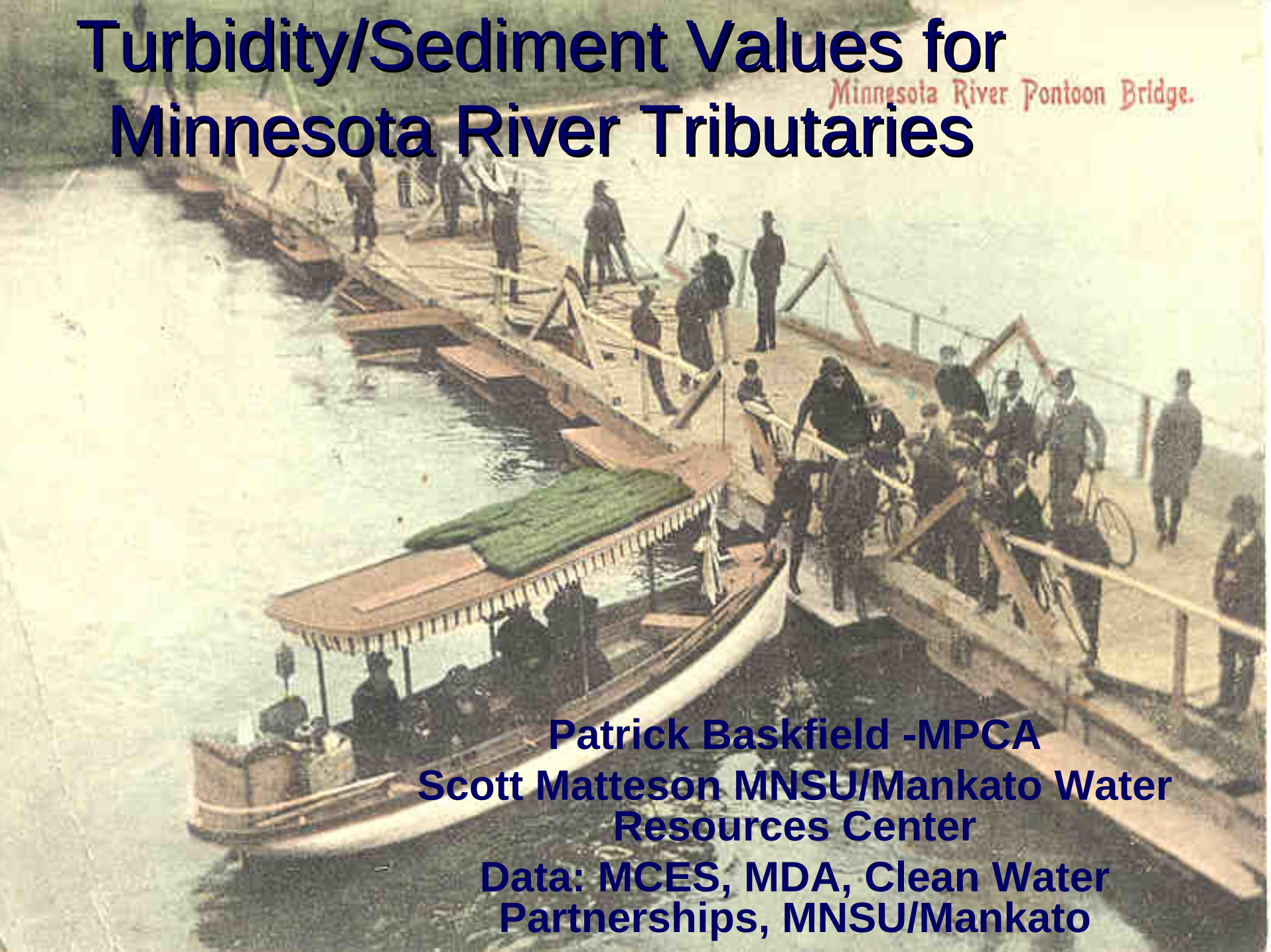
Turbidity/Sediment Values for Minnesota River Tributaries



Patrick Baskfield -MPCA

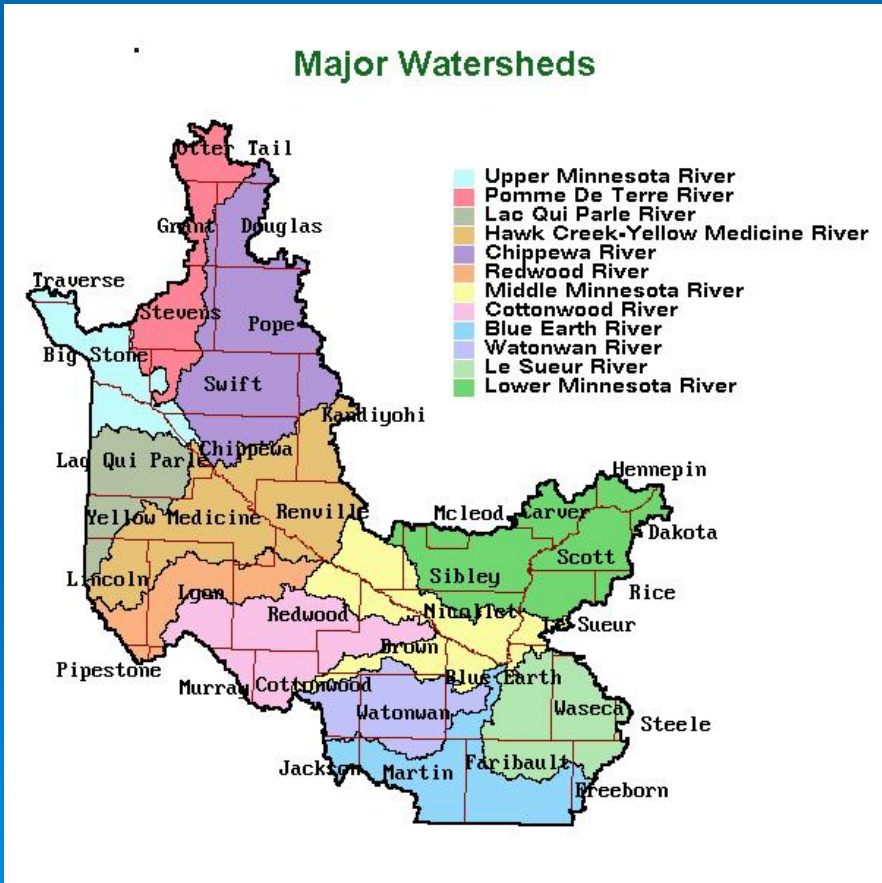
Scott Matteson MNSU/Mankato Water Resources Center

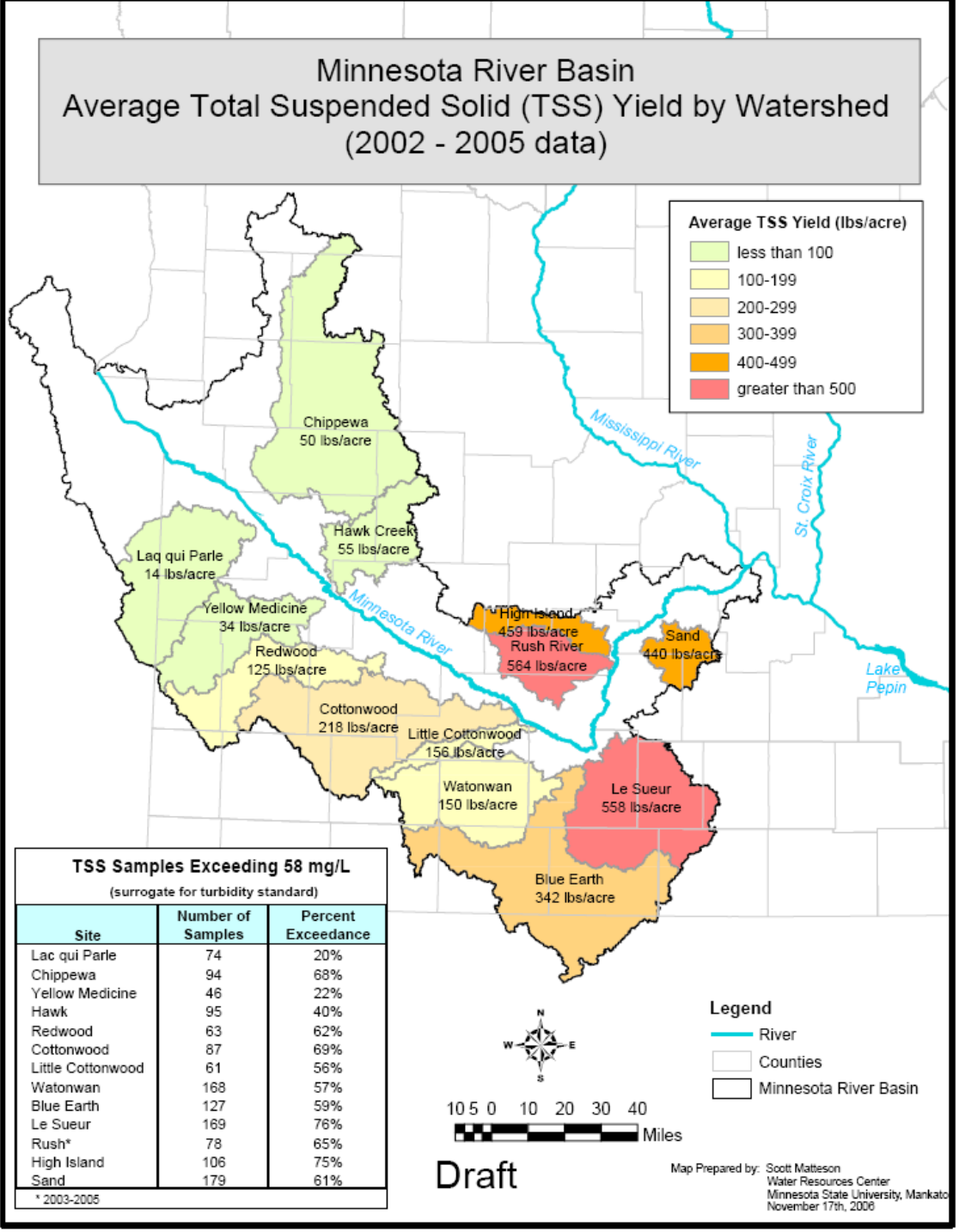
Data: MCES, MDA, Clean Water Partnerships, MNSU/Mankato

First: what numbers should we look at?

- Load – mass or total amount of pollutant
- Flow weighted mean concentration (FWMC): load/total flow volume
  example: 10 lbs/100 gallons = 0.1lb/gal
- Yield: mass/area
  example: 10 lbs/10 acres = 1 lb/acre

Q1. How do the major tributaries compare with each other?





TSS Samples Exceeding 58 mg/L

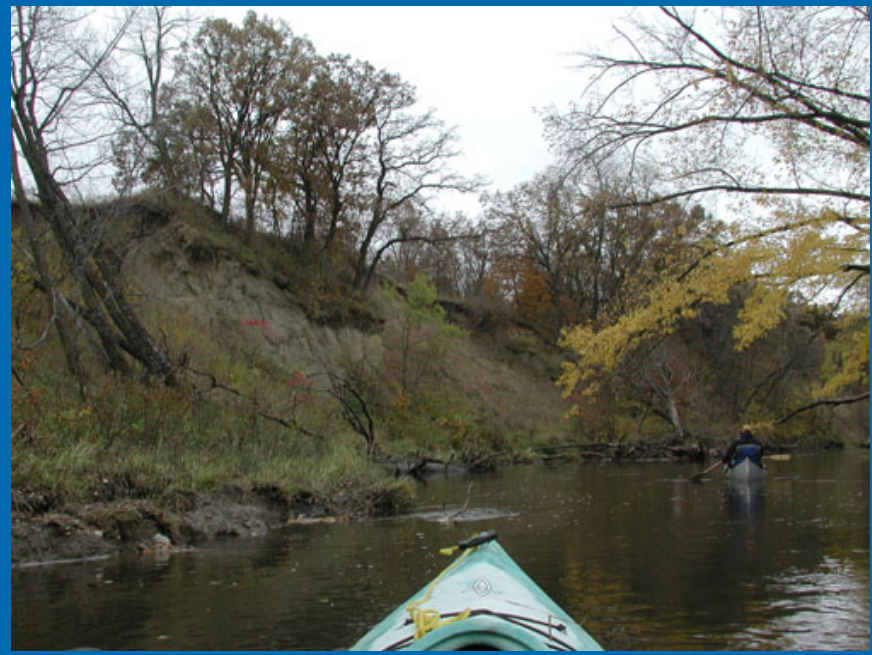
(surrogate for turbidity standard)

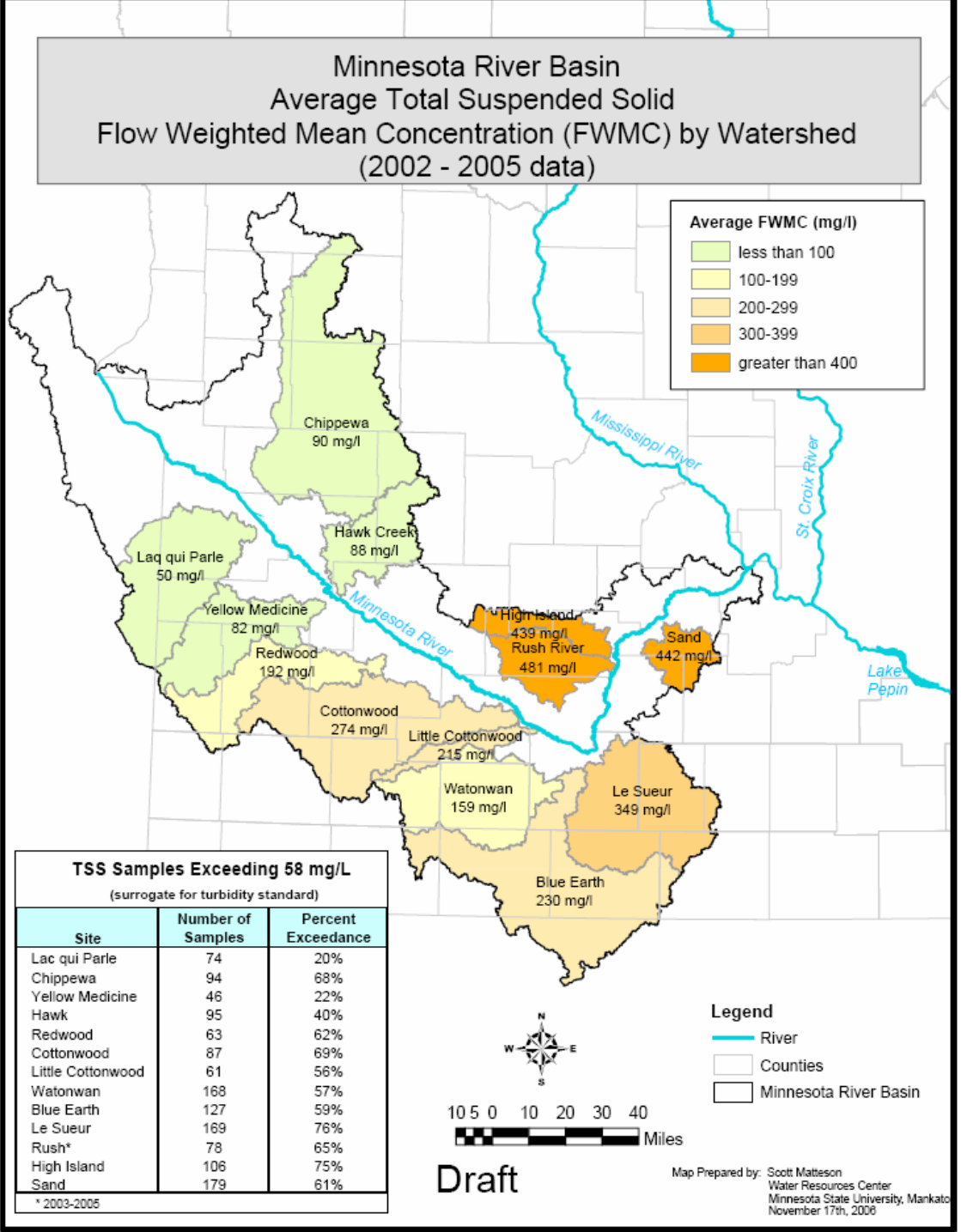
Site	Number of Samples	Percent Exceedance
Lac qui Parle	74	20%
Chippewa	94	68%
Yellow Medicine	46	22%
Hawk	95	40%
Redwood	63	62%
Cottonwood	87	69%
Little Cottonwood	61	56%
Watonwan	168	57%
Blue Earth	127	59%
Le Sueur	169	76%
Rush*	78	65%
High Island	106	75%
Sand	179	61%

* 2003-2005

- West to East Gradient in TSS Yields
  - Ten fold yield increase in east
- All monitored watersheds have turbidity impairments
- Blue Earth and Le Sueur rivers and lower Minnesota are most impaired

How impaired or dirty are these waters?





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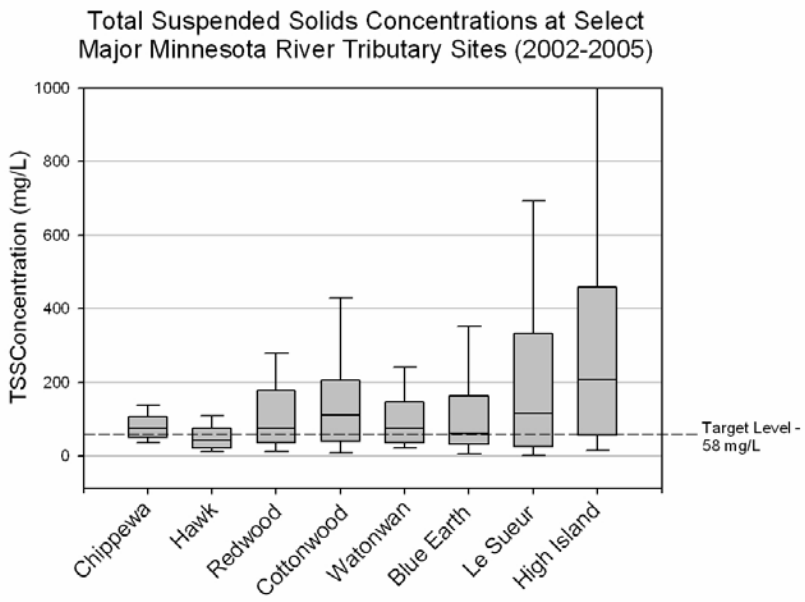
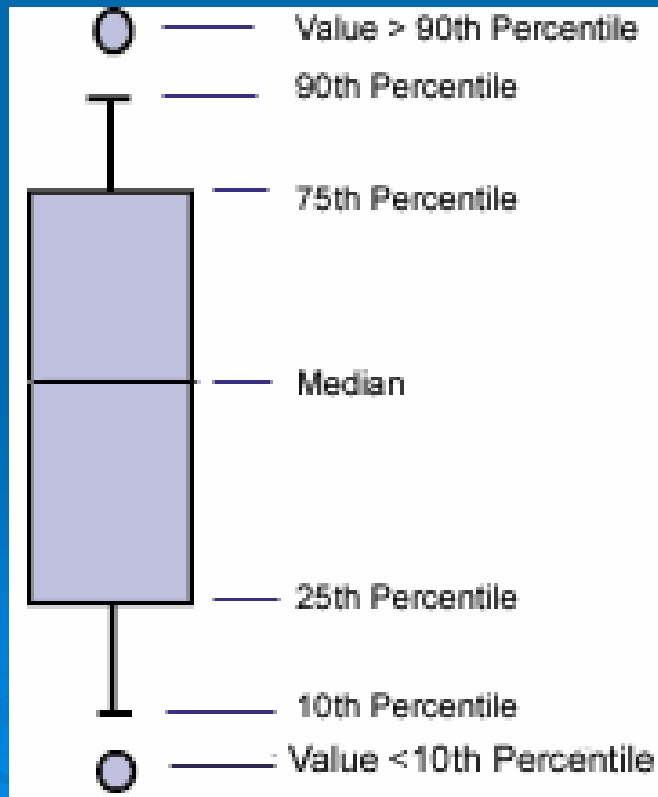
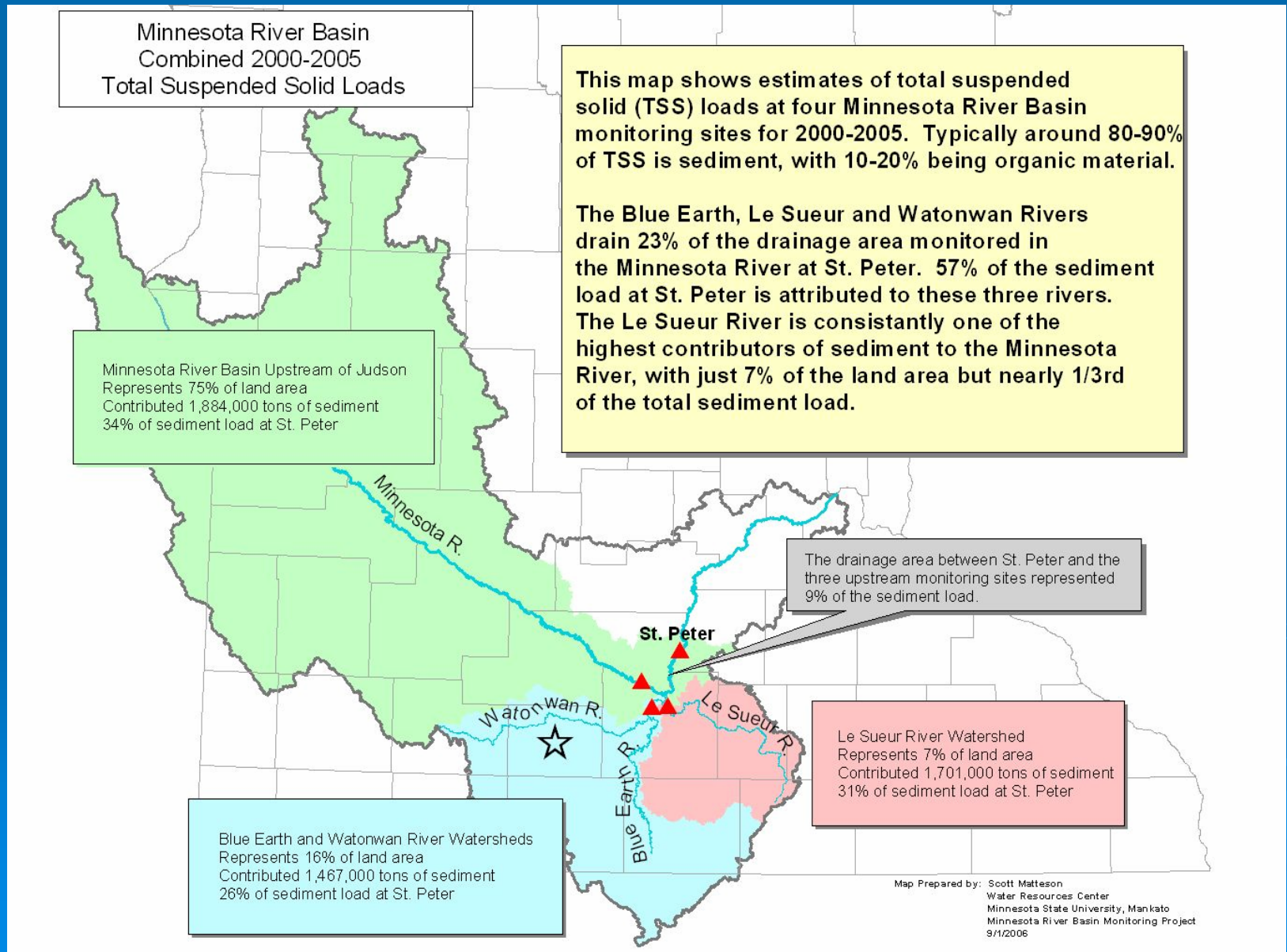
- Total Suspended Solids samples above 58 mg/L are out of compliance with the State's turbidity standard (WCBP ecoregion)

TSS Box Plot for MN River Tributaries



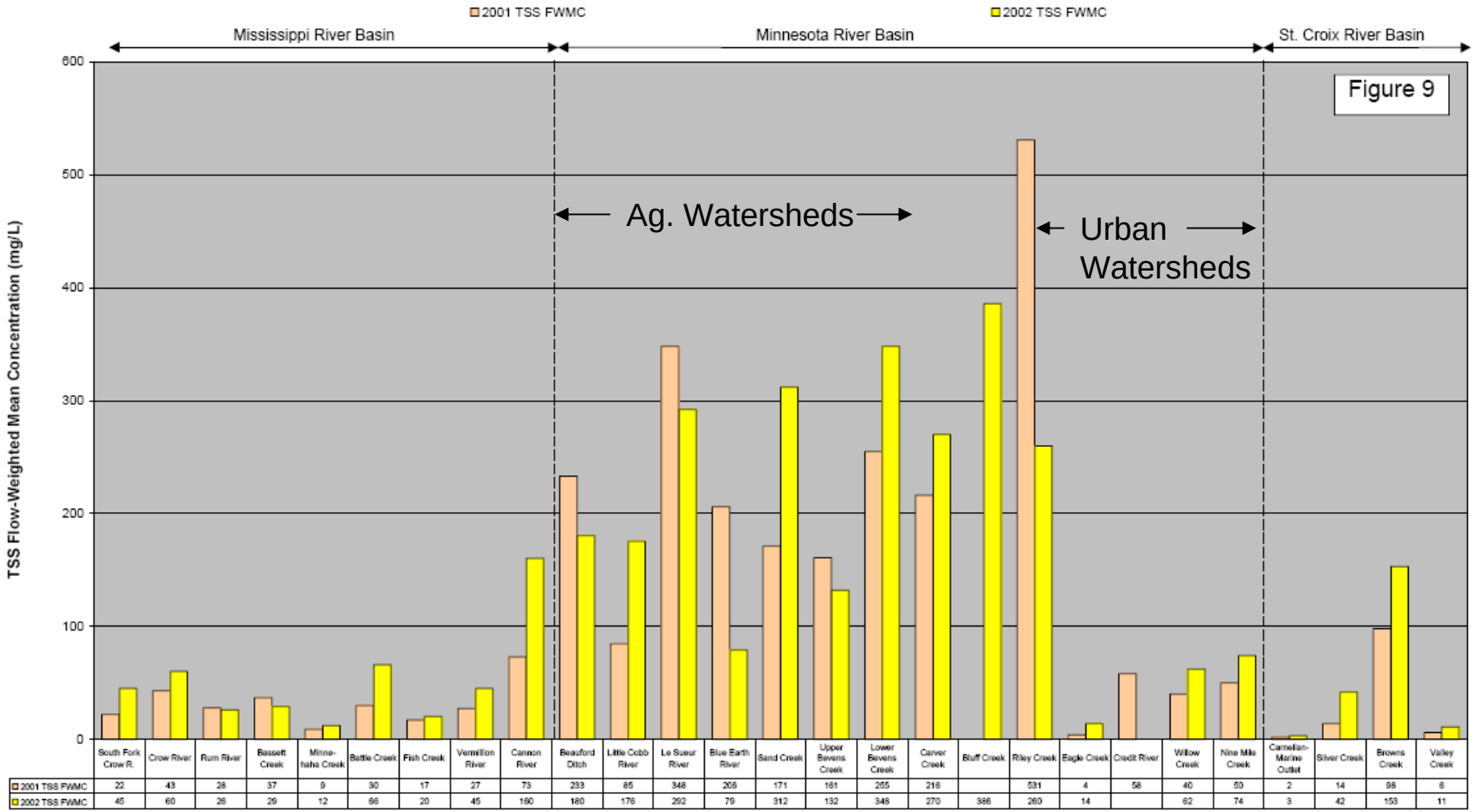


Basin Overview (Draft)



What about Metro Watersheds?

Figure 9. A Comparison of 2001-2002 Total Suspended Solids (TSS) Flow-Weighted Mean Concentrations (FWMC) by Stream and Major River Basin



	South Fork Crow R.	Crow River	Rum River	Bassett Creek	Minne-haha Creek	Battle Creek	Fish Creek	Vermillion River	Cannon River	Beaufort Ditch	Little Cobb River	Le Sueur River	Blue Earth River	Sand Creek	Upper Bevens Creek	Lower Bevens Creek	Carver Creek	Bluff Creek	Riley Creek	Eagle Creek	Credit River	Willow Creek	Nine Mile Creek	Carnelian-Marine Outlet	Silver Creek	Browns Creek	Valley Creek
2001 TSS FWMC	22	43	28	37	9	30	17	27	73	233	85	348	208	171	161	255	216		531	4	58	40	50	2	14	98	6
2002 TSS FWMC	45	60	26	29	12	66	20	45	160	180	176	292	79	312	132	348	270	386	260	14		62	74	3	42	153	11

Metropolitan Council Environmental Services

Land Use

Table 4.01. Watershed Land Use for Minor Minnesota River Tributaries Sites

	Agriculture	Residential	Commercial	Industrial	Public Semi-Public	Parks and Rec.	Transprt	Undev.	Water
Dry Weather	94%	1%						4%	1%
WFBC	92%	3%						4%	<1%
Clear	94%	<1%	<1%					3%	1%
Dutch	92%	1%						5%	
Seven Mile	86%	3%						8%	3%
Bevens	85%	2%						5%	8%
Chaska	73%	4%						12%	11%
Carver	58%	4%	0%	1%	0%	1%	0%	25%	9%
Bluff	19%	15%	<1%	3%	1%	21%	<1%	33%	6%
Riley	7%	20%	2%	3%	1%	17%	5%	31%	13%
Eagle	<1%	13%	2%	7%	20%	0%	6%	45%	7%
Credit	26%	17%	1%	1%	1%	14%	0%	37%	4%
Willow	0%	36%	11%	14%	2%	8%	3%	22%	4%
Nine Mile	0%	44%	6%	8%	4%	19%	5%	9%	6%

What about other source of sediment?

- **Sediment carried in storm water and runoff from construction sites can have local impacts on water quality**

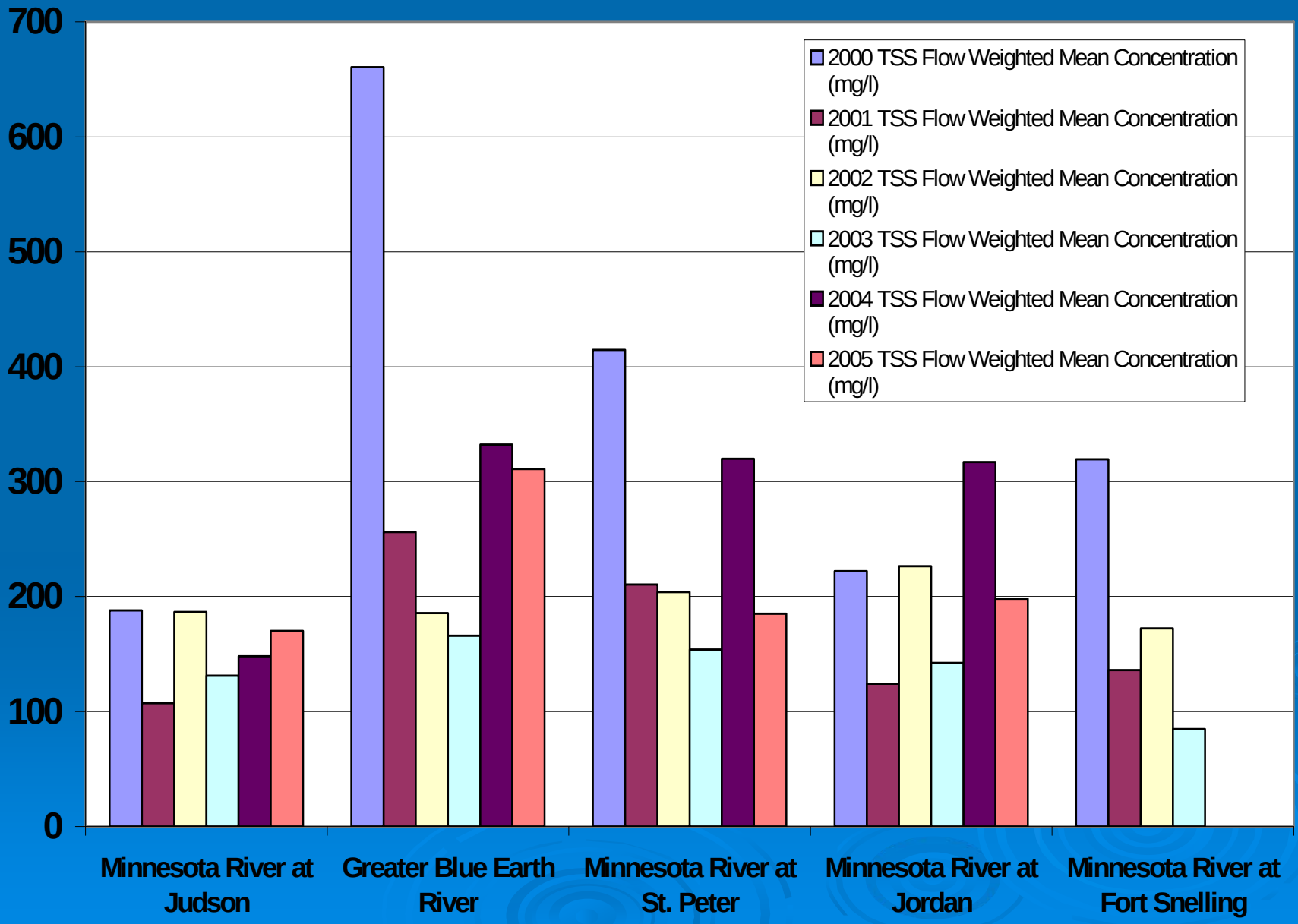
Table 2-1 Basin Characteristics

Basin	Area (Sq Miles)*	Average Precipitation (1979-2002)	Average Runoff (1979-2002)	Land Cover Percentages**					
				Urban	Forested	Tilled Agricultural	Pasture/ Grassland	Wetland/Open Water	Other
Cedar River	1,028	32.06	9.80	3.4%	3.3%	83.4%	6.2%	3.7%	0.0%
Des Moines River	1,535	27.98	5.68	1.8%	1.8%	79.9%	11.0%	5.5%	0.0%
Lake Superior	6,149	29.11	12.44	1.4%	57.1%	2.6%	3.5%	33.3%	2.1%
Lower Mississippi	6,317	33.29	10.28	2.4%	15.4%	52.2%	24.8%	5.1%	0.1%
Minnesota River	14,943	28.14	5.61	2.2%	4.6%	72.7%	12.6%	7.8%	0.1%

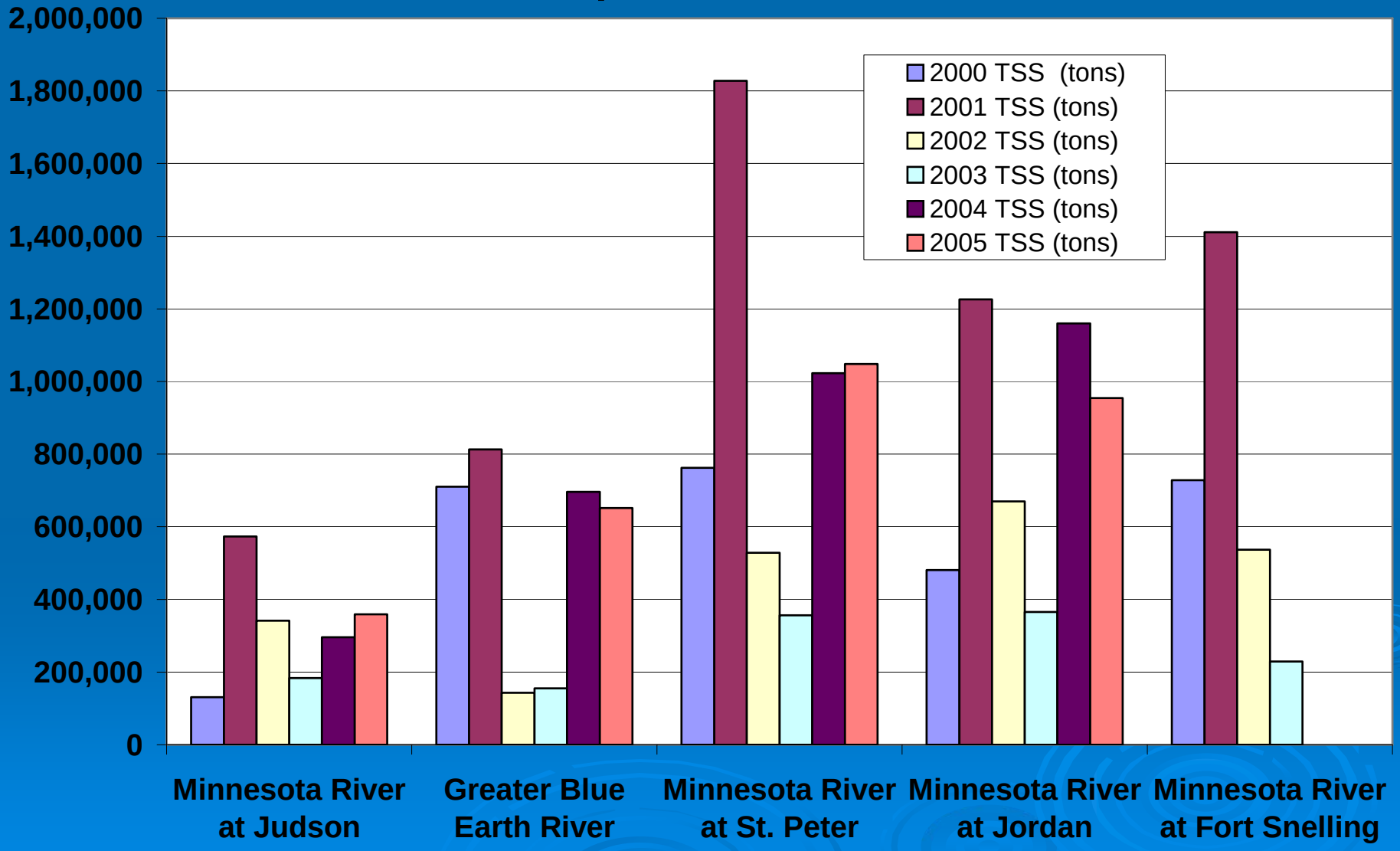
*Drainage area within Minnesota

**Based on USGS National Land Cover Database (1992)

Minnesota River Mainstem and Greater Blue Earth River Total Suspended Solids Flow Weighted Mean Concentrations



Minnesota River Mainstem and Greater Blue Earth River Total Suspended Solids Loads



Conclusions

- All monitored major watersheds in the Minnesota River Basin have turbidity Impairments
- Total suspended solids concentrations and yields are greatest in the Greater Blue Earth River watershed and many of the smaller watersheds in the Lower Minnesota River
- Sediment carried in storm water runoff and runoff from construction sites can have local impacts on water quality.
  - However, monitoring data show the majority of the sediment delivered to the Minnesota River originates above the greater metropolitan area.