



# SWAT2003 – Improvements And Challenges

**Jeff Arnold**  
**ARS- Temple, Texas**





# Personnel Changes

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- Srini is Director of Spatial Sciences Lab in College Station – 90 miles from Temple
- Susan Neitsch has left the Texas SWAT Team – Pursuing her M.S. Degree
- Martin Volk – Sabbatical in Temple
- Looking for (1) a replacement for Susan – SWAT support – and (2) ARS Scientist (US Citizen)



# SWAT2003 Current Research

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- Automatic Calibration  
Shuffled Complex Evolution
- Uncertainty Analysis  
Input Uncertainty
- Automated Sensitivity Analysis



## SWAT2003 Current Research

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- “Real Time” Simulation
- Run to Current Day with Historical Weather
- Generate Multiple Sequences of Weather from Current Day
- State Variables are Reset – Rerun from Current Day
- Incorporate Climate Forecasts





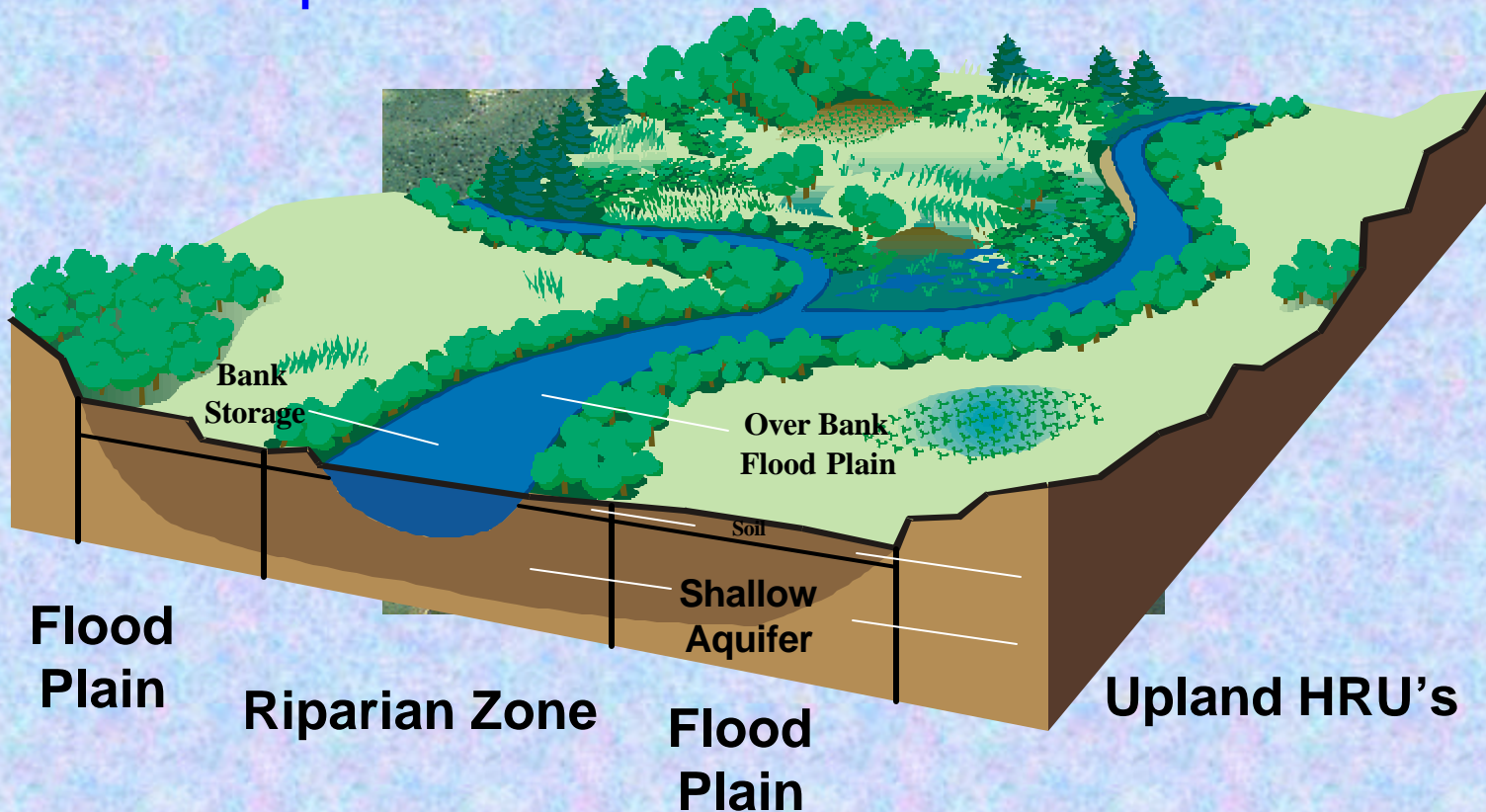
# SWAT2003 Current Research

## Riparian Zones

- Conceptual Plan

Potsdam Scientists Real Progress

Landscape Position – Distance to Streams





# SWAT2003 Current Research

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## Pothole Topography – Non Contributing

- Depressional Storage – Tile Drains
- Surface Runoff from one HRU to another
- Ponded Water on an HRU
- U.S. Midwest Farming







# SWAT2003 Current Research

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- Forest Simulation – Grow Trees from Seedling to Maturity
- Undercover During Seedling Growth
- Burning
- Boreal Forest in Alberta, Canada
- East Texas Data for Validation



# SWAT2000 Current Research

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## Bacteria Fate & Transport

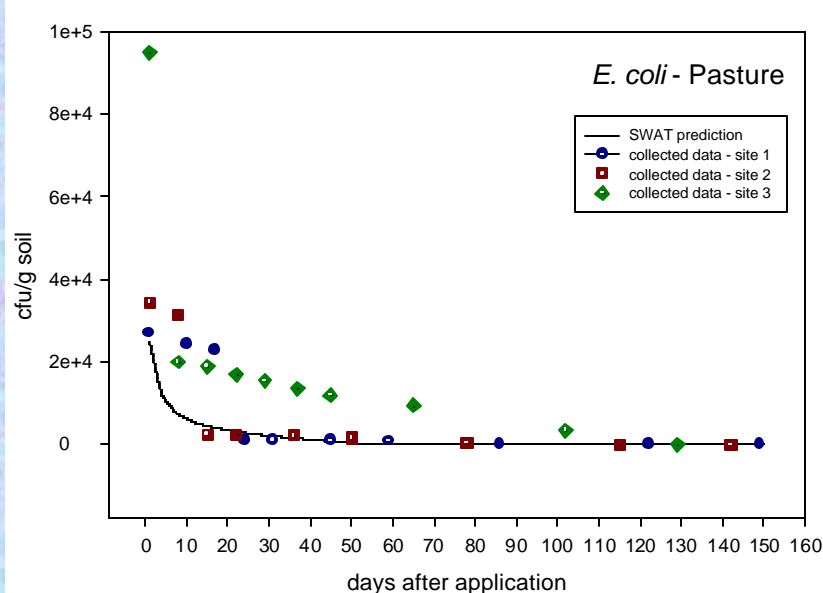
- Dieoff/Regrowth in Soil
- Concentration in Manure Applied
- Runoff and Sediment Transport
- Stream Losses



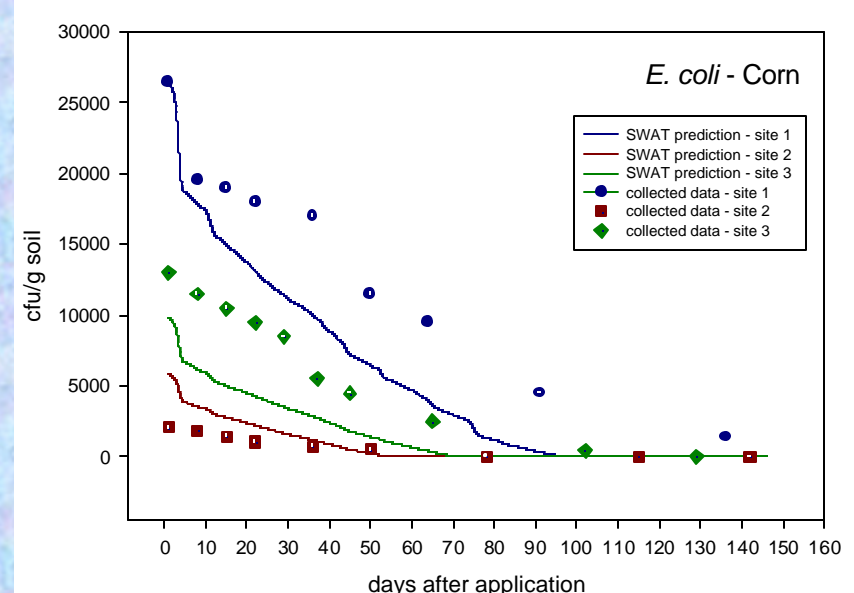


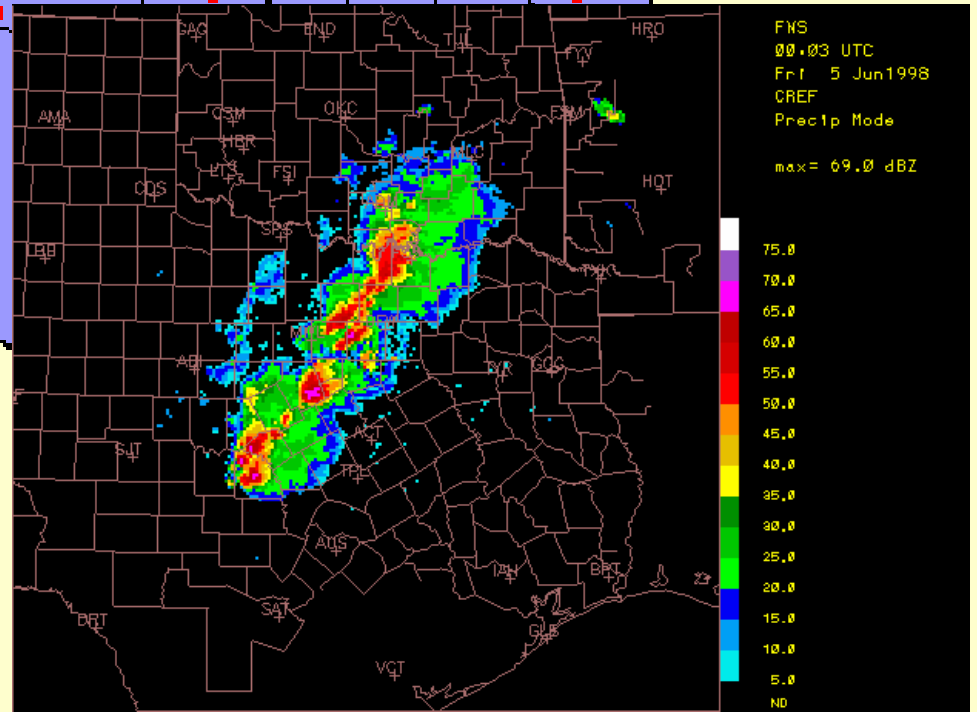
- **Bacteria Validation - E.Coli Concentrations in Soil After Manure Application**
- Watershed Validation – Claire Baffaut

## Pasture



## Corn







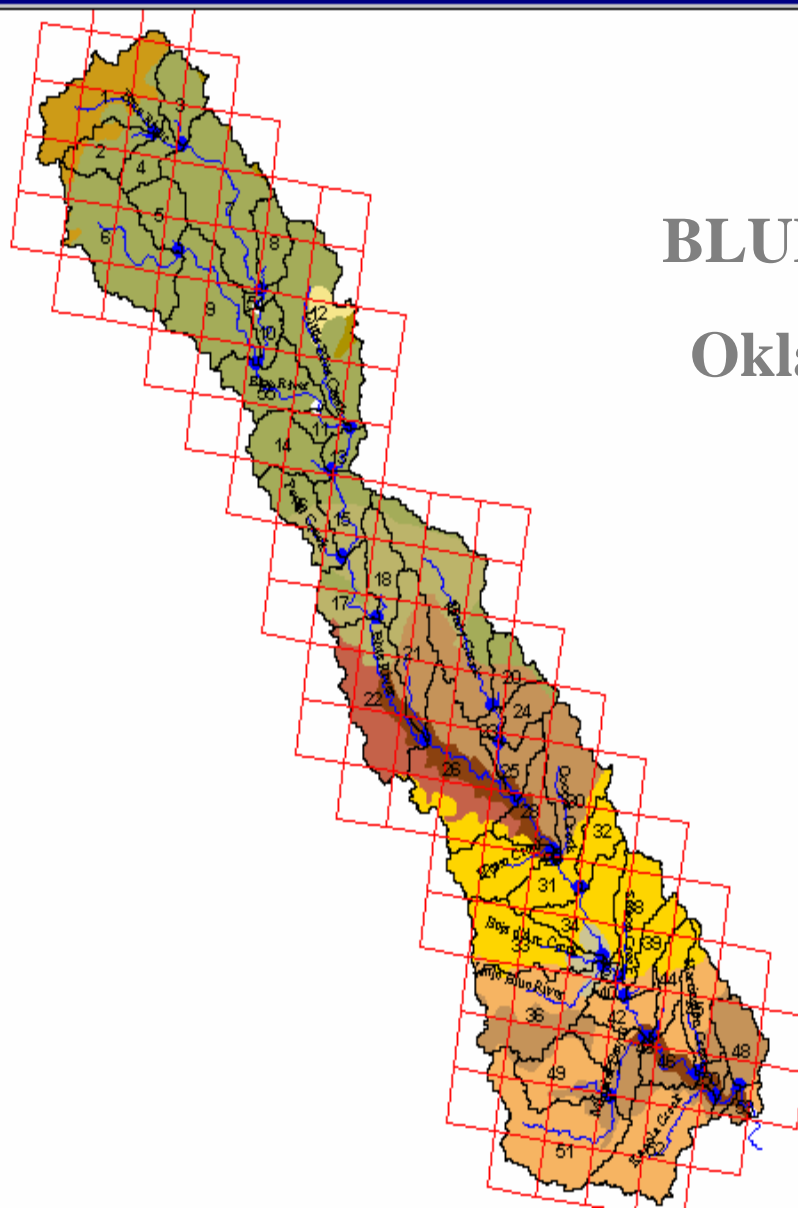


Scale 1: 536,366

1,987.14  
1,285,431.78

## Watershed

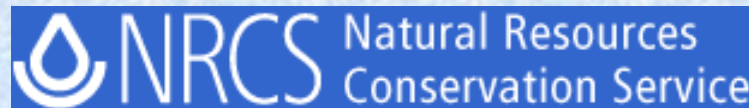
- ☒ Hrad
- ☒ Subbasins
- ☒ Streams
- ☒ Outlets  
● Linking stream added Outlet  
○ Table added Outlet
- ☒ SoilClass
- |  |       |
|--|-------|
|  | OK154 |
|  | OK157 |
|  | OK158 |
|  | OK161 |
|  | OK162 |
|  | OK163 |
|  | OK164 |
|  | OK166 |
|  | OK200 |
|  | OK206 |
|  | OK214 |
- ☒ SwatLandUseClass
- |  |      |
|--|------|
|  | AGRC |
|  | AGRR |
|  | FRSD |
|  | FRSE |
|  | FRST |
|  | PAST |
|  | RNGB |
|  | RNGE |
|  | UCOM |
|  | URHD |
|  | URLD |
|  | WATR |
|  | WETL |
- ☐ Outlets  
● Linking stream added Outlet  
○ Table added Outlet
- ☒ Streams



BLUE River  
Oklahoma

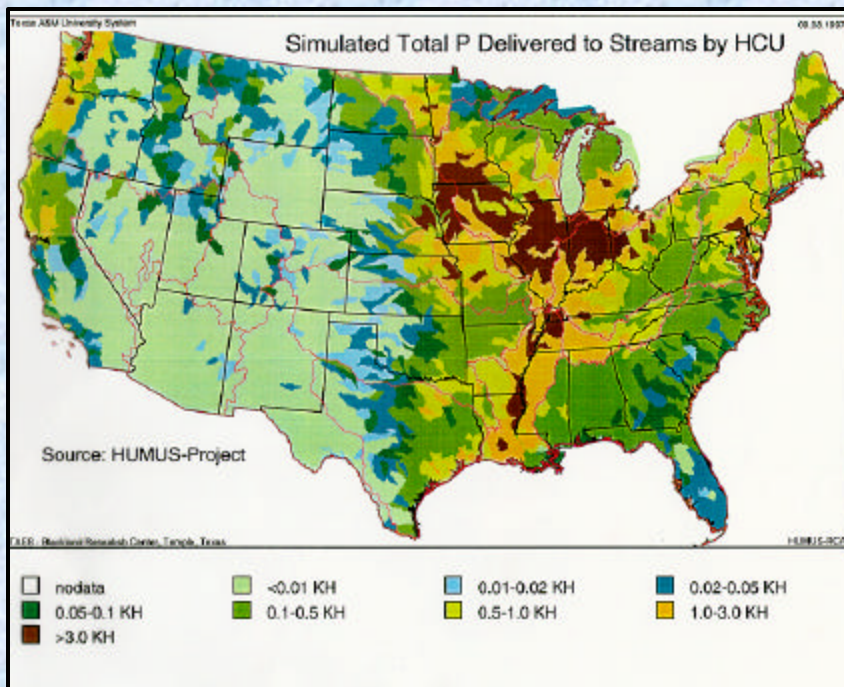
# National Conservation Assessment

- Federal Office of Management and Budget  
Requires Evaluation of
  - \* Farm Bill
    - EQIP – Pays Farmers to Install  
Conservation Practices
    - Conservation Reserve Program (CRP)
    - Nutrient Loss

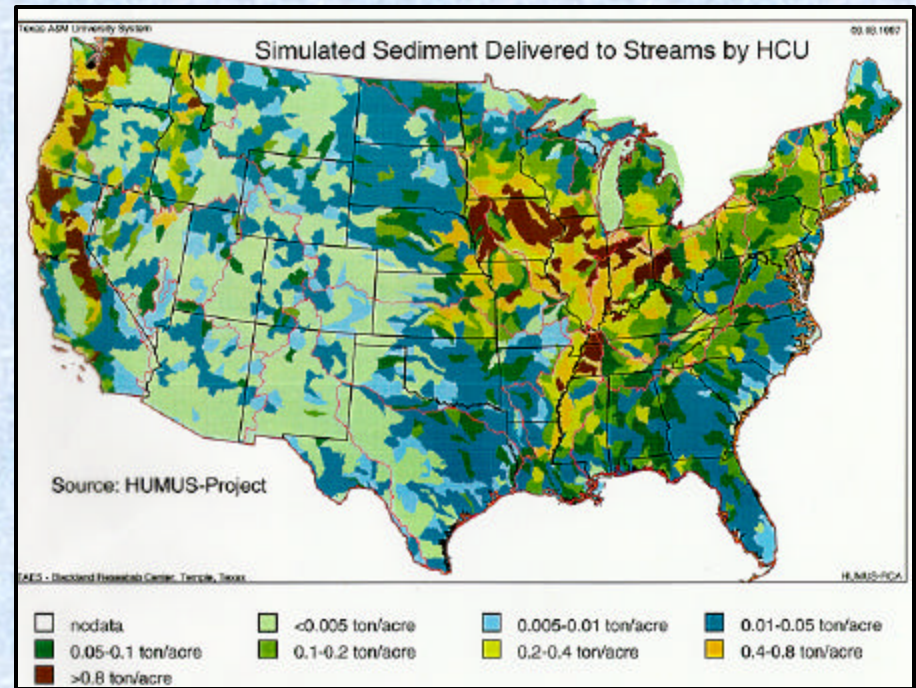




# HUMUS Results Point and Non Point Sources



## Simulated Total P Delivered to Streams by HCU



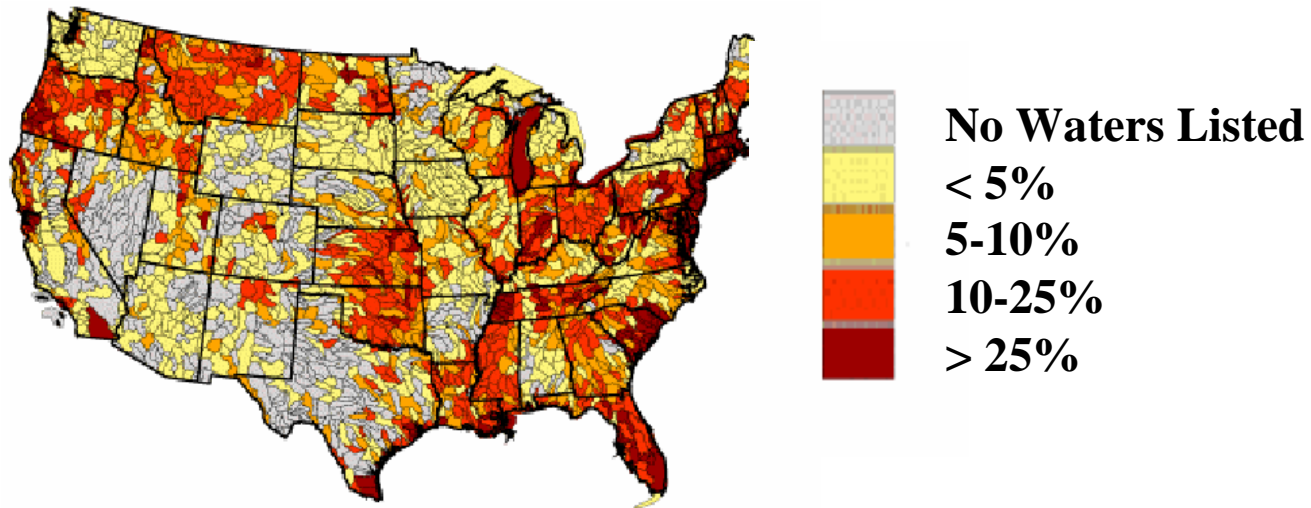
## Simulated Sediment Delivered to Streams by HCU

**New Scenarios**  
**Buffers**  
**Conservation Tillage**  
**Animal Waste Management**

# US Environmental Protection Agency

**SWAT is used to Determine  
Management Strategies to  
Meet Standards in Rivers  
Across the U.S.**

**Percent of Impaired Waters - 2000**







# Meeting Goals

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- Status of SWAT Development and Projects
- Your Thoughts on Model Needs and Improvements
- Continued and Improved Collaboration