Limited Irrigation No-Till Cropping Systems Demonstration for the Pumpkin Creek Watershed

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Discussing Water Issues

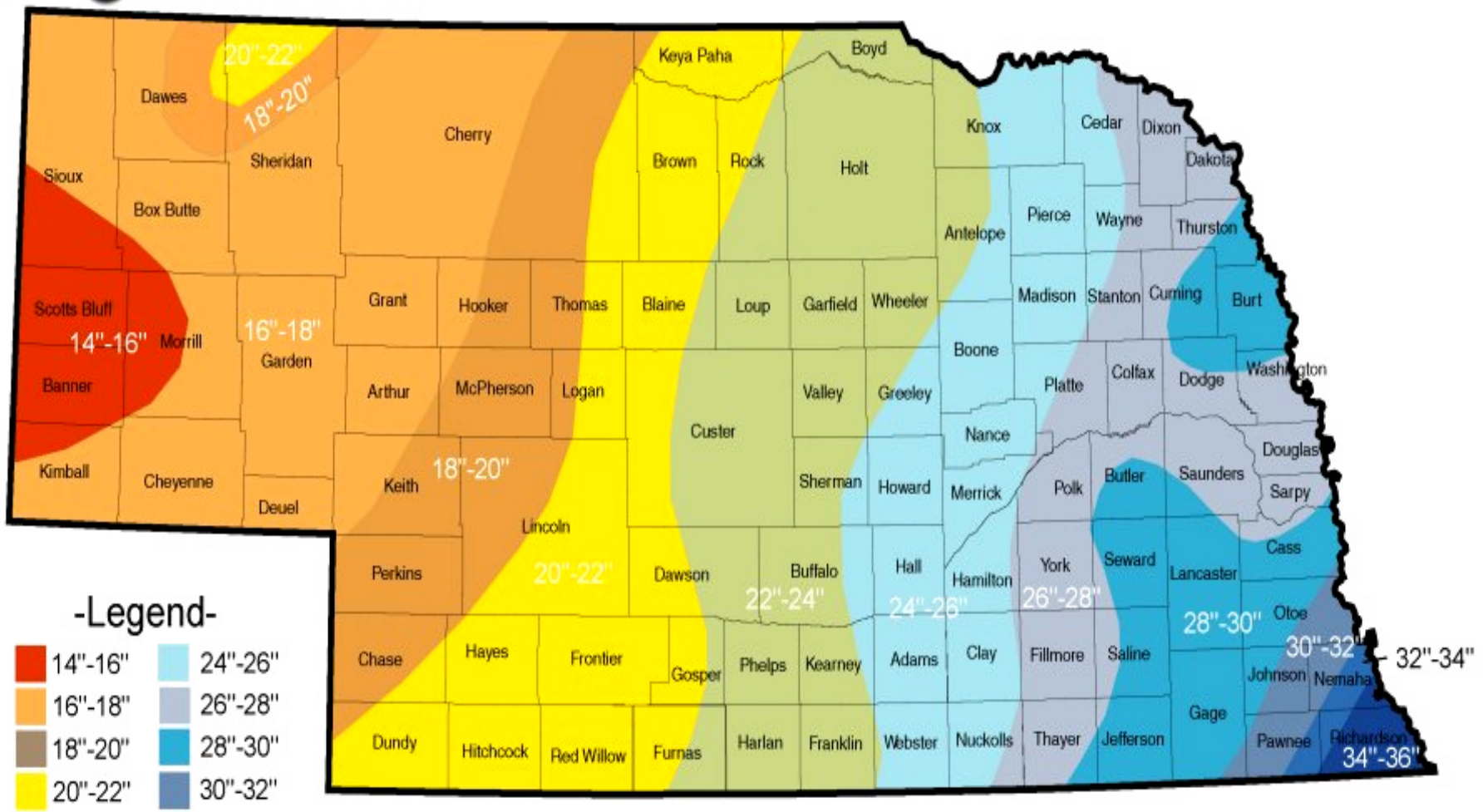
Water Quotes

- “Recurring droughts, interspersed with seductive rainier periods are a normal feature of the Great Plains.” Thornthwaite

- “I tell you, gentlemen, you are piling up a heritage of conflict and litigation over water rights, for there is not sufficient water to supply the land.”

  John Welsey Powell, speaking at the Los Angeles Irrigation Congress, 1893

Mean Annual Precipitation (in inches) From 1900-1979



Potato Brumbagh knew irrigation provided stability versus dryland!

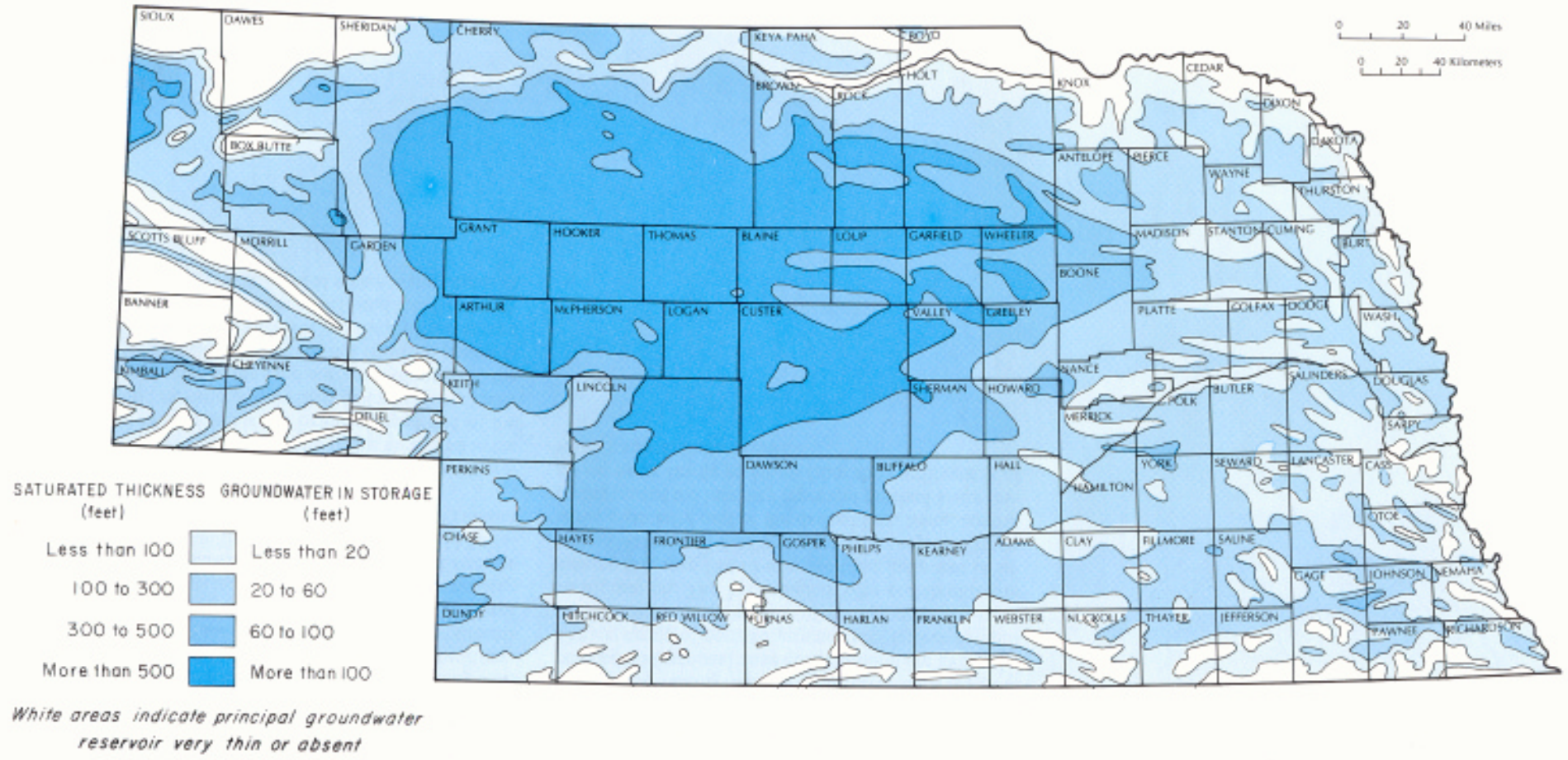
Rocky Mountain snow is for more than skiing!!!

Reduced Surface Water Supply

Platte River 2003

Lake Mac

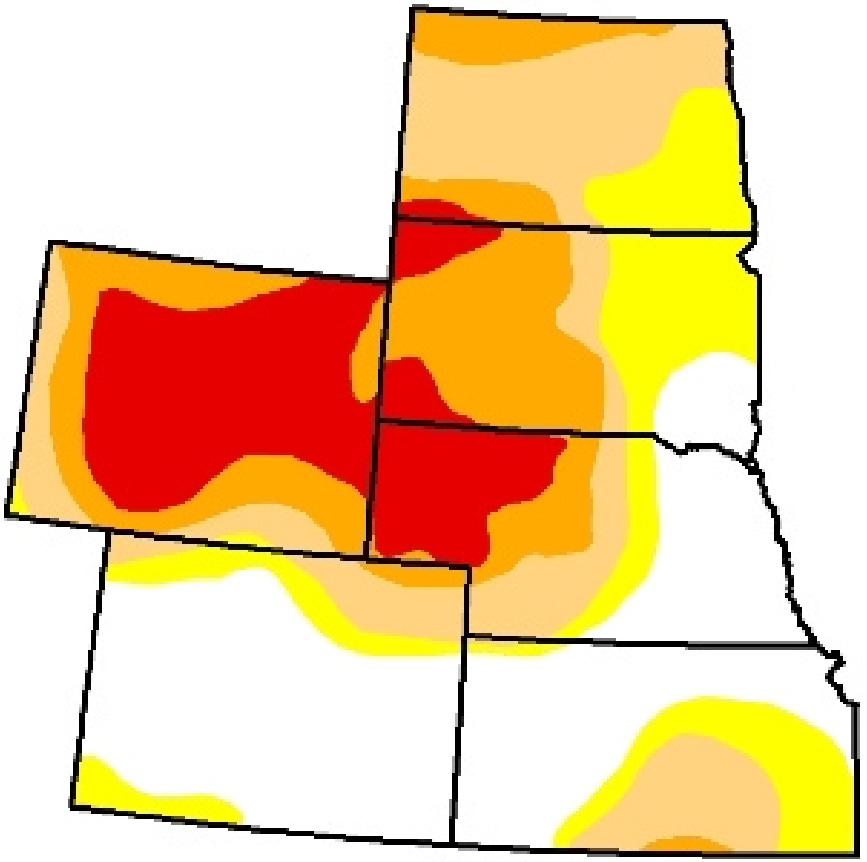
Saturated Thickness of High Plains Aquifer in Nebraska

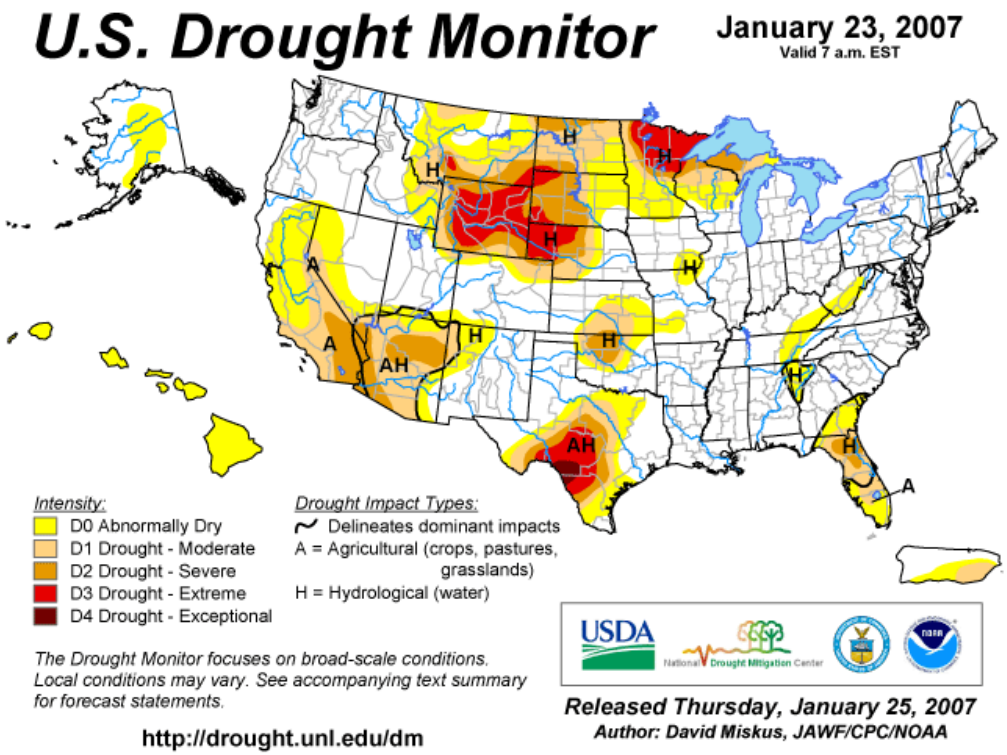


NE Registered Irrigation Wells 2006

101,546 wells

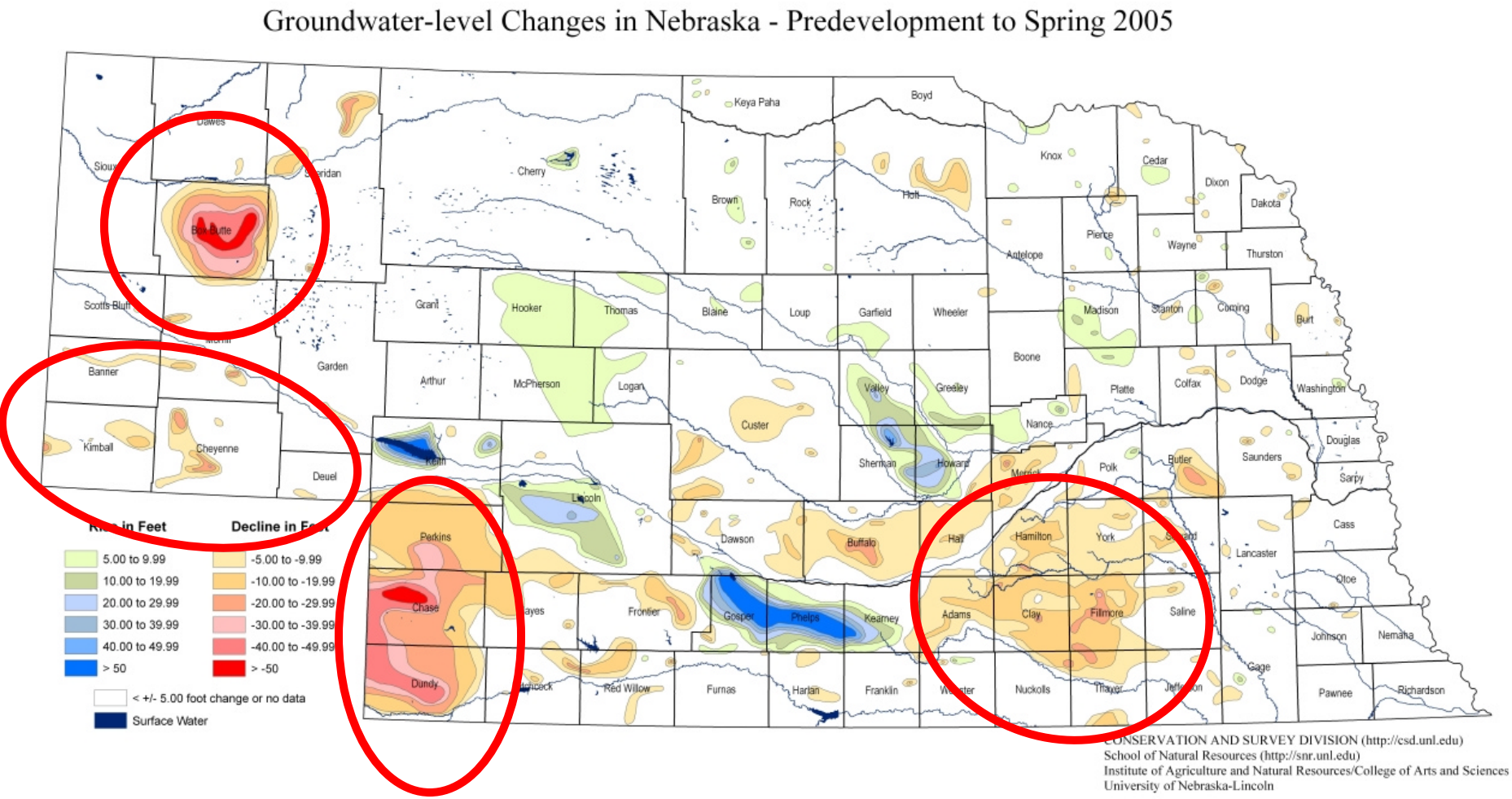
Drought Monitor
High Plains
January 2007





Drought exacerbated the surface water problem.
For ground water, it highlighted the over-development problem.

Declining Ground Water Levels



CONSERVATION AND SURVEY DIVISION (http://csd.unl.edu)
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University of Nebraska-Lincoln

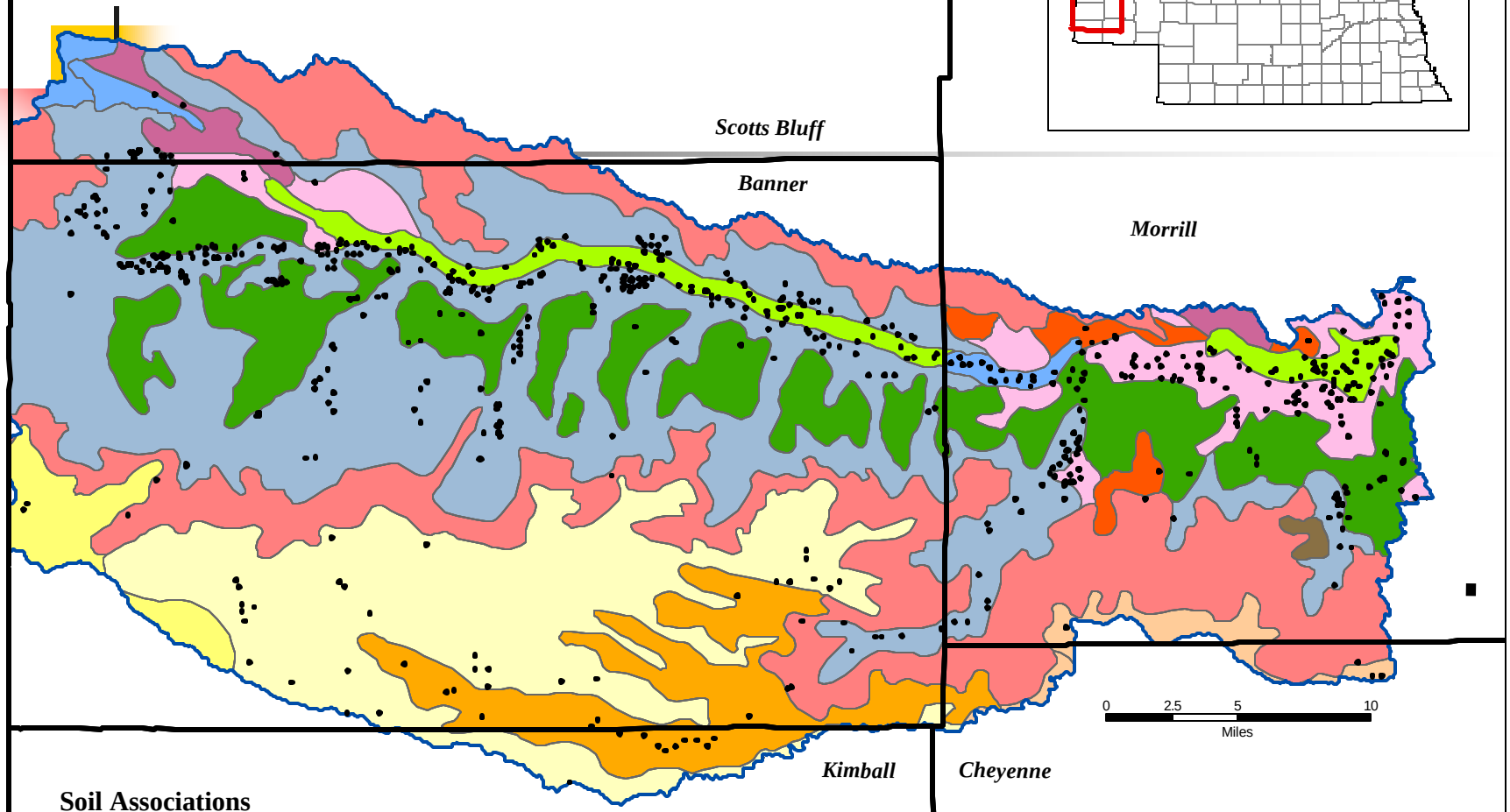
U.S. Geological Survey
Water Resources Division - Nebraska District

Nebraska Natural Resources Districts

Central Nebraska Public Power and Irrigation District

Mark Burbach, Water Levels Coordinator, CSD

Generalized Soil Associations (Pumpkin Creek Watershed)



Soil Associations

- Canyon-Rock Outcrop
- Dix
- Janise-Yockey
- Janise-Lisco-Gering
- Keith-Duroc-Creighton
- Alliance-Keith-Sidney
- Mitchell-Otero-Bridget
- Satanta-Alliance-Canyon
- Bayard-Bridget
- Tassel-Busher-Rock Outcrop
- Tripp-Alice
- Valent
- Valent-Sarben-Otero

Other Symbols

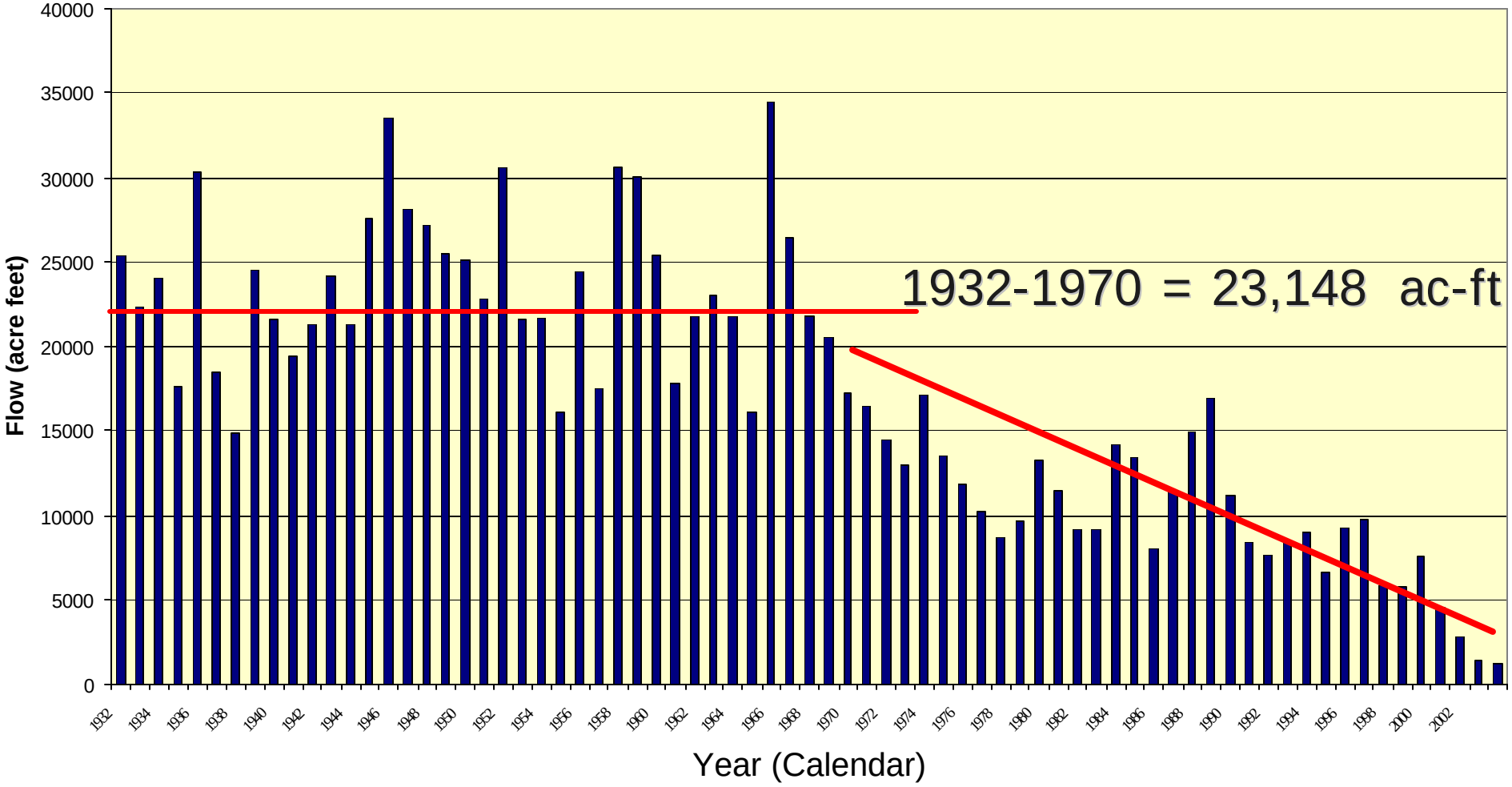
- County Boundaries
- Irrigation Wells (Current as of May 7, 2004)

CSREES Jan07

Pumpkin Creek Watershed

- Total Watershed: 450,700 acres
- Irrigated acres: 40,529 acres
- 14 inch irrigation allocation set in 2004
- Ground water pumped: 34,902 ac-ft
  - Irrigation: 32,613 ac-ft
  - Aquaculture: 2,019 ac-ft
  - Livestock: 270 ac-ft

Pumpkin Creek at Bridgeport (1932 to 2003)



Source: USGS & DNR data

What are the options?

- Sell the farm?
- Drill more wells?
- Hope for government help?
  - Who benefits?
  - Who pays?
- Make a number of management changes?

Limited Irrigation Cropping Systems

- Less water is applied than required to meet full irrigation demand.
- The crop will be stressed.
- Goal: Manage cultural practices and irrigation timing so the water stress has less impact on yield.

Why the system works

- Stores precipitation during the period between the last crop and the next
- No-Till saves 1” to 2” stored soil water
- Crop residue suppresses ET during irrigation season (saves 2-4” of water)

- 20 year research base (Hergert et al, 1993, J. Production Agriculture; Schneekloth et al, 1991, ASAE)

Project Objectives

1. Demonstrate limited irrigation no-till cropping systems

2. Educate farmers, natural resource groups, ag businesses about different management options

3. Develop economic scenarios for different cropping systems

Acknowledgements

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Conservation Innovation Grant

$120 K

North Platte NRD

$60 K

UNL-PHREC

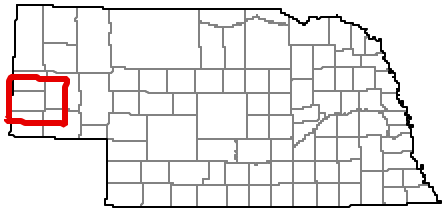
$60 K in-kind

Project Methods

- Steering committee of UNL + NRD +NRCS: agency interactions
- Extension Educator as project manager
- Educational programming a joint effort of PHREC educators & specialists

Producer Sites

Inset Map



Scotts

Bar

Morrill

WY

Kimball

Cheyenne

0 2.5 5 10

Miles

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University of Nebraska Lincoln EXTENSION

Pumpkin Creek Limited Irrigation Project Cooperators

Lerwick Site

Darnall Site

Laux Site

Pumpkin Creek Demo 2005

- Alton Lerwick: Spring Canola
  - 4 inch irrigation produced 1800 lbs/a
  - Crop growth when water available
- Lane Darnall: Spring Canola
  - 8 inch irrigation produced 1300-1500 lbs/a
  - Crop diversity, winter canola this year for higher yield
- Kirk Laux: No-till dry beans
  - Less irrigation for wheat & beans = water for alfalfa and corn for feedlot

Pumpkin Creek Demo 2006

- Alton Lerwick: NT Winter Wheat after canola
  - Water gone by 1 Aug
  - Need spring crops with good $ potential
- Lane Darnall: Winter Canola
  - Higher production potential than spring
  - Good fit for low water use, future bio-diesel crop
- Kirk Laux: No-till dry beans
  - Look at row widths, weed control
  - Worked out details for direct harvest

Success Factors

- One-on-one: Producers & Extension Educator plus team meetings
- Back-up from PHREC specialists
- Yearly field days to highlight successes and challenges
- Joint NRCS-NRD-UNL no-till conference in December 2006

Transitions and Change

- Agriculture is about ‘culture’
- Traditions and doing things a certain way have led to ‘survival’ and ‘accepted practice’
- How quickly can you (would you) change your traditions and what has worked?

Barriers and Solutions

- Barriers
  - Old Habits/Traditions
  - Lack of research in dryer areas
  - Perception by landlord, lenders, neighbors, family
  - Fear of Failure-$$$$
  - Long vs short term
  - Alternative crops
- Solutions
  - Education/Demo/Mentor
  - Research $$$$
  - Education/Mentors
  - Start small/Demos
  - Research plots/demos
  - More research/demos

Demo Summary

- Limited irrigation provides an economic advantage vs full irrigation of less acres
- Must think like a dryland producer who has some irrigation water & uses no-till
- Limitations based on crop options, system capacity, when water is available

Demo & Research Summary

- Many agronomic factors to ‘perfect’ before making no-till and limited irrigation ‘common practice’ in P.C.
- Need more data on limited irrigation response (3-5 years)
- Alternative crops that fit the panhandle may mean changing the whole system!
- For ag to survive with less water, it cannot be ‘business as usual’

Hope for the future: A pioneering effort