K-STATE
Research and Extension

Streambank Assessments in the Little Arkansas River Watershed

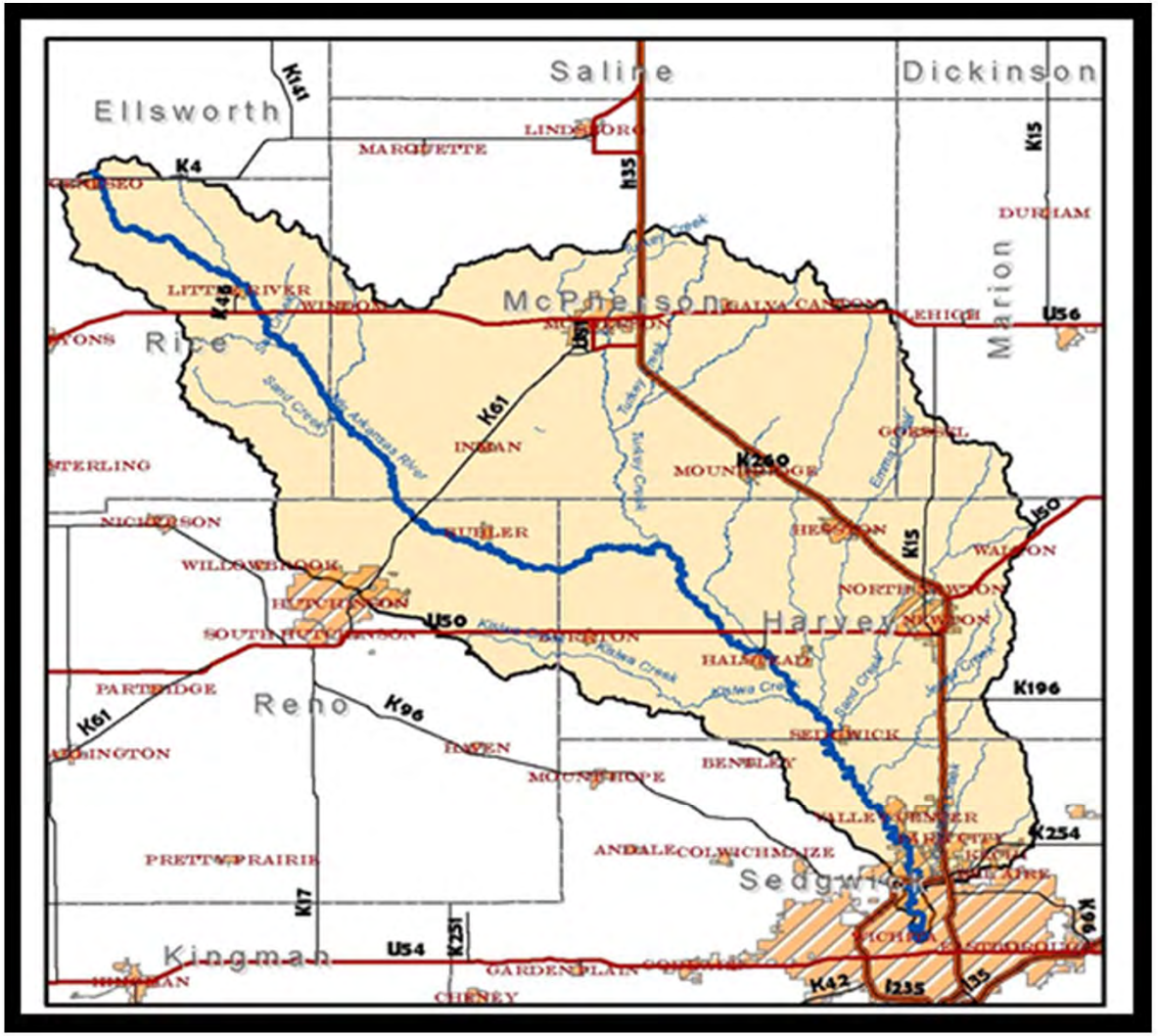
Ron Graber
Kansas State University

Stormwater Advisory Board
March 28, 2014

Knowledge for Life

K-STATE Research and Extension

Little Arkansas Watershed



Knowledge for Life

K-STATE Research and Extension

Implementation Goals

- Atrazine from Cropland
- Sediment from Cropland
- Nutrients from Cropland and Livestock
- Fecal Coliform Bacteria from Livestock
- Sediment and Nutrients from Streambank and Riparian Areas

Knowledge for Life

K-STATE
Research and Extension

LOWER ARKANSAS BASIN STREAMBANK EROSION ASSESSMENT

ArcGIS® Comparison Study: 1991 vs. 2010 Aerial Photography

DRAFT: October 2012

Photo taken by: Matt Unruh, KWO; Slate Creek, Sumner County

Prepared by:
Katie Hermes
Kansas Water Office
901 S. Kansas Avenue, Topeka, KS 66612
(785) 296-3185, www.kwo.gov
Katie.Hermes@kwo.ks.gov

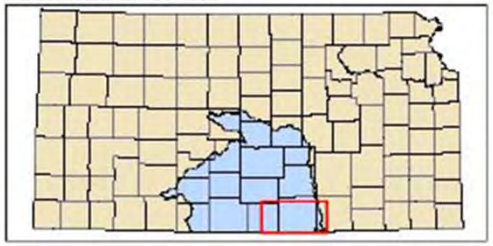
Kansas
Water Office

Knowledge for Life

1991 FSA Aerial Photo

2010 NAIP Aerial Photo

2010 NAIP Aerial Photo



Chikaskia River: Unique ID 0009

SB Lenght = 1,152 Feet
SB Height = 24 Feet
Area = 229,696 Sq/Ft.
Sedimentation = 11,461 Tons/Yr.

Figure 9: Little Arkansas River Streambank Erosion Sites

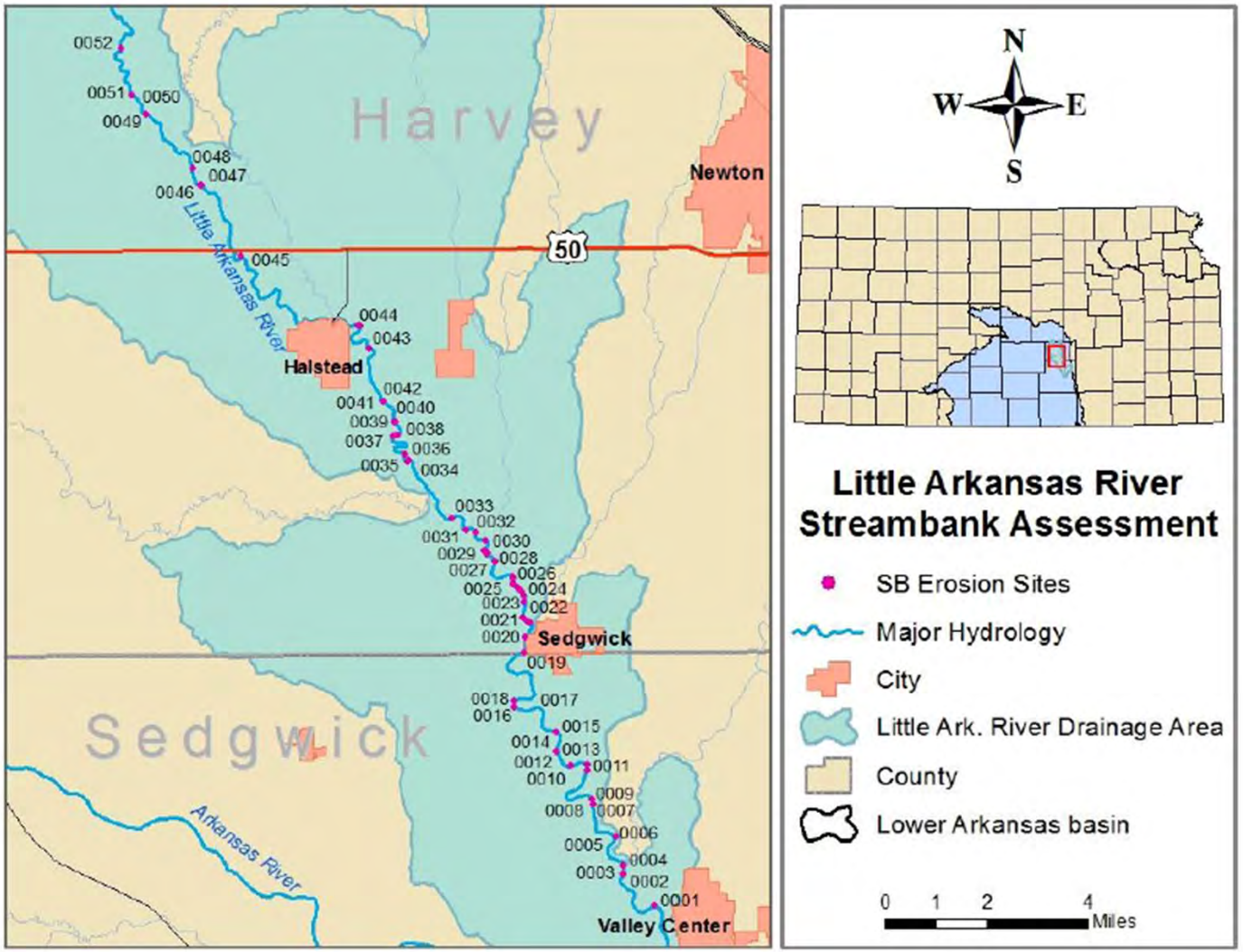
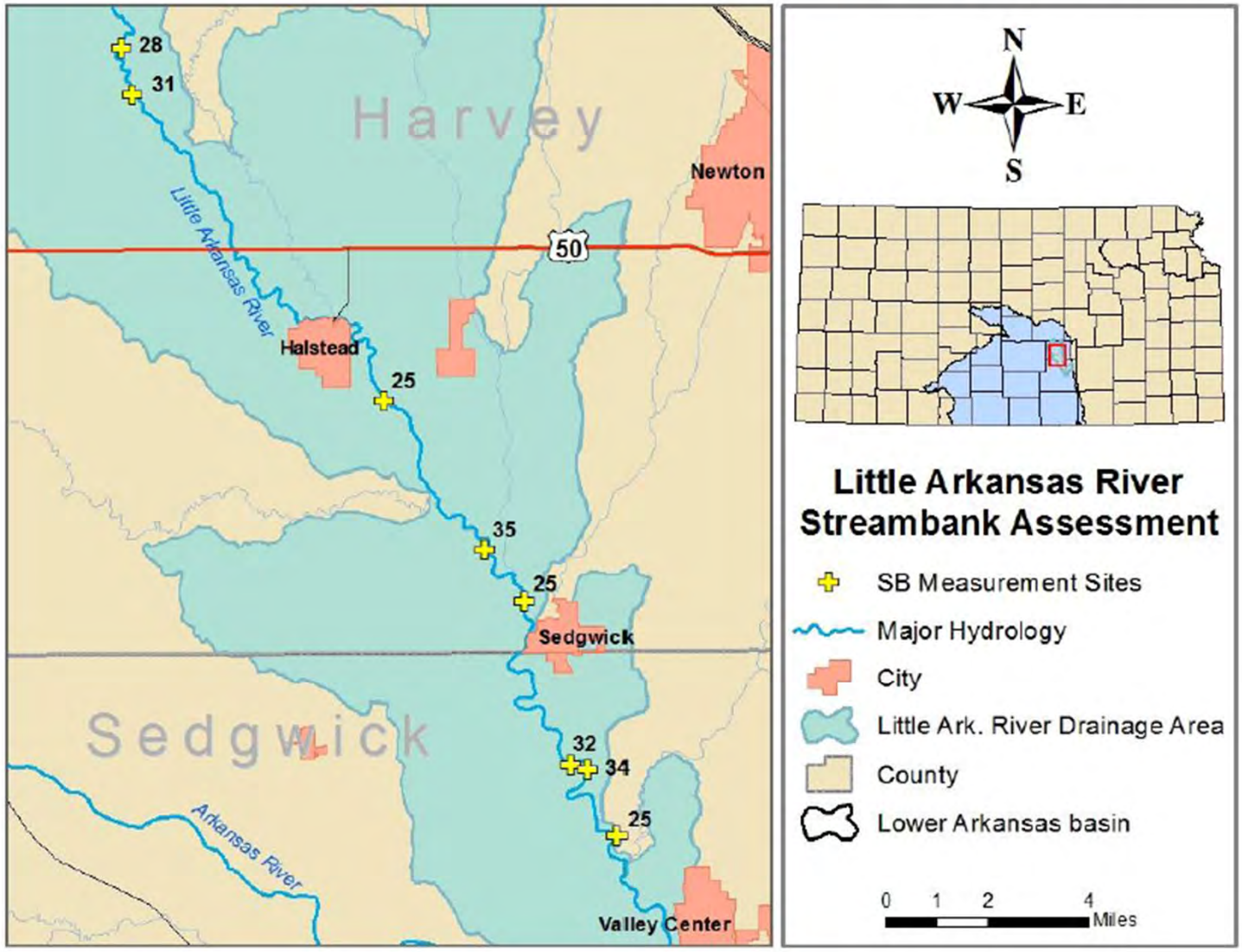


Figure 5: Little Arkansas River Streambank Heights Measurements (in feet) & Locations



Average Soil Loss Rate (Tons/Yr.) =

[Area_SqFt]*[BankHgtFt]*SoilDensity(lbs/ft3)/2000(lbs/ton)/([NAIP_ComparisonPhotoYear]-[BaseAerialPhotoYear])

Table 2: Lower Arkansas Basin Streambank Sediment Load by Erosion Site (Tons/Yr.)

Unique ID	Slate Cr	Chikaskia R	Little Arkansas R
0001	858.2	1,843.0	430.8
0002	315.6	3,362.9	639.7
0003	321.8	2,798.7	1,187.8
0004	888.2	2,525.1	832.4
0005	677.4	2,258.8	254.5
0006	459.3	1,391.7	487.7
0007	472.8	33,303.3	3,071.2
0008	332.7	5,772.7	1,952.2
0009	413.9	11,460.6	2,295.9
0010	879.3	2,280.9	1,159.2
0011	443.6	3,477.0	549.5
0012	1,059.9	1,356.7	1,113.9
0013	322.3	1,612.4	1,181.9
0014	197.9	5,851.0	1,013.3
0015	1,335.6	1,061.4	1,344.7
0016	527.2	987.4	952.9
0017	1,132.0	2,345.4	1,130.9
0018	677.4	895.9	682.2
0019	364.0	1,251.5	952.6
0020	436.6	854.0	557.6
0021	452.3	818.0	1,510.6
0022	655.9	1,595.2	919.2
0023	605.1	1,523.5	3,098.1
0024	221.6	1,503.7	747.4
0025	274.7	1,427.0	578.2
0026	332.0	1,774.2	854.9
0027	398.2	1,524.9	1,195.0
0028		10,756.9	399.5
0029		1,261.1	1,927.8
0030		1,688.8	730.3
0031		1,090.9	418.9
0032		1,273.6	675.8
0033		963.4	1,104.4
0034		3,520.8	2,197.7
0035		1,615.4	1,767.4
0036		3,695.7	1,251.6
0037		1,102.4	774.8
0038		5,247.8	2,040.8
0039		1,105.1	1,445.2
0040		1,270.6	1,760.5
0041		837.7	2,185.3
0042		1,429.3	994.1
0043		1,000.6	2,666.5
0044		538.1	1,996.7
0045		3,554.9	1,482.6
0046		550.3	829.0

Assessment; $71.50 per linear foot was used to calculate average streambank stabilization costs (Figure 7).

Figure 6: TWI Estimated Costs to Implement Streambank Stabilization BMPs

BMP Cost Description	Cost estimate per linear foot (in dollars)
1. Survey and design Rock delivery and placement As-built certification design Bank Shaping	$50 - $75
2. Vegetation (material and planting) Cover Crop Mulch Willow Stakes Bare root seedlings Grass filter strip	$5
3. Contingencies Unexpected site conditions requiring extra materials and construction time	$3 - $5.5
TOTAL	$58-$85.5

Table 1: Lower Arkansas Basin Streambank Erosion Assessment Table by Stream Reach

Stream Reach	SB Length (ft)	SB Erosion Site Sed (T/Yr)	Stabilization Cost Estimate	SB Erosion Sites (no.)	Yield Loss/ Bank Length (T/Yr/ft)	Poor Riparian Cond/SB Length (ft)	Est. Sed Reduction (T/Yr)	% SB Length w/ Poor Riparian Cond.
Slate Cr	8,831	15,055	$631,417	27	1.7	7,779	12,797	88.09%
Chikaskia R	49,980	175,633	$3,573,570	66	3.5	18,229	149,288	36.47%
Little Arkansas R	21,763	60,298	$1,556,055	52	2.8	9,363	51,253	43.02%
Total	**80,574**	**250,986**	**$5,761,042**	**145**	**8.0**	**35,371**	**213,338**	**43.90%**
Est Stabilization Cost/Linear Ft.			$71.50	Stabilization/Restoration Efficiency			0.85	

K-STATE
Research and Extension

Knowledge for Life

K-STATE
Research and Extension

Knowledge for Life

K-STATE
Research and Extension

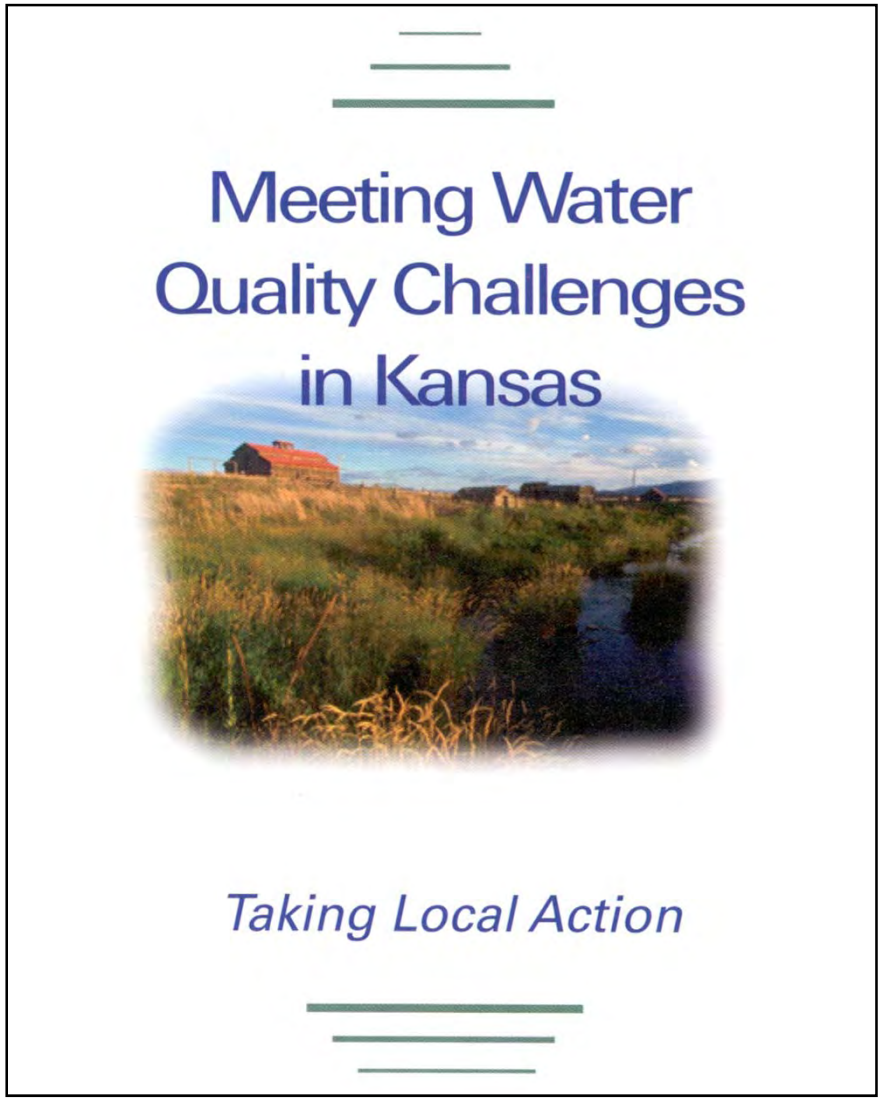
Knowledge for Life

K-STATE
Research and Extension

Knowledge for Life

K-STATE
Research and Extension

Knowledge for Life

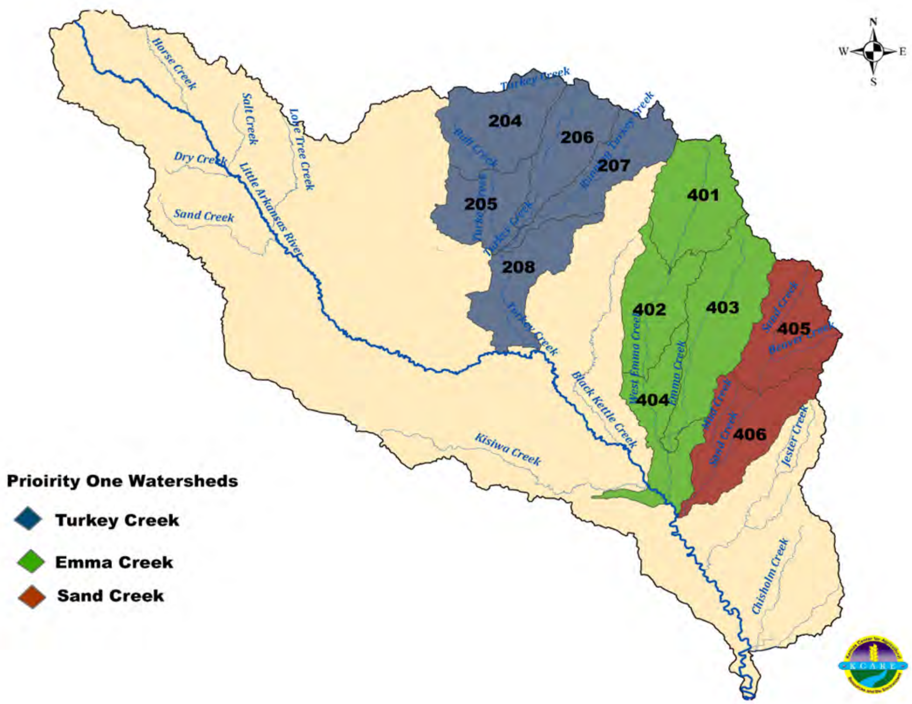


Questions

?

Ron Graber
Watershed Specialist
rgraber@ksu.edu

*Targeted Areas for **Sedimen**t*

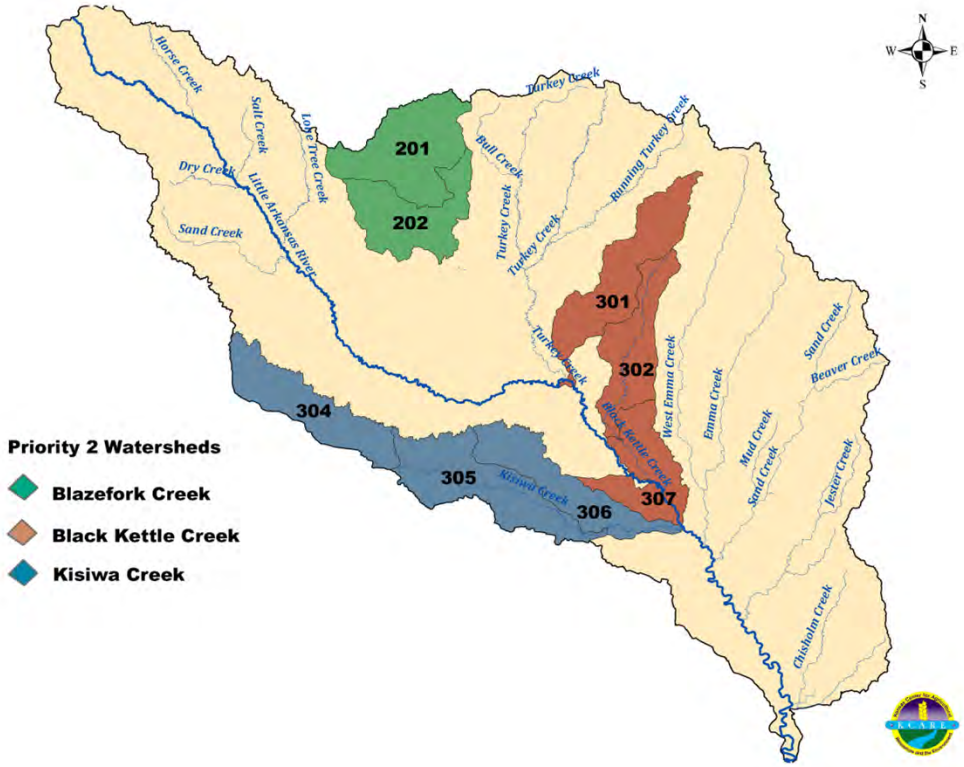


Tier 1:

- **Emma Creek**
- **Running Turkey Creek**
- **Lower Sand Creek**

K-STATE Research and Extension

*Targeted Areas for **Sediment***



Tier 2:

- **Kisiwa Creek**
- **Black Kettle Creek***
- **Lower Blazefork**

Knowledge for Life