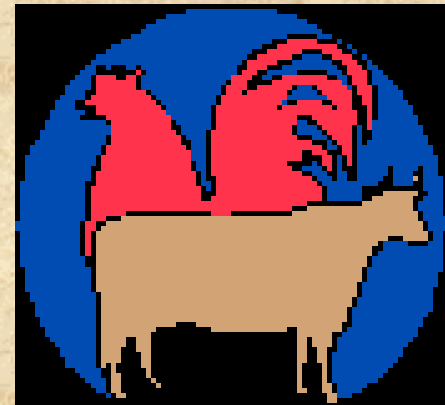


Watershed Scale Transport of *Salmonella*, *Campylobacter*, and Indicator Organisms in the Satilla River Basin

Erin K. Lipp, Richard Lowrance, Michael
Jenkins, Paige Gay, Sreekumari Rajeev and
Ethell Vereen, Jr.

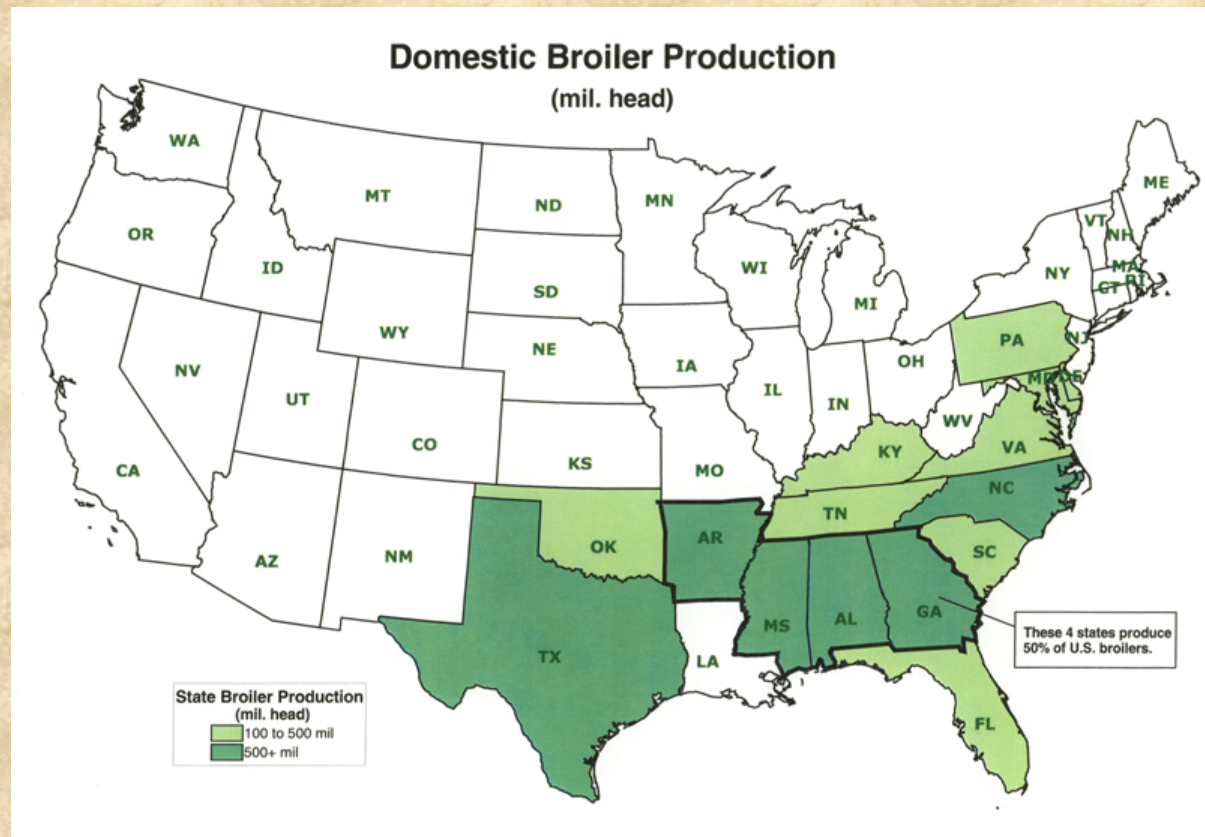
Objective

- To determine if beef cattle grazing and poultry litter application affects the presence, quantity, and seasonality of the pathogens, *Campylobacter* and *Salmonella* present in environmental areas in a Coastal Plain watershed of southeastern Georgia.



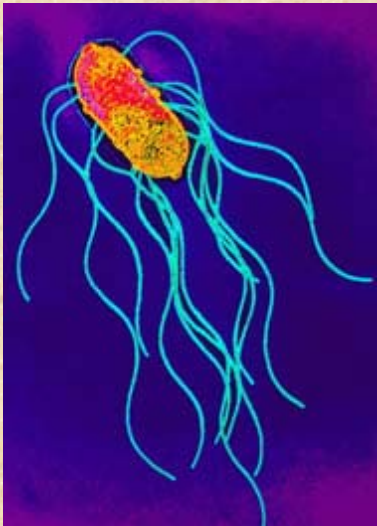
Background

- U.S. broiler production is concentrated in the south, particularly in Arkansas, Mississippi, Alabama, and Georgia
 - rapidly expanding industry in the coastal plain of Georgia



Background

- *Salmonella* and *Campylobacter* are zoonotic pathogens that cause gastroenteritis in humans,
- Contaminated water may contribute to human cases
- **Salmonella**
 - Gram-negative, rod-shape, aerobic, motile, flagella, causes >1 million food borne illnesses in the US annually
- **Campylobacter**
 - Gram-negative, curved S-shape, microaerophilic, motile with either uni- or bi- polar flagella, most common cause of diarrhea in the US



Salmonella



Campylobacter

Background

- We know little of the potential for pathogen contamination of streams at the watershed level from these animal manures
- Agricultural sources can contaminate both drinking and recreational waters and pose a serious threat to public health
- We will investigate watersheds within the Satilla River Basin (SRB) in southeast Georgia impacted by
 - varying levels of agriculture
 - poultry processing facilities
 - Human waste
 - to determine load and transmission of pathogens from each source

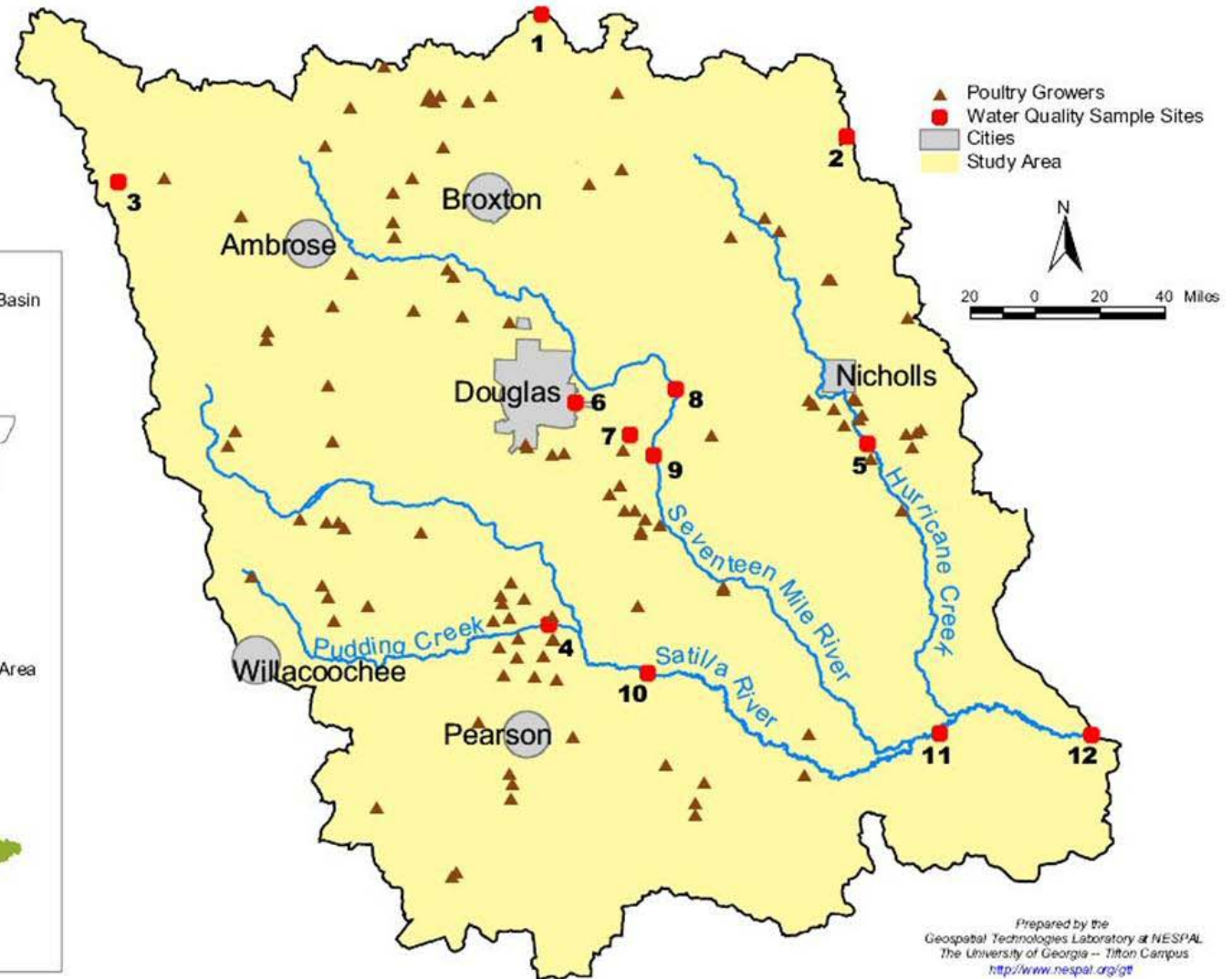
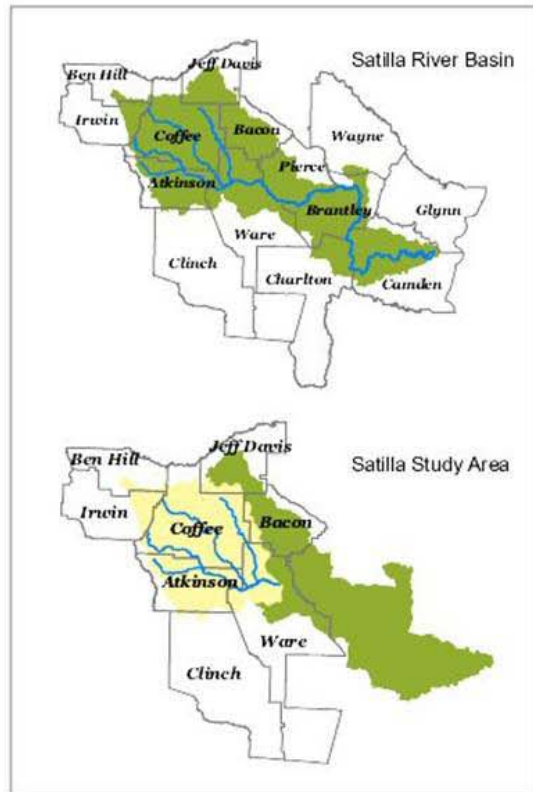
Research Approach

- Identify agricultural land and pastures in the Satilla River Basin (SRB)
- Determine concentration of pathogens in litter and manure and potential for run-off
 - Field surveys for census of litter application sites and beef cattle
 - Collect surface run-off using Low Impact Flow Event (LIFE) samplers to determine presence and number of pathogens
 - Analyze run-off samples, litter and manure for pathogens



Research Approach

Figure 1. Satilla River Basin Water Quality Study Area

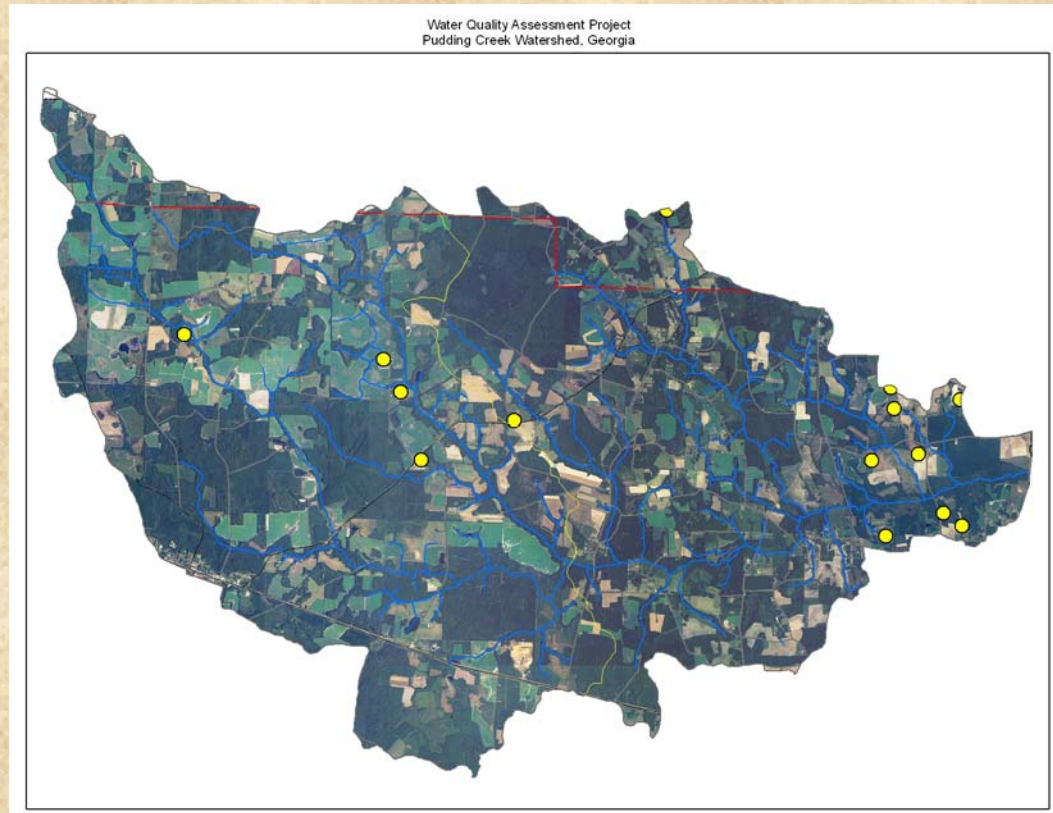


Research Approach

- Determination of pathogens in streams
 - Collect samples from sample sites in the SRB representing multiple sources
 - Analyze for pathogens using traditional and molecular methods of detection and enumeration (i.e. culture, PCR)
- Determination of indicator organisms and nutrients
 - Collect samples from sample sites in the SRB representing multiple sources
 - Analyze samples for indicator organisms and nutrients using standard methods

Progress to Date

- Watershed source mapping
 - GIS mapping
 - On-ground surveys
 - Detailed aerial photos



Progress to Date

- Optimization of detection assays from variety of sample types
 - *Salmonella*
 - *Campylobacter*



- Stream sampling will begin in February 2007
- Field run off samplers will be installed in February (prior to extensive application of litter)

Impact

- Will determine if pathogen load is associated with land use and will assess role of land application of animal manure and human sewage as sources.
- Will yield insight to the dynamics of two bacterial pathogens (*Salmonella* and *Campylobacter*) of public health concern and indicator bacteria (*E. coli*, fecal enterococci, and fecal coliform bacteria) in watersheds in which animal agriculture is intense and expanding.
- Will improve our understanding of the source of bacterial pathogens and indicator organisms in watersheds with commercial-level animal agriculture, and establish a basis for continued protection of our nation's water resources.

Thank You

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