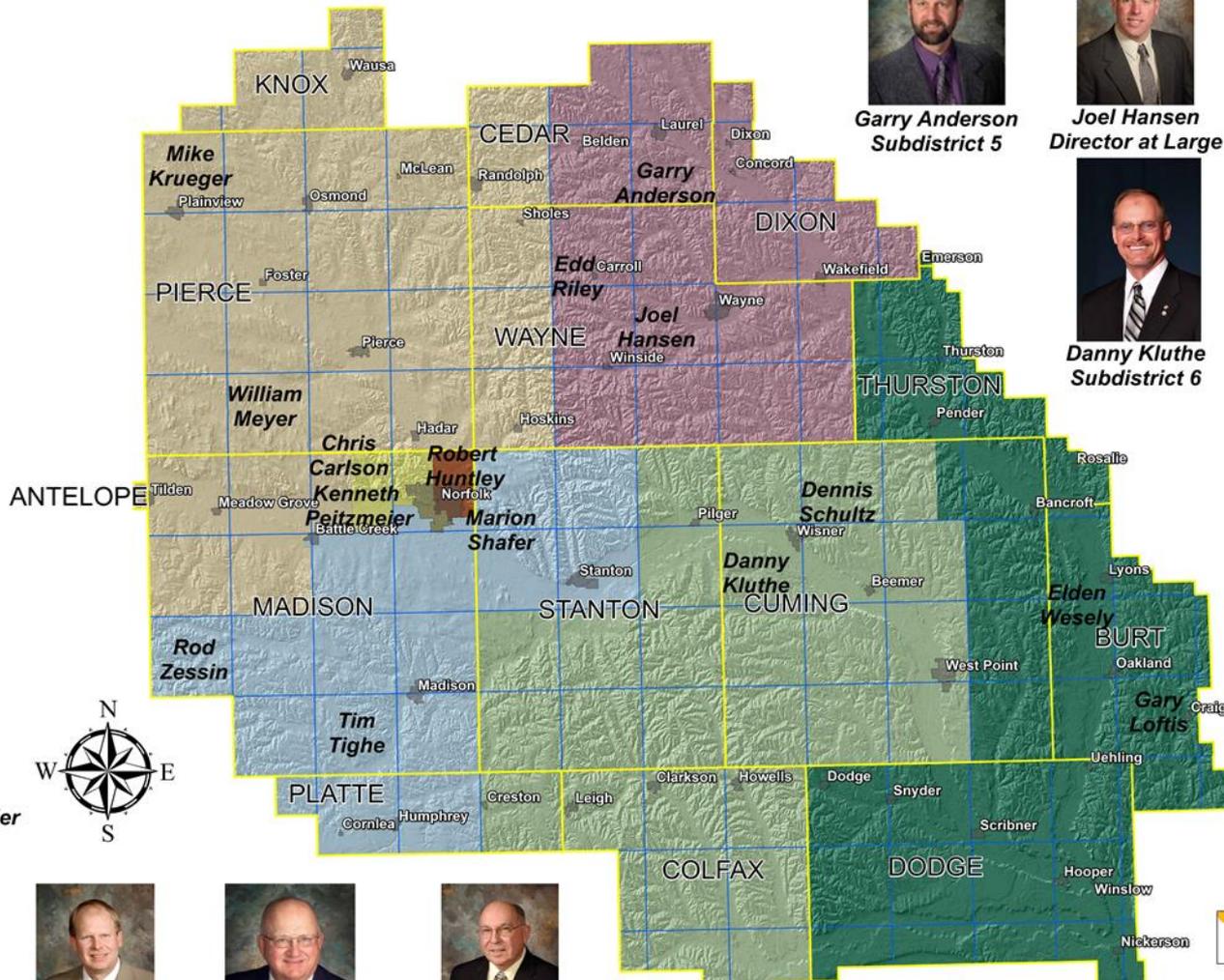
**Dennis Schultz**  
Subdistrict 6



**Elden Wesely**  
Subdistrict 7



**Gary Loftis**  
Subdistrict 7



	Subdistrict 1		Subdistrict 5
	Subdistrict 2		Subdistrict 6
	Subdistrict 3		Subdistrict 7
	Subdistrict 4		



Michael C. Murphy - GIS Specialist  
Lower Elkhorn Natural Resources District  
Source: Nebraska Department of Natural Resources  
September 2013



# NRDs help Nebraskans respond to natural resources challenges with local control.

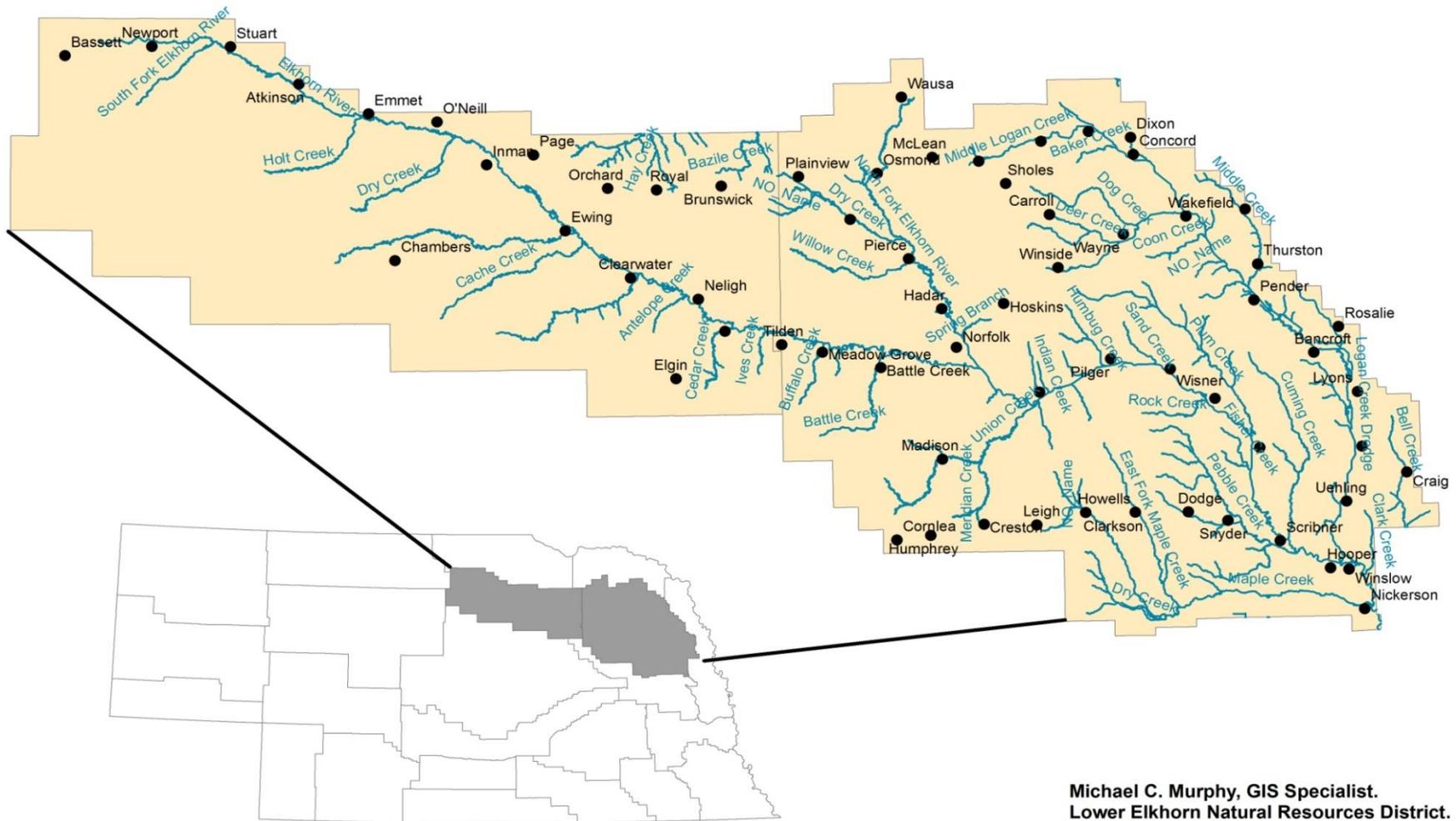
- An elected Board of Directors governs each District.
- Much of their funding comes from local property taxes.
- Your local NRD typically uses 1-2 percent of all property taxes collected in the District.
- Partnerships have been built with various state and federal agencies, municipalities, counties, and private organizations.

# NRDs have responsibilities in the following areas of resources conservation.

- Erosion prevention and control
- Prevention of damages from flood water and sediment
- Flood prevention and control
- Soil conservation
- Water supply for any beneficial uses
- Development, management, utilization, and conservation of groundwater and surface water
- Pollution control
- Solid waste disposal and sanitary drainage
- Drainage improvement and channel rectification
- Development and management of fish and wildlife habitat
- Development and management of recreational and park facilities
- Forestry and range management

# THE LOWER AND UPPER ELKHORN NATURAL RESOURCES DISTRICT

*"Protecting Lives, Protecting Property, Protecting the Future"*



Michael C. Murphy, GIS Specialist.  
Lower Elkhorn Natural Resources District.  
Data: NRCS Data Gateway, Nebraska  
Department of Natural Resources.  
October 20, 2010.













# Precipitation Records for June 2010

- Brown County – Ainsworth – 10.14 inches
- Rock County – Long Pine – 11.99 inches
- Holt County – Emmet – 12 inches
- Antelope County – Orchard – 7.10 inches
- Madison County – Norfolk – 11.10 inches
- Stanton County – Stanton – 14.69 inches
- Cuming County – West Point – 16.44 inches
- Dodge County – Scribner – 14.01 inches
- Washington County – Fort Calhoun – 12.52 inches
- Douglas County – Omaha – 11.14 inches
- Platte County – Humphrey – 16.95 inches \*\*record high

# Flood Control Levees

Howells

Scribner

Pender

Wakefield

Winslow

Clarkson

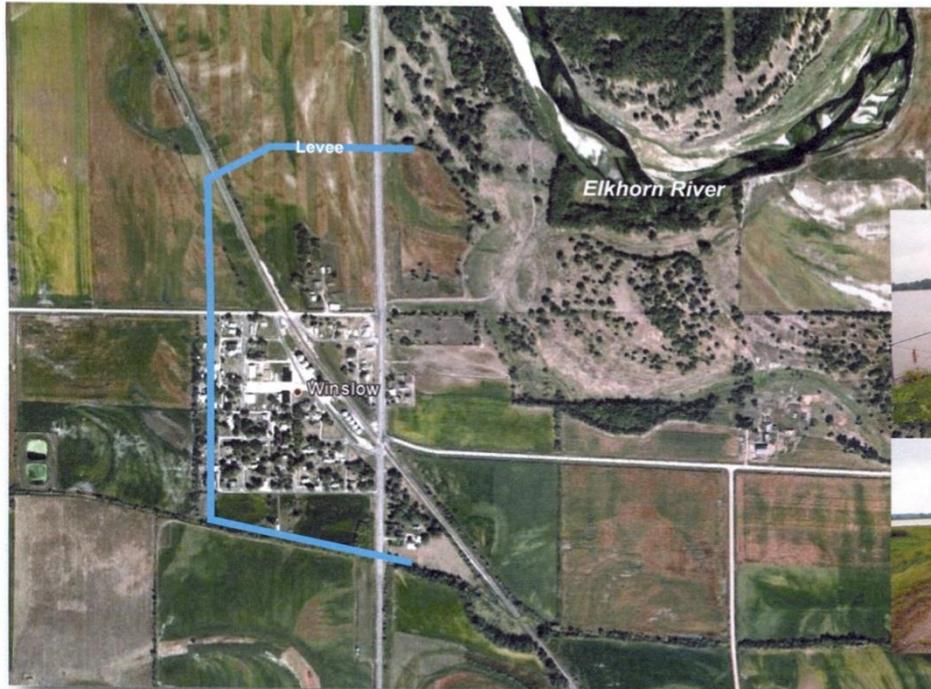
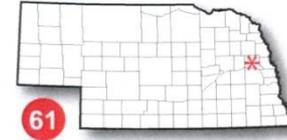
West Point

Hooper

Pierce

Norfolk – drainage channel, north fork of the  
Elkhorn River

# Winslow Levee



The Winslow Levee Project involved the construction of a levee on three sides of Winslow to provide flood protection from the Elkhorn River. The project was coordinated with Dodge County, the Nebraska Department of Roads, and the Burlington Northern Santa Fe Railroad.



**Sponsor:** Village of Winslow and Lower Elkhorn Natural Resources District

**Location:** Dodge County, Village of Winslow

**Project Size:** See Map Above

**Purposes:** Flood Abatement

**Completed:** 2009

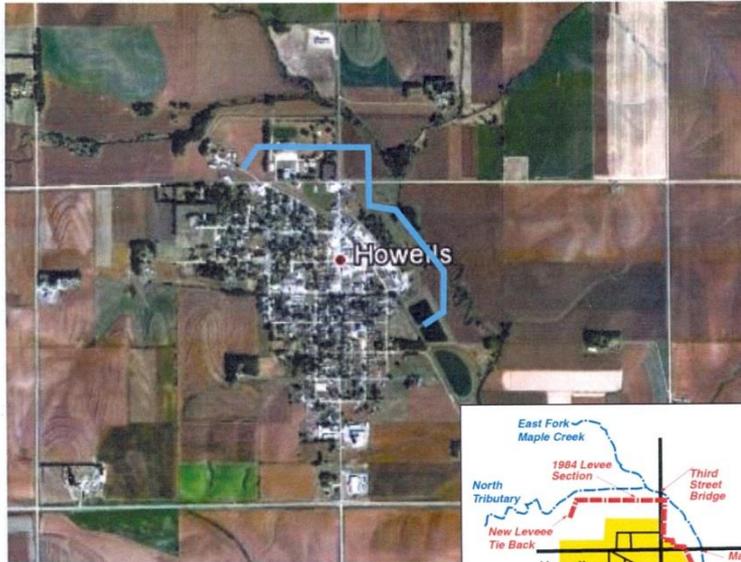
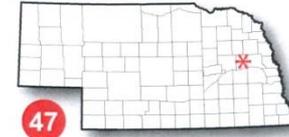
**NRDF Assistance:** Grant of \$452,078



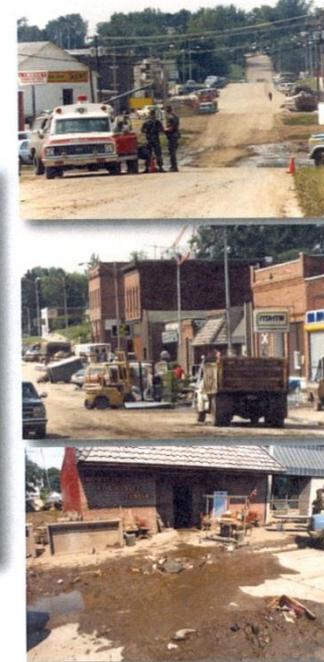




# Howells Levee



The Howells Levee Project was planned, designed, and principally funded by the Corps of Engineers as a Section 205 project, providing 500-year flood protection along the east fork of Maple Creek. The project consists of the improvement of an existing levee on the north side of Howells and the construction of a new levee on the east side of the community. Severe flooding in 1984, 1991, and 1992 resulted in the death of one person and caused property damages in excess of \$2,000,000.



**Sponsor:** Village of Howells

**Location:** Colfax County, Village of Howells

**Project Size:** 3,000 Foot of New and 1,000 Foot of Rehabilitated Levee

See Map Above

**Purposes:** Flood Abatement

**Completed:** 1997

# Scribner Levee



The Scribner Levee Project consists of the construction of a levee on the northwest, west, south, and southeast sides of Scribner to protect the city from Pebble Creek flooding events. The project was designed and primarily funded by the Corps of Engineers as a Section 205 project, providing 100-year flood protection to Scribner. The project as originally designed was completed and an additional levee was constructed on the east side of the city to better protect Scribner from the Elkhorn River.

**Sponsor:** City of Scribner

**Location:** Dodge County, around Scribner

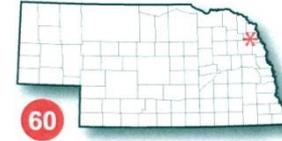
**Project Size:** See Map Above

**Purposes:** Flood Abatement

**Completed:** 1995

**NRDF Assistance:** Grant of \$426,433

# Pender Flood Control



The project was a Section 205 project planned, designed, and principally funded by the Corps of Engineers. The project will protect Pender from a 385-year flood event on Logan Creek and consists of a levee, floodwall, two state highway closure structures and a detention cell.

Description from the Corps of Engineers, Omaha NE., District.

12. LOGAN CREEK, PENDER, NE Location. This project is located in northeastern NE, approximately 75 miles north-northwest of Omaha, NE. Pender is located along the right bank of Logan Creek, about midpoint in the Logan Creek basin.

Existing Project. The selected and constructed plan is a combination levee and floodwall with a detention storage feature. It provides flood protection from Logan Creek as well as incidental benefit from Stage Creek flooding to the Village's residential and industrial area as well as its central business district. The levee extends approximately 15,000 feet in length along the north, east, and south edge of the community, averaging 10 feet in height.

**Sponsor:** Village of Pender

**Location:** Thurston County, Village of Pender

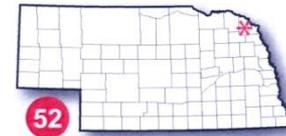
**Project Size:** See Map Above

**Purposes:** Flood Abatement

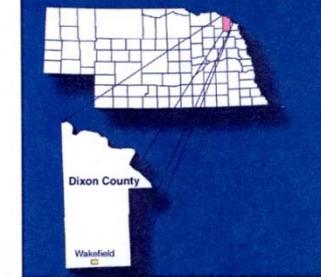
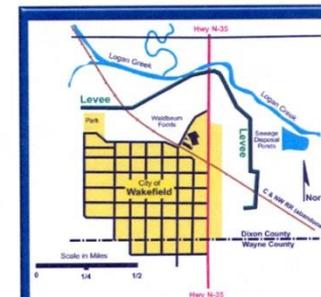
**Completed:** 2007

**NRDF Assistance:** Grant of \$784,591

# Wakefield Levee



The Wakefield Levee Project provides 100-year flood protection to the city of Wakefield from flooding along Logan Creek. The project consists of a levee on the north and east sides of the community, a highway closure structure, and the protection of three city wells. The city also received Federal Emergency Management Agency funding through the Hazard Mitigation Grant Program for the project.



**Sponsor:** City of Wakefield  
**Location:** Dixon County, City of Wakefield  
**Project Size:** See Map Above  
**Purposes:** Flood Abatement  
**Completed:** 2003  
**NRDF Assistance:** Grant of \$350,374

# Future Levee Accreditation

- Hooper - \$ 1.5 million
- Howells - \$ 68,000
- Clarkson - \$ 3.5 - 6 million
- West Point may exceed \$1 million
- All future levees must be accredited, however cost at this time is unknown.

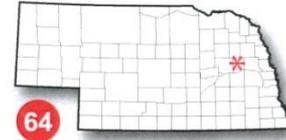
Many NRD projects leave permanent results: dams, terraces, drainage ditches, windbreaks, reservoirs, and recreational trails.



The LENRD now owns four recreation areas,  
with Maple Creek opening in May of 2011.



# Maple Creek Recreation Project



The project involved the construction of an earthen dam on the West Fork of Maple Creek just west of Leigh. Additional information on the Maple Creek Recreation Area can be found on the Lower Elkhorn Natural Resources District's website at <http://www.lenrd.org/pilger-recreation-area/>

**Sponsor:** Lower Elkhorn Natural Resources District

**Location:** Colfax County, West of Leigh

**Project Size:** 557 Total Acres with a 160 Acre Reservoir

**Purposes:** Flood Abatement and Recreation

**Completed:** 2010

**NRDF Assistance:** Grant of \$4,114,949

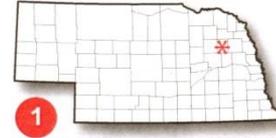
**The Pilger Recreation Area, near Pilger, opened to the public in 1964.**

**The Maskenthine Lake Recreation Area, near Stanton, opened to the public in 1979.**

**The Willow Creek State Recreation Area, near Pierce, opened to the public in 1984.**



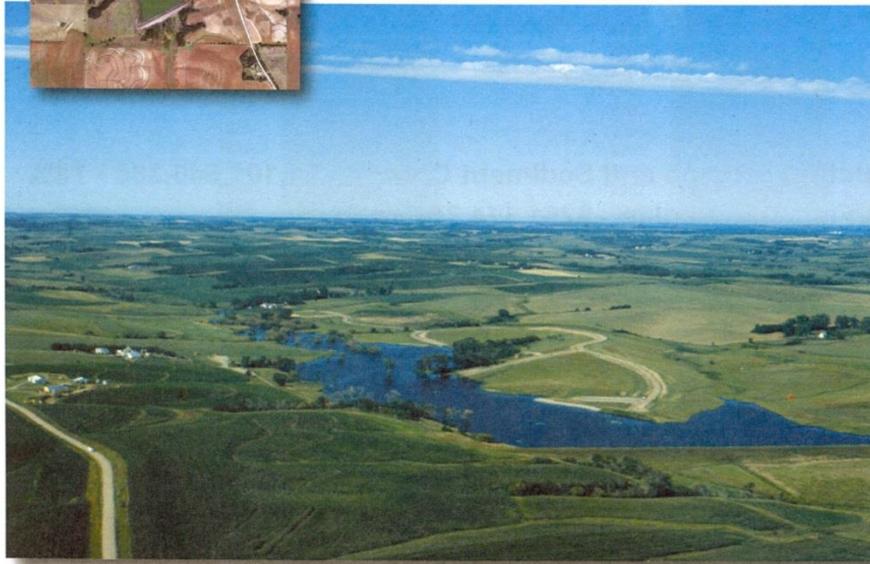
# Maskenthine Project



1

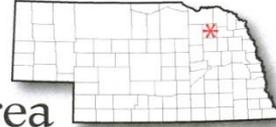


Maskenthine Lake Recreation Area was the first Nebraska Resources Development Fund project assisted with state funds. Recreational activities at the area include hunting, boating, picnicking, hiking, camping and swimming. An arboretum was established on the east side of the lake with additional tree plantings and windbreaks are located throughout the recreation area. No park permit or fee is required for entrance to the site. Additional information can be found on the Lower Elkhorn Natural Resources District's website at <http://www.lenrd.org/maskenthine-lake-recreation-ar/>.



**Sponsor:** Lower Elkhorn Natural Resources District  
**Location:** Stanton County, North of the City of Stanton  
**Project Size:** 680 Total Acres with a 100 Acre Reservoir  
**Purposes:** Flood Abatement, Sediment Control, Recreation,  
and Fish and Wildlife Enhancement  
**Completed:** 1976  
**NRDF Assistance:** Grant of \$269,978

# Willow Creek State Recreation Area



24

The Willow Creek project is primarily a water storage, recreation, and fish and wildlife project. Camping stays are limited to 14 days, there are 100 pads with 64 electrical hookups. Facilities also include a modern shower house, laundry facilities, and a dump station. Fees are charged for camping, with an additional cost for electricity. Campers are asked to self-register on arrival and deposit the appropriate fee in the drop box. Drinking water and vault toilets are available at the campground. For additional information on Willow Creek visit the Lower Elkhorn Natural Resources District's website at <http://www.lenrd.org/willow-creek-state-recreation/>.



**Sponsor:** Lower Elkhorn Natural Resources District

**Location:** Pierce County, Southwest of the City of Pierce

**Project Size:** 1,700 Total Acres with a 700 Acre Reservoir

**Purposes:** Flood Abatement, Recreation, Fish and Wildlife Enhancement

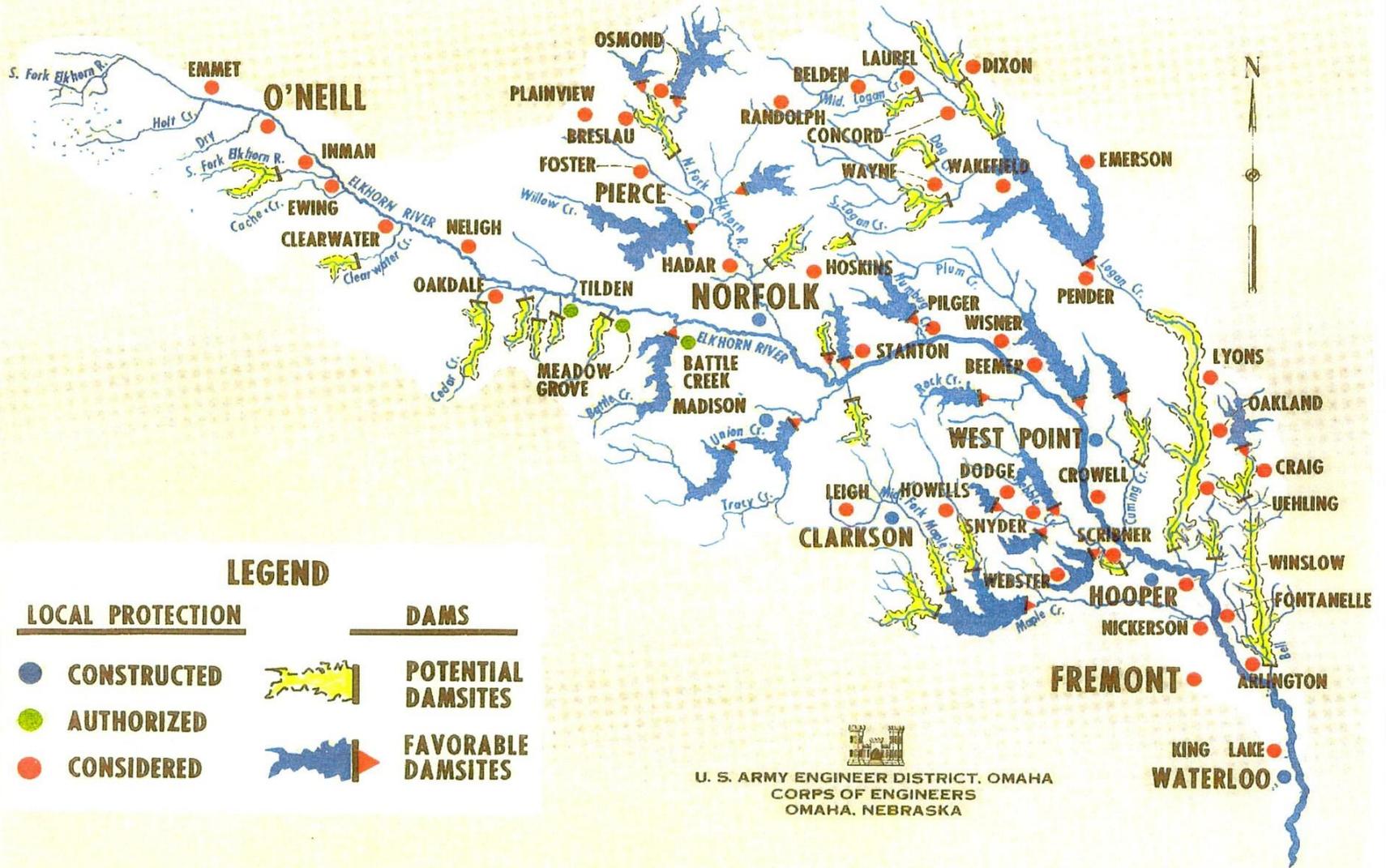
**Completed:** 1987

**NRDF Assistance:** Grant of \$3,828,455

# Future Flood Control Projects

- City of Randolph – Interior drainage, bridge replacement, partnership with the Corp of Engineers, other funding sources??
- City of Battle Creek – Drainage channel or dam
- City of Wayne – Dam on Dog Creek
- City of Clarkson – Dam on Maple Creek

# ELKHORN RIVER BASIN



Since being created in 1972, NRDs have experienced tremendous growth in the responsibilities given to them by state statute, especially in protecting groundwater.



# Managing Groundwater

- 2012 drought
- Pumping conflicts between groundwater users
- 2013 brings more dry weather
- Management for the future

# District rules to control new irrigation development

- Until 2008, the Lower Elkhorn Natural Resources District allowed unrestricted irrigation growth.
- In 2009, the Board approved rules to control the development of new irrigation in the entire District.

# District rules to control new irrigation development

- From 2009 through 2012, the District approved roughly 24,700 acres for new irrigation development using a variance process.
- The District turned down 6,325 acres of requests using this process.
- The rule states that each year the Board will decide the maximum number of new groundwater irrigated acres to be allowed under the variance process.

# Groundwater Levels

- Groundwater levels were the highest on record in the spring of 2011, and were only slightly lower in early spring 2012.

# Addressing seasonal groundwater declines

- The drought began in the last half of 2011
- Groundwater declines in the summer of 2012 caused many private well owners to be without water
- 2012 was the warmest and driest year on record in Nebraska (going back to 1895 – 118 years)
  - Groundwater withdrawals for irrigation were heavy and constant
  - Groundwater had little chance to recover, causing groundwater declines
  - This revealed areas of the District that are vulnerable to seasonal groundwater declines

# Summer of 2012

- The District received widespread and numerous reports of both domestic and irrigation well interference.
- In July of 2012, the Board decided to allow no new irrigated acres district-wide for 2013.

# LENRD Reported Well Interference & Locations of Domestic Well Cost-Share Sites

**★ REPORTED WELL INTERFERENCE - 35 WELLS**

**★ REPORTED WELL INTERFERENCE WITH DOMESTIC WELL COST-SHARE SITES - 136 WELLS**



**Lower Elkhorn  
Natural Resources District**  
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Protecting the Future*

COUNTY BOUNDARIES  
 TOWNSHIPS  
 LENRD HYDROLOGICALLY CONNECTED AREA

Produced by: Linda Unkel,  
 Programs Secretary /  
 Mike Murphy  
 Lower Elkhorn Natural Resources District  
 Processed: September 9, 2013

# Board action to address domestic well issues

- Public meetings were held throughout the summer, attended by more than 500 people
- Board voted to implement a special cost-share program
- Program provided up to \$1500 per well, per user for domestic wells only
- Provided over \$123,000 to 147 domestic & livestock well owners

# Addressing Seasonal Groundwater Declines

NRD fall groundwater level report:

- All 243 sites were lower than previous year.
- 32% had the lowest groundwater levels on record.

Board directed staff to develop a plan to address problem areas by January 1<sup>st</sup>, 2013.

# Addressing Seasonal Groundwater Declines

Board decided to develop and enact rules to protect groundwater quantity and manage seasonal groundwater declines.

## Rules and regulations

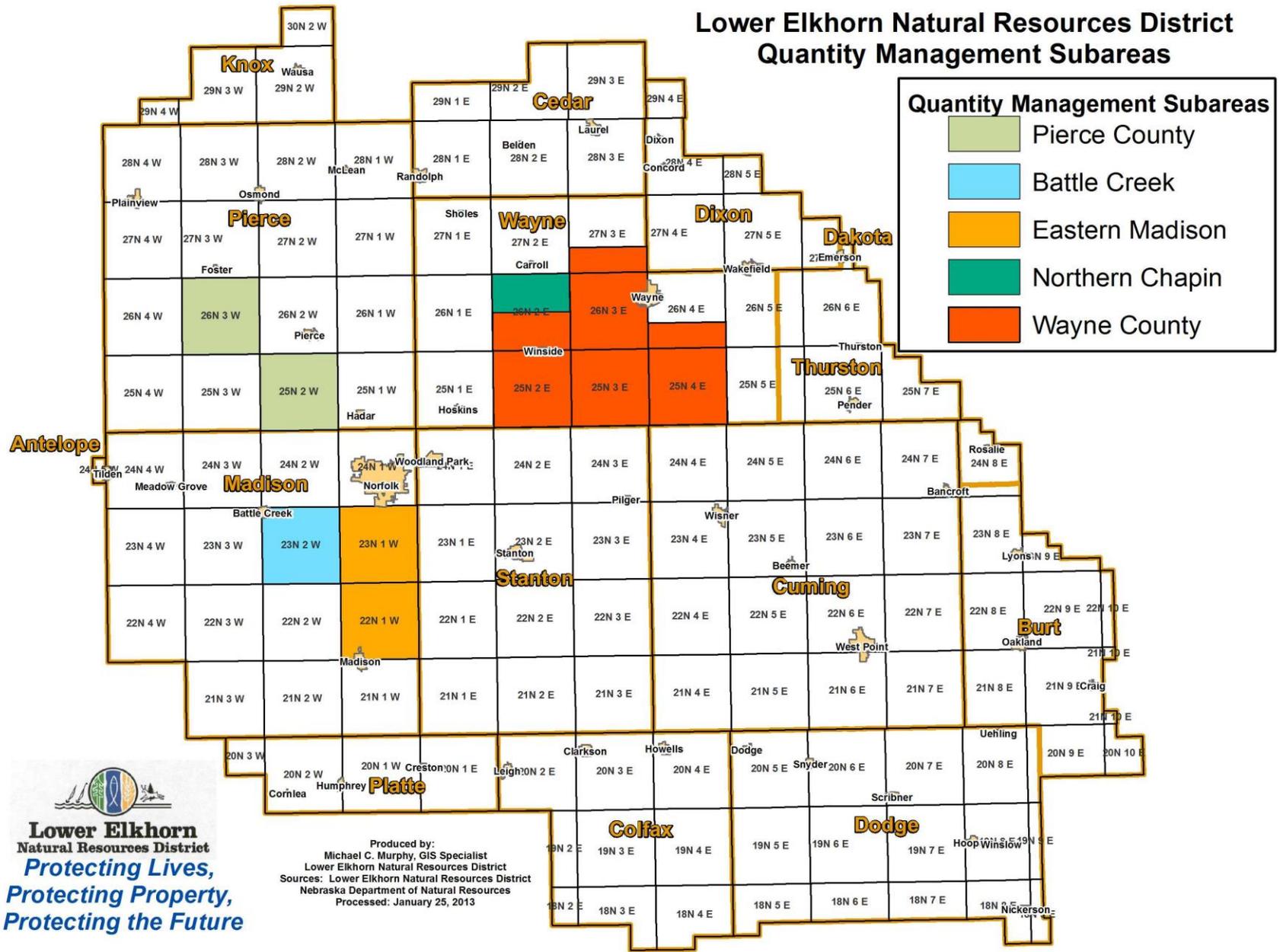
- Goals:
  - Allow groundwater to be used for the health, safety and welfare of the people of the District.
  - Protect groundwater formations from damage, especially confined aquifers.
  - Protect all uses of groundwater from seasonal groundwater declines.

# Managing the Resource

Last winter, to protect groundwater resources and to help calm neighbor versus neighbor disputes, the Board created several management subareas to address groundwater quantity concerns.

- Flow meters are required for all of the subareas and irrigation pumping limitations are in effect in two of the subareas.

# Lower Elkhorn Natural Resources District Quantity Management Subareas



  
**Lower Elkhorn  
 Natural Resources District**  
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Produced by:  
 Michael C. Murphy, GIS Specialist  
 Lower Elkhorn Natural Resources District  
 Sources: Lower Elkhorn Natural Resources District  
 Nebraska Department of Natural Resources  
 Processed: January 25, 2013

Lower Elkhorn Natural Resources District Quantity Subarea Controls, Approved January 24, 2013, Effective February 25, 2013

	Legal Description of Subarea Location by Precinct Name	<sup>1</sup> No New Irrigated Acres	<sup>2</sup> Mandatory Educational Requirement	<sup>3</sup> BMPs – No Offseason Irrigation	<sup>4</sup> New/Replacement Domestic Well Depth	<sup>5</sup> Measuring Devices Installed By:	<sup>6</sup> Allocation (acre-inches)
<b>Battle Creek Subarea</b>	All of Battle Creek Township, Madison County	X	X	X	X	May 1, 2014	No allocation.
<b>Pierce County Subarea</b>	All of Cleveland and Clover Valley Townships in Pierce County	X	X	X	X	May 1, 2014	No allocation.
<b>Northern Chapin Subarea</b>	Sections 1 through 18 in Chapin Township in Wayne County	X	X	X	X	May 1, 2014	No allocation.
<b>Eastern Madison County Subarea</b>	All of Union and Warnerville Townships, Madison County	X	X	X	X	May 1, 2013	14 for Sprinkler 18 for gravity 13 for SDI
<b>Wayne County Subarea</b>	All of Hancock, Brenna, Plum Creek, and Strahan Townships; and Sections 25 through 36 of Hunter and Wilbur Townships, and sections 19 through 36 of Chapin Township in Wayne County	X	X	X	X	May 1, 2013	13 for Sprinkler 17 for gravity 12 for SDI

1 No new acres allowed in Subareas without a variance, subject to Rules 13, 15 and 16

2 Attendance at one (1) District approved educational program worth four hours of credit in 2013

3 No offseason irrigation. This means that if a Landowner wishes to irrigate between the dates of September 15 and April 15, they must contact the District by telephone or in writing to register this irrigation with the District, and must irrigate only for the beneficial use of a crop that consumes water during those dates, such as winter wheat, alfalfa, pasture, oats or a cover crop.

4 New and replacement domestic wells must be constructed to a depth such that they are less likely to be affected by seasonal groundwater declines and submit well driller certification of this within 90 days of construction

5 A District-approved measuring device must be installed on all irrigation wells by the date indicated. Annual groundwater withdrawal reports for Subareas are due on November 1 of each year.

6 The Allocation amount, if required, as the number of inches per irrigated acre is indicated in this column.

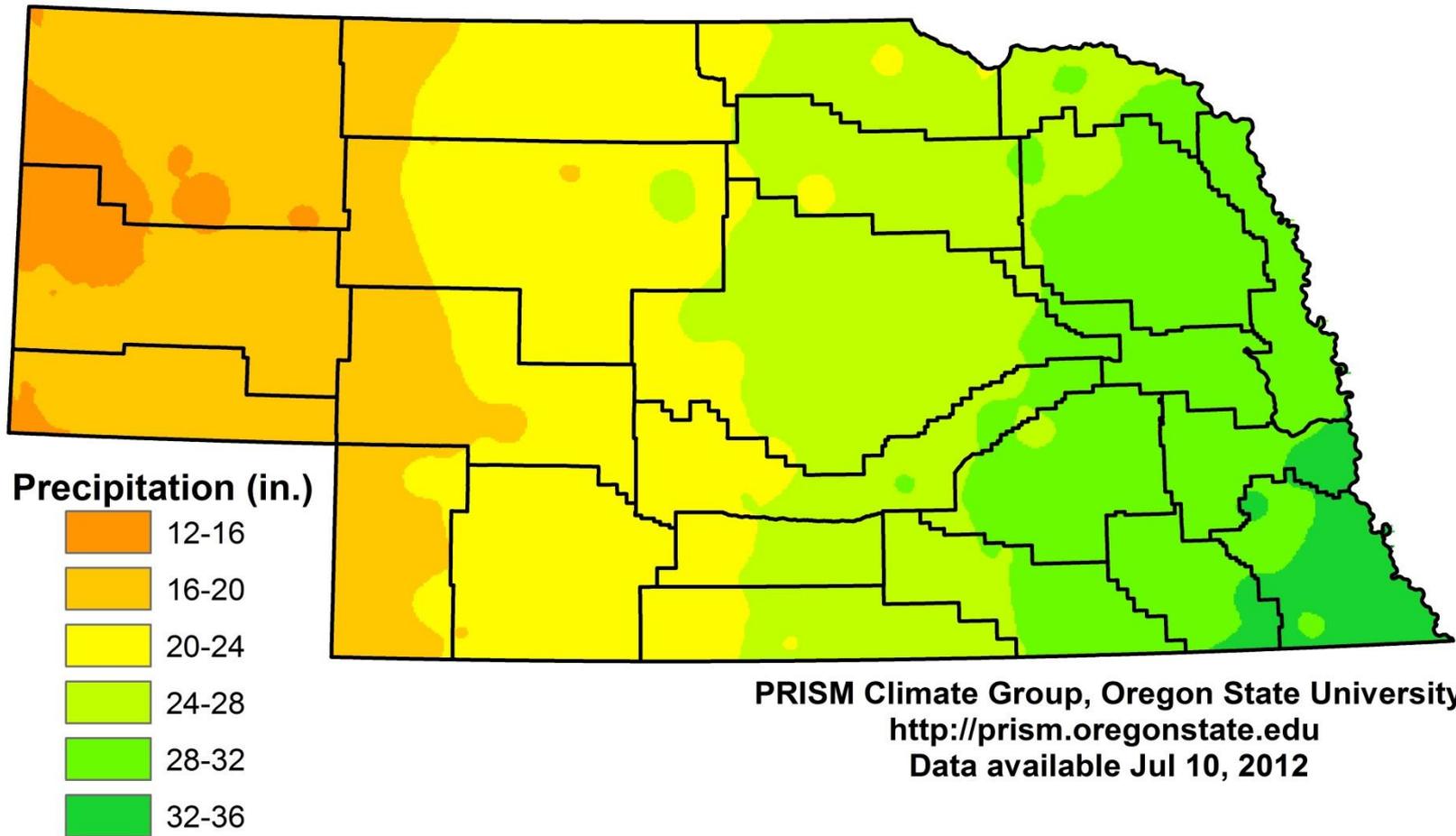
# 2013

- In the spring of 2013, 18% of the wells we measured were at an all-time low, and 66% had the largest one-year decline on record.

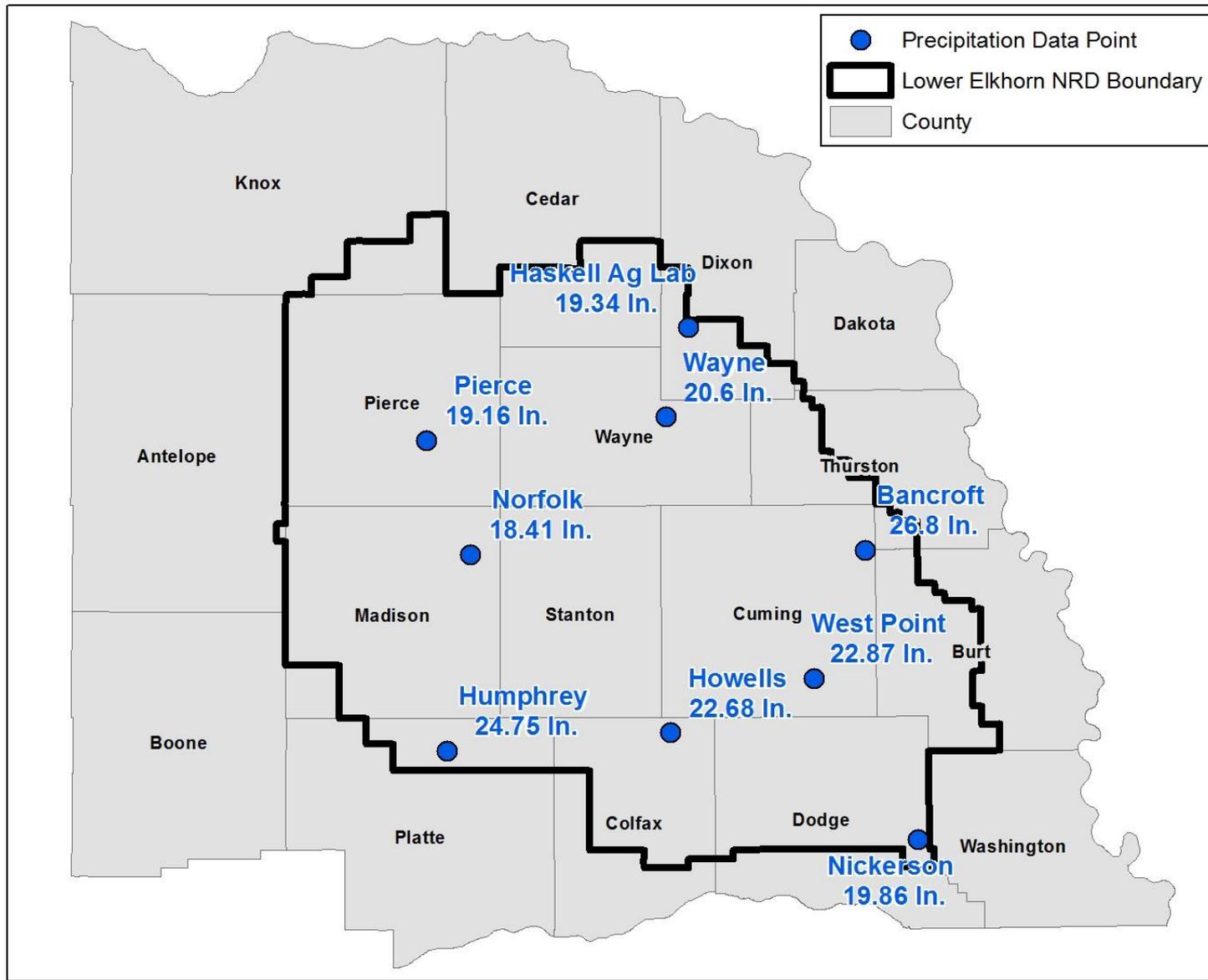
We caught a break!

**RAIN!!!**

# Nebraska Precipitation: Annual Climatology (1981-2010)



# Lower Elkhorn NRD 2013 Precipitation January through August



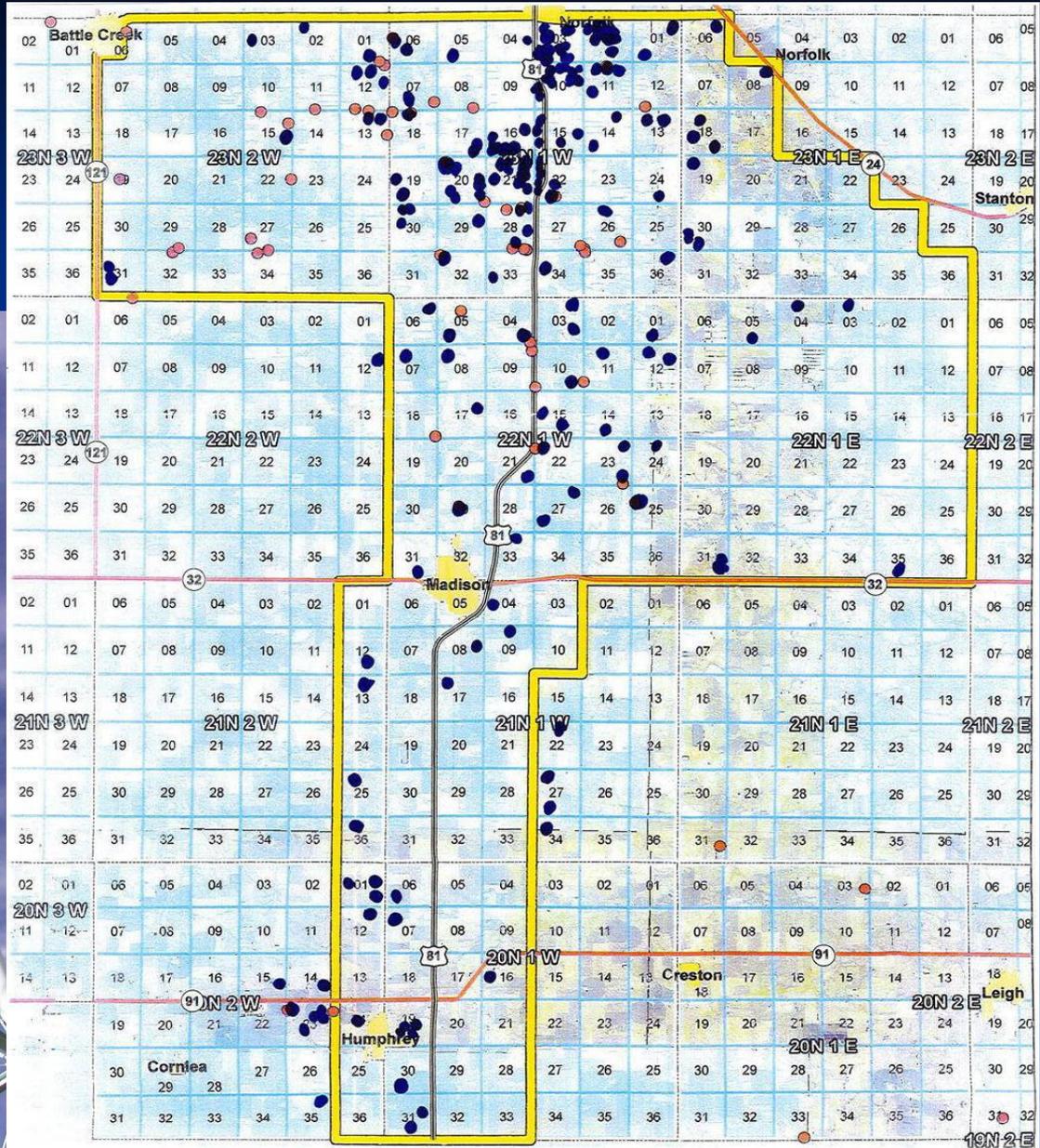
# Actions for 2013 irrigation season

- Installed 190 water meters in the Madison and Wayne County Subareas
- Provided up to 50% cost-share on flow meters

# Actions for 2014 irrigation season

- No new irrigated acres, no supplemental wells or irrigated acre transfers for 2014
- The board will allow up to 400 acres in some areas where landowners are interested in completing a full pivot circle for efficiency, up to 10 acres per project. The 400 acres will not include land in the new groundwater quantity subareas in parts of Wayne, Madison, and Pierce Counties.
- Develop a plan by March 1<sup>st</sup> for district-wide metering of irrigation wells
- There are approximately 5,700 wells across the district. If the maximum NRD cost-share is \$625 per well, that would be a total of \$ 3,562,500.

# Proposed Rural Water System



The LENRD completed its 2<sup>nd</sup> rural water system. The Wau-Col Regional Water System was dedicated in 2012.

The Logan East Rural Water System near Oakland supplies water to over 1,112 customers. The system was constructed in 1991.



# Groundwater Study: Helicopter flights/data collection

We are currently sponsoring a study of the aquifers in the Clarkson-Howells area of our district. Clarkson's municipal water system was dangerously close to running out of water during the summer of 2012.

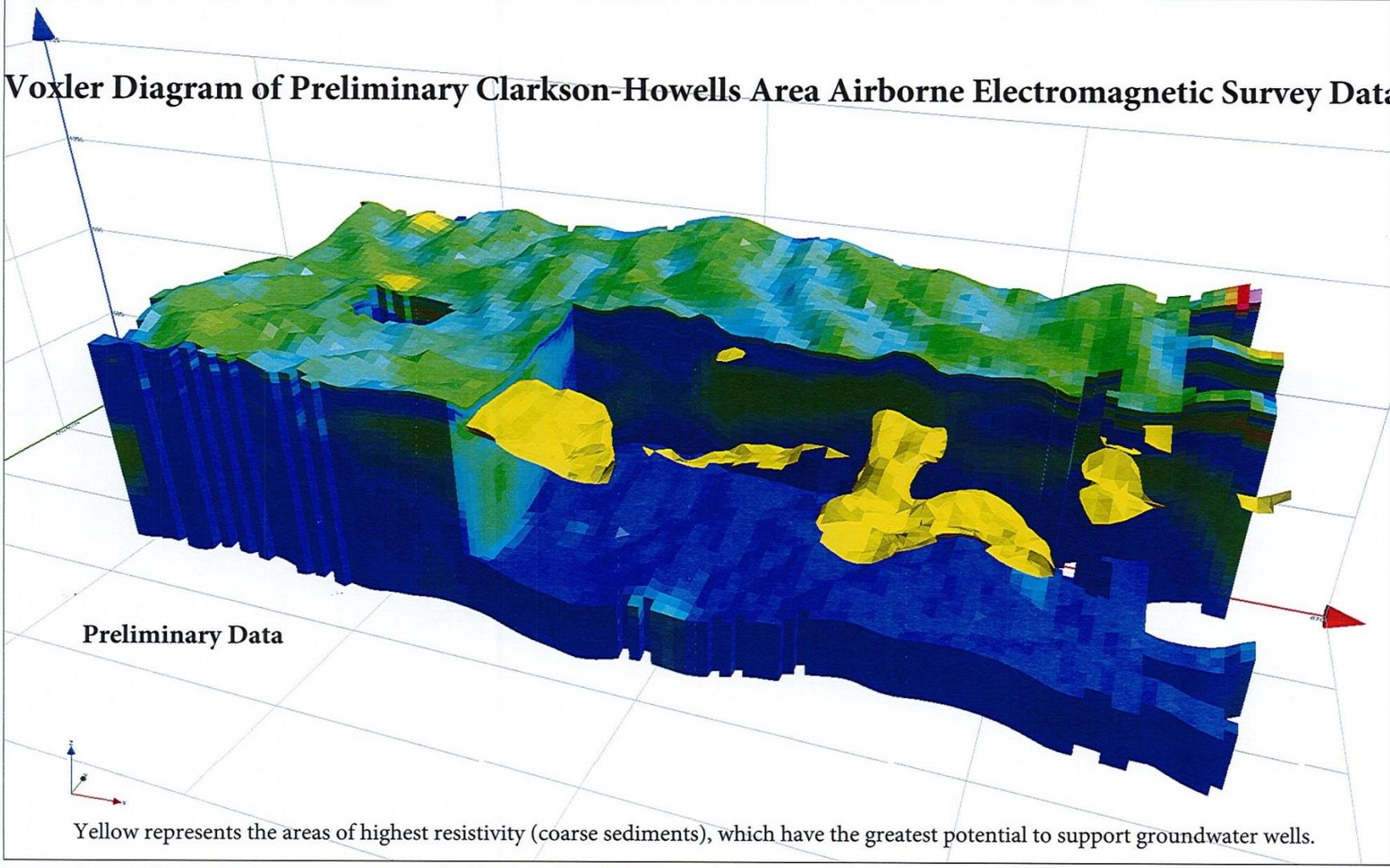
The study consisted of 36 square miles at a cost of \$ 200,000.







# Voxler Diagram of Preliminary Clarkson-Howells Area Airborne Electromagnetic Survey Data



# Eastern Nebraska Water Resources Assessment (ENWRA)



## INTRODUCTION TO A HYDROGEOLOGICAL STUDY

**Dana P. Divine**

ENWRA Project Coordinator

**R. M. Joeckel**

Conservation and Survey Division, School of Natural Resources

**Jesse T. Korus**

Lower Platte South Natural Resources District

**Paul R. Hanson**

Conservation and Survey Division, School of Natural Resources

**Susan Olafsen Lackey**

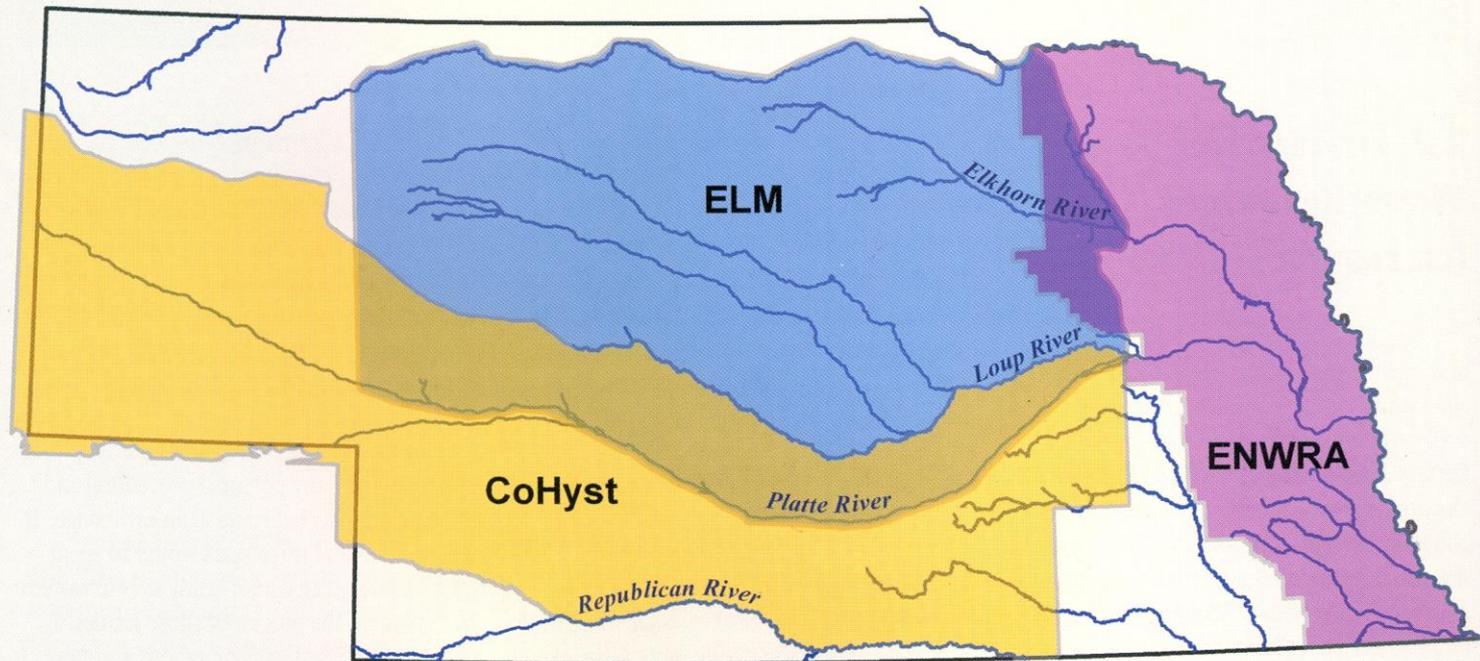
Conservation and Survey Division, School of Natural Resources

*Edited by R. M. Joeckel*



UNIVERSITY OF NEBRASKA-LINCOLN  
INSTITUTE OF AGRICULTURE AND NATURAL RESOURCES

Bulletin 1 (New Series)  
CONSERVATION AND SURVEY DIVISION  
SCHOOL OF NATURAL RESOURCES



**Figure 1.** Geographical boundaries of the COHYST, ELM, and ENWRA hydrogeological studies. COHYST concentrates on Platte River, ELM on Loup and Elkhorn Rivers.

# 5. Pilot Study Sites

## 5.1. Selection Criteria

The general locations of the pilot study sites were chosen to encompass the wide range of hydrogeologic settings in eastern Nebraska. The ENWRA partners determined that pilot study sites would be representative of one or more of these settings and would have the following characteristics:

- Presence of a primary aquifer.
- Proximity to a stream, so that the groundwater-surface water interactions could be assessed.
- Existing geologic data sets sufficient to support the formulation of working hypotheses.
- Local water quality or quantity problems that would benefit from intensified study.

On the basis of these criteria, sites were selected near the towns of Oakland, Ashland, and Firth, Nebraska (Figure 4).

## 5.2. Oakland Pilot Study Site

The Oakland Pilot Study Site is oriented northwest-southeast between the towns of Oakland and West Point in Burt and Cuming

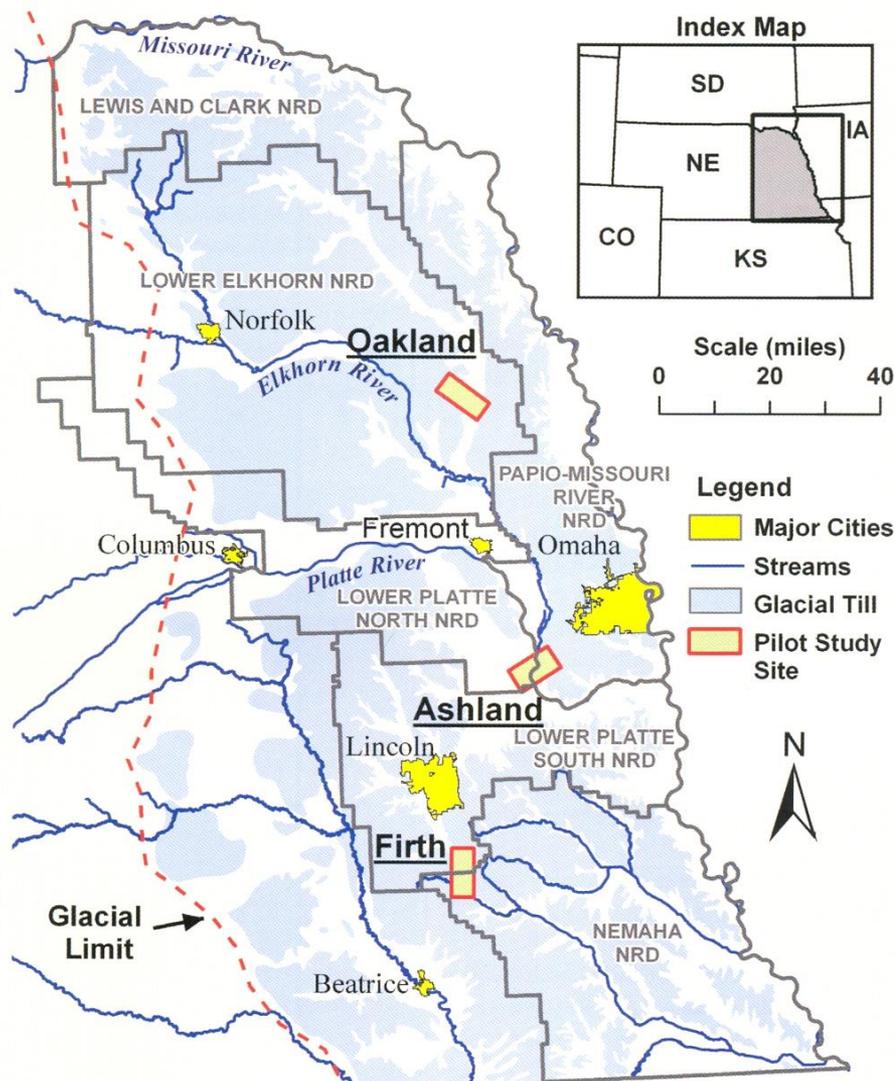


Figure 4. Location of ENWRA pilot study sites. Note extent of glacial till in eastern Nebraska.

Nebraska's NRDs are here to help sustain and nurture our environment for generations to come.





# Lower Elkhorn Natural Resources District

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