



SPNRD IMP

Meeting 1

TODAY'S AGENDA

- Welcome
- Why are we here?
- How did we get here?
- What has been done?
- South Platte NRD IMP
 - Stream Depletions 101
 - WWUM modeling
 - Datasets and modeling
 - Lessons learned
 - Next steps
- Public comment

WELCOME

- Open Meeting Notice
- Safety & Logistics
- Introductions



WHY ARE WE HERE?

Process Summary

PROCESS SUMMARY

Upper Platte Basin-Wide Planning

Statutory Authority

(How did we get here?)

Current Basin-Wide Plan

(What has been done?)

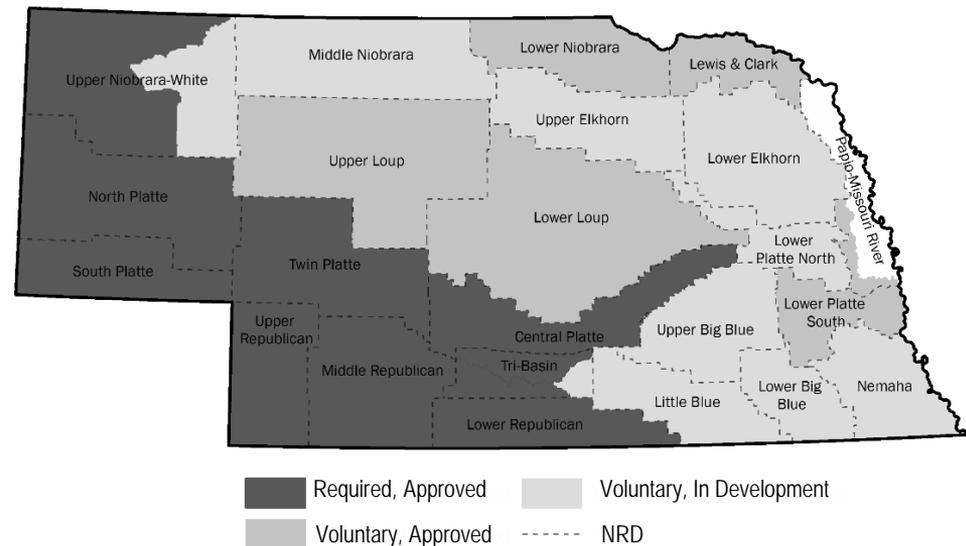
Basin-Wide Plan & IMPs

INTEGRATED WATER MANAGEMENT



INTEGRATED MANAGEMENT PLANNING IS A COLLABORATIVE PROCESS

- NeDNR + a Natural Resources District (NRD)
 - IMP development
 - Plan implementation
- Stakeholder Collaboration (seeking agreement)



STAKEHOLDER ROLES

- Convey local water issues/concerns
- Guide development of goals and objectives
- Disseminate information to local groups about IMP
- Attend meetings



NRD & NeDNR ROLES

- Acquire/disseminate information/data needed for stakeholder process
- Help formulate goals and objectives with stakeholders
- Coordinate with each other, stakeholders, facilitators throughout IMP process
- Help determine/convey feasible actions for plan implementation
- Write the Integrated Water Management Plan





HOW DID WE GET HERE?

Statutory Authority

STATUTORY DEFINITION § 46-713(4)(a)

Platte Overappropriated Area Basin-Wide Plan

Why?

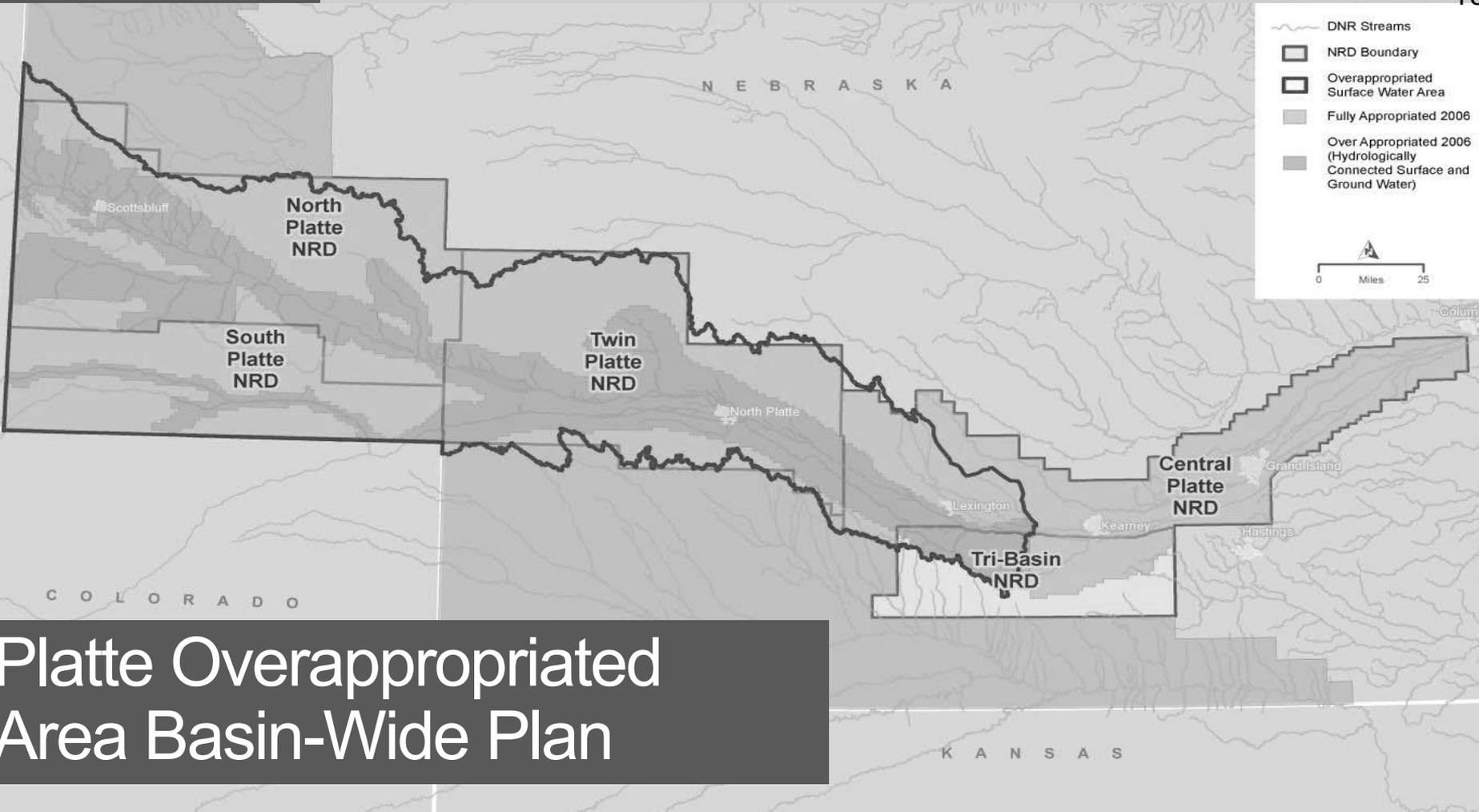
- Criteria for an overappropriated basin designation
 - Interstate agreement
 - Moratorium on surface water appropriations
 - Stays on well construction

When?

- Designated in September 2004

Where?

- Above Kearney Canal diversion



Platte Overappropriated Area Basin-Wide Plan

STATUTORY REQUIREMENTS § 46-715(2)(a)

The plan shall include **clear goals and objectives** with a purpose of sustaining a **balance** between water uses and water supplies so that the **economic** viability, **social** and **environmental** health, safety, and welfare of the basin can be achieved and maintained for both the **near term** and the **long term**.

STATUTORY REQUIREMENTS § 46-715(2)(b) – (e)

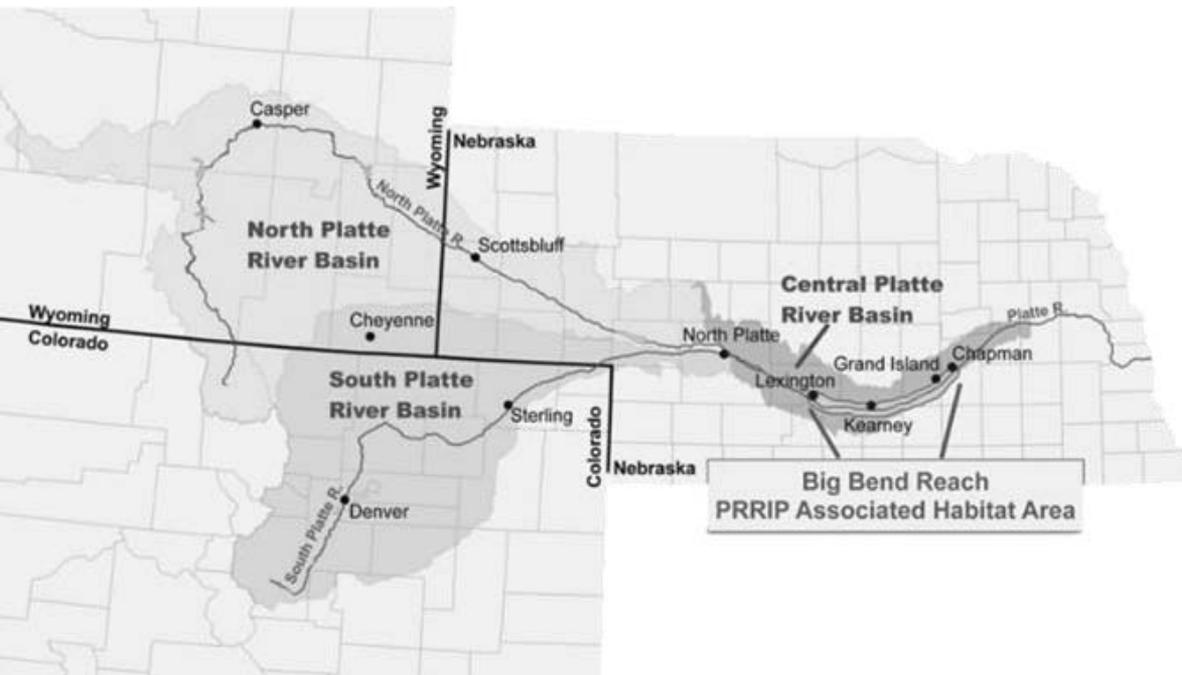
- A map of the area subject to the integrated management plan;
- At least one ground water control and at least one surface water control
- A monitoring plan
 - Plan to gather and evaluate data, information, and methodologies to increase understanding of the surface water and hydrologically connected ground water system, and test the validity of the conclusions and information upon which the integrated management plan is based.

STATUTORY REQUIREMENTS § 46-715(4)

- Ground water and surface water controls shall
 - a. Be consistent with the goals and objectives of the plan
 - b. Ensure Nebraska compliance with interstate agreement
 - c. Protect existing users (groundwater and surface water) from new uses

INTERSTATE AGREEMENT – PRRIP

Platte River Recovery Implementation Program; § 46-715(4)(b)

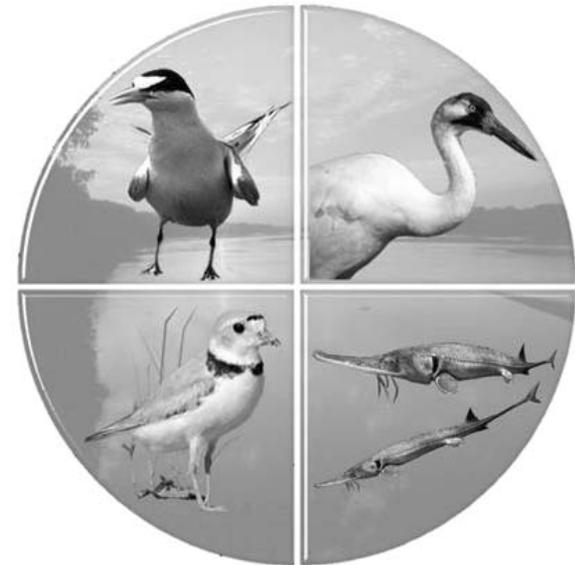


- Began January 1, 2007
- Basin-wide effort by Department of Interior, Colorado, Wyoming, and Nebraska
- Implementation of PRRIP is incremental.
 - The first increment is 13 years, through 2019.

INTERSTATE AGREEMENT – PRRIP

Platte River Recovery Implementation Program; § 46-715(4)(b)

- Endangered species
 - Improve habitat for four threatened and endangered species
 - Whooping Crane
 - Piping Plover
 - Least Tern
 - Pallid Sturgeon
 - Provide ESA Section 7 and Section 9 coverage for all water users in the basin
 - Avoid use of alternative ESA enforcement measures

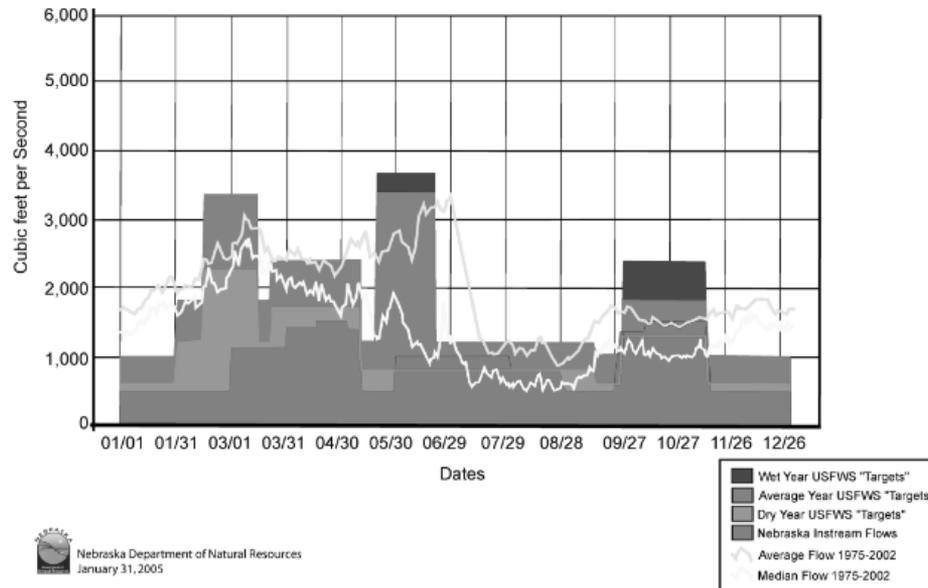


INTERSTATE AGREEMENT – PRRIP

Platte River Recovery Implementation Program; § 46-715(4)(b)

Comparison

USF&WS "Target Flows", Nebraska "Instream Flows",
Average and Median Flows/
Platte River at Grand Island



Nebraska Department of Natural Resources
January 31, 2005

- Target & state-protected flows
 - Reducing deficits to FWS Target Flows by average annual of 130,000 to 150,000 AFY
 - "Pulse" Flows for Adaptive Management

INTERSTATE AGREEMENT – PRRIP

Platte River Recovery Implementation Program; § 46-715(4)(b)

➤ Offsets & moratoriums

- Depletions to USFWS “target flows” and to “state-protected flows” because of groundwater and surface water uses begun or expanded between **July 1, 1997, and December 31, 2005**...will be offset in quantity, time, and location...

INTERSTATE AGREEMENT – PRRIP

Platte River Recovery Implementation Program; § 46-715(4)(b)

➤ Offsets & moratoriums

- **Surface Water** (administered by NeDNR)
 - Moratorium (1993) on issuance of any new surface water appropriations upstream of the Loup River confluence
 - No new direct diversions of surface water allowed without offset (2006)

- **Groundwater** (administered by NRDs)
 - No new uses of groundwater within the 28/40 area will be allowed without offset (2006)
 - Stays on new wells

STATUTORY REQUIREMENTS § 46-715(3)

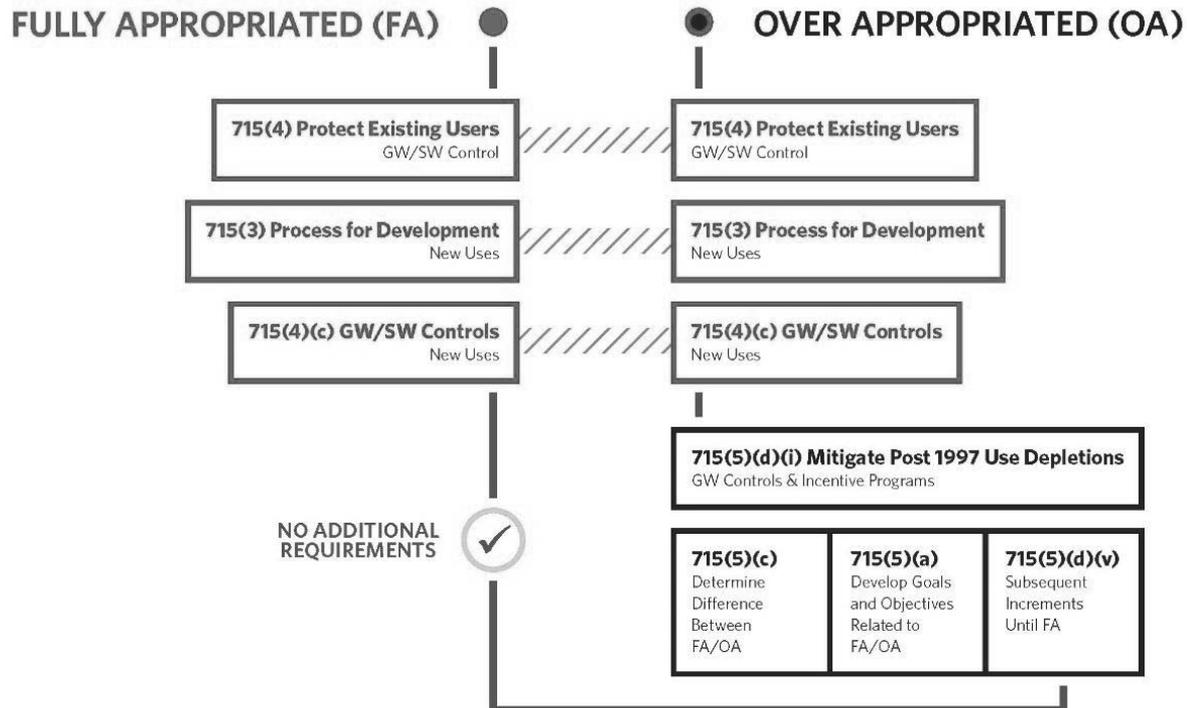
- Process for economic development opportunities and economic sustainability
- Clear and transparent procedures to track depletions and gains to streamflow utilizing the best available / generally accepted methods, information, data, and science
- Procedures the NRD / NeDNR use to report, consult, and otherwise share information
- Identify water available to mitigate new uses (i.e. water rights leases, interference agreements, augmentation projects, conjunctive use management, and use retirement)
- Guidelines for consultation with other water users to provide for economic development opportunities
- Rules to allow transfers from an old use to a new use, and offsets, as necessary, for new uses that adversely affect existing users. Water banking may also be used when appropriate

STATUTORY REQUIREMENTS § 46-715(5)(a)

➤ Basin-Wide Plan

- When the designated overappropriated area lies within two or more natural resources districts, the department and the affected natural resources districts shall jointly develop a basin-wide plan for the area designated as overappropriated
- Such plan shall be developed using the consultation and collaboration process
- Shall be developed concurrently with the development of the integrated management plan
- Shall be designed to achieve, in an incremental manner described the goals and objectives described in 46-715(2)
- The basin-wide plan shall be adopted after hearings by the department and the affected natural resources districts.

STATUTE § 46-715 INTERPRETATION



BASIN-WIDE PLAN VS. INTEGRATED MANAGEMENT PLAN

- Statute calls for a Basin-wide Plan (BWP) and individual Integrated Management Plans (IMP) in NRDs that have overappropriated area
- BWP is for the area designated as overappropriated
- IMP encompasses both overappropriated and fully appropriated areas
- Both BWP and IMPs must be adopted and take effect by September 2019
- 2nd increment Basin-wide Plan process began in 2016 with Stakeholders

THEY ARE SIMILAR BUT DIFFERENT

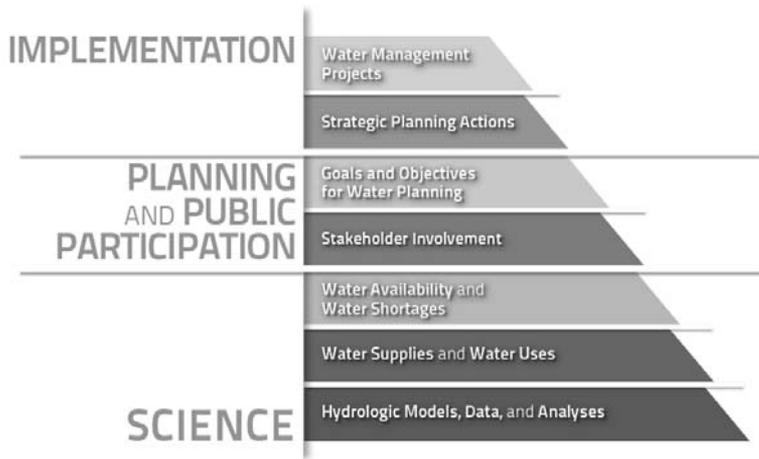
Basin-Wide Plan

- All basin NRDs & NeDNR
- Overappropriated Area
- Goals & objectives
 - Focused on regional, cross-boundary issues and opportunities
 - Consistency and collaboration among basin NRDs
 - A broad framework

Integrated Management Plan

- 1 NRD & NeDNR
- Overappropriated and fully appropriated areas
- Goals, objectives, & controls
 - Specific to one NRD
 - Tailored to local issues and opportunities
 - Specific targets and actions that each NRD will use to meet the goals of the Basin-Wide Plan as well as individual Integrated Management Plan goals

INTEGRATED MANAGEMENT PLANNING - SUMMARY



- Surface water and groundwater management
- Proactive
- Protects existing users

- Adaptive management
- Jointly developed between NRD and NeDNR
- Suited to local conditions

STAKEHOLDER CHARGE | What are you willing to do?



First Increment

- Costs have ranged from \$10's to \$1,000's per AF

Second Increment

- Most excess flows have been committed to projects in the first increment
- Incentive programs are willing seller/buyer
- Cost to maintain the projects that are currently in place

Overall

- Costs likely to increase

§ 46-715(2)(a) - The plan shall include clear goals and objectives with a purpose of sustaining a balance between water uses and water supplies so that the economic viability, social and environmental health, safety, and welfare of the basin can be achieved and maintained for both the near term and the long term.



WHAT HAS BEEN DONE?

Current Plan

UPPER PLATTE BASIN-WIDE PLAN

➤ 1st increment basin-wide plan

- Current plan went into effect in September 2009

➤ 2nd increment basin-wide plan

- Current process to incorporate stakeholder input into 2nd increment basin-wide plan
- Will present draft 2nd increment plan to stakeholders in September 2018
- 2nd increment plan will go effect in September 2019

Goals	1: Incrementally achieve and sustain a fully appropriated condition	2: Prevent or mitigate human-induced reductions in the flow of a river or stream that would cause noncompliance with an interstate compact or decree or other formal state contract or agreement	3: Keep the Plan current
Objectives	Offset impacts of streamflow depletions... to the extent those depletions are due to water use initiated after July 1, 1997	Prevent human-induced streamflow depletions that would cause noncompliance by Nebraska with the Nebraska New Depletions Plan (NDP) included within the Platte River Recovery Implementation Program (Program), for as long as the Program exists.	Meet at least annually to review progress toward achieving the goals and objectives of this Plan...
	Maintain first increment mitigation efforts		Gather and evaluate data and information to measure the effectiveness of controls, incentives and/or other programs...
	Conduct a technical analysis...to determine whether the controls are sufficient...		
	Continue to refine the methodology to determine the difference between the current and fully appropriated levels of development...		
	Use available funds and actively pursue new funding opportunities to...implement this Plan		
	Update and continue implementing IMPs in each Platte River Basin NRD		

Goals	4: Work cooperatively to identify and investigate disputes between ground water users and surface water appropriators and, if determined appropriate, implement management solutions to address such issues	5: Partner with municipalities and industries to maximize conservation and water use efficiency	6: Work to maintain economic viability of the basin while implementing this plan
Objectives	Identify disputes between ground water users and surface water appropriators	Continue to collect data on water use and existing conservation plans of municipalities and industries within the Basin	Support managers and users in the basin by better understanding the economic impacts of supply variability
	Investigate and address issues between ground water users and surface water appropriators, based on investigation results	Invite municipalities and industries to the annual meetings	Management practices to improve sustainability/viability for surface water and groundwater uses
		Establish allocations for each municipal and industrial user by 2026 and the M&I will offset their new uses themselves rather than NRD	Drought Planning
			Discuss economic impacts and potential mitigation options at the annual meeting

INTEGRATED MANAGEMENT PLAN

- Map of the Areas
 - Overappropriated
 - Fully appropriated
- Incentives
- Water banking
- Monitoring
- Studies
- Controls
 - Moratorium/certified acres
 - Transfers
 - Municipal and industrial
- Post-1997 Depletion Targets (NPR:13 af; SP/LP:213 af)
 - Accomplished through first increment by EQIP program retirements

MANAGEMENT ACTIONS TAKEN

- Conjunctive Management
 - Recharge of Excess Flows in Western Canal
 - 2011, 2013, 2015, 2016
 - Total diversion ~36,700 acre-feet
 - Total estimated recharge ~ **11,400** acre-feet
- Acres Retirements, Allocations



SOUTH PLATTE NRD IMP

Stream Depletions 101

WWUM modeling

Datasets and modeling

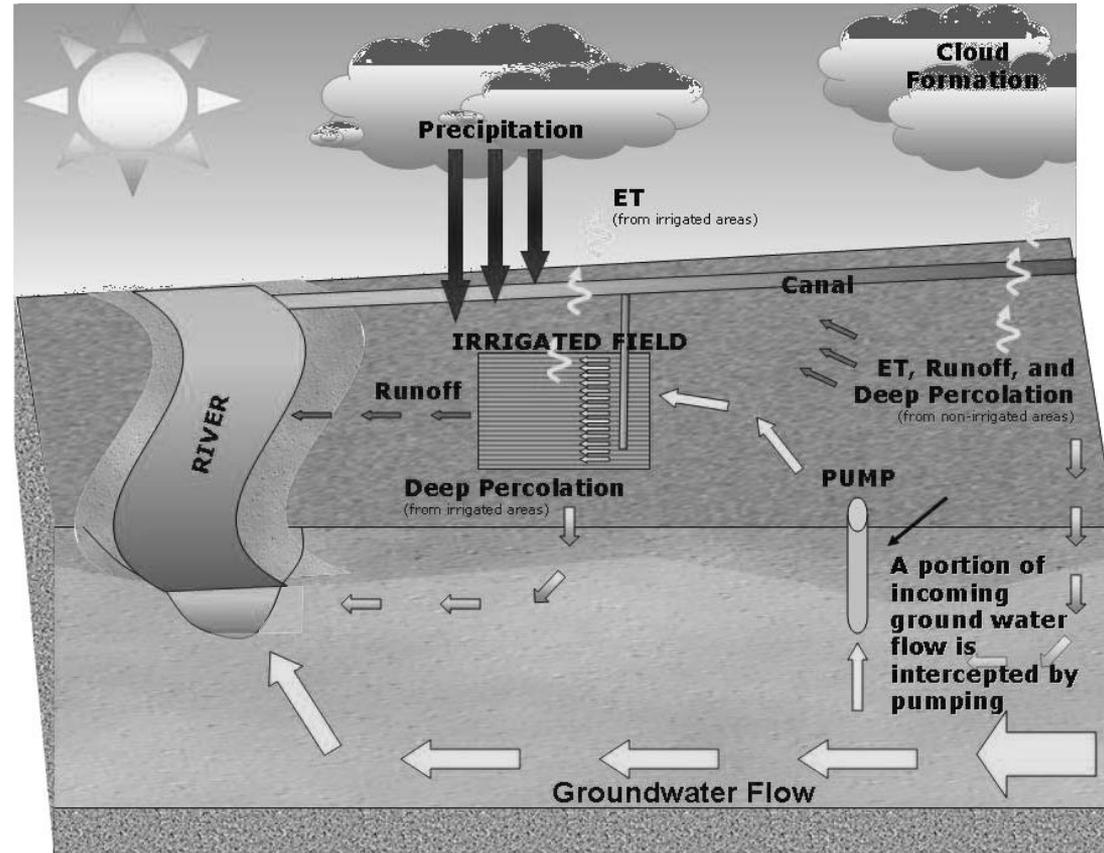
Lessons learned



STREAM DEPLETIONS 101

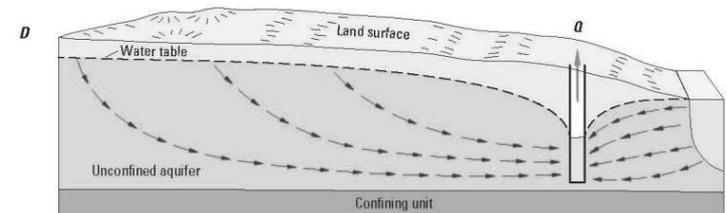
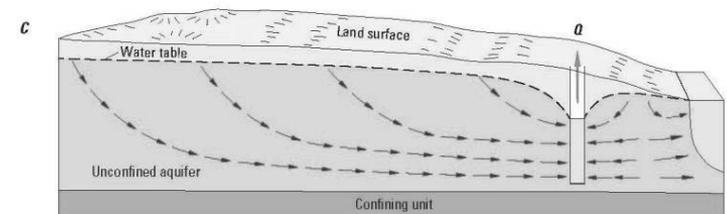
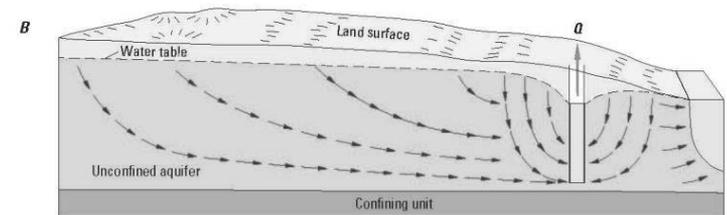
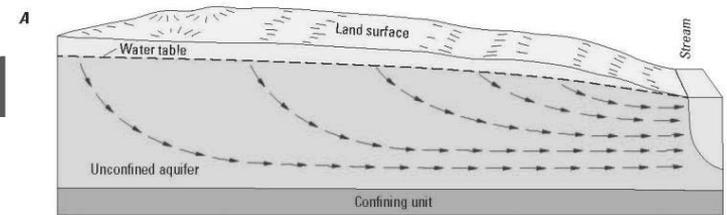
STREAM DEPLETIONS 101

- Typical elements of ground and surface water budgets

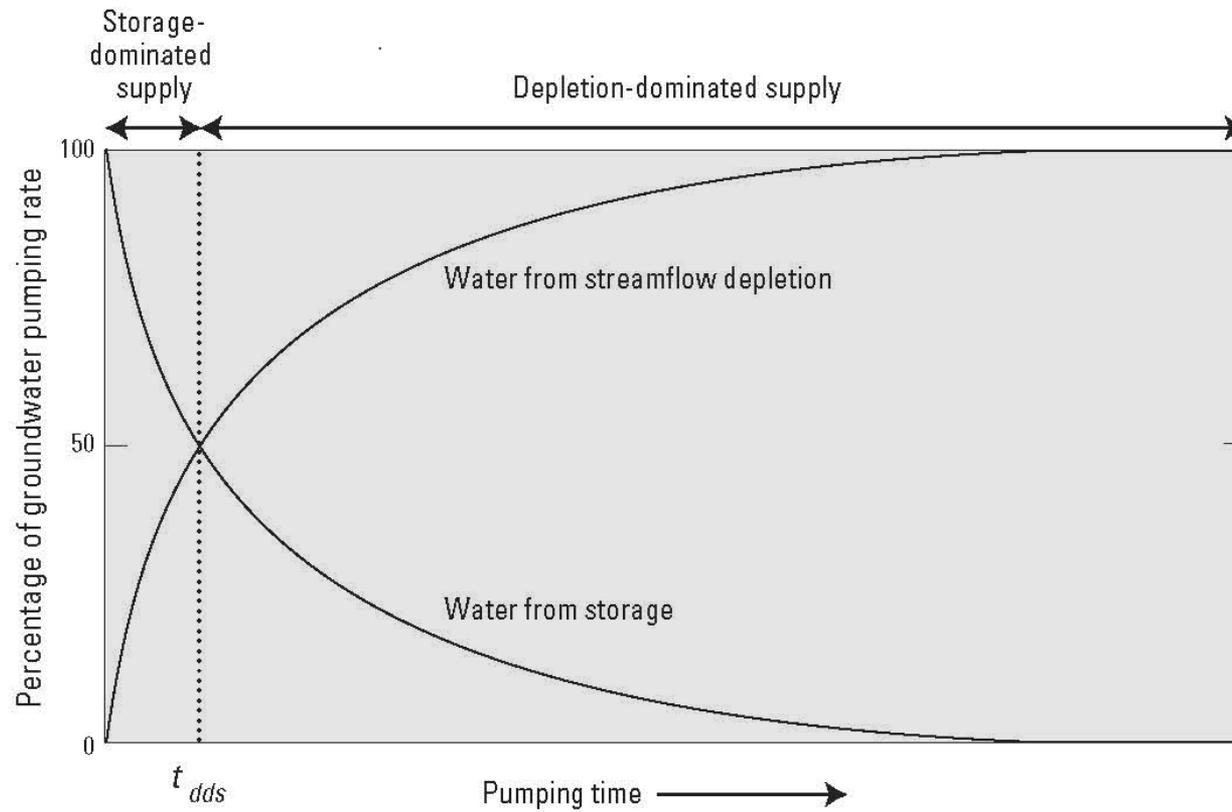


STREAM DEPLETIONS 101

- A. Pre-development conditions
- B. Pumping from aquifer storage
- C. Interception of groundwater baseflow
- D. Interception of groundwater baseflow and induced infiltration



STREAM DEPLETIONS 101

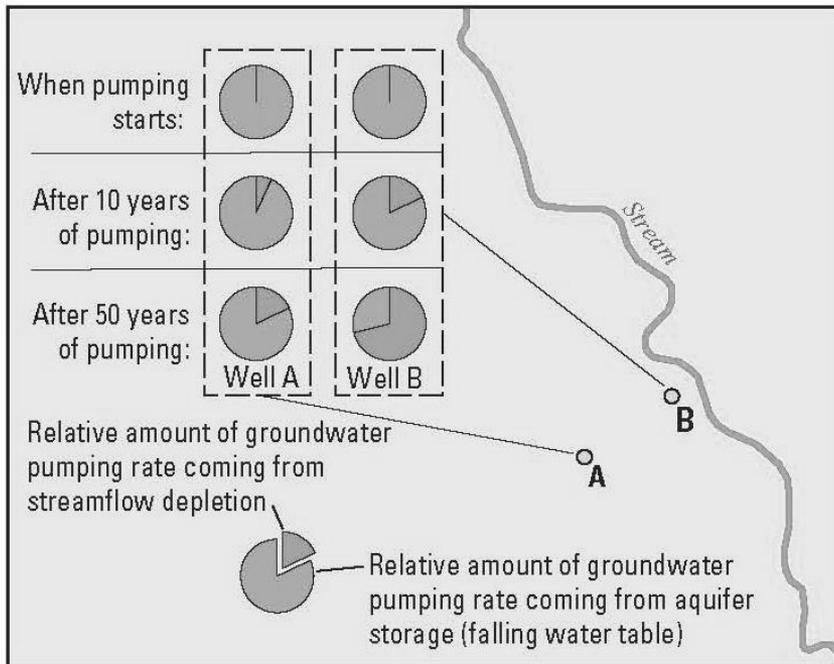


STREAM DEPLETIONS 101

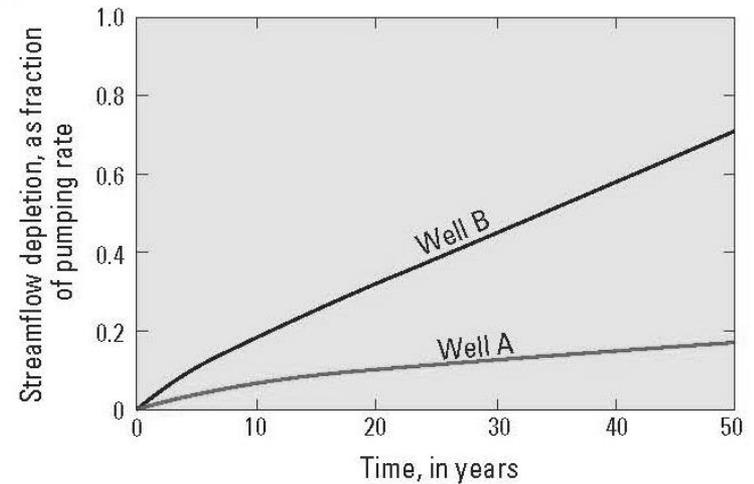
- Factors that affect timing, rates, and locations of streamflow depletion:
 - Geology and hydraulic properties of aquifer
 - Aquifer size/volume
 - Geometry of the surface water streams
 - Well location (vertical and horizontal distance from streams)
 - Pumping rates and operational characteristics

STREAM DEPLETIONS 101

A



B



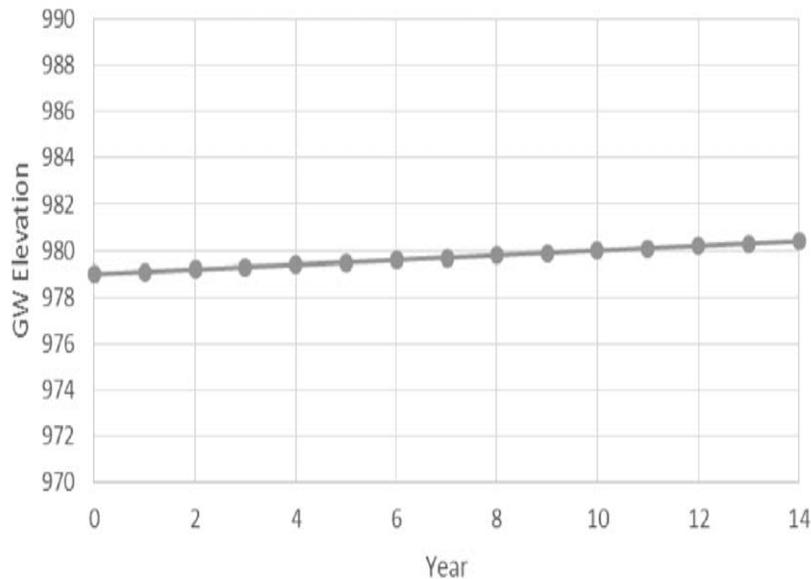
STREAM DEPLETIONS SUMMARY

- Variability in aquifer properties across basin
 - Degree of ground/surface water connection
 - Number/distribution/capacity of wells
 - Timing of well impacts on surface water/aquifer
- Physical characteristics are included and considered in water resources planning and management

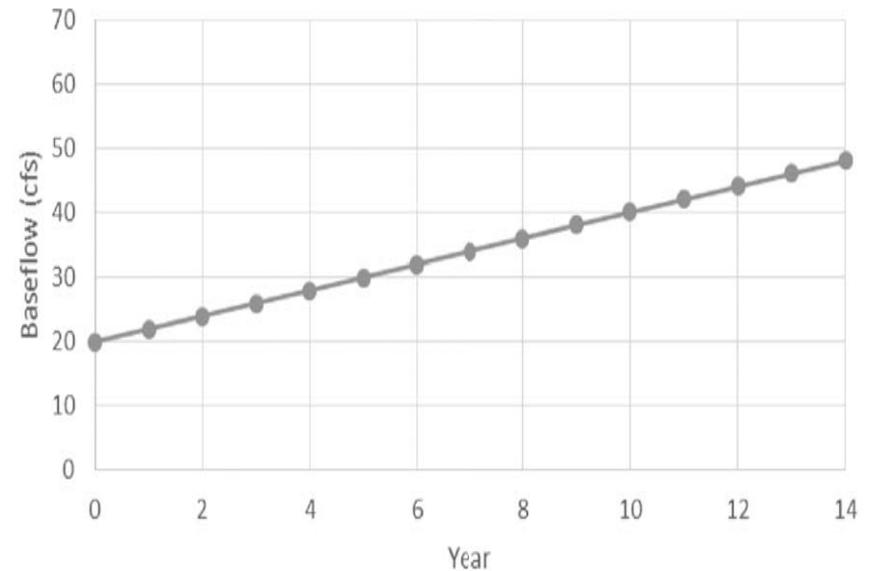
PLUM CREEK EXAMPLE

- Example of Observed Groundwater Elevation and Baseflow Trends near Plum Creek, Nebraska

GW Elevation



Baseflow



Question for discussion: Are there depletions occurring due to groundwater pumping in this area?

QUESTION FOR DISCUSSION

- Are there depletions occurring due to groundwater pumping in this area?

ANSWER...

We don't know for sure.

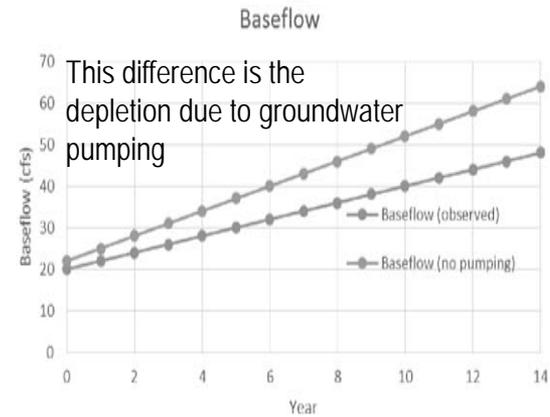
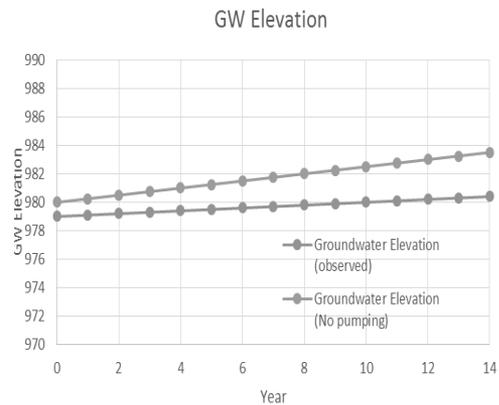
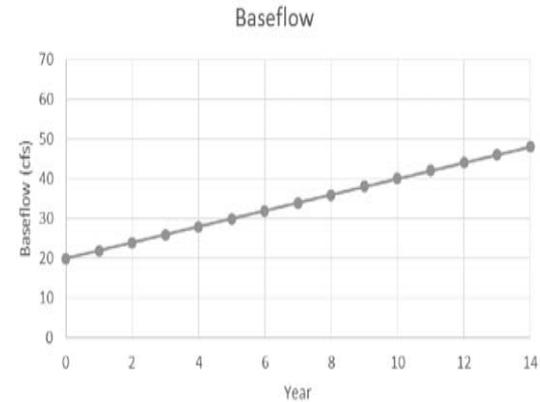
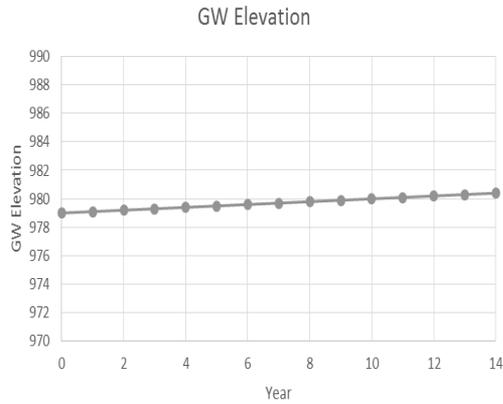
Why?

Because we don't know what conditions would have been without groundwater pumping occurring. ***This is what we use modeling tools for!***

How?

To estimate conditions without the effects of pumping, a model is used to simulate two identical hydrologic scenarios – one with groundwater pumping occurring, one without.

THE ESTIMATED EFFECTS OF GROUNDWATER PUMPING CAN BE DETERMINED





WWUM MODELING

Overview

WESTERN WATER USE MANAGEMENT MODELING

- Modeling was commissioned by:
 - North Platte NRD
 - South Platte NRD
 - Nebraska DNR

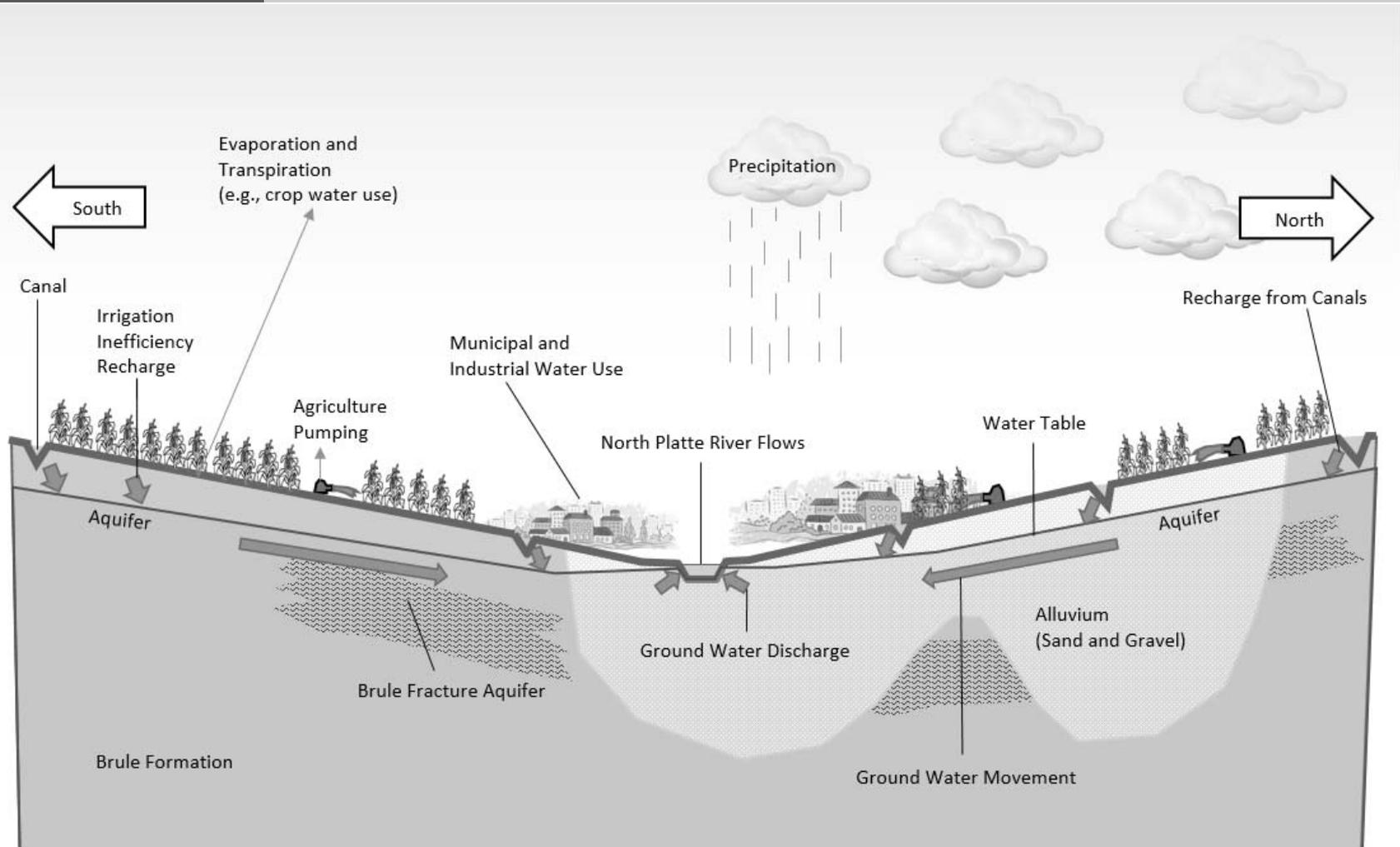
- Modeling started in 2009

WESTERN WATER USE MANAGEMENT MODELING CONT.

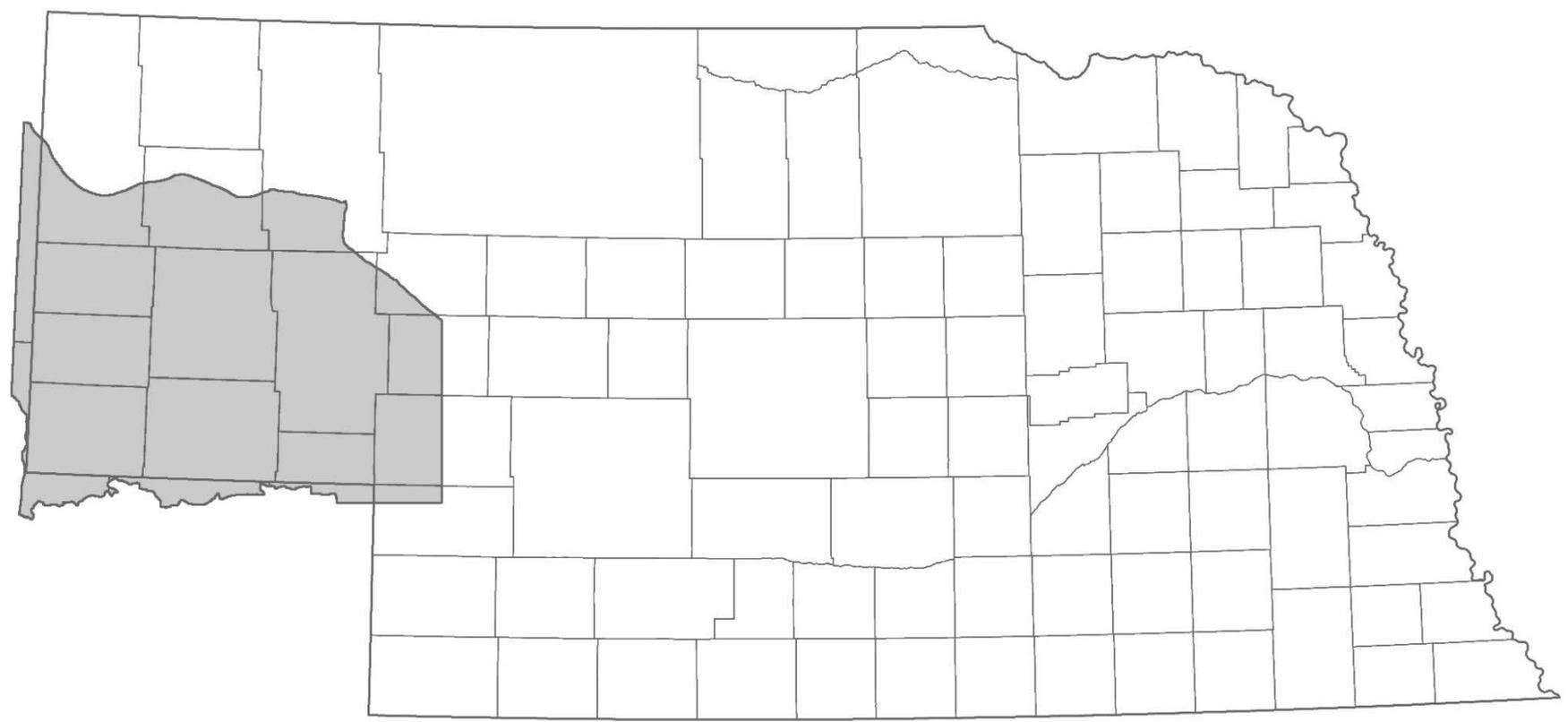
- **Purpose:** Data-centered and decision support modeling package to aid the South Platte NRD and the Nebraska DNR in water management decisions

- **Uses two models:**
 1. Regionalized Soil Water Balance Model
 - Provides crop water use and other information

 2. Ground Water Model (MODFLOW)
 - Timing and movement of water through the aquifer



MODEL AREA

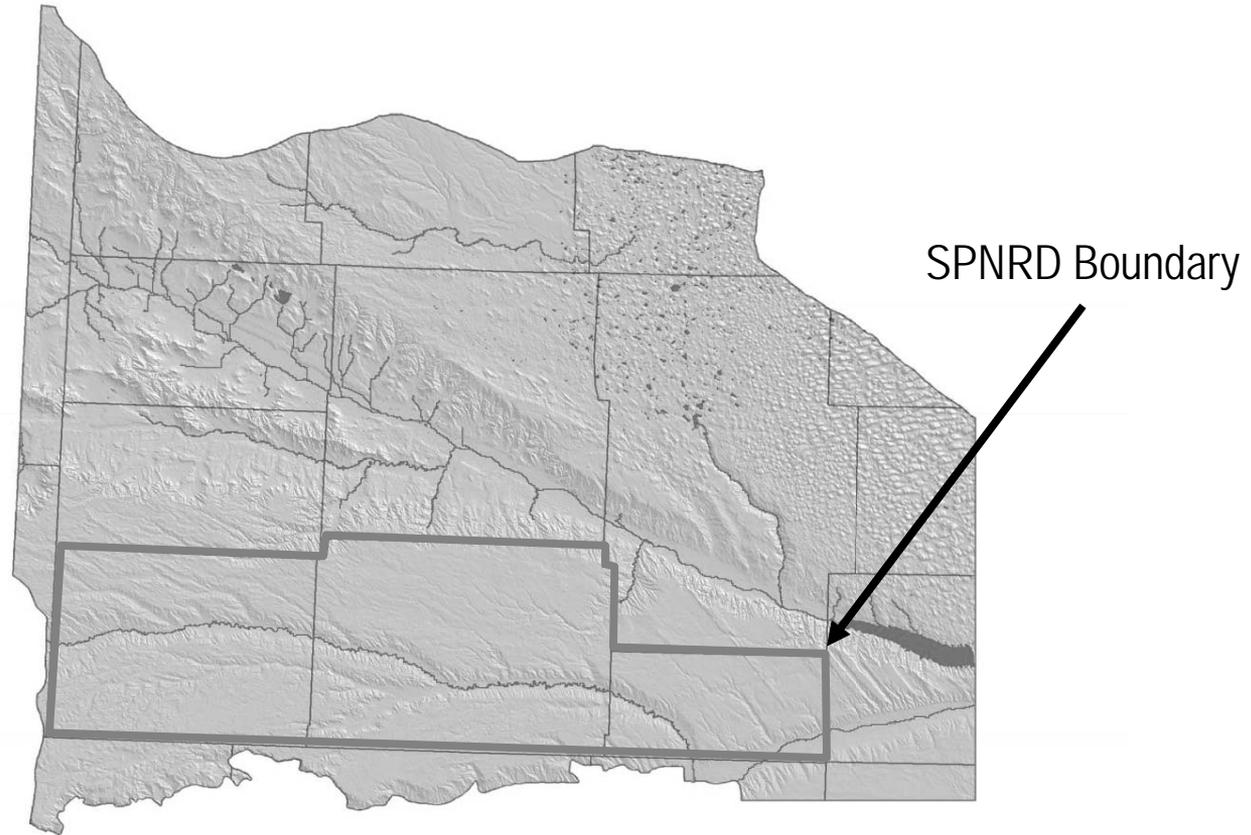




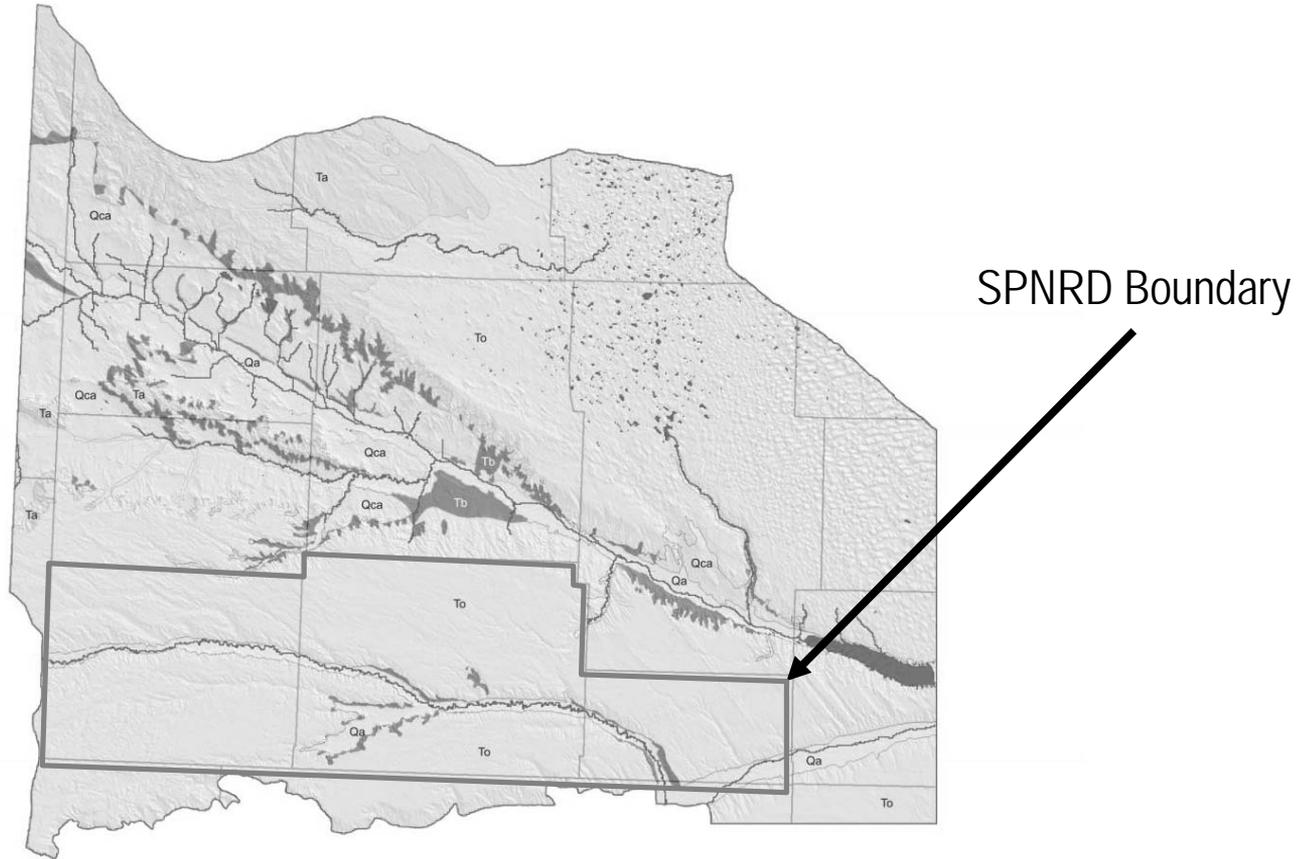
DATASETS AND MODELING

Overview

GROUND WATER MODEL AREA



GENERAL GEOLOGY IN THE MODEL AREA



MODELING THROUGH 2013

- Land Use – Yearly from 1953 - 2013
 - Aerial photo snap shot years
 - 1950s, 1970s, 1980s, 1993, 1997, 2001, 2003, 2005, 2009, 2010, 2012
 - Drew circles and squares around each parcel for each snapshot
 - Attributed With:
 - Crop type information
 - Irrigation water source from NPNRD and SPNRD
 - Flood or sprinkler irrigation method
 - Metered pumping information from each NRD

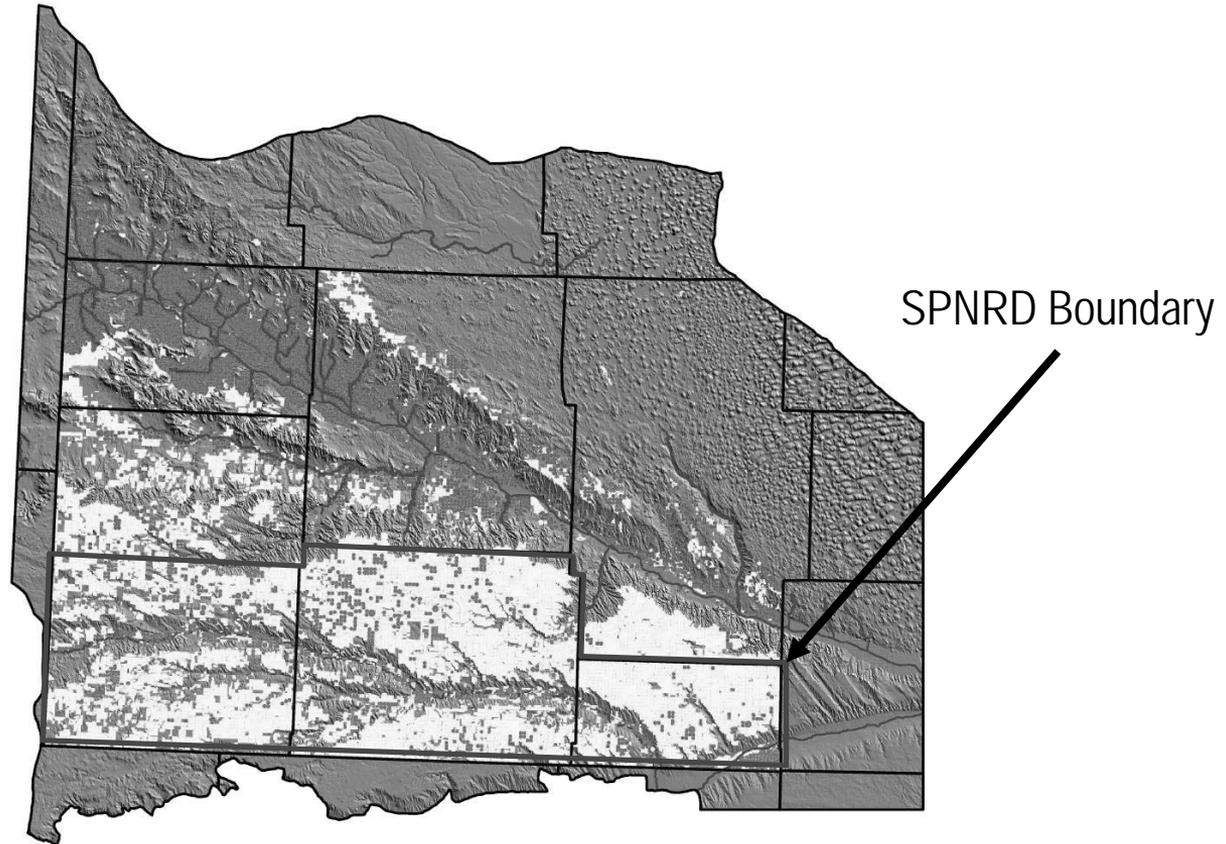
LAND USE DATASETS

1953 - 2013

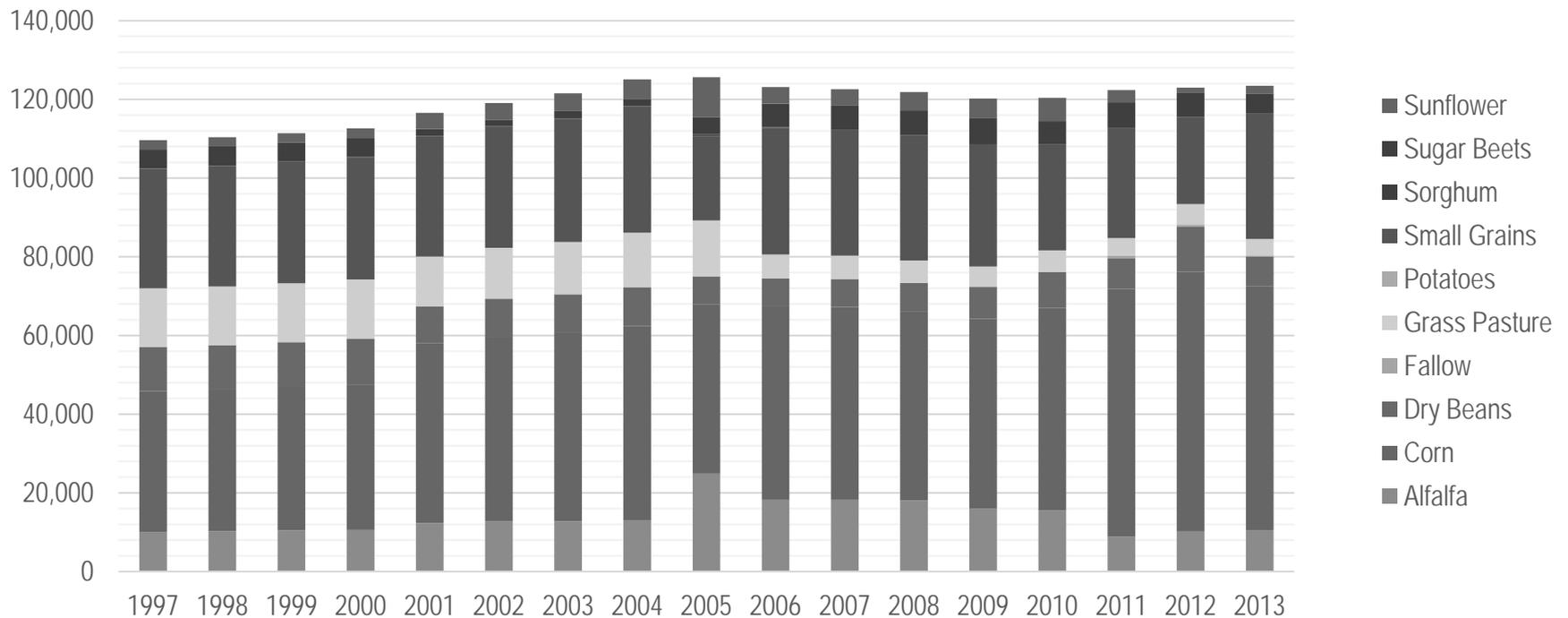


Refined Parcel Boundaries

GENERAL GEOLOGY IN THE MODEL AREA

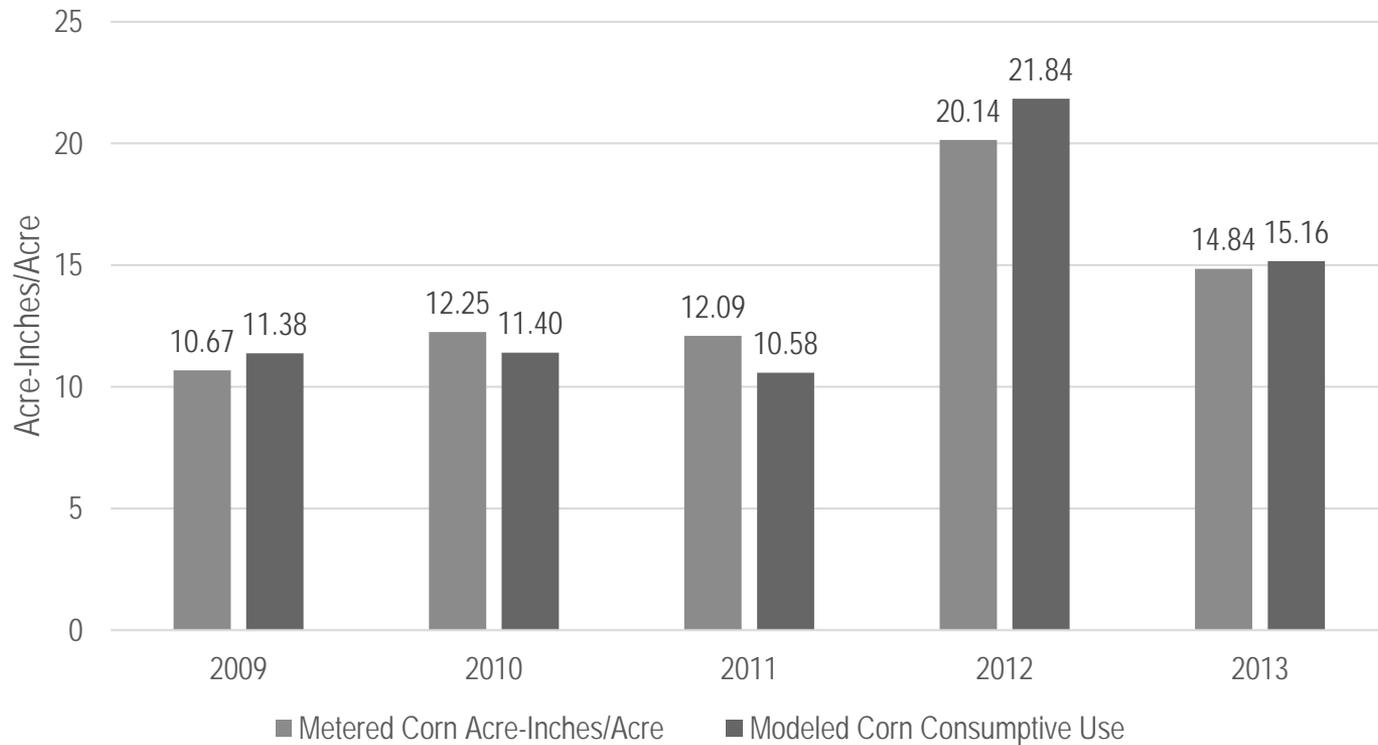


SPNRD ANNUAL CROP STATISTICS 1997 - 2013

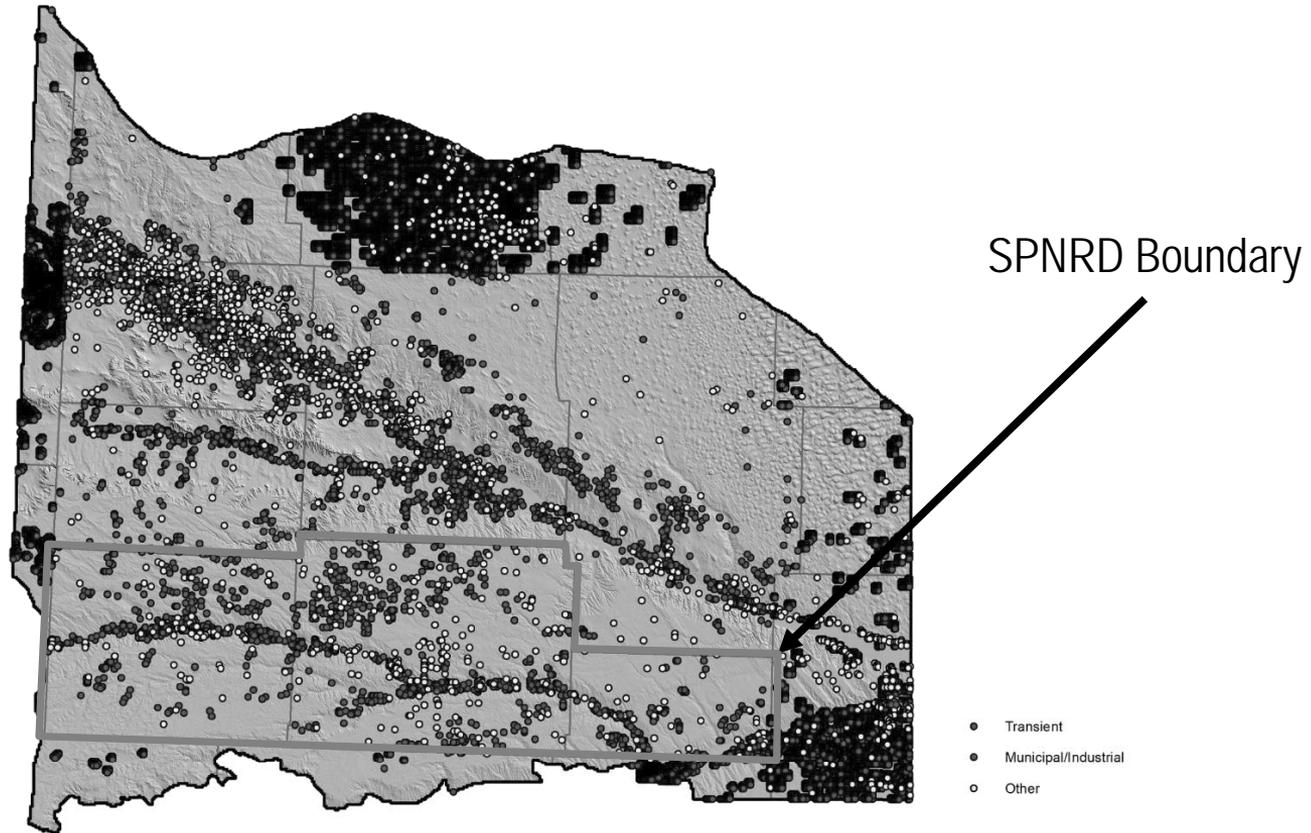


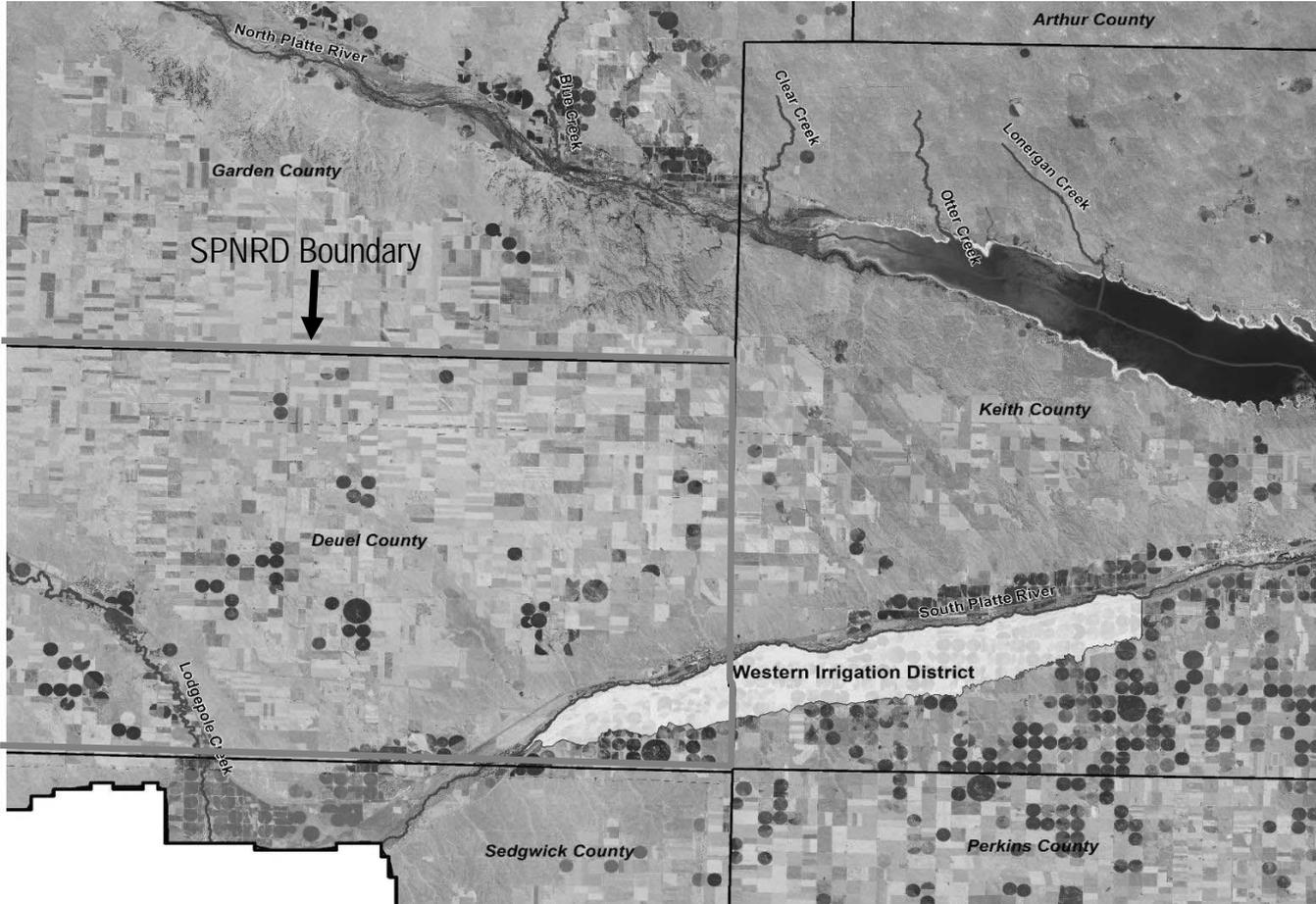
CORN ONLY LANDS METERED

CU vs. Modeled CU



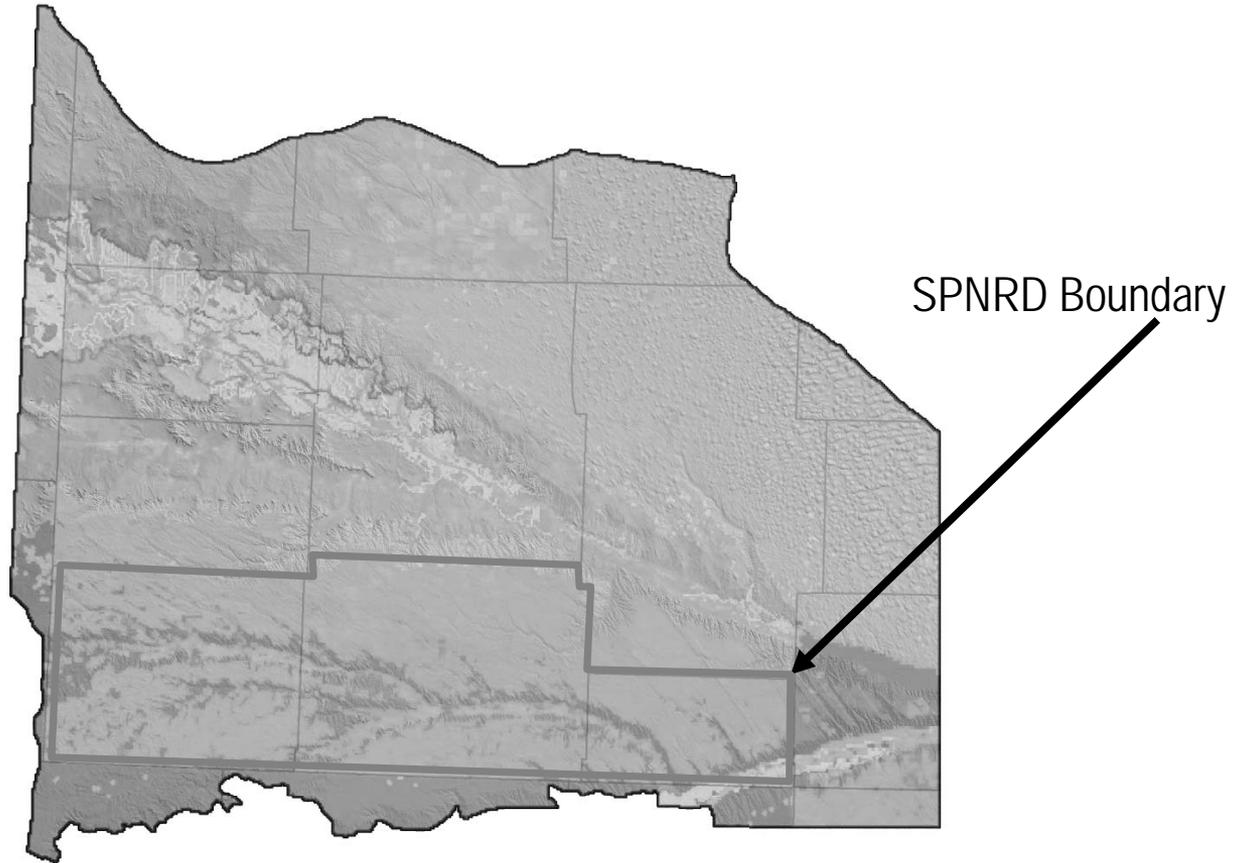
WELLS IN THE MODEL AREA



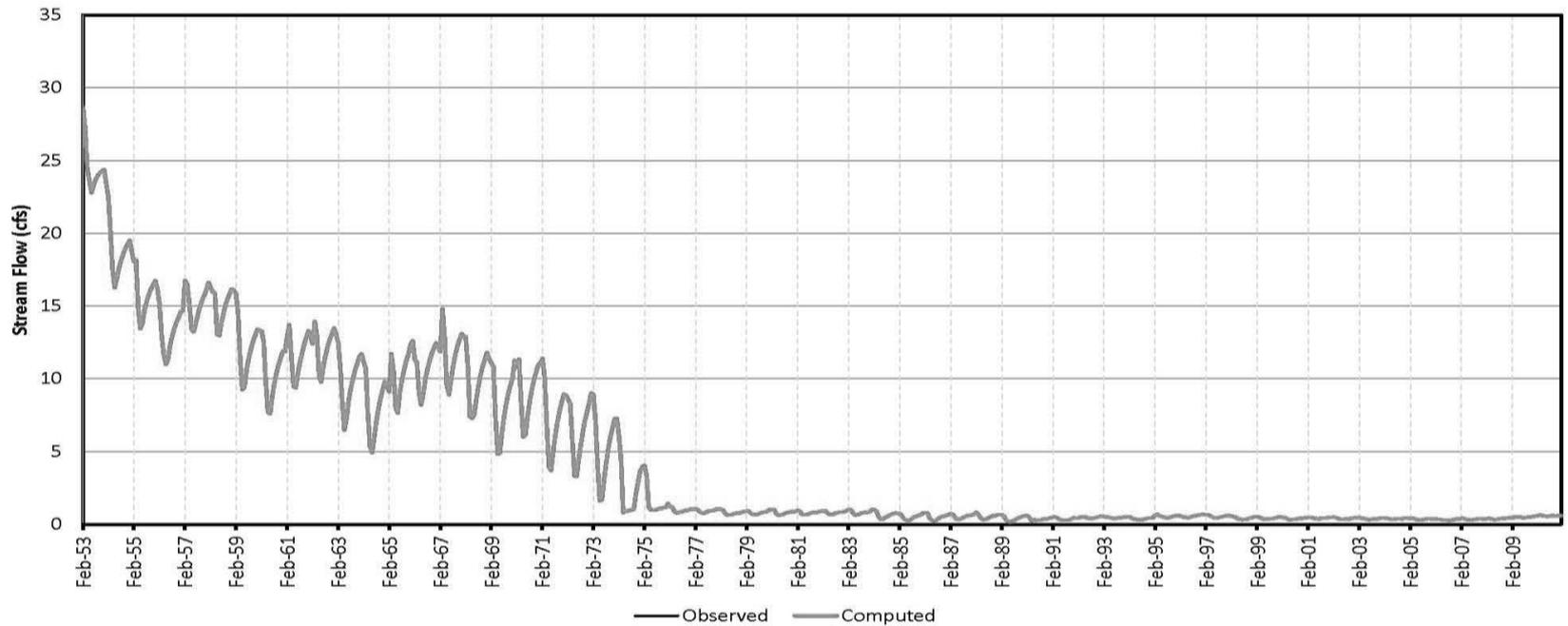


AVERAGE ANNUAL RECHARGE

0 - 0.7 FT D⁻¹ 1953 - 2014

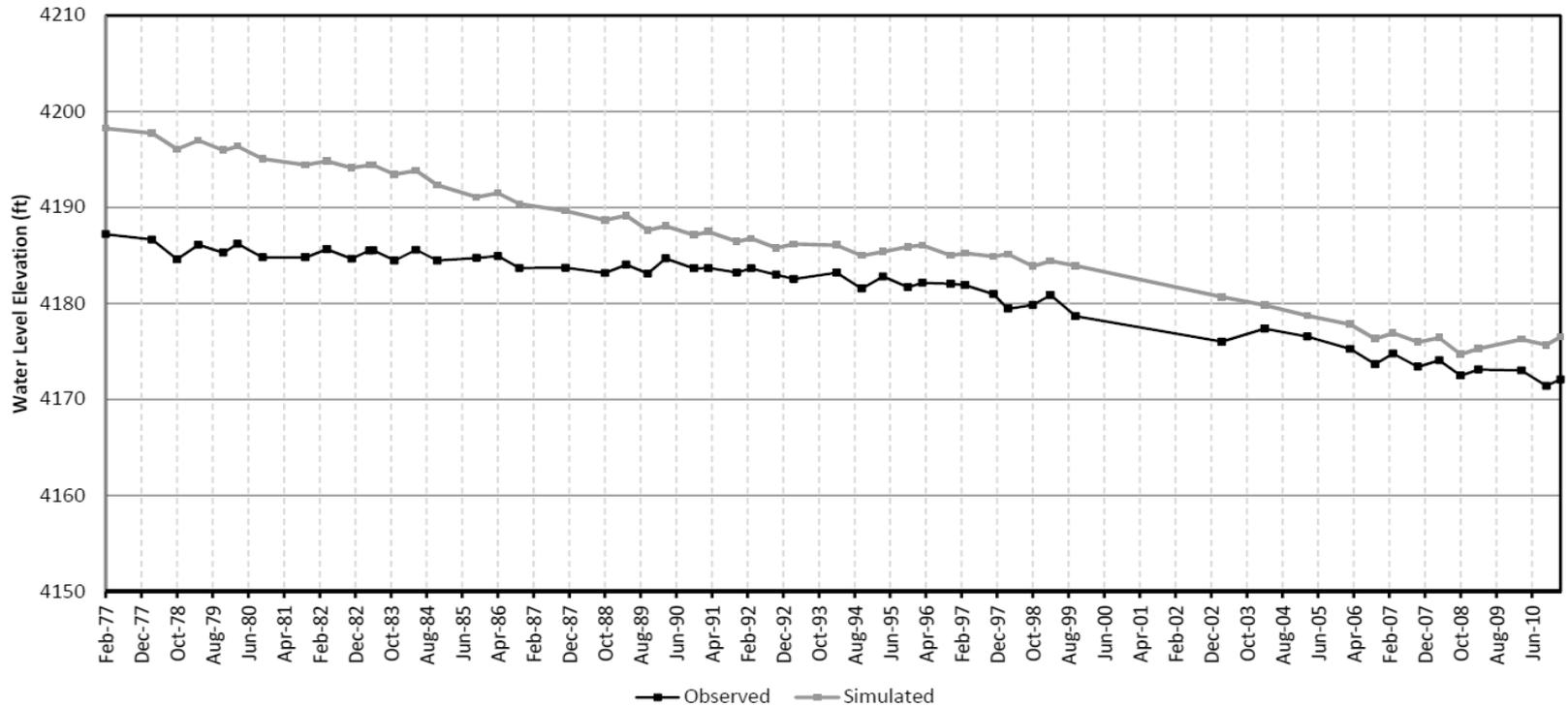


LOGGEPOLE CREEK FLOW HYDROGRAPHS



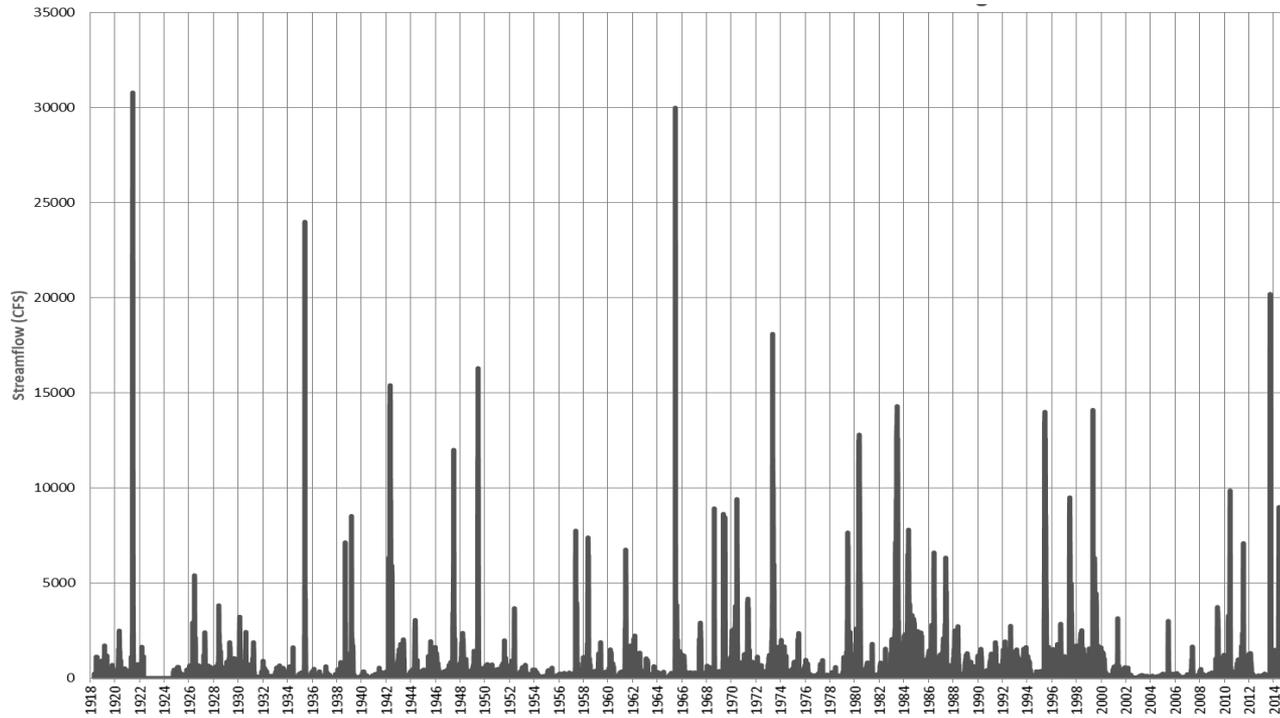
MONITOR WELL HYDROGRAPH

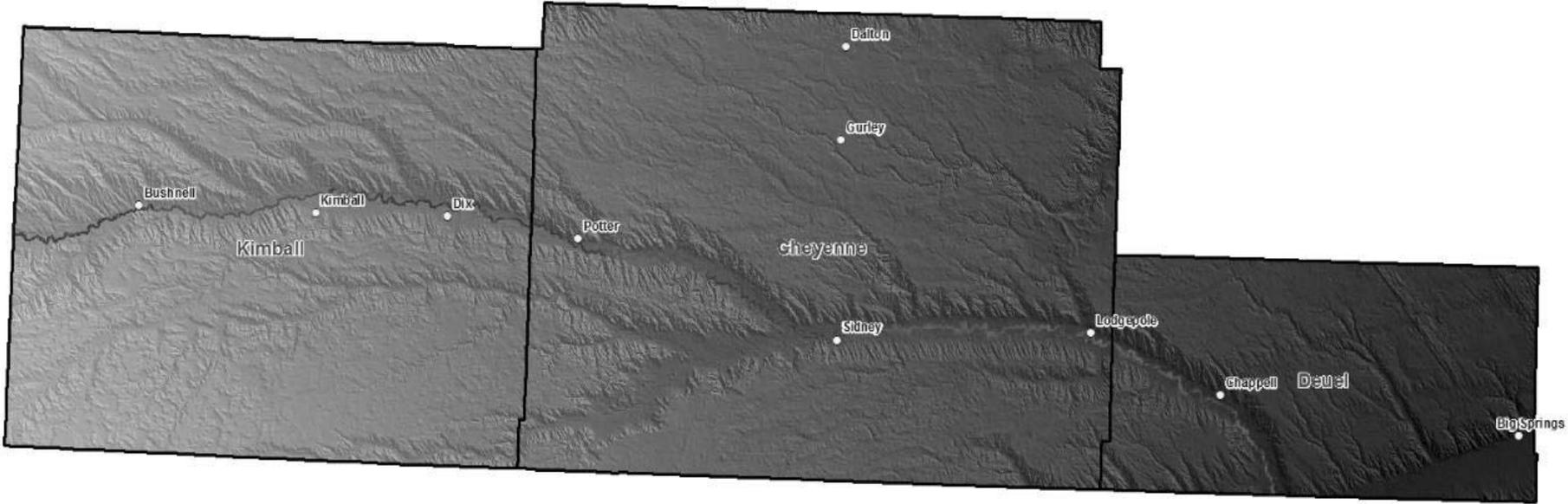
North Cheyenne County Tablelands



HISTORIC SOUTH PLATTE RIVER STREAMFLOW

Julesburg



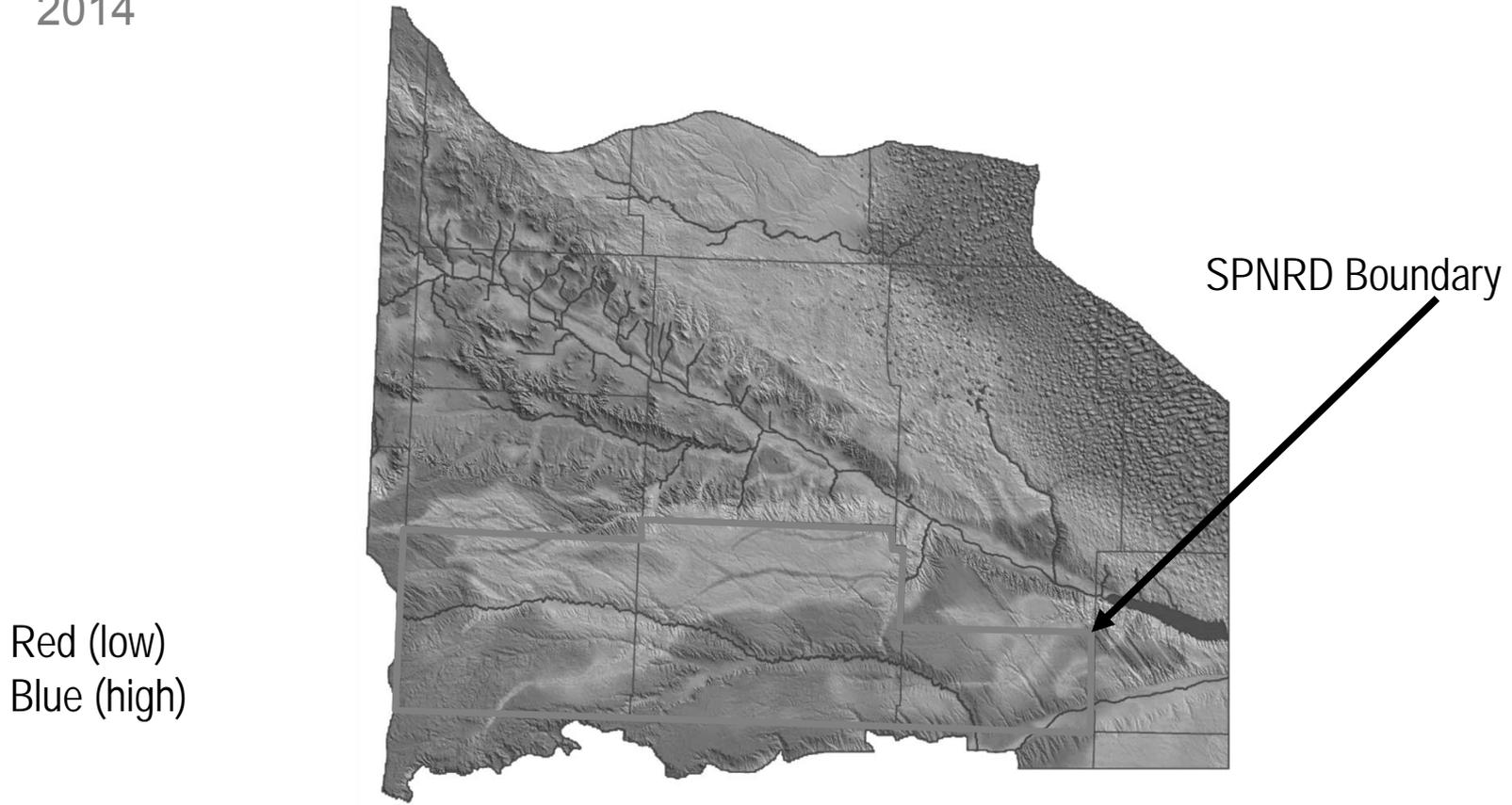


CURRENT MODELING

- Ground water modeling
 - 40 acre cell size
 - 177,780 active model cells
 - 874 head calibration targets
 - Mostly within NPNRD and SPNRD

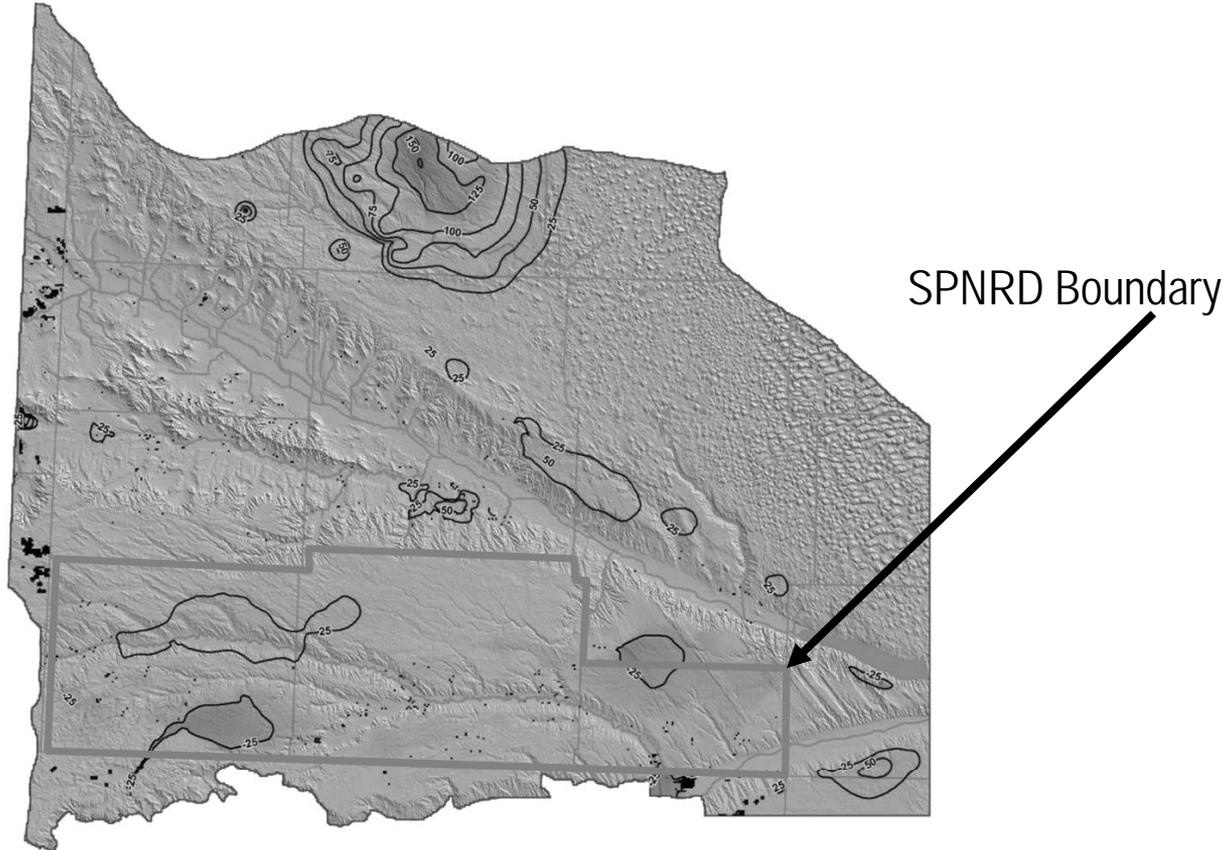
SATURATED THICKNESS IN MODEL AREA

2014



CHANGE IN MODELED WATER LEVEL

(Drawdown) 1953 - 2014





LESSONS LEARNED

From the First IMP

LESSONS LEARNED

- Initial understanding of the average annual depletion rates to the South Platte River (400 Acre-Feet), Lodgepole Creek (150 Acre-Feet) and the North Platte River (150 Acre-Feet)
- Limited options to implement measures to offset depletions throughout the District. Challenges in SPNRD to obtain offset water
 - Limited surface water supplies of which to take advantage
 - Small amount of groundwater irrigation compared to other Upper Platte Basin NRDs

LESSONS LEARNED CONT.

- Complexity of the Municipal and Industrial Water Use Accounting and offset provisions
 - Engaged to simplify and standardize with other Upper Platte River Basin Natural Resources Districts

LESSONS LEARNED CONT.

- SPNRD districtwide ground water management area rules and regulations were identified
 - Duplication between the two documents created a problem when the District's rules and regulations were regularly amended and the same set of rules in the IMP were not changed, thus creating inconsistencies
 - Proposed remedy - the District's rules and regulations will be removed from the IMP with a comment(s) added referencing the District's Ground Water Management Area Rules and Regulations

LESSONS LEARNED CONT.

- Level(s) of funding for mitigation of depletions may not be sustainable.
- Challenge of identifying Fully-Appropriated (FA) and Overappropriated (OA) distinction and defining fully-appropriated
- Challenge of finding a water use and supply balance - defining possibility and sustainability
- Excess flows for Western Canal could not always be taken when available

LESSONS LEARNED CONT.

- Confusion regarding the allocation program being outside of the IMP process (only in the District's Districtwide Ground Water Management Area Rules and Regulations), and using the benefits of allocations to offset depletions through the IMP
- Modeling process - NeDNR and the SPNRD have struggled communicating on modeling tasks
 - Progress has been made in this area and hopefully continues into the 2nd increment
 - Timeliness of Robust Review Analysis needs improvement
- Ongoing Education and Outreach efforts were not consistent during the course of the 1st increment and we would like to improve this in the 2nd



NEXT STEPS

MEETING DATES

- August 15, 2018
- November 14, 2018
- January 16, 2019



PUBLIC COMMENT

Thank you