

FLOW REGULATION IN THE --- UPPER VERDIGRIS RIVER BASIN

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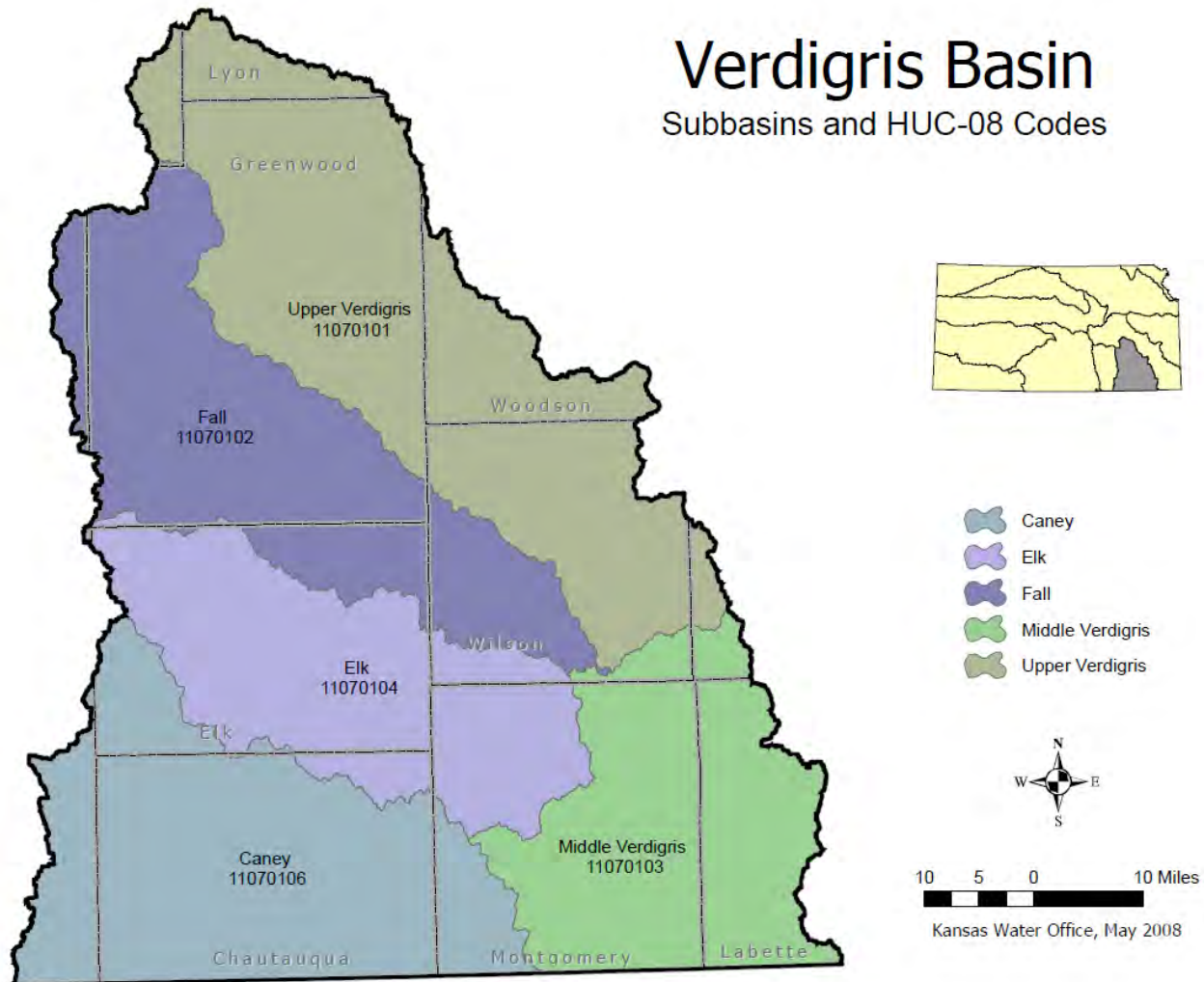
Items for discussion today...

- Brief overview of water management regulation by Federal reservoirs
- Overview of Kansas surface water law
 - Permitting system
 - Minimum flow targets
 - Water Marketing Program
- Kansas-Oklahoma Arkansas River Compact

Why Should Oklahomans Care about the Upper Verdigris Basin?

- It's good to know your neighbors!
- Water source for multiple municipalities
- Provides low flows for water quality

Upper Verdigris for my talk today = everything but Caney basin

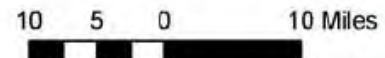


Regulation in Verdigris Basin by Federal Reservoirs

- **Four Federal reservoirs in Kansas**
 - Fall River Lake (WQ & Flood)
 - Toronto Lake (WQ & Flood)
 - Elk City Lake (WS, WQ, Flood)
 - Big Hill Lake (WS, Flood)
- **Set Conservation Pool**
 - Seasonal Pool Plans can be approved through SWD
- **Operated in concert**
 - Flood operations (in combination with Oologah Lake in OK)
 - Flood operations (in combination with other reservoirs in the Arkansas River Basin)



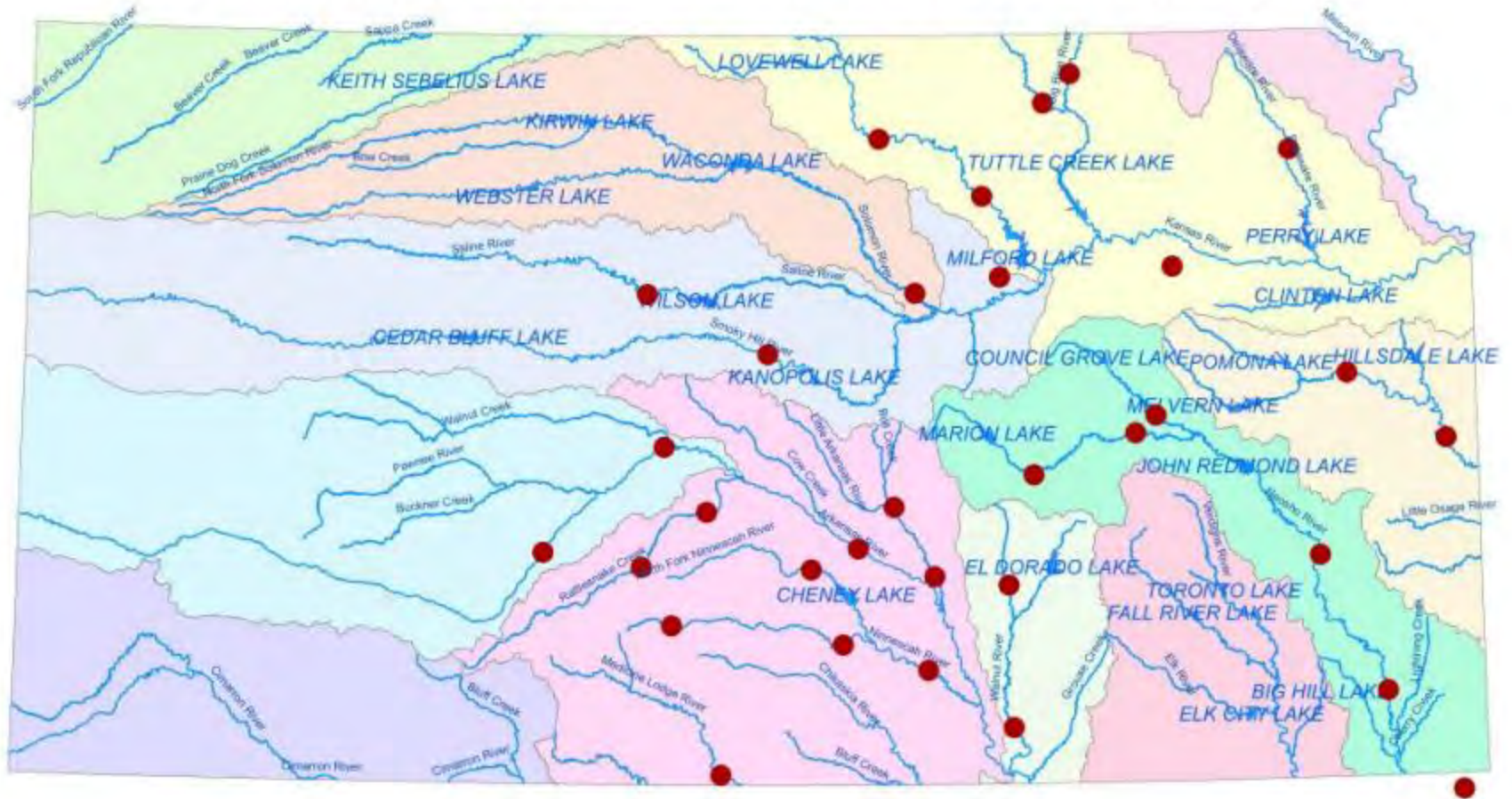
- County Seat
- ~ Hydrology
- ▬ Interstate Highway
- ▬ US Highway
- ▬ Kansas Highway
- ▭ Federal Lake
- ▭ County



Regulation of Minimum Flows

- Low flow releases coordinated by KWO
- Releases from both Federal reservoirs and State fishing lakes for minimum flow
- Set in MOU between USACE and KWO
 - Minimum for other basins set by statute
- Releases measured by KS Dept. of Ag's Division of Water Resources

Kansas Reservoirs and Minimum Desirable Streamflow (MDS) Gages



● MDS gages — Rivers 🌊 Federal Lakes

- | | | | | | |
|---------------------------|-------------------|----------|---------------------|------------------|-----------|
| Cimarron | Lower Arkansas | Missouri | Smoky Hill - Saline | Upper Arkansas | Verdigris |
| Kansas - Lower Republican | Marais des Cygnes | Neosho | Solomon | Upper Republican | Walnut |

What Does the Future Hold for Low Flow Releases?

- Loss of capacity in Federal reservoirs and State fishing lakes for minimum flow
 - Older lakes had sediment reserve for a 50-year capacity
 - Fall River and Toronto Lakes now over 50 years old
- Low flow releases can be temporarily diminished or ceased by agreement
- Low flow releases can be altered by MOU between KWO and USACE

Kansas Water Law

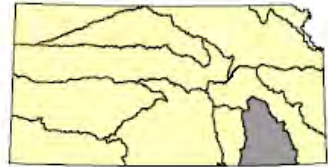
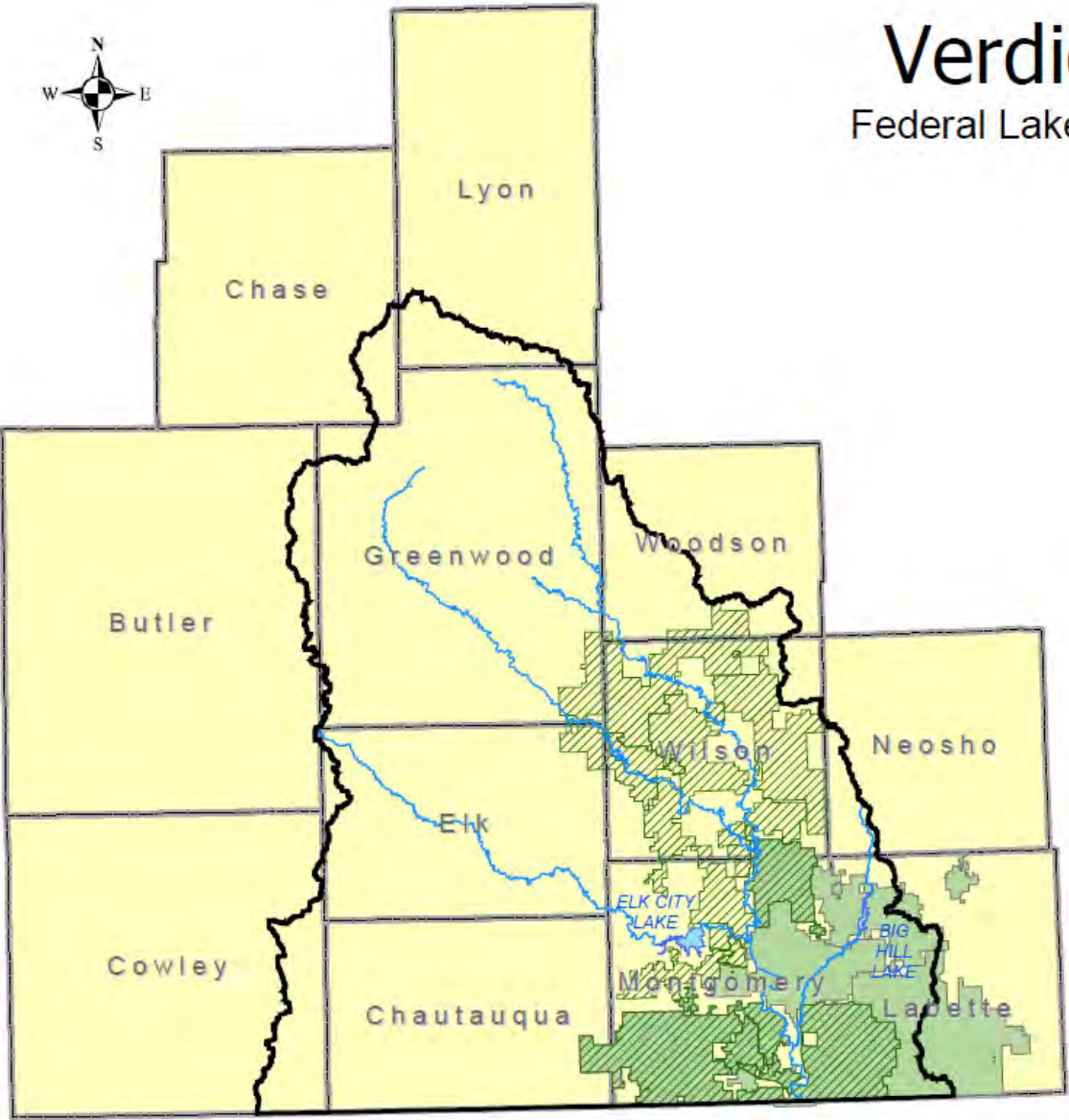
- Prior appropriation in conjunction with grandfathered riparian rights
- Some cities (such as Independence) still utilize some of their riparian rights
- Water permits issued conditional on availability of flow in rivers
- KWO does planning, policy, marketing, and coordination
- Permit enforcement and measurements by KS Dept. of Ag's Division of Water Resources
- Water Marketing Program

Kansas Water Marketing Program

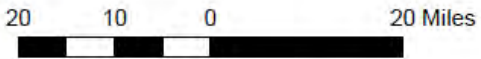
- Storage in Elk City Lake held in KWO's name
- Users can contract with KWO for releases to be made
- Releases made by USACE but coordinated through KWO
- Users retrieve the water from downstream diversion points
- Users only pay for water quantities they request

Verdigris Basin

Federal Lake Storage Customers

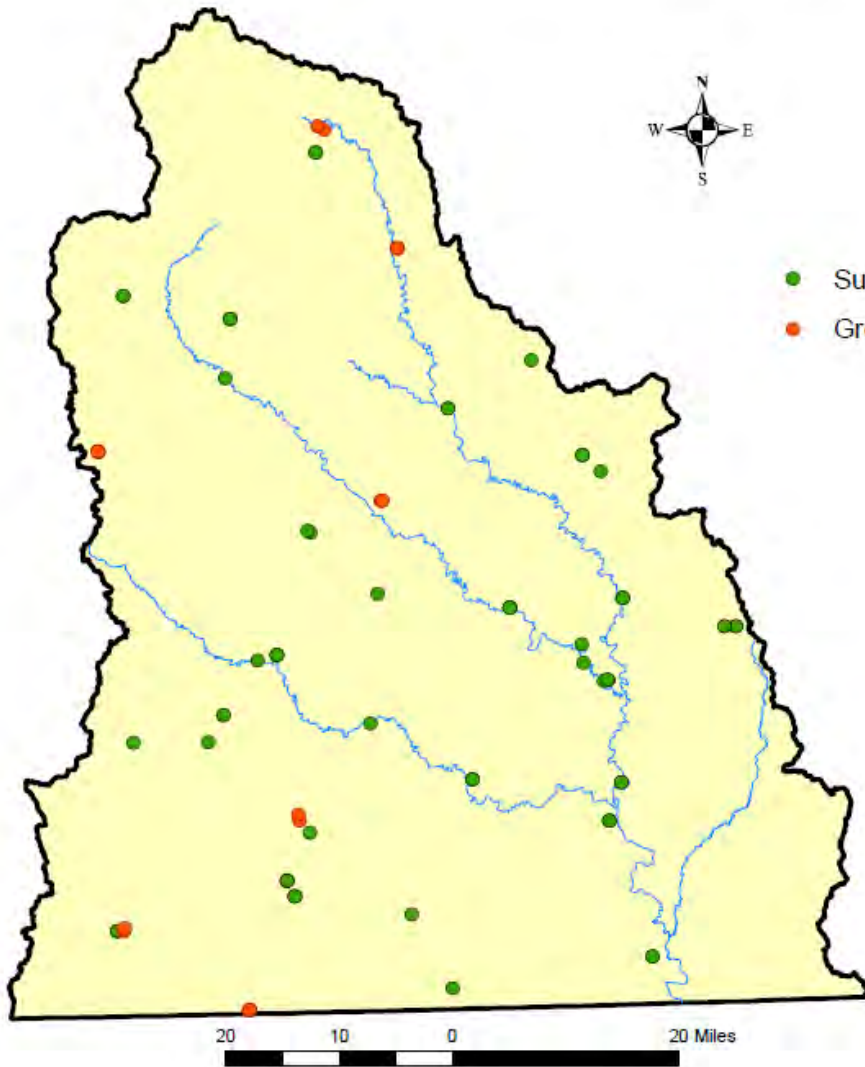


- Stream
- Mkt/AD Lake
- Water Marketing
- Verdigris MOA
- County
- Basin



Verdigris Basin

Municipal Points of Diversion



- Surface Water
- Ground Water

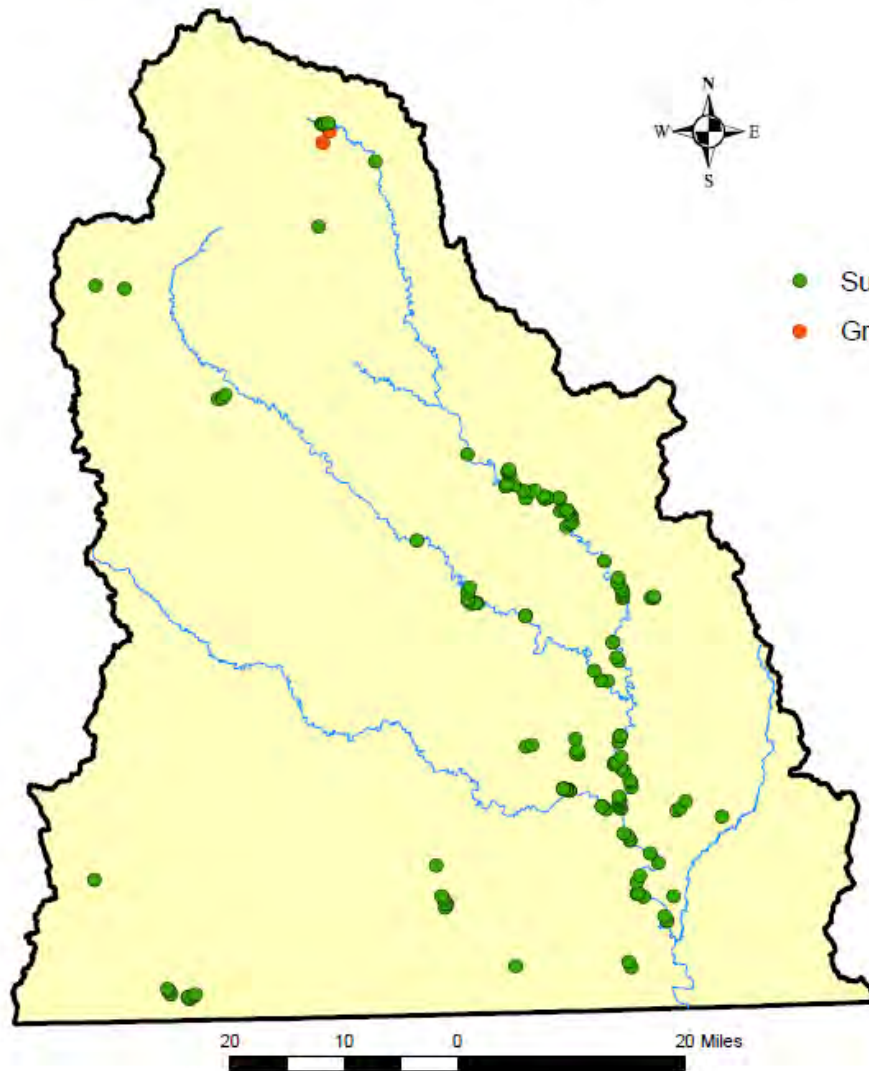


Prepared for Kansas Water Plan 2008

Data Source: Kansas Department of Agriculture
November 2008

Verdigris Basin

Irrigation Points of Diversion



- Surface Water
- Ground Water

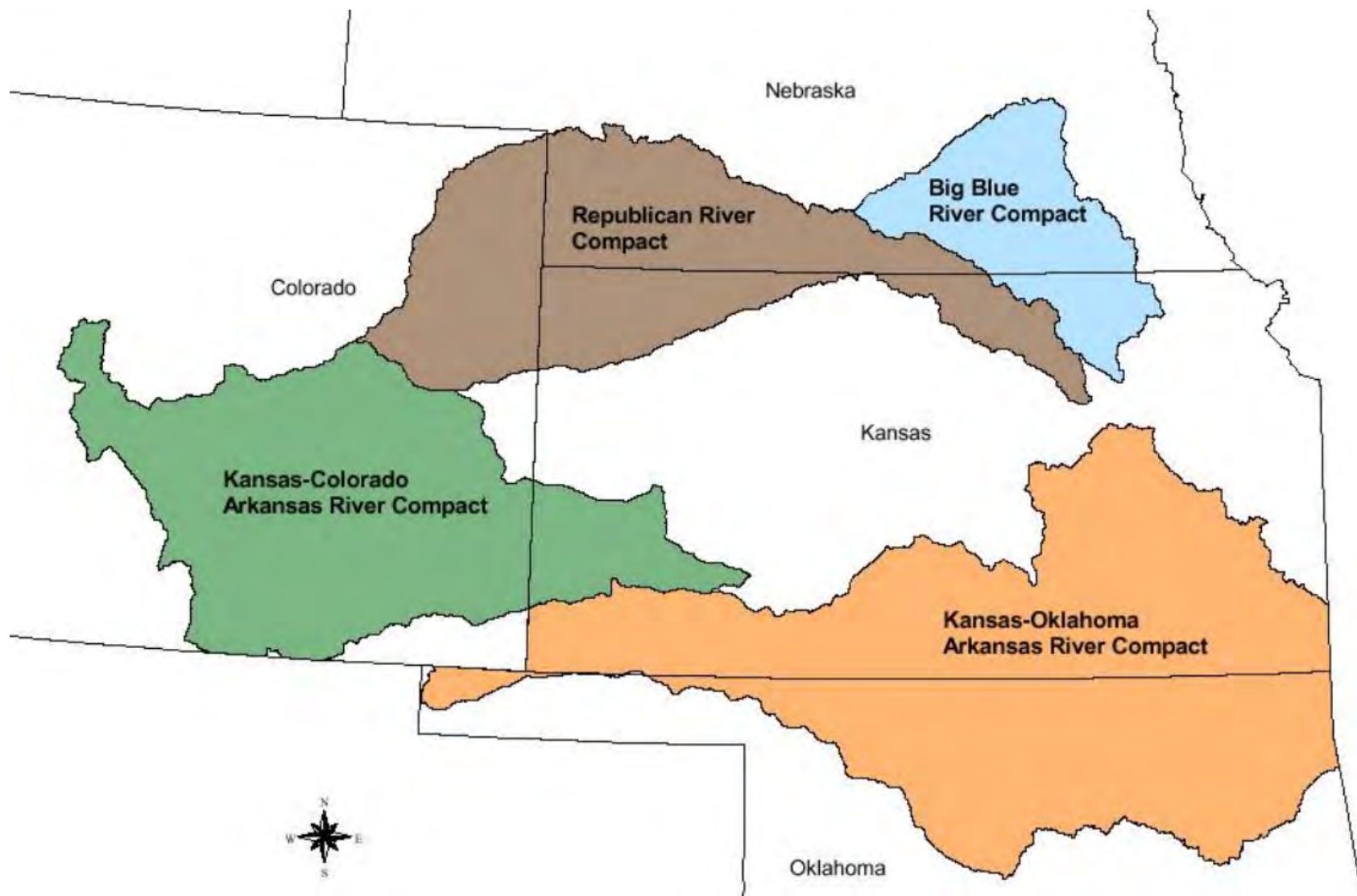


Prepared for Kansas Water Plan 2008

Data Source: Kansas Department of Agriculture
November 2008

Kansas-Oklahoma Arkansas River Compact

- Regulates flow and quality of water from Kansas into Oklahoma
- Regulates quantity of developed conservation storage
- Each main drainage basin considered separately
- Only involved states of OK & KS
 - No Tribes were a party to it



Kansas-Oklahoma Arkansas River Compact

Arkansas River Subbasin	Conservation Storage Allocation	Remaining Storage Allocation (in 2010)
Verdigris River Subbasin	300,000 acre-feet	1,214,930 acre-feet

- Conservation storage allocations were developed based on flows during the 1950's drought and projected needs through 2000
- Additional storage in Verdigris basin was to match conservation storage developed in Oologah Lake in Oklahoma

Kansas-Oklahoma Arkansas River Compact

- Exporting water to other basins possible with 5:1 credit against developed conservation storage
 - 5 ac-ft counted against developed quantity for every 1 ac-ft transferred to another basin
- Temporary impoundments in flood pool (even if later used for WS or WQ supply) does not count against developed conservation storage

What Does Oklahoma Need to Consider?

- Kansas could develop a lot more conservation storage.
 - Possible impact to yield in Oologah Lake
- Low flow releases in the Verdigris can be modified.
 - Minimum targets not set by statute
 - Minimum targets outlined in MOU between KWO and USACE
- Seasonal pools could provide more benefits to federal reservoirs.
 - Improve WS and WQ reliability in Kansas

What Does Oklahoma Need to Consider?

- Interbasin transfers are possible.
- Inclusion of tribal interests in the Kansas-Oklahoma Arkansas River Compact
 - Cherokee and Osage Nations should be included in the planning process

A photograph of a calm river or stream winding through a lush, green forest. The water is still, acting as a perfect mirror for the dense canopy of trees on both banks. The overall color palette is dominated by various shades of green, from vibrant lime to deep forest greens. The scene is peaceful and natural.

Any Questions?