

Recharging Aquifers through Excess Surface Water Diversions

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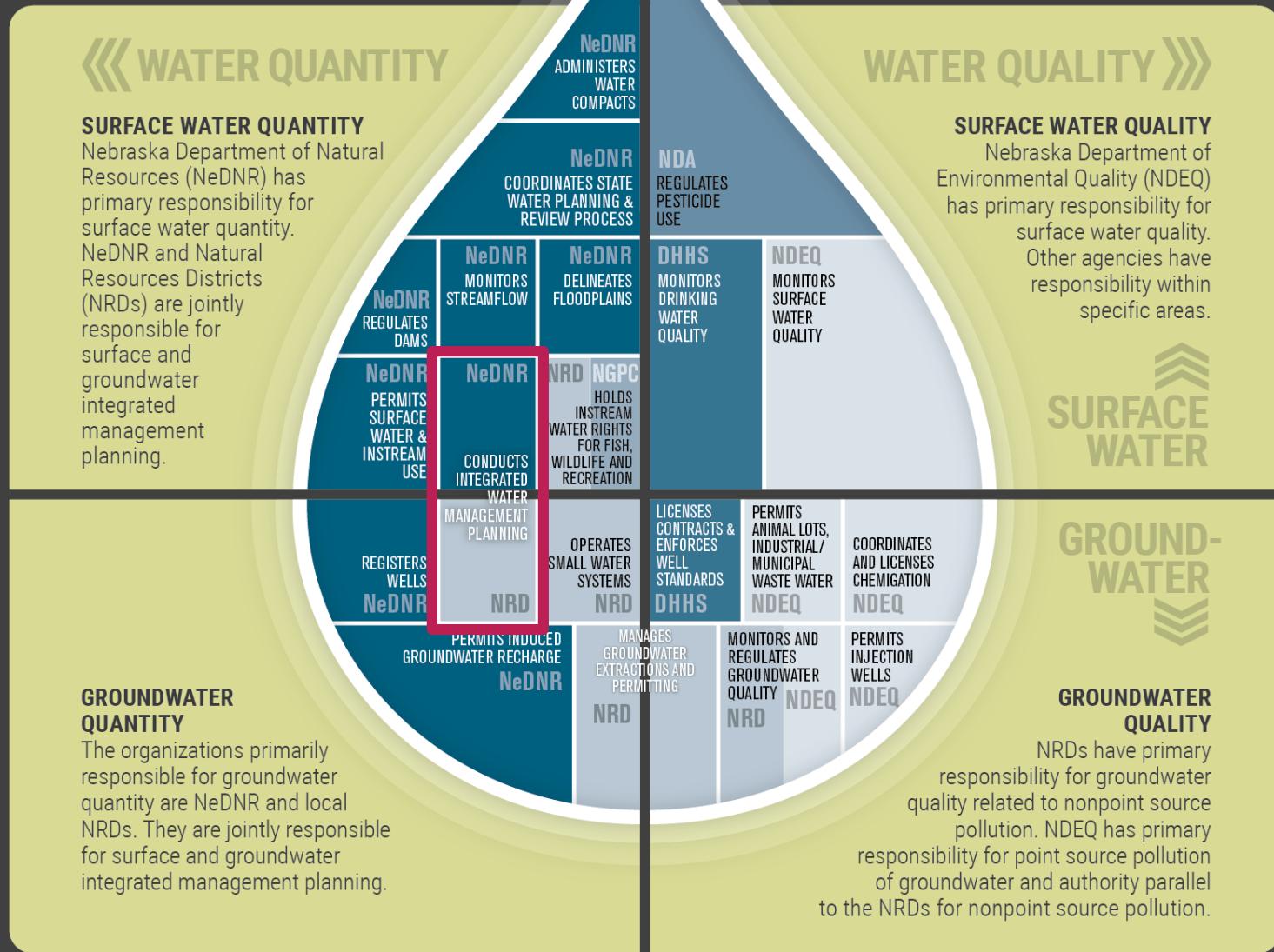
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Recharging Aquifers through Excess Surface Water Diversions

- Integrated Water Management and Conjunctive Water Management
- Application in Nebraska
 - Upper Platte River Basin
- Results and future work





Purpose

...An integrated management 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 river basin, subbasin, or reach

can be achieved and maintained for both the near term and the long term...

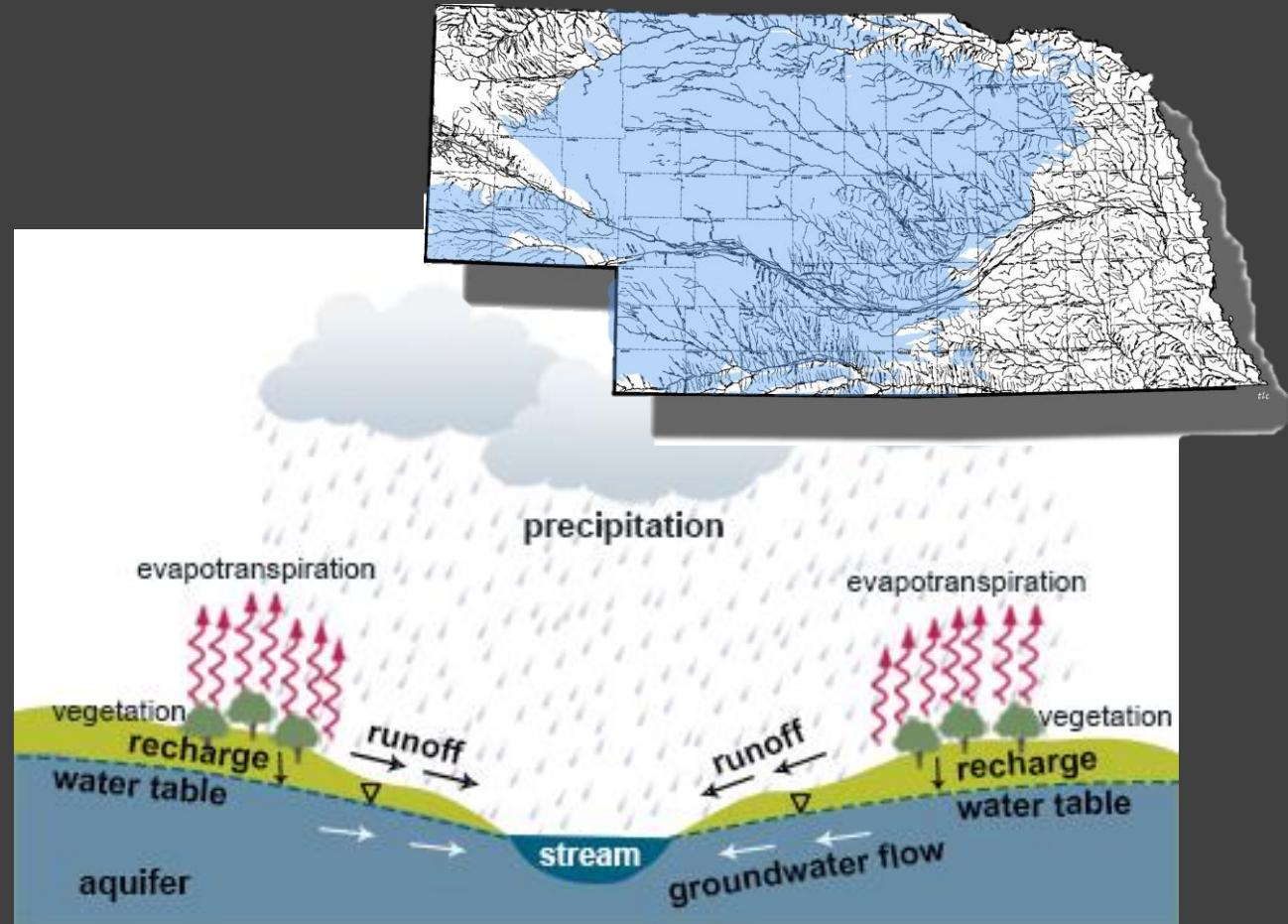


from *Neb. Rev. Stat. § 46-715 (2)*

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***.

UNDERLYING CONCEPTS

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



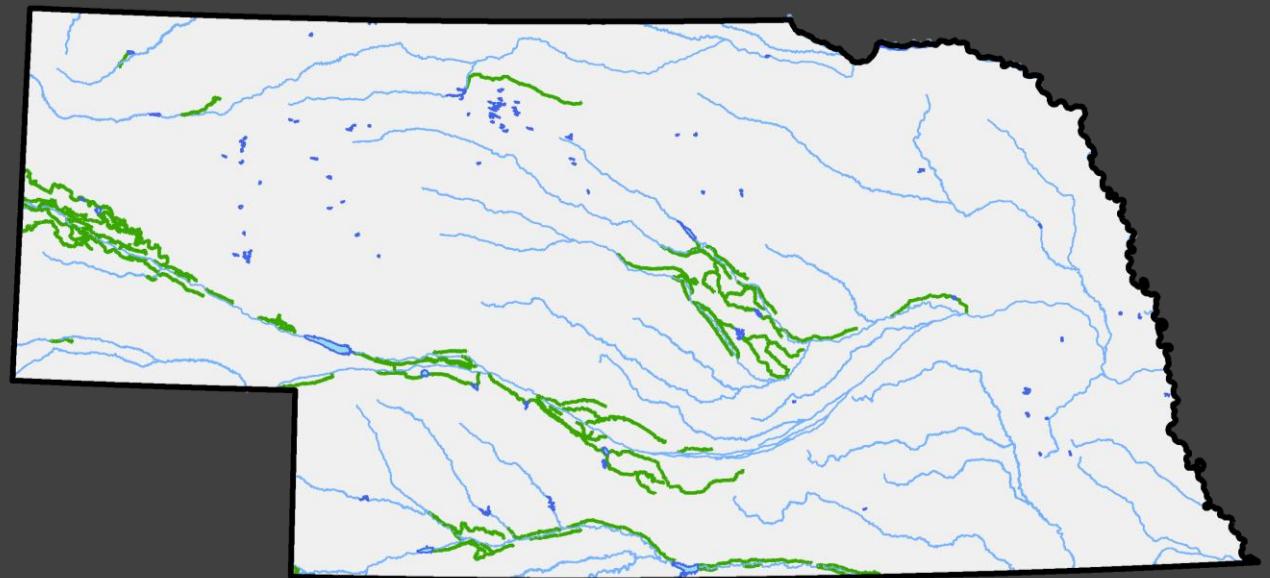
HOW IS CWM ACCOMPLISHED?

- Typically, by:
 - Using or storing additional surface water when it is plentiful
 - Relying more heavily on groundwater during dry periods
- Can change the timing and location of water for more efficient use



BENEFITS OF CWM

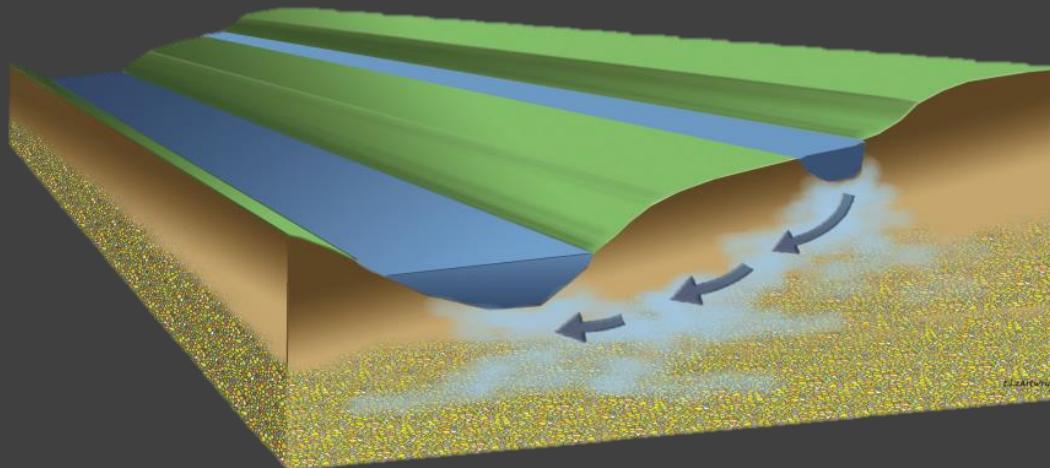
- Maximize available water supplies
- Leverage existing infrastructure
- Use existing planning framework
- Minimize the need for regulatory actions
- Customize to local opportunities or needs
- Maintain viability of existing uses



 Lake  Canal  Stream

EXAMPLES OF CWM PROJECTS

- Streamflow augmentation wells
- Broad scale recharge
- Slurry wall reservoirs
- Capturing excess flows via existing canals

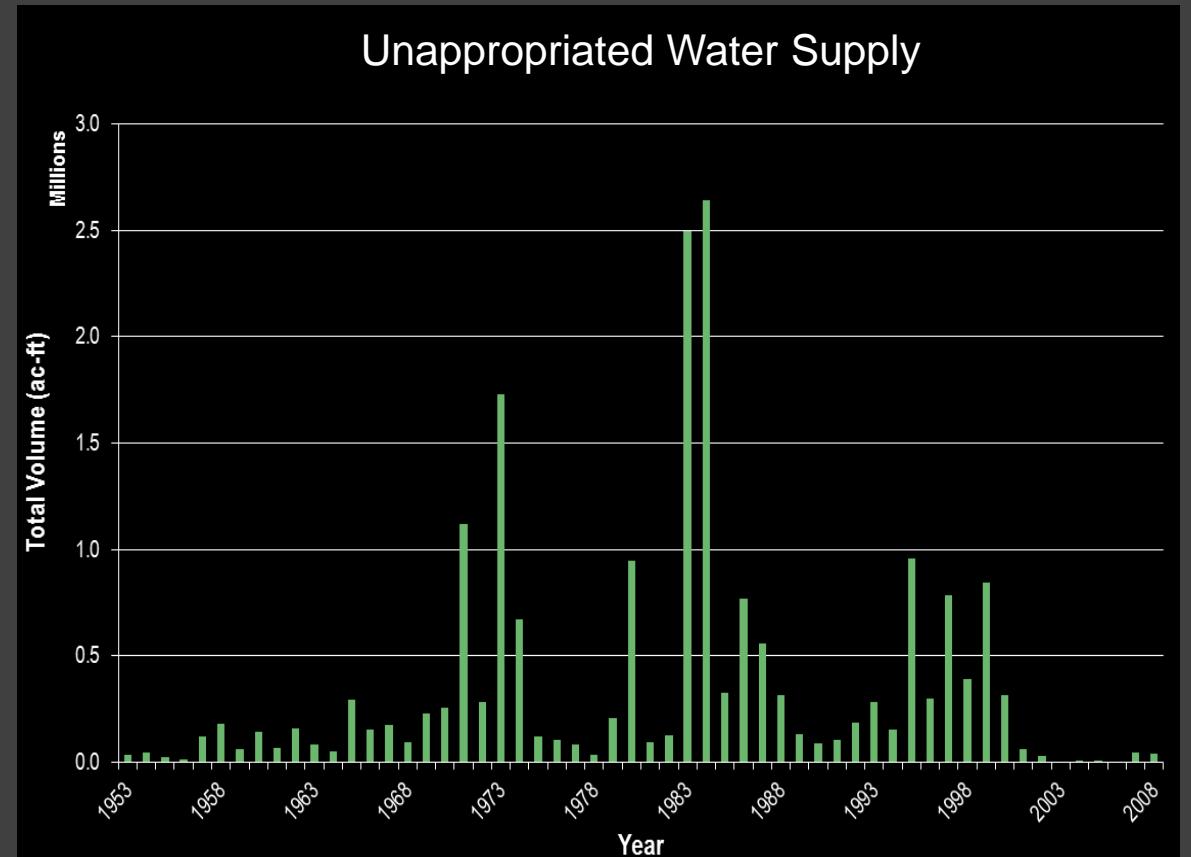
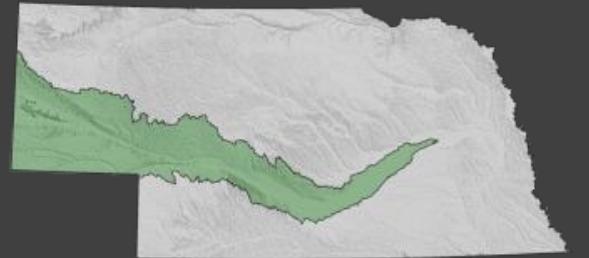




APPLYING CONJUNCTIVE MANAGEMENT IN THE UPPER PLATTE RIVER BASIN

UPPER PLATTE RIVER

- 1 million ac-ft/yr from snowmelt in WY
- More variable inflows from CO
- Water is generally fully allocated (overappropriated)
- Offset depletions since 1997, offset any new use
- Instream flow needs for fish and wildlife
- Unappropriated water occasionally available
- Extensive canal infrastructure
- Underlain by Ogallala Aquifer



2011 PILOT PROJECT

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

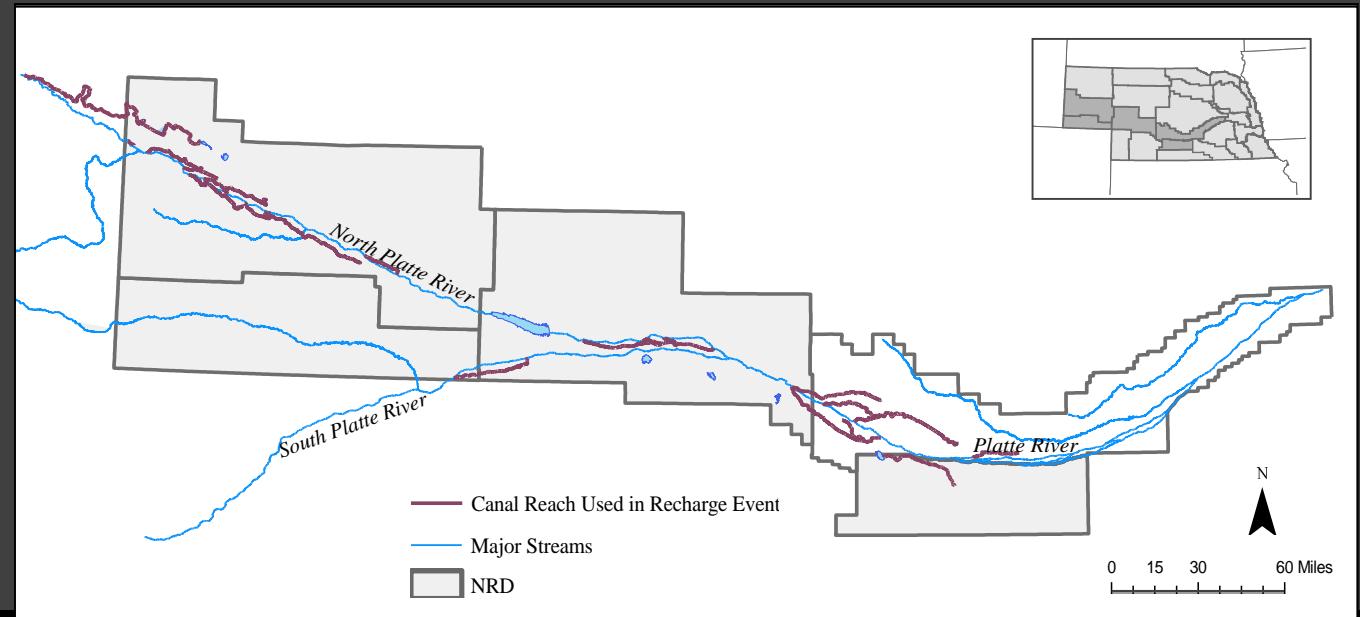


2011 PILOT PROJECT

23 Canals and 5 NRDs

Diversion Total 145,500 acre-ft
Recharge Total 96,120 acre-ft

Also helped mitigate flooding
impacts in the basin



PROCESS DEVELOPED

- NeDNR, NRDs contract with irrigation districts
 - Long term umbrella agreements, agreed upon rate
 - Task orders for specific events
 - Canal must have recharge permit – temporary 1 year
- NeDNR field office monitors flows, target flows, appropriations
- When flows are in excess of targets/all appropriations met, notifies canal operator can divert and notifies DNR main office
- Field office tracks when canal starts and stops diverting excess
- Water Planning division models recharge impacts to streamflows, measure progress toward IMP goals and objectives

Fall 2013 FLOOD FLOWS

South Platte River at North Platte, NE



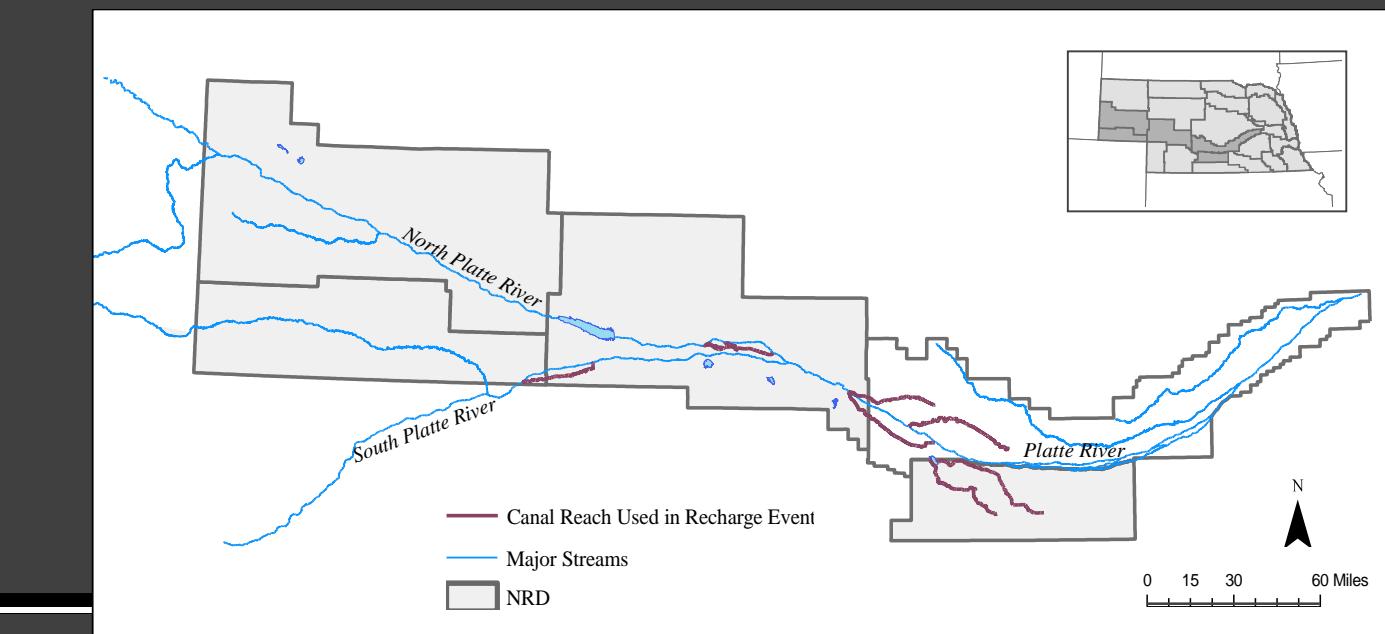
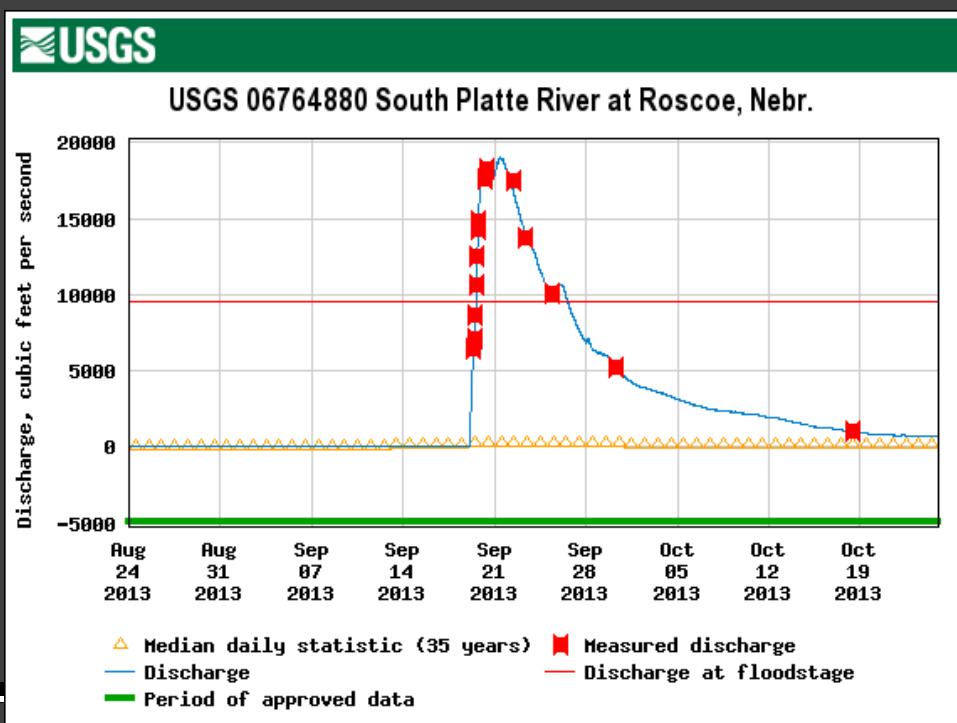
24 hours



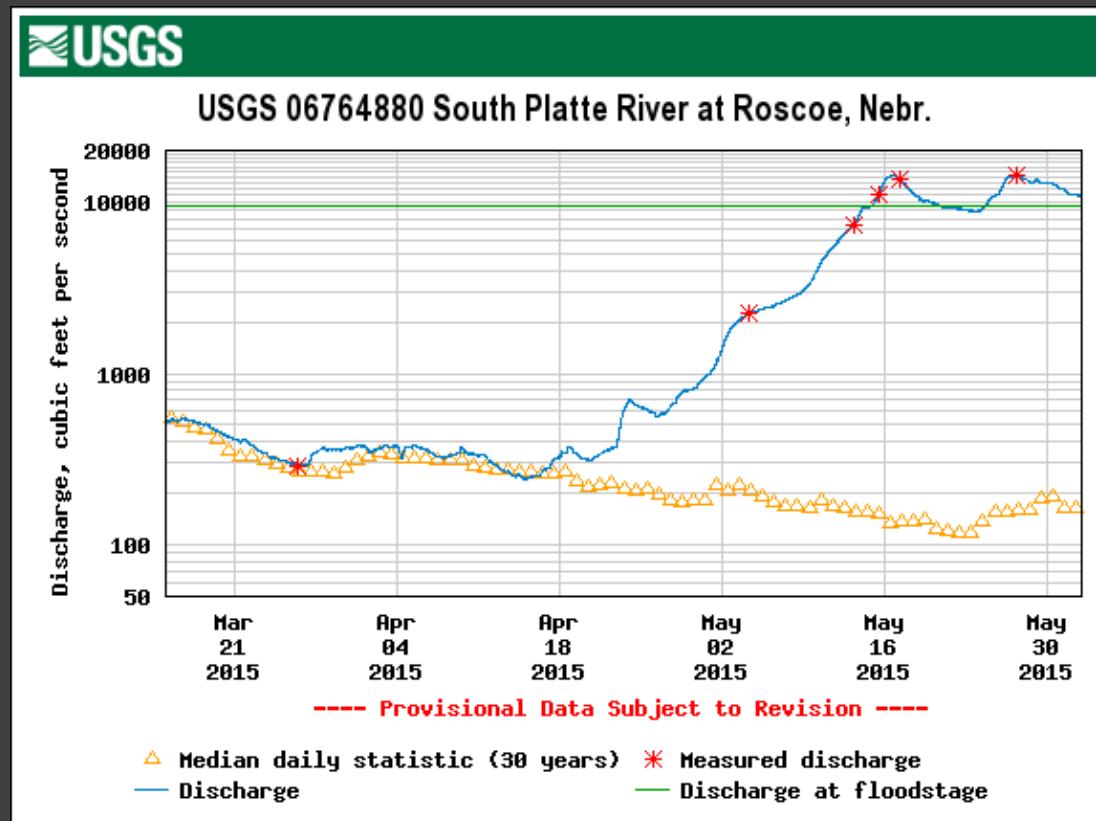
Fall 2013 FLOOD FLOWS

9 Canals and 4 NRDs

Diversion Total 27,300 acre-ft
Recharge Total 21,800 acre-ft



Spring 2015 FLOOD FLOWS

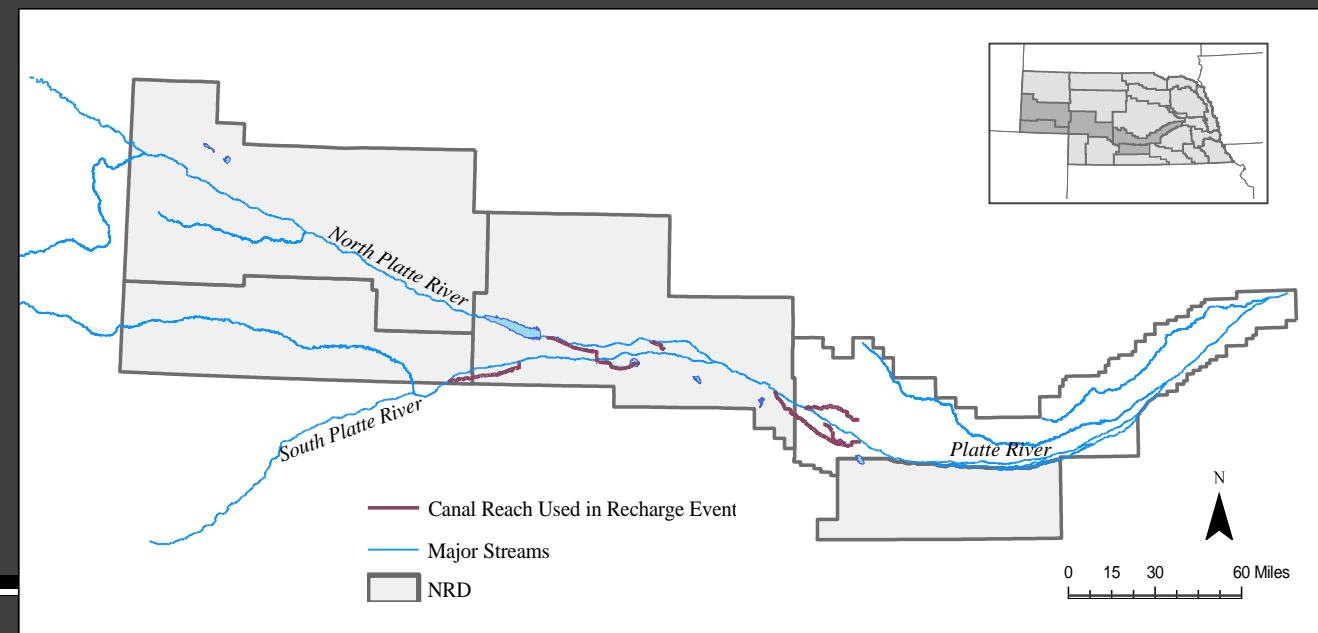


Spring 2015 FLOOD FLOWS

7 Canals and 4 NRDs

Diversion Total 17,600 acre-ft

Recharge Total 11,100 acre-ft



SUMMARY OF EXCESS FLOW DIVERSIONS

- Over **260,000** af diverted since 2011
- Recharge in excess of **176,000** af
- 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

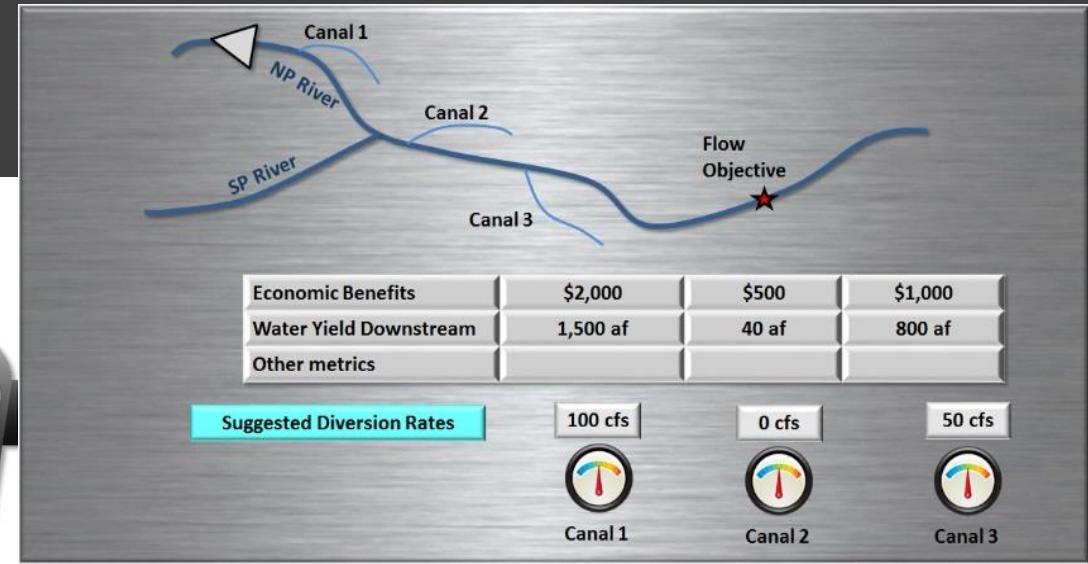
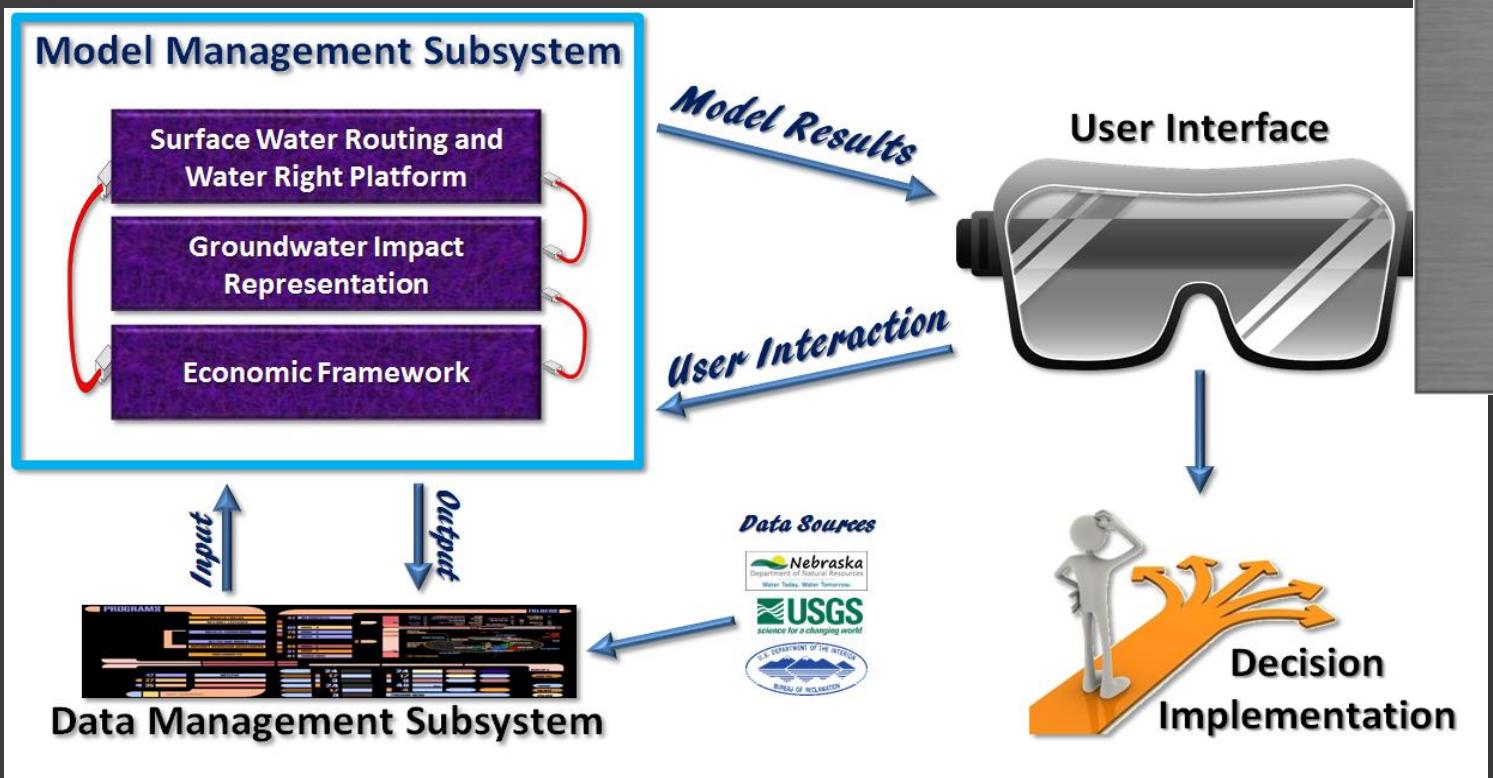


CWM FUTURE ACTIVITIES

- 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



Decision Support System



Questions?





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