

Water Quality Monitoring and Parameter Load Estimations in L'Anguille River Watershed and Deep Bayou

Presented by:

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Acknowledgements and Special Thanks

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- Wesley Griffin
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- Dr. Tim Knight
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- Entergy, Inc.
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- TNC



Projects Primary Goal

By collecting, analyzing and reporting water quality and discharge data; provide monthly and annual parameter loadings, as well as unit area loadings in numerous 12 digit HUCs.



- **Monitoring Structure** – Similar activities are implemented in each monitored watershed that support each project’s primary goal.
- **Water Quality Requirements** – Incorporates project design, collection methodology and analytical methodology to generate representative data and allow for an evaluation of water chemistry within the selected watersheds.
- **Discharge Requirements** – Estimate the volume of water that passes the monitoring station during the sampling period.
- **Data Compilation and Statistical Analysis** – Compile and statistically analyze the collected data to provide monthly, annual, and unit area loadings, as well as, compare results between monitoring stations.
- **Reporting Requirements** – Provide the project participants with the project outcomes and make the results readily available to the natural resource and watershed professionals and the general public.



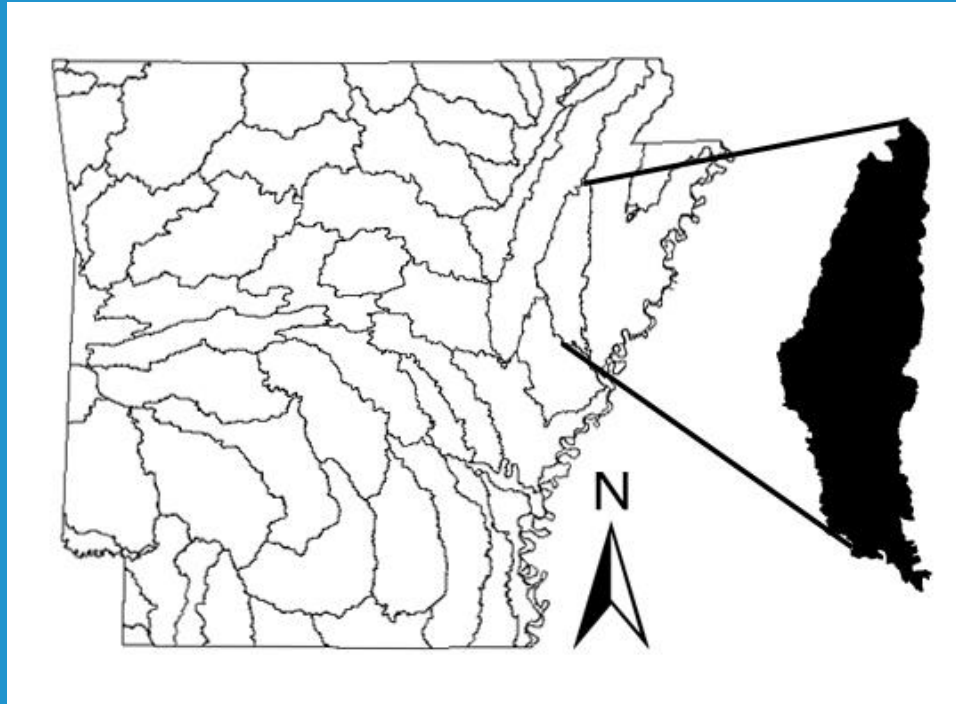
L'Anguille River Watershed

Five monitoring stations

Current Project Period
July 2012 – October 2015

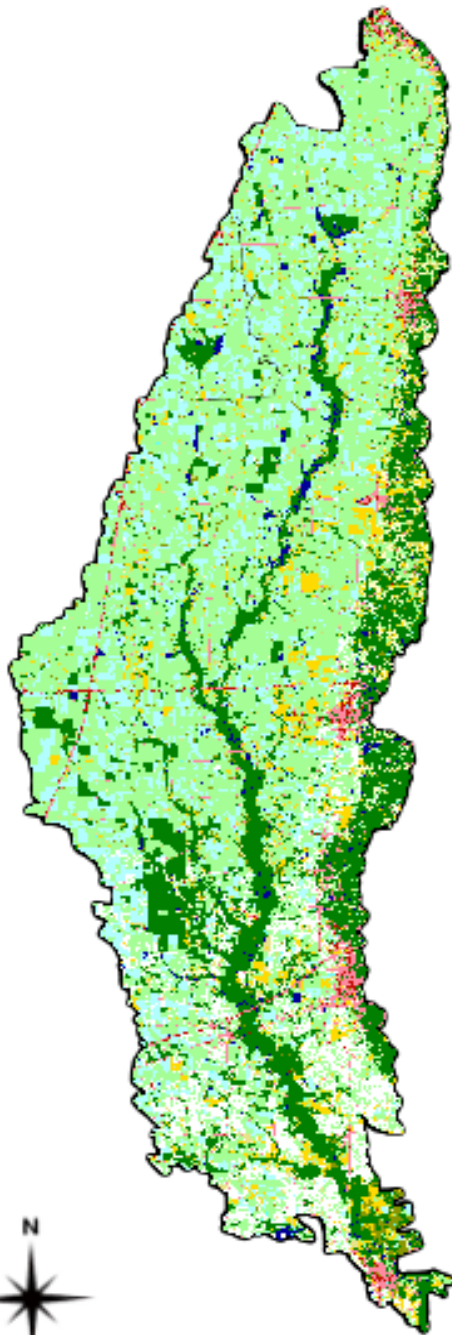
Monitoring the “outfalls” of
12 digit HUC

Completed sample collection
9/14/15, Preparing Final
Report



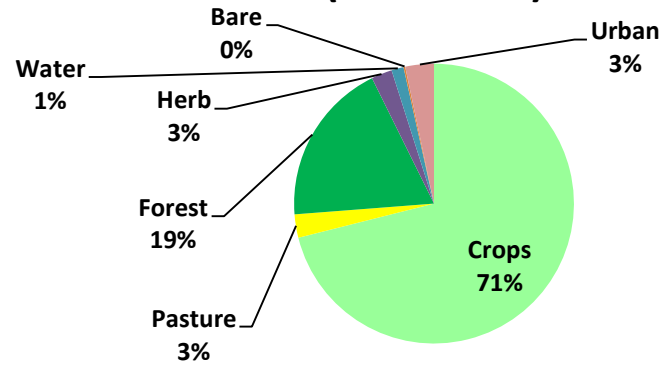
- The L'Anguille River was included on the Arkansas 1998 303(d) list for not supporting aquatic life due to siltation/turbidity and has been on each subsequent 303(d) list.
- ANRC has designated the watershed as a priority watershed.
- NRCS also identified the L'Anguille River as a priority in the Mississippi River Basin Healthy Watershed Initiative.





0 12 miles

L'Anguille 8-Digit HUC LULC (Cast 2006)

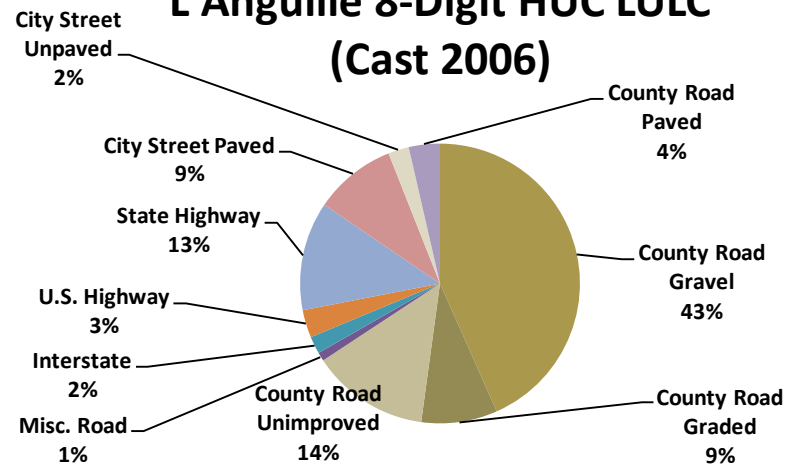


L'Anguille River- 08020205

Acres	618,384
Population (2000)	47,169

Source: Cast 2006

L'Anguille 8-Digit HUC LULC (Cast 2006)

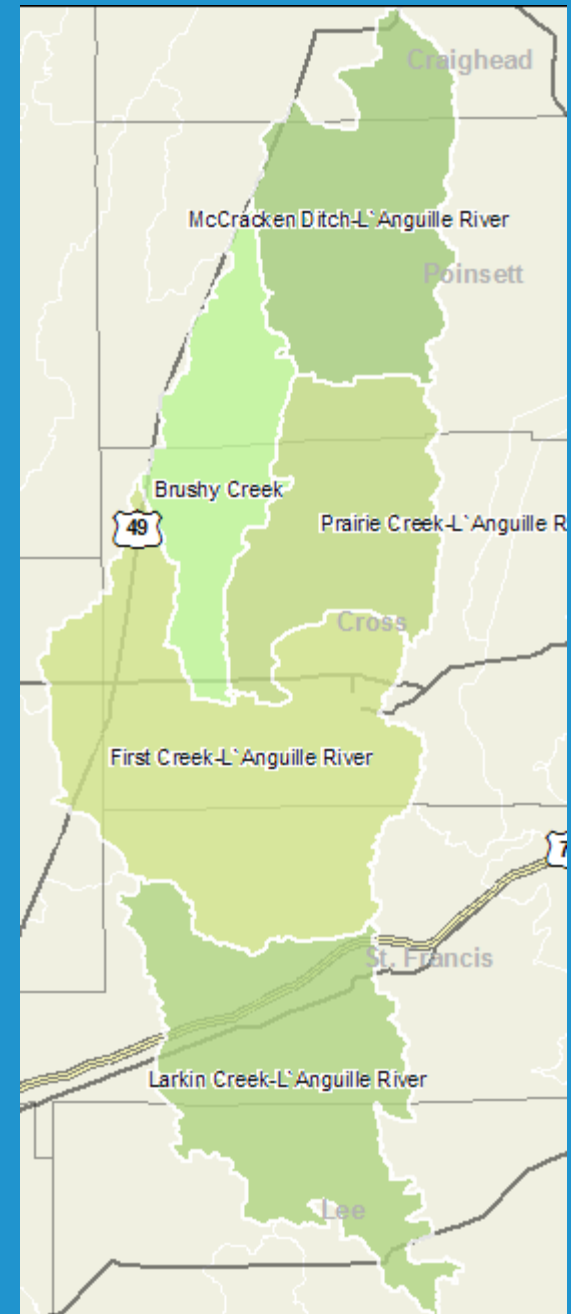


The L'Anguille River watershed has been a priority of the Arkansas NPS Management Program since the development of a TMDL in 2001.

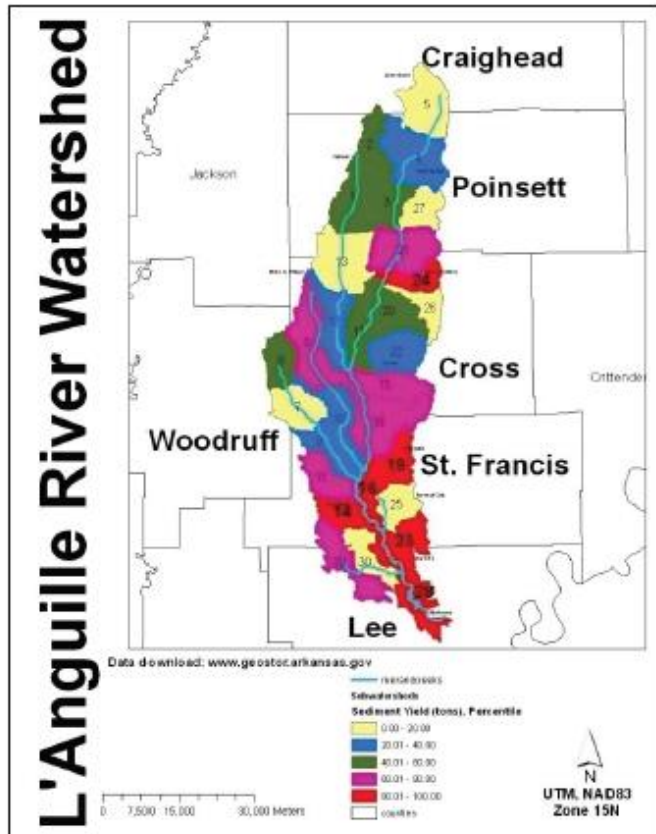
Pollutants of concern within this hydrologic unit area include: siltation/turbidity and nutrients as well as low dissolved oxygen, total dissolved solids, chlorides and sulfates.

ADEQ 303-d List 2014

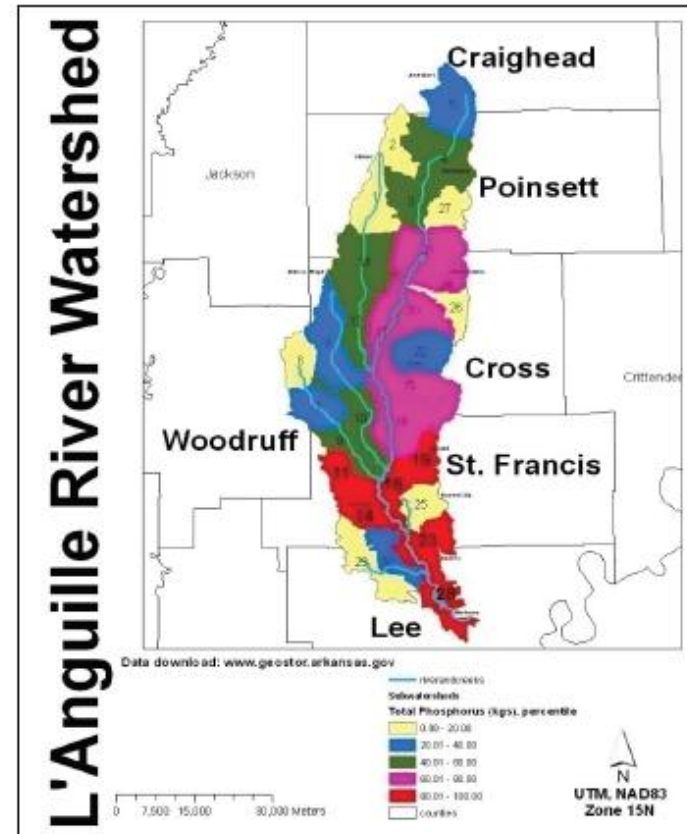
Reaches	Designated Use in Non Attainment	Water Quality Standard Non Attainment	Source of Contamination
13	FSH,PC	TB,PA,DO, Cl,SO ₄ ,TDS,Cu	MP,AG



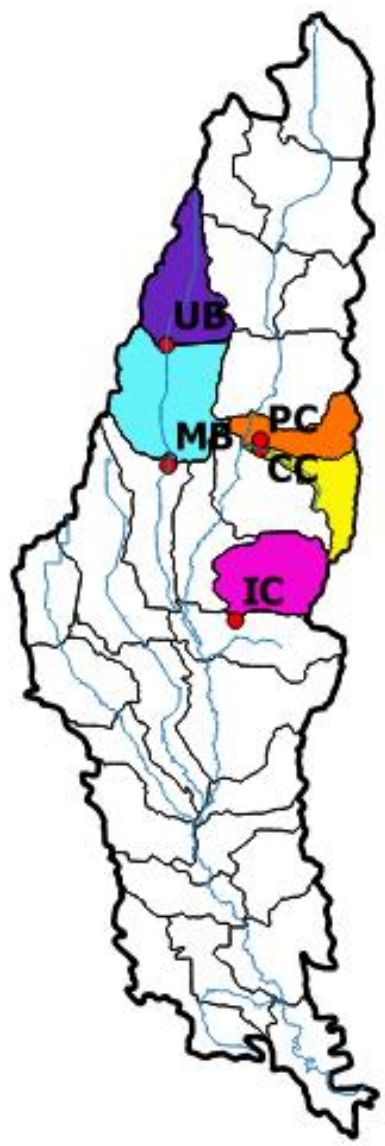
Priority Subwatersheds- Percentile Basis



Area: approx. 12. %
Sediment contribution: approx. 34%

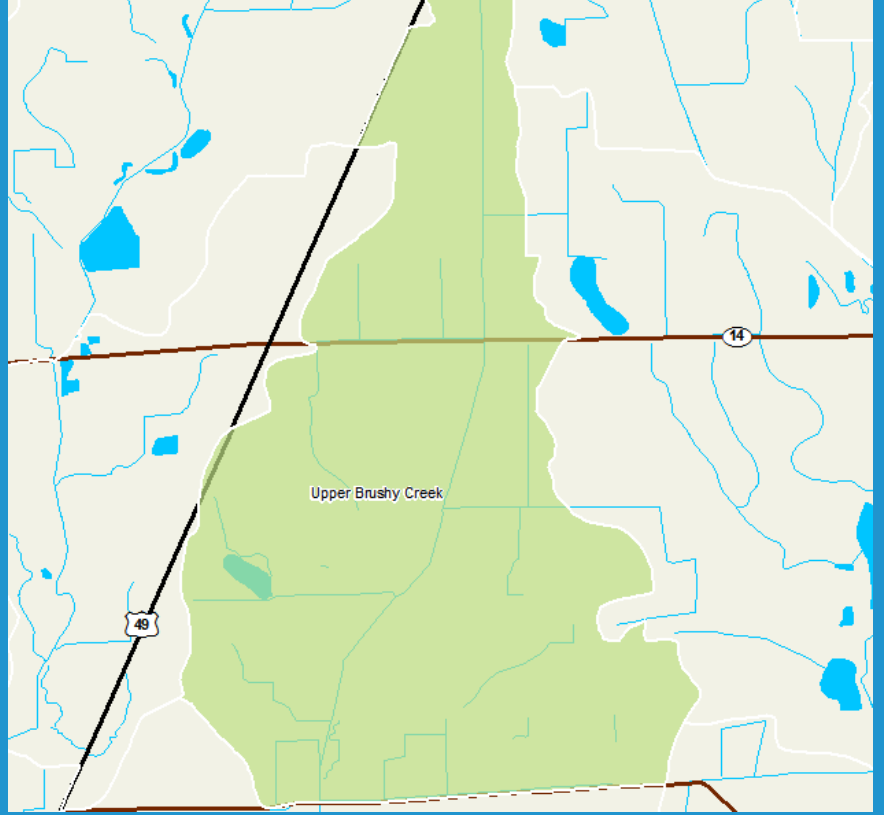


Area: approx. 6%
TP contribution: approx. 60 %



Arkansas Watershed Information System

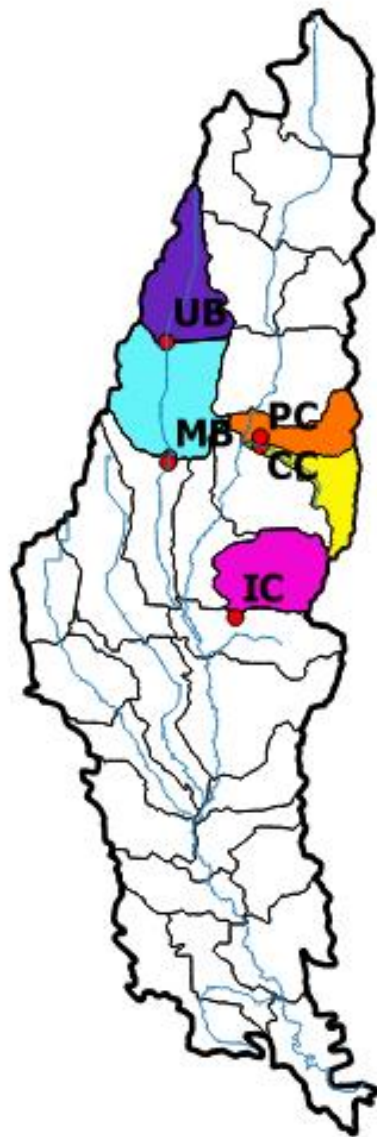
a module of the Arkansas Automated Reporting and Mapping System



Upper Brushy Creek - 080202050301

Acres	21,987
Population (2000)	154
Gravel Roads	89.0%
Crops	86.0%

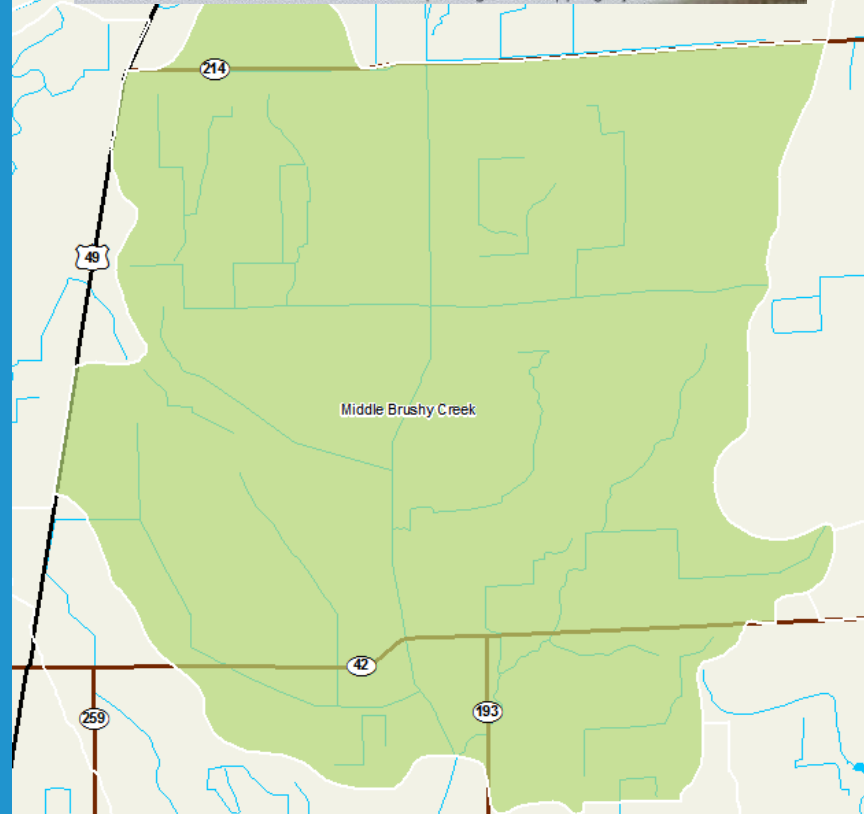
Source: Cast 2006



0 14 miles

Arkansas Watershed Information System

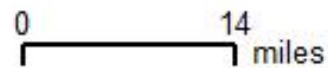
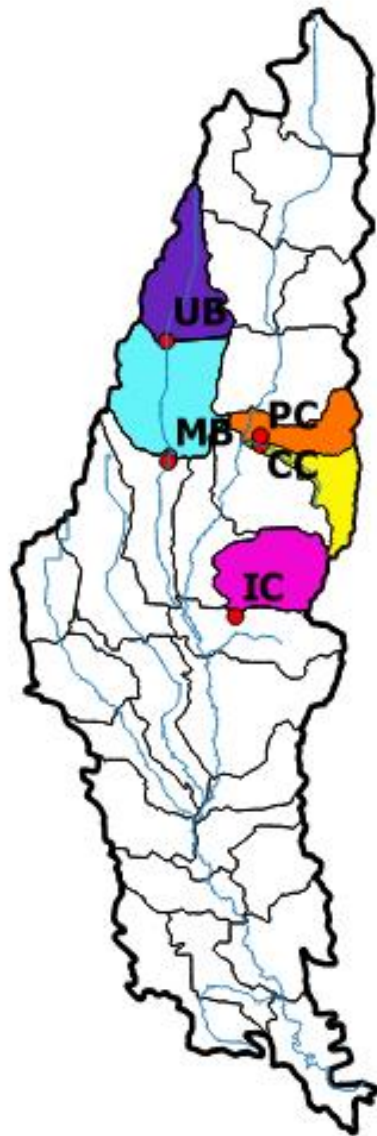
a module of the Arkansas Automated Reporting and Mapping System



Middle Brushy Creek - 080202050302

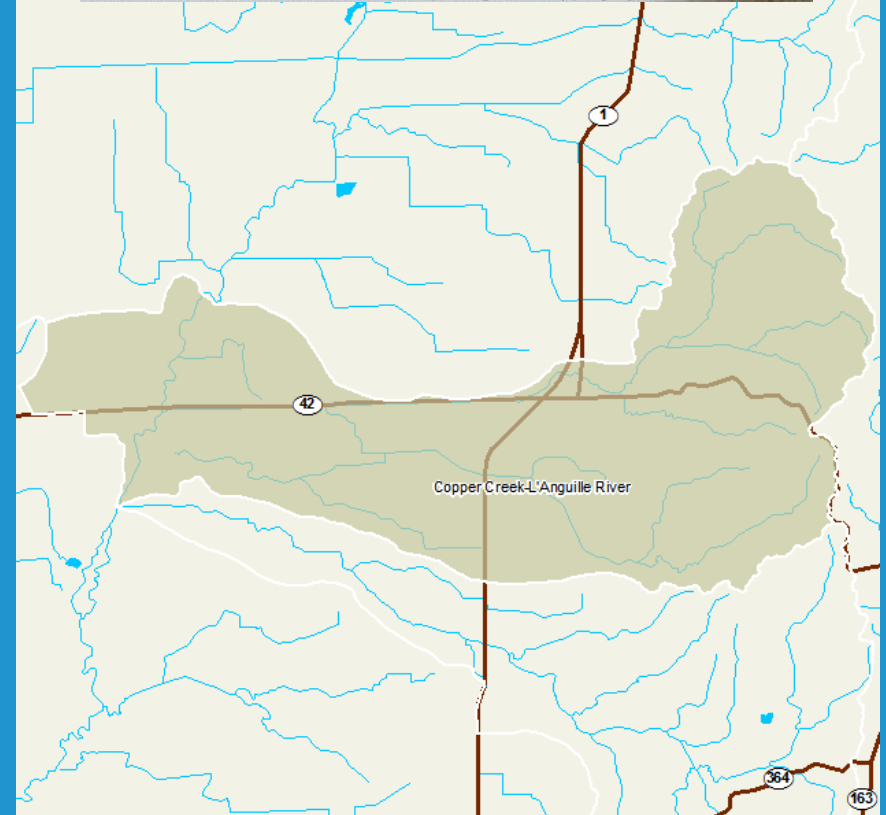
Acres	32,292
Population (2000)	196
Gravel Roads	84.0%
Crops	89.9%

Source: Cast 2006



Arkansas Watershed Information System

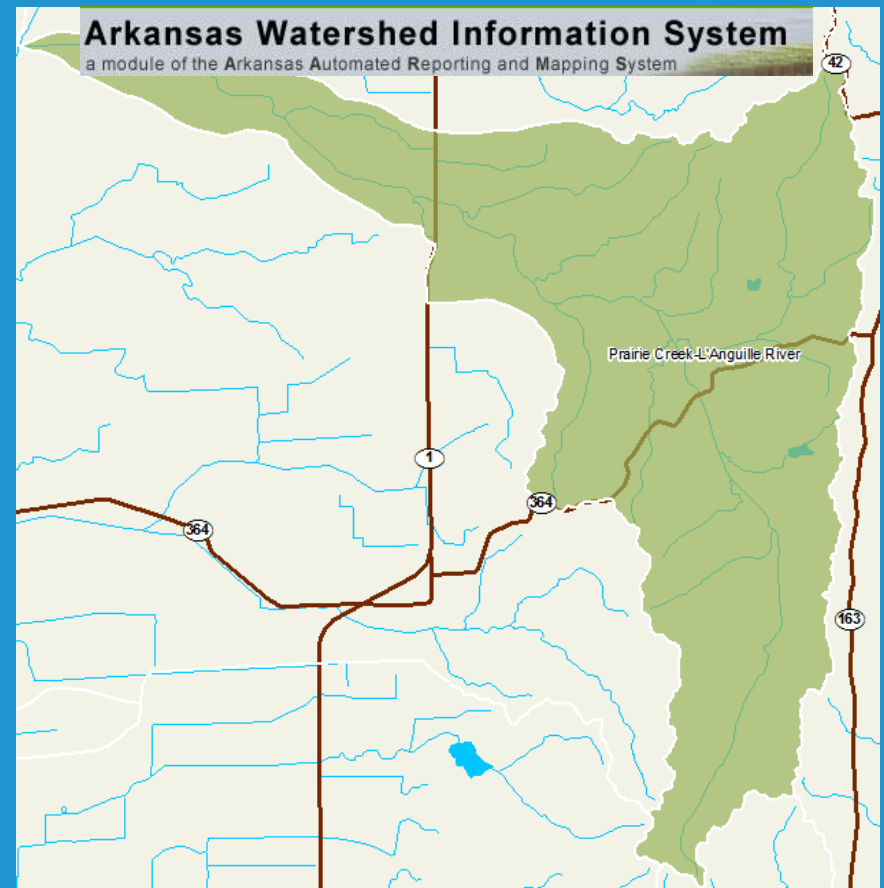
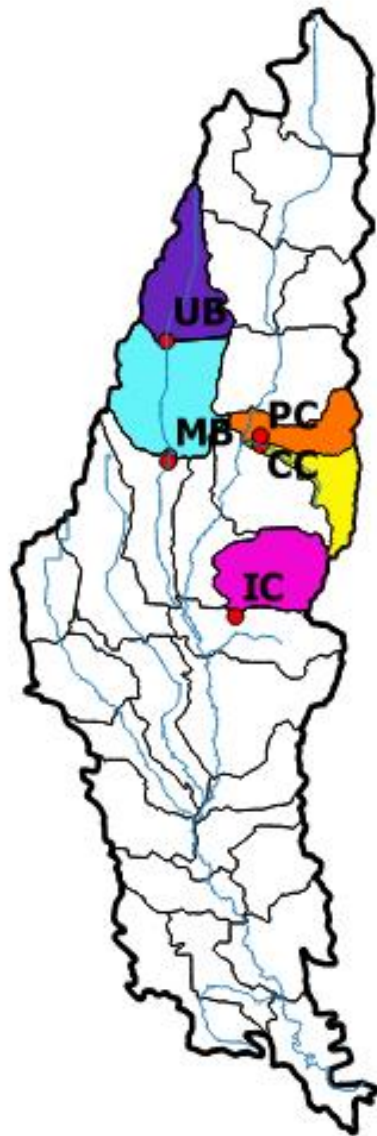
a module of the Arkansas Automated Reporting and Mapping System



Copper Creek - 080202050203

Acres	12,164
Population (2000)	938
Gravel Roads	59.8%
Crops	49.9%

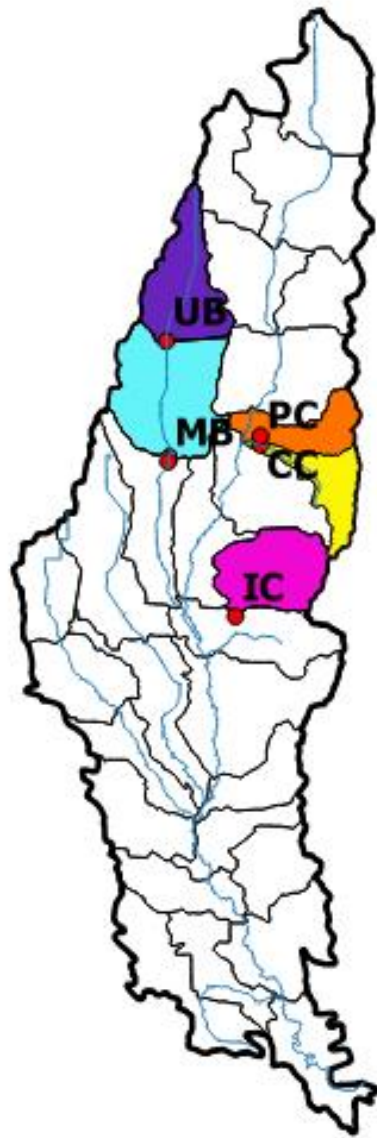
Source: Cast 2006



Prairie Creek - 080202050202

Acres	11,671
Population (2000)	453
Gravel Roads	82.0%
Crops	38.1%

Source: Cast 2006

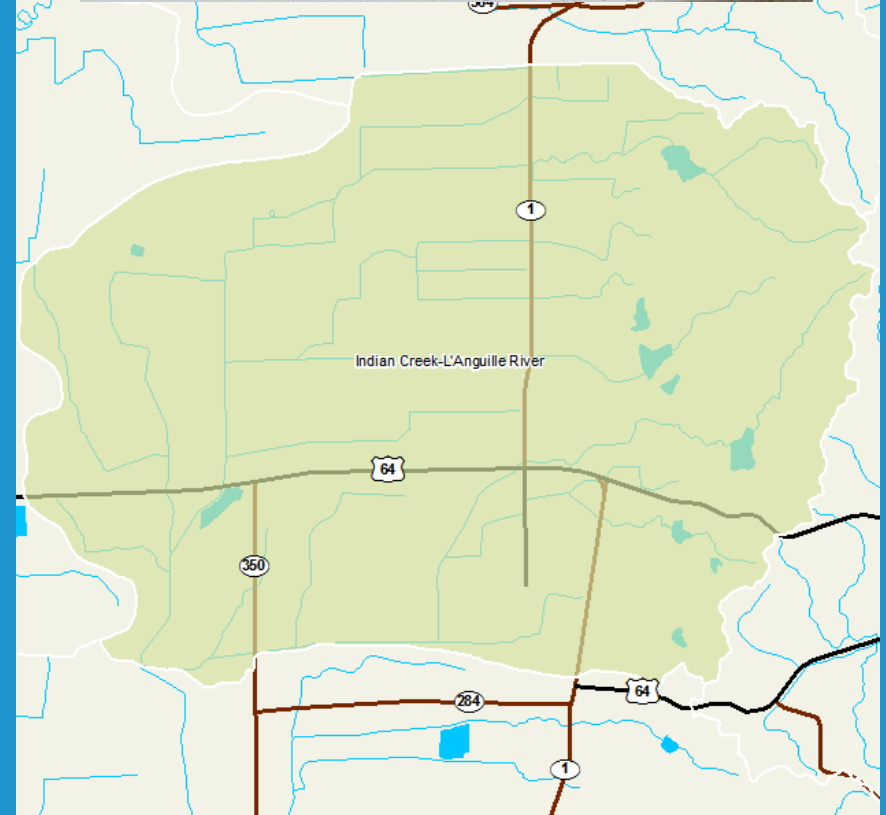


0 14 miles

A horizontal scale bar with a vertical tick at 0 and another at 14, labeled 'miles' at the end.

Arkansas Watershed Information System

a module of the Arkansas Automated Reporting and Mapping System

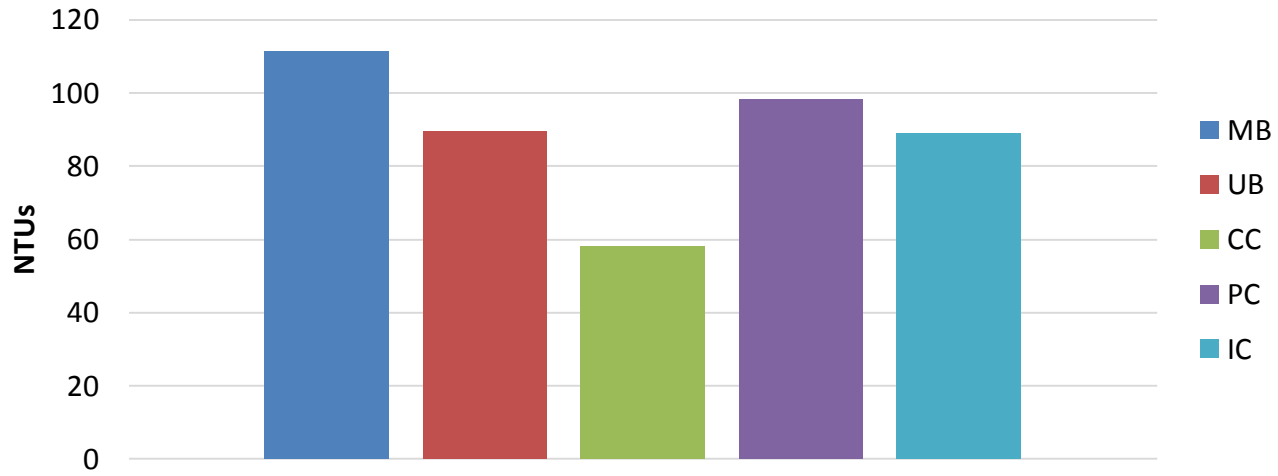


Indian Creek - 080202050401

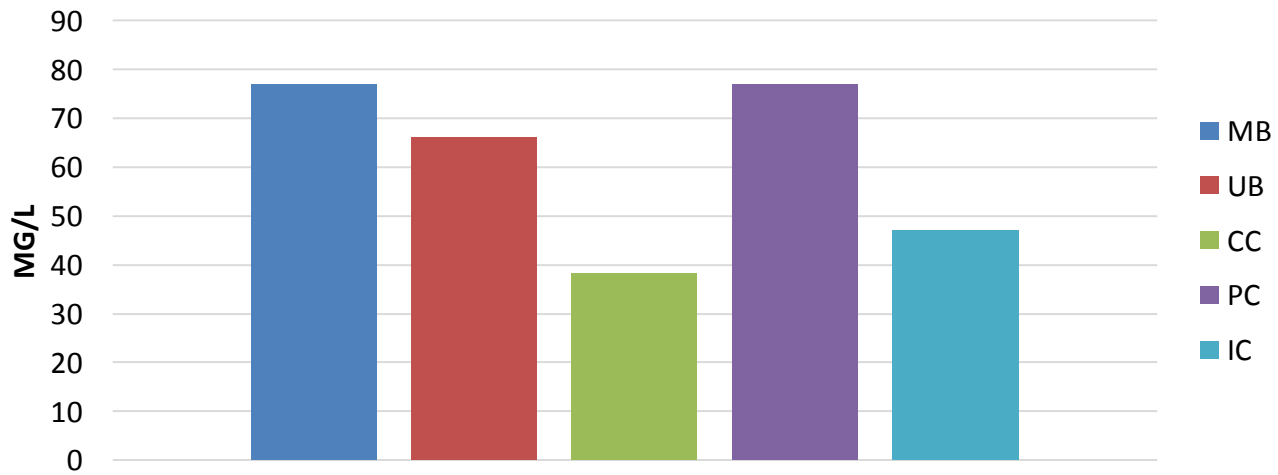
Acres	20,969
Population (2000)	4113
Gravel Roads	51.0%
Crops	65.1%

Source: Cast 2006

Mean Turbidity



MEAN TSS



L'Anguille RESULTS

- Turbidity and Reg. 2
 - Channel-Altered Delta Standard

- Base Flows 75 NTUs

- All Flows 250 NTUs

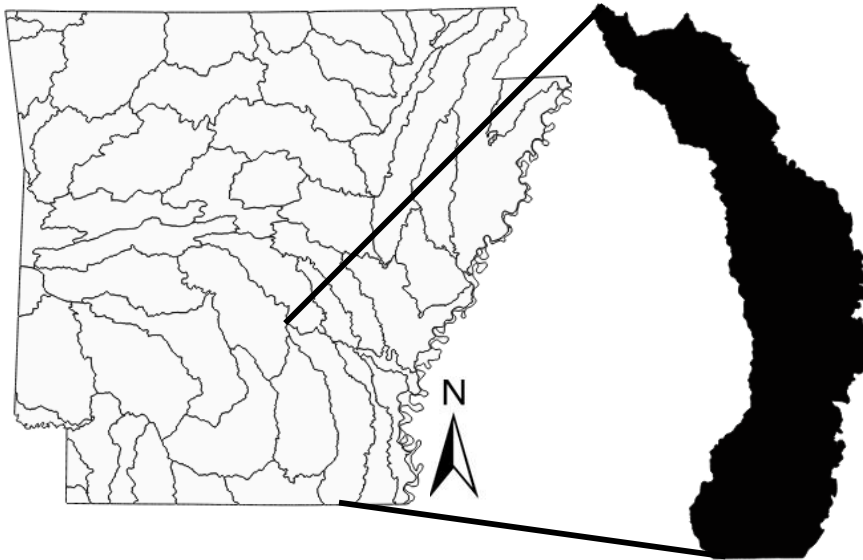
		MB	UB	CC	PC	IC
Base Flows	# samples	65	65	65	64	65
	# Exceeding Standard	8	7	3	5	4
	% Exceeding Standard	12.30%	10.77%	4.62%	7.81%	6.15%
All Flows	# samples	152	151	150	147	152
	# Exceeding Standard	13	12	5	8	12
	% Exceeding Standard	8.55%	7.95%	3.33%	5.44%	7.90%

L'Anguille RESULTS

- Minerals and Reg. 2
 - L'Anguille Standards
 - Chlorides 20mg/L Sulfates 30mg/L

		MB	UB	CC	PC	IC
Chloride	#Exceeding	64	69	27	34	61
	% Exceeding	42.11%	45.70%	18.00%	23.13%	40.13%
Sulfate	#Exceeding	31	16	18	21	43
	% Exceeding	20.39%	10.60%	12.00%	14.29%	28.29%

Deep Bayou - Bayou Bartholomew Watershed



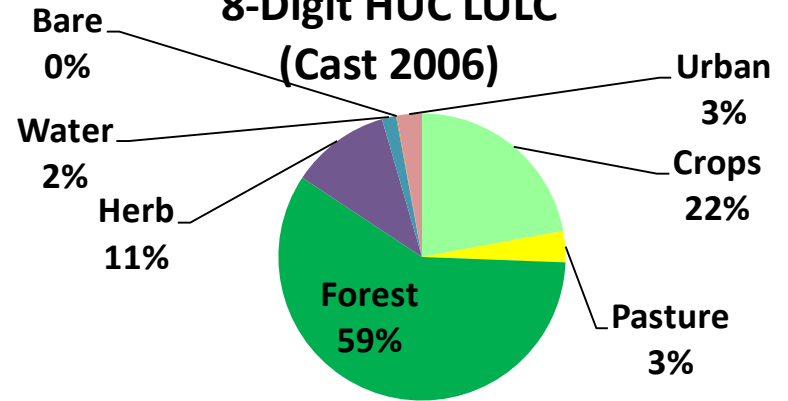
- Ten monitoring stations
- Current Project Period July 2013 – September 2017
- Focusing on the Deep Bayou and Cousart Bayou Sub-watersheds
- Currently in data collection phase

- The Bayou Bartholomew was included on the Arkansas 2014 303(d) for not supporting designated uses.
- ANRC has designated the watershed as a priority watershed.
- NRCS also identified the Bayou Bartholomew as a priority in the Mississippi River Basin Healthy Watershed Initiative.



0 6 miles

Bayou Bartholomew 8-Digit HUC LULC (Cast 2006)

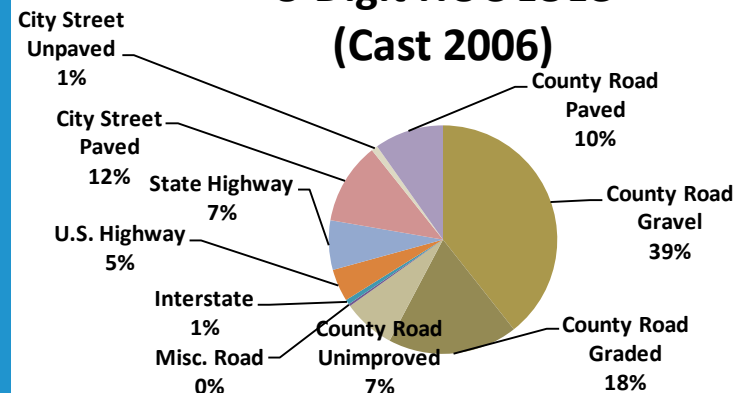


Bayou Bartholomew - 08040205

Acres	994,096
Population (2000)	73,256

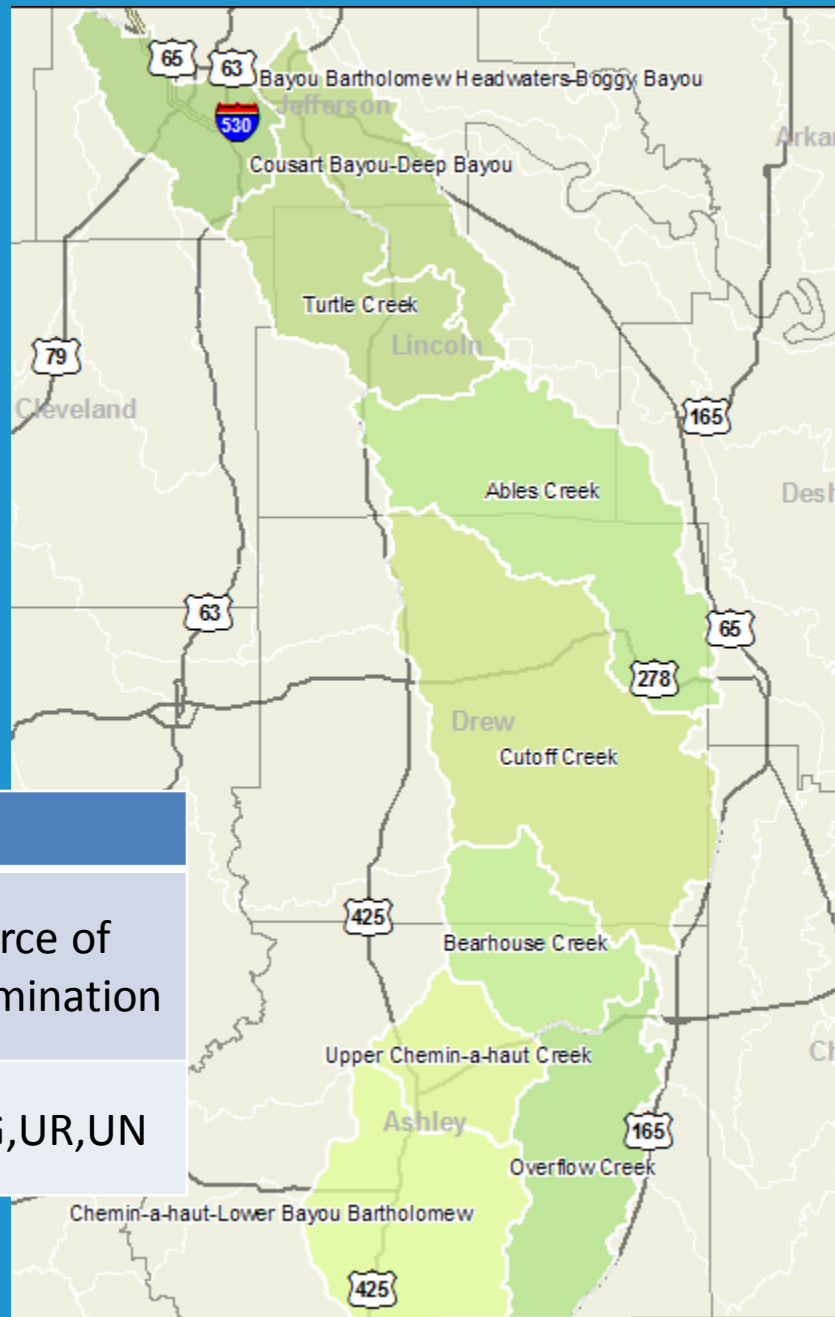
Source: Cast 2006

Bayou Bartholomew 8-Digit HUC LULC (Cast 2006)



The entire length of Bayou Bartholomew's main stem was placed on the 1998 federal 303(d) list of impaired waters in Arkansas because of its elevated turbidity levels.

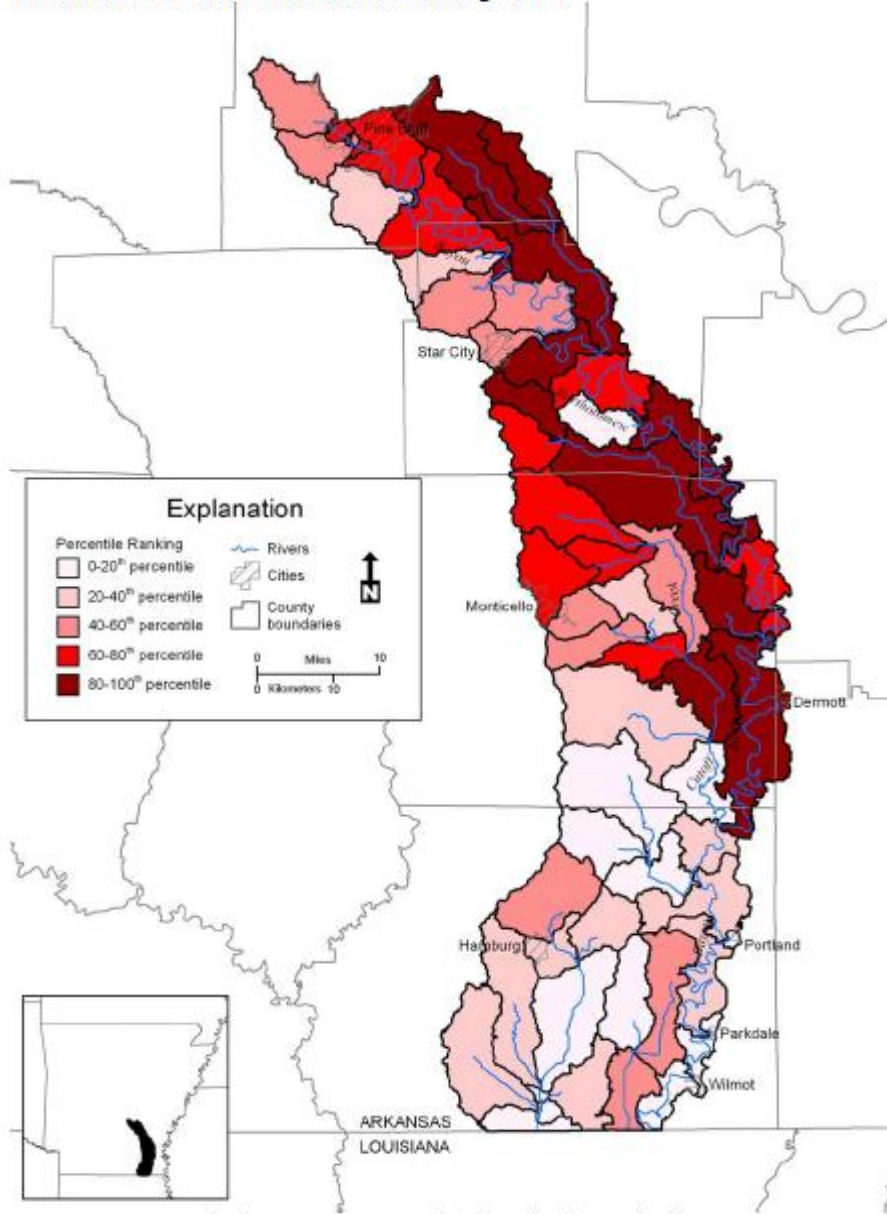
Pollutants of concern within this hydrologic unit area include: siltation/turbidity, zinc, dissolved oxygen, mercury, pathogens, lead, copper, beryllium, chlorine, and total dissolved solids.



ADEQ 303-d List 2014

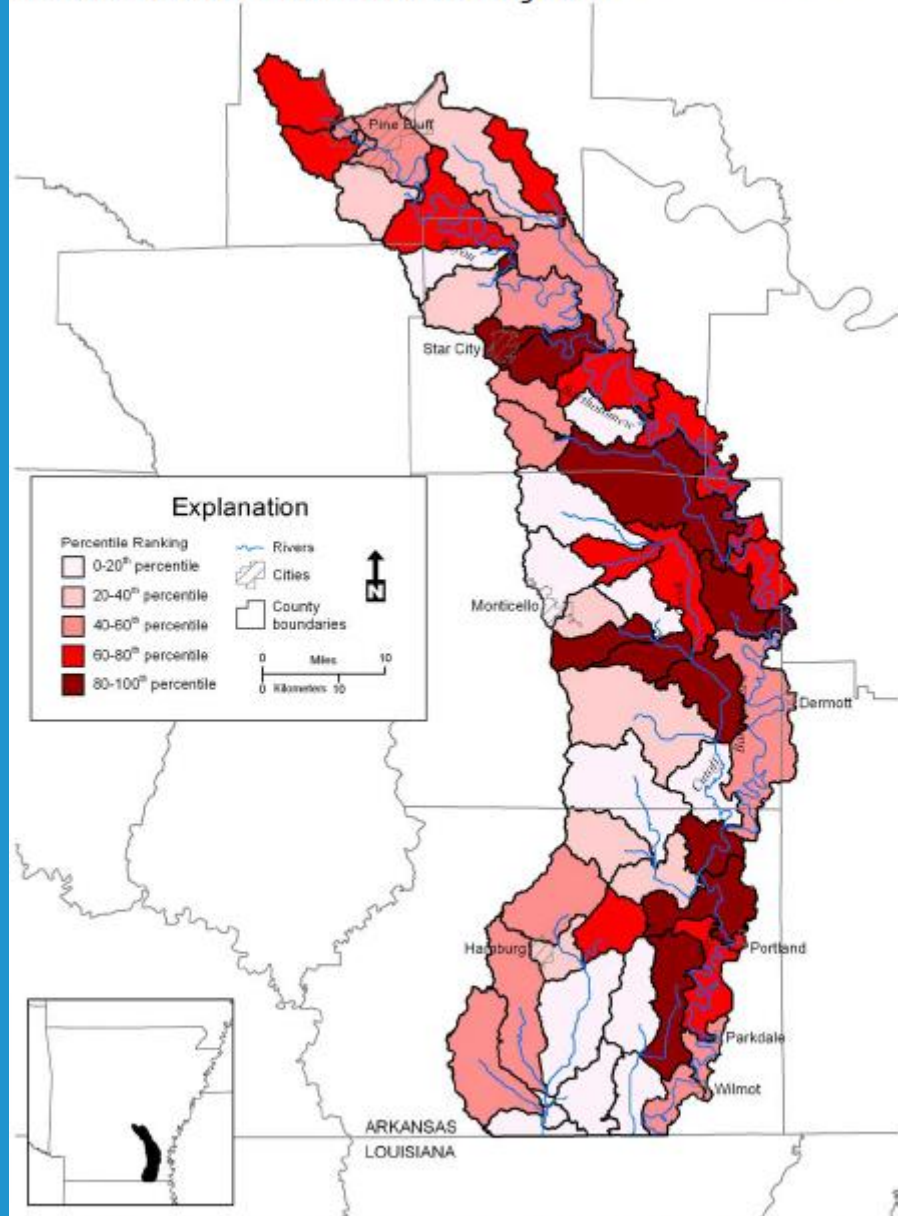
Reaches	Designated Use in Non Attainment	Water Quality Standard Non Attainment	Source of Contamination
27	FC,FSH,PC	DO,TB,CI,TDS,PA, Cu,Pb,Hg	SE,AG,UR,UN

Figure 9.2a: Relative estimates of contribution of Bayou Bartholomew sub-watersheds to total estimated runoff using SWAT

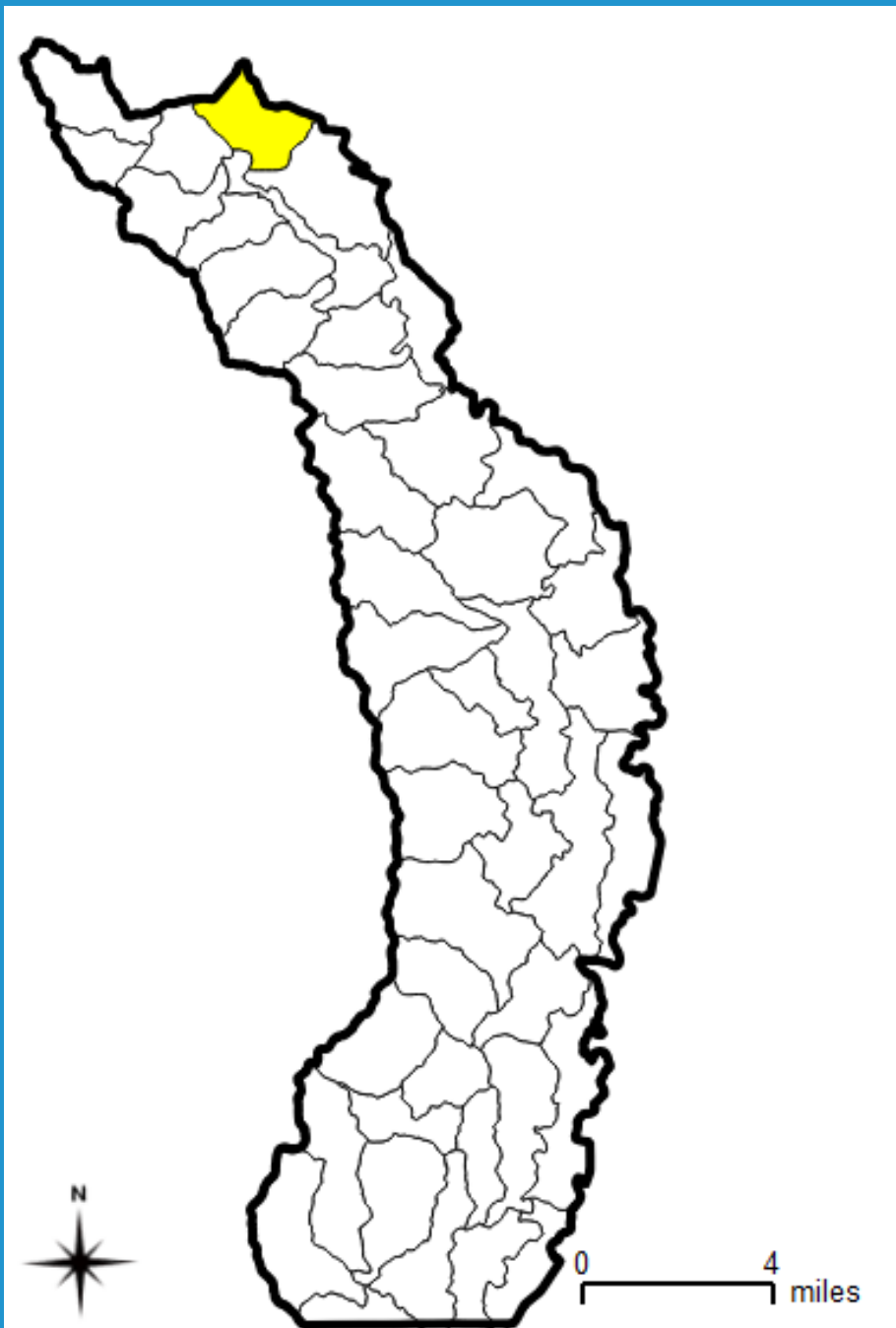


Source: University of Arkansas, Department of Biological and Agricultural Engineering, 2005

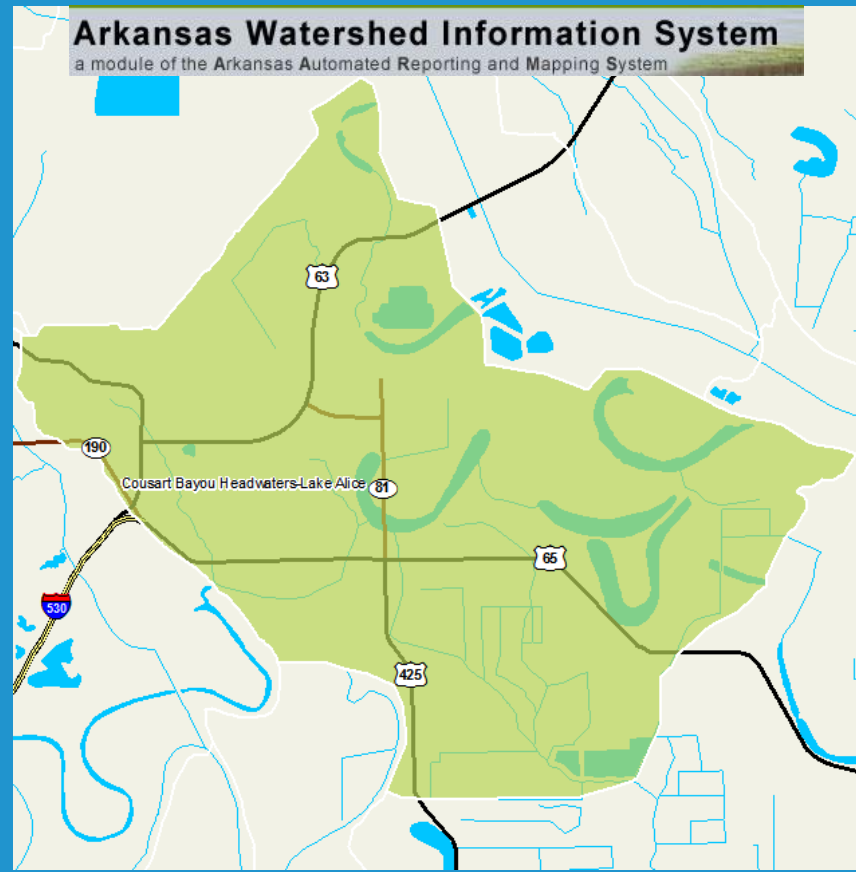
Figure 9.2b: Relative estimates of contribution of Bayou Bartholomew sub-watersheds to total estimated sediment using SWAT



Source: University of Arkansas, Department of Biological and Agricultural Engineering, 2005



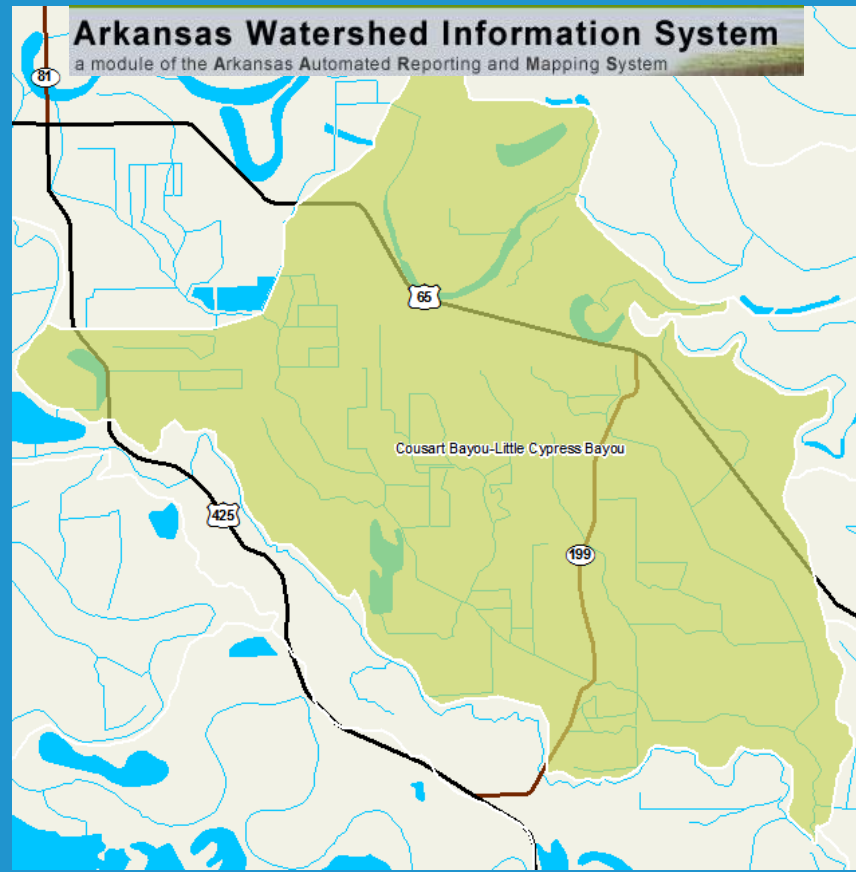
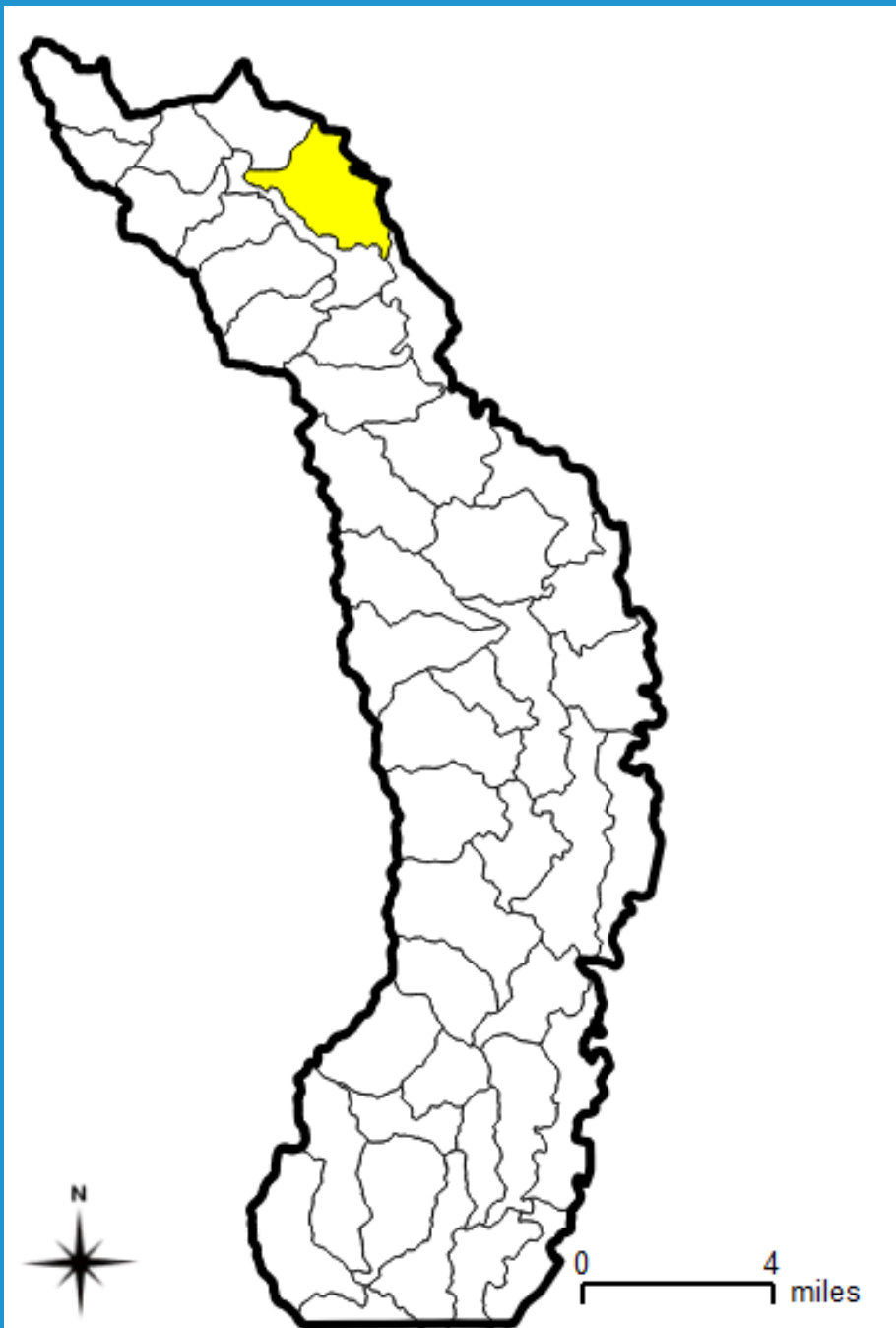
0 4 miles



Cousart Bayou Headwaters - Lake Alice 080402050301

Acres	19,345
Population (2000)	3755
Gravel Roads	51.6%
Crops	44.5%

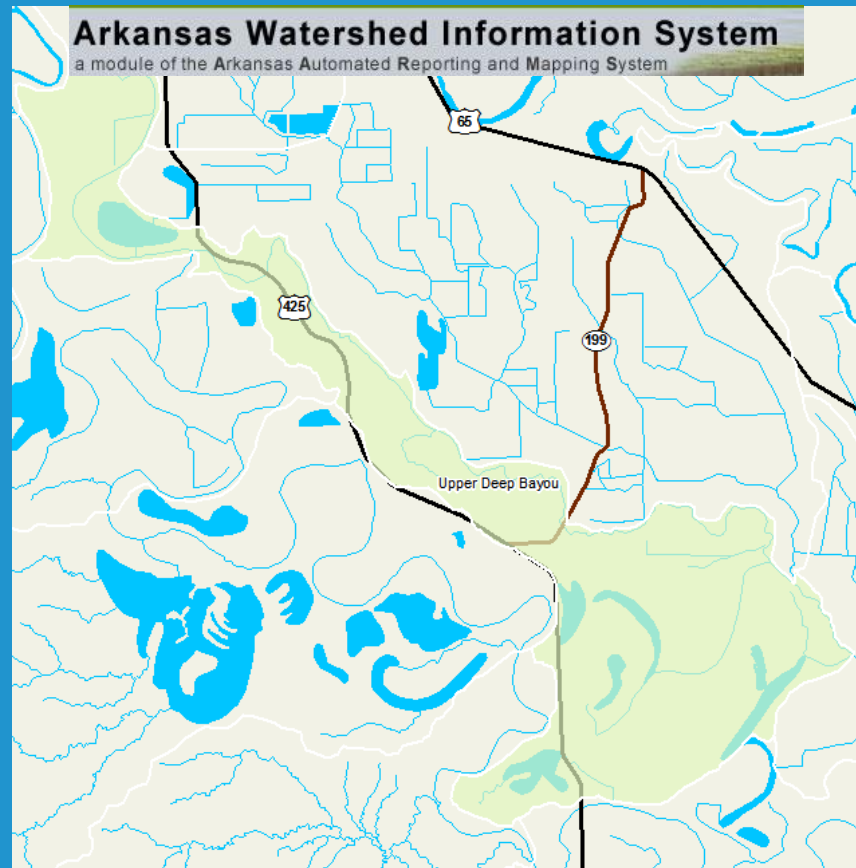
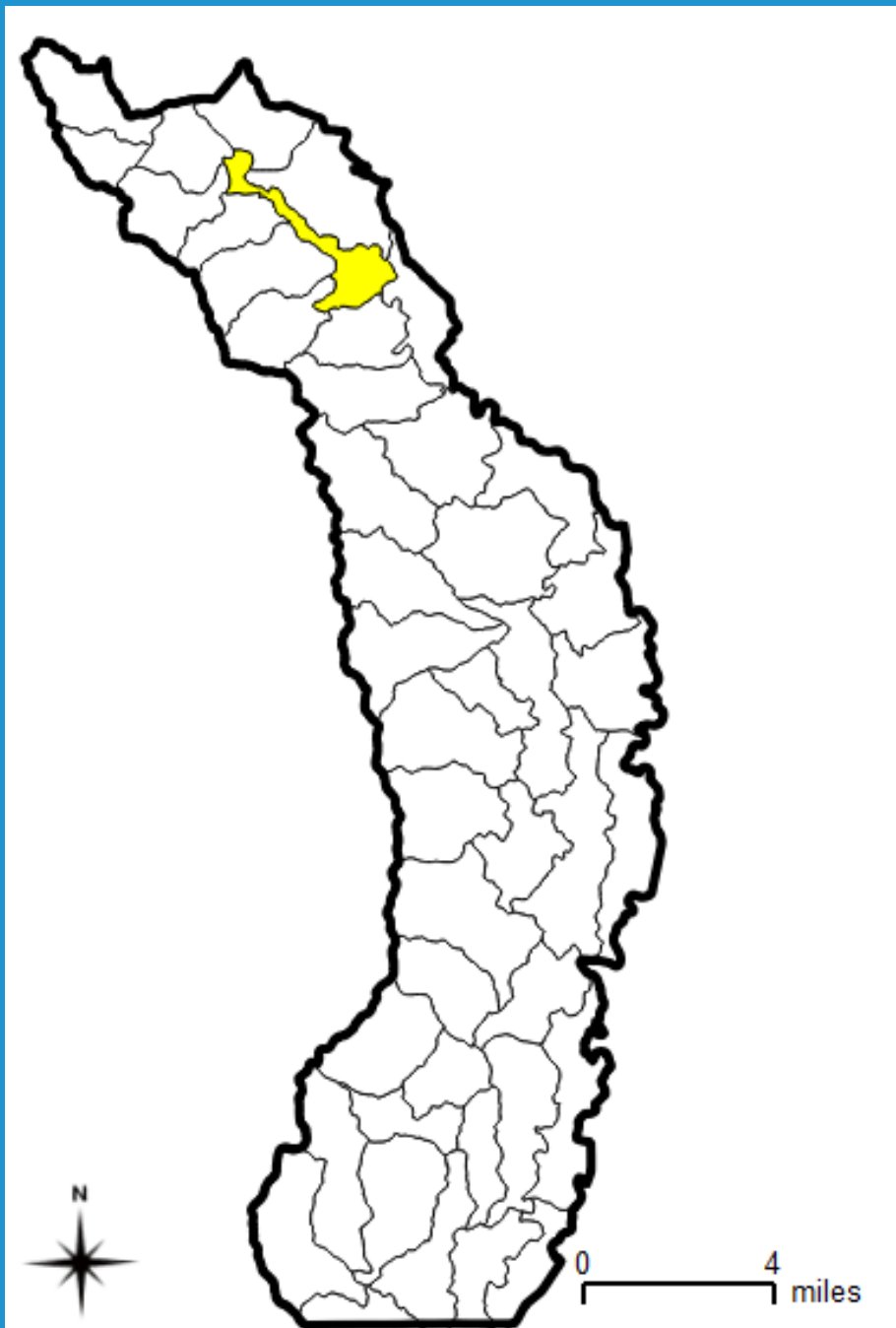
Source: Cast 2006



Cousart Bayou – Little Cypress Bayou
080402050302

Acres	28,763
Population (2000)	471
Gravel Roads	77.0%
Crops	74.9%

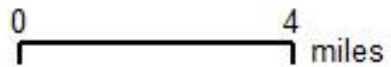
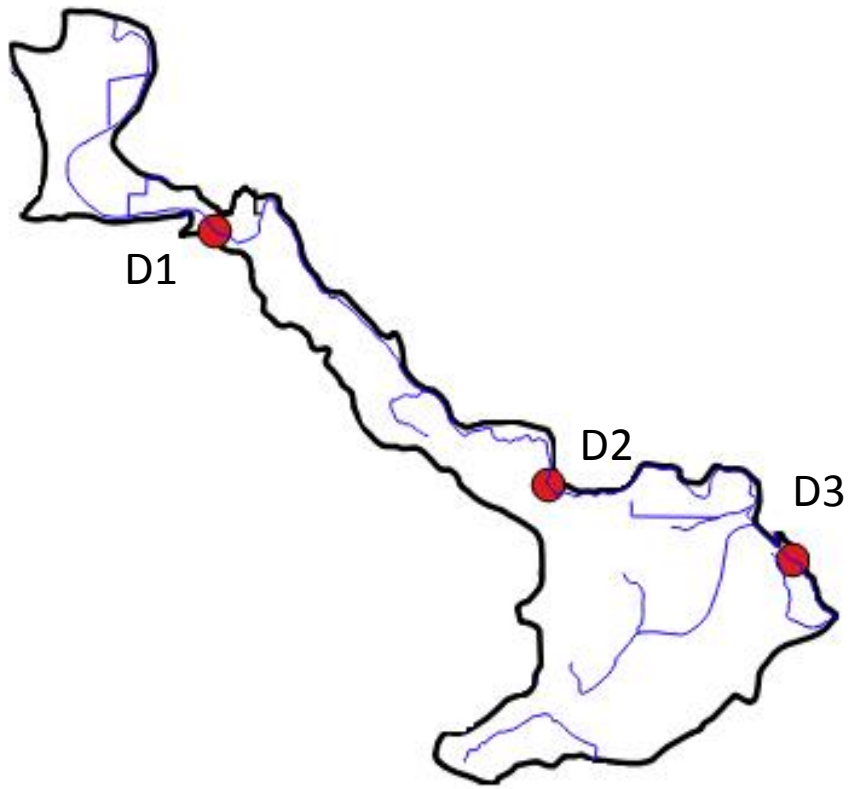
Source: Cast 2006



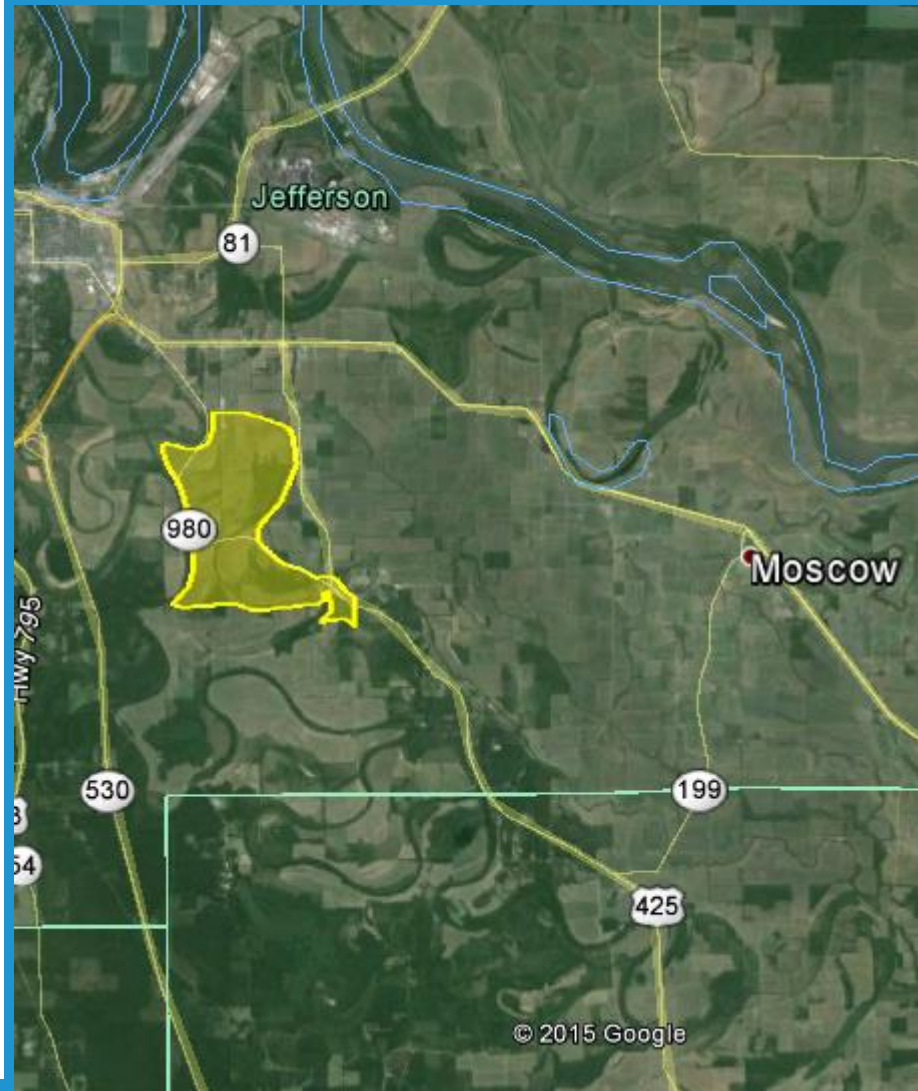
Upper Deep Bayou 080402050303

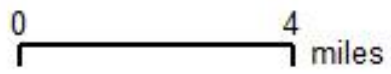
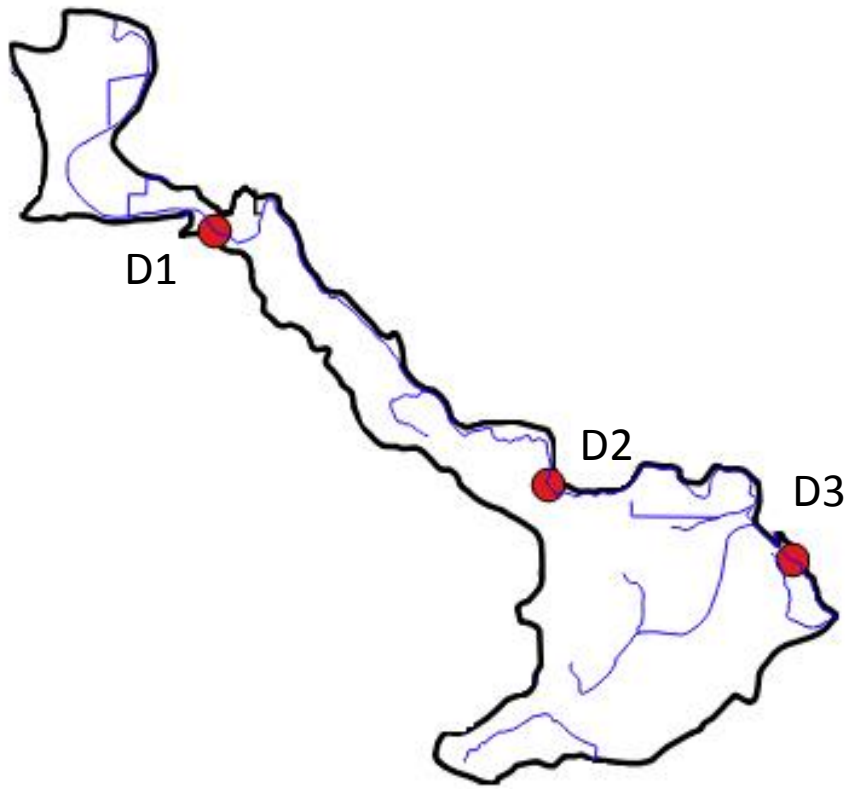
Acres	16,593
Population (2000)	468
Gravel Roads	79.8%
Crops	45.8%

Source: Cast 2006

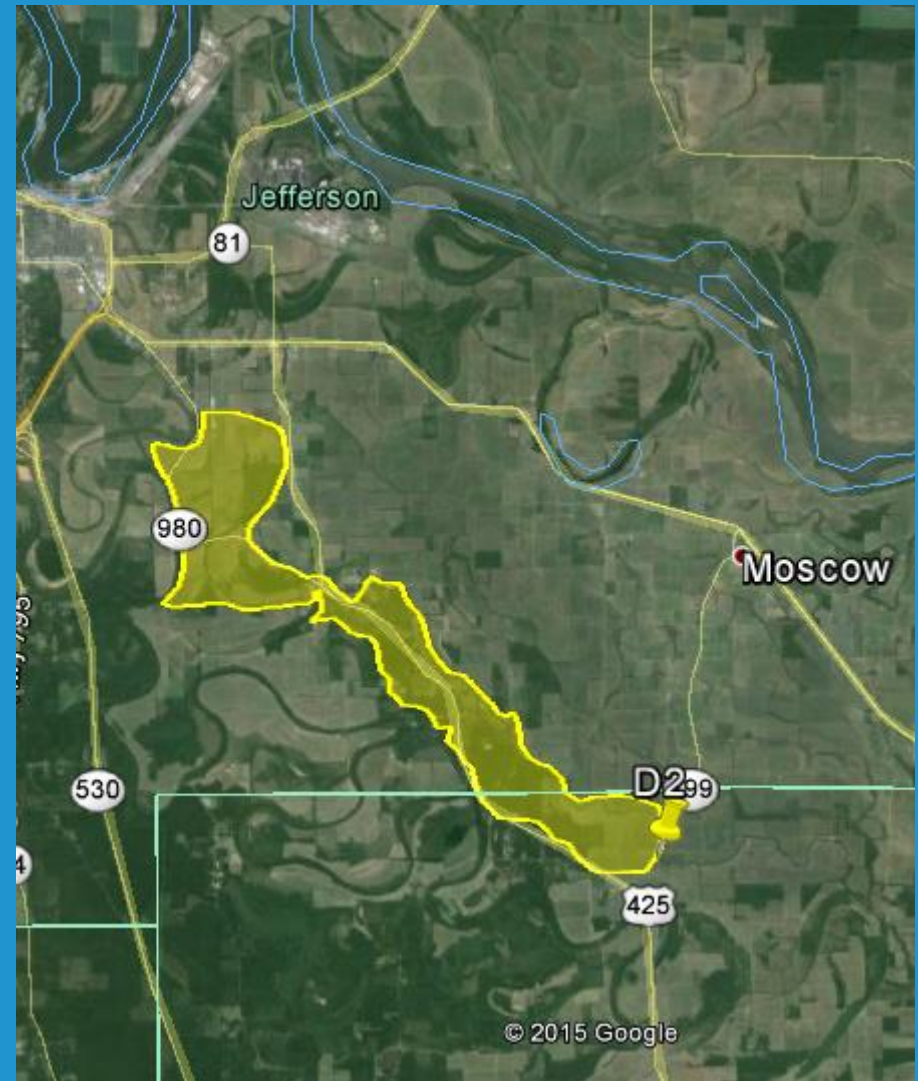


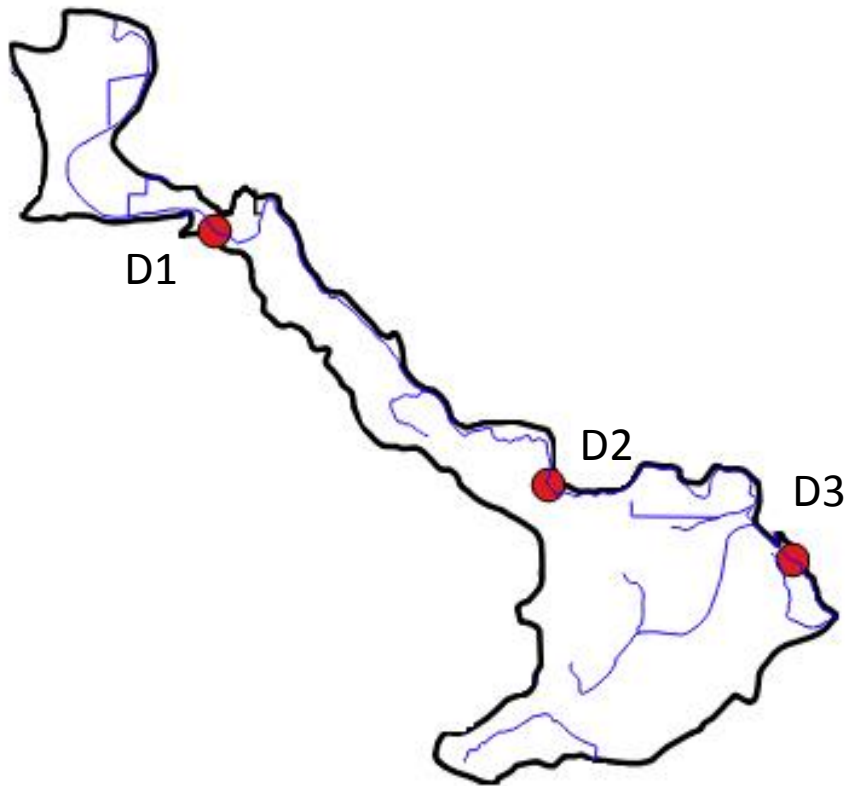
Site	Drainage Area
D1	3,116
D2	6,810
D3	54,373





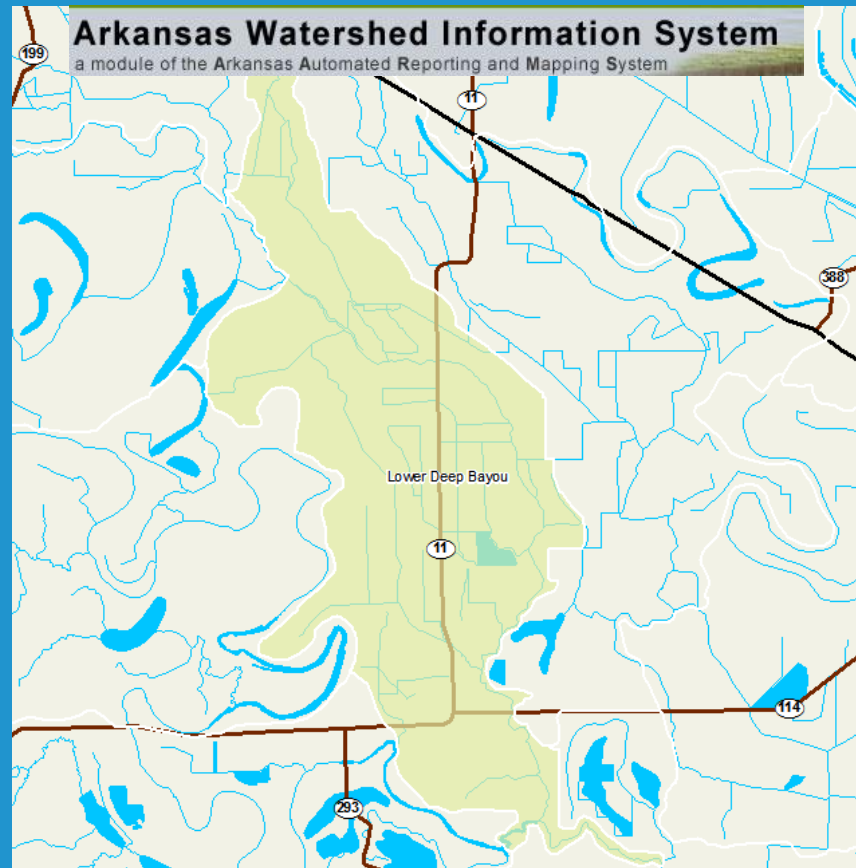
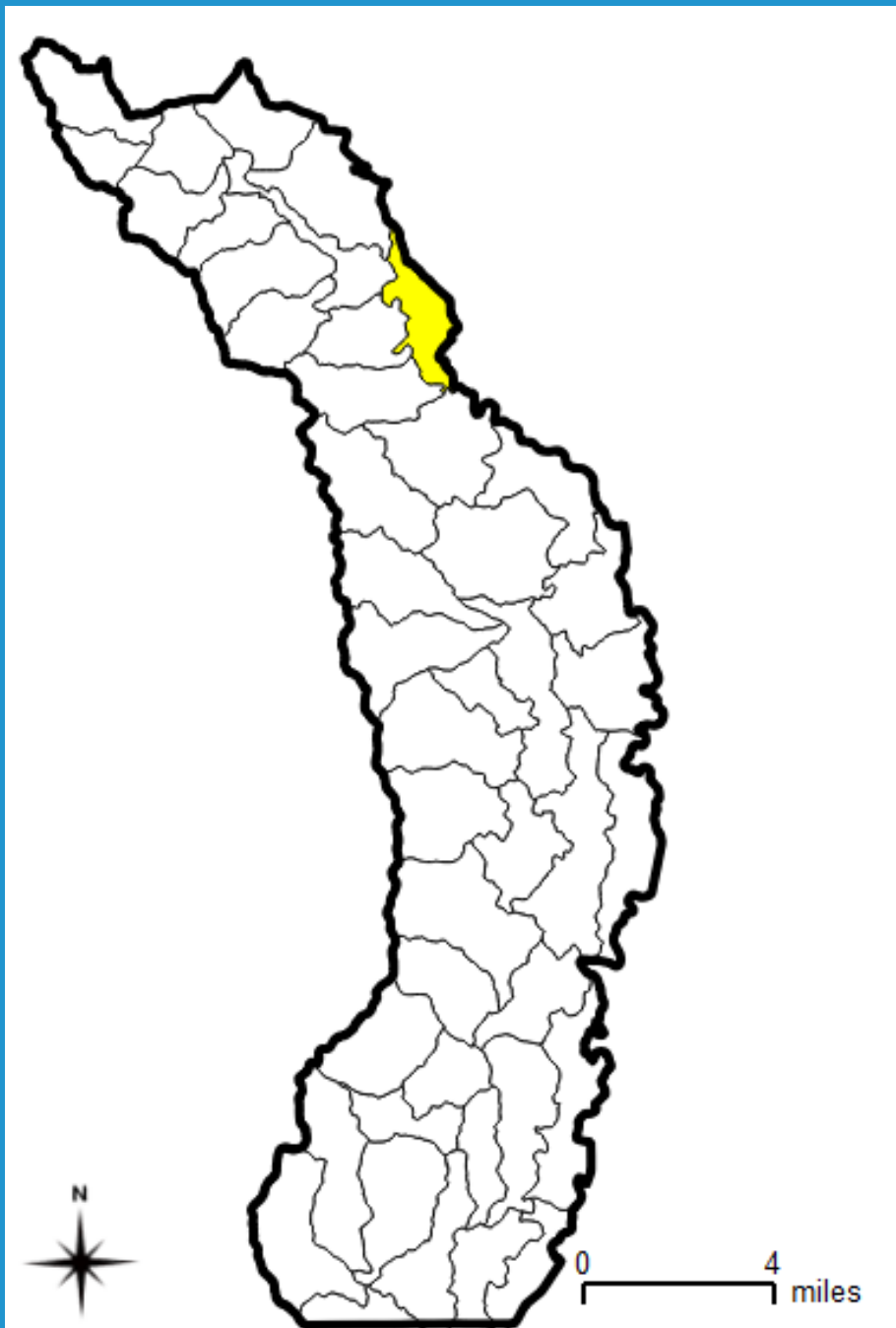
Site	Drainage Area
D1	3,116
D2	6,810
D3	54,373





Site	Drainage Area
D1	3,116
D2	6,810
D3	54,373

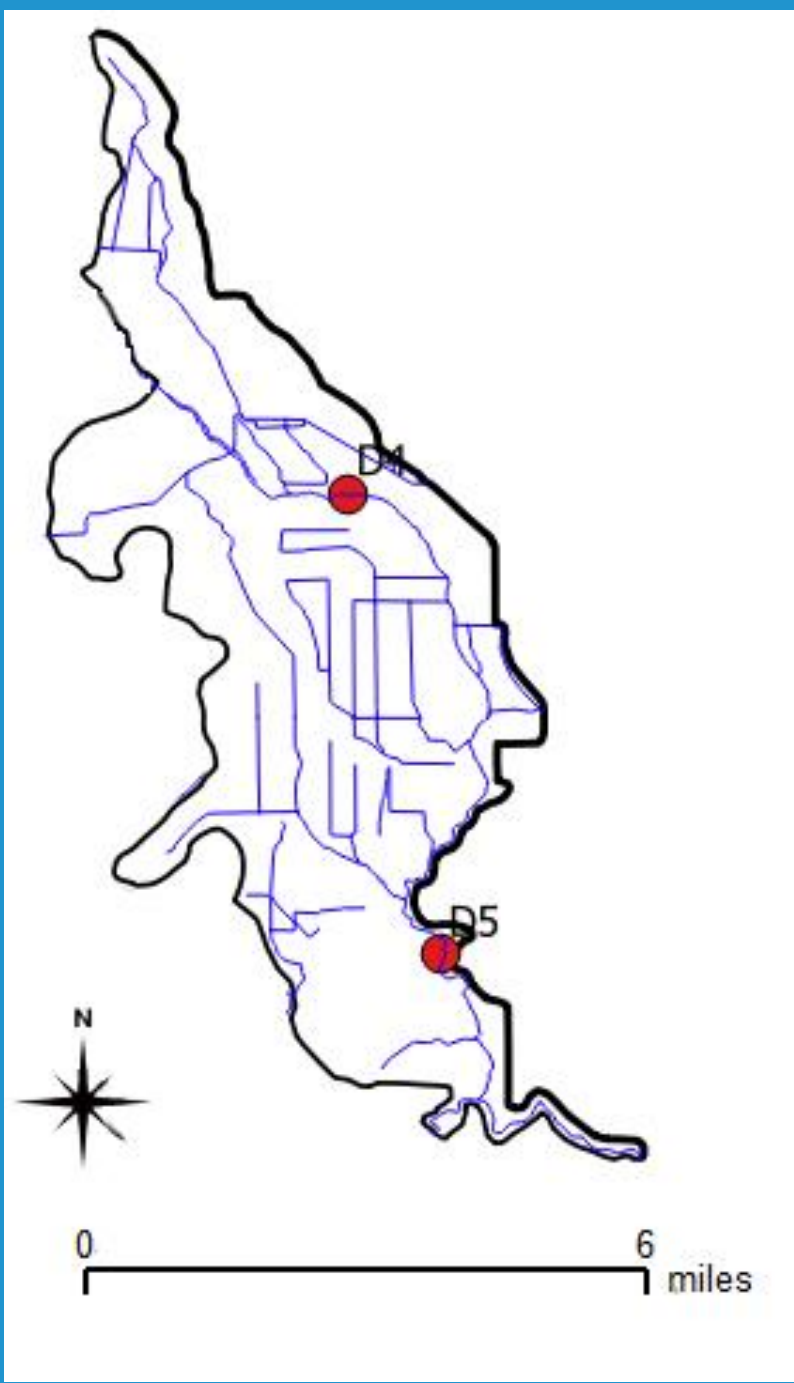




Lower Deep Bayou 080402050304

Acres	17,118
Population (2000)	130
Gravel Roads	65.5%
Crops	69.0%

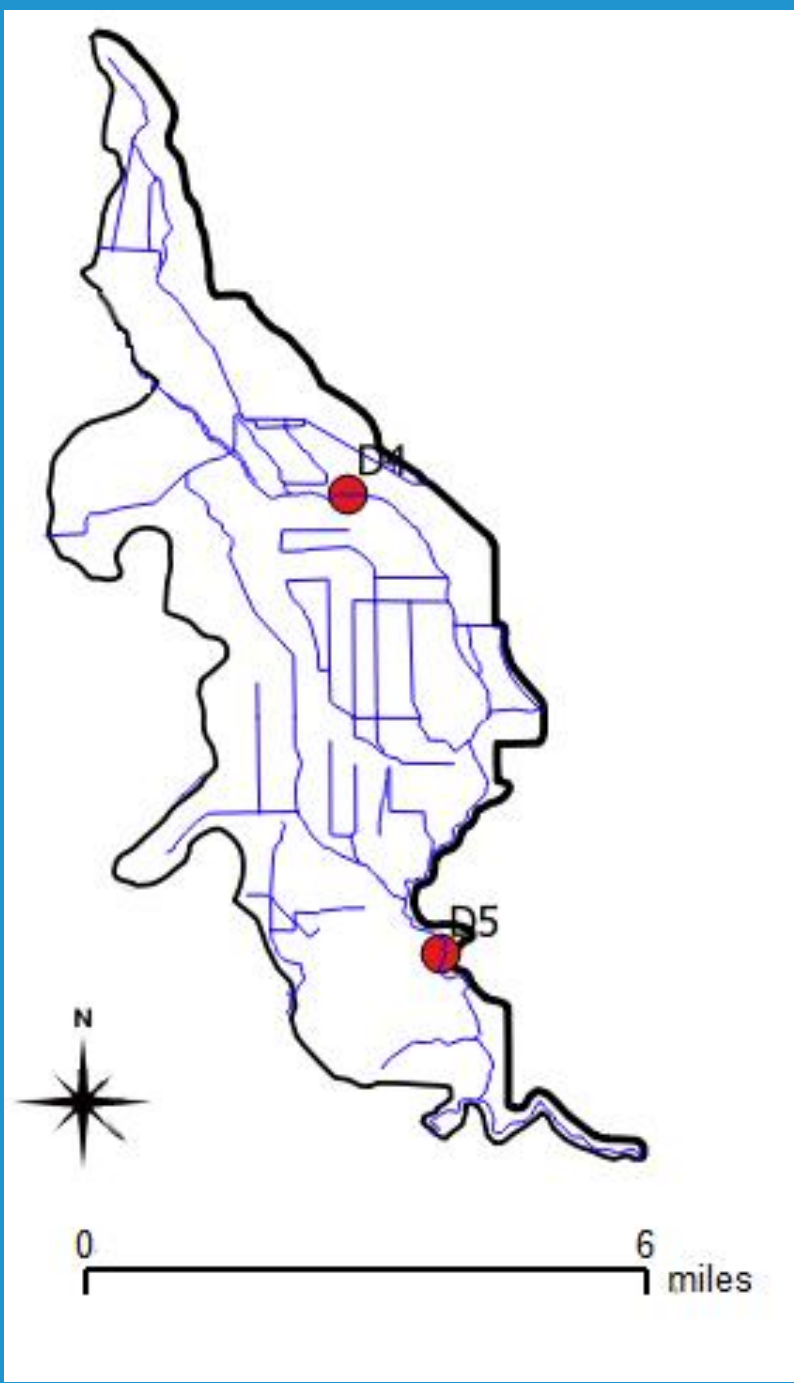
Source: Cast 2006

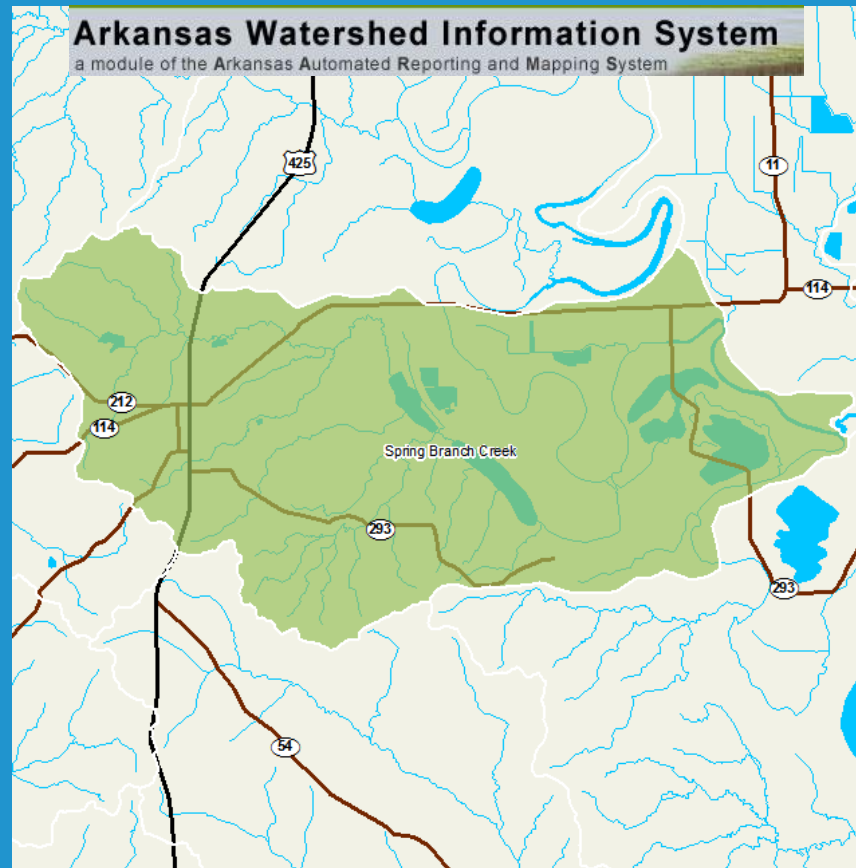
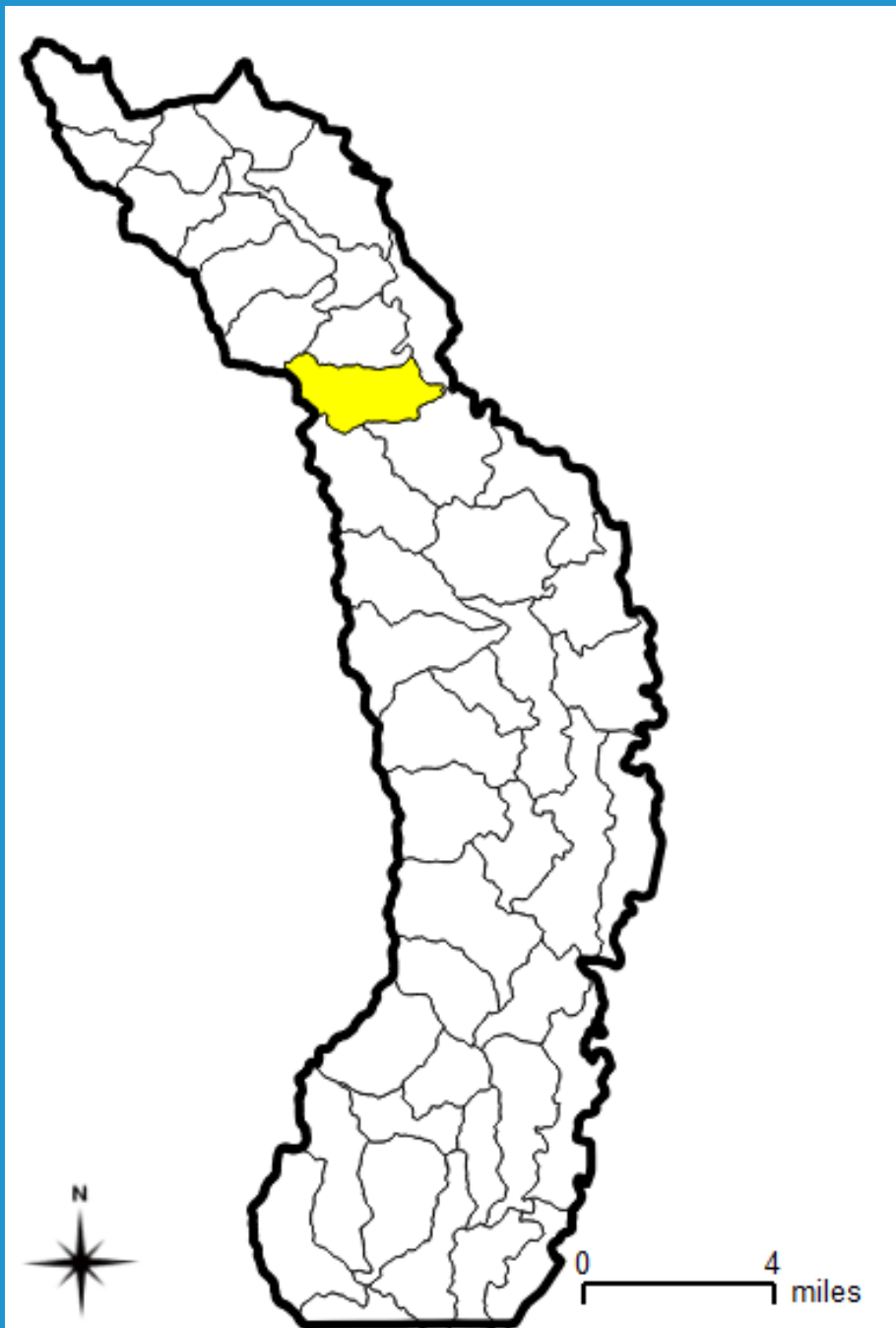


Site	Drainage Area
D4	63,020
D5	71,729



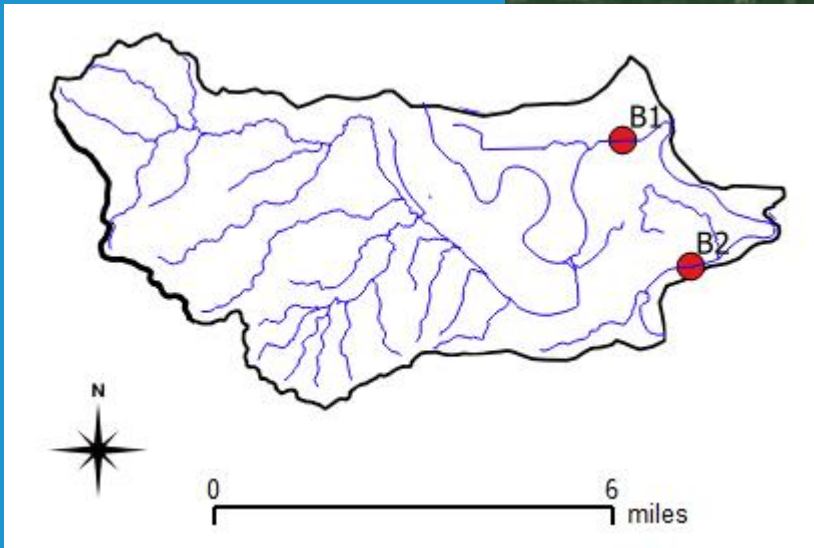
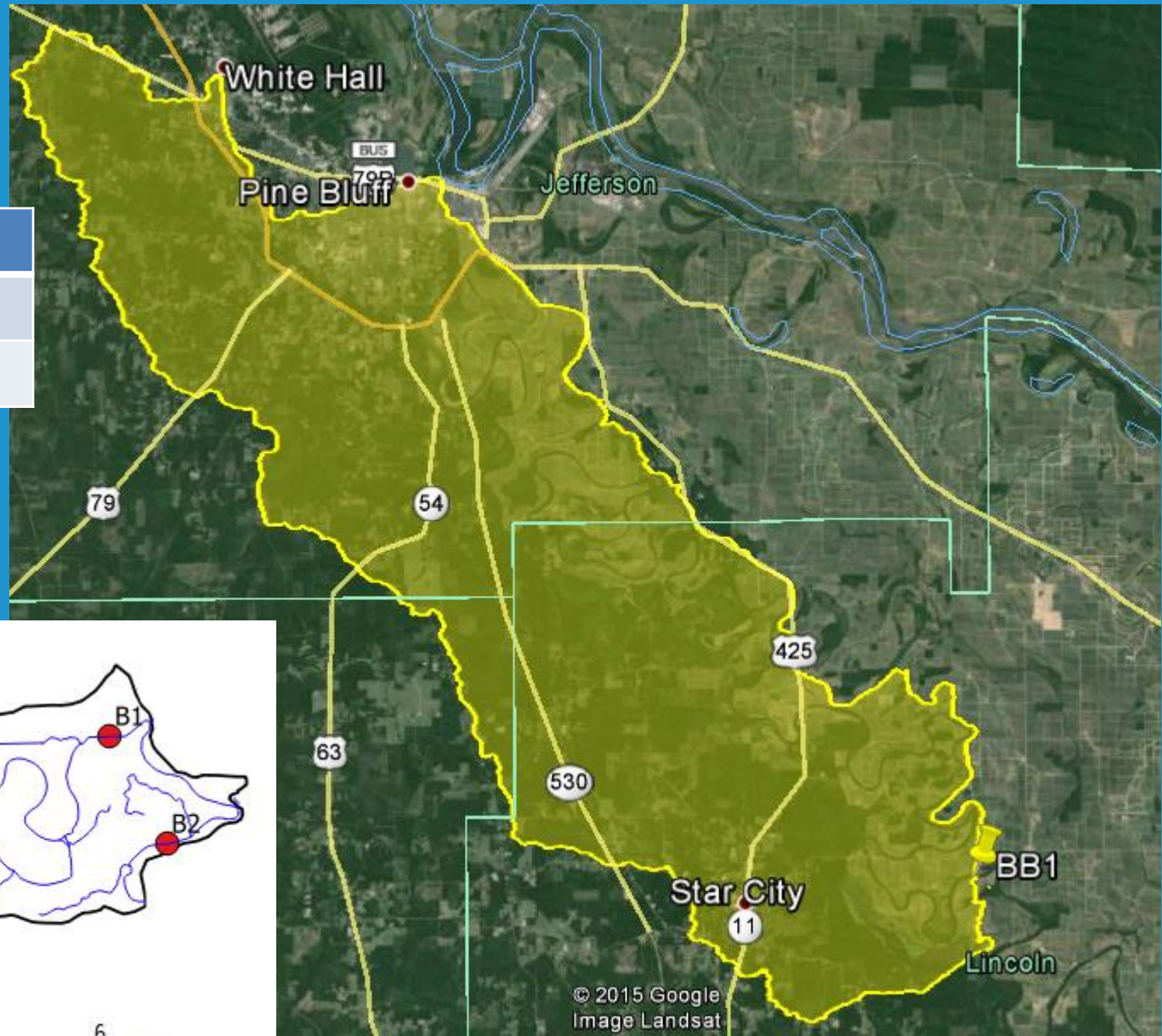
Site	Drainage Area
D4	63,020
D5	71,729



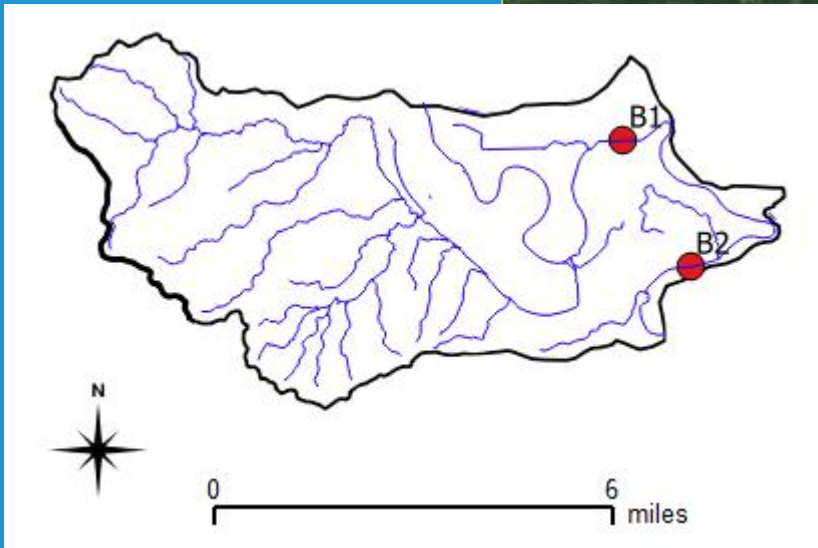
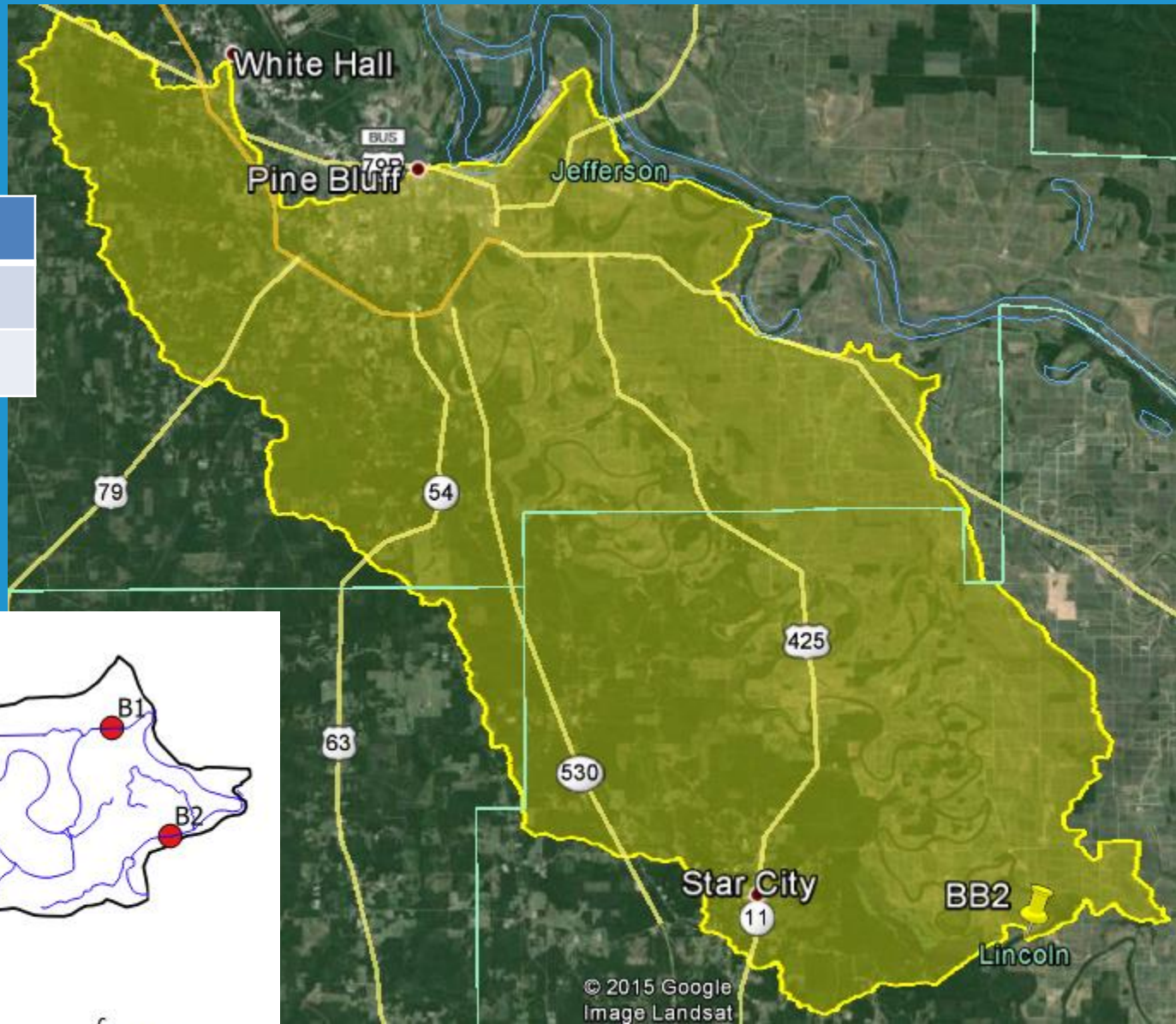


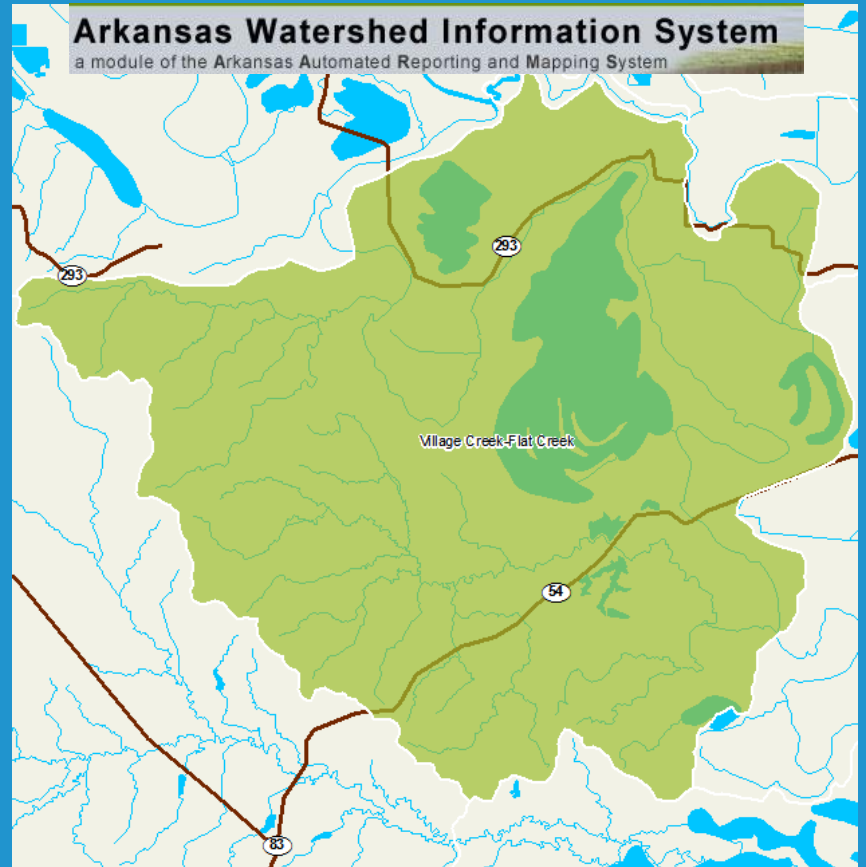
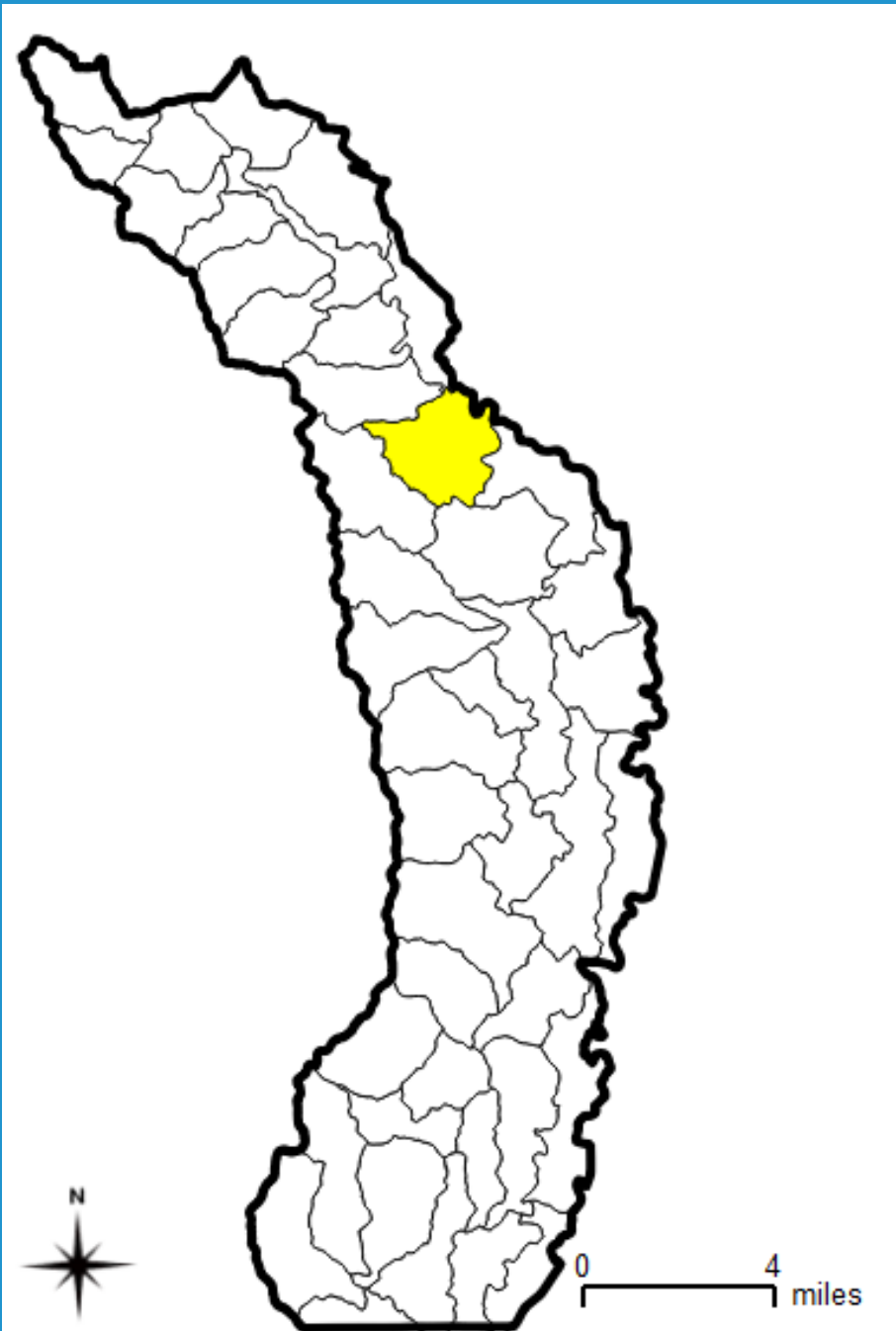
Spring Branch Creek 080402050205	
Acres	23,043
Population (2000)	3163
Gravel Roads	46.5%
Crops	16.6%
Source: Cast 2006	

Site	Drainage Area
B1	159,410
B2	234,279



Site	Drainage Area
B1	159,410
B2	234,279



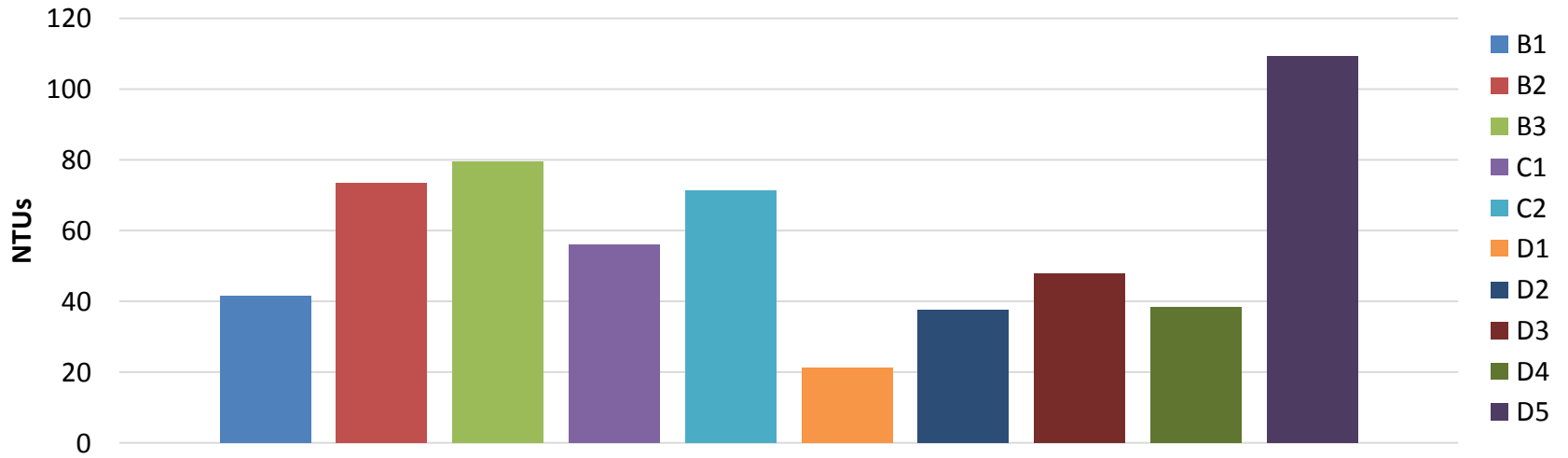


**Village Creek – Flat Creek -
080402050403**

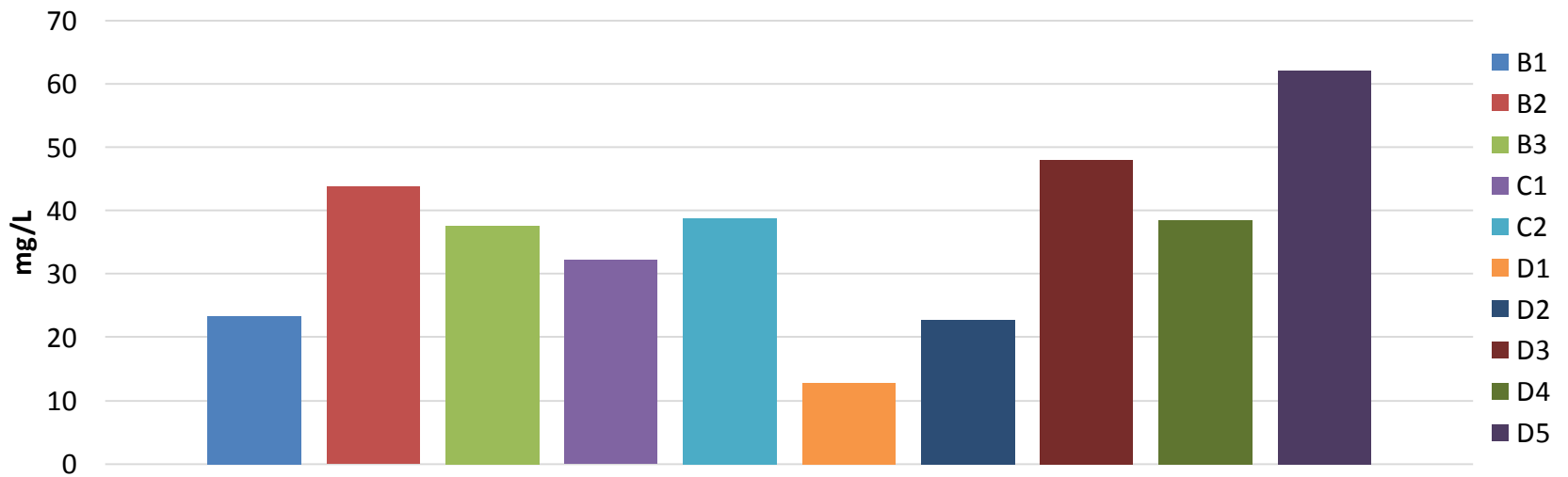
Acres	29,546
Population (2000)	431
Gravel Roads	78.2%
Crops	29.3%

Source: Cast 2006

Mean Turbidity



Mean TSS



Bayou Bartholomew Results

- Turbidity and Reg. 2
 - Channel-Altered Delta Standard

- Base Flows 75 NTUs

- All Flows 250 NTUs

		B1	B2	B3	C1	C2	D1	D2	D3	D4	D5
Base Flows	# samples	40	40	40	40	40	20	40	40	40	40
	# Exceeding Standard	0	0	1	1	1	0	1	0	1	3
	% Exceeding Standard	0.00%	0.00%	2.50%	2.50%	2.50%	0.00%	2.50%	0.00%	2.50%	7.50%
All Flows	# samples	99	99	99	98	99	68	98	99	99	99
	# Exceeding Standard	1	1	4	3	4	0	3	1	1	10
	% Exceeding Standard	1.01%	1.01%	4.04%	3.06%	4.04%	0.00%	3.06%	1.01%	1.01%	10.10%

Bayou Bartholomew Results

- Minerals and Reg. 2
 - Bayou Bartholomew Standards
 - Chlorides 30mg/L Sulfates 30mg/L

		B1	B2	B3	C1	C2	D1	D2	D3	D4	D5
Chloride	#Exceeding	0	16	14	0	45	0	10	38	34	33
	% Exceeding	0.00%	16.16%	14.14%	0.00%	45.45%	0.00%	10.20%	38.38%	34.34%	33.33%
Sulfate	#Exceeding	0	0	0	0	8	0	0	5	3	2
	% Exceeding	0.00%	0.00%	0.00%	0.00%	8.08%	0.00%	0.00%	5.05%	3.03%	2.02%

Thank You



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