Water Resources in the Lower Grand Watershed

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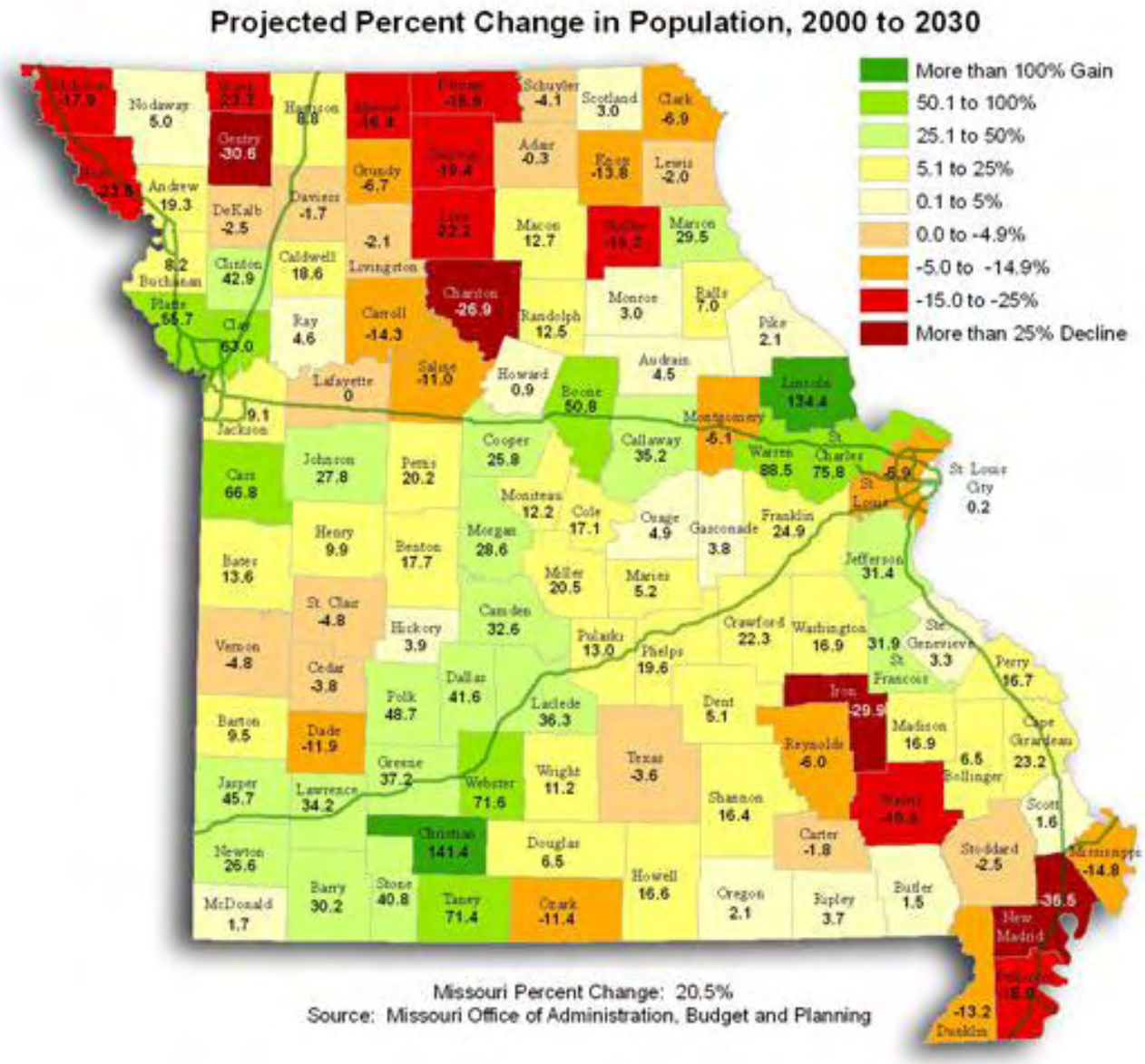
Water Resources Center

Water Supply Limitations – Drought Susceptibility

- Increased demand on systems
- Pumping from streams needed to supplement reservoir capacity
- Smaller streams run low or dry during drought
- Limited groundwater resources
- Emergency interconnections
- Regional water supply planning ongoing

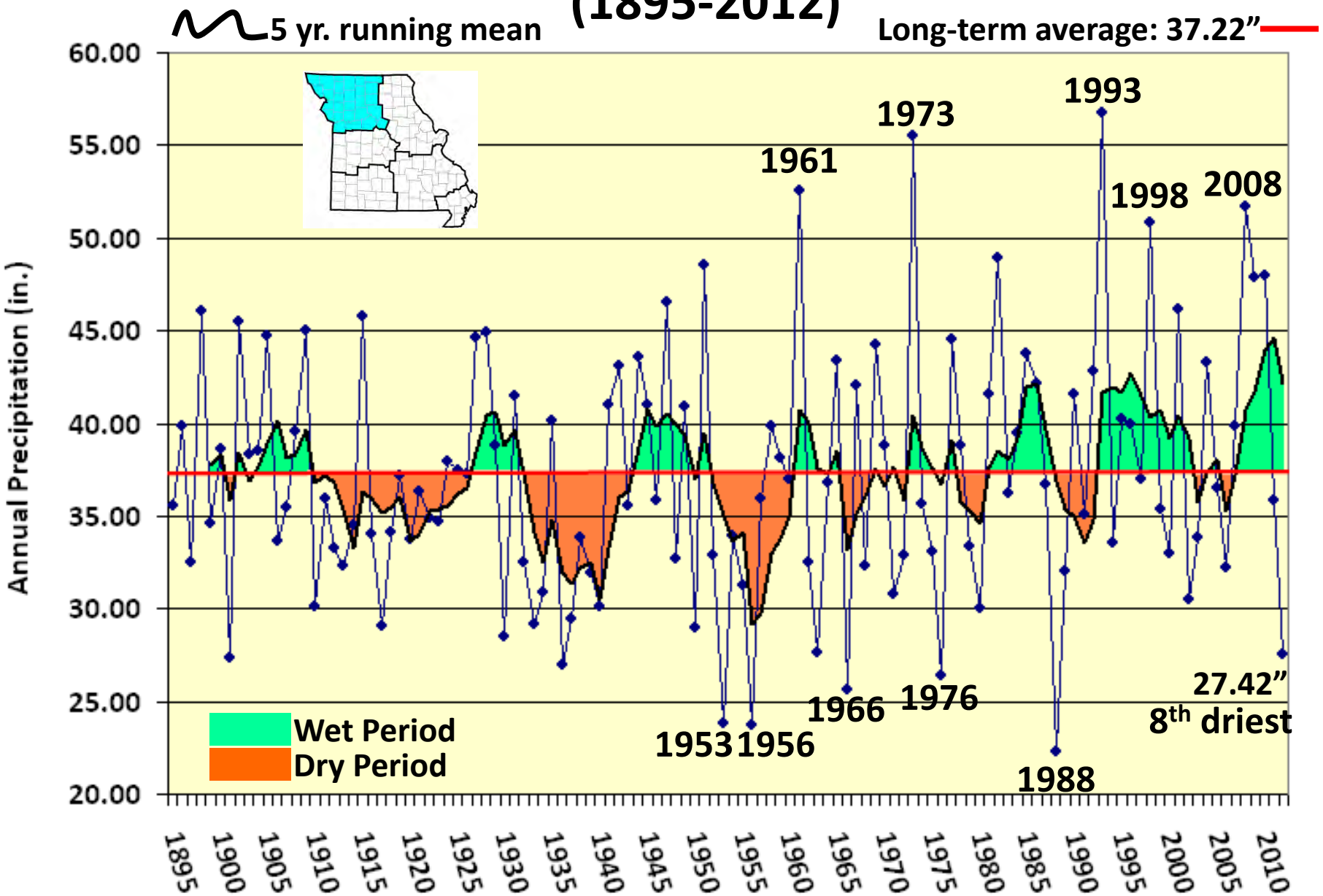
Population Projections



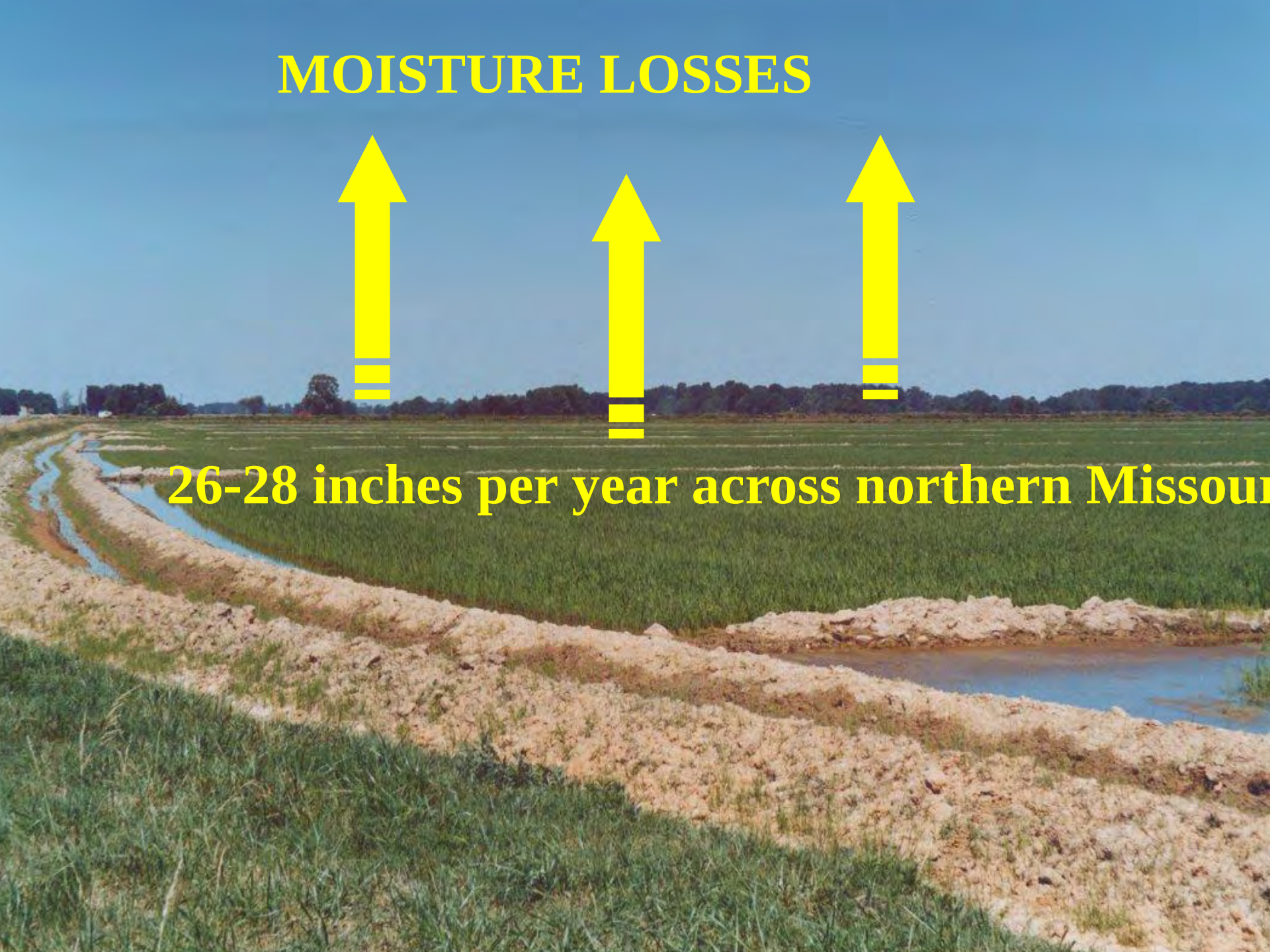
PRECIPITATION

35-38 inches per year across northern Missouri

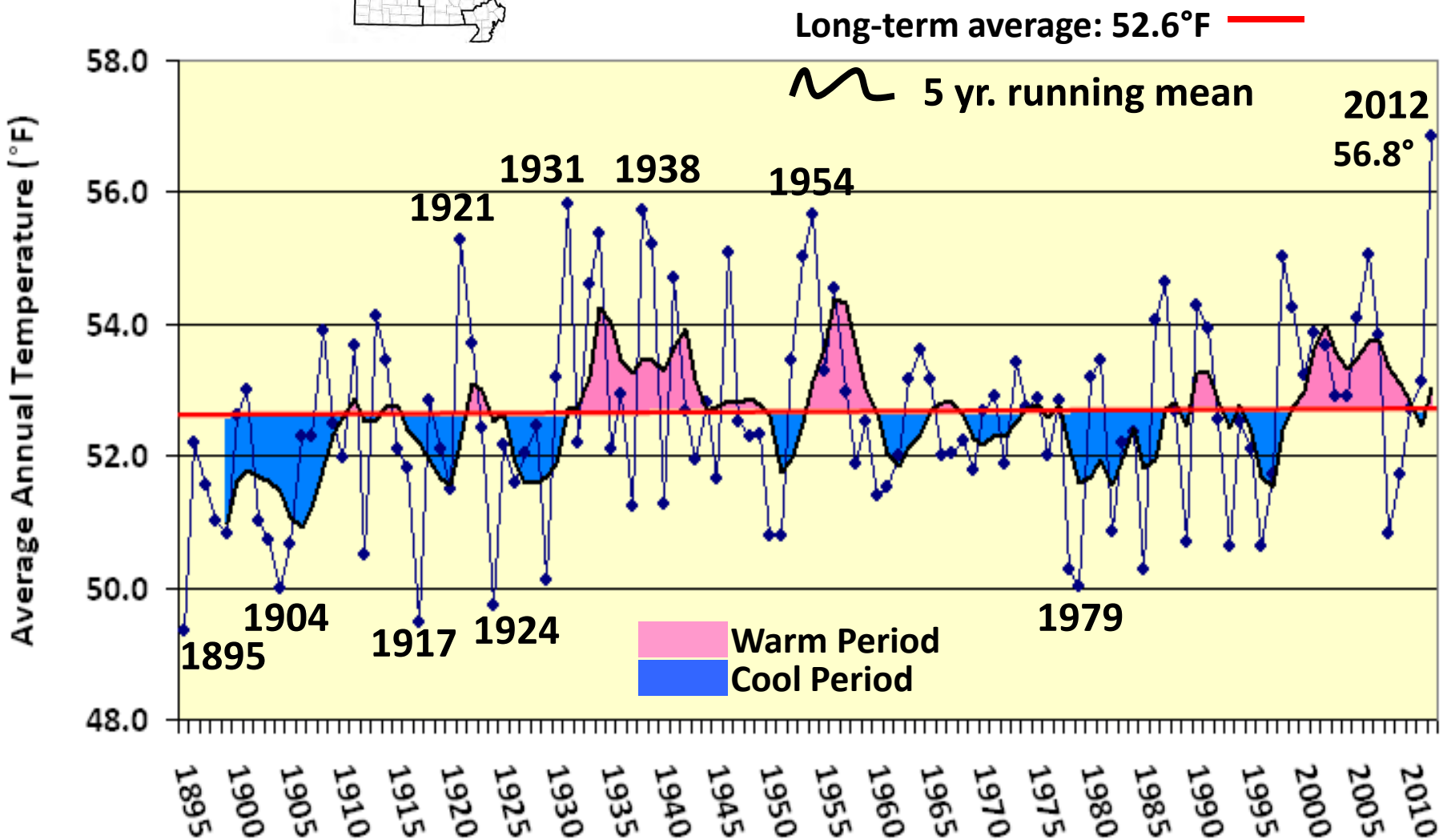
Northwest Missouri Annual Average Precipitation (1895-2012)



Data Source: Missouri Climate Center/NOAA


MOISTURE LOSSES
26-28 inches per year across northern Missour

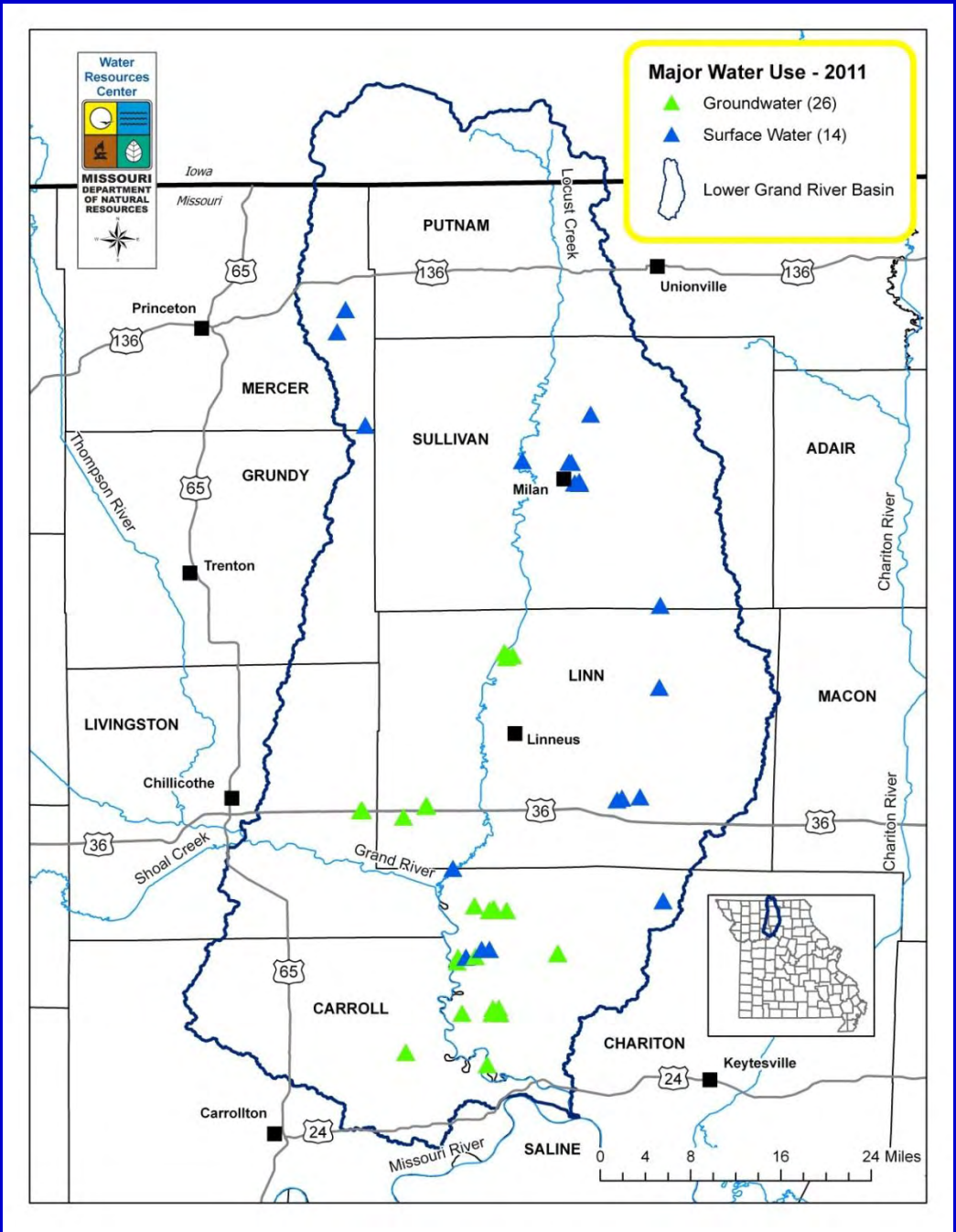
Northwest Missouri Annual Average Temperature (1895-2012)



Data Source: Missouri Climate Center/NOAA

Water Use

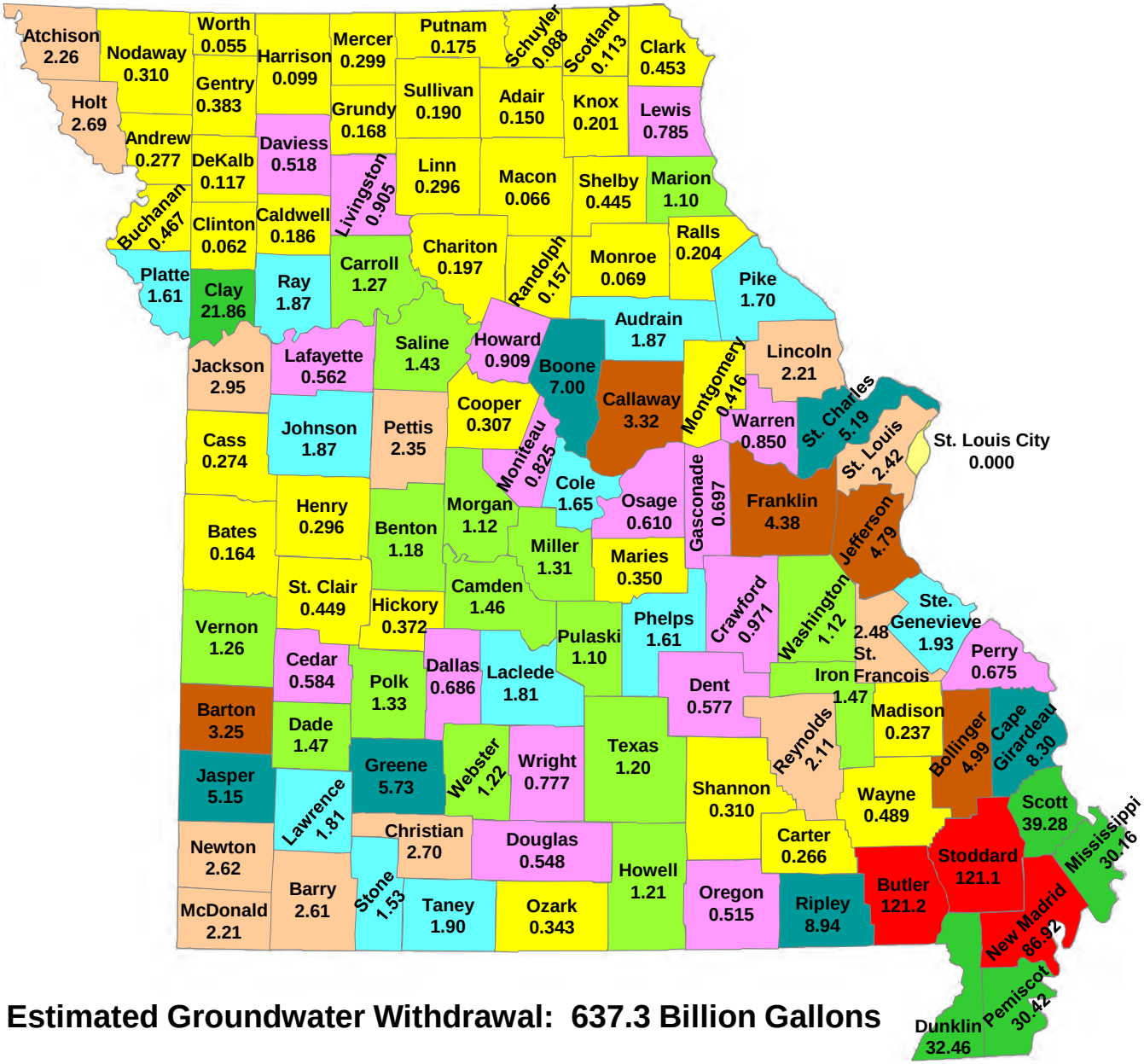
- Estimated annual use is 8 billion gallons
- 46% groundwater vs. 54% surface water
- Use categories
  - Municipal & Industrial
  - Agriculture (livestock and irrigation)
  - Fish and wildlife
  - Self-supplied



2005 Estimated Groundwater Withdrawal by County

GROUNDWATER USE
(billion gallons per year)

- 0-0.5 bgy (38 counties)
- 0.5-1.0 bgy (17 counties)
- 1.0-1.5 bgy (16 counties)
- 1.5-2.0 bgy (12 counties)
- 2.0-3.0 bgy (12 counties)
- 3.0-5.0 bgy (5 counties)
- 5.0-10.0 bgy (6 counties)
- 10.0-40.0 bgy (5 counties)
- 40.0-130.0 bgy (3 counties)



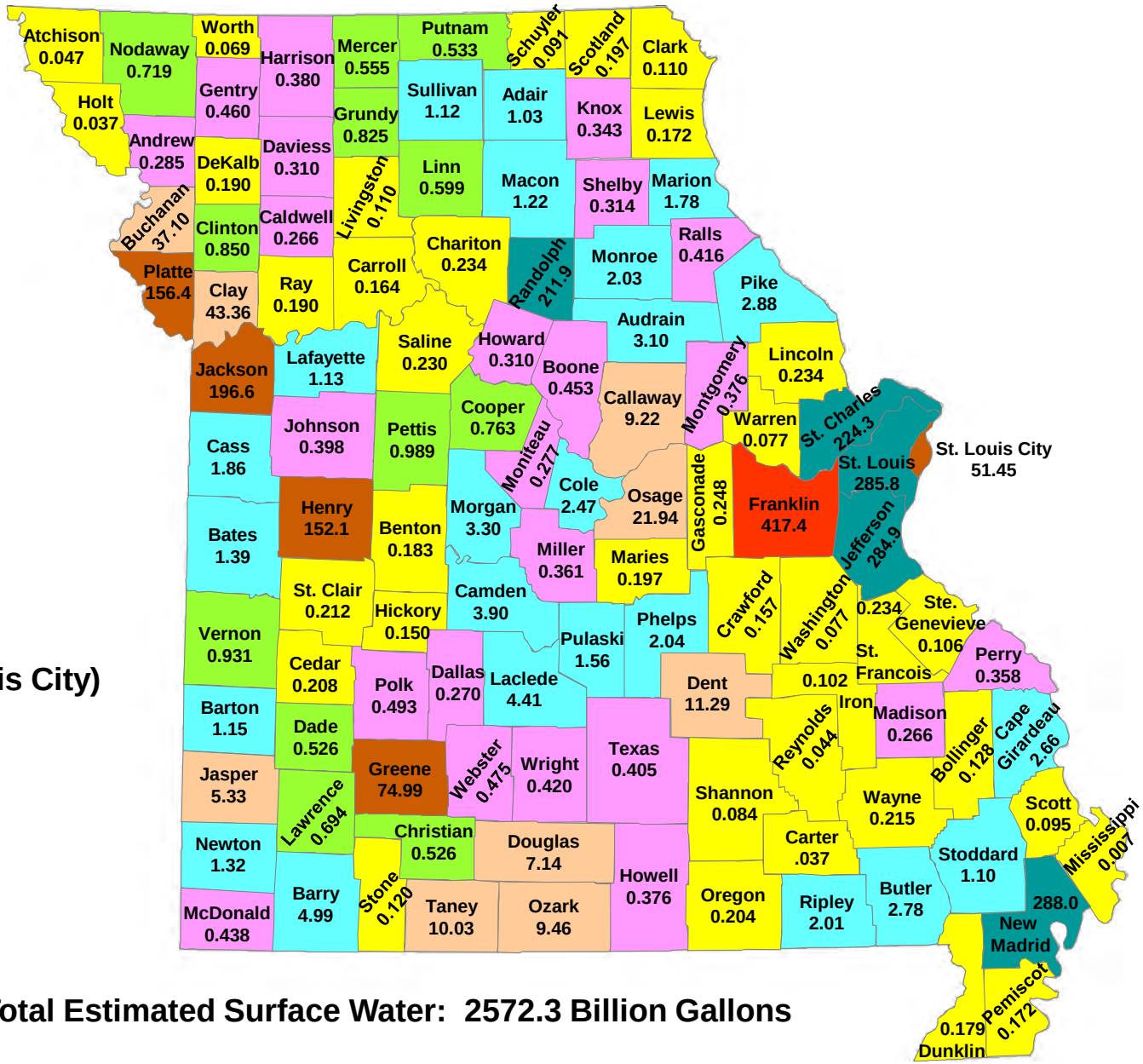
2005 Total Estimated Groundwater Withdrawal: 637.3 Billion Gallons

Data Source: U. S. Geological Survey

2005 Estimated Surface-Water Withdrawal by County

SURFACE-WATER USE
(billion gallons per year)

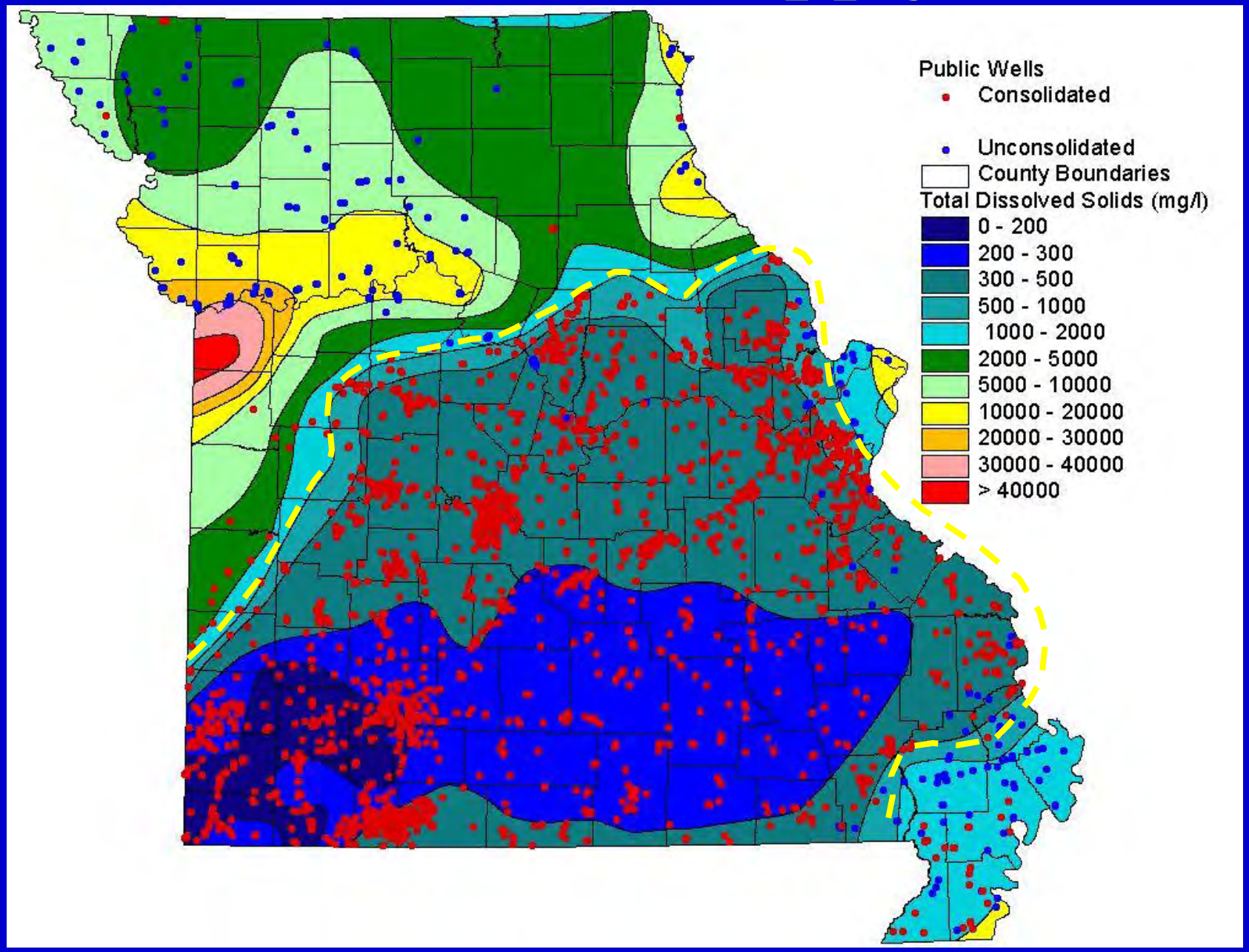
- Less than 0.25 bgy (37 counties)
- 0.25-0.5 bgy (23 counties)
- 0.5-1 bgy (12 counties)
- 1-5 bgy (23 counties)
- 5-50 bgy (9 counties)
- 50-200 bgy (4 counties+ St. Louis City)
- 200-400 bgy (5 counties)
- More than 400 bgy (1 counties)



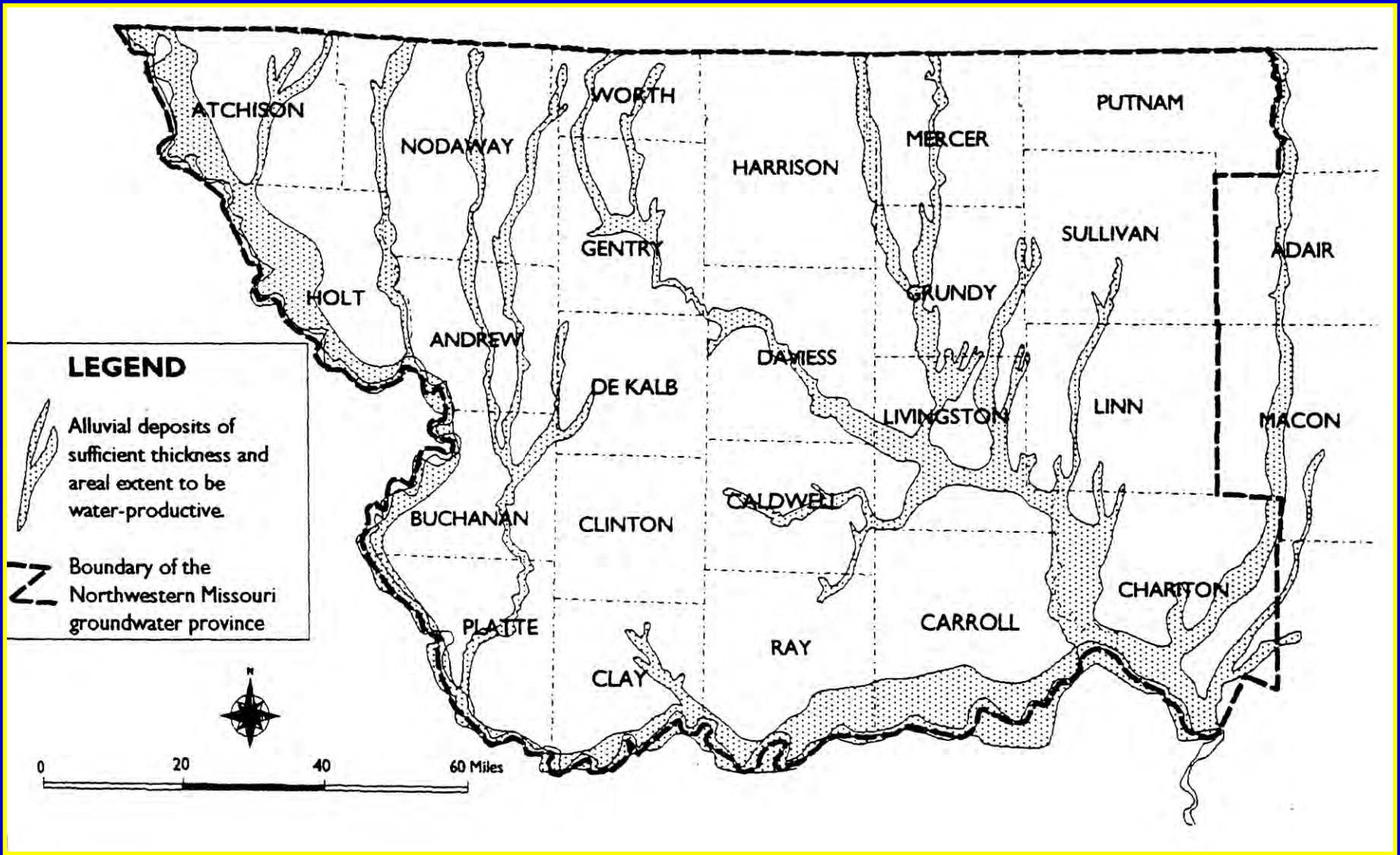
2005 Total Estimated Surface Water: 2572.3 Billion Gallons

Data Source: U. S. Geological Survey

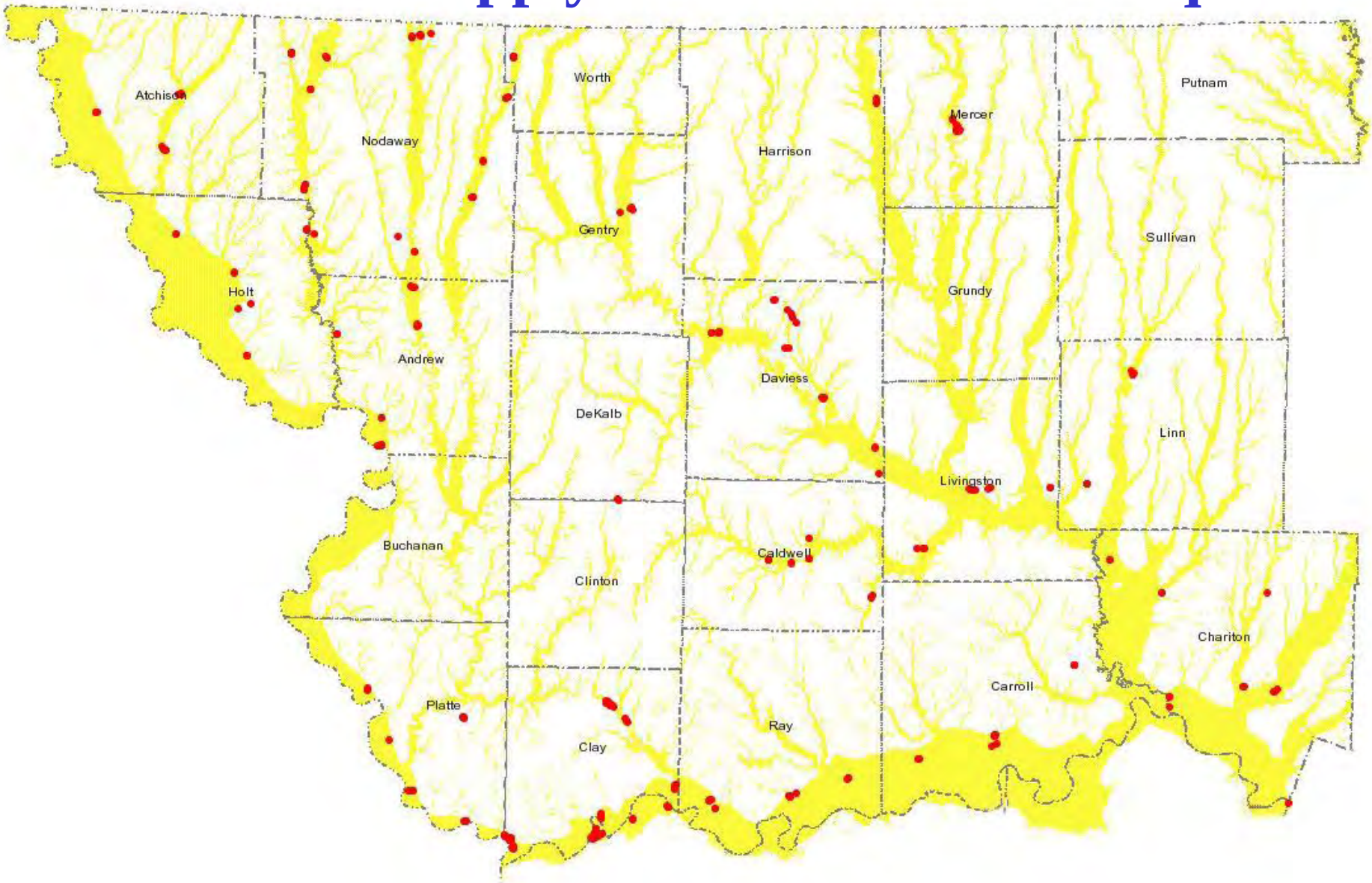
Public Water Supply Wells



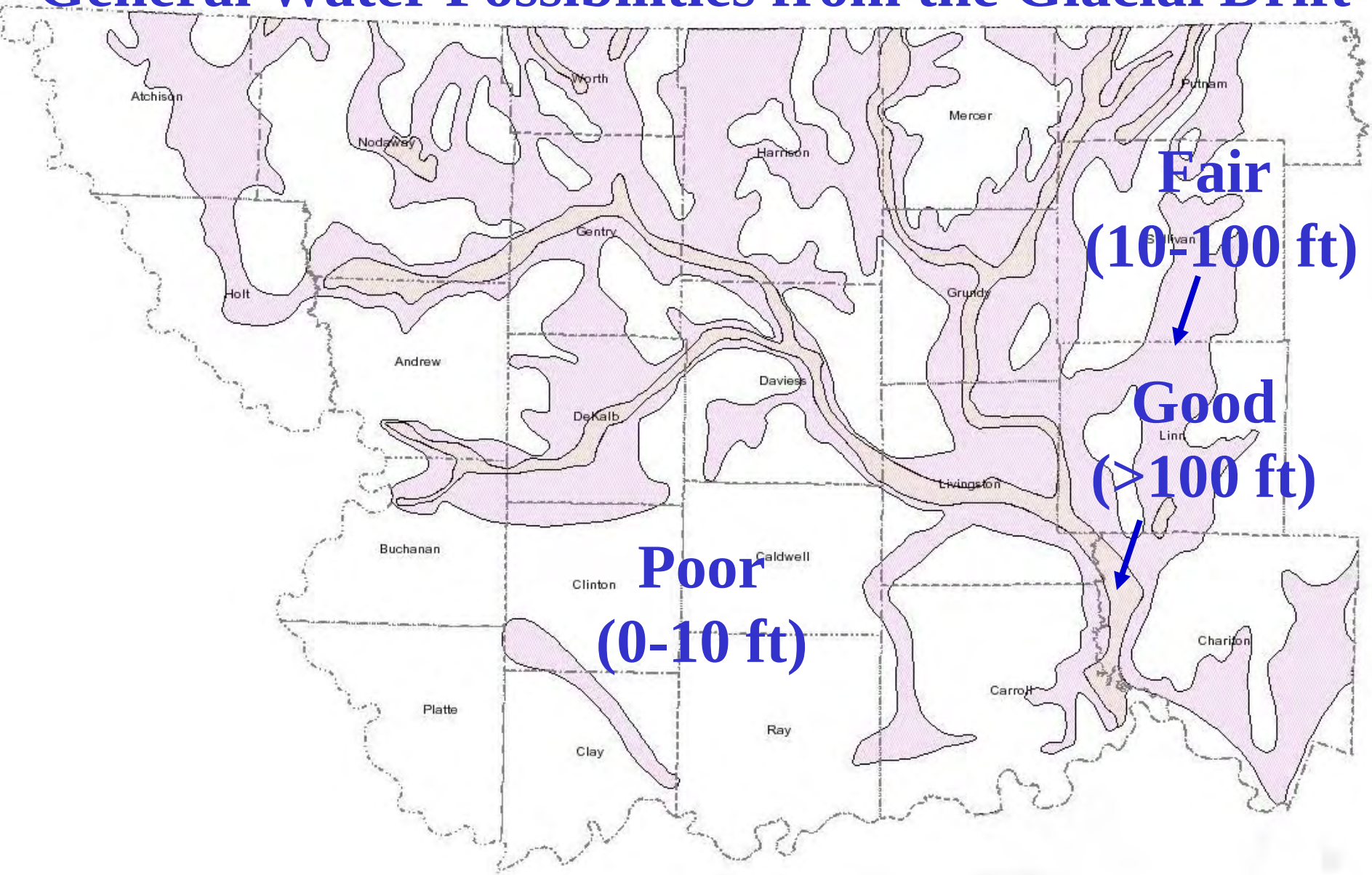
Alluvial Aquifers in Northwestern Missouri



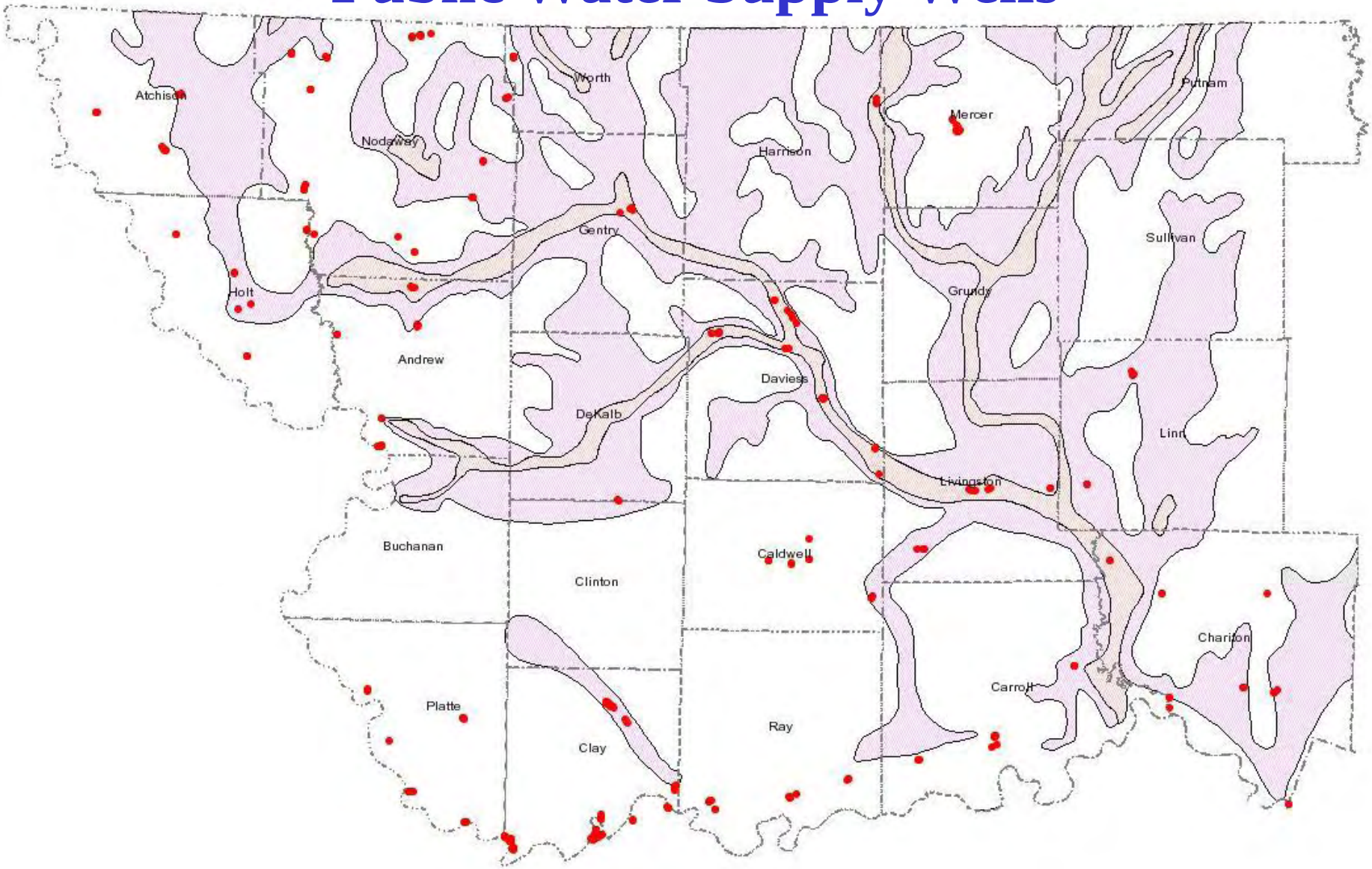
Public Water Supply Wells and Alluvial Aquifers



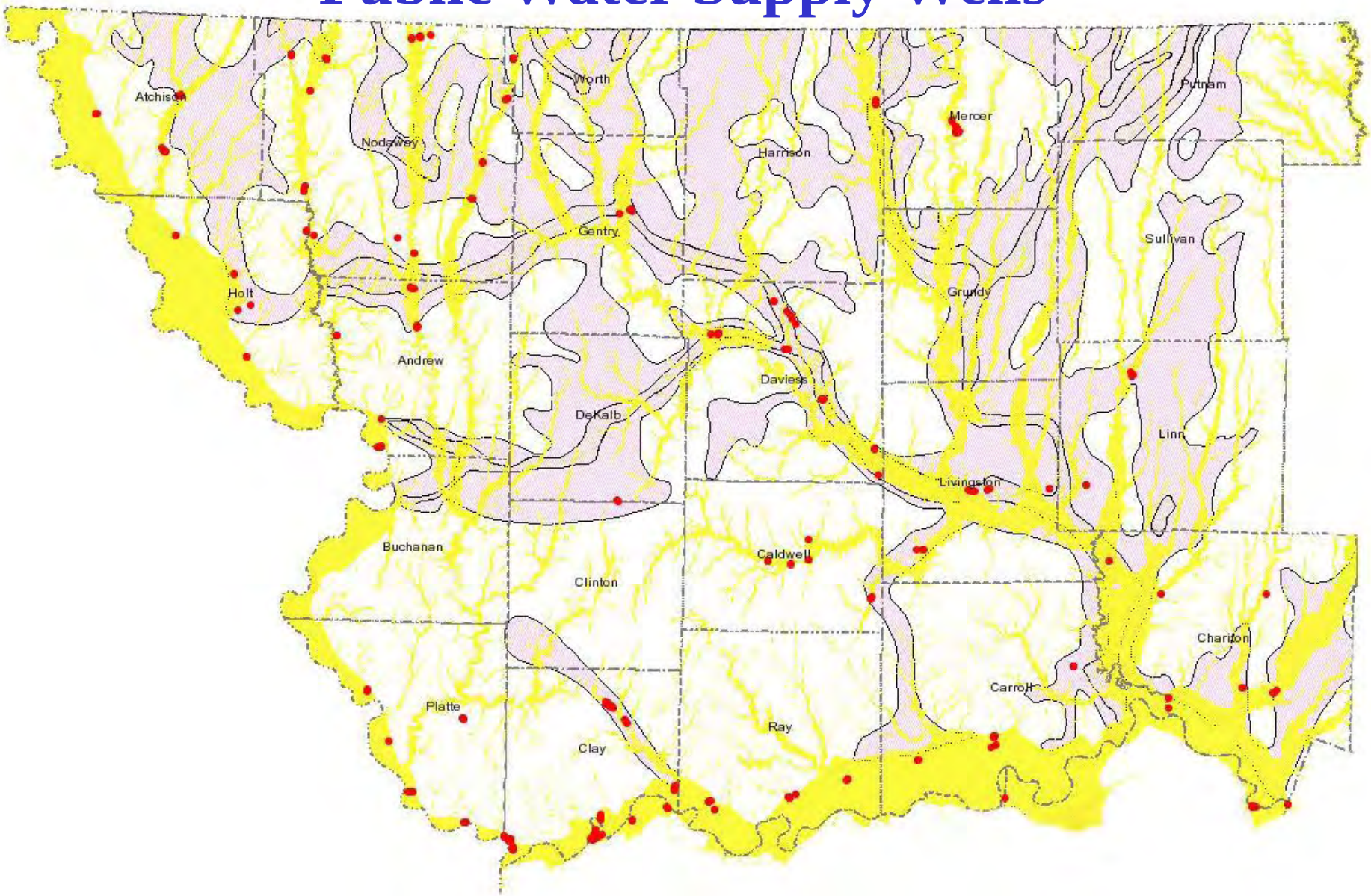
General Water Possibilities from the Glacial Drift



Public Water Supply Wells



Public Water Supply Wells

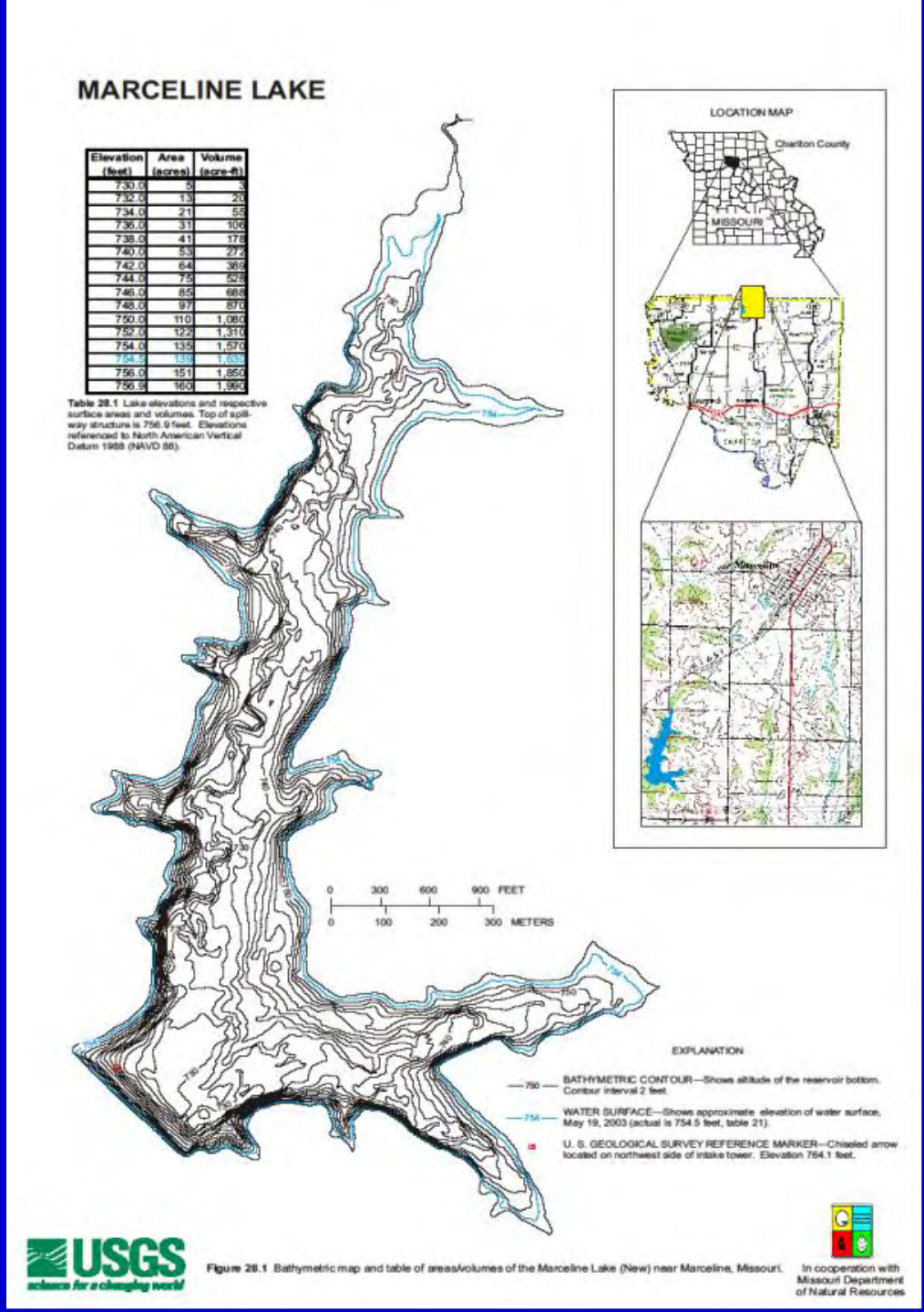


Drought Susceptibility

- Increased demand on systems
- Pumping from streams needed to supplement reservoir capacity
- Smaller streams run low or dry during drought
- Emergency interconnections
- Regional water supply planning ongoing

Reservoir Studies

- 40 reservoir systems analyzed in northern MO
- Reservoir surveys
- Modeled systems using 1950's drought
- Evaluated yield compared to demand
- Informs systems on how to allocate scarce water during drought

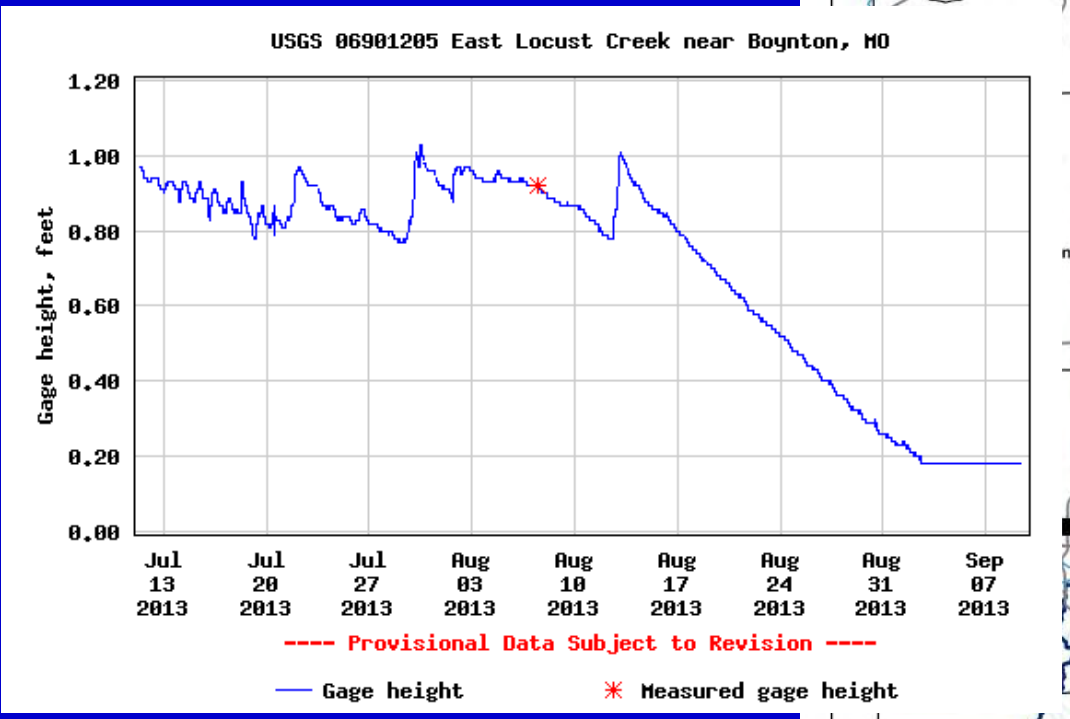


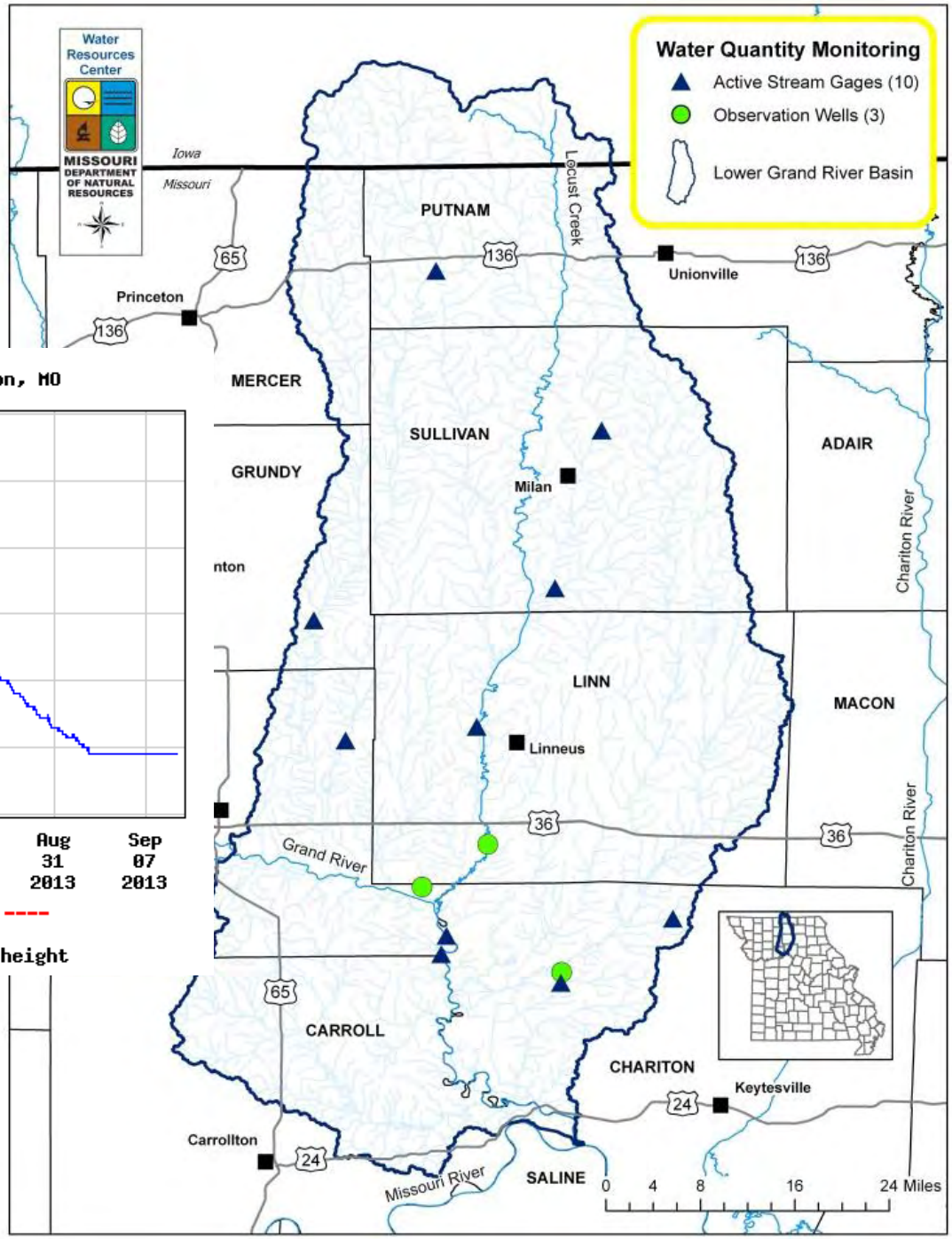
Elevation (feet)	Area (acres)	Volume (acre-ft)
730.0	5	3
732.0	13	20
734.0	21	55
736.0	31	106
738.0	41	178
740.0	53	272
742.0	64	389
744.0	75	528
746.0	85	688
748.0	97	870
750.0	110	1,080
752.0	122	1,310
754.0	135	1,570
754.5	138	1,637
756.0	151	1,850
756.9	160	1,990

Table 28.1 Lake elevations and respective surface areas and volumes. Top of spillway structure is 756.9 feet. Elevations referenced to North American Vertical Datum 1988 (NAVD 88).

Figure 28.1 Bathymetric map and table of areas/volumes of the Marceline Lake (New) near Marceline, Missouri.

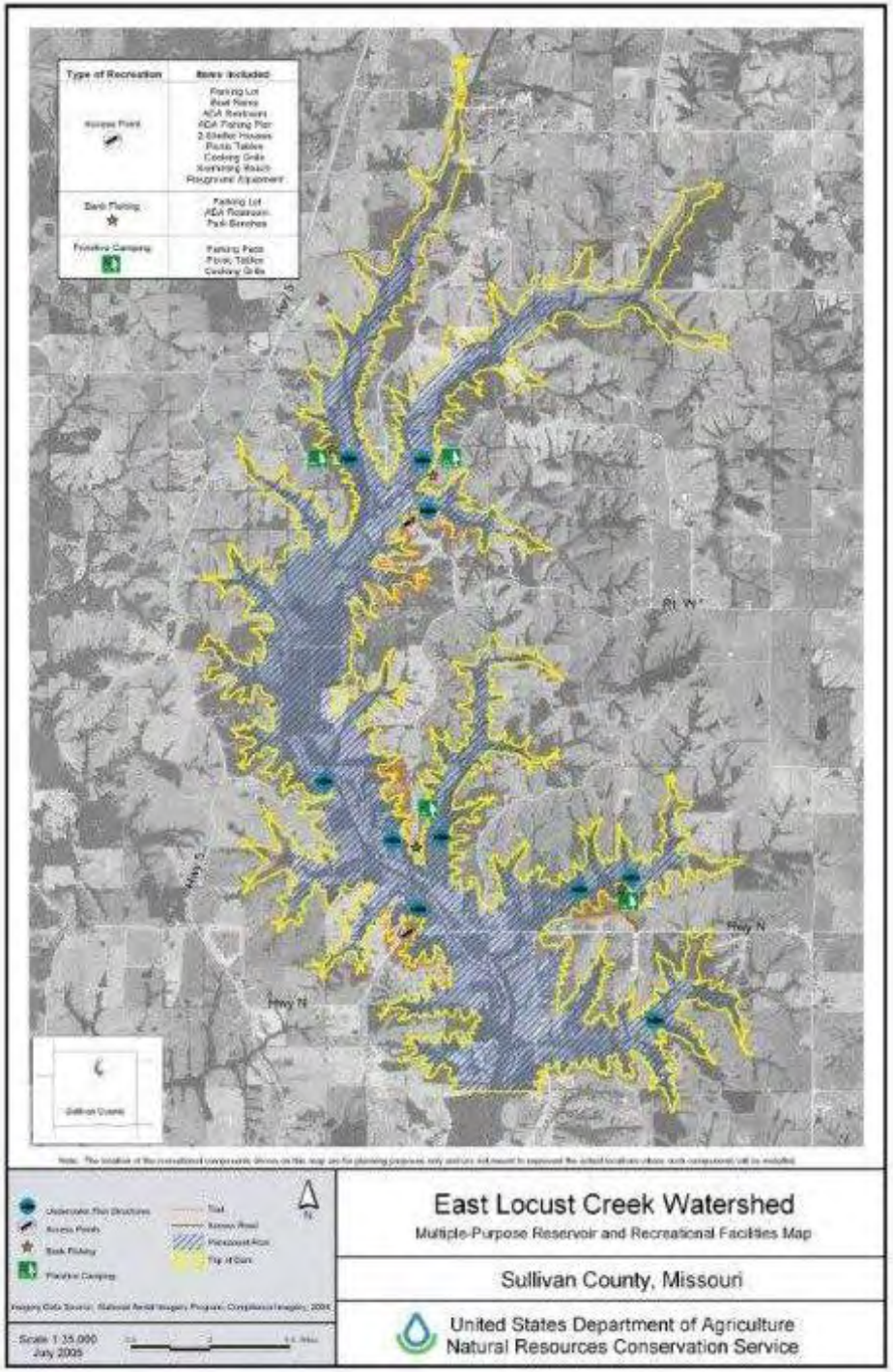
Water Resources Monitoring



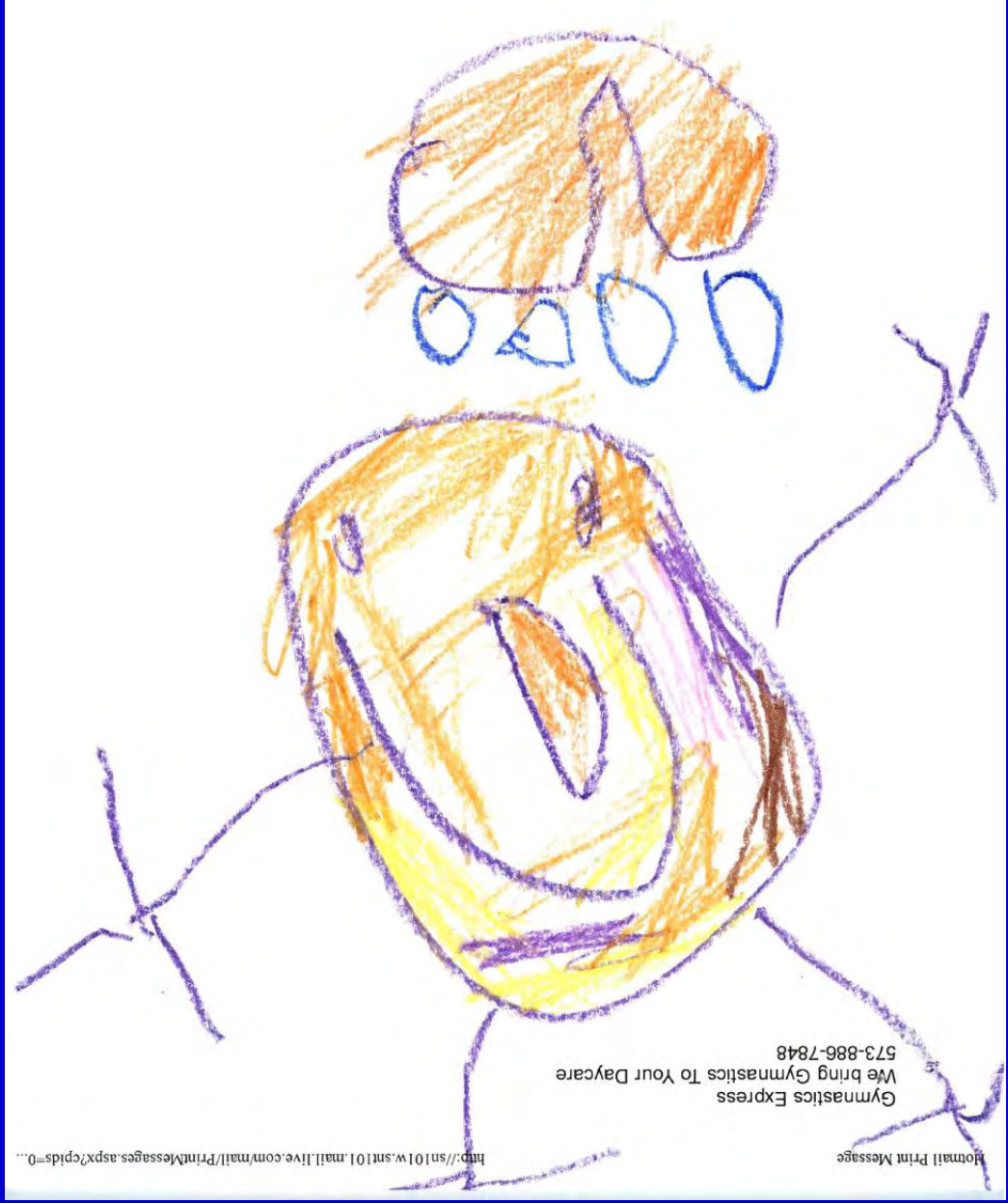


Regional Water Supply Planning

- East Locust Creek Reservoir – Sullivan Co.
- Little Otter Creek Reservoir – Caldwell Co.
- Clarence Cannon Wholesale Water Comm.
- Howard Co. Regional Water Commission
- Great Northwest Wholesale Water Comm.
- Atchison Co. Wholesale Water Commission



Thanks for Listening!



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http://dnr.mo.gov/env/wrc/index.html (water resources center website)