

# Continuous In-Situ Measurements of Turbidity in Kansas Streams

Turbidity and TSS Workshop  
Breakout Session 2  
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# Overview of Surrogate Studies in Kansas

- **Quivira National Wildlife Refuge**
- **New Lake Olathe**
- **Kansas River Real-Time Alert Network**
- **Equus Beds Ground-Water Recharge Project**

# Typical conditions in Kansas Streams

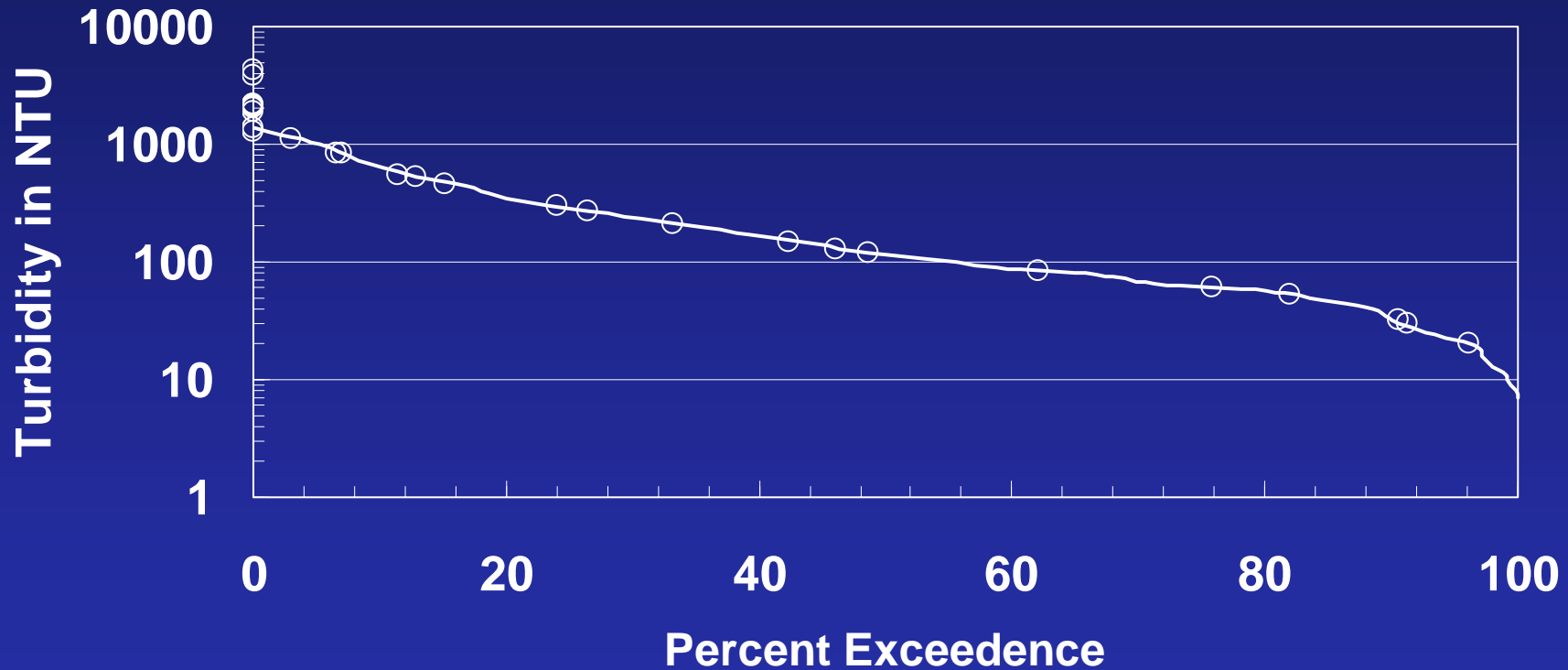
- **8 stream sites and 2 lake sites**
  - **DA are 15 to 60,000 m<sup>2</sup>**
  - **NTU range from <1 to >6000**
  - **SSC ranges from <1 to 6,000 mg/L**
  - **Sediment is nearly all fines**
  - **All sites are typically well mixed**

# Sample Design

- **Collect ~12 samples annually**
  - **Cover turbidity duration curve**
  - **Cover flow duration curve**
  - **Seasonal fluctuations**

# Turbidity Duration Curve

## Kansas River @ De Soto



# Real-time, Continuous Water-Quality Monitoring



- pH
- Water Temperature
- Dissolved Oxygen
- Specific Conductance
- Turbidity
- ORP
- Total Chlorophyll

# Surrogate used

# to Predict

Stage

Discharge

Specific Conductance

Chloride, alkalinity,  
dissolved solids,  
sulfate, triazine

**Turbidity**

Total suspended solids,  
suspended sediment,  
fecal coliform, *E. coli*,  
total nitrogen,  
total phosphorus

Fluorescence

Chlorophyll-a, Taste and odor

# Kansas River Alert Network



- Kansas Dept of Health and Environment (KDHE)
- Optimize sample collection frequency
- Fecal Coliform vs. E. Coli
- Monitor TMDLs
- Alert downstream water suppliers



# Site Selection

- **Representative of interested watershed**
- **Upgrade existing USGS stream gages**
  - **Infrastructure is there**
  - **Continuous Q**
  - **Site is accessible for sampling**

# Choosing a Sensor

- **Kansas District uses YSI Turbidity**
  - Wiper reduces maintenance
  - SDI-12 communications
- **Optical sensors without a wiper or shutter have required more frequent visits**

# Choosing a Sensor

- **Range can be an issue**
  - 0-1,000 NTU
  - 0- ~ 1500 NTU for YSI
  - 0- ~ 4000 NTU for D and A
- **Standards**
  - ISO 7027
  - EPA 180.1
  - GLI-2

# Collection of Manual Samples

- Collected during a range of hydrologic conditions
- Analyzed for nutrients, bacteria, and other selected constituents

