



Nebraska

Department of Natural Resources

NEBRASKA'S WATER MANAGEMENT RESOURCE

Providing the sound science and support for managing
Nebraska's most precious resource.

Canal Recharge Opportunities and Successes

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Nebraska Department of Natural Resources

Outline

- Water Availability and Shortages
- Conjunctive Water Management
- Platte Basin Conjunctive Management
- Future Conjunctive Management Opportunities



WATER AVAILABILITY & WATER SHORTAGES

**Core Goals of
Water Planning in
Nebraska**

**ECONOMIC
VIABILITY**

AQUIFER

STREAMFLOW



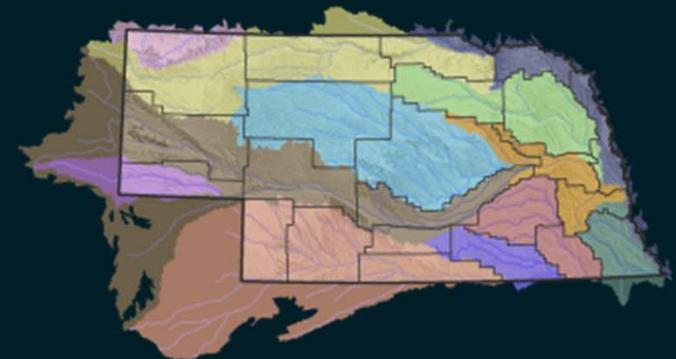
Water Availability & Water Shortages

Challenges

- Variable supplies
- Existing uses
- Compacts and agreements

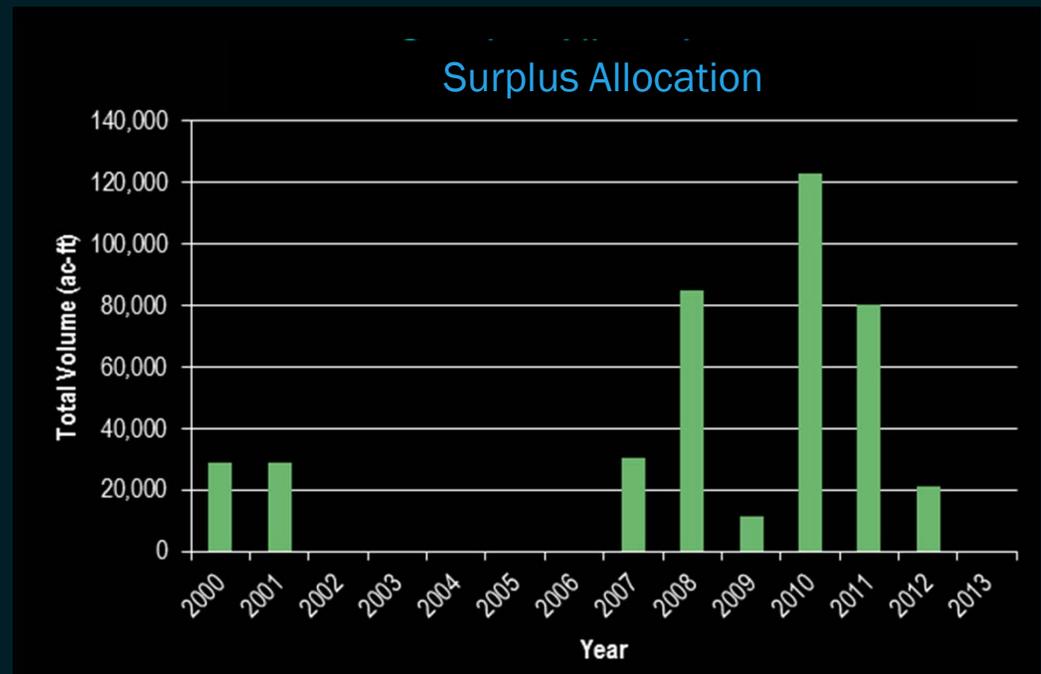
Opportunities

- Surface water and groundwater resources
- Infrastructure
- Planning framework



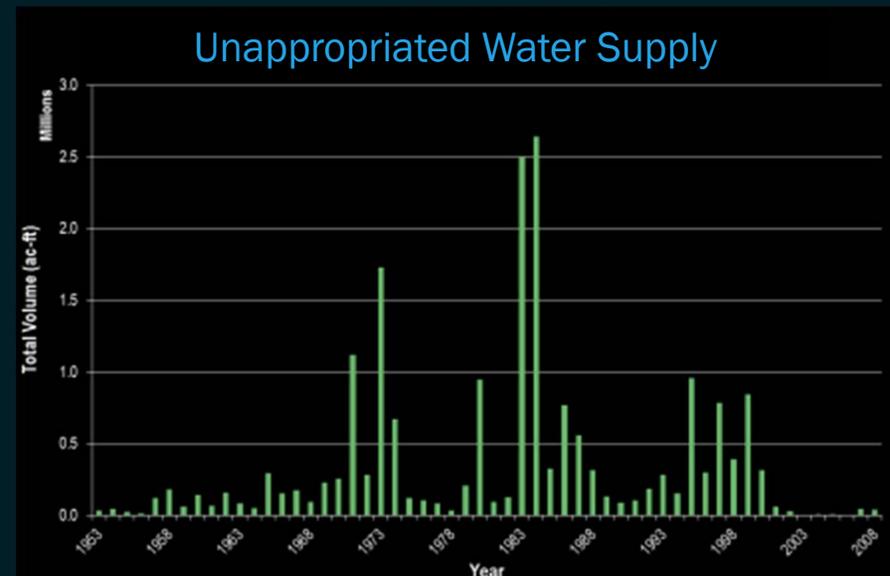
Republican River Water Supplies

- Determined by the Republican River Compact
- The total basin water supply is generally between 500,000 and 700,000 ac-ft
- Nebraska receives roughly half under the Compact
- During some dry years Nebraska fully utilizes its Compact allocations
- Many years Nebraska significantly underuses its Compact allocations
 - Approximately 400,000 ac-ft since 2000



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)
- Unappropriated water does occur during some very wet years, during shorter intervals, and outside of the irrigation season



Remaining River Basin Water Supplies

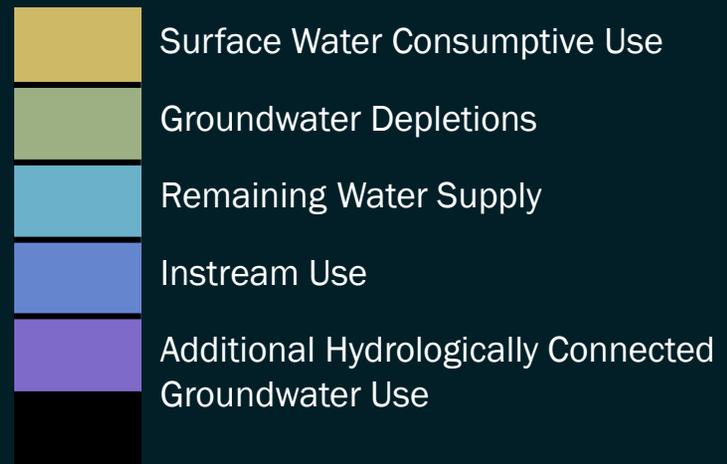
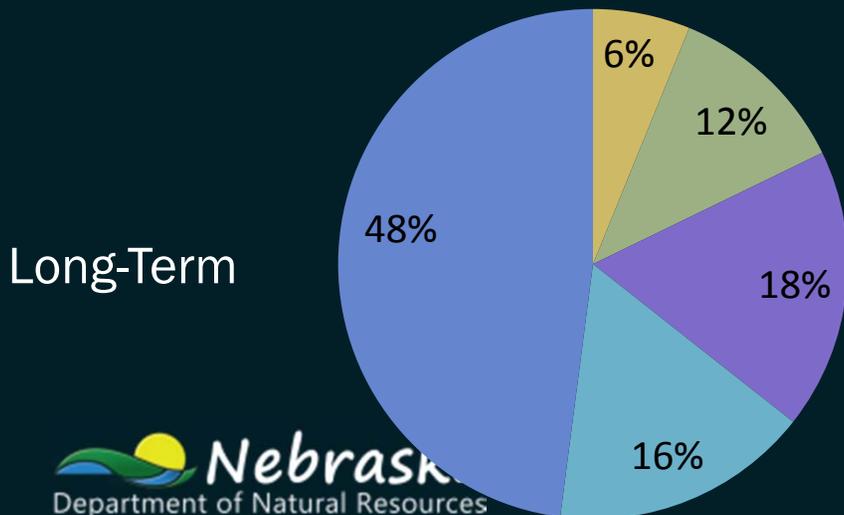
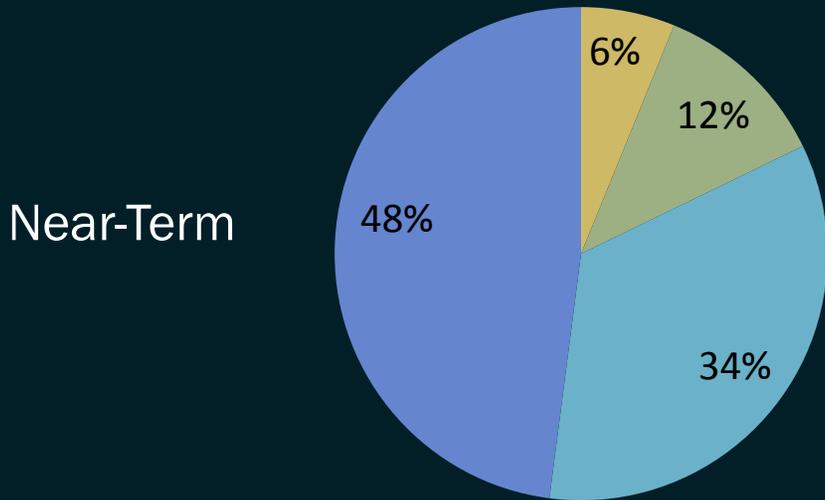
➤ Water use and water demands for:

- Niobrara River
- Loup River
- Elkhorn River
- Lower Platte River (including Salt Creek)
- Big and Little Blue River
- Bazile Creek



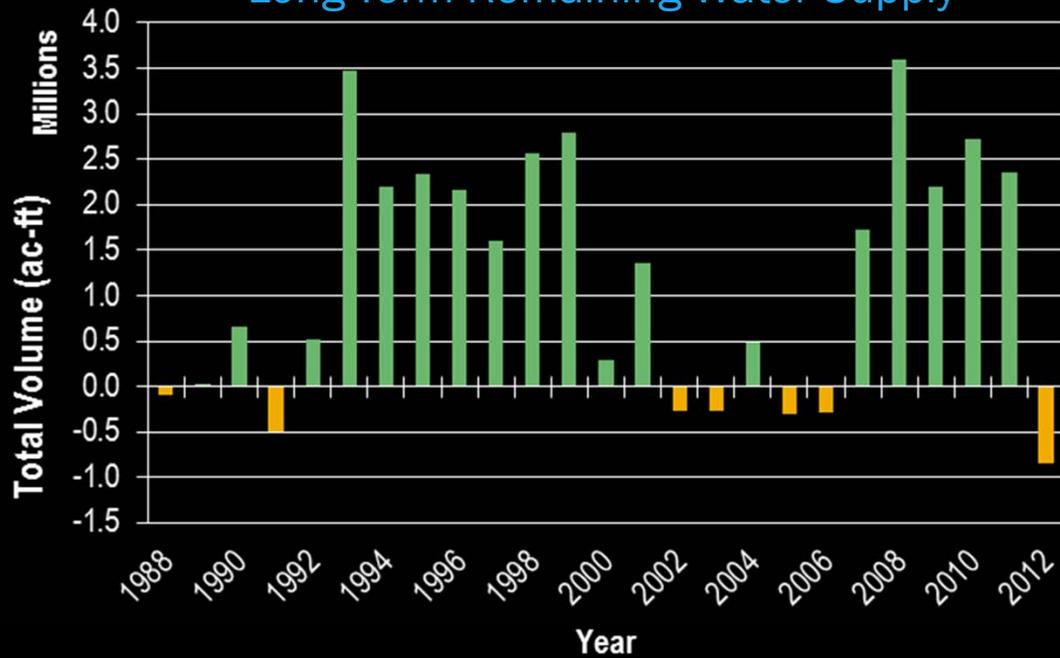
Remaining River Basin Water Supplies

**Total Water Supply = 7.3
M ac-ft**

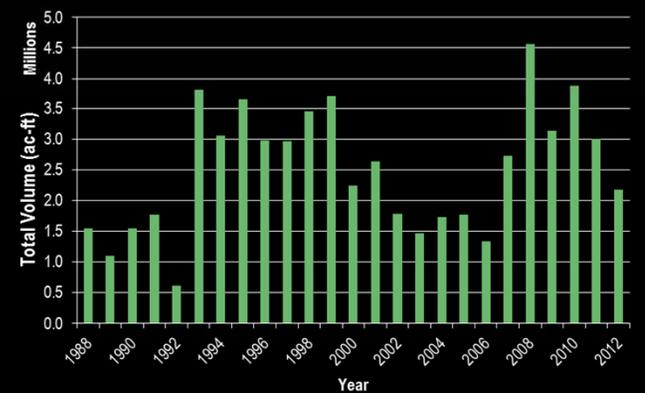


Remaining River Basin Water Supplies

Long-Term Remaining Water Supply



Near-Term Remaining Water Supply





CONJUNCTIVE WATER MANAGEMENT

Surface water and groundwater resources are *hydrologically interconnected*, and 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.



PLATTE RIVER CONJUNCTIVE MANAGEMENT

Platte River Basin in Nebraska

➤ Challenges

- Interstate agreement
- Fully and Overappropriated
- Must offset depletions

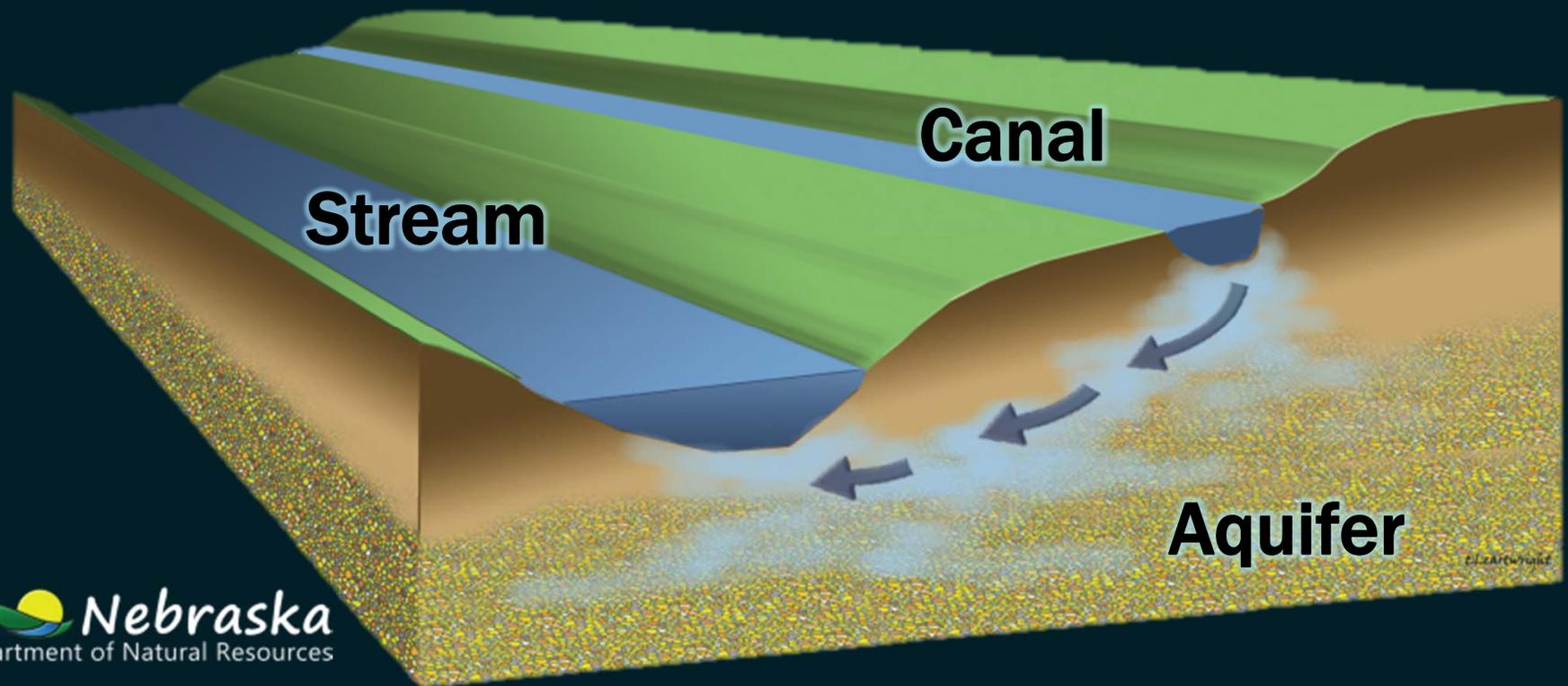
➤ Opportunities

- Comprehensive planning framework
- Local management
- Infrastructure



Canal Systems

- As part of normal operations, unlined irrigation canals provide groundwater recharge resulting in streamflow accretions



Opportunities

- Divert excess flow during non-irrigation season into canals
- Study indicated frequent excesses
- Provide additional recharge and accretions
- Mitigate flood impacts



2011 Pilot Project

- High flows in spring prior to irrigation season
- DNR coordinated with NRDs, Irrigation Districts/Canal Companies to divert excesses
- Established framework for process



General process

- Monitoring for opportunities
 - Upstream flows, snowpack, predictions
- Estimate timing of peak
- Irrigation District apply for permit
 - All existing rights satisfied
- Contract for payment

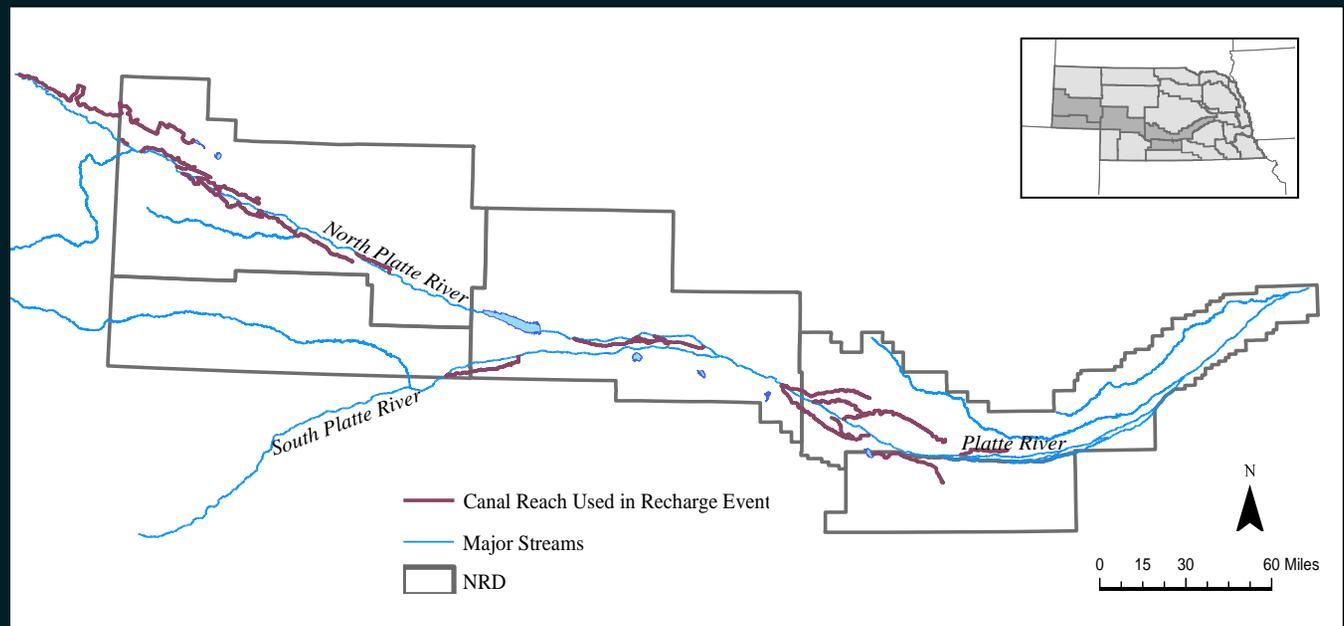
General process

- Diversions measured at head gates
- Canal returns measured
- Continue to divert
 - As long as excess exists
 - Until irrigation starts
 - Until weather inhibits
- Estimate volume recharged

2011 Pilot Project

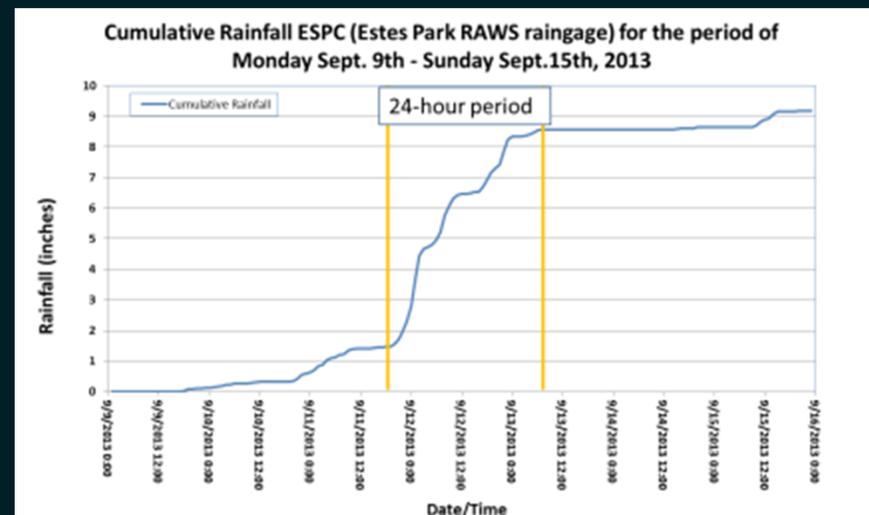
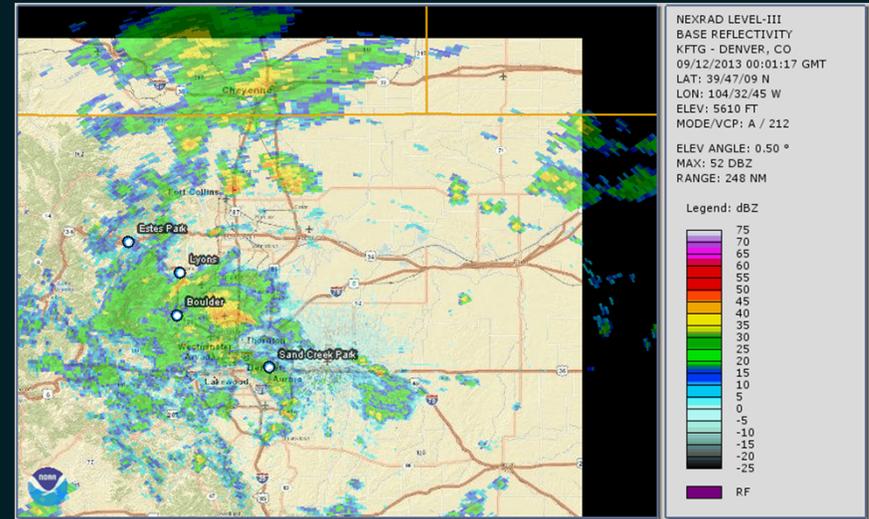
➤ 23 Canals and 5 NRDs

- Diversion Total 142,000 a-f
- Recharge Total 64,000 a-f
- 2011-2019 Accretion Estimate 15,000 a-f



2013 Flood Flows

- Flooding in Eastern Colorado due to extreme rainfall September 12-13, 2013
- Peak period of rainfall (6 PM Tuesday – 6 PM Wednesday)
- Cumulative Rainfall at Estes Park rain gage



2013 Flood Flows

Friday, September 20, 2013

Saturday, September 21, 2013

South Platte River Highway 83 Bridge, North Platte, NE



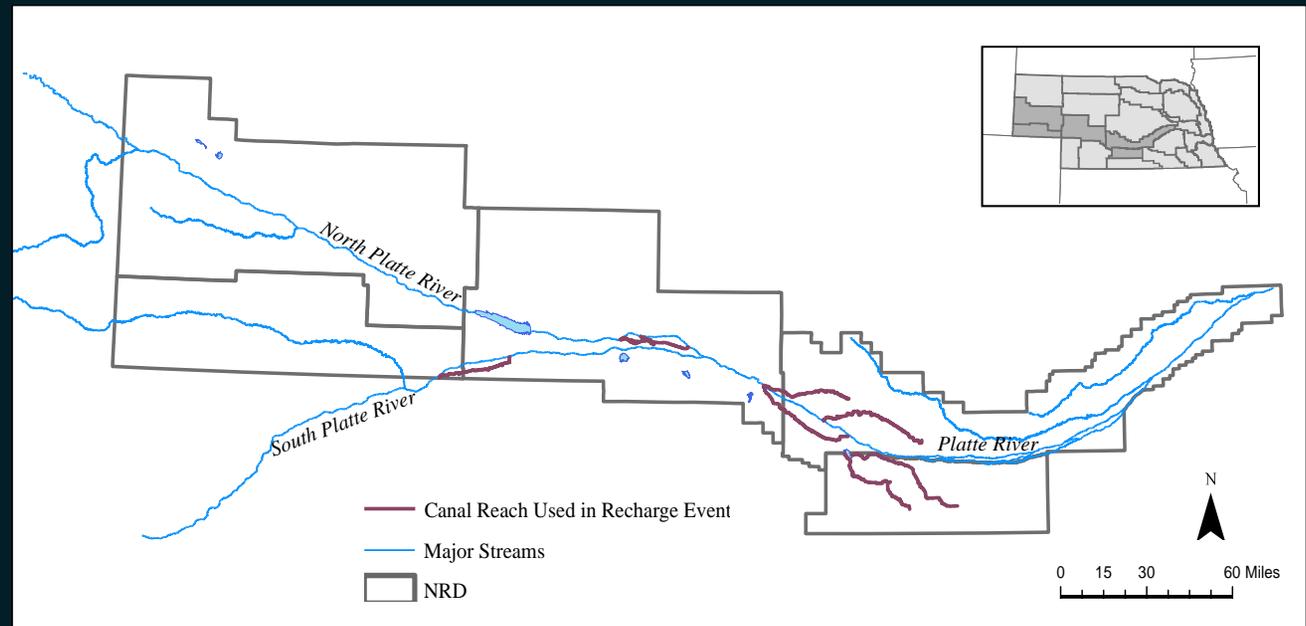
South Platte River Buffalo Bill Road Bridge, North Platte, NE



2013 Flood Flows

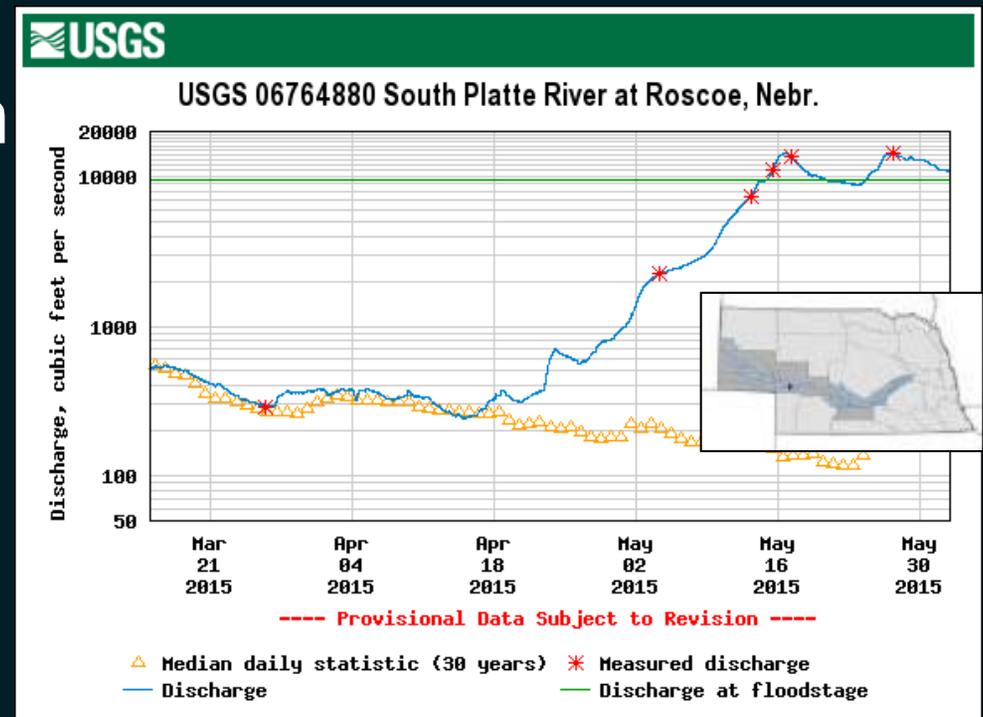
➤ 9 Canals and 4 NRDs

- Diversion Total 44,000 a-f
- Recharge Total 27,000 a-f
- 2011-2019 Accretion Estimate 5,600 a-f



2015 Flood Flows

- Wet conditions during above average spring snowmelt
- Canals filled early
- Recharged excess in canals, pits and reservoirs





Downstream of CNPPID Diversion, May 2015



CNPPID Canal return to Platte, May 2015



Platte River near Grand Island, June 2015



Orchard-Alfalfa Canal, May 2015



Orchard-Alfalfa Canal, June 2015



30-Mile Canal Headworks, June 2015

2015 Flood Flows

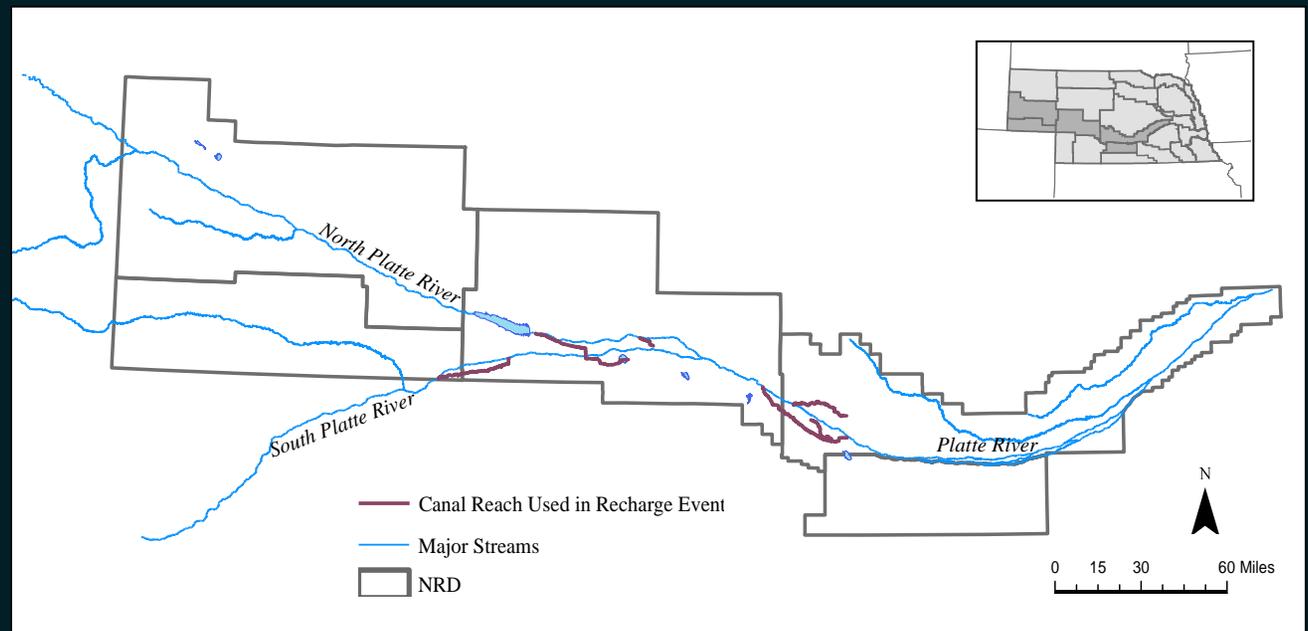
➤ Infrastructure utilized:

- Cozad Canal
- Orchard-Alfalfa Canal
- Thirty Mile Canal
- Western Canal
- Western Irrigation District recharge pits
- Elwood Reservoir

2015 Flood Flows

➤ 7 Canals and 4 NRDs

- **Diversion Total** 17,700 a-f
- **Preliminary Recharge Estimate** 7,600 a-f



Summary of Flood Flow Diversions

- Over 200,000 a-f of excess flood flows diverted since 2011
- Resulting recharge near 100,000 a-f
- Accretions will benefit Platte River flows for many years into the future
- Process in place for future successes

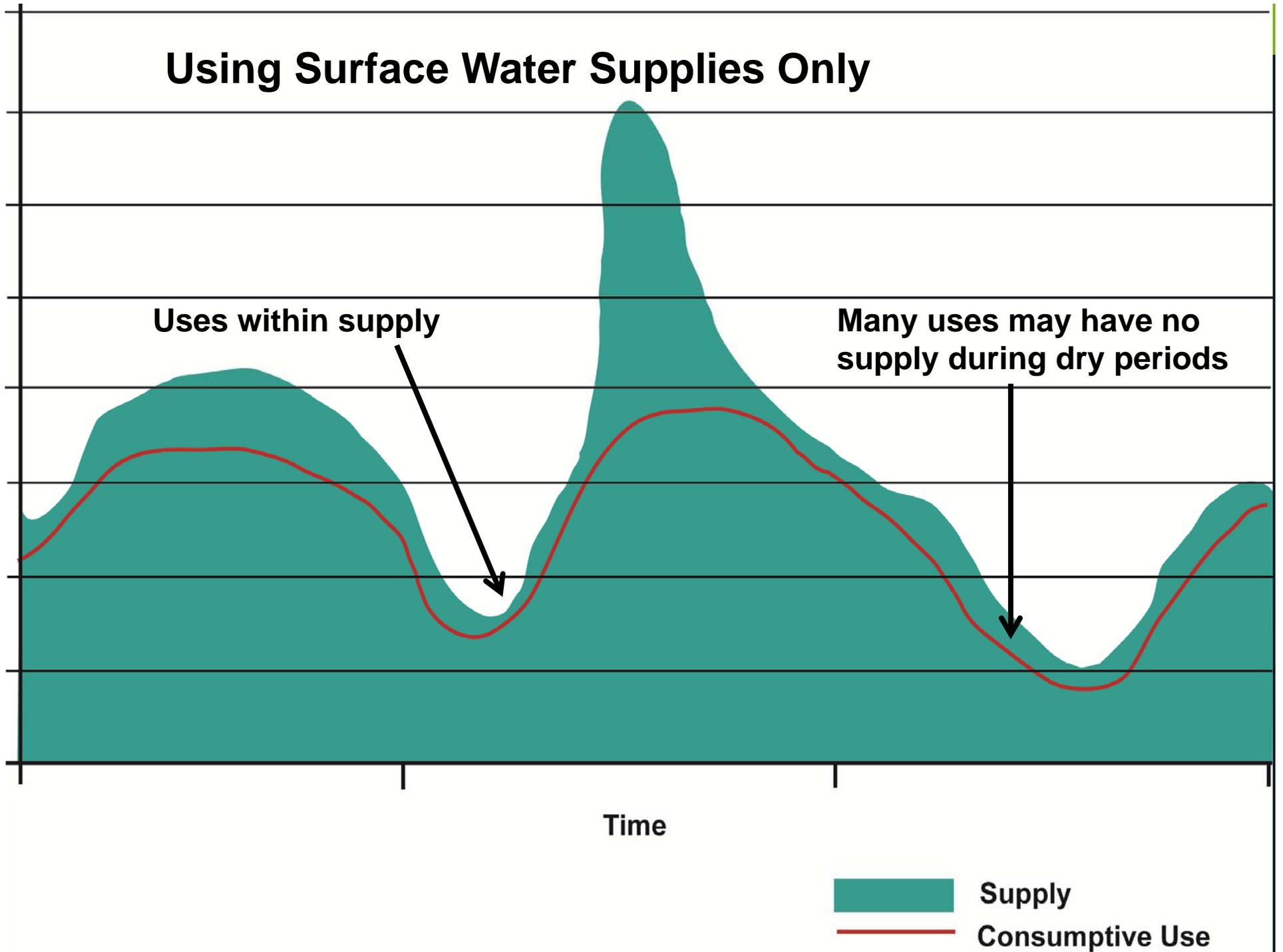
CWM into the Future

- Other projects
 - Canal Rehabilitation
 - Recharge pits
 - Reservoir recharge
- Modeling how to use groundwater and surface water most effectively
- Further optimization of water supply to meet competing demands

CWM Into the Future

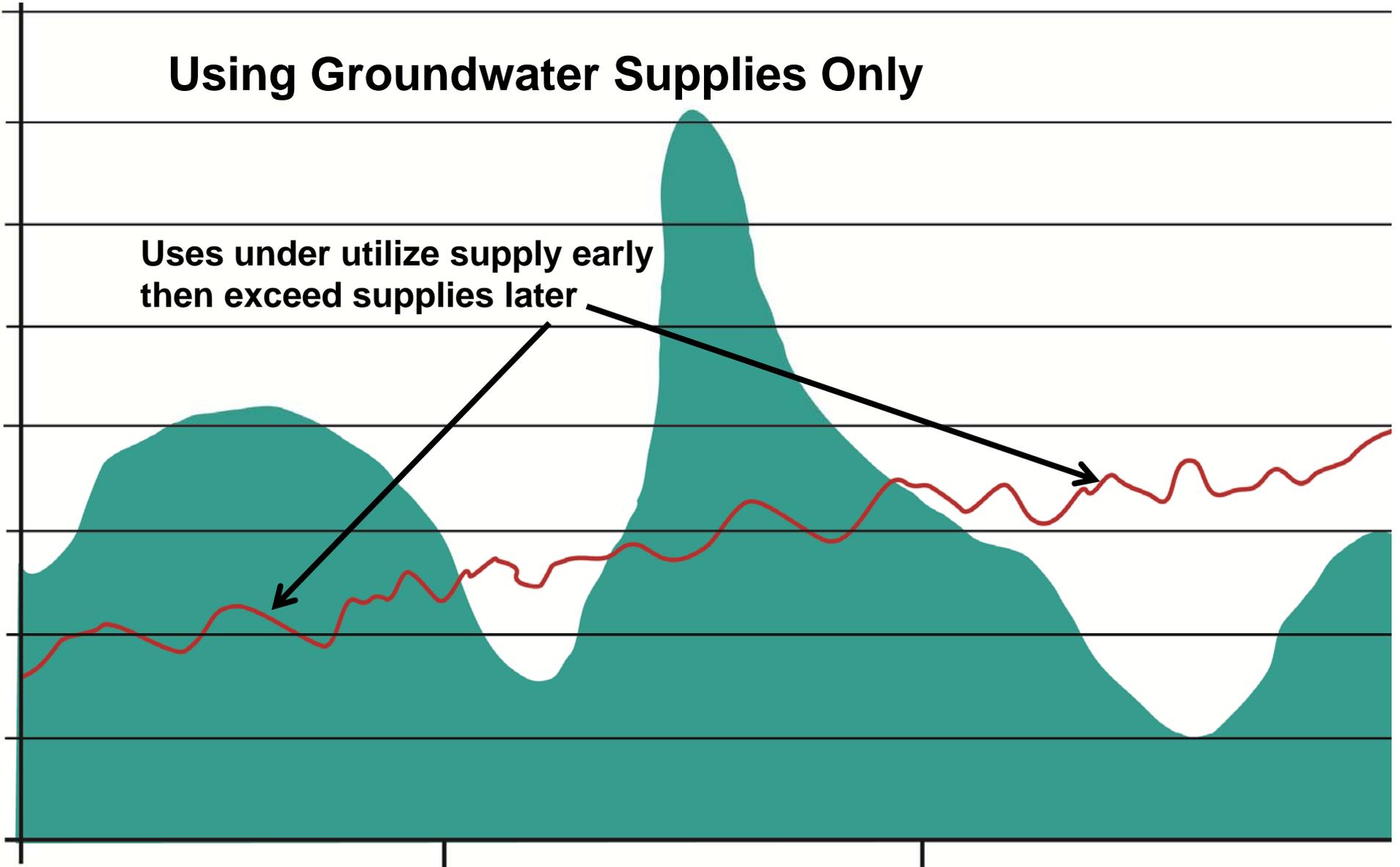
- Optimize water supplies for instream and out of stream uses
- Targeted to meet local and basin-wide objectives
- Foster coordinated/collaborative approaches between multiple stakeholder groups
- Maintain ground water levels
- Maintain ground water quality
- Maintain a fully water supply for ground water and surface water use year in and year out.
- Maintain the operations of surface water users in the Study Area

Using Surface Water Supplies Only



Using Groundwater Supplies Only

Uses under utilize supply early then exceed supplies later

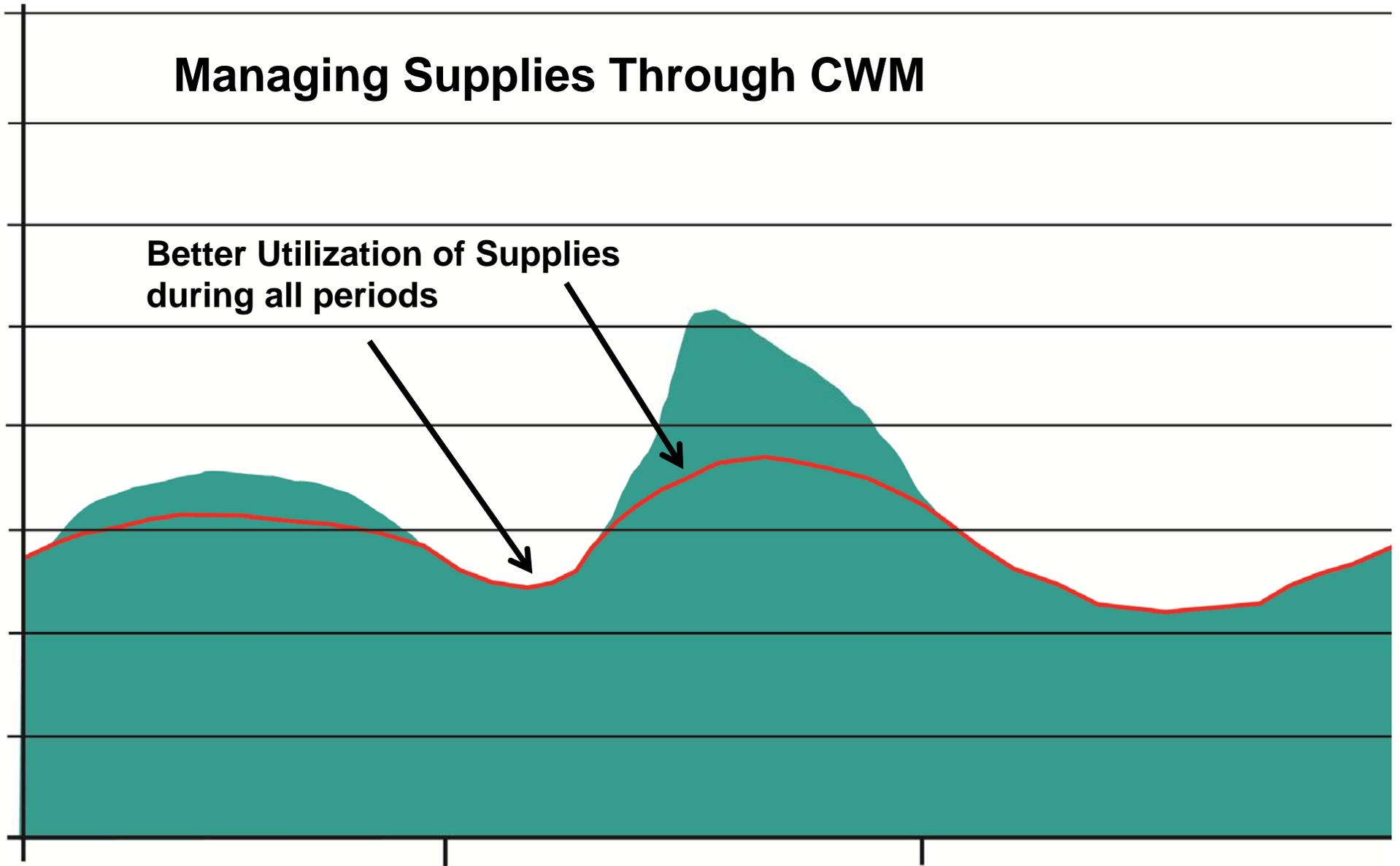


Time



Managing Supplies Through CWM

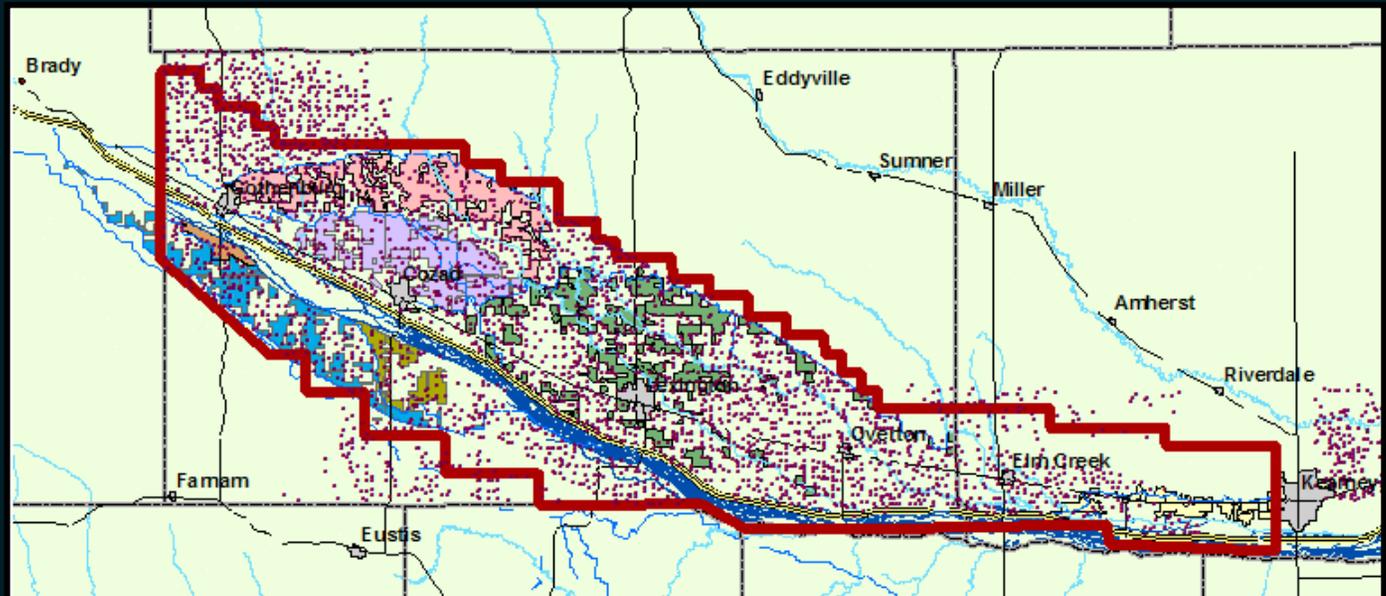
**Better Utilization of Supplies
during all periods**



Time



Dawson County CWM Study



CWM Into the Future

- Basin Study in Niobrara River Basin
- Basin Study in Republican River Basin
- Lower Platte Basin Coalition Planning
- Continued Refinements and expansion in the Upper Platte River Basin

Summary

- DNR/NRDs and partners are using CWM to maximize water uses while minimizing negative impacts
- The 2011 Pilot Project laid a solid framework for successes in 2013 and 2015
- CWM will continue to be part of the way Nebraska successfully manages water
- Additional efforts will be made to utilize infrastructure to optimize water use



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THANK YOU

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