Project Area 2
River Basin Groups D and E
Bacteria Impairments
TMDL

Peach Creek

Texas Commission on Environmental Quality
James Miertschin & Associates, Inc.

Purpose of Today's Presentation

- Provide an Overview and Update
- Discuss Emerging Issues and Accomplishments
- Give Future Direction

What is a TMDL (Total Maximum Daily Load)?

- Establishes the maximum amount of an impairing substance, or stressor, that a waterbody can receive and still meet Water Quality Standards
- allocate that load among pollutant contributors
- are a tool for implementing State water quality standards and are based on the relationship between pollution sources and in-stream water quality conditions

Peach Creek Segment 1803 C

- Placed on the 2000 §303(d) list because fecal coliform exceeded the segment specific criteria of 200 colonies per 100 ml (geometric mean) and 400 colonies per 100 ml (single grab).

- Designated Uses
  - Aquatic Life
  - Contact Recreation
  - Fish Consumption

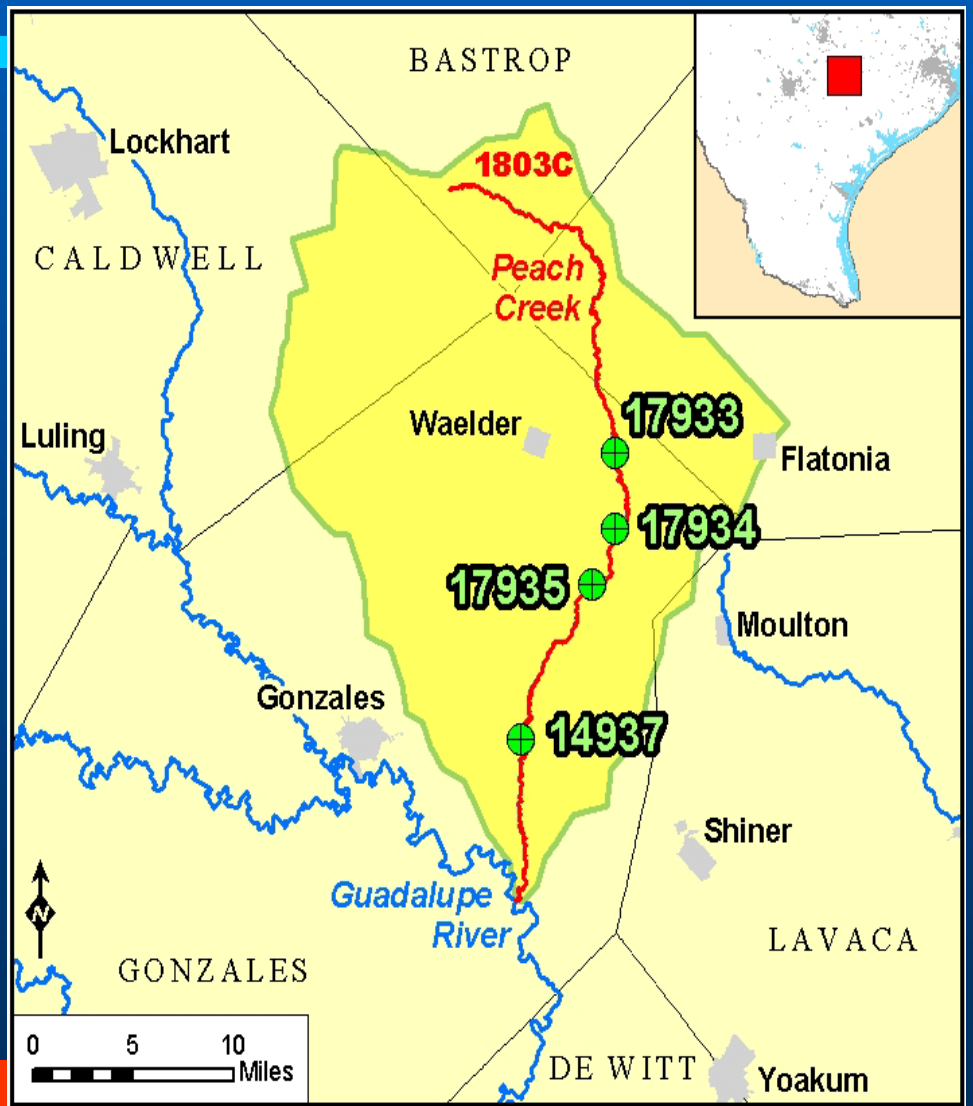
Current Phase of TMDL Development

- TMDL Allocation – Identify a quantifiable water quality target for each constituent

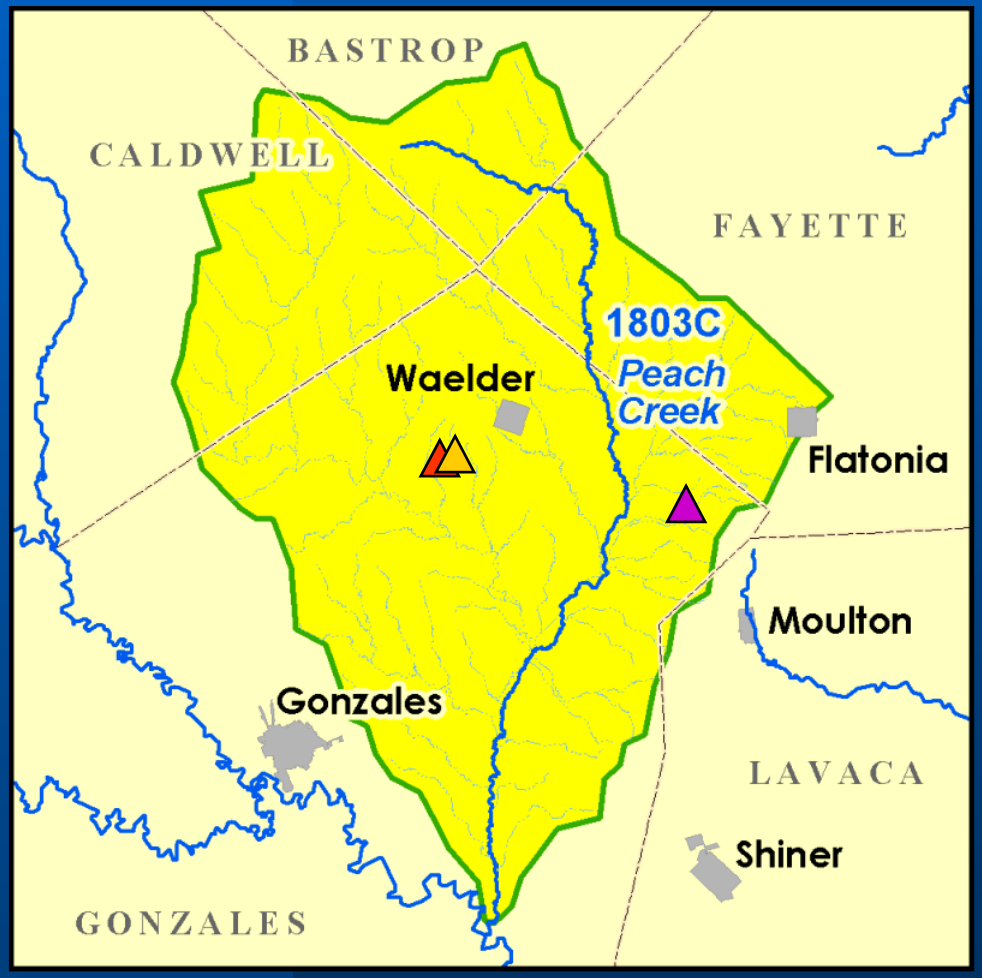
- Draft TMDL Report
- TCEQ Review / Public Comment
- TCEQ Approval / EPA Approval
- Implementation

Project Background

Water Quality Stations



Cal-Maine Operations

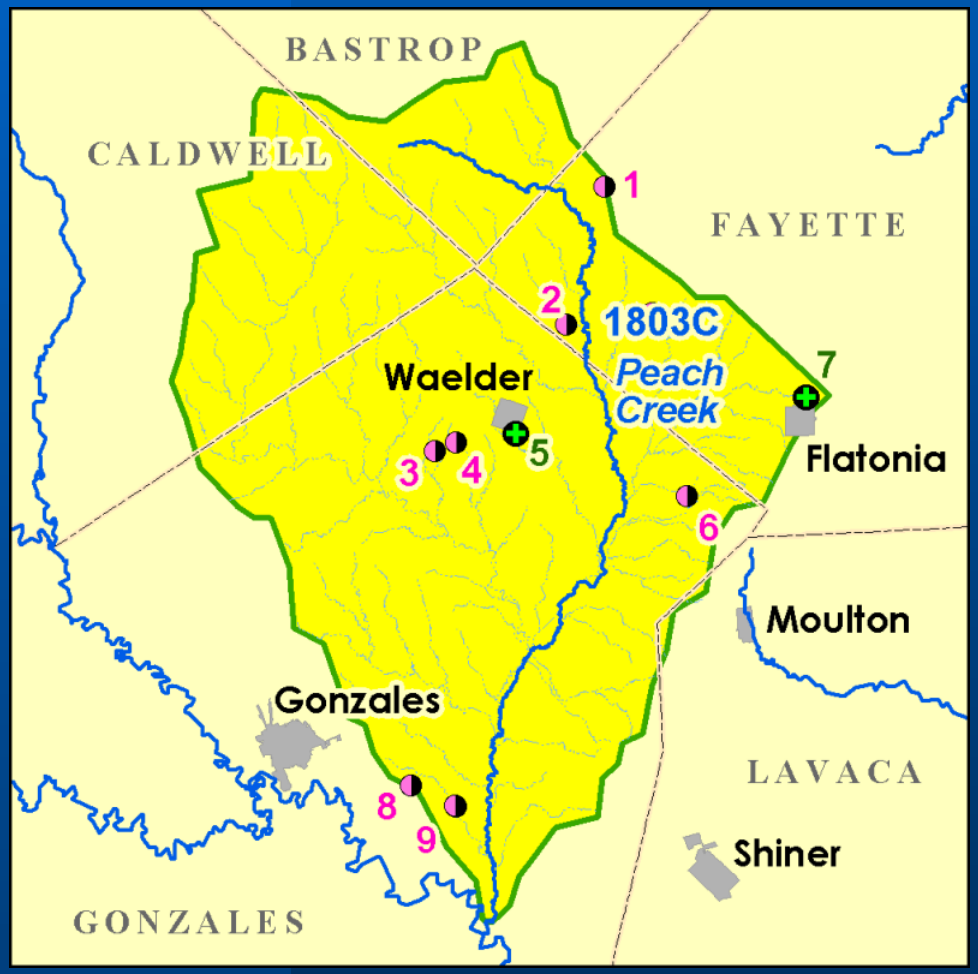


Cal-Maine Foods
3 Poultry Facilities

Number of Chickens

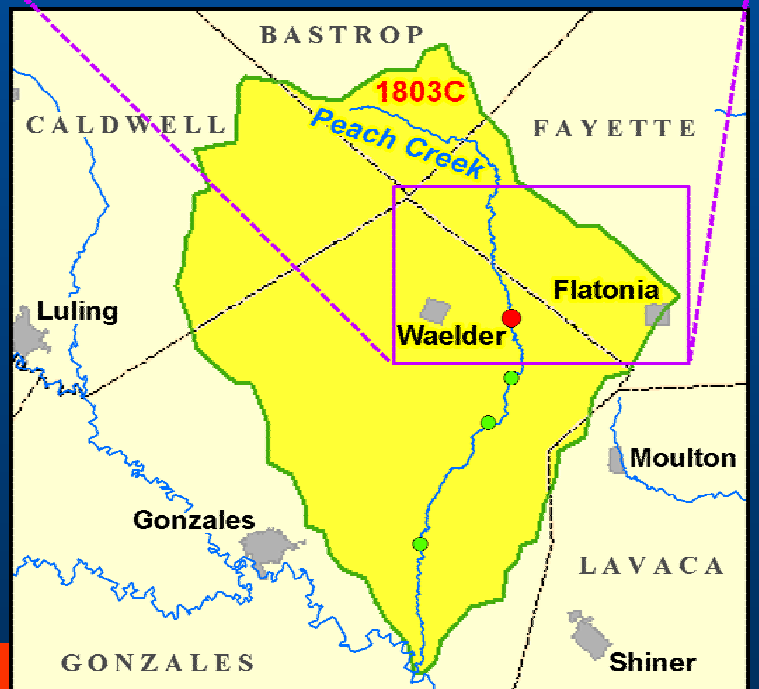
CAFO 1	1,680,192
CAFO 2	1,297,416
CAFO 3	+ 2,394,000
TOTAL	5,371,608

Segment 1803C Peach Creek Point Sources

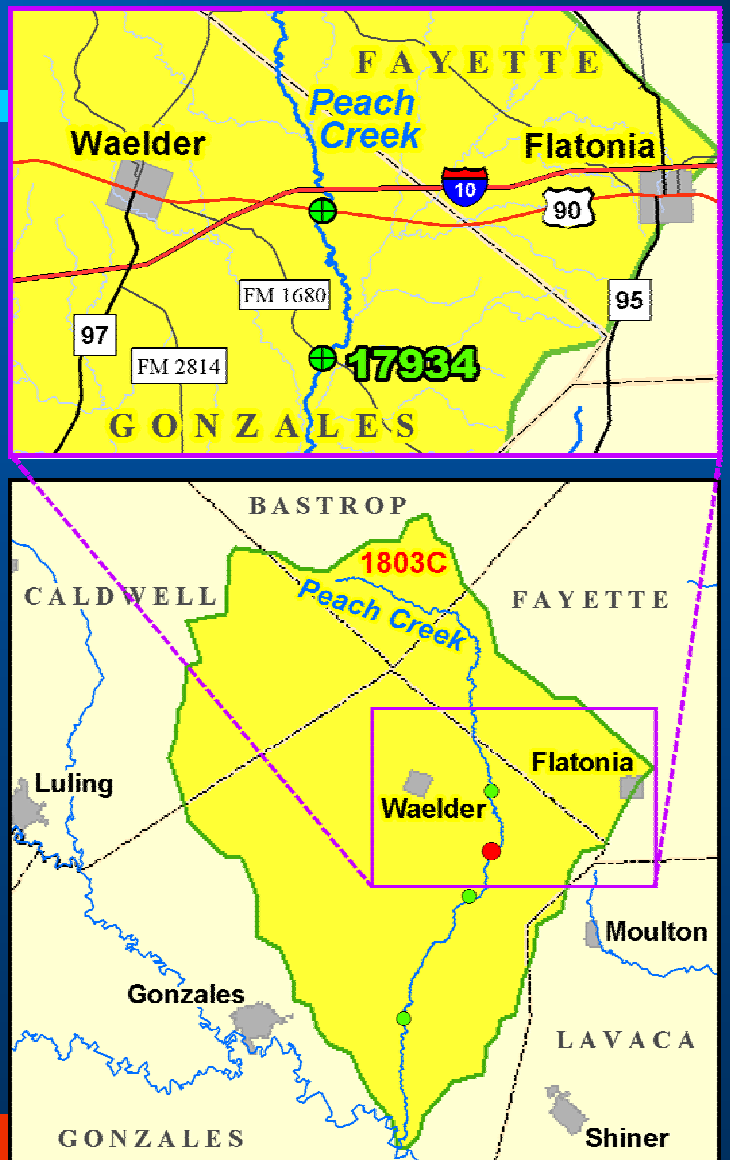


1 McCarty Road Landfill
2 Laughlin Environmental
3 Cal-Maine
4 Cal-Maine
5 **City of Waelder**
6 Cal-Maine
7 **City of Flatonia**
8 Southern Clay Products
9 Southern Clay Products

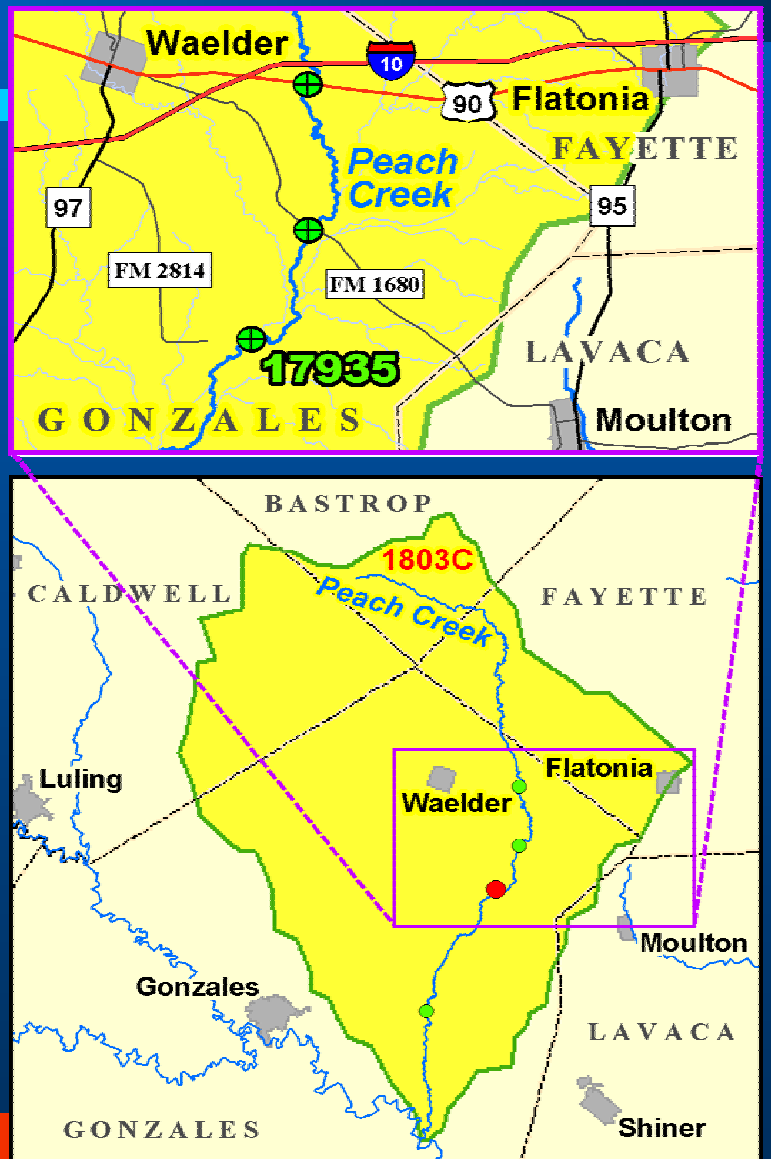
Station ID 17933 – Peach Creek at US 90



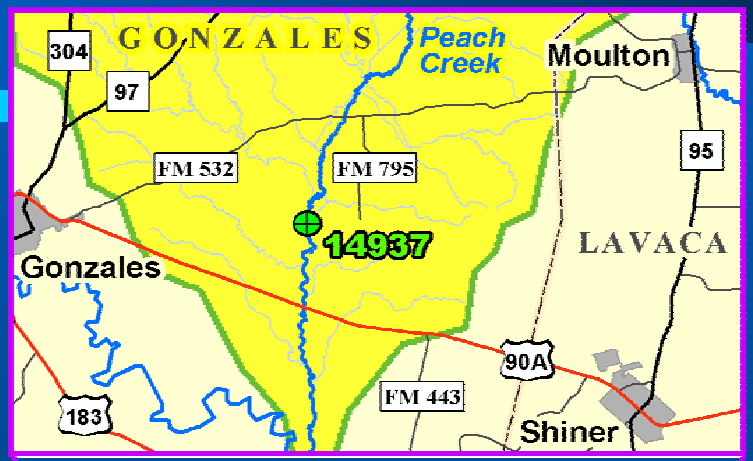
Station ID 17934 – Peach Creek at FM 1680

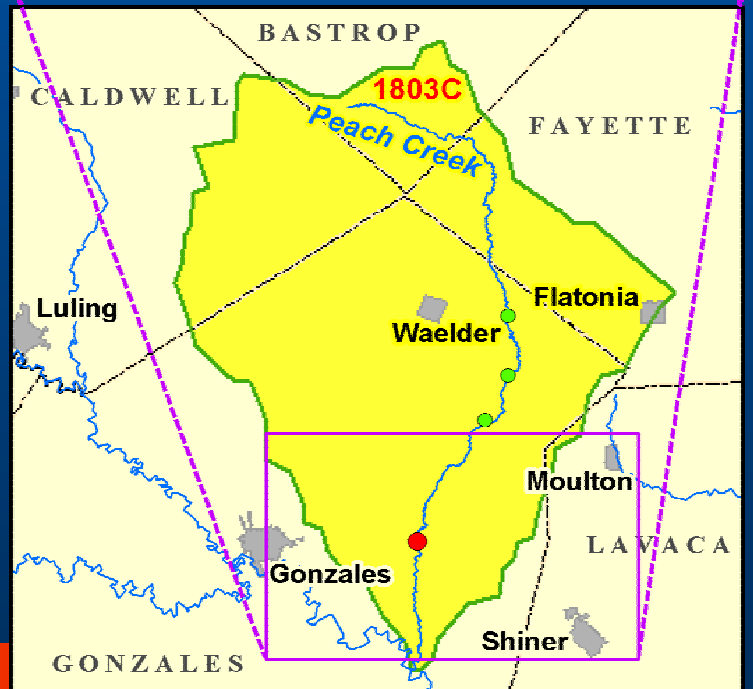


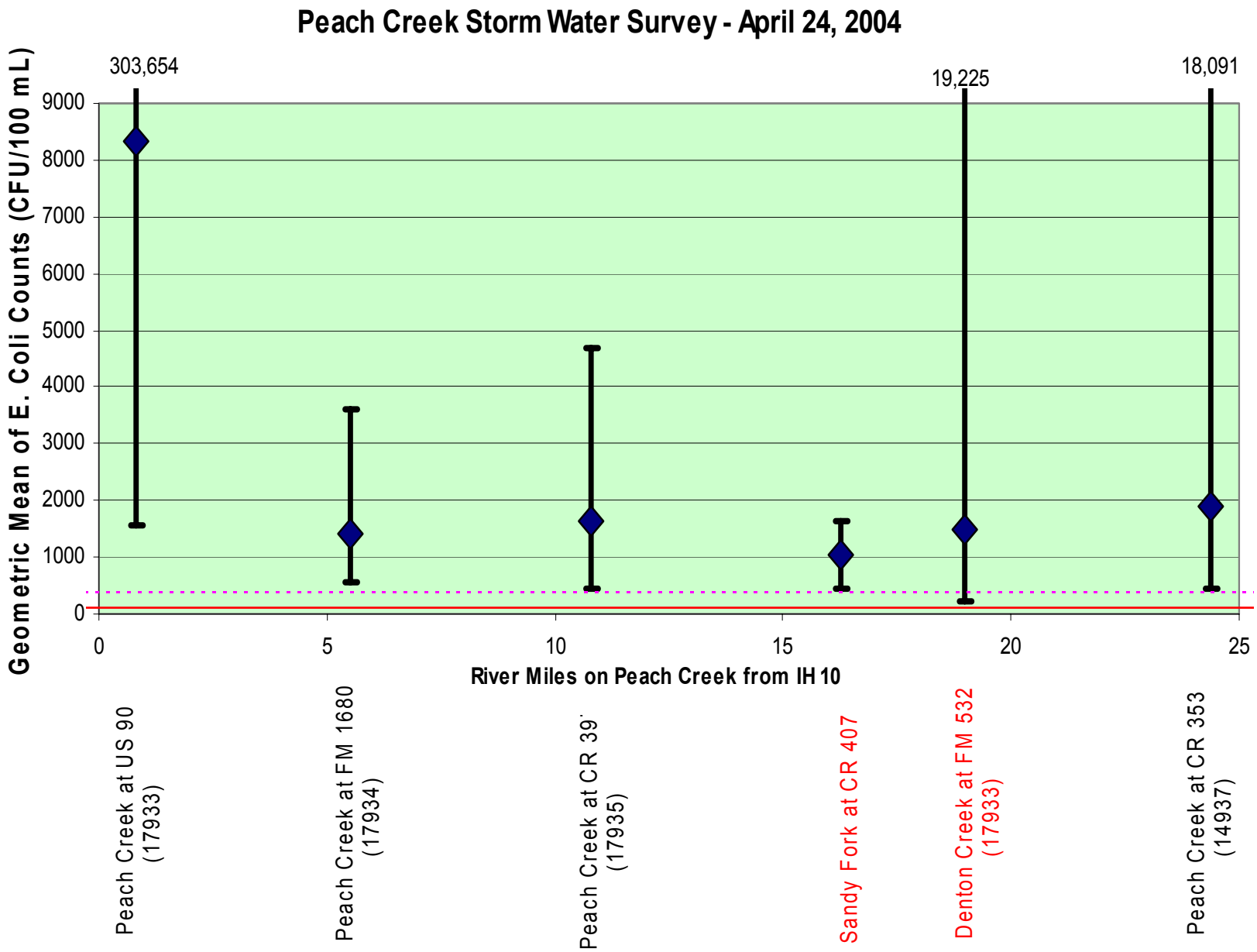
Station ID 17935 – Peach Creek at CR 397



Station ID 14937 – Peach Creek at CR 353

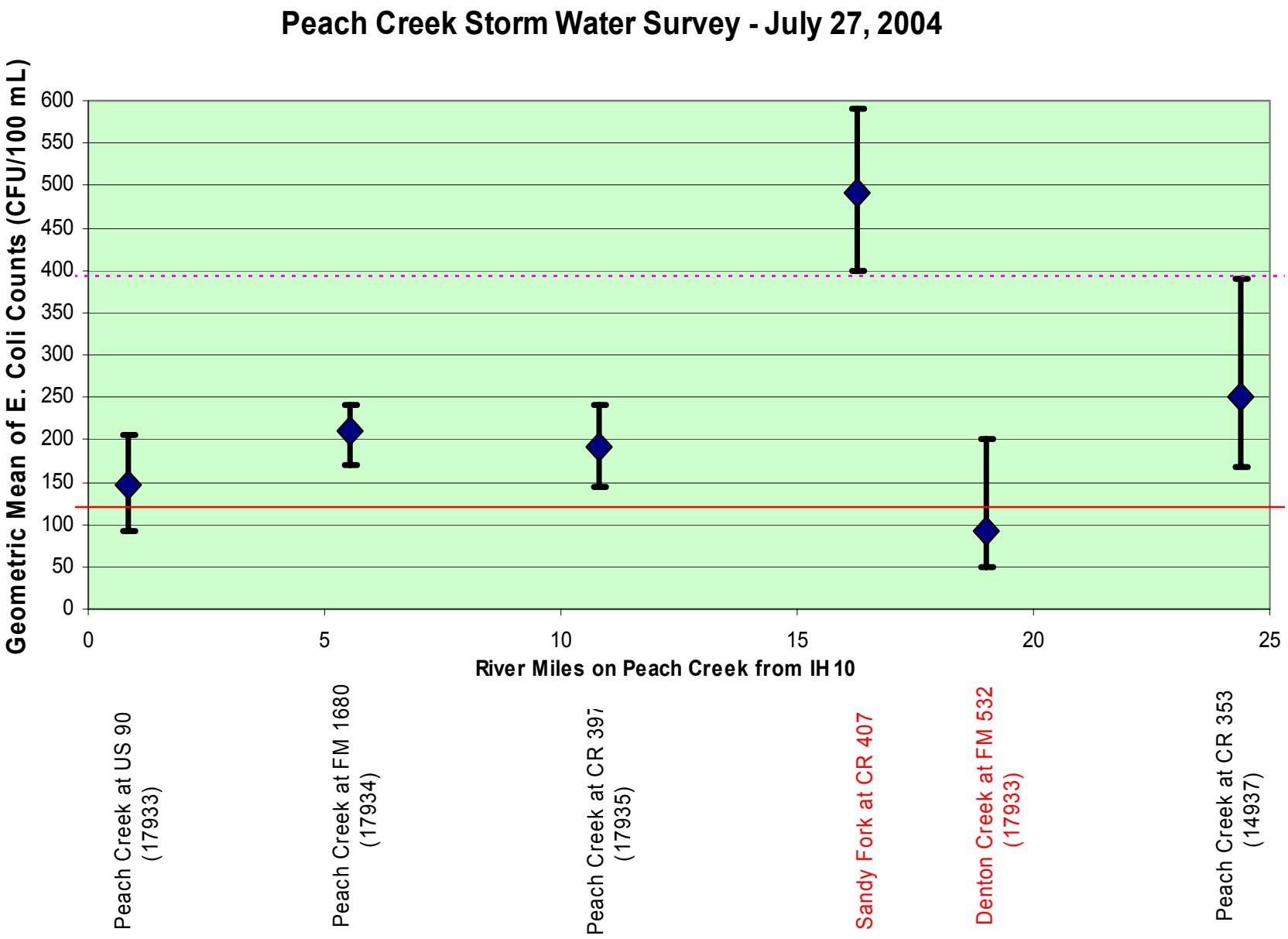





Peach Creek Storm Water Survey - April 24, 2004
Geometric Mean of E. Coli Counts (CFU/100 mL)
303,654
19,225
18,091
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
0
5
10
15
20
25
River Miles on Peach Creek from IH 10
Peach Creek at US 90 (17933)
Peach Creek at FM 1680 (17934)
Peach Creek at CR 39' (17935)
Sandy Fork at CR 407
Denton Creek at FM 532 (17933)
Peach Creek at CR 353 (14937)

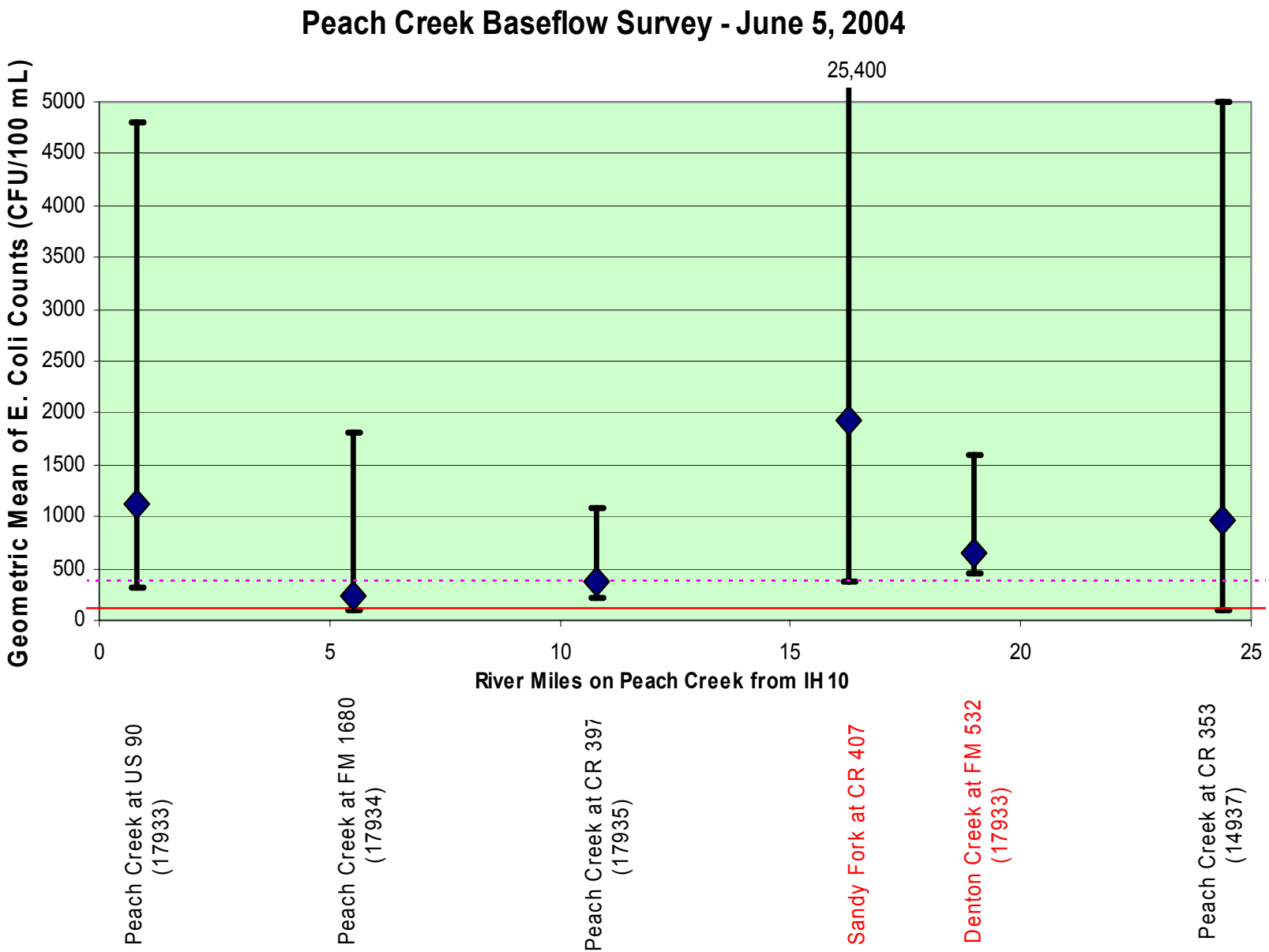
Peach Creek Storm Water Runoff Survey – April 24, 2004

- Main Stem
  - 4 Stations Sampled
  - 4 Stations with geometric means > 126 CFU/100 ml
  - 4 Stations with maximums > 394 CFU/100 ml
- Tributaries
  - 2 Stations Sampled
  - 2 Stations geometric means > 126 CFU/100 ml
  - 2 Stations with maximums > 394 CFU/100 ml
- WWTPs
  - 2 WWTPs sampled
  - 0 WWTPs with geometric means > 126 CFU/100 ml
  - 0 WWTPs with maximums > 394 CFU/100 ml


Peach Creek Storm Water Survey - July 27, 2004
Geometric Mean of E. Coli Counts (CFU/100 mL)
600
550
500
450
400
350
300
250
200
150
100
50
0
0
5
10
15
20
25
River Miles on Peach Creek from IH 10
Peach Creek at US 90 (17933)
Peach Creek at FM 1680 (17934)
Peach Creek at CR 397 (17935)
Sandy Fork at CR 407
Denton Creek at FM 532 (17933)
Peach Creek at CR 353 (14937)

Peach Creek Storm Water Runoff Survey – July 27, 2004

- Main Stem
  - 4 Stations Sampled
  - 4 Stations with geometric means > 126 CFU/100 ml
  - 0 Stations with maximums > 394 CFU/100 ml
- Tributaries
  - 2 Stations Sampled
  - 1 Stations geometric means > 126 CFU/100 ml
  - 1 Stations with maximums > 394 CFU/100 ml
- WWTPs
  - 2 WWTPs sampled
  - 0 WWTPs with geometric means > 126 CFU/100 ml
  - 0 WWTPs with maximums > 394 CFU/100 ml


Peach Creek Baseflow Survey - June 5, 2004
Geometric Mean of E. Coli Counts (CFU/100 mL)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
25,400
0
5
10
15
20
25
River Miles on Peach Creek from IH 10
Peach Creek at US 90 (17933)
Peach Creek at FM 1680 (17934)
Peach Creek at CR 397 (17935)
Sandy Fork at CR 407
Denton Creek at FM 532 (17933)
Peach Creek at CR 353 (14937)

Peach Creek Base Flow Survey – June 5, 2004

- Main Stem
  - 4 Stations Sampled
  - 4 Stations with geometric means > 126 CFU/100 ml
  - 4 Stations with maximums > 394 CFU/100 ml
- Tributaries
  - 2 Stations Sampled
  - 2 Stations geometric means > 126 CFU/100 ml
  - 2 Stations with maximums > 394 CFU/100 ml
- WWTPs
  - 2 WWTPs sampled
  - 0 WWTPs with geometric means > 126 CFU/100 ml
  - 0 WWTPs with maximums > 394 CFU/100 ml

Part I: Model Development

HSPF

- Watershed Modeling System
- Simulation of Hydrology
- Simulation of Point Source Loadings
- Simulation of Nonpoint Source Loadings
- Simulation of Receiving Water Quality

Model Hydraulic Calibration Results 2004 – Peach Creek at Dilworth

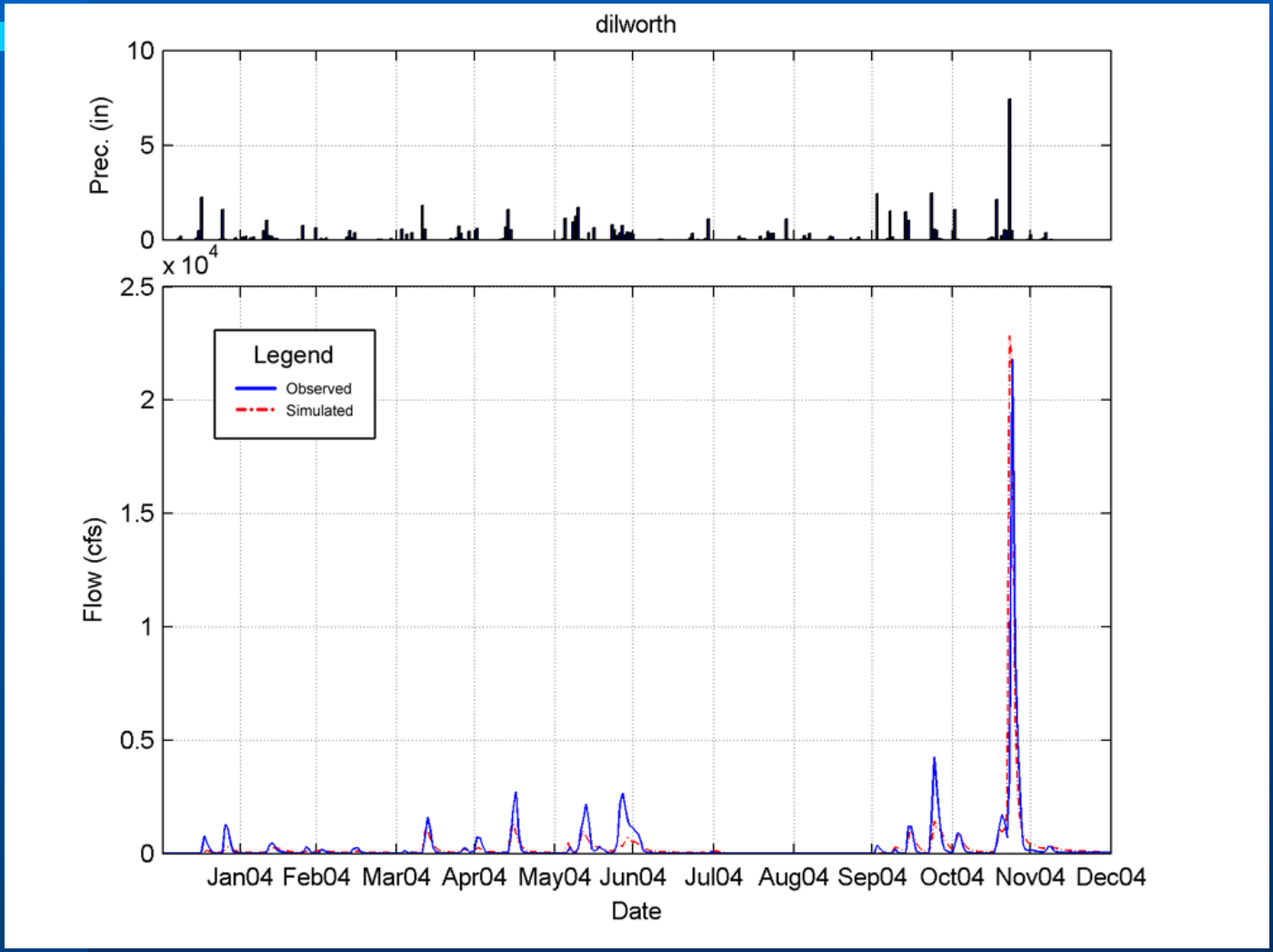


Table of Hydrologic Calibration Results

Average Annual Expert Sysem Stats for Reach 70
Analysis for Time Period of 1/1/2001 to 12/31/2004
Number of Years: 4
Summer: 6/1 - 9/30
Winter: 11/1 - 3/1
Number of Storms Events: 10
# of Summer Days: 22
# of Winter Days: 43

	Observed	Simulated	Residual	% Diff.	Quality	Observed
total (inches)	6.39	6.4	0.01	0.2	very good	-2.99
storm volume (inches)	3.93	3.94	0.01	0.2	very good	-1.76
average storm peak (cfs)	7106.62	6610.27	-496.35	-6.98	very good	-3808.465
summer volume (inches)	1.28	1.05	-0.23	-18	fair	-18.755
winter volume (inches)	3.3	3.46	0.17	5.02	very good	3.455
summer storms (inches)	0.61	0.45	-0.17	-27.43	poor	-27.82
winter storms (inches)	2.52	2.54	0.02	0.87	very good	-0.38

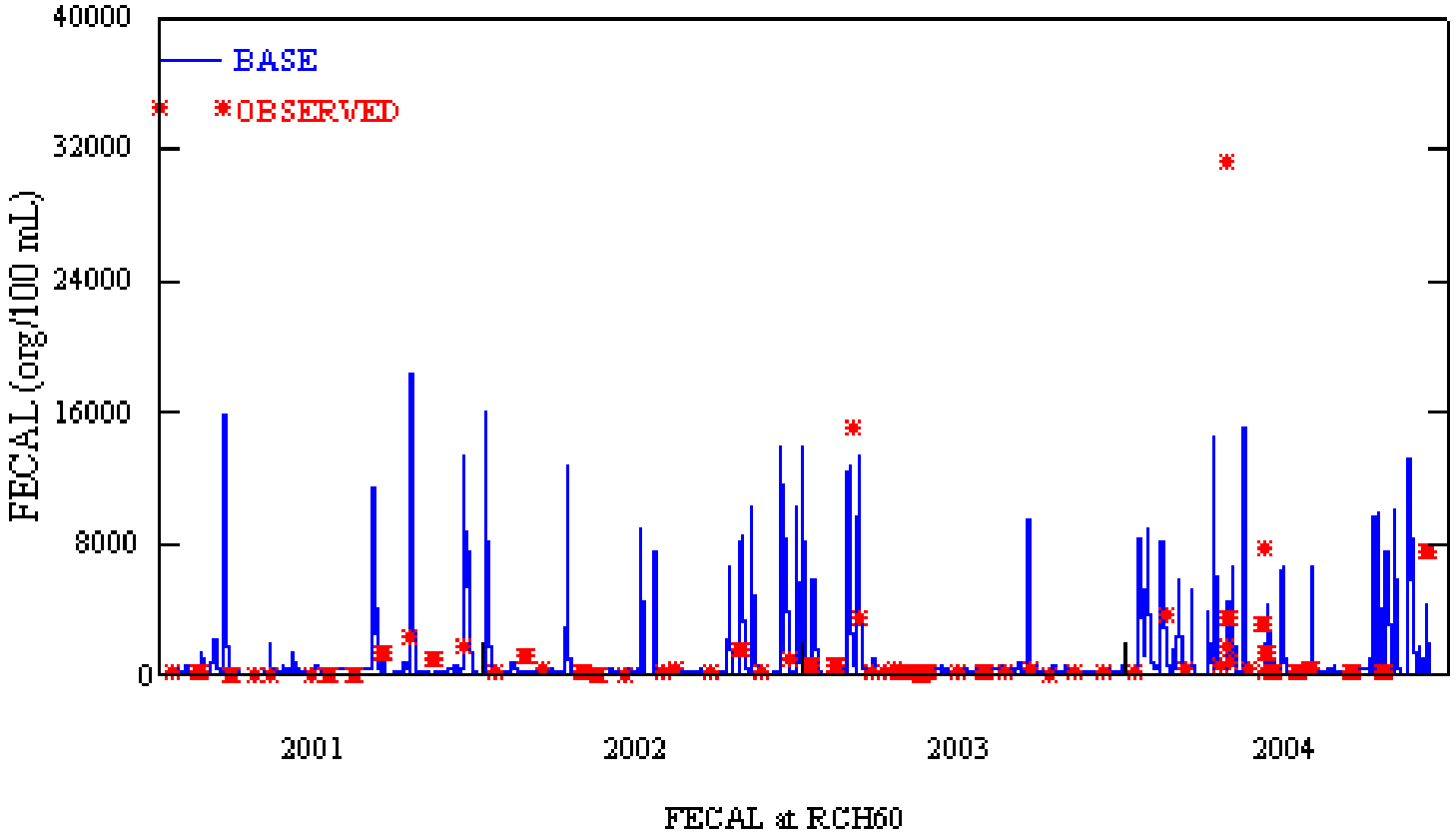
Fecal Sources Considered in Modeling Analysis

- **Direct Sources**
  - Failing septics
  - Direct wildlife and livestock contributions
  - Leaking sewer lines (implicit)
- **Rangeland, Forestland**
  - Wildlife (deer, raccoon, opossum, ducks, feral hogs)
  - Livestock (cattle, horses/donkeys, sheep/goats, hogs)
- **Waste Application Fields**
  - Chickens
- **Cropland**
  - Wildlife (deer, raccoon, opossum, ducks, feral hogs)
- **Urban (residential, commercial/industrial)**
  - General urban sources and loading factors

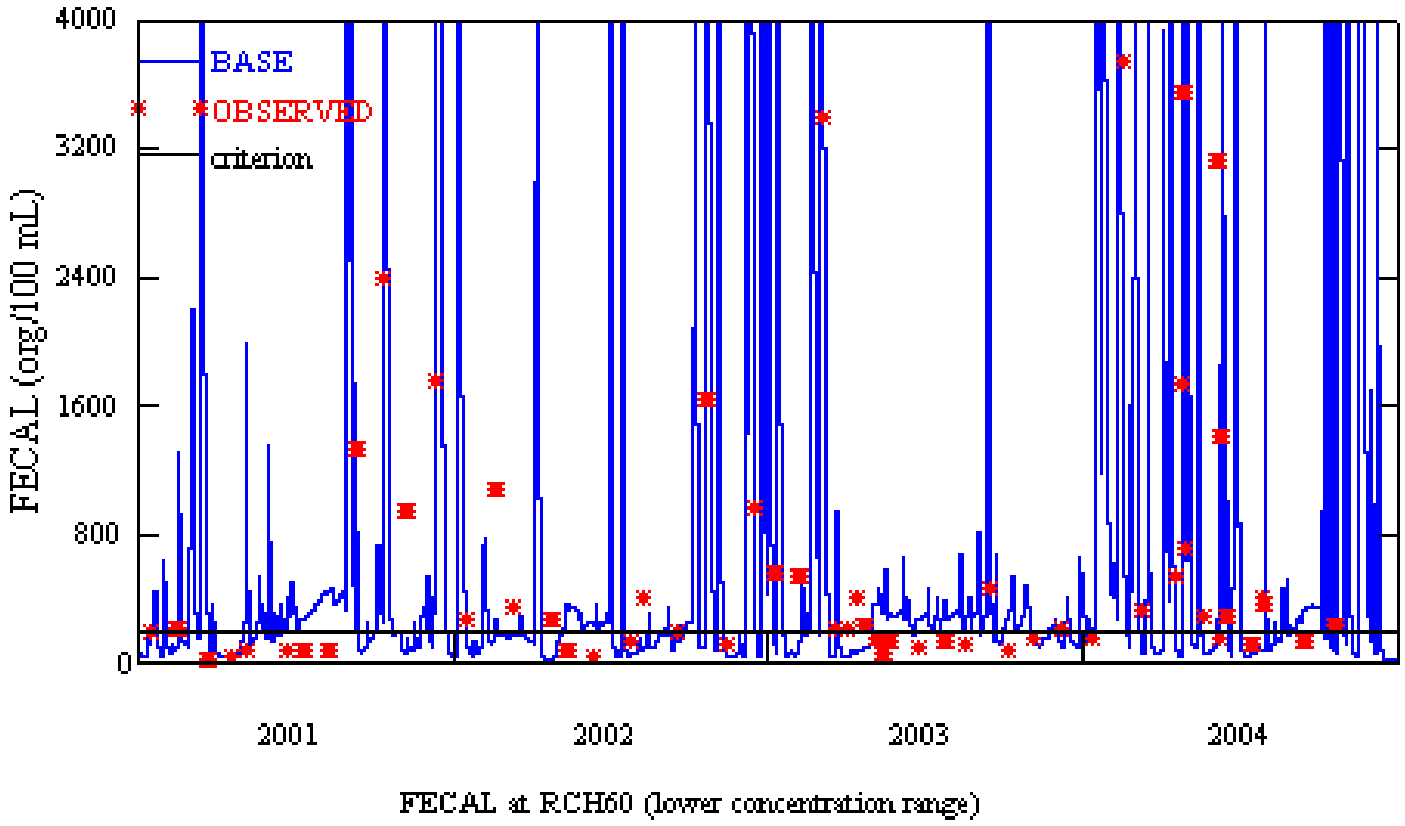
Peach Creek Model Calibration for Fecal Coliform

Station Location	Model Location	Observed Data 95% Confidence Interval	Simulated FC Median Values (Col/100 mL)
Highway 353	RCH 60 Base Flow	120 - 214	154
Highway 353	RCH 60 Runoff	933 - 3415	949

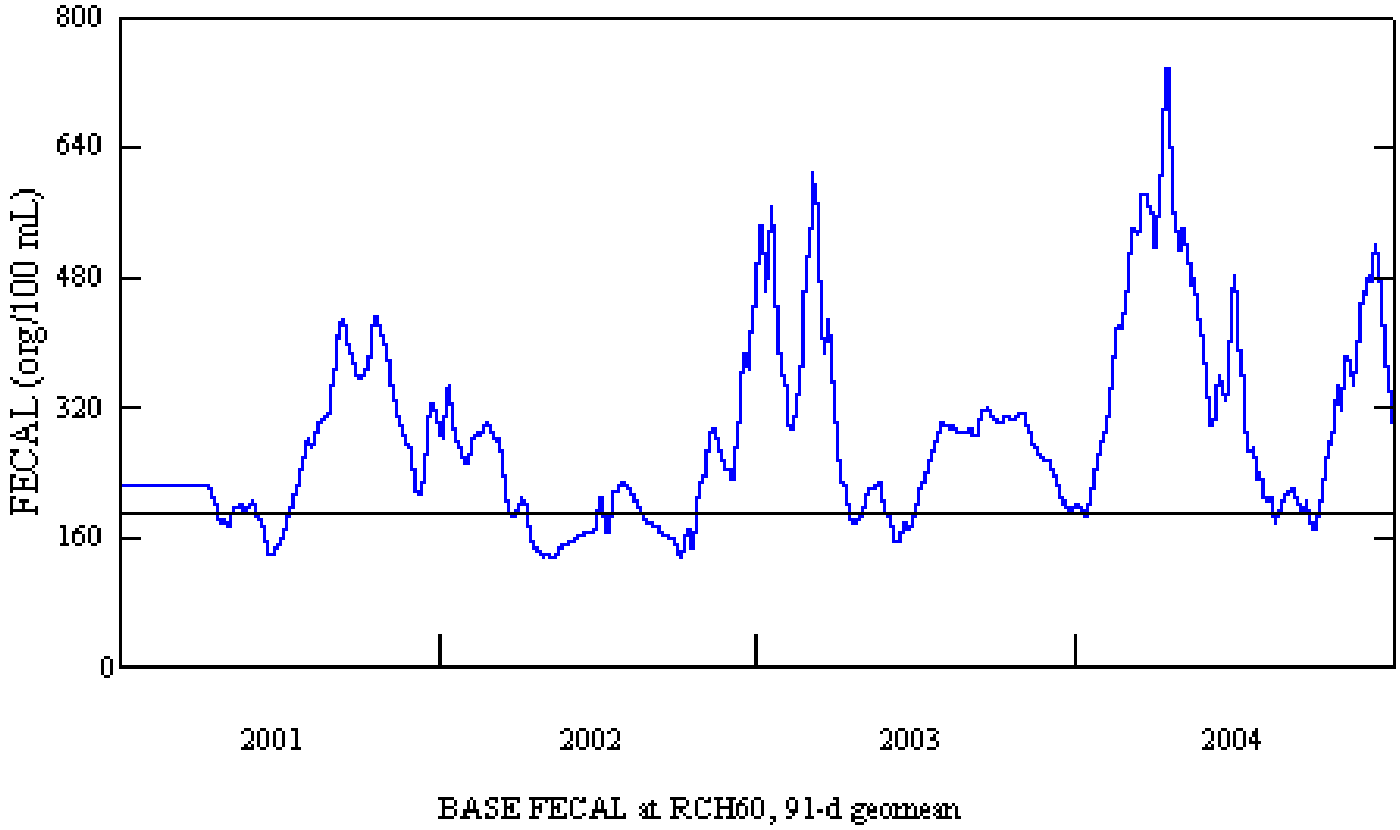
Simulated and Observed FC Peach Creek



Simulated and Observed FC, Lower Range Peach Creek



Simulated and Observed FC, Geometric Mean Peach Creek



Calculation of TMDL

TMDLs are the sum of the individual waste load allocations (WLAs) for point sources, load allocations (LAs) for non-point sources and natural background conditions, and a margin of safety (MOS).

$$TMDL = WLA + LA + MOS$$

Goals of TMDL

- **TMDL Target**
  - **200 org/100 mL Fecal Coliform**
- **MOS 5%**
  - **10 org/100 mL Fecal Coliform**

Part III – Bacterial Source Tracking Results

Bacterial Source Tracking (BST)

- Method: Ribotyping
  - Genetic fingerprints of *E. coli* strains
  - Genes that code for ribosome RNA
  - Distinguish between different bacterial strains
  - Lab Results from El Paso Agricultural Research and Extension Center, El Paso, Texas
- Library of Known Bacteria Types (Knowns)
  - Salado Creek/Upper San Antonio River: 500 Samples
  - Lower San Antonio River: 200 Samples

BST Water Samples (Unknowns)

- Station 14937 – At Highway 353 - # 75 samples

Source Identification of Ambient Water Samples from Peach Creek (n=73)

Source	Number Isolates ERIC-PCR (≥85% sim) ID	% of Total Sources	Number Isolates RiboPrinting (≥85% sim) ID	% of Total Sources
Cattle	15	20.5	8	11.0
Domestic Sewage	15	20.5	13	17.8
Chicken	12	16.4	10	13.7
Sheep	3	4.1	5	6.8
Dog	3	4.1	12	16.4
Racoon	2	2.7	5	6.8
Coyote	2	2.7	0	0.0
Goat	1	1.4	0	0.0
Horse	0	0.0	4	5.5
Skunk	0	0.0	3	4.1
Pig	1	1.4	1	1.4
Duck	0	0.0	1	1.4
Deer	0	0.0	1	1.4
Unidentified	19	26.0	10	13.7

Questions / Comments ?