

Review of the Departments New Methods for Assessing Water Supplies and Water Demands

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Outline

- Development of the new methods
- Concepts behind the methods
- Example of the methods
- INSIGHT

Timeline

- Platte Basin NRDs and Department initiate methodology study (2009)
- Release of Literature Review and Initial Recommendations (2010)
- Stakeholder Meetings and Initial Reports by Consultants (2011)
- Final Stakeholder Meetings Final Report (2013) <http://dnr.ne.gov/website/MainPage.aspx>

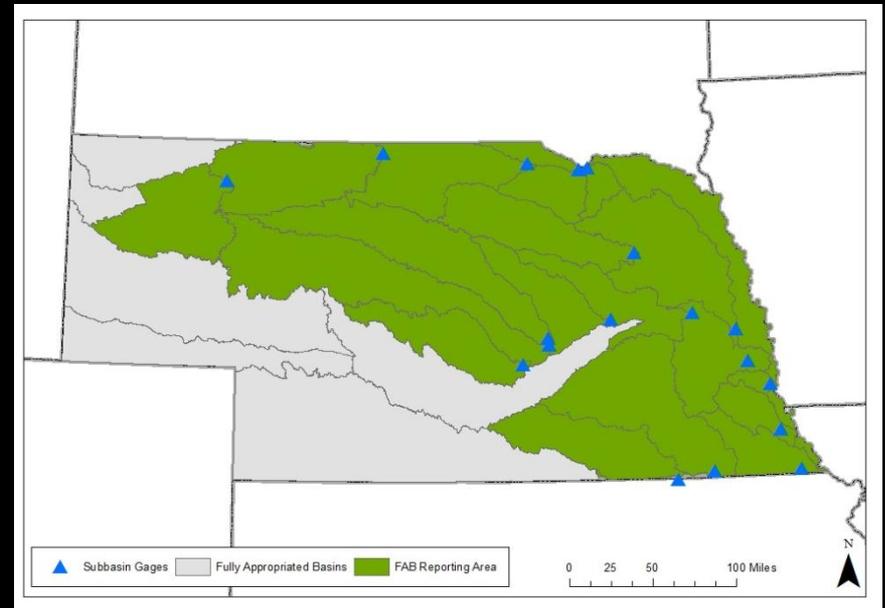
Concepts

■ Basin Water Supplies

- Streamflow
- Groundwater Depletions
- Surface Water Consumption

■ Total Water Uses

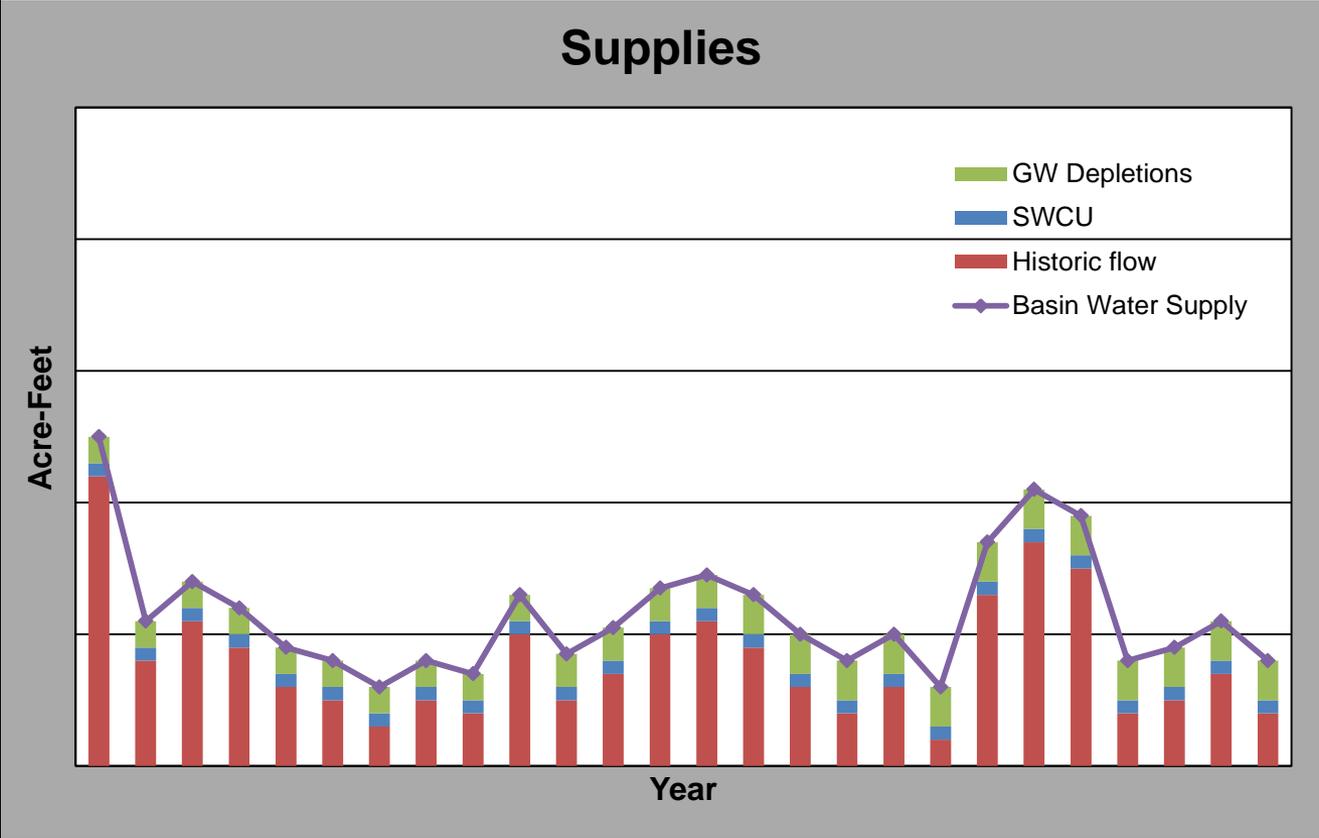
- Groundwater Consumption
- Surface Water Consumption
- Water for Canal Deliveries
- Instream Flow Demands
- Hydropower Demands
- Downstream Water Demands



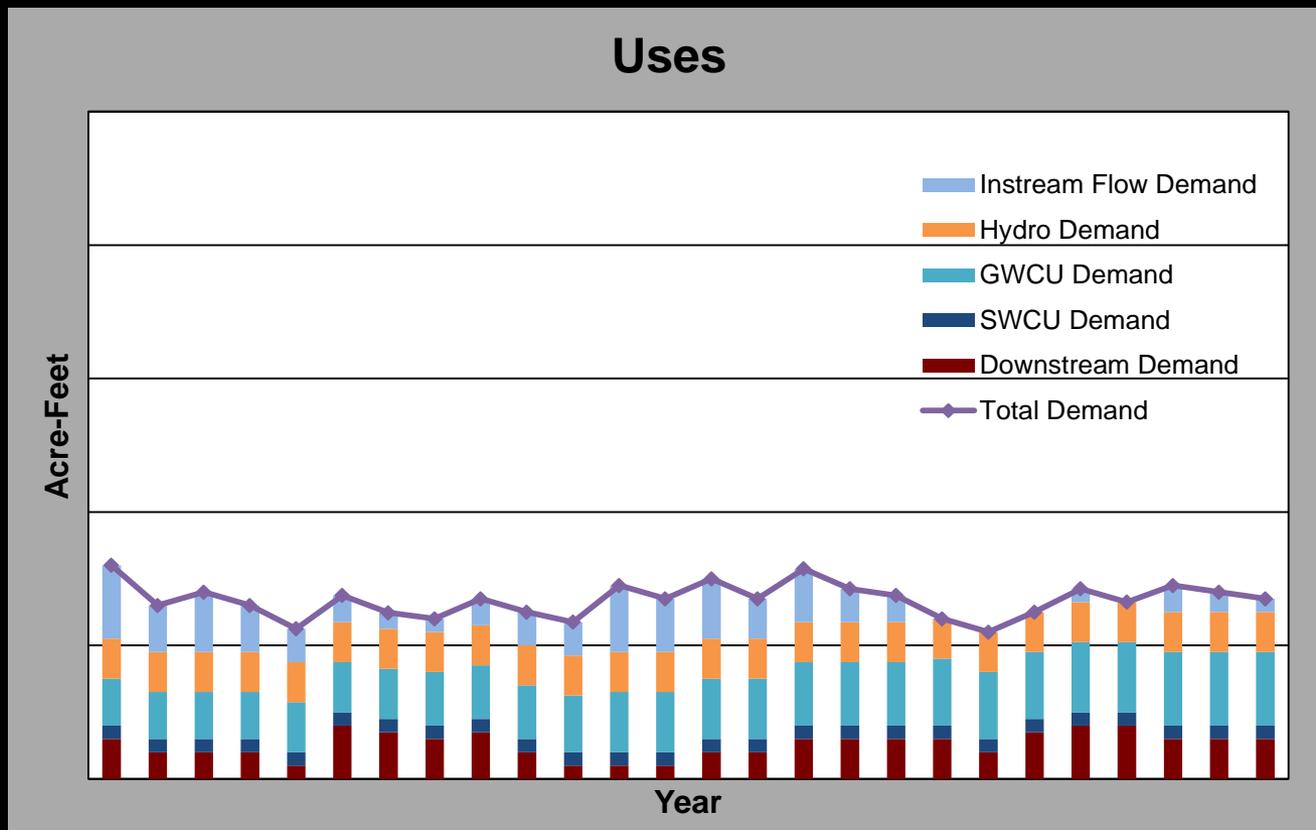
Concepts

- Representative Period
 - Statistical analysis of appropriate period
- June – August (peak demand)
- September – May (non-peak demand)
- Near-term and long-term

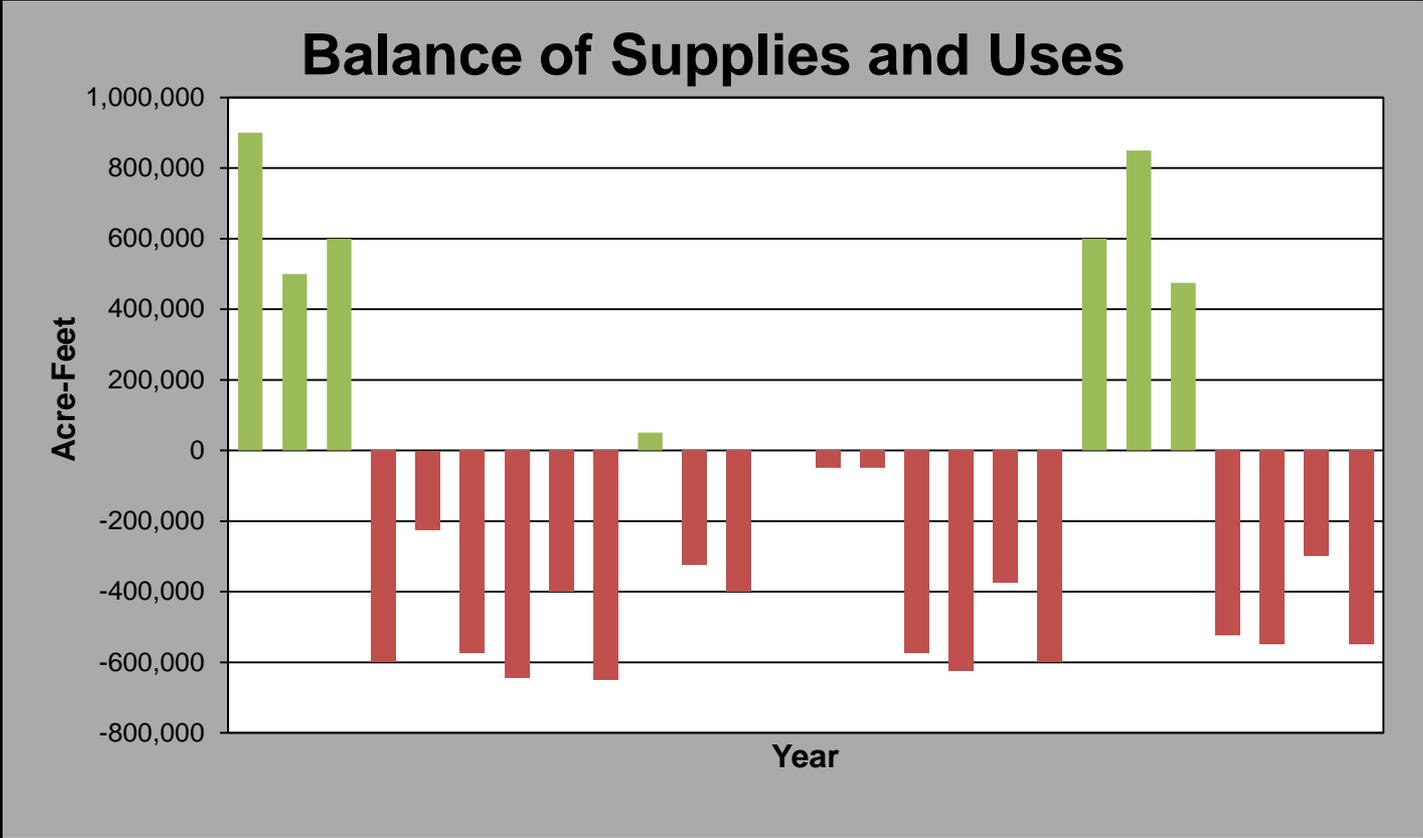
Concepts



Concepts

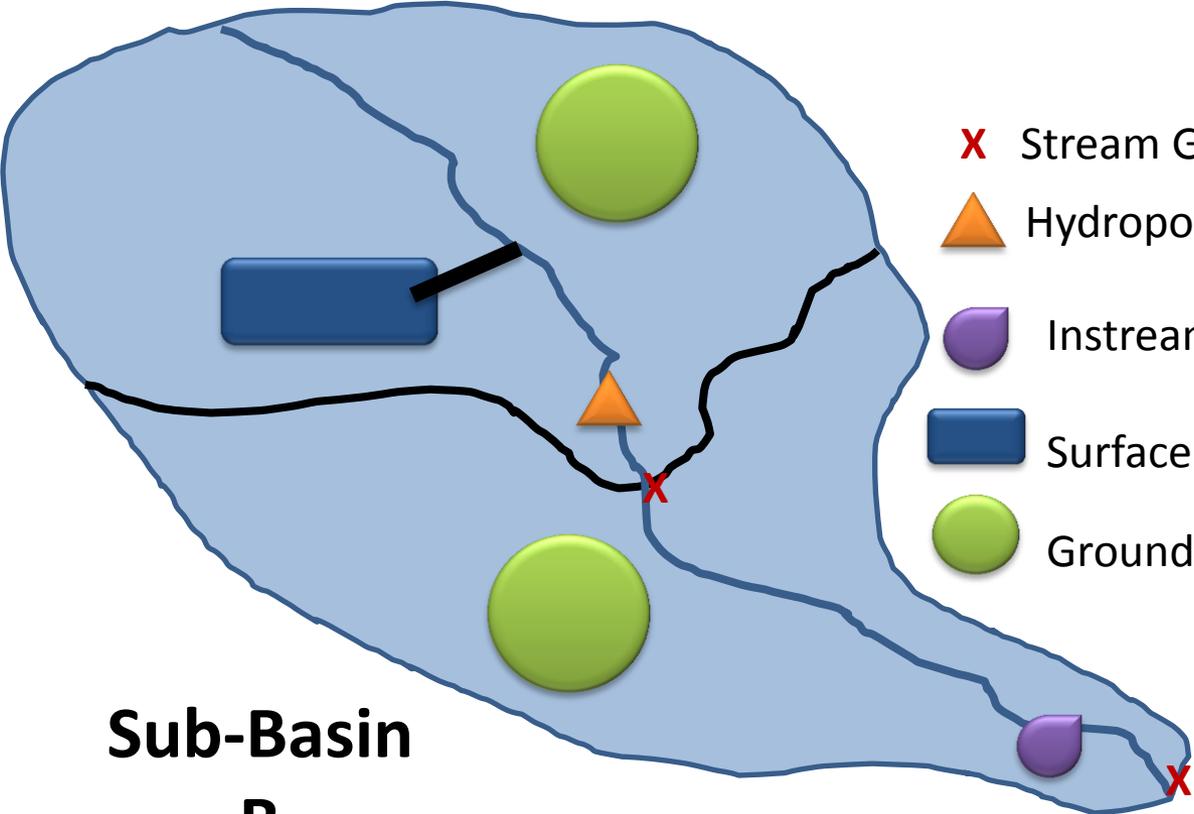


Concepts



Example

**Sub-Basin
A**



X Stream Gage

▲ Hydropower

● Instream

■ Surface Water_c

● Groundwater_c

**Sub-Basin
B**

Example

$$BWS = \text{Stream Gage} + \text{Surface Water}_C + \text{Groundwater}_D$$

Sub-Basin A

Stream Gage = 400

Surface Water_C = 100

Groundwater_D = 300

A Total BWS = 800

Proportion of Total = 40%

Entire Basin (A & B)

Stream Gage = 1300

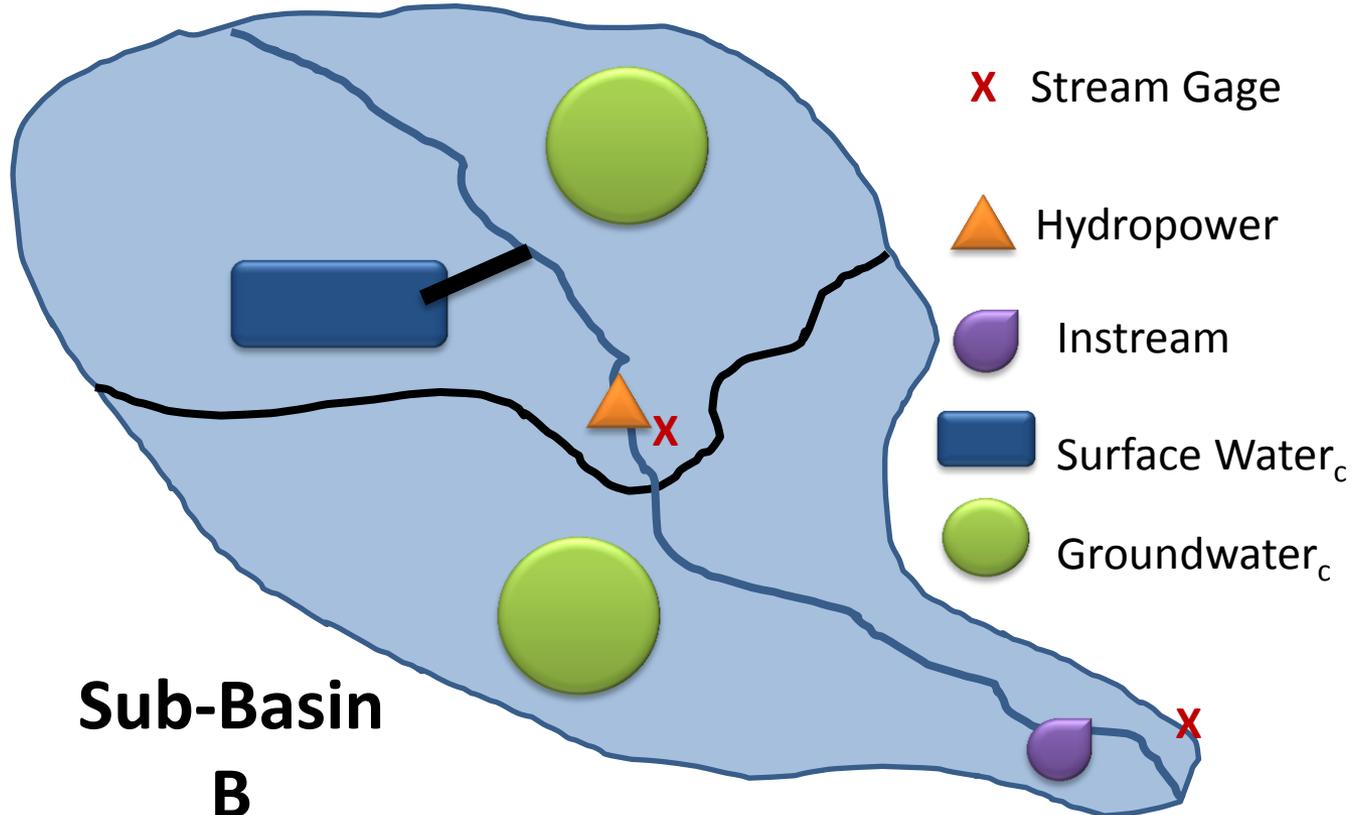
Surface Water_C = 100

Groundwater_D = 600

B Total = 2000 (1200 exclusive to B)

Proportion of Total = 60%

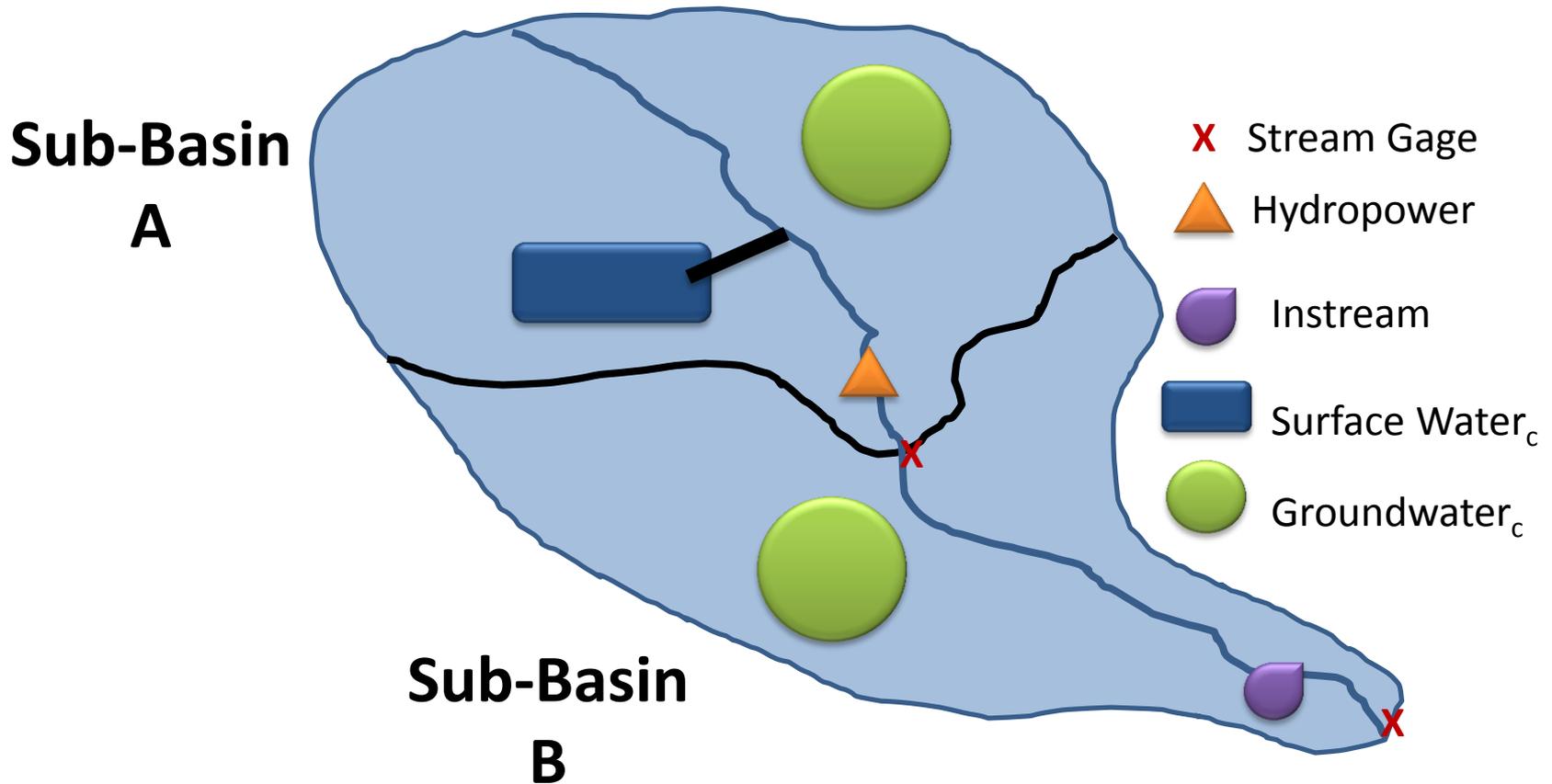
Sub-Basin A



Example

Near Term Demand = Groundwater_D + Surface Water_C + Hydropower + Instream +
Downstream Demand

Long Term Demand = Groundwater_C + Surface Water_C + Hydropower + Instream +
Downstream Demand



Example

Uses in Sub-Basin A

Groundwater_c = 500

Surface Water_c = 100

Hydropower = 300

Total Demands in A = 900

Mainstem Consumptive Demand=160

Downstream Non-Consumptive=200

Downstream Demand = 160+200-300=60

A Total = 500 + 100 + 300 + 60 = 960

Uses in Sub-Basin B (not inclusive of A)

Groundwater_c = 400 (mainstem) 200 (tributary)

Surface Water_c = 0

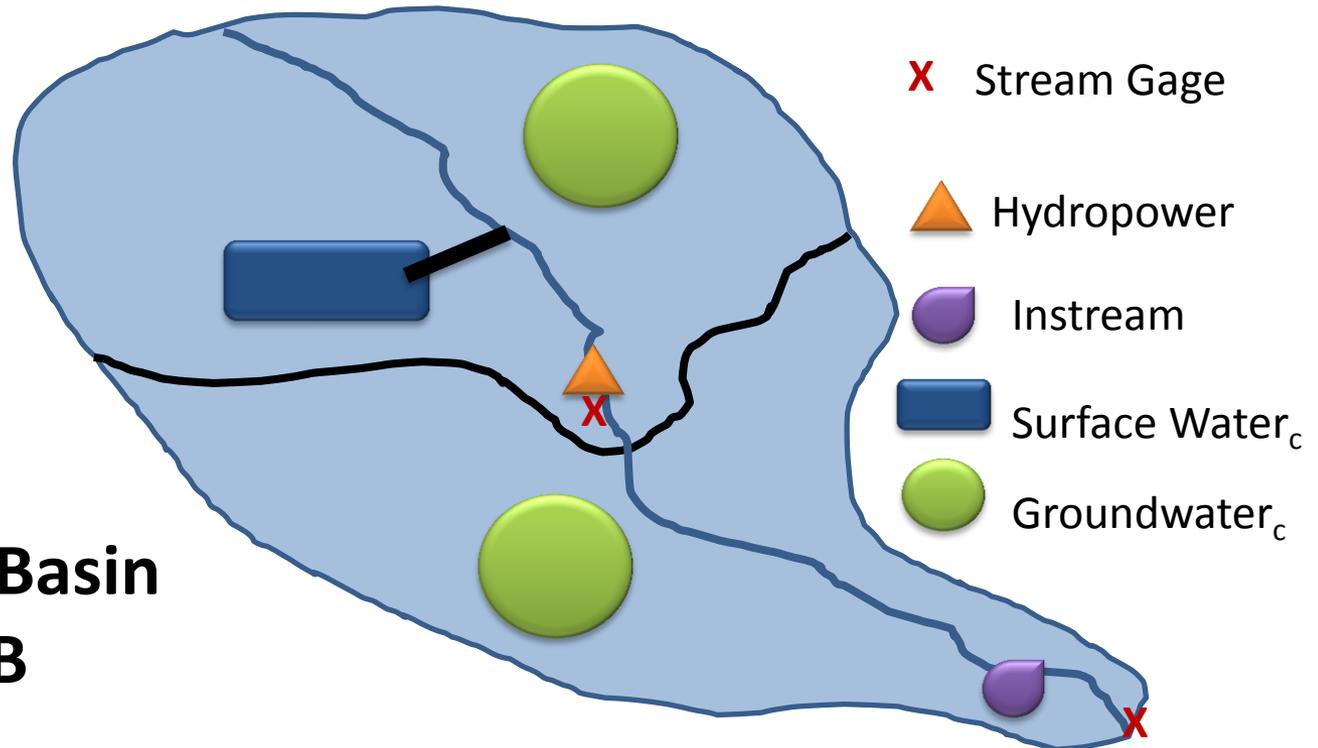
Instream = 500 (mainstem)

Assigned as Downstream Demand to Sub-basin A =160

B Total = 400 + 200 + 500 – 360 = 740

**Sub-
Basin
A**

**Sub-Basin
B**



Example

Sub-basin A

BWS = 800

Total Long-term Demand = 1060

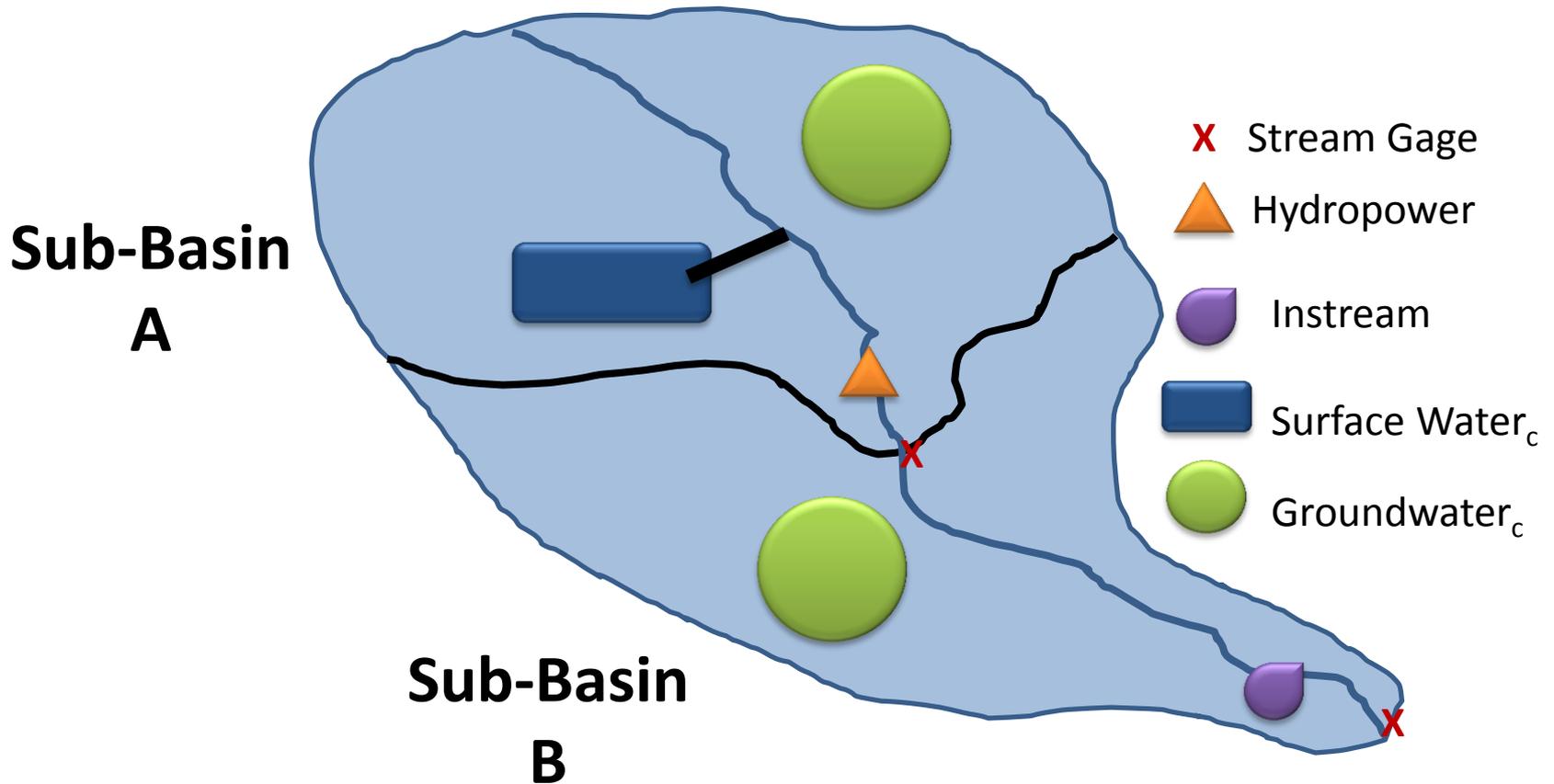
Balance = - 260

Sub-basin B

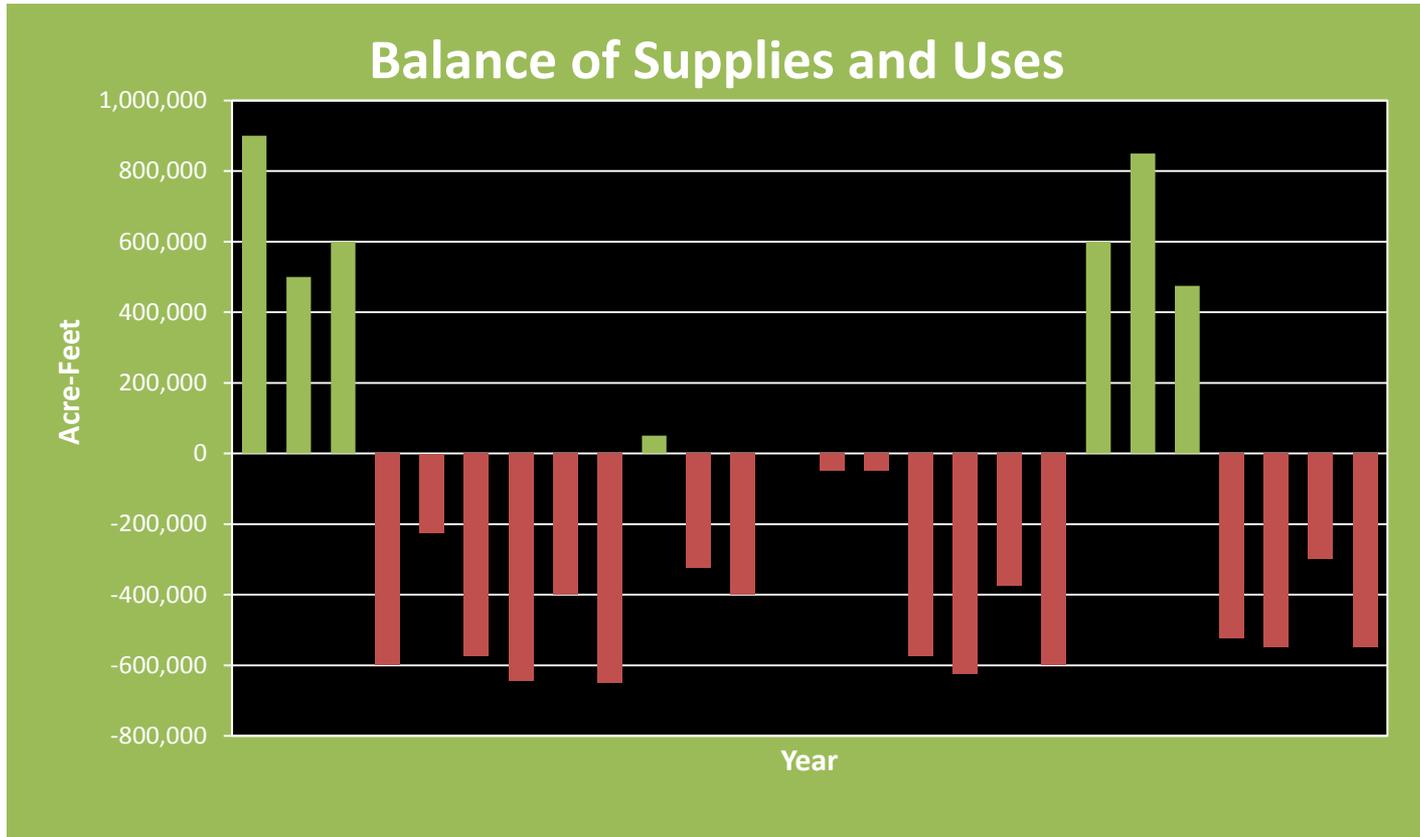
BWS = 1200

Total Long-term Demand = 640

Balance = + 560



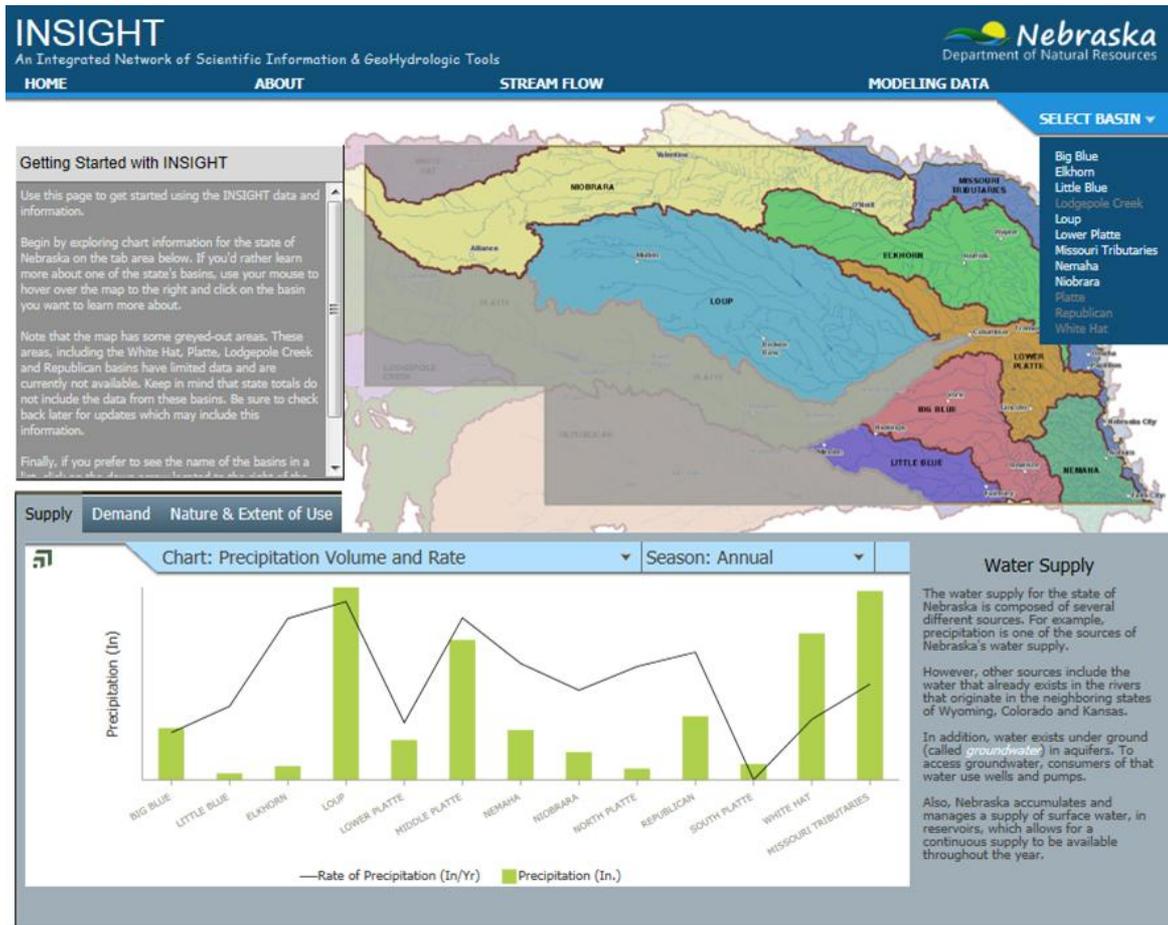
Concepts



INSIGHT Charts and Graphs on Website

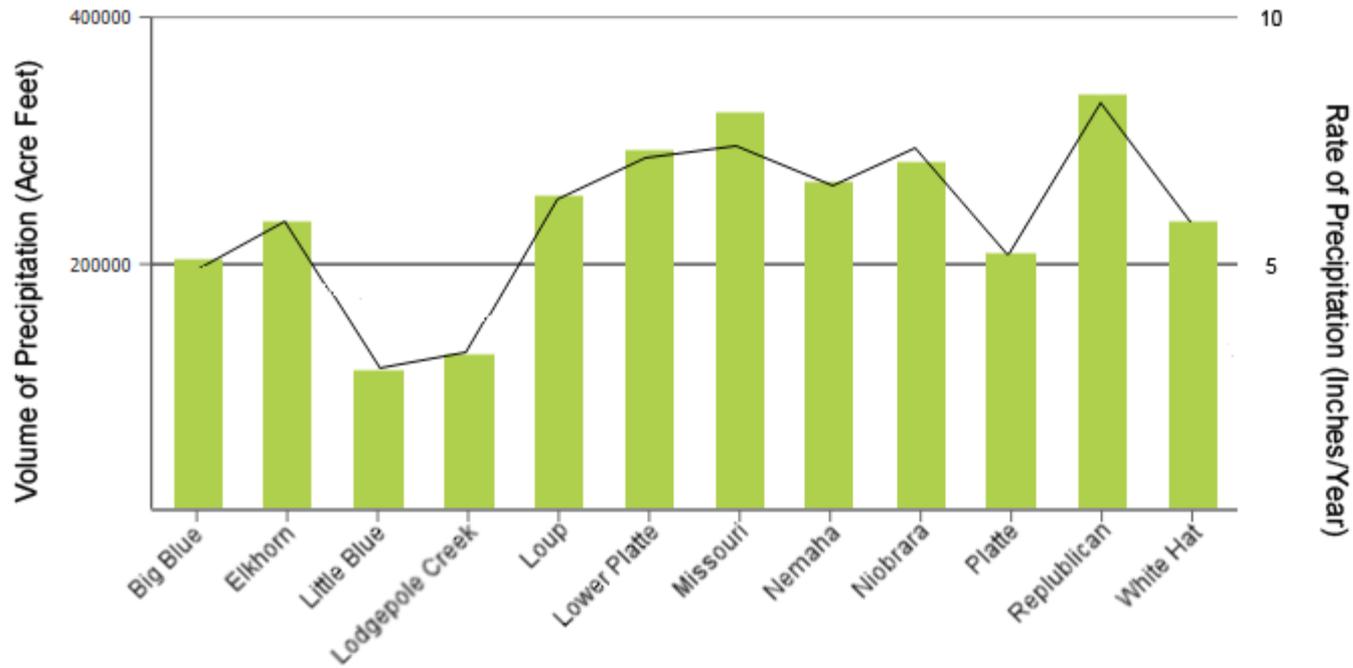
- Information will be displayed on the INSIGHT Website by the following categories:
 - ▣ Statewide
 - Big Picture
 - Supply
 - Demand
 - Nature & Extent of Use
 - ▣ Basin/Sub-Basin
 - Big Picture
 - Supply
 - Demand
 - Nature & Extent of Use
 - Balance

INSIGHT Website Example for Statewide Presentation of Data



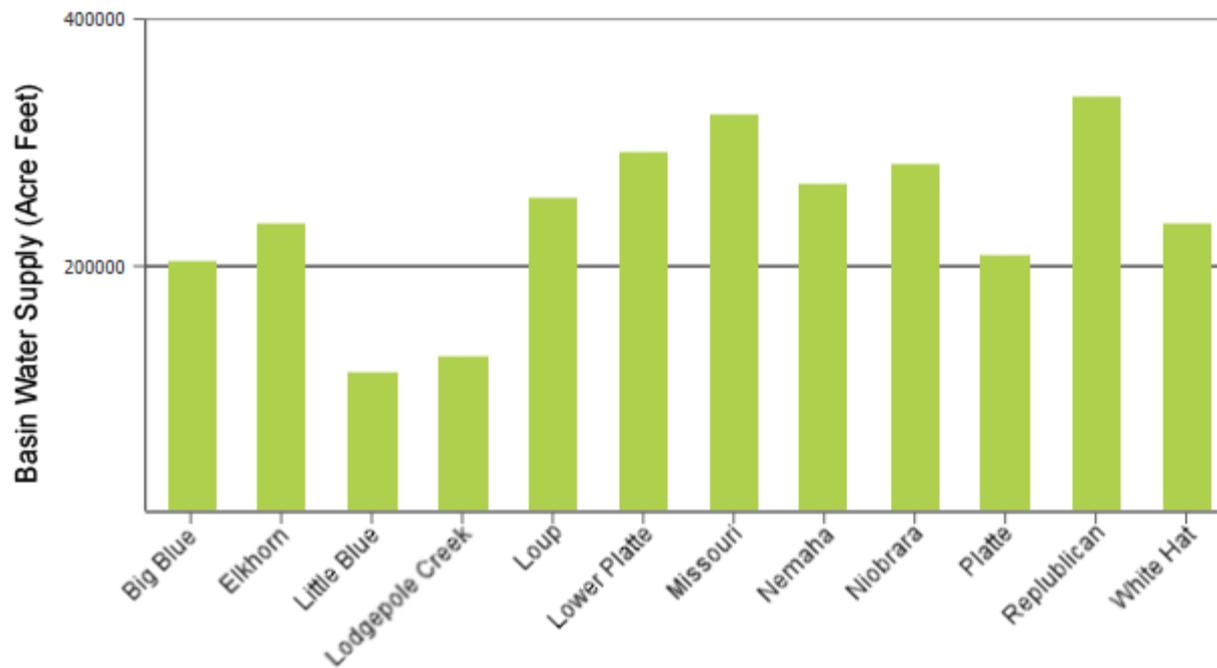
Statewide: Supply

Precipitation Rates and Volumes by Basin



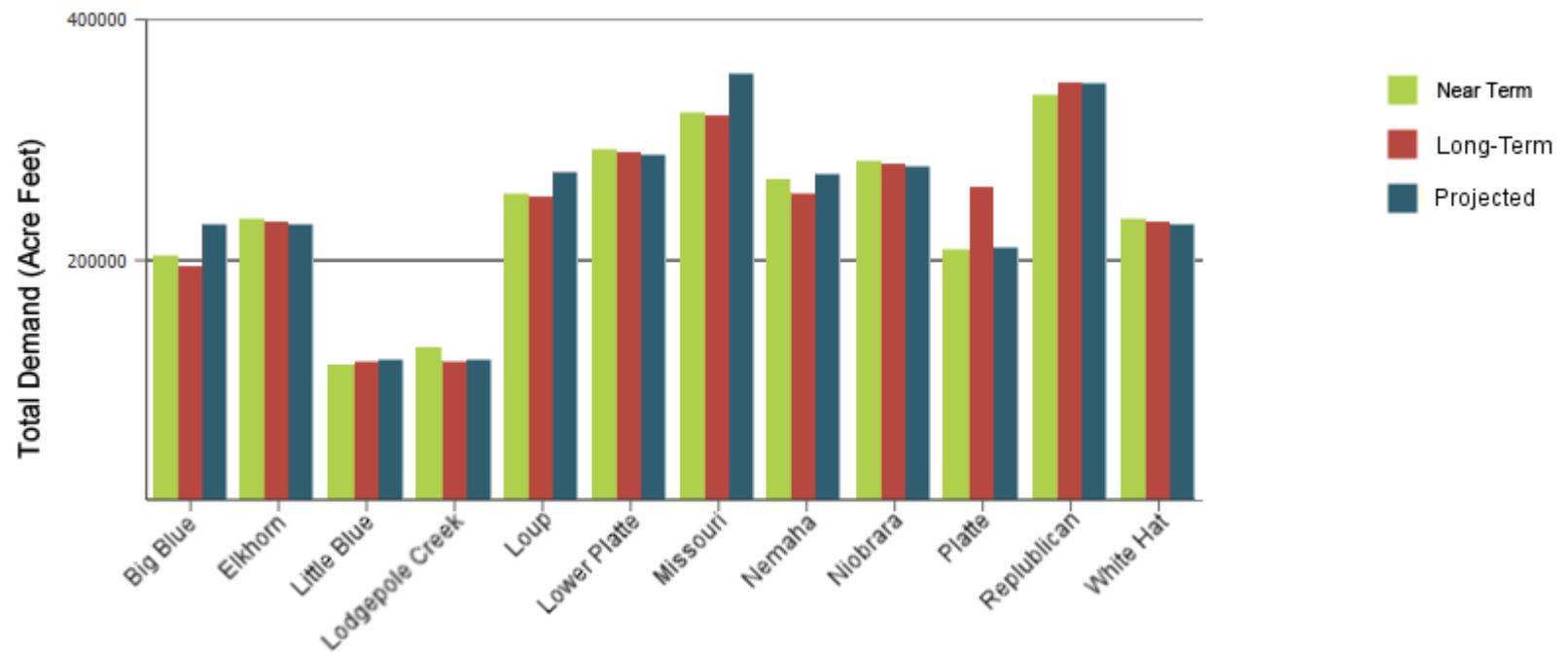
Statewide: Supply

Average Basin Water Supply



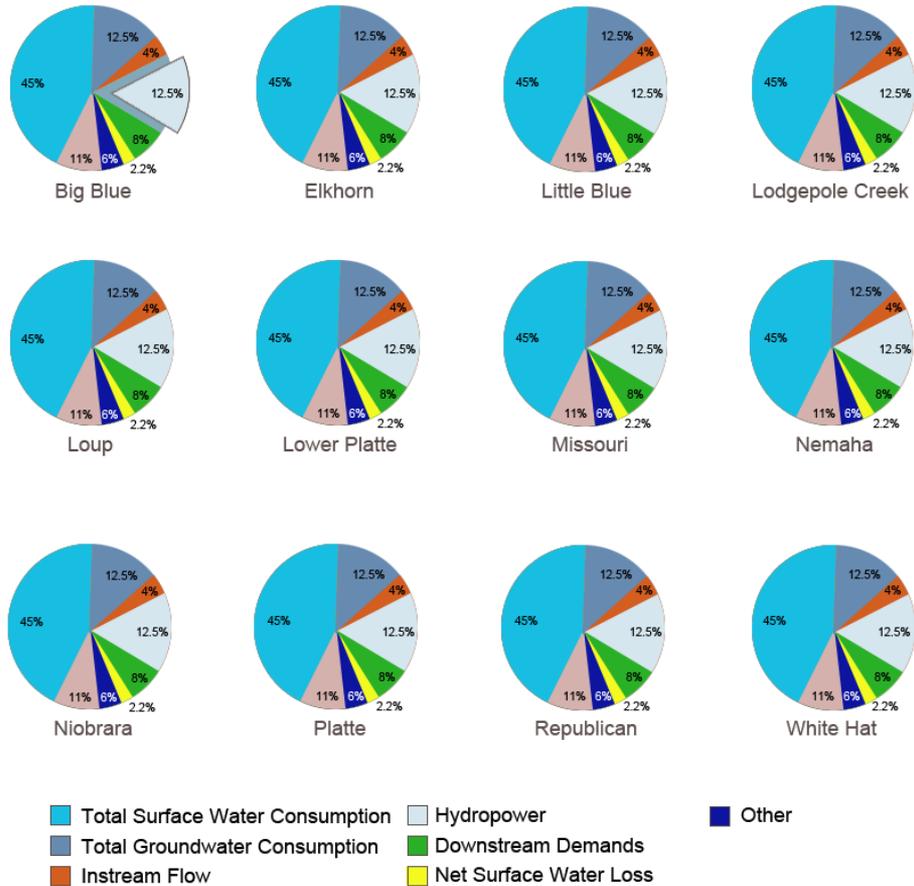
Statewide: Demand

Average Total Demand



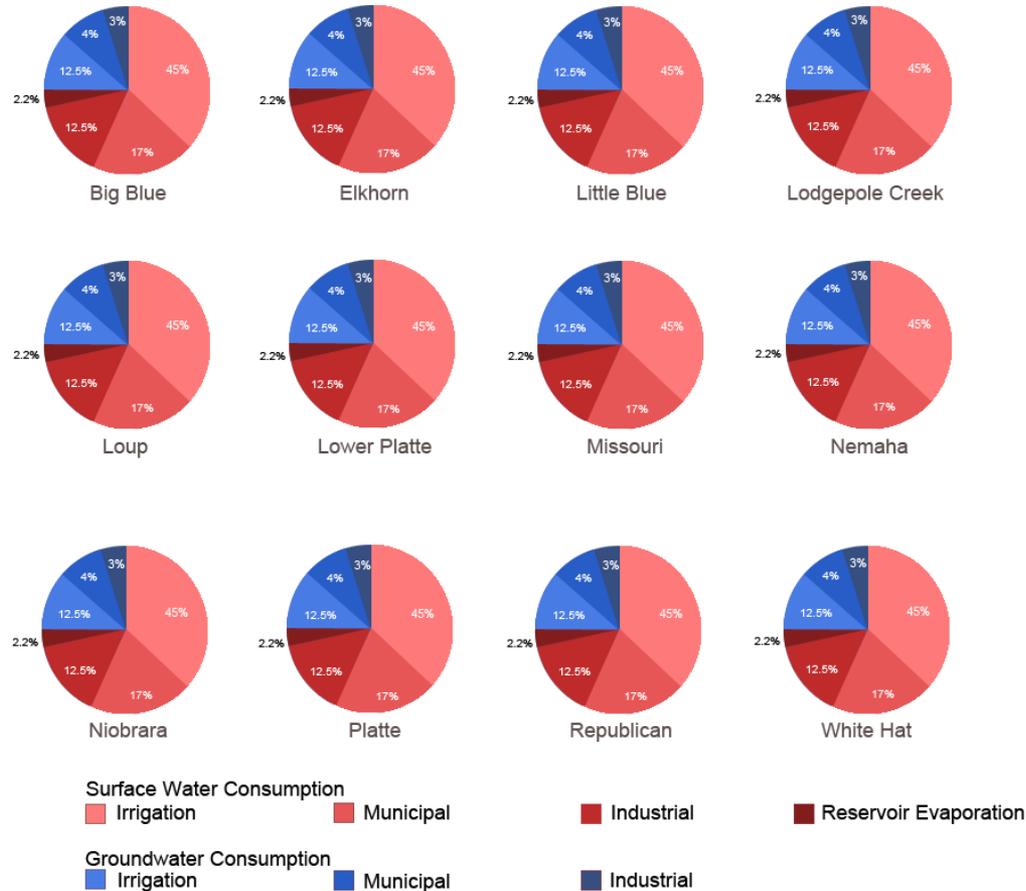
Statewide: Nature & Extent of Use

Average Long-Term Total Demand by Basin by Category



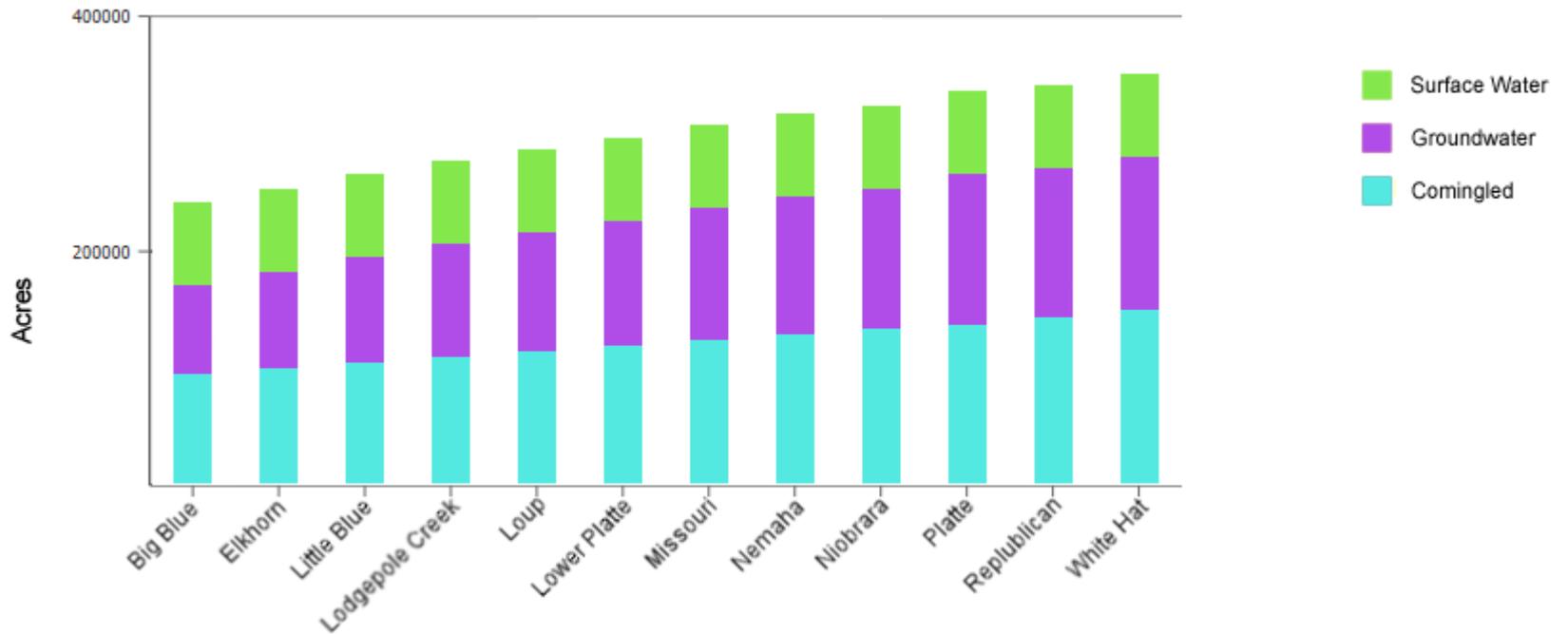
Statewide: Nature & Extent of Use

Average Long-Term Surface Water Consumption and Groundwater Consumption by Basin by Category



Statewide: Nature & Extent of Use

Irrigated Acres by Basin



INSIGHT Website Example for Basin/Sub-Basin Presentation of Data

INSIGHT
 An Integrated Network of Scientific Information & GeoHydrologic Tools



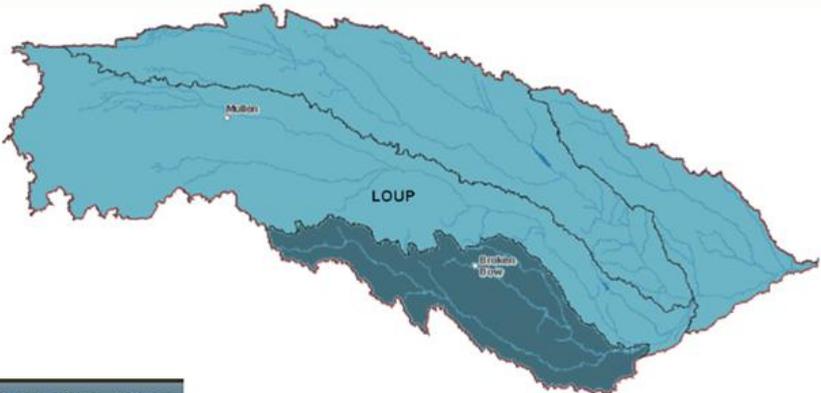
HOME
ABOUT
STREAM FLOW
MODELING DATA

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.

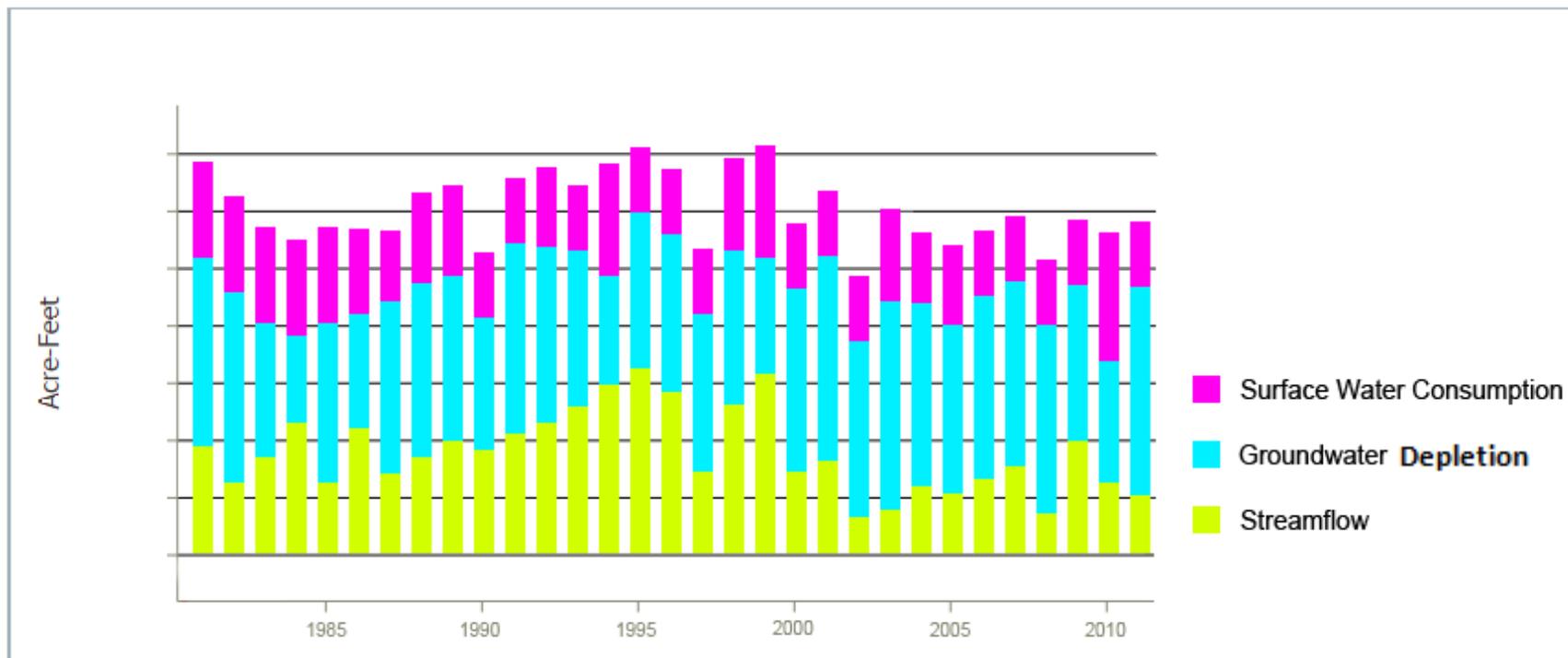
According to the 2010 U.S. Census, the largest city in the basin is Broken Bow, with a population of about 3,600. In descending order, the next largest cities include St. Paul (2,300), Ord (2,100), Ravenna (1,400), and Fullerton (1,300).

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

Basin/Sub-Basin: Supply

Basin Water Supply



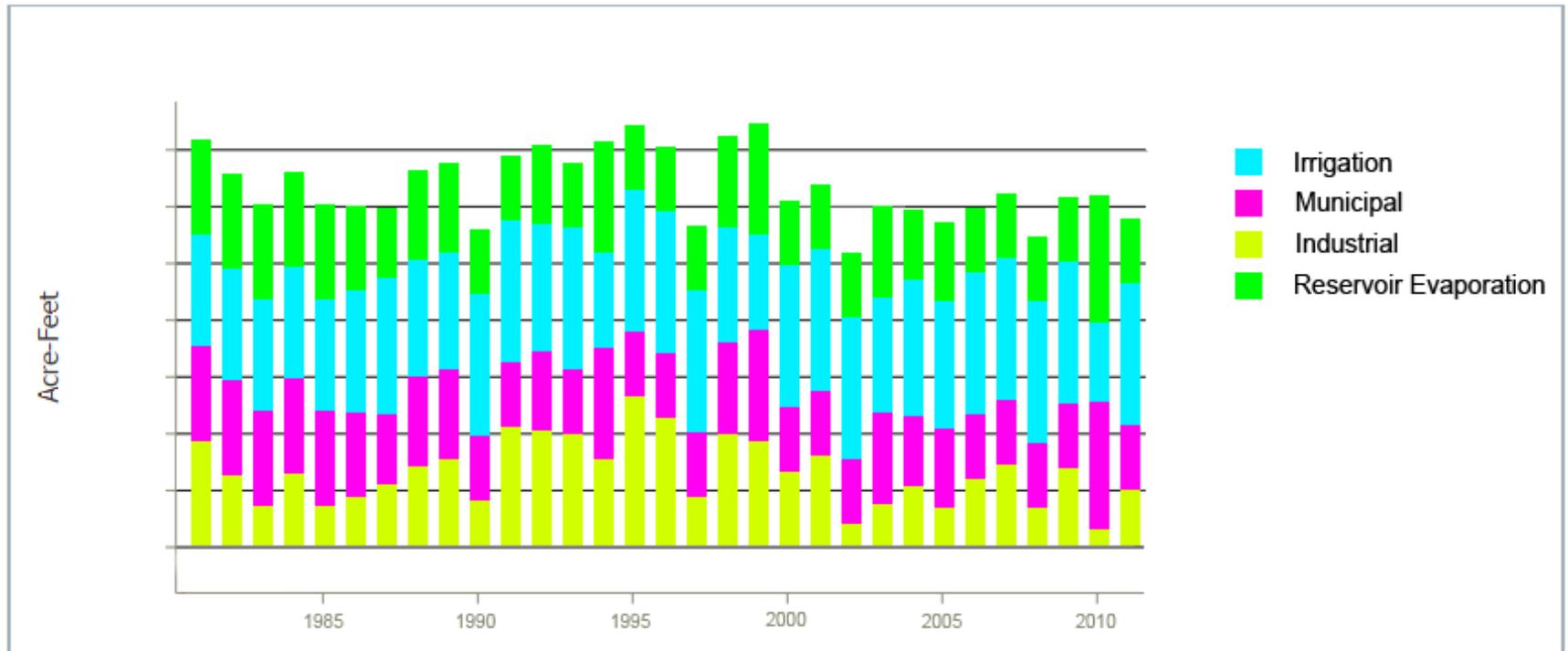
Basin/Sub-Basin: Demand

Total Demand



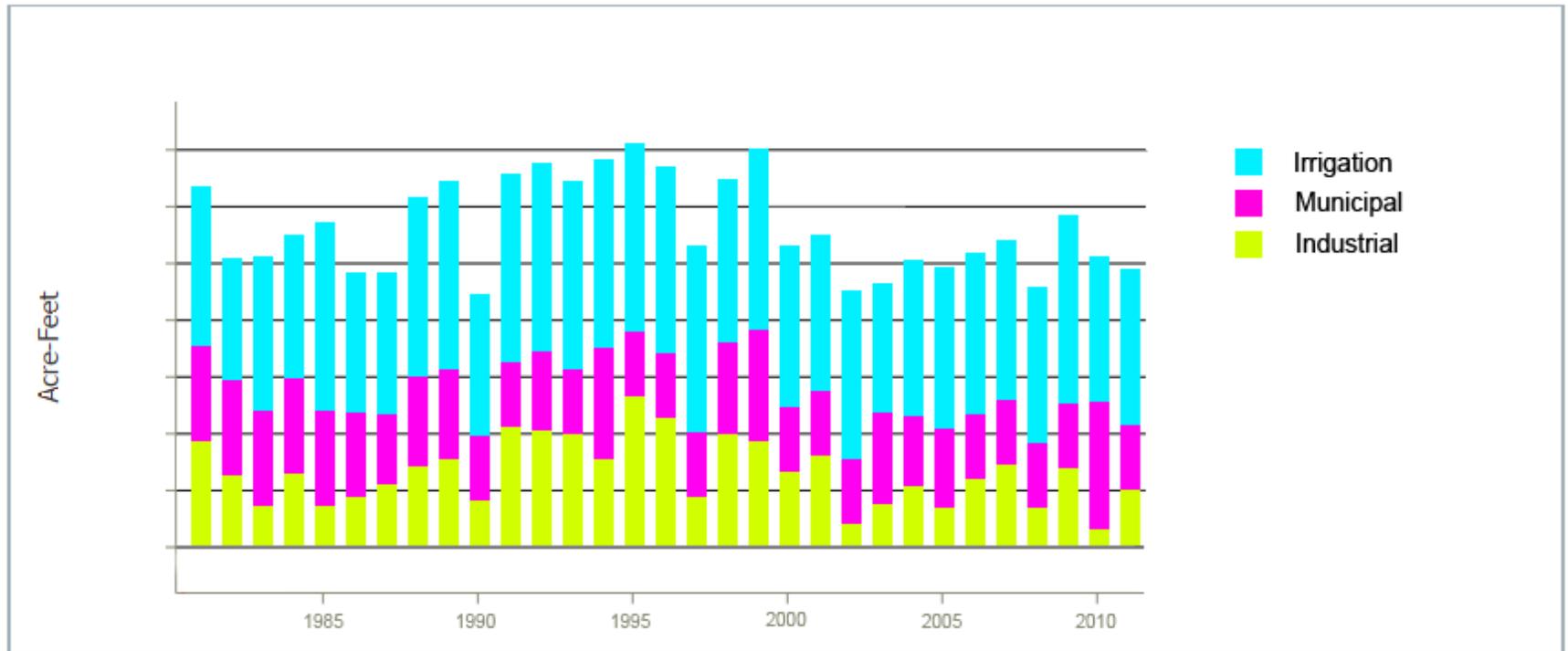
Basin/Sub-Basin: Demand

Total Surface Water Consumption



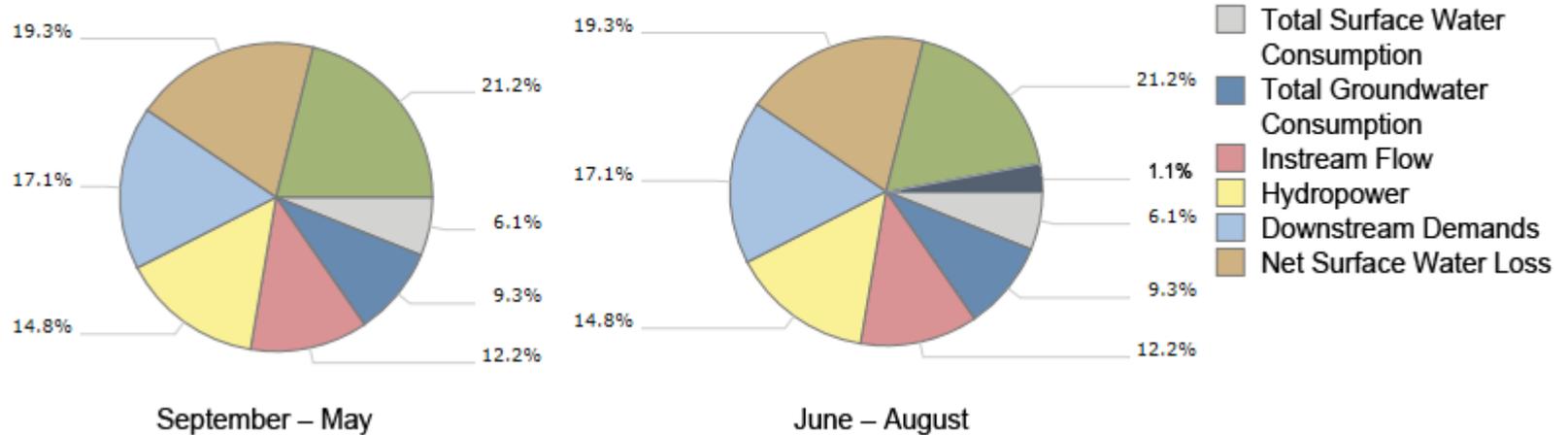
Basin/Sub-Basin: Demand

Total Groundwater Consumption



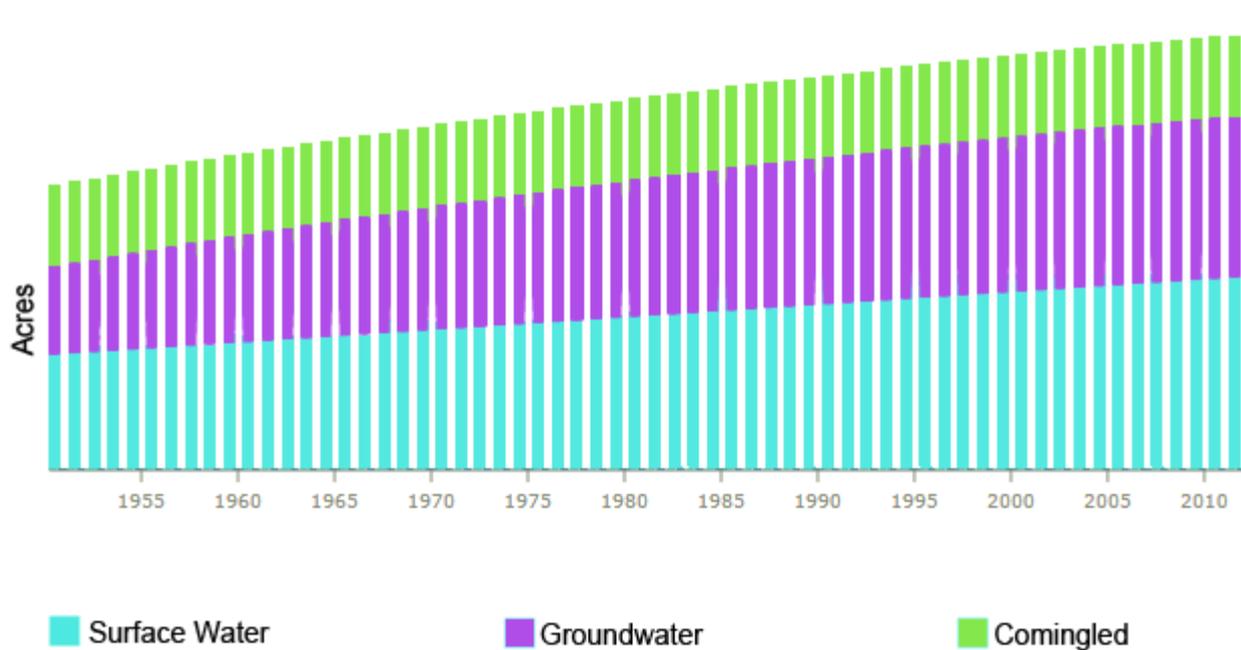
Basin/Sub-Basin: Nature & Extent of Use

Long-Term Average Total Demand by Sector



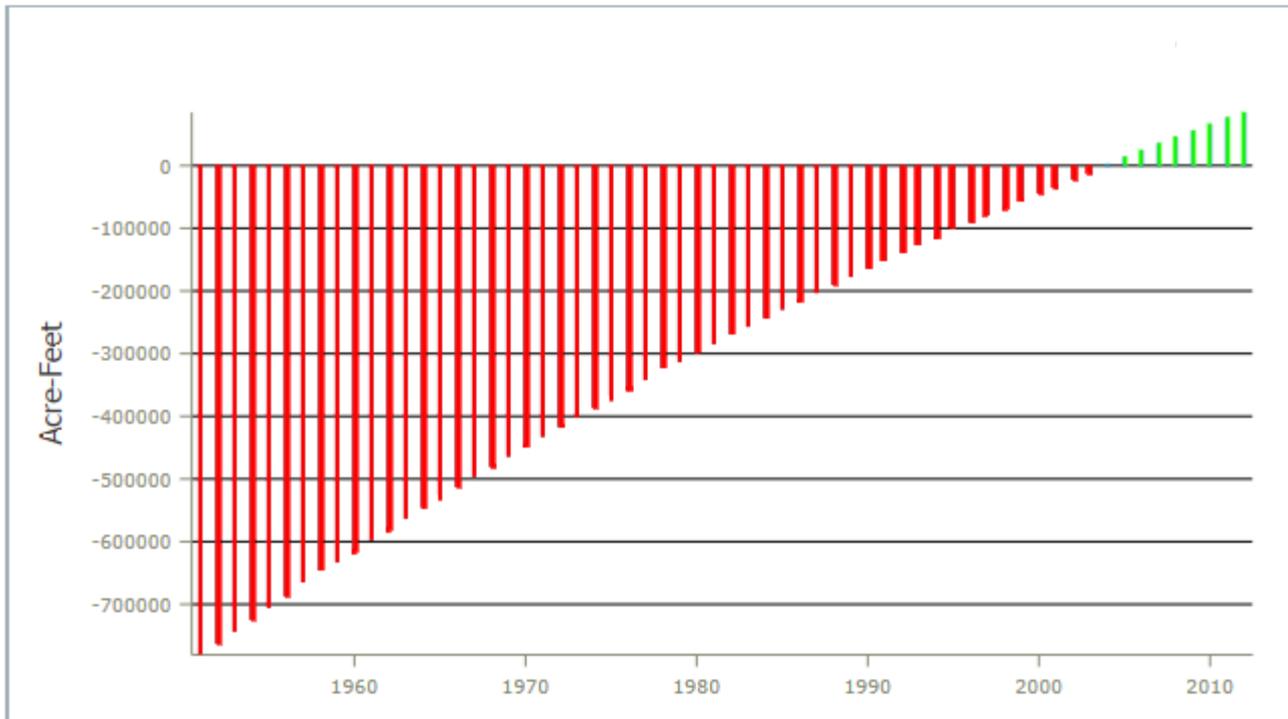
Basin/Sub-Basin: Nature & Extent of Use

Irrigated Acres



Basin/Sub-Basin: Balance

Long-Term* Balance of Water Supplies and Total Demands



Summary

- Methods and tools developed support unique setting with each basin, sub-basin, or reach
- New methods provide comprehensive assessment of hydrologically connected water supplies and demands on those supplies
- INSIGHT provides for a single location to access the data, tools, and results

Thank you

Questions?