# Review of the Department's New Methods for Assessing Water Supplies and Water Demands

*Presented to the*

UNL Water Symposium

Changes: Climate, Water and Life on the Great Plains

***October 15, 2013***

Jesse Bradley, P.G.

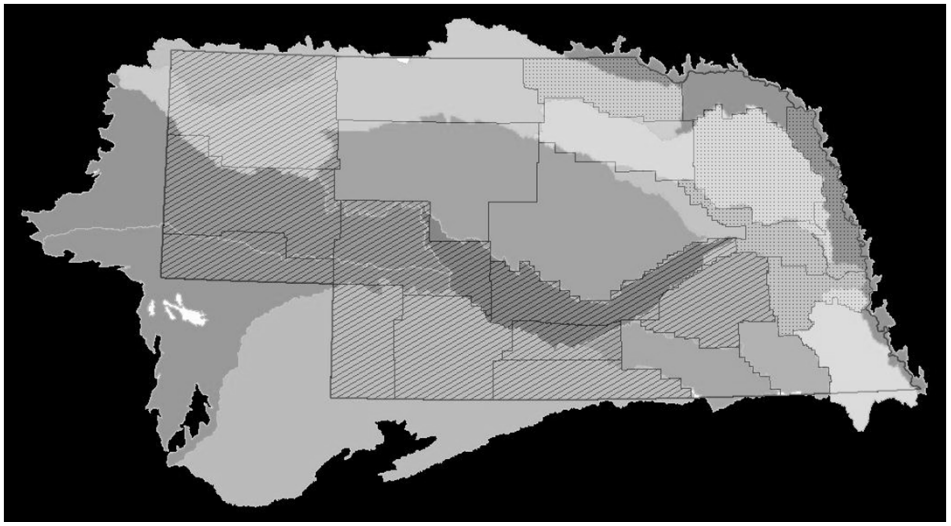
Integrated Management Division Head

Nebraska Department of Natural Resources

Department of Natural Resources

# Outline

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

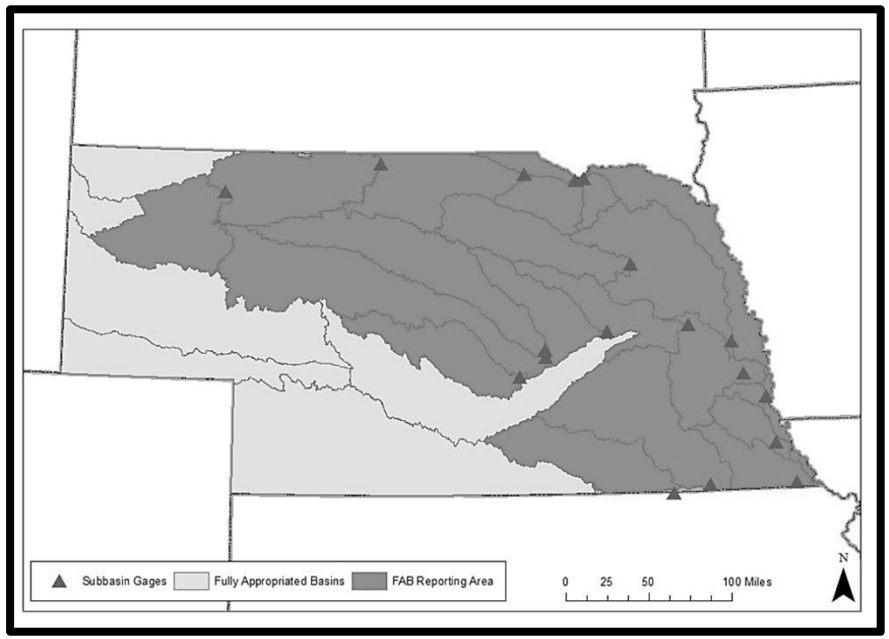


# Timeline

- 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

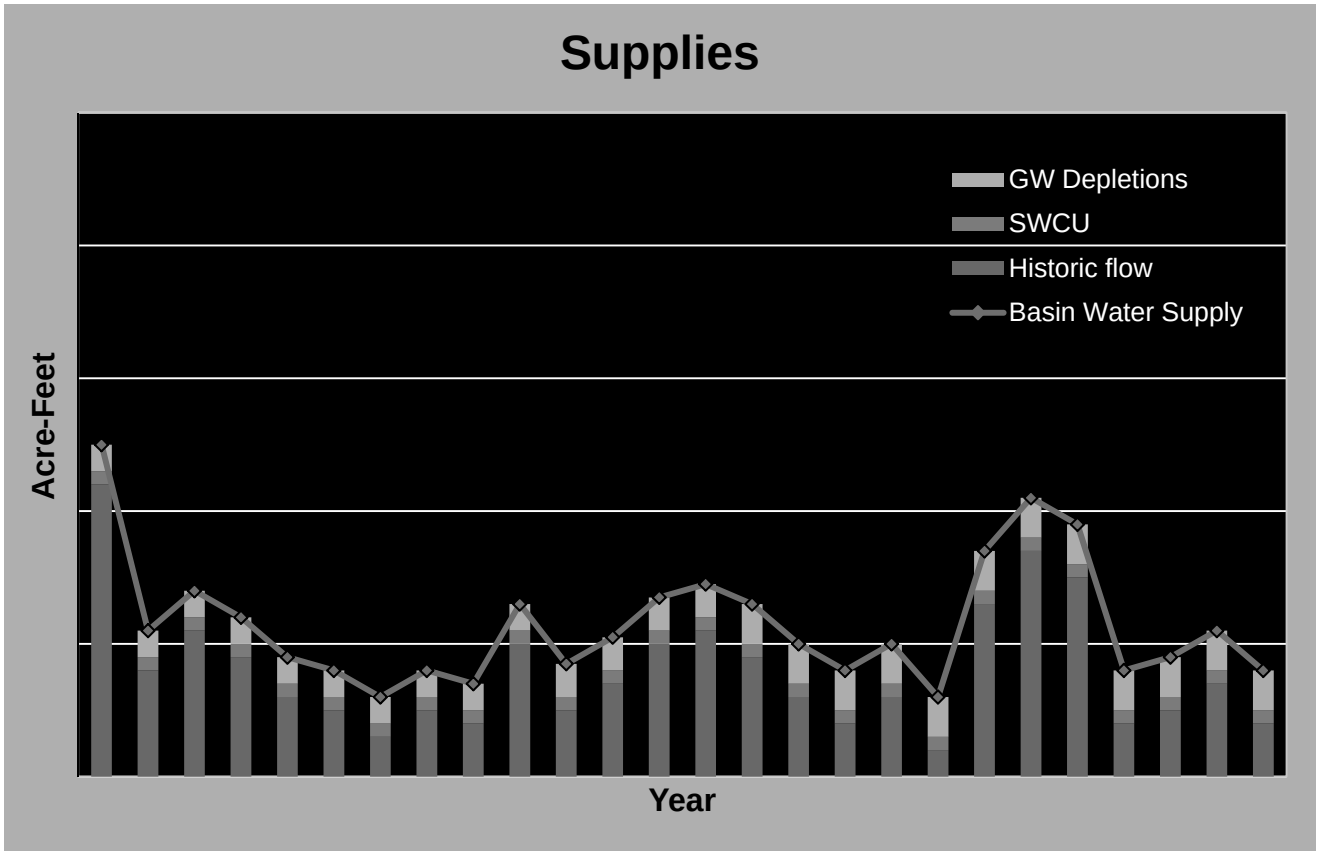
- Basin Water Supplies
  - Streamflow
  - Groundwater Depletions
  - Surface Water Consumption
- Total Water Uses
  - Groundwater Consumption
  - Surface Water Consumption
  - Water for Canal Deliveries
  - Instream Flow Demands
  - Hydropower Demands
  - Downstream Water Demands



# Concepts

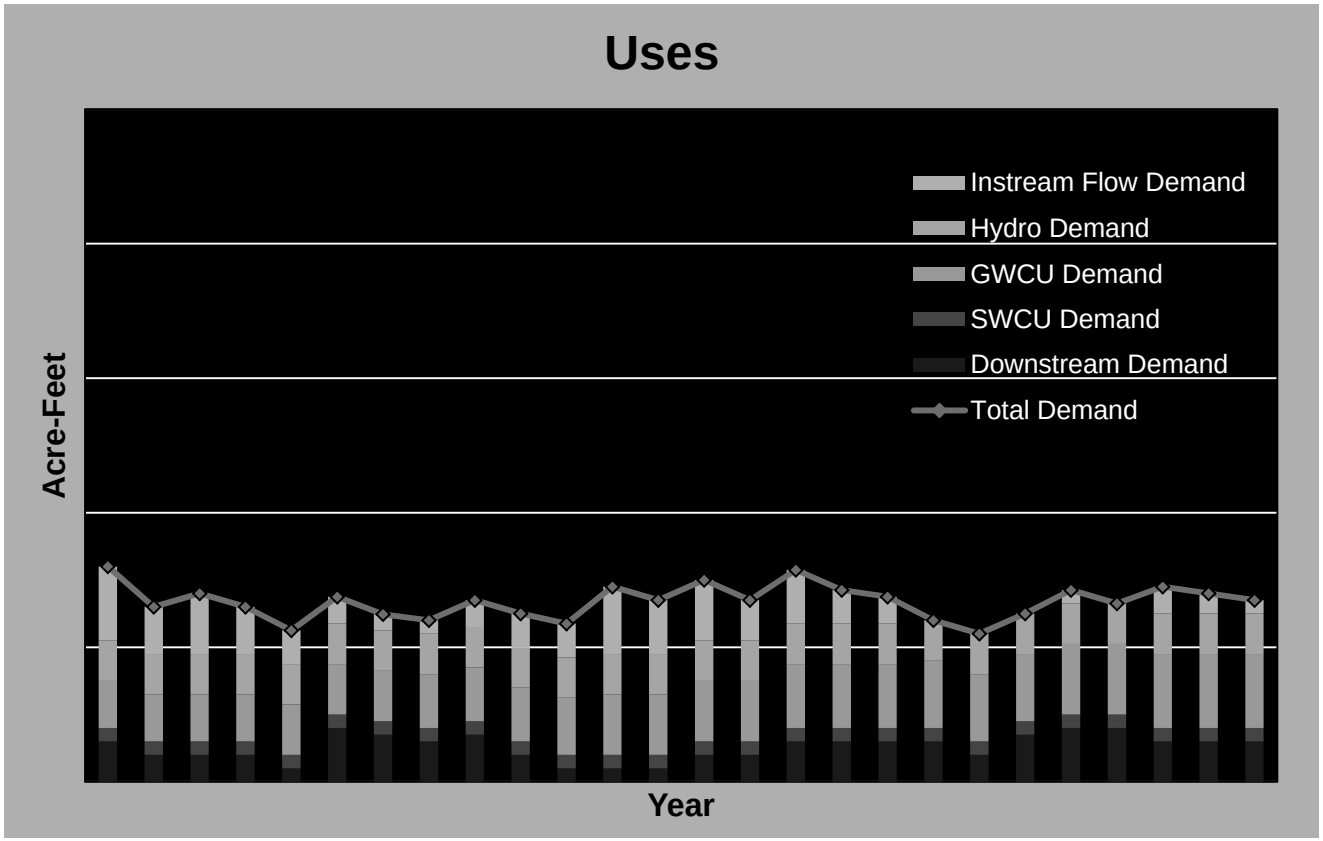
- Representative Period
  - Statistical analysis of appropriate period
- June – August (peak demand)
- September – May (non-peak demand)
- Near-term and long-term

# Concepts



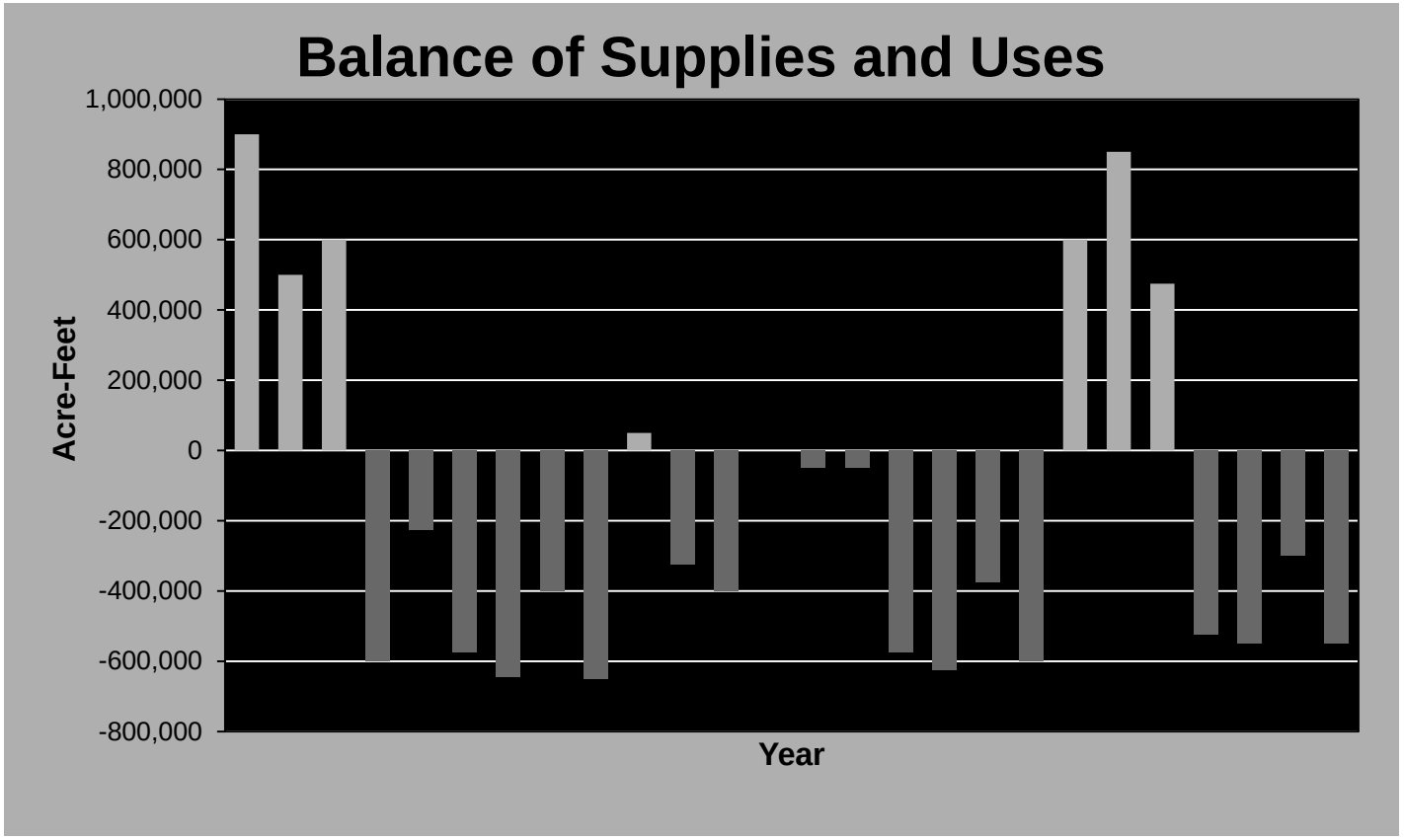

***The chart on this slide depicts fictitious data.***

# Concepts



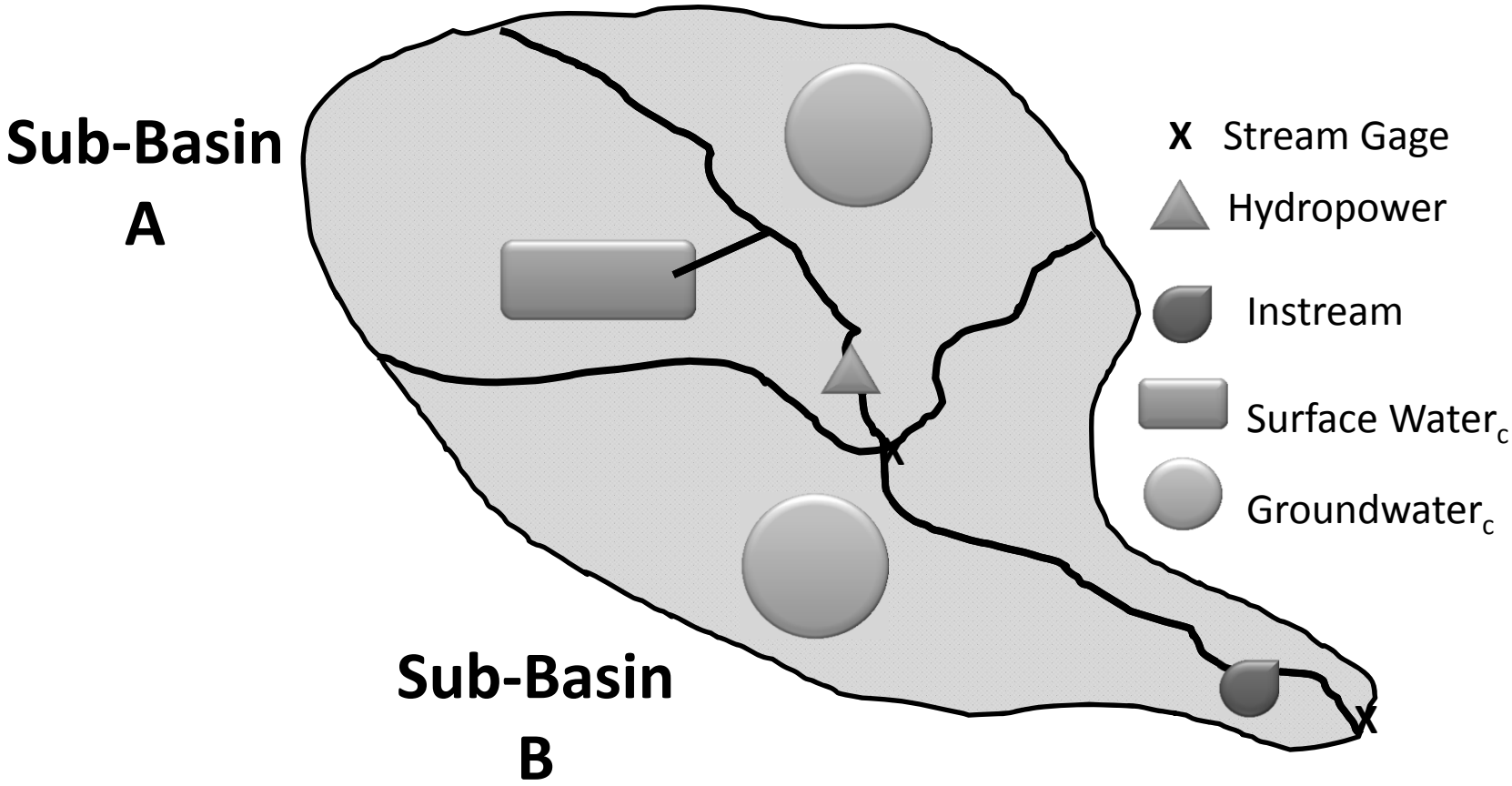

***The chart on this slide depicts fictitious data.***

# Concepts




***The chart on this slide depicts fictitious data.***

# Example

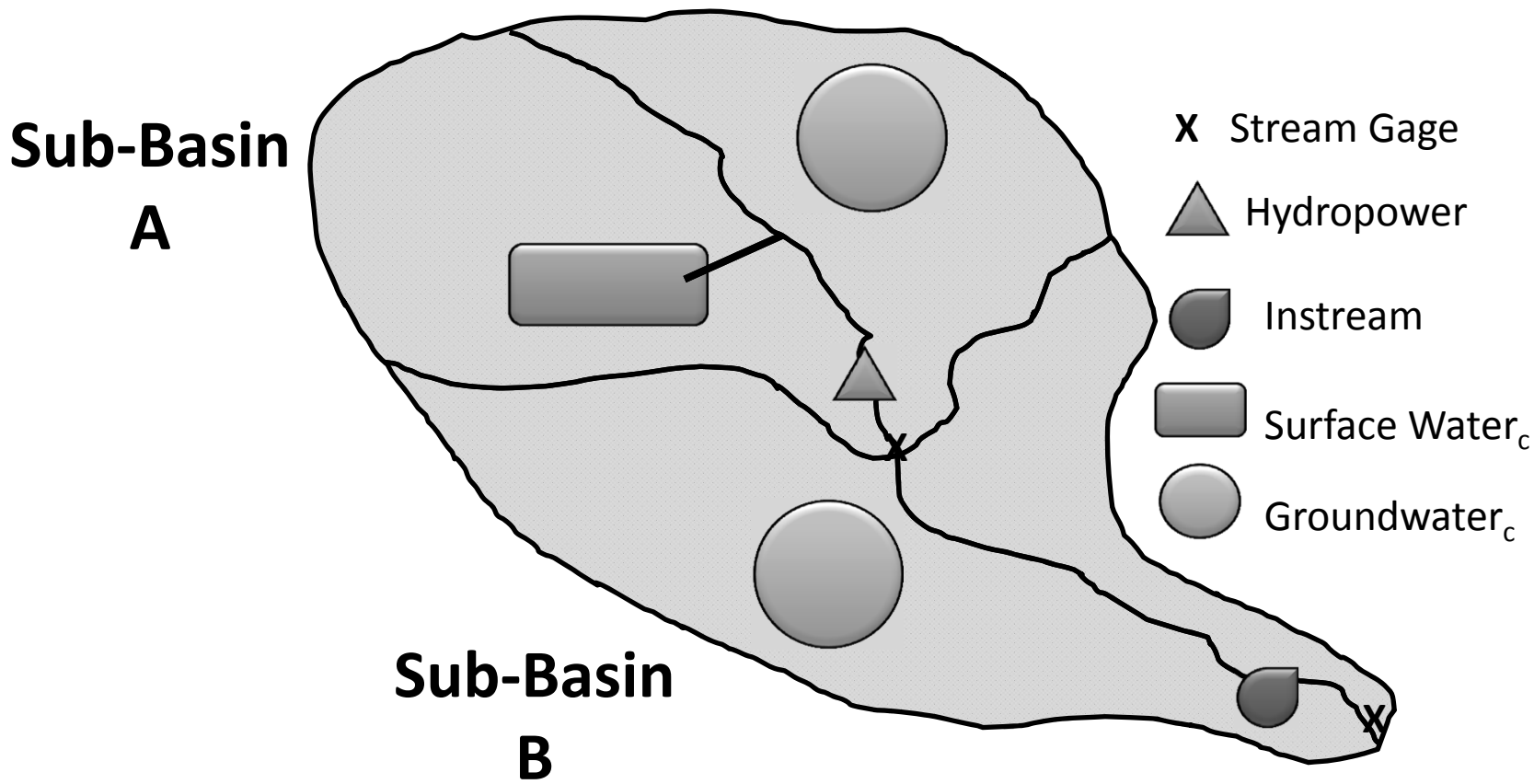

Sub-Basin A
Sub-Basin B
X Stream Gage
Hydropower
Instream
Surface Water$_c$
Groundwater$_c$

# Example *(Supply)*

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

Stream Gage = 400
Surface Water$_C$ = 100
Groundwater$_D$ = 300
**A Total BWS = 800**
Proportion of Total = 40%

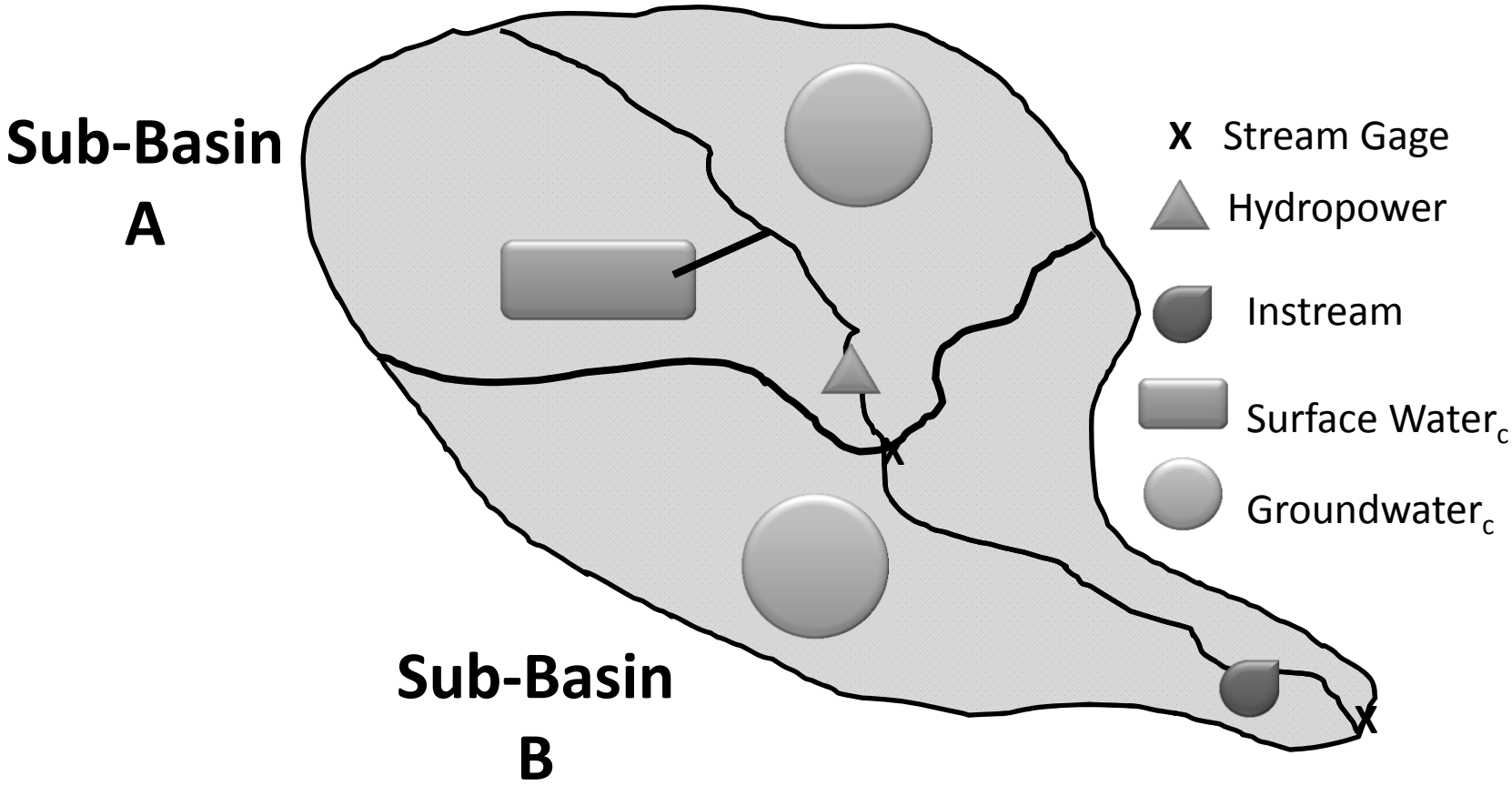
Stream Gage = 1300
Surface Water$_C$ = 100
Groundwater$_D$ = 600
**Total = 2000 (1200 exclusive to B)**
Proportion of Total = 60%



# Example *(Demand)*

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

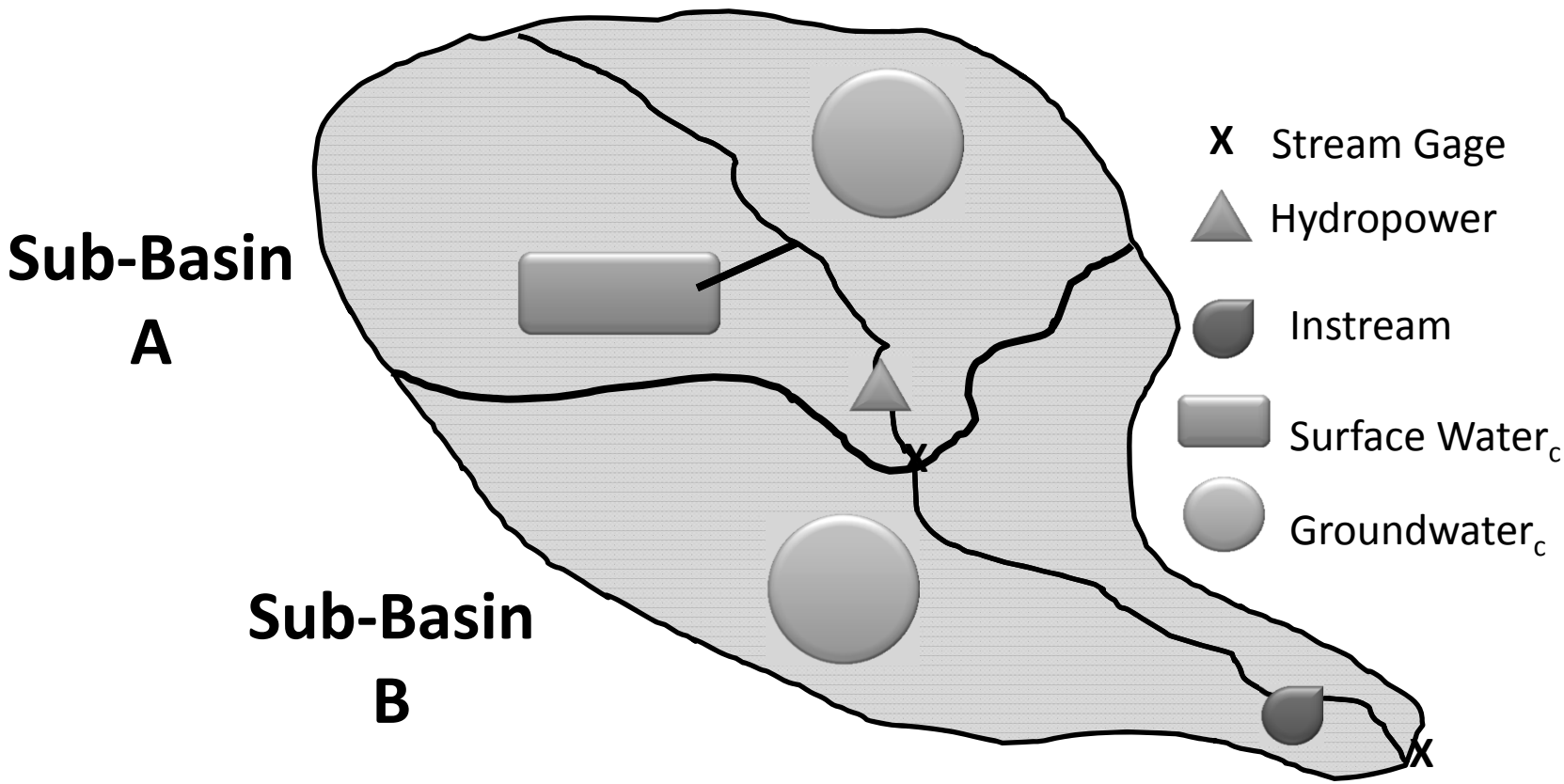
$$\textit{Long Term Demand} = \boxed{Groundwater_C} + Surface\ WaterC + Hydropower + Instream + Downstream\ Demand$$



# Example *(Demand cont.)*

Groundwater$_C$ = 500
Surface Water$_C$ = 100
Hydropower = 300
Total Demands in A = 900
40% * 400 = 160
40% * 500 =200
Downstream Demand = ~~360~~ = 60
**A Total = 500 + 100 + 300 + 60 = 960**

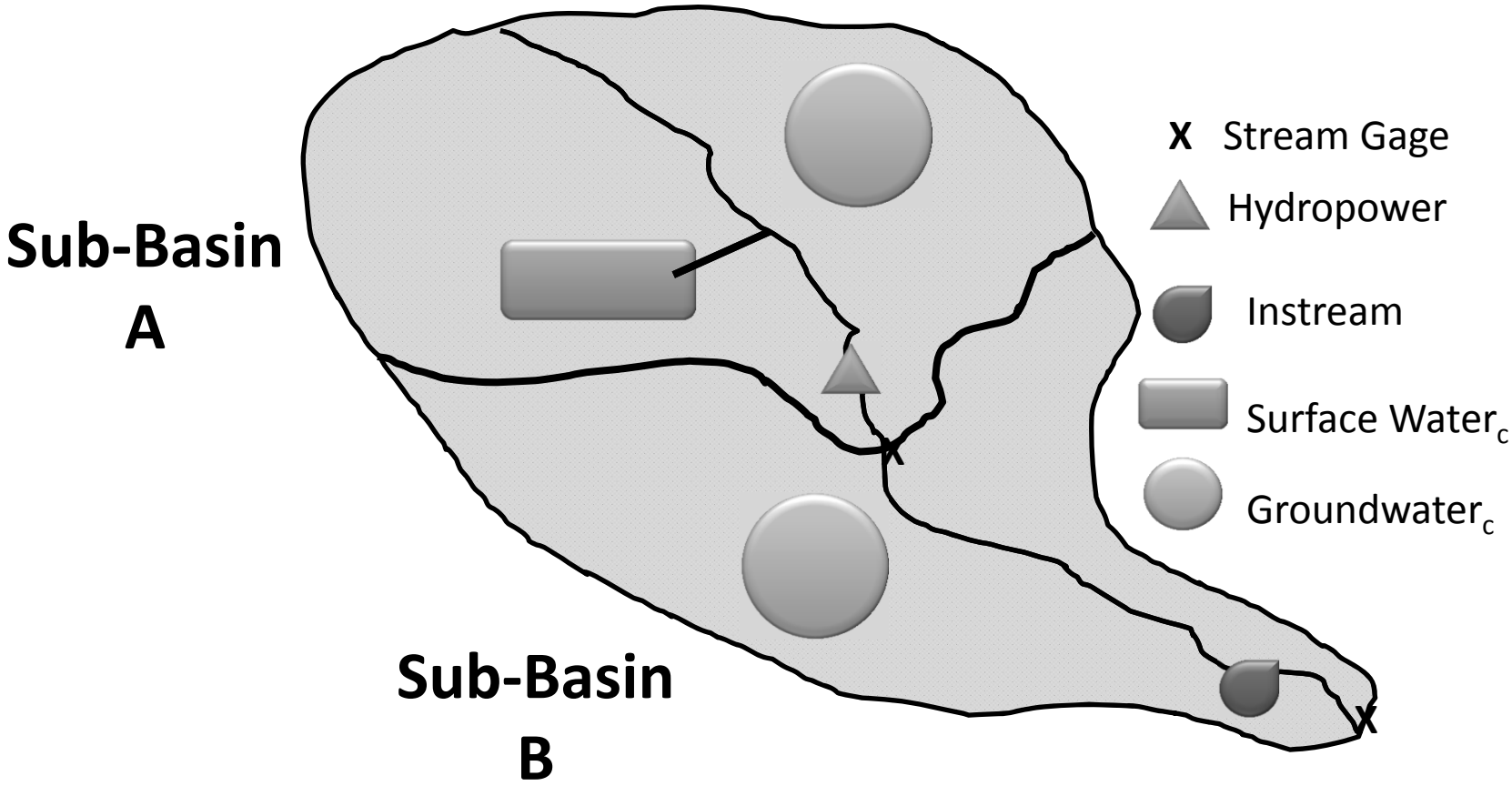
Groundwater$_C$ = 400 (mainstem) 200 (tributary)
Surface Water$_C$ = 0
Instream = 500 (mainstem)
Total Demands in B = 1100
Assigned as Downstream Demand to Sub- basin A =360
**B Total = 400 + 200 + 500 – 360 = 740**



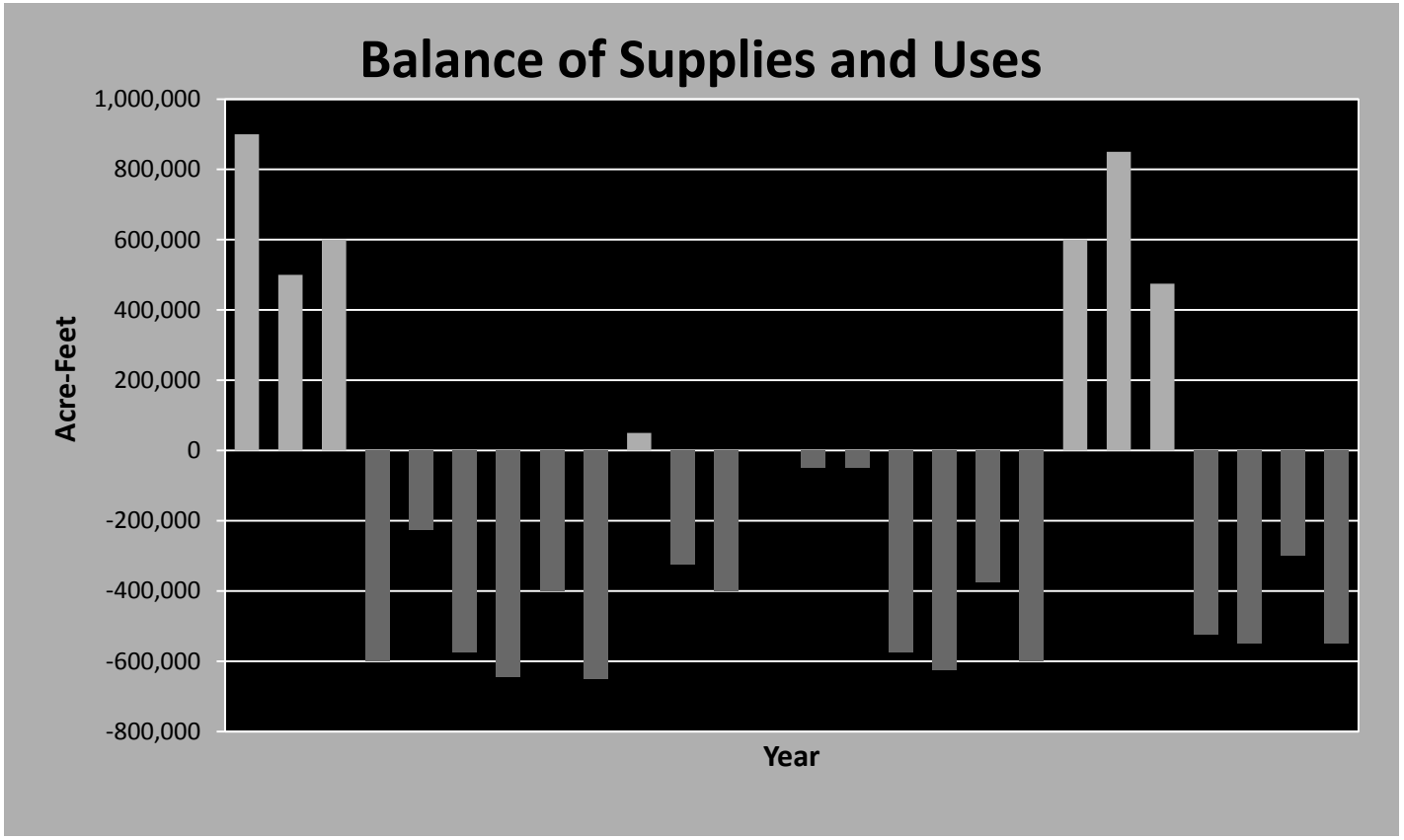
# Example *(Balance)*

**Sub-basin A**
BWS = 800
Total Long-term Demand = 960
Balance = **- 160**

**Sub-basin B**
BWS = 1200
Total Long-term Demand = 740
Balance = **+ 460**



# Concepts




***The table on this slide depicts fictitious data.***

# Summary

- Methods and tools developed support unique setting within each basin, sub-basin, or reach
- New methods provide comprehensive assessment of hydrologically connected water supplies and demands on those supplies

# Thank you

# Questions?

Jesse Bradley, P.G.
Integrated Management Division Head
Nebraska Department of Natural Resources

Department of Natural Resources