

Effects of CSO's on Water Quality of Brush Creek and Blue River, Kansas City, MO

Principal Investigator: Don Wilkison

**Project team: Dan Armstrong, Eric
Christensen, Shelley Severn, Dale Blevins**

**Analytical R&D: Steve Zaugg, Ed Furlong, Andy
Carson**

COOPERATOR

City of Kansas City, MO



Driving forces-----

EXTENSIVE CAPITAL IMPROVEMENTS
PRIVATE INVESTMENT IN BRUSH CREEK
CORRIDOR

\$419M COMPLETED/UNDERWAY

\$211M PLANNED

Source: Brush Creek
Community
Partners, 2000



Driving forces----- Extensive capital improvements

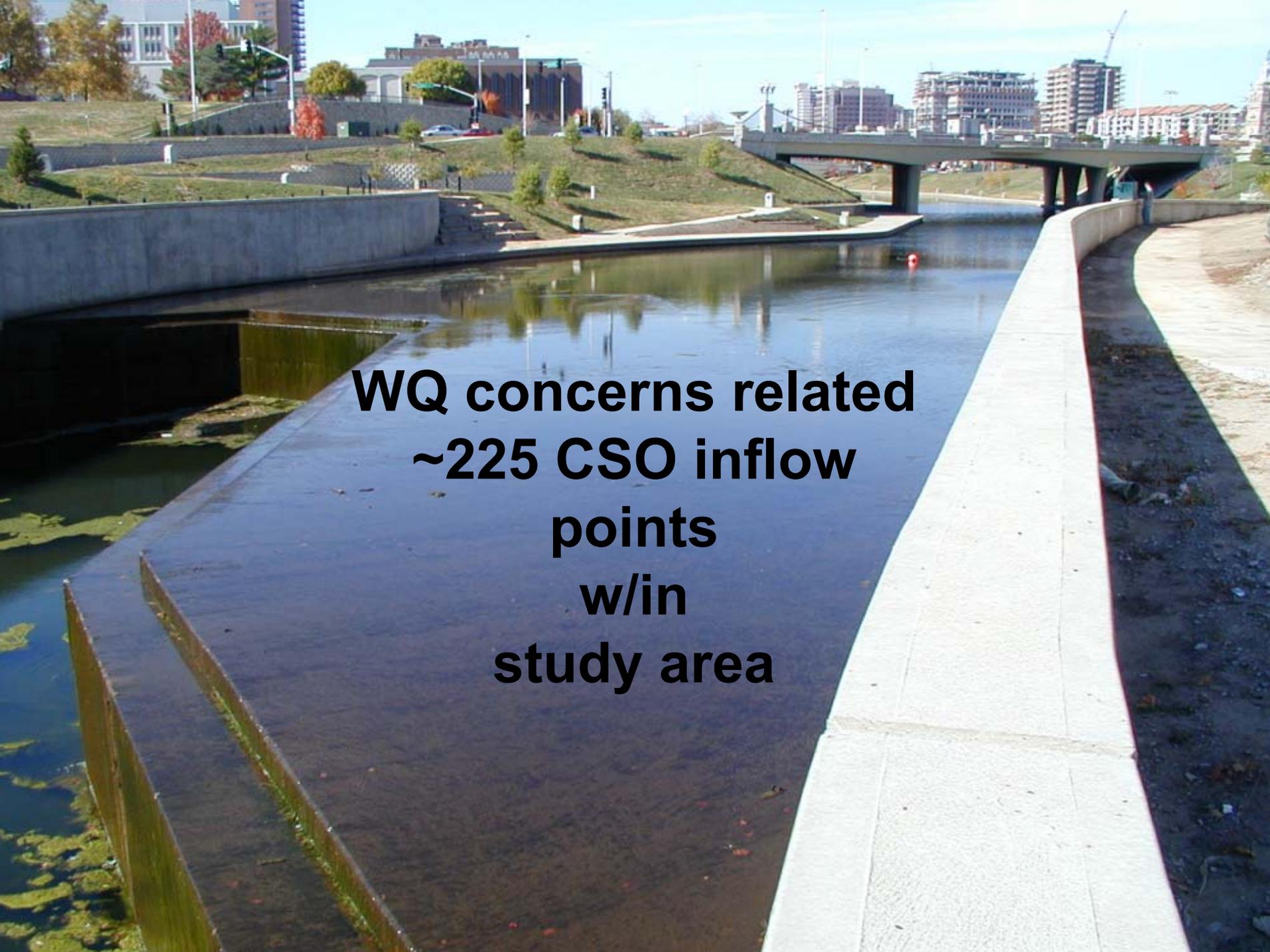
PUBLIC INVESTMENT

\$121 M COMPLETED/UNDERWAY

\$73 M PLANNED

Source: Brush Creek
Community
Partners, 2000



A photograph of a concrete-lined canal or river. The water is dark and reflects the sky. In the background, there is a bridge and a city skyline with several buildings. The canal is bordered by concrete walls on both sides. The text is overlaid on the water.

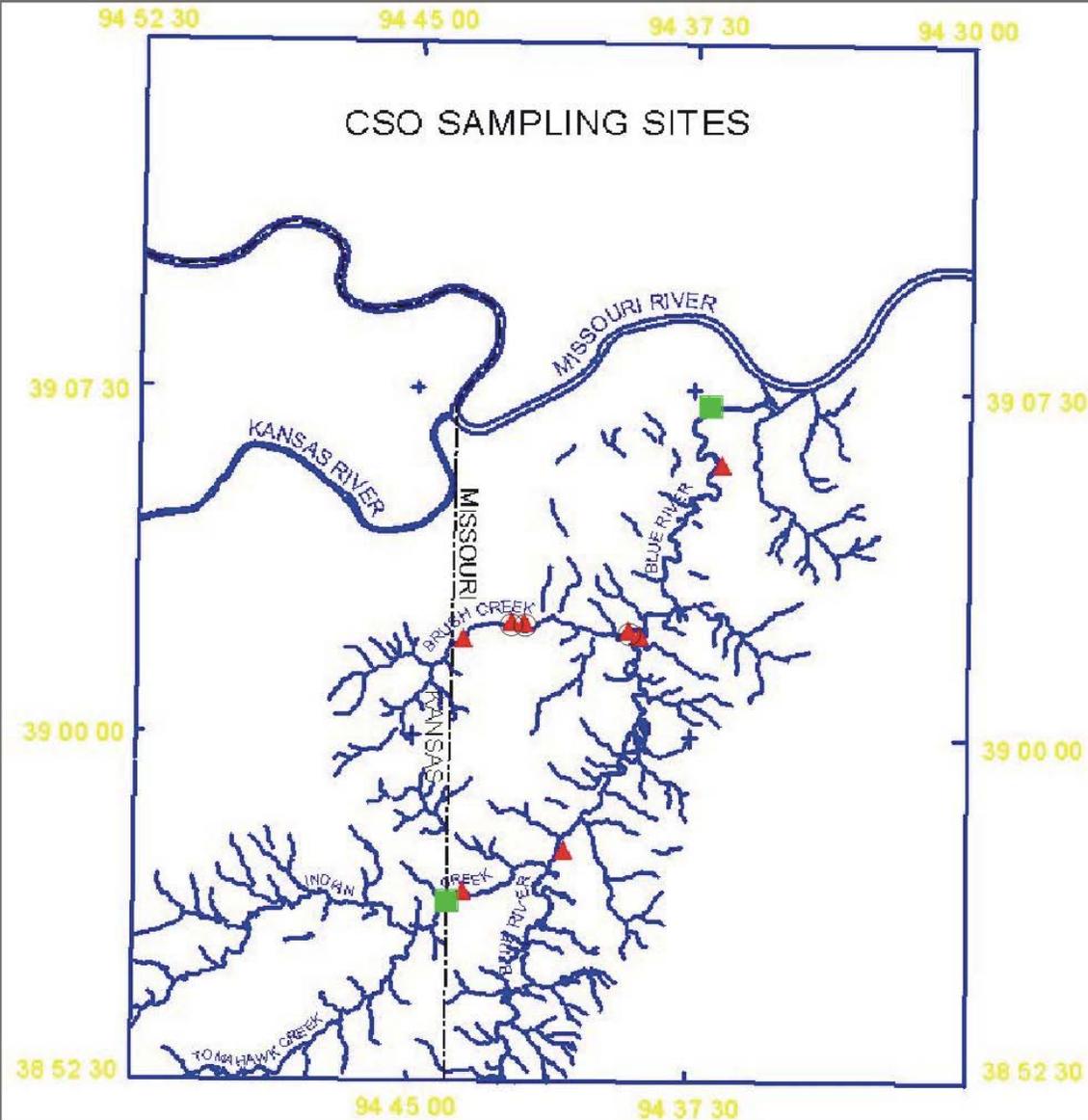
**WQ concerns related
~225 CSO inflow
points
w/in
study area**

A photograph showing a concrete drainage structure, possibly a culvert or a series of steps, situated in a field. The structure is made of light-colored concrete and is surrounded by dense green vegetation, including tall grasses and leafy plants. In the background, a white tarp is visible, partially covering a structure. The overall scene suggests a rural or agricultural setting. The text "New methods & technology available for tracing wastewater" is overlaid in yellow on the lower part of the image.

**New methods &
technology available for tracing wastewater**

Objectives

- **Determine conc. & loads for selected contaminants associated with sewage overflows during base- and storm flows**
- **Identify critical stream areas affected by CSO's**
- **Examine CSO impacts on 3 Brush Creek impoundment's**



EXPLANATION

-  **Stream site**
-  **Stream site w/ impoundment**
-  **Sewage treatment plant**



Approach

- **Base flow sampling (x6) annually**
 - 7 surface sites & 3 sewage streams
- **Continuous Q @ 6 sites**
- **Continuous WQ @ 5 sites**
- **Satellite telemetry @ 5 sites**

Approach (cont.)

- **Sample 4-5 storms annually**
- **Segmented storm sampling**
- **Flow-composite automatic samplers**
Using TINY BASIC programs



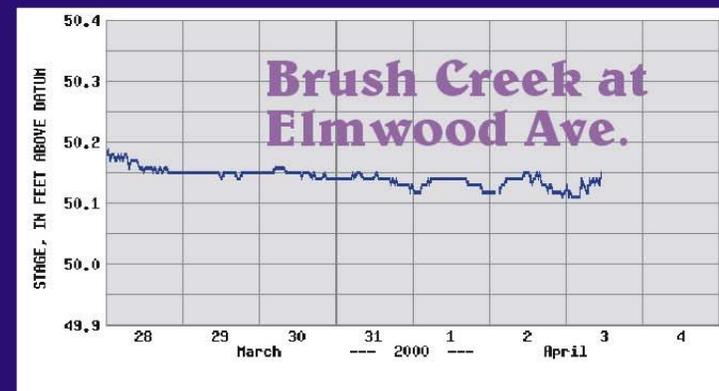
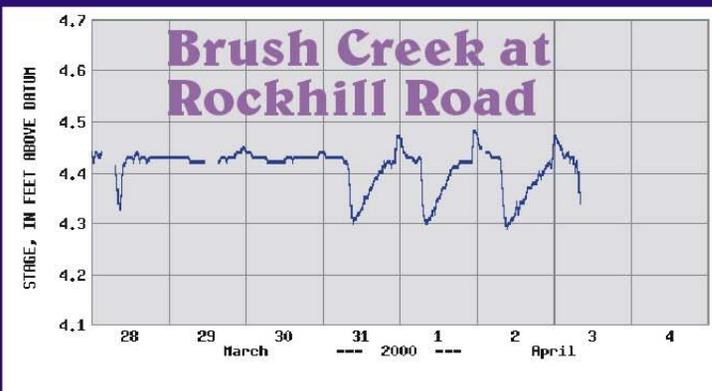
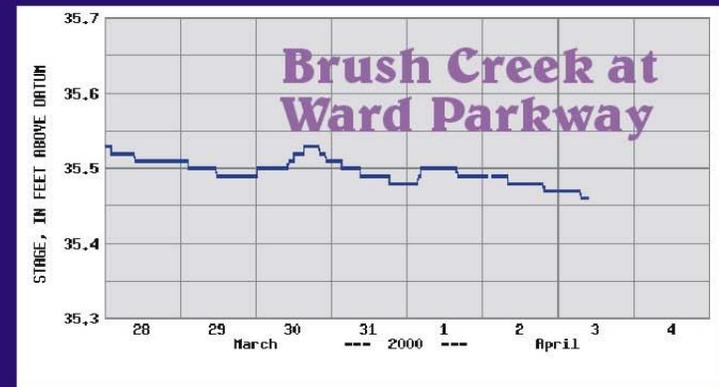
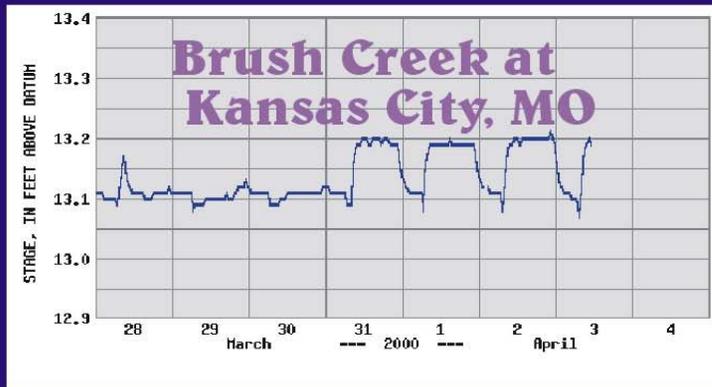
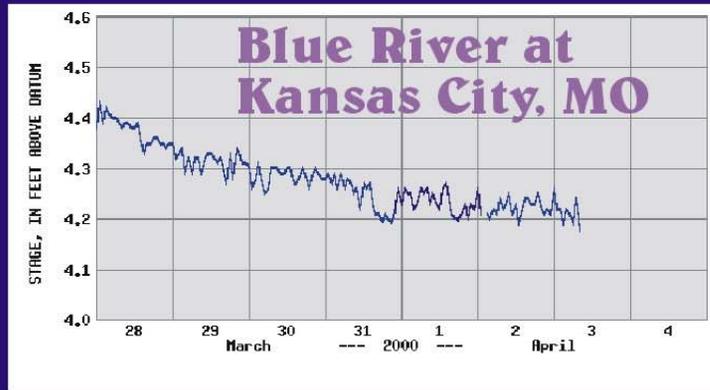
Approach (cont.)

- **New wastewater methodology being used to sample for:**
 - **Bisphenol A (food packaging cmpds)**
 - **Cholesterol, Coprostanol**
 - **17- β -estradiol**
 - **Detergent metabolites**
 - **Caffeine, disinfectants, fragrances**

Approach (cont.)

- **Nutrients**
- **Suspended sediment**
- **TOC, COD, CL, BOD₅**
- **Selected Pharmaceutical compounds**
 - **Acetaminophen, Ibuprofen**
 - **Diltiazem (anti-hypertension)**
 - **Sulfamethoxazole, Trimethprim (Antibacterial)**
 - **Cimetidine (antacid)**

Realtime Stream-flow data available at <http://missouri.usgs.gov>



**Suspended pump
rises
with floodwaters**

**Remote pump
In waterproof
housing**



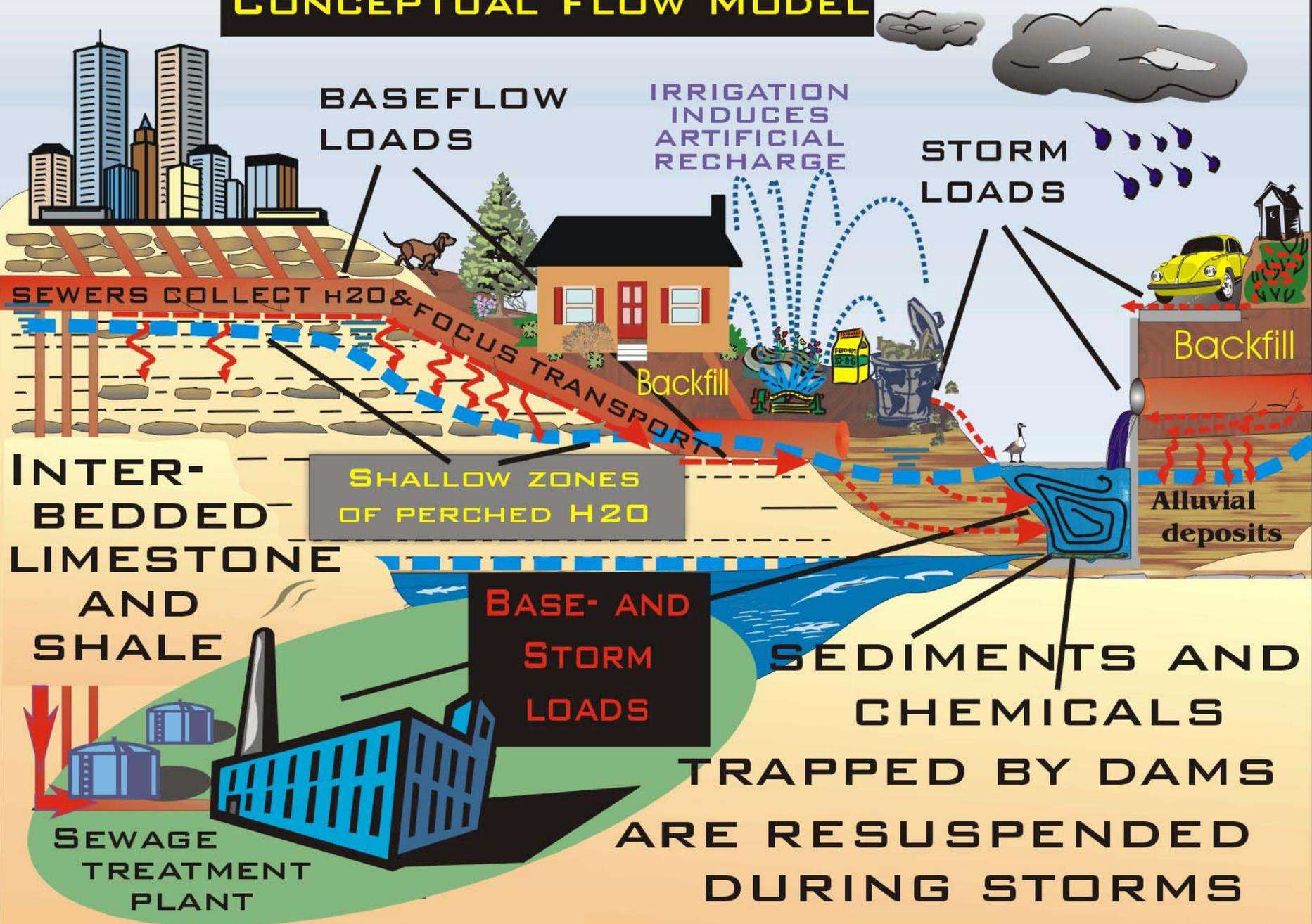
**SURVEYING
WITH
DIFFERENTIAL
GPS**



Flood forecasting data



CONCEPTUAL FLOW MODEL



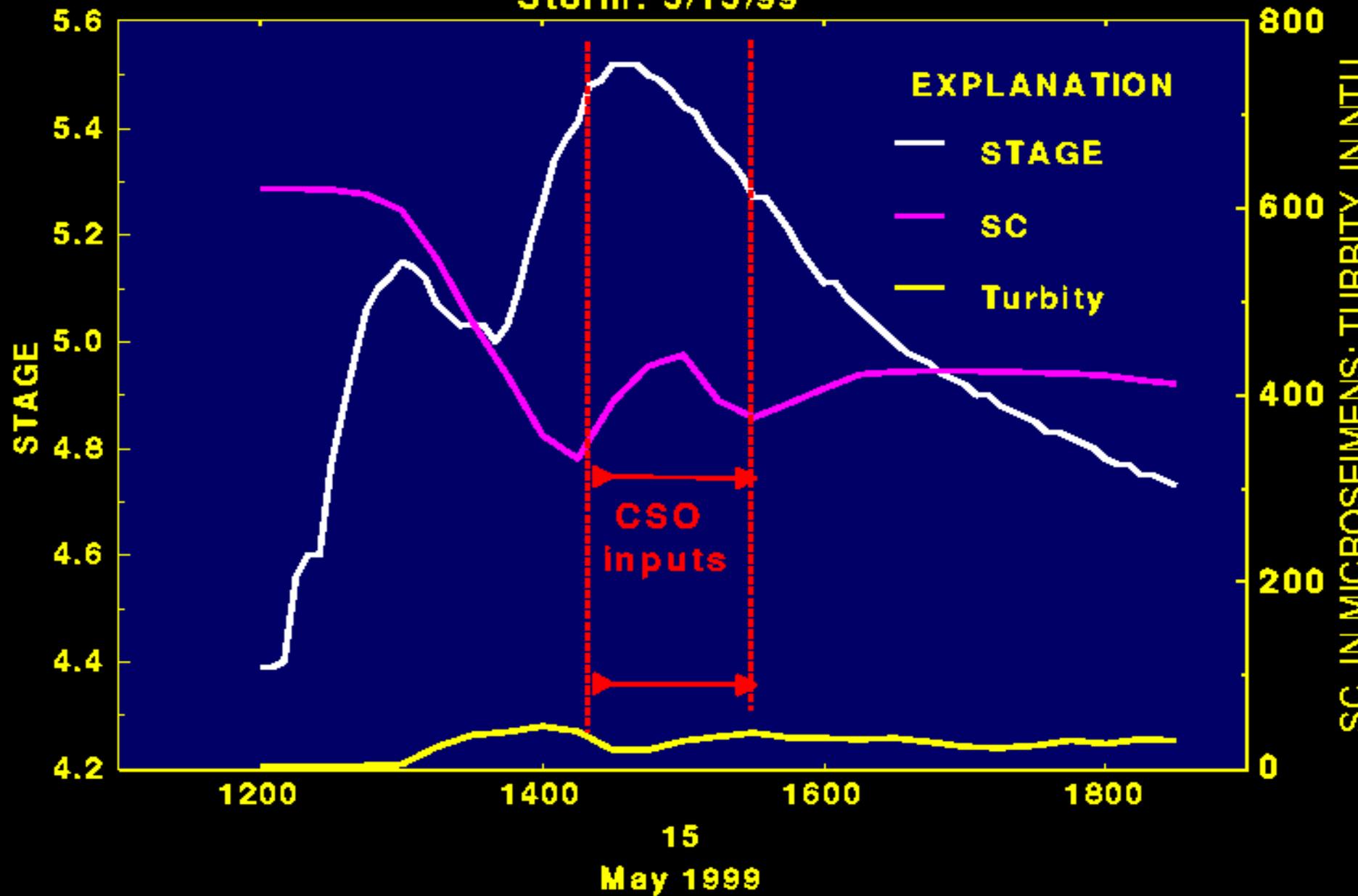


Storms deposit sediments

These sediments
may provide a
continuous source of
contaminants during
baseflow



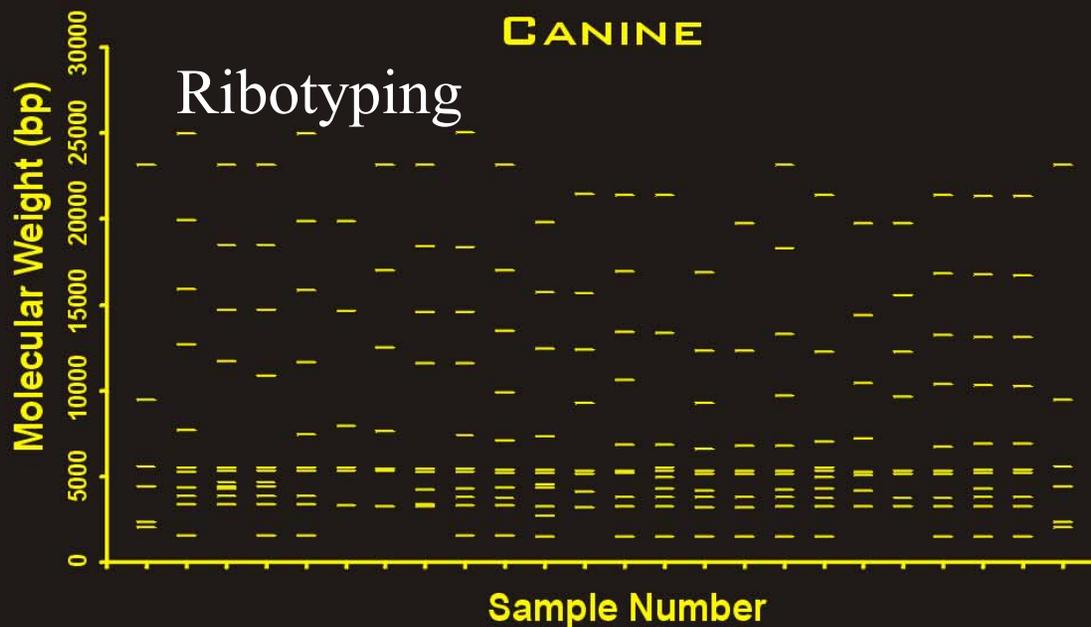
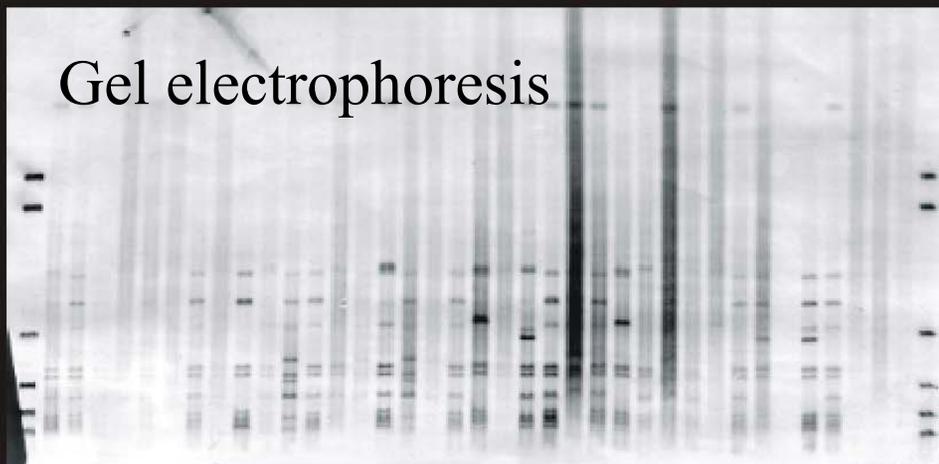
Brush Creek @ Rockhill Rd
Storm: 5/15/99



BACTERIAL SOURCE TRACKING

- **Currently under development**
- **Andy Carson, U. of Missouri
(Veterinary Pathobiology)**
- **Wide application**
 - Jack's Fork (Horse/human?)
 - Shoal Creek (CAFO's/Poultry?)
 - Little Sac River (STP/Cows?)
 - Longbranch Reservoir
(Humans/Hogs/Geese?)
 - Kansas City (Humans/Dogs/Geese?)

E. Coli source tracking using:



Preliminary results

- **Frequent detections of many waste-water indicators during base flow and storm flows**
- **Detections of human pharmaceuticals**
- **Treated sewage effluent a source**

