Floodplains of the Illinois River: their use and their economic and environmental value

THE WETLANDS INITIATIVE

The simple logic of floodplain management:

- The state of our floodplains is a matter of land use
- Land use is a matter of economics
- Therefore, economics control the environmental conditions of our floodplains

What problems have been caused by past uses of our floodplains?

- Flood damage
- Degraded water quality
- Reduced wildlife
- Limited biodiversity

Pre-settlement: Wetlands

Settlement: Drainage

Today: Concrete and Steel

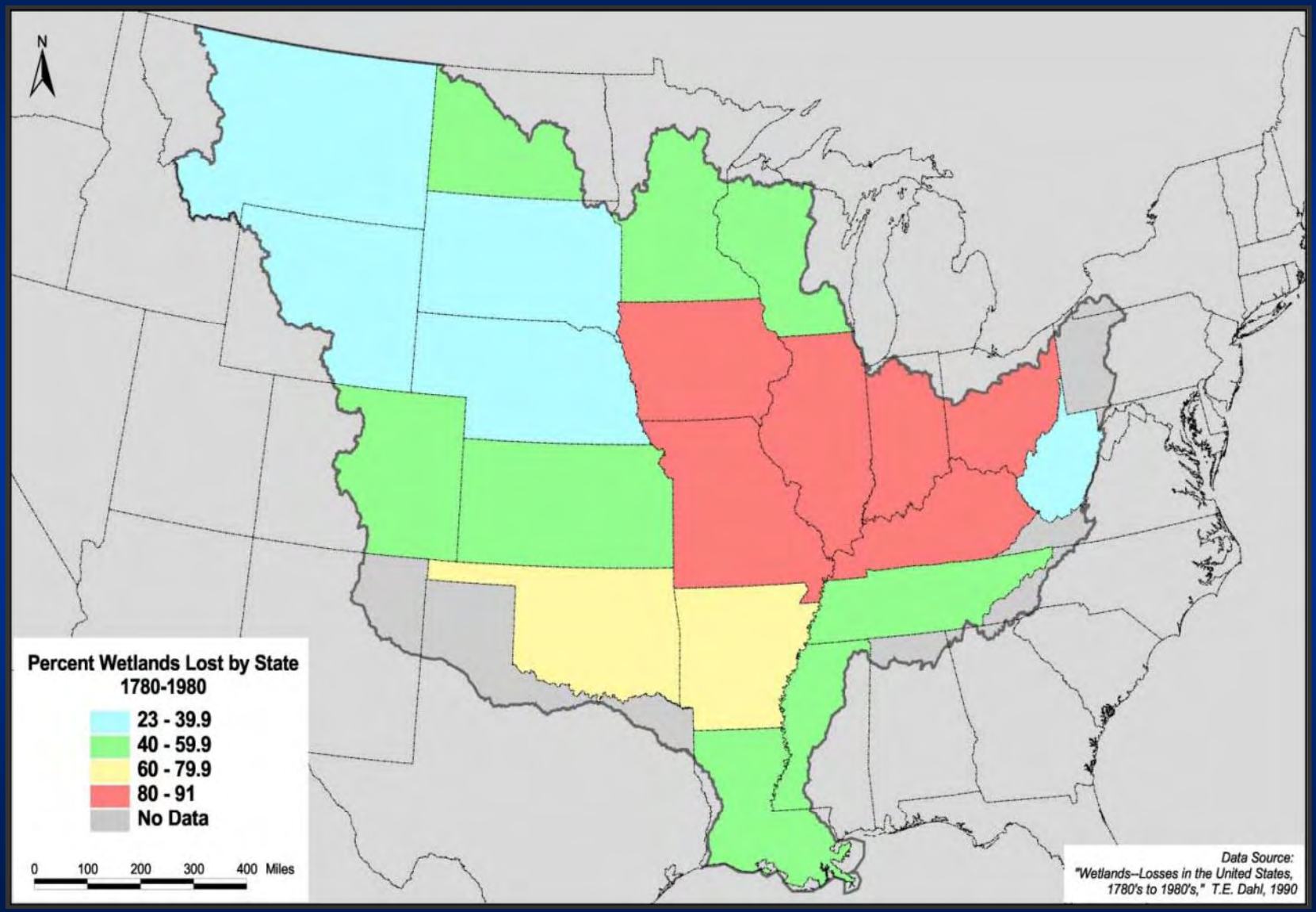
Why do these problems occur and why is our environment not more diverse, more functional, more to our liking?

Use Category	Unit Value ($/acre)
Recreation	1,000
Row-crop	3,000
Suburban	25,000
Urban	100,000
Commercial	2,000,000

And, what of these values?

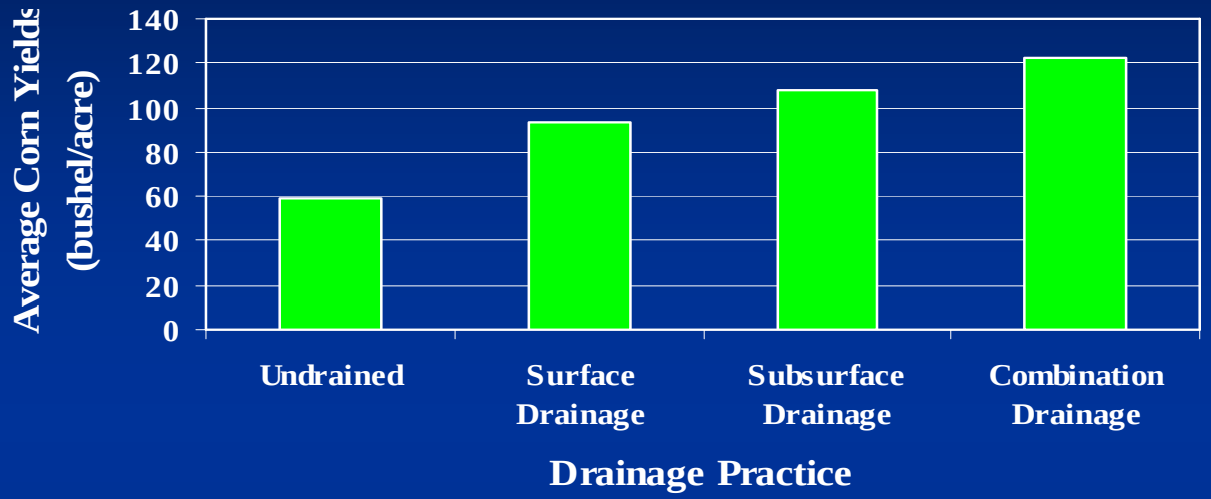
Ecosystem Use	Unit Value ($/acre)
Floodwater Storage	?
Nutrient Management	
Nitrogen	?
Phosphorous	?
Carbon	?
Sediment Control	?
Wildlife habitat	?
Biodiversity	?

Wetland Losses: Mississippi River Basin



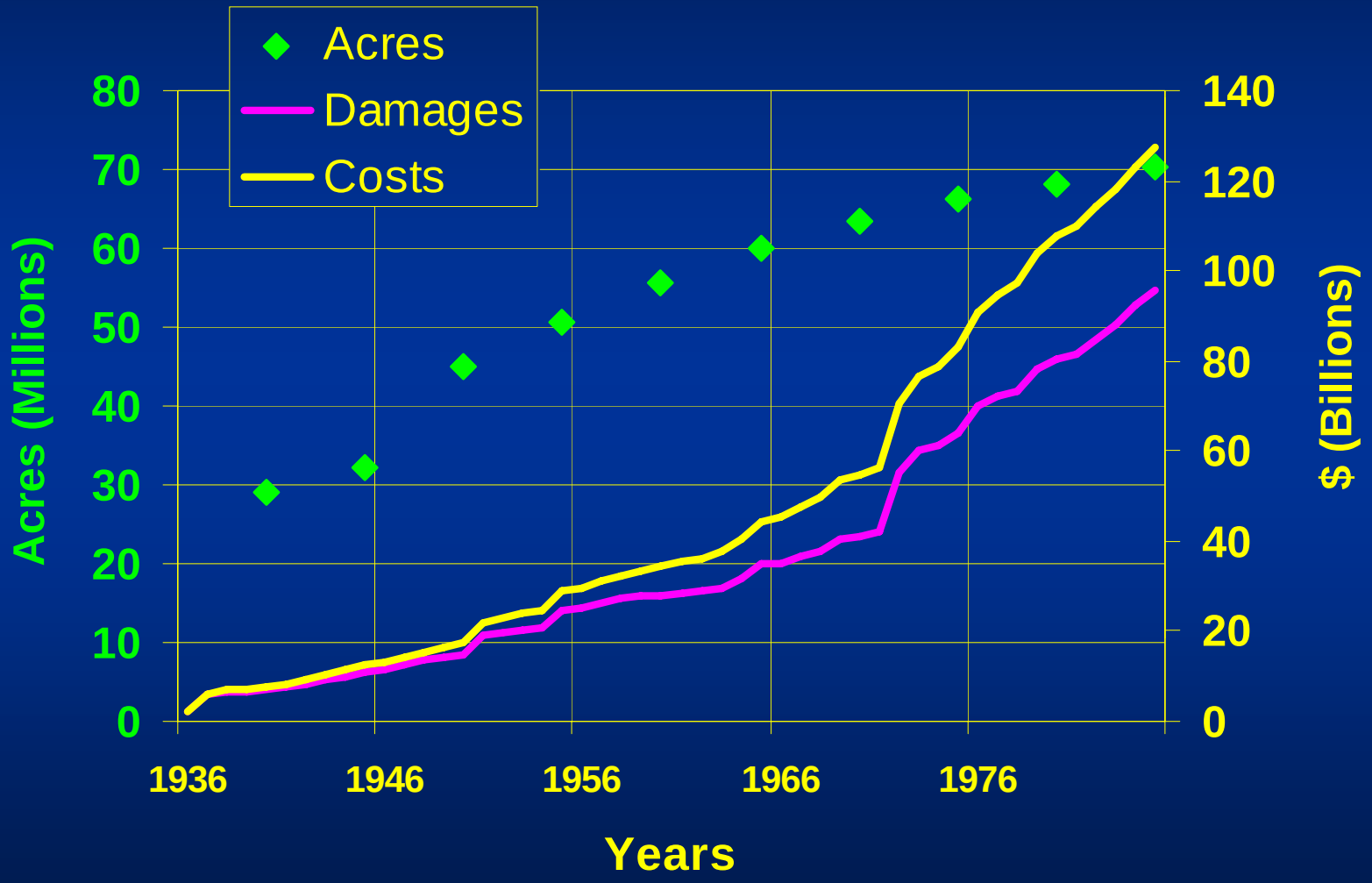
Agricultural drainage: pros and cons

Drainage Benefits

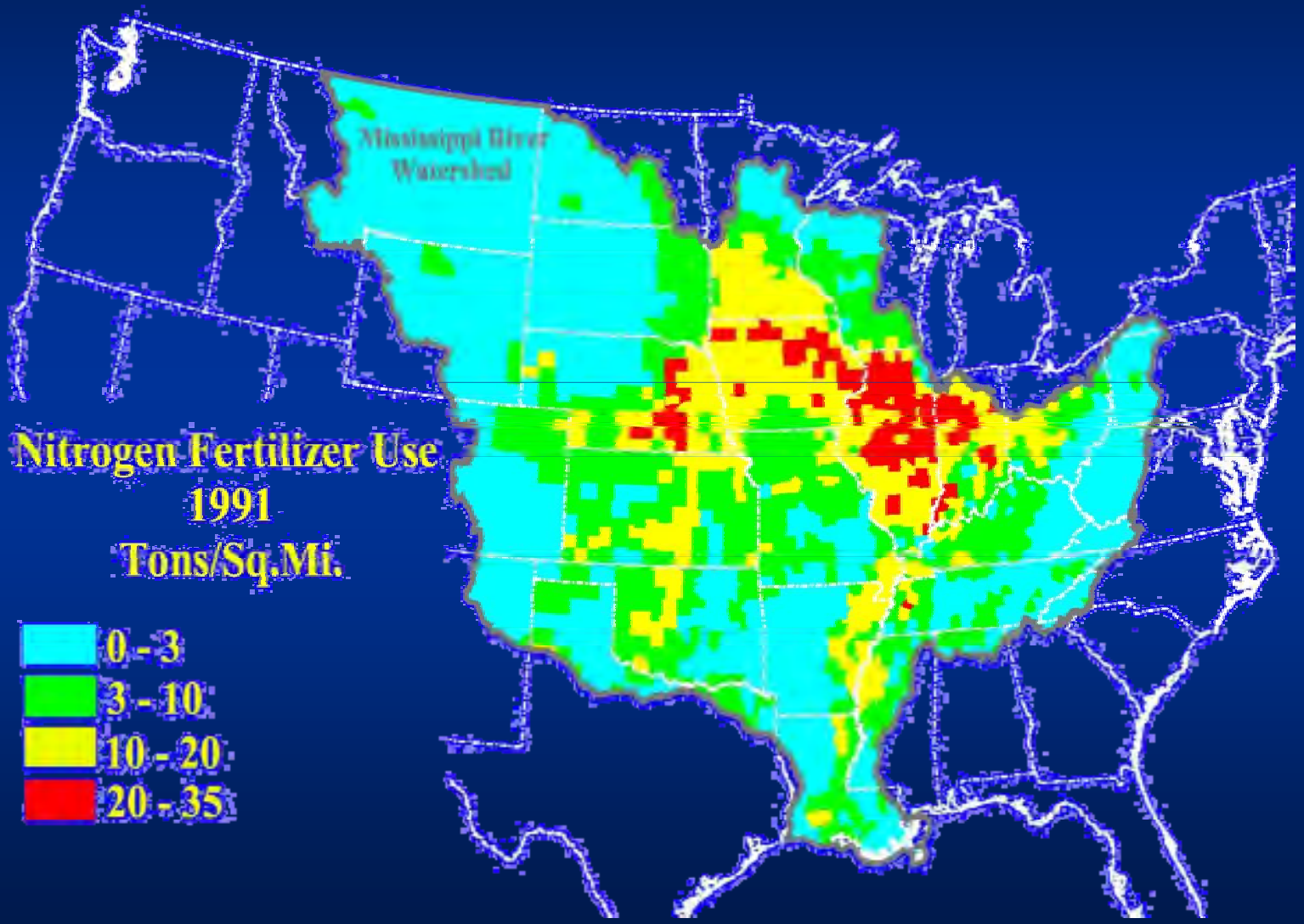


Area Drained: Mississippi River Basin

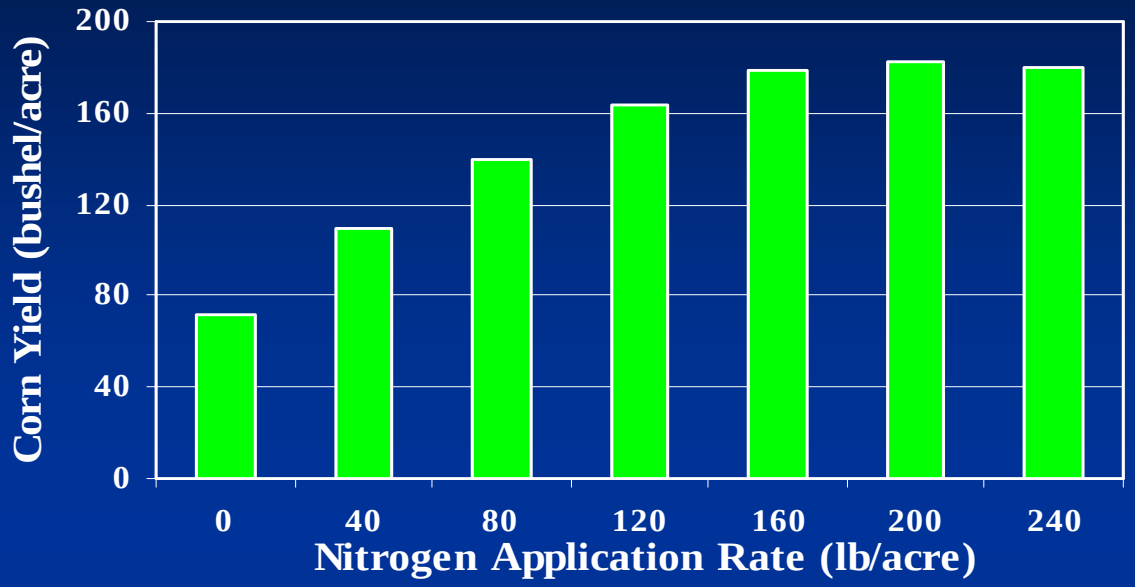
Cumulative flood damage and control costs (1985 dollars)



Nitrogen Fertilizer Use, 1991



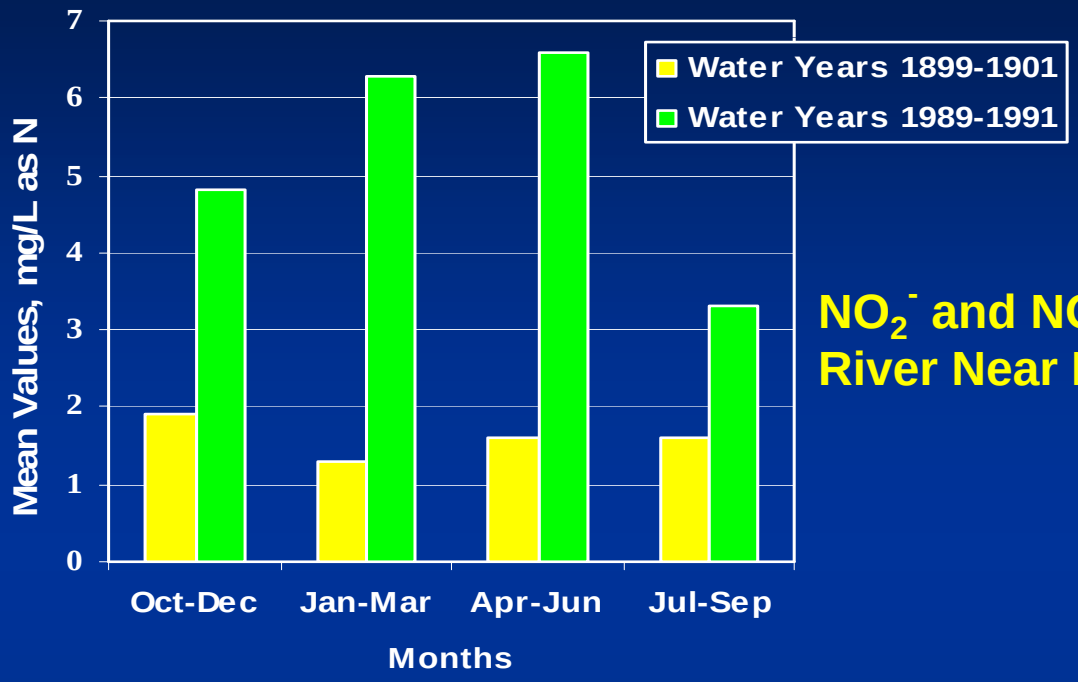
Nitrogen benefits and use



- Effect of nitrogen application rate on corn yield

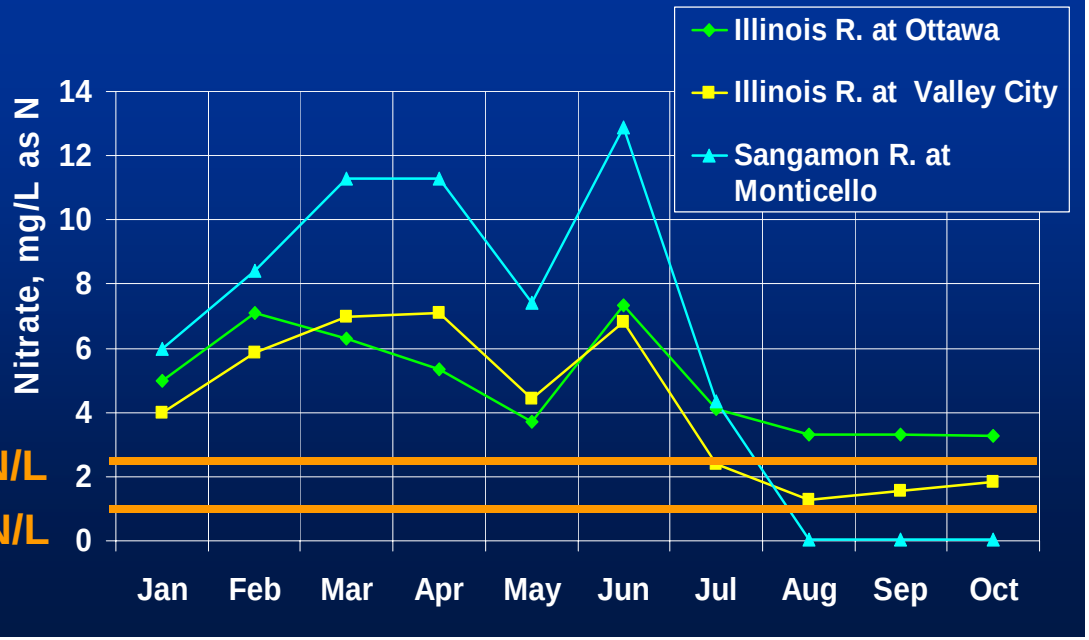
- Annual Nitrogen Fertilizer Usage: Mississippi-Atchafalaya River Basin

Nitrogen in the water



NO_2^- and NO_3^- Concentrations in the Illinois River Near Peoria, 1900 and 1990

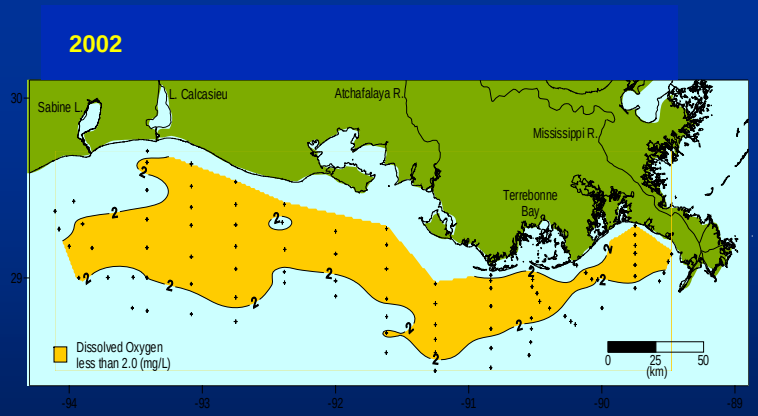
2001 Illinois River NO_3-N Levels



USEPA Ecoregion Criteria: 2.14 mg TN/L

USEPA Ecoregion Criteria 1.6 mg NO_3-N/L

And, what about water quality? Hypoxia in the Gulf of Mexico is a good place to start.



A solution so simple: wetland restoration

Of the nitrogen loads reaching the Gulf of Mexico, the Illinois River contributes more than its fare share.

- The Illinois River contributes 3% of the flow but 12% (126,000 tons) of the total yearly NO_3-N load
- To reach pre-1970's NO_3-N loads to the Gulf of Mexico (350,000 tons/year) requires a load reduction of 700,000 tons/year in the Mississippi River and 100,000 tons/year in the Illinois River
- For the Illinois River, the solution requires 10% of drained wetlands to be restored, which would occupy 32% of the FEMA floodplain

	Acres	% Watershed
Wetlands required	407,000	2.0
Wetlands drained	4,170,000	20.0
FEMA Floodplain	1,280,000	6.3

Potential Restoration Areas in FEMA Floodplain

Upper Mississippi River Basin

State	Watershed* (acres)	Hydric Soils* (acres)	Row Crops on Hydric Soils (acres)
Illinois	**28,929,000**	**1,008,000**	**736,000**
Iowa	**36,007,000**	**2,216,000**	**937,000**
Minnesota	**31,685,000**	**1,269,000**	**179,000**
Missouri	**32,833,000**	**1,435,000**	**832,000**
Wisconsin	**24,899,000**	**916,000**	**275,000**
Total Area	**154,353,000**	**6,894,000**	**2,960,000**

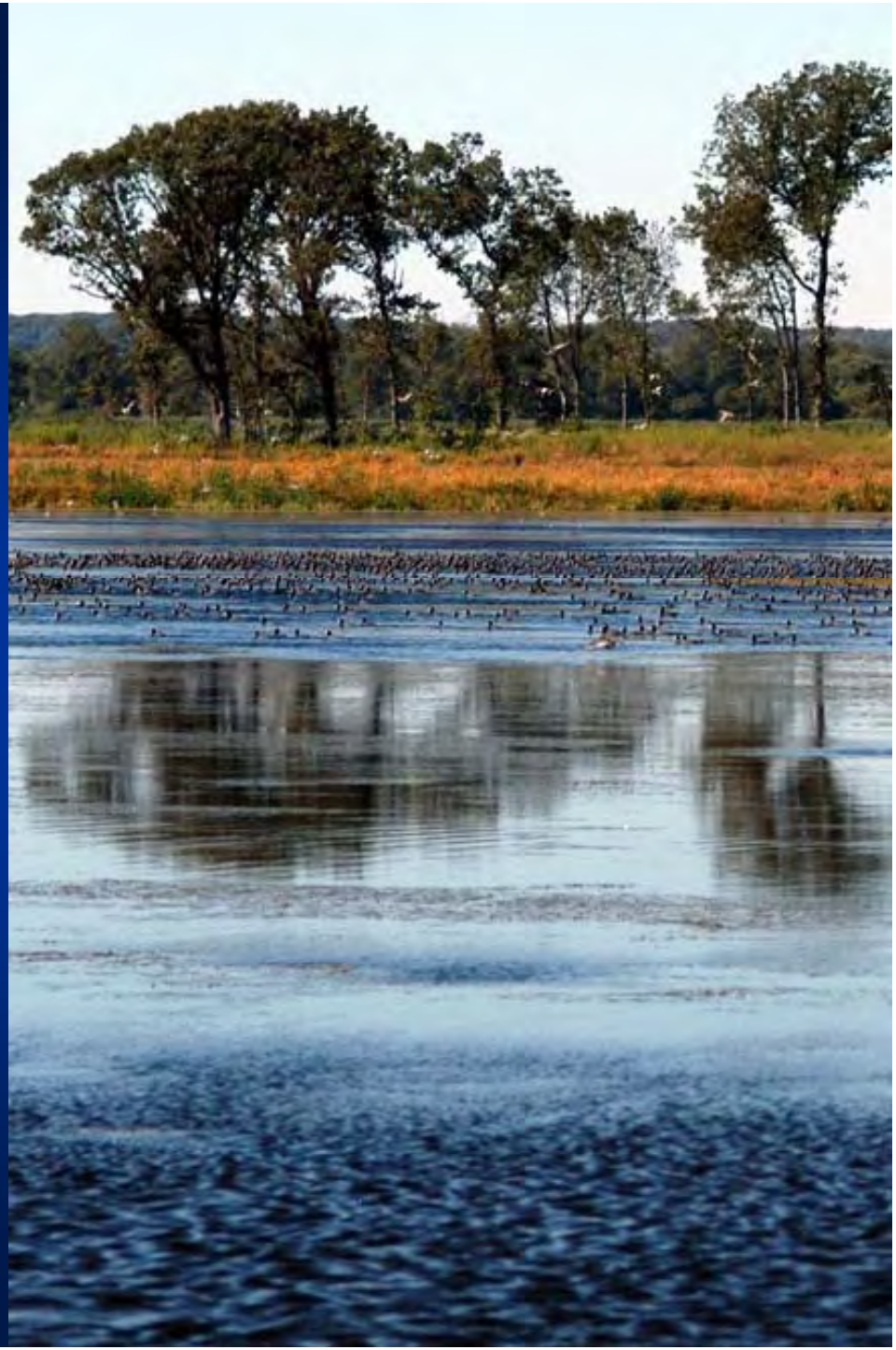
- Extrapolated data from the report: *Flood Damage Reduction in the Upper Mississippi River Basin (UMR): An Ecological Means*

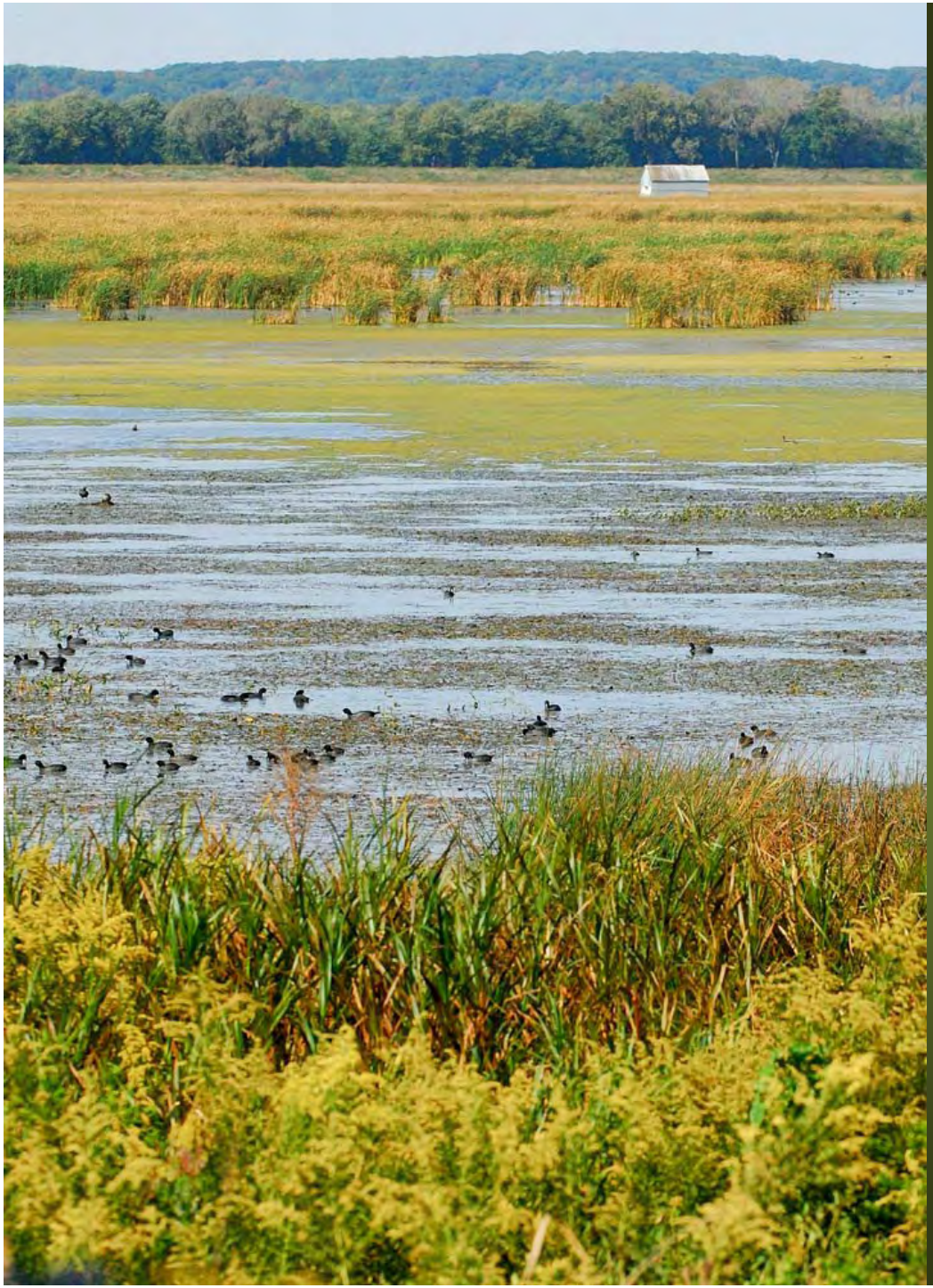
Financing Restoration

Water Quality/Nutrient Trading

Nutrient Farming

- Cost Comparison
- Market Structure





NUTRIENT FARMING

A strategy that:

utilizes created and restored wetlands to naturally remove nitrogen and phosphorous from surface waters and CO_2 from the air

is a business enterprise based on the sale of nutrient reduction credits

“Credits” will be sold to dischargers who need to meet water quality standards.

WERF ECONOMIC COMPARISON

Effluent Limit (mg/L)	Wetland Size (acres)	Total Nitrogen		
		Savings*	50% split of savings	Net Profit/acre
3.0 TN, 1.0 TP	189,000	74,000,000	37,000,000	196
2.18 TN, 0.5 TP	322,000	76,000,000	38,000,000	118

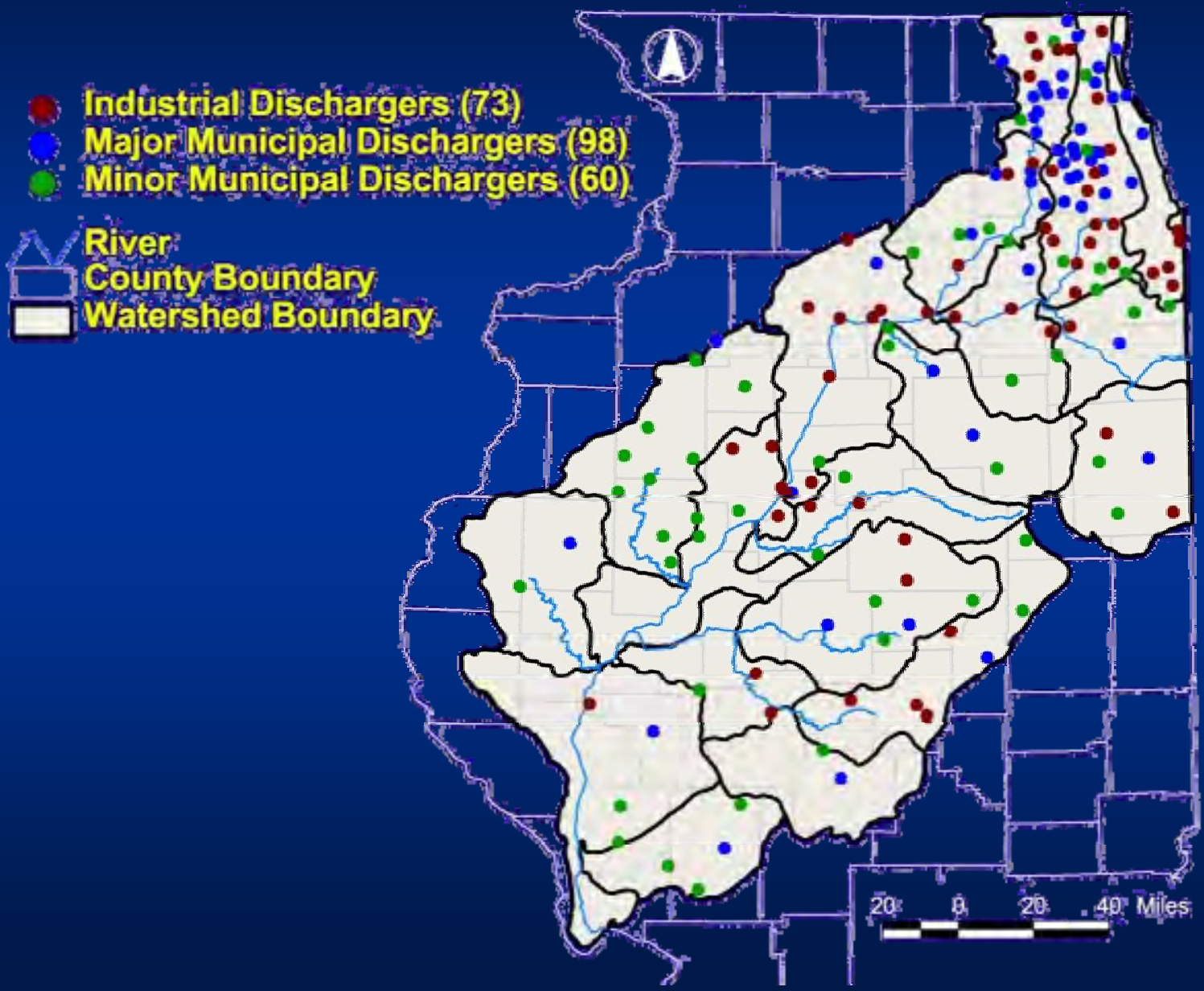
Effluent Limit (mg/L)	Wetland Size (acres)	Total Phosphorous		
		Savings*	50% split of savings	Net Profit/acre
3.0 TN, 1.0 TP	189,000	59,400,000	29,700,000	157
2.18 TN, 0.5 TP	322,000	88,400,000	44,200,000	137

Total annual MWRDGC cost savings: $66,700,000-$82,200,000

Total annual Nutrient Farmer net profit: $255-$353/acre

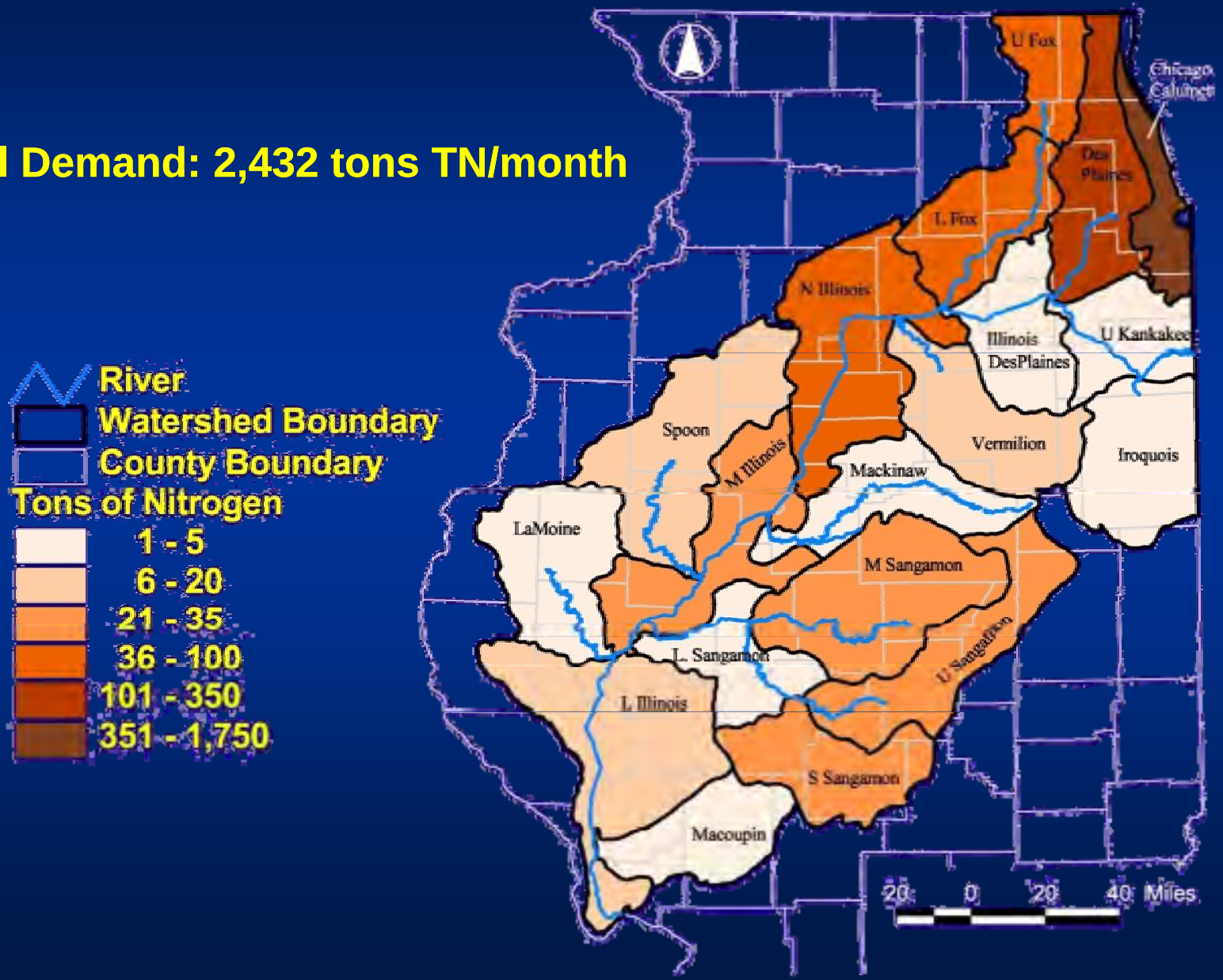
*** includes sale of extra credits**

TN CREDIT DEMAND



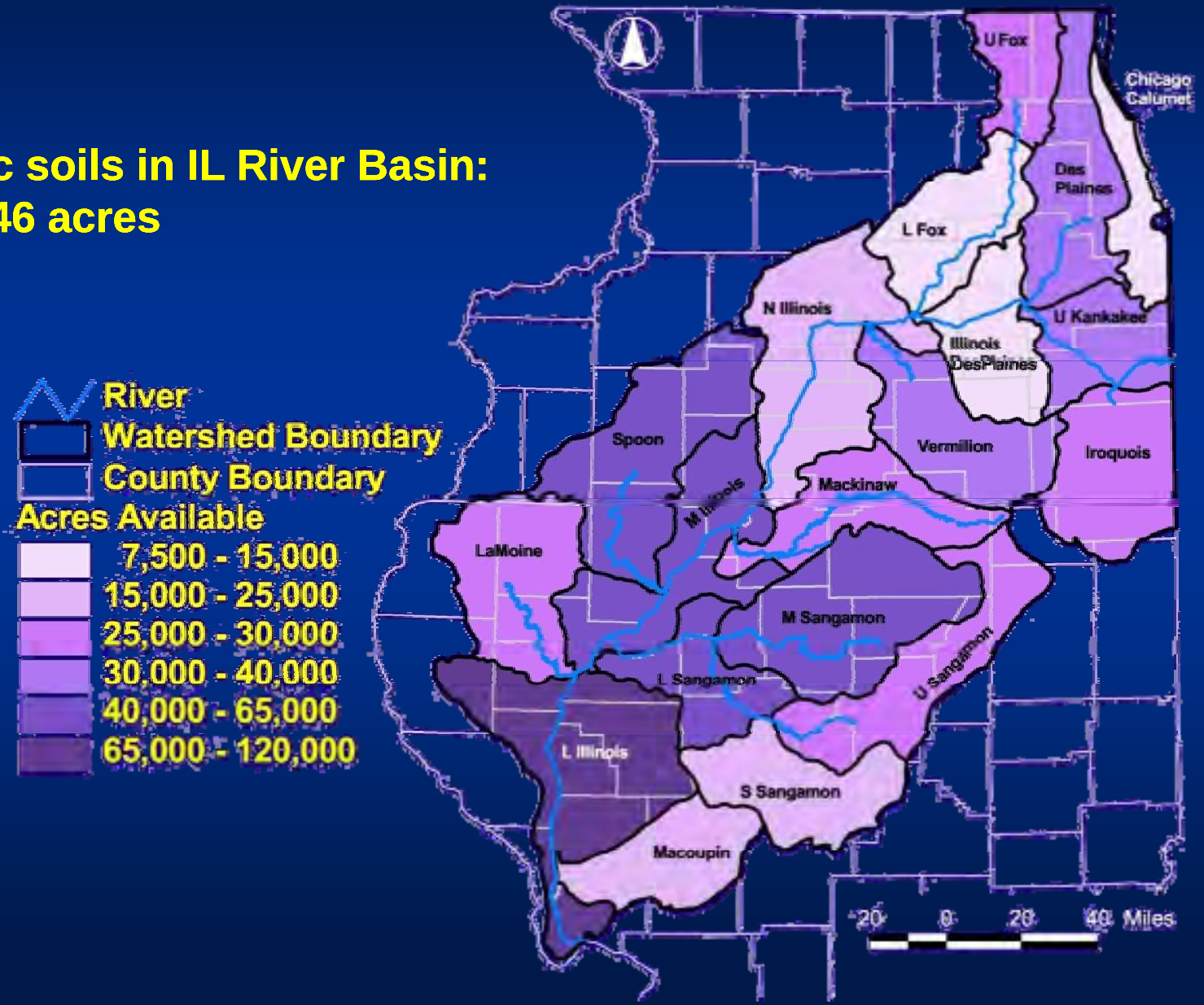
TN CREDIT DEMAND

Total Demand: 2,432 tons TN/month



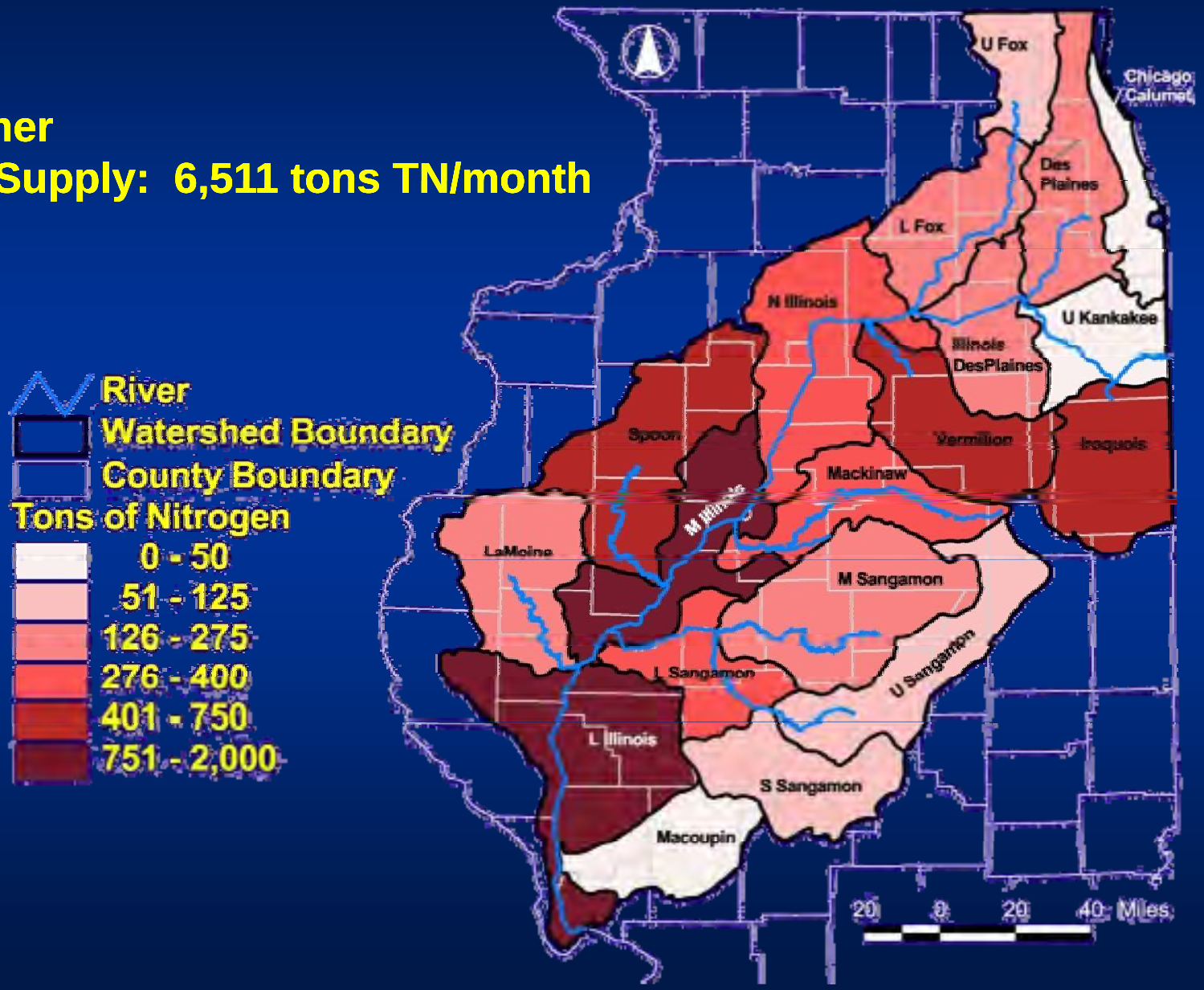
TN CREDIT SUPPLY: LAND

Hydric soils in IL River Basin:
655,146 acres



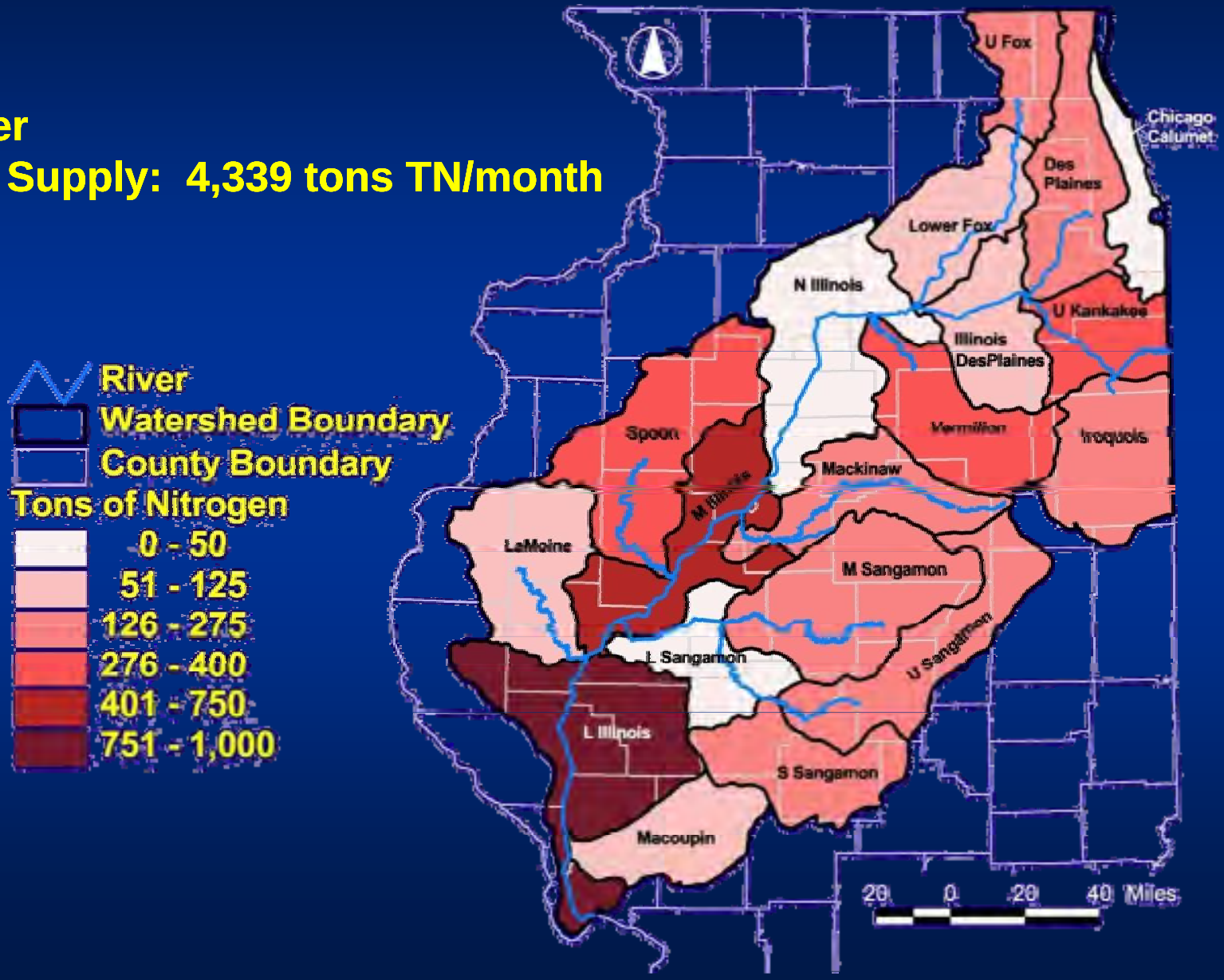
TN CREDIT SUPPLY: LOAD

Summer
Total Supply: 6,511 tons TN/month



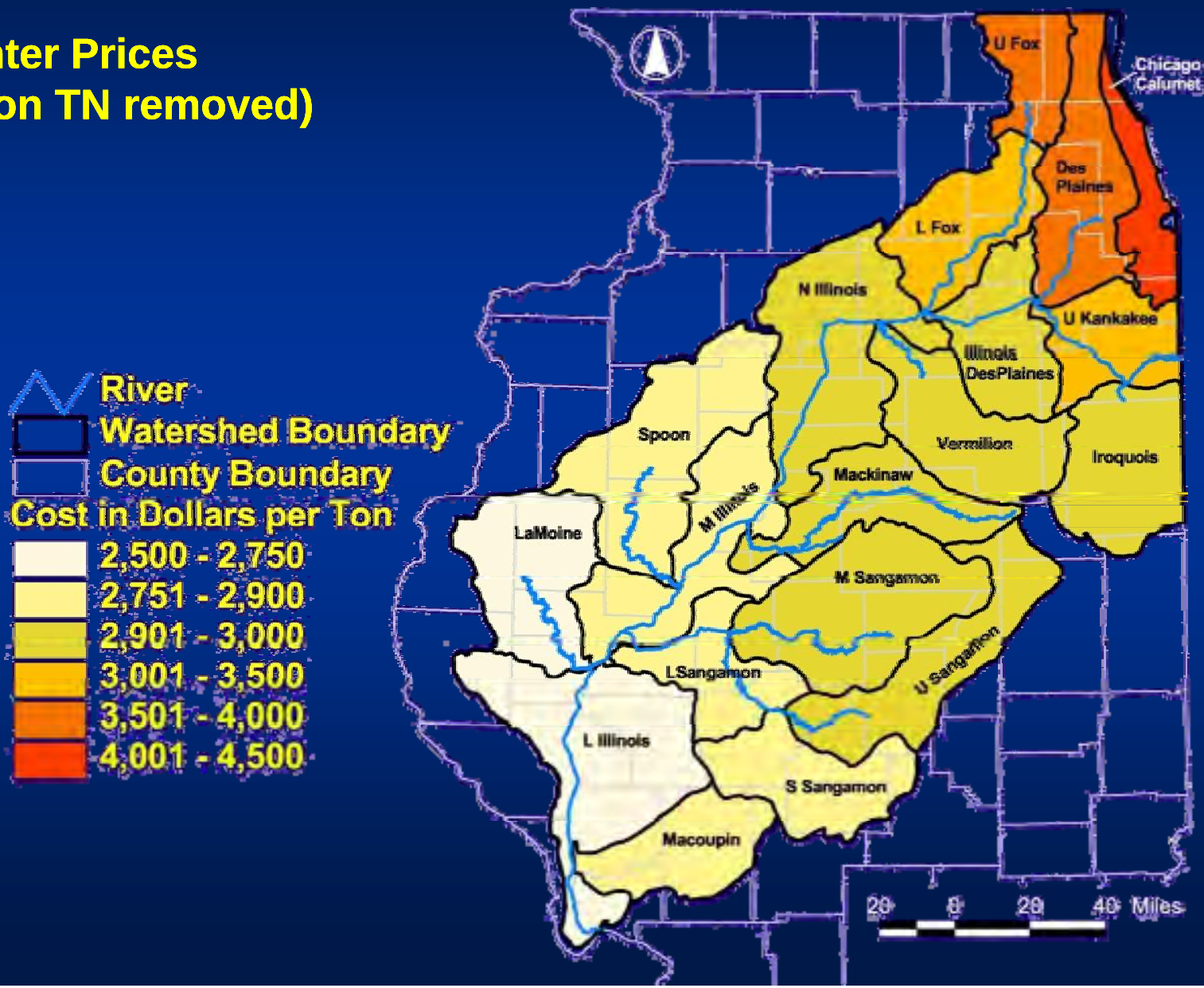
TN CREDIT SUPPLY: LOAD

Winter
Total Supply: 4,339 tons TN/month



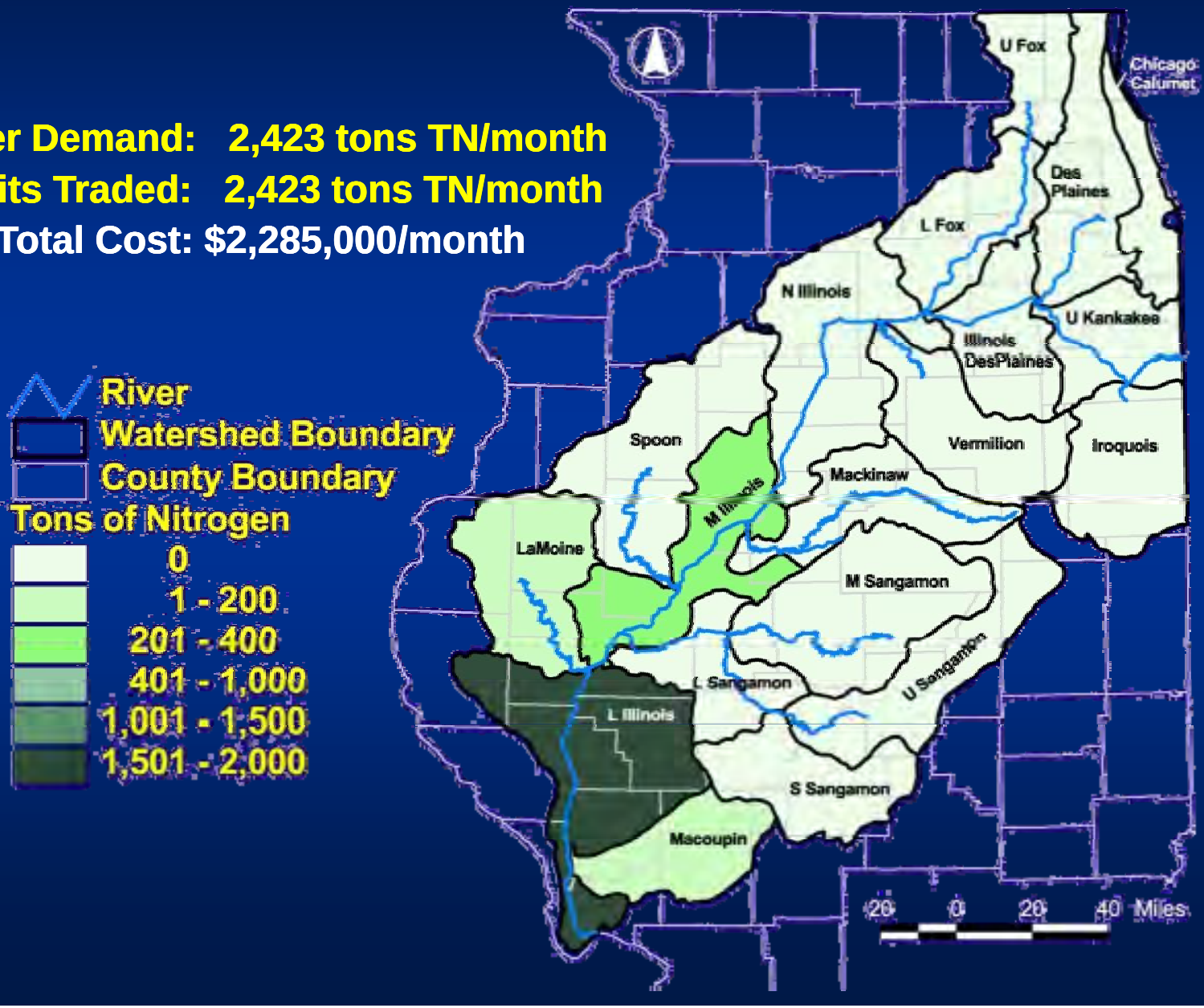
TN CREDIT COST

Winter Prices
($/ton TN removed)



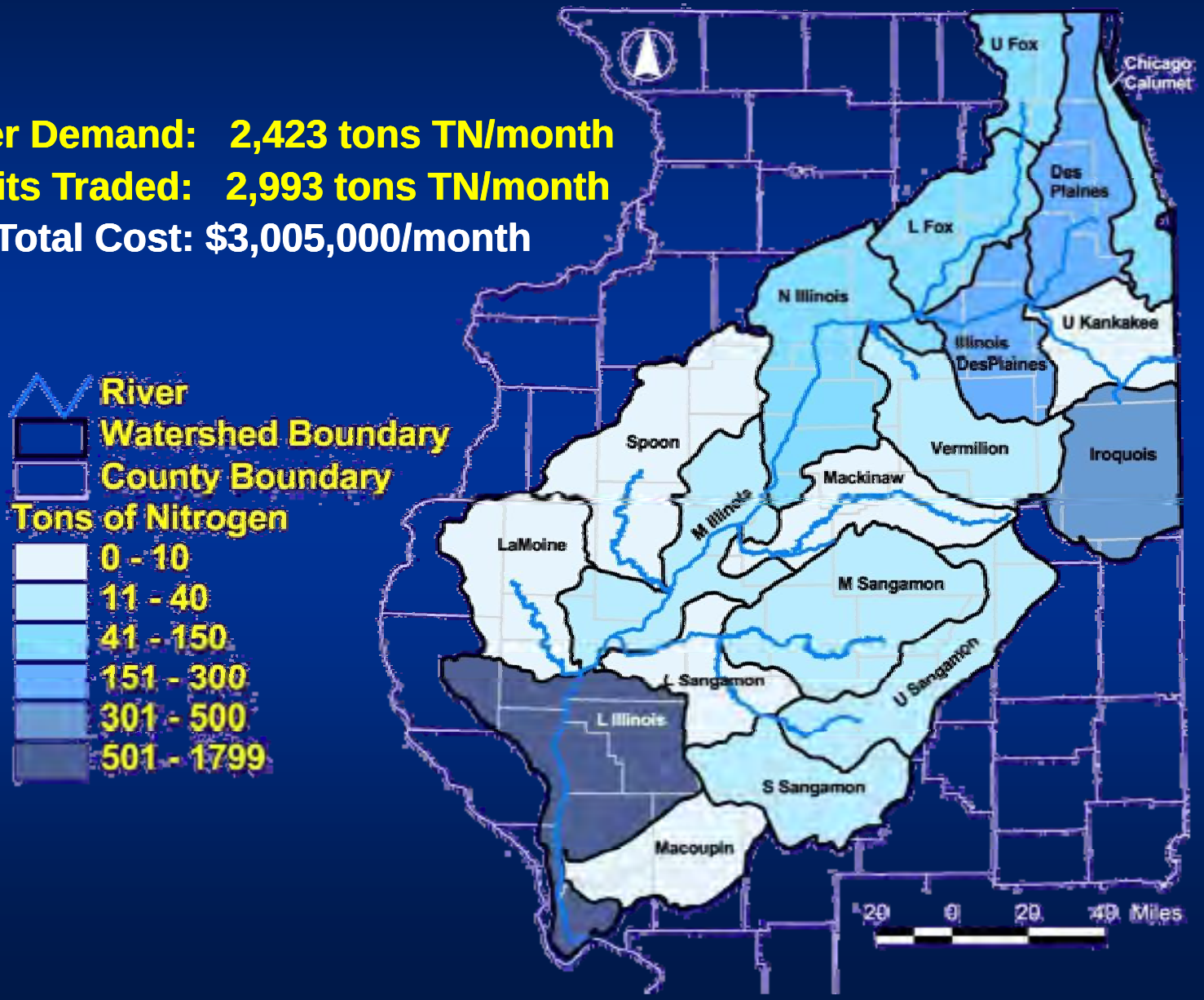
TRADE SCENARIO: NO RESTRICTION

Summer Demand: 2,423 tons TN/month
Credits Traded: 2,423 tons TN/month
Total Cost: $2,285,000/month



TRADE SCENARIO: 10% ACCRUED

Summer Demand: 2,423 tons TN/month
Credits Traded: 2,993 tons TN/month
Total Cost: $3,005,000/month



- Largely, self-sustaining nutrient management
- Point and non-point nutrient control
- Income generation from bottom lands
- Efficient and fare