TPNRD IMP

Meeting 2

TODAY'S AGENDA

- Welcome
- Modeling Overview and Updates
  - COHYST FAQ
  - TPNRD CIR
  - Meter Data
  - Updated Robust Review Results
- Further Framework for BWP and IMP
  - Basin-Wide Plan Goals & Objectives (draft)
  - Additional Details on IMP Statutes
- Twin Platte NRD IMP
  - Current Conditions
  - Monitoring and Studies
  - 1st Increment IMP Lessons Learned
- Conjunctive Management
- Next Steps
- Public Comment

WELCOME

- Open Meeting Notice
- Safety & Logistics
- Previous meeting recap

MODELING OVERVIEW AND UPDATES

COHYST FAQ
TPNRD CIR
Meter Data
Updated Robust Review results

MODELING OVERVIEW AND UPDATES

COHYST FAQ

COHYST FAQ

- 2006 – First Report published
  - TPNRD post-1997 depletions estimated at 17,600 af
- 2008 – Second Report published
  - TPNRD post-1997 depletions estimated at 7,500 af
  - Concerns over estimates of recharge led to Robust Review
- 2018 – Third Report published
  - TPNRD post-1997 depletions estimated at 22,500 af
  - Robust Review completed, depletions estimates refined

COHYST FAQ

- Primary inputs and assumptions of the model:
  - Acres by landuse (irrigated, dryland, pasture)
  - Crop type
  - Daily climate data (precipitation)
  - Climate Repeats 1989-2013 for the years 2014-2063
  - Landuse data repeats after 2013 in the baseline simulation.
  - Surface water and commingled acres remain constant.
  - Groundwater acres reflect annual changes in irrigated acres.
- What data could be improved?
  - Groundwater pumping is derived from:
    - Groundwater-irrigated acres
    - Crop type
    - Crop water needs (changes based on weather)
  - Pumping could instead be measured directly.

COHYST FAQ

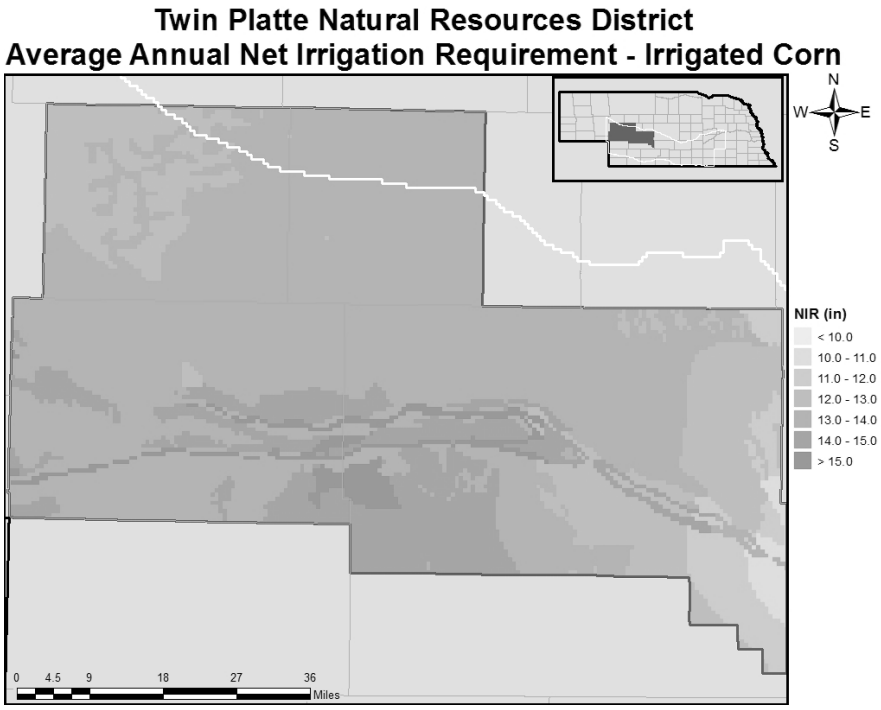
- Why has the post-1997 depletions estimate increased from ~7,500 acre-feet to ~22,500 acre-feet?
  - A 57,000-acre increase in groundwater-irrigated acres.
  - Recharge in the model has been updated and improved to represent annual variability What data could be improved?
- How do I know that in the future we will not have another significant change in depletions estimated from the model?
  - In 2008, the report noted concern in how recharge was calculated. Since then, COHYST has addressed this concern by improving the model. Similar magnitude concerns are no longer present in the model. Future changes would most likely be a result of changes in management actions or a change in long-term climate patterns.

MODELING OVERVIEW AND UPDATES

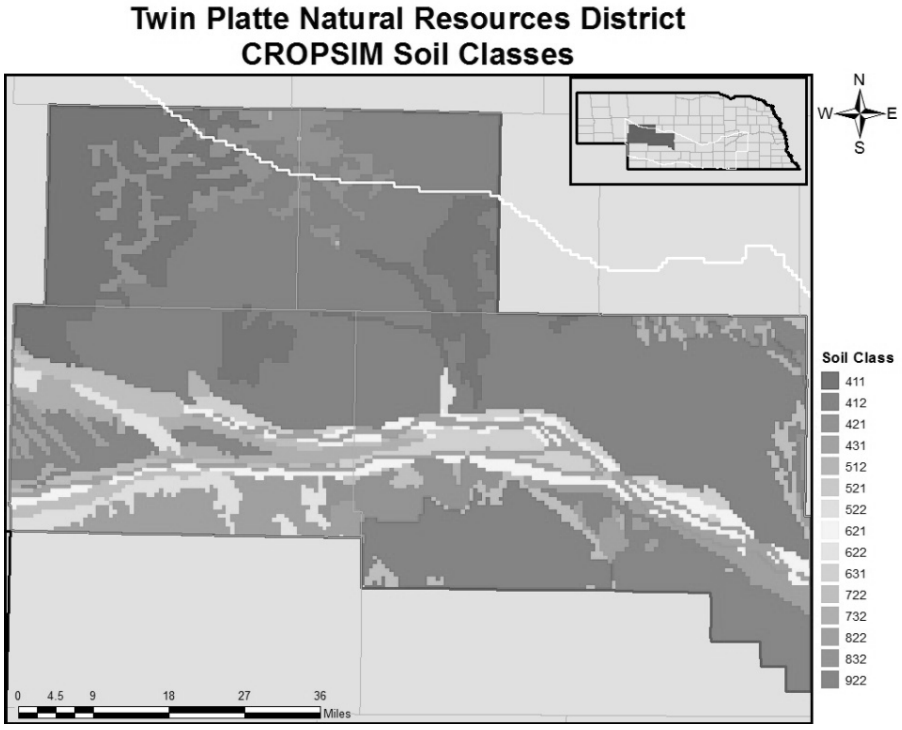
TPNRD CIR

TPNRD Avg. Annual Net Irrigation Requirement

Irrigated Corn



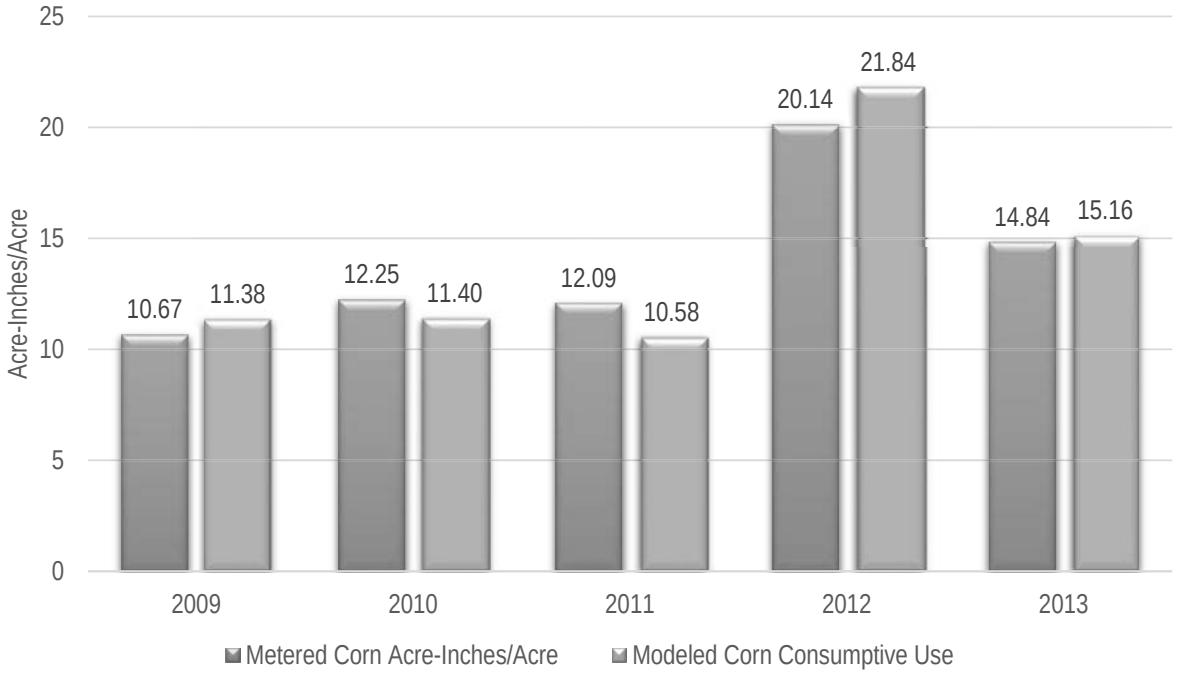
TPNRD Avg. CROPSIM Soil Classes



MODELING OVERVIEW AND UPDATES

TPNRD METER DATA

NPNRD Corn Only Lands
Metered CU vs. Modeled CU



MODELING OVERVIEW AND UPDATES

ROBUST REVIEW RESULTS

Updated Robust Review Results for TPNRD

Robust Review Goals

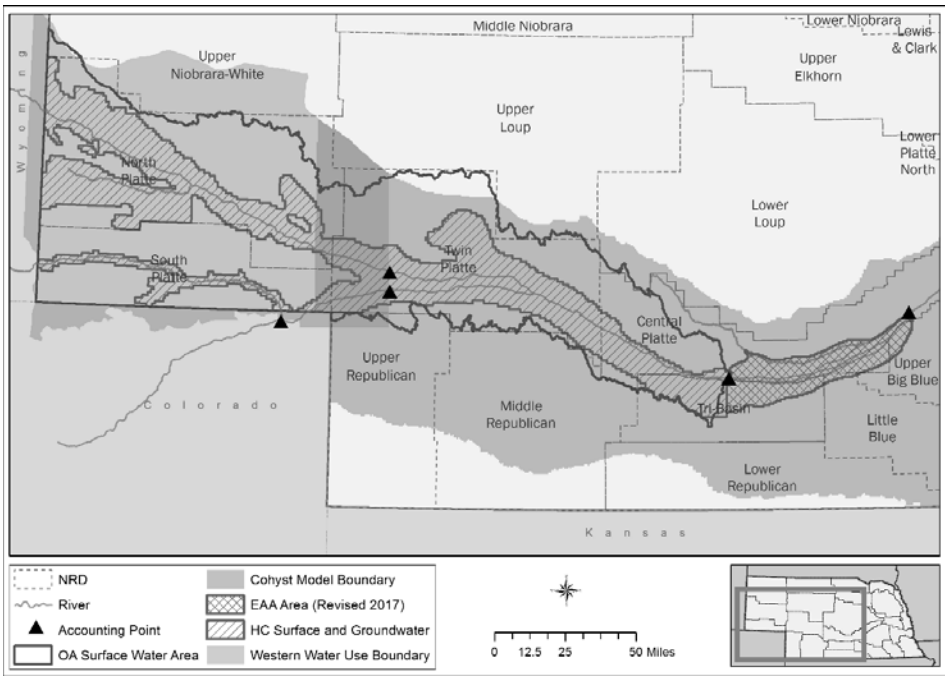
- Complete monitoring activities outlined in the current IMP
- Assess progress on first increment goals and objectives
- Provide for more informed discussion of second increment objectives with the TPNRD IMP stakeholders

Robust Review Model Simulation Setup

COHYST Area Assumptions

- Used version 28 of the groundwater model and version 29 of the watershed models
- Models are simulated from 1950 – 2063
- Climate repeats 1989-2013 twice for 2014-2063
- Historical groundwater irrigated acres and crops are used in the baseline simulation and the 1997 level of groundwater irrigated acres and crops are used in the “1997” simulation
- Surface water and commingled acres remain constant in the baseline and 1997 simulations to cancel out commingled effects
- Results are summarized for the area upstream of Chapman

Model Areas


Middle Niobrara
Lower Niobrara
Lewis & Clark
Upper Niobrara-White
Upper Elkhorn
Upper Loup
Lower Platte North
North Platte
Lower Loup
South Platte
Twin Platte
Central Platte
Upper Republican
Upper Big Blue
Middle Republican
Tri-Basin
Little Blue
Lower Republican
Wyoming
Colorado
Kansas
NRD
River
Accounting Point
OA Surface Water Area
Cohyst Model Boundary
EAA Area (Revised 2017)
HC Surface and Groundwater
Western Water Use Boundary
0 12.5 25 50 Miles

TPNRD - Inputs

Change in acres

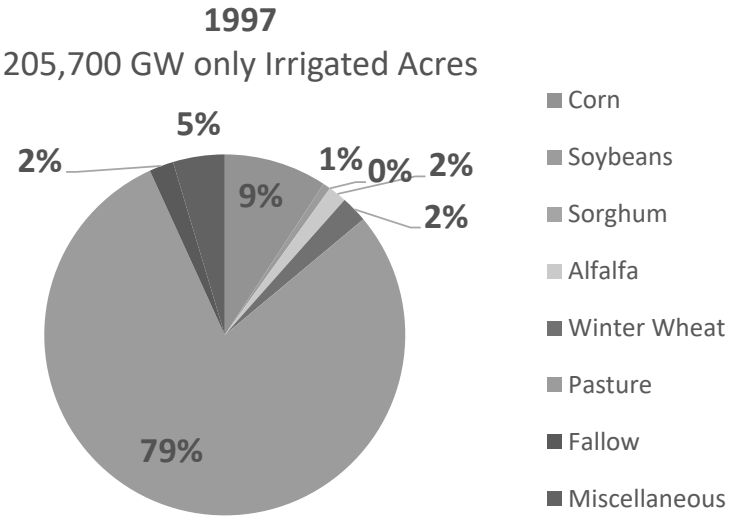
- Change in groundwater-only irrigated acres 1997-2013

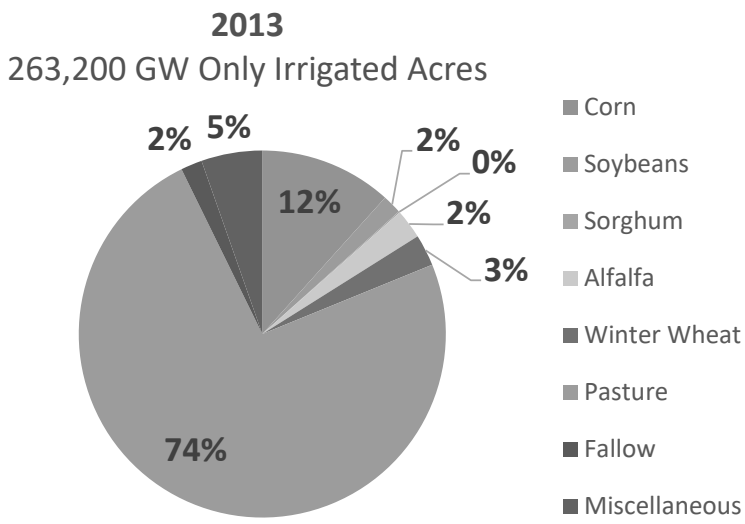
TPNRD	Total change (1997 to 2013)
District-Wide	57,500 acres

TPNRD - Inputs

Changes in crop type, District-wide

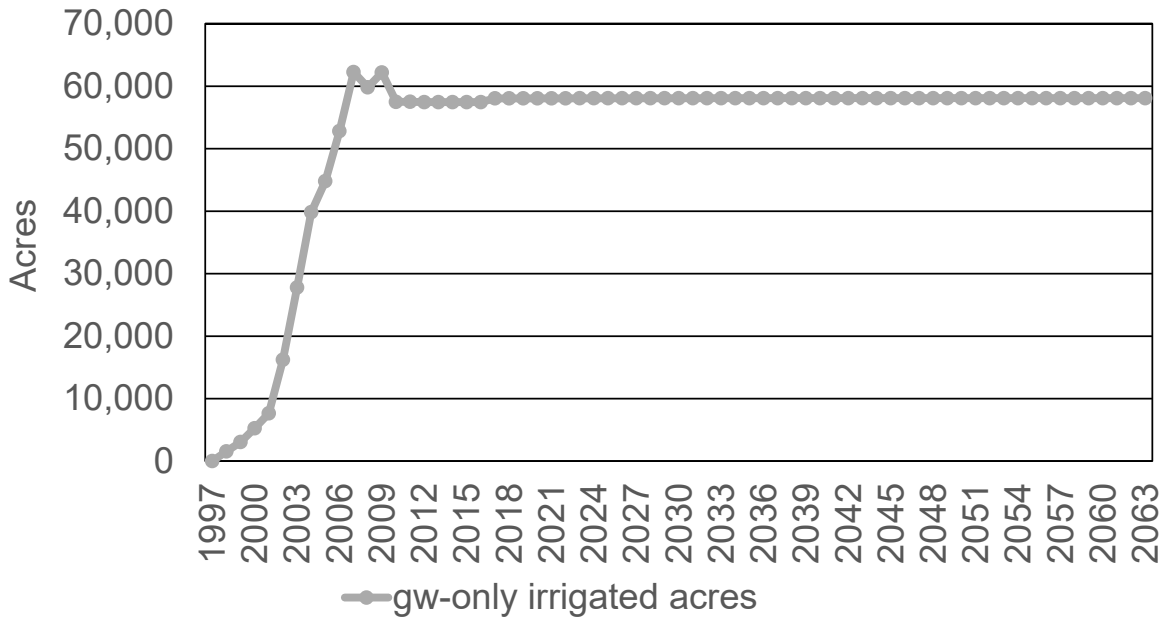
- Change in groundwater-only irrigated acre crop types 1997-2013





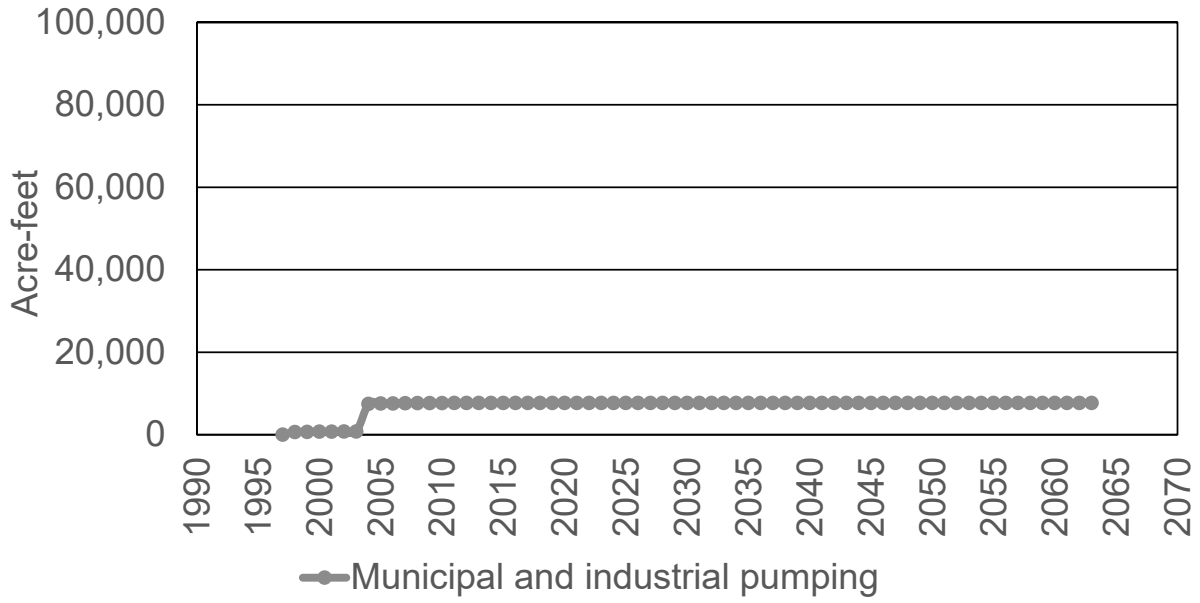
TPNRD - Inputs

Change in groundwater-only irrigated acres from 1997, District-wide



TPNRD - Inputs

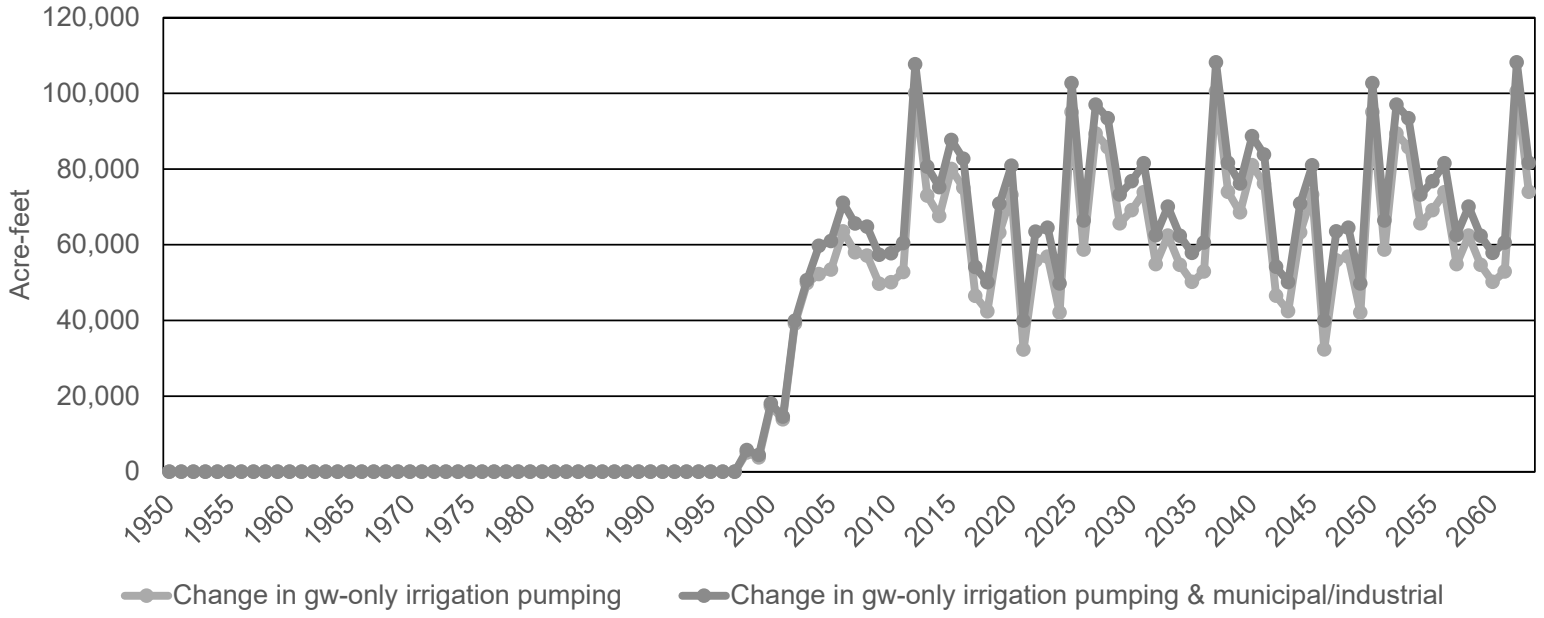
Change in municipal and industrial pumping from 1997, District-wide



TPNRD - Inputs

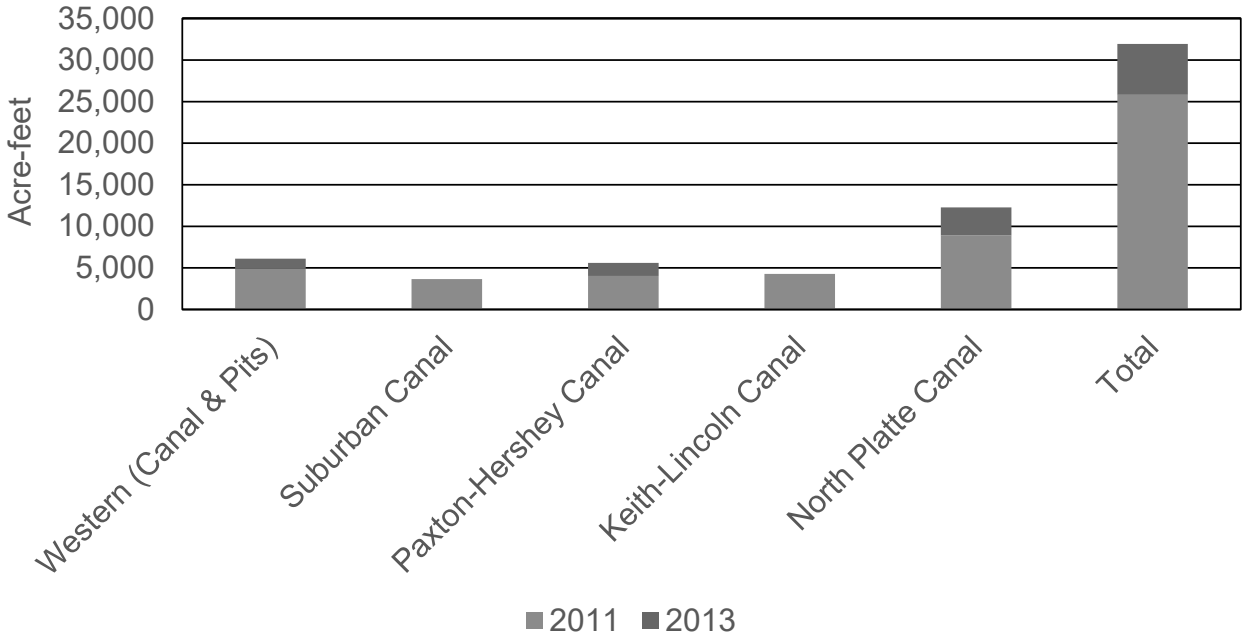
Pumping Changes, District-Wide

- Groundwater-only irrigation pumping (57,500 acres) AND municipal/industrial pumping



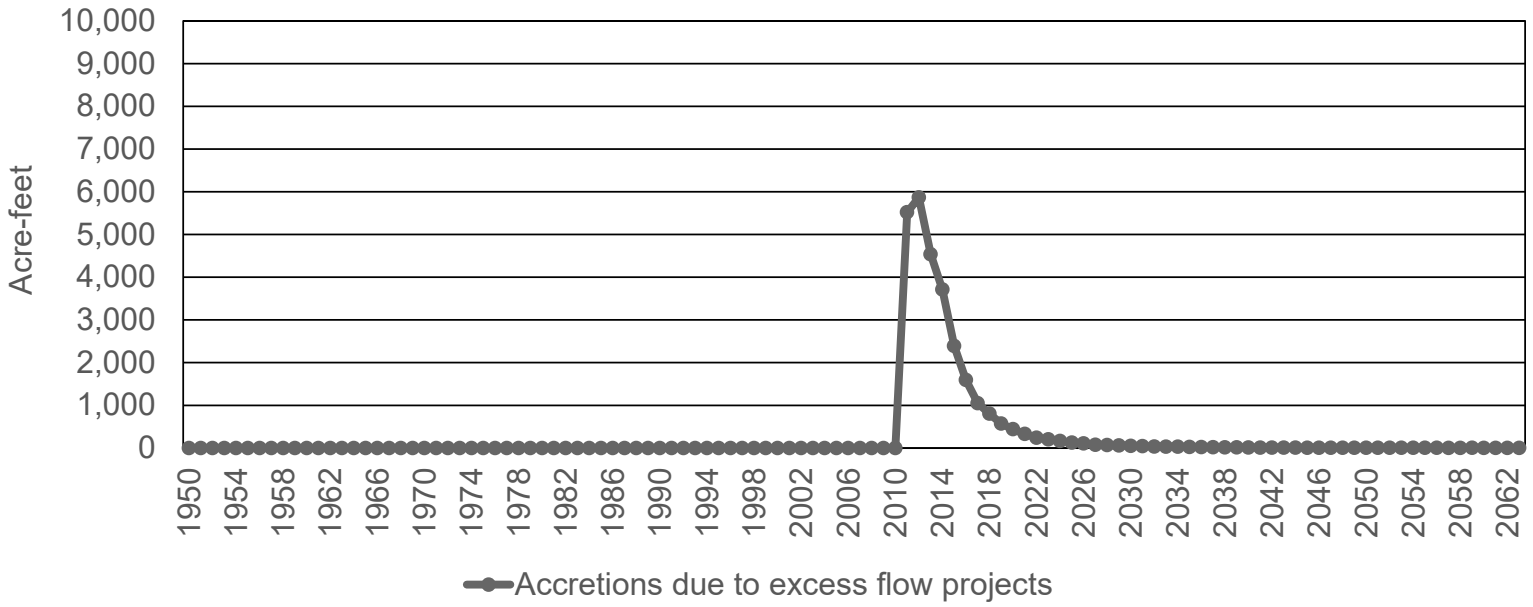
TPNRD- Inputs

Recharge from excess flow projects, 2011-2013



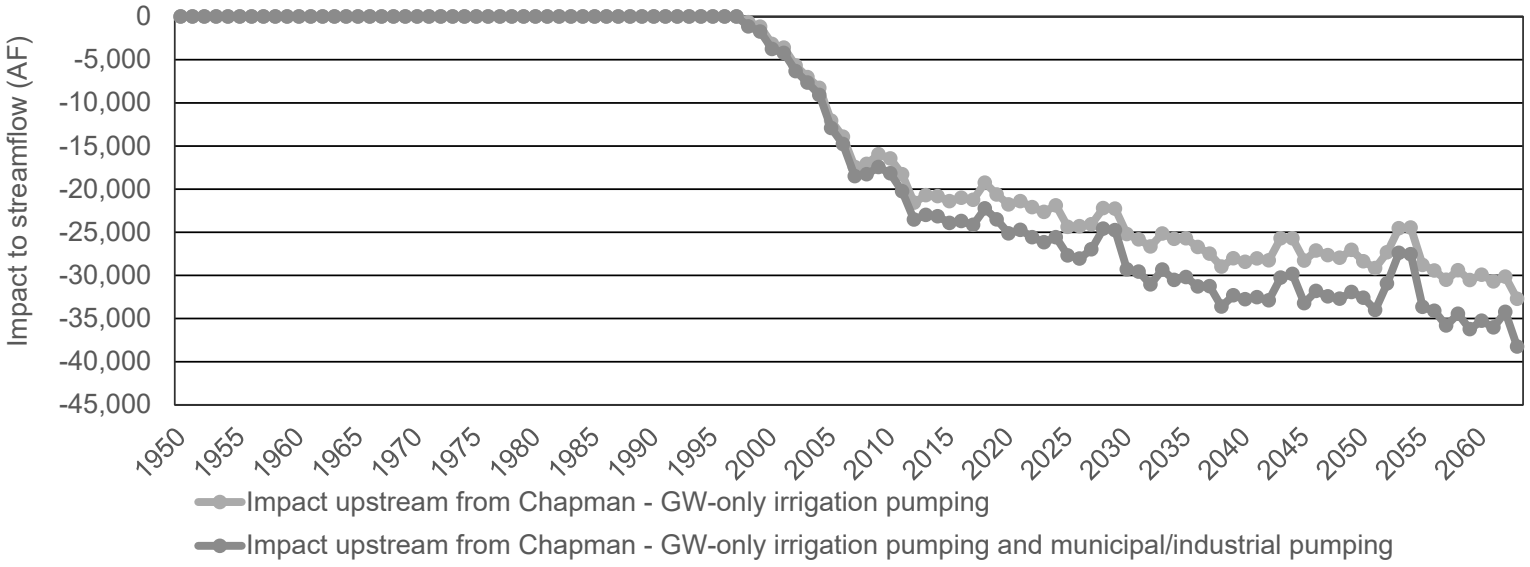
TPNRD - Inputs

Accretions from excess flow projects, 2011-2013



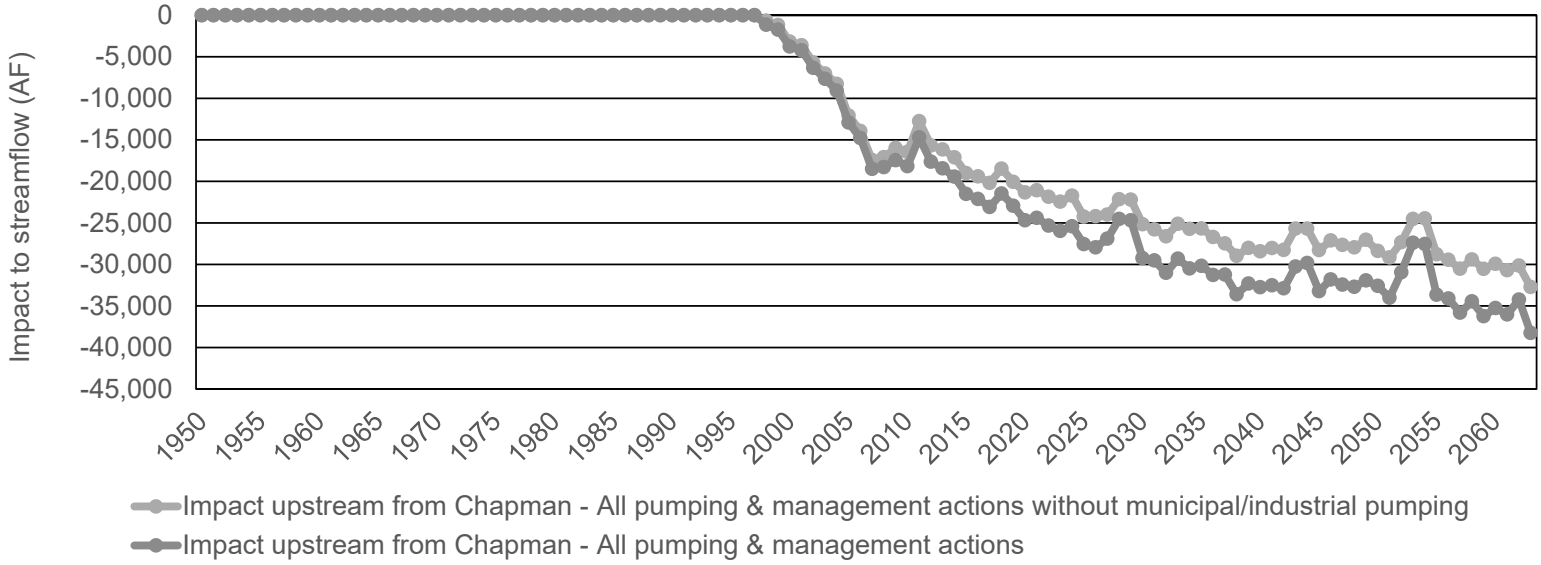
TPNRD Results

- Impact upstream from Chapman due to changes in groundwater pumping
- Groundwater-only irrigation pumping (57,500 acres) AND municipal/industrial pumping



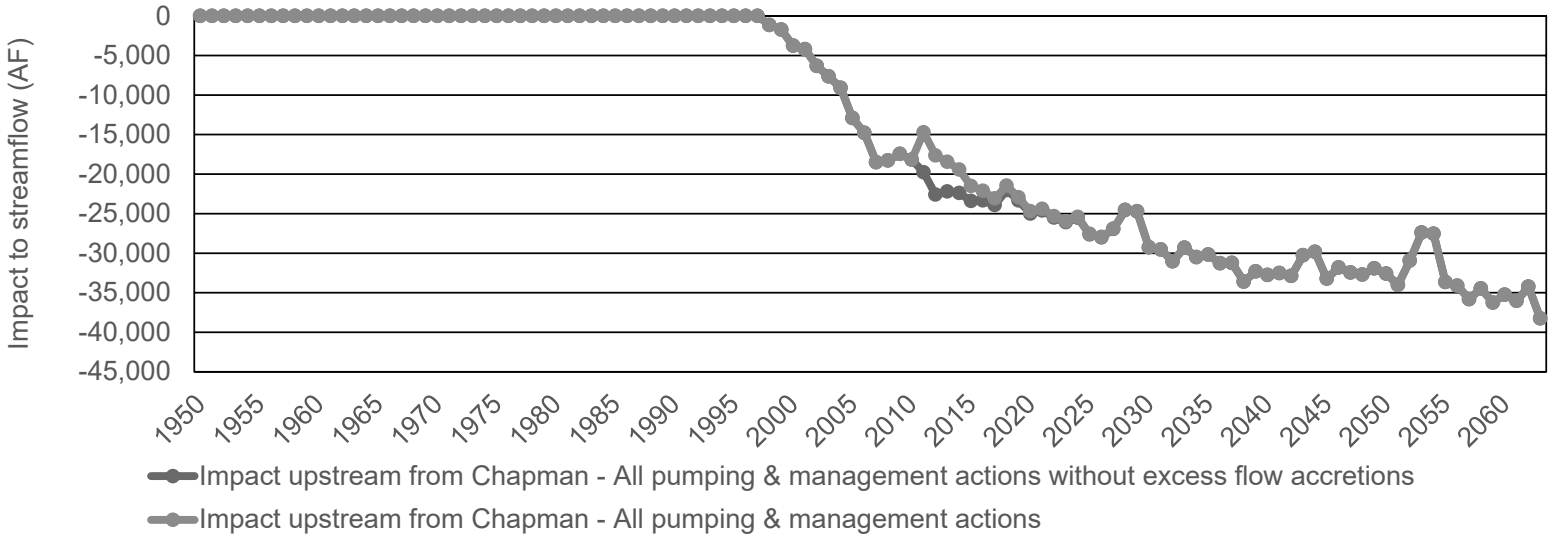
TPNRD Results

- Impact upstream from Chapman due to total pumping and management actions
- Includes groundwater-only irrigation pumping, accretions from projects, and retirements.
- With and without municipal & industrial pumping.



TPNRD Results

- Impact upstream from Chapman due to total pumping and management actions
- Includes groundwater-only irrigation pumping, municipal & industrial pumping, and retirements.
- With and without excess flow accretions.



TPNRD Summary

Post-1997 depletions estimates

Year	2019	2029	50-year
Current IMP	6,800		7,000
Updated Estimate	23,000	24,700	38,200
Updated Estimate – w/o M&I	20,100	22,200	32,700

All values in acre-feet/year

Why Are We Here?

- 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

(STATUTORY REQUIREMENTS § 46-715(4))

FURTHER FRAMEWORK FOR BWP AND IMP

Basin-Wide Goals and Objectives (draft)
IMP Statutes

FURTHER FRAMEWORK FOR BWP AND IMP

BWP GOALS AND OBJECTIVES (DRAFT)

Goals	1: Incrementally achieve and sustain a fully appropriated condition	2: Work to maintain economic viability of the basin while implementing this plan	3: 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.
Objectives	Offset impacts of streamflow depletions… to the extent those depletions are due to water use initiated after July 1, 1997	Understand the economic impacts of supply variability on water users	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.
	Maintain first increment mitigation efforts	Assess short and long-term basin water supply and demand	
	Conduct a technical analysis…to determine whether the controls are sufficient…	Explore potential measures to mitigate impacts of basin supply variability on surface water and groundwater users	
	Use available funds and actively pursue new funding opportunities to…implement this Plan	Develop a basin drought contingency plan for management of supplies during times of shortage	
	Update and continue implementing IMPs in each Platte River Basin NRD		

Goals	4: Partner with municipalities and industries to maximize conservation and water use efficiency	5: Work cooperatively to identify and investigate disputes between groundwater users and surface water appropriators and, if determined appropriate, implement management solutions to address such issues.	6: Keep the Upper Platte River Basin-Wide Plan current and keep stakeholders informed.
Objectives	Continue to collect data on water use and existing conservation plans of municipalities and industries within the Basin	Identify disputes between groundwater users and surface water appropriators.	Meet at least annually to review progress toward achieving the goals and objectives of this Upper Platte River Basin-Wide Plan and those portions of individual NRD IMPs that implement this plan.
	Invite municipalities and industries to the annual meetings	Investigate and address issues between groundwater users and surface water appropriators, based on investigation results.	Gather and evaluate data and information to measure the effectiveness of controls, incentives, and other programs in the individual NRD IMPs used to implement this Upper Platte River Basin-Wide Plan.
	Establish baseline water use levels and reasonable water use levels for each municipal and industrial user by January 1, 2026.		Improve information sharing with interested stakeholders

FURTHER FRAMEWORK FOR BWP AND IMP

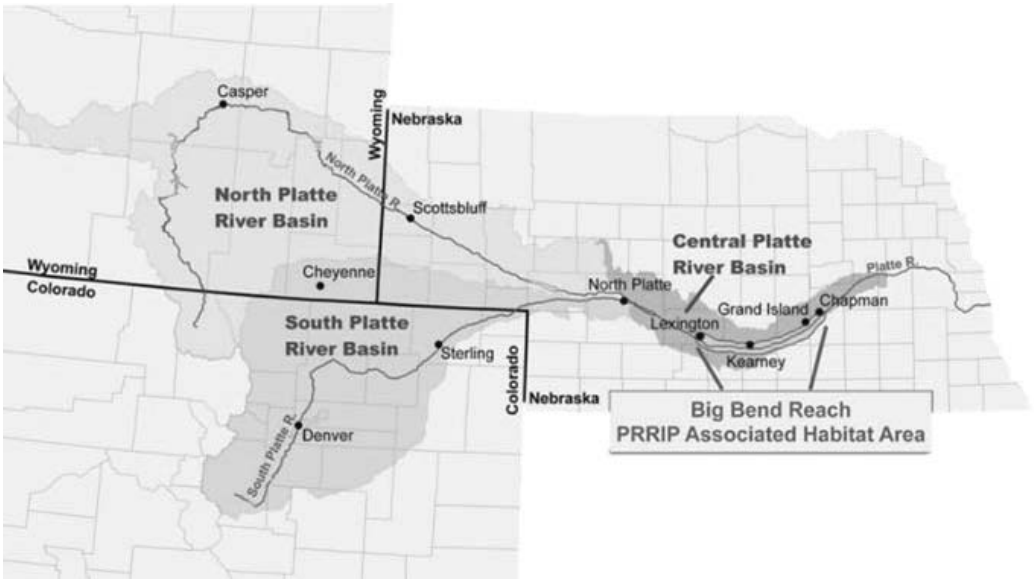
ADDITIONAL DETAILS ON IMP STATUTES

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

INTERSTATE AGREEMENT – PRRIP

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

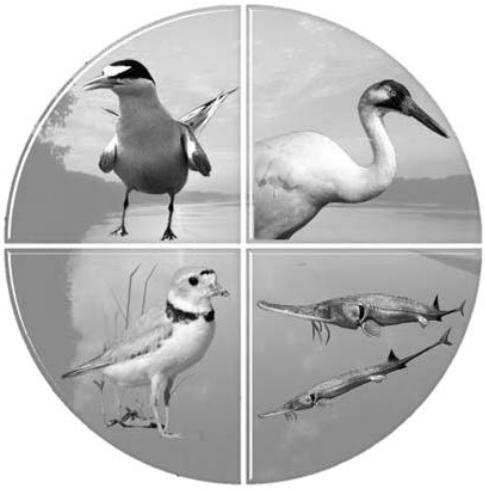


- Began January 1, 2007
- Basin-wide effort by Department of Interior, Colorado, Wyoming, and Nebraska
- Implementation of PRRIP is incremental.
  - The first increment is 13 years, expected to extend through 2032.

INTERSTATE AGREEMENT – PRRIP

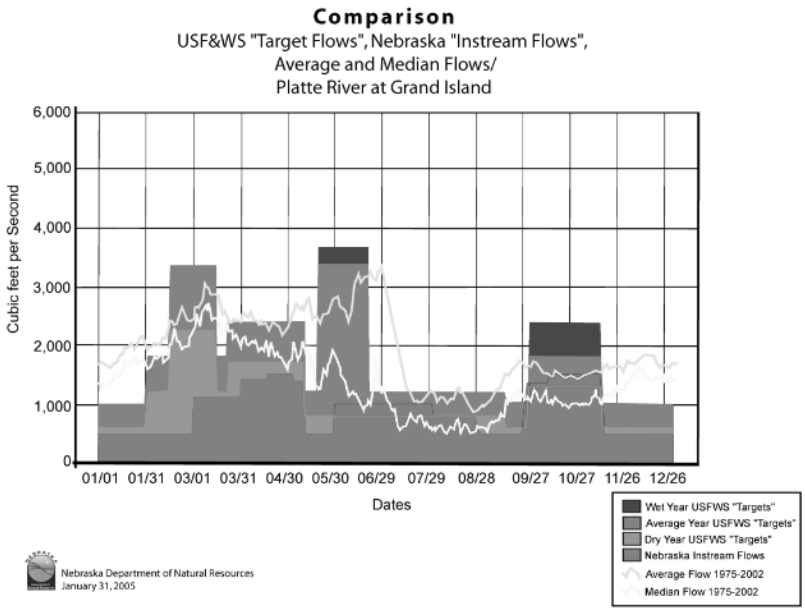
Platte River Recovery Implementation Program; § 46-715(4)(b)

- 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)



- 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

TWIN PLATTE NRD - CURRENT IMP

Current Conditions

Monitoring & Studies

1st Increment IMP Lessons Learned

TPNRD CURRENT IMP
CURRENT CONDITIONS

GOALS

- Incrementally achieve and sustain a FA condition
- Be in compliance by NE with interstate, decree, compact, contract, etc.
- Maintain consistency with the BWP

OBJECTIVES

- Within the 1st 10 years implement measures to offset an average 7,700 ac-ft. to the river from 2043-2048
- Conduct tech analysis after 6 years to see if adopted measures are sufficient to offset post-'97 depletions
- Continue to refine differences between current and FA levels
- Develop and maintain analytical tools (COHYST, etc.)
- Review IMP provisions to see if they are adequate

ACTION ITEMS: NON-REGULATORY

- I + E Programs
- Incentive programs
  - EQIP
  - CREP
  - AWEP
- Other programs

ACTION ITEMS: REGULATORY

- Annually compare stream depletions to accretions
- Triggers stair steps
  - If meet triggers, continue as is
  - If do not meet triggers, establish regulations
- Controls
  - Alternative crops
  - Reduction of acres
  - Allocations

ACTION ITEMS: REGULATORY

Triggers by year (ac-ft)

* 7,700 ac-ft = average annual depletion rate to be offset for period 2043-2048

2009	2010	2011	2012	2013
5,599	5,635	5,756	5,804	5,859

2014	2015	2016	2017	2018	2019
5,862	5,901	5,931	6,024	6,155	6,185

TPNRD CURRENT IMP

MONITORING AND STUDIES

This section is to ensure the FA + OA areas within TPNRD reach and maintain FA condition

MONITORING

- Annually tracking activities
  - Certify acres
  - Transfer
  - Flow meter readings
  - Well construction permits
  - Variances
  - Retirements
  - Water banking transactions

MONITORING

- Reporting
  - Evaluate need of a subsequent increment
    - Change in recharge from SW diversion on stream flow
    - Change groundwater irrigation, municipal, industrial, domestic, livestock
    - Change in conservation measures on stream
    - Timing and location of net change in streamflow
  - Annual reports
  - Measure success – compare results of annual reports to total depletions
  - Robust review of progress
  - COHYST runs – compare

MONITORING

- Studies
  - Stream depletions due to groundwater wells & comingled surface water
  - Crop rotation
  - Vegetation management
  - Irrigation scheduling
  - Types of irrigation systems
  - Tillage practices
  - BMP
  - Conjunctive management
  - Water budget analyses
  - Invasive species
  - Conservation measures

TPNRD CURRENT IMP

LESSONS LEARNED

From the First IMP

Lessons Learned

- Water is expensive and not readily available
  - Sustainability of funding
- POAC – PBC – technical and financial management
- Shortage of water is a Management Problem
- Modeling process and technology updates
  - Need for better communication
  - Need to improve timeliness of analyses
- Education and outreach efforts need to improve
- Challenge in identifying fully appropriated (FA) and overappropriated (OA) distinction and defining fully appropriated
- Challenge in finding a water use and supply balance – defining possibility and sustainability

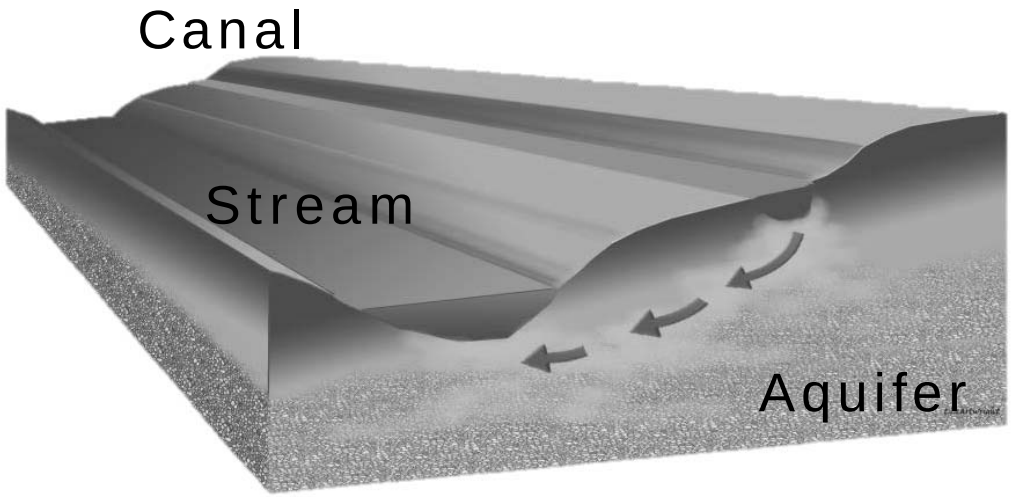
CONJUNCTIVE MANAGEMENT

IN THE UPPER PLATTE RIVER BASIN

UNDERLYING CONCEPTS OF CONJUNCTIVE WATER MANAGEMENT

(CWM)

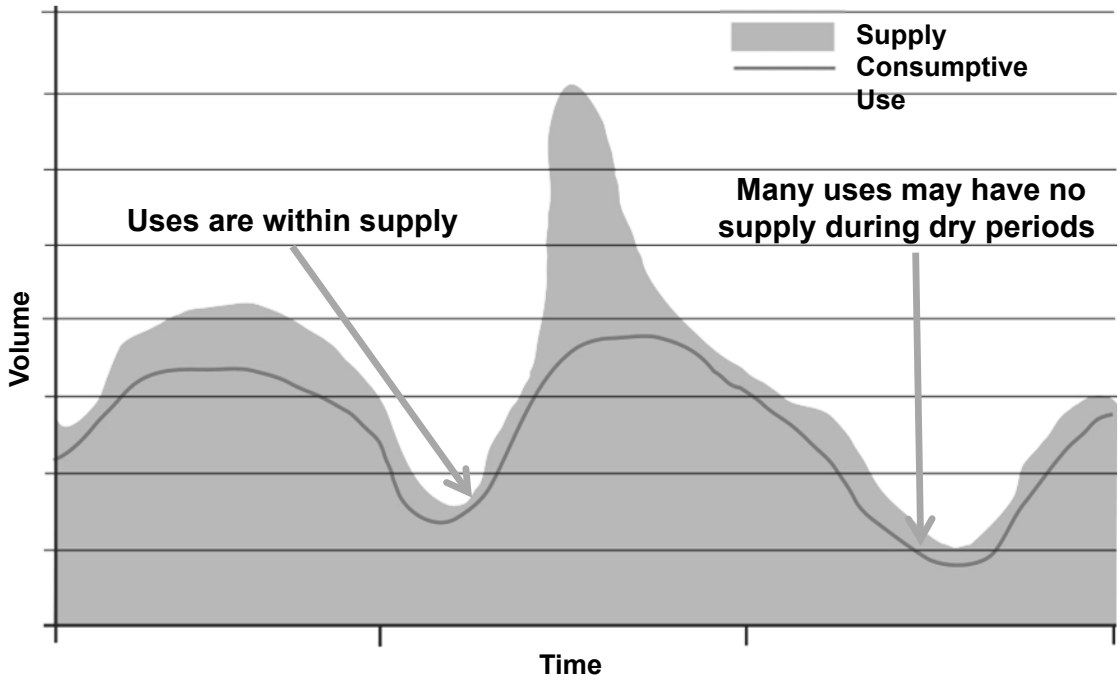
- Surface and groundwater resources are interconnected
- Decisions to improve the management of one cannot be made properly without considering the other



Conjunctive Water Management is an ***adaptive process*** that utilizes the ***connection*** between surface water and groundwater to ***maximize water use***, while ***minimizing impacts*** to streamflow and groundwater levels in an effort to increase the overall water supply of a region and improve the reliability of that supply.

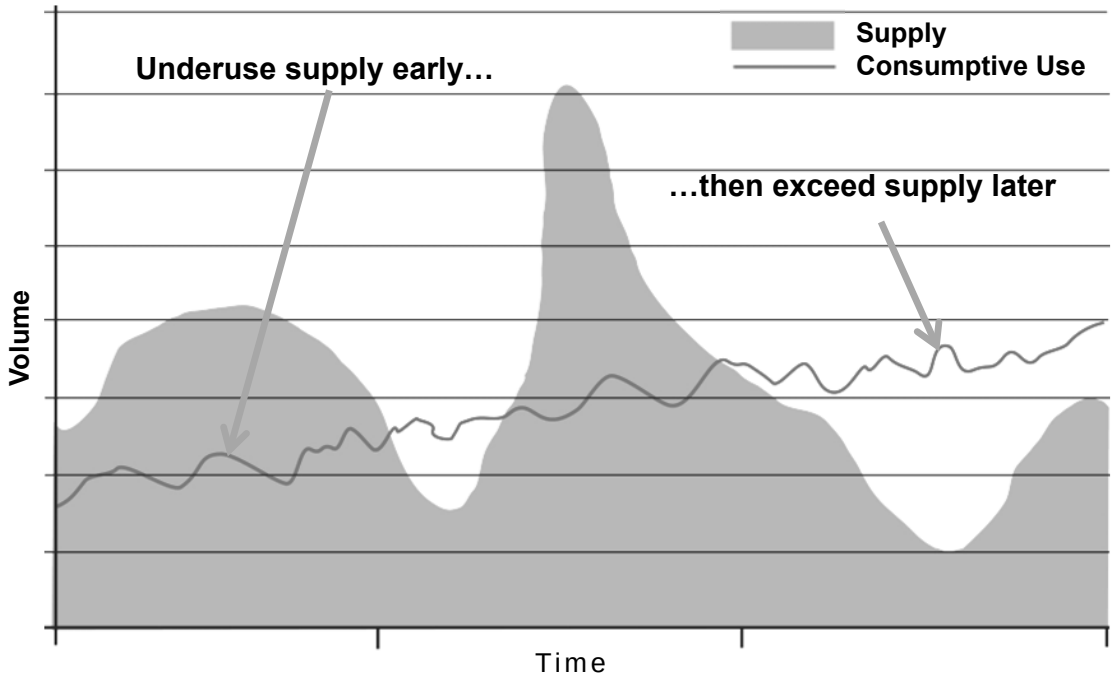
SCENARIO 1:

USING SURFACE WATER ONLY



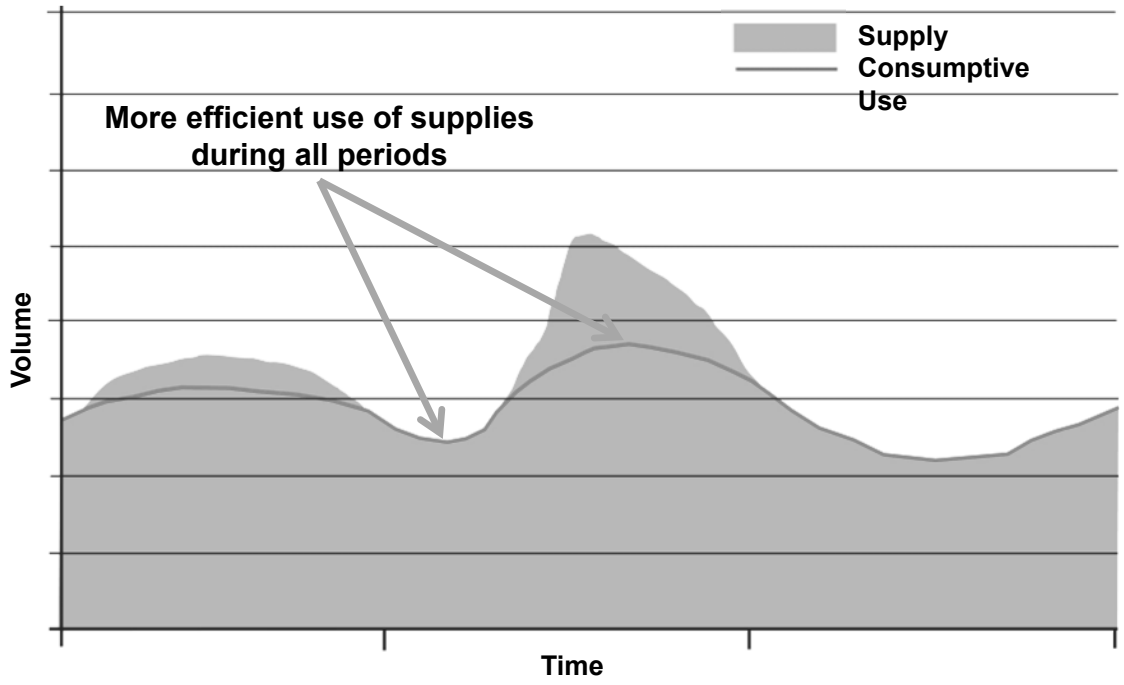
SCENARIO 2:

USING GROUNDWATER ONLY



SCENARIO 3:

MANAGING SUPPLIES THROUGH CWM

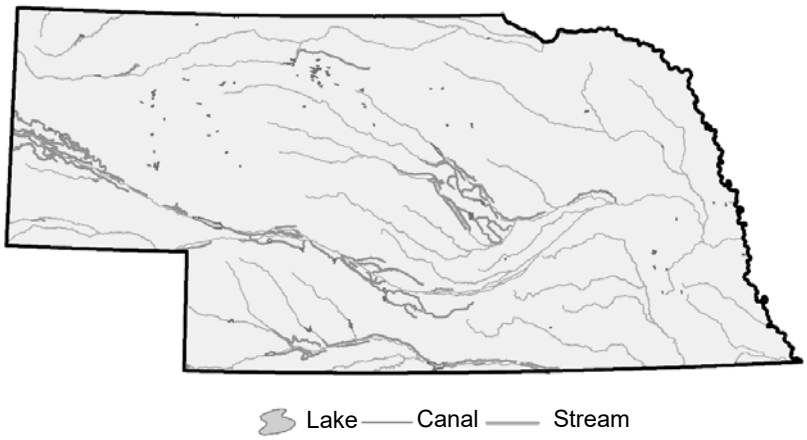


COMPONENTS OF CWM

- Surface water diversion and groundwater pumping
- Aquifer recharge
- Management of the timing of return flows
- Program for monitoring and evaluation

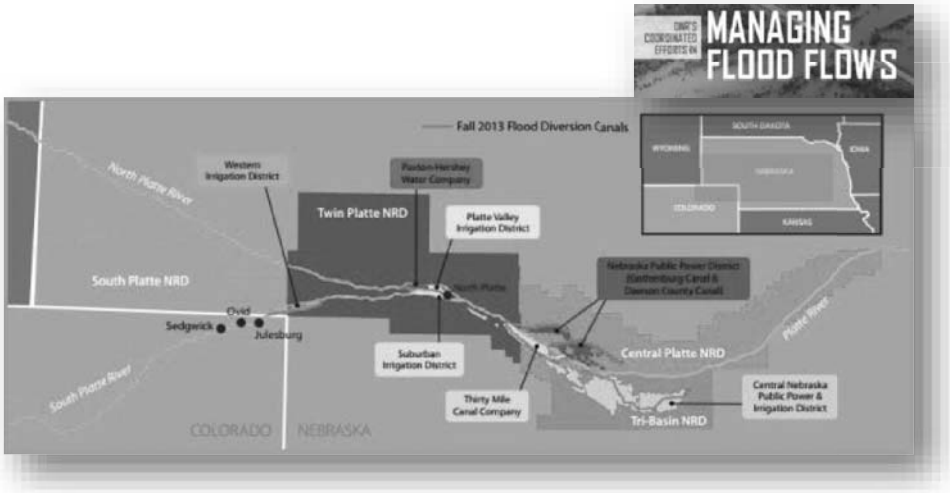
BENEFITS OF CWM

- Maximize available water supplies
- Leverage existing infrastructure
- Use existing planning framework
- Minimize the need for regulatory actions
- Customize to local opportunities or needs
- Maintain viability of existing uses



EXAMPLES OF CWM PROJECTS

- Augmentation projects such as N-CORPE
- Western canal conjunctive management study
- Water leasing arrangements
- CPNRD transfers and canal refurbishment
- Capturing excess flows using existing canal infrastructure (in partnership with irrigation districts)



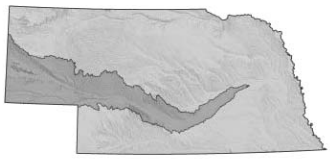
APPLYING CONJUNCTIVE MANAGEMENT

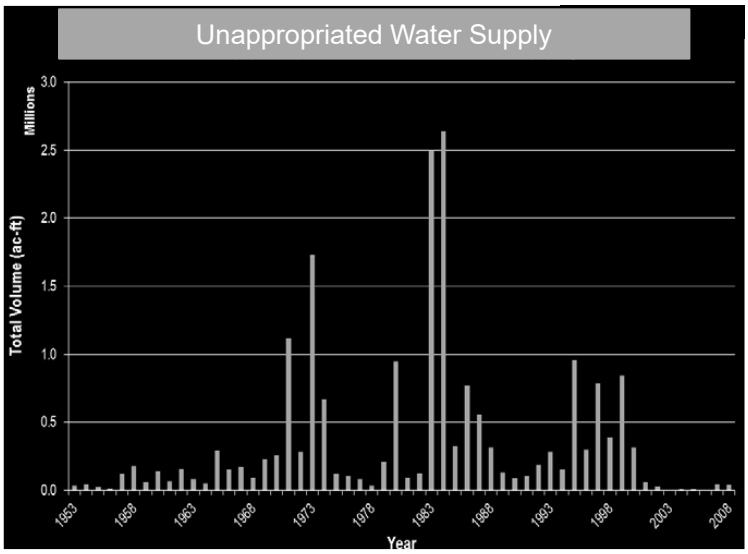
IN THE UPPER PLATTE RIVER BASIN

First Increment CWM Activities

UPPER PLATTE RIVER WATER SUPPLIES

- Receives average of 1 million ac-ft from snowmelt in Wyoming each year (North Platte Decree)
- More variable inflows in South Platte from Colorado
- Water is generally fully allocated, particularly above Elm Creek (overappropriated)
- Streamflows required to be shared under Endangered Species Act (Federal)
- Unappropriated water does occur during some very wet years, during shorter intervals, and outside of the irrigation season



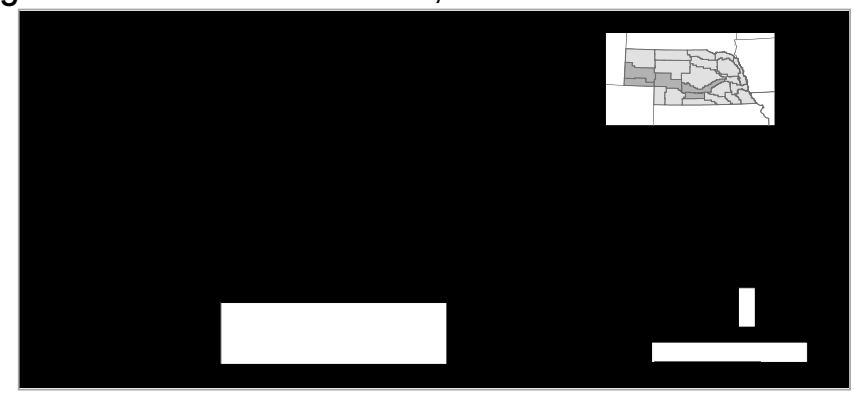


2011 PILOT PROJECT

- High flows in spring prior to irrigation season
- NeDNR coordinated with NRDs, Irrigation Districts/Canal Companies to divert excesses
- Acquisition of permits
- Contracts
- Monitor

2011 PILOT PROJECT

- 23 Canals and 5 NRDs
  - Diversion Total 142,000 acre-ft
  - Recharge Total 64,000 acre-ft
  - TPNRD Diversion Total 33,200 acre-ft
  - TPNRD Recharge Total 25,800 acre-ft

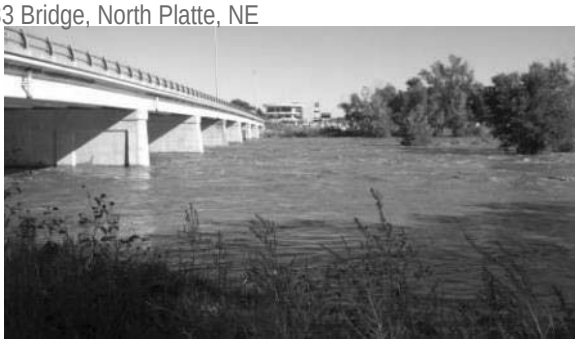


2013 FLOOD FLOWS

Friday, September 20, 2013

Saturday, September 21, 2013

South Platte River Highway 83 Bridge, North Platte, NE



South Platte River Buffalo Bill Road Bridge, North Platte, NE

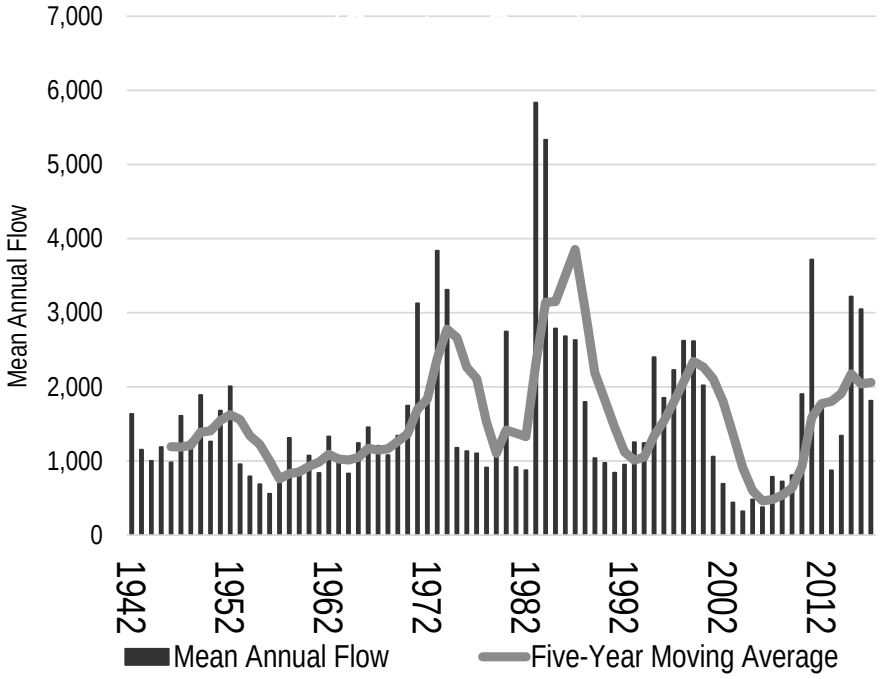
2013 FLOOD FLOWS

- 9 Canals and 4 NRDs
  - Diversion Total 44,000 ac-ft
  - Recharge Total 27,000 ac-ft
  - TPNRD Diversion Total 8,700 ac-ft
  - TPNRD Recharge Total 6,100 ac-ft

SUMMARY OF FLOOD FLOW DIVERSIONS

First Increment

- Over 200 Kaf of flood flows diverted since 2011
- Resulting recharge in excess of 100 Kaf
- Accretions will benefit Platte River flows for many years into the future
- Process in place for future successes
- Reduces the need for additional regulations
- Creates greater resiliency in future periods



CWM FUTURE ACTIVITIES

- Expand implementation of CWM projects
- Enhance adaptation strategies based on management goals
- Support continued investment in maintaining and enhancing infrastructure
- Ensure that sound science and monitoring are available to support management decisions

Cozad Canal, Gothenberg, NE

NEXT STEPS

MEETING DATES

- September 19, 2018
- November 13, 2018
- January 15, 2019

PUBLIC COMMENT

Thank you