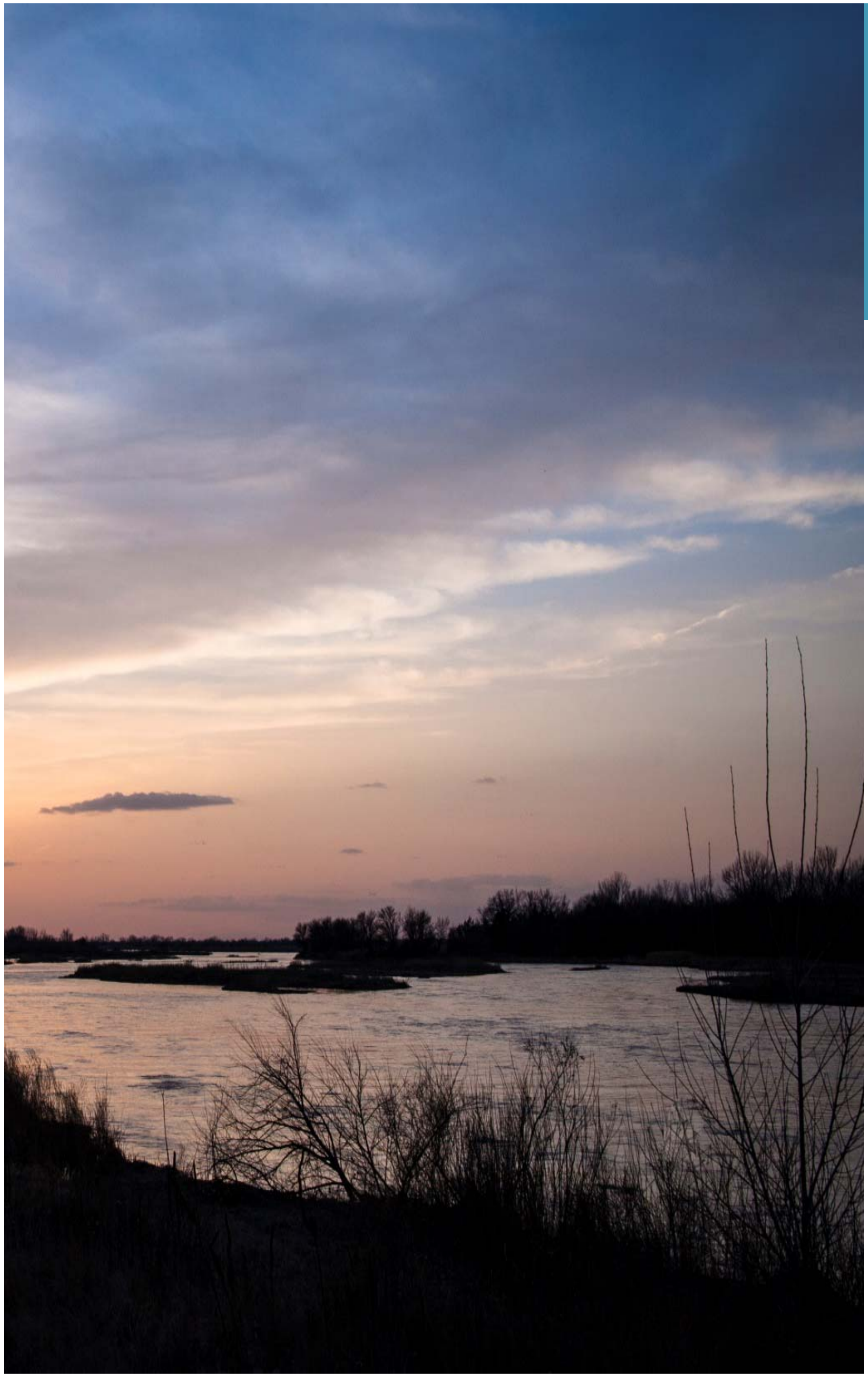
LOWER PLATTE RIVER BASIN COALITION
WATER MANAGEMENT PLAN

Water Banking Workshop Part 2

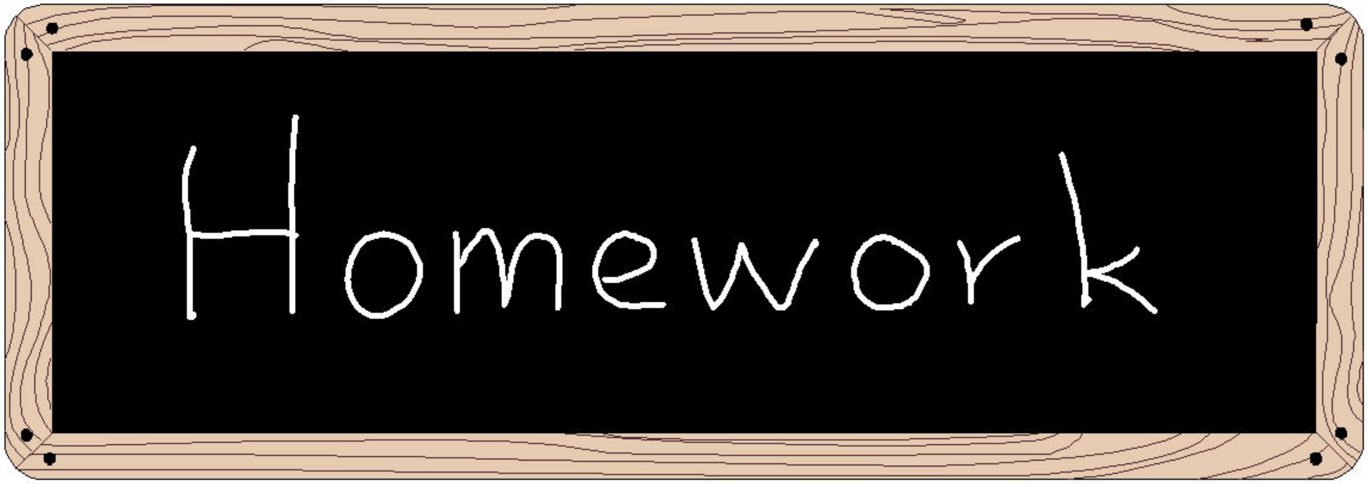
July 20, 2015



01 Water Banking Purposes

02 Example Water Banks

03 Preliminary Conclusions



Assignment from March
Water Banking Workshop #1

- **Prior to next workshop, come up with your own list of project needs**
- **What would YOU like a water bank to do for you?**

Water Banking Purposes

- Prevent Fully Appropriated status in the future
- Protect existing uses and infrastructure
- Maintain local control
- Allow for future development
- Facilitate water transfers
- Meet specific flow needs at a specific time
- Follow consistent accounting of water across Coalition area
- Provide assurances that banked water will be protected against future accounting changes
- Enable sustainability in non-hydrologically connected areas

Water Banking Purposes

Balancing Overall Supplies and Demands

- Prevent Fully Appropriated status in the future
- Protect existing uses and infrastructure
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- Follow consistent accounting of water across Coalition area
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- Enable sustainability in non-hydrologically connected areas

Moving and/or Retiming Supplies

- Meet specific flow needs at a specific time
- Facilitate water transfers

Maintain Local Control

Water Banking Examples

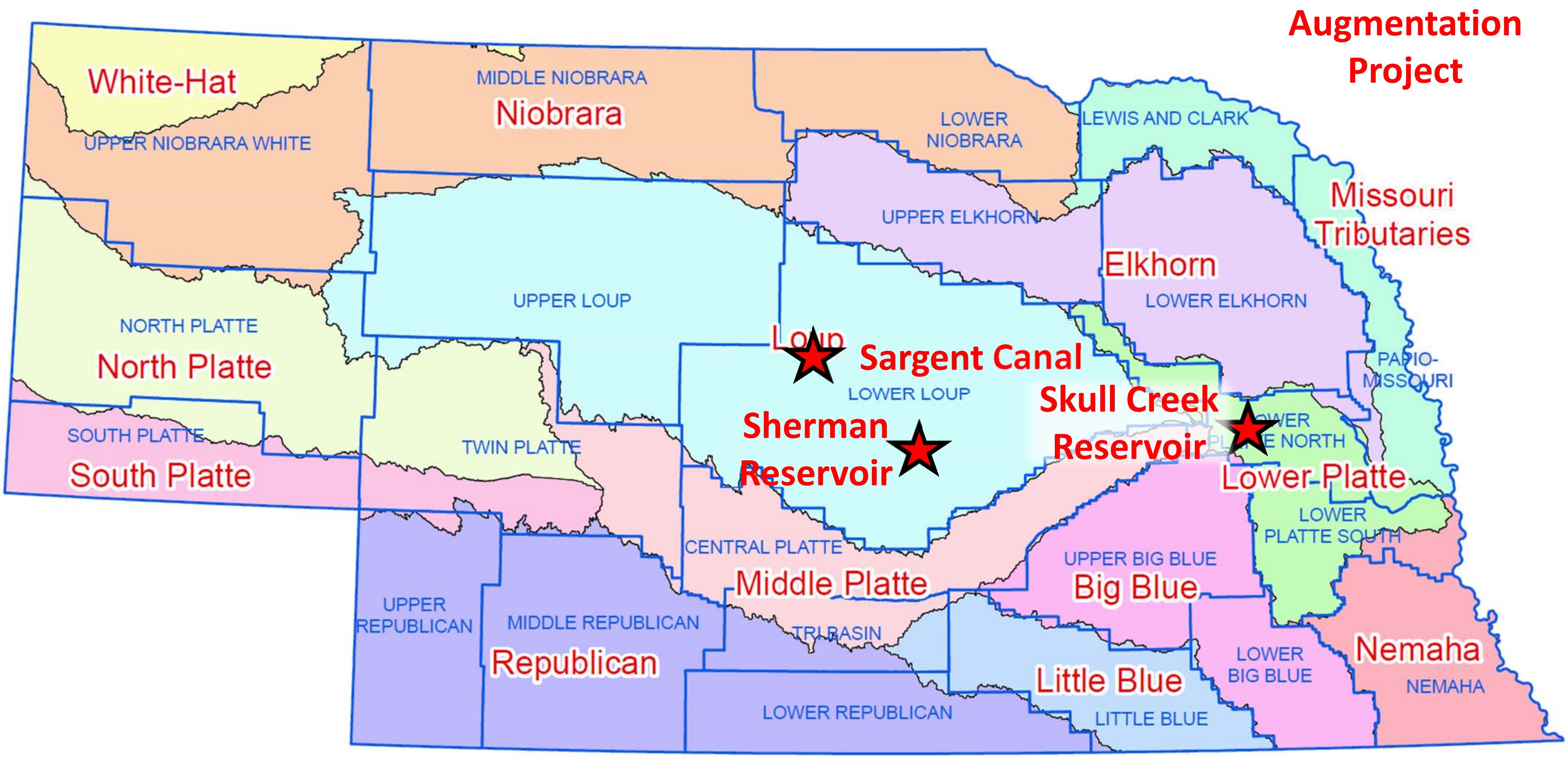
Balancing Overall Supplies and Demands

- Sargent Canal Recharge
- Sherman Reservoir Operations

Moving and/or Retiming Supplies

- Skull Creek Reservoir
- Augmentation Pumping Project

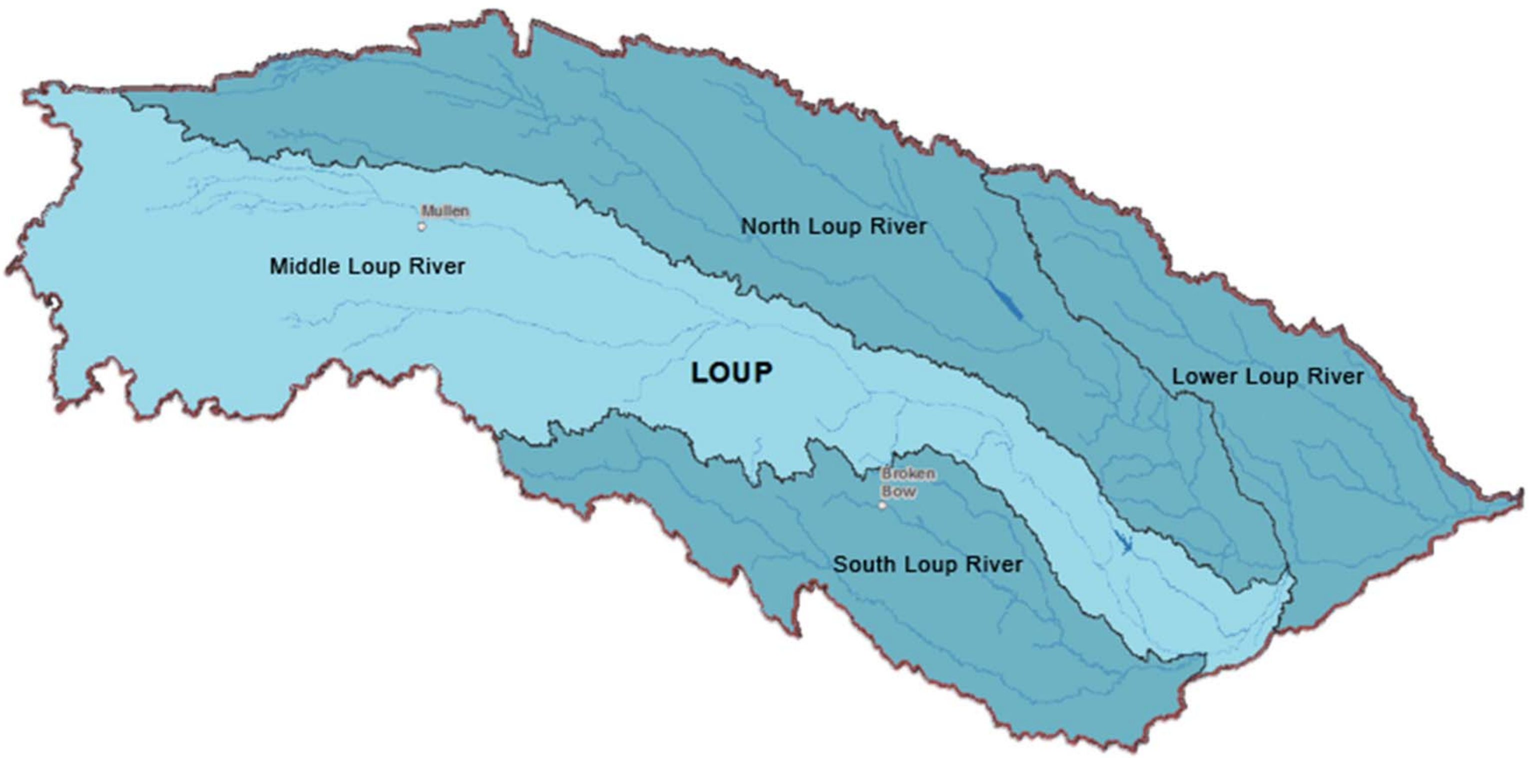
Water Banking Examples



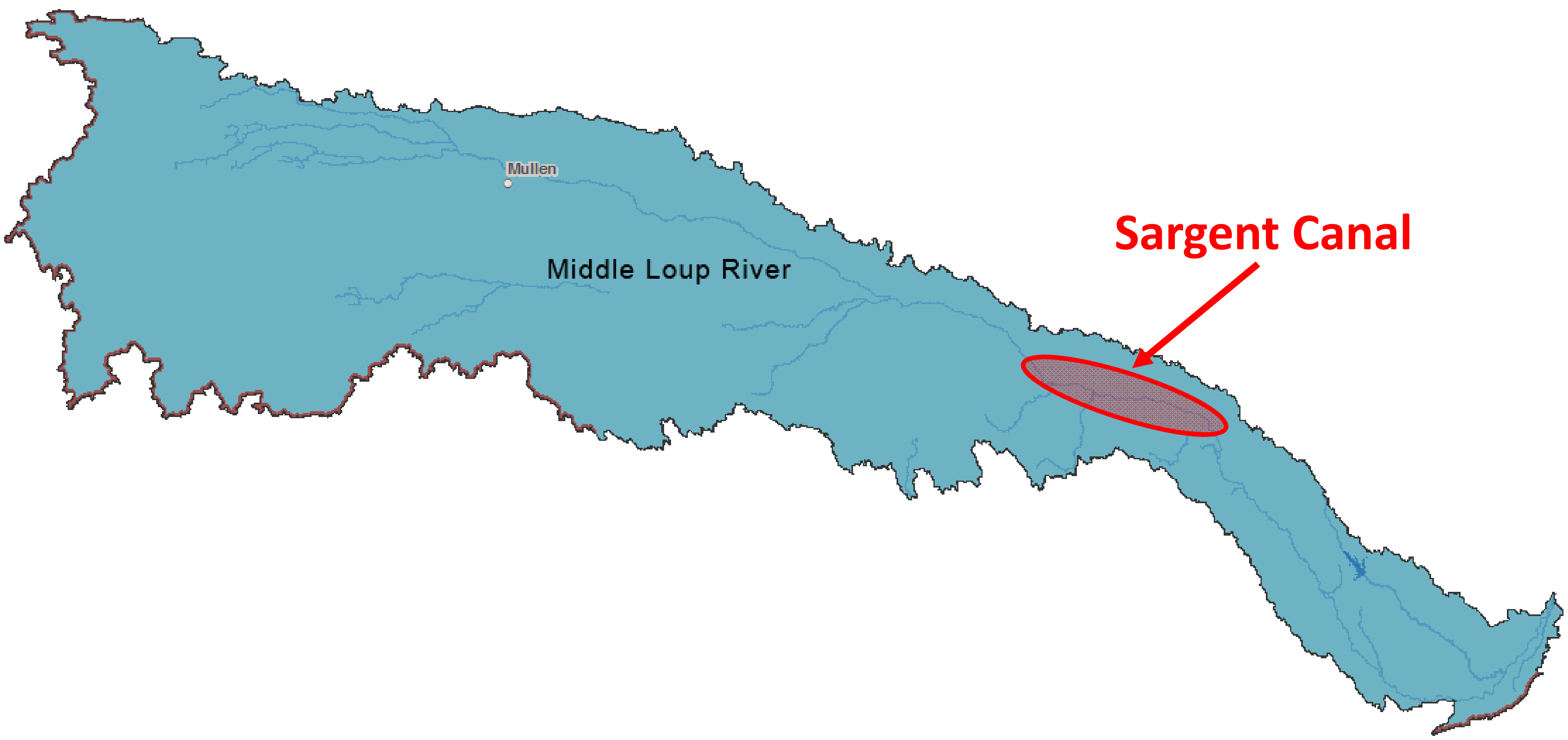
Balancing Overall Supplies and Demands

Sargent Canal Recharge

Sargent Canal Recharge



Sargent Canal Recharge



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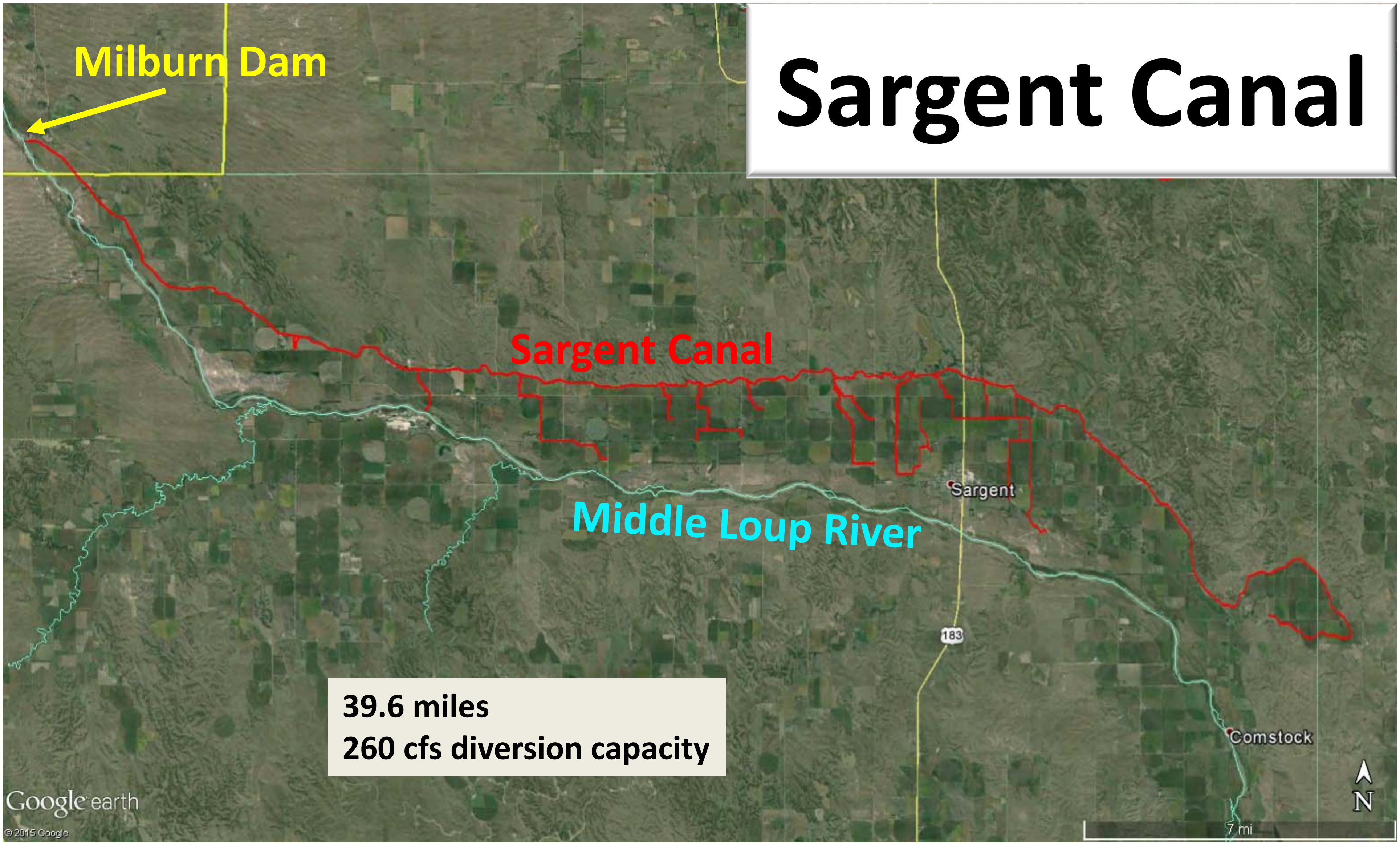
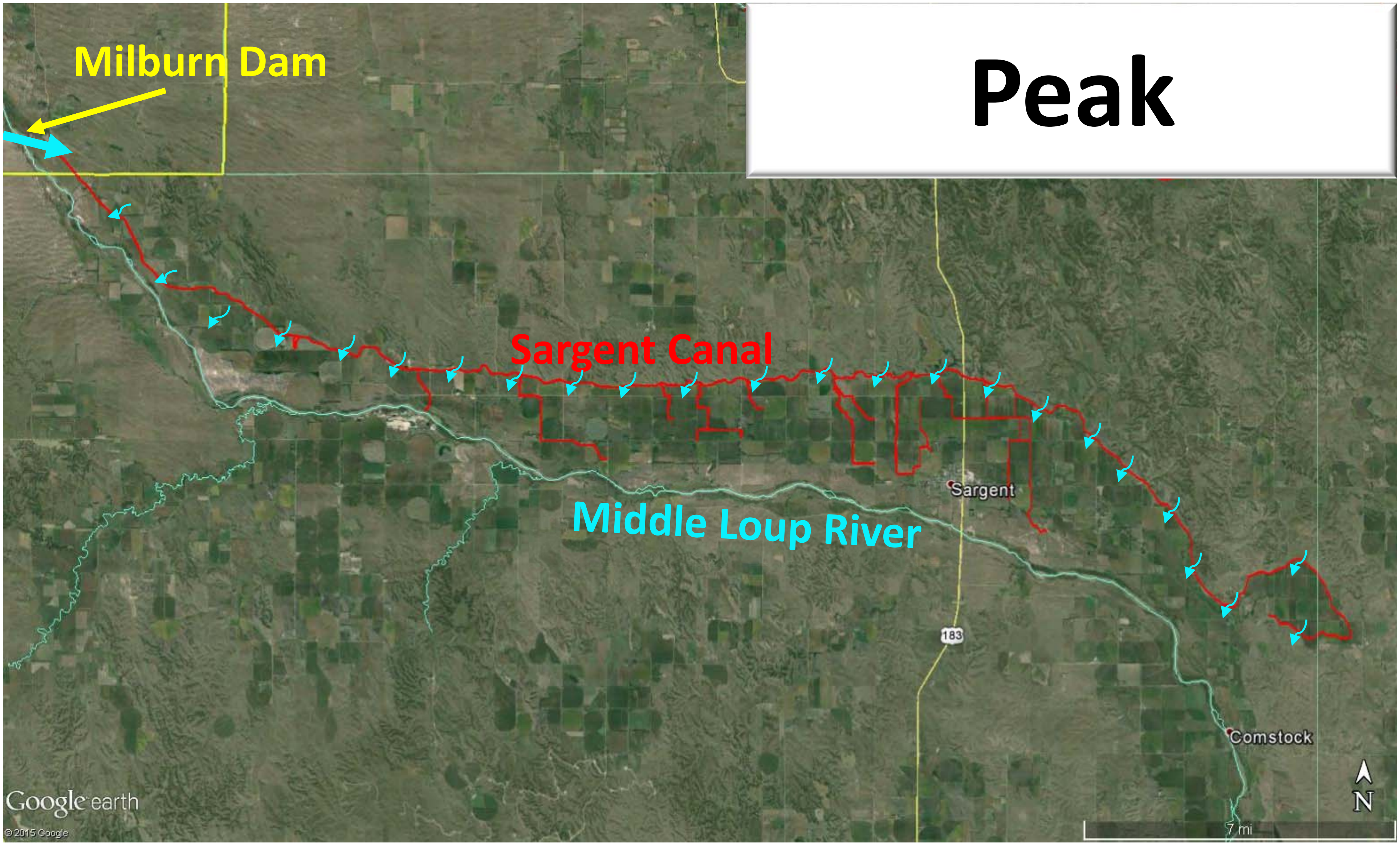


Sargent Canal Recharge

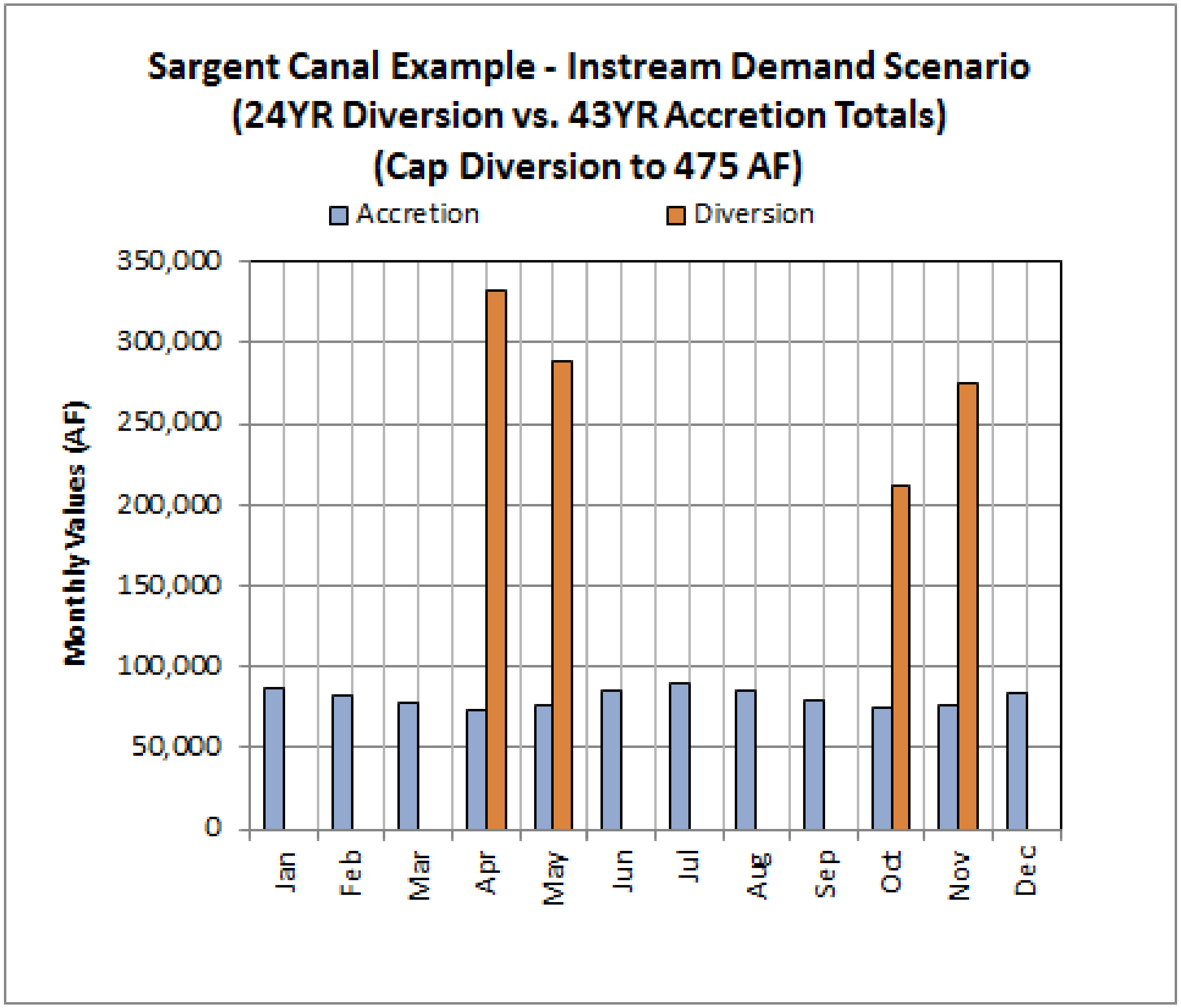
Canal Recharge Operations

- Divert in April, May and October, November (before and after irrigation season)
- Seepage from canal provides return flows over entire year, including irrigation season
- Recharge activity could shift supplies from Non-Peak to Peak period, when supplies are usually more scarce
- Would make Fully Appropriated determination less likely, allow for future development, etc.

Sargent Canal Recharge

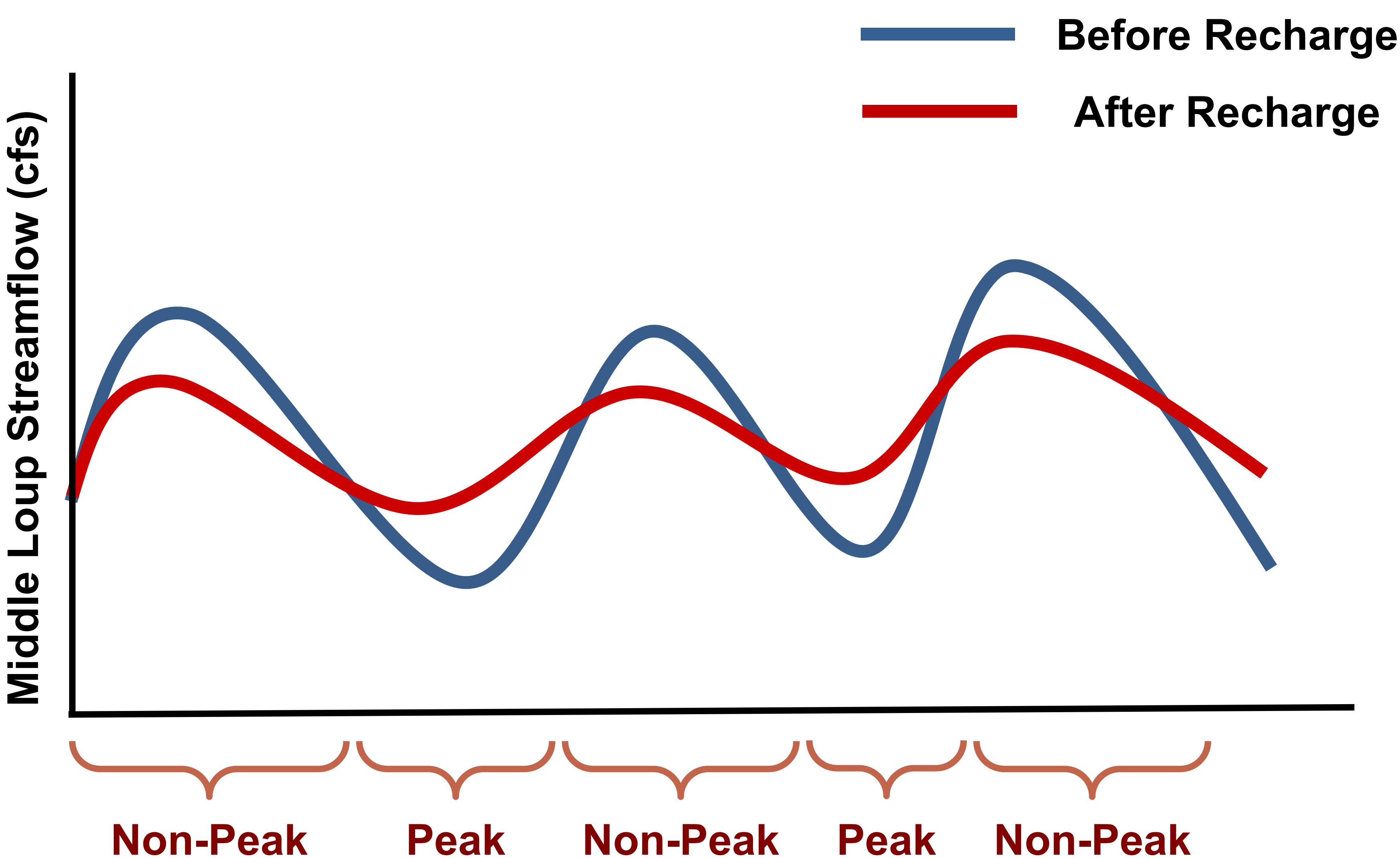


Sargent Canal Recharge

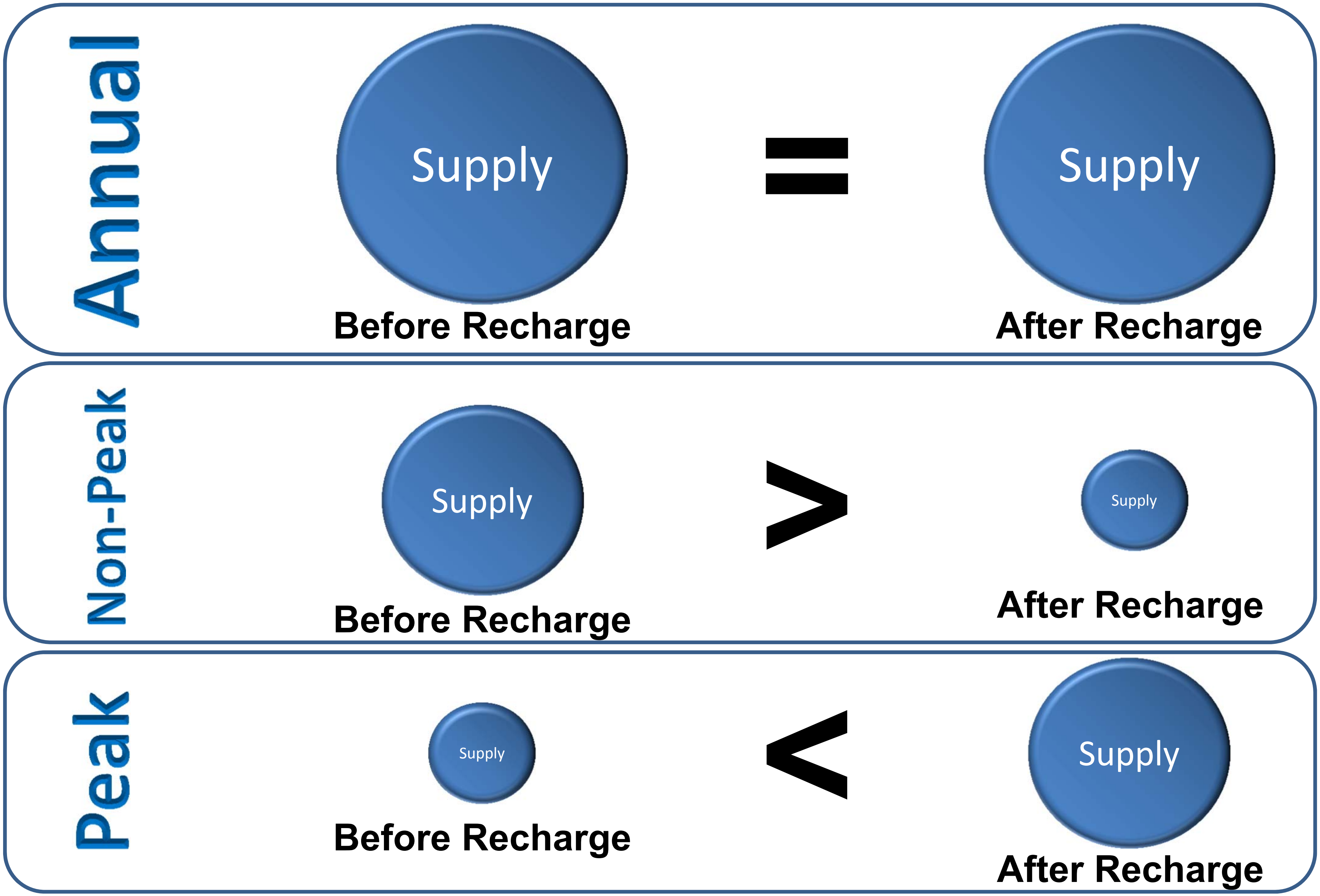


Sargent Canal Recharge

Middle Loup River Flow



Sargent Canal Recharge

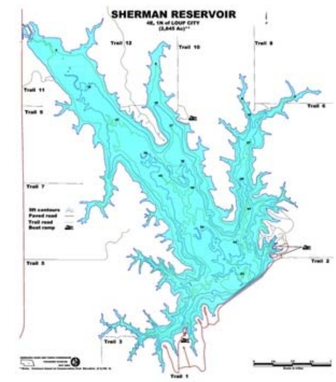


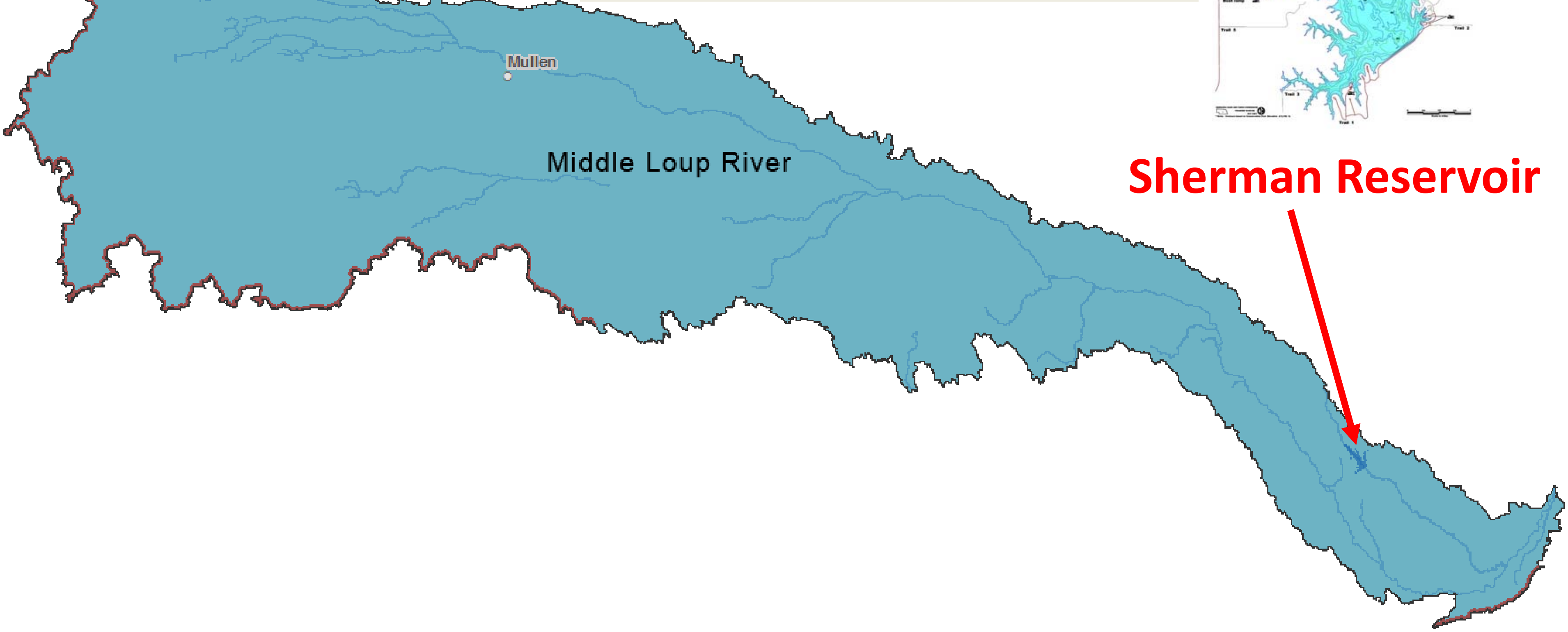
Balancing Overall Supplies and Demands

Sherman Reservoir Operations

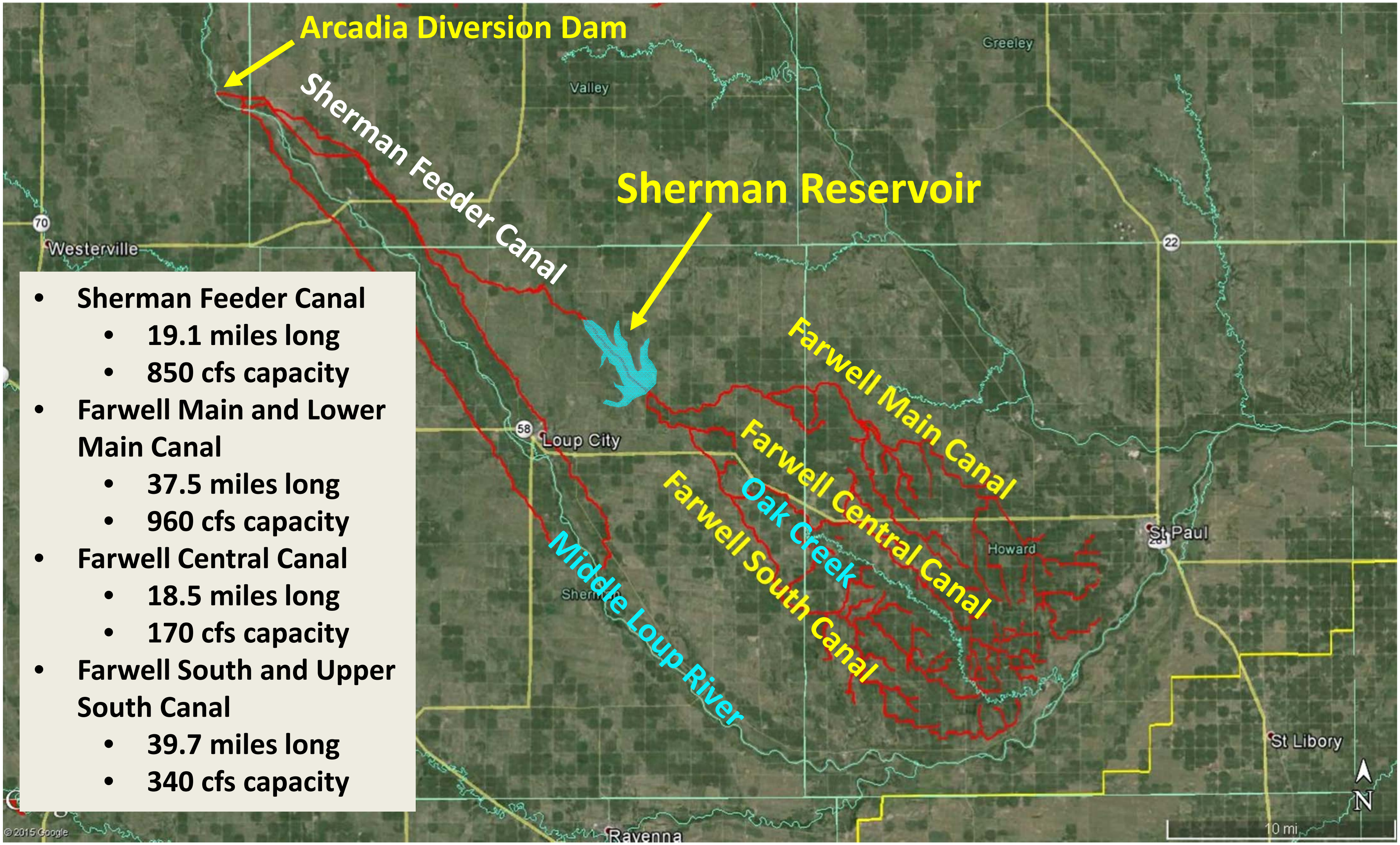
Sherman Reservoir Operations

About 68,000 acre-feet capacity
Active capacity 58,000 af





Sherman Reservoir Operations



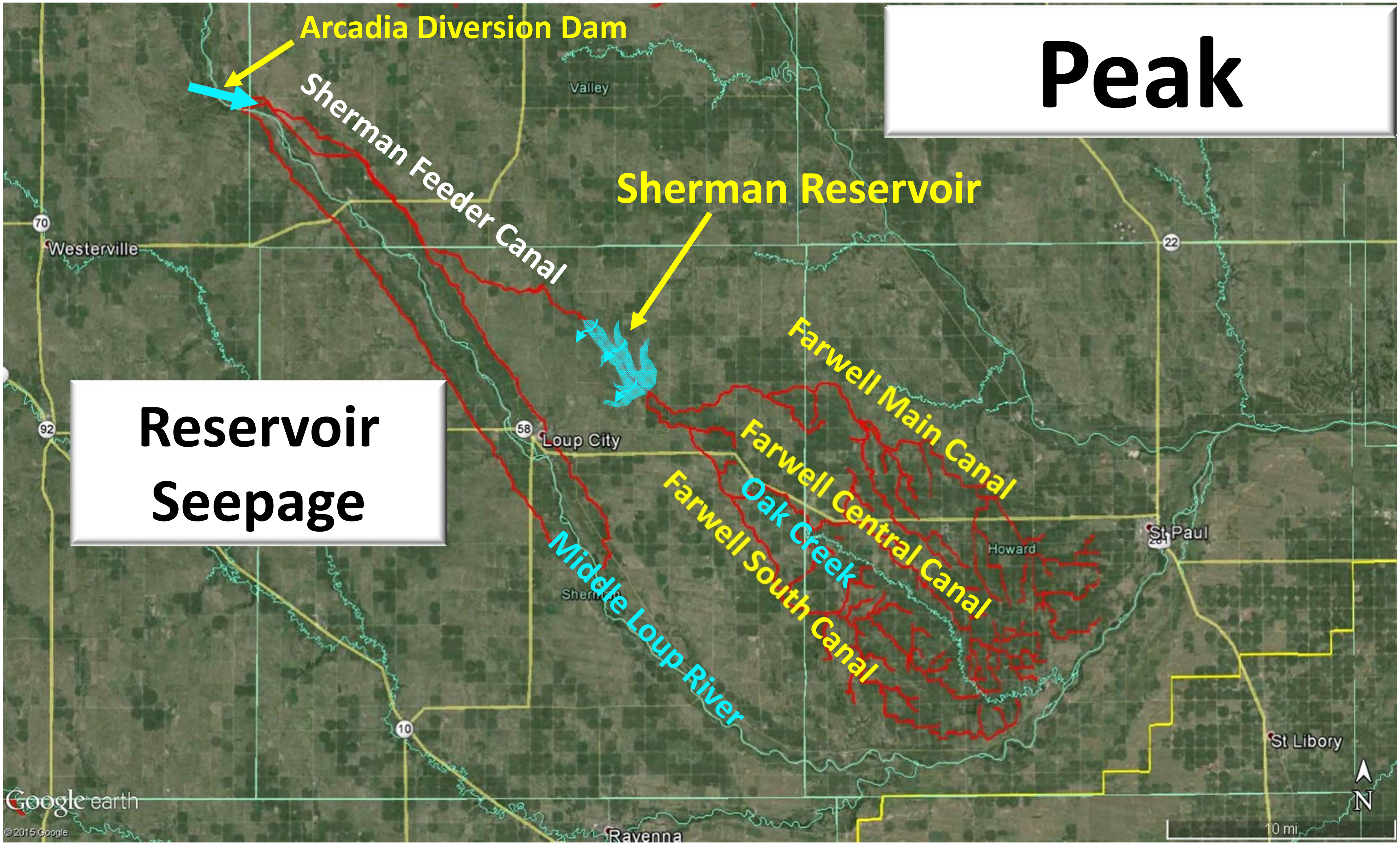
- Sherman Feeder Canal
    - 19.1 miles long
    - 850 cfs capacity
- Farwell Main and Lower Main Canal
    - 37.5 miles long
    - 960 cfs capacity
- Farwell Central Canal
    - 18.5 miles long
    - 170 cfs capacity
- Farwell South and Upper South Canal
    - 39.7 miles long
    - 340 cfs capacity

Sherman Reservoir Operations

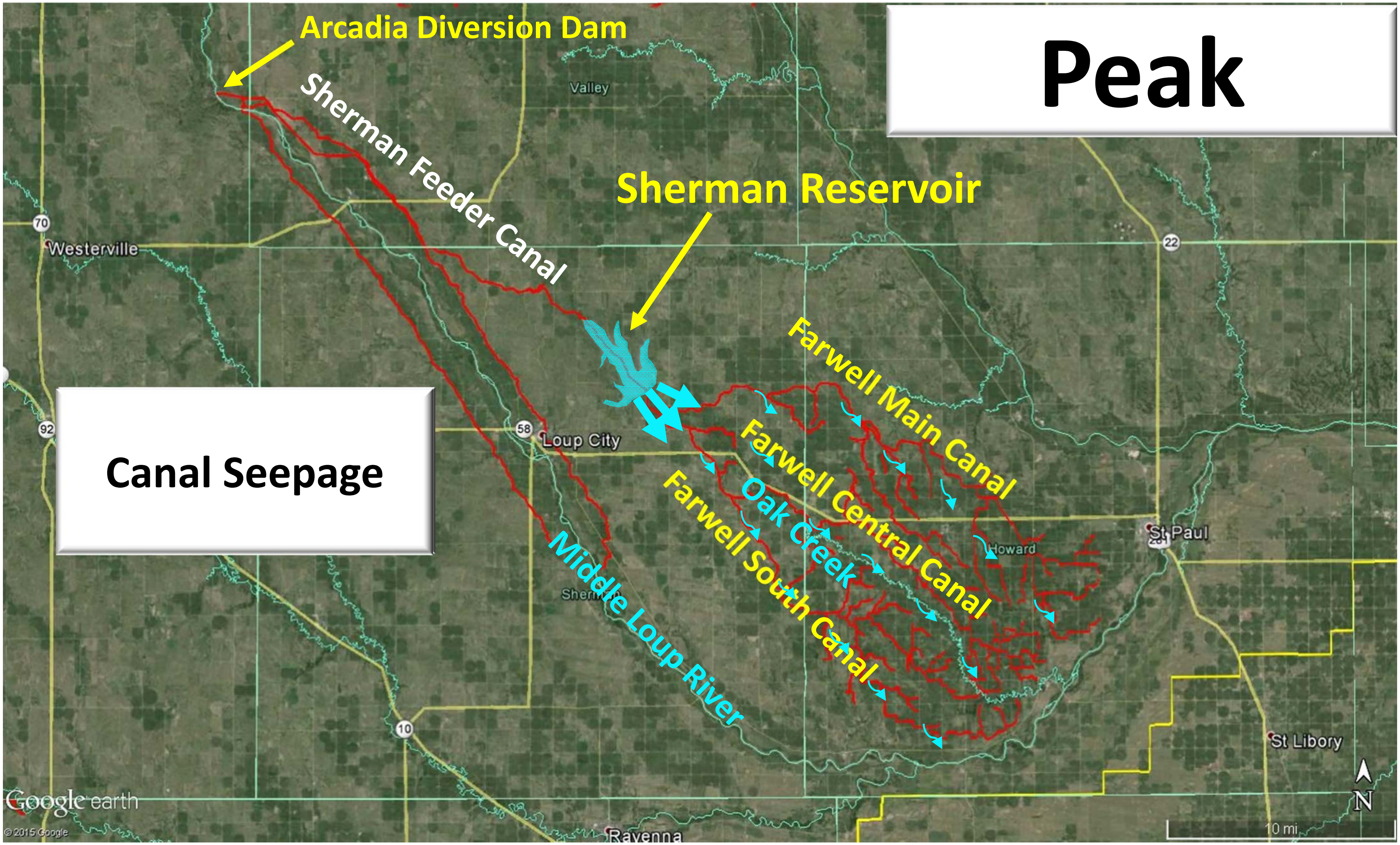
Reservoir Operations

- Normally store water during off-season for later irrigation releases
- Reallocate storage (2-3 feet) in fall or spring to hold excess flows
- Reservoir seepage, and/or releases to Farwell canals for subsequent canal seepage could shift supplies from Non-Peak to Peak period, when supplies are usually more scarce
- Would make Fully Appropriated determination less likely, allow for future development, etc.

Sherman Reservoir Operations

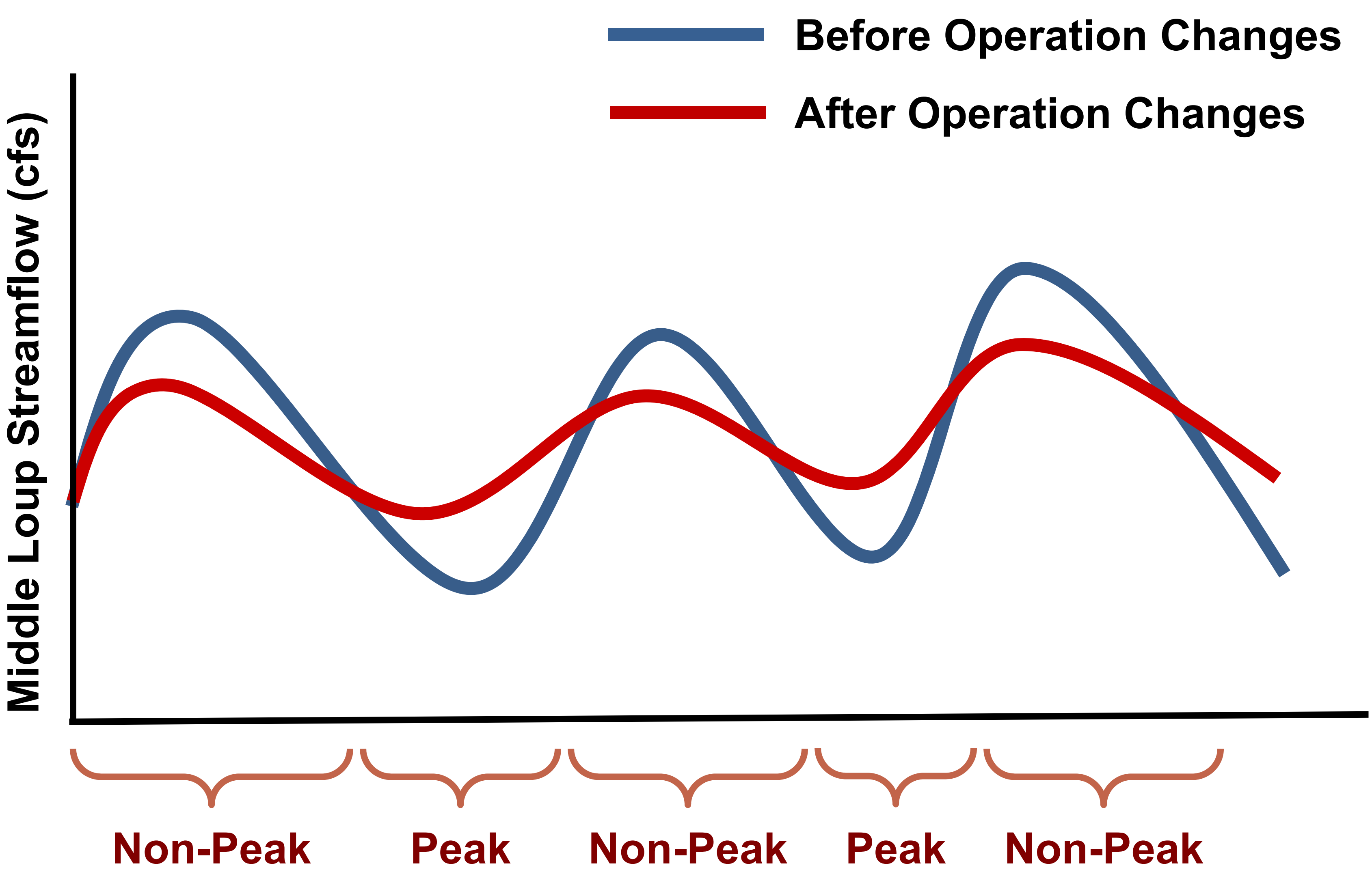


Sherman Reservoir Operations

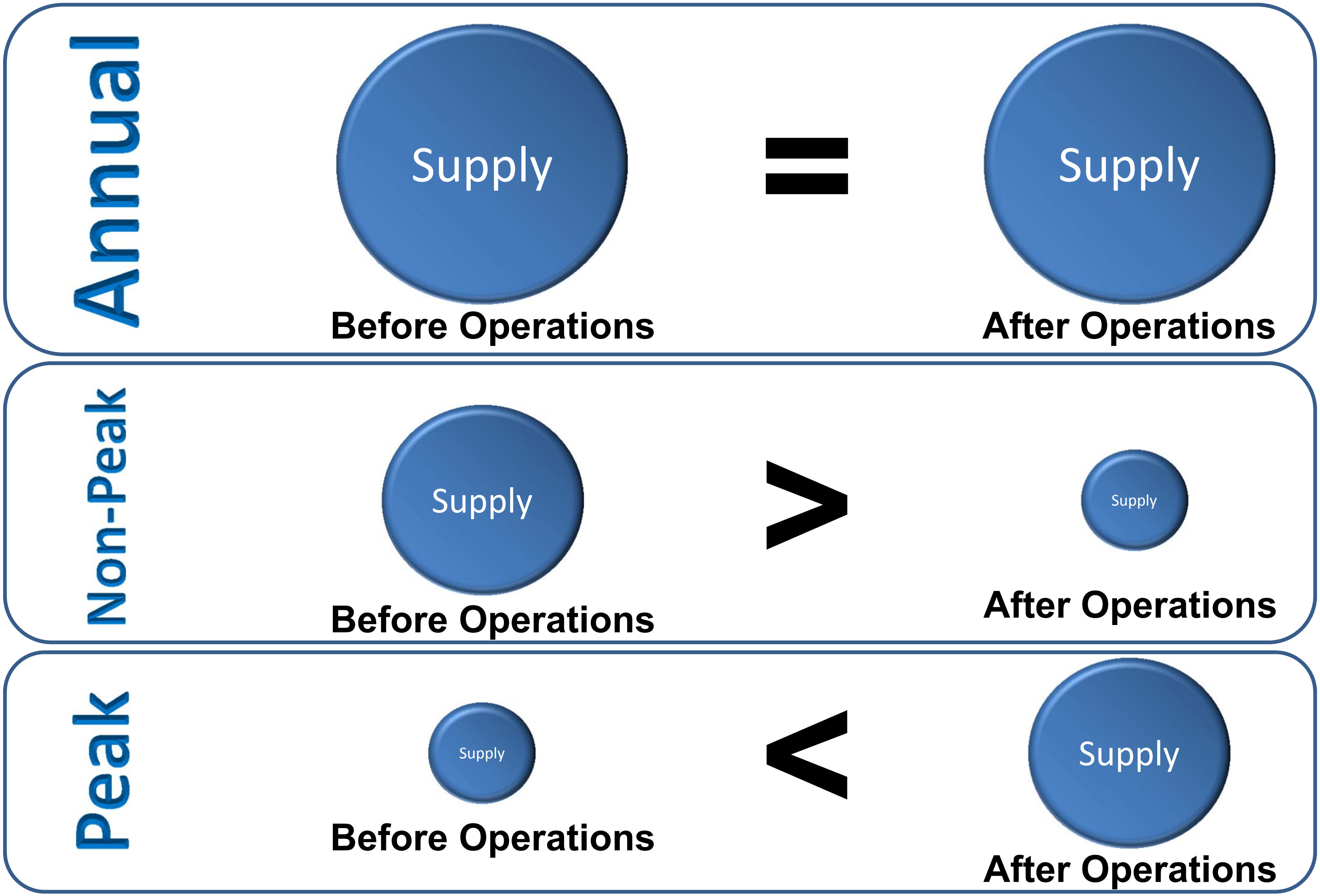


Sherman Reservoir Operations

Middle Loup River Flow



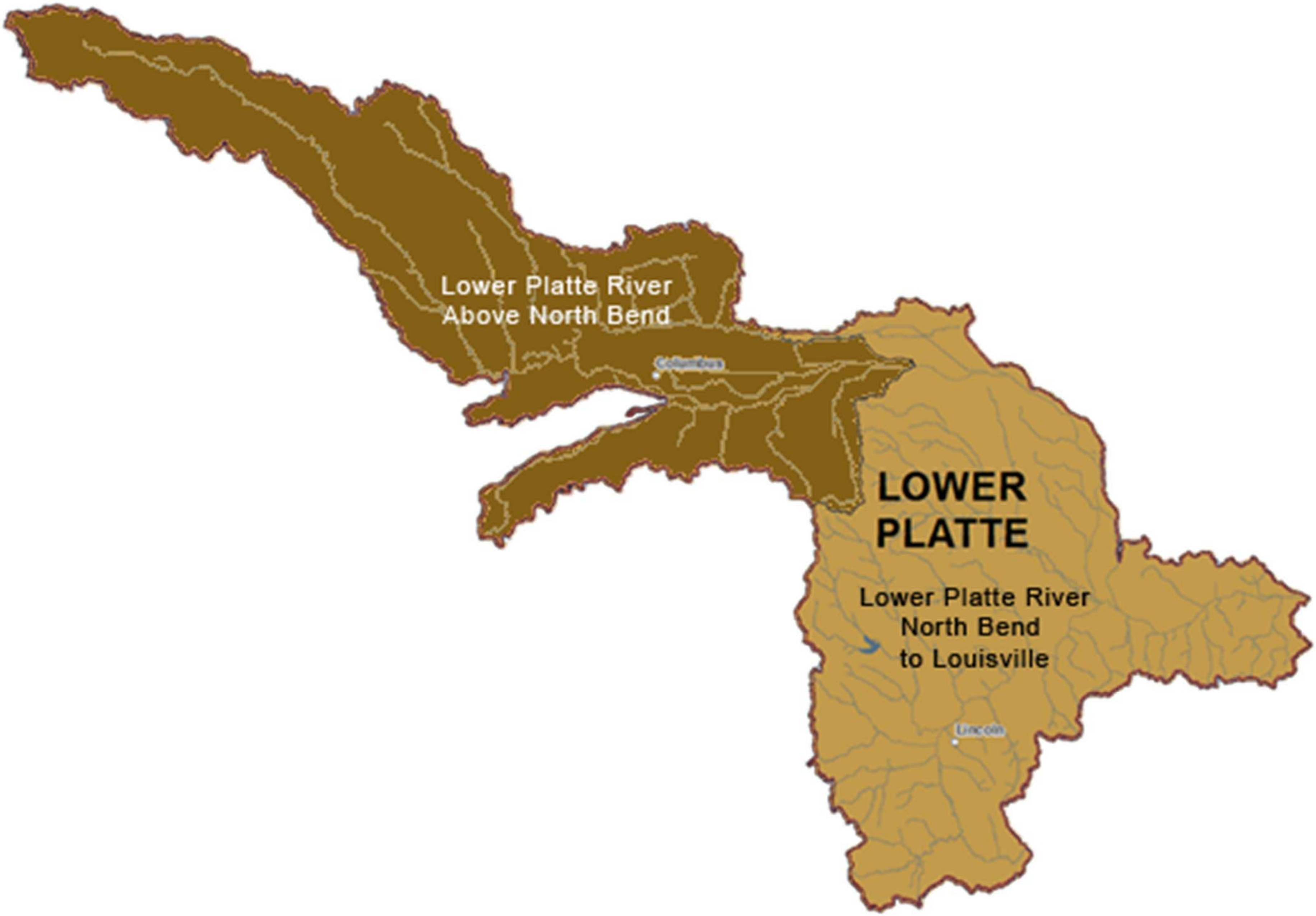
Sherman Reservoir Operations



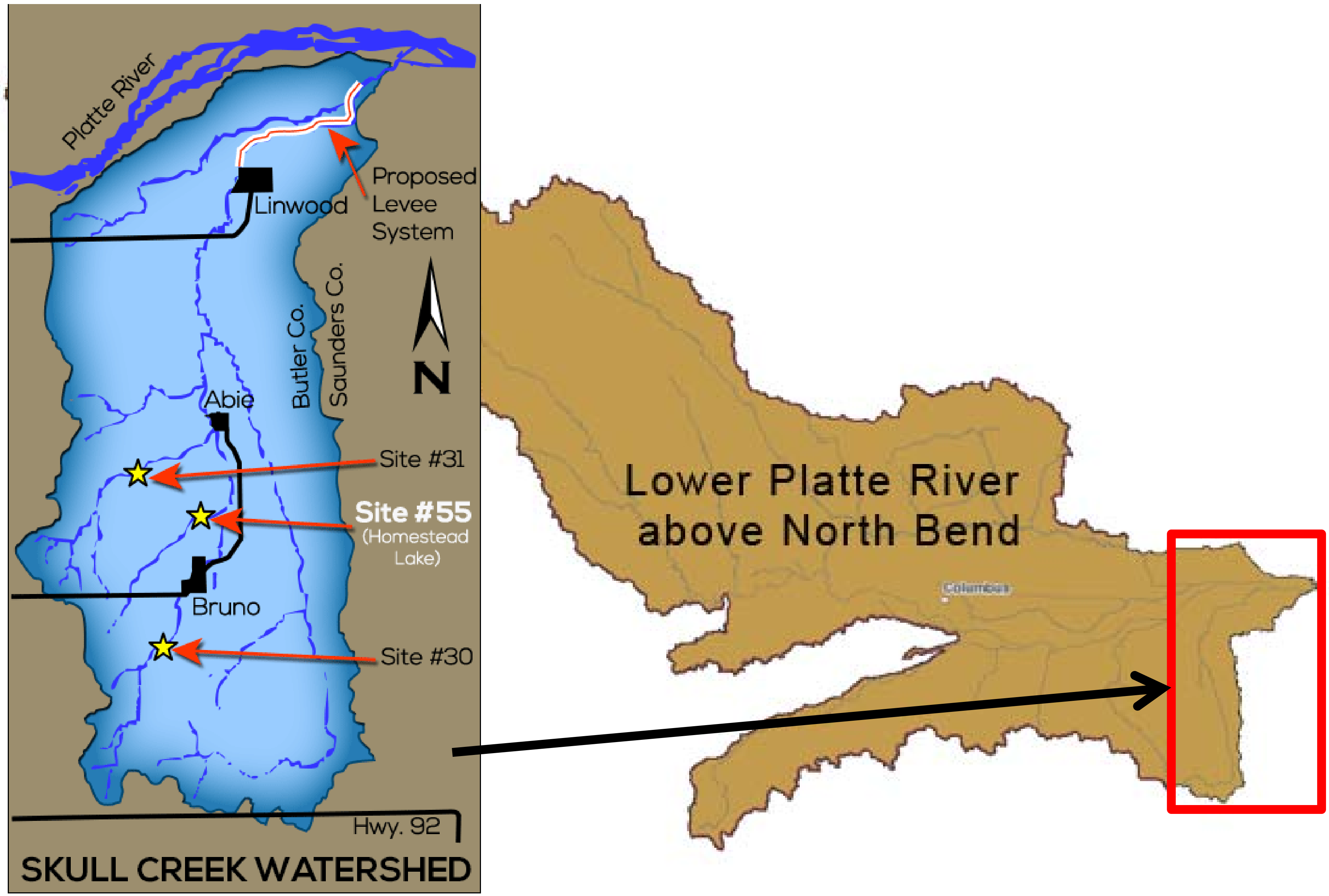
Moving and/or Retiming Supplies

Skull Creek Reservoir

Skull Creek Reservoir



Skull Creek Reservoir



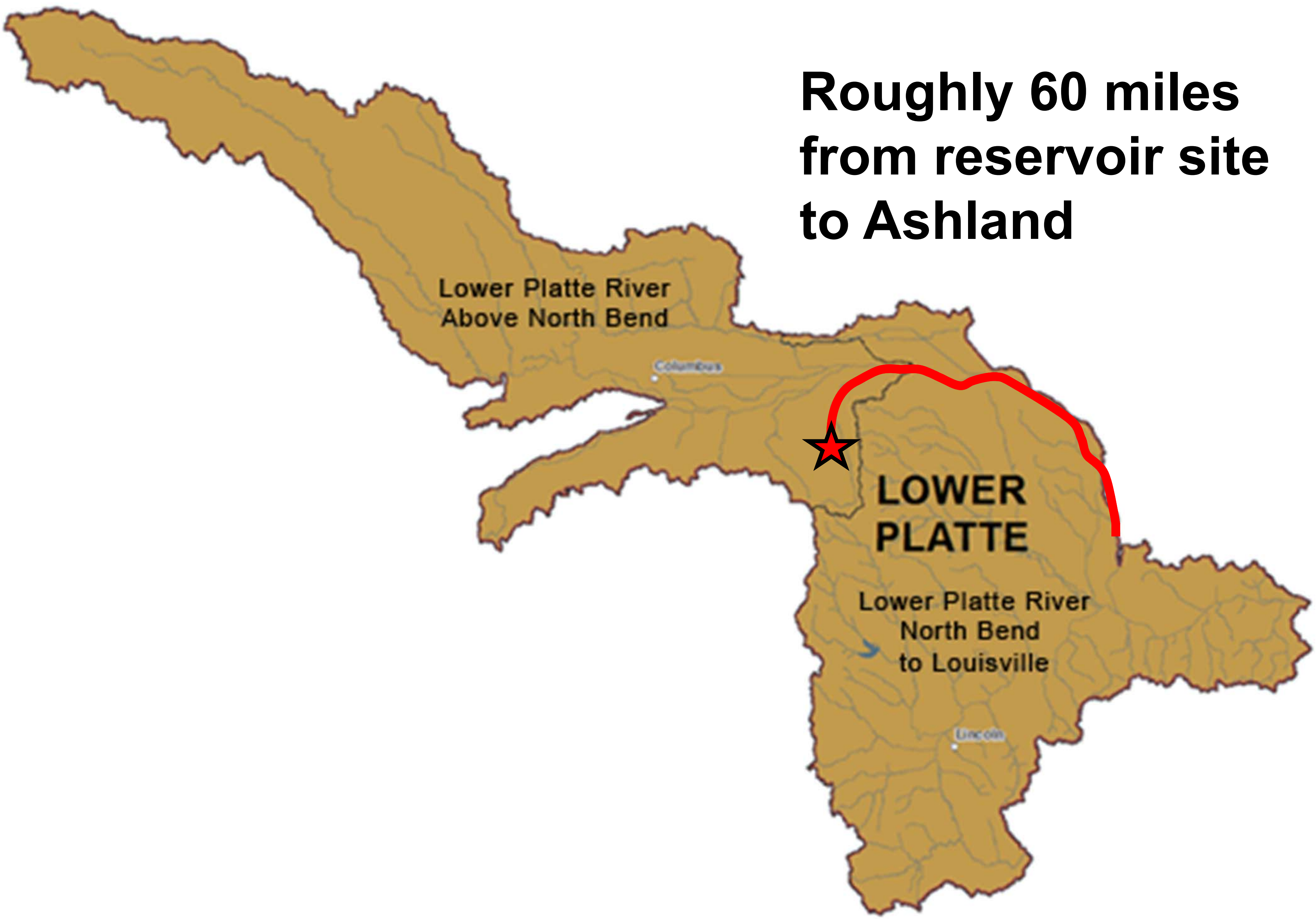
Skull Creek Reservoir

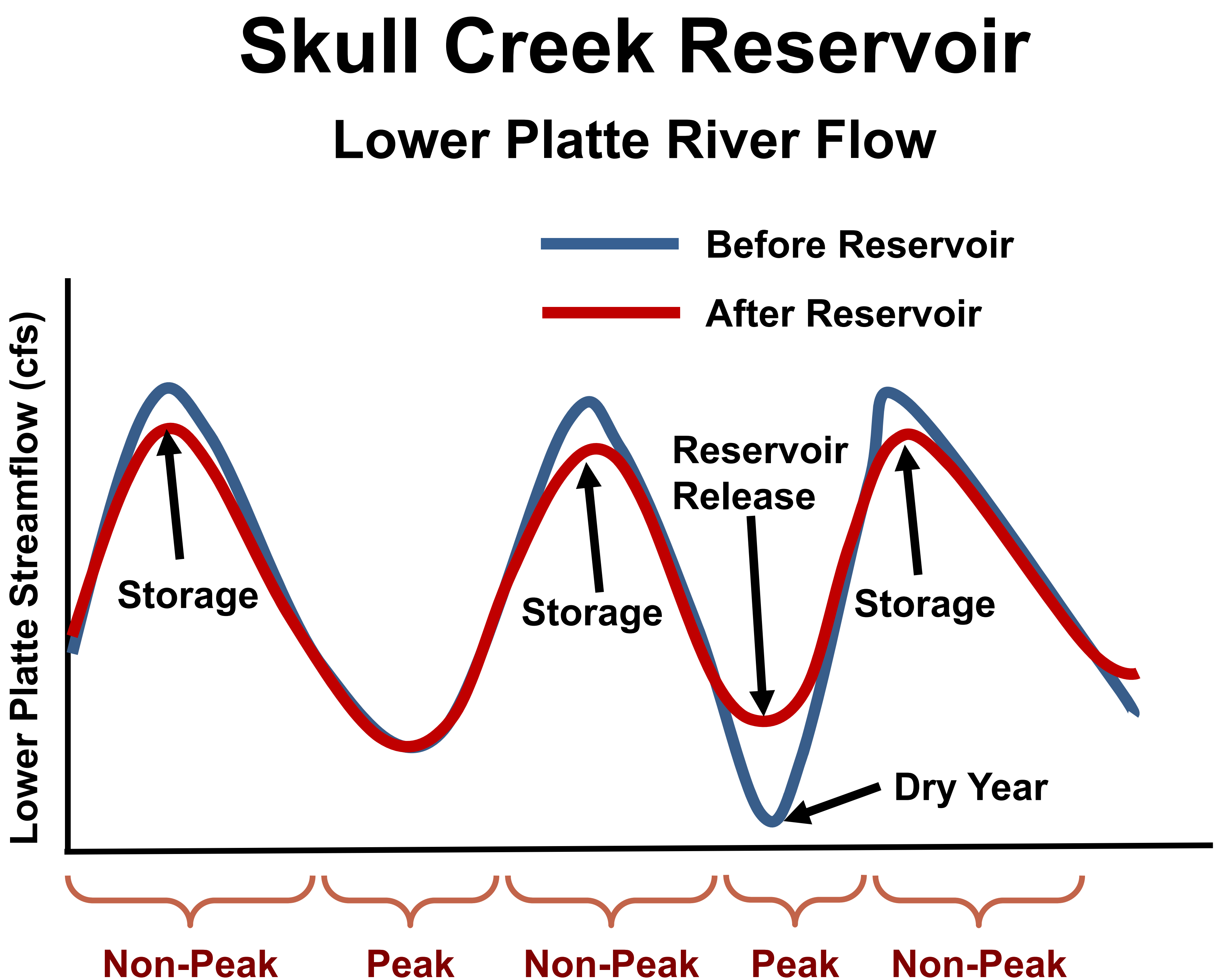
New Reservoir and Operations

- **Store flows during Non-Peak months, release when needed**
- **Permitting required**
- **New storage right and storage use rights through DNR**
- **Losses from reservoir to delivery point**
- **Could provided wet water when needed**

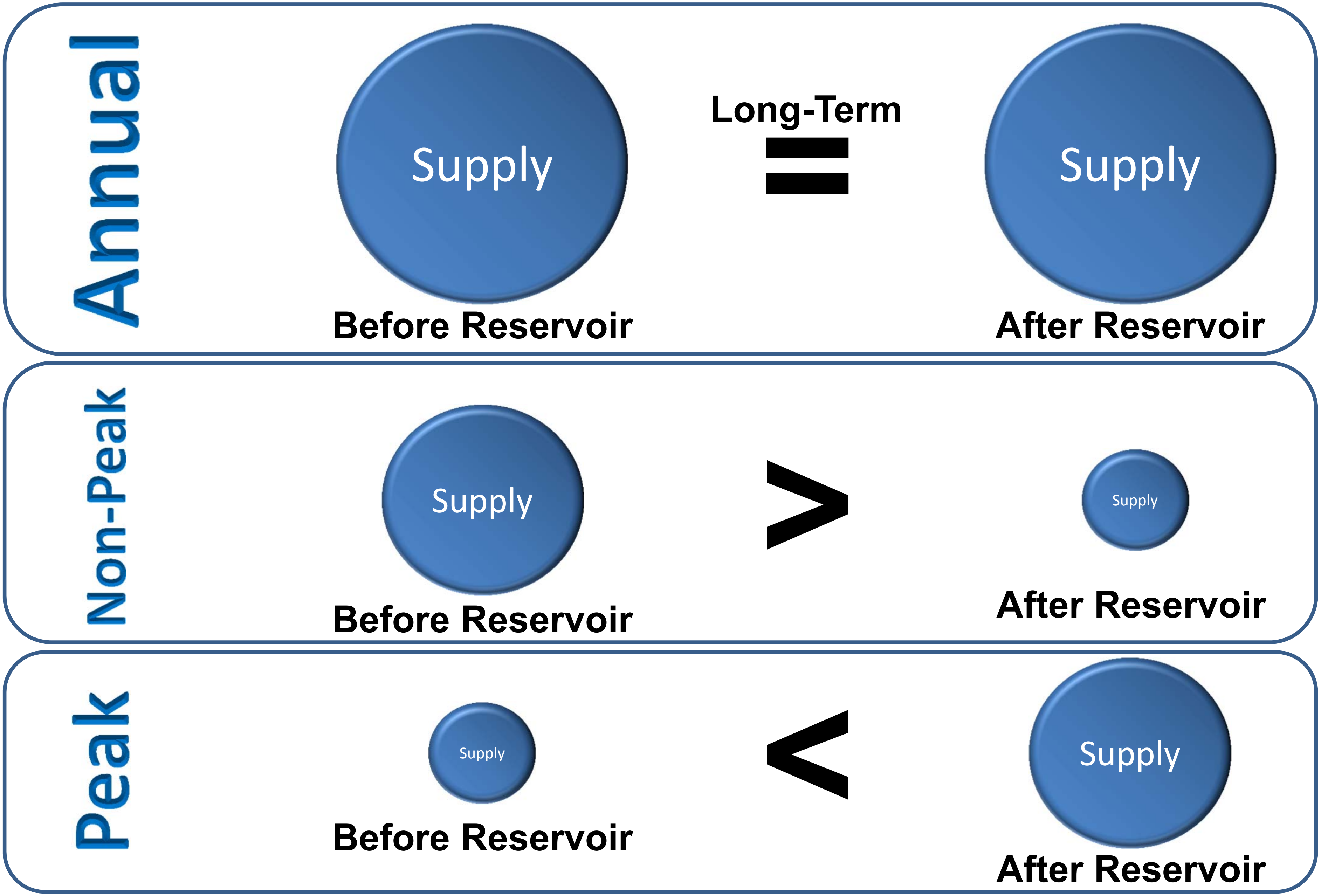
Skull Creek Reservoir

Roughly 60 miles from reservoir site to Ashland




Skull Creek Reservoir
Lower Platte River Flow
Before Reservoir
After Reservoir
Lower Platte Streamflow (cfs)
Storage
Storage
Reservoir Release
Storage
Dry Year
Non-Peak
Peak
Non-Peak
Peak
Non-Peak

Skull Creek Reservoir



Skull Creek Reservoir

Impacts to Overall Basin Accounting

- **Shift water supply from Non-Peak to Peak period**
- **Could be used to meet increased downstream demands during Peak period**
- **Would require cooperation between multiple NRDs – using common accounting**

Moving and/or Retiming Supplies

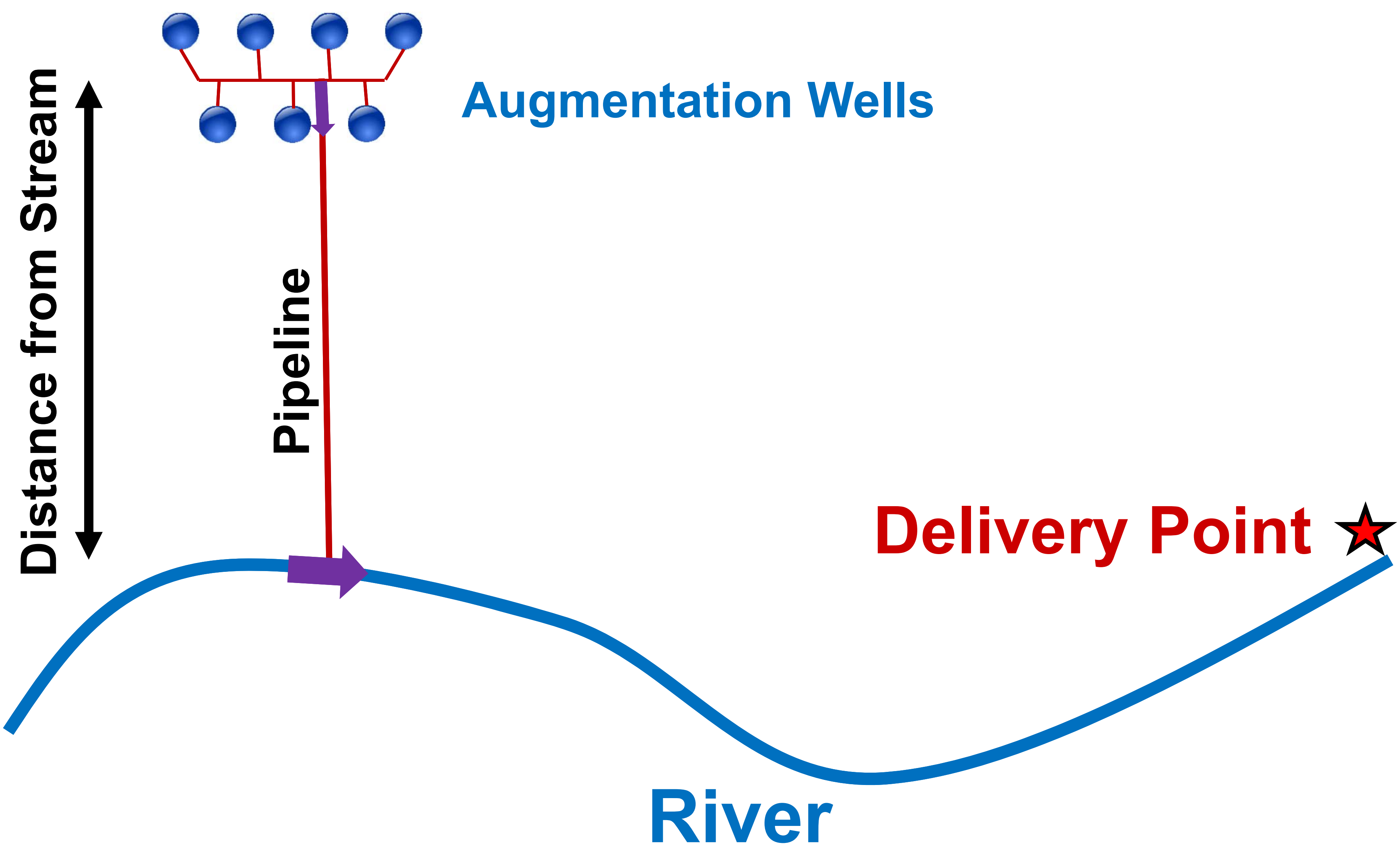
Augmentation Pumping Project

Augmentation Pumping Project

Augmentation Operations

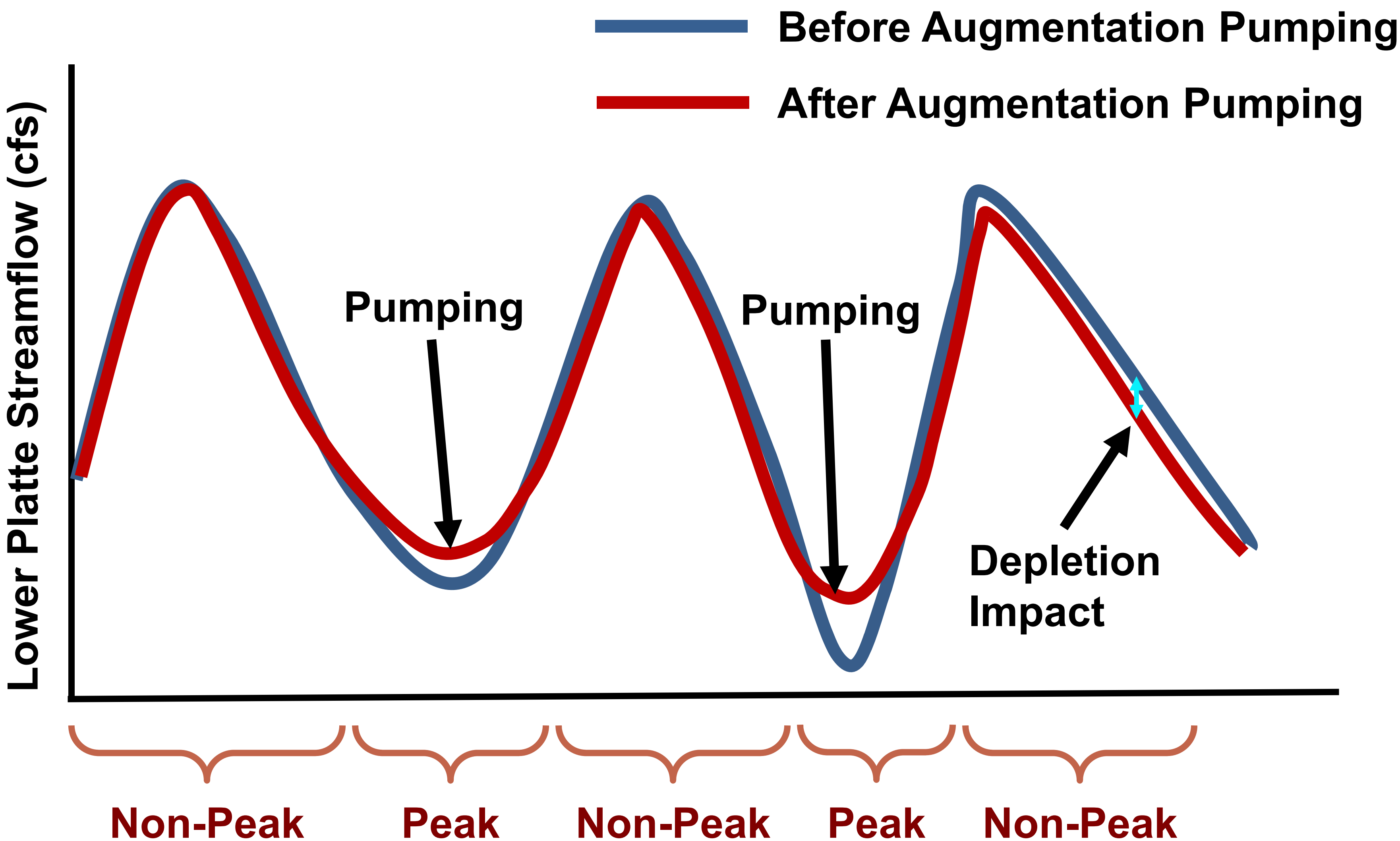
- Develop wellfield at location with significant, and accessible, groundwater supplies – preferably at considerable distance from stream (low SDF)
- Pump water when needed for downstream demands
- Losses along path to diversion point
- Could use a DNR “Conduct Water” permit to protect water from diversion

Augmentation Pumping Project

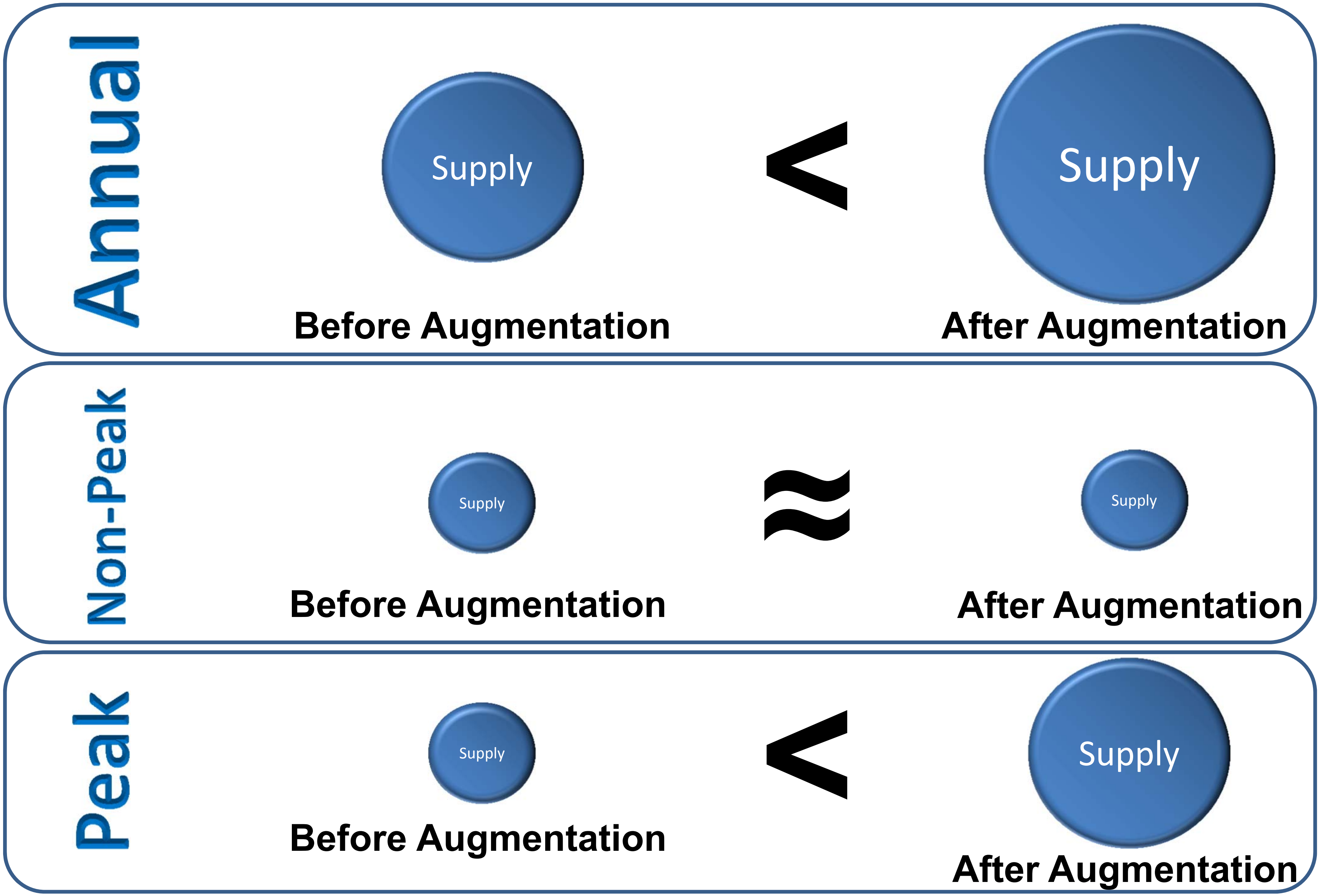


Augmentation Pumping

Lower Platte River Flow



Augmentation Pumping



Augmentation Pumping Project

Impacts to Overall Basin Accounting

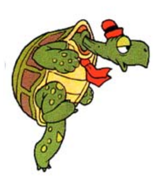
- **Lag effects from groundwater pumping delayed, but accumulate over time**
- **Increase in supply as measured by pipeline discharge**
- **Net long-term impacts depend on hydrologic connectivity to stream, and pumping methods**
- **Could include retirement of irrigated acres to counter pumping depletions (as with N-CORPE)**

Water Banking

"Speed of Delivery" Spectrum

Passive ⟵⟶ **Active**

Delayed



Canal Rechage

Reservoir Seepage

Reservoir Releases

Augmentation Pumping

On Demand

Preliminary Conclusions

- Water banking has potential to meet needs to:
  - Balance overall water supplies and demands
  - Meet specific demands at particular times
- All banking operations can be tracked by overall accounting methods
- Some banking activities may require cooperation between NRDs, while some could be done within a single NRD
- This is a small sample – banking options are almost limitless, and could be tailored for specific region and purpose

Questions?