



INSIGHT: A new look at water supplies and uses in Nebraska

Presented to the
Nebraska Water Resources Association
Water Round Table

February 12, 2014

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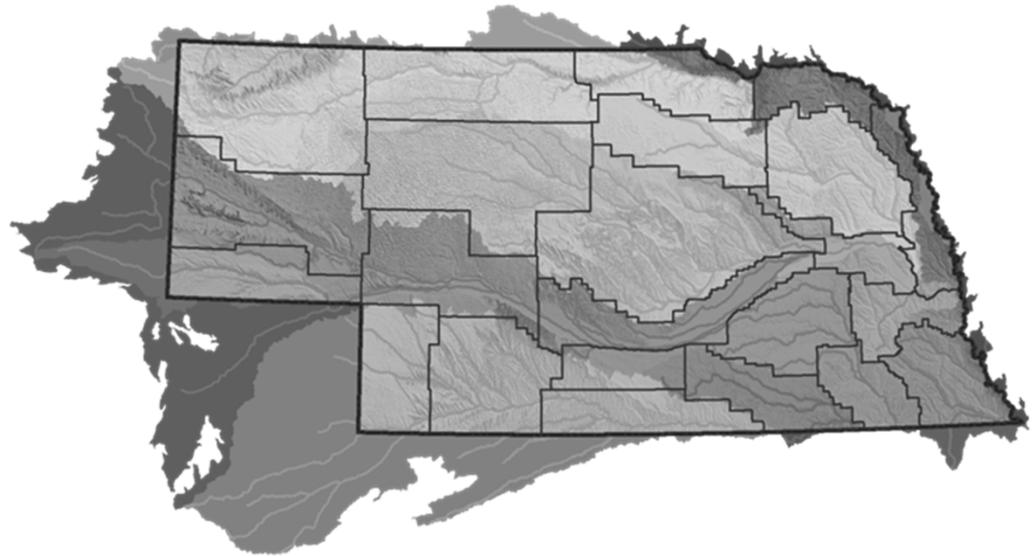
Nebraska Department of Natural Resources



Department of Natural Resources

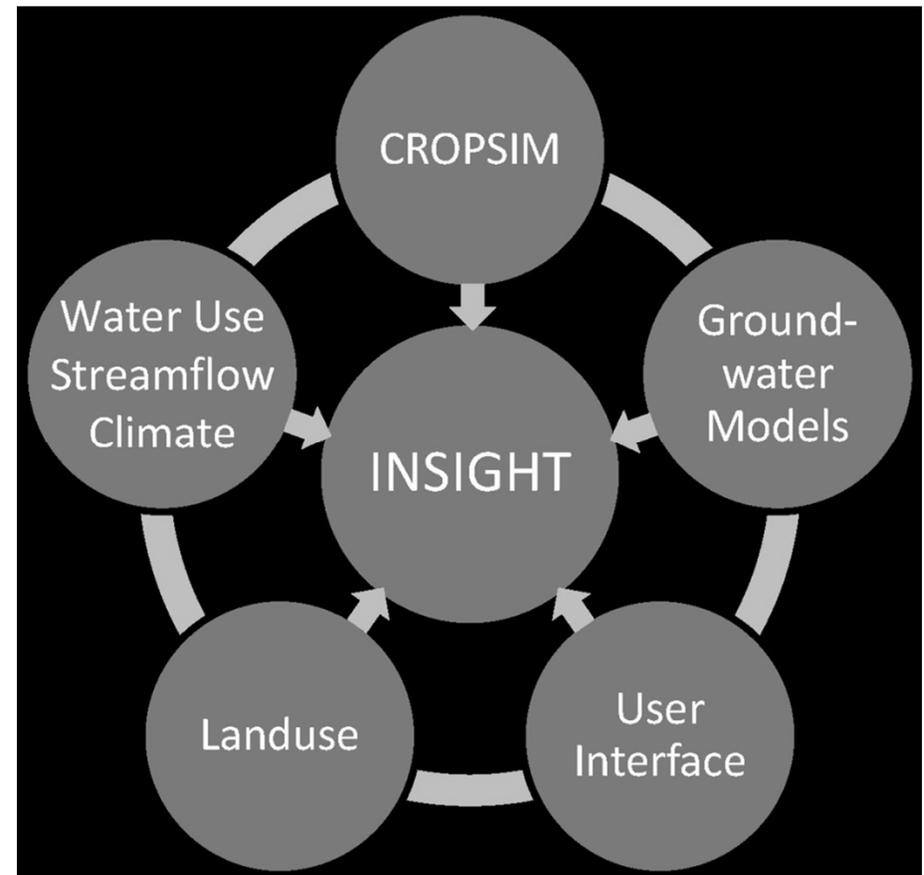
Outline

- Primary purpose of INSIGHT
- Collaborative development of INSIGHT methods
- INSIGHT demo

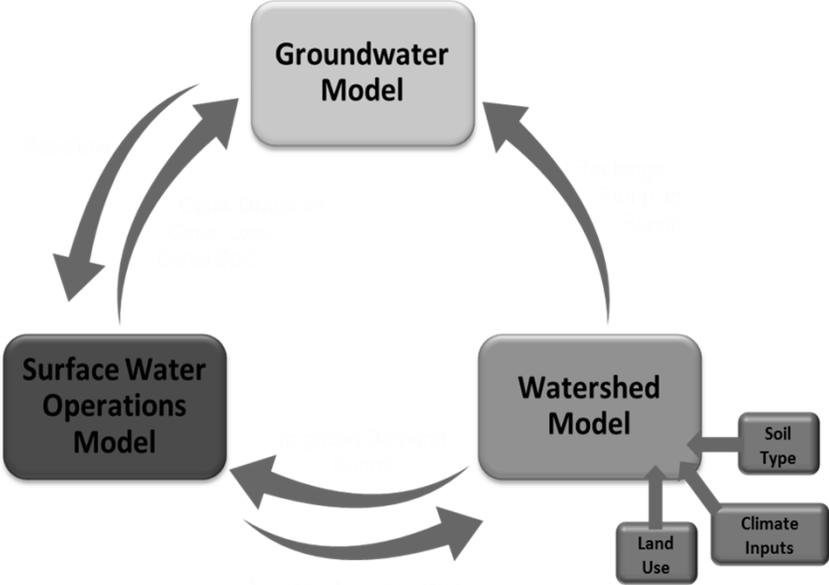
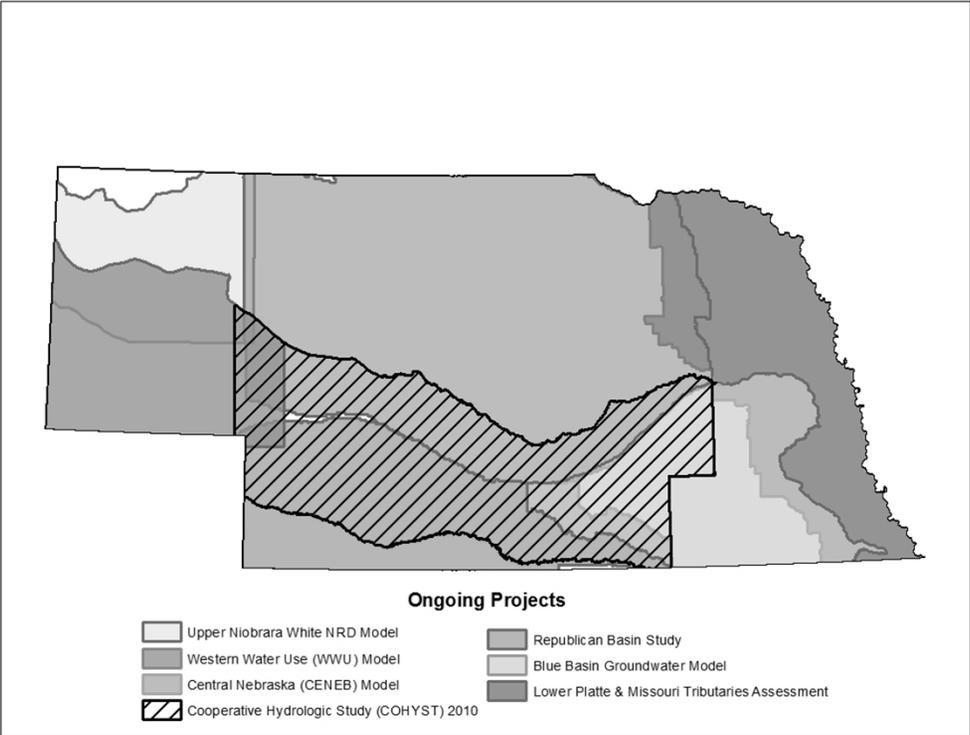


INSIGHT – *Integrated Network of Scientific Information & GeoHydrologic Tools*

- An annual snapshot of water conditions across the state
- An educational tool for water managers and the public
- A tool to help evaluate water management options



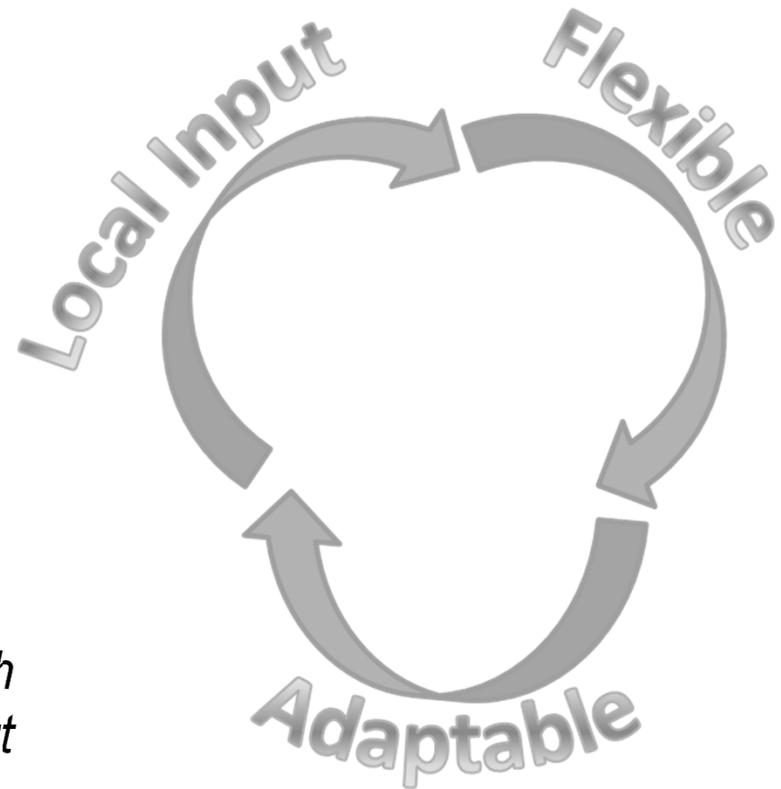
Integration of Modeling Data



Collaboration with Stakeholders

- The Department and stakeholders collaborated through:
 - Public Q&A sessions
 - Public hearings
 - Public comment period
 - Stakeholder interviews

Stakeholders were provided with various means of providing input (e.g., written/public comments)



Statewide Data

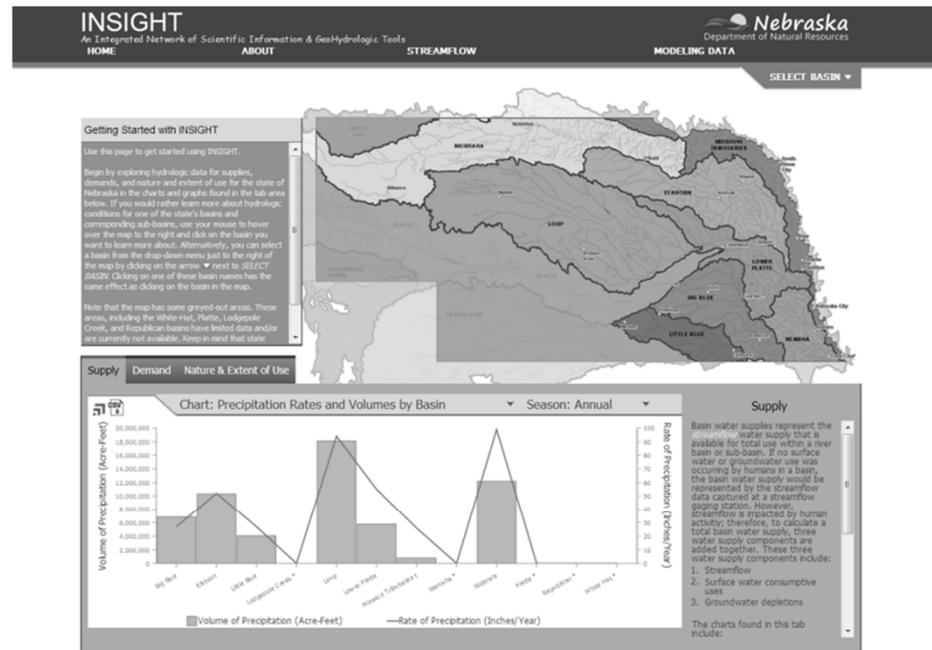
Basin-to-Basin Comparisons

Information available:

- ✓ Supply
- ✓ Demand
- ✓ Nature & Extent of Use

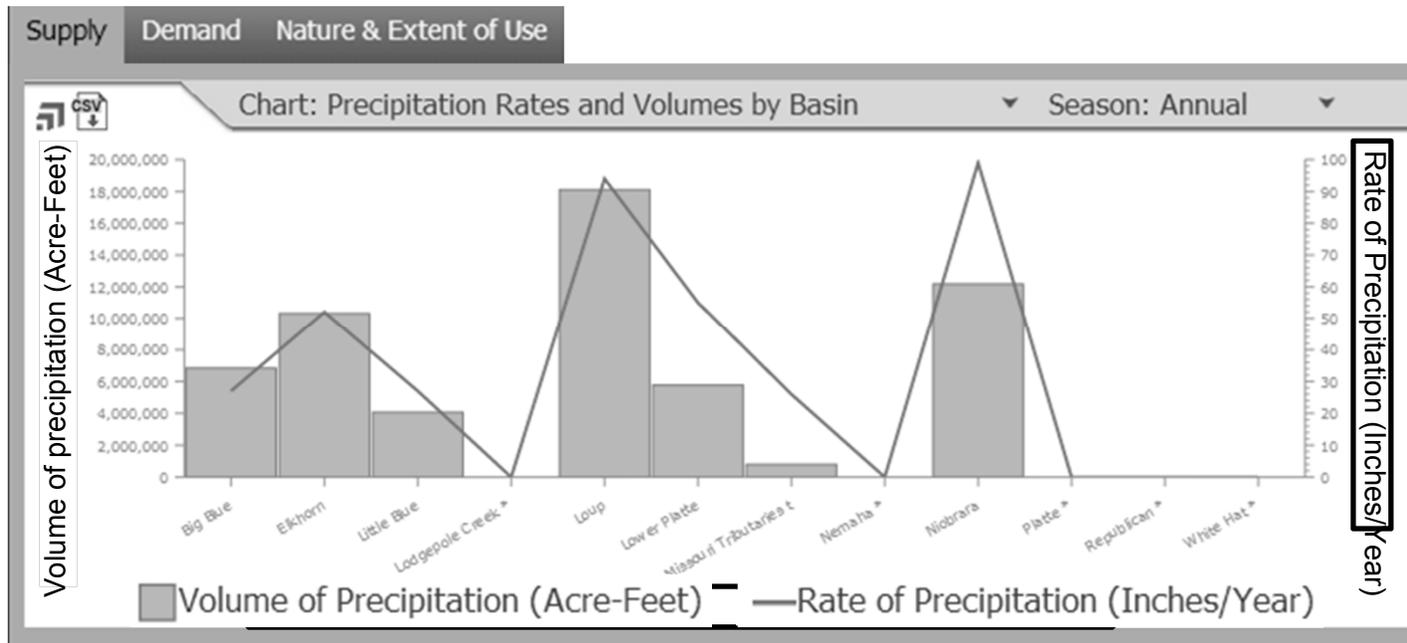
Seasons available:

- ✓ Annual
- ✓ Peak
- ✓ Non-Peak



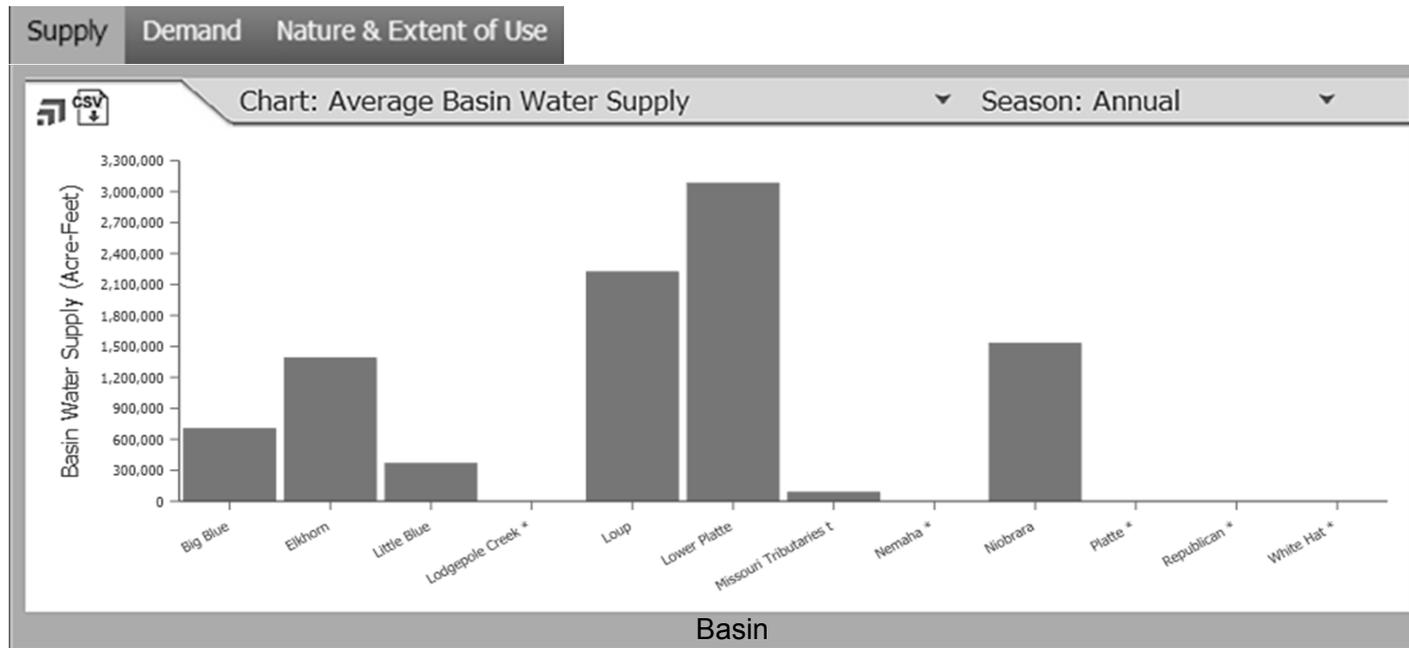
Statewide Data: Supply

Precipitation Rates and Volumes by Basin



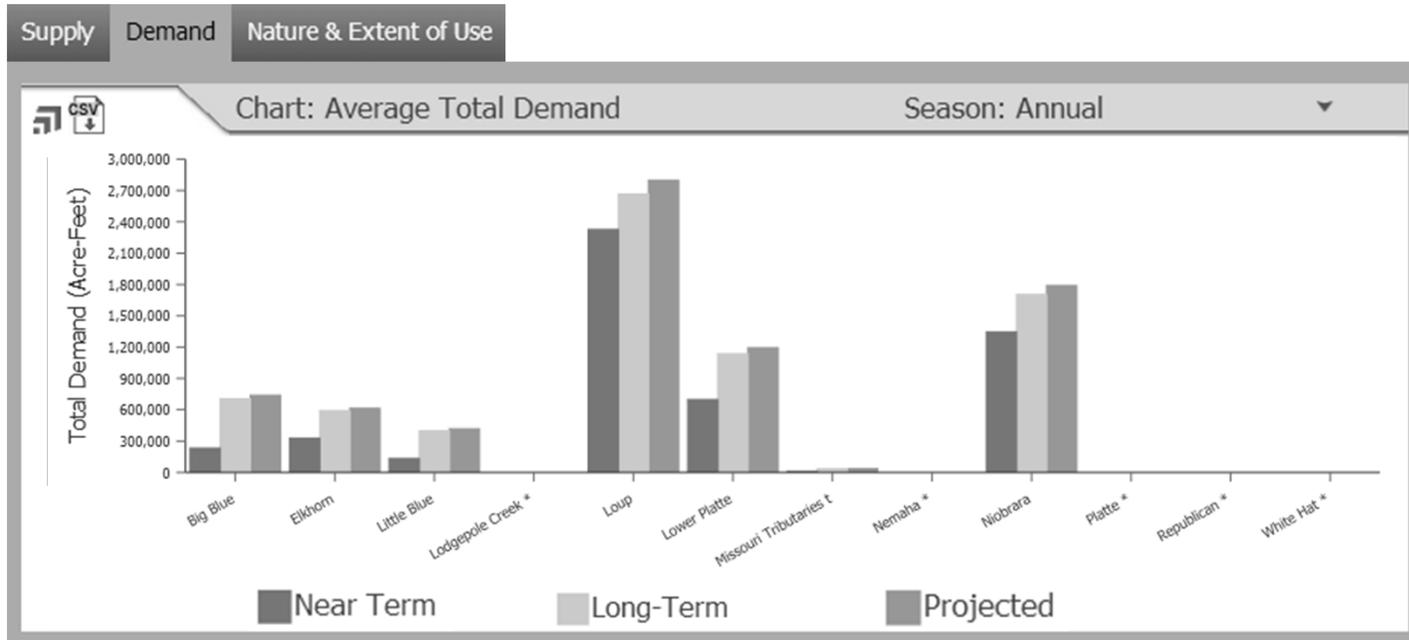
Statewide Data: Supply

Average Basin Water Supply

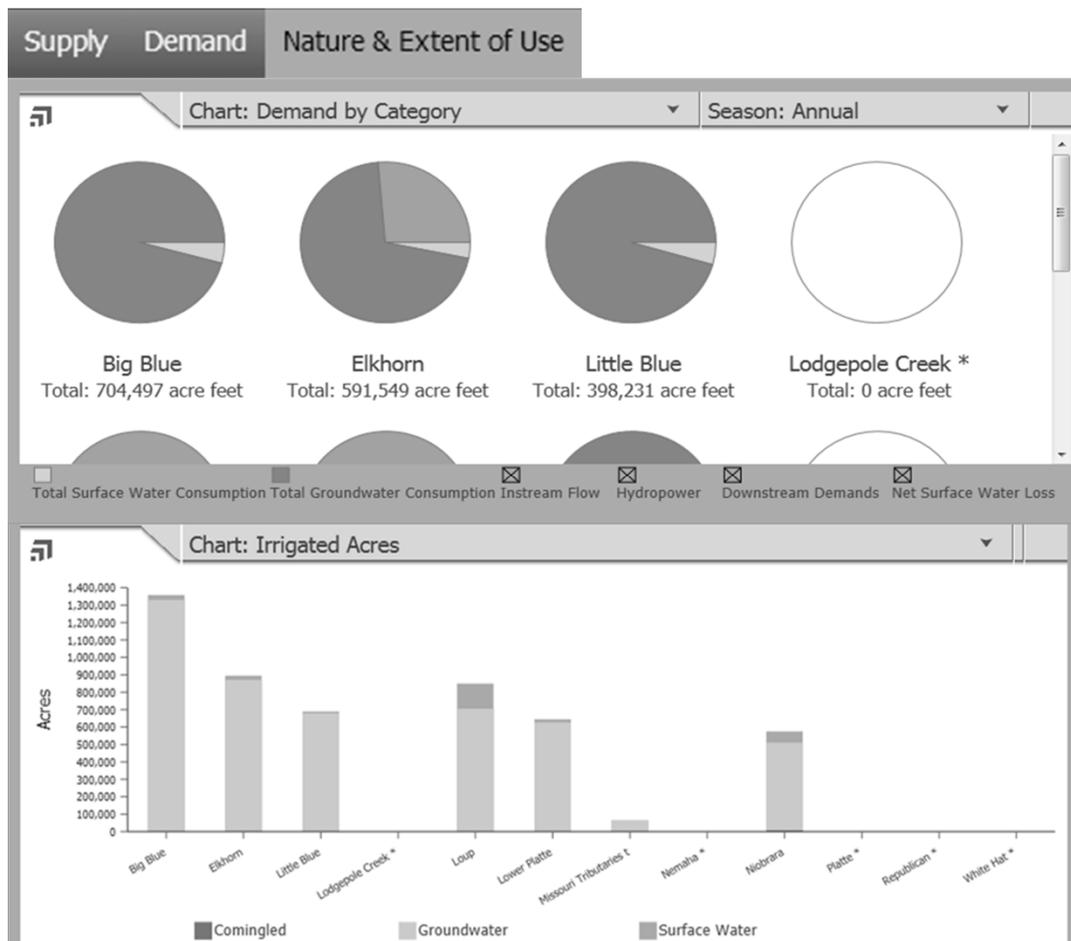


Statewide Data: Demand

Average Total Demand



Statewide Data: Nature & Extent of Use



Average Long-Term Total Demand by Basin by Category

Irrigated Acres by Basin by Source

Basin and Subbasin Data

A More Detailed Picture

Information available

- ✓ Basin Overview
- ✓ Big Picture
- ✓ Supply
- ✓ Demand
- ✓ Nature & Extent of Use
- ✓ Balance

Seasons available

- ✓ Annual
- ✓ Non-Peak
- ✓ Peak

INSIGHT
An Integrated Network of Scientific Information & Geo-Hydrologic Tools

Nebraska
Department of Natural Resources

HOME ABOUT STREAMFLOW MODELING DATA

SELECT BASIN ▾

Explore the Loup Basin

Use this page to explore hydrologic data for the Loup Basin in the tab area below. If you'd rather learn more about one of the 13 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. Hydrologic data at the basin and sub-basin levels are presented below in each tab by big picture, supplies, demands, nature and extent of use, and balance.

Navigate to another basin by selecting one from the drop-down list or use the back button in your browser to reach the statewide map to click on another basin in the map.

Basin Overview Big Picture Supply Demand Nature & Extent of Use Balance

At a Glance

Basin: Loup
 Approximate Area: 14,200 square miles
 Basin Water Supply: 1,863,983 acre-feet/year
 Near Term Water Demand: 1,899,735 acre-feet/year
 Long Term Water Demand: 1,980,915 acre-feet/year
 Projected Water Demand: 1,253,872 acre-feet/year
 Number of Irrigated Acres: 223,096 acres

Average Consumption by Sector (Acre-Feet)

	Surface Water	Groundwater
Irrigation	11,802 100%	107,792 99%
Municipal	0 0%	827 1%
Industry	0 0%	26 0%

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

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 (1,360).

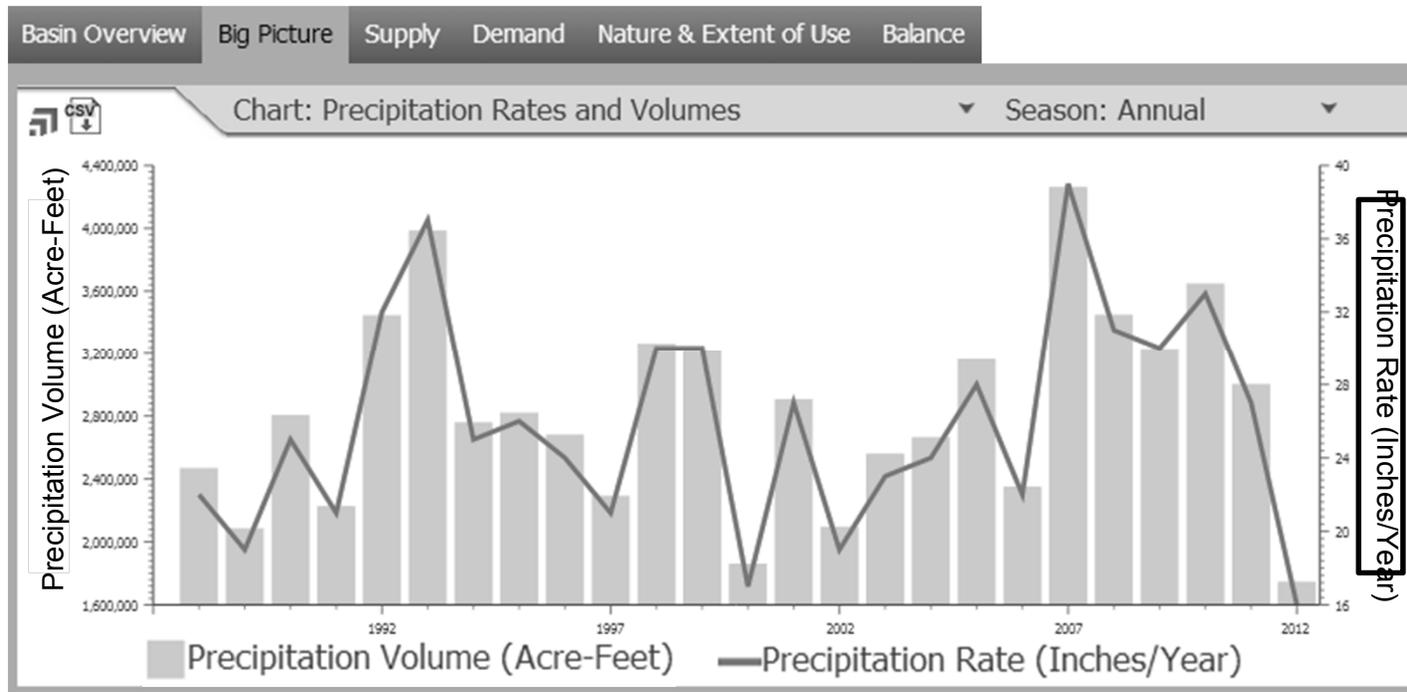
The topography of more than half of the upstream end of the Loup Basin consists of sand hills, which are sand dunes stabilized in place by a grass cover. The downstream portion of the basin consists mostly of dissected plains, with small areas of upland plains. The upland plains are land that is flat 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 farming 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



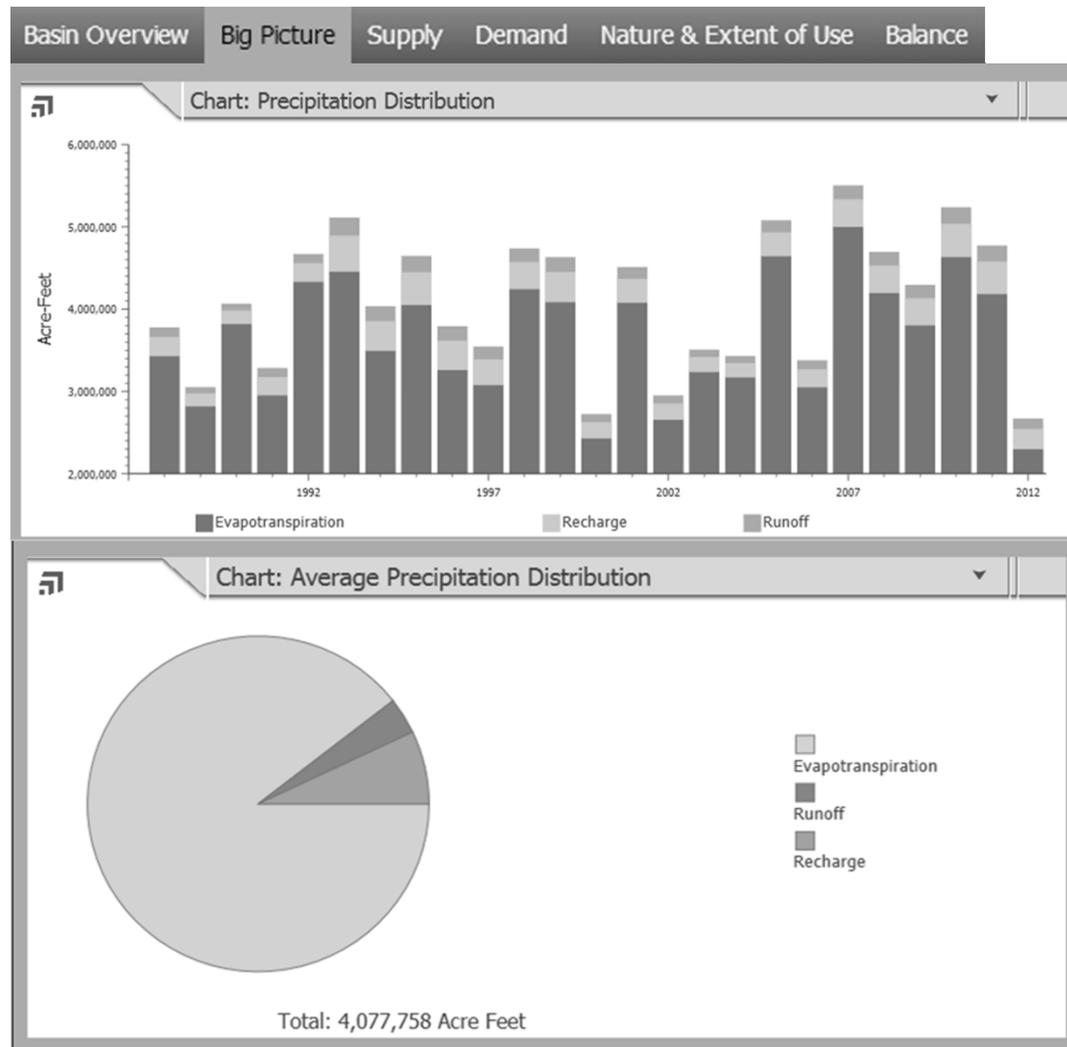
Basin/Subbasin Data: Big Picture

Precipitation Rates and Volumes



Basin/Subbasin Data: Big Picture

Precipitation Contribution

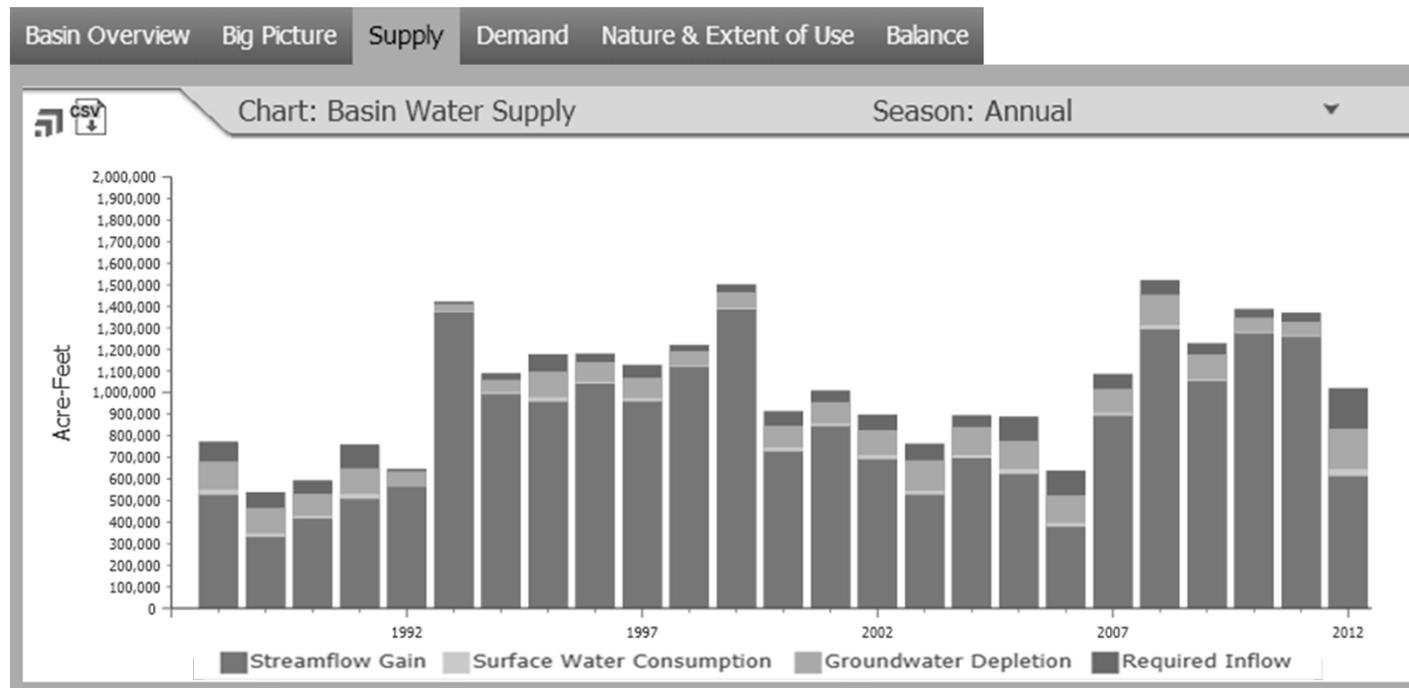


Precipitation
Distribution

Average
Precipitation
Distribution

Basin/Subbasin Data: Supply

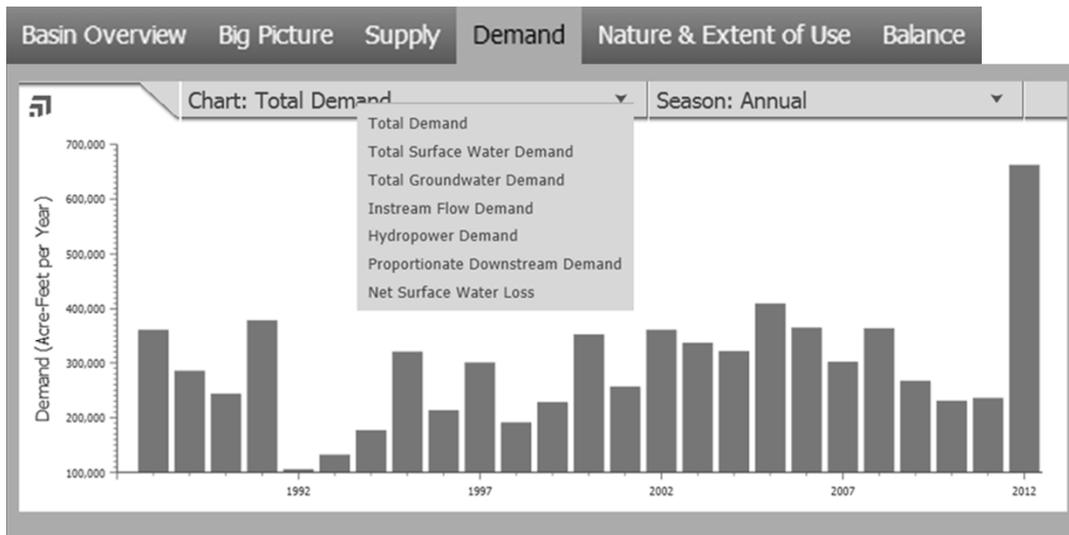
Basin Water Supply (BWS)



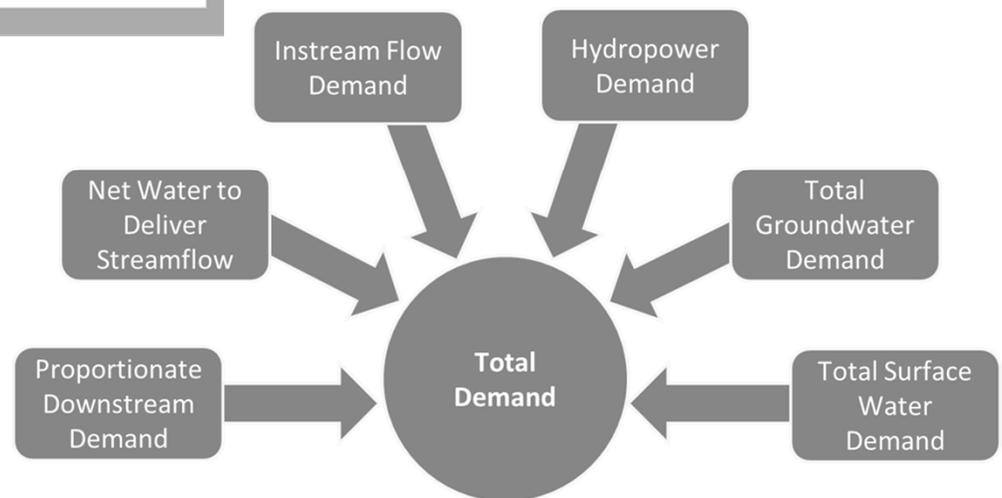
$$\text{BWS} = \text{Streamflow} + \text{Surface Water Consumption} + \text{Groundwater Depletion} + \text{Required Inflow}$$

Basin/Subbasin Data: Demand

Total Demand (TD)

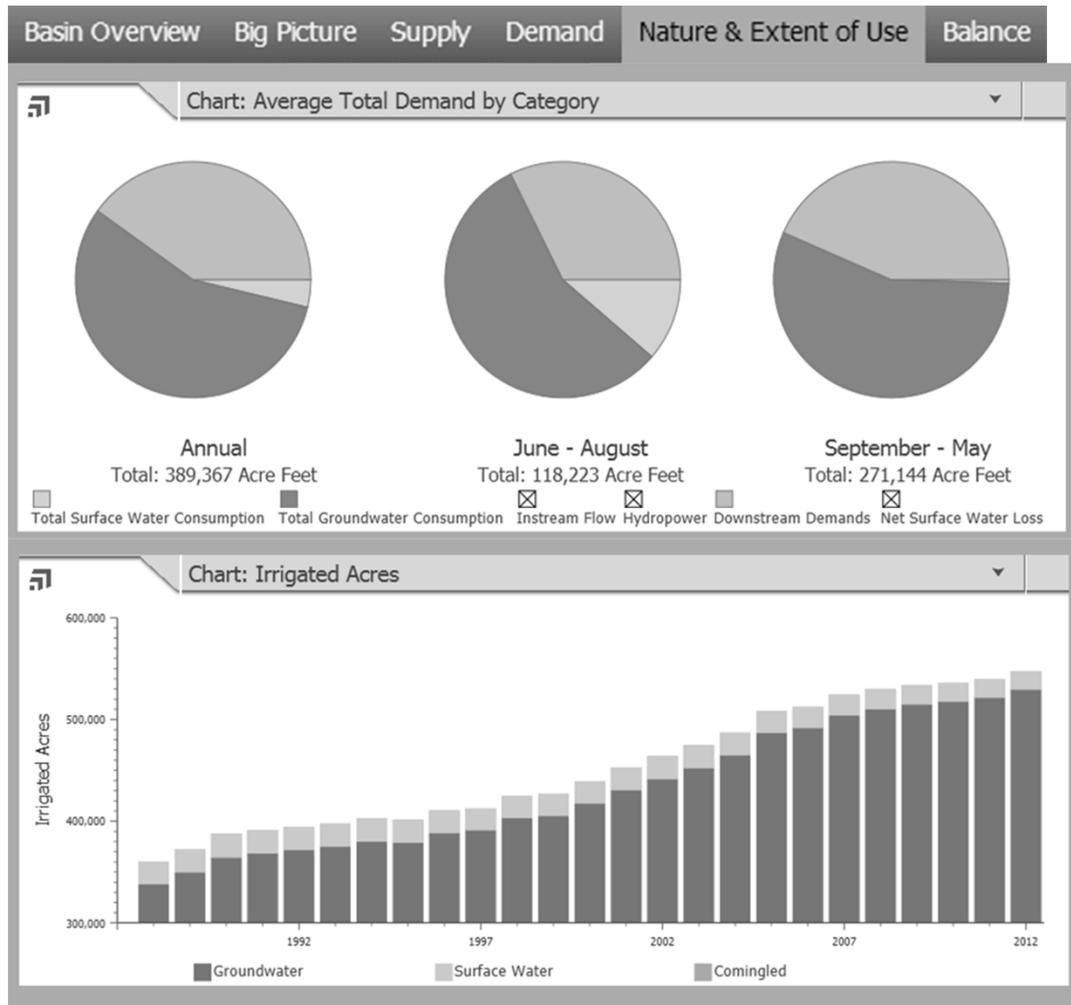


Includes six categories of water use



Basin/Subbasin Data: Nature & Extent of Use

Average Total Demand by Category



Average Long-Term Total Demand by Category

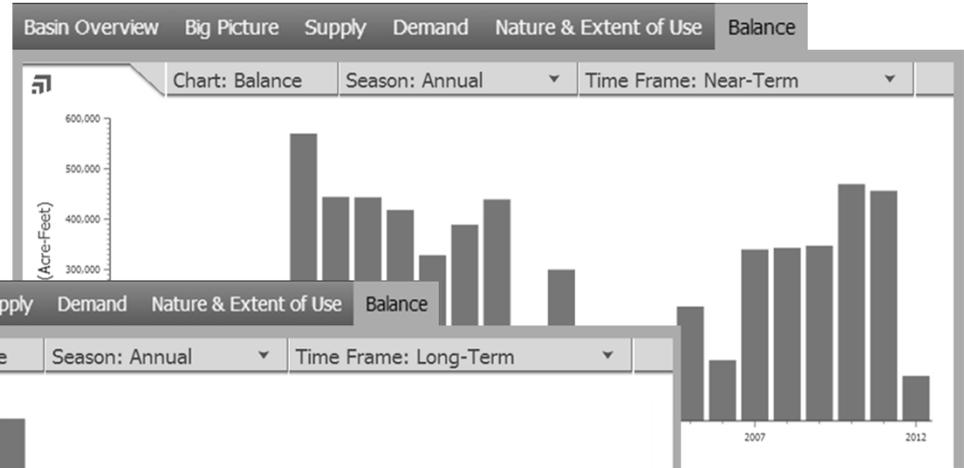
Irrigated Acres by Source

Basin/Subbasin Data: Balance

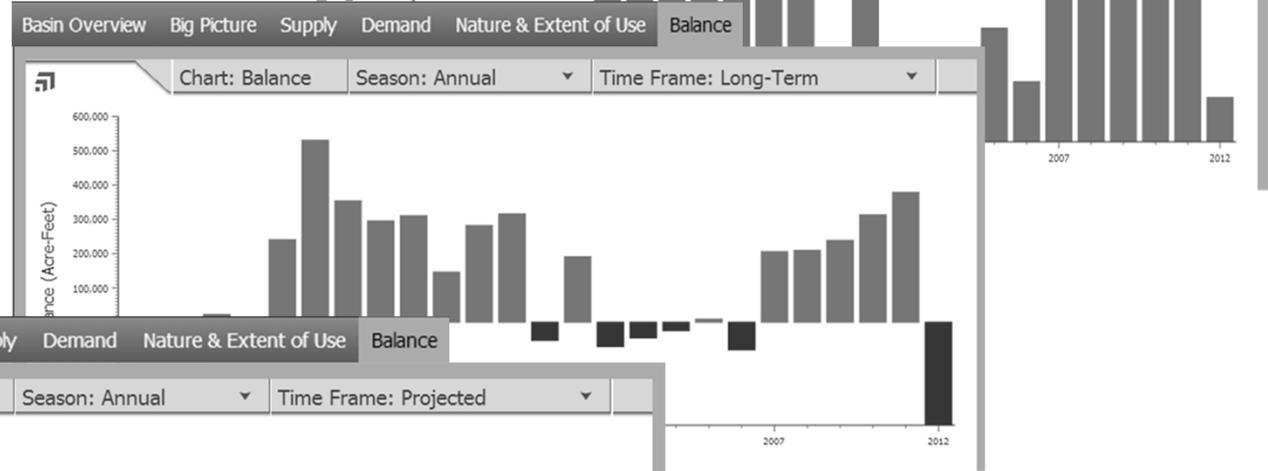
Balance of Water Supply and Demand

Balance of annual water supply and demand in three time frames:

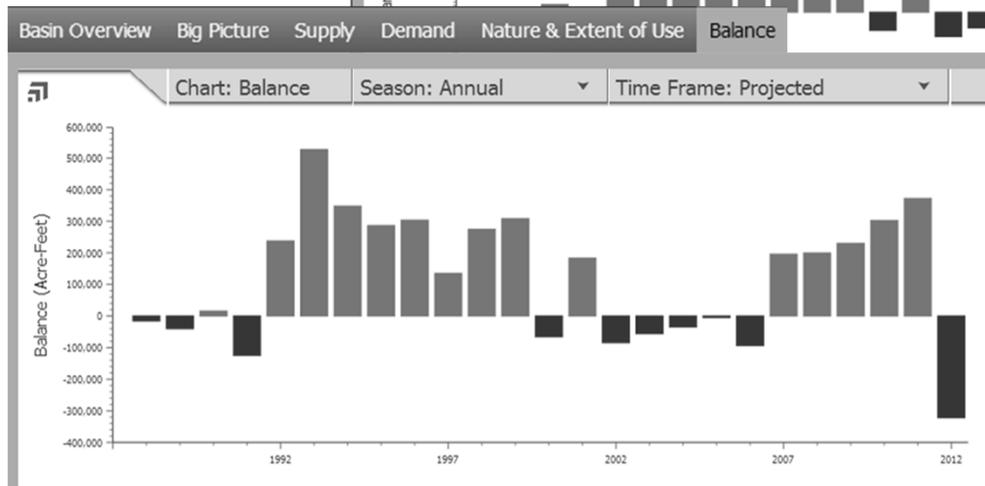
Near-Term



Long-Term



Projected



Balance =
Basin Water Supply –
Total Demand

A Professional & Public Resource

- INSIGHT is designed to be a resource for professionals and the public
 - **Professional resource** = One-stop shop for hydrologic data and analyses maintained by the Department
 - **Public resource** = Easy access to data pertaining to local basins and the water-related issues that affect them

INSIGHT is now available at
<http://dnr.nebraska.gov/insight/>



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Nebraska Department of Natural Resources



Department of Natural Resources