

Assessing TMDL Implementation

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Assessment Starts with Definition

- **TMDLs: The maximum amount of a pollutant that can enter a water without causing a violation of water quality standards**
- **TMDL = WLA + LA + MOS [Allocation process]**
 - **WLA for point sources**
 - **LA for non-point sources**
 - **MOS for the environment**

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TMDL Assessment takes Two Forms

- **Output – Oriented Assessment**
 - What have we done during implementation?
- **Outcome – Oriented Assessment**
 - What has implementation accomplished for water quality?
- *Intrinsic to Assessment is that **Targeting** of resources and effort has occurred during implementation*
 - Where and what should we concentrate our assessment?

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TMDL Outputs ~ “Structural”

- **Point Sources – Wasteload Allocations**
 - NPDES Permits
 - Monitoring Requirements – Effluent, Upstream, Downstream
 - Schedule of Compliance – Study & Design
 - Permit Effluent Limits – Concentrations & Loads
- **Non-Point Sources – Load Allocations**
 - Best Management Practices (USDA/Cons Commission)
 - Location within the Watershed (HUC 12)
 - Type & Extent (miles of buffer, number of livestock waste systems)
 - Cost (Total, Program, Individual)

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TMDL Outputs ~ “Social”

- Delivery Mechanism of Program Resources to People to Address Local WQ
 - **Number of Participants**
- Conservation District Work Plan
- Watershed District Management Plan
- Local Environmental Protection Program
- Watershed Restoration and Protection Strategies
- **All Lead to Implementation at Local Level**

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TMDL Outcomes

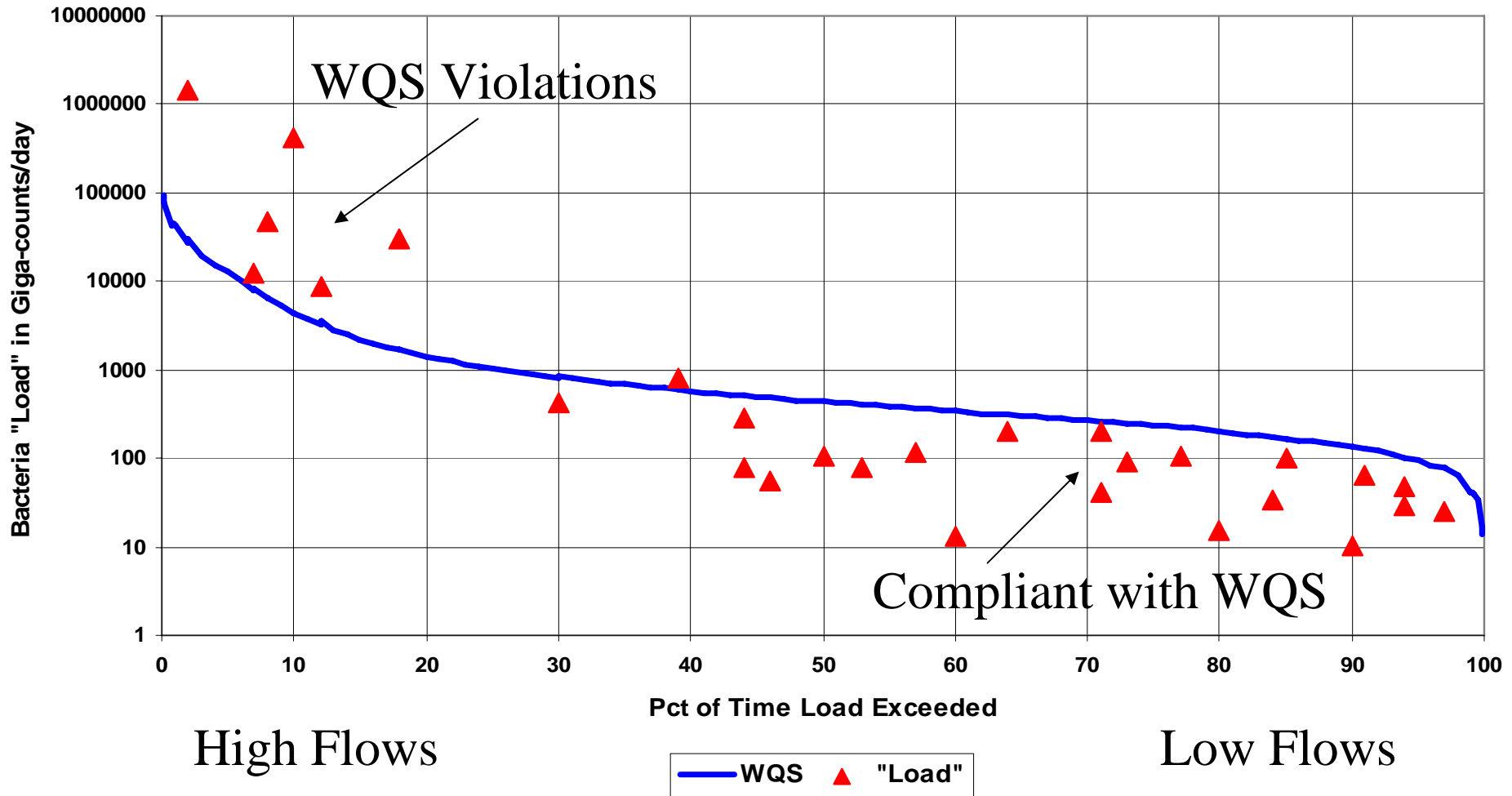
- Success is always compliance with WQ Standards
- Wasteload Allocations lead to NPDES limits, but Point Sources are a small proportion of loading
- NPS Load Allocations are “Gross allotments”...nothing to measure, no consequences of slippage
- WQ Standards comprise both numeric and narrative criteria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

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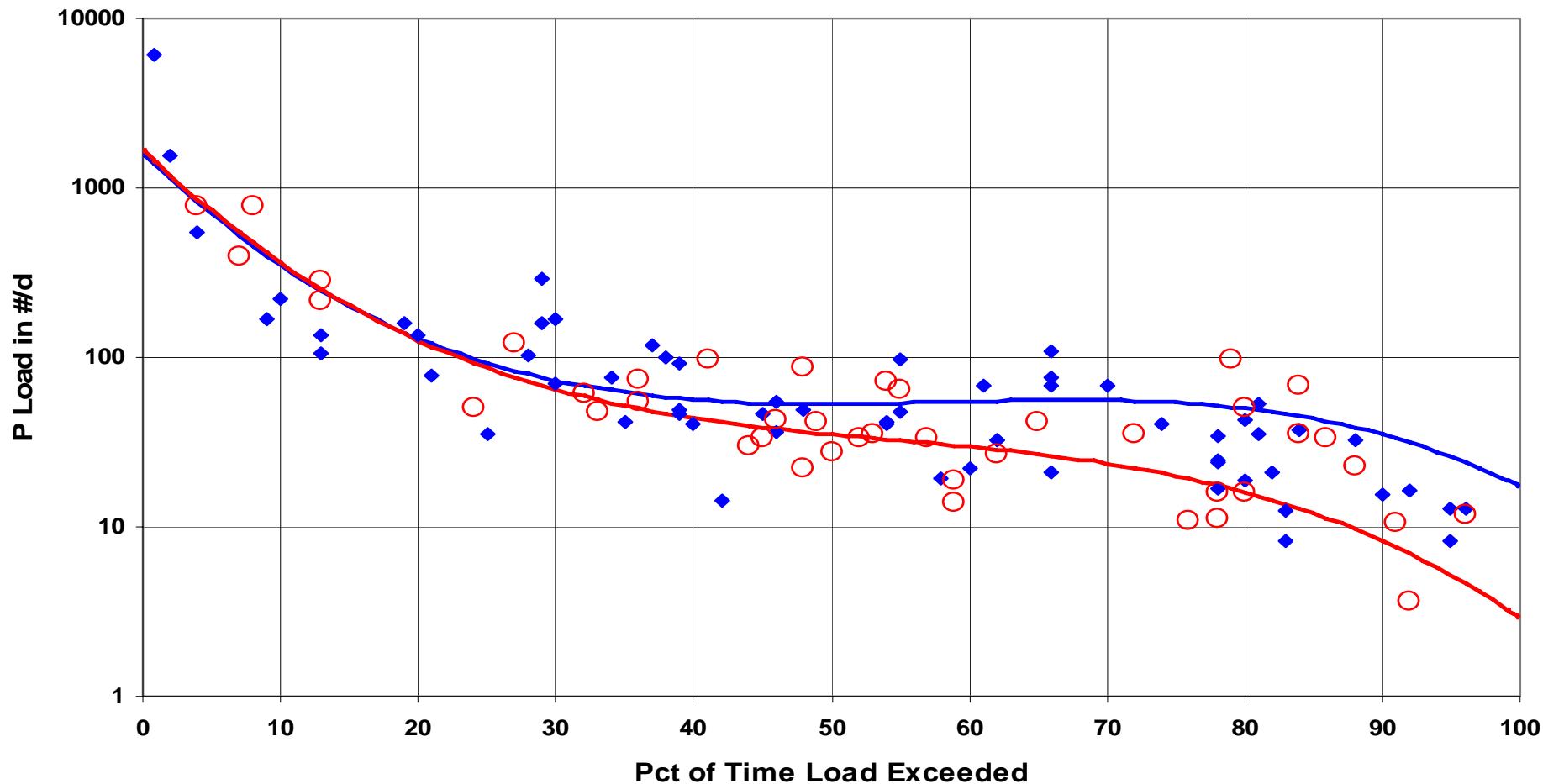
Example Stream with Numeric Criteria (E coli < 262 counts)

Little Arkansas River Bacteria TMDL



Example Stream with Narrative Criteria (Phosphorus)

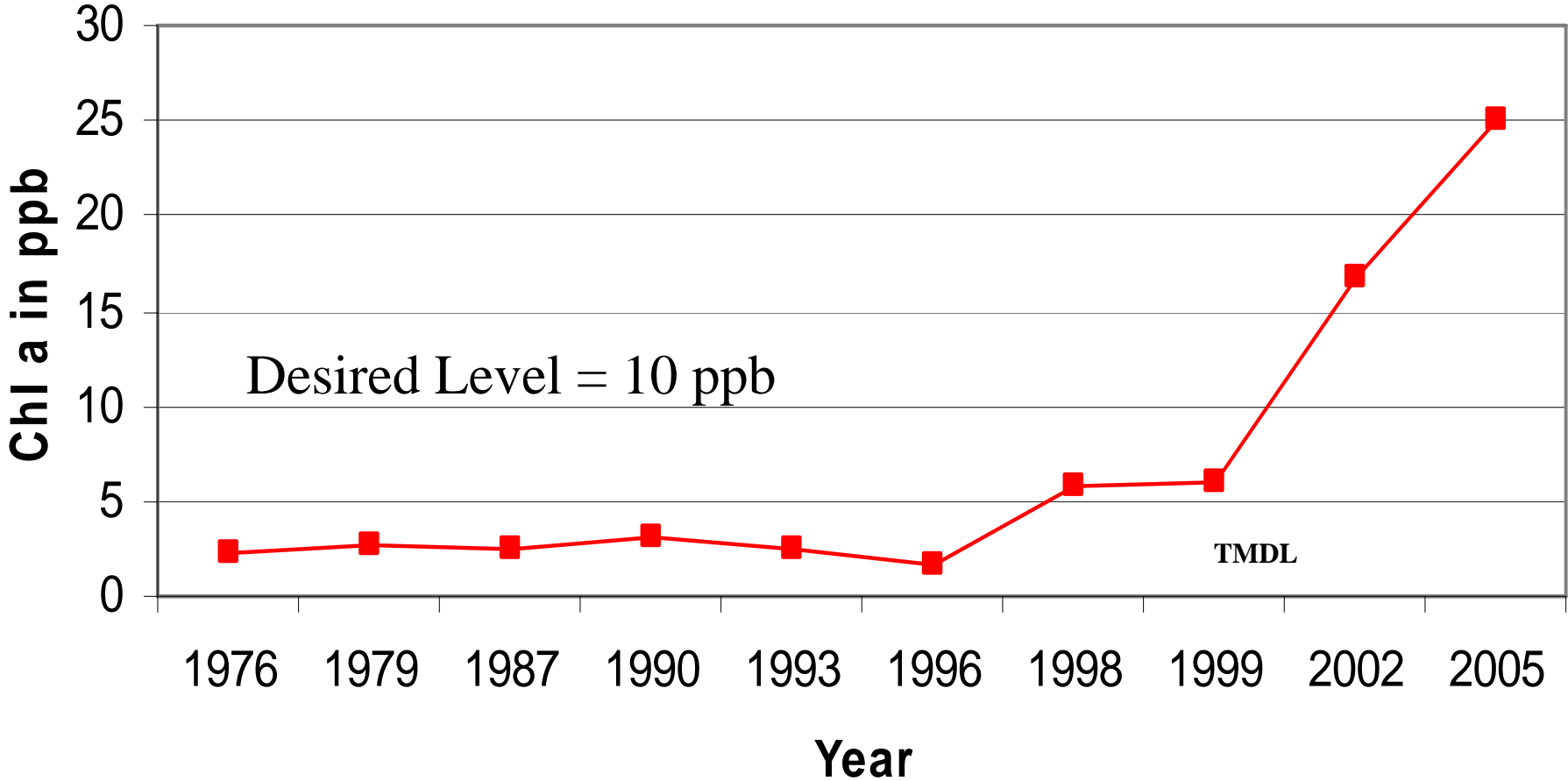
NF Ninescah River Phosphorus Loads



◆ 1990-2000 P Load ○ 2001-2008 P Load — TMDL P Load — Eval P Load

Example Lake with Designated Use

Cheney Lake Chlorophyll



Conclusions

- **1. Takes a lot of data over many years to find the signal of improved water quality amidst the noise**
- **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. There is a high BMP density threshold to influence water quality on the watershed scale**
- **5. Legacy loads and pollutant interaction 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. WQS may need to recognize Conditional Attainment of Uses**
- **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, outputs will need to be the interim measure of success**

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