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

September 23, 2013

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Nebraska
Department of Natural Resources

Outline

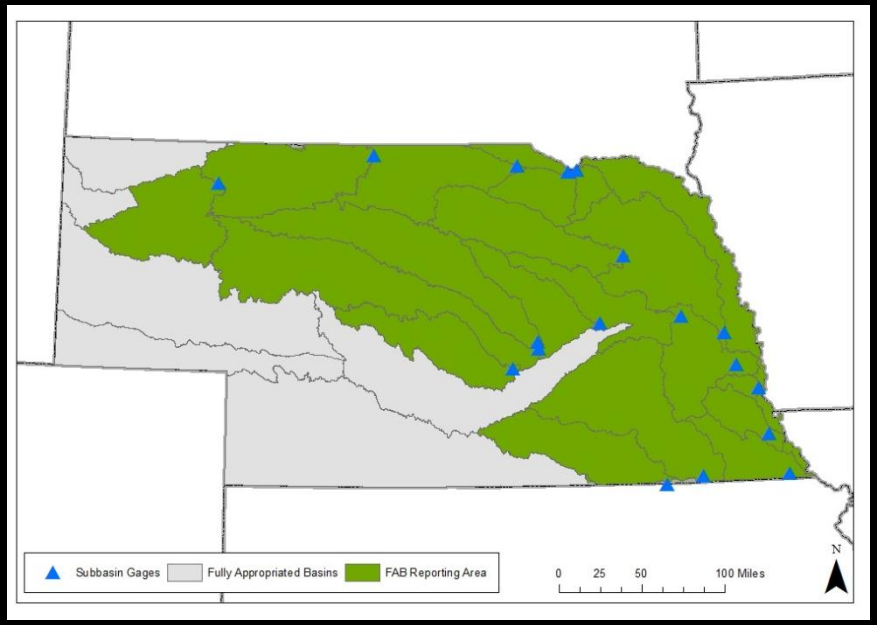
- Development of the new methods
- Concepts behind the methods
- Example of the methods
- INSIGHT

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

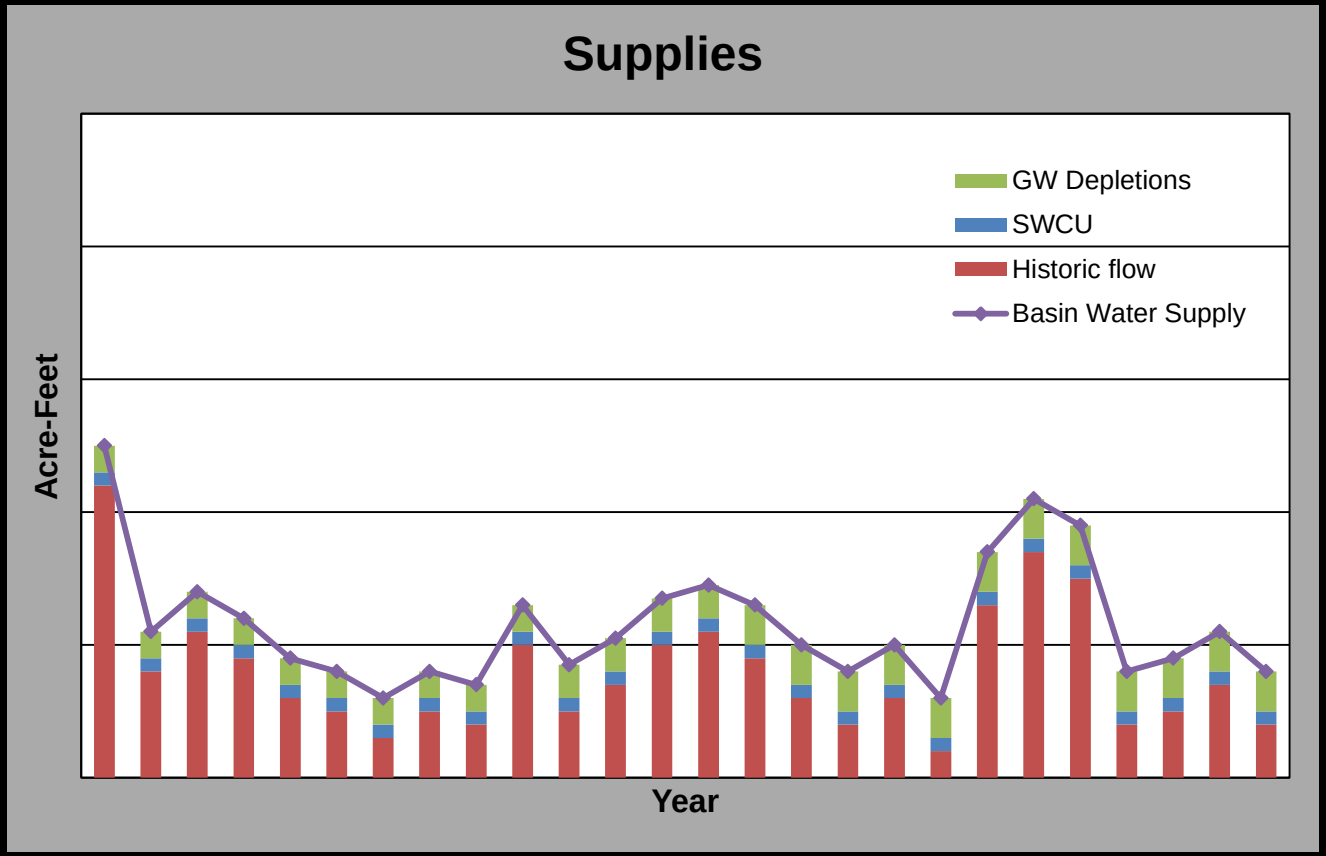
- Basin Water Supplies
  - Streamflow
  - Groundwater Depletions
  - Surface Water Consumption
- Total Water Uses
  - Groundwater Consumption
  - Surface Water Consumption
  - Water for Canal Deliveries
  - Instream Flow Demands
  - Hydropower Demands
  - Downstream Water Demands



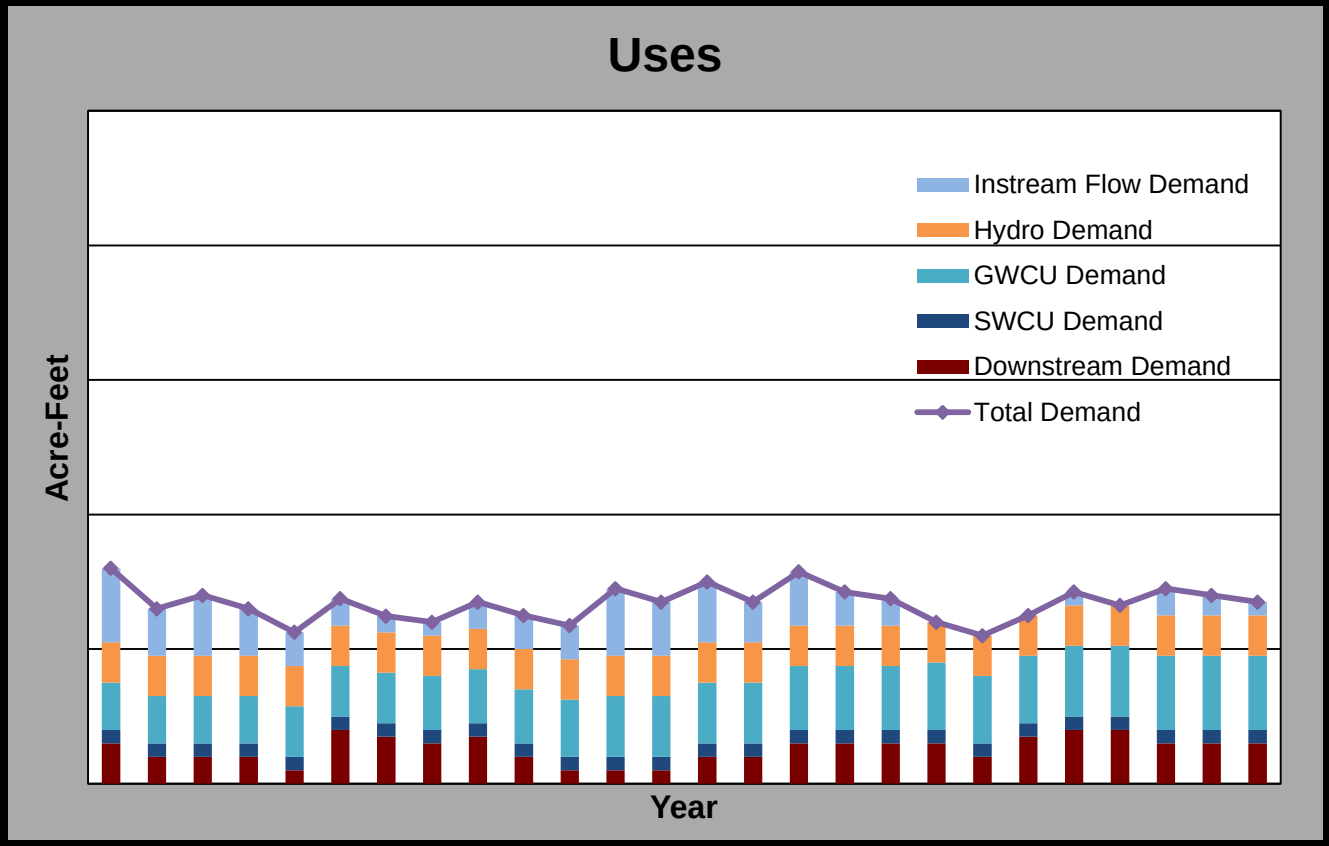
Concepts

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

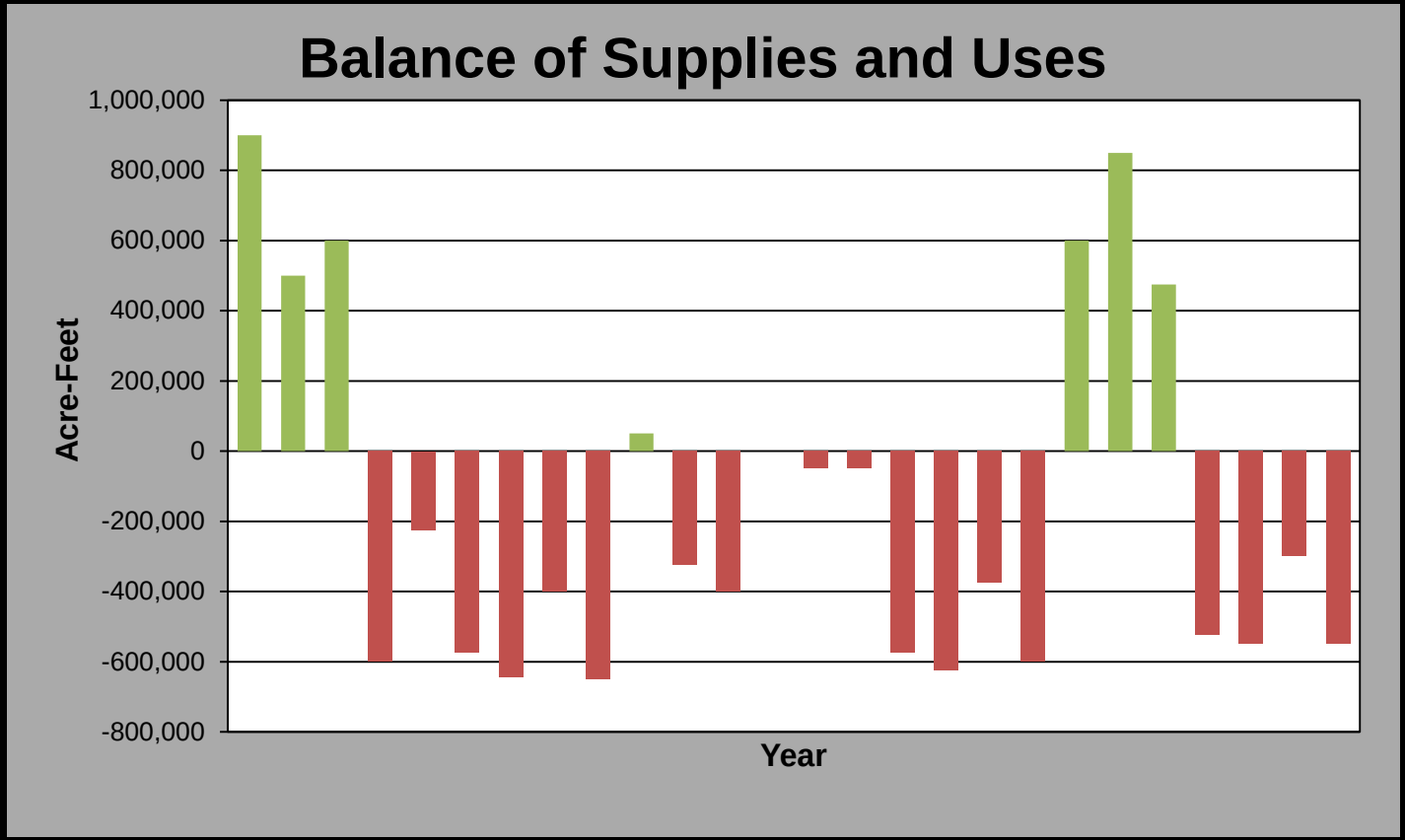
Concepts


Supplies
GW Depletions
SWCU
Historic flow
Basin Water Supply
Acre-Feet
Year

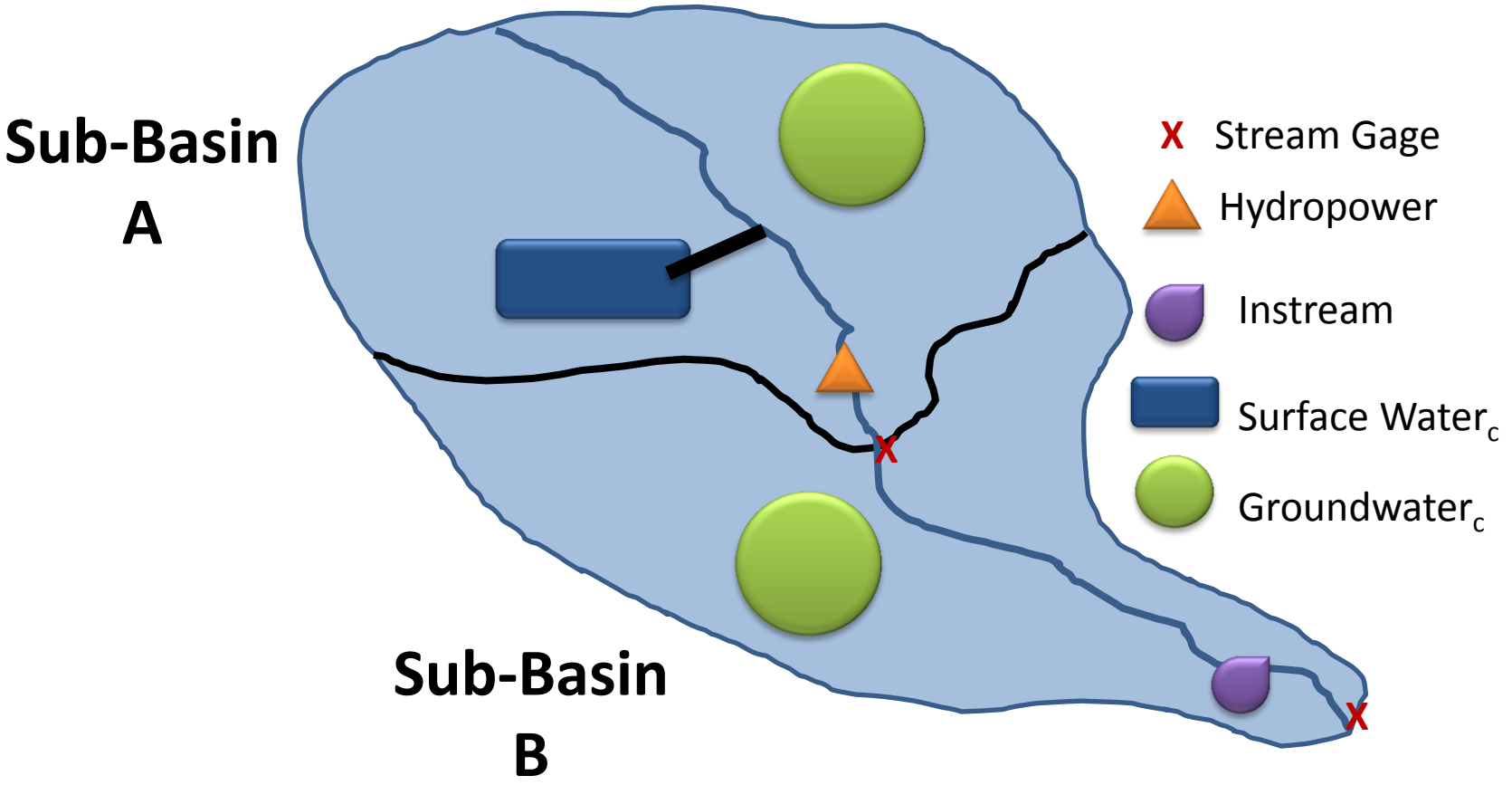
Concepts


Uses
Acre-Feet
Year
Instream Flow Demand
Hydro Demand
GWCU Demand
SWCU Demand
Downstream Demand
Total Demand

Concepts


Balance of Supplies and Uses
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
-400,000
-600,000
-800,000
Acre-Feet
Year

Example


Sub-Basin A
Sub-Basin B
X Stream Gage
Hydropower
Instream
Surface Water$_c$
Groundwater$_c$
X
X

Example

$$BWS = Stream\ Gage + Surface\ WaterC + Groundwater_{D}$$

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)

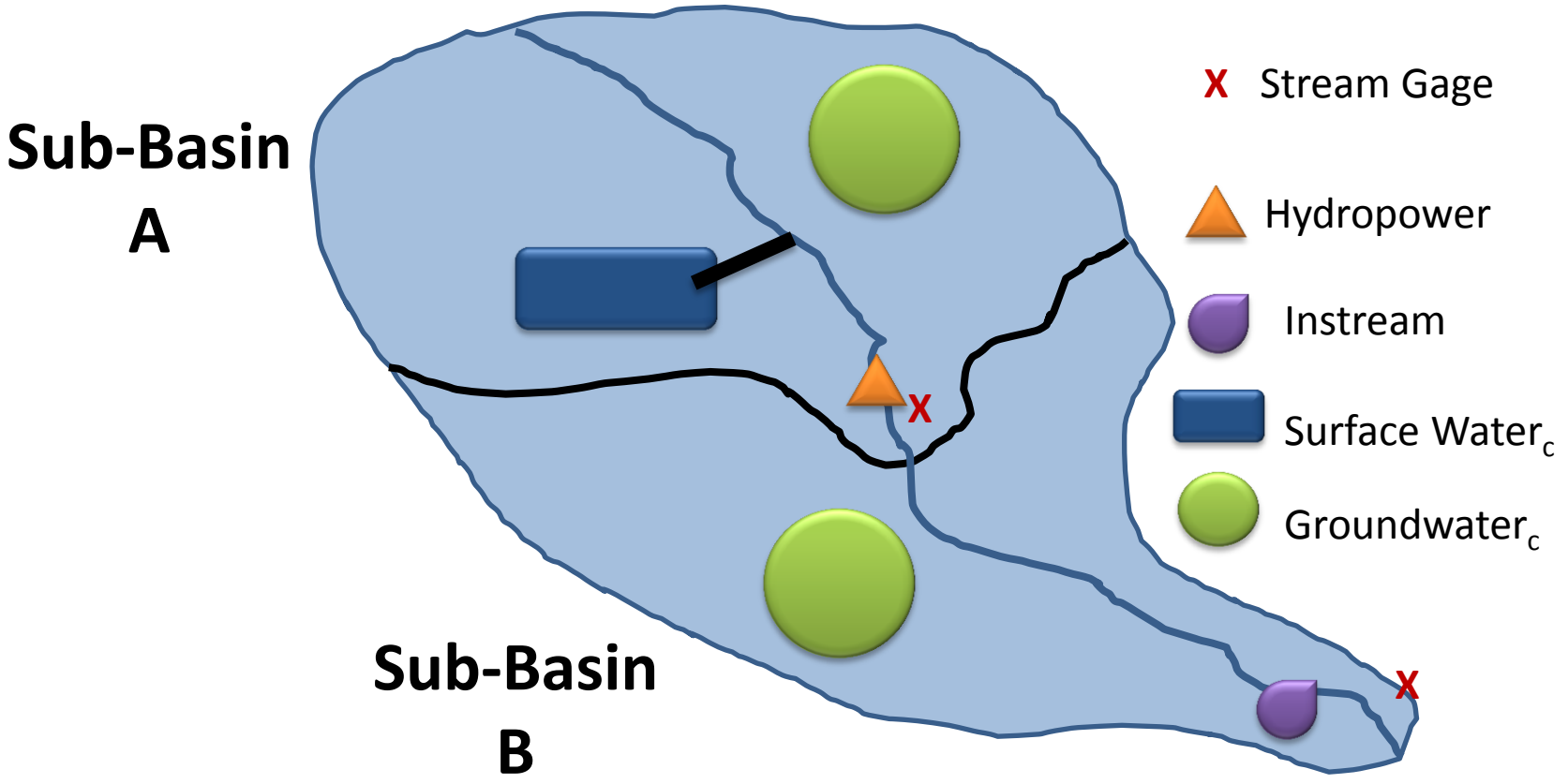
Stream Gage = 1300

Surface Water$_C$ = 100

Groundwater$_D$ = 600

B Total = 2000 (1200 exclusive to B)

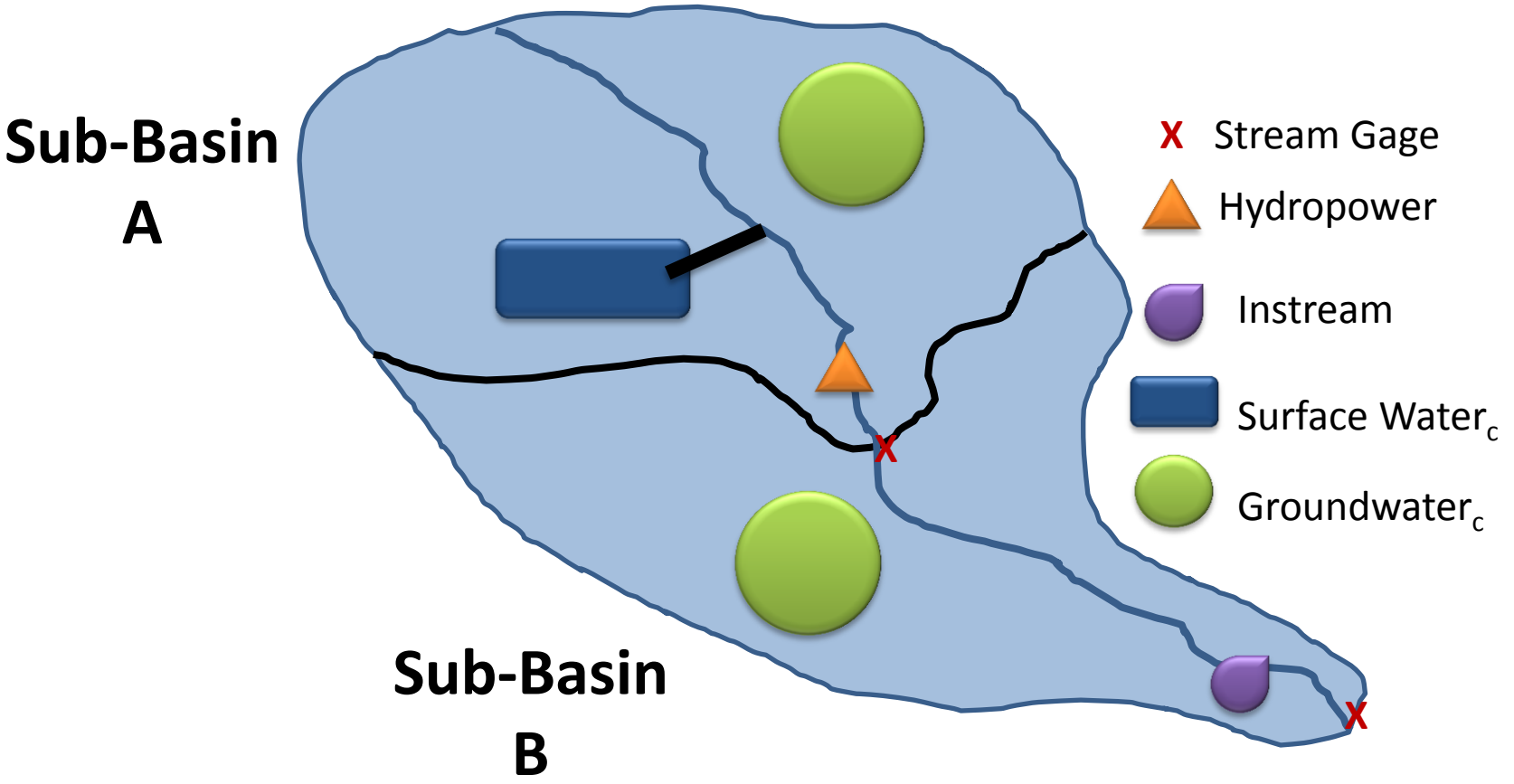
Proportion of Total = 60%



Example

$$Near\ Term\ Demand = \boxed{Groundwater_D} + Surface\ WaterC + Hydropower + Instream + Downstream\ Demand$$

$$Long\ Term\ Demand = \boxed{Groundwater_C} + Surface\ WaterC + Hydropower + Instream + Downstream\ Demand$$



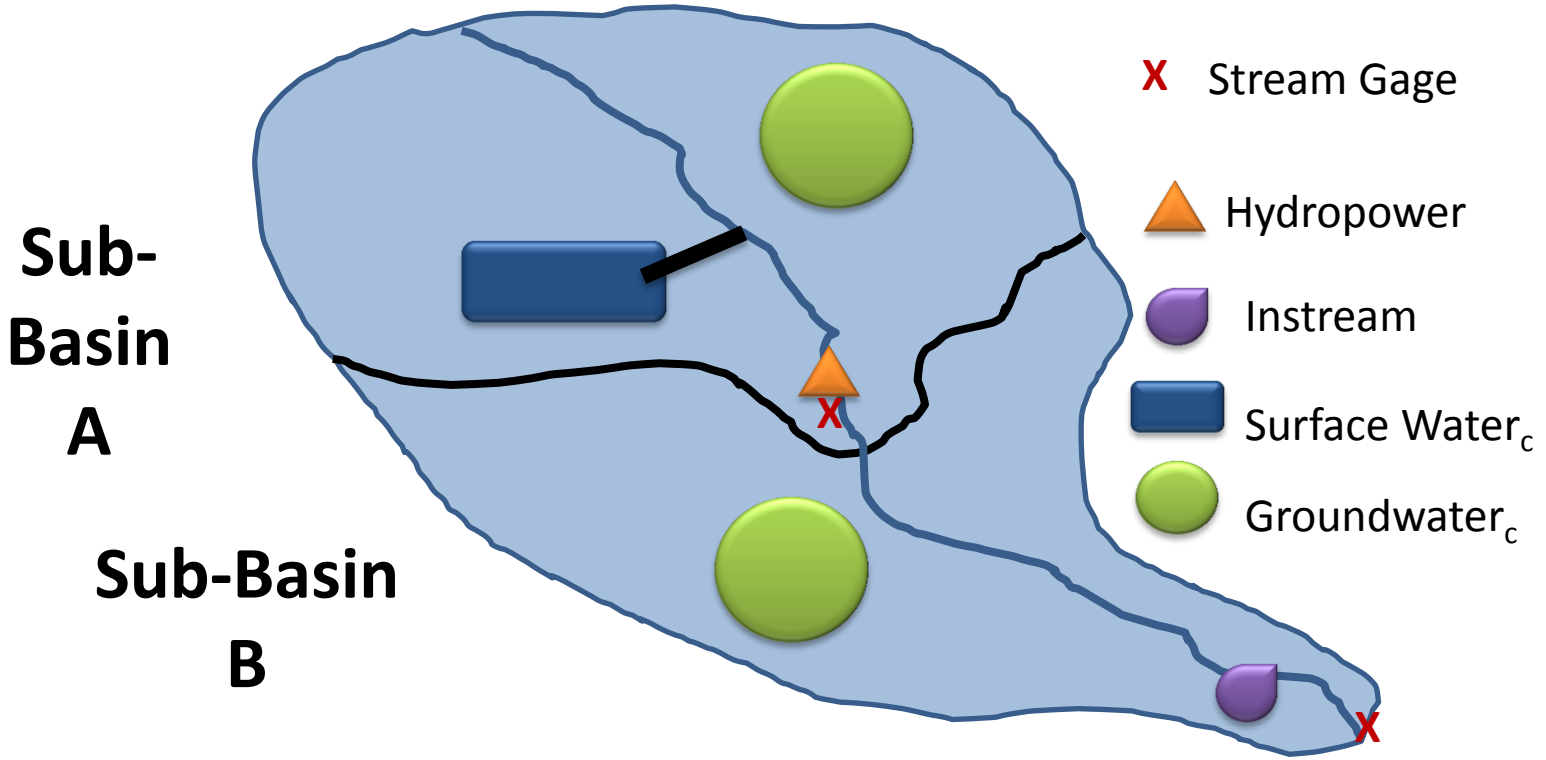
Example

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)

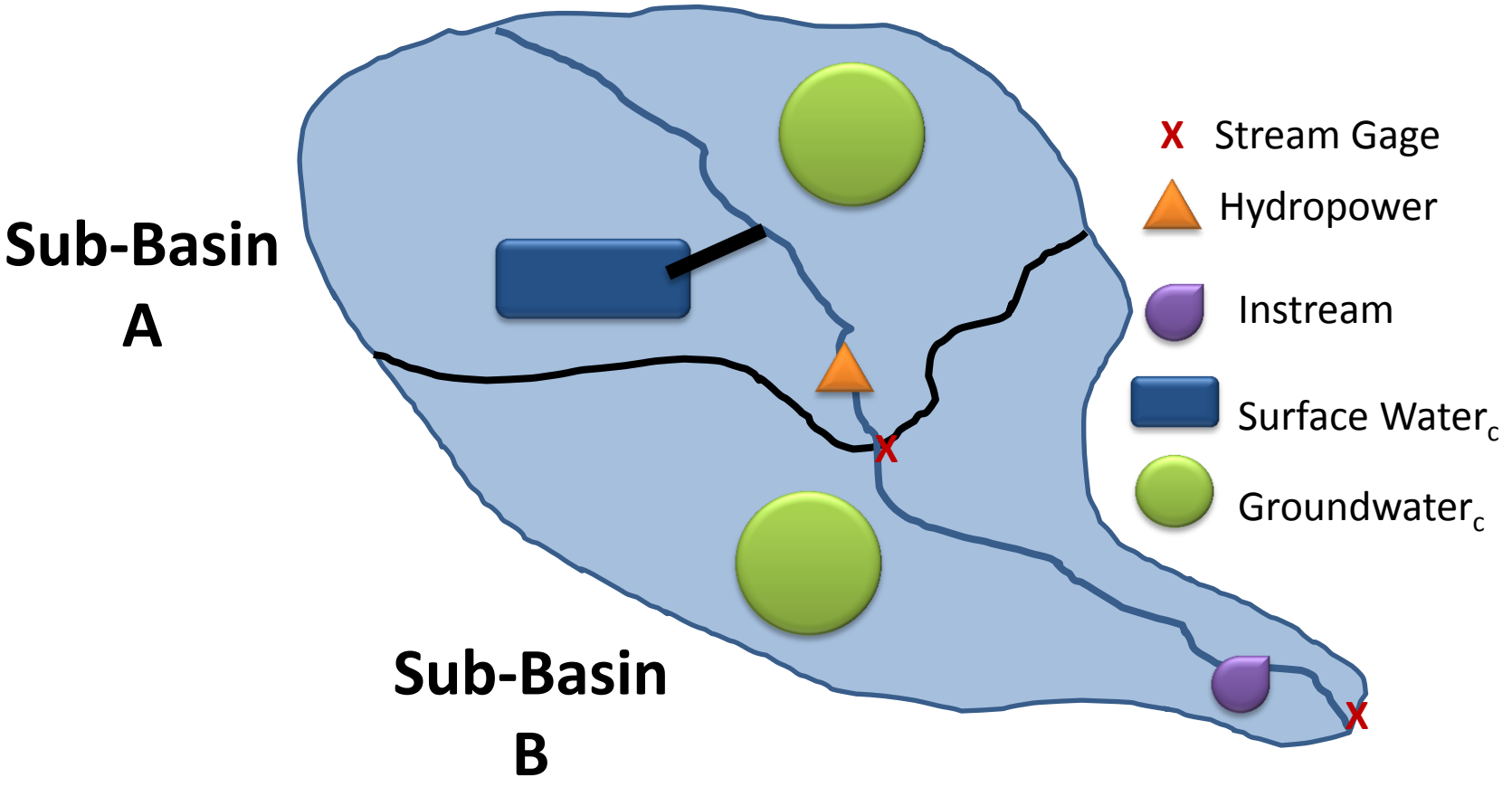
Groundwater$_C$ = 400 (mainstem) 200 (tributary)
Surface Water$_C$ = 0
Instream = 500 (mainstem)
Assigned as Downstream Demand to Sub-basin A =160
B Total = 400 + 200 + 500 – 360 = 740



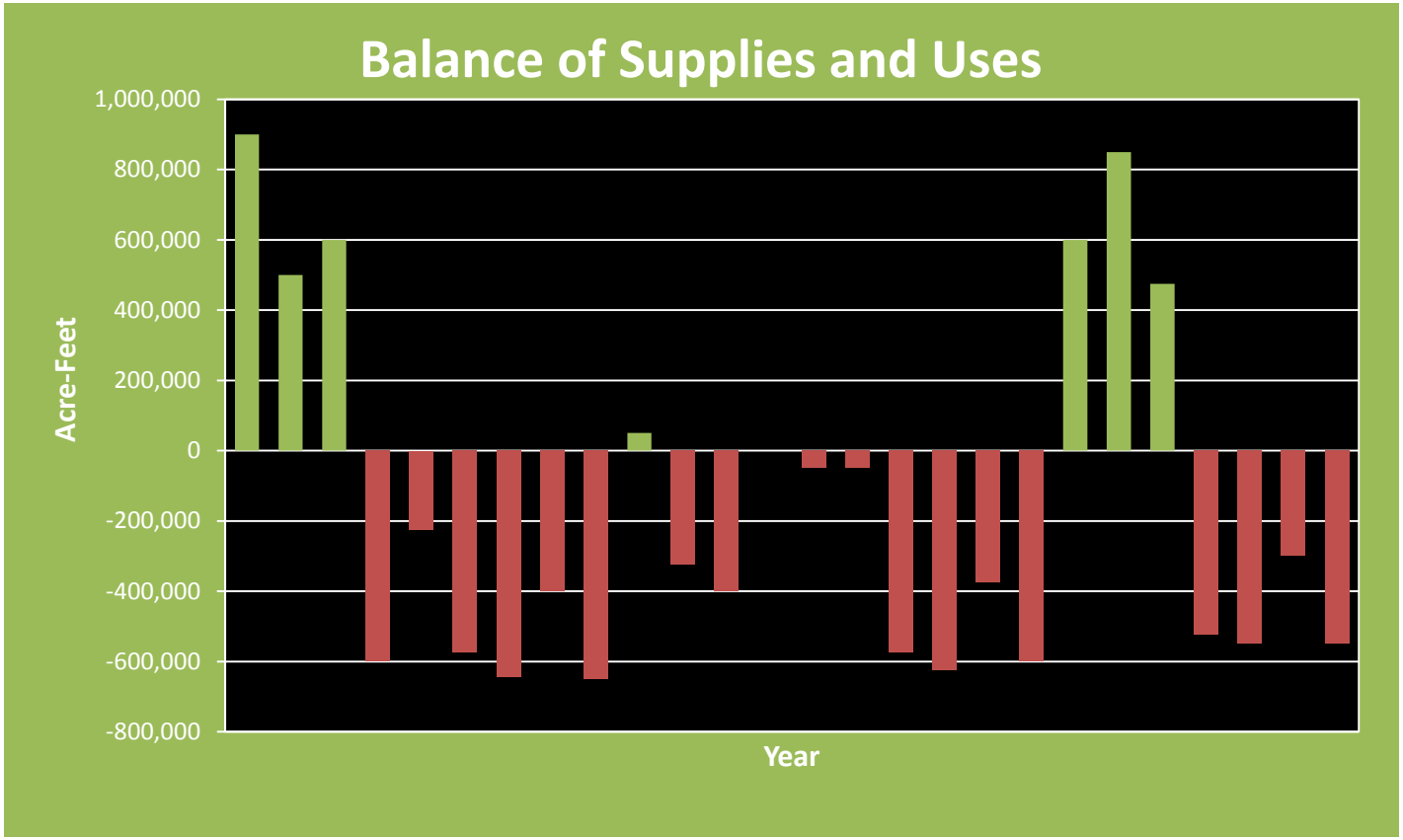
Example

Sub-basin A
BWS = 800
Total Long-term Demand = 1060
Balance = **- 260**

Sub-basin B
BWS = 1200
Total Long-term Demand = 640
Balance = **+ 560**



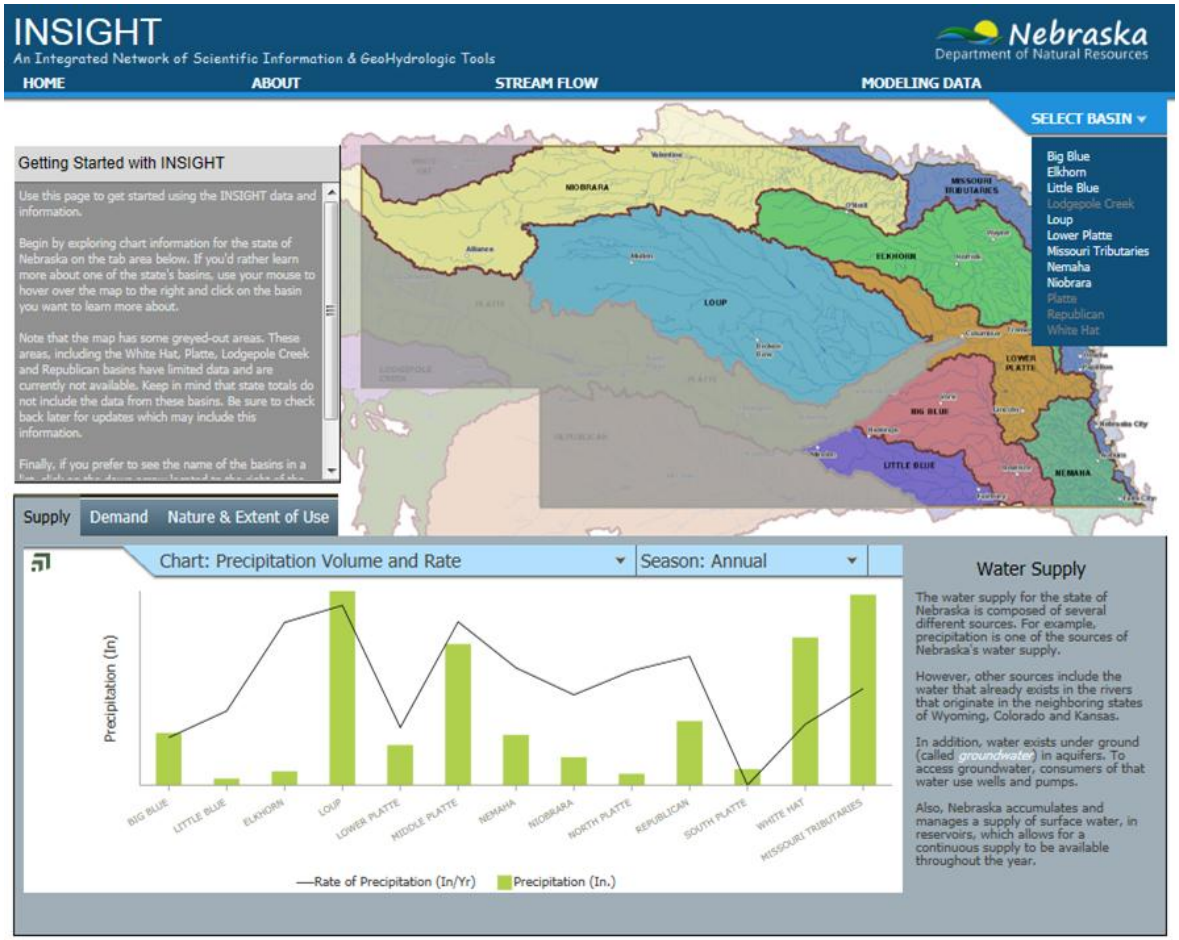
Concepts


Balance of Supplies and Uses
1,000,000
800,000
600,000
400,000
200,000
0
-200,000
-400,000
-600,000
-800,000
Acre-Feet
Year

INSIGHT Charts and Graphs on Website

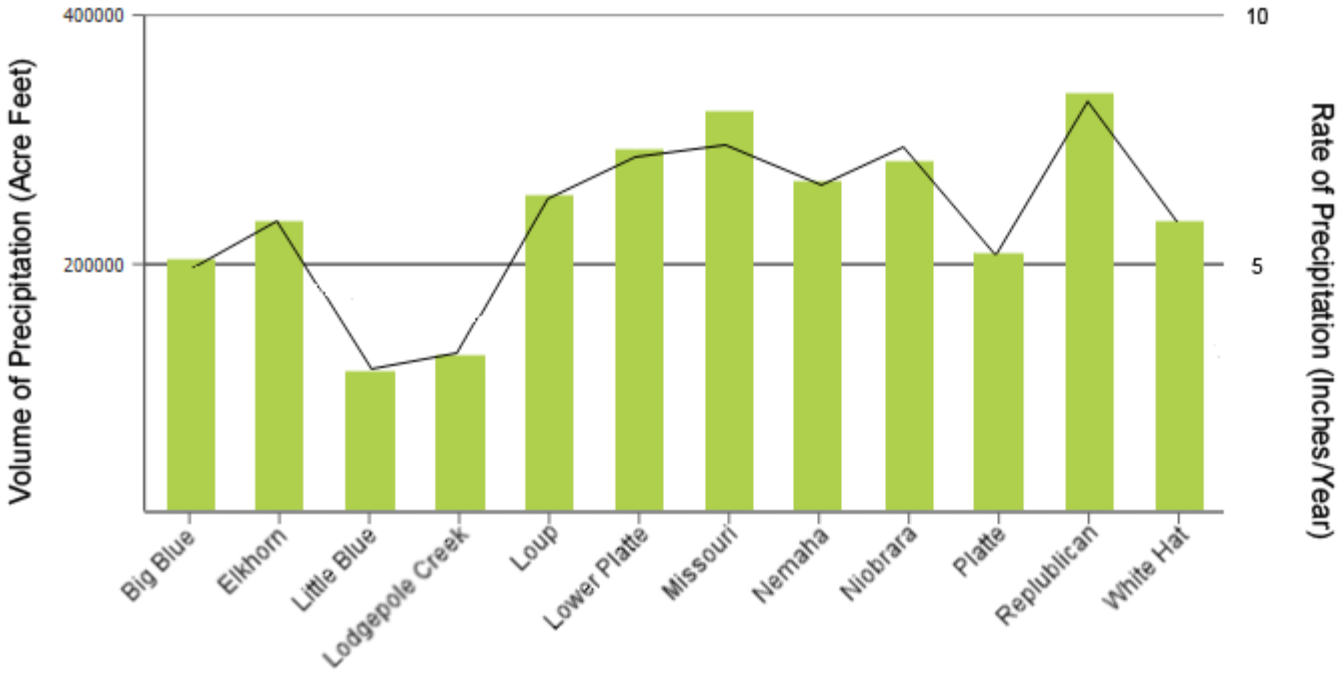
- Information will be displayed on the INSIGHT Website by the following categories:
  - Statewide
    - Big Picture
    - Supply
    - Demand
    - Nature & Extent of Use
  - Basin/Sub-Basin
    - Big Picture
    - Supply
    - Demand
    - Nature & Extent of Use
    - Balance

INSIGHT Website Example for Statewide Presentation of Data



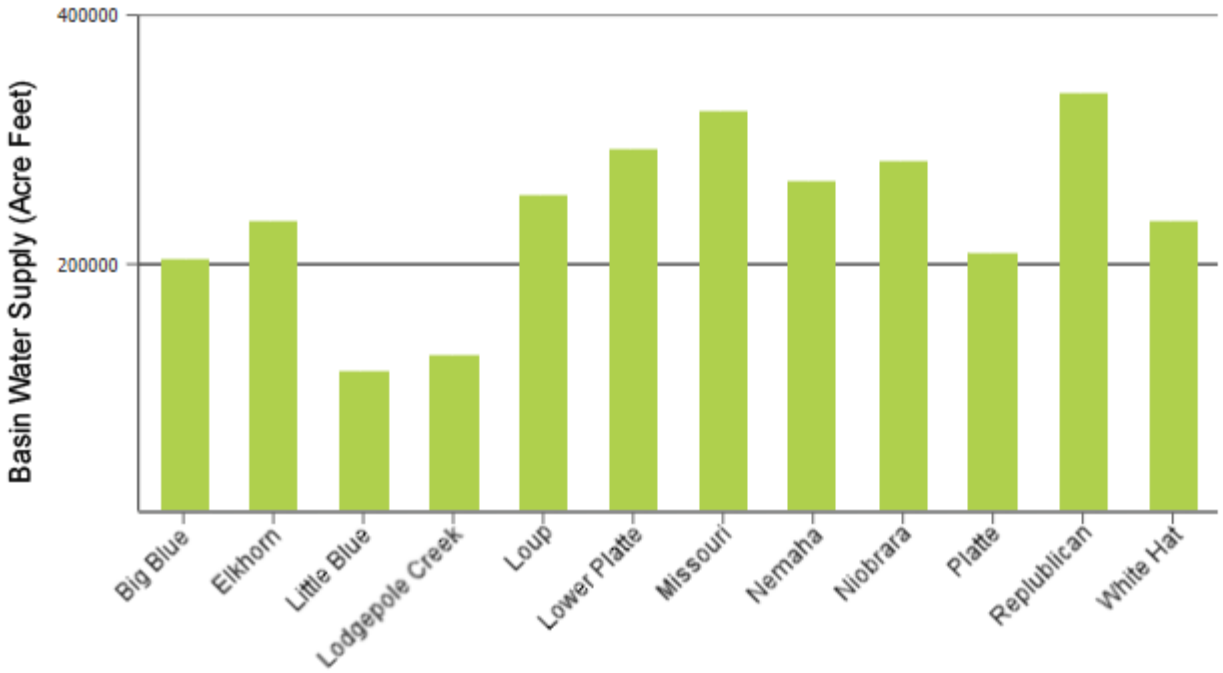
Statewide: Supply

Precipitation Rates and Volumes by Basin



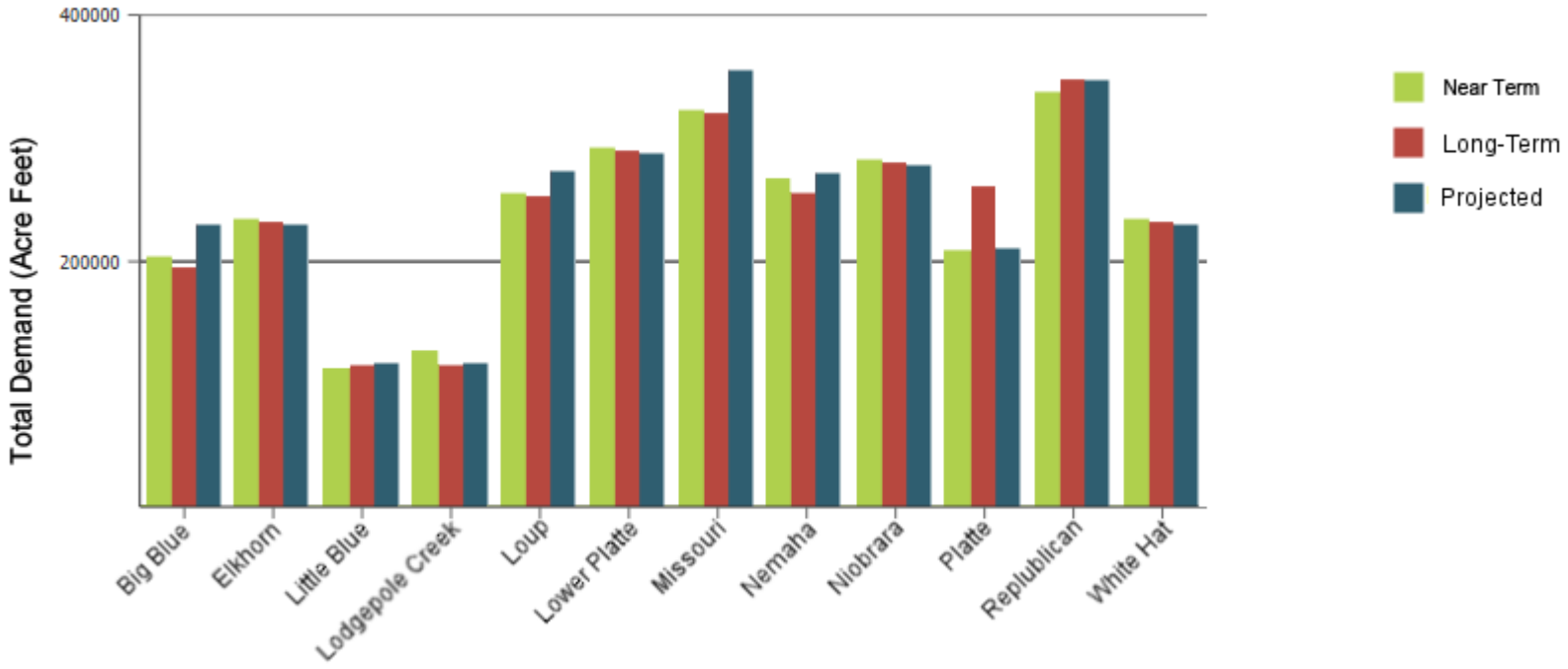
Statewide: Supply

Average Basin Water Supply



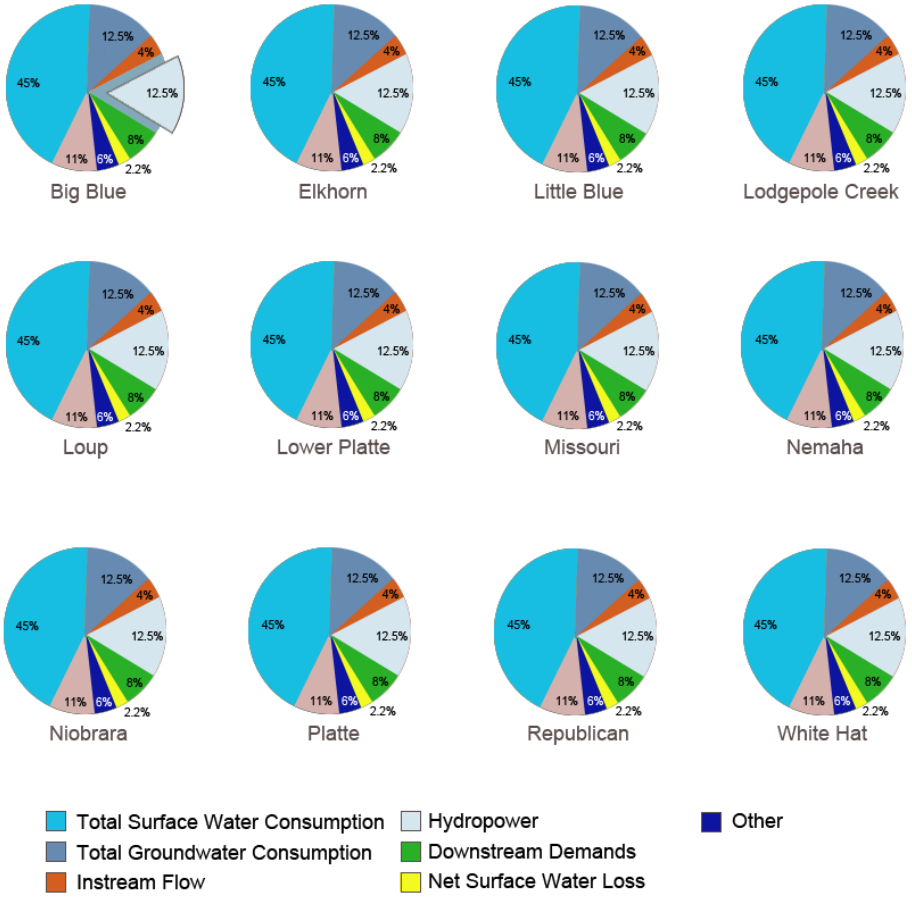
Statewide: Demand

Average Total Demand



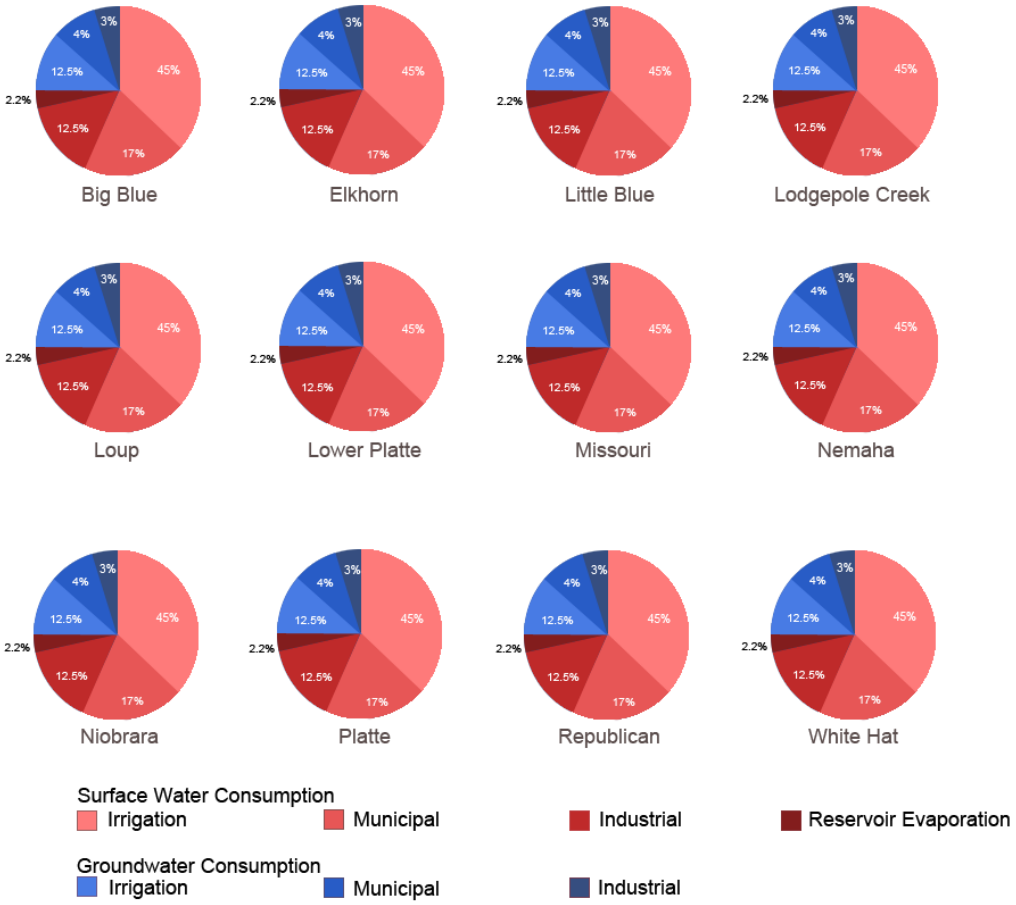
Statewide: Nature & Extent of Use

Average Long-Term Total Demand by Basin by Category



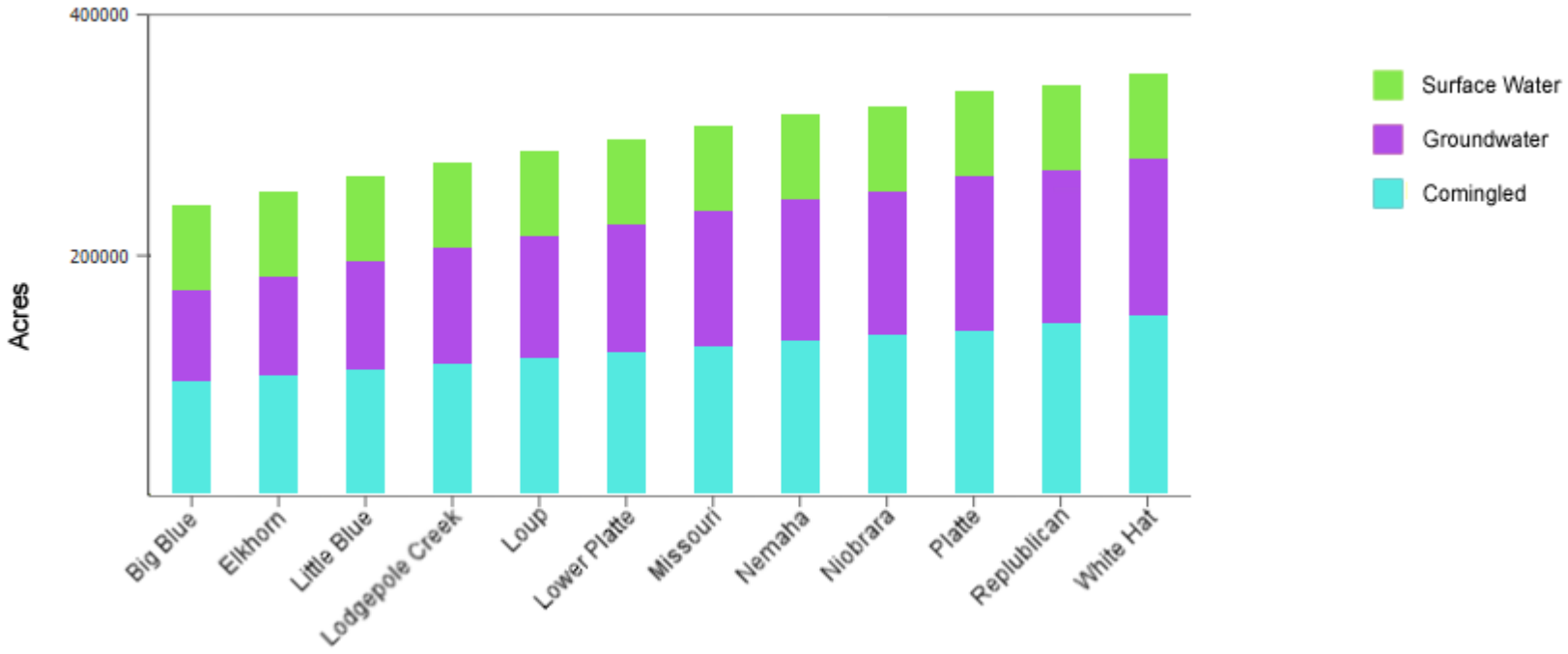
Statewide: Nature & Extent of Use

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

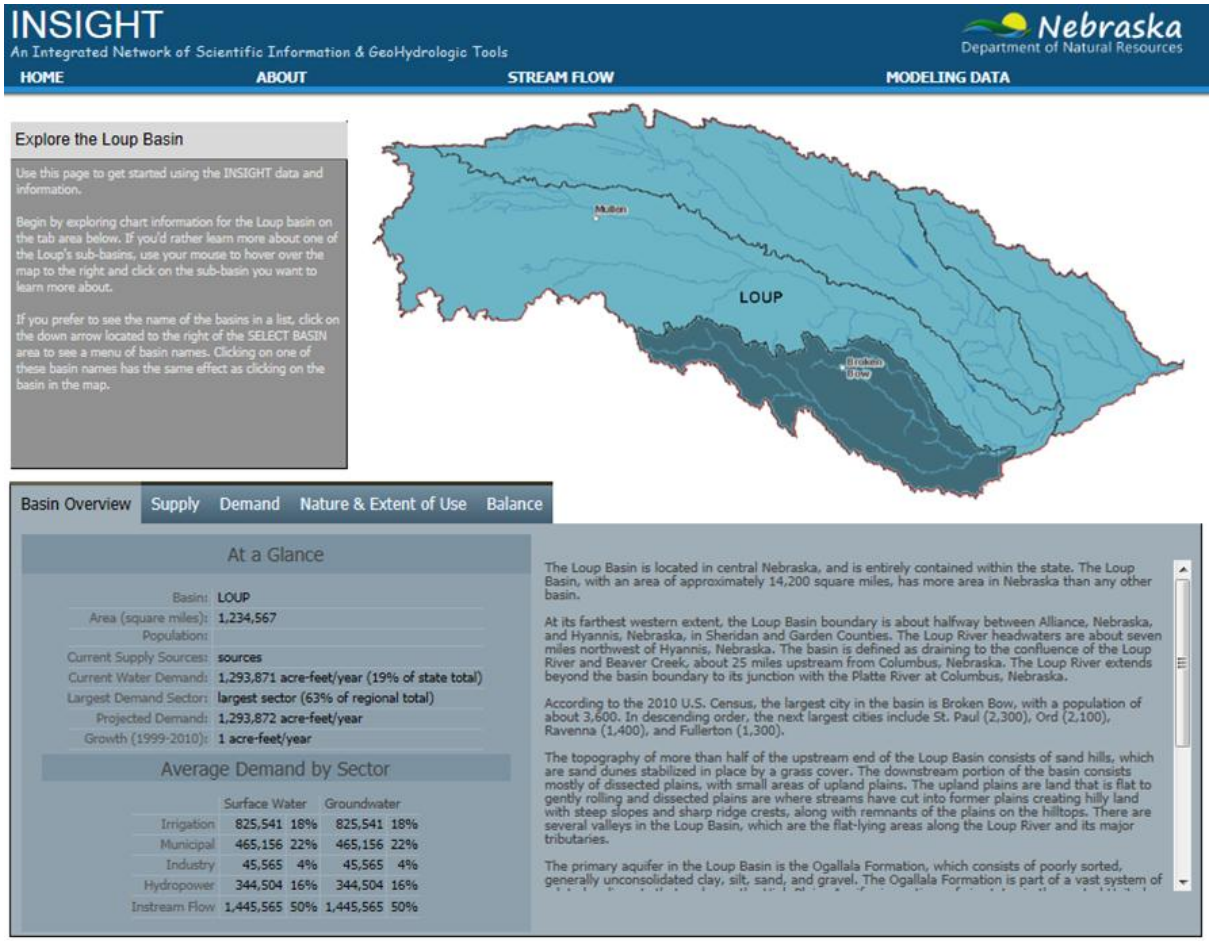


Statewide: Nature & Extent of Use

Irrigated Acres by Basin

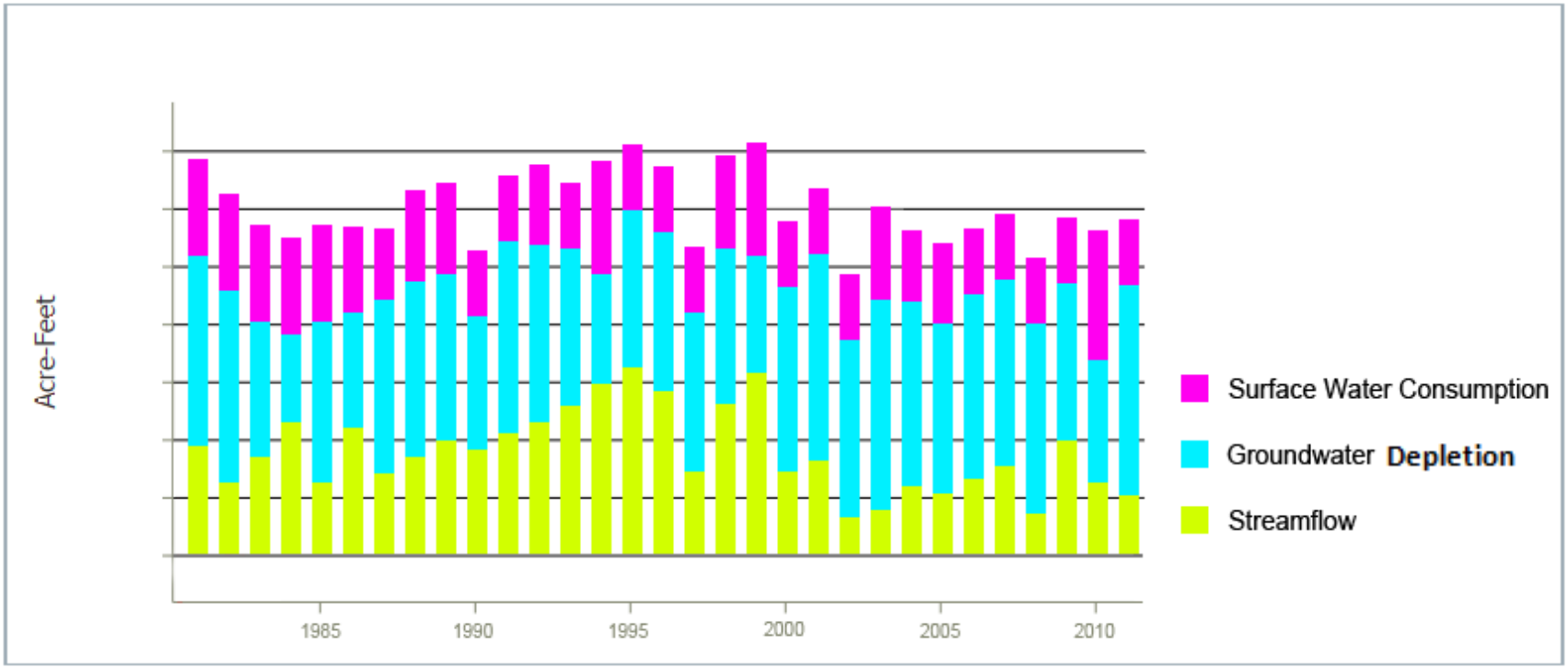


INSIGHT Website Example for Basin/Sub-Basin Presentation of Data



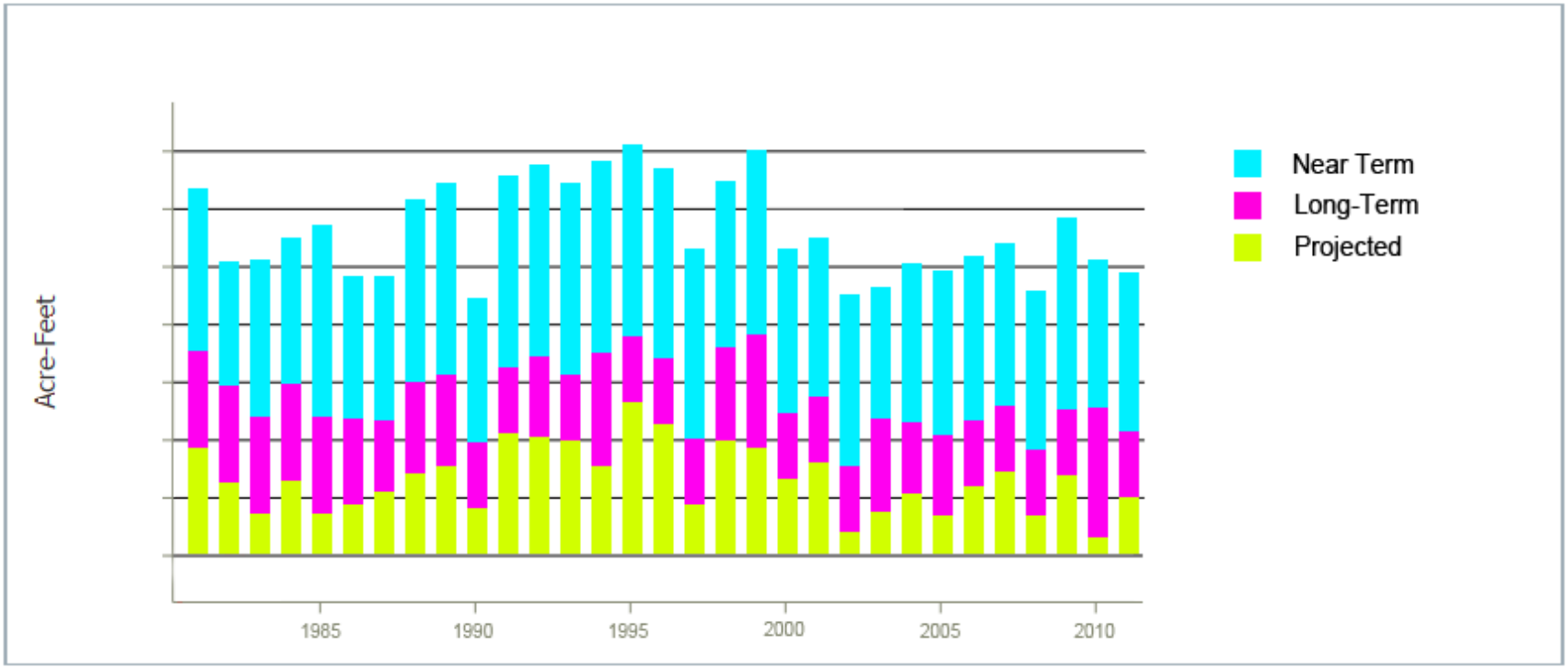
Basin/Sub-Basin: Supply

Basin Water Supply



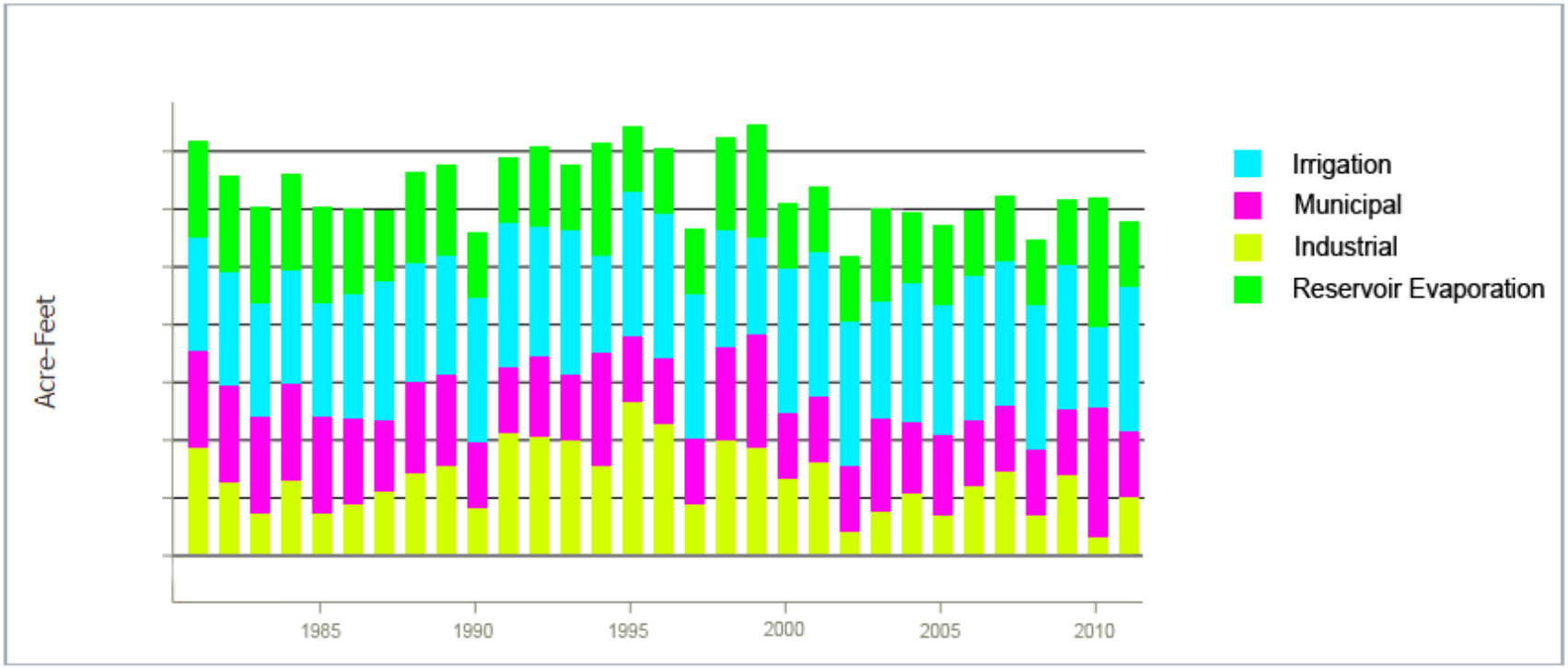
Basin/Sub-Basin: Demand

Total Demand



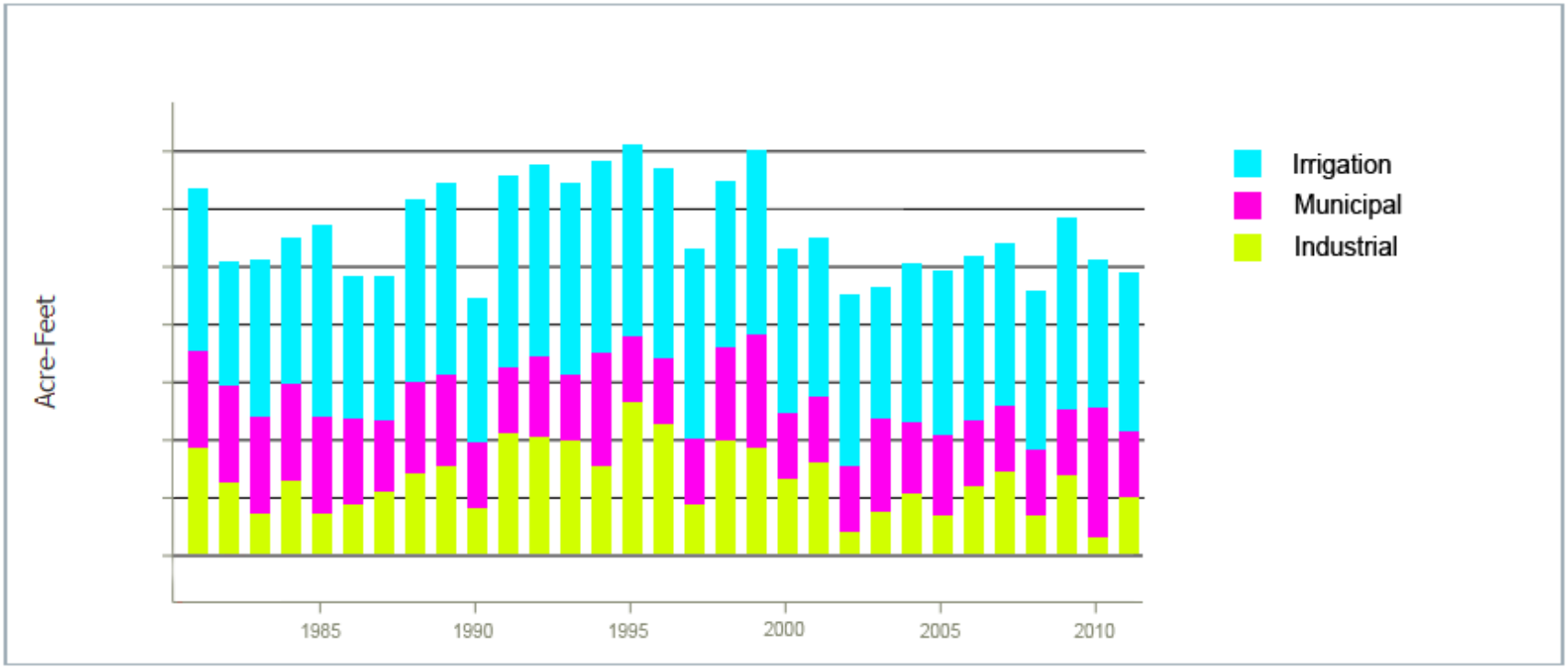
Basin/Sub-Basin: Demand

Total Surface Water Consumption



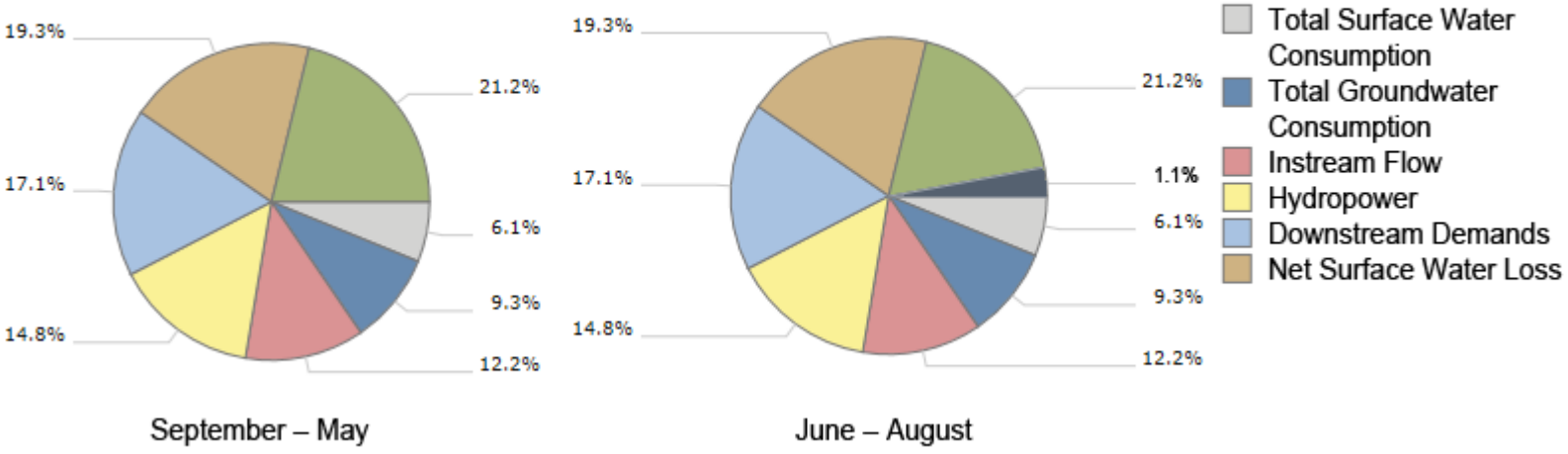
Basin/Sub-Basin: Demand

Total Groundwater Consumption



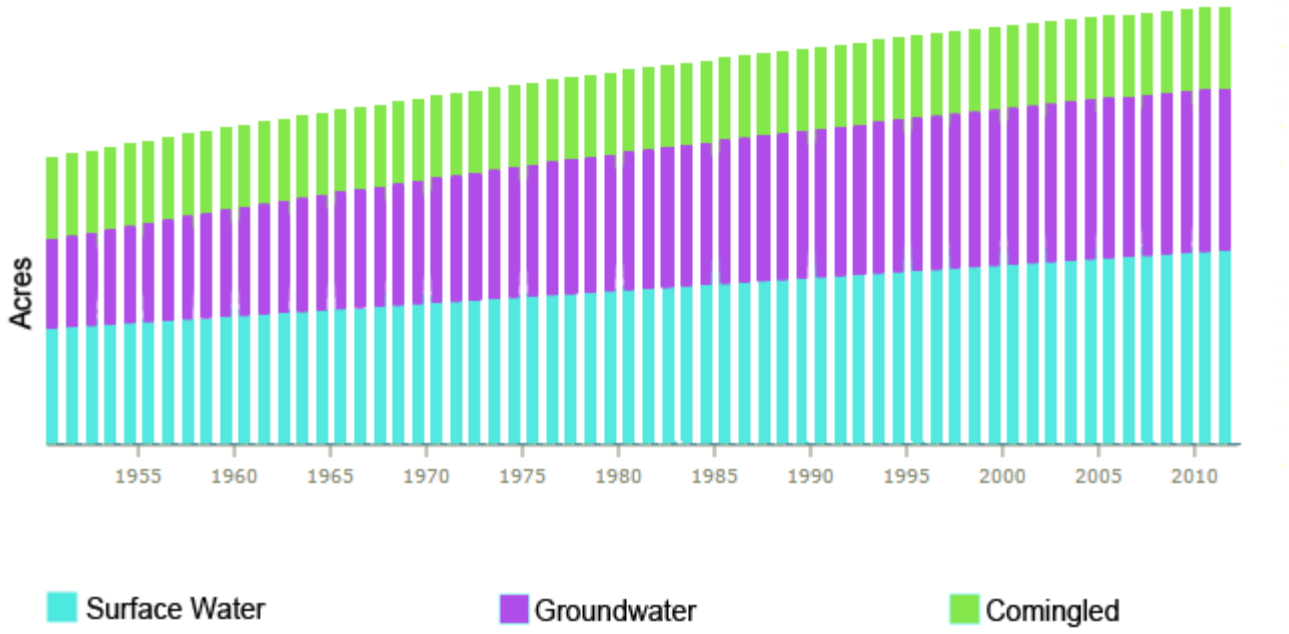
Basin/Sub-Basin: Nature & Extent of Use

Long-Term Average Total Demand by Sector



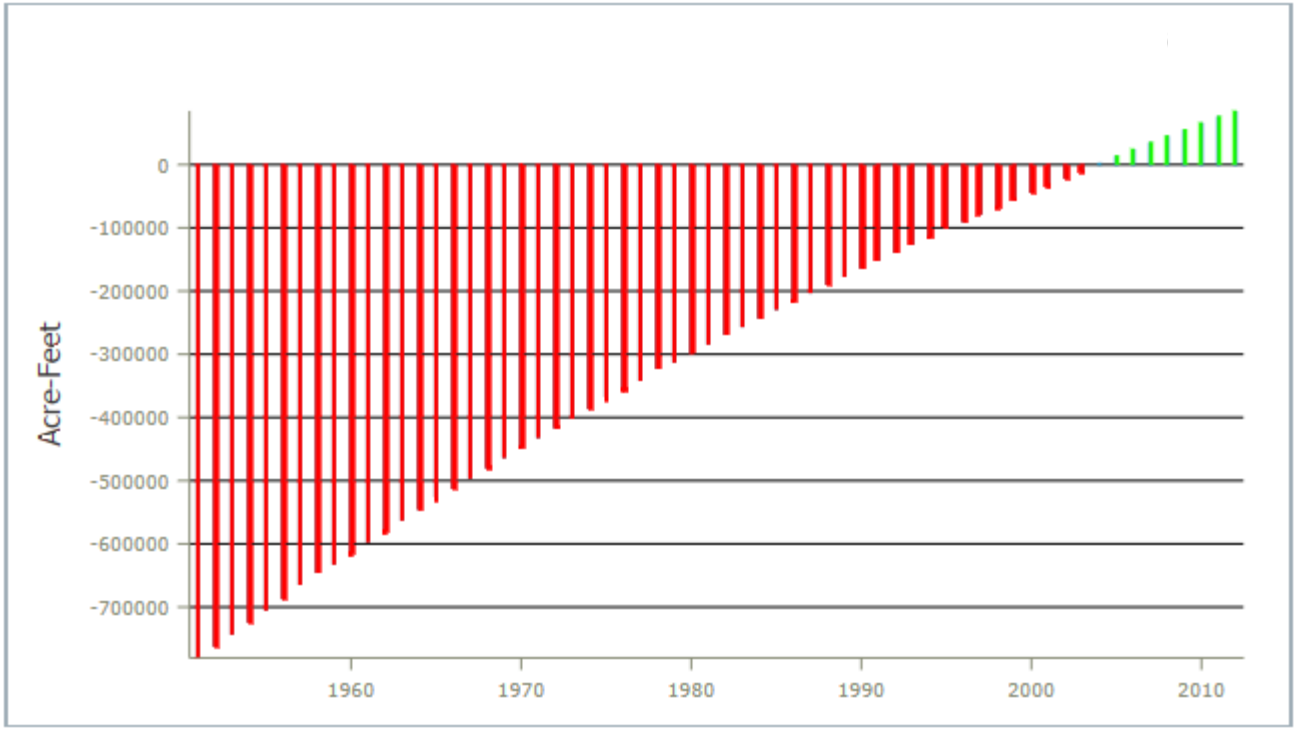
Basin/Sub-Basin: Nature & Extent of Use

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?

Nebraska
Department of Natural Resources