

The Data, Tools, and Information that Support Water Management Planning

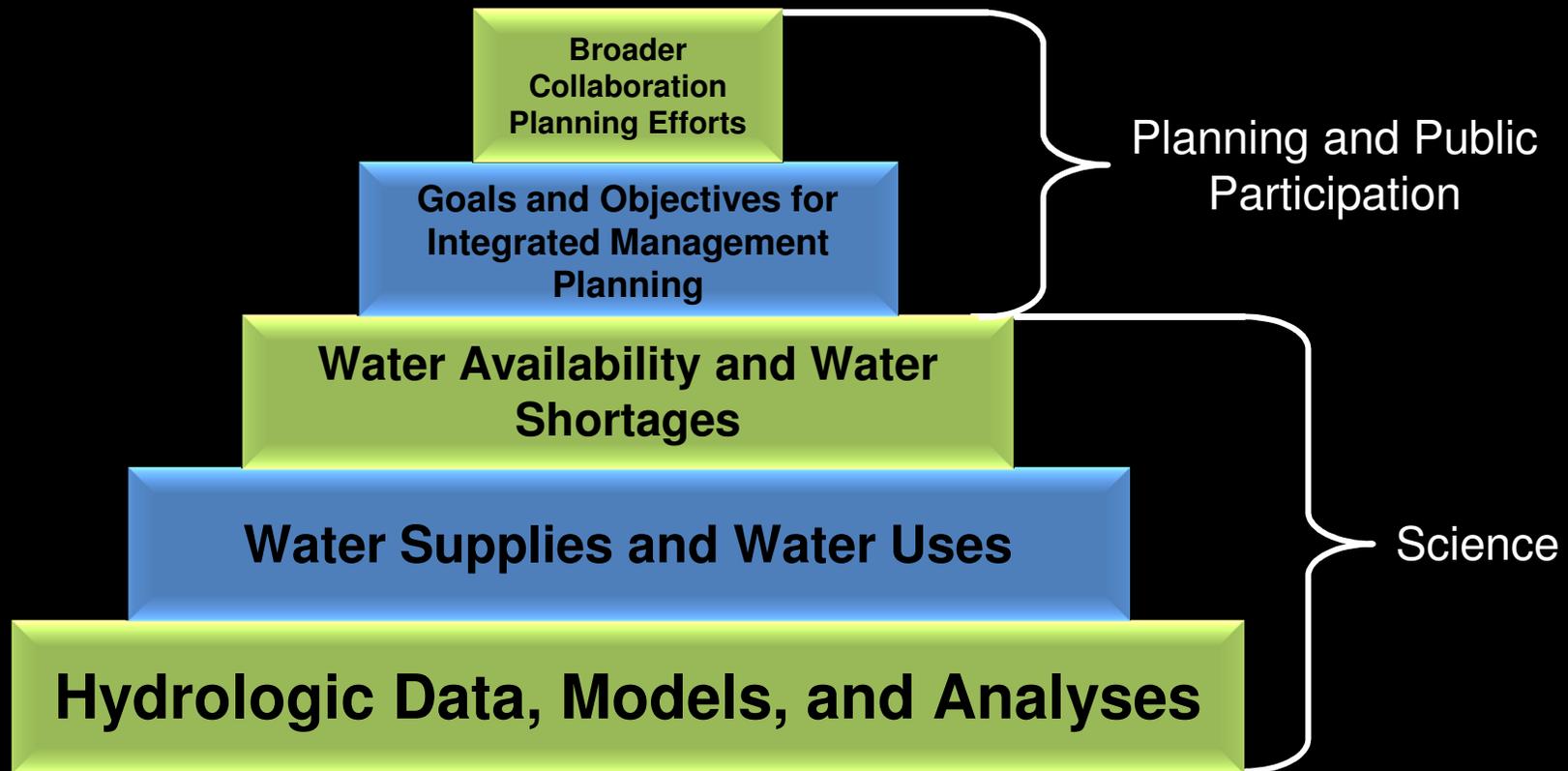
July 26, 2013

Presented to the
Water Funding Task Force

Jim Schneider Ph.D., *Nebraska Department of Natural Resources, Deputy Director*



Outline



Hydrologic Data, Models, and Analyses

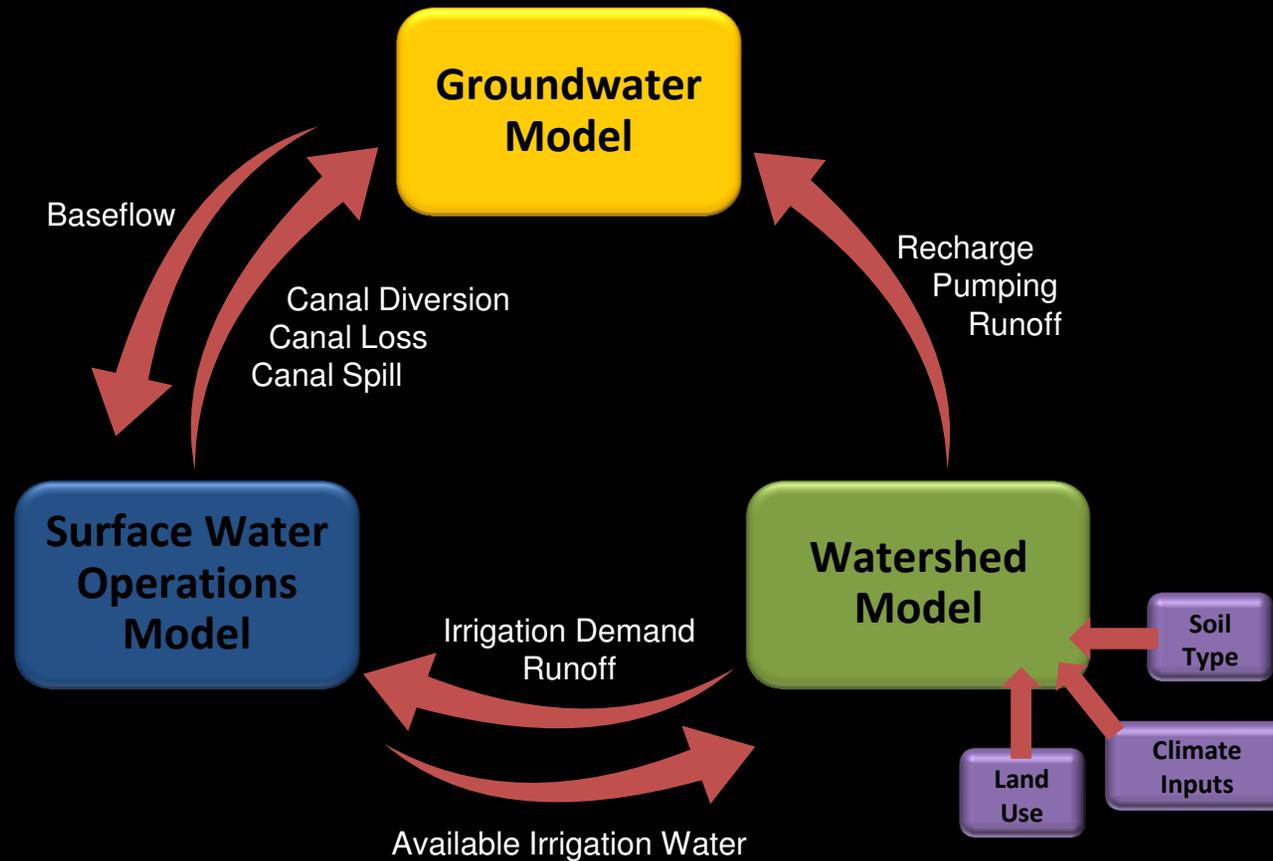
Hydrologic Data

- Climate
- Streamflows
- Groundwater Levels
- Soils
- Landuse
- Water consumption
- Hydrogeology

Hydrologic Modeling

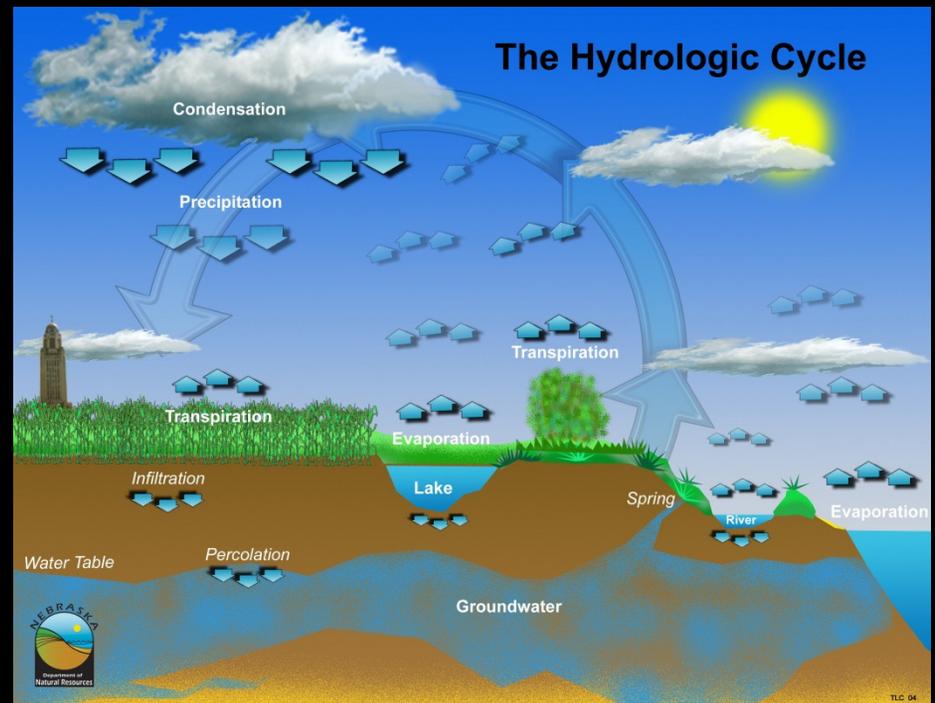
- Hydrologic system is easily observed.
- Much more difficult to understand causal relationships.
- Some things easily inferred (e.g., flooding).
- Other relationships are extremely complex (e.g., stream-aquifer interactions)
- Untangle various effects with Models.

Hydrologic Modeling Process

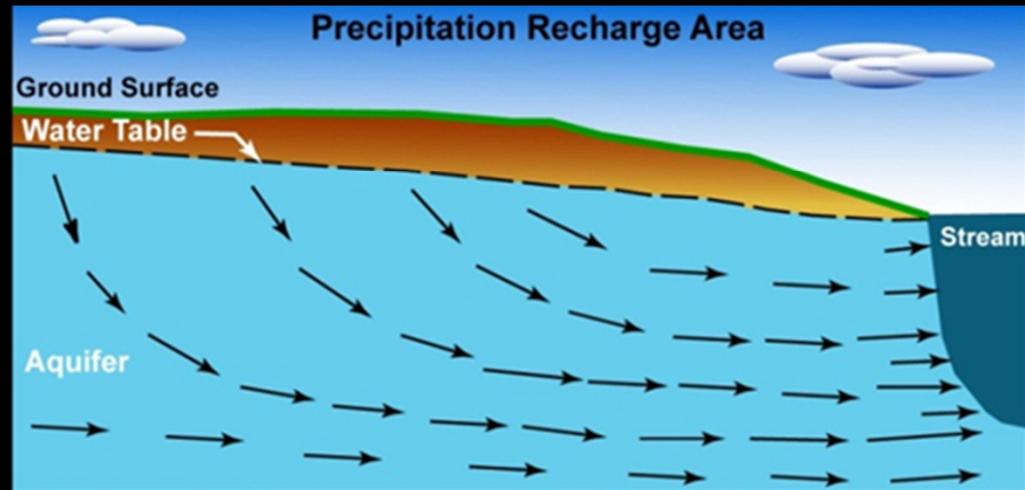
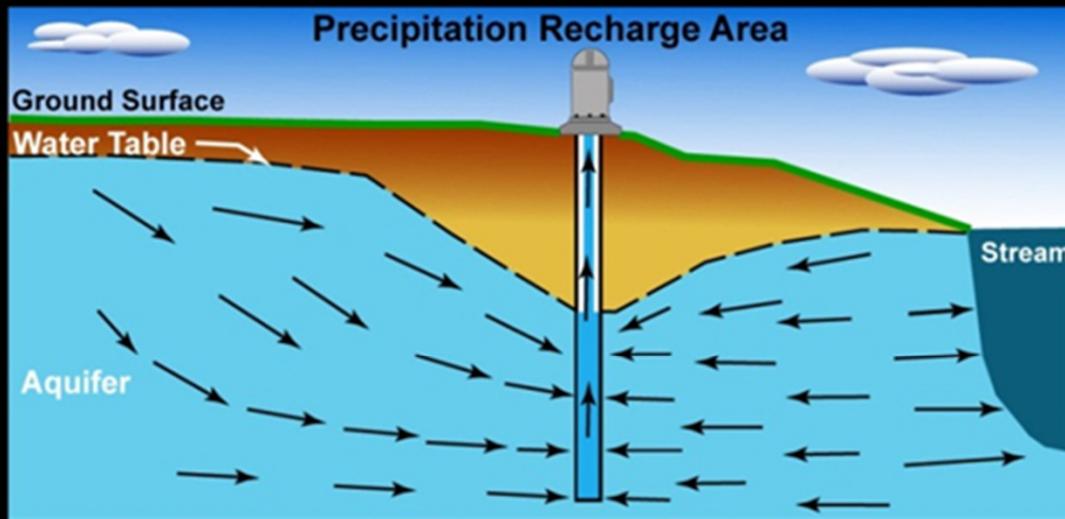


Hydrologic Analyses

- Understand the impacts of water use in time and space
 - Groundwater Use
 - Surface Water Use

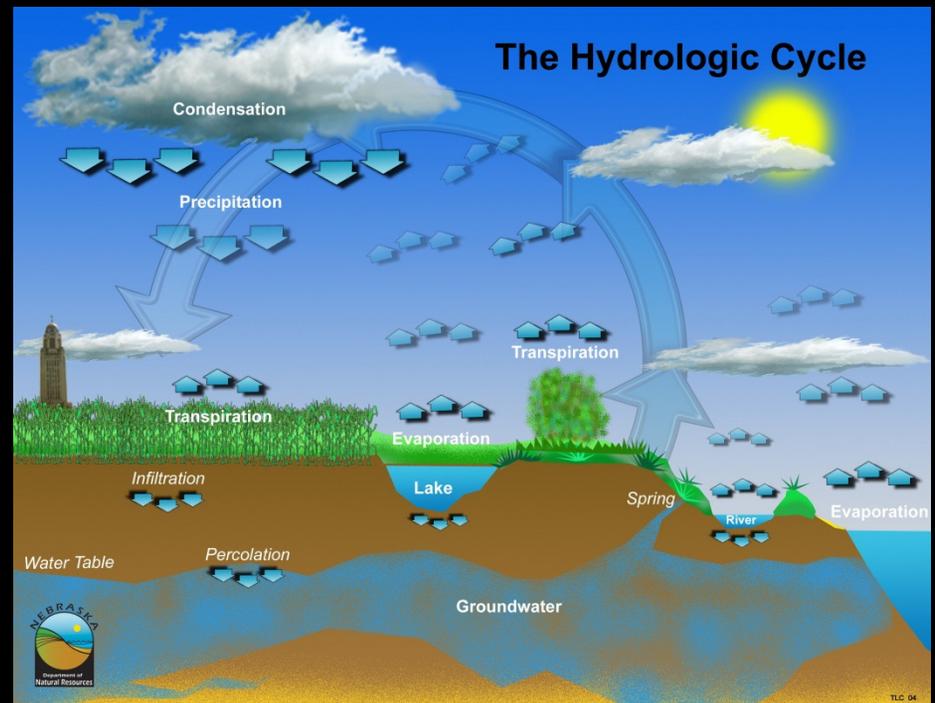


Groundwater Depletions

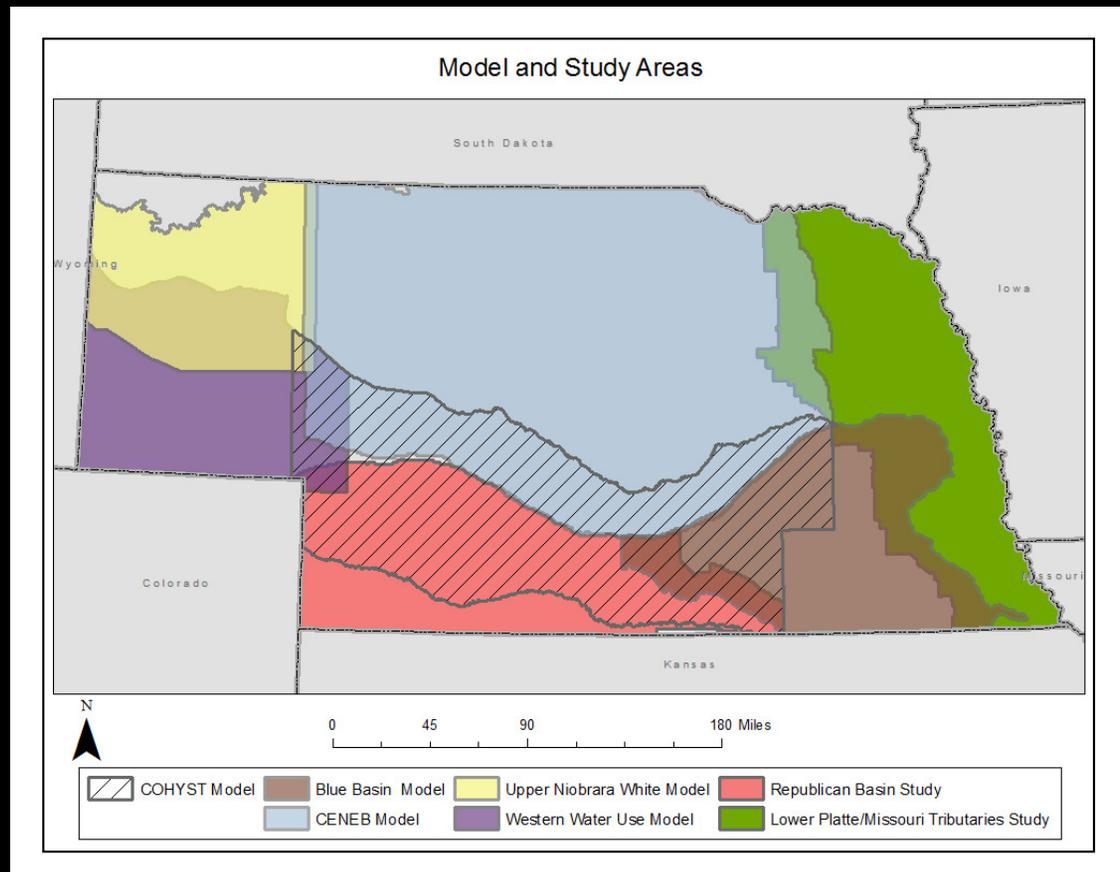


Surface Water Use

- Reservoir Operations
- Diversions
- Recharge
- Spills
- Consumption
- Comingled Uses



Current Models and Studies



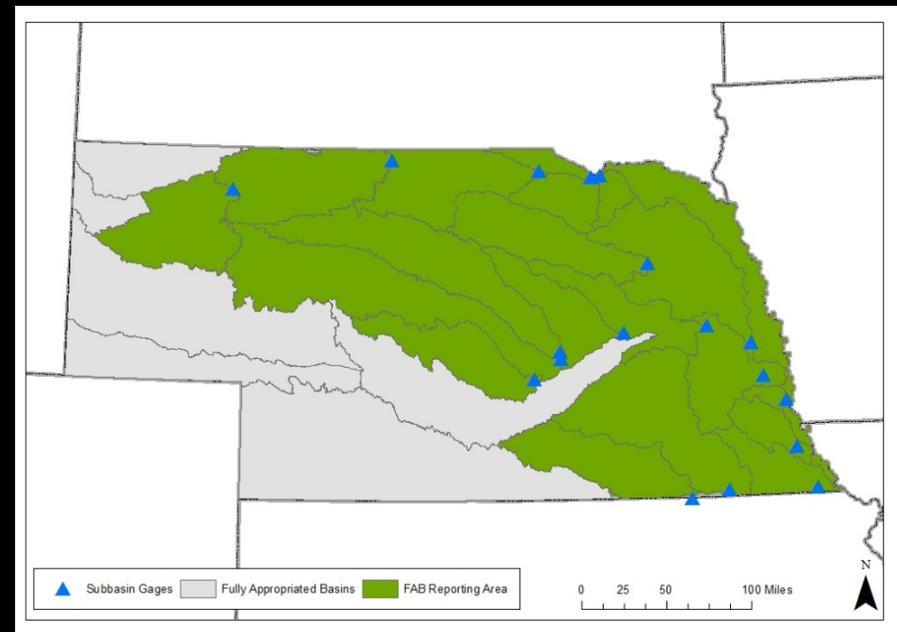
Water Supplies and Water Uses

Water Supplies and Water Uses

- Current Processes in IMP areas
 - Republican Basin
 - Compact accounting prescribes methods and allocations
 - Conjunctive management studies (WaterSMART)
 - Upstream portion of the Platte Basin
 - First increment focuses on post 1997 uses
 - Excess flow and conjunctive management studies

Water Supplies and Water Uses

- New Evaluation Methods
 - Other Basins across the state
- Basin Water Supplies
 - Streamflow
 - Groundwater Depletions
 - Surface Water Consumption
- Total Water Uses
 - Groundwater Consumption
 - Surface Water Consumption
 - Instream Flow Demands
 - Hydropower Demands
 - Downstream Water Demands



Water Availability and Water Shortages

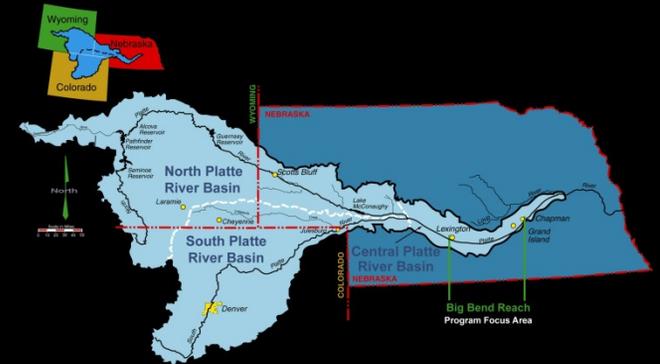
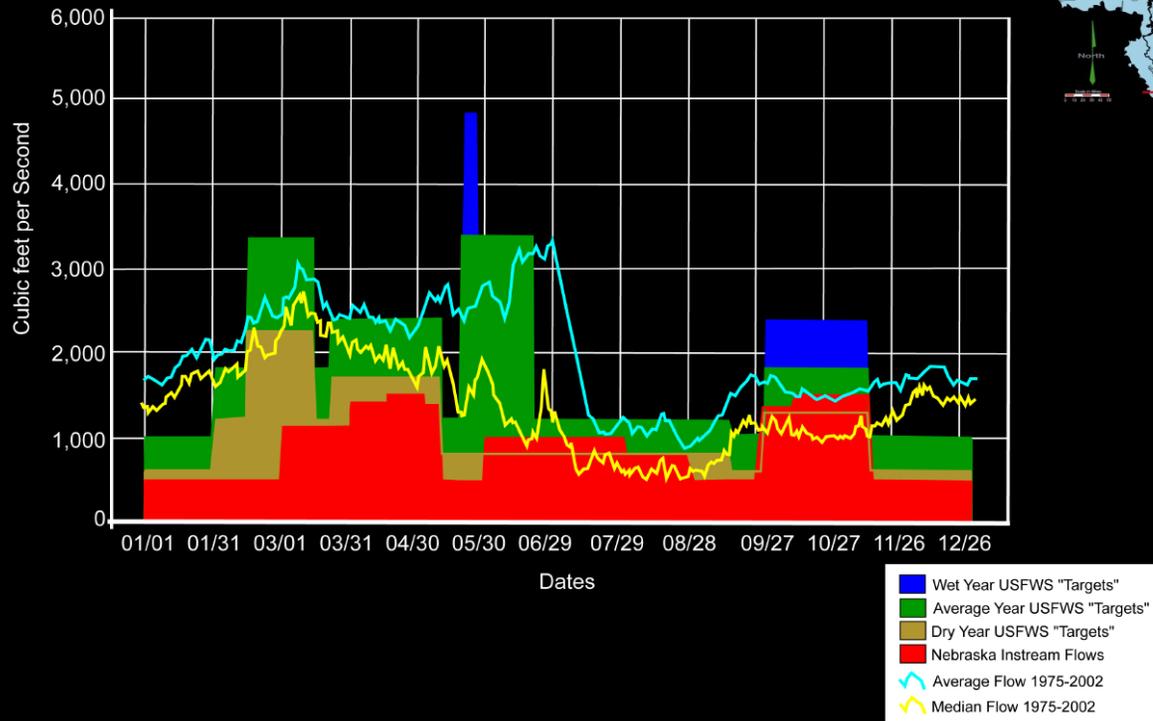
Water Availability and Water Shortages

- Variable water supplies
- External factors – Compacts and Agreements
- Existing groundwater and surface water uses within Nebraska

Water Availability and Water Shortages

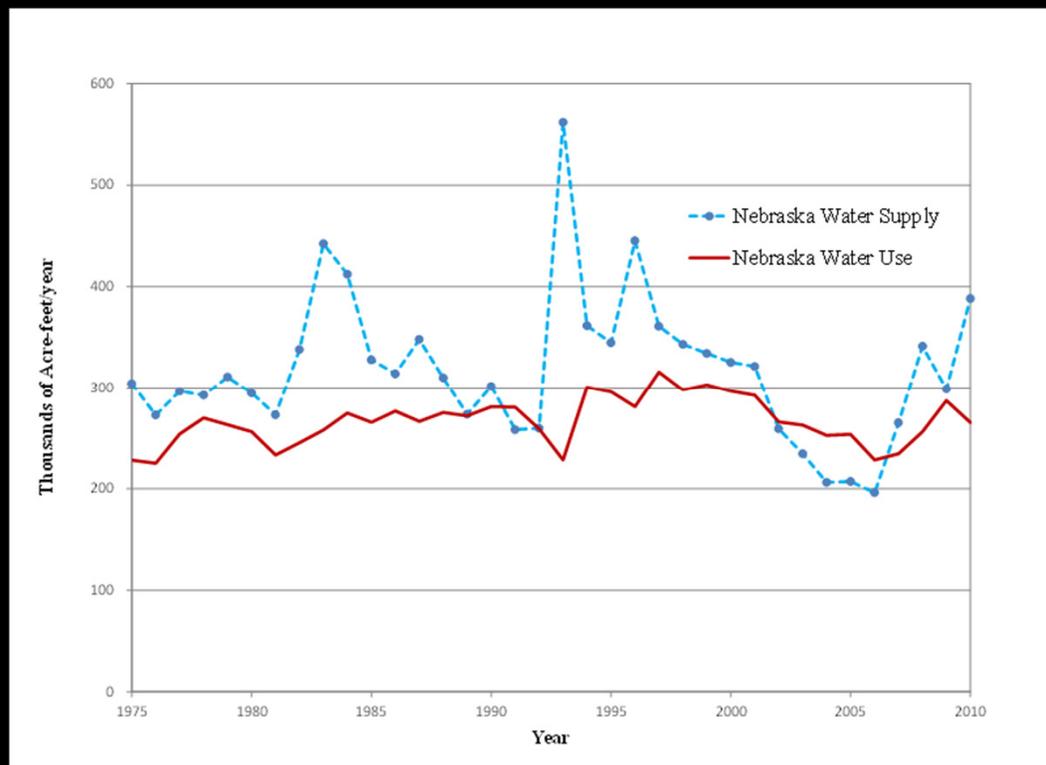
Comparison

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



Water Availability and Water Shortages

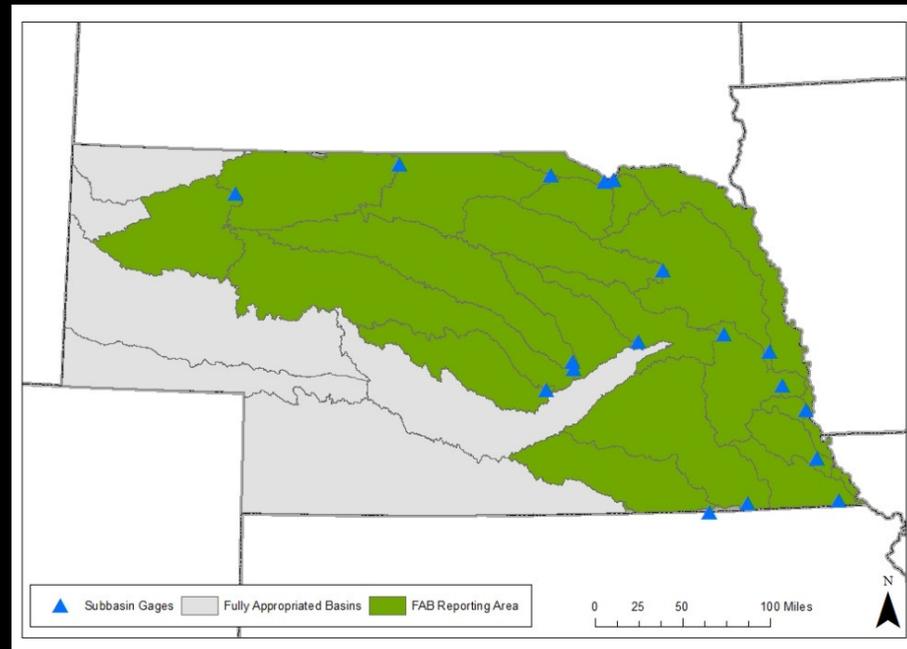
Republican River Basin Water Supplies and Uses



Water Availability and Water Shortages

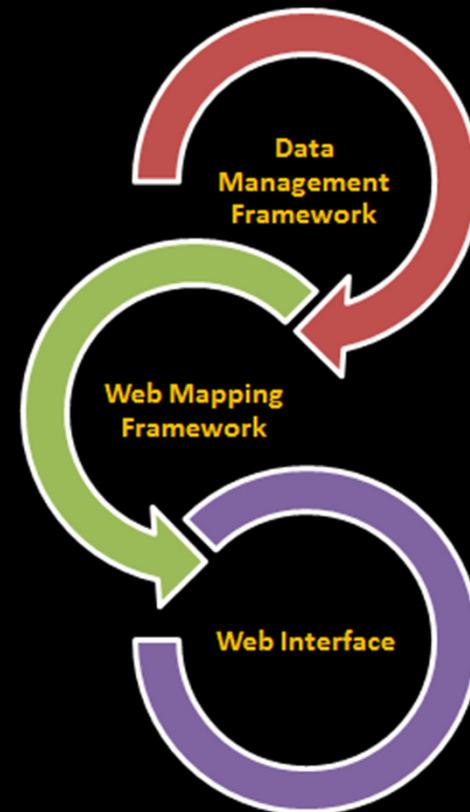
INSIGHT

(Integrated Network of Scientific Information and GeoHydrologic Tools)

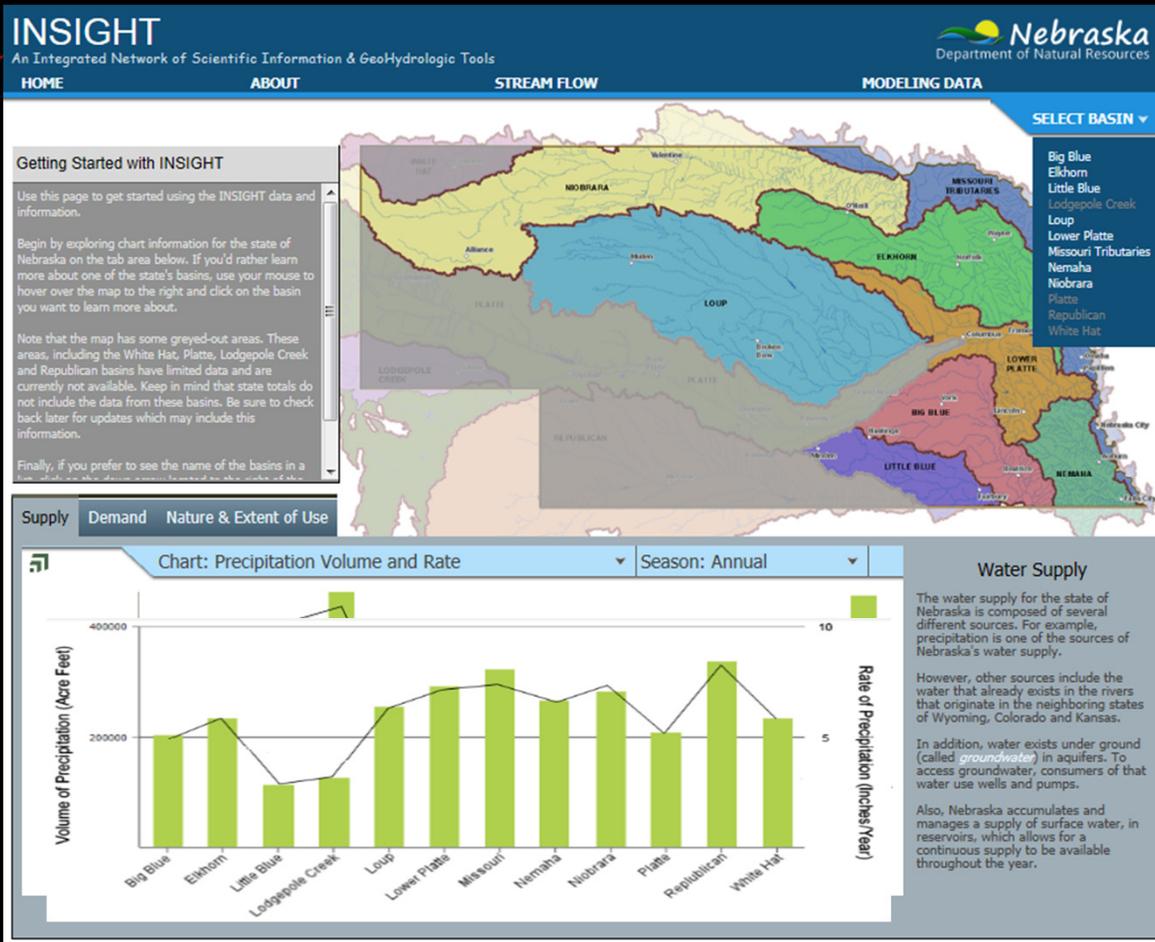


Water Availability and Water Shortages

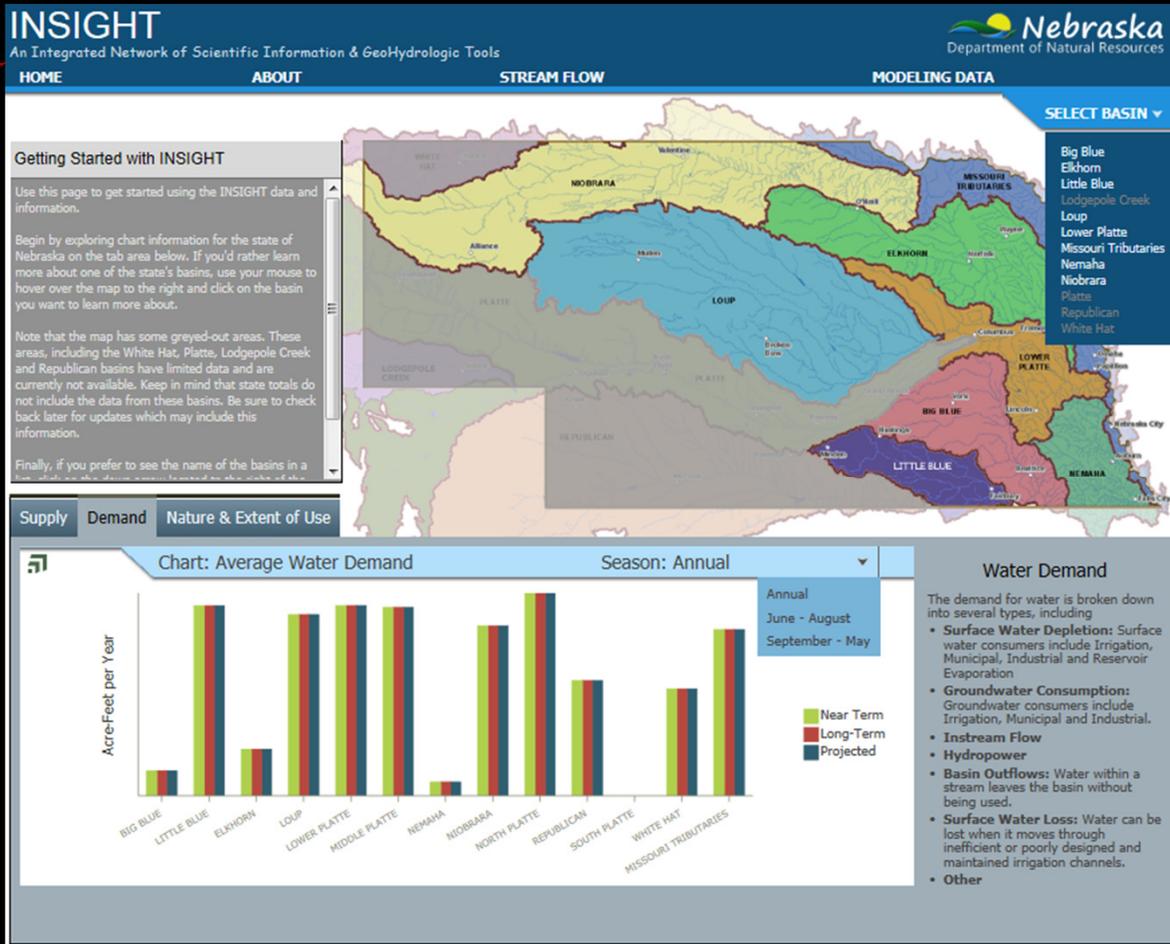
- Water Supplies
 - Basin water supplies
 - Groundwater depletions
 - Surface water depletions
 - Streamflow
- Water Uses/Demands derived from:
 - Meter data
 - Diversion records
 - Climate data
 - CROPSIM outputs
 - Water administration data
 - Land use data
 - And more...



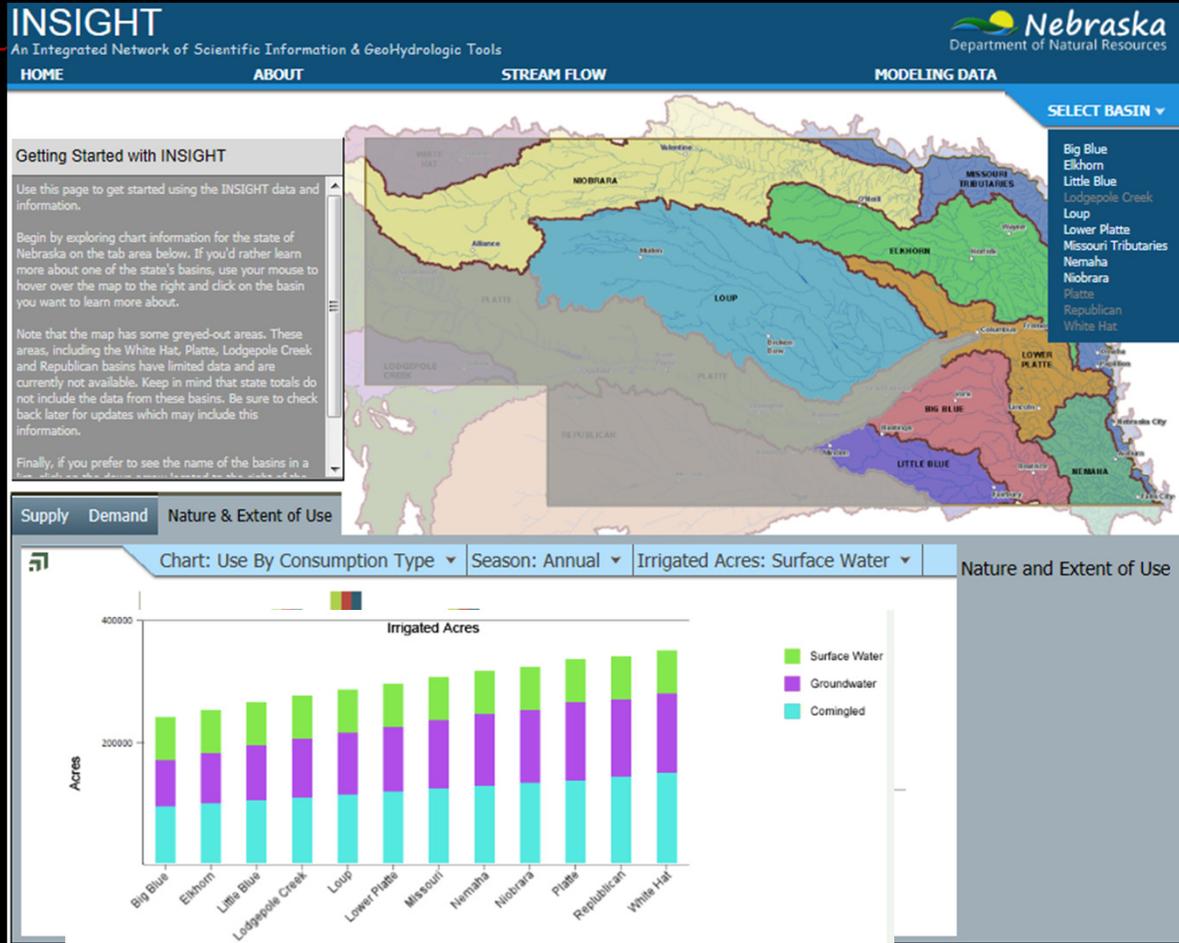
INSIGHT Statewide: Supply



INSIGHT Statewide: Demand



INSIGHT Statewide: Nature & Extent of Uses



INSIGHT Basin: Overview

INSIGHT

An Integrated Network of Scientific Information & GeoHydrologic Tools



HOME

ABOUT

STREAM FLOW

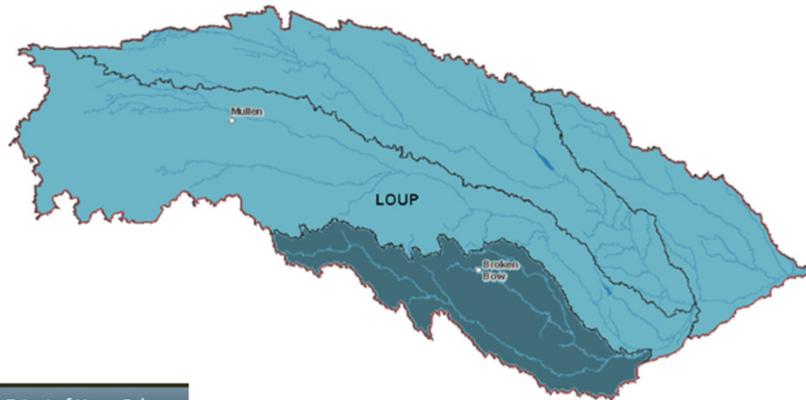
MODELING DATA

Explore the Loup Basin

Use this page to get started using the INSIGHT data and information.

Begin by exploring chart information for the Loup basin on the tab area below. If you'd rather learn more about one of the Loup's sub-basins, use your mouse to hover over the map to the right and click on the sub-basin you want to learn more about.

If you prefer to see the name of the basins in a list, click on the down arrow located to the right of the SELECT BASIN area to see a menu of basin names. Clicking on one of these basin names has the same effect as clicking on the basin in the map.



Basin Overview

Supply

Demand

Nature & Extent of Use

Balance

At a Glance

Basin:	LOUP
Area (square miles):	1,234,567
Population:	
Current Supply Sources:	sources
Current Water Demand:	1,293,871 acre-feet/year (19% of state total)
Largest Demand Sector:	largest sector (63% of regional total)
Projected Demand:	1,293,872 acre-feet/year
Growth (1999-2010):	1 acre-feet/year

Average Demand by Sector

	Surface Water	Groundwater
Irrigation	825,541 18%	825,541 18%
Municipal	465,156 22%	465,156 22%
Industry	45,565 4%	45,565 4%
Hydropower	344,504 16%	344,504 16%
Instream Flow	1,445,565 50%	1,445,565 50%

The Loup Basin is located in central Nebraska, and is entirely contained within the state. The Loup Basin, with an area of approximately 14,200 square miles, has more area in Nebraska than any other basin.

At its farthest western extent, the Loup Basin boundary is about halfway between Alliance, Nebraska, and Hyannis, Nebraska, in Sheridan and Garden Counties. The Loup River headwaters are about seven miles northwest of Hyannis, Nebraska. The basin is defined as draining to the confluence of the Loup River and Beaver Creek, about 25 miles upstream from Columbus, Nebraska. The Loup River extends beyond the basin boundary to its junction with the Platte River at Columbus, Nebraska.

According to the 2010 U.S. Census, the largest city in the basin is Broken Bow, with a population of about 3,600. In descending order, the next largest cities include St. Paul (2,300), Ord (2,100), Ravenna (1,400), and Fullerton (1,300).

The topography of more than half of the upstream end of the Loup Basin consists of sand hills, which are sand dunes stabilized in place by a grass cover. The downstream portion of the basin consists mostly of dissected plains, with small areas of upland plains. The upland plains are land that is flat to gently rolling and dissected plains are where streams have cut into former plains creating hilly land with steep slopes and sharp ridge crests, along with remnants of the plains on the hilltops. There are several valleys in the Loup Basin, which are the flat-lying areas along the Loup River and its major tributaries.

The primary aquifer in the Loup Basin is the Ogallala Formation, which consists of poorly sorted, generally unconsolidated clay, silt, sand, and gravel. The Ogallala Formation is part of a vast system of

INSIGHT Sub-Basin: Supply

INSIGHT

An Integrated Network of Scientific Information & GeoHydrologic Tools



HOME

ABOUT

STREAM FLOW

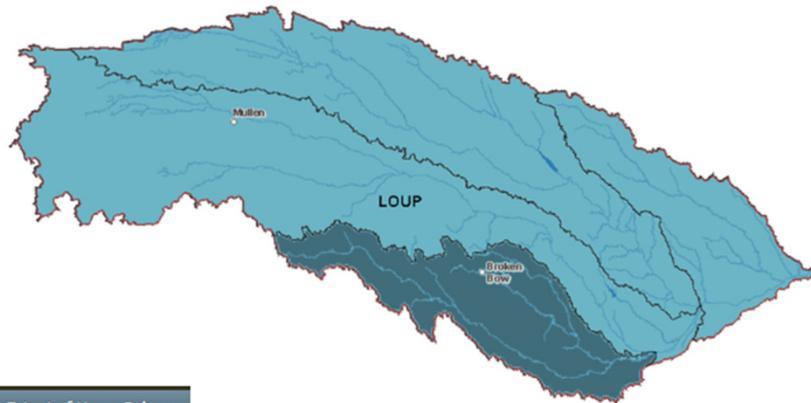
MODELING DATA

Explore the Loup Basin

Use this page to get started using the INSIGHT data and information.

Begin by exploring chart information for the Loup basin on the tab area below. If you'd rather learn more about one of the Loup's sub-basins, use your mouse to hover over the map to the right and click on the sub-basin you want to learn more about.

If you prefer to see the name of the basins in a list, click on the down arrow located to the right of the SELECT BASIN area to see a menu of basin names. Clicking on one of these basin names has the same effect as clicking on the basin in the map.



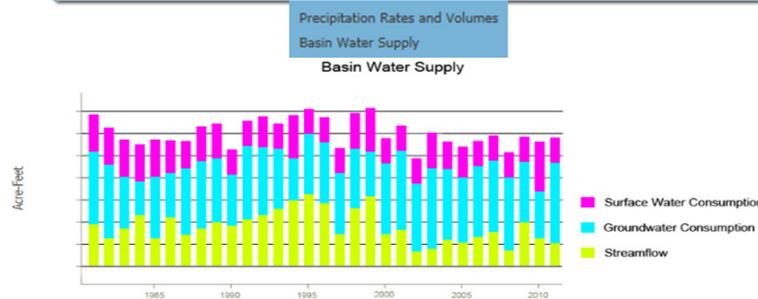
Basin Overview **Supply** Demand Nature & Extent of Use Balance



Chart: Basin Water Supply

Season: Annual

Nature and Extent of Use



INSIGHT Sub-Basin: Balance

INSIGHT

An Integrated Network of Scientific Information & GeoHydrologic Tools

Nebraska
Department of Natural Resources

HOME

ABOUT

STREAM FLOW

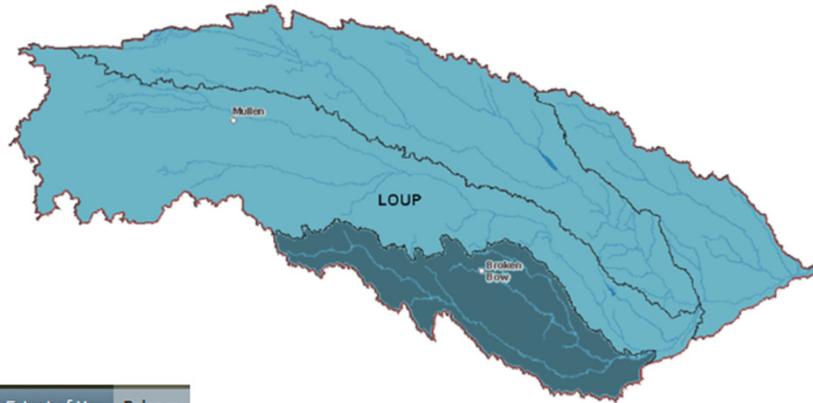
MODELING DATA

Explore the Loup Basin

Use this page to get started using the INSIGHT data and information.

Begin by exploring chart information for the Loup basin on the tab area below. If you'd rather learn more about one of the Loup's sub-basins, use your mouse to hover over the map to the right and click on the sub-basin you want to learn more about.

If you prefer to see the name of the basins in a list, click on the down arrow located to the right of the SELECT BASIN area to see a menu of basin names. Clicking on one of these basin names has the same effect as clicking on the basin in the map.



Basin Overview Supply Demand Nature & Extent of Use Balance



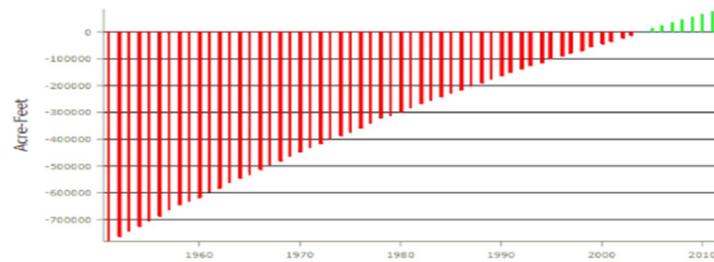
Chart: Near-Term Balance of Supplies and Demands

Season: Annual

Time Frame: Near-Term

Nature and Extent of Use

Near-Term Balance of Basin Water Supplies and Total Demands



Summary

- Sound water management planning requires foundational data on water supplies and water uses such that times of availability and shortage can be identified
- Through IMPs the Department works in conjunction with local NRDs to develop extensive information on water supplies and water uses in fully appropriated and overappropriated areas such that water management projects can be most effective
- This years release of the new fully appropriated report and INSIGHT will provide detailed summaries of water supplies, water uses, and balances at the sub-basin level that can support proactive planning efforts

Thank you

Questions?

