GENERAL BASIN MAP
MISSOURI TRIBUTARIES RIVER BASIN

Planning and Assistance Division

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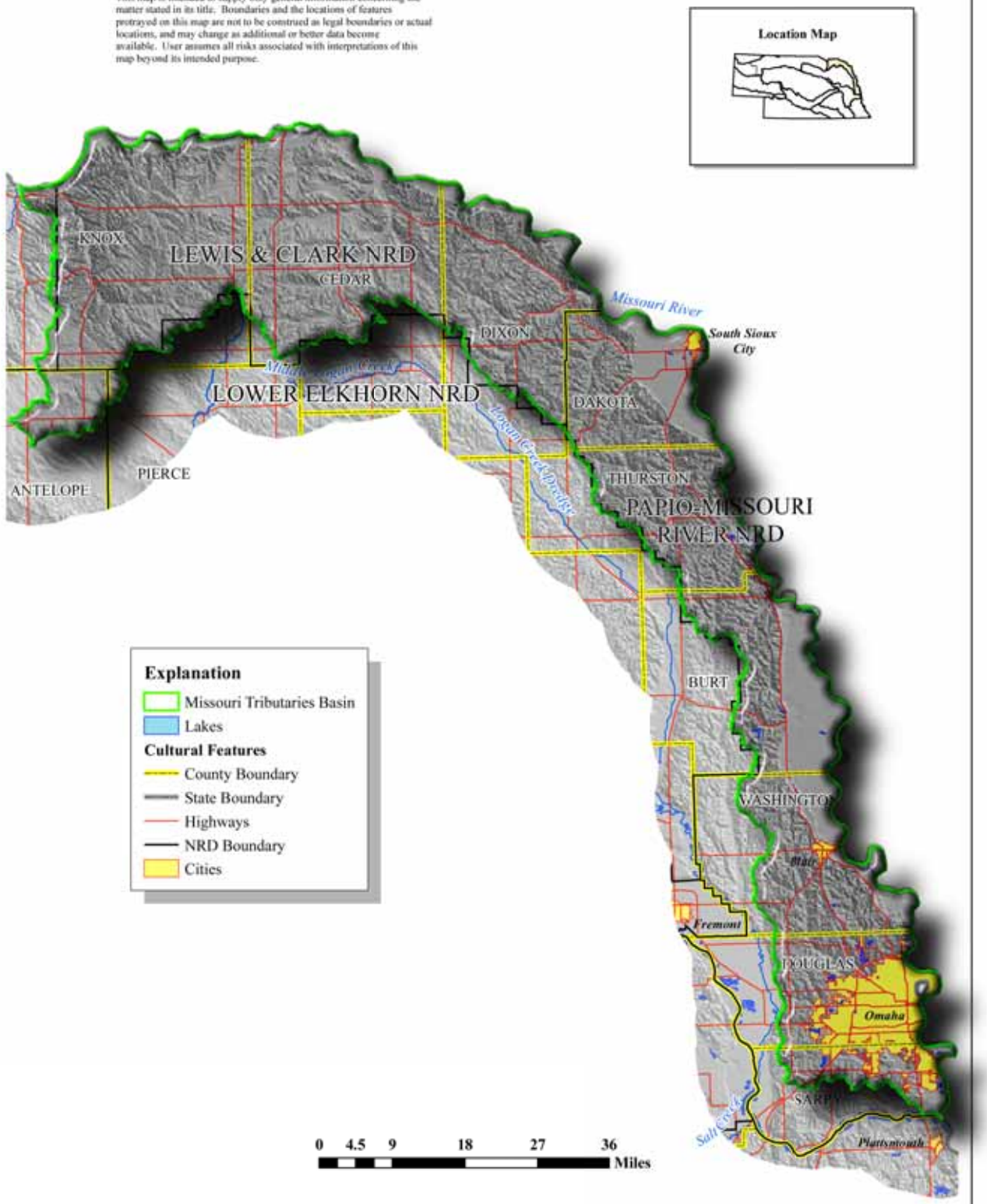


Figure MT-1.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
General basin map produced by Shuhai Zheng, October 12, 2005.

General Surface Water Features
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

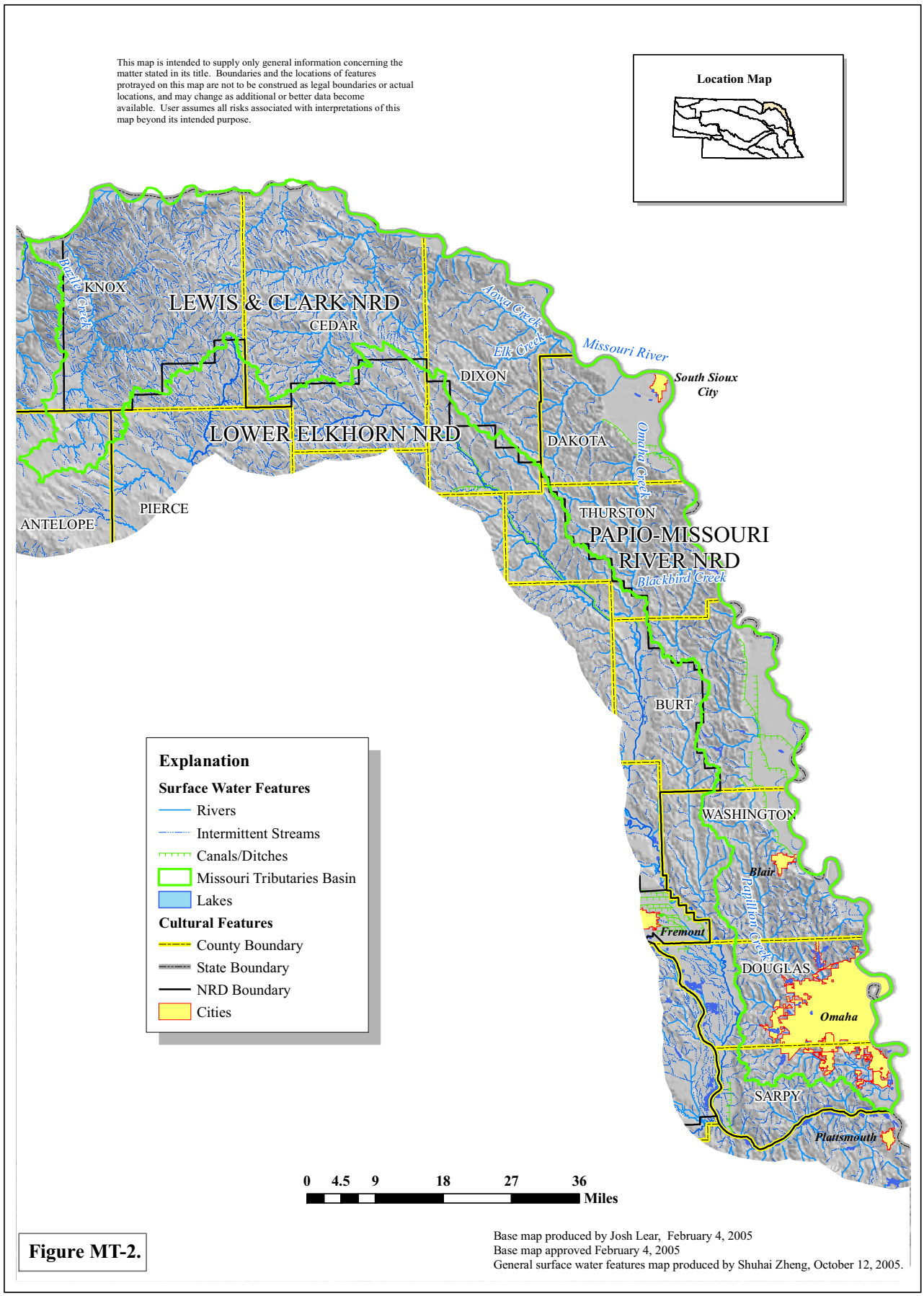


Figure MT-2.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
General surface water features map produced by Shuhai Zheng, October 12, 2005.

Figure MT-3. Annual Precipitation at Blair, Nebraska.

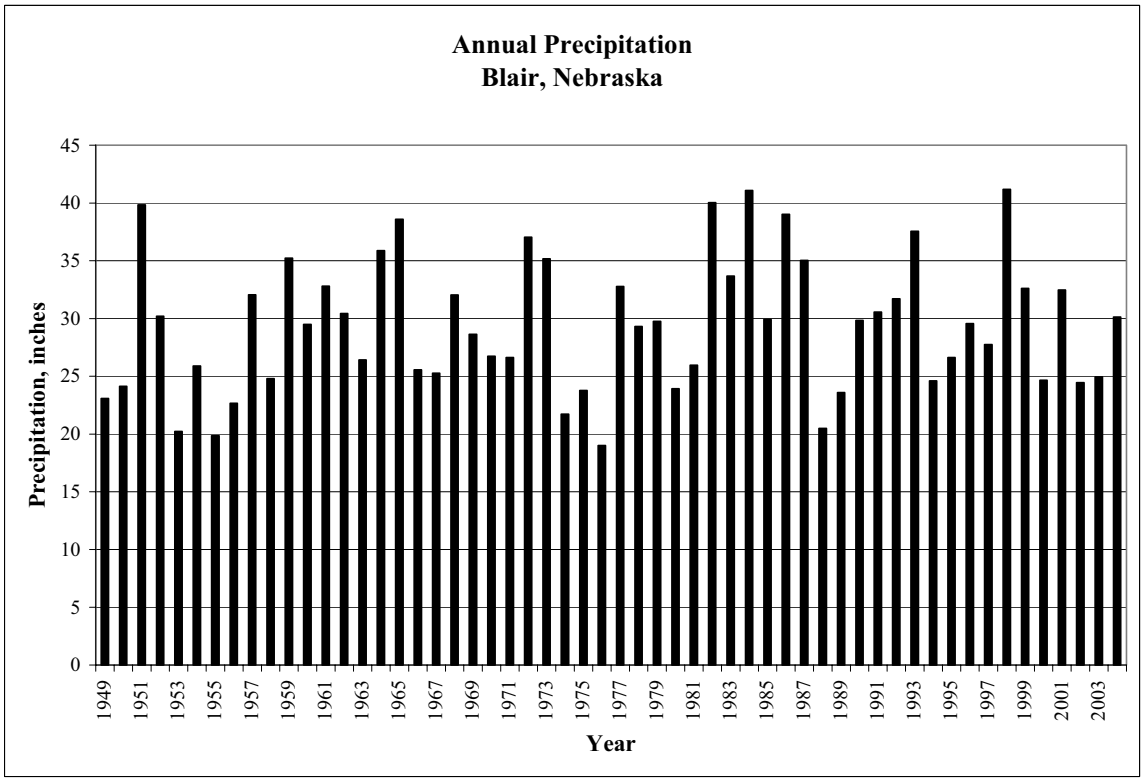
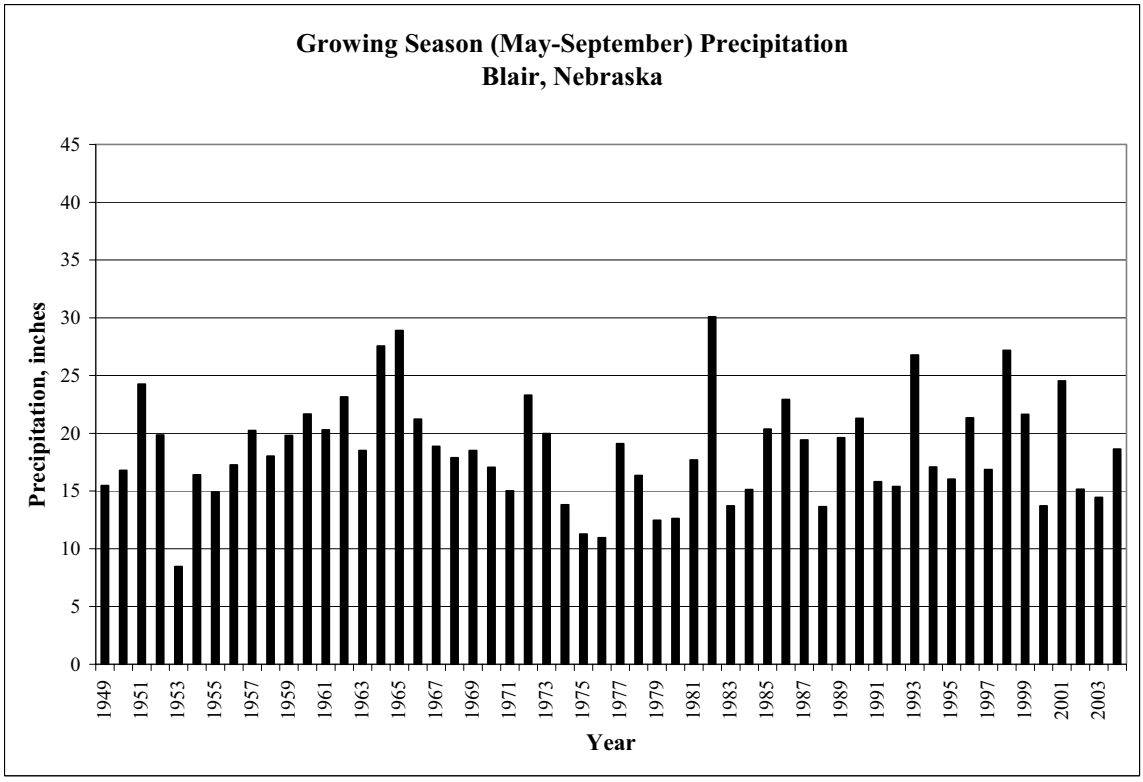


Figure MT-4. Growing Season (May-September) Precipitation at Blair, Nebraska.



Source: High Plains Climate Center

Figure MT-5. Annual Precipitation at Butte, Nebraska.

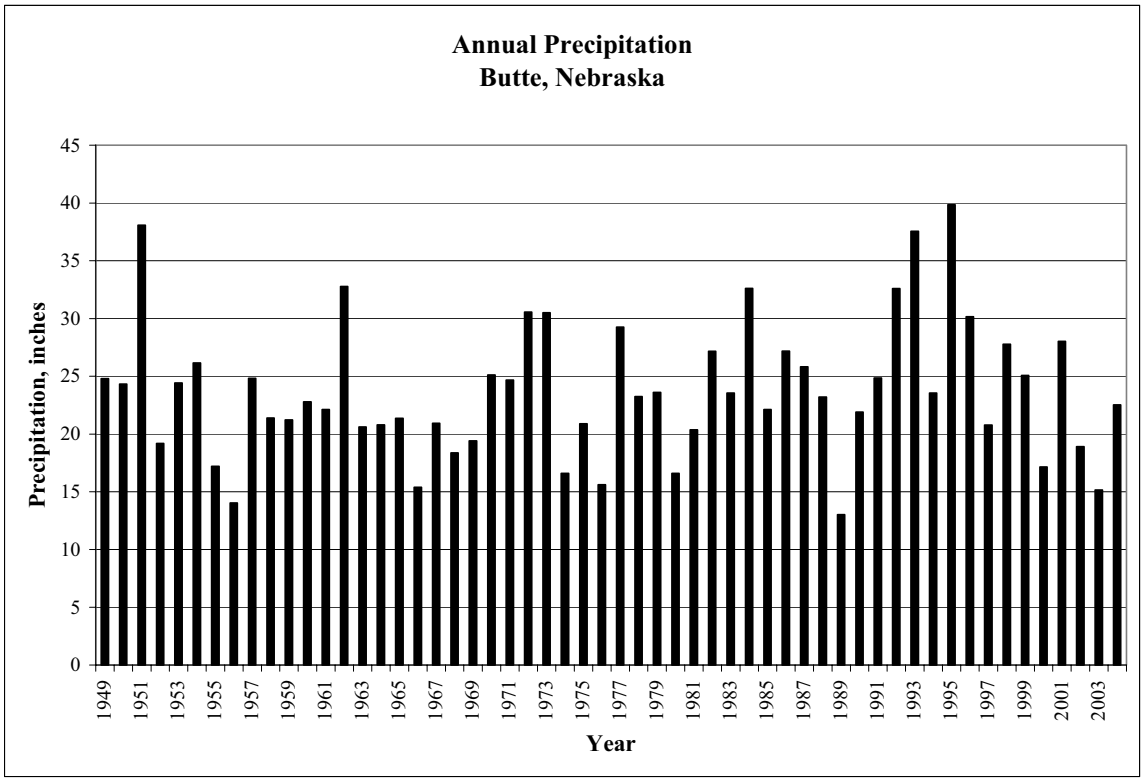
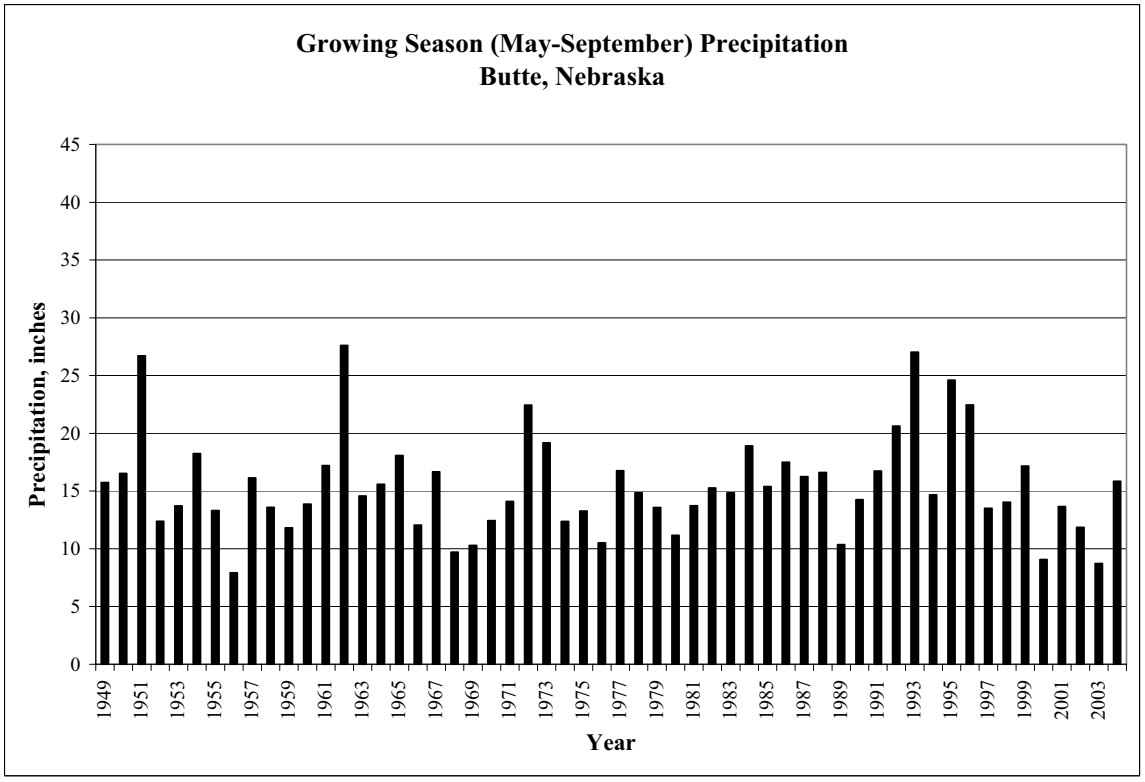


Figure MT-6. Growing Season (May-September) Precipitation at Butte, Nebraska.



Source: High Plains Climate Center

Figure MT-7. Annual Precipitation at Hartington, Nebraska.

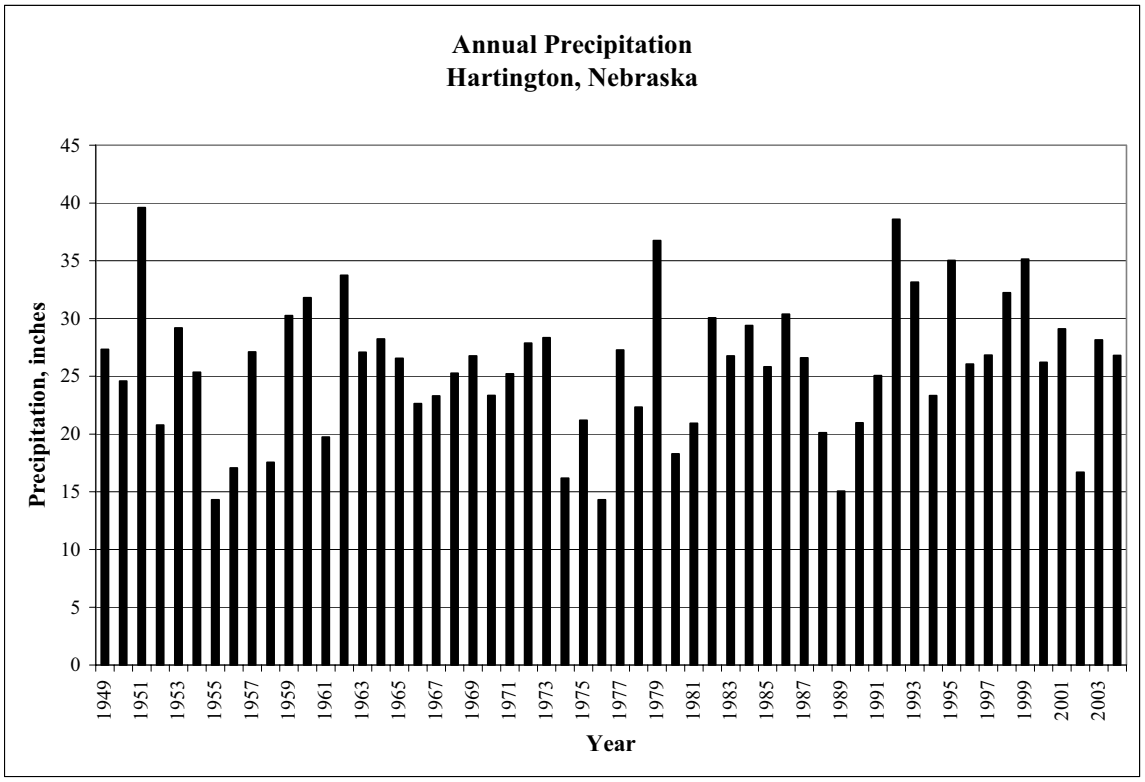
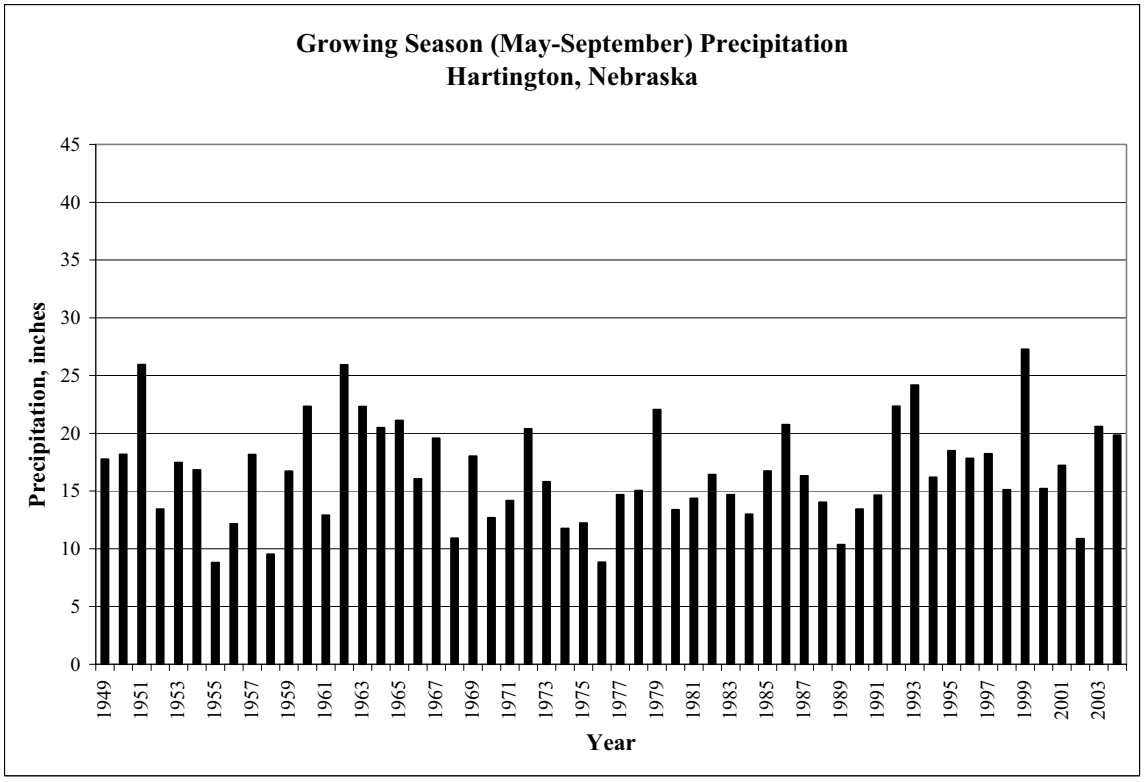


Figure MT-8. Growing Season (May-September) Precipitation at Hartington, Nebraska.



Source: High Plains Climate Center

Figure MT-9. Annual Precipitation at Homer, Nebraska.

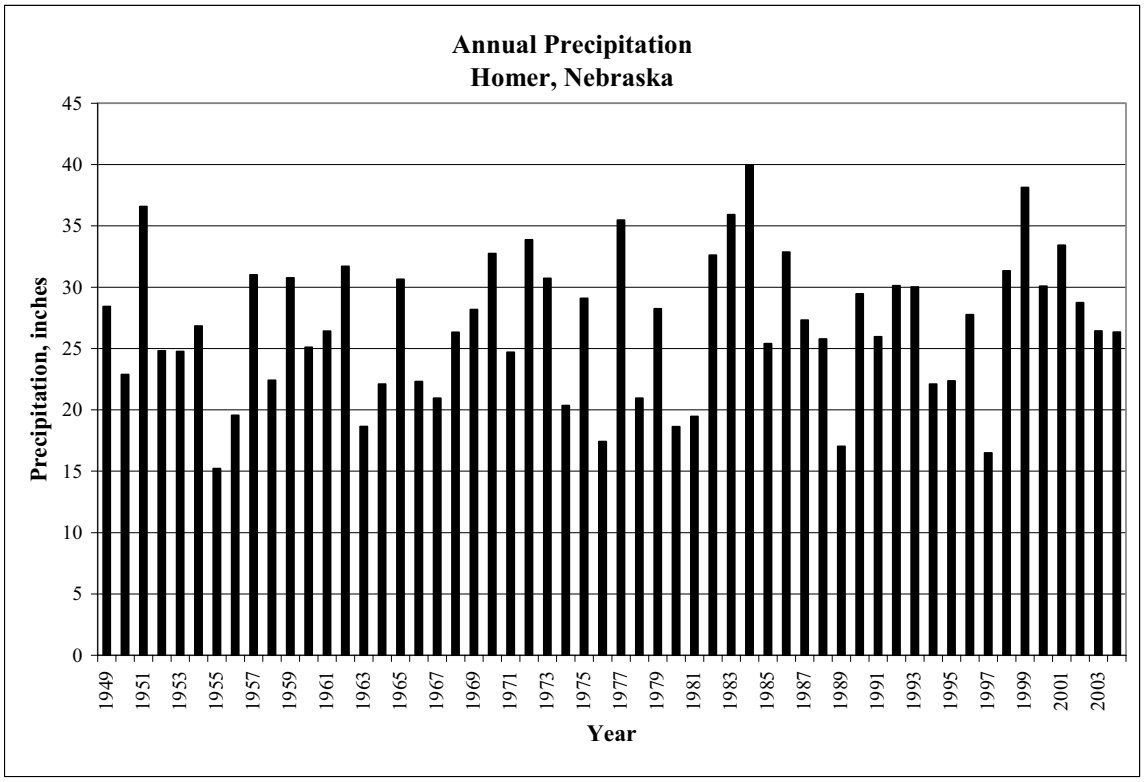
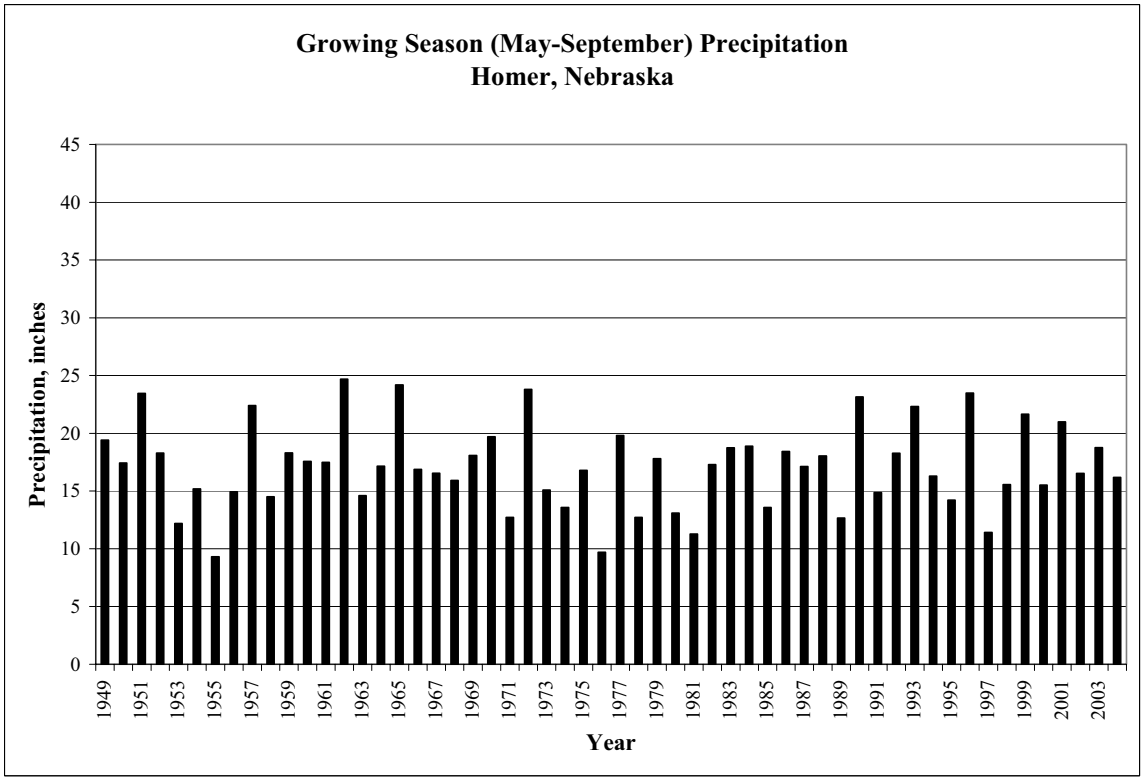


Figure MT-10. Growing Season (May-September) Precipitation at Homer, Nebraska.



Source: High Plains Climate Center

Figure MT-11. Annual Precipitation at Newcastle, Nebraska.

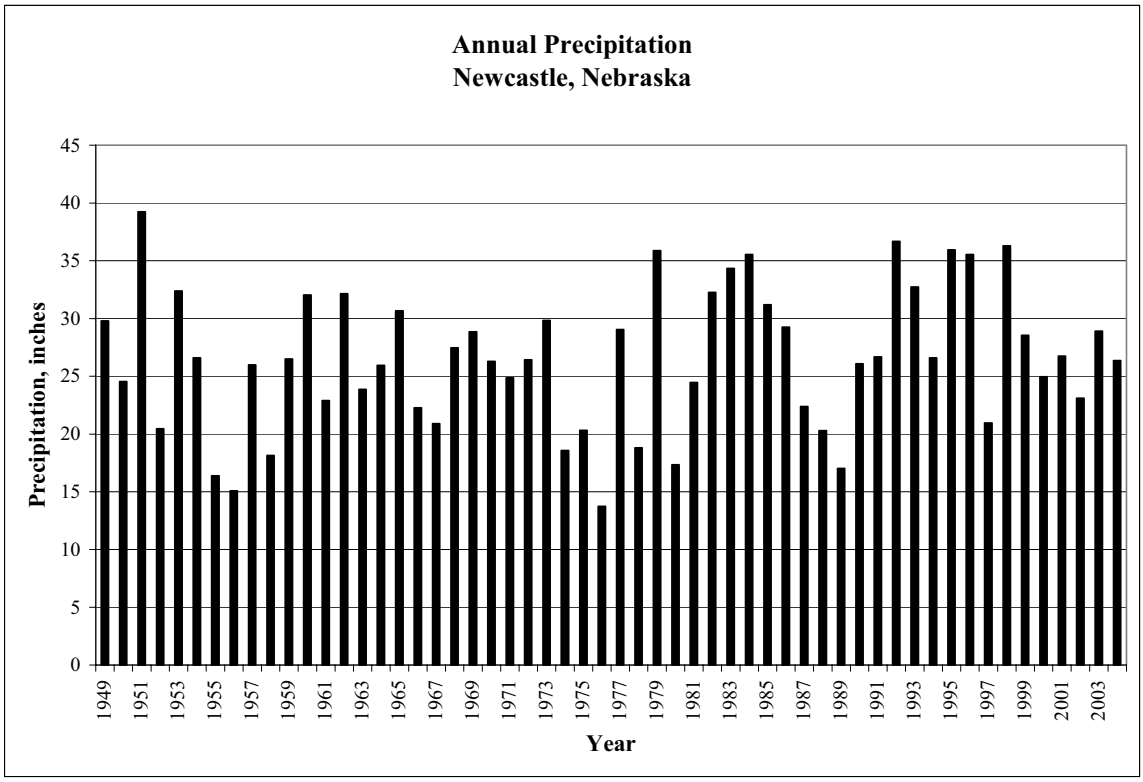
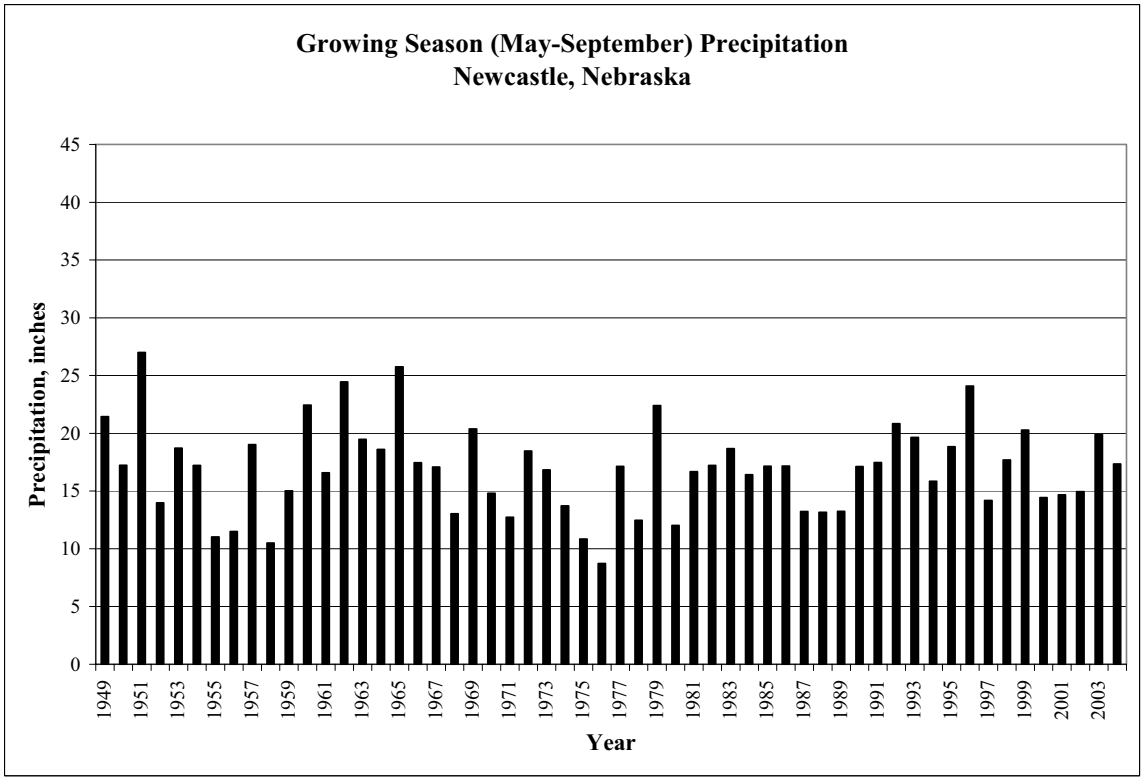


Figure MT-12. Growing Season (May-September) Precipitation at Newcastle, Nebraska.



Source: High Plains Climate Center

Figure MT-13. Annual Precipitation at Omaha, Nebraska.

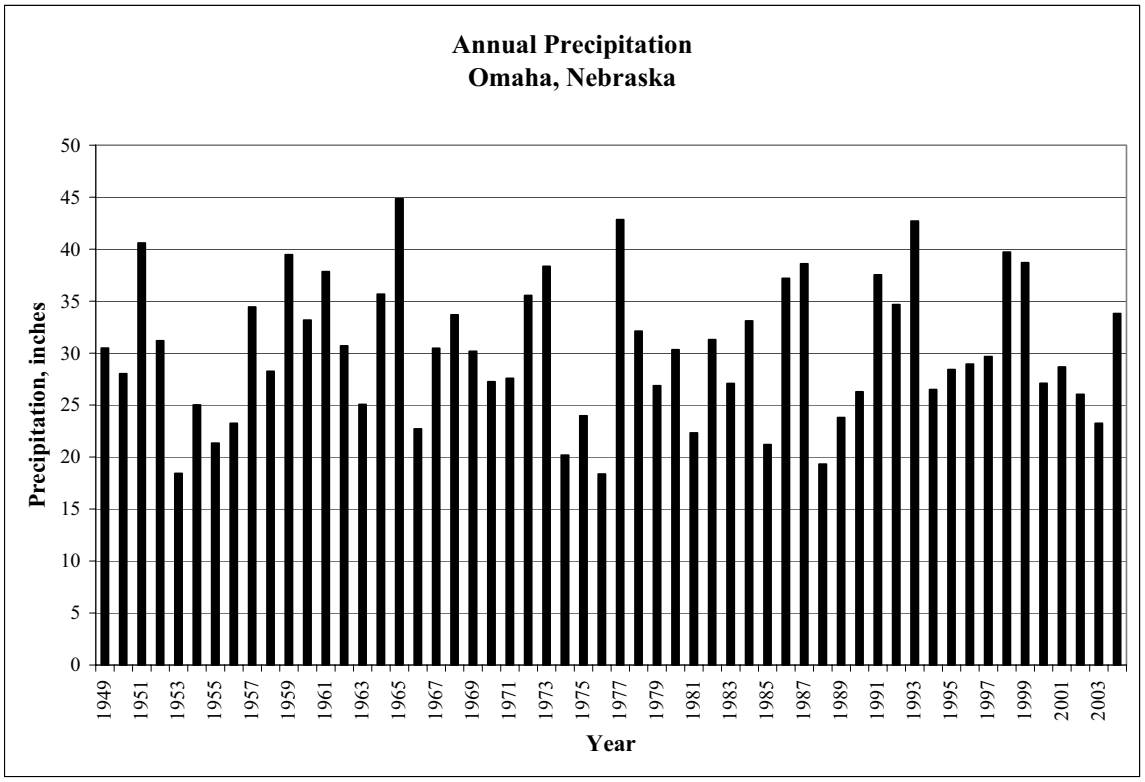
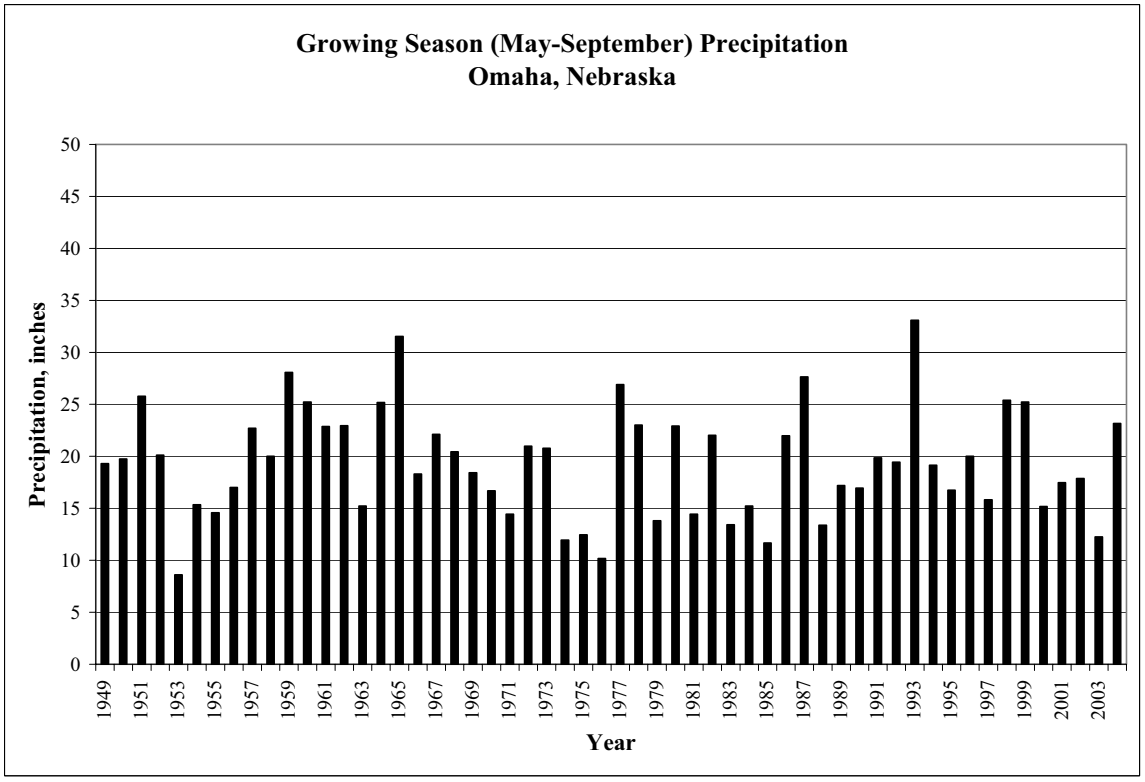


Figure MT-14. Growing Season (May-September) Precipitation at Omaha, Nebraska.



Source: High Plains Climate Center

Precipitation Gages
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

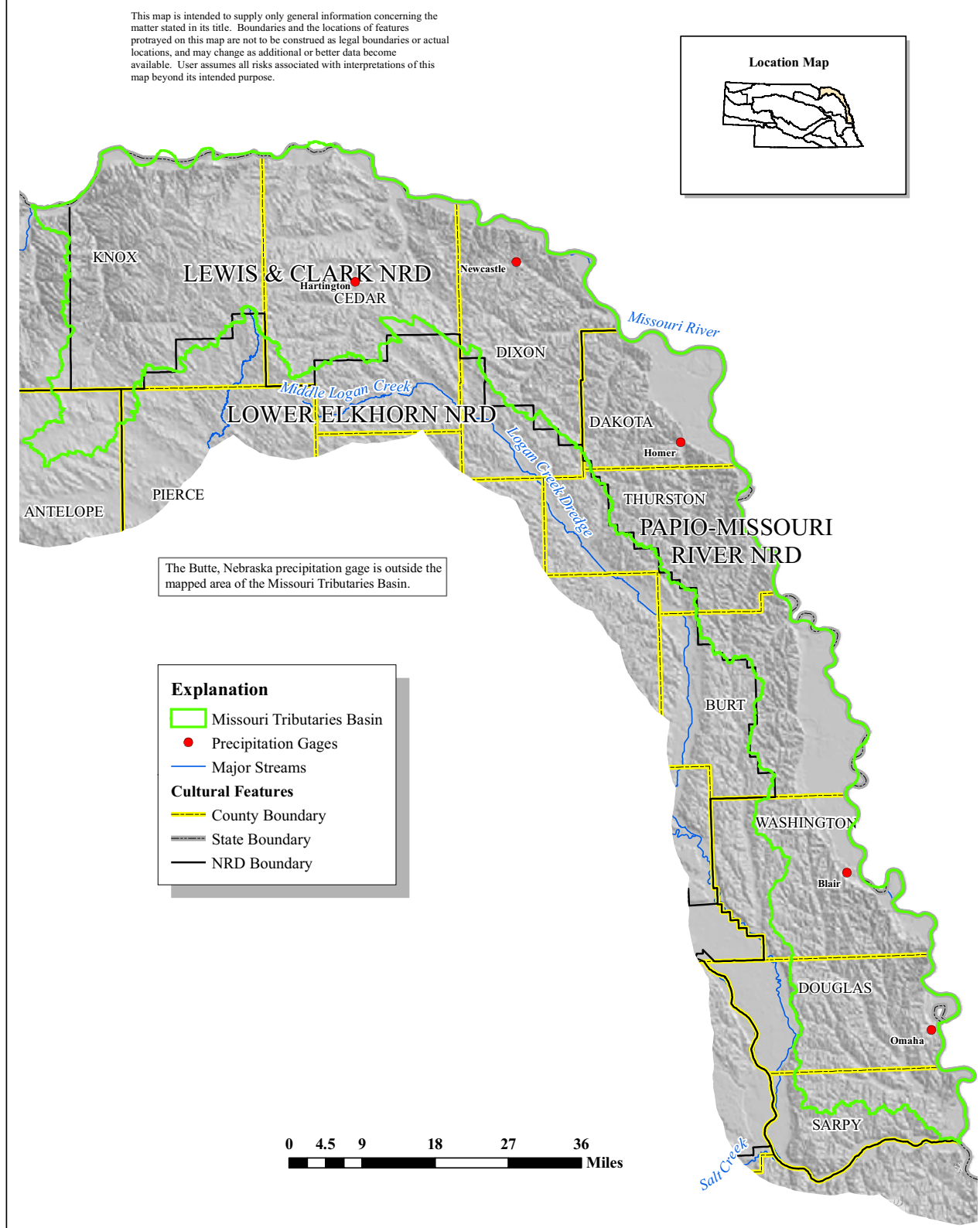


Figure MT-15.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Precipitation gages map produced by Jeff Shafer, October 19, 2005.

Glacial Till
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

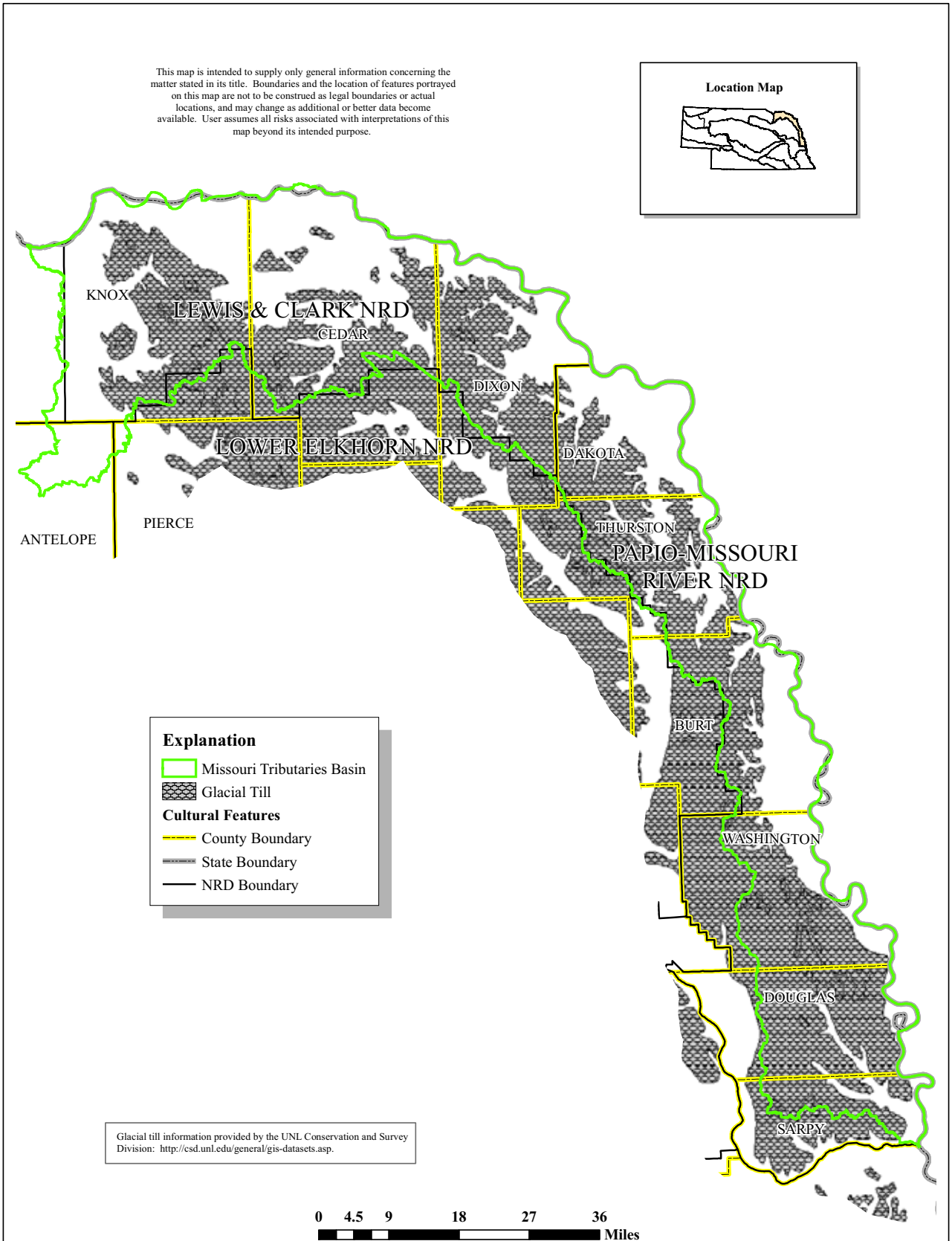


Figure MT-16.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Glacial till map produced by Kevin J. Schwartman, October 12, 2005

Table MT-1. – Aquifers in unconsolidated surficial deposits (modified from Verestraeten and Ellis, 1995; Kent, Engberg, and Ellis, 1981)

System	Hydrogeologic unit	Character and description	Maximum thickness, in feet	Hydrogeologic characteristics
Quaternary	Elkhorn River Alluvial Aquifer	Sand and gravel deposits located within the incised bedrock valley of the Elkhorn River.	90	Unconfined aquifer with wells yielding 700 to 1,200 gal/min.
	Missouri River Valley Alluvial Aquifer	Sand and gravel deposits located within the incised bedrock valley of the Missouri River.	100	Usually unconfined but may be locally confined. Wells generally yield 600 to 1,200 gal/min.
	Platte River Valley Alluvial Aquifers	Sand and gravel deposits located within the incised bedrock valley of the Platte River.	100	Unconfined aquifer with wells that yield 900 to 2,000 gal/min.
	Upland Area Alluvial Aquifers	Sand and gravel with eolian deposits of silt and clay sized loess and clay sized glacial till.	<200	Confined or partially confined discontinuous beds of saturated sand and gravel with yields from 10 to 300 gal/min with some wells in the northeast with yields from 550 to 1,500 gal/min.

Table MT-2. – Characteristics of bedrock aquifers (modified from Verestraeten and Ellis, 1995; Kent, Engberg, and Ellis, 1981)

System	Hydrogeologic unit	Character and description	Maximum thickness, in feet	Hydrogeologic characteristics
Tertiary	Ogallala Group	Sand, silty clay, interbedded with a little volcanic ash and orthoquartzite.	125	Not a principal source of water, may yield water to some domestic wells.
Cretaceous	Niobrara Formation	Clayey limestone, chalky, highly fractured in places.	340	Significant source of water to wells in areas with secondary porosity. Well may have yields of 360 to 900 gal/min.
	Dakota Sandstone	Sandstone with claystone and shale. Locally cemented with iron oxide. Claystone is massive and often silty. Some areas have numerous thin layers of carbonaceous material.	500	Confined or partially confined with wells yielding 10 to 600 gal/min depending on thickness of saturated sandstone.
Mississippian to Cambrian	Undifferentiated limestone, shale and sandstone beds	Mostly massive dolomite bedding with limestone beds in the upper part, thin dolomite shale in the middle and sandstone beds in the lower part.	1600	Confined aquifers. Well yields range from 200 to 1,300 gal/min.

Bedrock Geology
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

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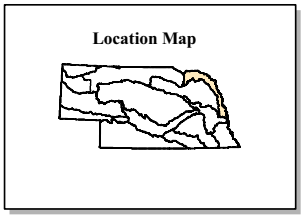

Bedrock geology information provided by the UNL Conservation and Survey Division: http://csd.unl.edu/general/gis-datasets.asp.

Figure MT-17.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Bedrock geology map produced by Kevin J. Schwartman, October 12, 2005

Saturated Thickness
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

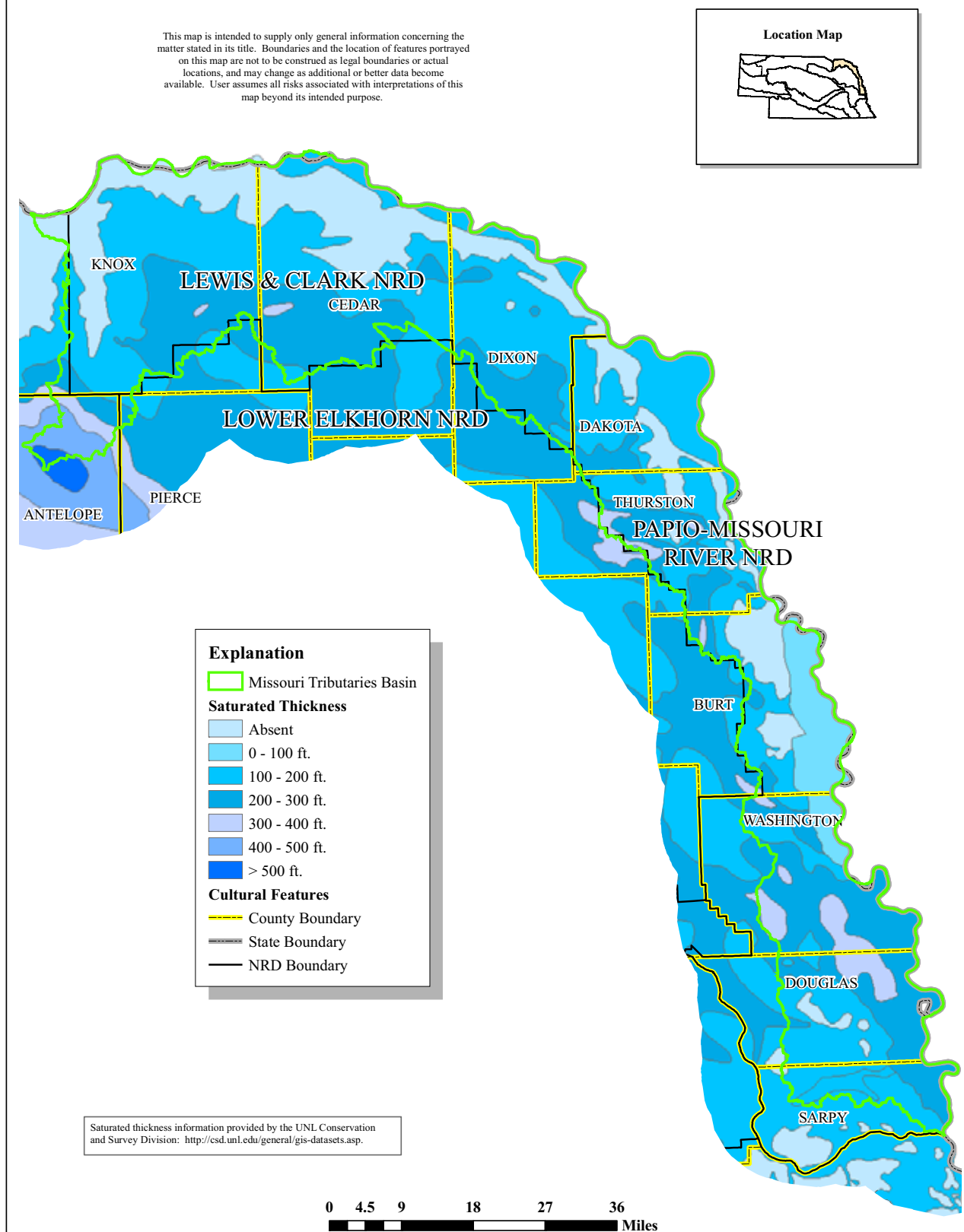

Figure MT-18.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Saturated thickness map produced by Kevin J. Schwartman, October 12, 2005

Depth to Water
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

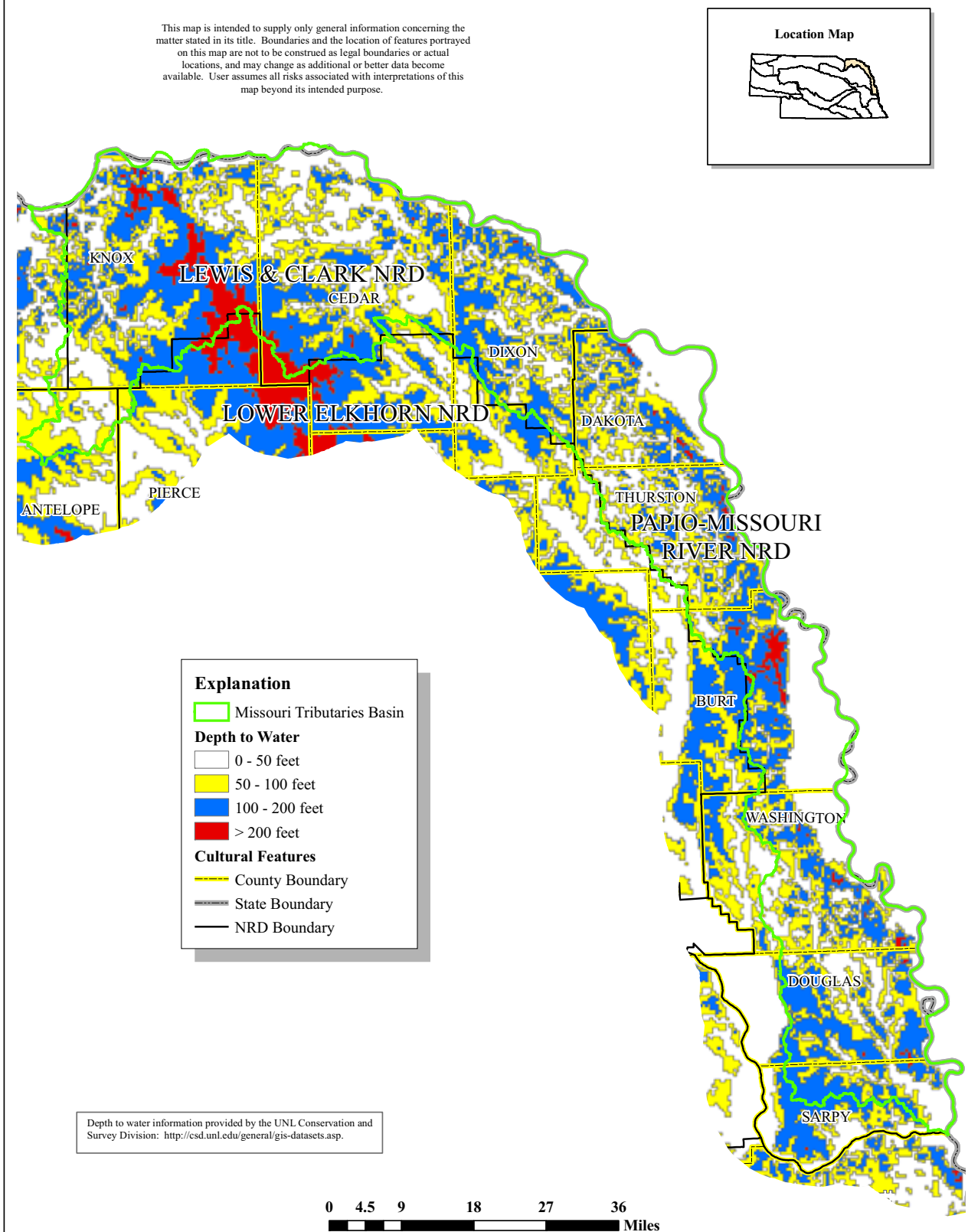

Figure MT-19.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Depth to water map produced by Kevin J. Schwartman, October 12, 2005

Transmissivity
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

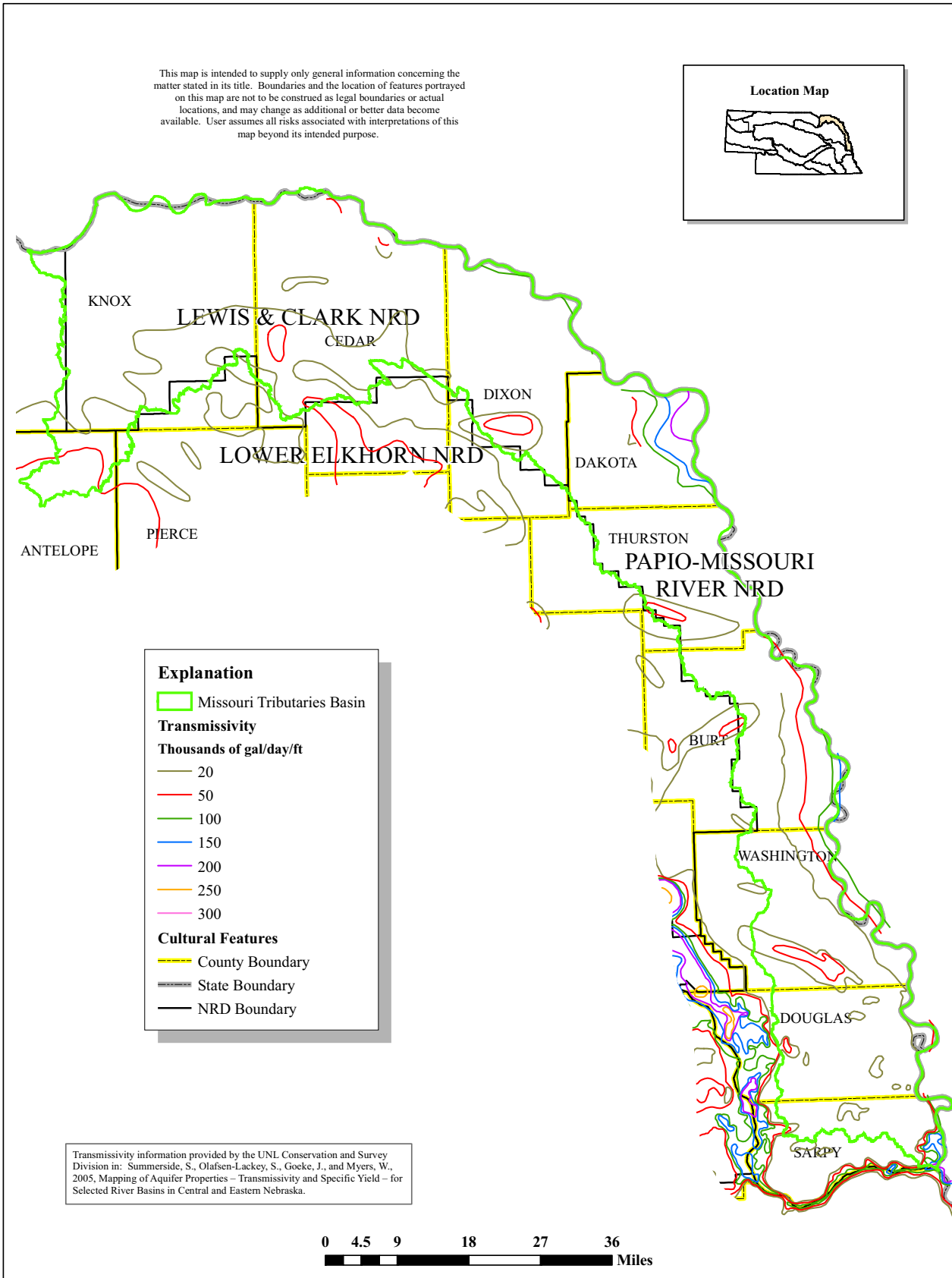

Figure MT-20.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Transmissivity map produced by Kevin J. Schwartman, October 12, 2005

Specific Yield
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

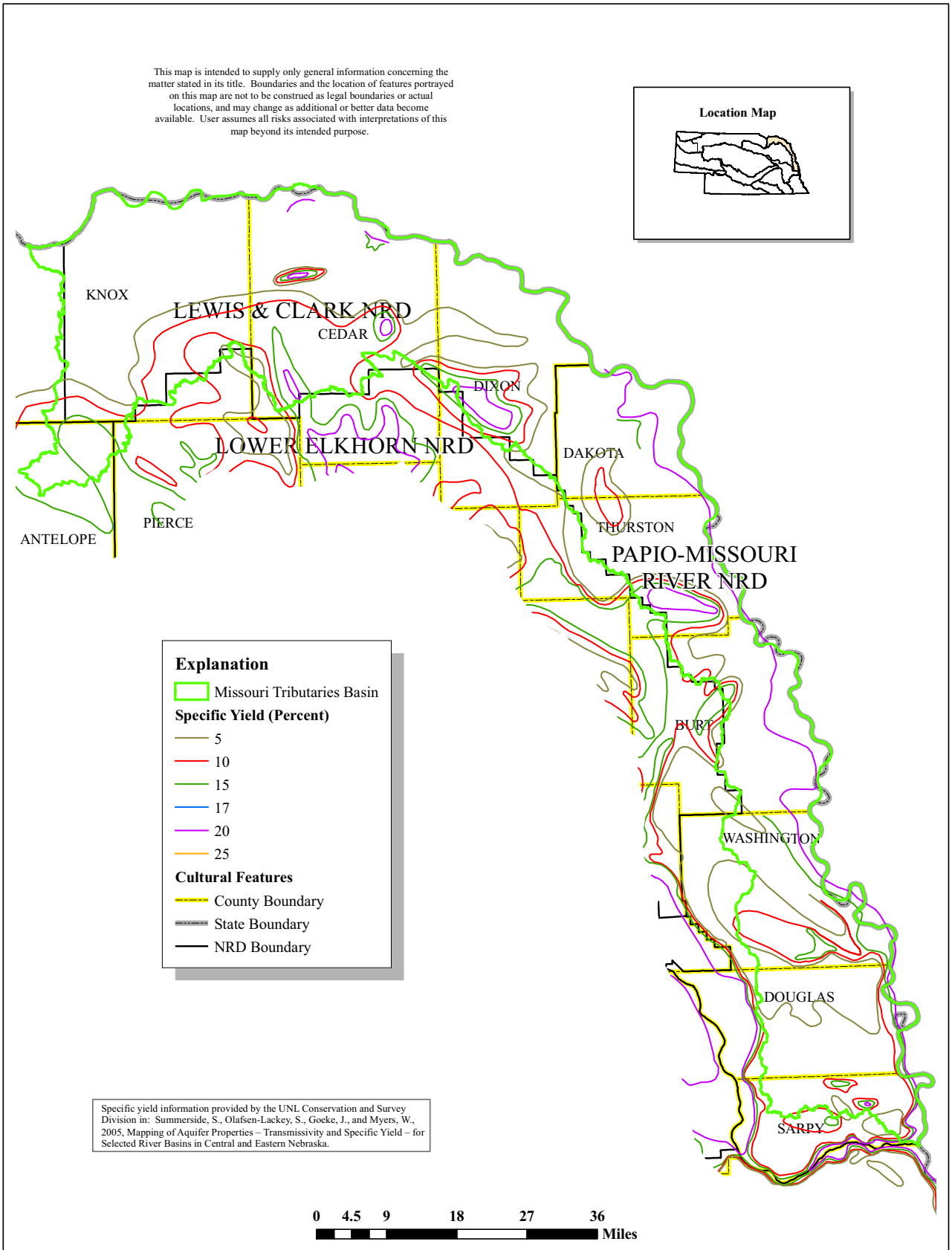

Figure MT-21.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Specific yield map produced by Kevin J. Schwartman, October 12, 2005

1995 Ground Water Table
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

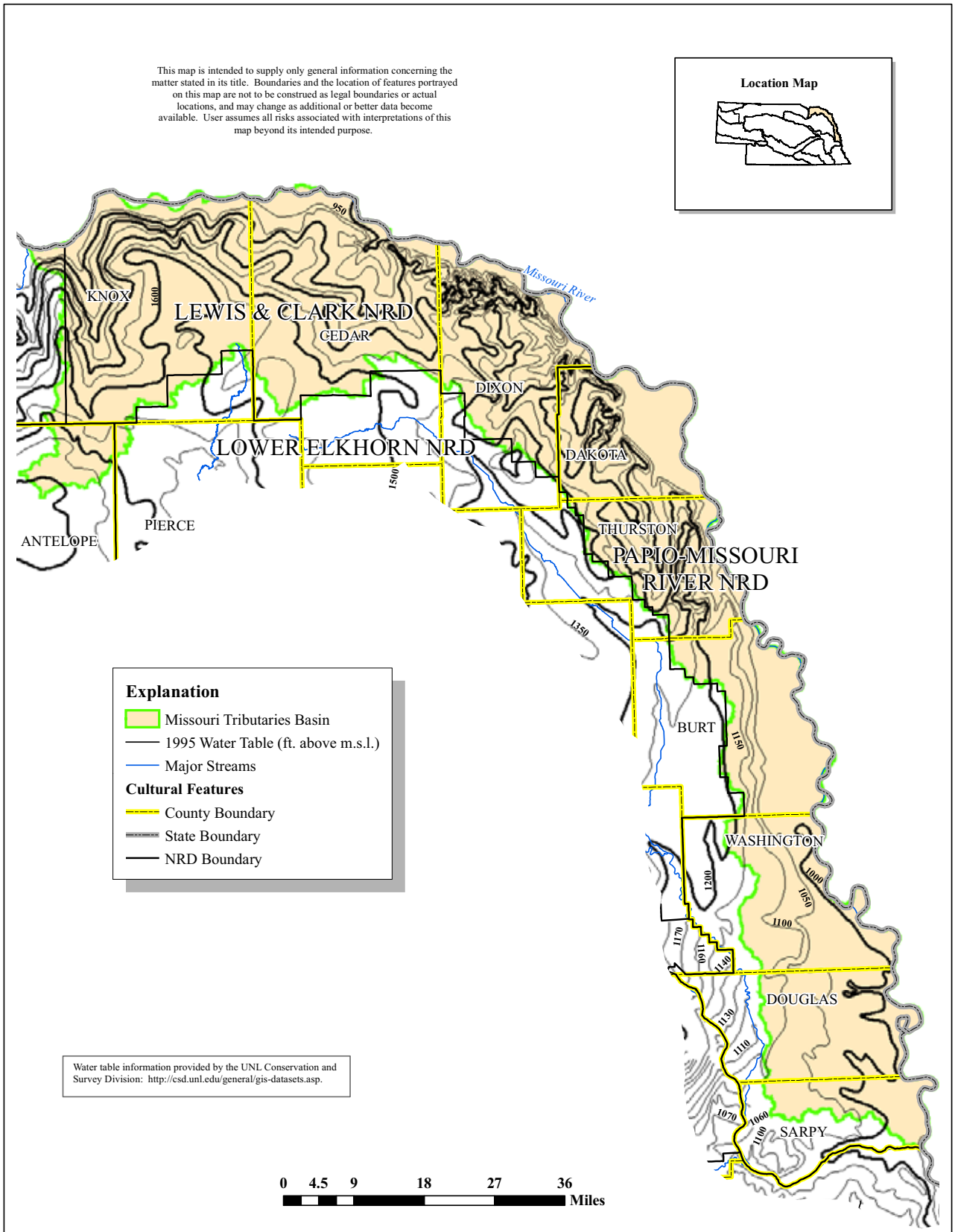

Figure MT-22.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Water table map produced by Kevin J. Schwartman, February 10, 2005

Depletive Ground Water Wells
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

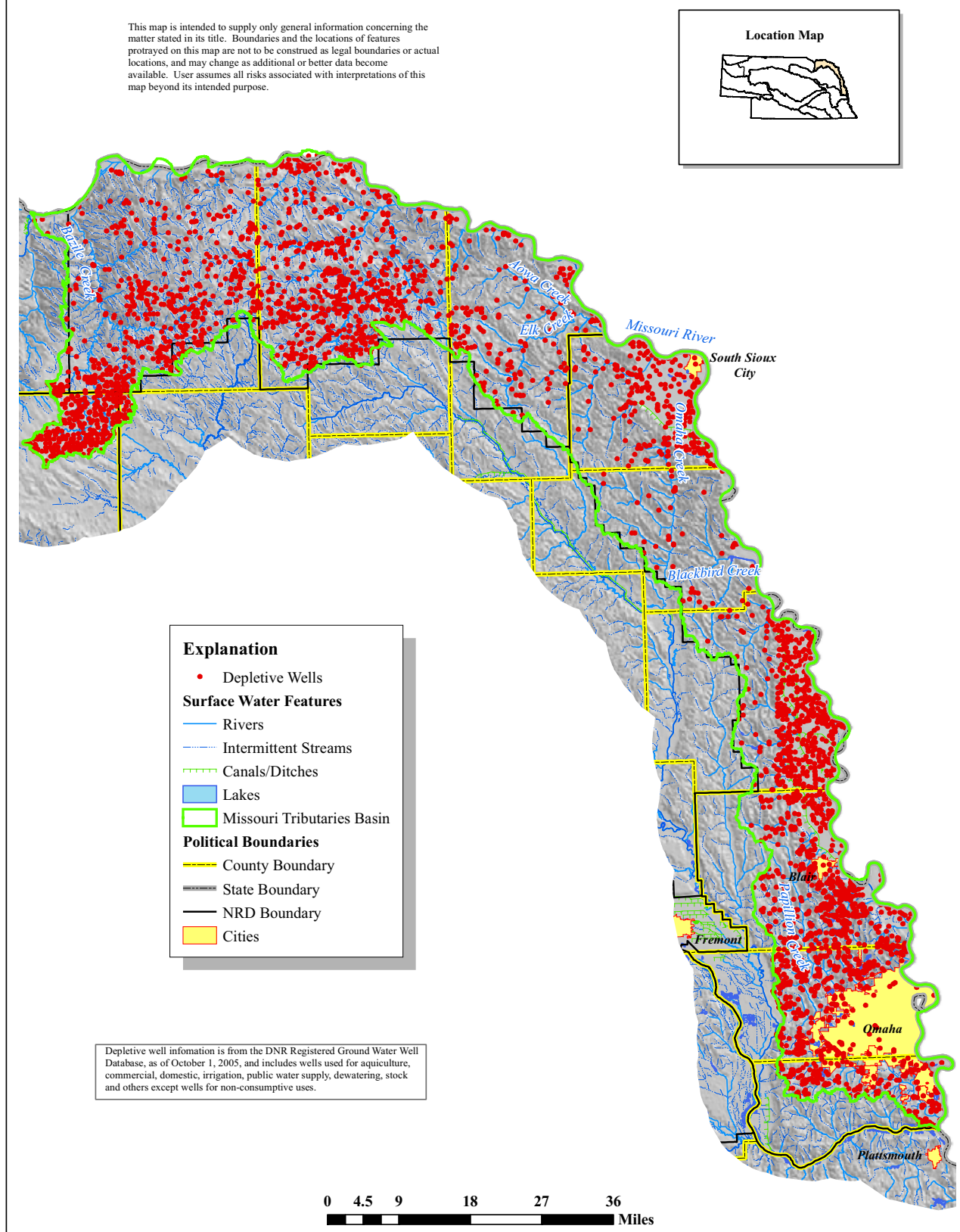

Figure MT-23.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Depletive ground water wells map produced by Shuhai Zheng, October 12, 2005.

High Capacity Wells by Completion Years
MISSOURI TRIBUTARIES RIVER BASIN

Planning and Assistance Division

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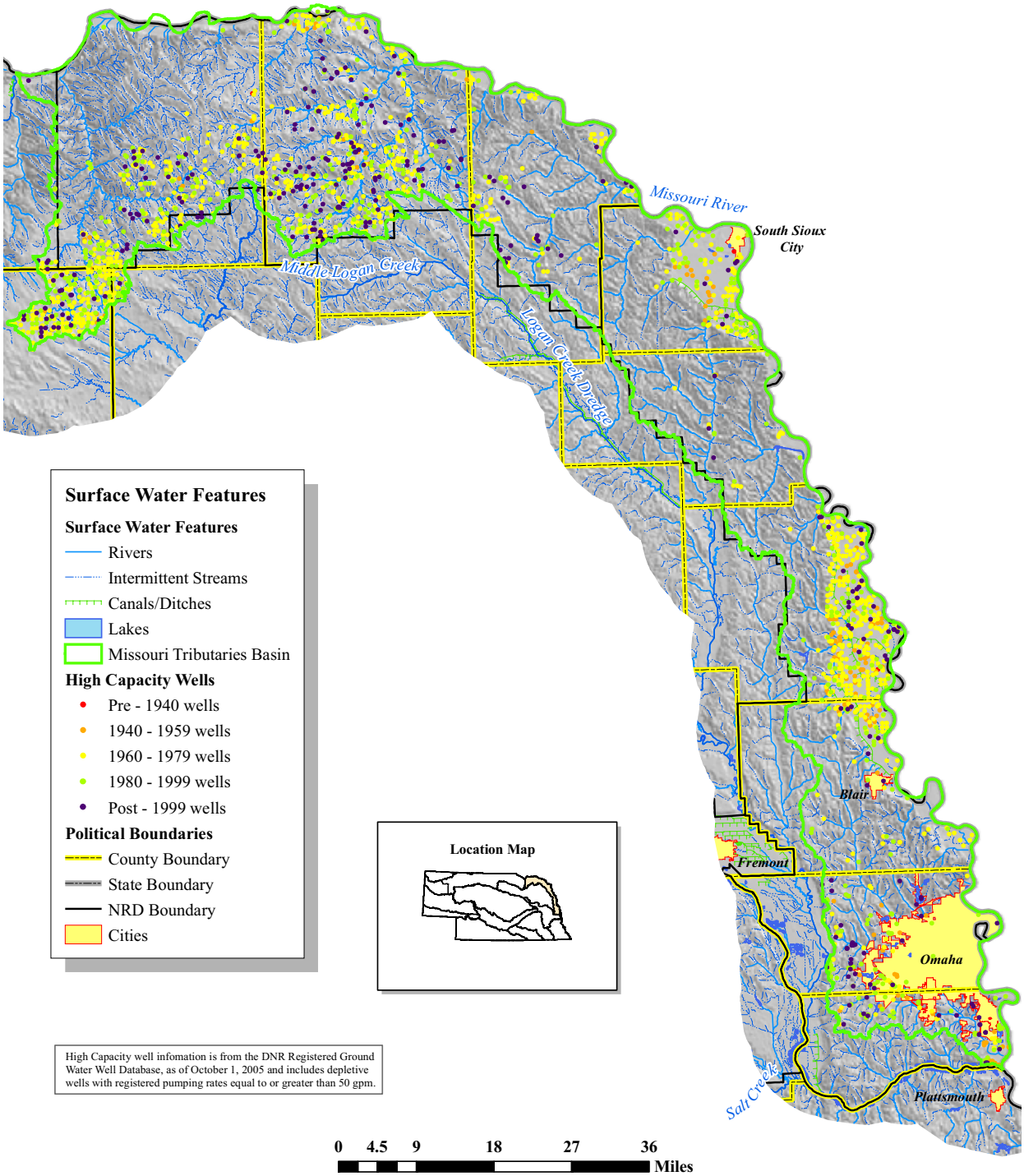


Figure MT-24.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
High capacity wells map produced by Shuhai Zheng, November 10, 2005.

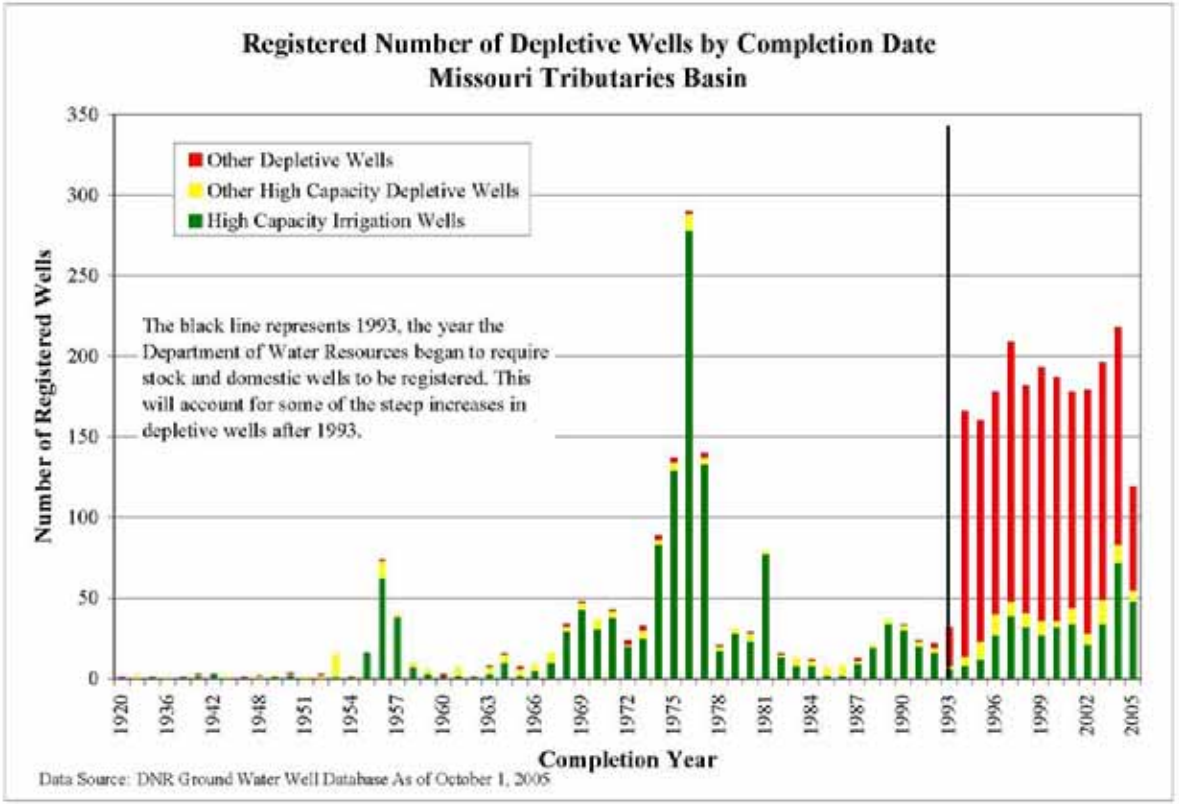


Figure MT-25

By Shuhai Zheng, 10/1/2005

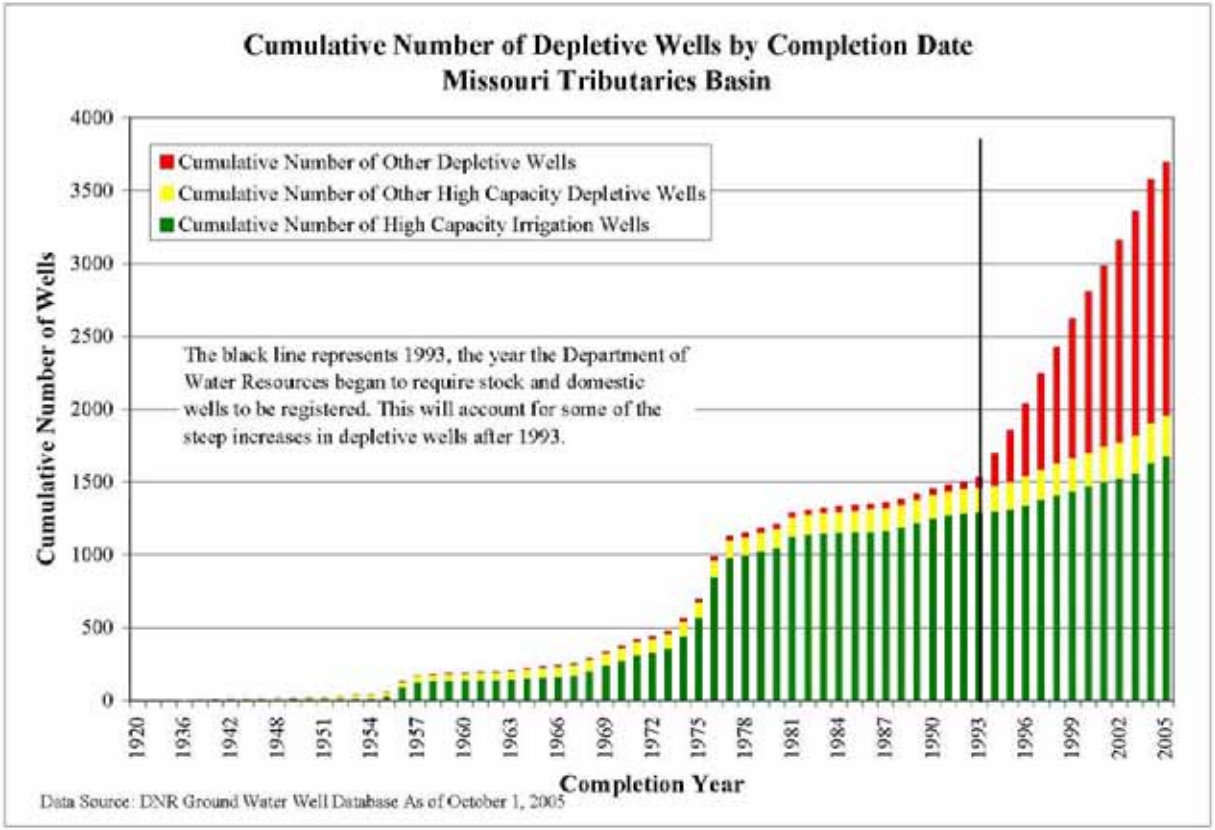


Figure MT-26

By Shuhai Zheng, 10/1/2005

Table MT-3. Average Irrigated Acreage 1950-2003 for Counties Fully or Partially in the Missouri River Tributaries Basin

		Estimated Average Irrigated Acreage by County					
County Name	*Percent of County in Missouri Tributaries Basin*	*1950-1959*	*1960-1969*	*1970-1979*	*1980-1989*	*1990-1999*	*2000-2003*
Antelope	8	3140	14709	89076	160910	184990	213225
Burt	55	1381	5037	23483	39080	47950	55925
Cedar	71	963	2710	22303	54880	65180	78350
Dakota	100	489	1734	5431	10190	17000	18000
Dixon	72	105	599	5859	15650	17290	19025
Douglas	73	825	2188	7555	12830	12640	9850
Knox	53	677	3535	17682	35420	43430	49875
Pierce	1	1673	5891	42958	94670	104610	114725
Sarpy	46	816	981	3597	5390	6690	6375
Thurston	65	592	1277	3823	8470	6450	13275
Washington	70	512	1693	7132	17270	16340	17250
Total		**11172**	**40354**	**228899**	**454760**	**522570**	**595875**
% Change from Previous 10 Years			261.20%	467.23%	98.67%	14.91%	14.03%

* The percentage is the percentage of the county area which is in the Missouri Tributaries Basin. It does not necessarily represent the percentage of irrigated county acreage in the Missouri River Tributaries Basin.

Data Source: http://www.usda.gov/nass/, National Agricultural Statistics Service, **U.S. Department of Agriculture**

Shuhai Zheng, October 20, 2005

Ground Water Level Changes
Predevelopment to Spring 2005
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

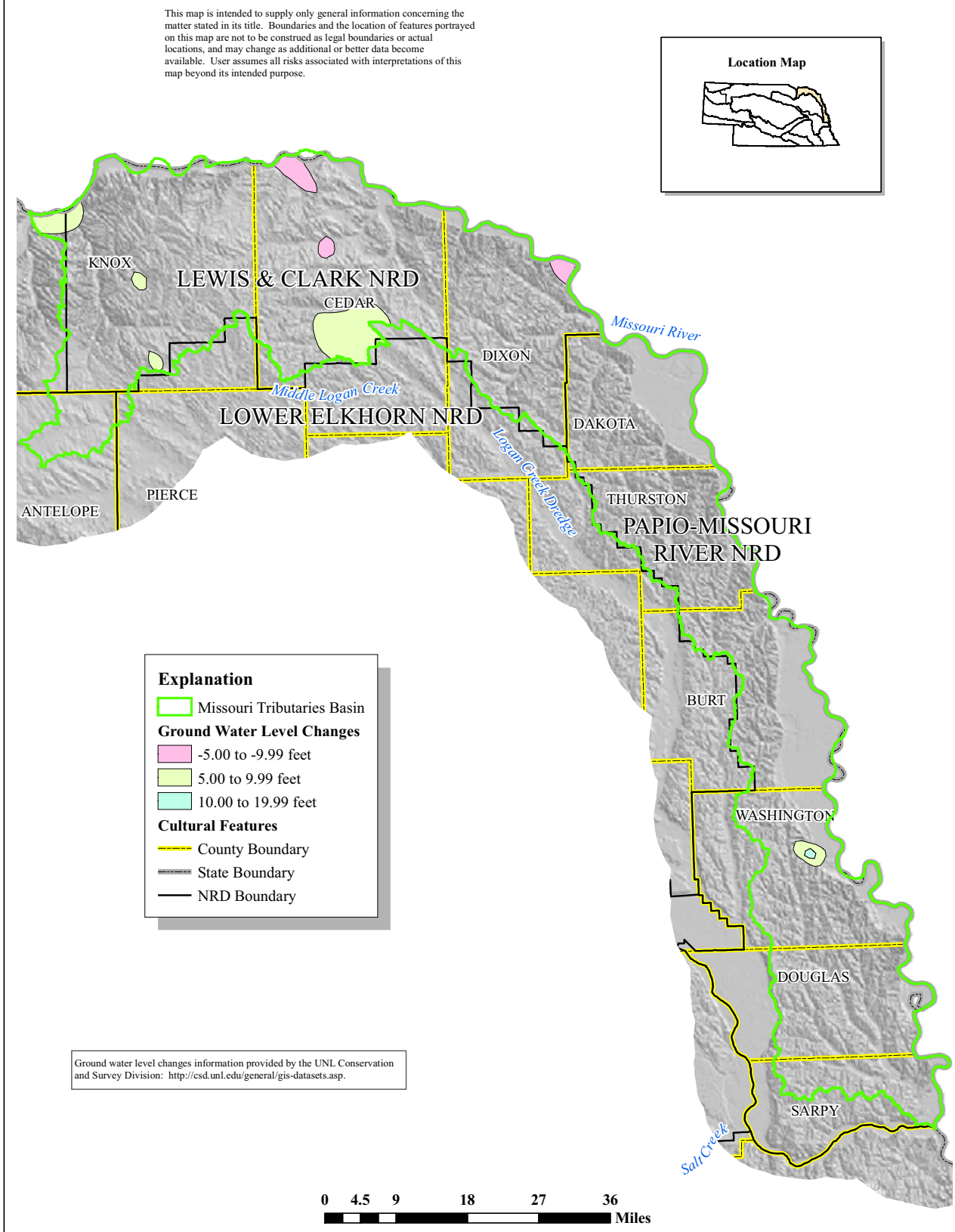


Figure MT-27.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Ground water level changes added by Shuhai Zheng, October 13, 2005

Ground Water Hydrograph Locations
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

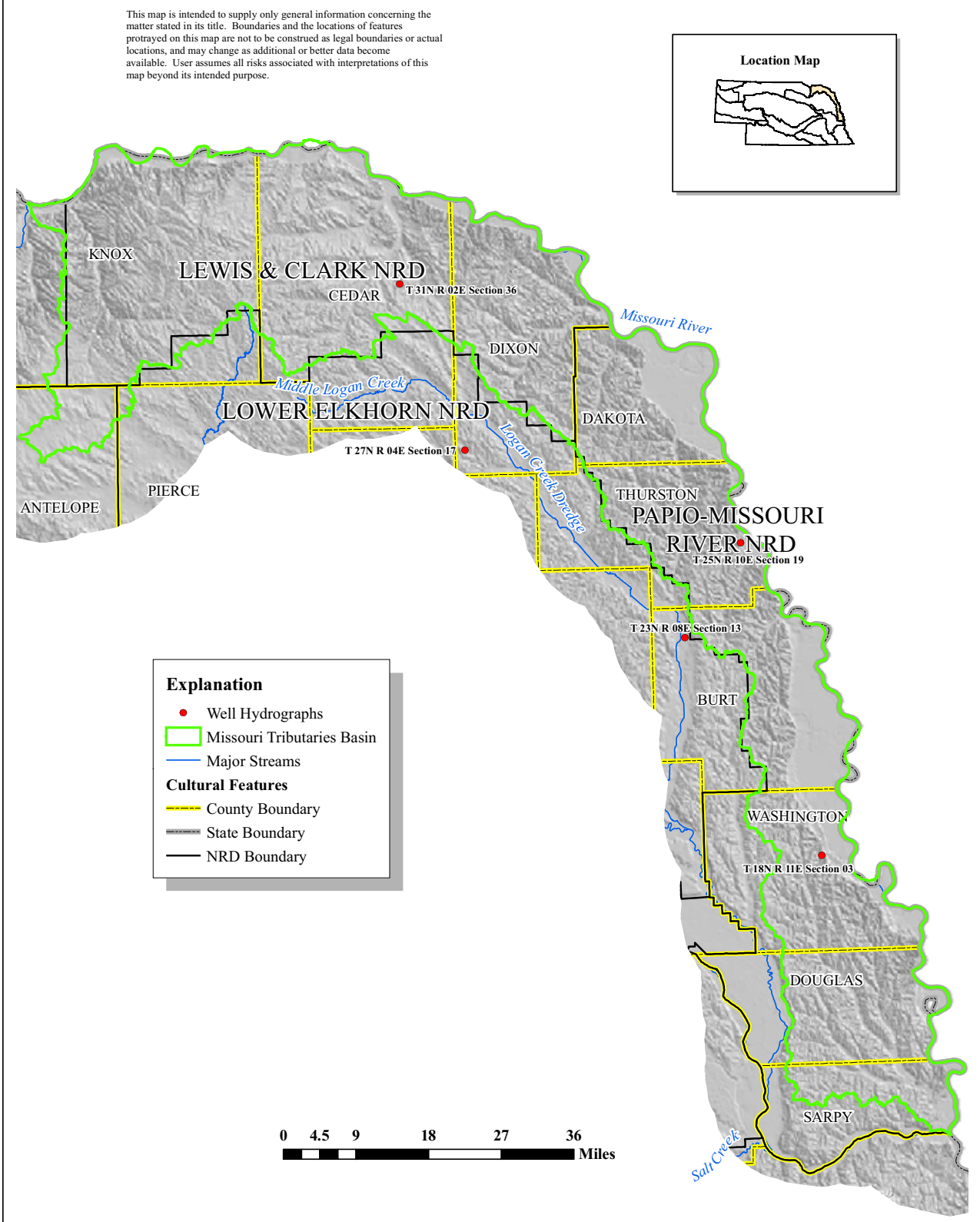
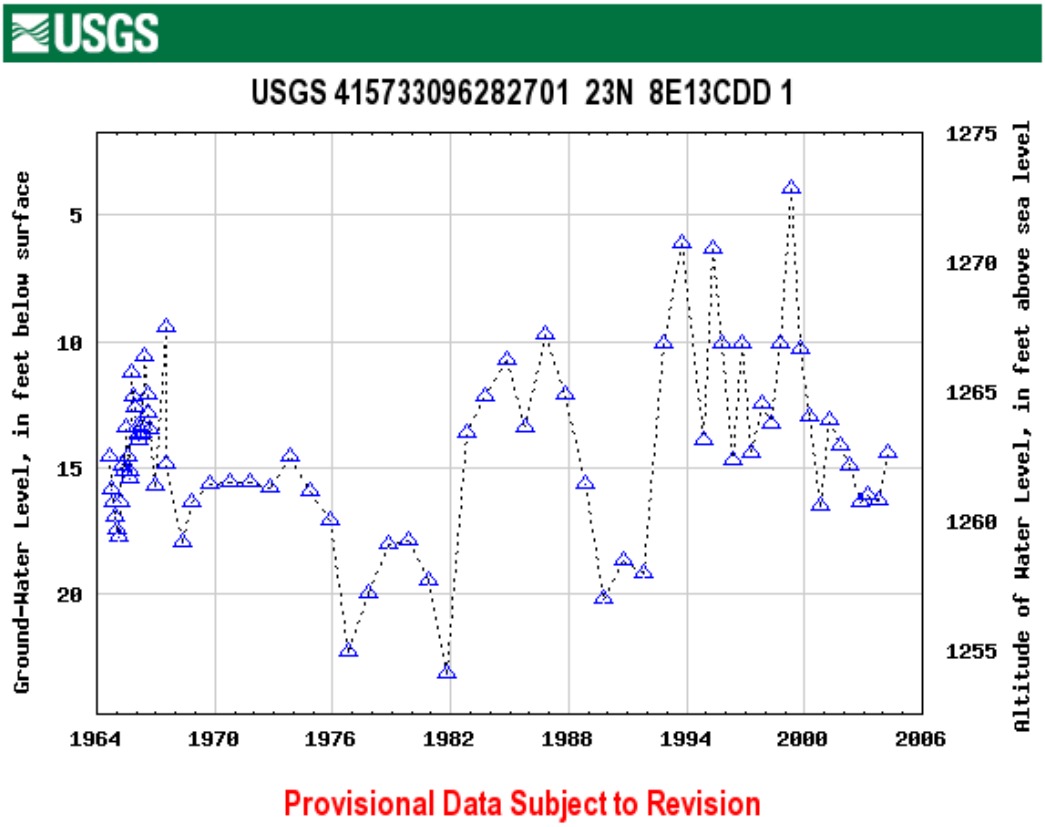


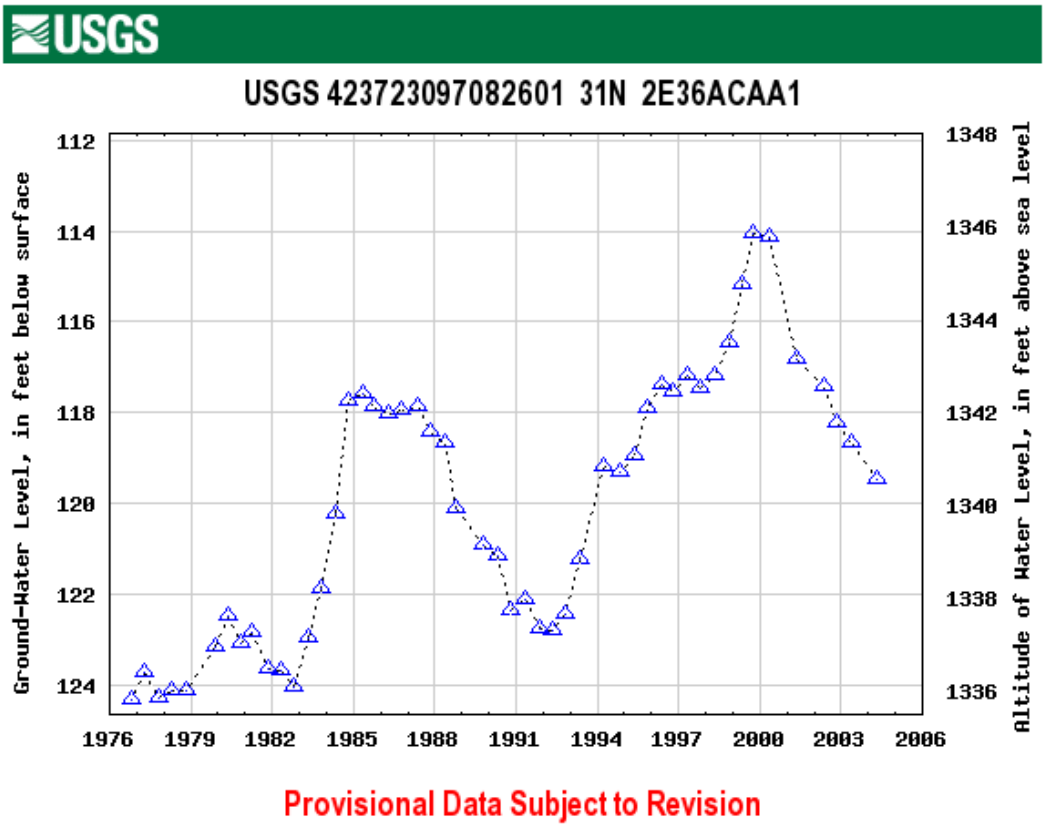
Figure MT-28.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Ground water hydrograph map produced by Kevin J. Schwartman, November 1, 2005.



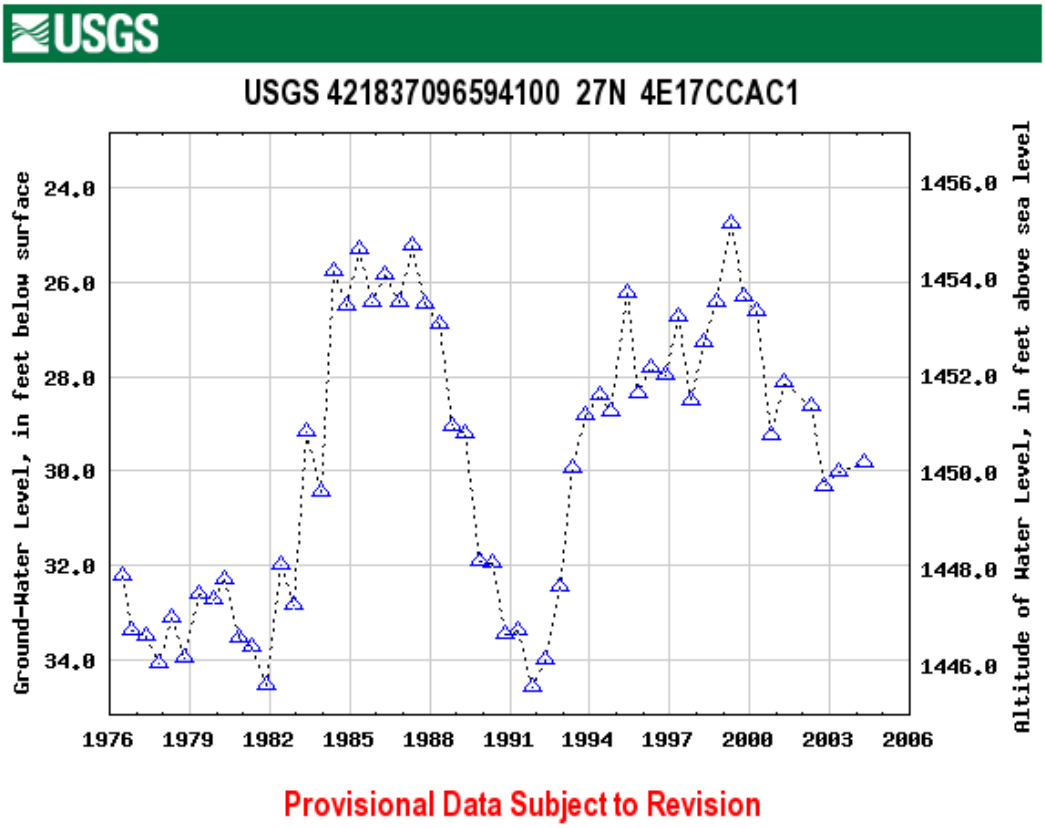
Burt County, Nebraska
Hydrologic Unit Code 10220004
Latitude 41°57'34.5", Longitude 96°28'25" NAD27
Land-surface elevation 1,277 feet above sea level NGVD29
The depth of the well is 48.0 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure MT-29 (T 23N R 08E Section 13)



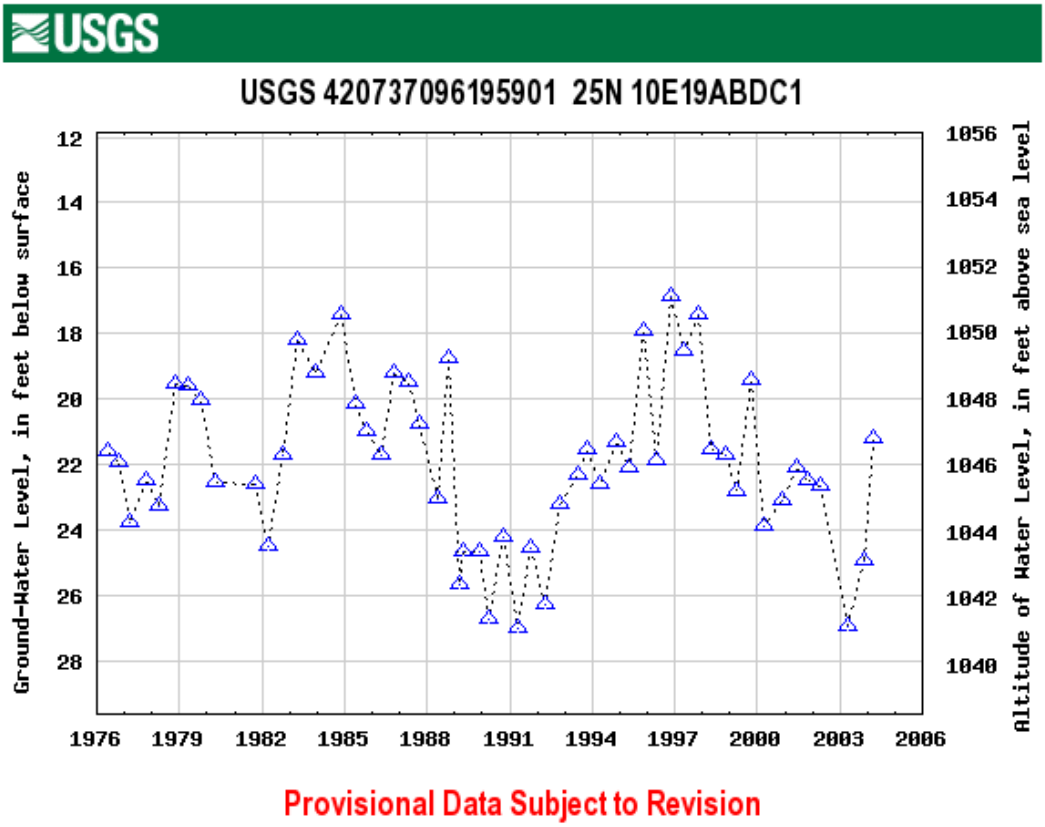
Cedar County, Nebraska
Hydrologic Unit Code 10170101
Latitude 42°37'23", Longitude 97°08'26" NAD27
Land-surface elevation 1,460. feet above sea level NGVD29
The depth of the well is 178 feet below land surface.
This well is completed in the QUATERNARYGRAVEL DEPOSITS (112SDGV) local aquifer.

Figure MT-30 (T 31N R 02E Section 36)



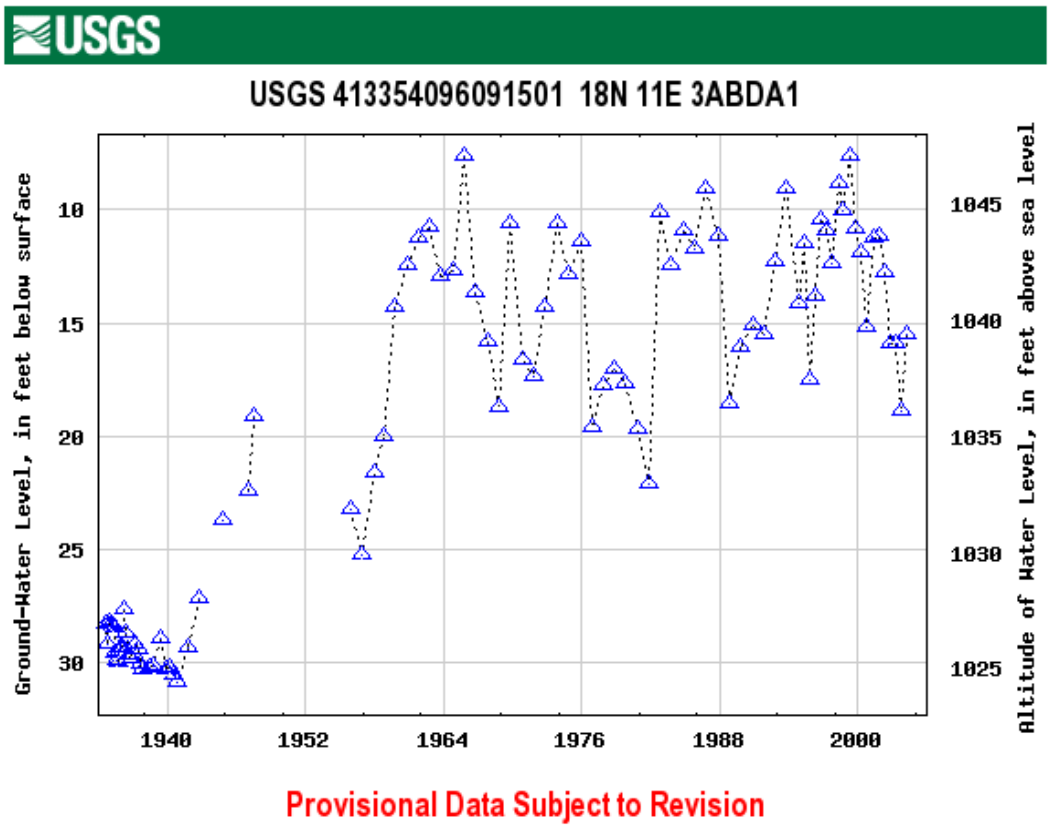
Dixon County, Nebraska
Hydrologic Unit Code 10220004
Latitude 42°18'37", Longitude 96°59'41" NAD27
Land-surface elevation 1,480. feet above sea level NGVD29
The depth of the well is 122 feet below land surface.
This well is completed in the QUATERNARY GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure MT-31 (T 27N R 04E Section 17)



Thurston County, Nebraska
Hydrologic Unit Code 10230001
Latitude 42°07'37", Longitude 96°19'59" NAD27
Land-surface elevation 1,068. feet above sea level NGVD29
The depth of the well is 93.0 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS (112SDGV) local aquifer.

Figure MT-32 (T 25N R 10E Section 19)



Washington County, Nebraska
Hydrologic Unit Code 10230001
Latitude 41°33'55.26", Longitude 96°09'36.73" NAD83
Land-surface elevation 1,055 feet above sea level NGVD29
The depth of the well is 36.0 feet below land surface.
This well is completed in the QUATERNARY SAND AND GRAVEL DEPOSITS, UNDIFFERENTIATED (110SDGV) local aquifer.

Figure MT-33 (T 18N R 11E Section 03)

Figure MT-34. Annual Flows, Bazile Creek near Niobrara.

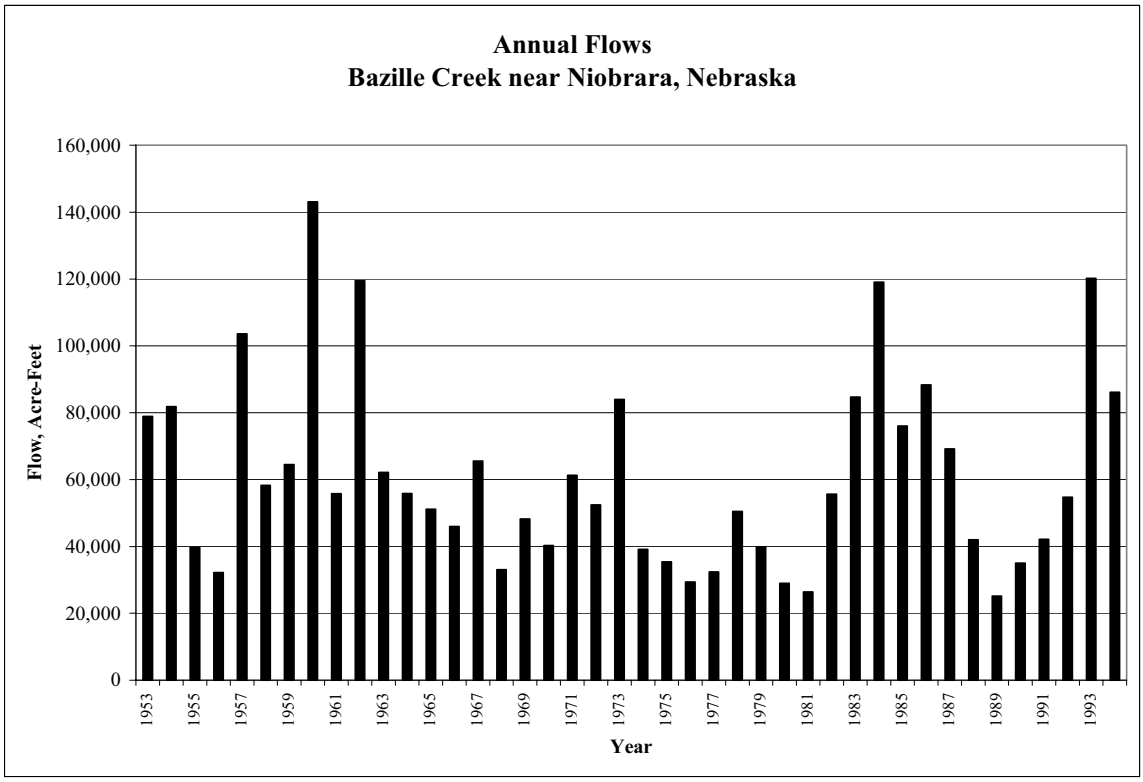
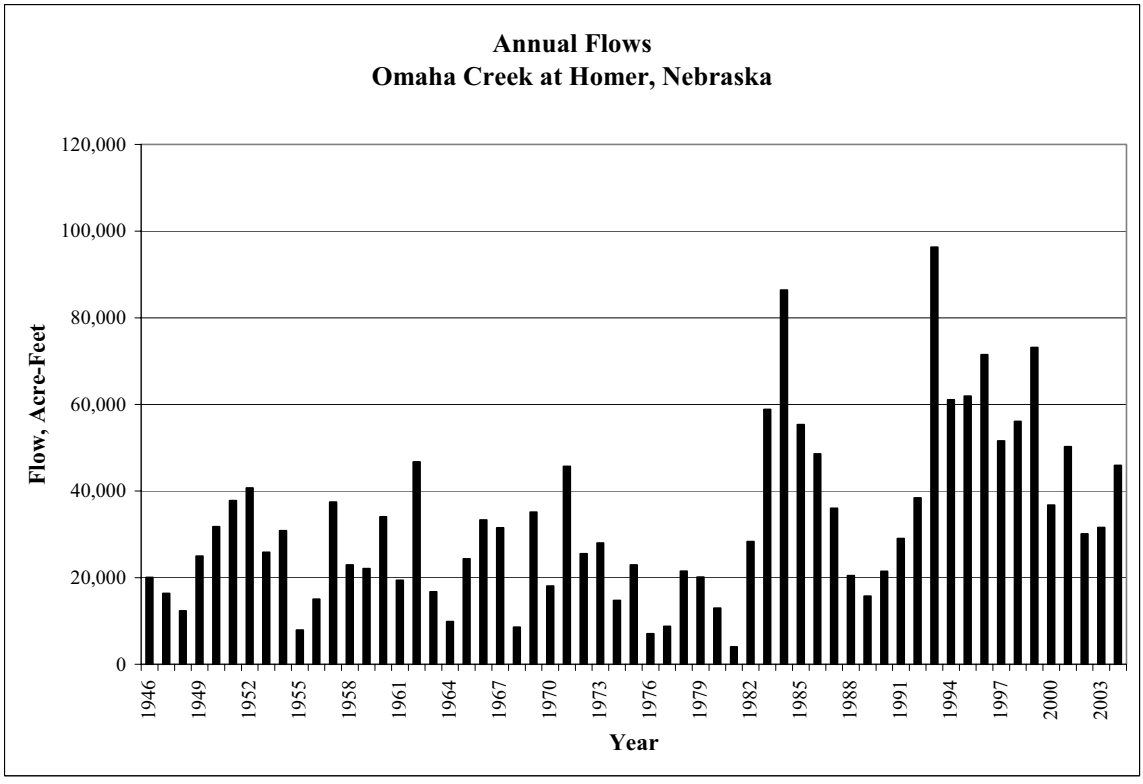


Figure MT-35. Annual Flows, Omaha Creek at Homer.



Data from: US Geological Survey and NE Department of Natural Resources

Figure MT-36. Annual Flows, Tekamah Creek at Tekamah.

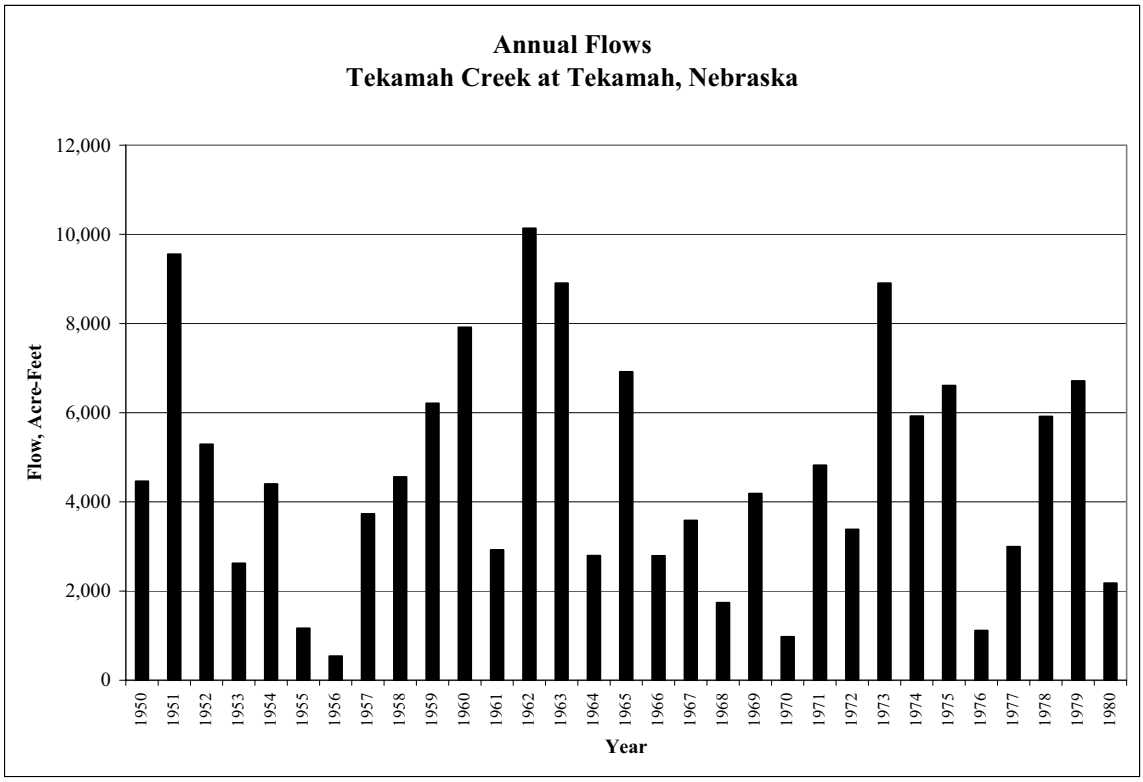
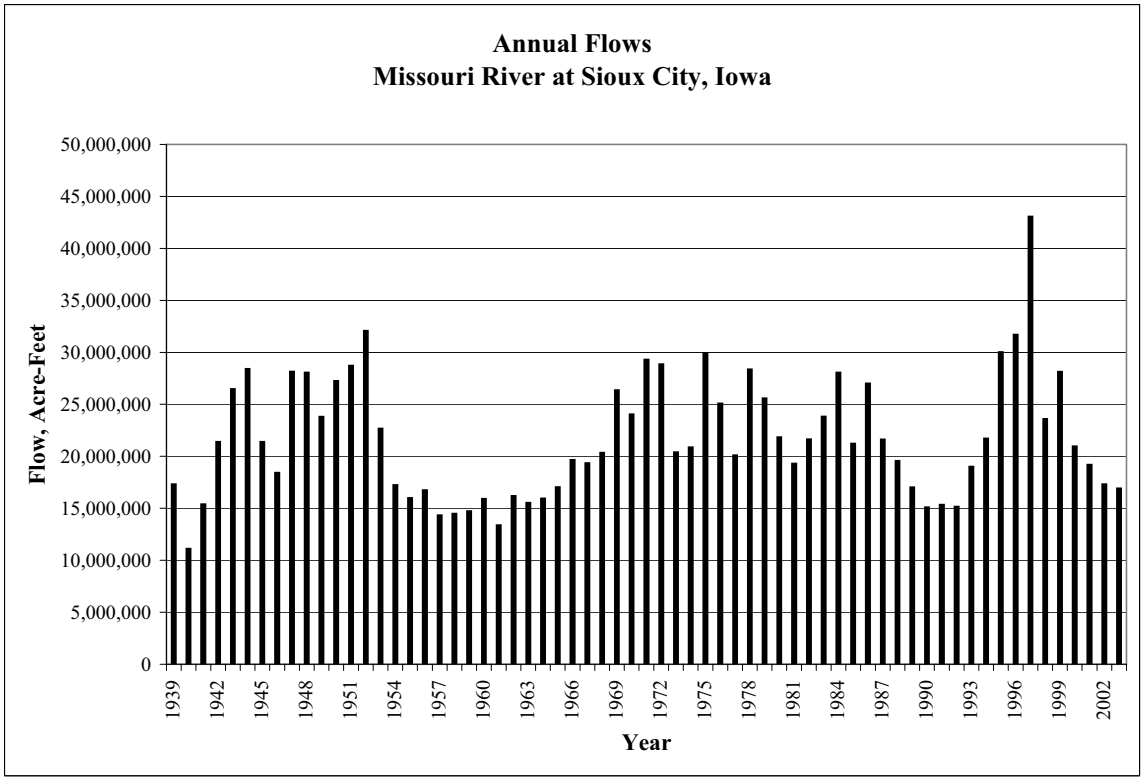
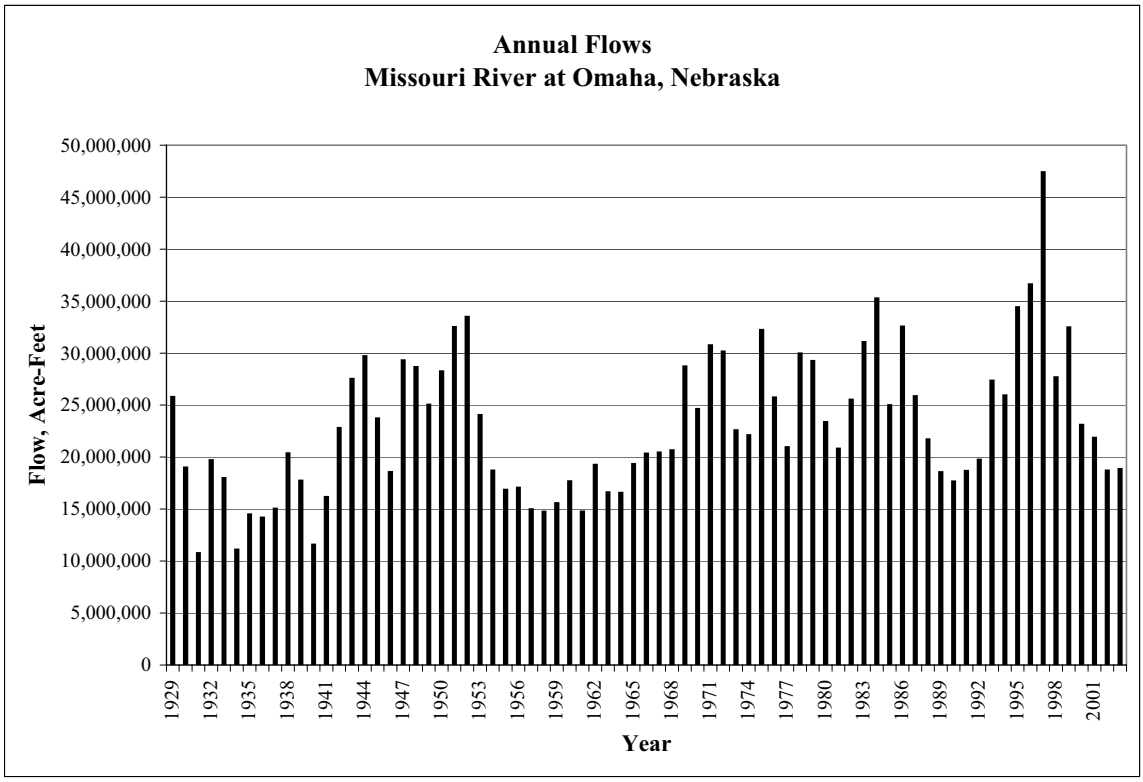


Figure MT-37. Annual Flows, Missouri River at Sioux City.



Data from: US Geological Survey and NE Department of Natural Resources

Figure MT-38. Annual Flows, Missouri River at Omaha.



Data from: US Geological Survey and NE Department of Natural Resources

Stream Gages
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

This map is intended to supply only general information concerning the matter stated in its title. Boundaries and the locations of features protrayed on this map are not to be construed as legal boundaries or actual locations, and may change as additional or better data become available. User assumes all risks associated with interpretations of this map beyond its intended purpose.

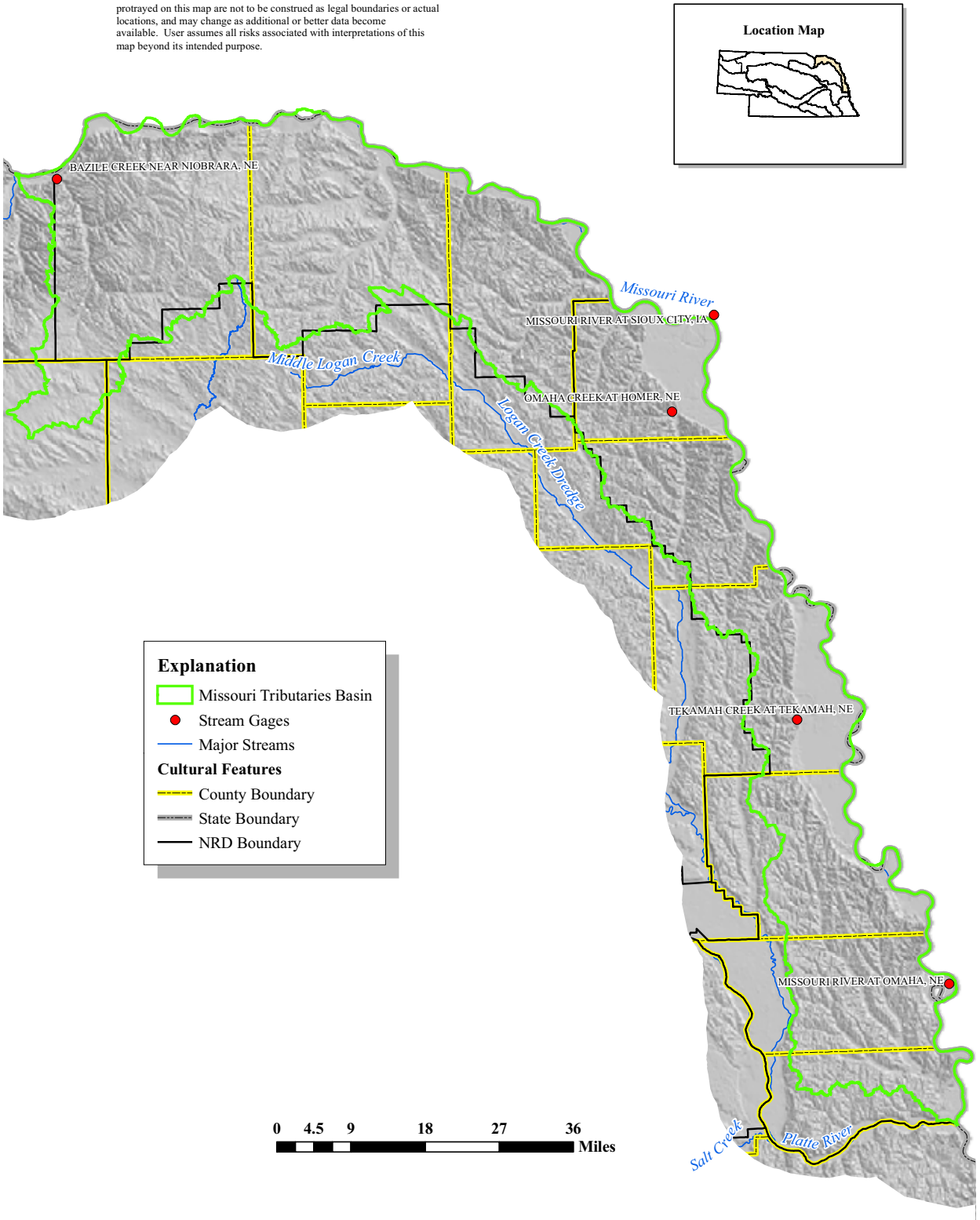
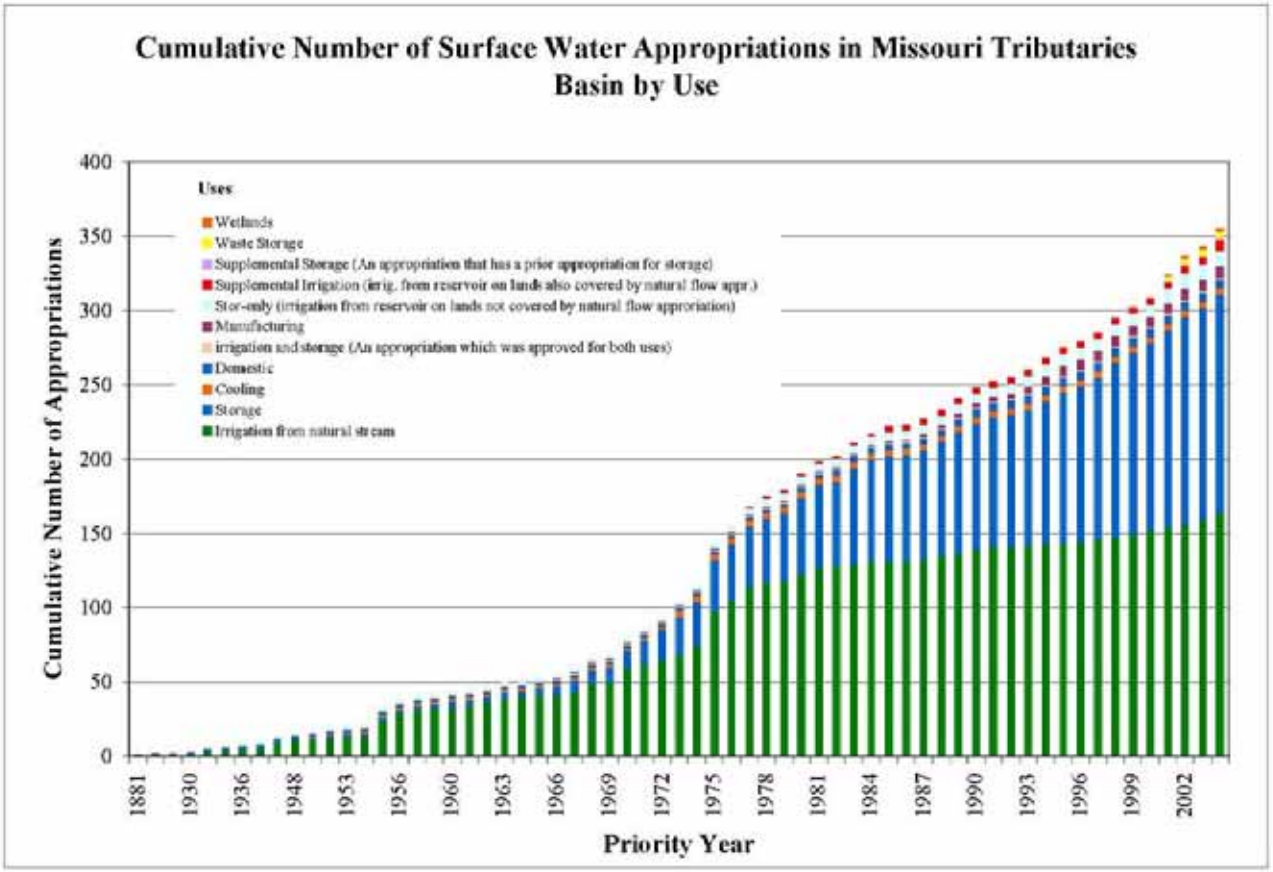


Figure MT-39.

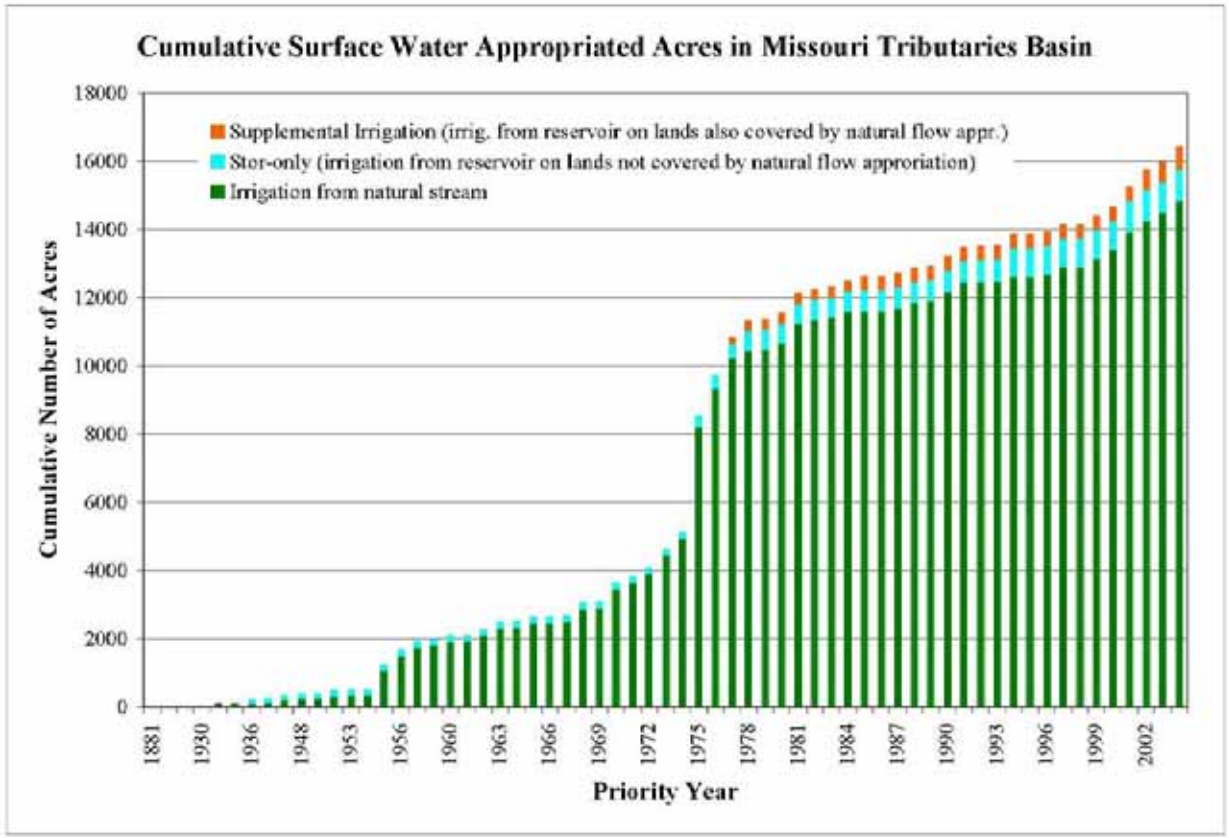
Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Stream gages map produced by Jeff Shafer, October 19, 2005.



Source: DNR Surface Water Rights Database

Figure MT-40

10/1/2005 by Shuhai Zheng



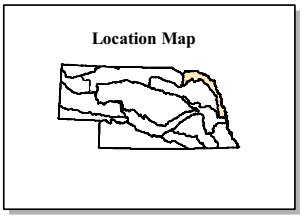
Source: DNR Surface Water Rights Database
Figure MT-41

10/1/2005 by Shuhai Zheng

Surface Water Irrigation Locations
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

This map is intended to supply only general information concerning the matter stated in its title. Boundaries and the location of features portrayed on this map are not to be construed as legal boundaries or actual locations, and may change as additional or better data become available. User assumes all risks associated with interpretations of this map beyond its intended purpose.



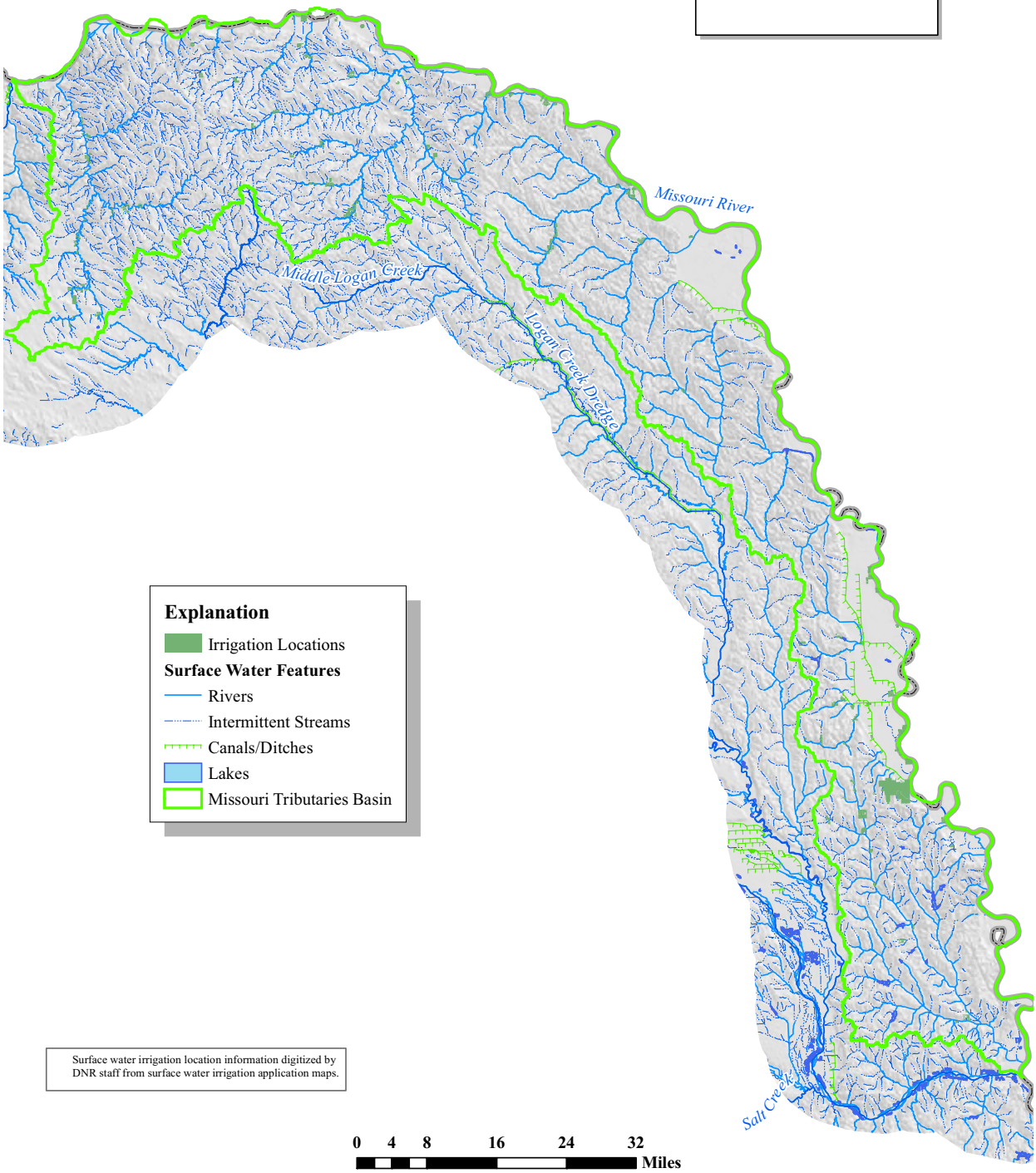


Figure MT-42.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Surface water irrigation locations map produced by Jeff Shafer, October 12, 2005

Map of Geographic Area within which Surface Water and Ground Water Are Hydrologically Connected For Purposes of the Determination of Fully Appropriated

NEBRASKA DEPARTMENT OF NATURAL RESOURCES
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

This map is intended to supply only general information concerning the matter stated in its title. Boundaries and the location of features portrayed on this map are not to be construed as legal boundaries or actual locations, and may change as additional or better data become available. User assumes all risks associated with interpretations of this map beyond its intended purpose.

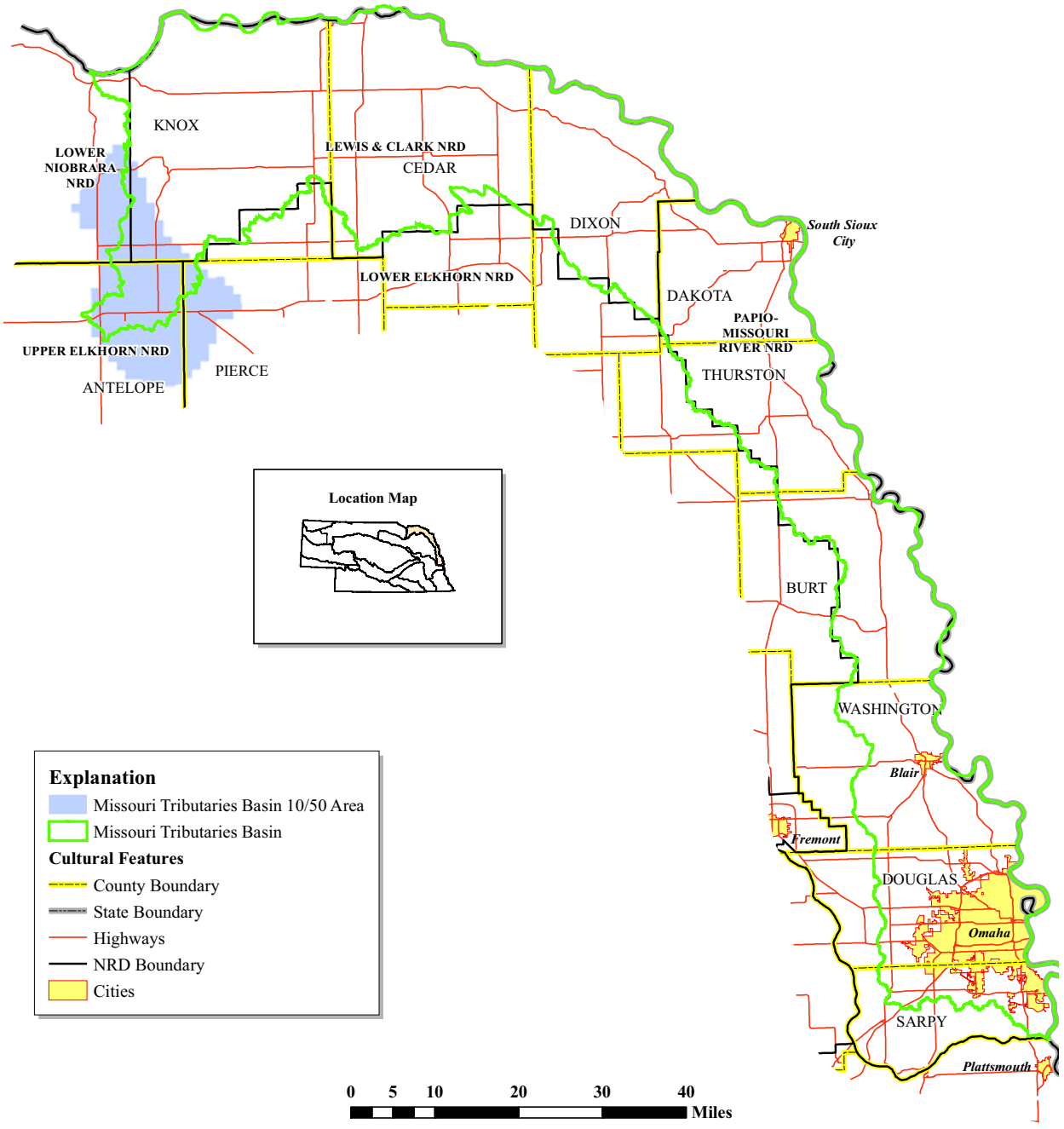
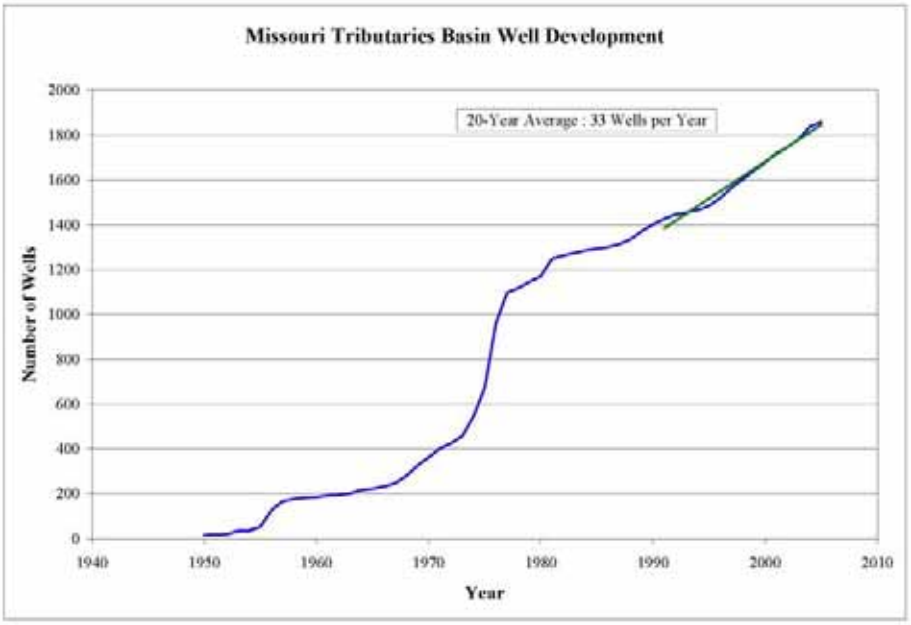


Figure MT-43.

Jeff Shafer, Nebraska Department of Natural Resources
September 26, 2005

Figure MT-44. Historic High Capacity Well Development in the Missouri Tributaries Basin.



Source: DNR Registered Ground Water Well Database

Net Corn Irrigation Requirement
MISSOURI TRIBUTARIES BASIN

Planning and Assistance Division

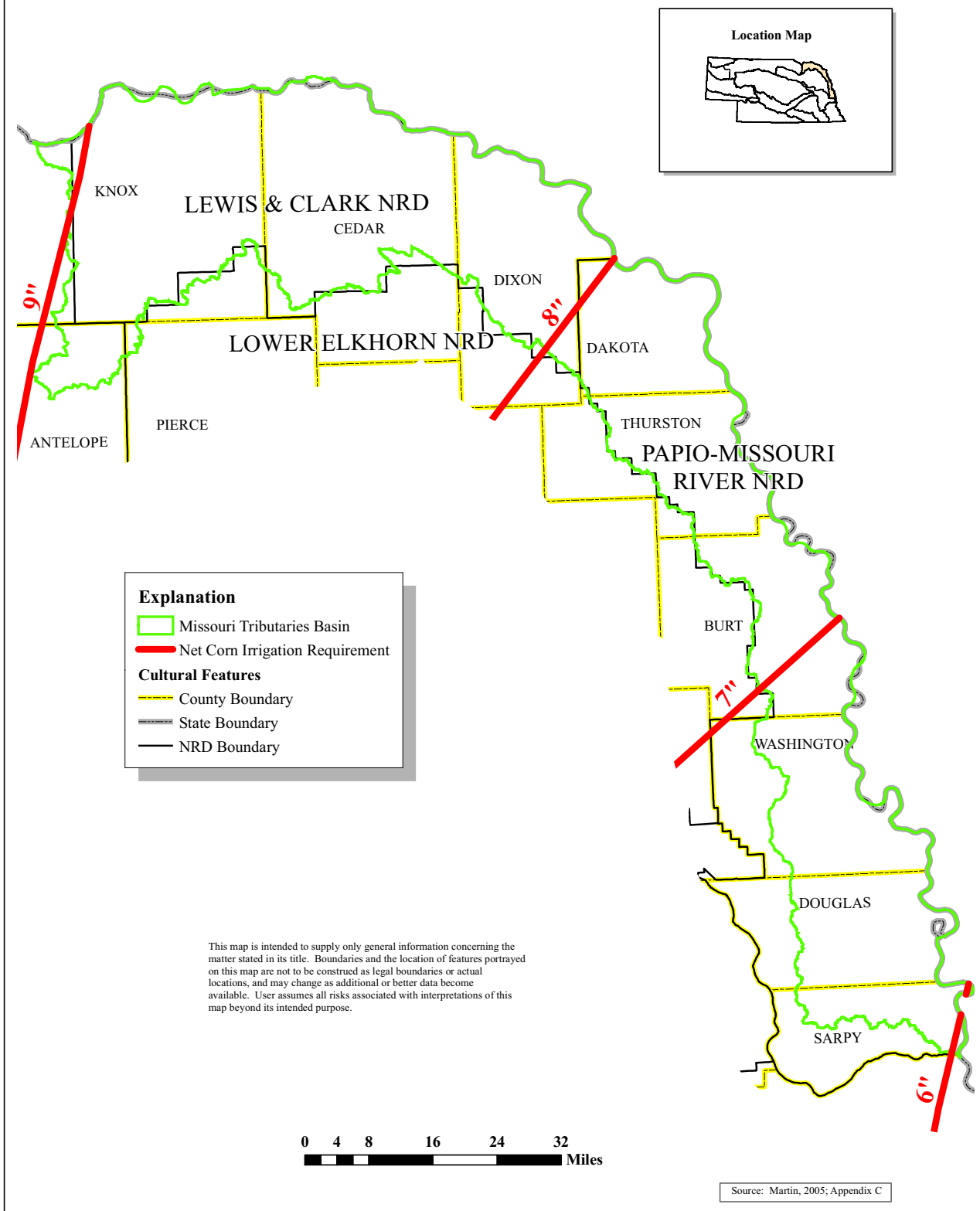


Figure MT-45.

Base map produced by Josh Lear, February 4, 2005
Base map approved February 4, 2005
Transmissivity map produced by Kevin J. Schwartman, December 7, 2005

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