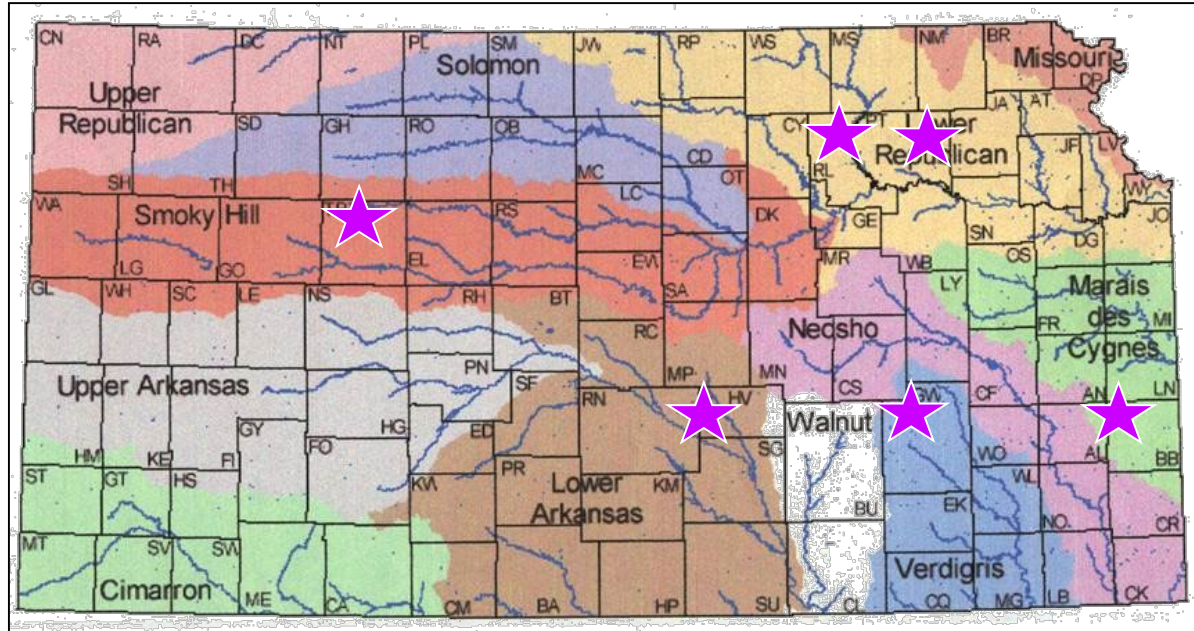


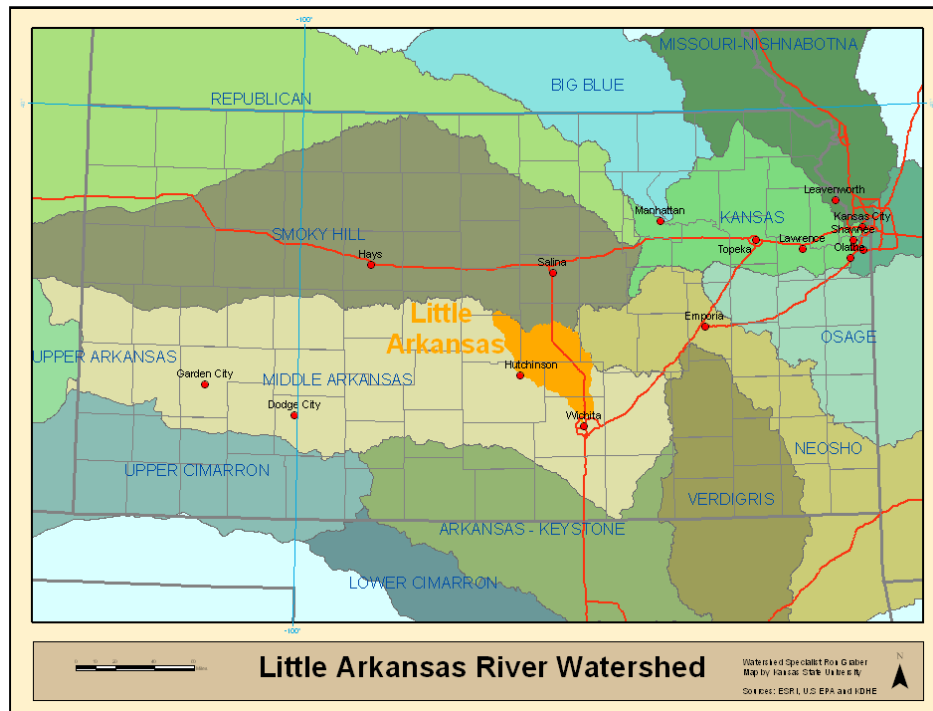
Bringing Urban and Rural Communities Together to Improve Water Quality

Ron Graber
K-State Research & Extension

RAC
April 24, 2022

KSU Watershed Specialists





- Little Ark WRAPS was completed in 2004
- Revised Plan Addressing EPA 9 Elements in 2011
- Revised Goals in 2016
- Revised Strategy in 2019
- Working with Little Ark producers since **2005** to implement water quality BMPs

Little Arkansas Watershed

Agricultural watershed

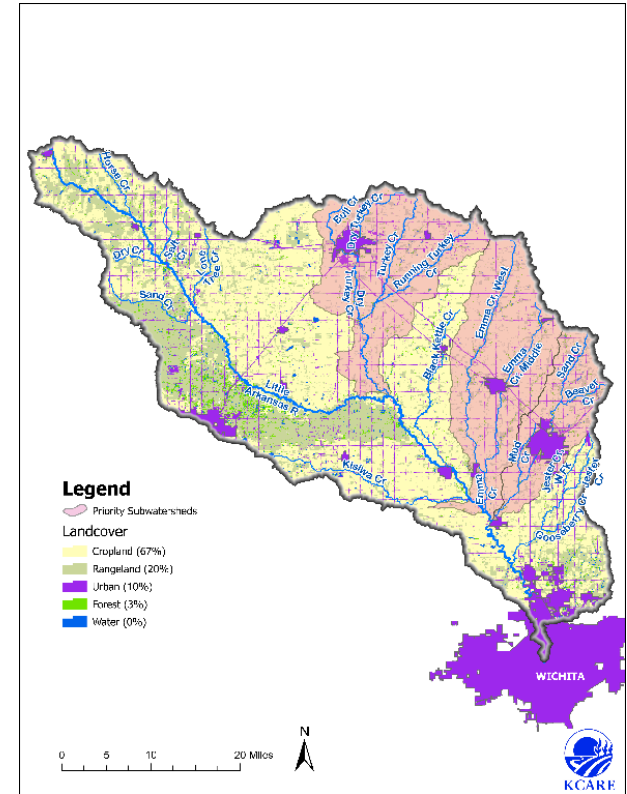
- 913,430 acres
- 67% cropland
- 20% grazingland
- 237 registered CAFO's

TMDLs set for the watershed

- 52% of stream segments required TMDLs
- Water quality concerns include bacteria, nutrients, sediments, pesticides

Drinking water source for city of Wichita and numerous smaller cities and towns

- 205 public water supplies
- 7400 groundwater wells



Water quality is a big challenge, and requires partnerships to solve

Kansas State University

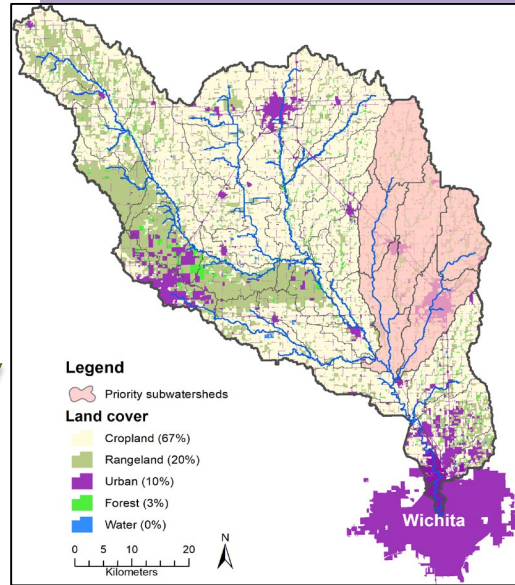
Watershed Restoration & Protection Strategy (WRAPS)

KS Dept of Health & Environment (KDHE)

Agricultural Players

Rural landowners

Farmers & ranchers



Urban players

City of Wichita

- Stormwater
- Drinking water
- Wastewater

Developers

Rate payers (citizens)

One water resource: the **Little Arkansas River**

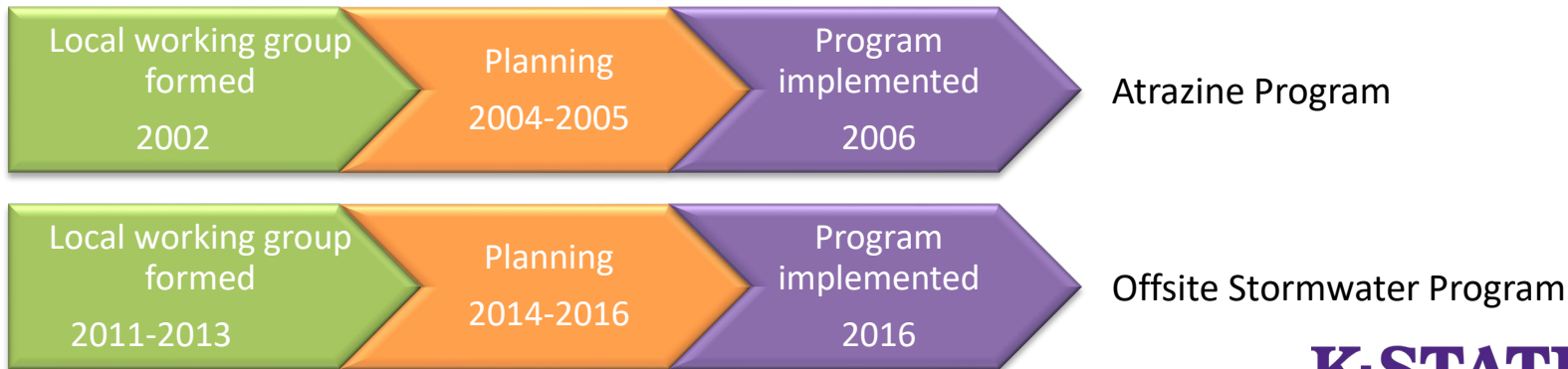
- Drinking water source
- TMDL-regulated for sediment, bacteria, nutrients, pesticides

Two programs aimed to unify watershed management goals

1. Driven by drinking water quality concerns and treatment costs
 - Primary concern: *atrazine*
2. Driven by stormwater MS4 permit requirements
 - Primary concern: *sediment*

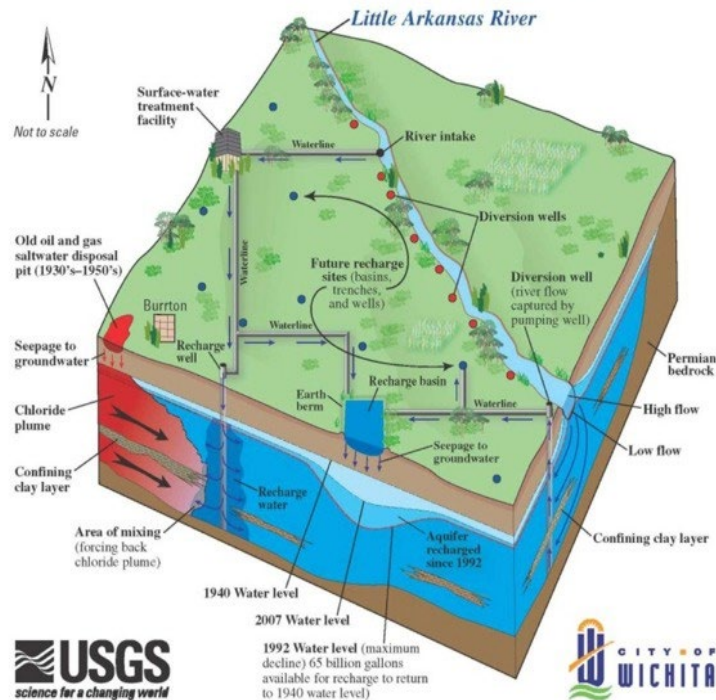
Two programs, similar bridge-building materials

- Education
- Local input
- Trust between partners
- Time



Urban and rural communities partnering to improve drinking water

Equus Beds Aquifer—Artificial Recharge Process



Atrazine removal from river	\$\$\$\$\$ \$\$\$
Atrazine runoff prevention	\$

Managing atrazine for drinking water quality

- Partnered with the city of Wichita to reduce atrazine runoff from corn and grain sorghum fields.
- Education and awareness campaign with growers, pesticide dealers and crop consultants.
- **Targeted watersheds** for rapid implementation of atrazine herbicide BMPs.
- Installation of a surface water quality monitoring system to evaluate the effectiveness of BMP's implemented.



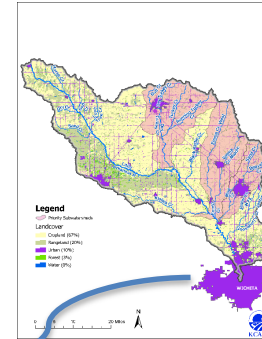
Form Used To Calculate Incentive Payment

<u>Atrazine BMPs Utilized</u> (Check all that apply)		<u>Reduction in Runoff Factor</u>
Incorporate atrazine into the first 2 inches of soil prior to planting		.70
Apply atrazine in the fall or prior to April 15		.50
Apply atrazine as part of a postemergence premix		.60
Reduce soil-applied atrazine rates based on 1.6 lb ai/acre or less		--
Use split applications of atrazine, e.g. 2/3 prior to April 15 and 1/3 at planting		.25
Band apply atrazine at planting		.50
Use no atrazine		1.00
Establish buffer strip		.25
Incorporate atrazine with ½ inch sprinkler irrigation		.60
TOTAL ATRAZINE BMP RUNOFF EFFECTIVENESS (TABRE)		_____
Add Reduction in Runoff Figure		
Incentive Payment Per Acre	\$6.00 (GS) or \$3.00 (C) X TABRE	\$_____
(Riparian 2x)		
(TC non-riparian 1.5x)		

Summary 2006-2021

- 1275 growers implemented BMP's - **92%** of those contacted
- **281,115** acres of corn & grain sorghum implemented Atrazine BMP's
- **\$2.96** per acre average incentive
- Using KSU effectiveness data – **50.20%** reduction in atrazine runoff predicted
- Actual water quality monitoring – **41.4%** reduction
- Annual load reduction – **840 lbs a.i.**

Urban and rural communities partnering to reduce sediment pollution



Economic efficiency of sediment removal in rural vs urban BMPs

Little Ark Watershed Cropland BMP Effectiveness	
BMP	\$/Ton TSS, BMP life
Streambank stabilization	\$2.30
No-Till	\$2.87
Conservation Tillage	\$2.87
Intensive Crop Rotations	\$4.30
Nutrient Management	\$4.88
Vegetative Buffers	\$7.17
Grassed Waterways	\$8.60
Ponds	\$13.44
Terraces	\$18.28
Permanent Vegetation	\$28.30
Cover Crops	\$43.01

Urban stormwater BMP Effectiveness	
BMP	\$/Ton TSS, BMP life
Vegetative Buffers	\$475
Grass filter strip	\$930
Extended detention basin	\$2,120
Bioretention	\$4,440
Hydrodynamic separator	\$5,425
Pervious pavement	\$19,130

Bringing rural and urban communities together through a stormwater program

KDHE

- Regulatory oversight

City of Wichita

- Raise program awareness
- Tracks new, redevelopment projects
- Collects sediment credit fee from properties opting for offsite program
- Transfers fees to KSU-WRAPS
- Reports to KDHE

KSU-WRAPS

- Recruit producers from high priority sub-basins to program
- Execute payments for contracted BMPs
- Track offsite BMP sediment credits through time
- Report to City

Developers

- Choose onsite or offsite BMPs
- Pay fee to CoW for offsite credits
- Maintain peak flow standards

Producers

- Implement contracted BMPs
- Maintain contracted BMPs

Sediment credit fee based upon...

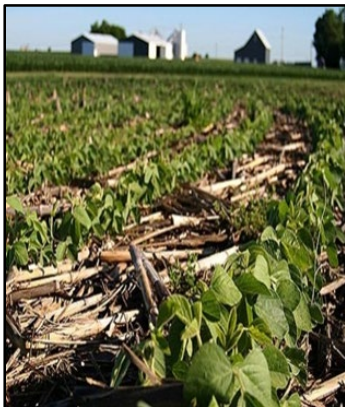
- *Sediment credit ratio*: Required to purchase 2 offsite sediment credits for every 1 unit of sediment production onsite
- *Most-likely offsite BMP costs*: Cost to producer to adopt AND maintain no-till with intensive crop rotations
- *Replacement costs*: Cover cost to enroll replacement offsite BMPs if previous BMPs are discontinued
- *Technical assistance*: costs to enroll and track offsite BMPs

USER INPUTS						
Onsite Sediment produced	0.4	tons/ac/yr				
Offsite:onsite credit ratio	2	:1				
% no-till fields replaced	100%	every 5 years				
No-till sediment credit "cushion"	1.1	(affects pace at which no-till implemented to remain ahead of onsite sediment demand)				
Starting fee all acres to date, \$/ton sed.	\$ 48.00			\$ 38.40	Annual Cost/acre under initial fee	
Reduced fee for all subsequent years, \$/ton sed	\$ 10.00	Year of fee reduction	8	\$ 8.00	Annual Cost/acre under reduced fee	
Inflation rate, annual program costs	3.00%					
Inflation rate, annual fee	3%	per year				
City growth rate, year 1	200	acre	Avg annual growth, ac/yr	200	City participation rate	100%
Interest rate on start-up funds	0%	annual	# compounded/yr	12	payback period (yrs)	7

Spreadsheet tool developed to assist City in setting sediment credit fee



Offsite BMPs targeted to priority subwatersheds; 5-year contact based on sediment reduction



Little Ark WRAPS Watershed Field Sign Up Sheet



City of Wichita off site BMP Sediment Reduction Program

SD 01

	Best Management Practices	Erosion Reduction Efficiency (%)
___	Establish riparian vegetative buffer (check width) ___ less than 30' wide ___ 30' to 60' wide ___ greater than 60' wide	.25 .40 .50
___	No-till	.75
___	Crop rotations	.25
___	Conservation till (>30% residue following planting)	.30
___	Farm on the contour	.35
___	Establish new terraces	.30
___	Establish contour grass strips	.50
___	Establish grassed waterways	.30
___	Establish permanent grass	.95
___	Other	
	Total Erosion Reduction (TER) (accumulative effect of BMP's)	

Field Legal Description & HUC 12: _____

Land Operator/Manager _____

Address and Telephone Number _____

Total Payment = ERE% x acres x \$50 = \$ _____

Payments will be split over 4 years. Payments BMP Atr. # of crop Inspection date

Payment each year will be made year 1) \$ _____ year 1) _____ year 1) _____

after inspection by KSU agronomist year 2) \$ _____ year 2) _____ year 2) _____

I agree to implement this practice(s) year 3) \$ _____ year 3) _____ year 3) _____

and maintain it for 5 years. year 4) \$ _____ year 4) _____ year 4) _____

year 5) \$ _____ year 5) _____ year 5) _____

Participant(s) must agree to utilize Best Management Practices for Atrazine for crops labeled for Atrazine use on the above location for the duration of the 5 year agreement period. BMP Atrazine agreement work sheet number and or crop is listed above.

Land Manager/Operator _____ Date: _____

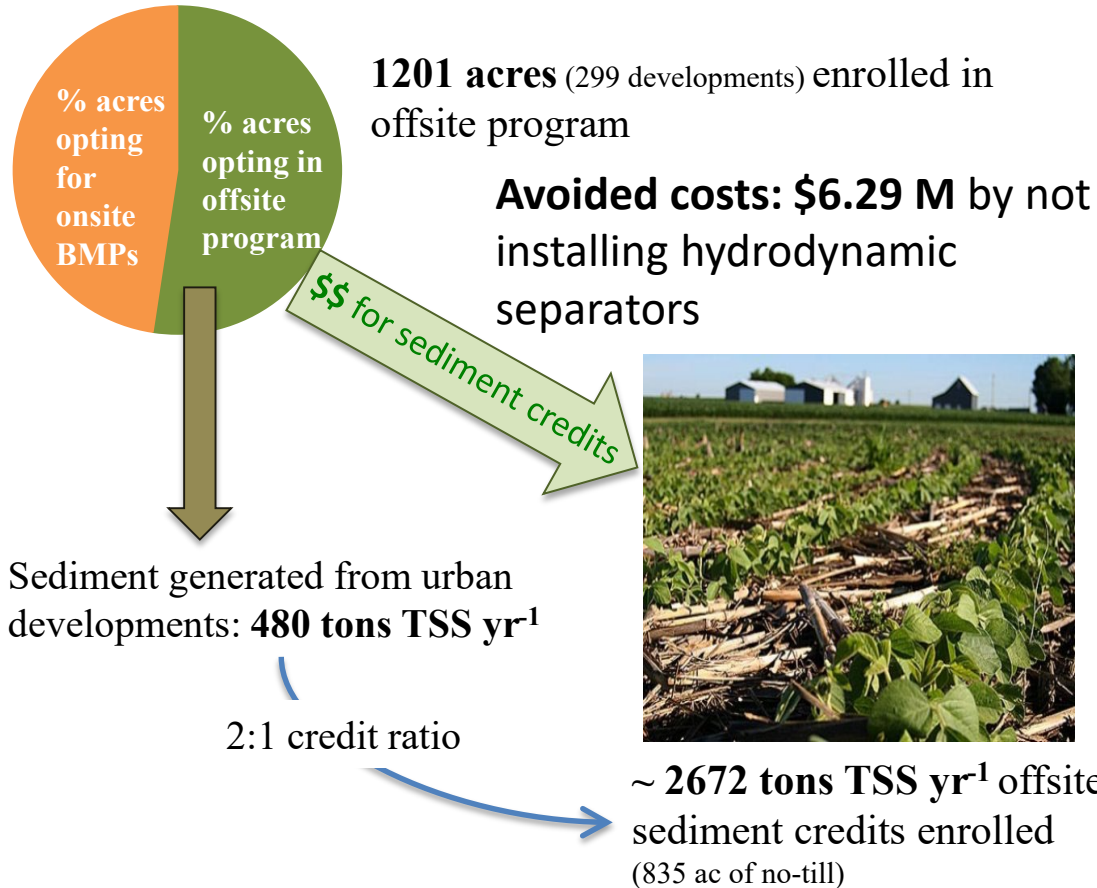
Agonomist _____

K-STATE
Research and Extension



KCARE
Kansas Center for Agricultural
Resources and the Environment

2016-2022 implementation: by the numbers



Questions?



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K-STATE
Research and Extension

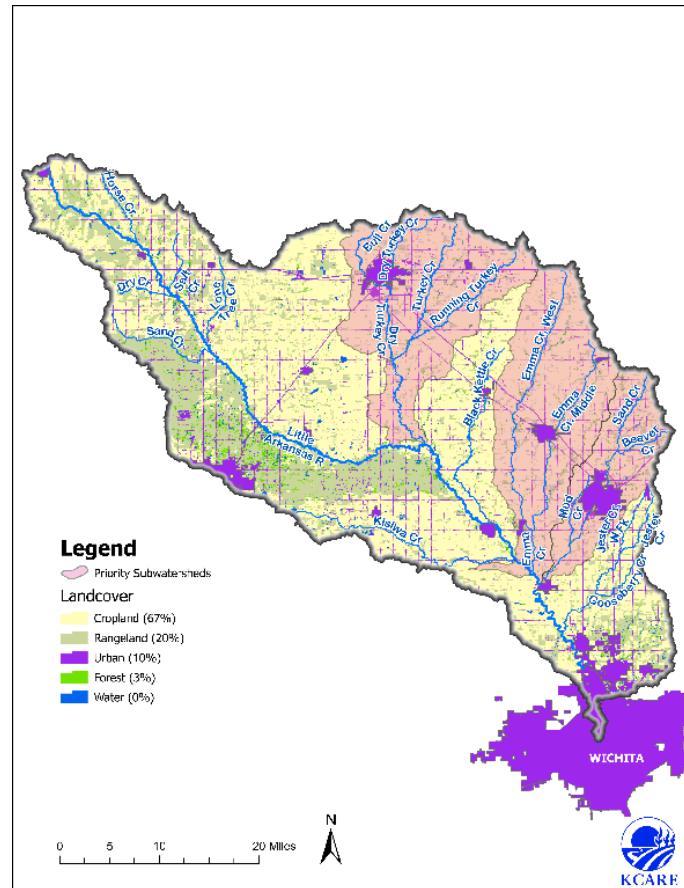


Keys to Success

- Local Input
- Trust
- Education
- Partnerships between the agricultural community and their urban neighbors (WRAPS)
- Non-traditional marketing of BMP implementation
- Flexibility
- Time
- Monitoring/assessment



KCARE
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Resources and the Environment



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