

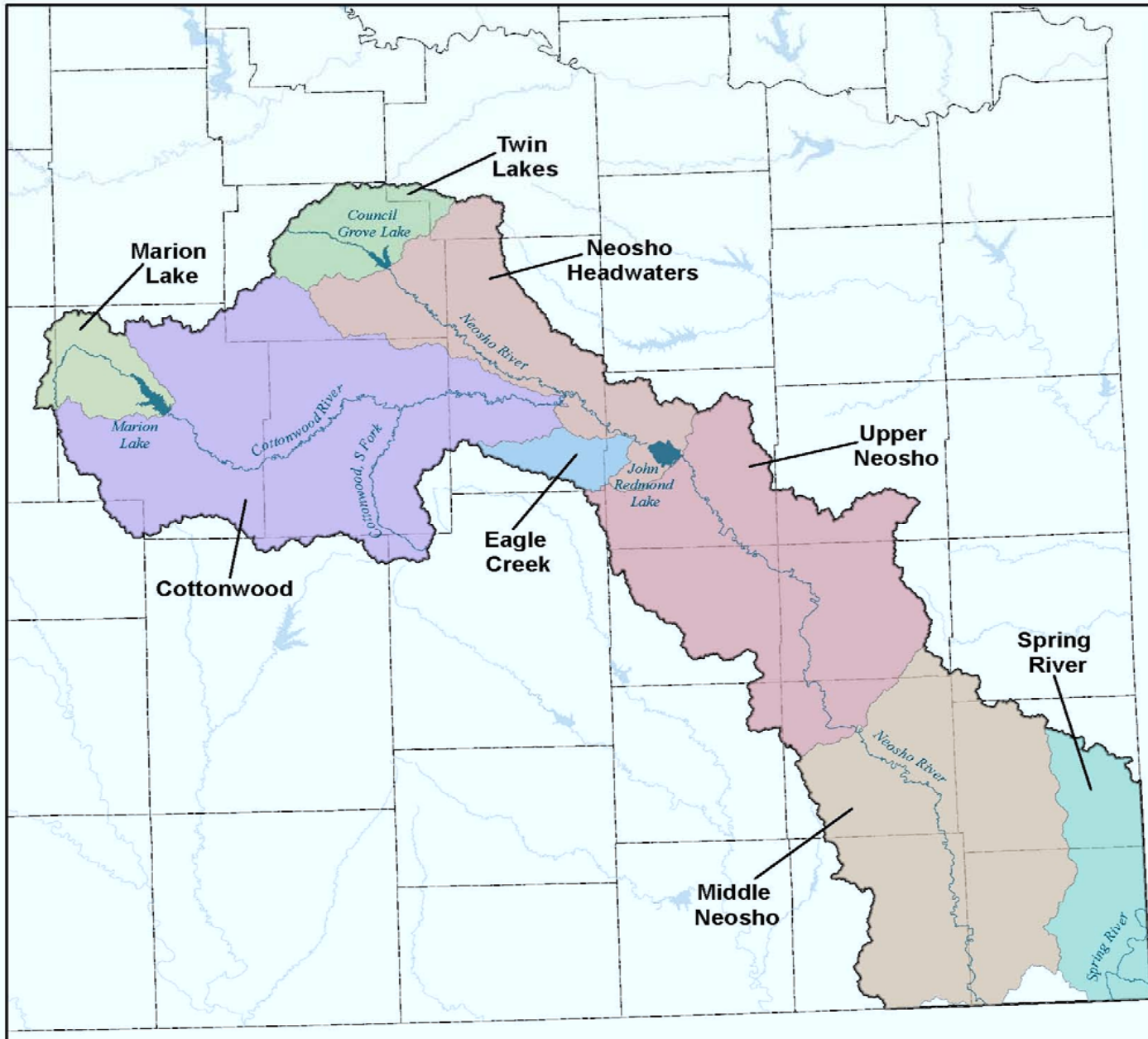
Grand Lake and Blue-Green Algae: Upstream Responses, Perspective and Strategies




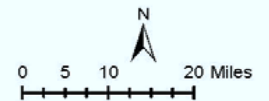
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Neosho Basin

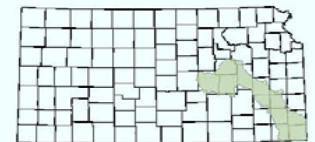
Stakeholder Leadership Team Areas



-  Cottonwood
-  Eagle Creek
-  Marion Lake
-  Neosho Headwaters
-  Middle Neosho
-  Upper Neosho
-  Spring River
-  Twin Lakes
-  Major River
-  Major Reservoir
-  County Boundary



Neosho Basin shown in green.



Map produced by
 Kansas Department of Health & Environment
 July 2011

Listings & TMDLs below John Redmond

- Tributary Dissolved Oxygen
- Occasional Atrazine or Bacteria
- Numerous Small Lake Eutrophication
- Metals along Spring River
- Phosphorus on Labette Creek & Tributaries of Spring River

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2000-2011 Trophic Status of Neosho Lakes

Lake	Chlorophyll	Total P	2011 BGA?
Marion Co. Lake	37.5 ppb	66 ppb	Yes
Marion Lake (COE)	26.8 ppb	158 ppb	Yes
Council Grove (COE)	7.1 ppb	172 ppb	No
John Redmond Reservoir (COE)	38.3 ppb	234 ppb	No

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2000 – 2011 Median TP in Neosho & Spring Rivers

Stream	Location	Median TP
Neosho River	Le Roy below John Redmond	161 ppb
Neosho River	Oswego above Stateline	161 ppb
Spring River	Crestline at MO Stateline	132 ppb
Spring River	Baxter Springs at OK Stateline	197 ppb

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1970 – 2011 Annual Average Flows

- Neosho Riv @ Burlington (Redmond Outlet): 1687 cfs
- Neosho Riv @ Commerce, OK (Stateline): 4202 cfs
- **Gain in Neosho River Flow/Load = 2500 cfs (2174#/d)**
- Spring River @ Waco, MO = 1109 cfs
- Spring River @ Quapaw, OK = 2491 cfs
- **Gain in Spring River Flow/Load = 1400 cfs (1860 #/d)**

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NPDES Contributions

City	Design Q	Avg TP	TP Load	MS4?
• Iola	0.82 MGD	2470 ppb	17 #/d	NO
Chanute	2.2 MGD	2500 ppb	46 #/d	NO
Parsons	2.5 MGD	1560 ppb	33 #/d	YES
Total Design Flow on Neosho River below John Redmond = 10.9 MGD				
Pittsburg	3.0 MGD	5530 ppb	139 #/d	YES
Total Design Flow on Spring River = 102.5 MGD (97.4 MGD by Empire Electric)				

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Population Stress?

Pct Population Change from 2000 to 2010 in Counties between J.Redmond & Stateline

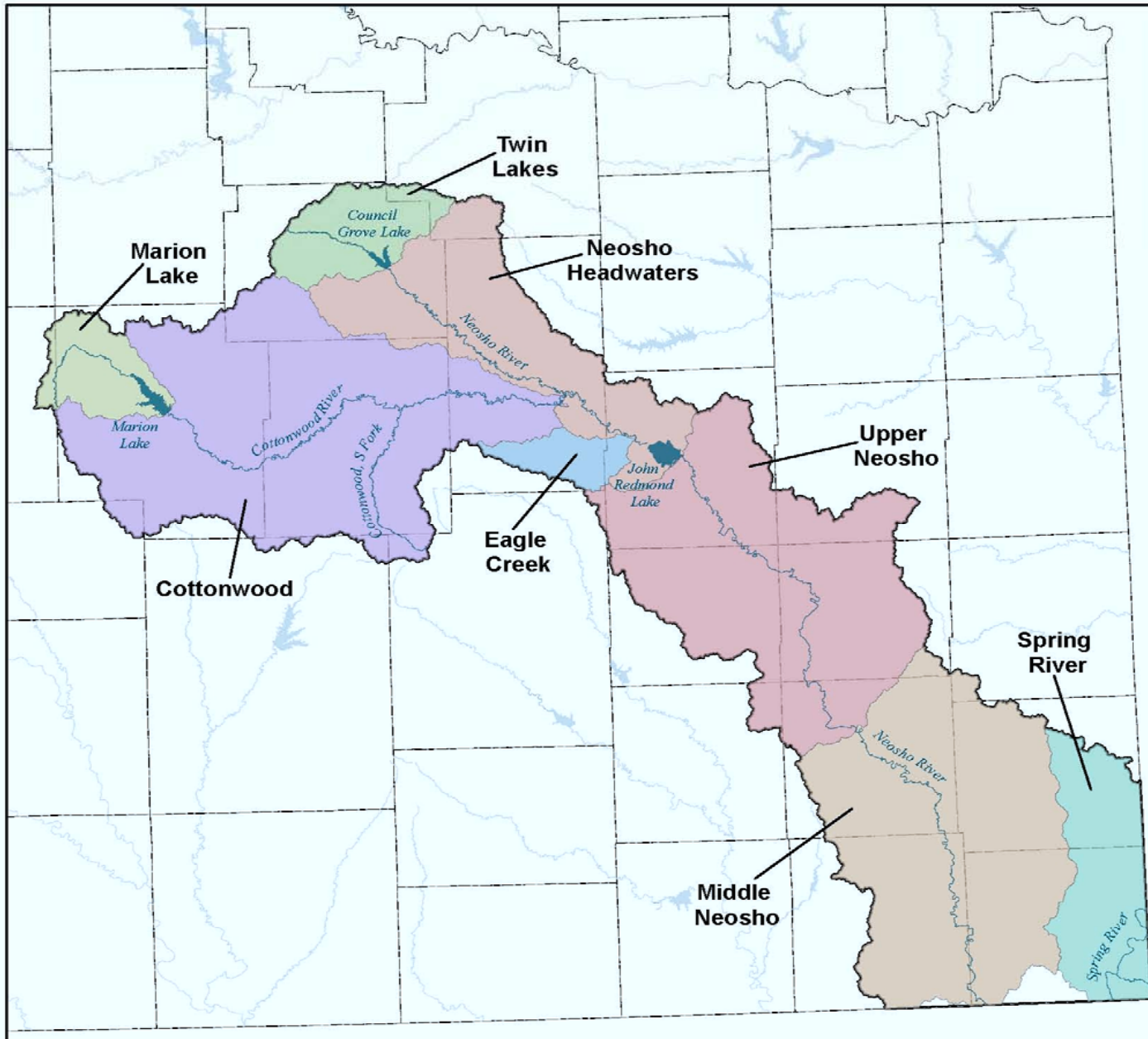
- Coffey: -3.0%
- Woodson: -12.6%
- Allen: -7.0%
- Neosho: -2.9%
- Labette: -5.4%
- Crawford: +2.3%
- Cherokee: -4.4%

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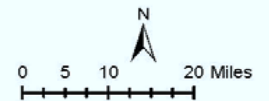


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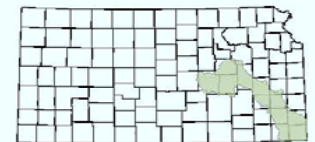
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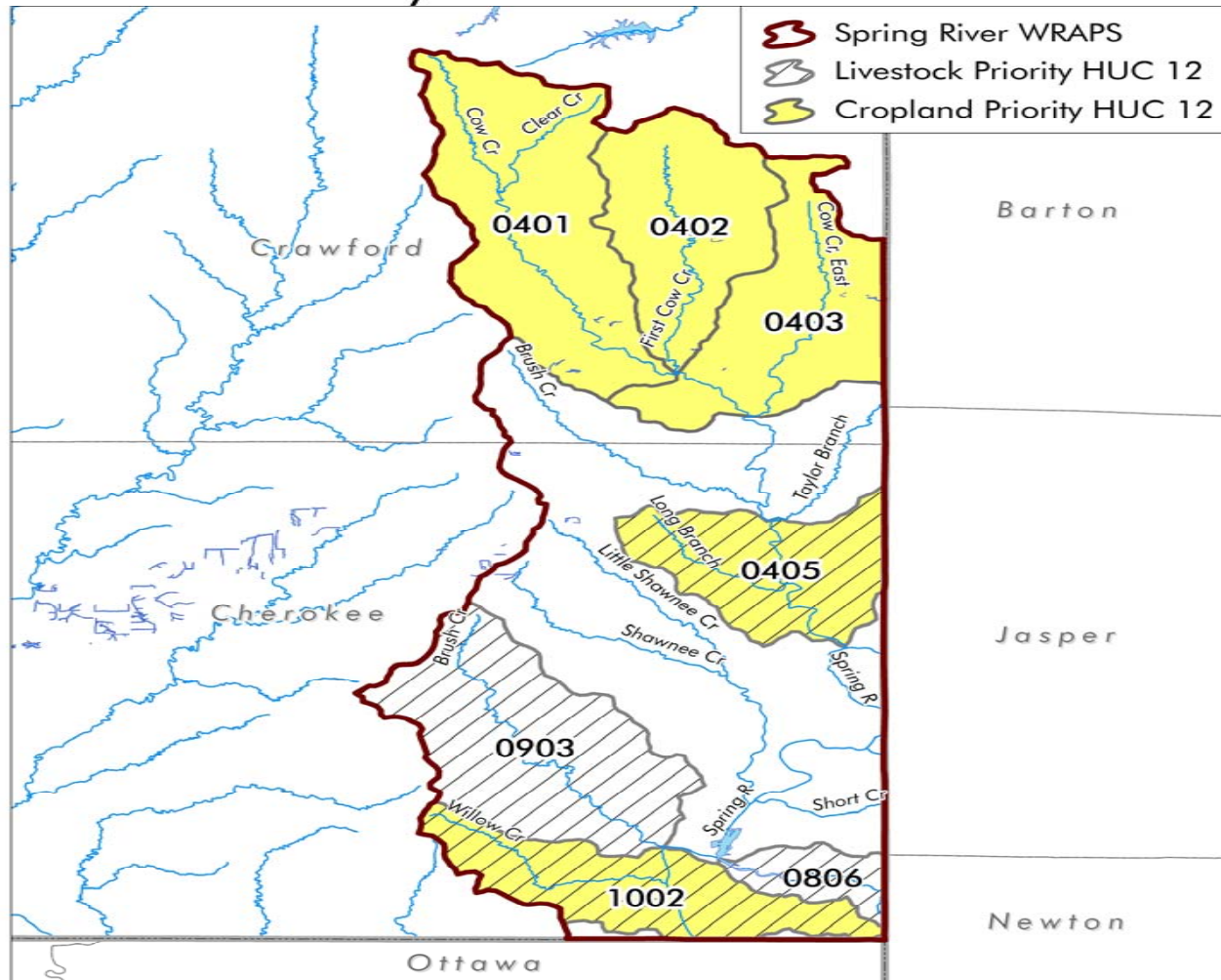
Middle Neosho WRAPS Goals & Milestones

- Reduce Current TP Loads by 30% = 134,000 # per year
- Reduce Current Sediment (TSS) Loads by 30% = 52,891 tons per year
- Delist Dissolved Oxygen Impairments in Neosho River Tributaries by 2020
- Reduce Median TP & TSS Concentrations and Loads by 10% over 2010 - 2020

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Spring River WRAPS Priority HUC 12 Watersheds



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Adaptive Management Scenarios (Tested by Modeling)

- **1. Zero out NPDES Loads – NPS Loads Only**
- **2. Decouple Phosphorus & Nitrogen**
- **3. Switch Load Reductions between Kansas & Missouri on Spring River**
- **4. Alter John Redmond Release Loads**
- **5. Reduce at a Rate Greater Than 30%**
- **6. Rotate Weighted Reductions between Upper Neosho, Middle Neosho & Spring HUC 8's**

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Blue Green Algae 2012

- **Advisory**

- **Microcystins over 4 ppb but less than 20 ppb, or**
- **Cyanobacteria cell counts over 20K but less than 100K**
- **Advise Public to Avoid Contact with Lake Water**
- **Advise Public Water Suppliers of Elevated Risks**
- **Enhanced Follow up Monitoring**

- **Warning**

- **Microcystins over 20 ppb, or**
- **Cyanobacteria cell counts over 100K**
- **Shut Down Lake for Recreation**
- **Advise Public Water Suppliers to Treat for Toxin Removal**
- **Enhanced Follow up Monitoring**

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Emerging Issues for Grand Lake

- **Will There Be a Simulation Model to Evaluate Reduction Strategies?**
- **Will There Be an Oklahoma TMDL for the Lake?**
- **Can We Make a Dent in the Hydrology?**
- **Is There an Impact from Fertilizers? Manure? Litter?**
- **Can the Four States Marshall the Resources to Reduce Loads (in Kansas)?**
- **How Much Time Do We Have?**

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Questions



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