



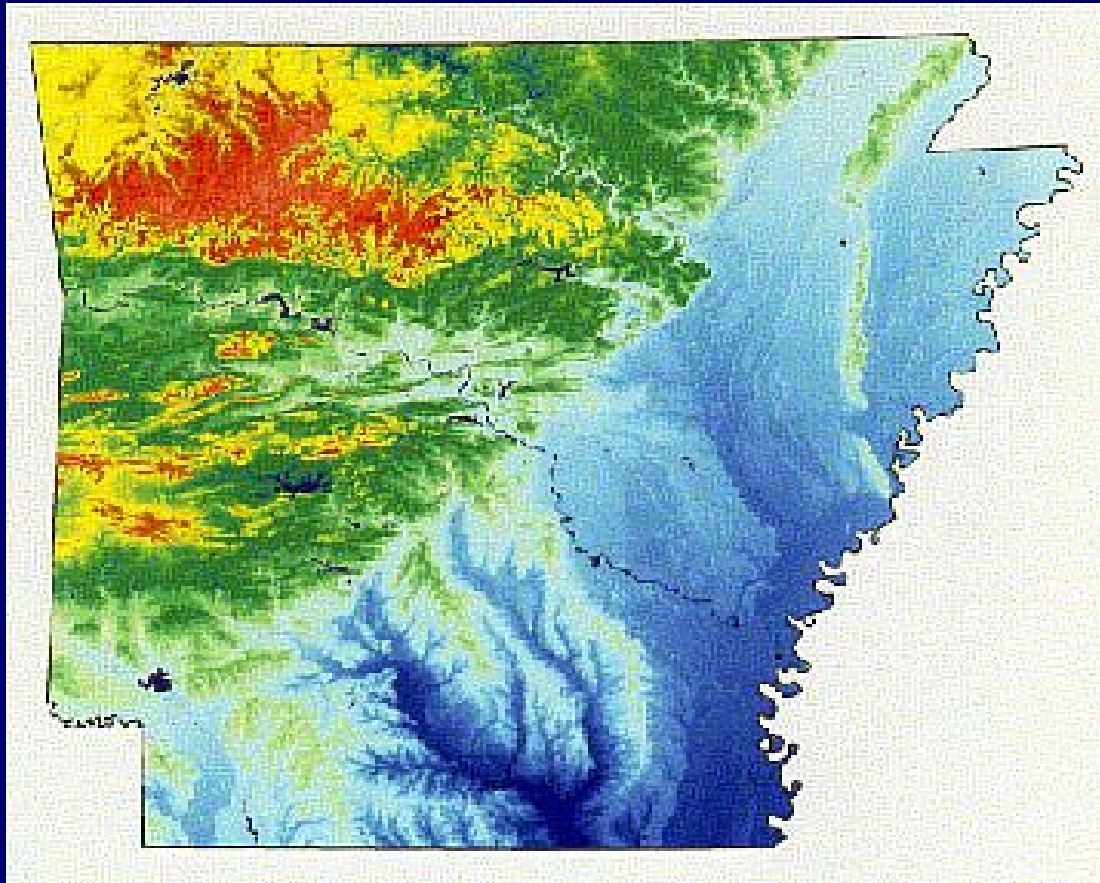
Interstate Phosphorus Issues: A Perspective from Arkansas

Mike Daniels



UNIVERSITY OF ARKANSAS
DIVISION OF AGRICULTURE
Cooperative Extension Service

Shaded Relief Map of Arkansas



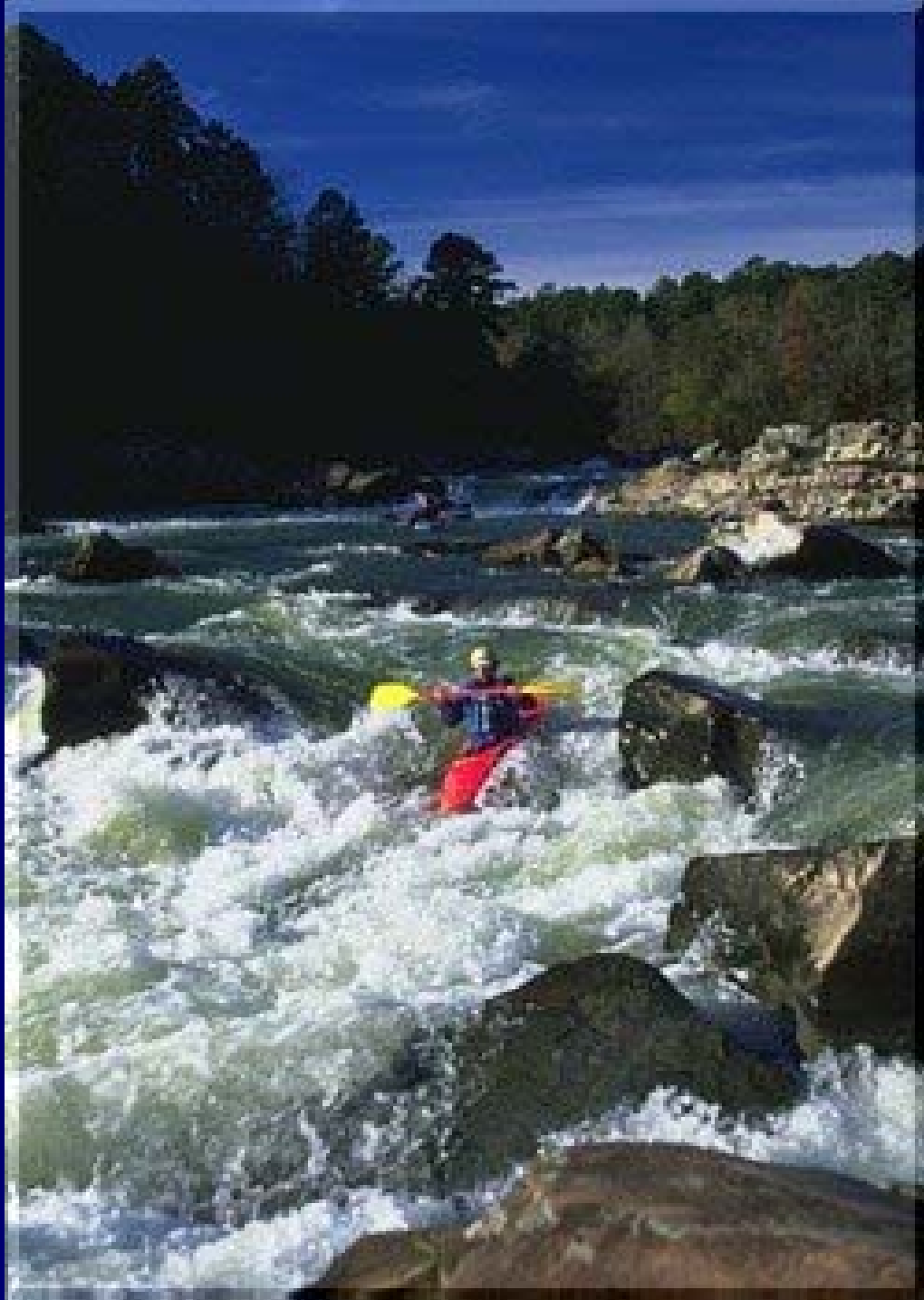
This image can tell us a lot about
land use in Arkansas





















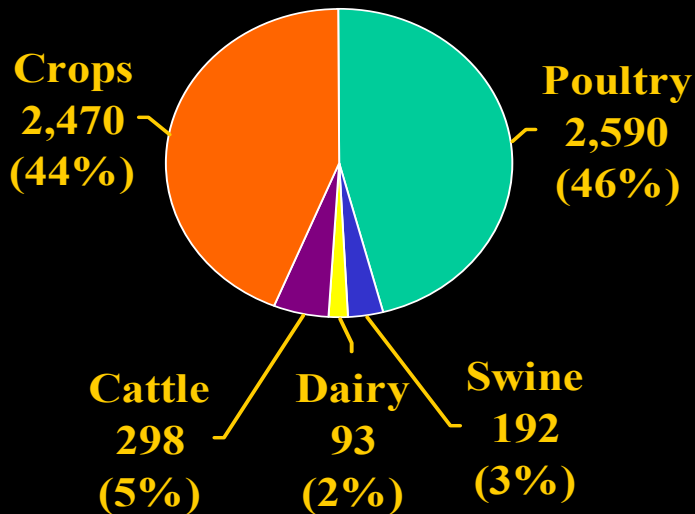




Importance of Animal Agriculture

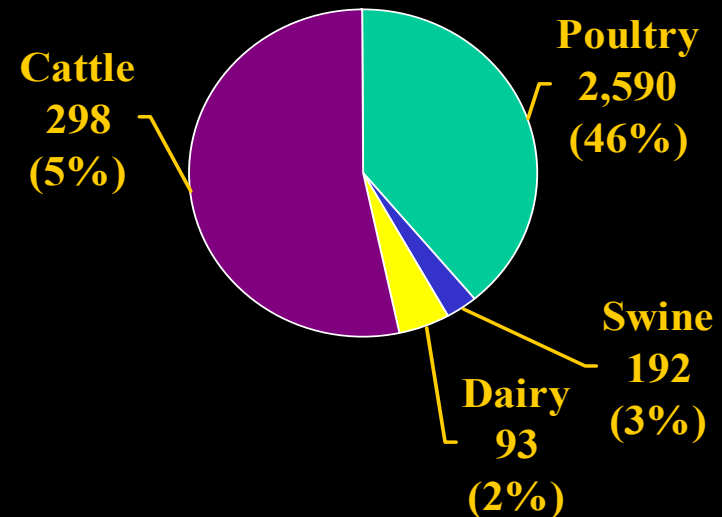
1997 Cash Reciepts (\$ Millions)

Animal Total: \$3,173 (56%)



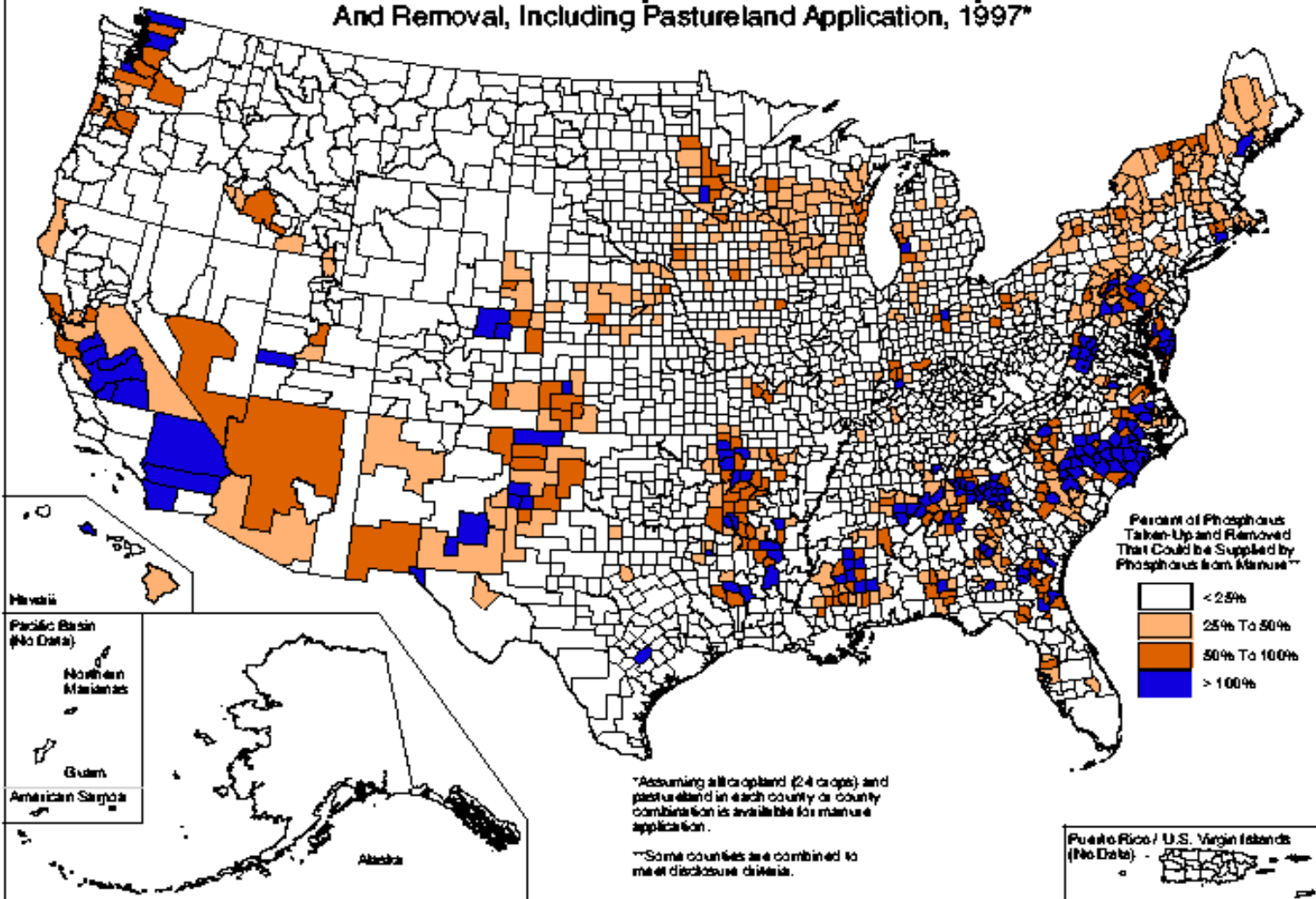
1997 Manure Production (Millions Tons)

Total: 3,393





Potential for Manure Phosphorus To Exceed Plant Uptake And Removal, Including Pastureland Application, 1997*



Are we surprised by the Controversy Over Water Quality?

Arkansas News Bureau

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States Agree To Avoid Lawsuits During Water Dispute

By Rob Moritz

Arkansas News Bureau

LITTLE ROCK -- An agreement has been reached to avoid any lawsuits while discussions continue over Oklahoma's proposed water quality regulations for the Illinois River, Arkansas Attorney General Mark Pryor's office announced Friday afternoon.

Jim Pitcock, spokesman for Pryor, said the attorney general and Oklahoma Attorney General Drew Edmondson reached the agreement "late Friday."

The two agreed "that no legal action would be taken by either state while discussions continue between their offices aimed at resolving the controversy over water quality in Northeast Oklahoma," Pitcock said.

"Discussions between Pryor and Edmondson have been under way for sometime and additional meetings are scheduled for the near future," Pitcock said, adding that Pryor "is hopeful that a settlement can be reached that would head off threatened legal action."

Oklahoma Gov. Frank Keating recently signed new water pollution standards that are intended to reduce levels of phosphorus in six Oklahoma waterways, including the Illinois River, which flows into Northwest Arkansas.

Gov. Mike Huckabee has said he is concerned about the effects of the proposed Oklahoma standards on Northwest Arkansas, where runoff from residential neighborhoods, poultry and cattle operations contribute to phosphorus levels in the Illinois.

He said that if the regulations do become law, he would consider stricter standards for chlorine in the Arkansas River, which flows through Oklahoma.

Gregg Cooke of Dallas, the U.S. Environmental Protection Agency regional administrator, told Oklahoma and Arkansas officials earlier this month to settle their differences through mediation and not lawsuits.

From the Wednesday, May 29, 2002 Arkansas Democrat-Gazette

States set meeting on water stand

BY ROBERT J. SMITH -ARKANSAS DEMOCRAT-GAZETTE

OKLAHOMA CITY -- Arkansas and Oklahoma officials plan to meet Monday morning in Oklahoma City to discuss phosphorus limits proposed for six Oklahoma waterways.

J.D. Strong, a spokesman for Oklahoma Secretary of Environment Brian Griffin, said some details of Monday's meeting are still being worked out, including who will represent each state and how many people will attend.

Strong said Griffin and Arkansas Department of Environmental Quality Director Marcus Devine are expected to be among the attendees.

Jim Harris, a spokesman for Gov. Mike Huckabee's office, confirmed on Tuesday that Devine would attend Monday's meeting, but it was unclear on Tuesday who else will attend.

The meeting comes as the two states have squabbled over phosphorus, an element found in chemical lawn fertilizers, chicken litter and sewer plant effluent that reaches waterways.

Oklahoma officials have proposed limiting phosphorus to 0.037 milligrams per liter of water in the Illinois River, Flint Creek, Little Lee Creek, Lee Creek, Baron Fork Creek and the Upper Mountain Fork River.

Arkansas wouldn't care as much if four of those streams didn't start in Arkansas: The Illinois, Upper Mountain Fork, Flint Creek and Lee Creek.

Arkansas officials have said the limit would negatively impact Northwest Arkansas cities and the poultry industry. Hundreds of chicken and turkey farmers in Benton and Washington counties use litter packed with phosphorus to fertilize their farm fields and pastures. Fayetteville, Springdale, Rogers and Siloam Springs discharge treated sewage into the Illinois River watershed.

The attorneys general from the two states agreed last week not to file lawsuits as the discussions are taking place. The agreement reached on Friday is a promise to avoid litigation while the talks are occurring.

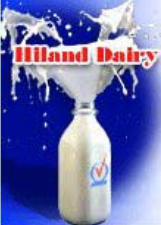
Oklahoma Attorney General Drew Edmondson in March threatened to sue poultry companies based in Oklahoma and Arkansas over the phosphorus issue.

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From the Democrat
Gazette
Northwest Arkansas
News
Police take 29 games

A Brief History

- **Arkansas Oklahoma Compact – 1990's**
 - State Agencies agreed to 40% reduction of P in Illinois River with voluntary efforts
- **In 1999, Arkansas Poultry Industries request voluntary environmental training for contract growers**
- **Oklahoma passed emergency animal waste regulations in late 1990's**
 - Restricted litter applications
- **In 2001, Oklahoma proposes a Phosphorus water quality standard 0.037 mg/l in scenic rivers, of which 6 begin in Arkansas**
 - States begin to negotiate standard to avoid possible legal action
 - Oklahoma submits standard to EPA

More Recently...

- In 2002, City of Tulsa files class action lawsuit against an Arkansas Municipality and 6 Poultry Integrators
 - Lawsuit Settlement and Consent Decree
 - No P application in Eucha-Spavinaw basin
 - Joint P-Index to be developed by UA and OSU by Jan '04
 - Non-profit agency created to oversee settlement
- In 2003, Arkansas passes new regulations for poultry litter and nutrient applications

ACT 1059: Nutrient Management Planner and Applicator Certification

- State implements a education, training, and certification program to ensure minimal competence and knowledge of planners
 - 4 day training and certification test
- State implements a education, training, and certification program to ensure minimal competence and knowledge of nutrient applicator in nutrient sensitive areas

ACT 1060: Registration of Poultry Feeding Operations

- All poultry operations confining or feeding 2,500 birds on any one day in a 12 month period must register annually (\$10 fee).
- Items to be reported to ASWCC (Not for public record)
 - # and kind of houses, location, litter management system, litter storage system, Acreage, application method, amount of litter sold or transferred

ACT 1059: Nutrient Management Planner and Applicator Certification

- State implements a education, training, and certification program to ensure minimal competence and knowledge of planners
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- State implements a education, training, and certification program to ensure minimal competence and knowledge of nutrient applicator in nutrient sensitive areas

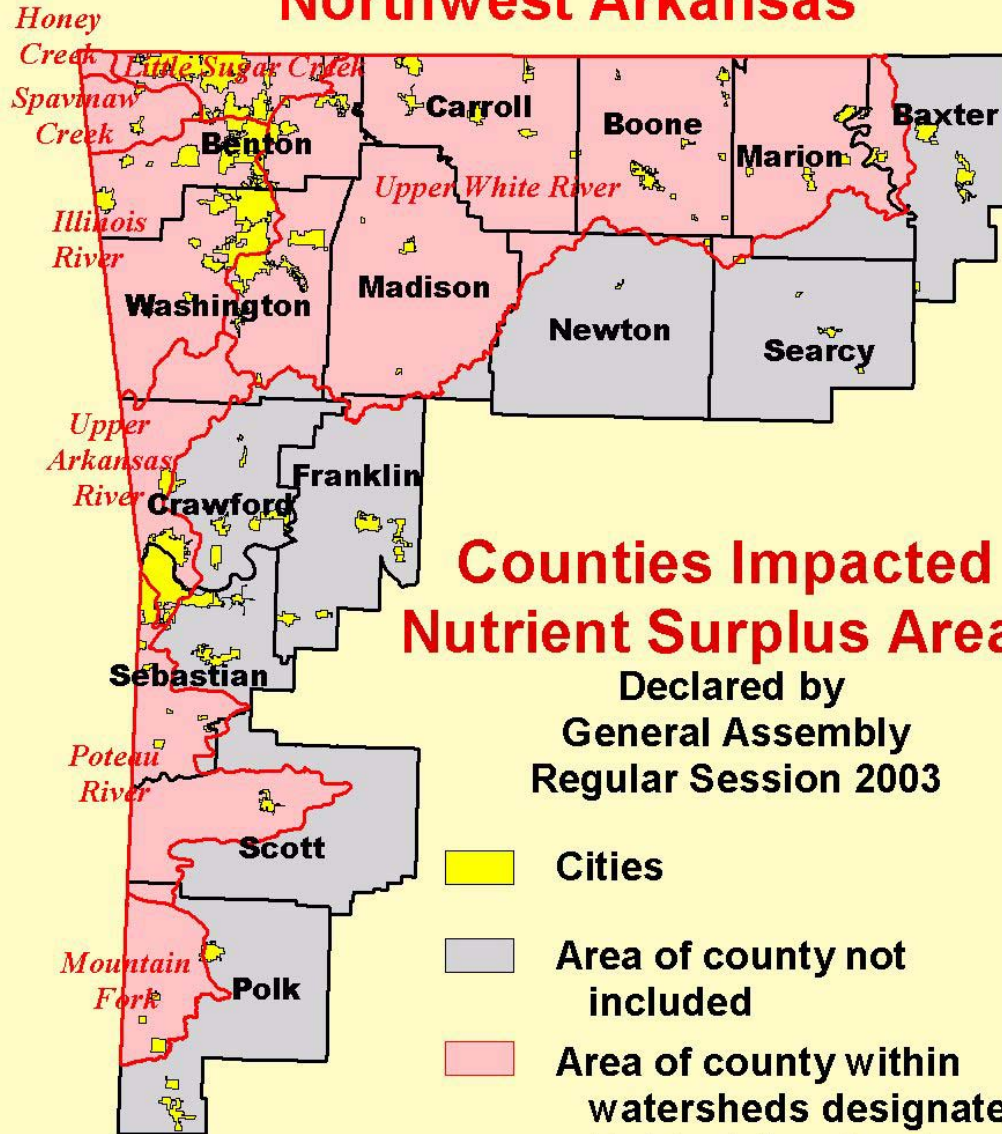
ACT 1061: Proper Nutrient Utilization in Sensitive Watersheds

- Nutrients will be applied at protective rates determined by ASWCC
- Protective rate is the agronomic or other rate that provides for proper crop utilization, and prevention of significant impacts to waters within the State

ACT 1061: Proper Nutrient Utilization in Sensitive Watersheds




- On residential parcels of 2.5 acres or more, nutrients have to be applied by certified nutrient applicator
- Poultry operations required to have NMP prepared by certified planner and nutrients applied by certified applicators

Northwest Arkansas



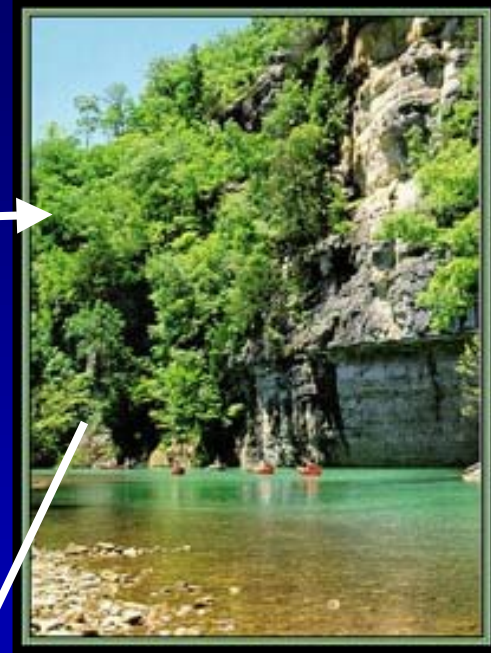
Counties Impacted Nutrient Surplus Areas

Declared by
General Assembly
Regular Session 2003

-  Cities
-  Area of county not included
-  Area of county within watersheds designated Nutrient Surplus Areas



P losses from Pastures in runoff is not well understood



Phosphorus Delivery to Streams

Delivery = function (source & transport)

The diagram illustrates the concept of phosphorus delivery to streams as a function of source and transport. The main title 'Phosphorus Delivery to Streams' is at the top. Below it, the equation 'Delivery = function (source & transport)' is presented. Two arrows originate from this equation: one points to a box on the left containing source-related factors (Manure P, Fertilizer P, Soil Test P, and ??), and the other points to a box on the right containing transport-related factors (Runoff Potential, Erosion, and various sub-factors like Soil Type, Topography, Climate, Hydrology, Land use, and a long string of question marks).

- **Manure P**
- **Fertilizer P**
- **Soil Test P**
- **??**

- **Runoff Potential**
- **Erosion**
 - **Soil Type**
 - **Topography**
 - **Climate**
 - **Hydrology**
 - **Land use**
 - **????????????????**
 - ...

Arkansas P Index

- **Developed by USDA and UA researchers**
- **Uses a risk assessment approach to consider many factors to determine manure application rates**
- **Each factor weighted based on their contribution for P movement as determined in research and/or professional judgement.**

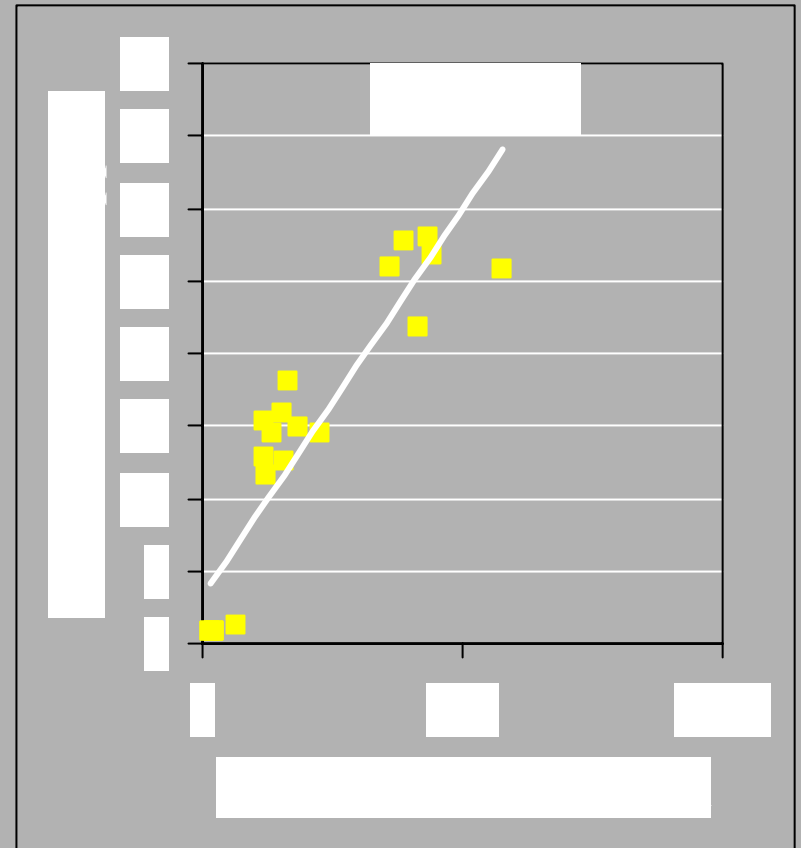
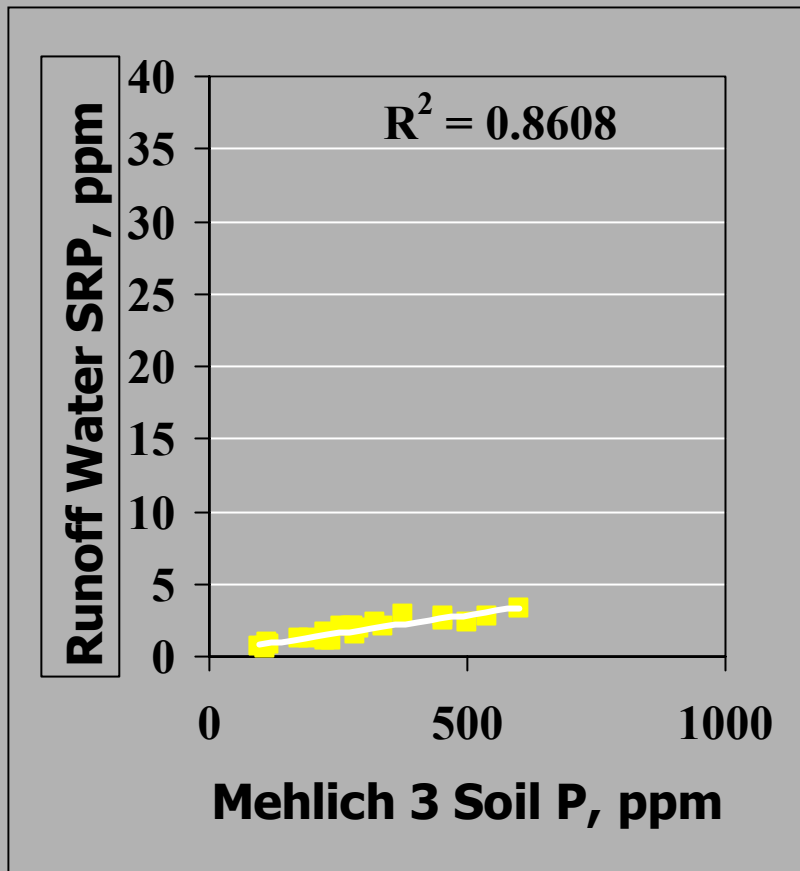


The Arkansas P Index for Pastures

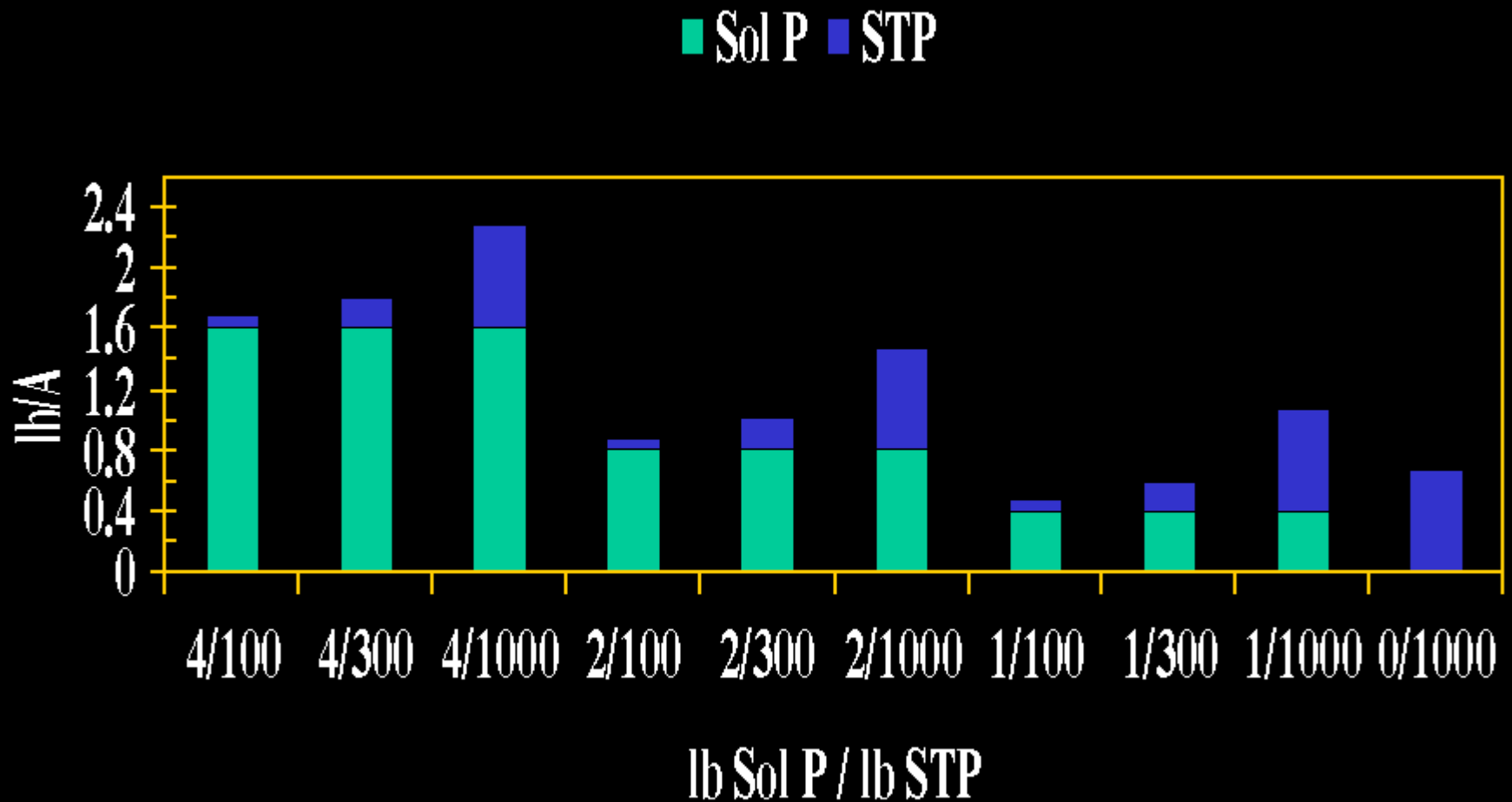
$P \text{ Index} = \text{Source} * \text{Transport} * \text{Precipitation} * \text{BMP}$



Where Does P in Runoff Water Come From?



Typical P Source Values



P Index Transport Factors

P Transport = Sum of Site Characteristic Loss Rating Values

Site Characteristic	Description				
Soil Erosion	< 1	1 to 2	2 to 3	3 to 5	> 5
	0	0.1	0.2	0.4	1
Runoff Class	Negligible	Low	Moderate	High	Very High
	0.1	0.2	0.3	0.5	1.0
Flooding Frequency	None	Occasional		Frequent	
	0	0.1		2.0	
Application Method	Incorporated	Surface Applied		Surface Applied on Frozen Ground or Snow	
	0.1	0.2		0.5	
Application Timing	June-Oct	March - May		Nov - Feb	
	0.1	0.2		0.3	
Grazing Management	Hayed Only	Grazed and Hayed		Grazed Only	
	0.1	0.2		0.3	

Green text represents typical values

Precipitation Factor

Annual Precipitation (in)	Weighting Factor
0-10	0.2
10-20	0.4
20-30	0.6
30-40	0.8
40-50	1.0
50-60	1.2
60-70	1.4

P Index Process (Putting It All Together)

Farm Conditions/Management Practices

$$P \text{ source} = (.404 * \text{lb/ac sol P}) + (.000666 * \text{lb/ac STP})$$

P Transport = Sum of Site Characteristic Loss Rating Values

$$P \text{ Index} = P \text{ Source} * P \text{ Transport} * \text{Precipitation Factor}$$

$$P \text{ Index} = P \text{ Index} * 0.9^{(\# \text{ BMP})}$$

Influence of BMP to Reduce PI

Each BMP Not Included in Source or Transport Is Assumed 10% Effective

$$PI = PI * 0.9^{(\# \text{ Bmp})}$$

BMPs	Value		
0	0.6	1.2	1.8
1	0.5	1.1	1.6
2	0.5	1.0	1.5
3	0.4	0.9	1.3

P Index Interpretive Guidance

P Index	Site Interpretation and Guidance
< 0.6	Low potential for P movement from site. Apply nutrients based on crop needs, normally nitrogen. Caution against long term buildup.
0.6 to 1.2	Medium potential for P movement from site. Evaluate the Index and determine any areas that could cause long-term concerns. Consider adding conservation practices or reduced P application to maintain the risk at 1.2 or less. Apply nutrients based on crop needs, normally nitrogen.
1.2 to 1.8	High potential for P movement from site. Evaluate the Index and determine elevation cause. Add appropriate conservation practices and/or reduce P application. The immediate planning target is a PI value of 1.2 or less. If this cannot be achieved with realistic conservation practices and /or reduced P rates in the short term, then a progressive plan needs to be developed with a long term goal of a PI less than 1.2.
>1.8	Very High potential for P movement from site. No litter application. Add nutrients to meet crop phosphorus needs according to NRCS Nutrient Management Standard (590). Add conservation practices to decrease this value below 1.8 in the short term and develop a progressive conservation plan that would reduce the PI to

a lower risk category, with long term goal of a PI of less than 1.2.

OK Phosphorus Risk Assessment Ratings for Non-Nutrient Limited Watershed

Rating	Soil Test P Index	0 – 8% Slope	8 to 15% Slope	0 to 15% Slope
		Soil > 20” Deep	Soil > 20” Deep	Soil 10” to 20” Deep
Low	0 – 65	Full Rate	Full Rate Split	Half Rate
Moderate	66 – 250	Full Rate	Half Rate	Half Rate
High	251 – 400	Half Rate	Half Rate	Half Rate
Very High	> 400	Plant Rem.	Plant Removal	Plant Removal
Severe		No Appl.	No Appl.	No Appl.

OK Phosphorus Risk Assessment Ratings for Nutrient Limited Watershed

Rating	Soil Test P Index	0 – 8% Slope Soil > 20”	8 to 15% Slope Soil > 20”	0 to 15% Slope Soil 10” to 20”
Low	0 – 65	Full Rate	Full Rate Split Appl.	Half Rate
Moderate	66 – 120	Full Rate	Half Rate	Half Rate
High	121 – 300	Half Rate	Half Rate	Half Rate
Severe	> 300	No Appl.	No Appl.	No Appl.

Full Rate – Not to exceed the Nitrogen requirement of the crop and the following P_2O_5 rates:

- 1. 200 lbs P_2O_5 per acre when surface applied.**
- 2. 300 lbs P_2O_5 per acre when application is by sprinkler irrigation and managed to prevent runoff from field.**
- 3. 400 lbs P_2O_5 per acre if injected below the soil surface or surface applied and incorporated within 7 days.**

Half Rate – Not to exceed the Nitrogen requirement of the crop and the following P_2O_5 rates:

- 1. 100 lbs P_2O_5 per acre when surface applied.**
- 2. 150 lbs P_2O_5 per acre when application is by sprinkler irrigation and managed to prevent runoff from field.**
- 3. 200 lbs P_2O_5 per acre if injected below the soil surface or surface applied and incorporated within 7 days.**

Split Application – Not to exceed the Nitrogen requirement of the crop

The Effects of Policy

- Regulation 5 (Liquid Wastes) requires CNMP
- NRCS has moved to CNMP
- National AFO/CAFO Regulations Require Management plan (CNMP)
- State regulations may require CNMP for dry manure systems in sensitive watersheds
- Under lawsuit Consent Decree, Nutrient Management plans using joint P-Index in Eucha Spavinaw basin

A photograph of a sunset over the ocean. The sun is a bright yellow-orange orb in the center of the sky, casting a long, shimmering reflection on the water's surface. The sky transitions from a deep orange near the horizon to a lighter, hazy orange at the top. The ocean is dark with small waves, and the foreground shows a sandy beach with some dark, thin plants or grasses. The text "Thank You Questions?" is written in a white, serif font, centered in the lower half of the image.

**Thank You
Questions?**