

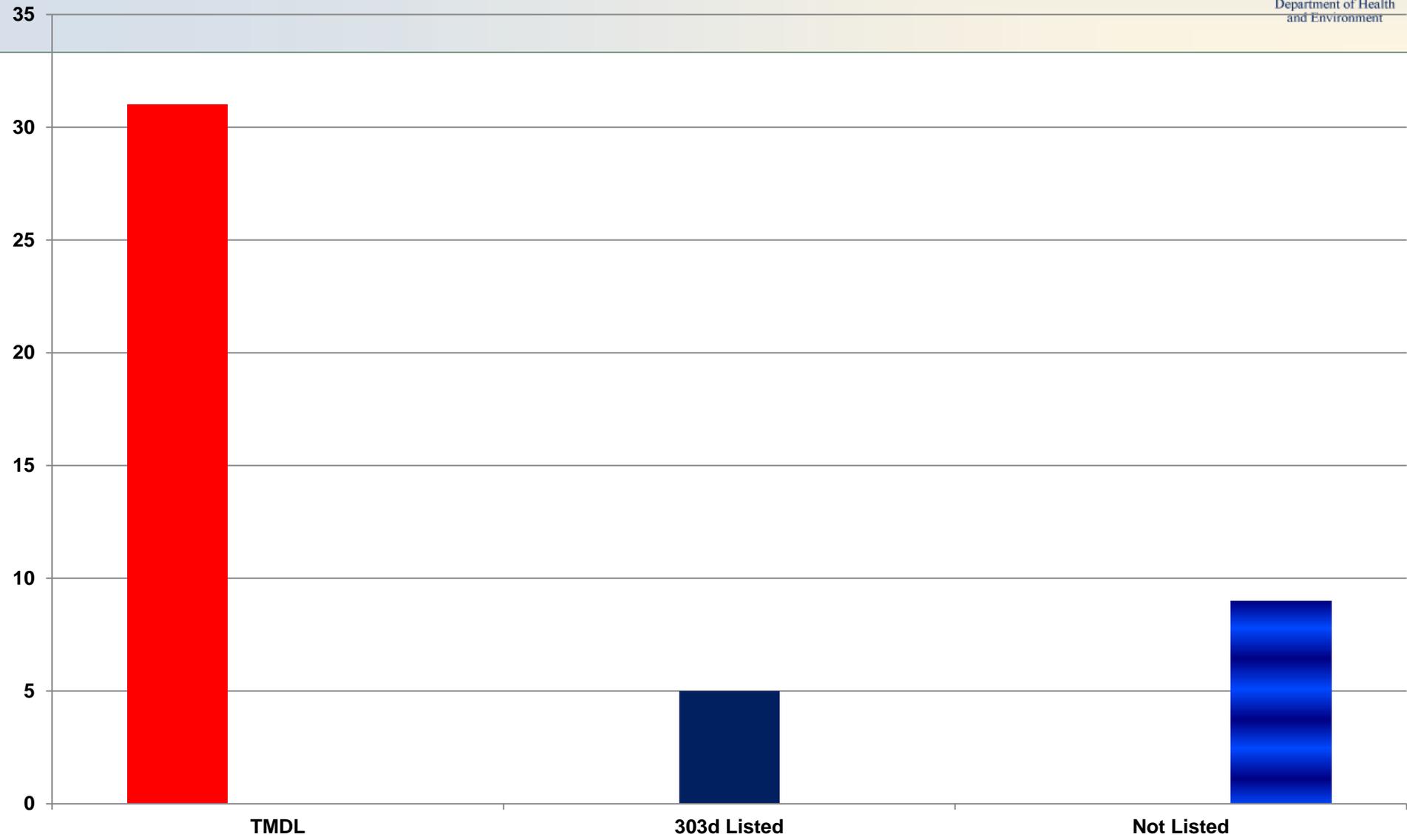


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Watershed Management Update Related to HAB Lakes

HAB Partners Meeting
October 15, 2013

Impaired Status of 2010 - 2013 HAB Lakes



Findings and Unconventional Wisdom – Same as Last Year

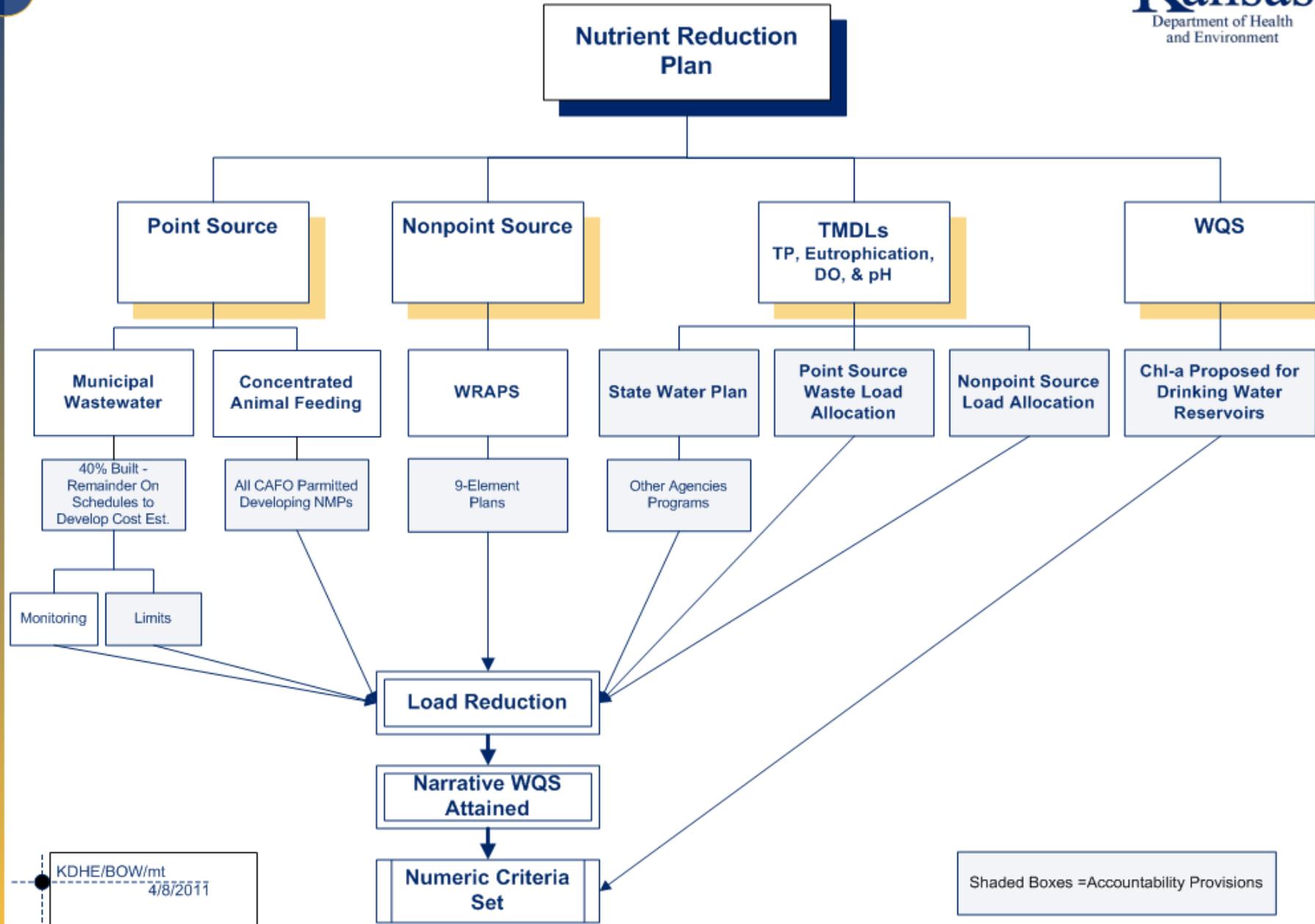
- TMDLs solve nothing, implementation is the key
- BGA are going to occur regardless of status
- Goal is to reduce magnitude, duration and frequency just like any other impairment
- Long range chlorophyll a goals are 10 -12 ppb in lakes
- The first focus of implementation needs to be on load reduction, not on achieving a number

Responding to HABs in Lakes with TMDLs



- TMDLs developed after HAB issues
 - 2012 – Lovewell Lake – No point sources, cropland predominant in riparian area
 - 2013 – Memorial Park Lake in Great Bend – Emphasis on urban stormwater
 - 2013 – Milford Lake in draft – Huge watershed; some point sources; mostly NPS
- HAB occurring after TMDL developed
 - 2012 – Lake Shawnee – Suburban stormwater and ag runoff, waterfowl and golf course

Kansas Nutrient Reduction Strategy



Challenges to Managing thru NPDES

- Technology limitations to reducing nutrients
- Small portion of total load entering lakes
- Many towns using lagoons
- Many towns losing population

- Pushing Biological Nutrient Removal on mechanical plants – 1.5 mg/l TP; 8 mg/l TN initially (Enhanced Nutrient Removal ~ 0.5 mg/l above lakes)

Typical Point Sources: Elevated Concentrations but Low Volume

Table 11. Discharging Facilities with nutrient monitoring within the Milford Lake Watershed.

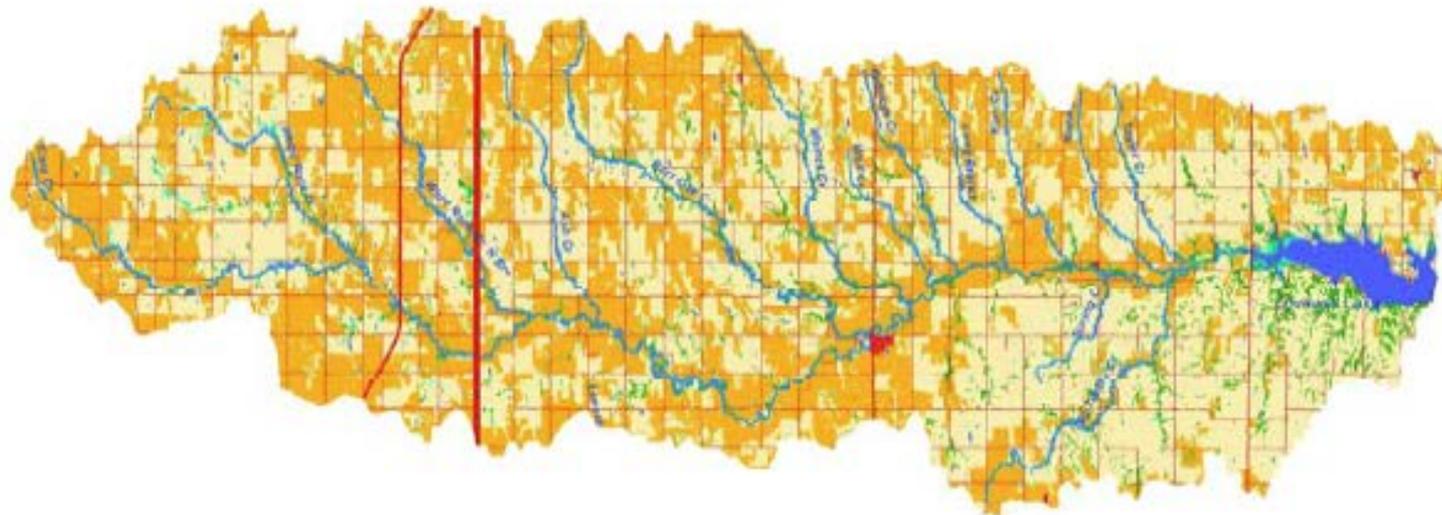
NPDES Facility	Average Discharge MGD	Nutrient Monitoring Frequency	Average TP (mg/L)	Avg. TN (mg/L)
NESIKA ENERGY, LLC - ETHANOL PLANT	0.045	Monthly	0.274	NA
BELLEVILLE, CITY OF	0.209	Monthly	2.8	7.51
CLAY CENTER, CITY OF	0.473	Monthly	3.16	13.49
CLIFTON, CITY OF	NA	Quarterly	2.47	NA
CLYDE, CITY OF	NA	Quarterly	2.97	NA
CONCORDIA, CITY OF	0.562	Monthly	3.55	18.08
COURTLAND, CITY OF	NA	Quarterly	2.51	NA
GEARY COUNTY SEWER DISTRICT #4	0.006	Monthly	2.17	15.87
VALLEY FERTILIZER	0.133	Monthly	NA	13.42

Challenges to Managing thru NPS

- Scale issue: large watersheds producing large hydrology and large loads
- Resource issue: papering the watershed with BMPs takes lots of cash
- Social issue: the voluntary nature of NPS requires the willingness of the landowner to play
- Economic issue: all progress can be undone by \$8/bushel corn
- Need a suite of BMPs to cover alternative pathways

Land Use is a Chief Driver to Loading

White Rock Creek Watershed



Legend

-  County Boundary
-  2009_Registered Stream
-  2009 Registered lakes

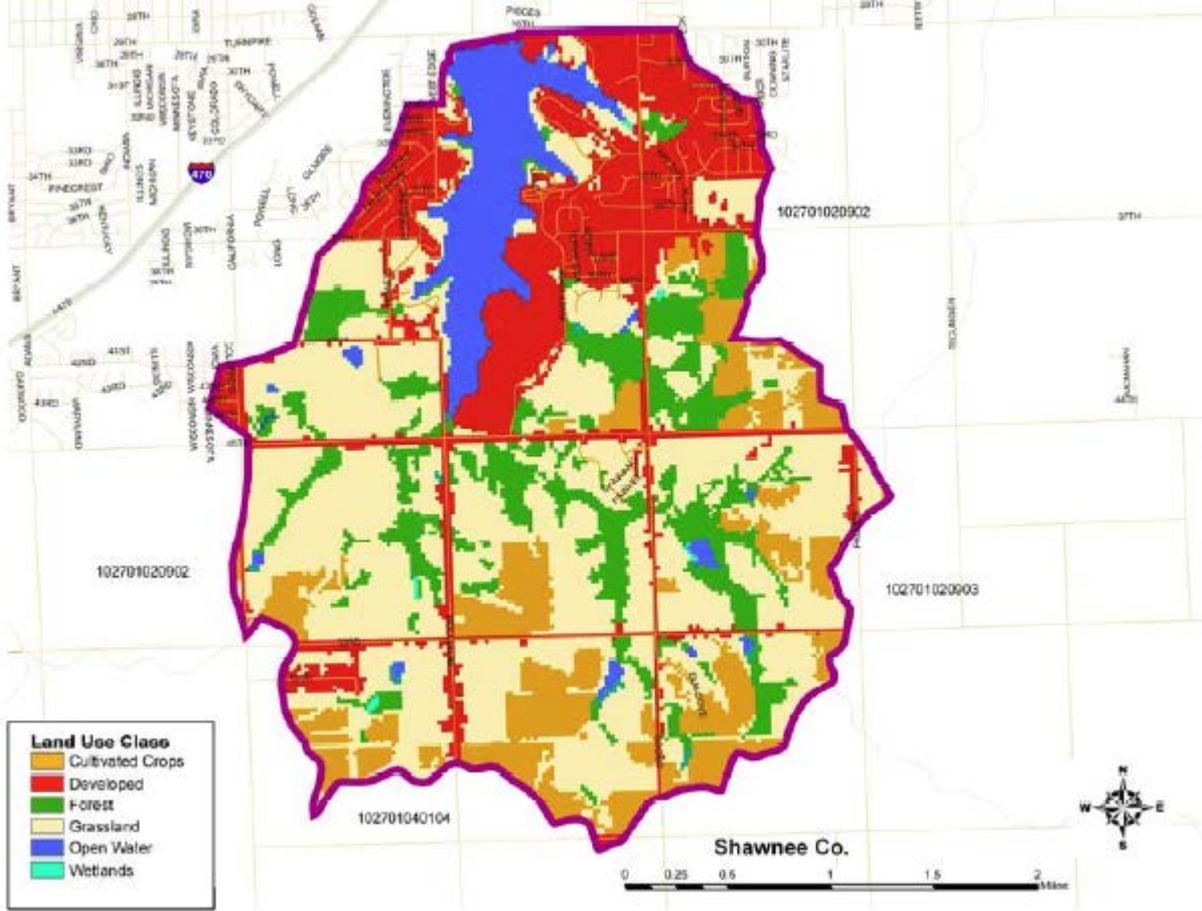
Land Use Class

-  Cultivated Crops
-  Developed
-  Forest
-  Grassland
-  Open Water
-  Wetlands

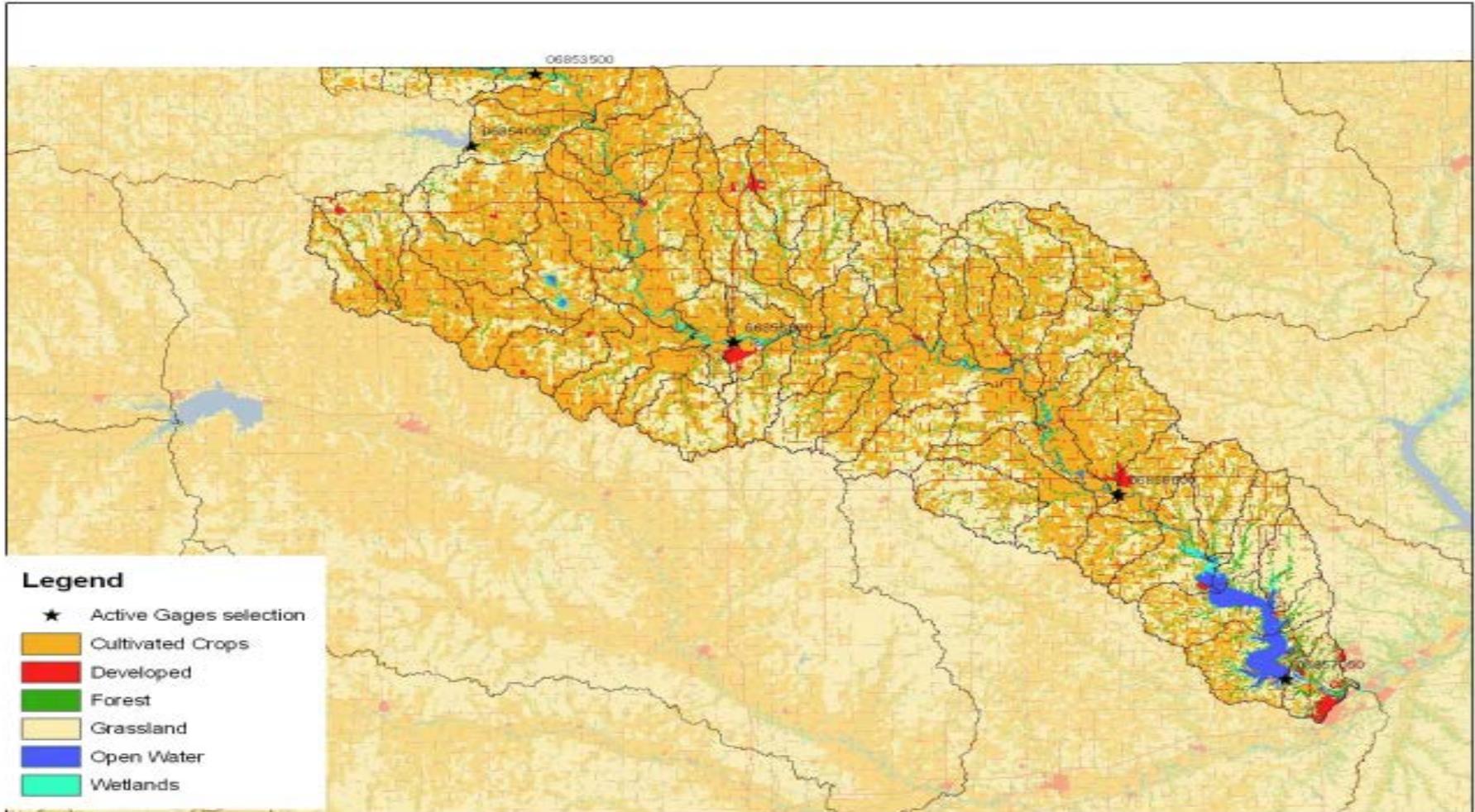
0 1.5 3 6
Miles



Urban Influences in Proximity to Lake

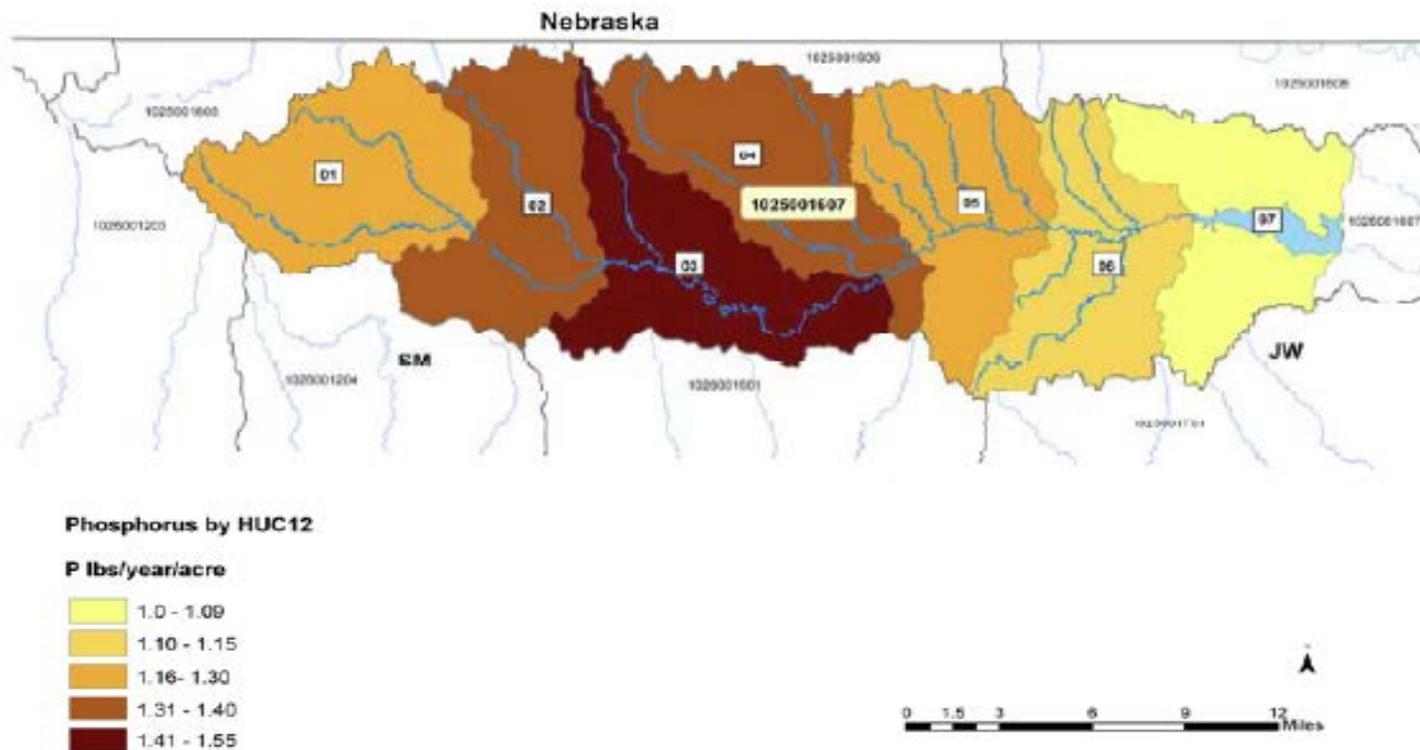


Large Reservoirs Impacted by Large Watersheds



Targeting to Match Resources to Sources

Lovewell Lake Watershed STEPL: Phosphorus



Head and Shoulders above the Rest

Lake	Chlorophyll <i>a</i> (µg/L)	Total Phosphorus (µg/L)	Total Nitrogen (µg/L)	Secchi (m)
Lake Shawnee	30.2	41	817	1.39
Shawnee Co. SFL*	8.8	26	403	1.24
Lake Jivaro**	4.0	51	724	1.00
Douglas Co SFL*+	11.6	24	855	1.78
Lone Star Lake+	14.8	43	819	1.46
Stowbridge Reservoir +	18.5	45	856	0.93
Osage Co SFL	7.5	31	501	1.67
<i>Average of Surrounding Lakes</i>	<i>10.8</i>	<i>37</i>	<i>693</i>	<i>1.35</i>

*Identified by Kansas Biological Survey as Reference Lake in the Central Irregular Plains.

+Identified as Impaired by Eutrophication on 2010 303(d) List or by Existing TMDL.

**Only one sample collected since 2000.

We Saw This Coming

Table 7. Algal communities observed in Lake Shawnee during KDHE sampling years.

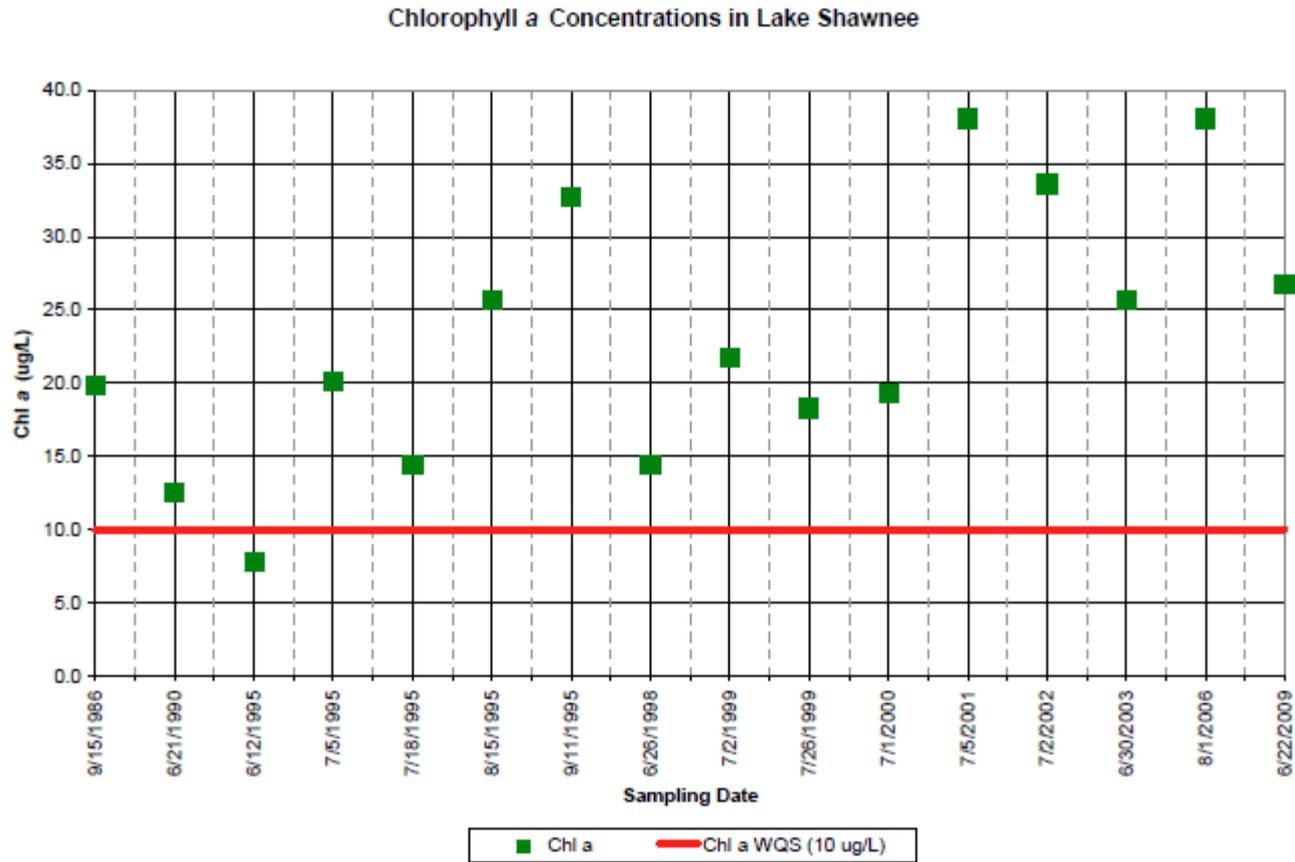
Sampling Date	Total Cell Count cells/mL	Percent Composition				Chl- <i>a</i> µg/L
		Green	Blue Green	Diatom	Other	
1995	63,500	2	96	0	2	18.8
1999	50,022	0	100	0	0	20.0
2003	44,888	7	90	3	<1	25.7
2006	70,371	4	94	2	<1	38.1
2009	72,198	1	98	1	<1	26.8

Problem Building with Time

Table 7. Algal Communities observed in Milford Lake during KDHE sampling years.

Sampling Date	TSI Chl-a	Total Count (cells/ml)	Percent Composition			
			Green	Blue Green	Diatom	Other
1991	55	12400	18	74	8	<1
1994	41.6	1450	65	0	0	35
1996	48.2	2898	15	76	7	2
1997	51.1	7277	10	82	8	<1
1998	56.8	9041	34	50	3	13
2000	51.7	4914	35	59	5	1
2003	57.5	24224	16	83	<1	<1
2006	51.2	23342	<1	99	<1	0
2009	67.4	151893	3	96	1	0
2012	72.0	233730	1	92	0	6

Why the Uptick in Chlorophyll?



Consistent Pattern among Lakes

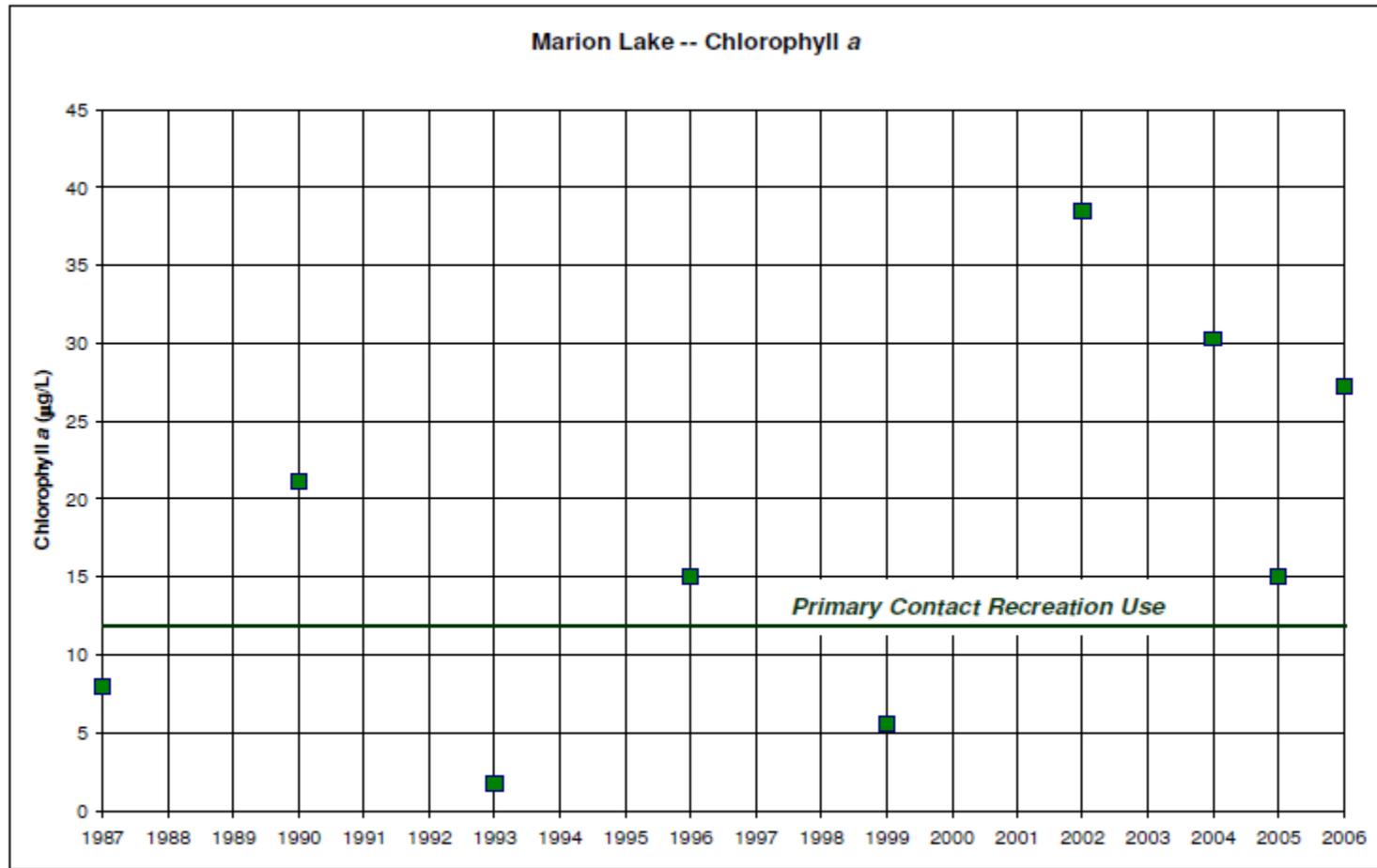
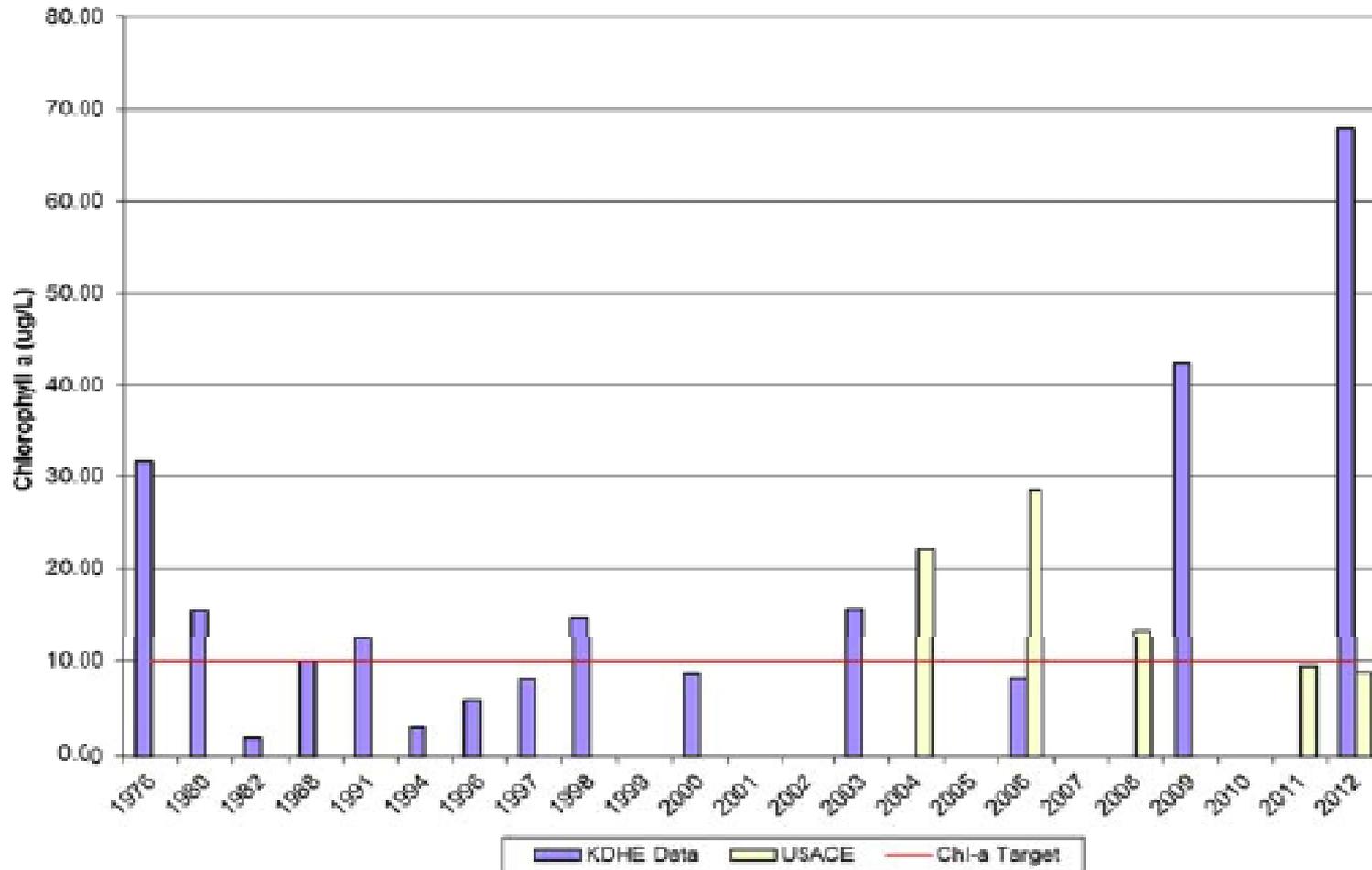


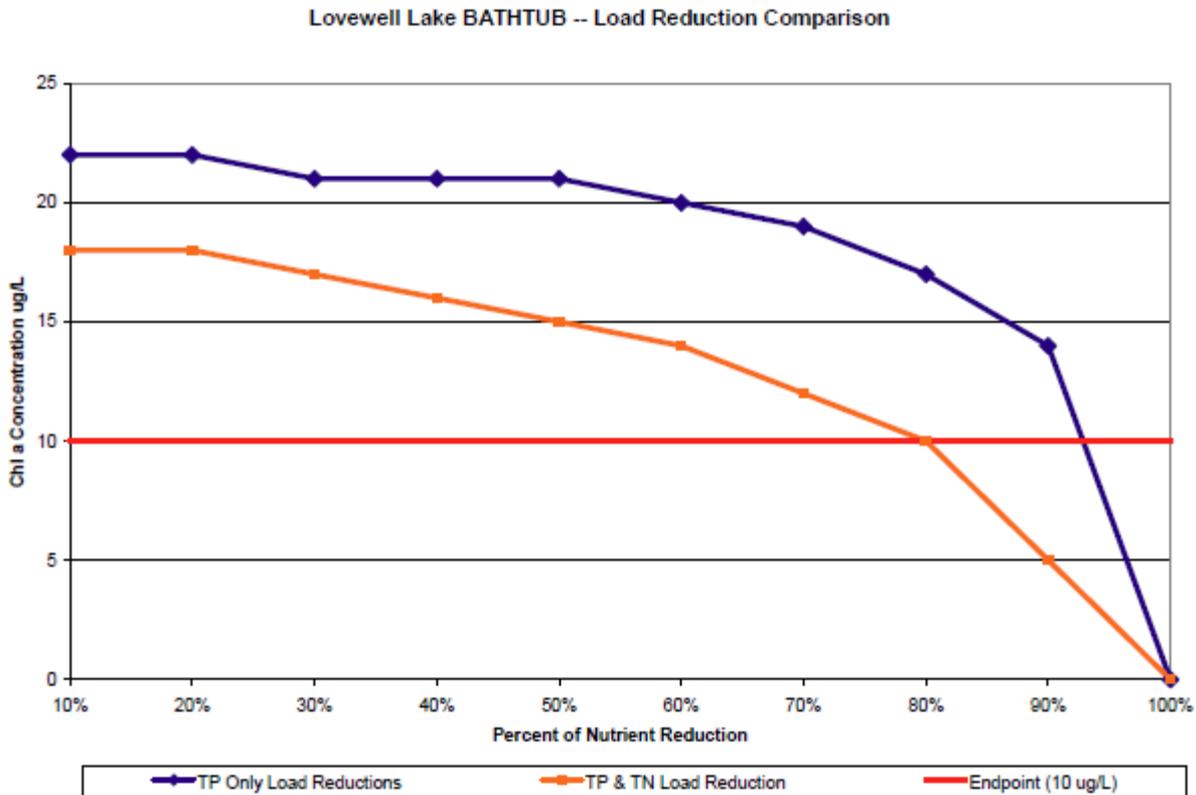
Figure 5. Chlorophyll *a* concentrations at Marion Lake Site during 1987 – 2006.

More Prevalent this Decade

Chlorophyll a - Milford Lake



One Nutrient or Two?



2013 Conclusions

- Will continue to push point source reductions thru NPDES
- Will continue to push NPS reductions thru WRAPS and targeted BMPs
- Phosphorus is Job #1 – easier to control
- Nitrogen runs with the water – need source control
- Our efforts are battling scale, land use, weather and economics to make an environmental difference