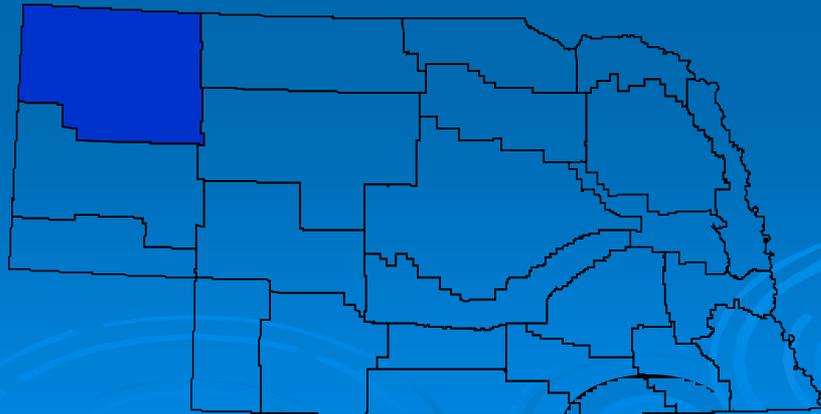
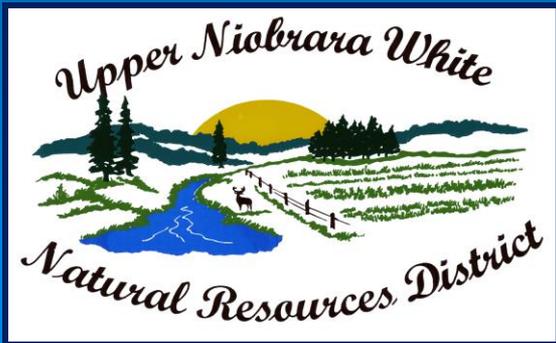
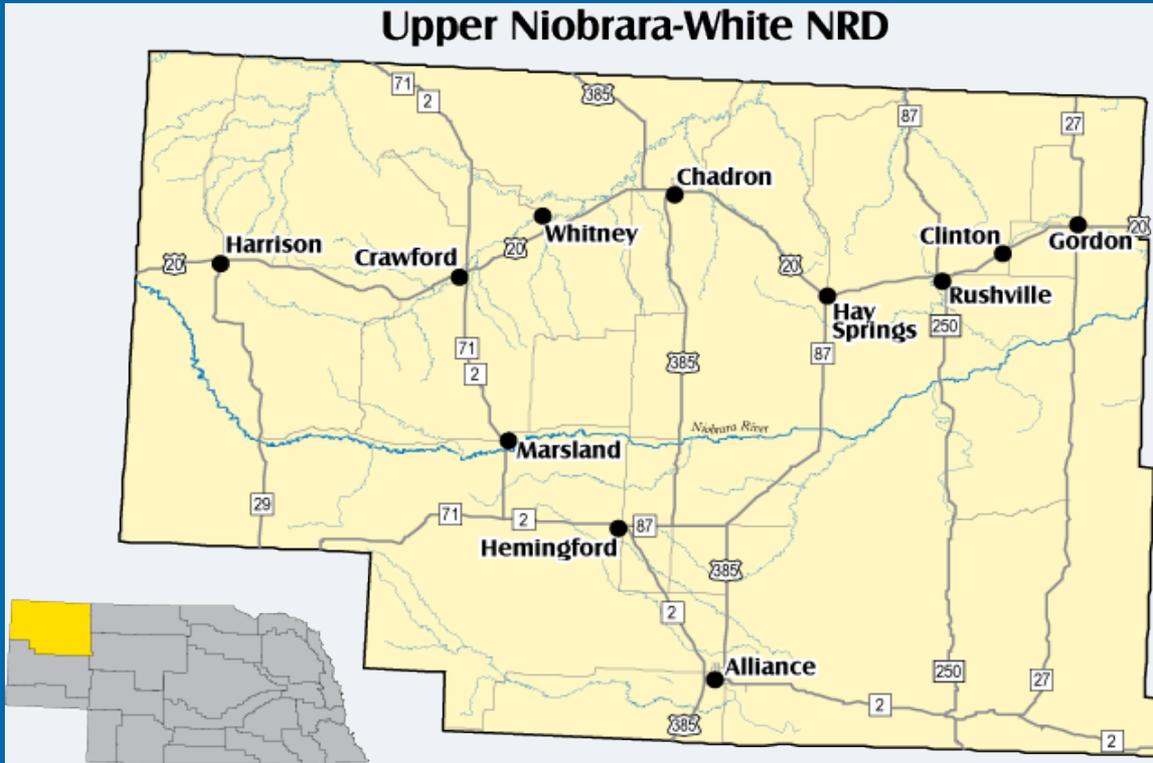


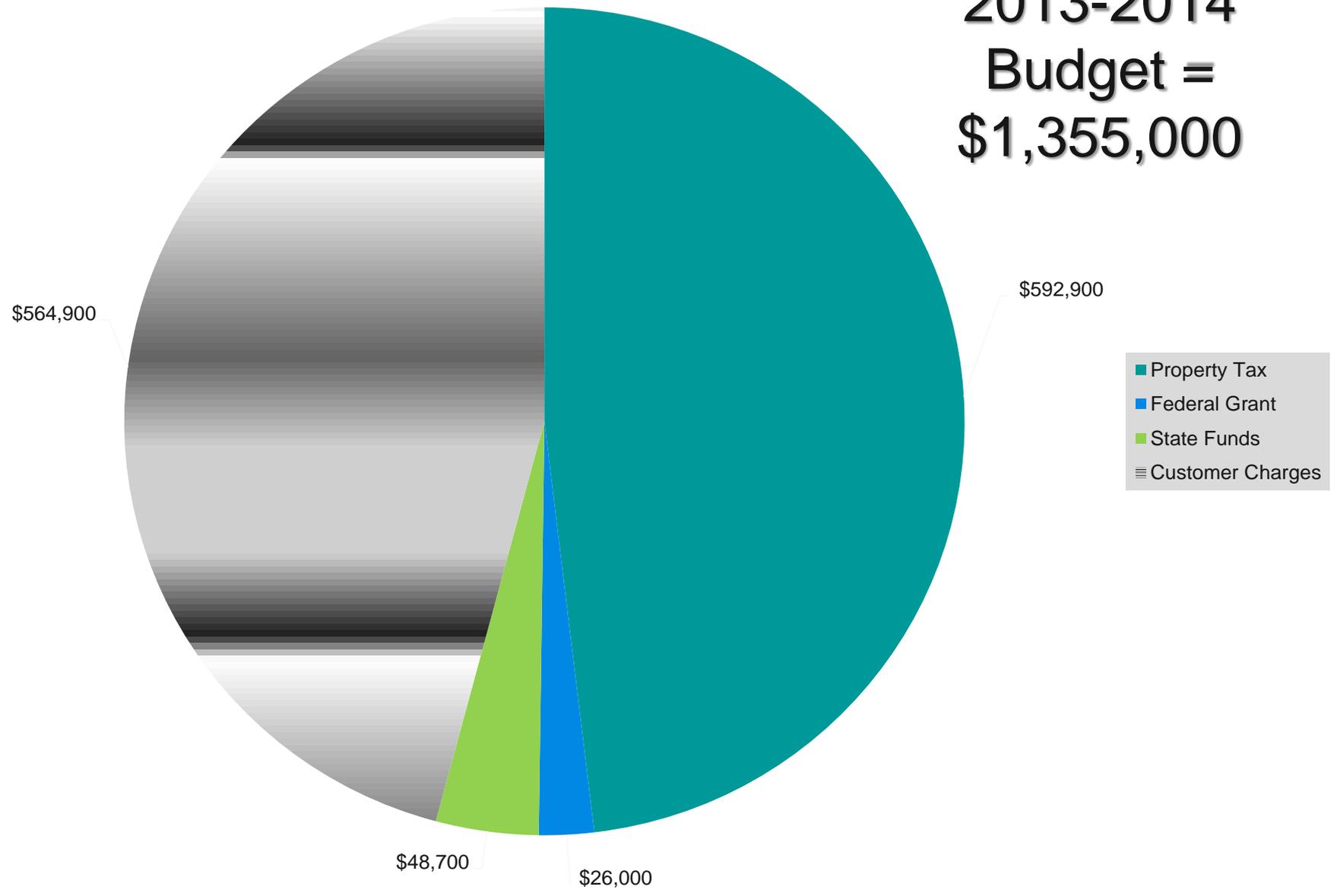
Water Management Efforts in the Upper Niobrara Basin



Upper Niobrara-White NRD



2013-2014 Budget = \$1,355,000



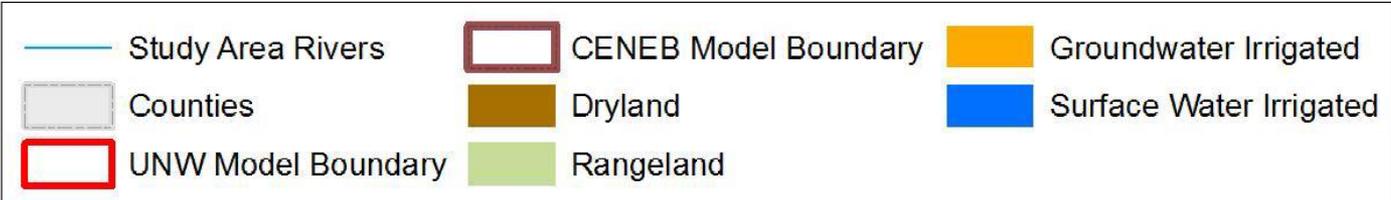
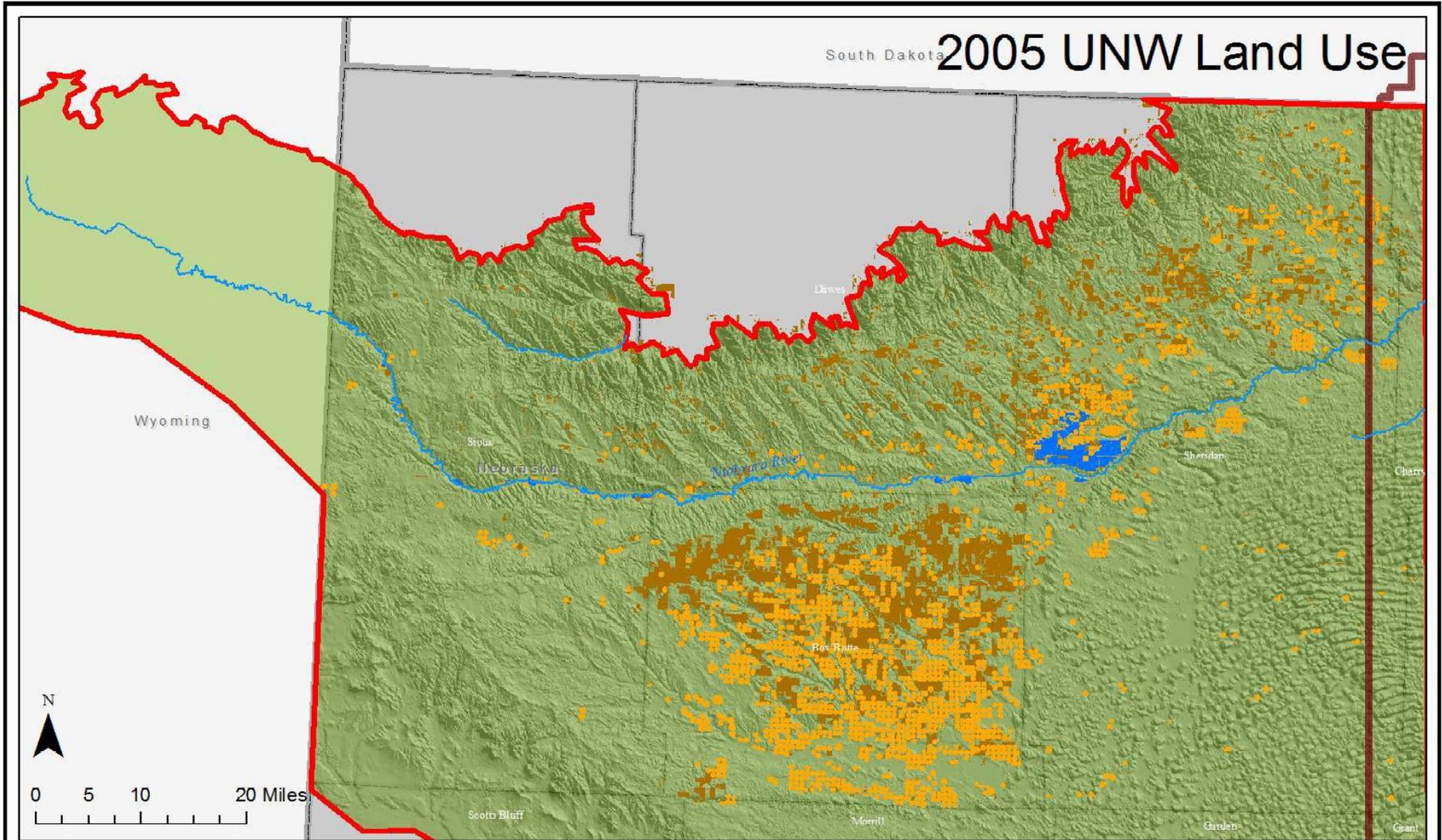
CSD

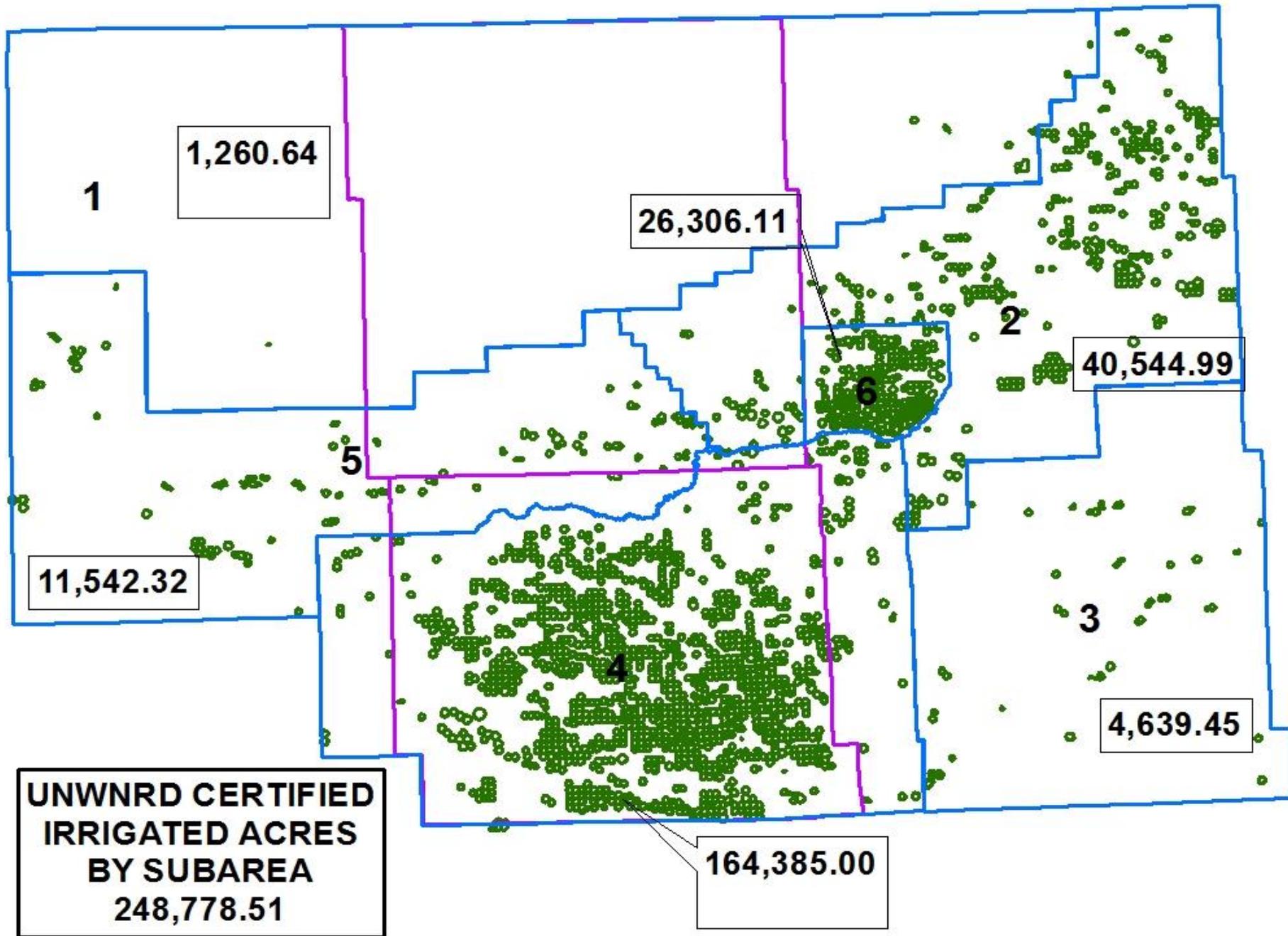
Eight Regions of similar physical features

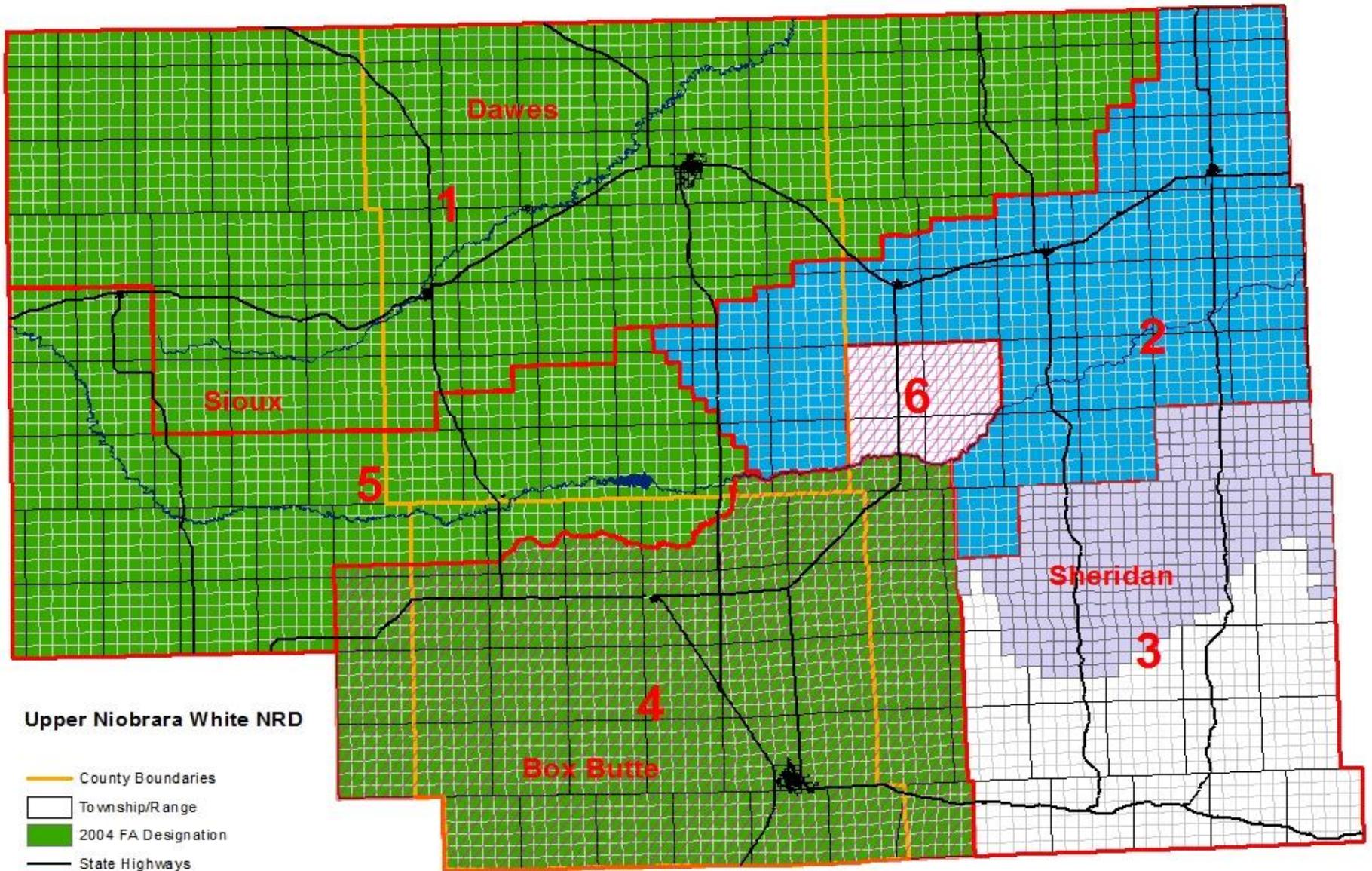
- Plains
- Dissected Plains
- Valleys
- Sand Hills
- Rolling Hills
- Bluffs and Escarpments
- Valley Side Slopes
- Large Reservoirs



2005 UNW Land Use







Upper Niobrara White NRD

- County Boundaries
- Township/Range
- 2004 FA Designation
- State Highways
- Phase III - Allocation Areas
- Phase II - Moratorium on Acres
- Area Subject to "483" Rules

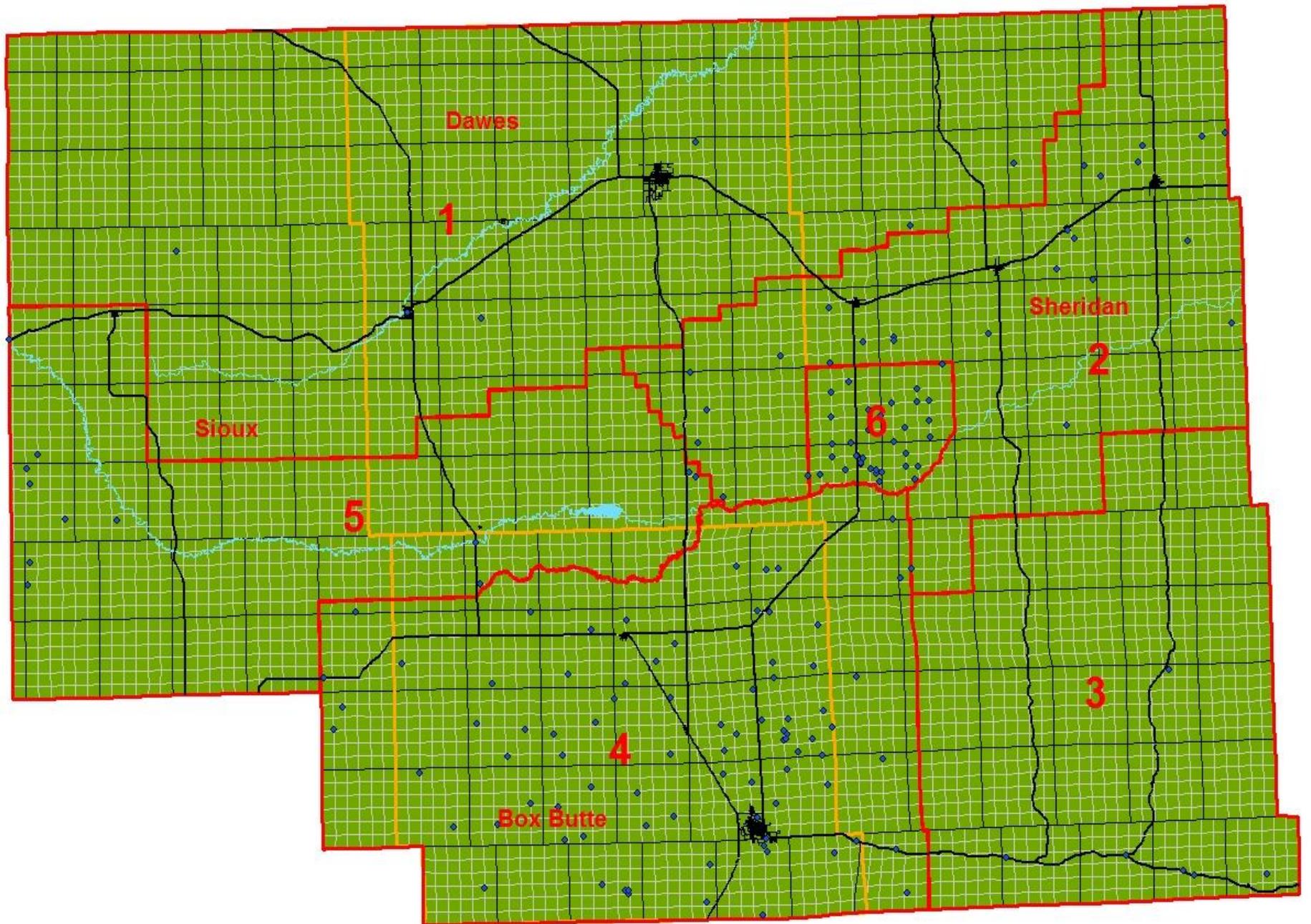
Agricultural Crops

- Alfalfa
- Corn
- Sugar Beets
- Potatoes
- Winter Wheat
- Edible Beans
- Field Peas

Ground Water

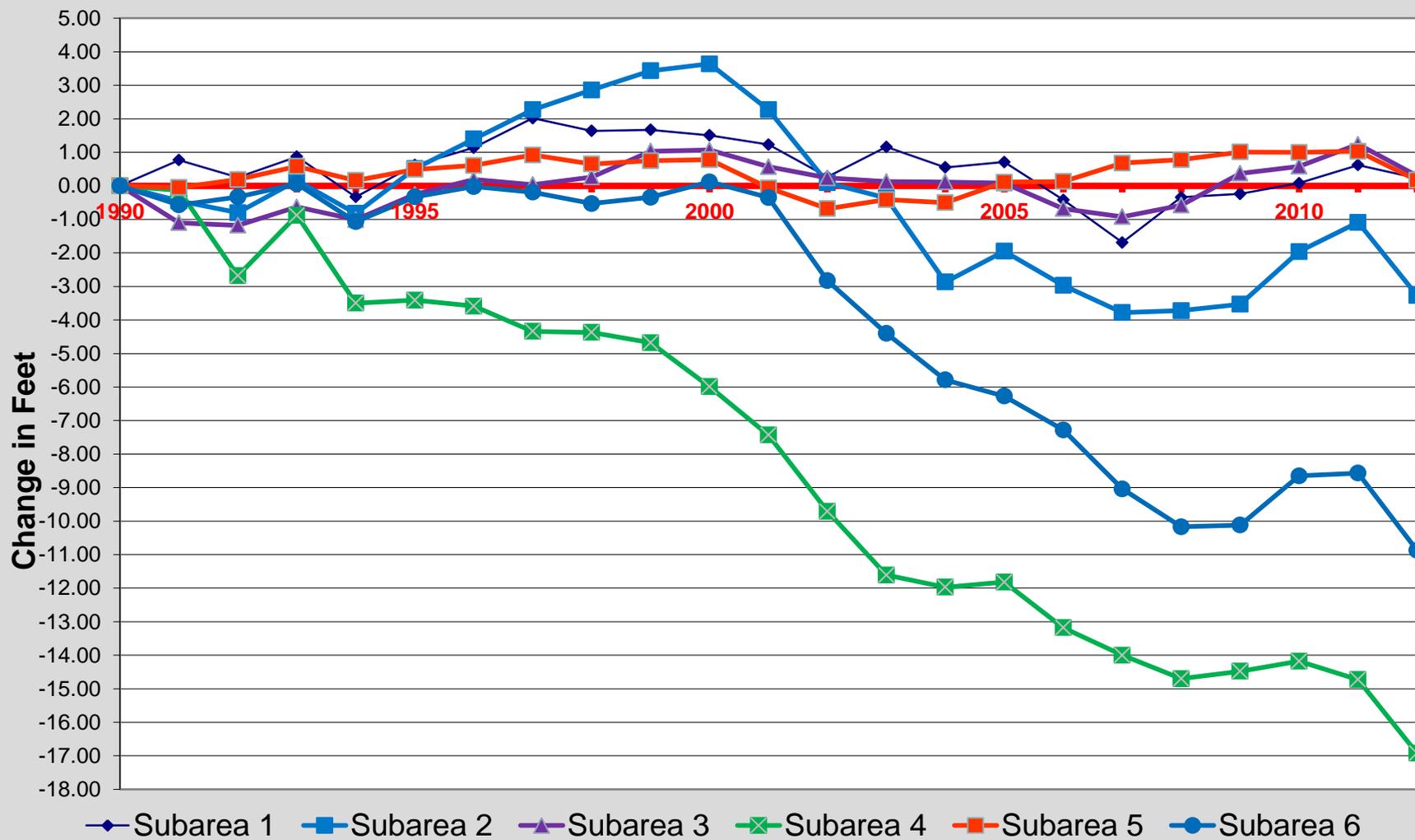
Sub-area Static Water Level Overview



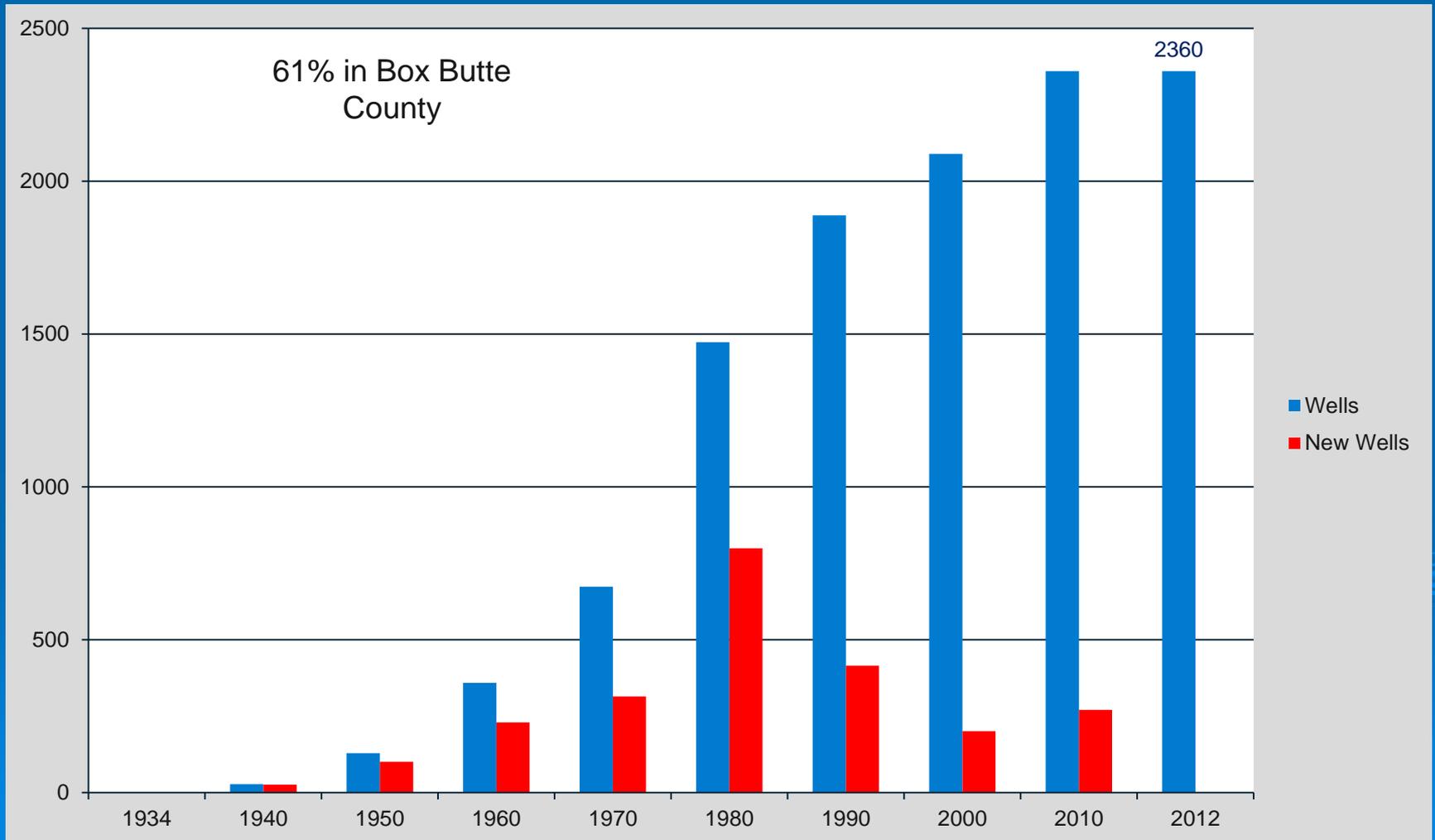


UNWNRD Sub-areas

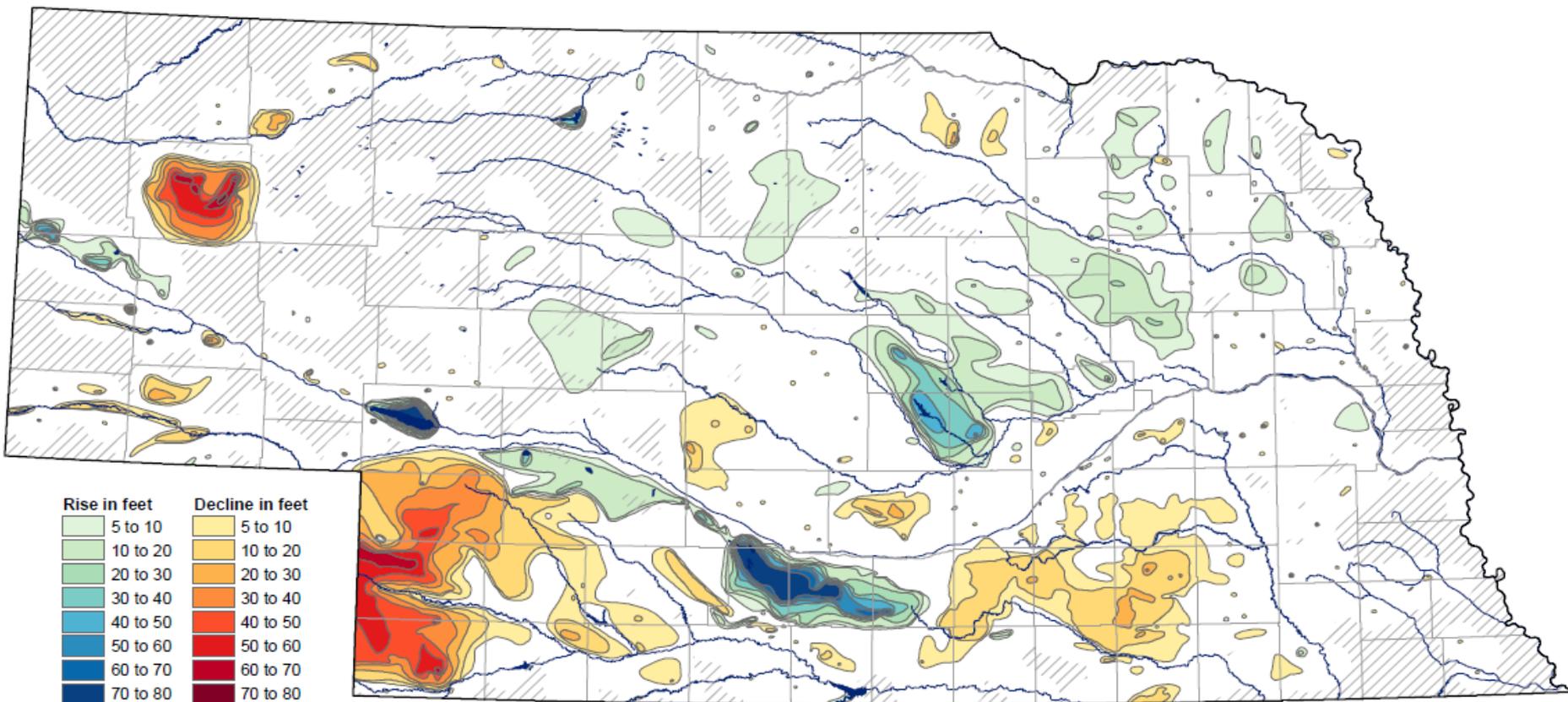
Change in Static Water Levels from 1990



UNWNRD Well Development by Decade



Groundwater-level Changes in Nebraska - Predevelopment to Spring 2012



Rise in feet	Decline in feet
5 to 10	5 to 10
10 to 20	10 to 20
20 to 30	20 to 30
30 to 40	30 to 40
40 to 50	40 to 50
50 to 60	50 to 60
60 to 70	60 to 70
70 to 80	70 to 80

- < +/- 5 feet
- Sparse data
- Surface water

(1 foot = .3048 meters)

CONSERVATION AND SURVEY DIVISION (<http://snr.unl.edu/csd>)
 School of Natural Resources (<http://snr.unl.edu>)
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

Aaron Young, Water Resources Coordinator, CSD
 Mark Burbach, Water Levels Program Supervisor, CSD
 Les Howard, GIS Manager, CSD
 Jesse Korus, Survey Geologist, CSD

U.S. Geological Survey
 Nebraska Water Science Center

U.S. Bureau of Reclamation
 Kansas-Nebraska Area Office

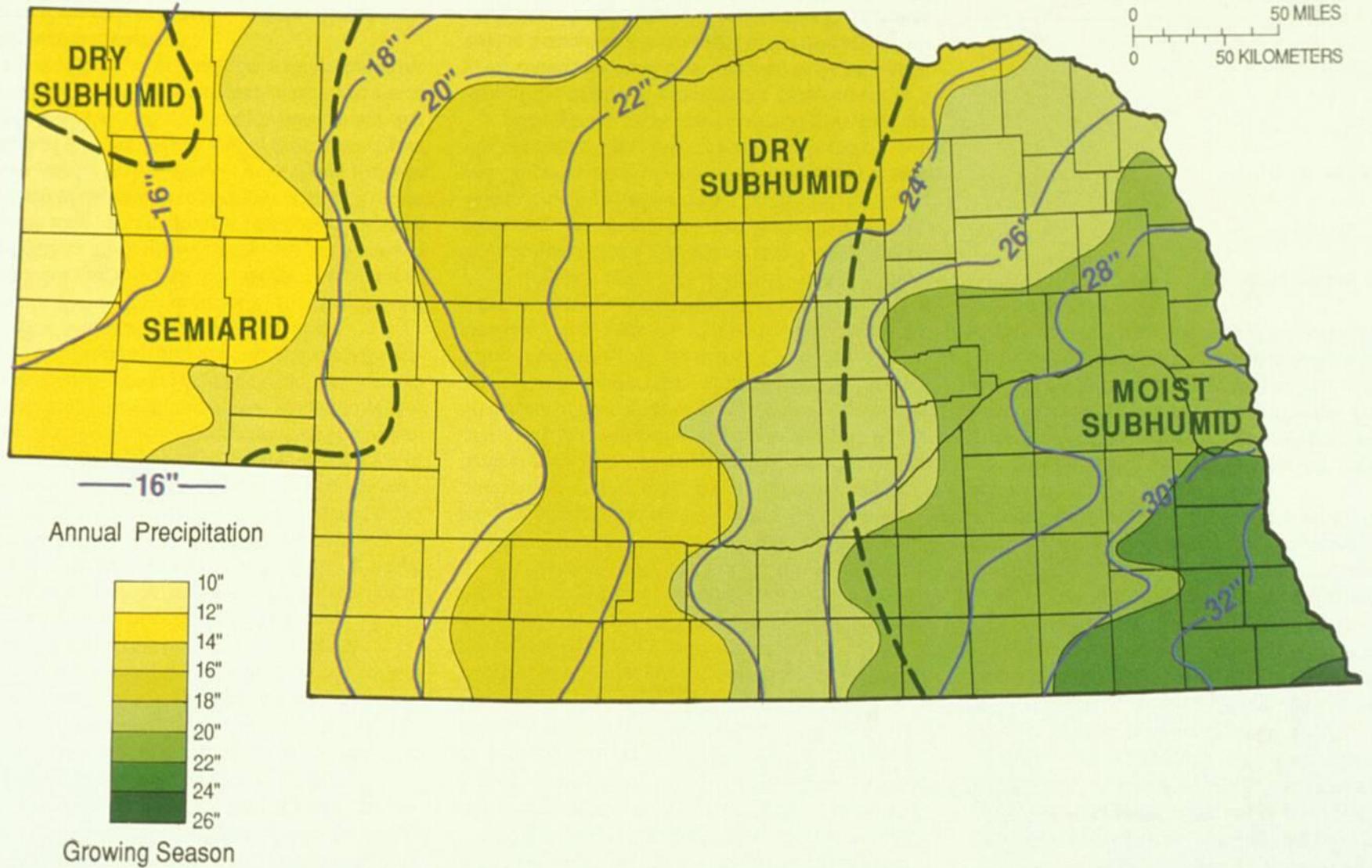
Nebraska Natural Resources Districts

Central Nebraska Public Power and Irrigation District

School of Natural Resources
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

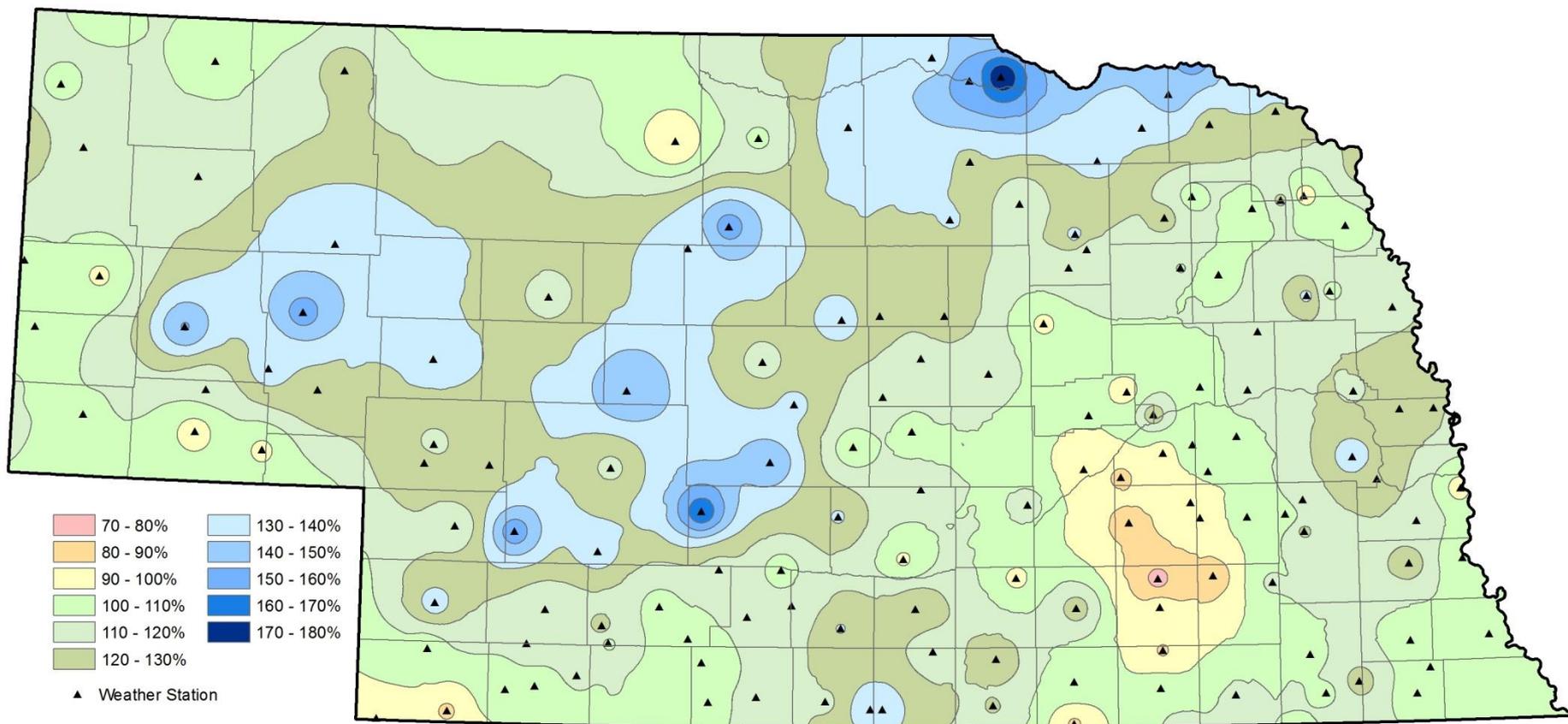
The University of Nebraska-Lincoln does not discriminate based on gender, age, disability, race, color, religion, marital status, veteran's status, national or ethnic origin, or sexual orientation.

Figure 16



Average Annual and Average Growing Season Precipitation

Percent of Normal Precipitation - January 2010 to January 2011



CONSERVATION AND SURVEY DIVISION (<http://snr.unl.edu/csd>)
 School of Natural Resources (<http://snr.unl.edu>)
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

National Climate Data Center
 Asheville, North Carolina

High Plains Regional Climate Center
 University of Nebraska - Lincoln

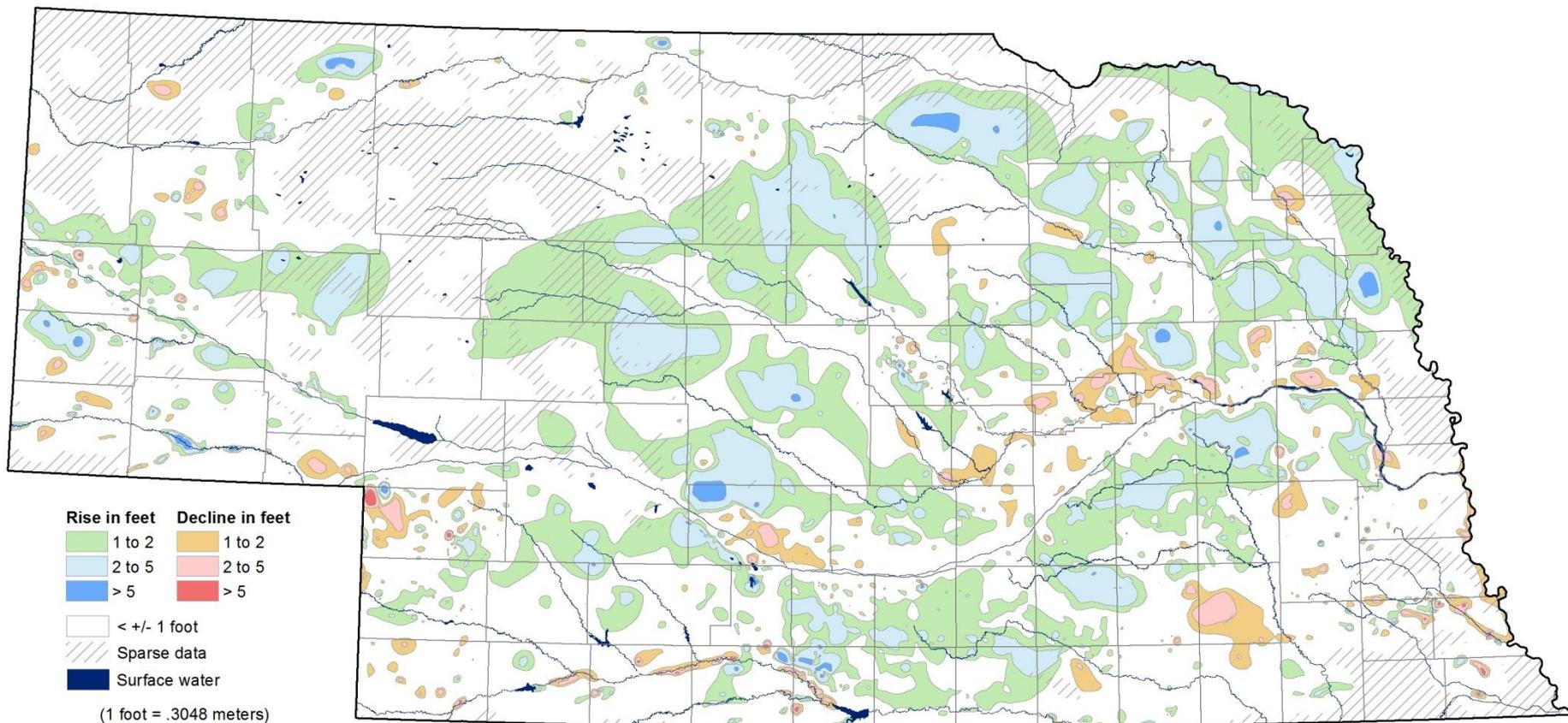
Jesse Korus, Survey Geologist, CSD
 Mark Burbach, Water Levels Program Supervisor, CSD
 Les Howard, GIS Manager, CSD

N School of Natural Resources
I Institute of Agriculture and Natural Resources
ANR University of Nebraska-Lincoln

The University of Nebraska-Lincoln does not discriminate based on gender, age, disability, race, color, religion, marital status, veteran's status, national or ethnic origin, or sexual orientation.

December 2011

Groundwater-level Changes in Nebraska - Spring 2010 to Spring 2011



CONSERVATION AND SURVEY DIVISION (<http://snr.unl.edu/csd>)
 School of Natural Resources (<http://snr.unl.edu>)
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

Jesse Korus, Survey Geologist, CSD
 Mark Burbach, Water Levels Program Supervisor, CSD
 Les Howard, GIS Manager, CSD

U.S. Geological Survey
 Nebraska Water Science Center

U.S. Bureau of Reclamation
 Kansas-Nebraska Area Office

Nebraska Natural Resources Districts

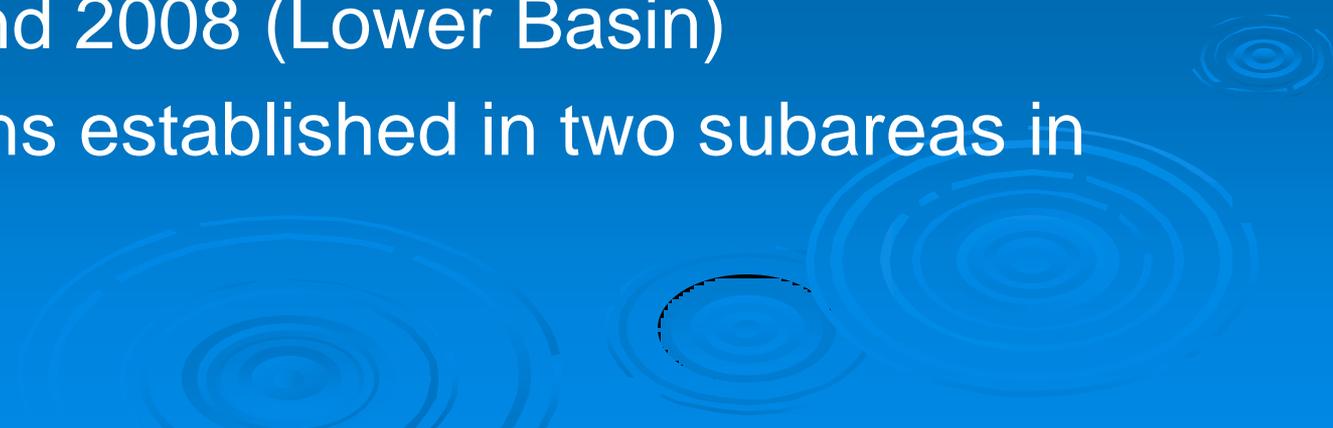
Central Nebraska Public Power and Irrigation District

IANR School of Natural Resources
 Institute of Agriculture and Natural Resources
 University of Nebraska-Lincoln

The University of Nebraska-Lincoln does not discriminate based on gender, age, disability, race, color, religion, marital status, veteran's status, national or ethnic origin, or sexual orientation.

December 2011

UNWNRD Groundwater Management Activities

- Suspension on issuance of water well permits in 2003
 - Suspension on increasing irrigated acres in 2004
 - Certified irrigated acres in 2006
 - Declared Fully appropriated in 2004 (Upper Basin) and 2008 (Lower Basin)
 - Allocations established in two subareas in 2007
- 

Ground Water Quantity Management Phase I

- Entire District
- Free Educational Seminars – Ag, Industrial, Municipal
- One on one producer contact
- All regulated wells metered
- All uses from regulated wells certified.
- 50% cost share for first 3 meters per landowner

Ground Water Quantity Management Phase II

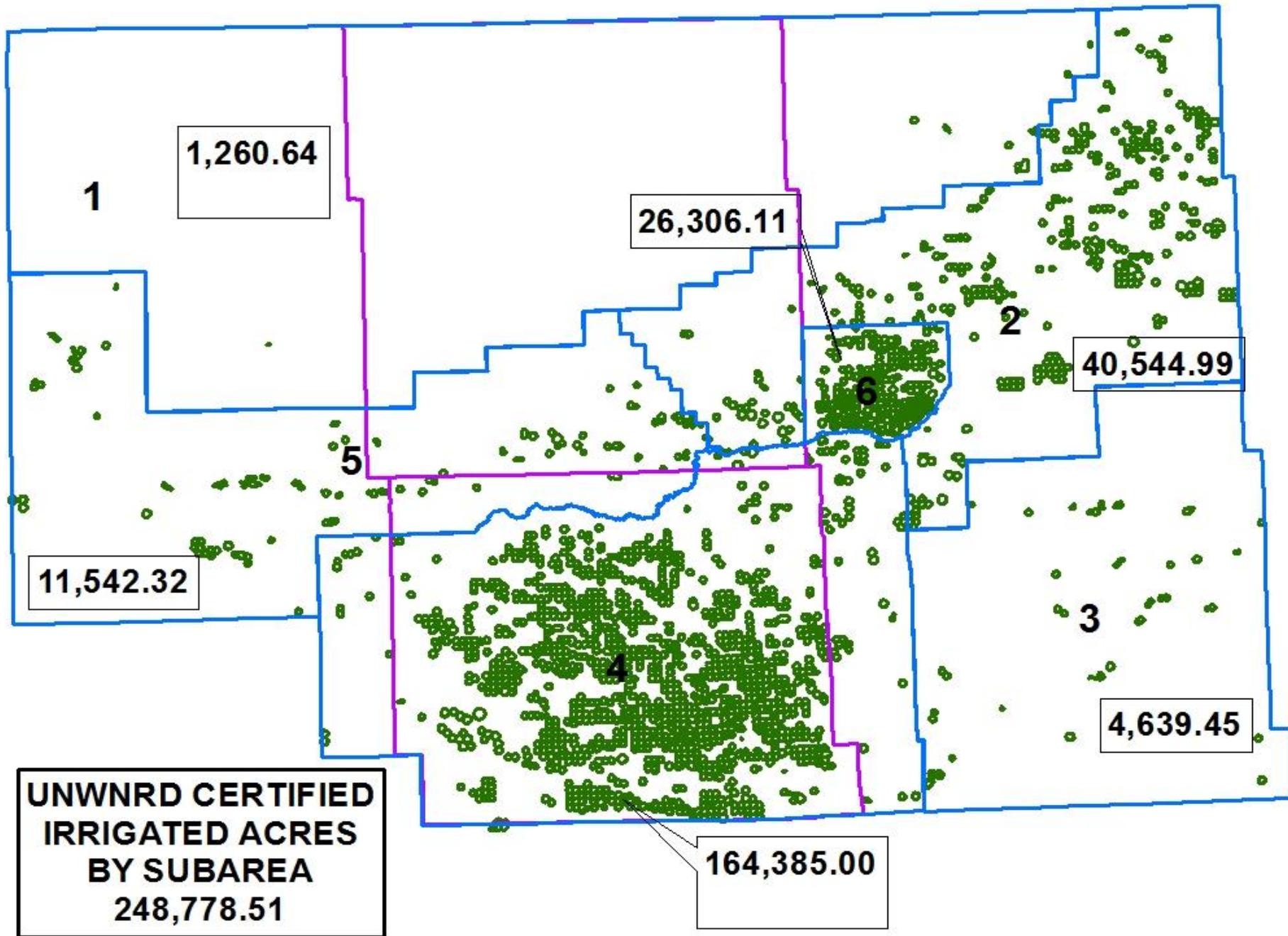
- Implemented when average spring static water level exceeds 3 foot decline below 1990
- Phase I controls continued
- No new regulated wells permitted
- Suspension on new irrigated acres
- One Subarea
 - Subarea 2

Ground Water Quantity Management Phase III

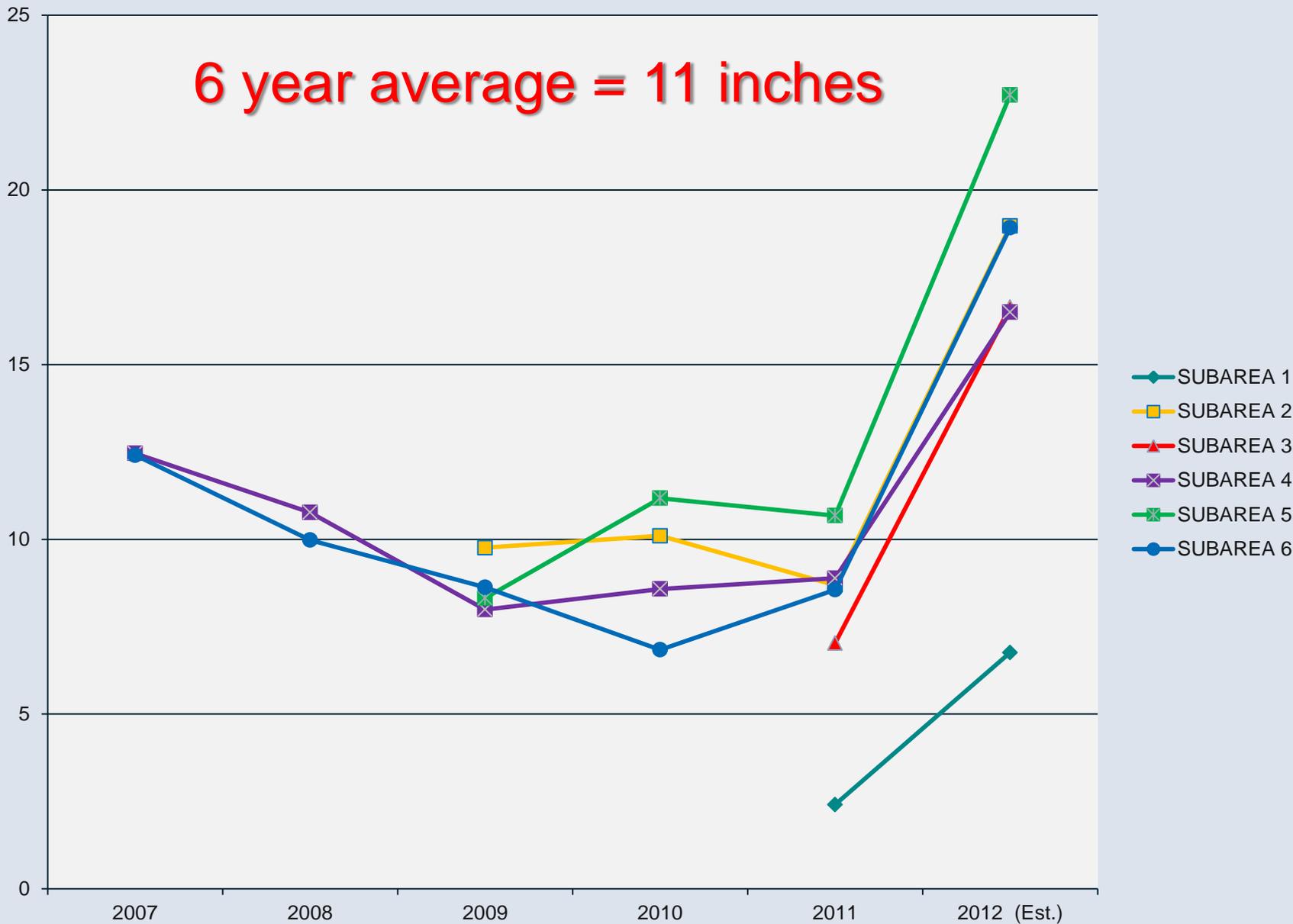
- Implemented when average spring static water levels exceed 6 foot decline below 1990
- All Phase I and II control will continue
- Groundwater will be allocated based on certified uses
- Four year allocation - 50% carryover
- Currently 13.5 inches in subareas IV & VI

Water Use Averages by Subarea





6 year average = 11 inches



WATER USE 2007-2012	<u>SUBAREA 1</u>	<u>SUBAREA 2</u>	<u>SUBAREA 3</u>	<u>SUBAREA 4</u>	<u>SUBAREA 5</u>	<u>SUBAREA 6</u>	<u>AVG. YEAR</u>
2007 INCHES				12.46		12.41	12.45
2008 INCHES				10.77		9.98	10.66
2009 INCHES		9.76		7.99	8.32	8.63	8.37
2010 INCHES		10.10		8.58	11.18	6.84	8.77
2011 INCHES	2.41	8.69	7.03	8.89	10.68	8.56	8.84
2012 INCHES (Est.)	6.76	18.97	16.65	16.50	22.72	18.92	17.40
AVG. USE SUBAREA	4.59	11.88	11.84	10.87	13.23	10.89	
TOTAL ACRES	1,260.64	40,544.99	4,639.45	164,385.00	11,642.32	26,306.11	248,778.51

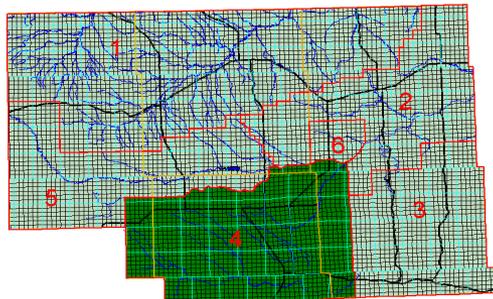
Future Allocations

- Next allocation period starts 2015
- Declines still observed
- Reduction in Phase III areas
 - Sub-area IV and VI
- District-wide allocation for remaining sub areas an option



Integrated Management

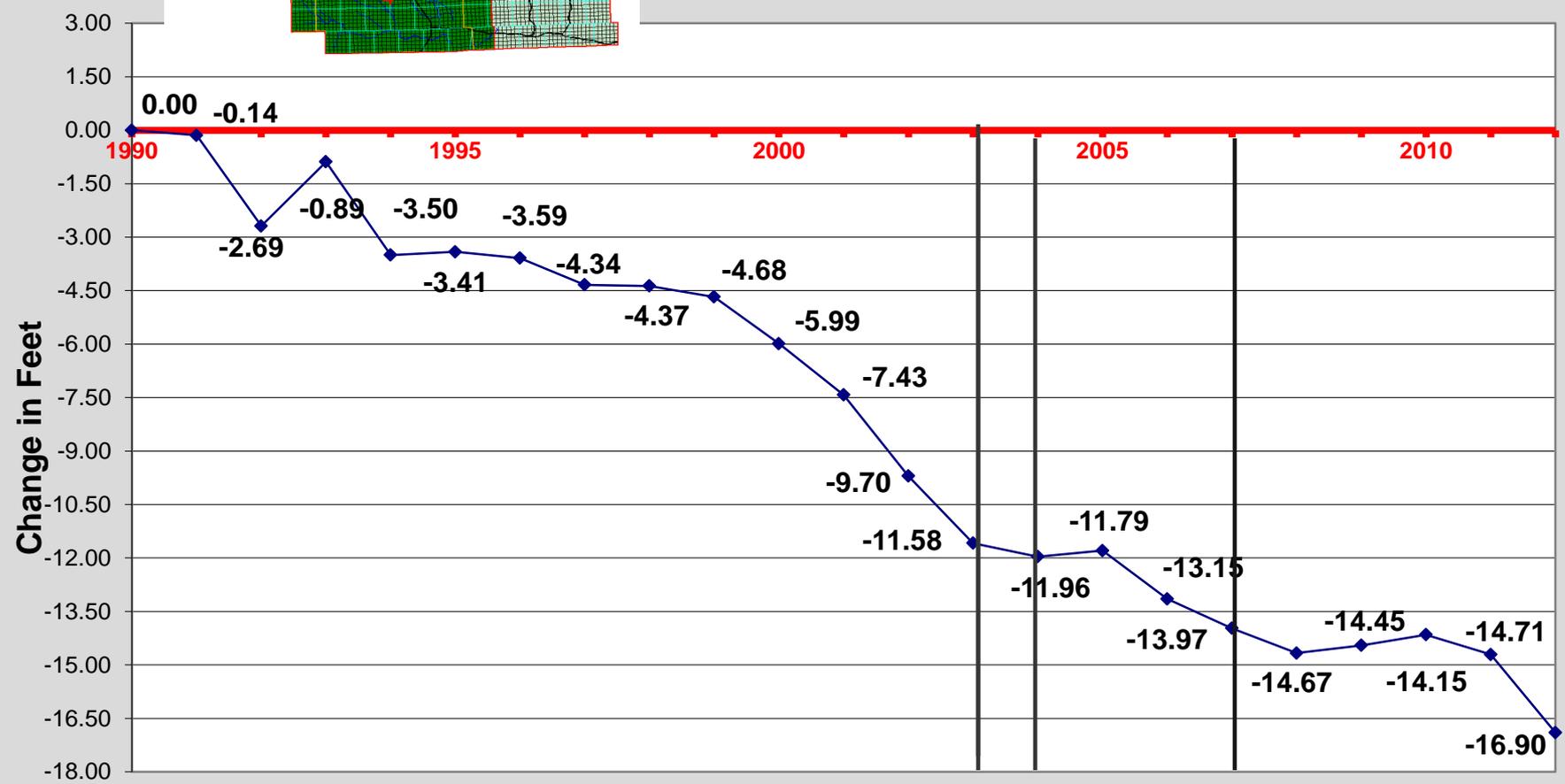
- Attempt to avoid conflicts between SW and GW
- January 2003 – requested the NDNR, in consultation with the NRD, study the hydrologically connected gw and sw resources.
- UNWNRD imposed a stay on all new regulated wells
- NDNR imposed stay on all new surface water rights
- Integrated Management Plan completed and approved 2009 and revised in 2011



Sub-area IV

Change in Static Water Levels from 1990

2013 Spring measurements show an average decrease in Static Water Levels of 2.19'



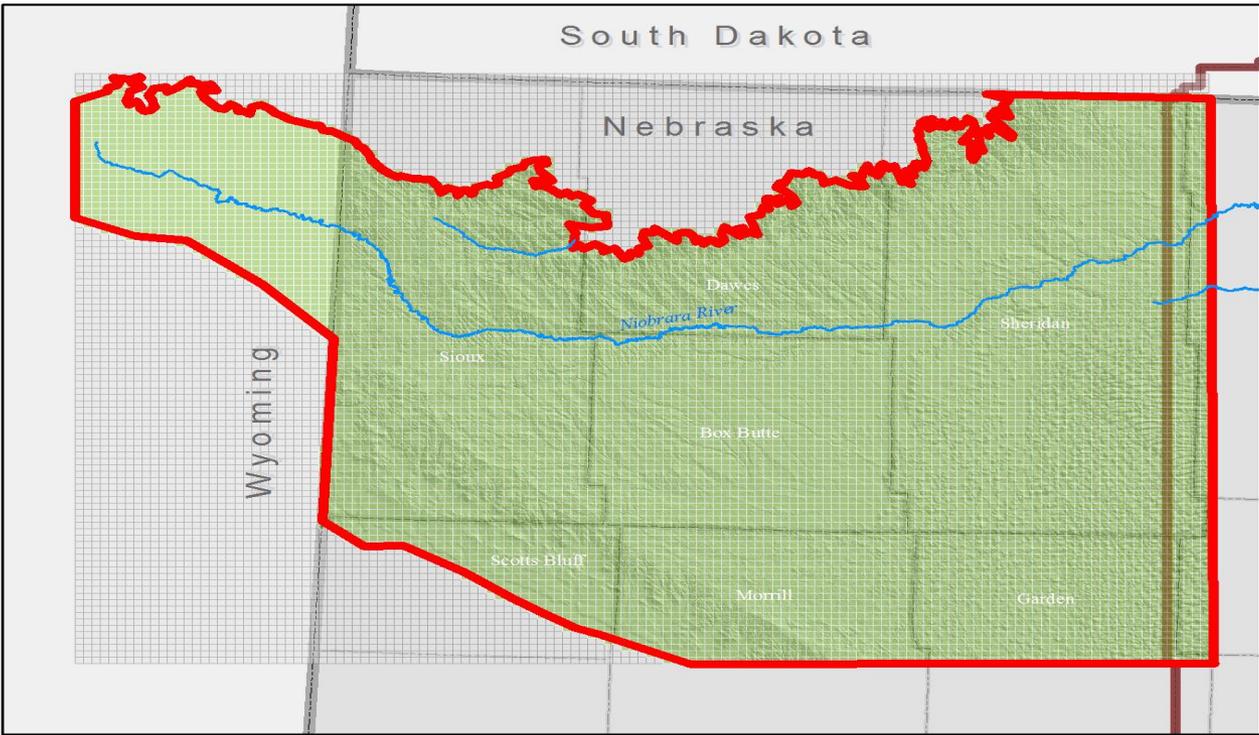
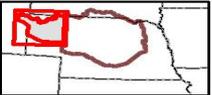
Upper Niobrara White Conjunctive Management Model

- **A tool to assist in ground and surface water management**
 - **IWMPPF Grant: Funding \$168,800.00**
 - **Needs to:**
 - Establish base for forward-looking analysis
 - Be capable of evaluating conjunctive management scenarios
 - Quantifying uses, demands and supplies
 - Quantify and assess impacts to surface water flows and ground water levels from historic development

Upper Niobrara White Conjunctive Management Model



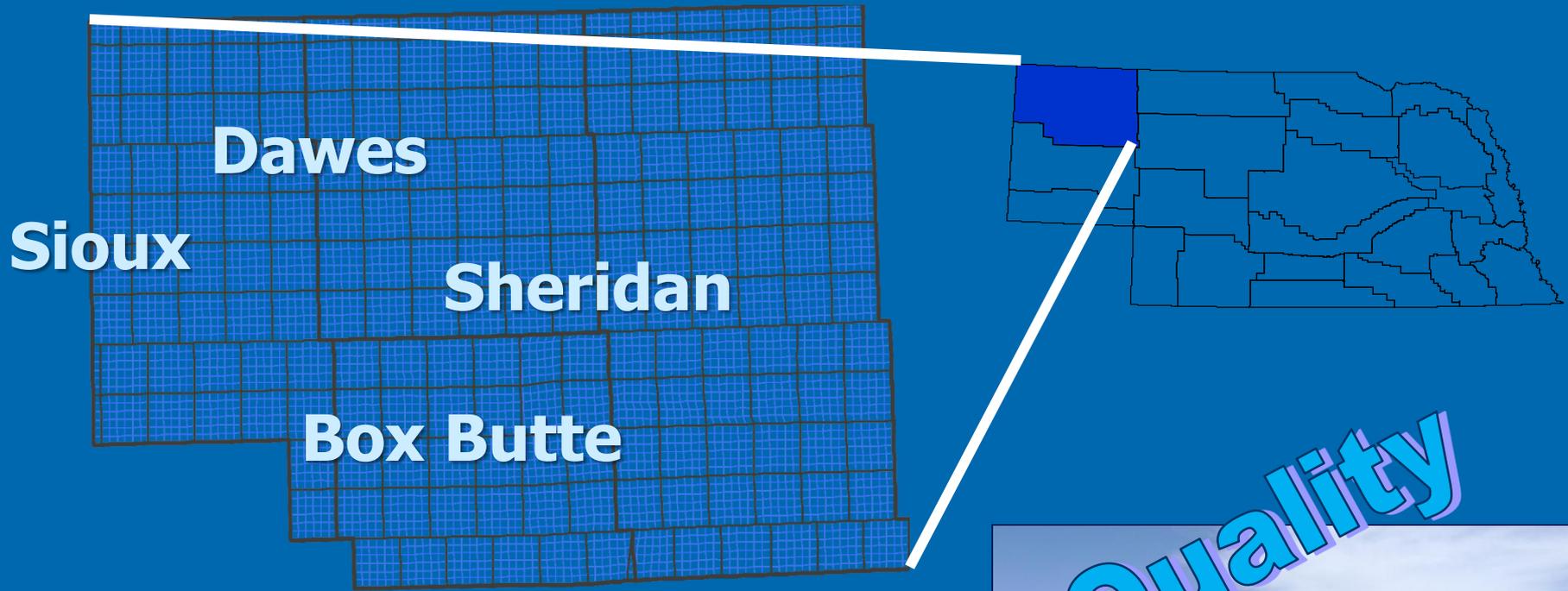
Upper Niobrara Basin (UNW) Model Boundary



Study Area Rivers	UNW Model Boundary
Upper Model Grid	CENEBC Model Boundary
Inactive	Counties
Active	

0 3.5 7 14 Miles





Dawes

Sioux

Sheridan

Box Butte

Sheri Daniels
UNWNRD Water Resources Manager

Ground Water Quality



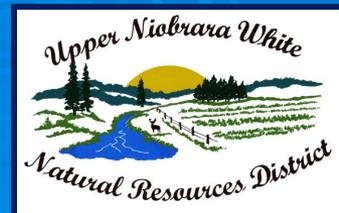
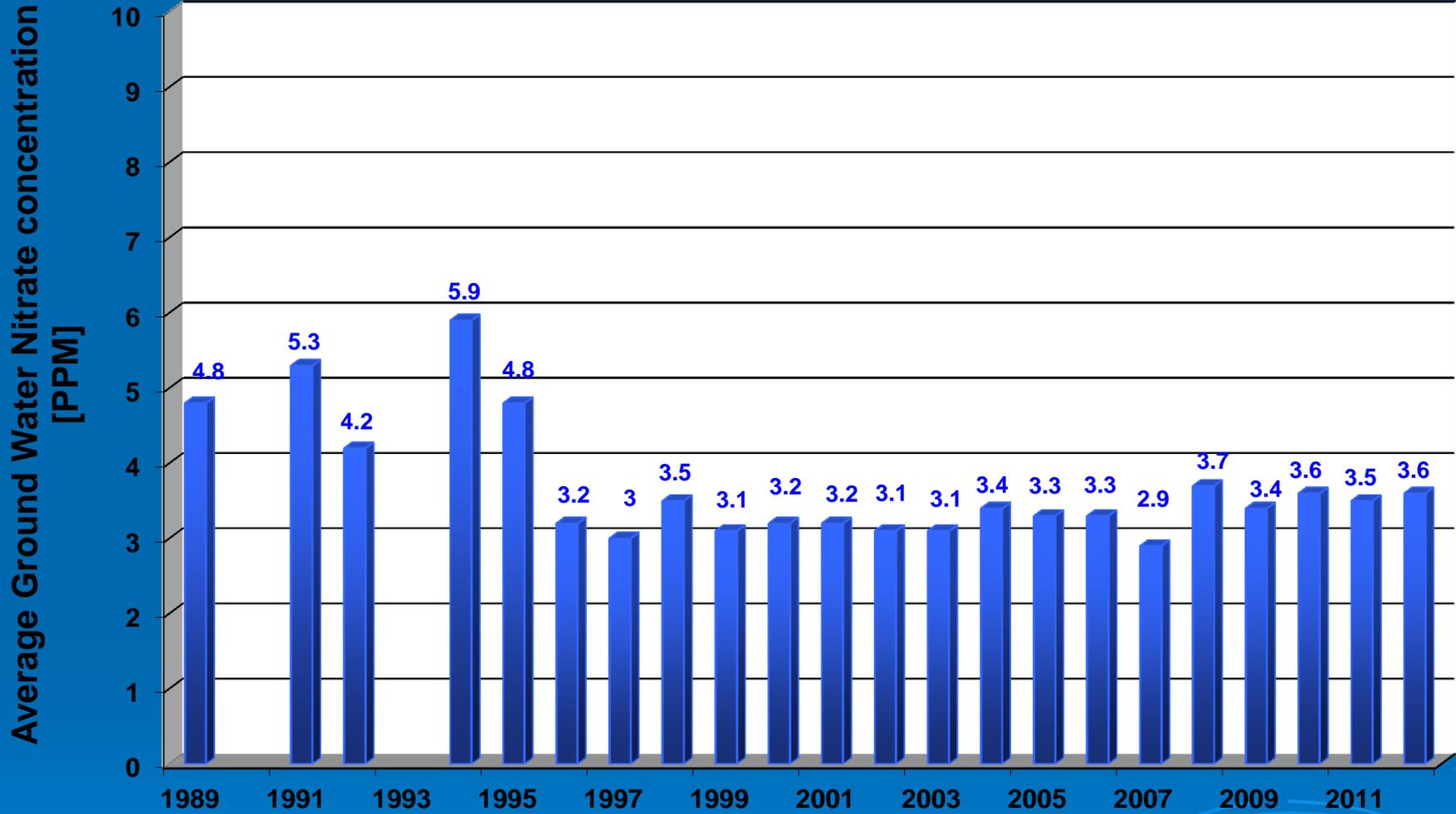
UNW Ground Water Sampling Program

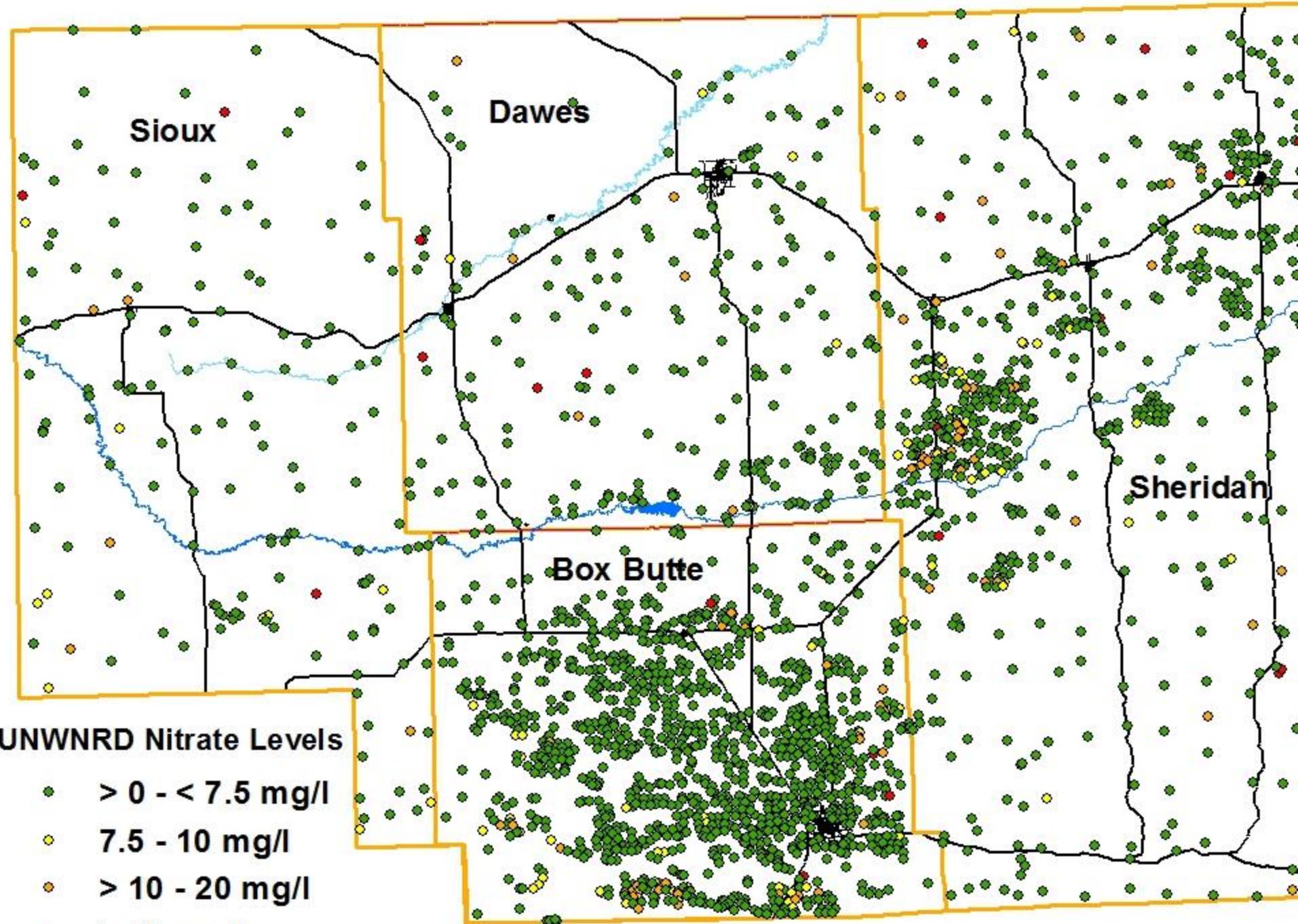
In 2012, 1,025 samples collected for nitrate analysis

Average Nitrate Concentration = 3.5 ppm



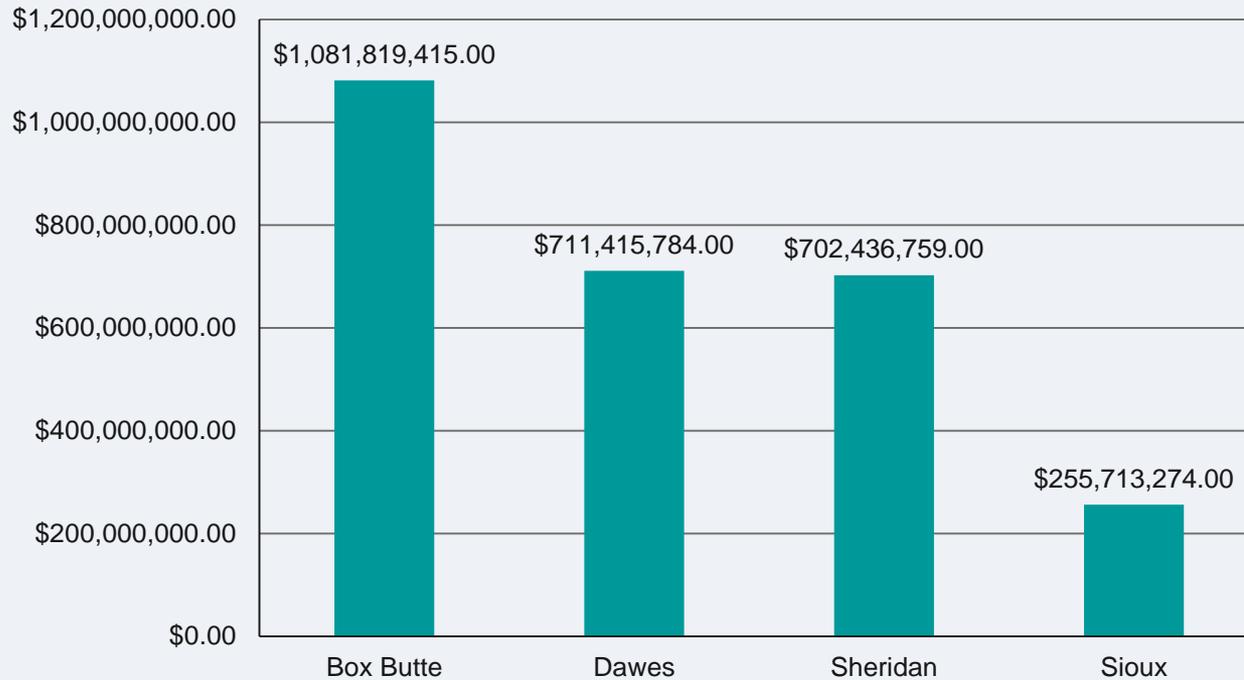
Average Nitrate Concentration Irrigation Well Samples 1989-2012



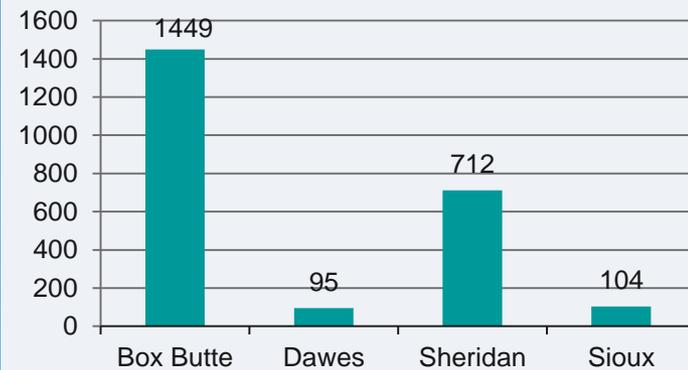


The Value of Water

County Valuation



Irrigation Wells





Nebraska's Natural Resources Districts

40 YEARS

Protecting Lives, Protecting Property & Protecting the Future Since 1972

CONSERVATION
FOR THE NEXT
GENERATION!

