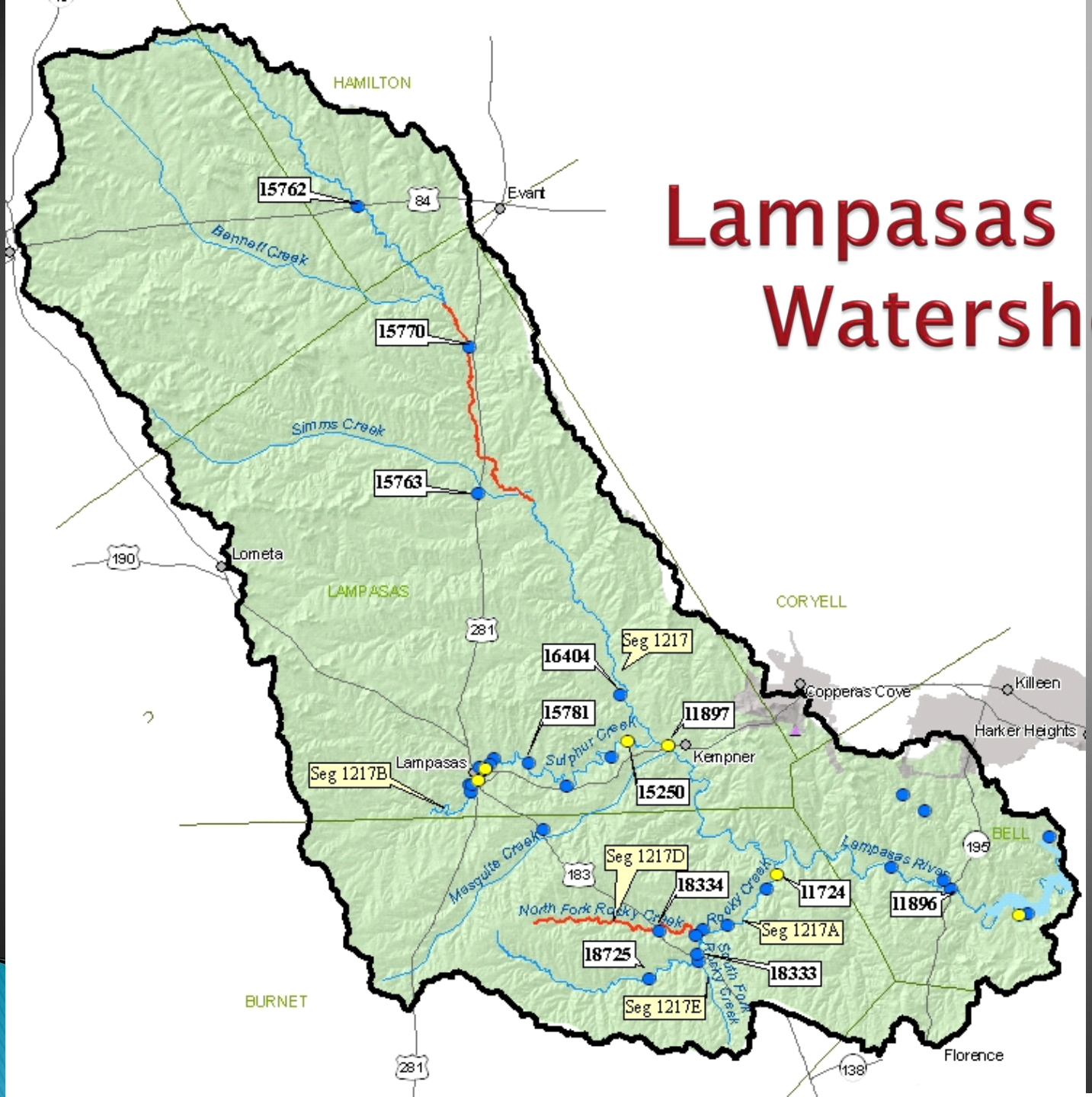
Why Was the Lampasas River Watershed Selected for a WPP?

Pamela Casebolt
Texas State Soil and Water Conservation Board

Lampasas River Watershed



Lake Stillhouse Hollow Clean Water Steering Committee

- Established in 2003
- Focused primarily on the area of influence of Stillhouse Hollow Lake and backwater portion of the Lake that extends into the Lampasas River
- Source Water Protection Plan
- Clean Rivers Program Special Study with Brazos River Authority

Soil
Water
TSSWCB

How Did Lampasas River Get Selected?

- Existing active stakeholder groups
- Water quality impairment for bacteria and depressed dissolved oxygen
- Predominately rural watershed

How Did Lampasas River Get Selected?

- AgriLife Research submitted a proposal to TSSWCB for a Clean Water Act Section 319(h) Nonpoint Source grant from the U.S. Environmental Protection Agency to develop a WPP for the Lampasas River
- TSSWCB and USEPA funded the WPP and AgriLife Research began engaging potential stakeholders and collecting existing data and information to be used in this watershed planning process
- 3 year contract beginning in 2007
- $ 498,422 (federal); $830,703 (project total)

Roles

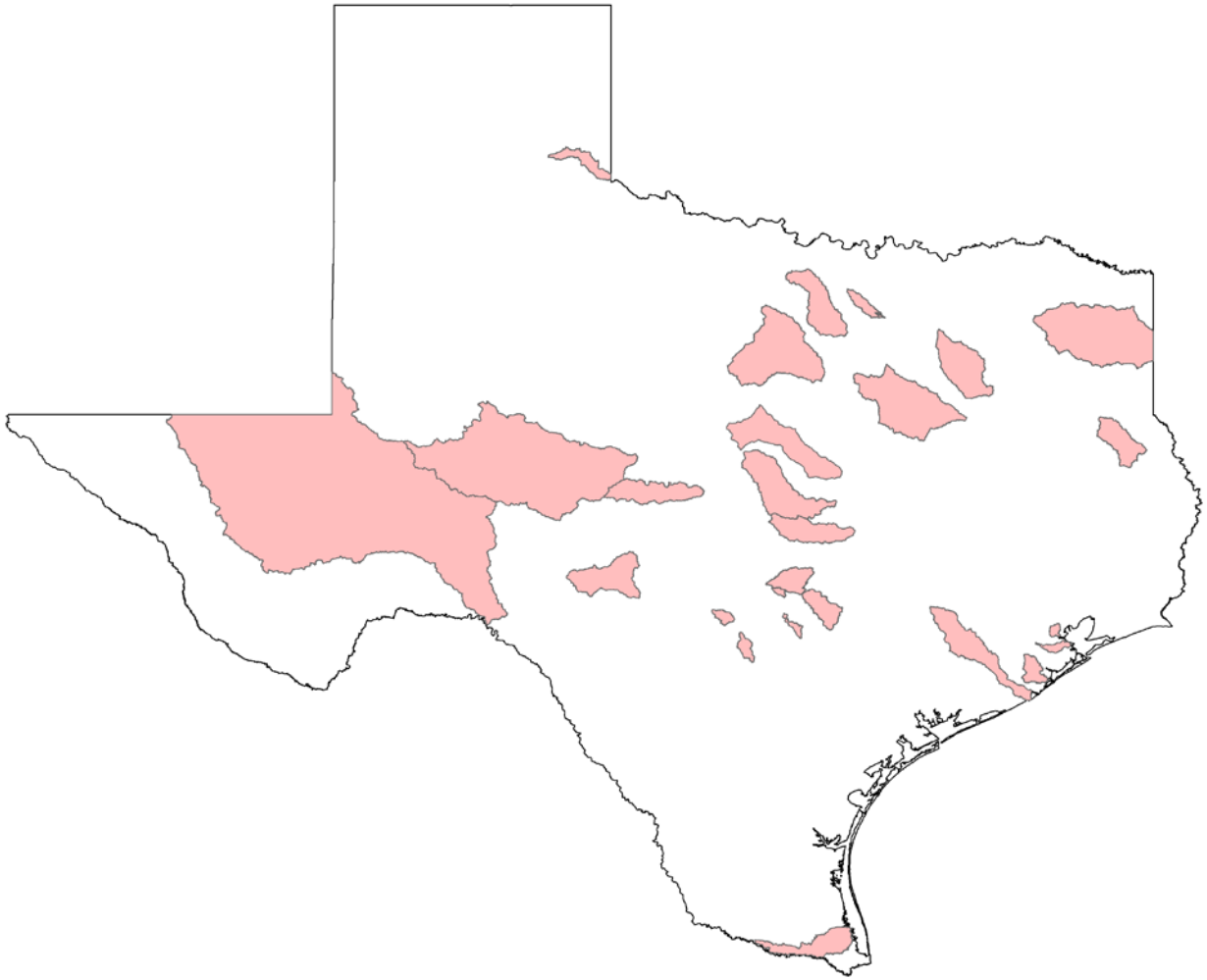
- Texas AgriLife Research
  - Facilitate the stakeholder process
  - Collect and analyze data
    - LDCs, Land Use/Land Cover, SELECT modeling
  - Write the WPP based on stakeholder decisions

- Texas State Soil and Water Conservation Board
  - Ensure WPP satisfies EPA's 9 elements

Importance of WPPs

- Critical to the Texas Nonpoint Source Management Program
- Restore water quality and achieve “swimmable and fishable” designated uses

WPPs Across Texas



Soil
Water
TSSWCB

TAG Involvement

- Provide guidance and direction to stakeholders on:
  - Technical understanding of water quality conditions and assist with finding solutions
  - Agency programs to solve water quality issues (technical and financial assistance)
  - How can your programs can be implemented in this watershed

Websites

- TSSWCB Watersheds
  - http://www.tsswcb.state.tx.us/watersheds#lampasasriver
- Lampasas River Watershed (Texas AgriLife Research)
  - http://lampasasriver.org

Thank You!

Pamela Casebolt
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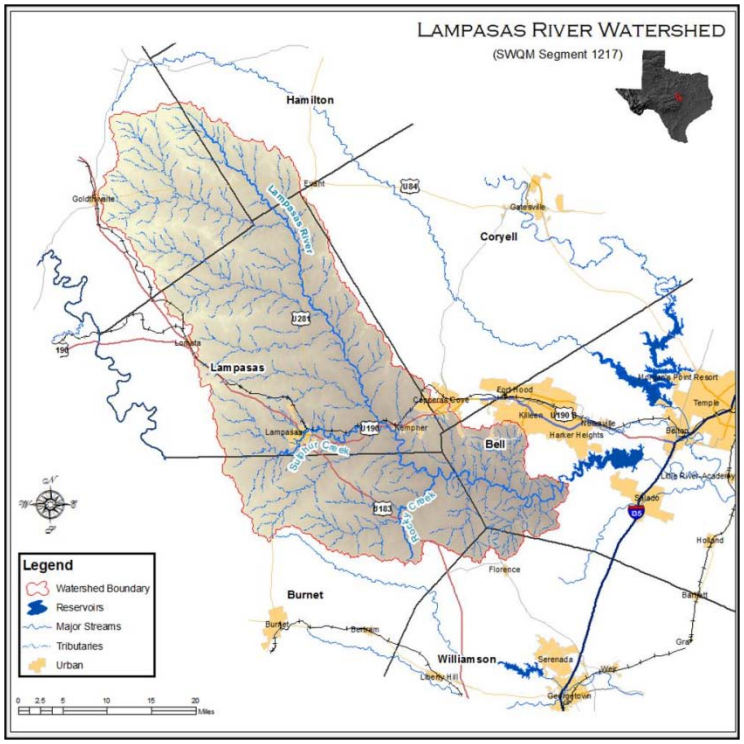
Historic and Current Monitoring Efforts within the Lampasas River Watershed

June Wolfe III
Water Science Laboratory
Texas AgriLife Research – Temple
Blackland Research and Extension Center, Temple

Overview

- Personal experience
- Brazos River Authority – Clean Rivers Program
- Texas Commission on Environmental Quality – Bacteria Special Study
- Texas State Soil and Water Conservation Board – Bacteria Source Tracking
- Discussion

Personal Experience



Brazos River Authority

Clean Rivers Program Water Quality Monitoring

Jenna Barrett
Water Quality Programs Manager
254-761-3149
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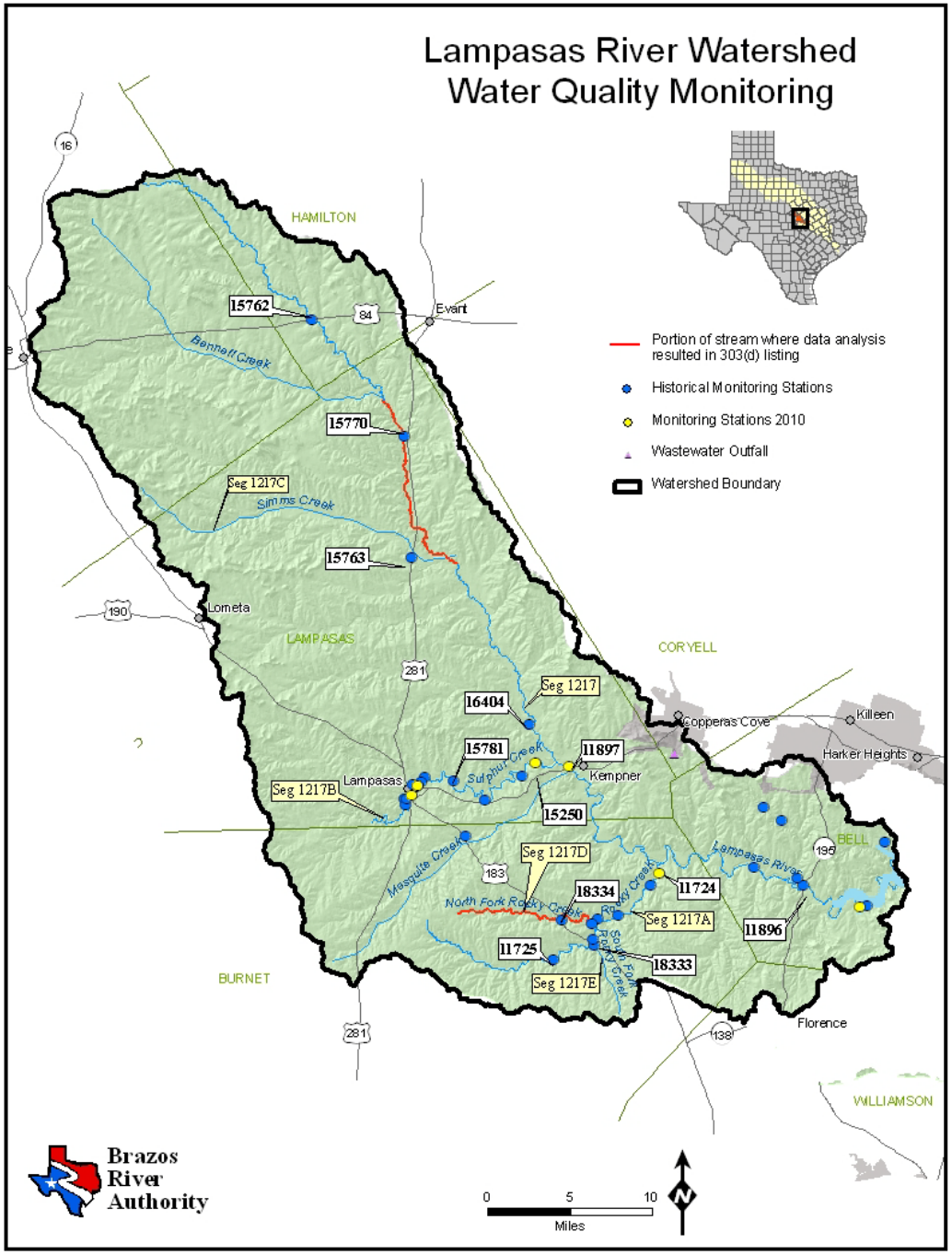
Texas Commission on Environmental Quality

Bacteria Water Quality Sampling and Analysis in Specified Stream Segments

Eric Reese
Project Manager
TMDL Program
512/239-5936
ereese@tceq.state.tx.us

FY2010 Monitoring

- One station on Lampasas River mainstem monitored quarterly
  - Station 11897 – LAMPASAS RIVER AT US 190 is monitored quarterly for conv, bact, flow, field
    - Two Biological Assessments in 2010
      - Habitat + benthic + nekton + 24 hr DO
- Four tributaries stations monitored quarterly
  - 18783 – SULPHUR CREEK AT US 183
  - 18760 – SULPHUR CREEK UPSTREAM OF LAMPASAS WWTP
  - 15250 – SULPHUR CREEK AT CR 8 (Hallmark Crossing)
  - 11724 – ROCKY CREEK at FM 963

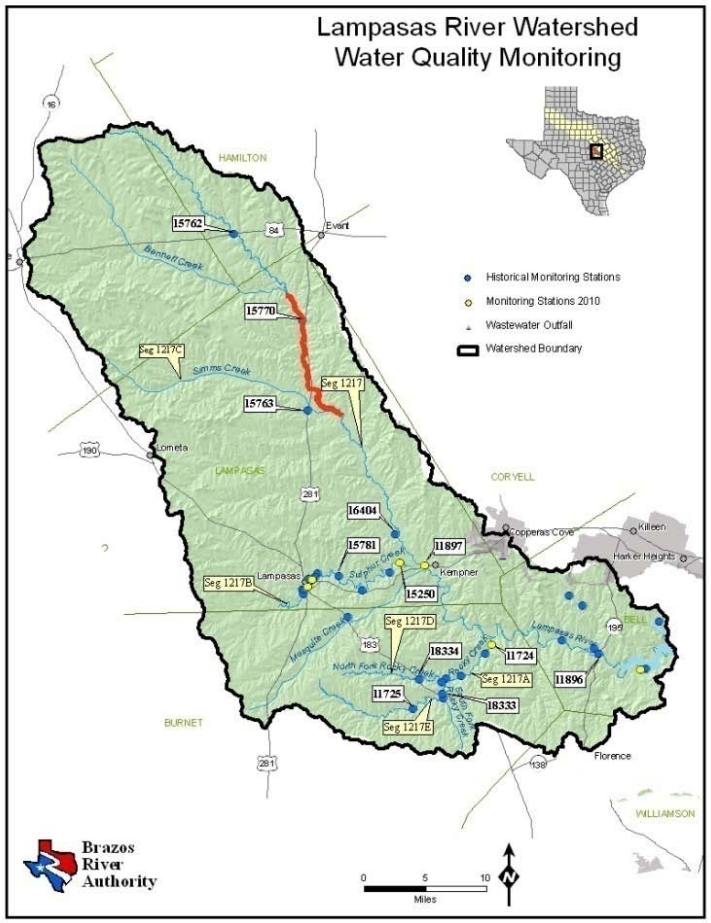

Lampasas River Watershed
Water Quality Monitoring
HAMILTON
Evant
15762
84
Bennett Creek
15770
Seg 1217C
Simms Creek
15763
Lometa
190
LAMPASAS
281
CORYELL
Seg 1217
16404
Copperas Cove
Killeen
Harker Heights
15781
11897
Kempner
Sulphur Creek
Lampasas
Seg 1217B
15250
Mesquite Creek
Seg 1217D
183
BELL
196
Lampasas River
Rocky Creek
11724
18334
North Fork Rocky Creek
Seg 1217A
11896
South Fork Rocky Creek
11725
18333
Seg 1217E
BURNET
281
138
Florence
WILLIAMSON
Portion of stream where data analysis resulted in 303(d) listing
Historical Monitoring Stations
Monitoring Stations 2010
Wastewater Outfall
Watershed Boundary
Brazos River Authority
0
5
10
Miles
N

303(d) Listings

- Segment 1217 – Lampasas River Above Stillhouse Hollow Lake
  - First Listed in 2002 for not supporting Contact Recreation, due to elevated bacteria
    - 1217_04 – *From the FM 1690 crossing to the CR 117 crossing,* (Station 15770) is the portion of the stream that resulted the listing
    - 1217_05 – *From CR 117 crossing to the upper end of the segment,* (Station 15762) was listed as having a concern for Contact Recreation due to elevated bacteria
    - 1217_05 was listed in error, will be corrected in 2010 list
    - 2010 Data providers pre-draft list, new listings
      - 1217b_02, Sulphur Creek, ALU, DO 5c
      - 1217D_01, N Fork Rocky Creek, ALU, DO, 5b
      - 1216A_01, Trimmier Creek, Rec, bacteria, 5c

303(d) Listings

- 1217_04 Station 15770
  LAMPASAS RIVER AT CR 105
  (6 miles north of Adamsville)
  - Fecal coliform data collected from 6/98 through 7/99
  - 12 samples collected
    - 6 samples contained >400 CFU
    - Geometric mean was 235 CFU (>200 CFU is non-supporting)
      - Dissolved Oxygen Grab Data
        - N = 13
        - Average = 8.1 mg/l



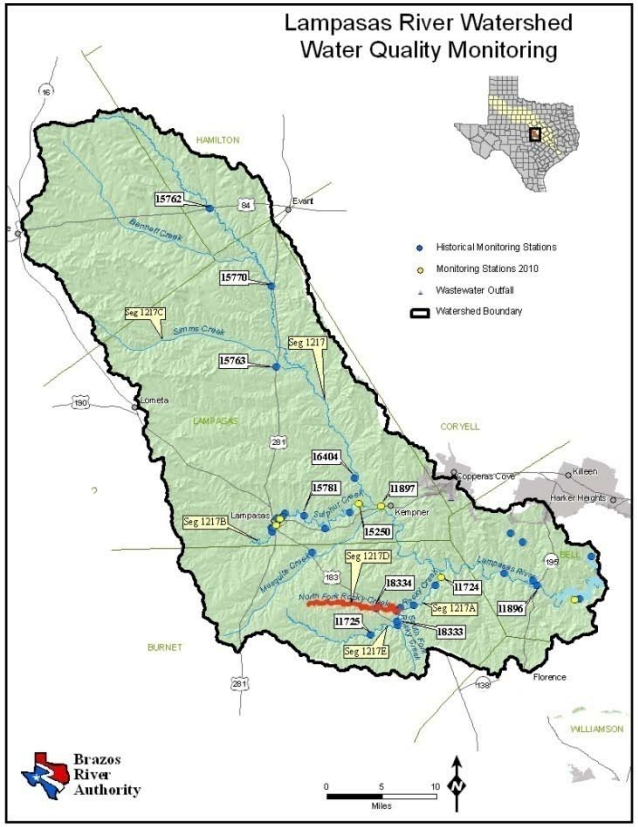
303(d) Listings

- Unclassified Segment 1217D – Station 18334 – NORTH FORK ROCKY CREEK SOUTHERN FM 963 CROSSING

  - First Listed in 2006 for not supporting designated Aquatic Life Use (ALU) due to low 24-hr average Dissolved Oxygen

  - 24-hr Dissolved Oxygen data was collected from 8/02 through 9/04.

  - There were 13 events
    - Of these, 5 events produced samples that were <3 mg/L



Bacteria Water Quality Sampling and Analysis in Specified Stream Segments

- Funded by TCEQ
- Contract with TIAER
- One station – 15770
- 24 ambient water quality sampling events
- September 2009 – August 2011 (monthly)
- Collecting *E. coli*, field parameters, flow

Station 15770 – Sep 2009

Station 15770 – Oct 2009

Outcomes

- Preliminary data, 2 events in 2009
- Dataset for the 2012 Water Quality Inventory
- Assessment of use attainment using *E. coli* indicator
- Assessment probably based on revised 2010 Water Quality Standards
- Dataset used for analyses and modeling
- Inform future activities in the watershed

Bacteria Source Tracking

Goal: Identify sources of elevated bacterial levels

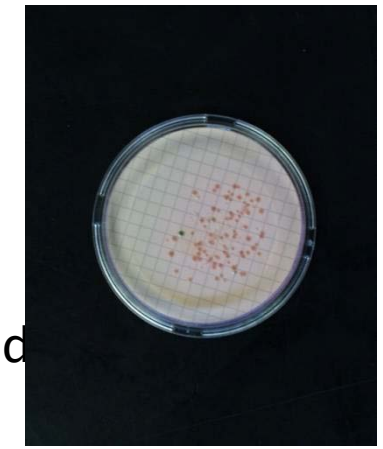
- Proposed, not yet funded, Spring 2010 tentative start

- Texas State Soil and Water Conservation Board
  - Project funding

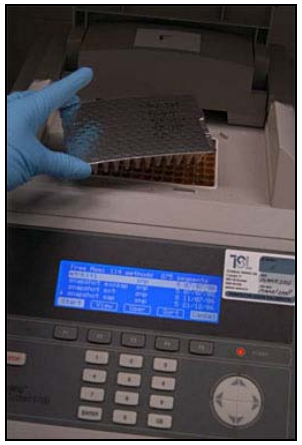
- Texas Water Resource Institute
  - Project coordination and administration

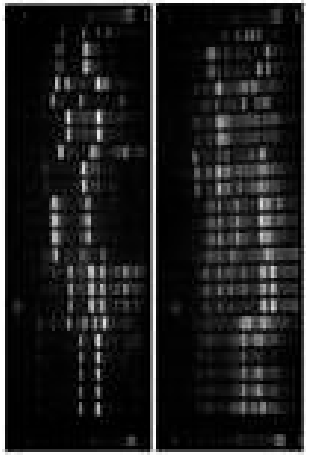
Bacteria Source Tracking

- Texas AgriLife Research – Temple
  Blackland Research and Extension Center
  - Collect samples, measure stream flow
  - 12 locations,18 sampling events (monthly)
  - Enumerate *E. coli* using membrane filtration method
  - Ship samples to El Paso lab



- Texas AgriLife Research – El Paso
  - Culture *E. coli,* extract DNA
  - Sequence DNA using ERIC-PRC
    and RP combo method
  - Compare to “known source” library





Lampasas River Watershed Technical Advisory Group Meeting

3 February, 2010

Texas AgriLife Research at
Blackland Research & Extension Center

Technical Advisory Group Meeting

3 February, 2010

Welcome and Introduction

Technical Advisory Group Meeting
3 February, 2010

Status of the Lampasas Watershed Partnership

Steve Potter
Texas AgriLife Research at
Blackland Research & Extension Center

Goal: Lampasas River fully meeting its designated uses for contact recreation and a healthy aquatic ecosystem

To have an adequate chance of success, watershed protection plan must have a reasonably high probability of:

1) being implemented

2) bringing the river into full compliance of its designated uses within a 10 to 15-year period .

- ✓ Stakeholder participation is critical
- ✓ Outreach key to reaching project goal

Stakeholder Outreach: Build Consensus and Build Capacity.

Building Consensus

Help stakeholders

a) identify a common vision,

b) reach agreement on a plan to realize that vision, and

c) formulate a strategy to implement the plan.

How?

- Listening Sessions
- Watershed Partnership
- Technical Liaisons

Listening Sessions

Important Phase

- Lampasas Watershed proximity to Leon and Bosque Watersheds
- Gain Approval of Key Political Leaders
- Build Relationships & Trust

Watershed Partners
Spring 2009

Over 40 land owners, water users, and public officials attended a meeting in Killeen, TX to learn about the Lampasas River Watershed and the watershed partnership.

Four days later, 75 more stakeholders attended a similar meeting in Lampasas, TX.

Steering Committee Meeting
November 2009

- Established
  - Watershed Partnership
  - Steering Committee and
  - Work Groups
- Representatives from upper, middle, lower WS

Status of the Lampasas Watershed Partnership

- Workgroups
  - Wastewater Infrastructure
  - Agricultural Issues
  - Habitat & Wildlife
  - Urban/Suburban Issues
  - Outreach & Education

Status of the Lampasas Watershed Partnership

- 12-month schedule to complete draft WPP
  - Expected late Fall/early winter 2010
- Watershed Tour

Technical Advisors

Current

- TSSWCB
- Local County Extension Agents
- Texas A & M

Establish

State and Federal Agency Partners

Building Capacity

Over 60 stakeholders attended a full day "Watershed Stewards" course to learn about the water cycle, watershed health, and the Lampasas River.

Steering Committee Meeting
December 2009

Primarily Educational

- Interpreting Water Quality Data
- Impairment Source ID Methodologies

a core message to stakeholders

For a healthy river and sustainable watershed

there is only one key to success;
don't stop.

Community stakeholders will need help and support....

through strong partnerships

Technical Advisory Group Meeting

Existing Data & Gaps

Steve Potter
Texas AgriLife Research at
Blackland Research & Extension Center

Data and Knowledge Gaps

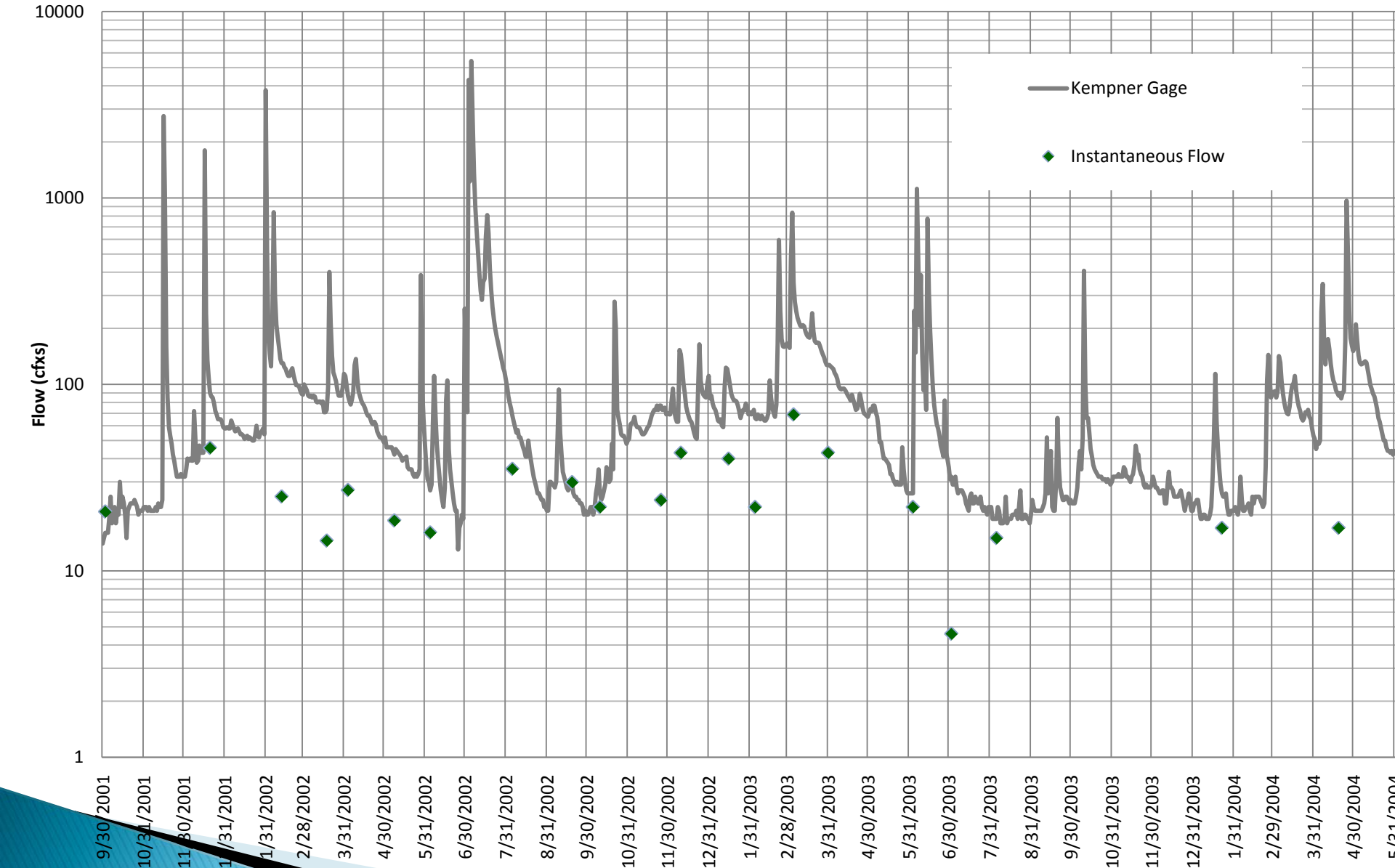
Significant Surface – Ground Water Interactions Need better understanding of area geology.

Sulphur Creek: Lack of long-term flow records in Sulphur Creek (28 points only for instantaneous measured flow). Poor fit to average daily flow at Kempner. Graphs/Maps. Discuss possible methods of extending record.

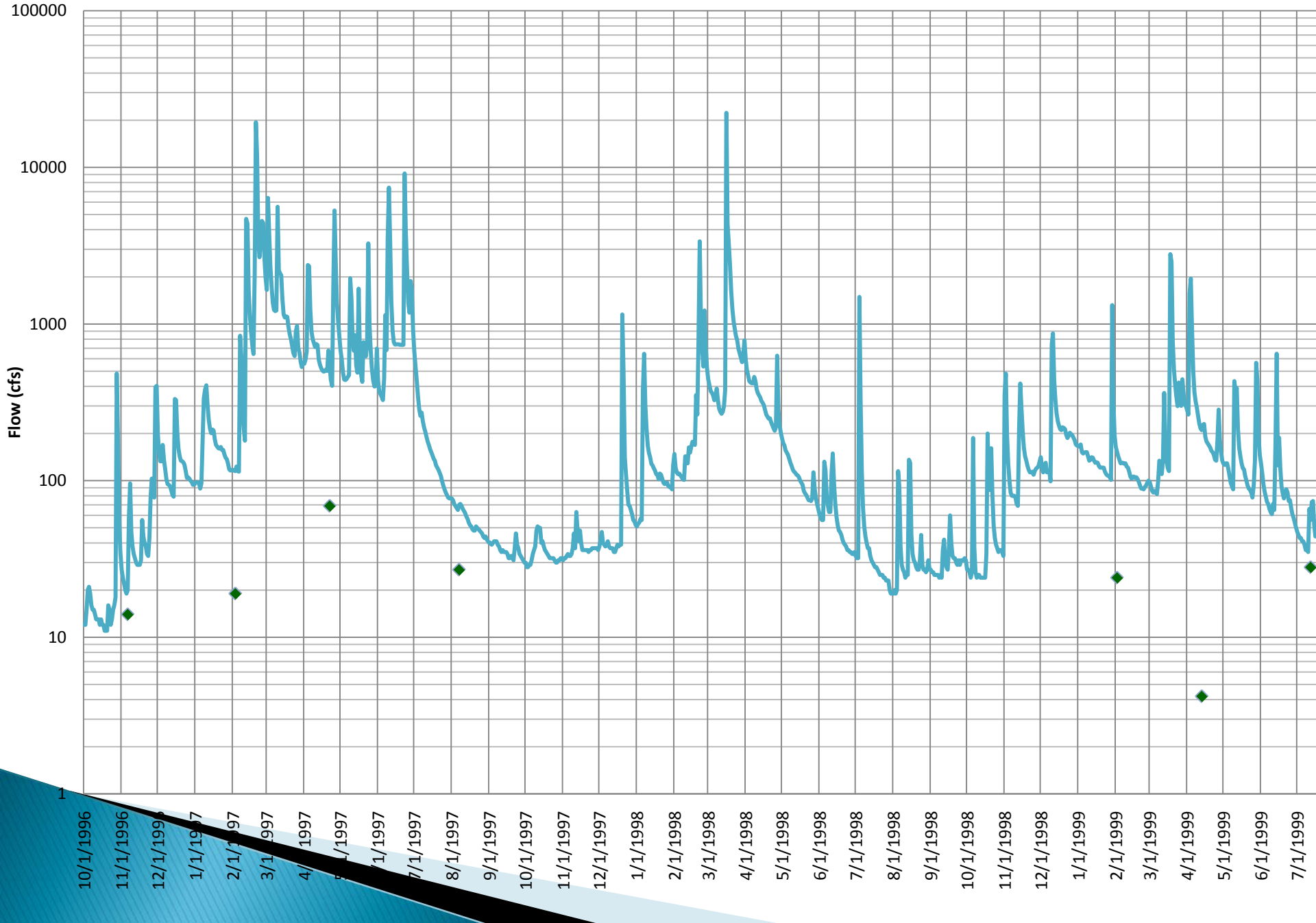
- Flow records / estimates for springs,
- Discharge from OMI WWTP,
- Daily well (water table elevation) records.
- Dilution factor method
- Other Ideas?

Lower Lampasas (between Kempner and Youngsport loses water during droughts; gains during wet and normal periods.

Kempner Gage vs Measure Flow at Sulfur Creek



Kempner Daily Flow vs Instantaneous Flow (15250)



Date	11724	11896	**11897**	**15250**	**Kempner**	15762	18330	18331	18332	18333	18334
11/6/1996		20		**14**	**20**						
2/3/1997		111		**19**	**115**						
4/22/1997				**69**	**550**						
8/7/1997		67		**27**	**70**						
2/2/1999	17			**24**	**153**						
4/13/1999	1.9			**4.2**	**210**						
7/12/1999				**28**	**56**	0.5					
10/2/2001			**16**	**20.8**	**16**						
12/20/2001			**76**	**45.7**	**90**						
2/12/2002		118		**25.06**	**130**						
3/18/2002		82		**14.53**	**73**						
4/3/2002		99		**27.15**	**87**						
5/8/2002		44		**18.64**	**42**						
6/4/2002			**31**	**16.06**	**27**						
8/5/2002	19.81		**70**	**35.24**	**68**		19.64	1.85	34.56	10.79	12.48
9/19/2002			**51**	**29.91**	**29**						
10/10/2002			**24**	**22**	**26**						
11/25/2002			**67**	**24**	**77**						
12/10/2002			**139**	**43**	**145**						
1/15/2003			**99**	**40**	**110**						
2/4/2003				**22**	**66**						
3/5/2003			**445**	**69**	**352**						
3/31/2003			**115**	**43**	**127**						
6/3/2003			**23**	**22**	**26**						
7/2/2003			**31**	**4.6**	**32**						
8/5/2003			**26**	**15**	**19**						
1/22/2004			**25**	**17**	**26**						
4/19/2004			**88**	**17**	**87**						
Count	3	7	[illegible]	28	28	1	1	1	1	1	1

Data and Information

- TCEQ: Use Attainability Assessment for Rocky Creek?
- TCEQ: CAFO and WWTF and Point Sources
- Numbers of septic systems and distribution?
- Methods to estimate and distribute numbers of wildlife, birds, and feral.
- Methods to distribute livestock across watershed?
- Duck pond fecal loading rates?

Water Quality Data

a. Are numbers of E coli data sufficient for analysis? Fill in with fecal?

   Discuss graph of Fecal x E Coli that show poor correlations.

a. Discuss other water quality parameters w/respect to sufficient data to get probability distributions.
b. TDS vs Specific Conductance. Discuss graphs of Conductance xTDS. Can we use data to extend TDS data?
c. Should we combine data which is similar but not exactly the same?

Example:

Orthophosphate

671 ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN

70507 ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FILTER >15MIN

and

NO2+NO3

630 NITRITE PLUS NITRATE, TOTAL 1 DET. (MG/L AS N)

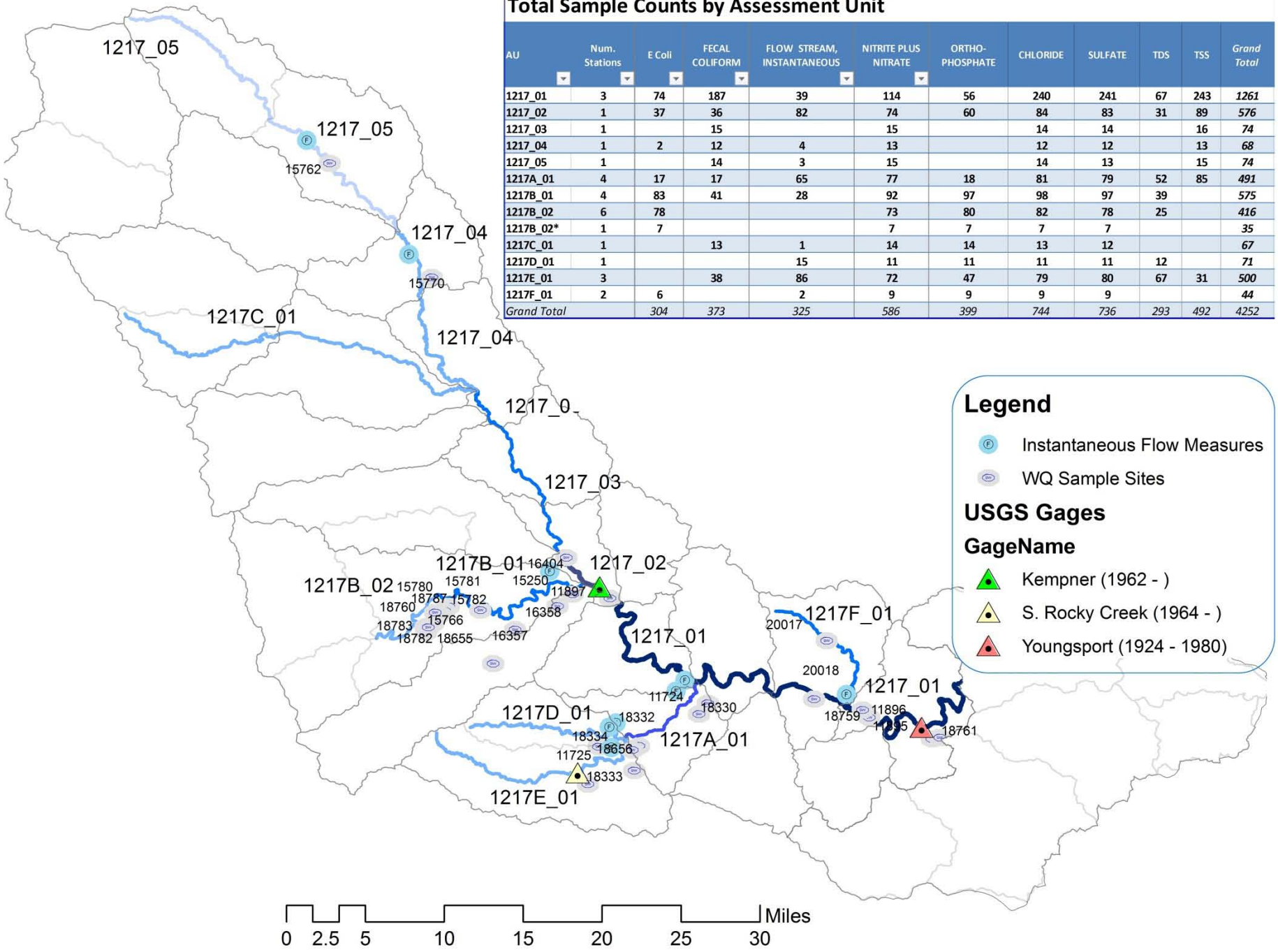
593 NO2 PLUS NO3-N, TOTAL, WHATMAN GF/F FILT (MG/L)

631 NITRITE PLUS NITRATE, DISS 1 DET. (MG/L AS N)

620 NITRATE NITROGEN, TOTAL (MG/L AS N) +
615 NITRITE NITROGEN, TOTAL (MG/L AS N)

Total Sample Counts by Assessment Unit

AU	Num. Stations	E Coli	FECAL COLIFORM	FLOW STREAM, INSTANTANEOUS	NITRITE PLUS NITRATE	ORTHO-PHOSPHATE	CHLORIDE	SULFATE	TDS	TSS	*Grand Total*
1217_01	3	74	187	39	114	56	240	241	67	243	*1261*
1217_02	1	37	36	82	74	60	84	83	31	89	*576*
1217_03	1		15		15		14	14		16	*74*
1217_04	1	2	12	4	13		12	12		13	*68*
1217_05	1		14	3	15		14	13		15	*74*
1217A_01	4	17	17	65	77	18	81	79	52	85	*491*
1217B_01	4	83	41	28	92	97	98	97	39		*575*
1217B_02	6	78			73	80	82	78	25		*416*
1217B_02*	1	7			7	7	7	7			*35*
1217C_01	1		13	1	14	14	13	12			*67*
1217D_01	1			15	11	11	11	11	12		*71*
1217E_01	3		38	86	72	47	79	80	67	31	*500*
1217F_01	2	6		2	9	9	9	9			*44*
Grand Total		*304*	*373*	*325*	*586*	*399*	*744*	*736*	*293*	*492*	*4252*



Total Sample Counts by Assessment Unit and Station.

AU	E Coli	FECAL COLIFORM	FLOW STREAM, INSTANTANEOUS	NITRITE PLUS NITRATE	ORTHO-PHOSPHATE	CHLORIDE	SULFATE	TDS	TSS	*Grand Total*
Station ID										
1217_01	**74**	**187**	**39**	**114**	**56**	**240**	**241**	**67**	**243**	***1261***
11895	64	84		67	49	132	133	56	134	*719*
11896	4	103	39	40		101	101	11	102	*501*
18761	6			7	7	7	7		7	*41*
1217_02	**37**	**36**	**82**	**74**	**60**	**84**	**83**	**31**	**89**	***576***
11897	37	36	82	74	60	84	83	31	89	*576*
1217_03		**15**		**15**		**14**	**14**		**16**	***74***
16404		15		15		14	14		16	*74*
1217_04	**2**	**12**	**4**	**13**		**12**	**12**		**13**	***68***
15770	2	12	4	13		12	12		13	*68*
1217_05		**14**	**3**	**15**		**14**	**13**		**15**	***74***
15762		14	3	15		14	13		15	*74*
1217A_01	**17**	**17**	**65**	**77**	**18**	**81**	**79**	**52**	**85**	***491***
11724	17	17	20	44	18	48	46	16	49	*275*
18330			15	11		11	11	12	12	*72*
18331			15	11		11	11	12	12	*72*
18332			15	11		11	11	12	12	*72*
1217B_01	**83**	**41**	**28**	**92**	**97**	**98**	**97**	**39**		***575***
15250	53	40	28	61	66	67	66	39		*420*
15781	15	1		16	16	16	16			*80*
15782	2			2	2	2	2			*10*
16358	13			13	13	13	13			*65*
1217B_02	**78**			**73**	**80**	**82**	**78**	**25**		***416***
15766	15			14	15	15	15	1		*75*
15780	14			15	15	15	15			*74*
18760	17			15	18	19	17	16		*102*
18782	7			7	7	7	7			*35*
18783	18			15	18	19	17	8		*95*
18787	7			7	7	7	7			*35*
1217B_02*	**7**			**7**	**7**	**7**	**7**			***35***
18784	7			7	7	7	7			*35*
1217C_01		**13**	**1**	**14**	**14**	**13**	**12**			***67***
15763		13	1	14	14	13	12			*67*
1217D_01			**15**	**11**	**11**	**11**	**11**	**12**		***71***
18334			15	11	11	11	11	12		*71*
1217E_01		**38**	**86**	**72**	**47**	**79**	**80**	**67**	**31**	***500***
11725		38	69	59	45	67	67	54	17	*416*
18333			16	12	1	12	12	12	13	*78*
18657			1	1	1		1	1	1	*6*
1217F_01	**6**		**2**	**9**	**9**	**9**	**9**			***44***
18759	6			7	7	7	7			*34*
18850				2	2	2	2			*10*
Grand Total	*304*	*373*	*325*	*586*	*399*	*744*	*736*	*293*	*492*	*4252*

Technical Advisory Group Meeting

3 February 2009

Analytical Approach/ Modeling Tools Overview

Modeling Tools Overview

- Stakeholder Input
- Contaminant Loads => Load Duration Curves
- Watershed Inventory
- Update Land Use/ Land Cover
- Terrain Analysis
- Select Model
- Texas A&M: Ongoing research in watershed

Land Use /Land Cover and Terrain Analysis

- Use of aerial orthophotos & satellite imagery to characterize the vegetation, water, natural surface, and cultural features on the land surface
- Several national datasets are available, but dated (1992 or 2001)

Watershed Inventory

- Watershed boundaries
- County boundaries
- Major roads
- County Roads
- Creeks, drainages, ponds, etc.
- WWTPs
- CAFOs
- City or Town boundaries
- Census data
- Livestock Data
- Wildlife Data

Next Steps for Modeling & Analysis

- Land use/land cover and terrain analysis
- Analyze historical data via FDCs & LDCs
- *Estimate* contaminant loads and calculate river loading capacities at key locations
- Attempt to understand cause-effect mechanisms: sources, transport, stressors, impacts, and impairments
- Assemble SELECT model inputs, identify sources of uncertainty, and develop information and evidence to support stakeholder decision-making.

THANKS FOR PARTICIPATING!

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Texas AgriLife Research at
Blackland Research & Extension Center