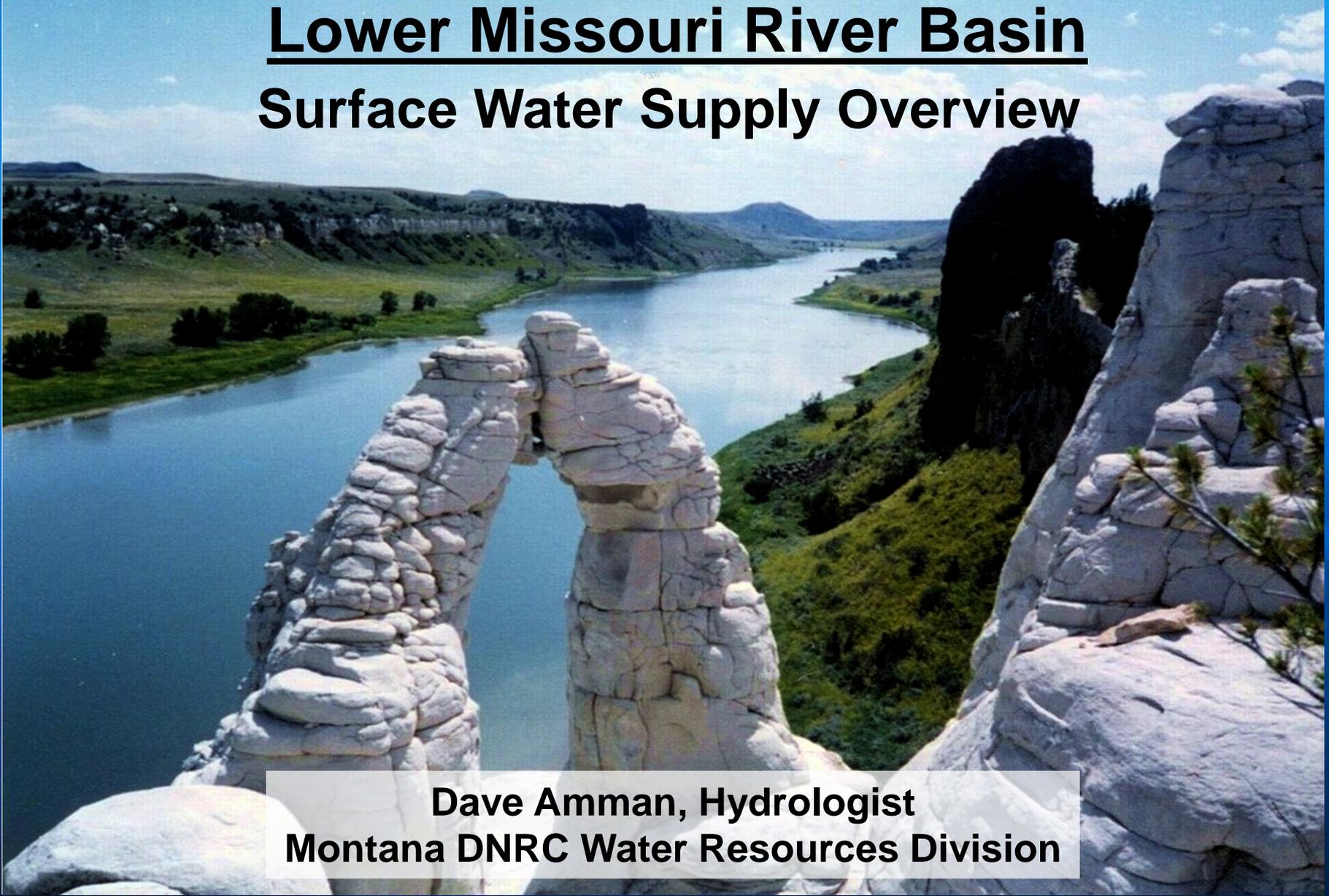
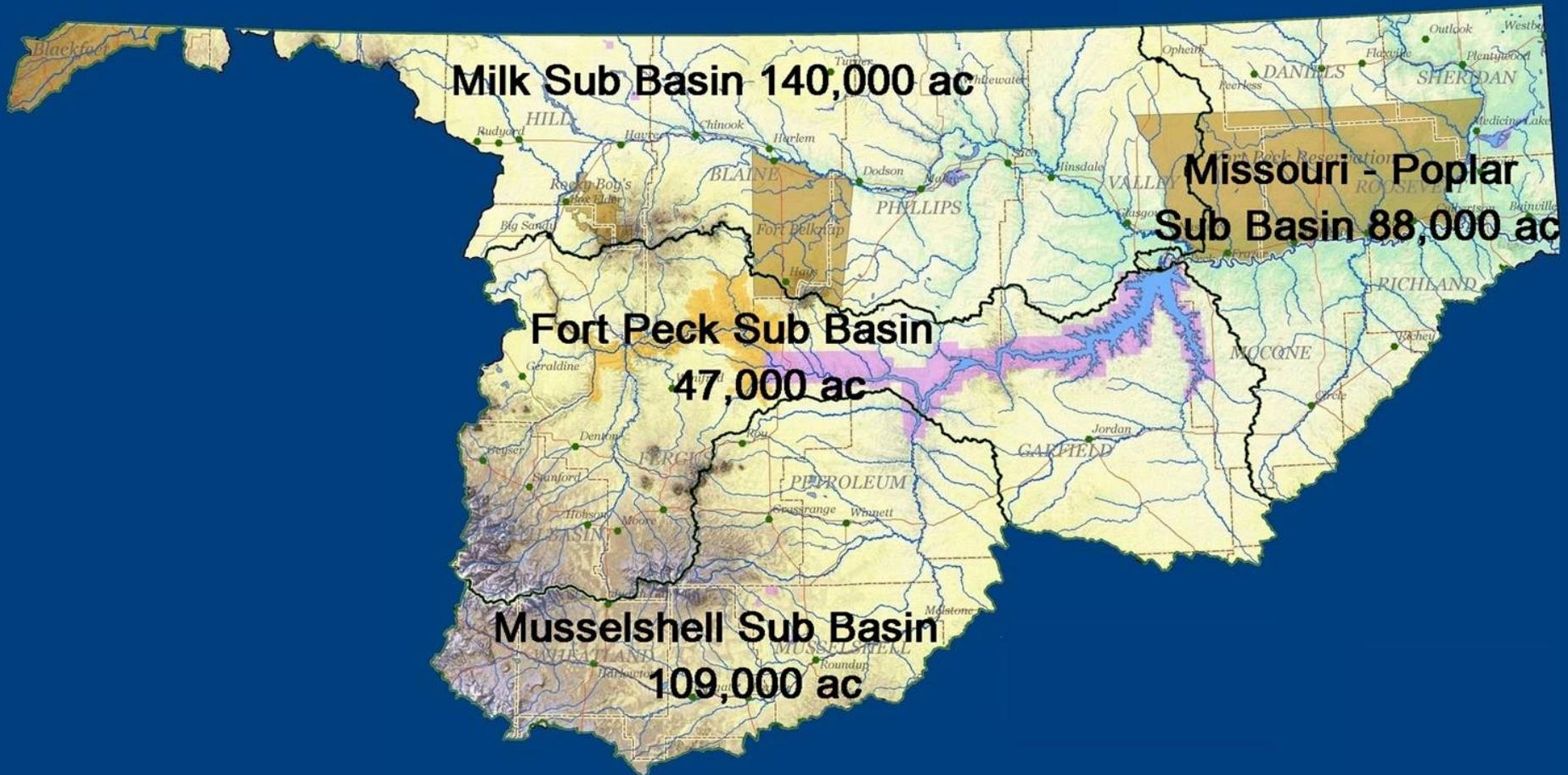


2015 Montana Water Supply Initiative
Lower Missouri River Basin
Surface Water Supply Overview



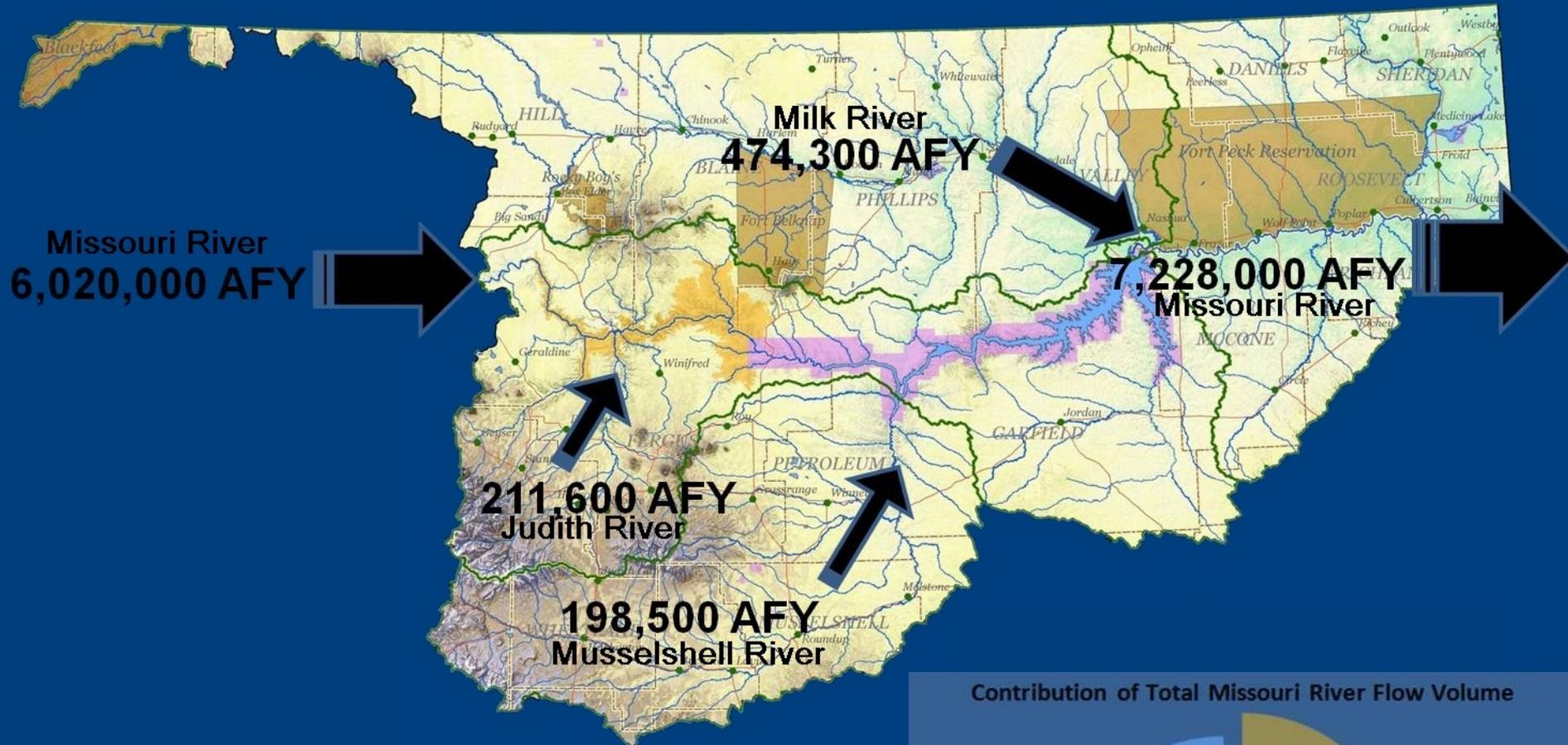
Dave Amman, Hydrologist
Montana DNRC Water Resources Division

Approximate Irrigated Acres

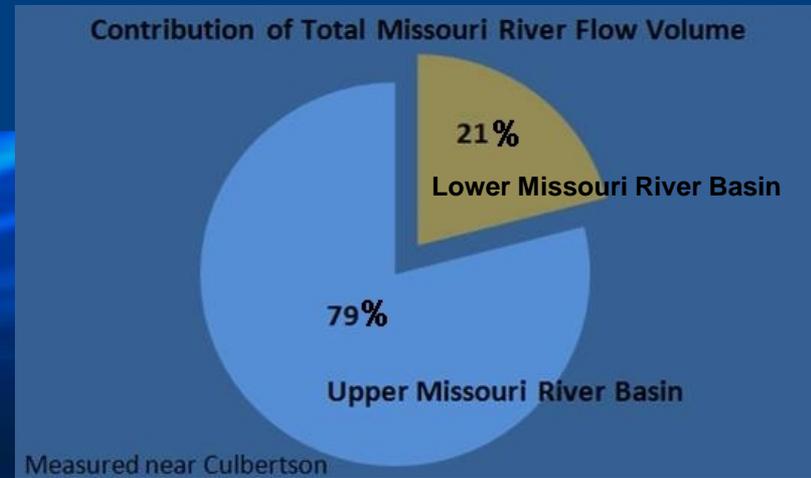


Lower Missouri Basin = 49,800 square miles, one-third of Montana area.

Lower Missouri River Basin Contribution by Sub Basin



50% to 60% of total flow comes during irrigation season (May – Oct)



2015 Montana Water Supply Initiative

Lower Missouri River Basin



Diverse Geography and Climate

Elevations	9,000 feet
	2,000 feet

Precipitation	70 inches
	10 inches

Physical Factors Influence Water Supply

Elevation: Precipitation Type/Quantity
Air Temperature/Evaporation
Growing Season

Upstream Conditions/Inflows

Water Quality

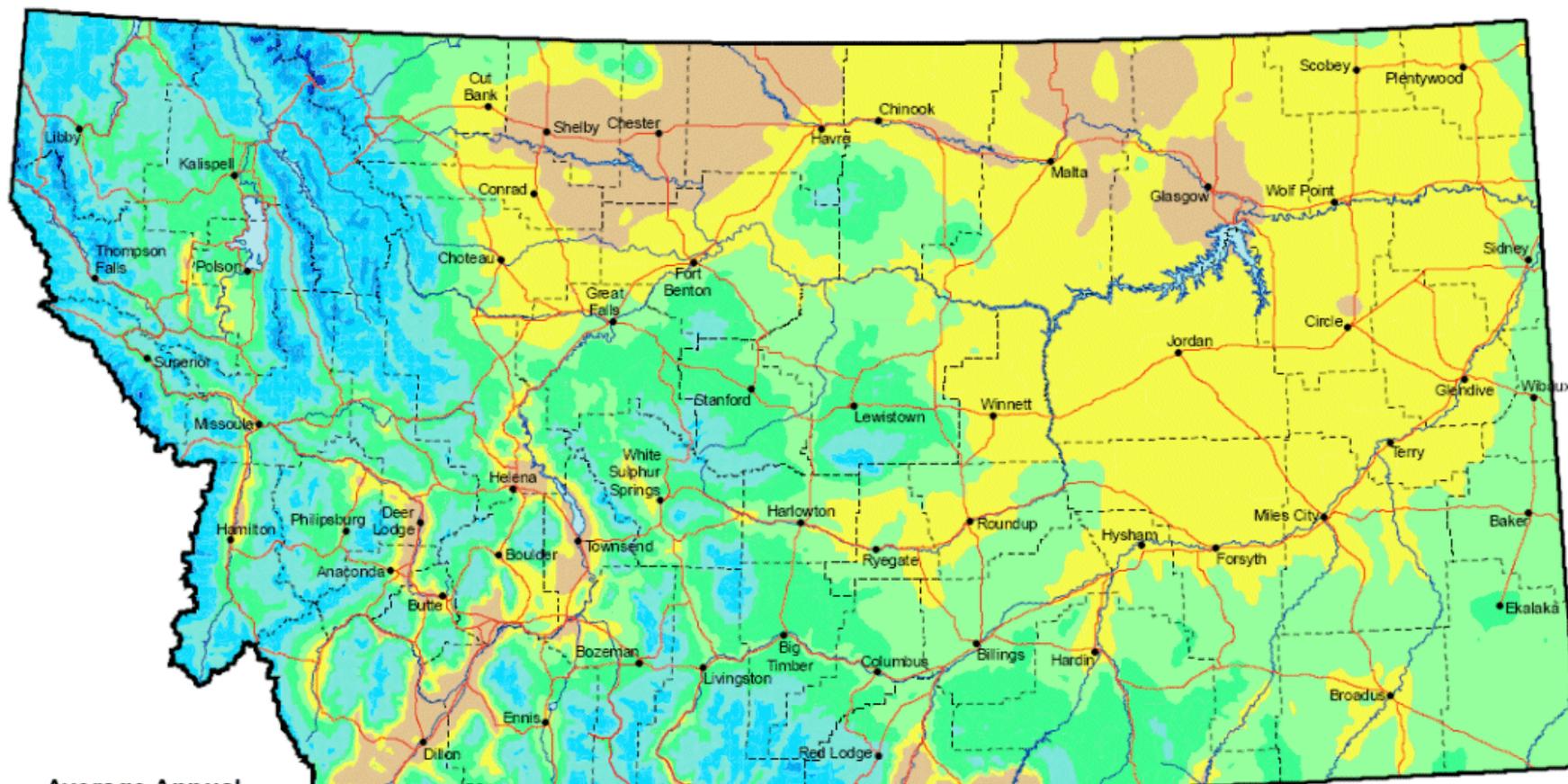
Storage Reservoirs

Existing Uses

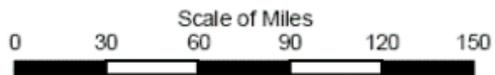


Montana

Average Annual Precipitation, 1971-2000

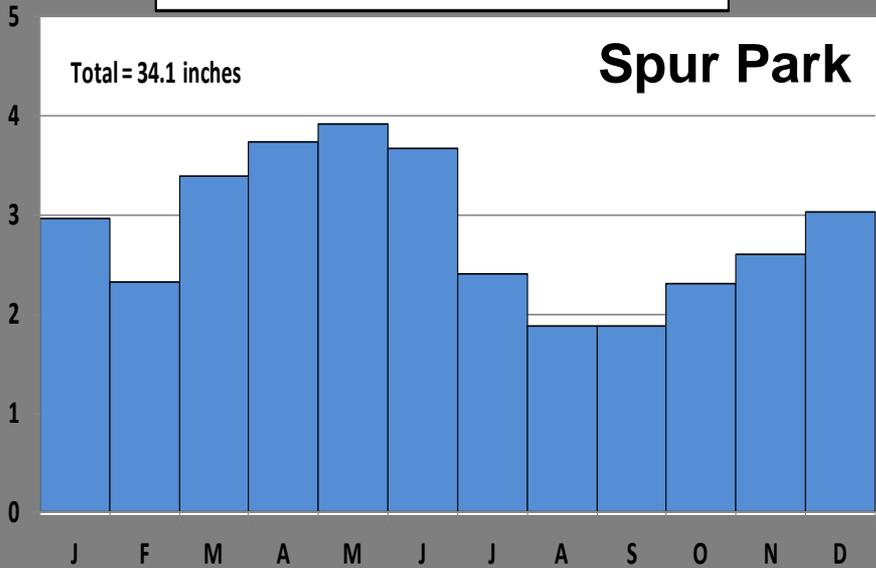


Average Annual Precipitation, Inches

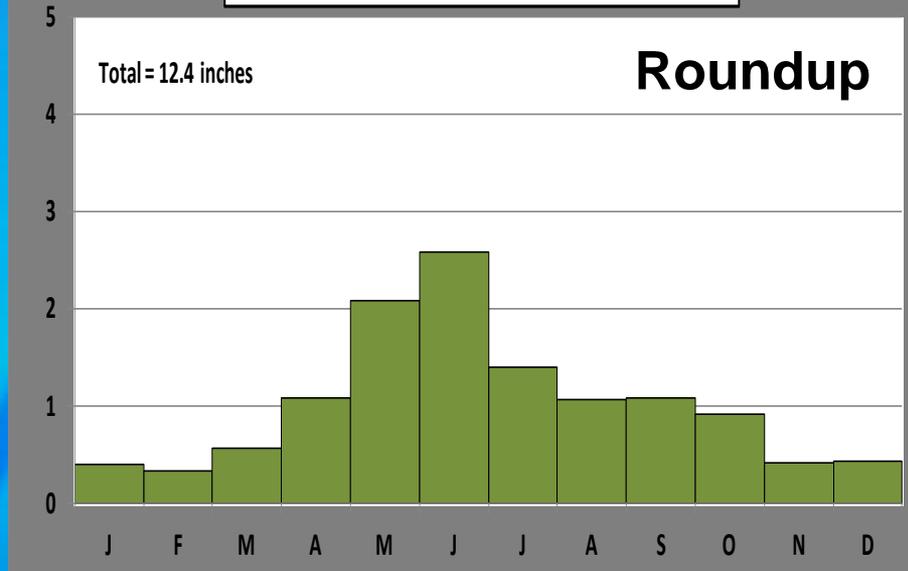


This precipitation map was created by PRISM software, based on data from the National Climate Data Center, NRCS Snotel stations, and USGS Digital Elevation Models.
 Copyright © 2004, PRISM Group, Oregon State University, <http://www.prismclimate.org>

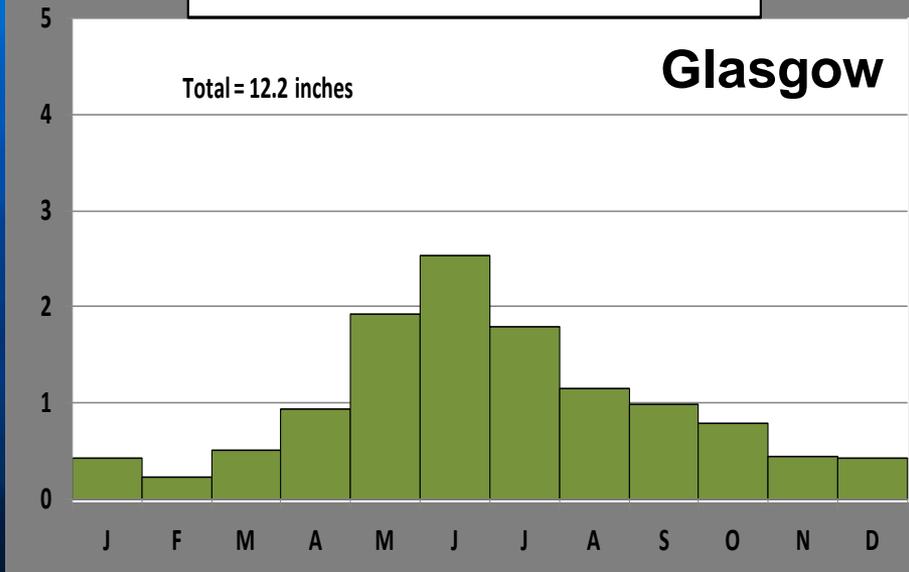
Average Monthly Precipitation at Spur Park, Elev. 8100 feet



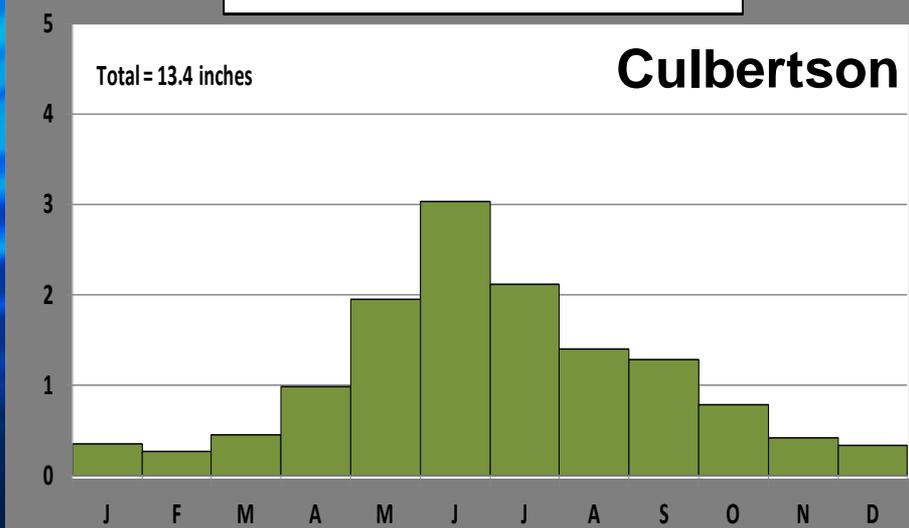
Average Monthly Precipitation at Roundup, Elev. 3230 feet



Average Monthly Precipitation at Glasgow, Elev. 2090 feet

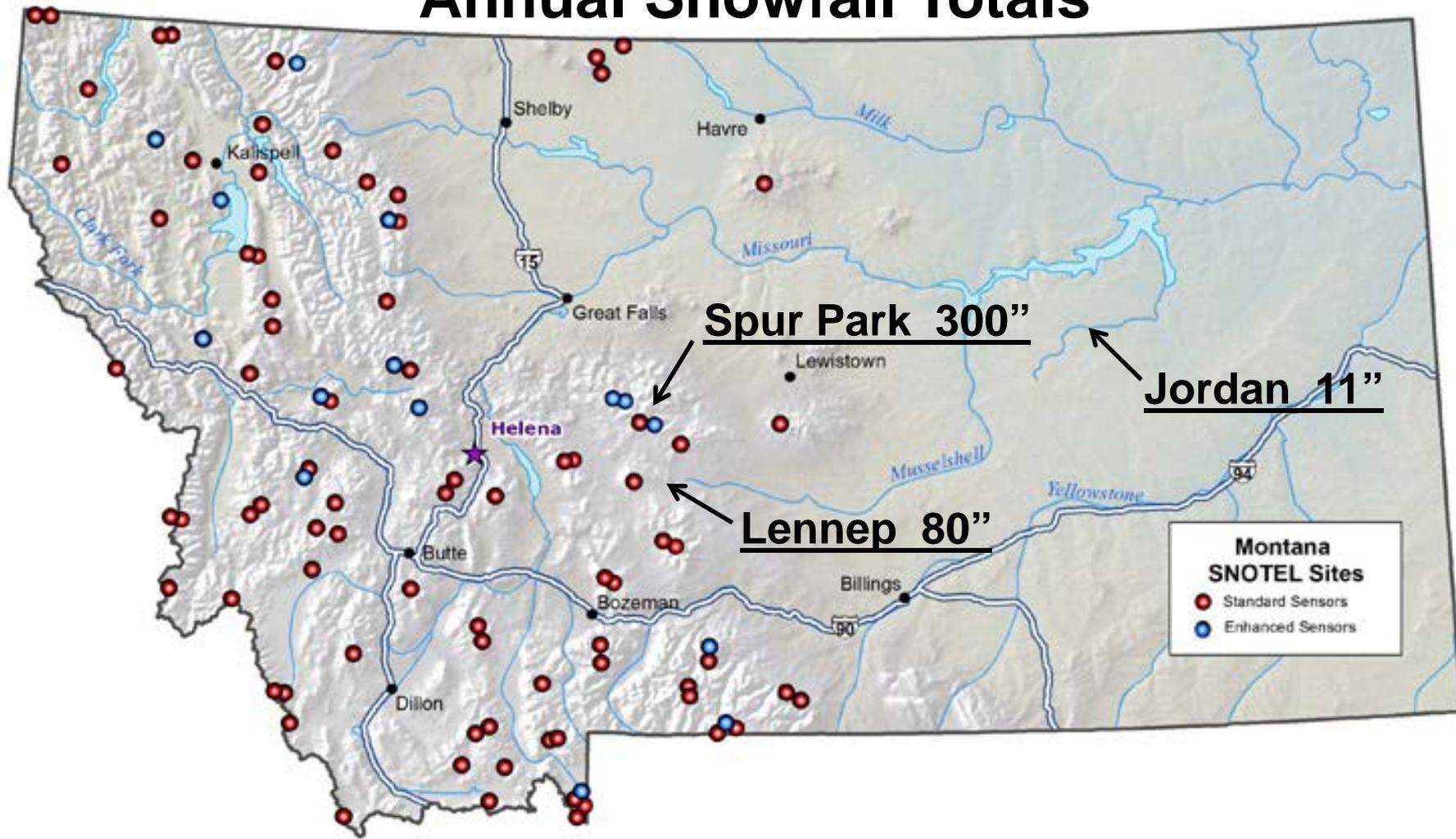


Average Monthly Precipitation at Culbertson, Elev. 1920 feet



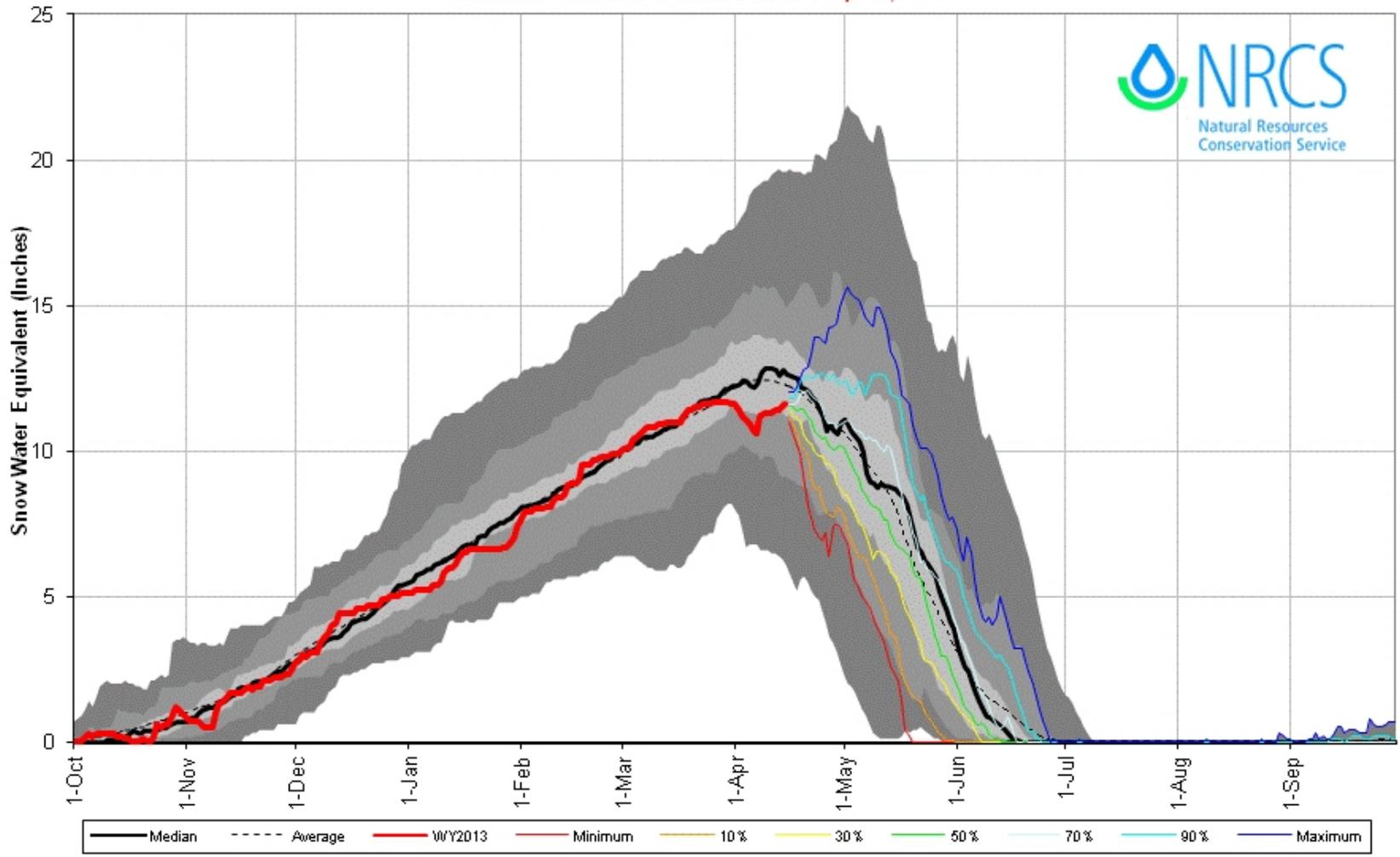
2015 Montana Water Supply Initiative Lower Missouri River Basin

Annual Snowfall Totals



Smith-Judith-Musselshell River Basins with Non-Exceedence Projections

Based on Provisional SNOTEL Data as of Apr 15, 2013

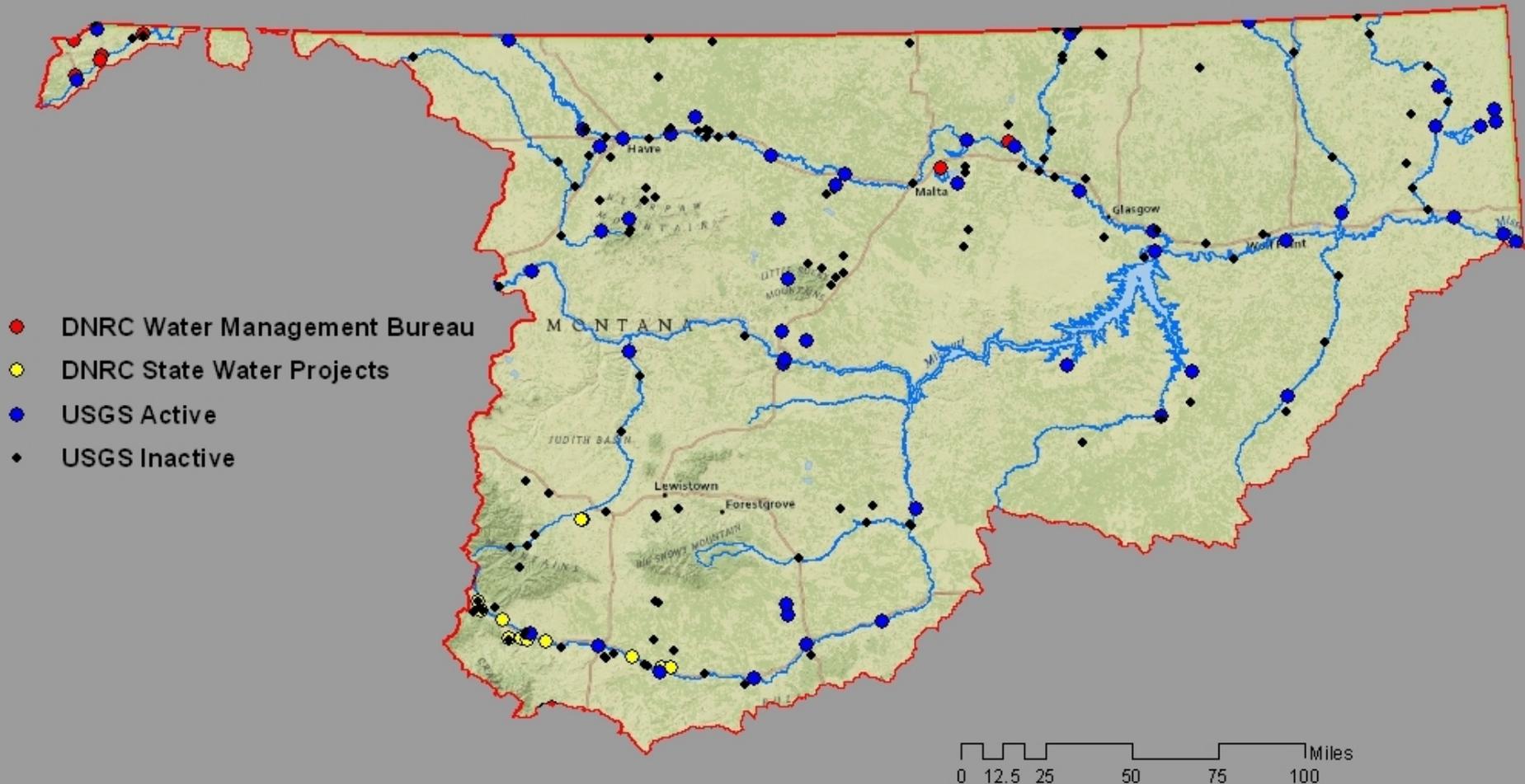


Water Supply Forecasting for Floods and Droughts

2015 Montana Water Supply Initiative

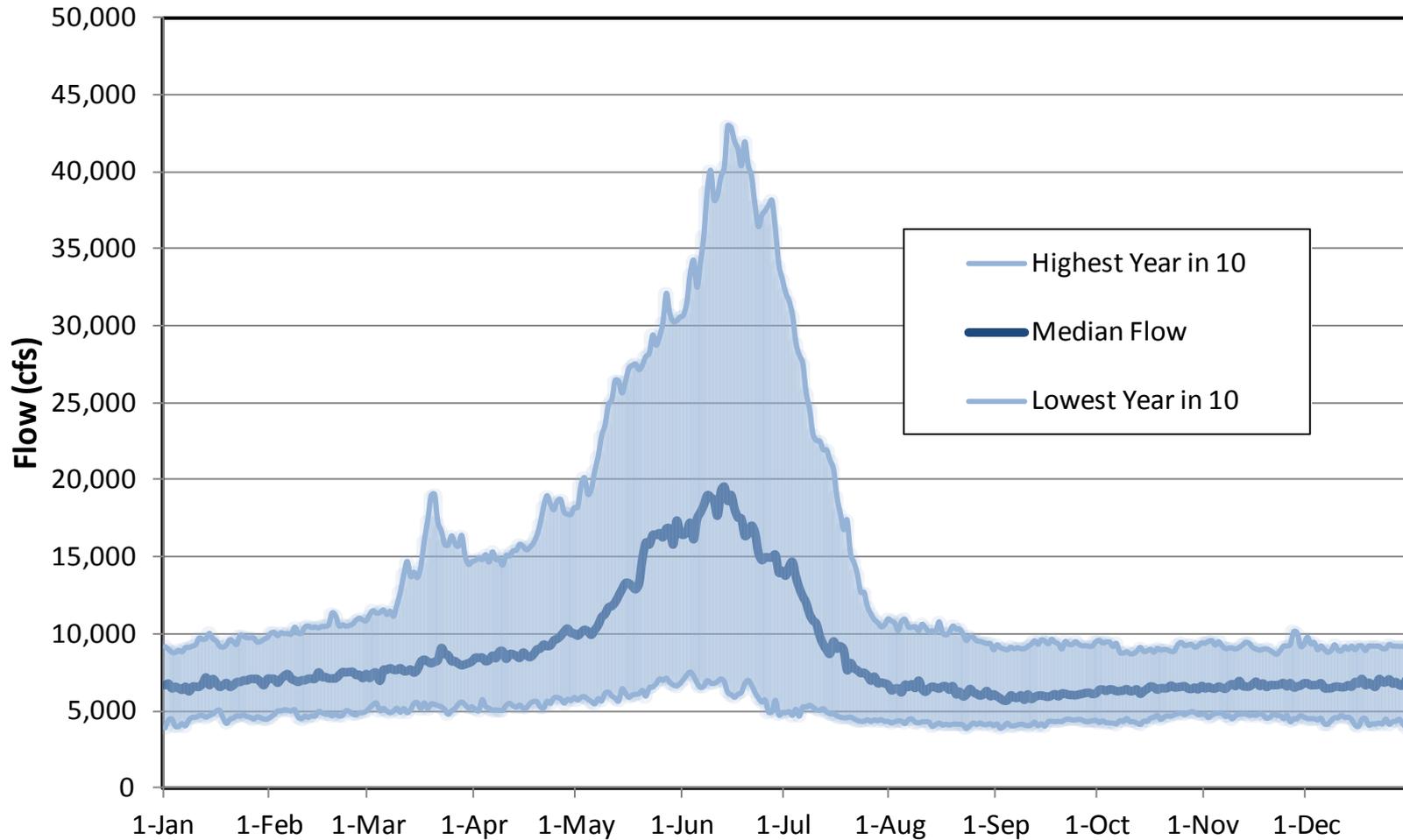
Lower Missouri River Basin

Lower Missouri River Basin - DNRC and USGS Stream Gage Locations



200+ USGS gages in MT; about 50 are DNRC cost-share

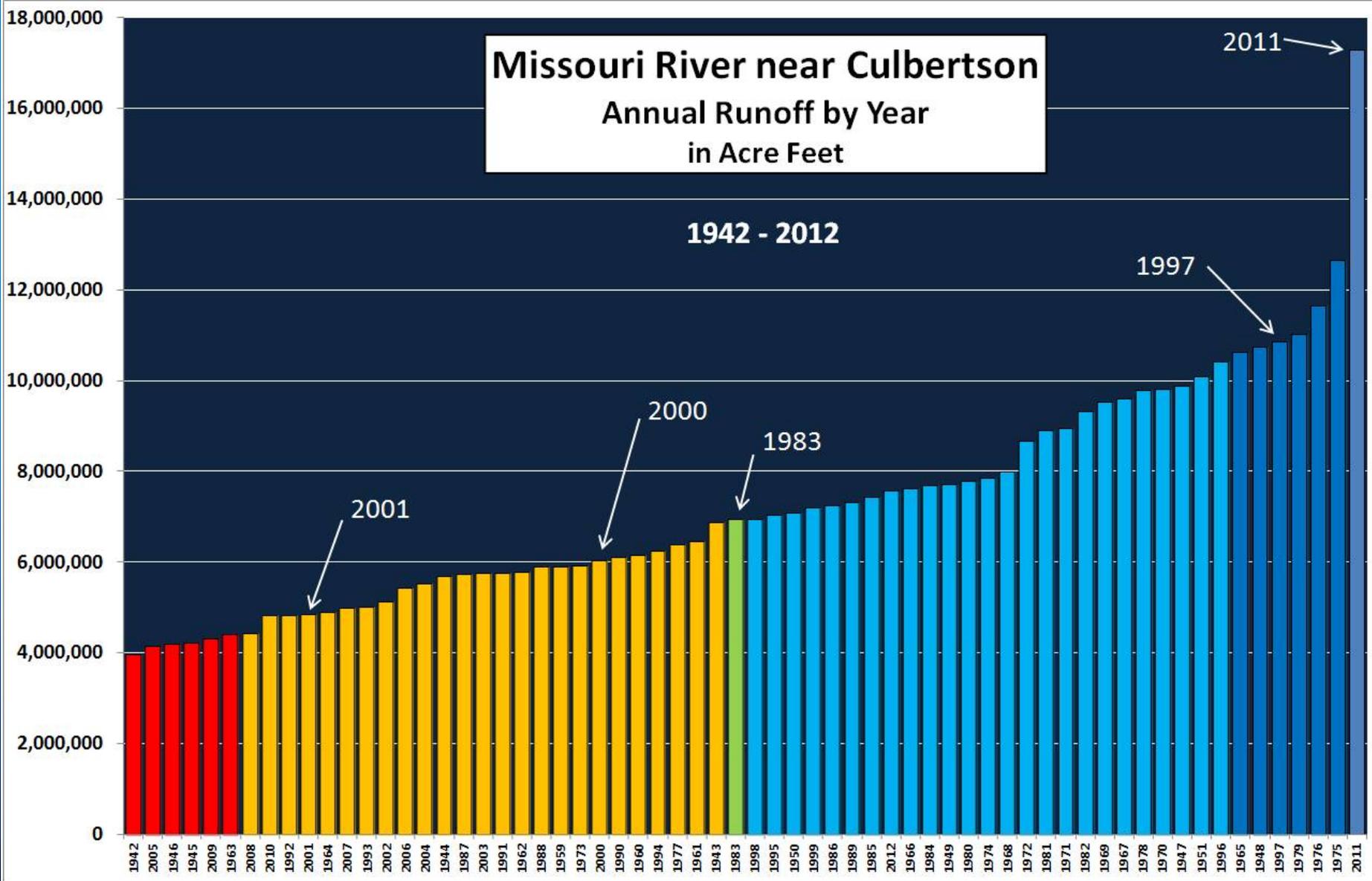
Total Inflow to Fort Peck Reservoir - Typical Range



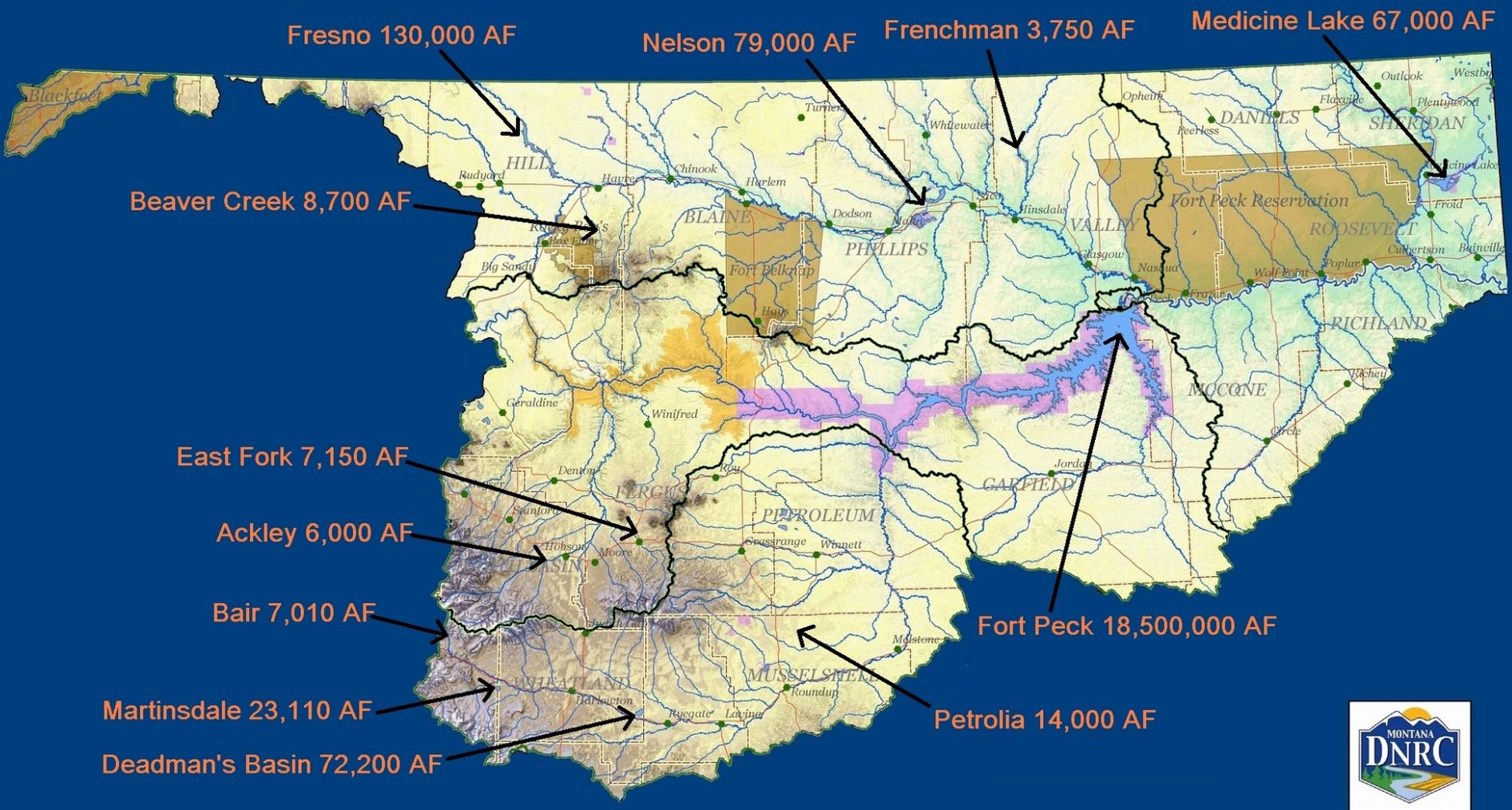
Stream Gauging for Engineering/Construction Design, Flood Planning, Recreation, Water Supply Planning, Long term Monitoring

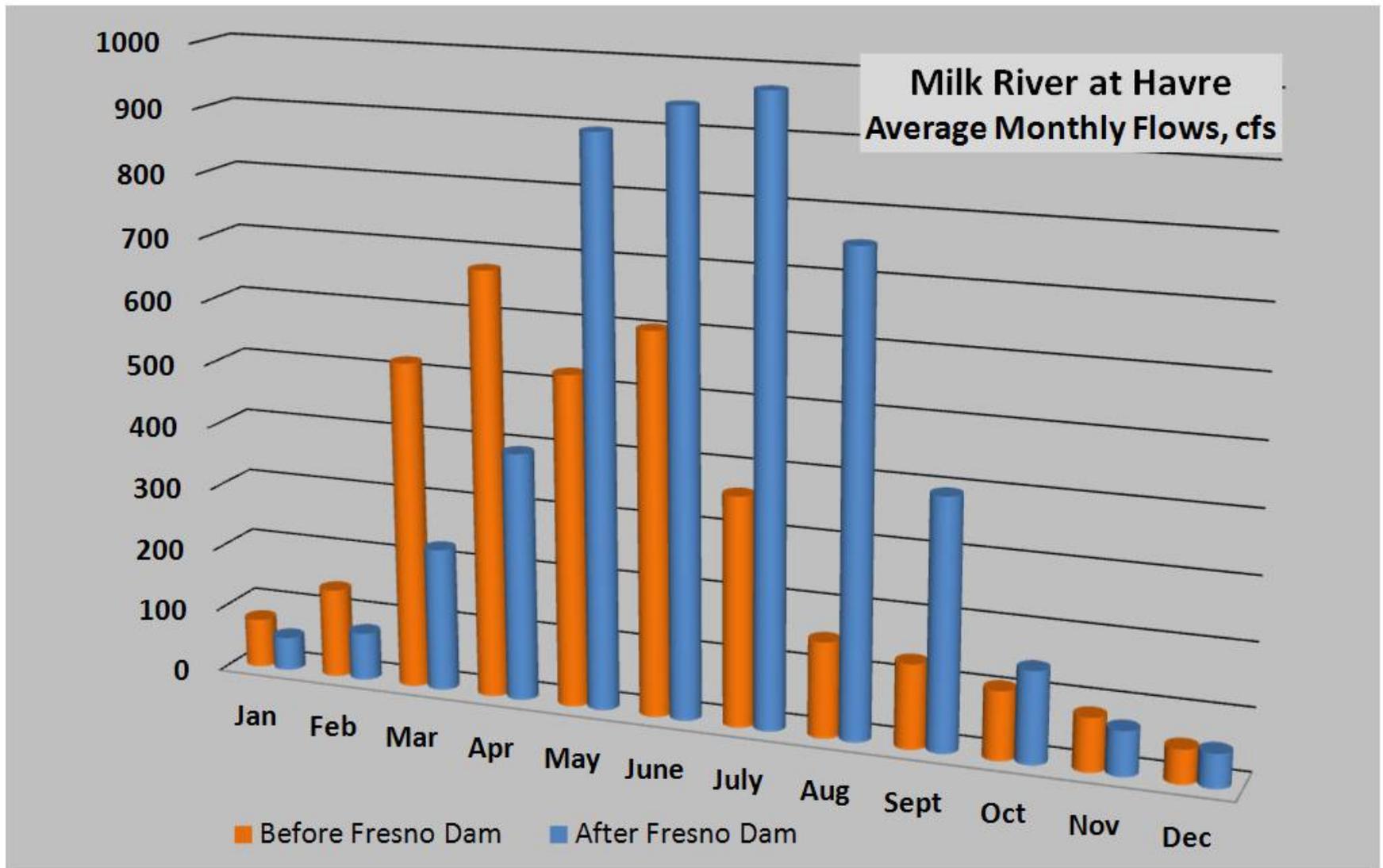
Missouri River near Culbertson Annual Runoff by Year in Acre Feet

1942 - 2012



Lower Missouri River Basin Major Storage Facilities





Storage creates a change in timing of water supply

Fort Peck Sub Basin

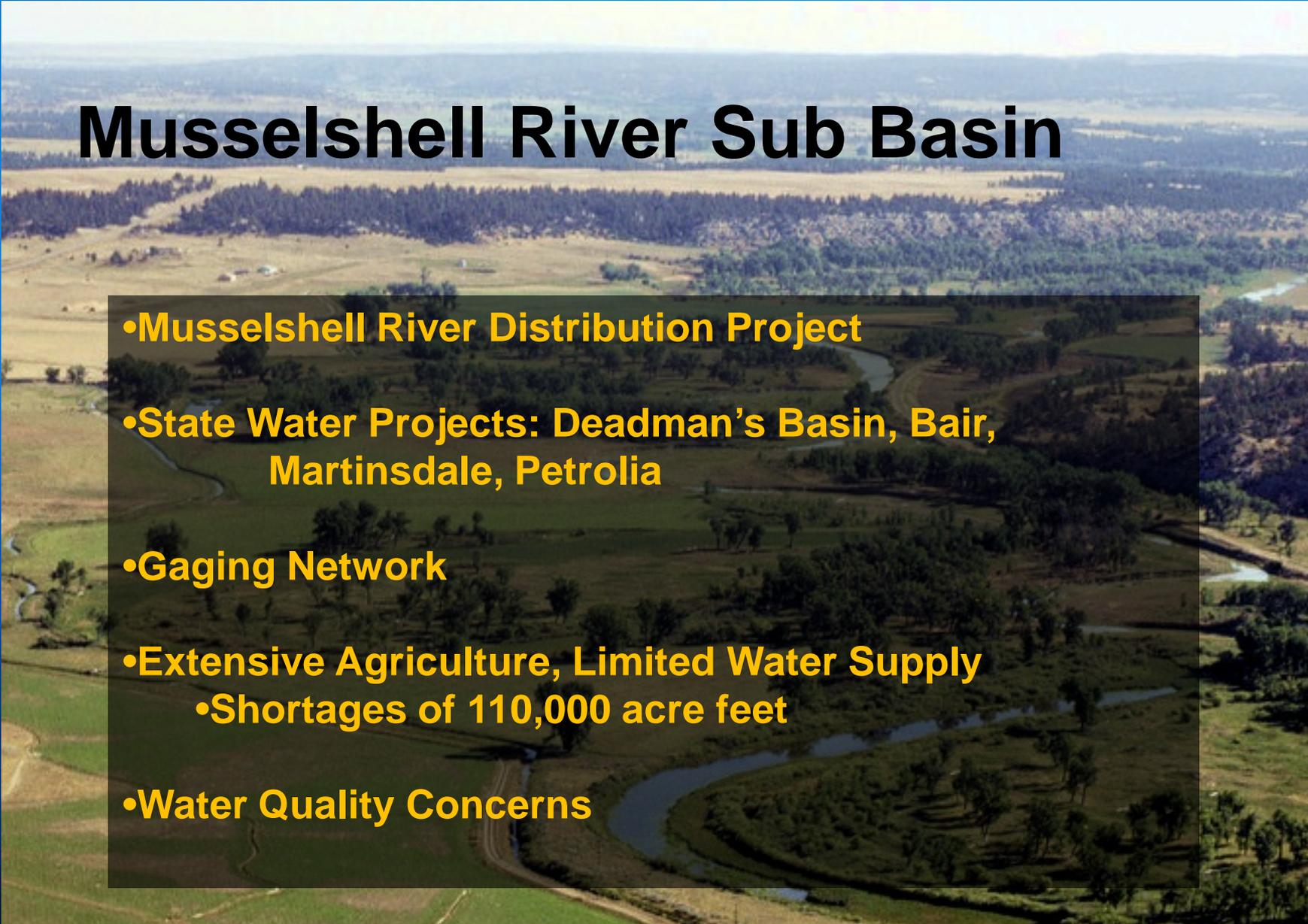


- Supply is strongly influenced by Upper Missouri inflows
- Upper Missouri River Breaks National Monument Mgmt
- BLM Upper Missouri Wild & Scenic River Compact
- CMR National Wildlife Refuge Mgmt
- Water Quality Concerns

Milk River Sub Basin

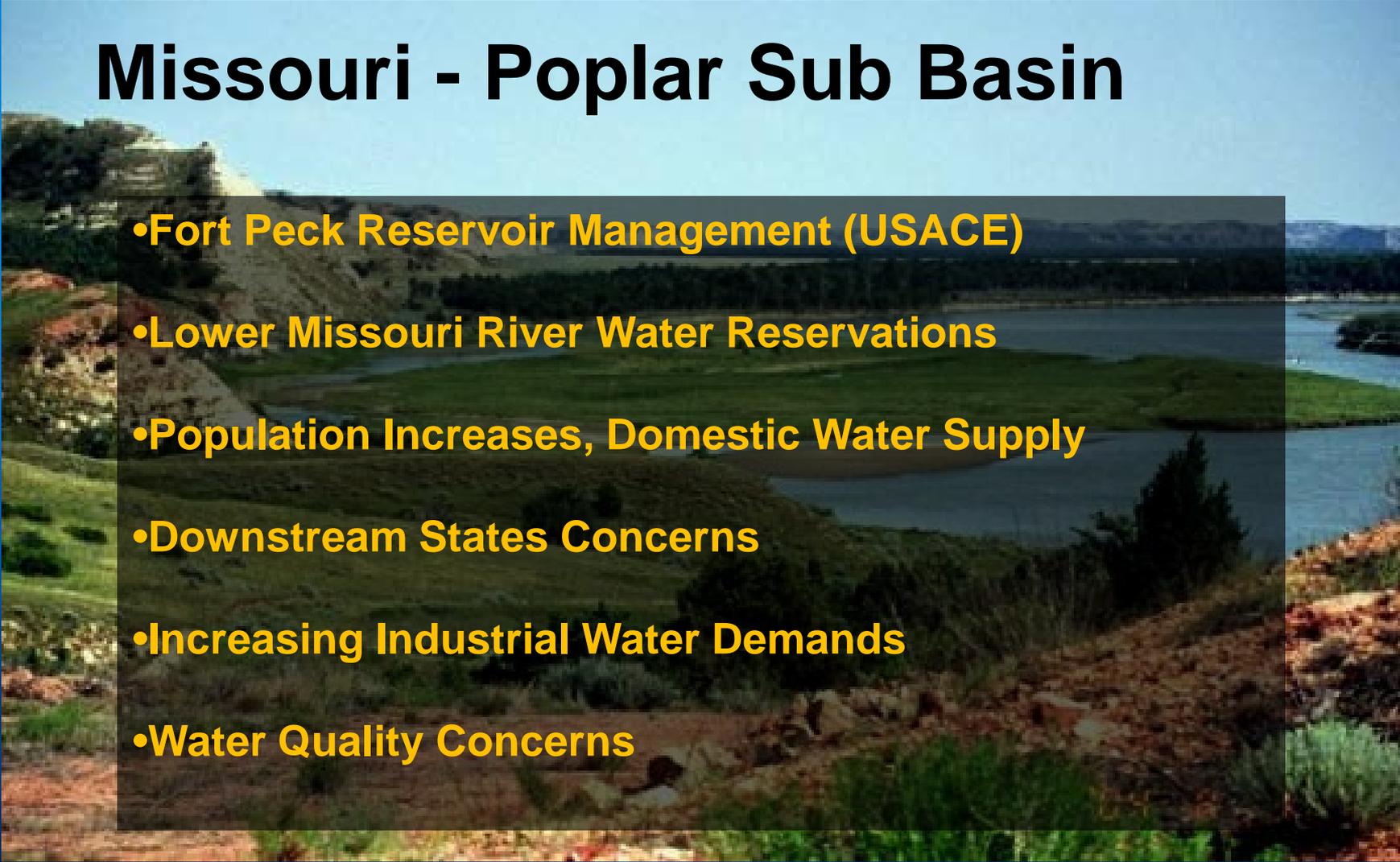
- **Indian Tribal Water Compacts: Blackfeet, Rocky Boy's, Fort Belknap, Fort Peck**
- **Imported Water from Canada, Boundary Waters Treaty**
- **Extensive BOR Projects**
- **Storage Reservoirs: Fresno and Nelson**
- **Water Shortages of 71,000 acre feet**
- **Water Quality Concerns**

Musselshell River Sub Basin



- **Musselshell River Distribution Project**
- **State Water Projects: Deadman's Basin, Bair, Martinsdale, Petrolia**
- **Gaging Network**
- **Extensive Agriculture, Limited Water Supply**
 - **Shortages of 110,000 acre feet**
- **Water Quality Concerns**

Missouri - Poplar Sub Basin



- Fort Peck Reservoir Management (USACE)
- Lower Missouri River Water Reservations
- Population Increases, Domestic Water Supply
- Downstream States Concerns
- Increasing Industrial Water Demands
- Water Quality Concerns

2015 Montana Water Supply Initiative
Lower Missouri River Basin

Balance Competing Uses



Comments / Discussion

