

# INSIGHT: An Interactive Web Portal for Water Information

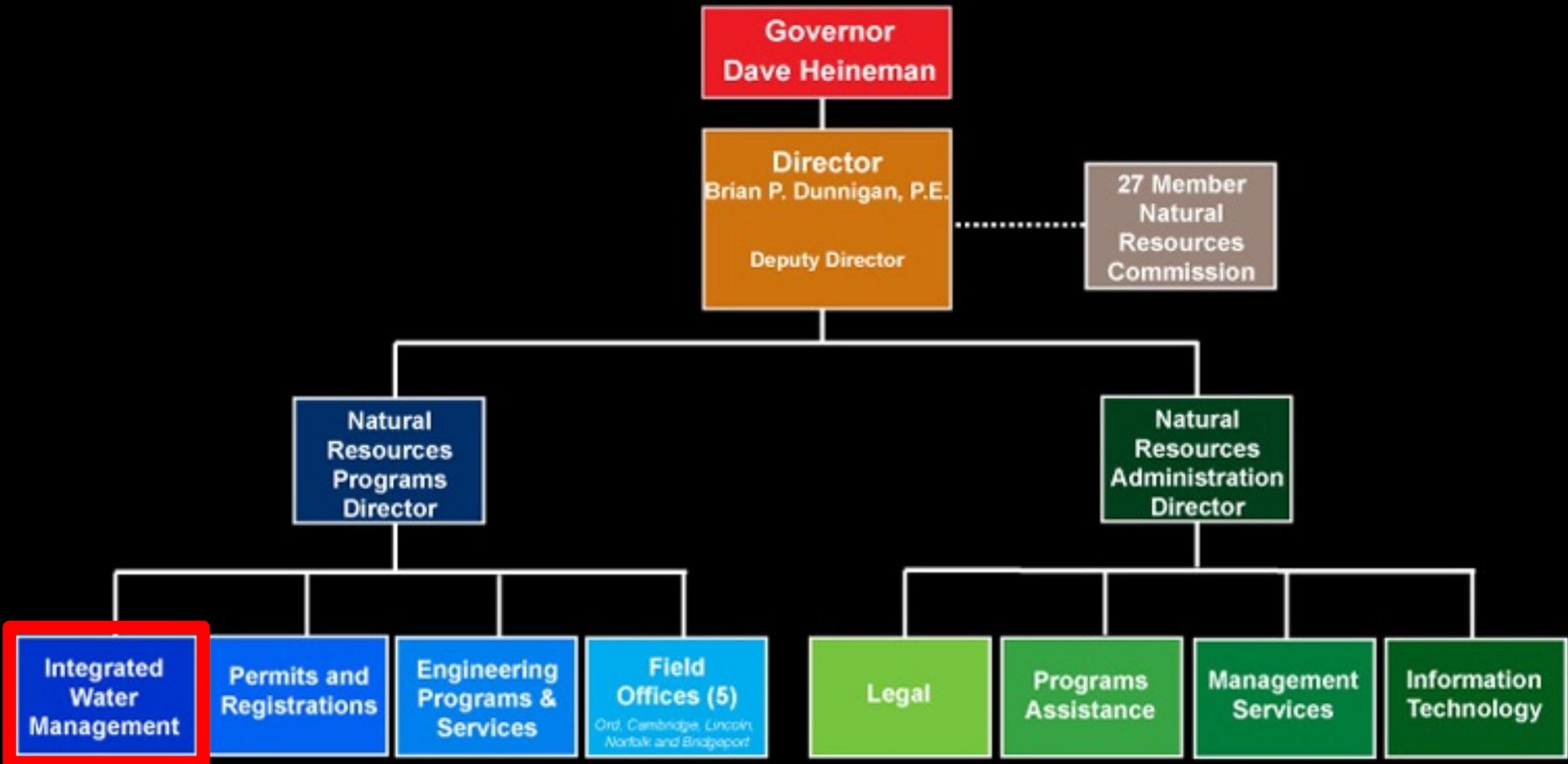
Brandi Flyr, Ph.D.

Integrated Water Management Coordinator  
Nebraska Department of Natural Resources





# Nebraska Department of Natural Resources



## What we do:

Provide  
technical expertise,  
planning, and  
coordination

Develop  
models

Conduct  
studies

Help water  
managers

Collaborate  
with NRDs  
and other  
stakeholders

### To help better understand:

- Nebraska's water supplies and uses
- The effects of potential water management strategies

# Overview

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- INSIGHT
  - History: Need for easily accessible information
  - What it Entails
  - Implementation and Use in Planning and Monitoring

INSIGHT:

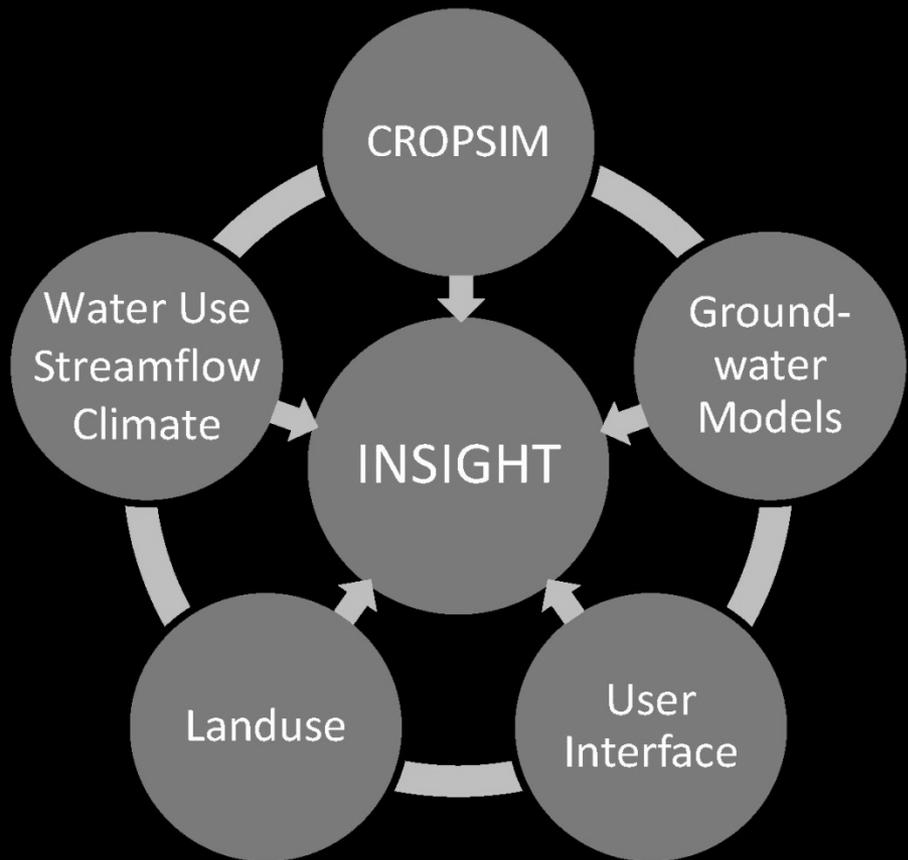
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NEED & DEVELOPMENT

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

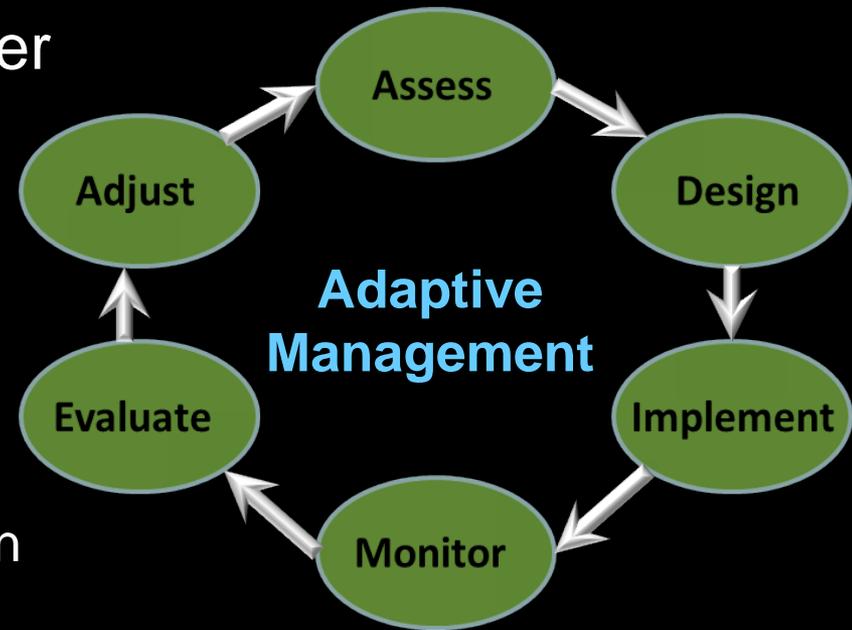
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- An **annual snapshot** of water conditions across the state
- An **educational tool** for water managers and the public
- A tool to help **evaluate** water management options



# INSIGHT was Developed Through Collaboration with NRDs

- Part of the Department's goal of adaptively managing hydrologically connected water resources
  - ✓ Pro-active vs. Reactive
- Department & NRDs
  - ✓ Collaborated on:
    - Investigation of process to determine difference between Fully and Overappropriated
    - Selection of INSIGHT consultants through RFPs
    - Data sharing

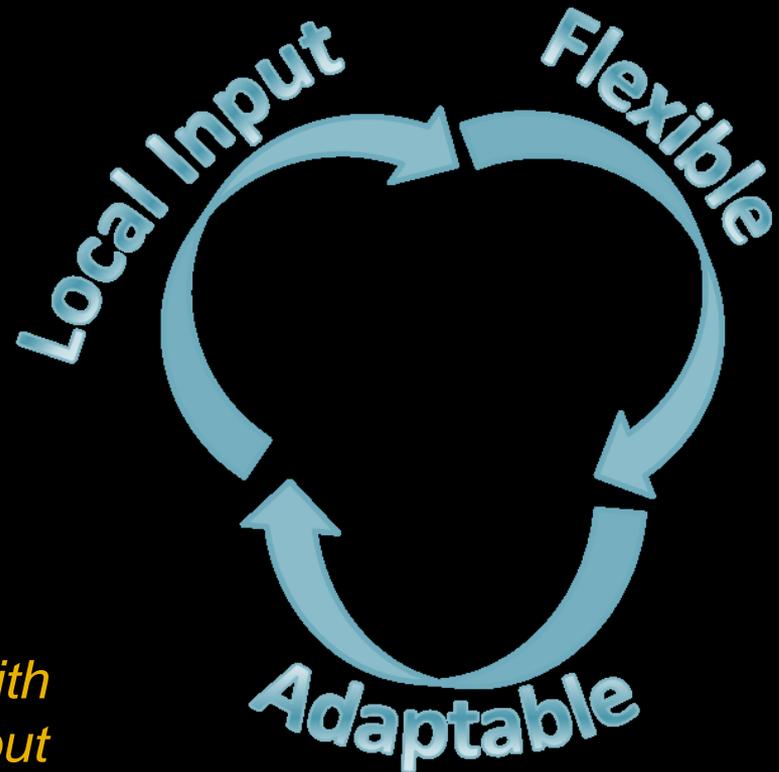


# INSIGHT was developed through Collaboration with the Public

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

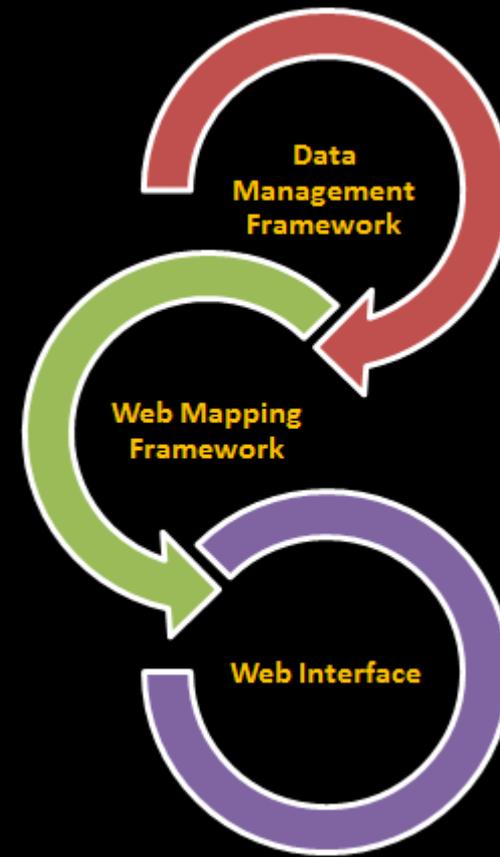
*Stakeholders were provided with various means of providing input (e.g., written/public comments)*



# INSIGHT was developed through Consolidation of Hydrologic Data

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



INSIGHT:

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WHAT IT ENTAILS

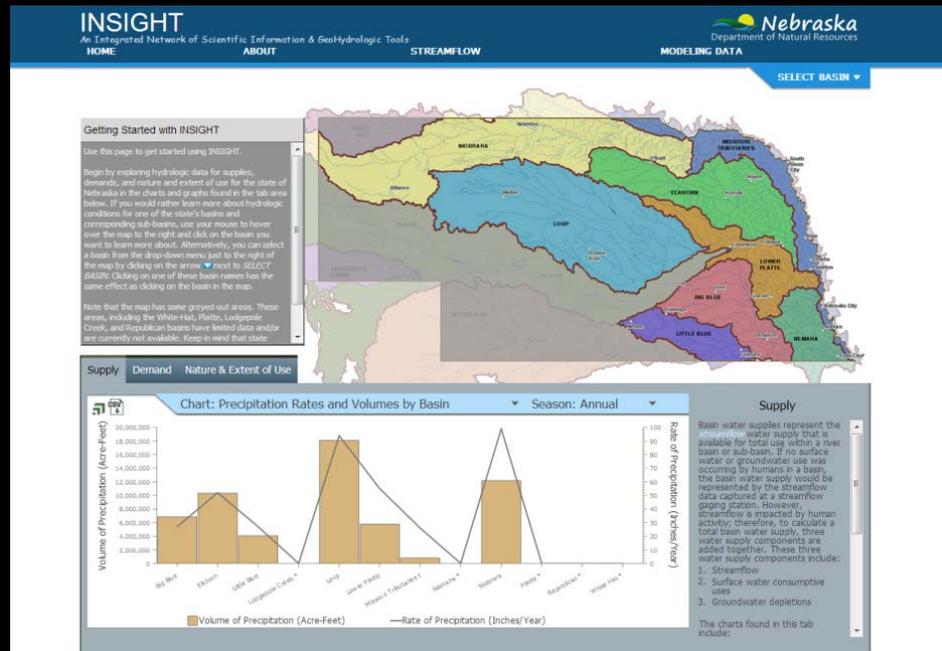
# INSIGHT Provides Statewide Basin-to-Basin Comparisons

## Information available:

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

## Seasons available:

- ✓ Annual
- ✓ Peak
- ✓ Non-Peak



# Basin & 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

HOME ABOUT STREAM LOW MODELING DATA

Nebraska Department of Natural Resources

SELECT BASIN ▾

**Explore the Loup Basin**

Use this page to explore hydrologic data for the Loup Basin basin in the tab area below. If you'd rather learn more about one of the 16 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, supply, 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	1,863,863 acre-feet/year	
Near-Term Water Demand	1,899,735 acre-feet/year	
Long-Term Water Demand	1,986,915 acre-feet/year	
Projected Water Demand	1,293,872 acre-feet/year	
Number of Irrigated Acres	221,096 acres	

**Average Consumption by Sector (Acre-Feet)**

	Surface Water		Groundwater	
Agriculture	11,802	100%	107,792	99%
Municipal	0	0%	627	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).

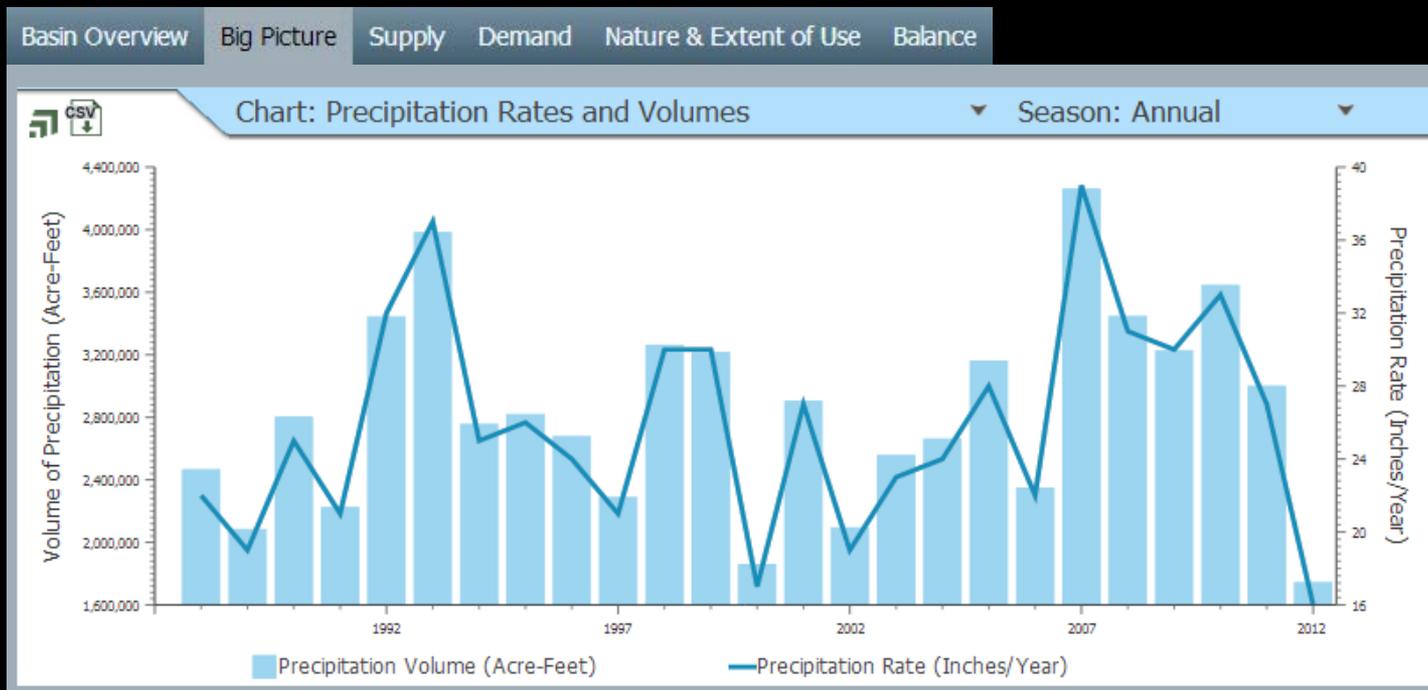
The topography of more than half of the upstream end of the Loup Basin consists of sand hills, which are sand dunes stabilized in place by a grass cover. The downstream portion of the basin consists mostly of dissected plains, with small areas of upland plains. The upland plains are land that is flat to gently rolling and dissected plains are where streams have cut into former plains creating hill 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 flatting 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

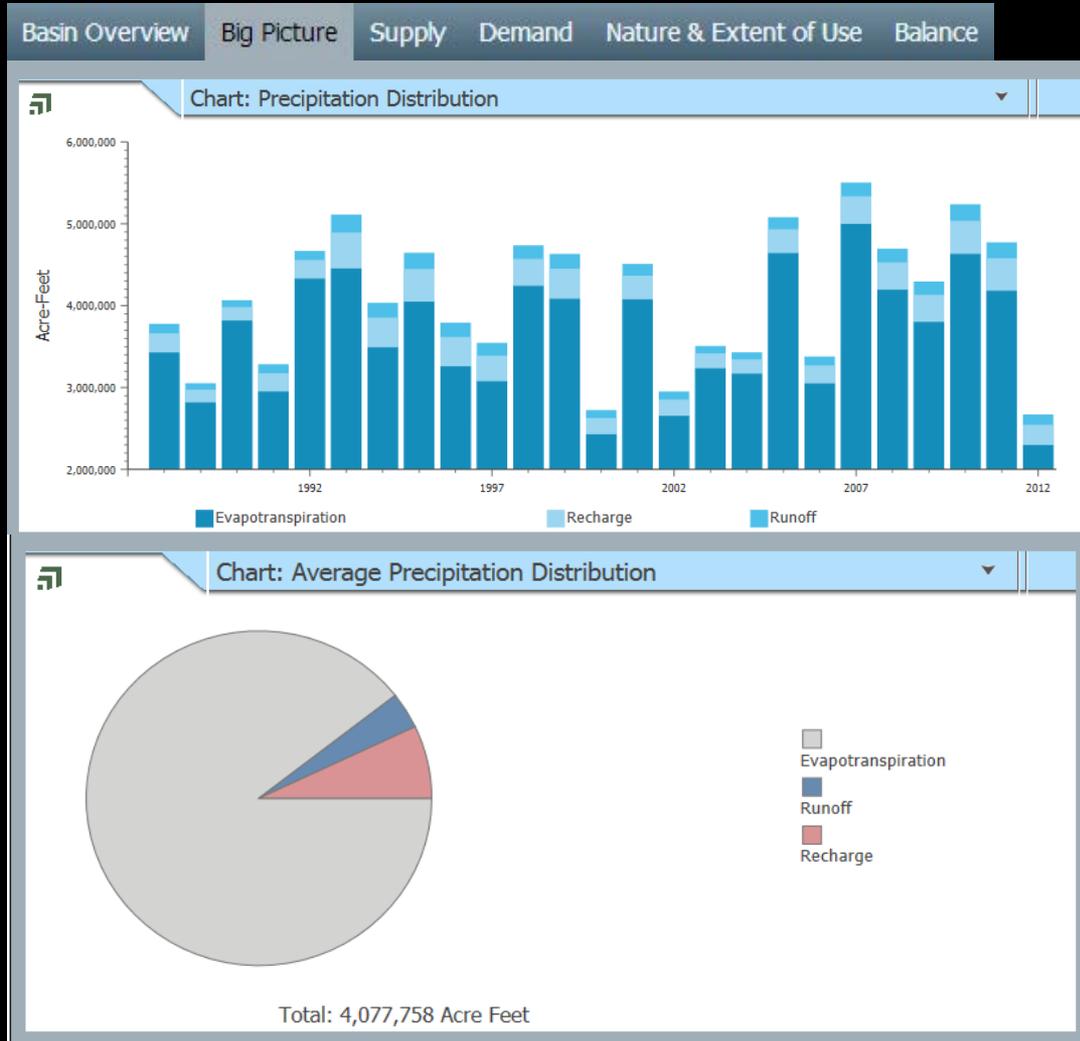
Multiple hydrographs can be generated for the Loup Basin. The following hydrograph is for the Loup Basin at Broken Bow, Nebraska. The hydrograph shows the flow rate in cubic feet per second (CFS) over time. The x-axis represents time in days, and the y-axis represents flow rate in CFS. The hydrograph shows a peak flow rate of approximately 100 CFS occurring around day 100. The flow rate then gradually decreases over time, reaching a minimum of approximately 10 CFS by day 200. The hydrograph also shows a secondary peak of approximately 50 CFS occurring around day 300. The flow rate then continues to decrease, reaching a minimum of approximately 5 CFS by day 400. The hydrograph shows a clear seasonal pattern, with higher flow rates occurring during the spring and summer months, and lower flow rates occurring during the fall and winter months.

# Basin/Subbasin Data: Big Picture

## Precipitation Rates and Volumes by Basin



# Basin/Subbasin Data: Big Picture

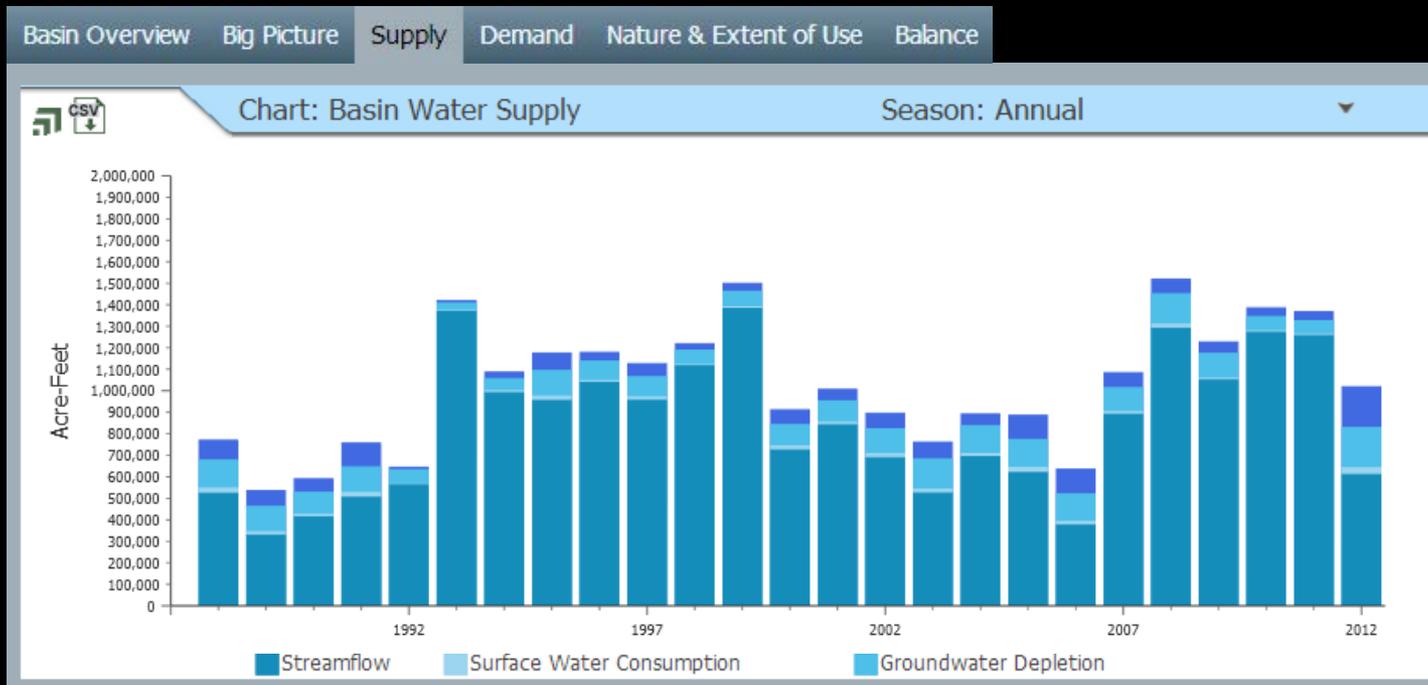


Precipitation  
Distribution

Average  
Precipitation  
Distribution

# Basin/Subbasin Data: Supply

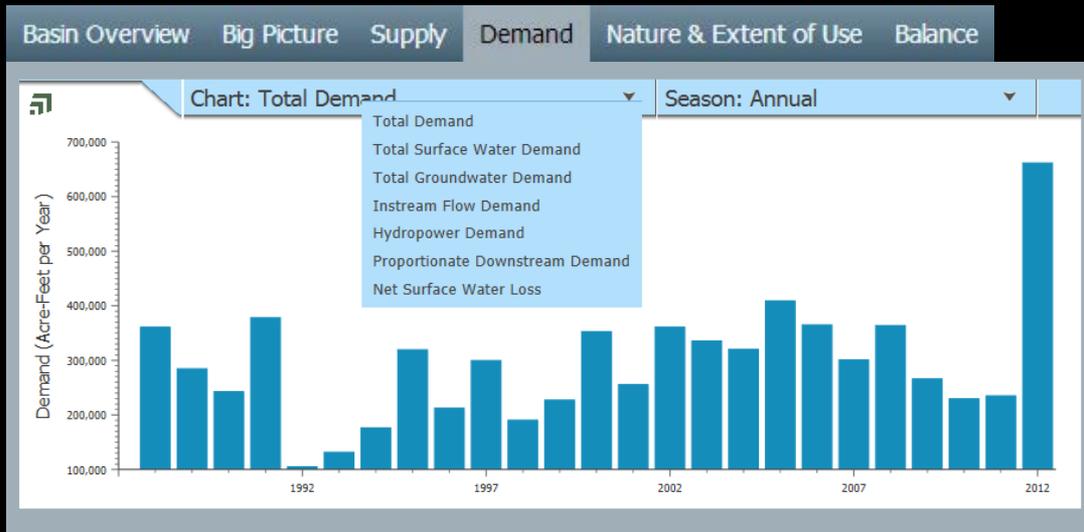
## Basin Water Supply



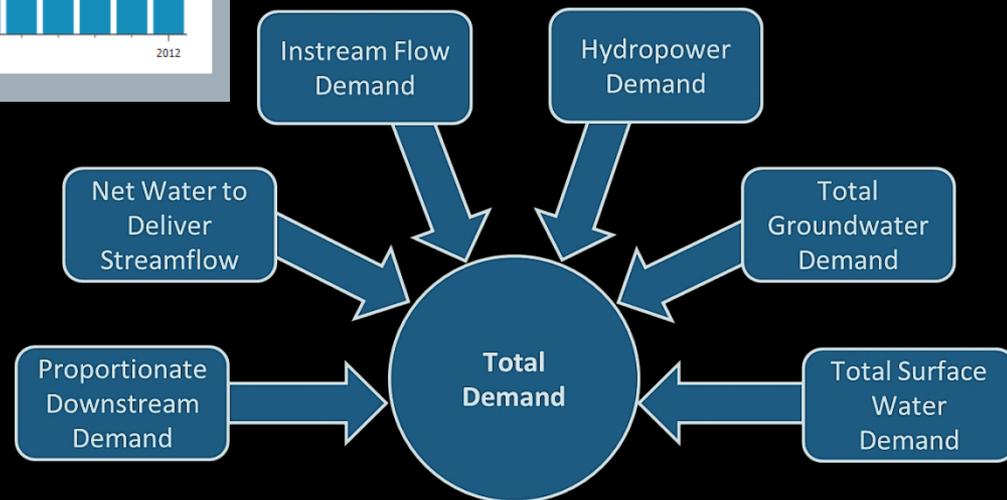
$$\text{BWS} = \text{Streamflow} + \text{Surface Water Consumption} + \text{Groundwater Depletion} + \text{Required Inflow}$$

# Basin/Subbasin Data: Demand

## Total Demand



Includes six categories of water use



# Basin/Subbasin Data: Nature & Extent of Use



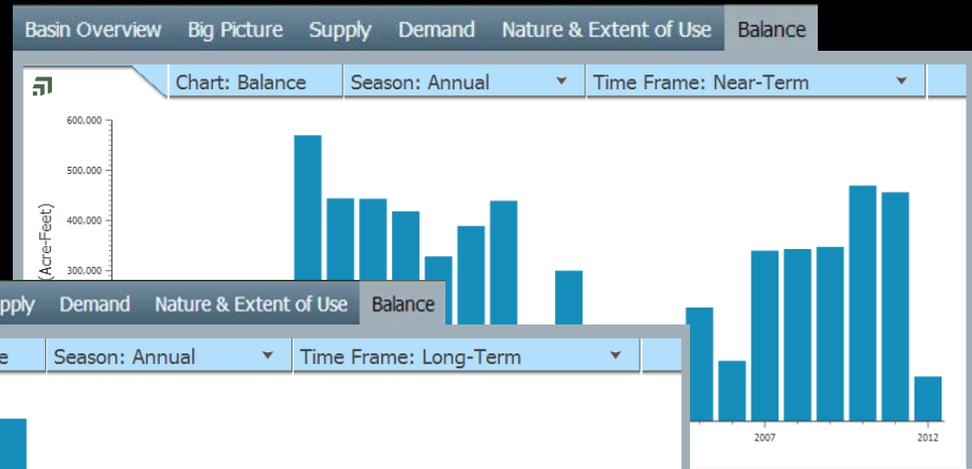
Average Long-Term  
Total Demand by  
Category

Irrigated Acres  
by Source

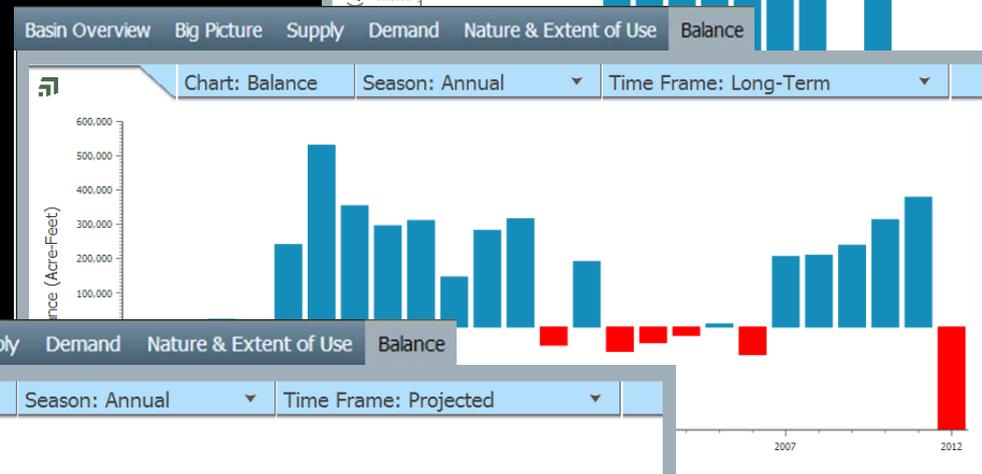
# Basin/Subbasin Data: Balance of Water Supply and Demand

Balance of  
annual water  
supply and  
demand under  
three scenarios:

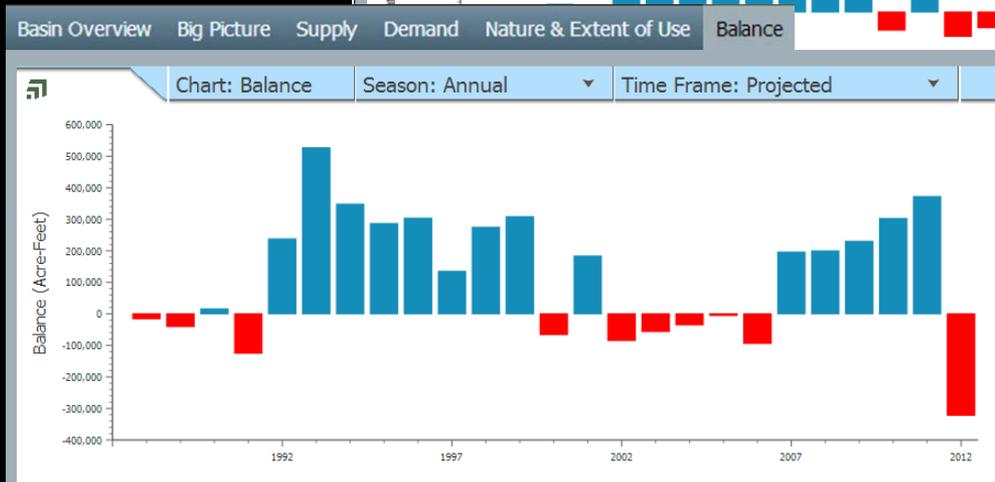
Near-Term



Long-Term



Projected  
Long-Term



**Balance =**  
Basin Water Supply –  
Total Demand

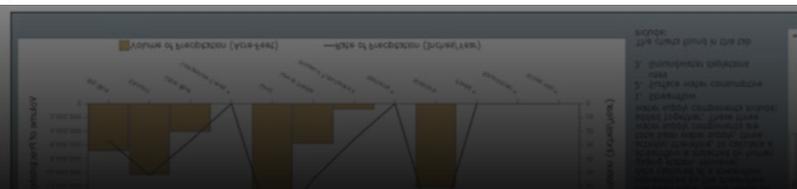
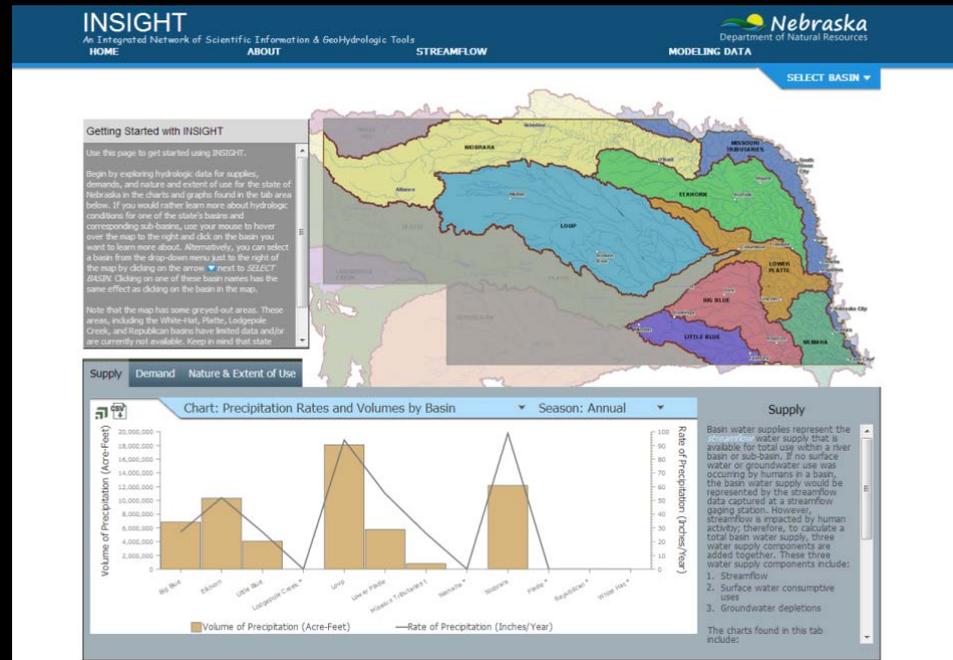
**INSIGHT:**

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**IMPLEMENTATION AND USE  
IN PLANNING AND MONITORING**

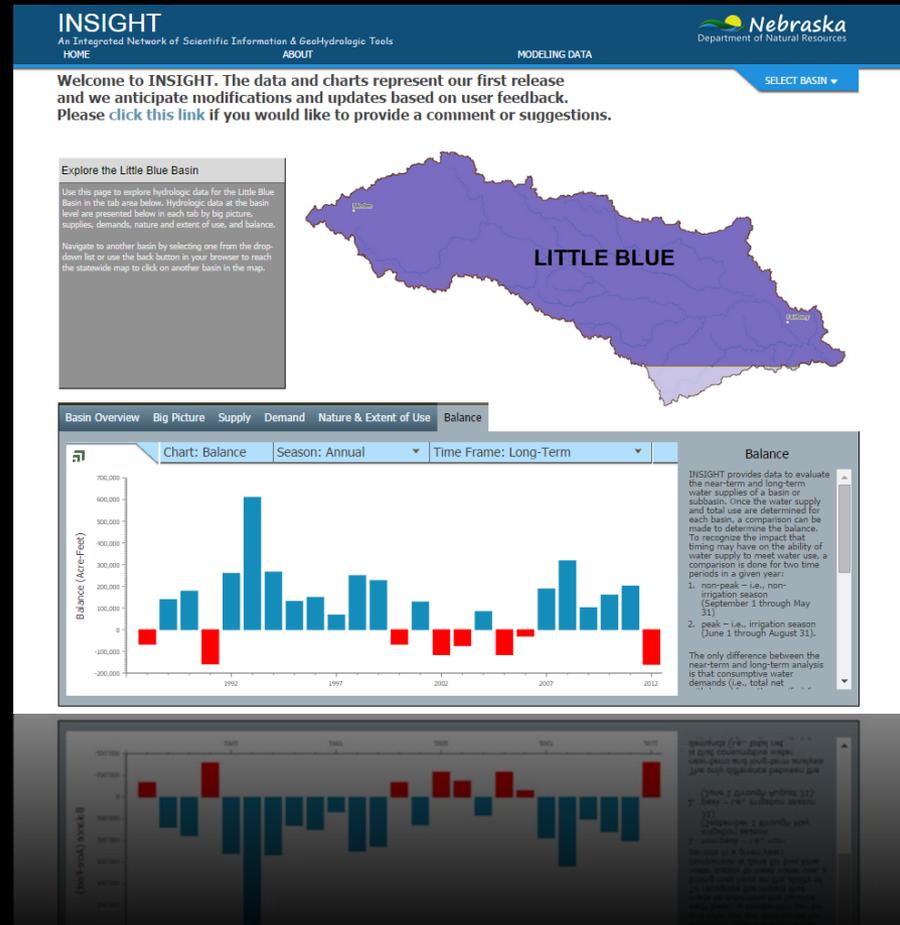
# Benefits of INSIGHT

- Offers an easily accessible compilation of information about water resources across the state



# Benefits of INSIGHT

- Allows users to weigh decisions based on the current and projected balance between supply and demand



# INSIGHT and Water Management

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- INSIGHT can help water managers:
  - ✓ Understand current and future demands
  - ✓ Evaluate the effectiveness of water management strategies
  - ✓ Assess critical areas of water shortage
  - ✓ Identify potential problems before they occur
  - ✓ Make proactive water management decisions



Thank  
You