

# Kickapoo Water Quality

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Environmental Office**





# Outline

- Introduction
- Water Quality Data
- Interval
- Streambank Stabilization
- Other Activities/Projects
- Future Projects



# Introduction

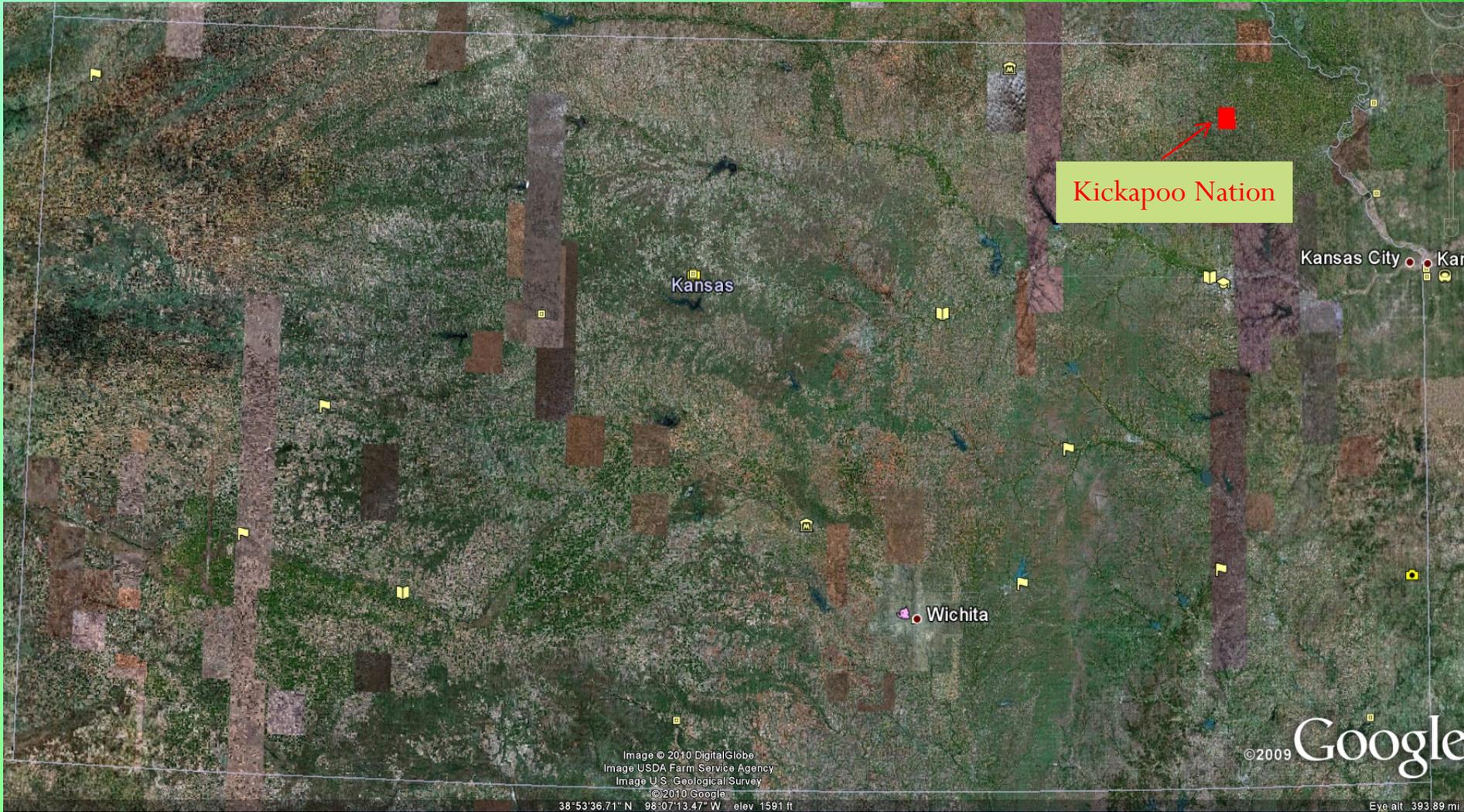


Image © 2010 DigitalGlobe  
Image USDA Farm Service Agency  
Image U.S. Geological Survey  
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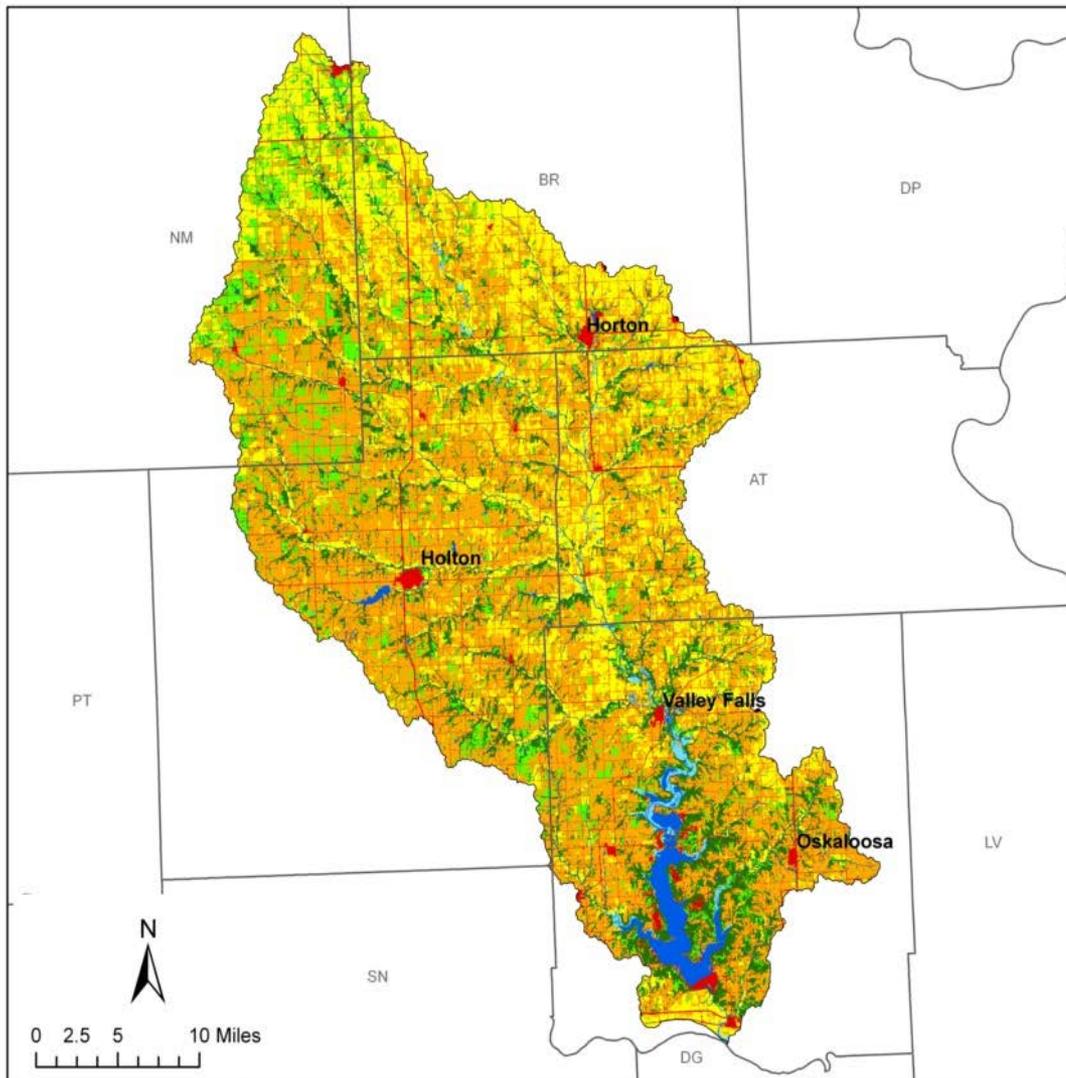
38°53'36.71" N 98°07'13.47" W elev 1591 ft

Eye alt 393.89 mi

# Delaware Watershed



## Delaware Land Cover



### Land Cover Classification

- Water
- Urban/Developed
- Barren/Transitional
- Forest/Woodland
- Shrubland
- Grassland/Herbaceous
- Pasture/Hay
- Cropland
- Wetlands

Map area shown in blue.



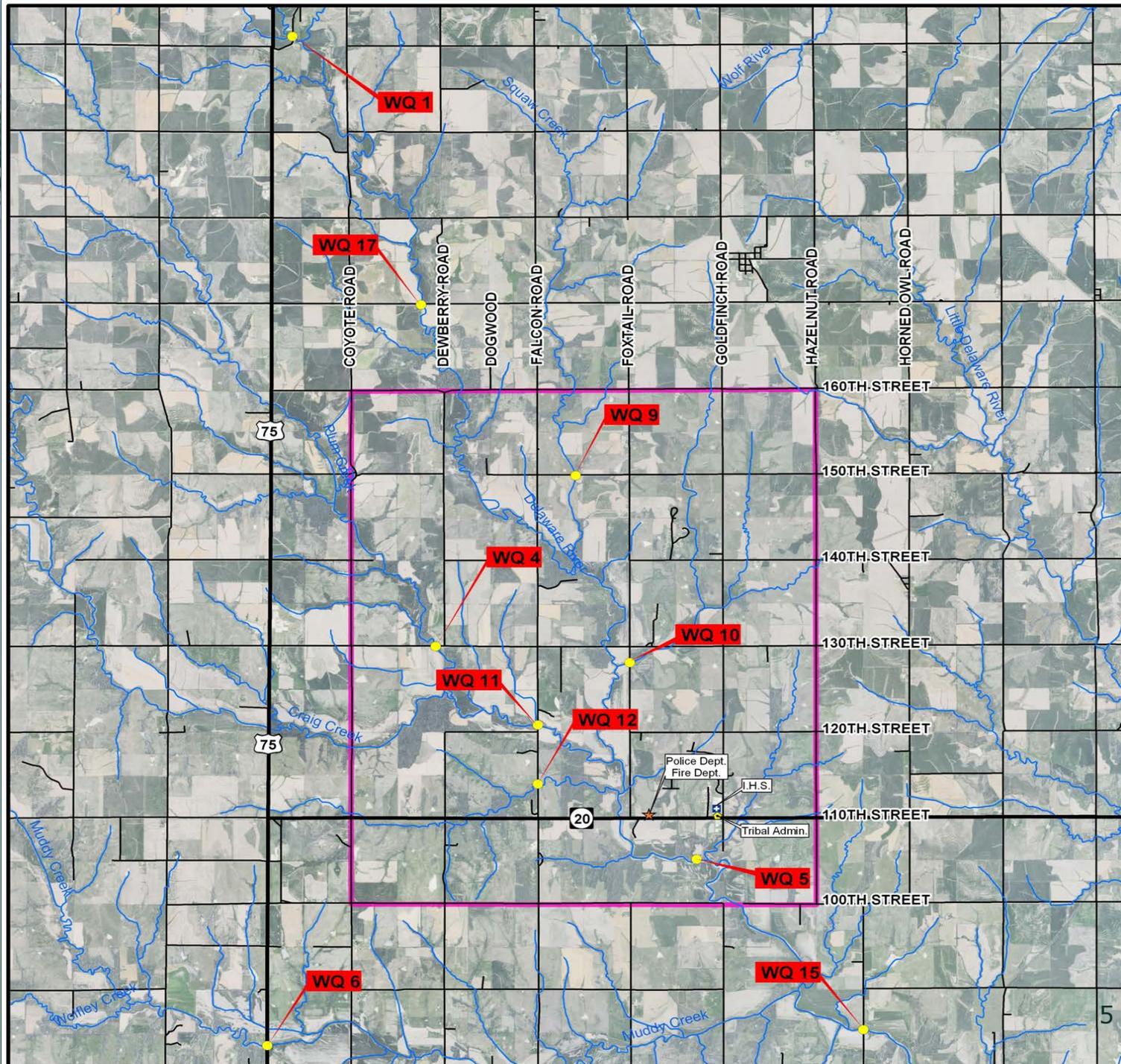
### Land cover Statistics

Land Cover	Acres	Percentage
Water	18593.8	2.5%
Urban/Developed	37979.6	5.1%
Barren/Transitional	124.1	0.0%
Forest/Woodland	95610.8	12.8%
Shrubland	1649.3	0.2%
Grassland/Herbaceous	63765.6	8.5%
Pasture/Hay	338531.9	45.4%
Cropland	182135.5	24.4%
Wetlands	7413.5	1.0%
<b>Total:</b>	<b>745804.2</b>	<b>100%</b>

Source: USGS 2001 National Land Cover Data



Map produced by  
Kansas Department of Health & Environment  
April 2008



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# Project Description

- 2007, 2009, and 2010
- Conducted by **USGS** (contracted) between April and October
- Run-off samples are collected within 48 hours after a **precipitation event**
- Base-flow samples are collected during **normal stream flow**
- Problem areas are going to be discussed

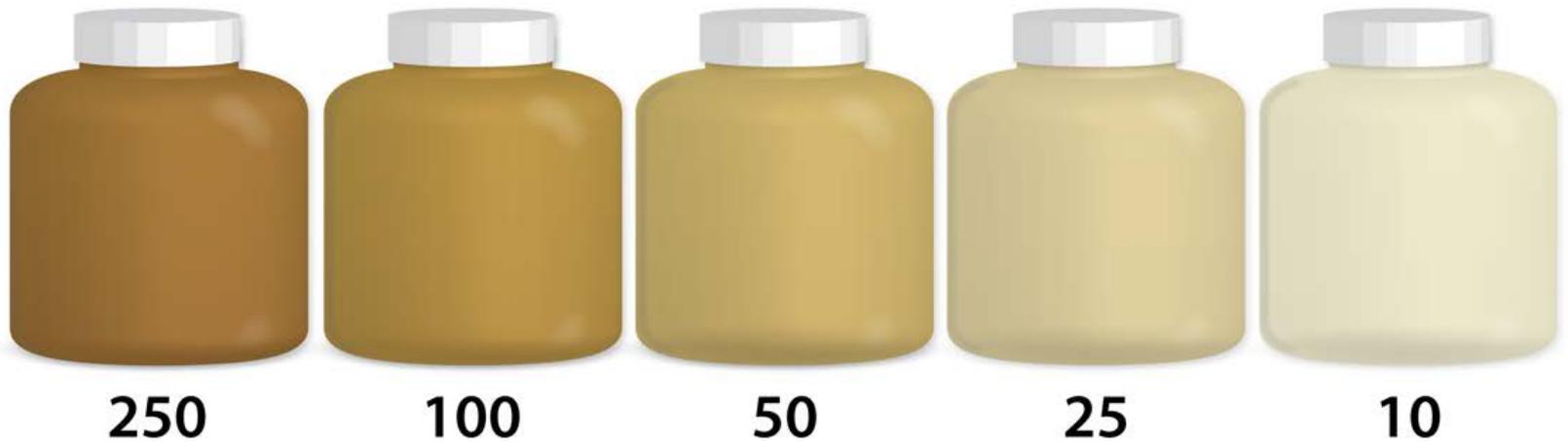


# Turbidity



## Turbidity (NTU)

*Water Samples:*





# Turbidity



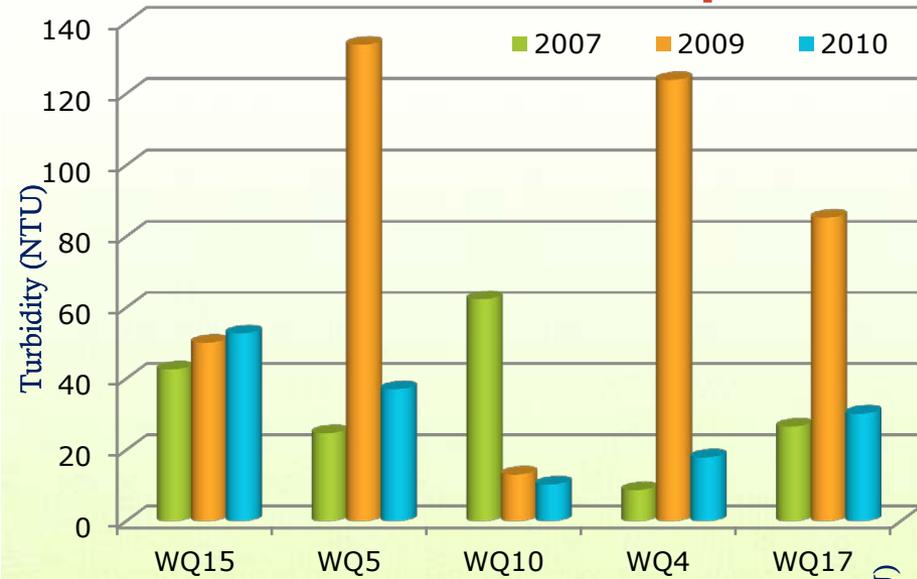
- Turbidity indicates the amount of solids suspended in the water, whether mineral (e.g., soil particles) or organic (e.g., algae)
- High concentrations of particulate matter can cause increased sedimentation and siltation in a stream, which in turn can **ruin important habitat areas for fish and other aquatic life**
- Sedimentation of streams causes an increase in turbidity and a **decrease in dissolved oxygen**
- Sedimentation can also **fill up interstitial spaces** which small fish and invertebrates use for their **survival**



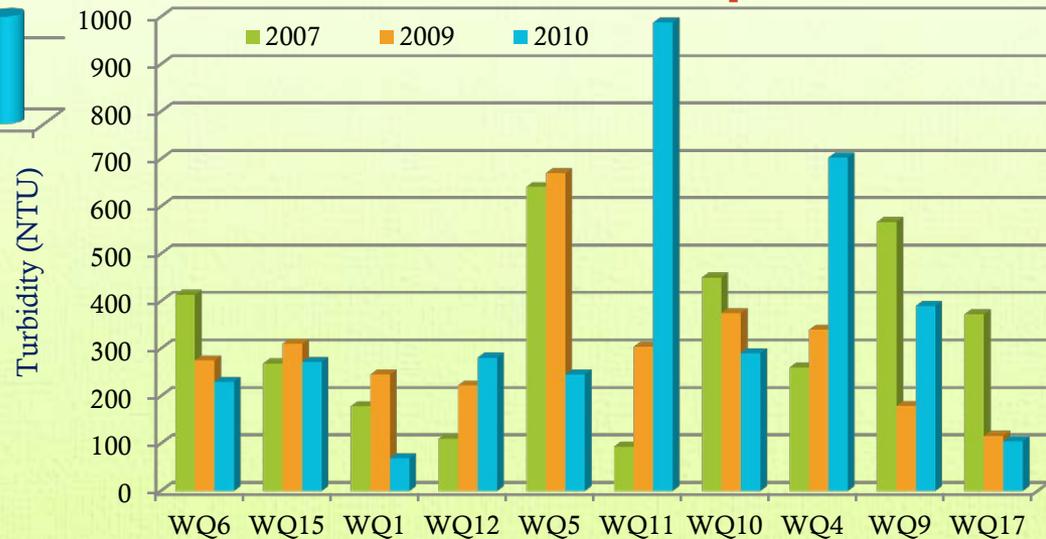
# Turbidity



## Base-Flow Samples



## Run-Off Samples





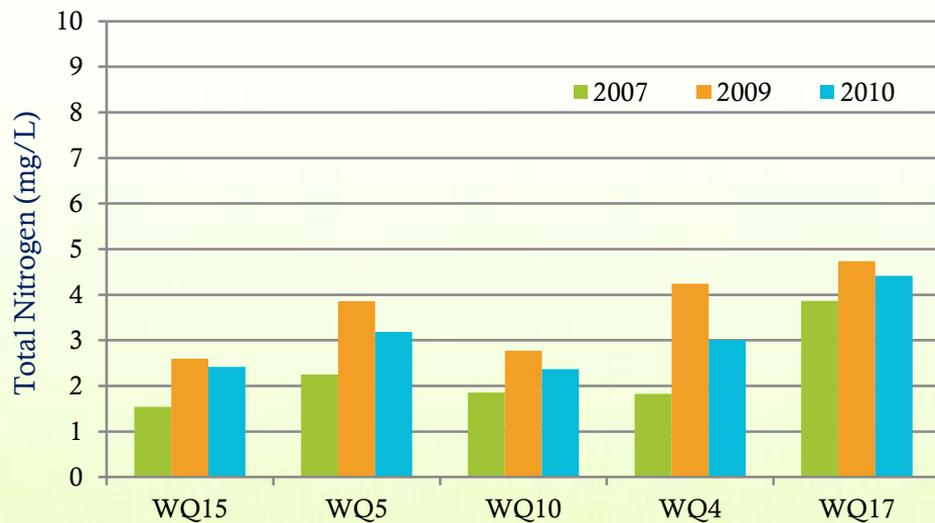
# Total Nitrogen

- Nutrients are required in a stream for growth and productivity, but are not always necessarily beneficial
- The additional algae and other plant growth allowed by the nutrients may be beneficial up to a point, but may easily become a nuisance

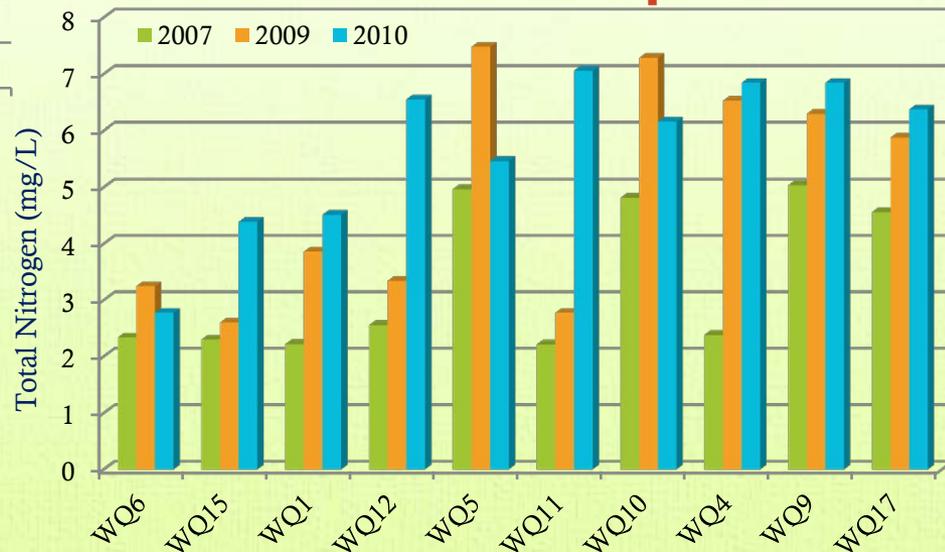


# Total Nitrogen

## Base-Flow Samples



## Run-Off Samples





# Algal Blooms

- Certain species of Algae out-compete other organisms and reproduce rapidly, often forming visible discolored patches on the surface of the water that can **produce toxins detrimental** to other organisms
- The blooms can **block sunlight** and **deplete oxygen** in the water which causes **distress** to other organisms



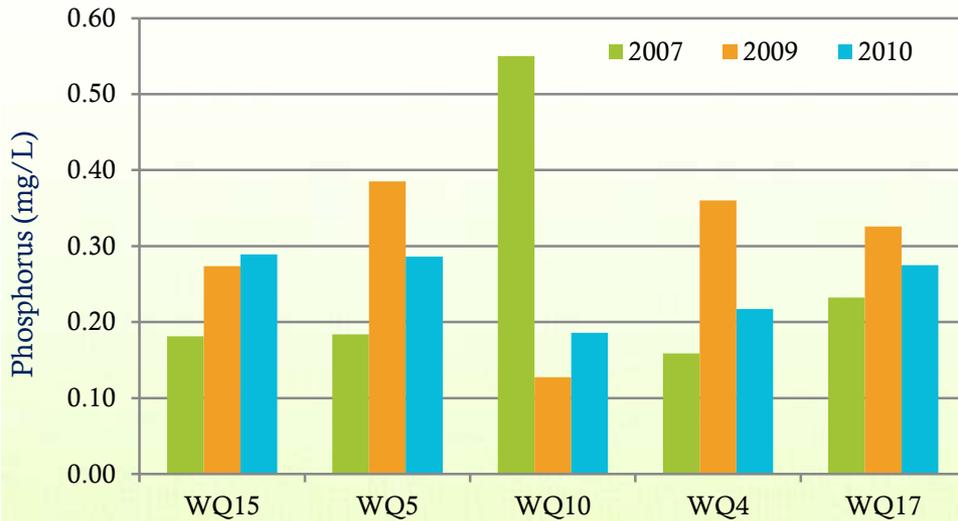
# Total Phosphorus

- Phosphorus is a **plant nutrient** needed for growth and a fundamental element in the metabolic reactions of plants and animals (hence its use in fertilizers)
- Sources of phosphorus include **human and animal wastes** (i.e., sewage), **soil erosion**, and **fertilizers**
- Excess phosphorus causes extensive algal growth called "**blooms**," which are a classic symptom of cultural eutrophication and lead to decreased oxygen levels in creek water



# Total Phosphorus

## Base-Flow Samples



Recommended maximum for rivers and streams is 0.1 mg/L

## Run-Off Samples





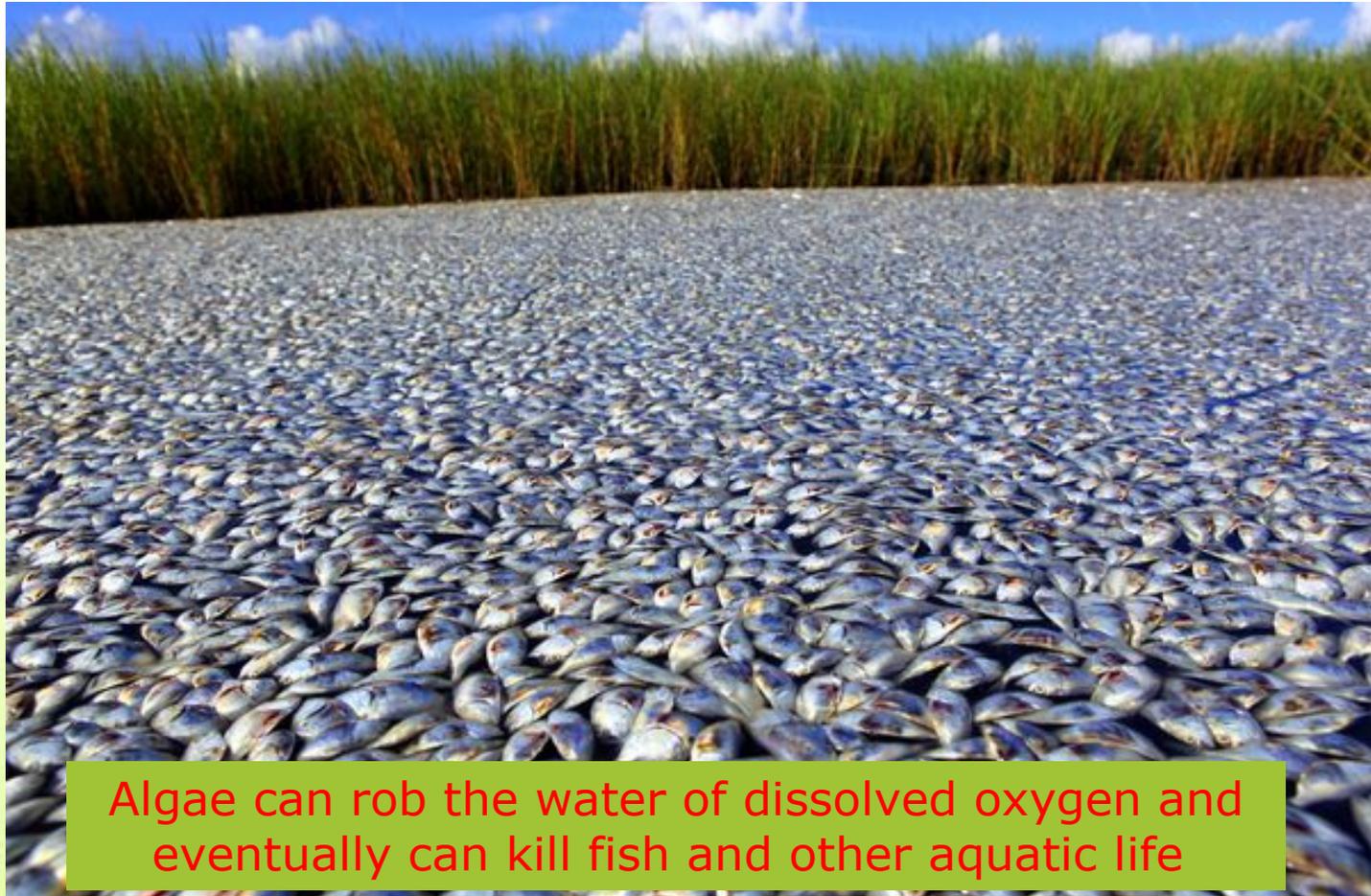
# Algal Blooms



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# Algal Blooms



Algae can rob the water of dissolved oxygen and eventually can kill fish and other aquatic life



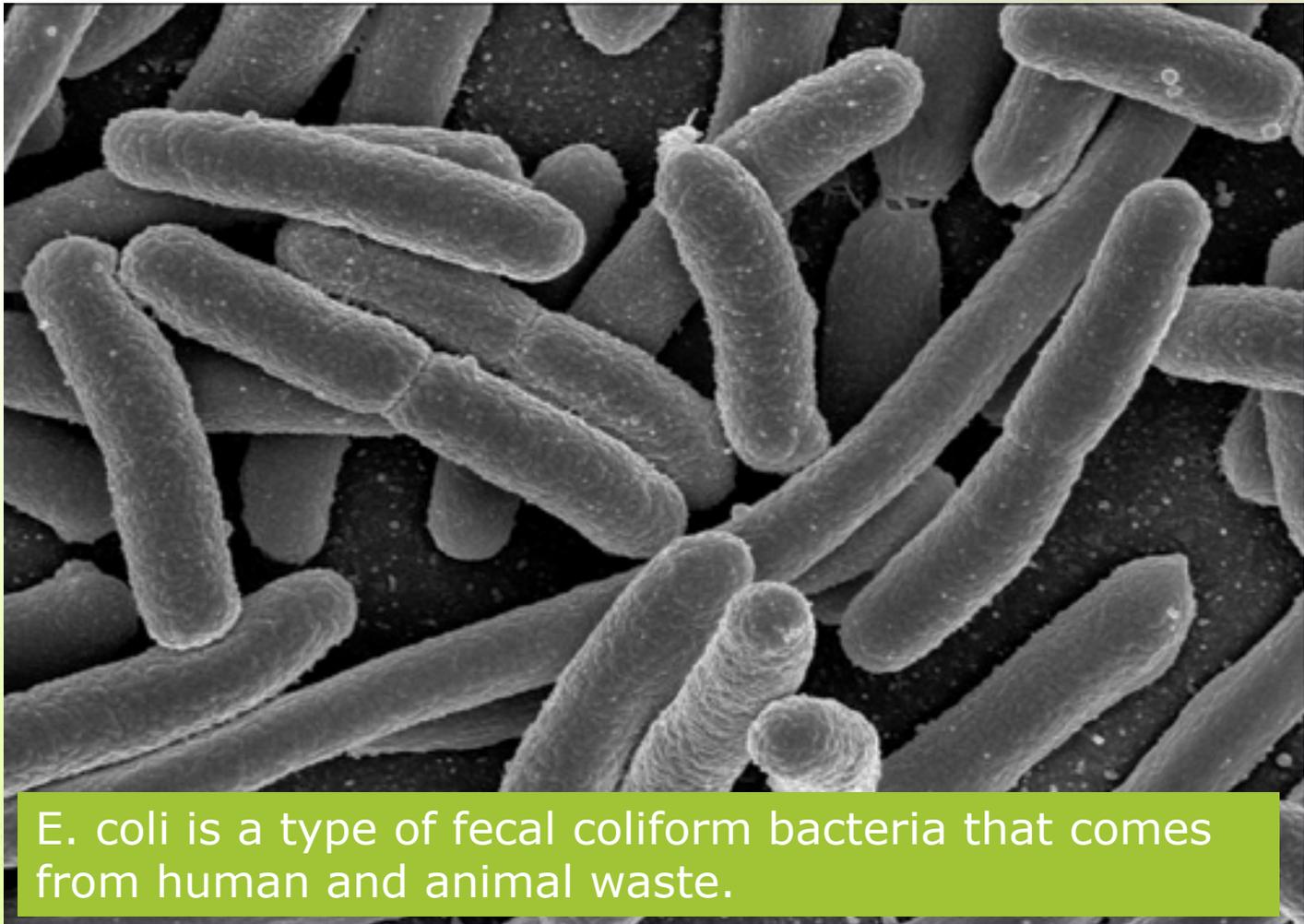
# E-Coli



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# E-Coli



E. coli is a type of fecal coliform bacteria that comes from human and animal waste.



# E-Coli

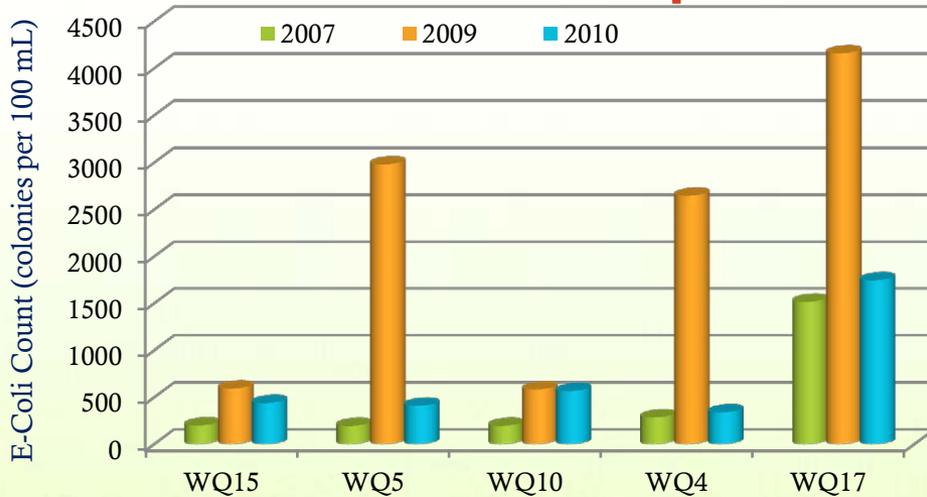




# E-Coli



## Base-Flow Samples



The EPA water quality standard for E. coli bacteria is 394 colony forming units per 100 mL

## Run-Off Samples





# Triazine Screen

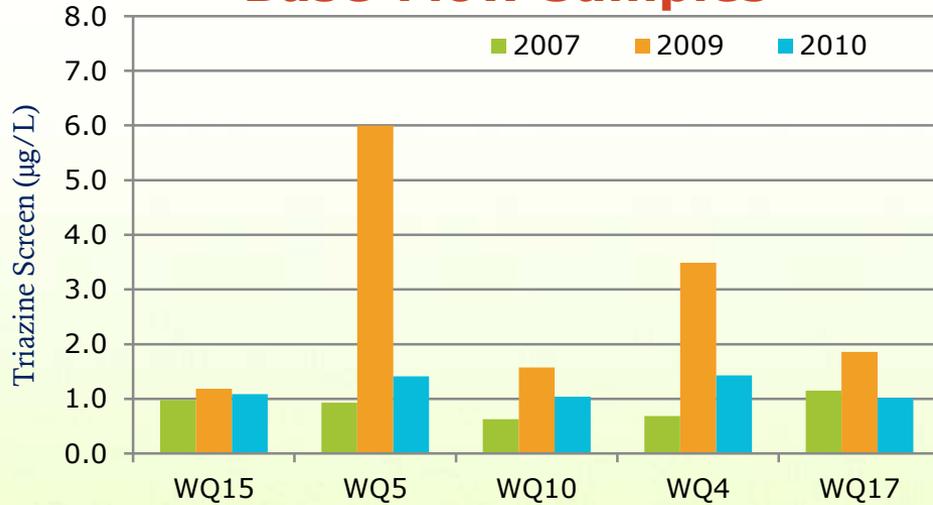


- Triazine screen is the value indicating the **presence of pesticides** in the water sample
- Strong evidence that Atrazine is an endocrine disrupting chemical (EDC), interfering with critical **reproductive hormones** even at extremely low levels.
- For example, studies in the laboratories have indicated that even low levels of Atrazine may turn **male frogs into female**

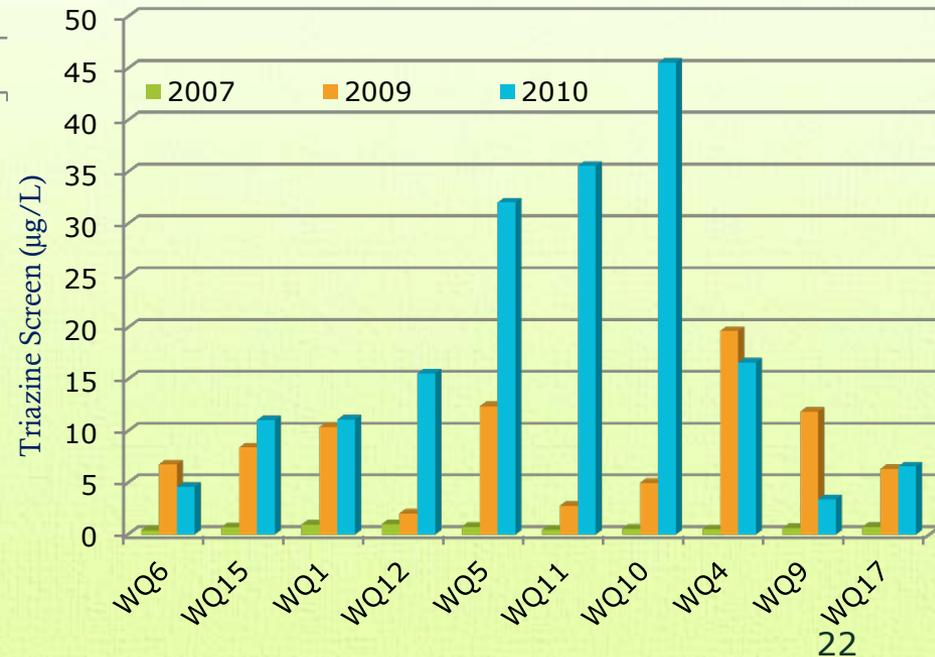


# Triazine Screen

## Base-Flow Samples



## Run-Off Samples





# Interval

- Nothing is Perfect
- We strive to get better every moment



# Healthy Stream

- The stream is safe for people to **swim, fish, and wade**
- Usually the waters of a healthy stream are **clear, cool, and odorless**
- There is **enough oxygen** for the fish and other aquatic life in the stream
- There are **no toxic chemicals** from **farms, homes, roads, lagoons, and lawns** washing into the stream
- Shade from the **trees (deep roots)** and **shrubs** keep the temperature of the water stable, making it a good home for fish and **stabilizes the banks**



# Healthy vs Unhealthy Stream





• High water events eroded the banks







May 2011

# Streambank Stabilization



- **Rock Weir Construction**
  - Dozers and Backhoes working to slope the banks

May 2011



- Rock Weir Construction
  - Dozers and Backhoes working to slope the banks



- **Willow Stakes**

- Were planted closest to the stream. Their long roots helps holding the soil together



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- **Sycamore trees** were planted above the willows and then **American plum** and **Fragrant Sumac** were planted higher up the bank





- **Native grasses** are planted above all the tree plantings.



- **Signs** are posted for public awareness



## DELAWARE RIVER

# STREAMBANK RESTORATION PROJECT

### EROSION



BEFORE STABILIZATION

Prior to the streambank stabilization project in 2011, unchecked erosion had created a steep, unstable streambank and was cutting into the Kickapoo Pow-Wow grounds at a rate of 0.3 feet/year.

#### Unwanted Impacts of Erosion:

- Decreased water quality
- Loss of habitat for fish and wildlife
- Property loss resulting from bank collapse
- Increased transport of pollutants
- Sedimentation in downstream reservoirs

*The Delaware River carries large quantities of sediment from eroding streambanks to Perry Lake each year, impacting water quality and recreational opportunities, and shortening the life-span of the reservoir.*

Modifications to streams and rivers, such as straightening the channel or removing trees growing on streambanks, accelerates erosion.

### STREAMBANK STABILIZATION



In the spring of 2011, the steep, eroded streambank was reshaped to a more gentle slope, designed to minimize erosion, prevent bank collapse and allow riparian vegetation to regrow.



Rock was placed at the toe of the slope, and in the river in rock vanes, designed to deflect flow from the streambank and trap sediment.

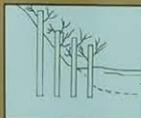


Diagram of willow stakes planted in streambank

After reshaping the streambank and adding rock—

800 live-cut willow stakes were planted to help stabilize the stream-bank. Willows grow rapidly, sending down roots to hold the soil in place.

### RIPARIAN RESTORATION



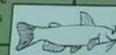
AFTER STABILIZATION

Native grasses and fast-growing trees were planted on the reshaped slope and at the top of the bank.

As they grow, their long roots will anchor the soil and prevent erosion.

#### Benefits of a Healthy Riparian Area:

- Reduced streambank erosion
- Improved water quality
- Increased habitat for fish and wildlife
- Enhanced recreational opportunities



Riparian vegetation prevents erosion, filters pollutants, and decreases sedimentation.

#### Project Sponsors:



Funded in part through a U.S. EPA Clean Water Act Section 319 grant provided by the Kansas Dept. of Health & Environment



June 2011



June 2011







# Outreach



- Kickapoo National School & Boys and Girls Club
  - Conduct Water Quiz competitions
  - Field Trips
- Kickapoo Tribal Council
  - Water Luncheon
- Kickapoo Farm and Roads Dept.
  - Vegetation strips
- Household Hazardous waste collection & Pharmaceutical collection
- Booths at Earth Day and Health Fairs



# Water Quality Emergency Preparedness Plan

- Emergency Preparedness Plan
  - Floods
  - Tornados
  - Spills (Chemical or Oil)
  - Wastewater Lagoon Failure
  - Water Quality Sampling Kits
  - Spill Kits



# Future Projects

- Obtain CWA 319 Grant
- Continue Monitoring
  - Streams, Ponds, and Groundwater
- Rainwater Harvesting
- Bio-Assessment
  - Macro-invertebrates
- Habitat Assessment (Wadeable Stream, QHEI)

KICKAPOO - He who moves about

**Thank You**

KICKAPOO TRIBE IN KANSAS



# Acknowledgements

Kickapoo Tribal Council

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