



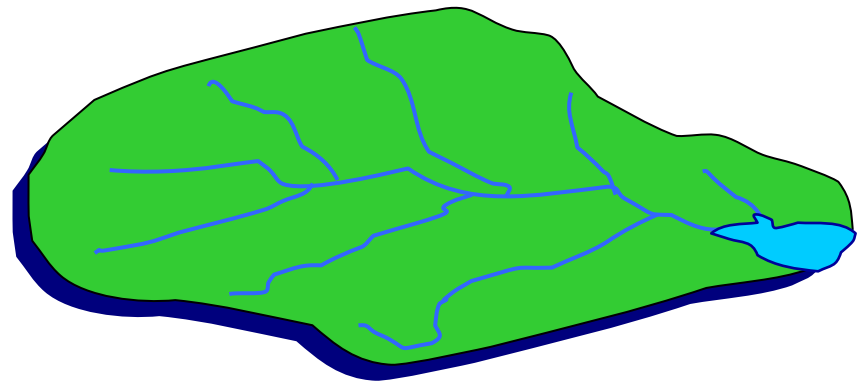
Watershed Management for NPS, TMDLs, & Finding Success

Tom Stiles

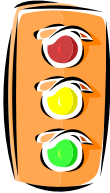



Kansas Dept of Health &
Environment

What is KS-WRAPs?

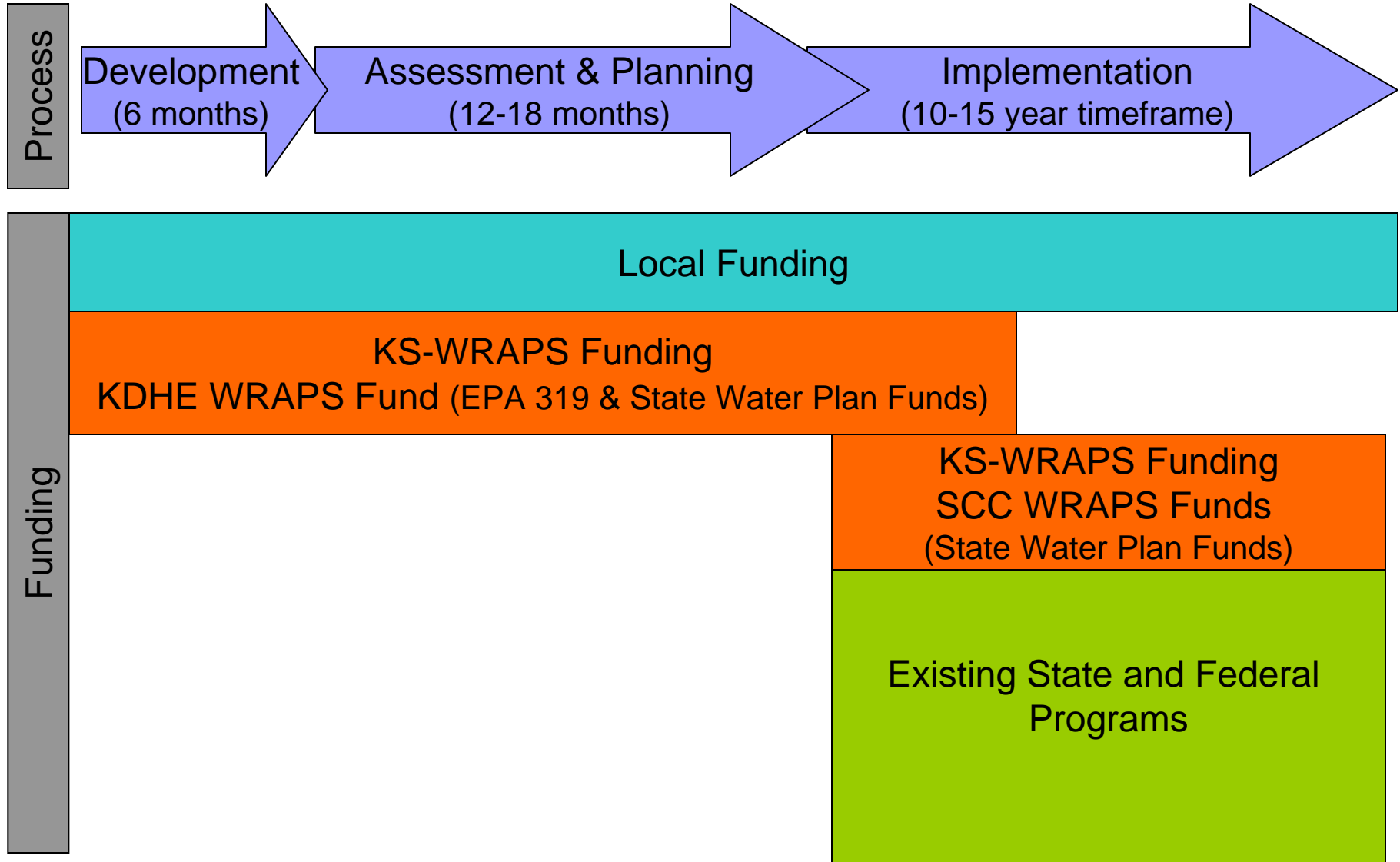
- Provides a framework for citizens and other stakeholders to protect and restore Kansas watersheds through a collaborative planning and management process.
- This process consists of:
 - Identifying watershed restoration & protection needs
 - Establishing watershed goals
 - Creating plans to achieve goals
 - Implementing plans



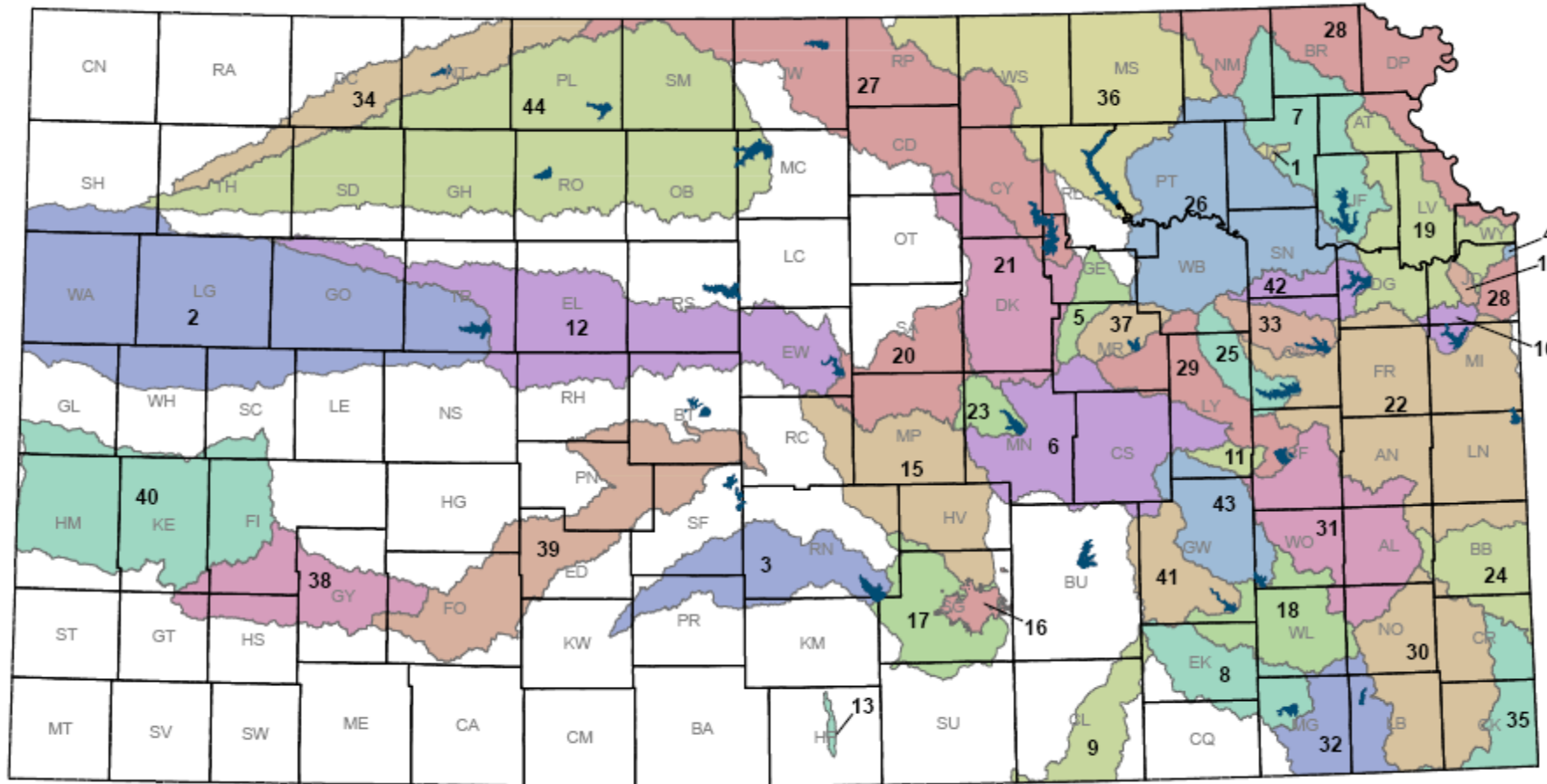
KS-WRAPPS Process

<p>Development</p> 	<p>Evaluation</p>	<p>Stakeholder community building</p>
<p>Assessment</p> 		<p>Watershed conditions & behavior</p>
<p>Planning</p> 		<p>Watershed goals & plan selection</p>
<p>Implementation</p> 		<p>Carry out actions to achieve goals</p>

WRAPS Process & Project Funding



WRAPS Projects Geographic Coverage



WRAPS leads to EPA's 9-Element Planning for 319

- 1. Identification of Impairment Causes
- 2. Estimated pollutant load reductions
- 3. NPS management measures & critical areas for implementation
- 4. Estimated technical & financial assistance needed
- 5. Information & education component
- 6. Schedule for implementation
- 7. **Interim milestones** for implementation progress
- 8. **Criteria for achieving load reductions and progressing toward attaining water quality standards**
- 9. **Monitoring** component to **evaluate effectiveness** of implementation over time



WRAPS Planning & Evaluation Supports EPA Performance Measures

- SP-10: Number of waters delisted
- SP-11: Number of impairments removed
- SP-12: Number of HUC-12s showing WQS achievement or water quality improvement
- *WQ-10: Number of NPS impaired waters partially or fully restored*
- *WQ-21: Number of 2002 water segments that now have TMDLs or 4b or 5m status*

Determining Evaluations

- Goals – Long Term Outcome: Restoration of WQS
 - Lake Eutrophication
- Objectives – Mid Term Accomplishments
 - 50% Phosphorus Load Reduction (Quantitative)
 - Less Frequent Algal Blooms (Qualitative)
- Milestones – Short Term Outputs
 - 1000' of fencing along streams in next two years
- Criteria – Summer chlorophyll a concentrations
- Indicators - # of Taste & Odor Complaints
- Targets – *No more than 5 days of T&O complaints in Sept*
- **Prior** Assessment asks the questions
- **Post** Evaluation answers the questions

TMDL Evaluation takes Two Forms

- **Output – Oriented Assessment**

- What have we done during implementation?

- **Outcome – Oriented Assessment**

- What has implementation accomplished for water quality?

- *Intrinsic to Evaluation is that **Targeting** of resources and effort has occurred during implementation*

- Where and on what should we concentrate our assessment and follow-up evaluation?

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TMDL Outcomes

- Success is always compliance with WQ Standards
- Wasteload Allocations lead to NPDES limits, but Point Sources are a small proportion of loading
- NPS Load Allocations are “Gross allotments” ...nothing to measure, no consequences of slippage
- WQ Standards comprise both numeric and narrative criteria and more importantly, the designated uses

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Some Expressions of Success

- NPDES Permit Limits
- Pollutant Load Reductions
- Less Frequency of WQ Excursions
- Lower Concentrations of Pollutants
- Achievement of Water Quality Standards
- Public Indicators of Use Support

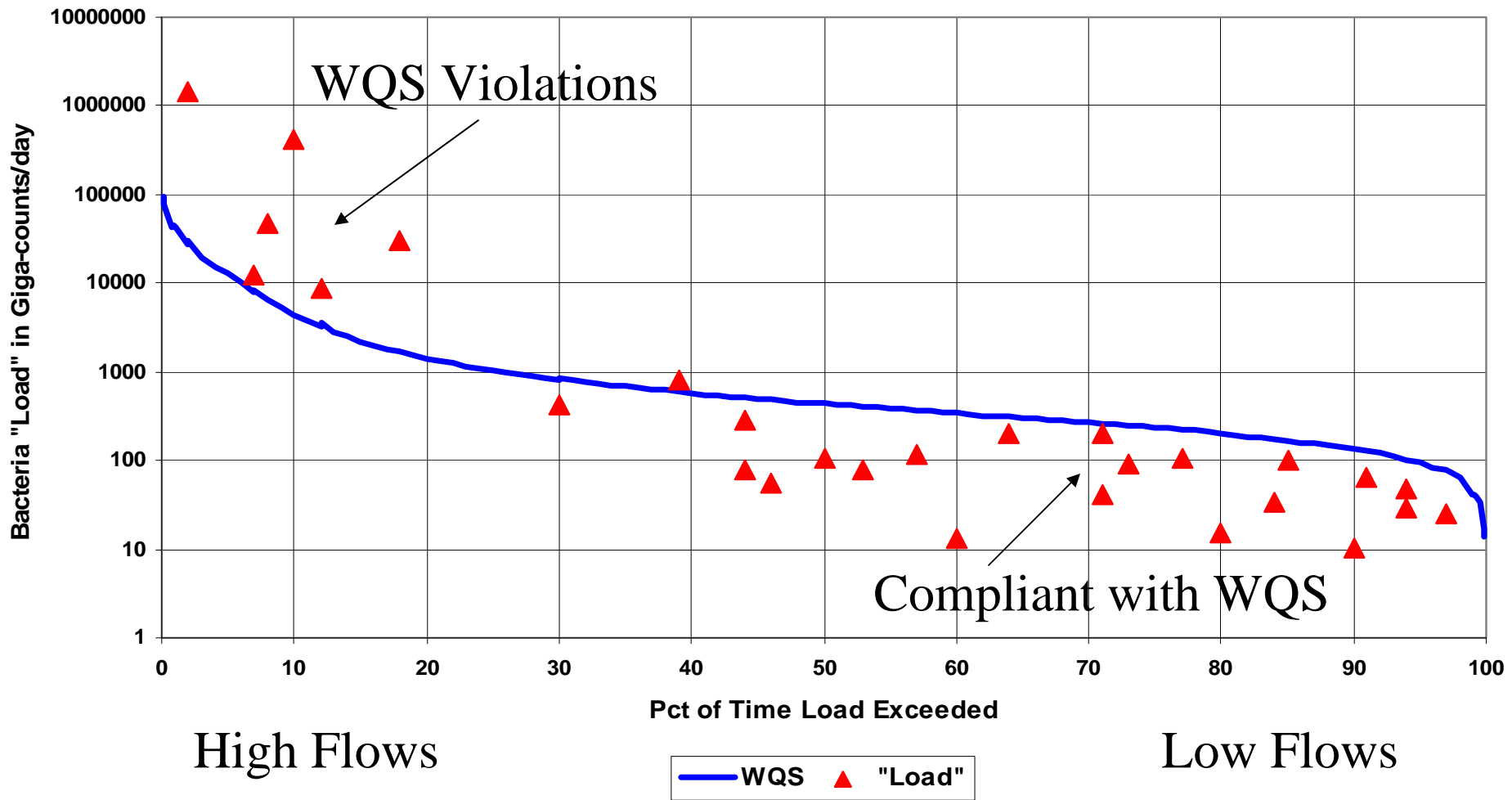


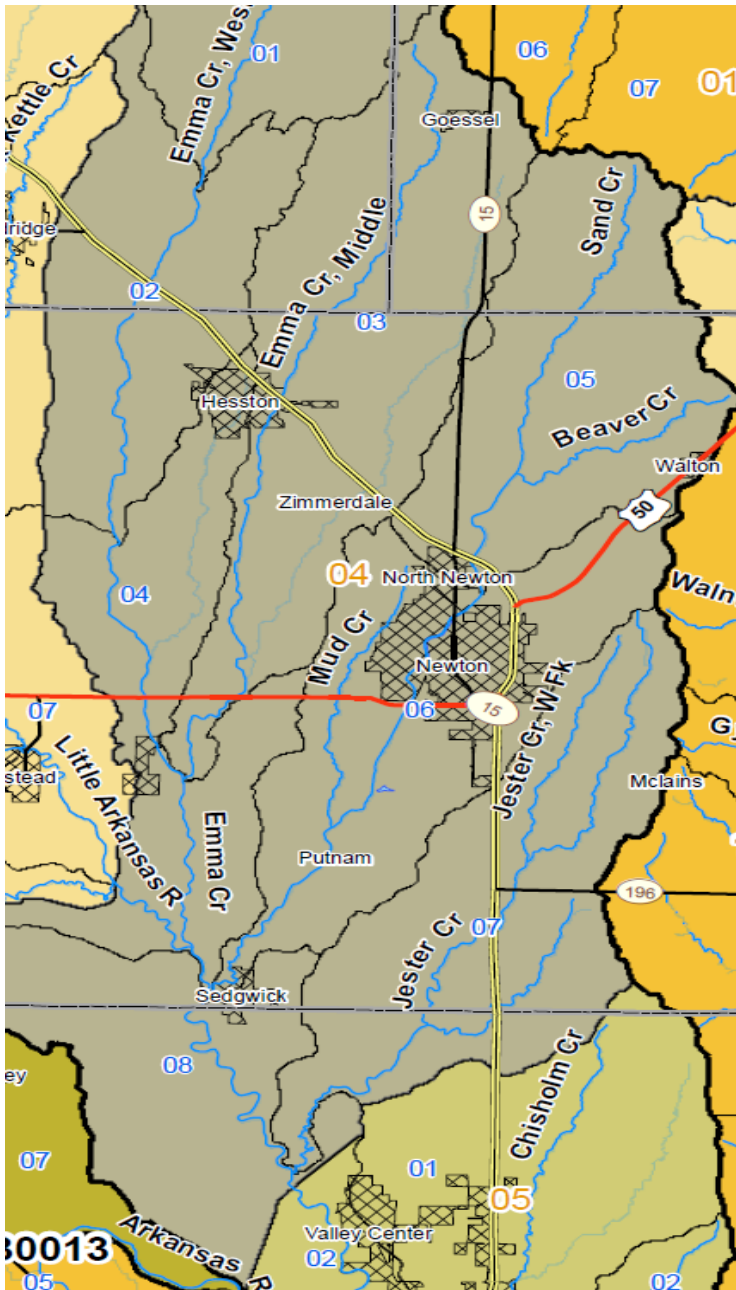
Relatable Indicators are the key to Public Buy-In

- Fewer Algal Blooms
- No Fish Kills
- Less Boat Groundings
- No Beach Closings
- Removal of Consumption Advisories
- Eliminate Taste and Odor Complaints
- Deeper Secchi Disk Depths
- More Riffles Clear of Silt and Filaments

TMDL Success is Challenged by Hydrology

Little Arkansas River Bacteria TMDL





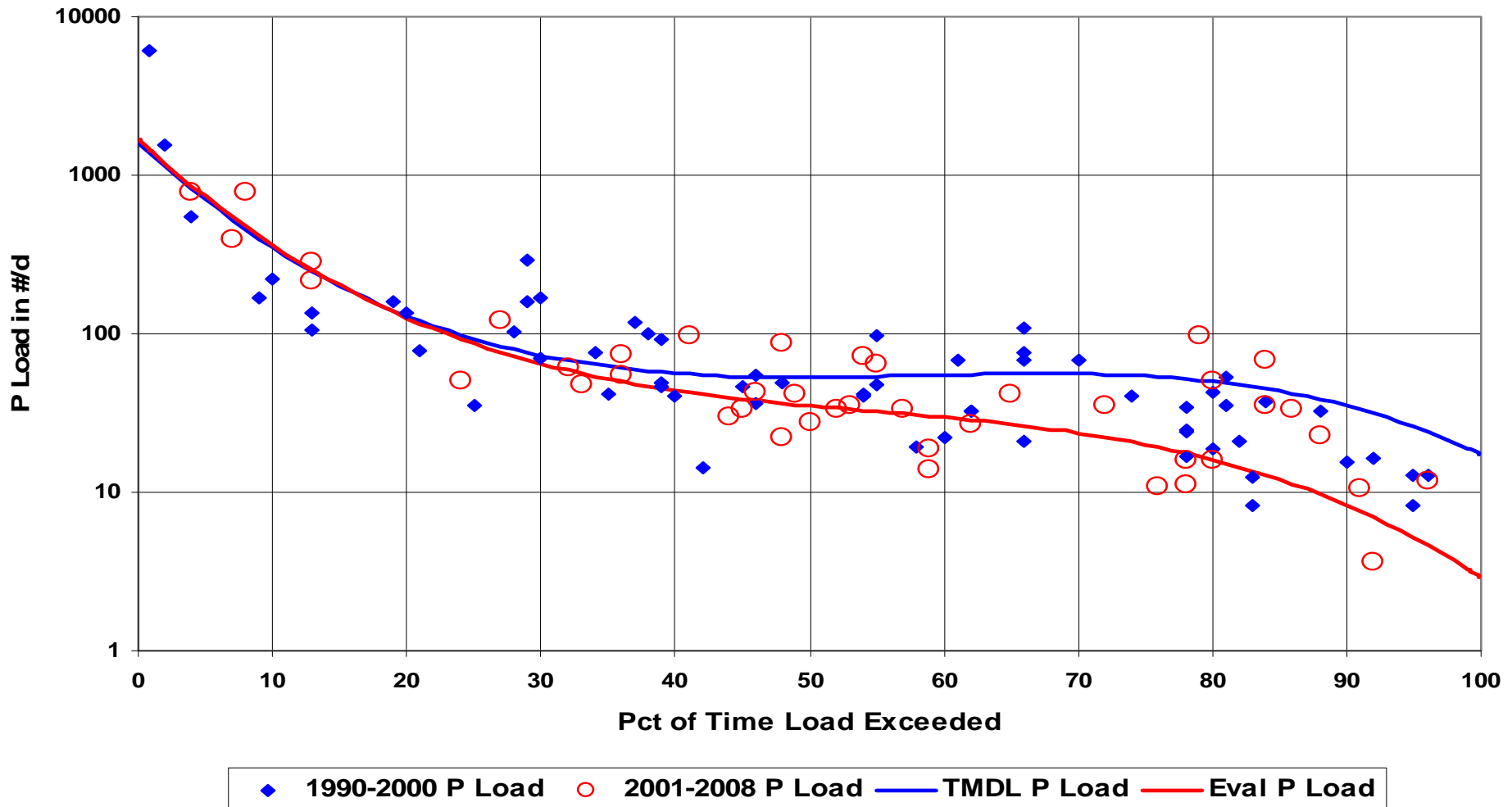
- What Scale to Assess, Implement & Evaluate?
- HUC8 = 1 M acres
- HUC10 = 160K acres
- HUC12 = 24K acres
- Kansas TMDLs typically cover 1-2 HUC10s

Social Challenges to Success

- **State Conservation Commission 2009 Budget**
- **Water Resource Cost Share Program = \$3.4M**
 - District Needs = \$2.7M
 - TMDLs = \$0.6M
- **NPS Pollution Control Cost-Share = \$3.6M**
 - Base Funding = \$1.5M
 - TMDLs = \$0.5M
 - WRAPS = \$0.8M
- **16-27% of Funding Directed to TMDLs/WRAPS**

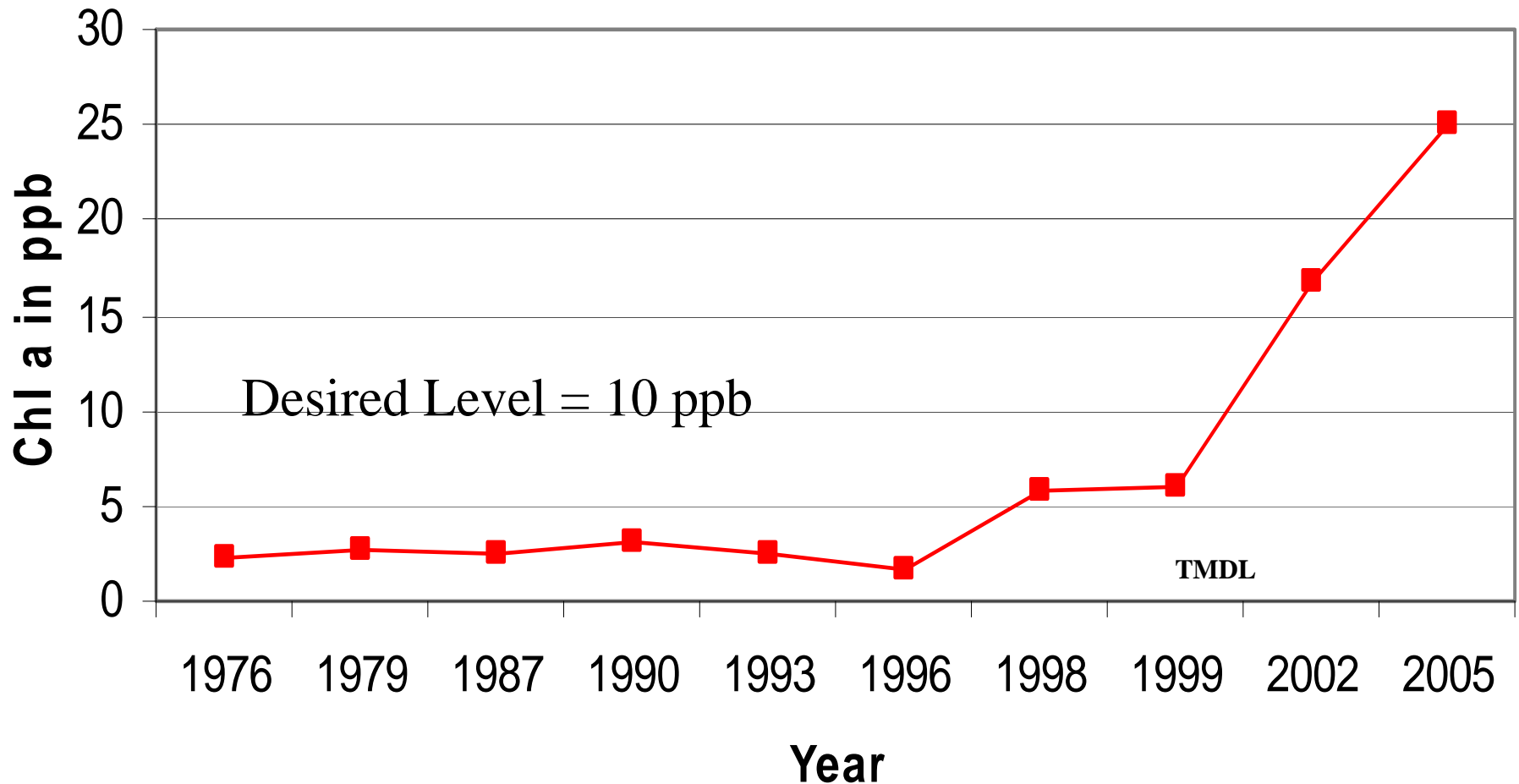
Unintended Consequences of Successful Watershed Management

NF Ninescah River Phosphorus Loads



Unintended Consequences @ Downstream Lake

Cheney Lake Chlorophyll



For Kansas, Evaluation Emerges with 2012 List

- Consistent with EPA performance measure timeline
- Original Court Decree TMDLs from 1999-2003 will be focus
- ~ 10+ years of implementation
- 2004-2011 data set should see some signals amidst the noise
- Hopeful successes: Bacteria, atrazine, chlorides, sulfates, chlordane, ammonia & nitrates
- Not so much: eutrophication, siltation, biology, DO

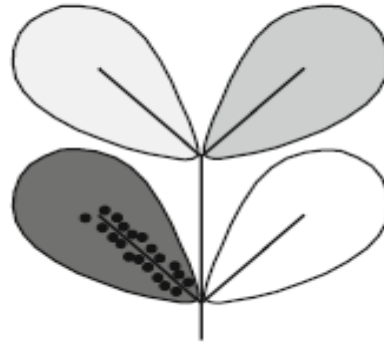
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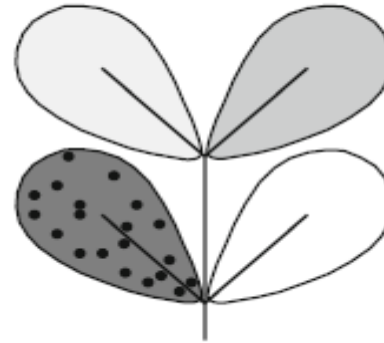
Next Steps: True Targeting

Ultimate TMDLs
-Mandated BMP
Placement

Aggregated/Targeted



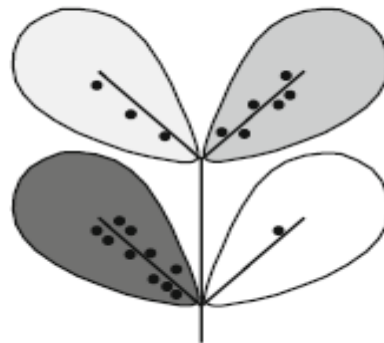
Aggregated/Random



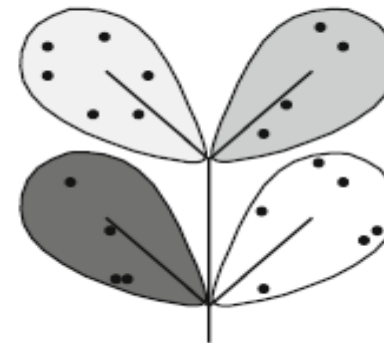
Initial TMDLs

More Directive
TMDLs

Dispersed/Targeted



Dispersed/Random



Default Status

Fig. 2 Simplified illustrations of geographical allocation approaches. Black lines form a stream network; spatially-independent watersheds are shaded according to their contribution to NPS pollution (darker = higher); Black dots (20 in each approach) are locations of BMPs (for illustrative purposes, locations near streams reduce more pollution)

Targeting Lowers Cost, Increases Success

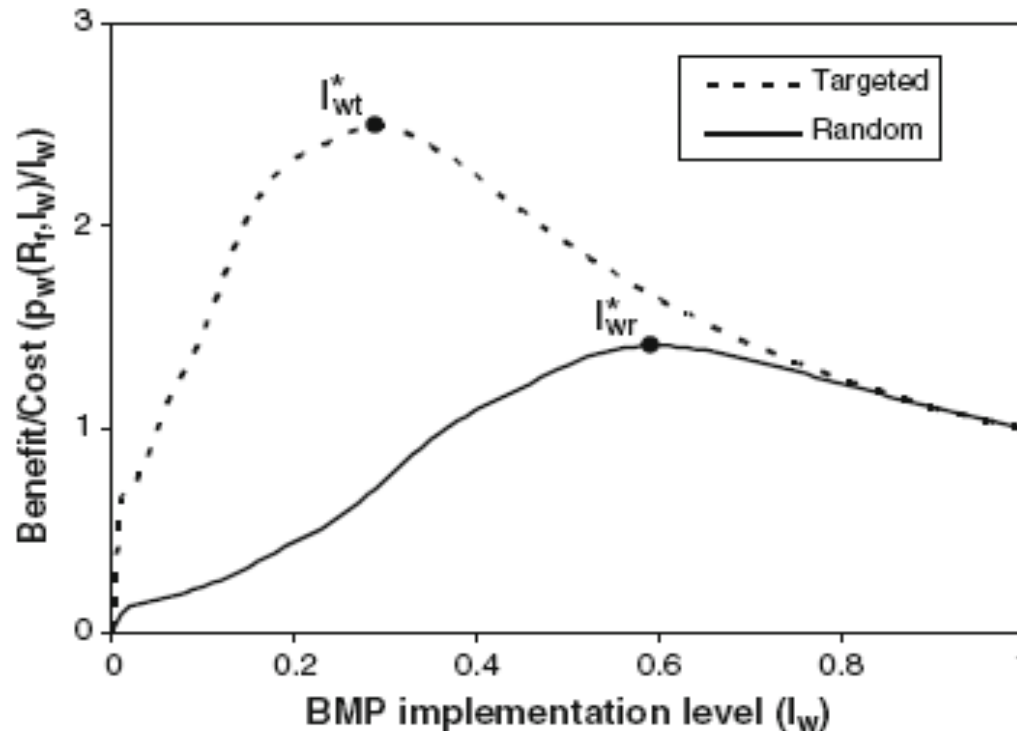


Fig. 4 Estimation of the stop points (I_{wr}^* and I_{wt}^*) for aggregated approaches in the baseline scenario. Benefit is equal to the probability of detecting a significant difference in stream water phosphorus at the outlet of a watershed (p_w). Cost is the proportion of fields with BMPs (I_w). The stop point is the maximum of each curve, where net benefit is greatest (targeted = 29%, random = 59%)



New Watershed Targeting Concepts

- Efforts should be **aggregated** to highest contributing sub-watersheds to impaired watershed
- Efforts should be **targeted** to most likely contributing fields within sub-watershed
- Density, Location and Proximity will be Basis of BMP Placement
- Flies in the face of social orientation of NPS control
- Likely next outcome from failure to meet CWA performance measures
- Opens door to Adaptive Management (Implementation)



Next Steps: Improved Coordination among WQ Programs

- Monitoring
- TMDL (303d)
- 319 & State Watershed Management
- Farm Bill & State NPS Abatement
- NPDES – Wastewater
- NPDES – Stormwater
- WQS – Criteria
- WQS – Designated Uses



Future Role of Watershed Plan: Unification of Source Control

- Implementation of Nutrient Reduction
- NPDES – WW Treatment Technology (Stage I)
- Targeted NPS Controls in Watershed
- Refined Definition of Use Support and Applicable Criteria in WQS
- NPDES – WW Treatment Technology (Stage II) after Initial Success in Reduction
- Adapt Implementation for next NPS Controls

Conclusions

- 1. Takes a lot of data over many years to find a signal of improved water quality amidst the noise in the data
- 2. Climate and hydrology has a bigger influence than management practices on pollutant loadings
- 3. There will always be runoff conditions that overwhelm practices on the land
- 4. Depending on scale and targeting, there is a high BMP density threshold to influence water quality in a watershed
- 5. Legacy loads and pollutant interactions may thwart recovery

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Conclusions, cont.

- 6. Current WQ Standards might not be the best measure to assess NPS management ~ perfection is not attainable, but improvement (load reduction) always is
- 7. Public relates better to indicators of uses, than water quality criteria
- 8. First improvements with TMDLs will be seen with point sources, then small drainages and lakes, then larger drainages and finally, large lakes.
- 9. Investments over many years will yield measurable outcomes, addressing smaller scale issues may be successful sooner

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