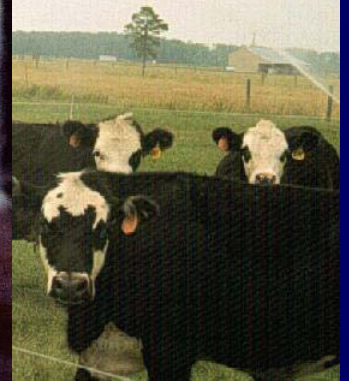


Phosphorus Management in North Carolina

Deanna L. Osmond
Department of Soil Science
NC State University

The Face of North Carolina




Animal Agriculture in North Carolina



43 M Turkeys
\$ 452 M
#1 US

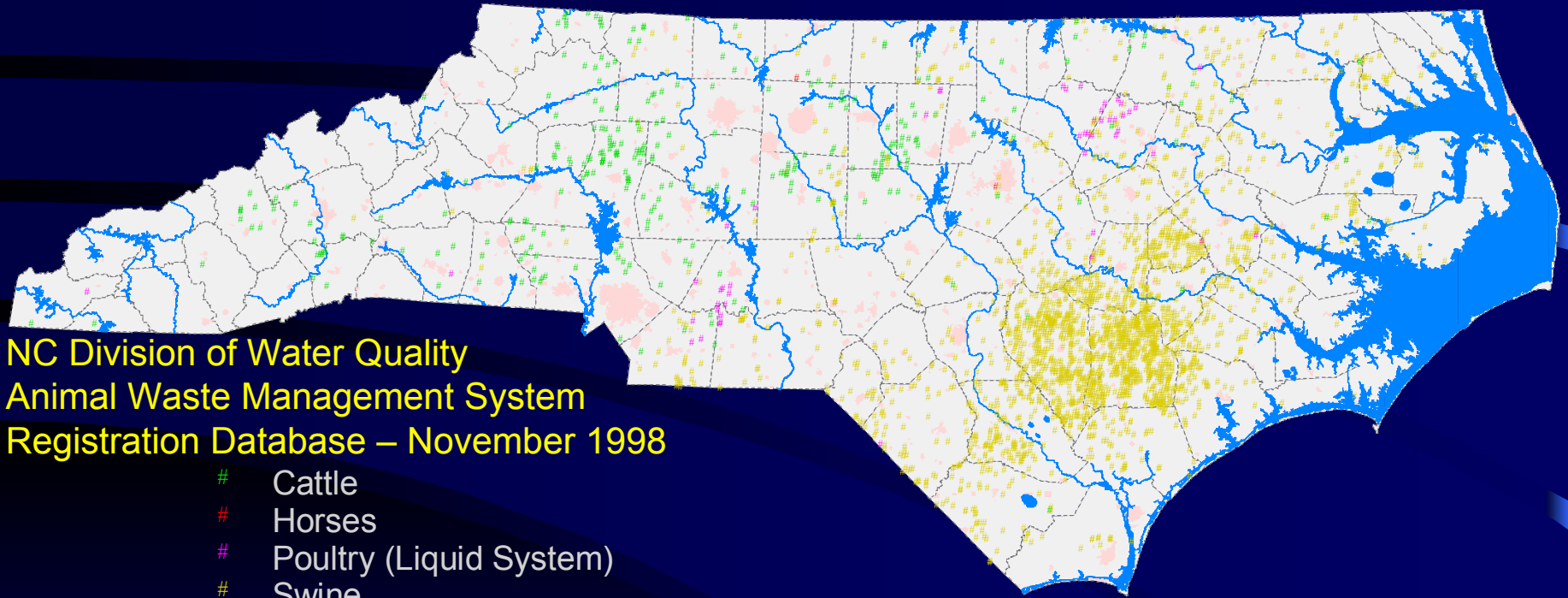


9.6 M Swine
\$ 1.7 B
#2 US

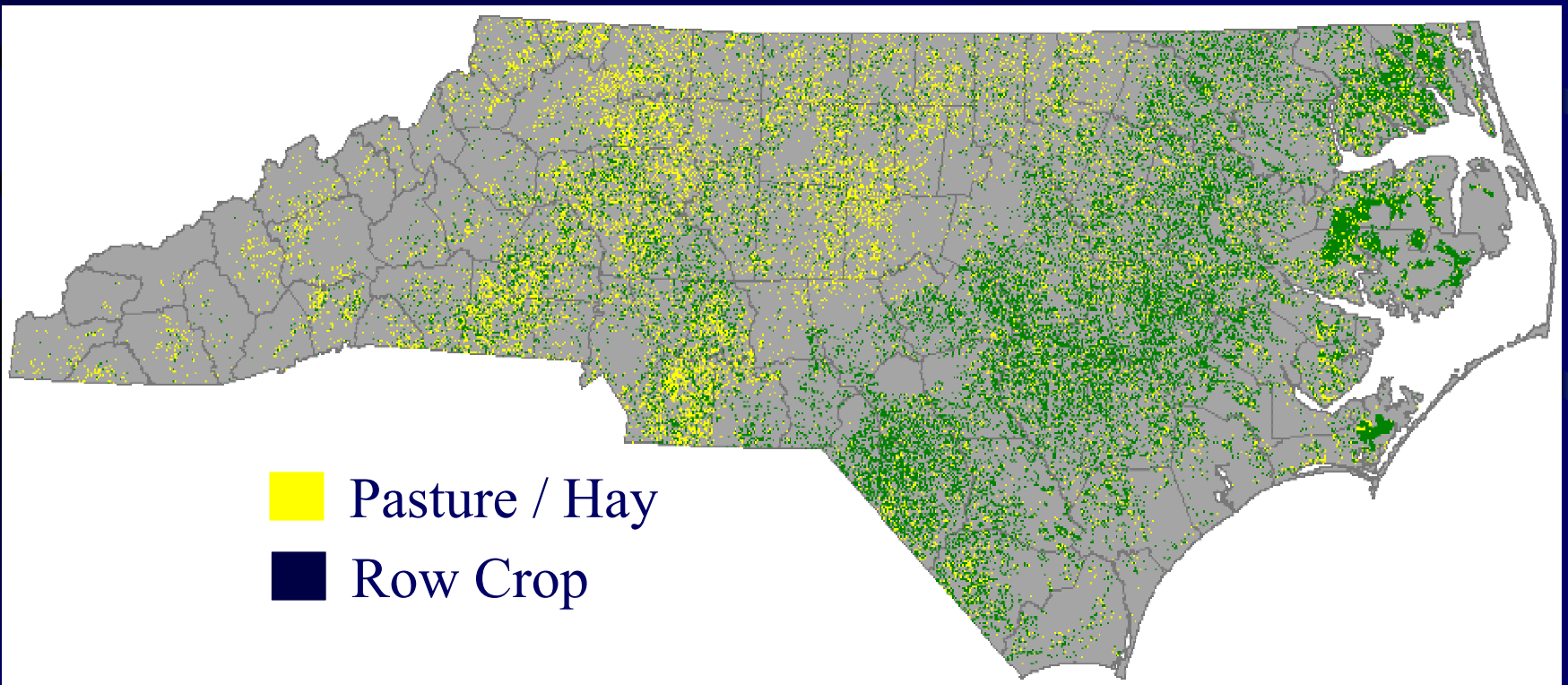


712 M Broilers
\$ 1.7 B
#4 US

Livestock Production Distribution



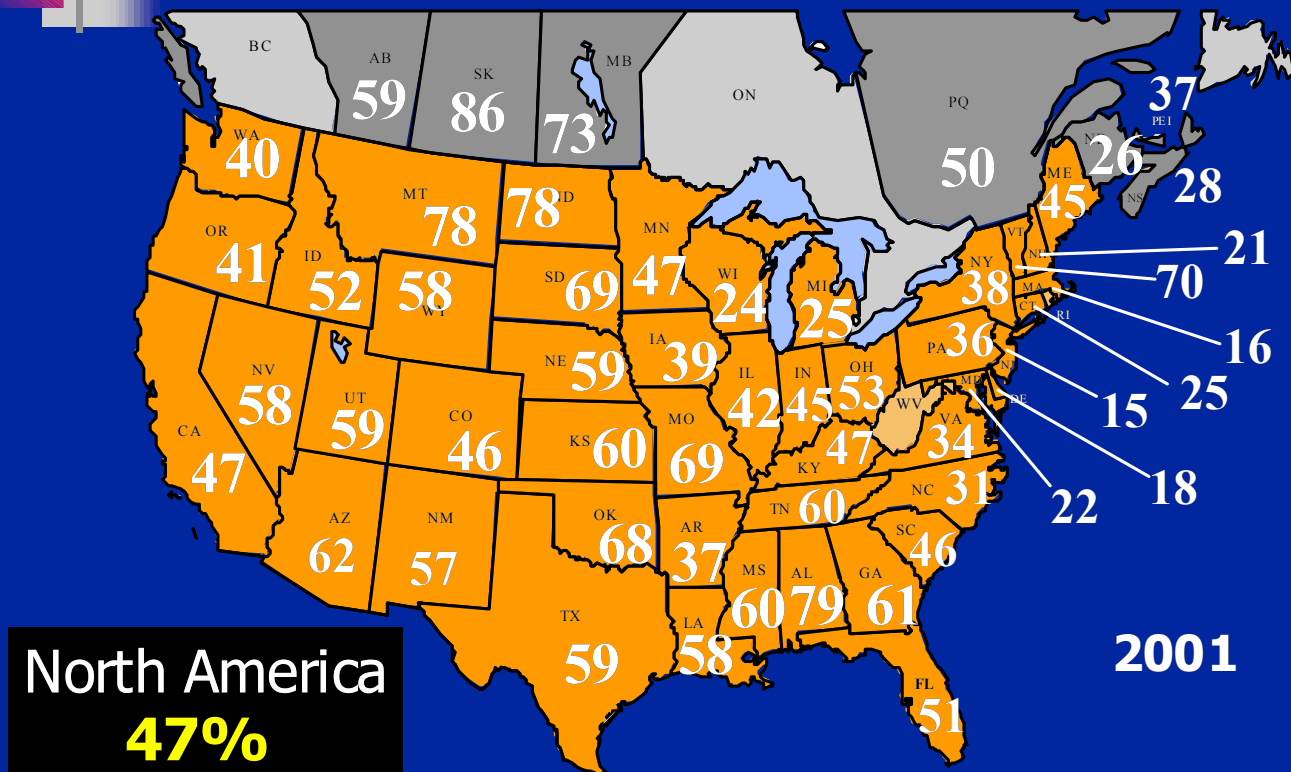
Crop Production and Physiographic Region



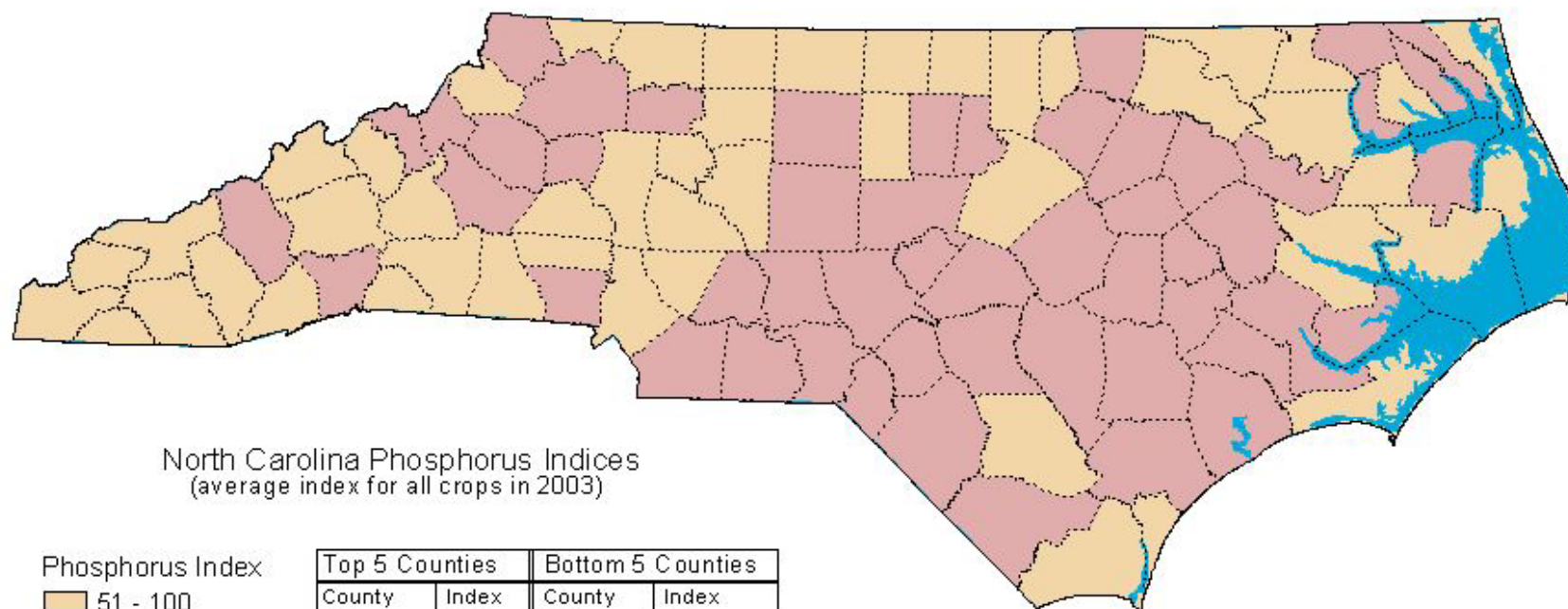
Phosphorus and NC Soils

Nutrients and North Carolina Soils

Figure 2. Percent of Soils Testing Medium or Lower in P



Average Soil Test Phosphorus



North Carolina Phosphorus Indices
(average index for all crops in 2003)

Phosphorus Index

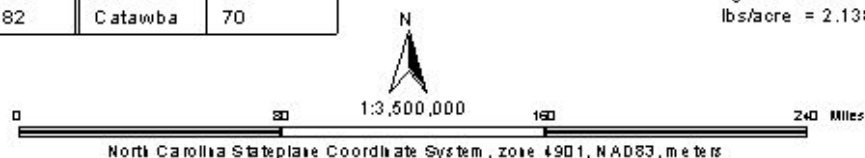
- 51 - 100
- > 100

Top 5 Counties		Bottom 5 Counties	
County	Index	County	Index
Wilkes	255	Stokes	60
Duplin	195	Yancey	66
Richmond	186	Hyde	67
Union	183	Caswell	69
Lenoir	182	Catawba	70

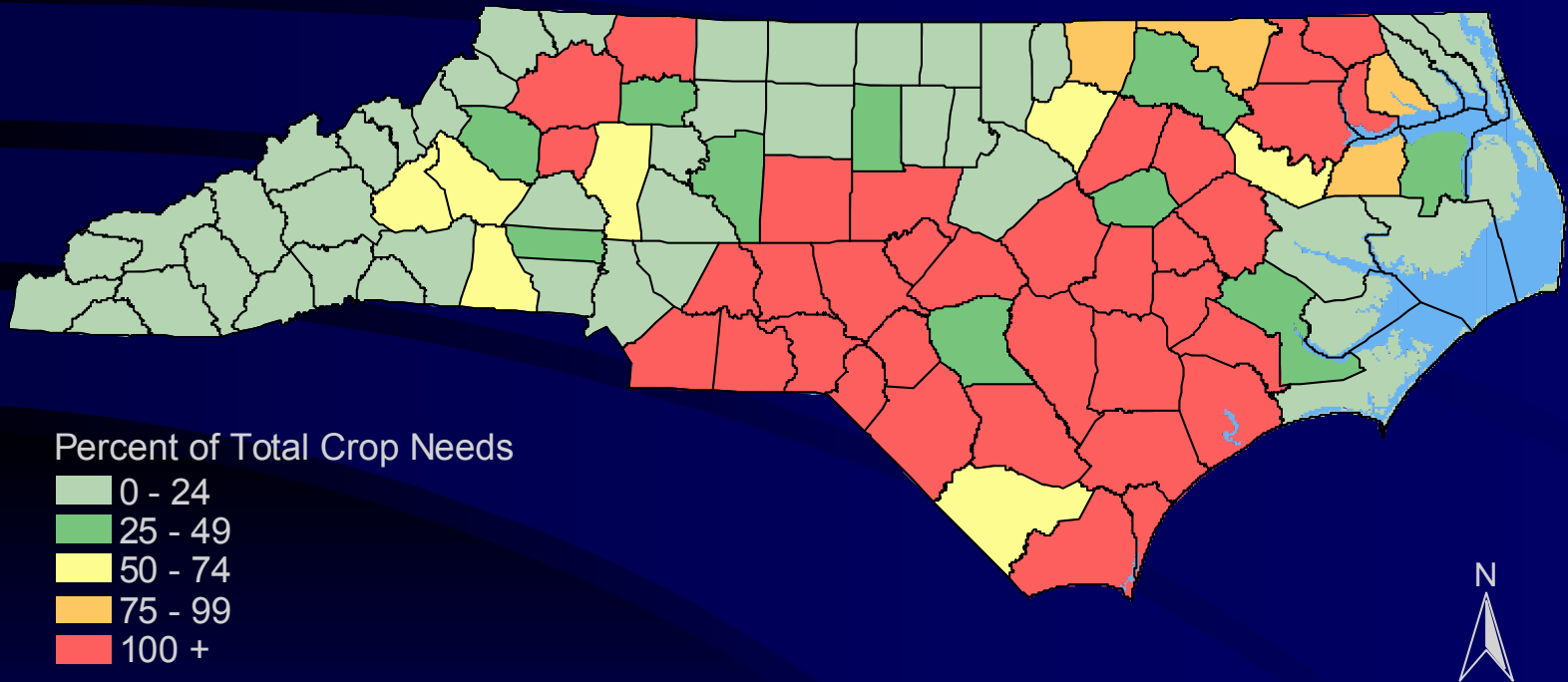
Multiplication factors for converting soil test index values to a quantitative equivalent

$$\text{kg/ha} = 2.4 \times \text{Phosphorus Index}$$

$$\text{lbs/acre} = 2.138 \times \text{Phosphorus Index}$$



Percent of Total Crop P Needs - 2000



NRCS New 590
Nutrient Management
Standard & its Phosphorus
Accounting Tool: a site specific
assessment using a phosphorus index



North Carolina Phosphorus Loss
Assessment Tool (PLAT)

Who Developed PLAT?

- **NCSU**
 - Steve Hodges
 - Robert Evans
 - Wendell Gilliam
 - John Havlin
 - Gene Kamprath
 - Deanna Osmond
 - John Parsons
 - Wayne Skaggs
- **NCDAC &S**
 - Richard Reich
 - David Hardy
- **USDA-NRCS**
 - Roger Hansard
 - Lane Price
- **DENR-Div. Soil & Water**
 - Carroll Pierce



P Lost Through Erosion

Total P Lost by Erosion =
Amount of Soil Eroded * Soil Test P
* Best Management Practices



P Lost Through Runoff

Total of P Lost Through Runoff =
Amount of Runoff * Soil Test P



P Lost Through Leaching

Total of P Lost Through Leaching =

Amount of Drainage * Soil Test P

OR

High Soil Test P in the Subsoil



P Lost Through Source

Total of P Lost Through Sources =
Source Characteristics * Application
Method * Source Rate

Phosphorus Loss Assessment Rating

Rating = Erosion + Runoff + Leaching + Source

Very High = No more P application (except starter)

High = Crop removal levels of P

Medium = N-based nutrient management plan

Low = N-based nutrient management plan

PLAT: Computerization

North Carolina Agricultural Nutrient Assessment Tool (NCANAT) v2.0

Navigation: [Back] [Forward] [Home] [EXIT] [Download Updates]

Menu: Main | Record View | View Tables | About NLEW and PLAT | Credits

Buttons: New Record | Get Record | Save Record | NLEW | PLAT | NLEW And PLAT | RESET | View/Print Results

Location
County: [Dropdown] Mapping Unit: [Dropdown]

Cropping Systems
Most Erosive Crop: [Dropdown]

Identification
Calendar Year: [2002] Tract Number: [Text Box]
Producer ID: [Text Box] Field Number: [Text Box]

BMPs
Enter BMPs... | BMP Count = 0

Nutrient Applications
Soil Loss (t/ac/yr): [Text Box]
Receiving Slope Dist. [Dropdown] ft.
Application Source And Rate: [Text Box]
Nutrient Count = 0

CALCULATE

Field Verification of PLAT

Phase I

- Selected counties
- Selected sampling
- Soil type, soil test P, and leaching
- Initial determination for the affect of the new NRCS 590 nutrient management standard

Phase II

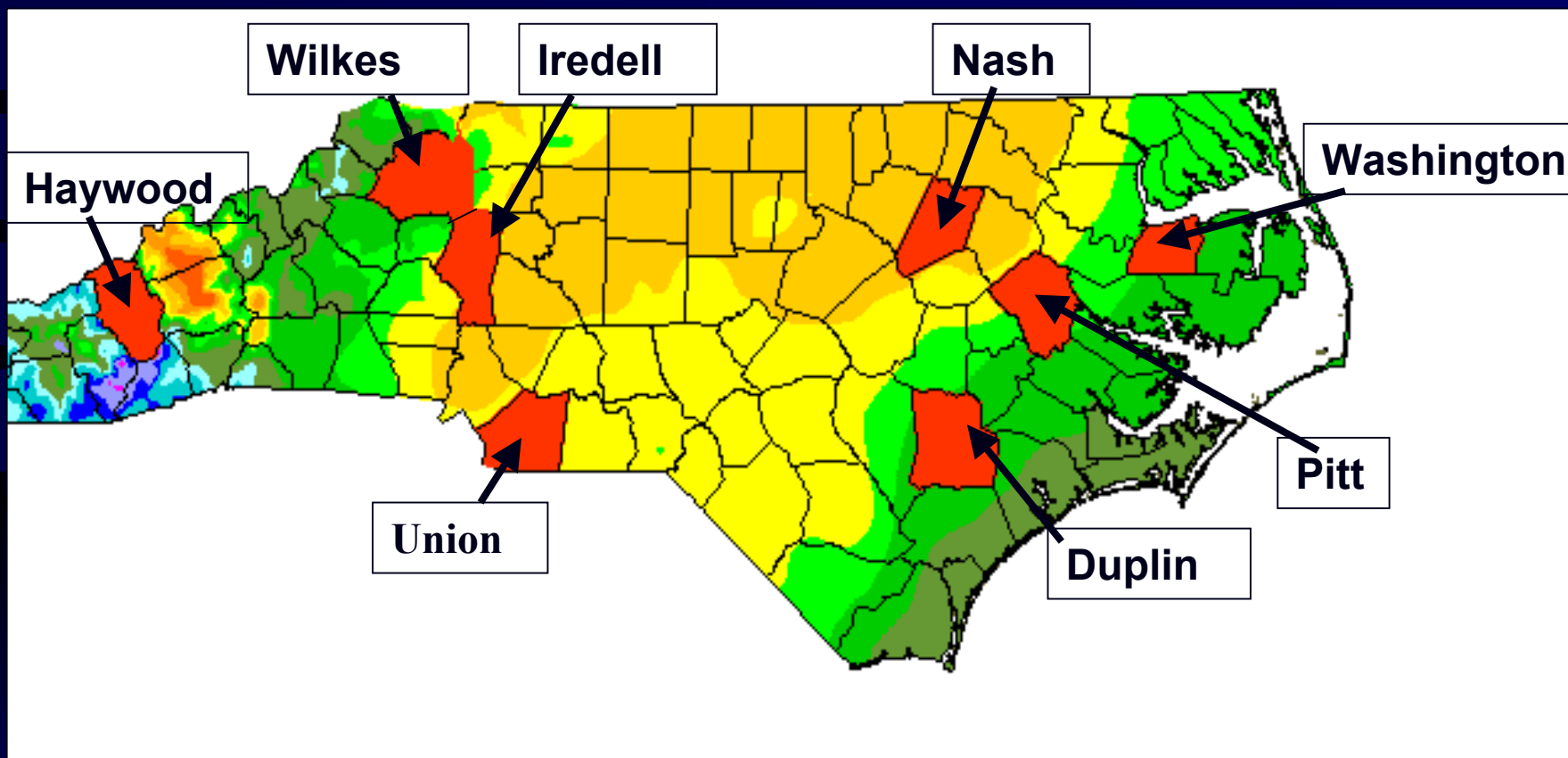
- All counties
- Proportional sampling
- Random samples
- Determine number and type of producers affected by new NRCS 590 nutrient management standard

Field Verification of PLAT

Amy Johnson, PhD 2004

Phase I

Counties Sampled



Soil Type

Counties Sampled

•Mountain clays	Haywood, Wilkes
•Piedmont clays	Iredell, Union
•Coastal Plain loams	Duplin, Nash, Pitt
•Coastal Plain sands	Duplin, Pitt
•Mineral-Organics	Washington
•Organics	Washington

Soil Type

Row Crop

Pasture

Animal Waste

Inorganic

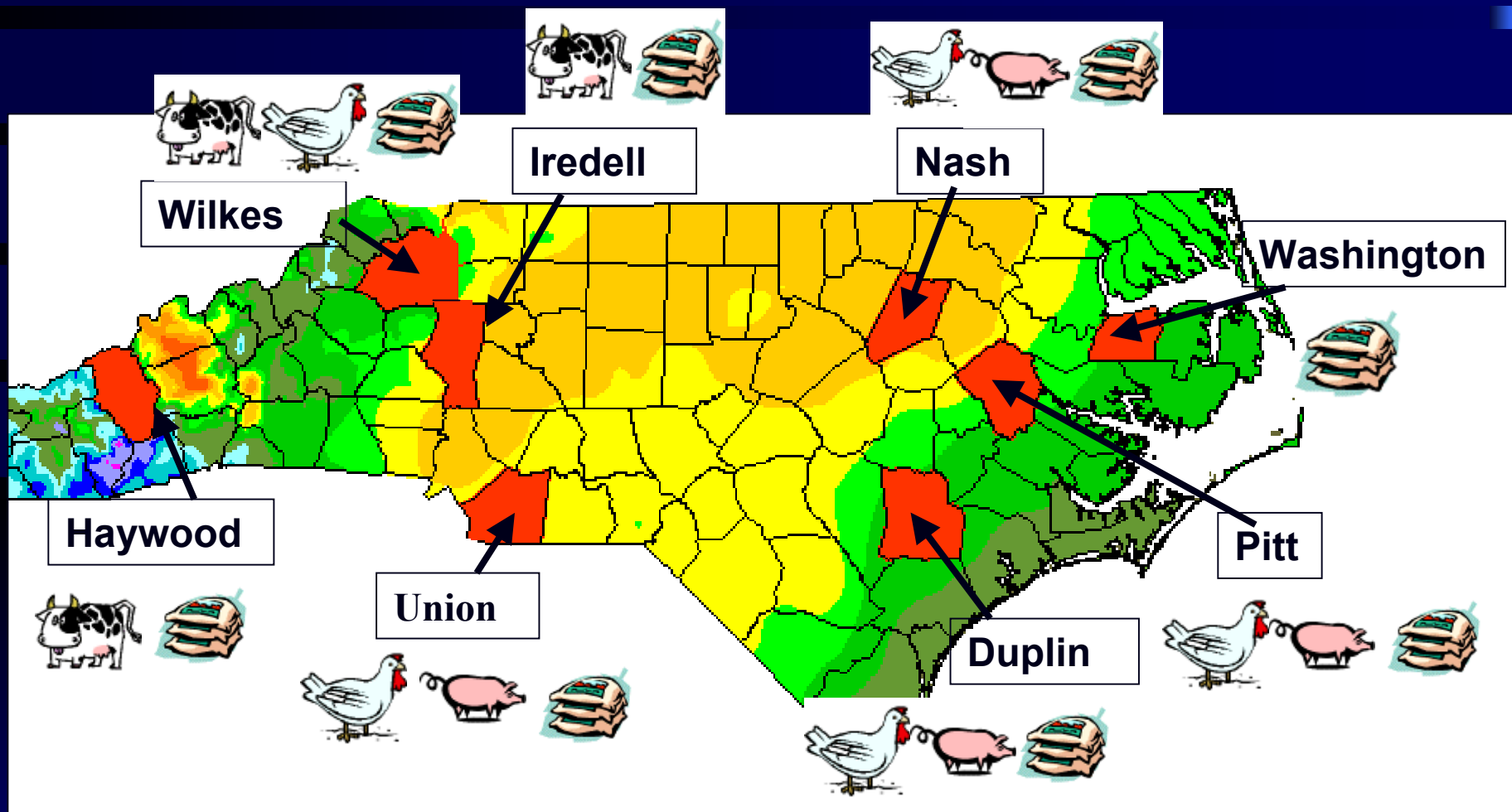
Animal Waste

Inorganic

- Dairy
- Poultry
- Swine

- Dairy
- Poultry
- Swine

Counties & Fertilizer Source Sampled

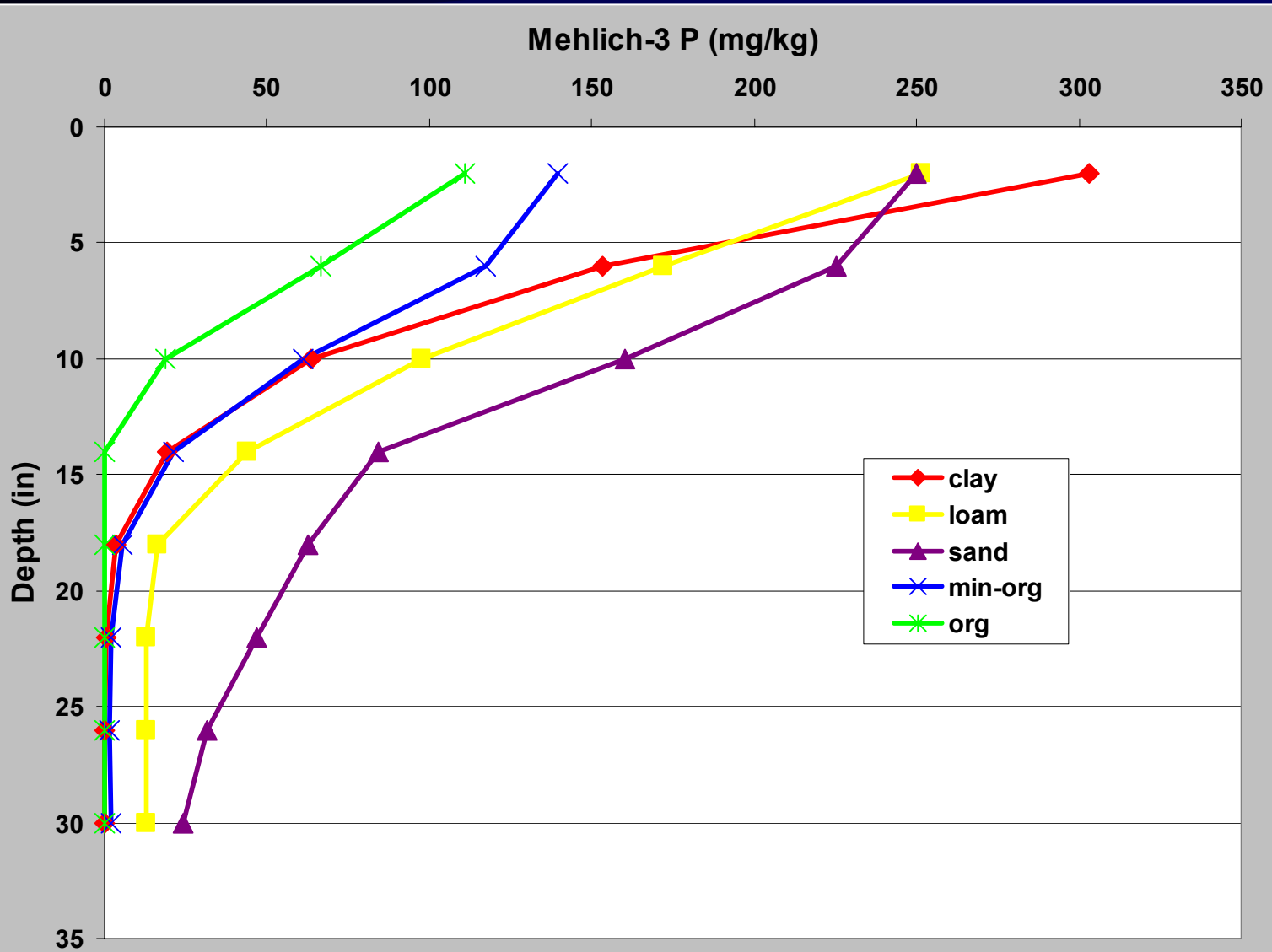


Methods

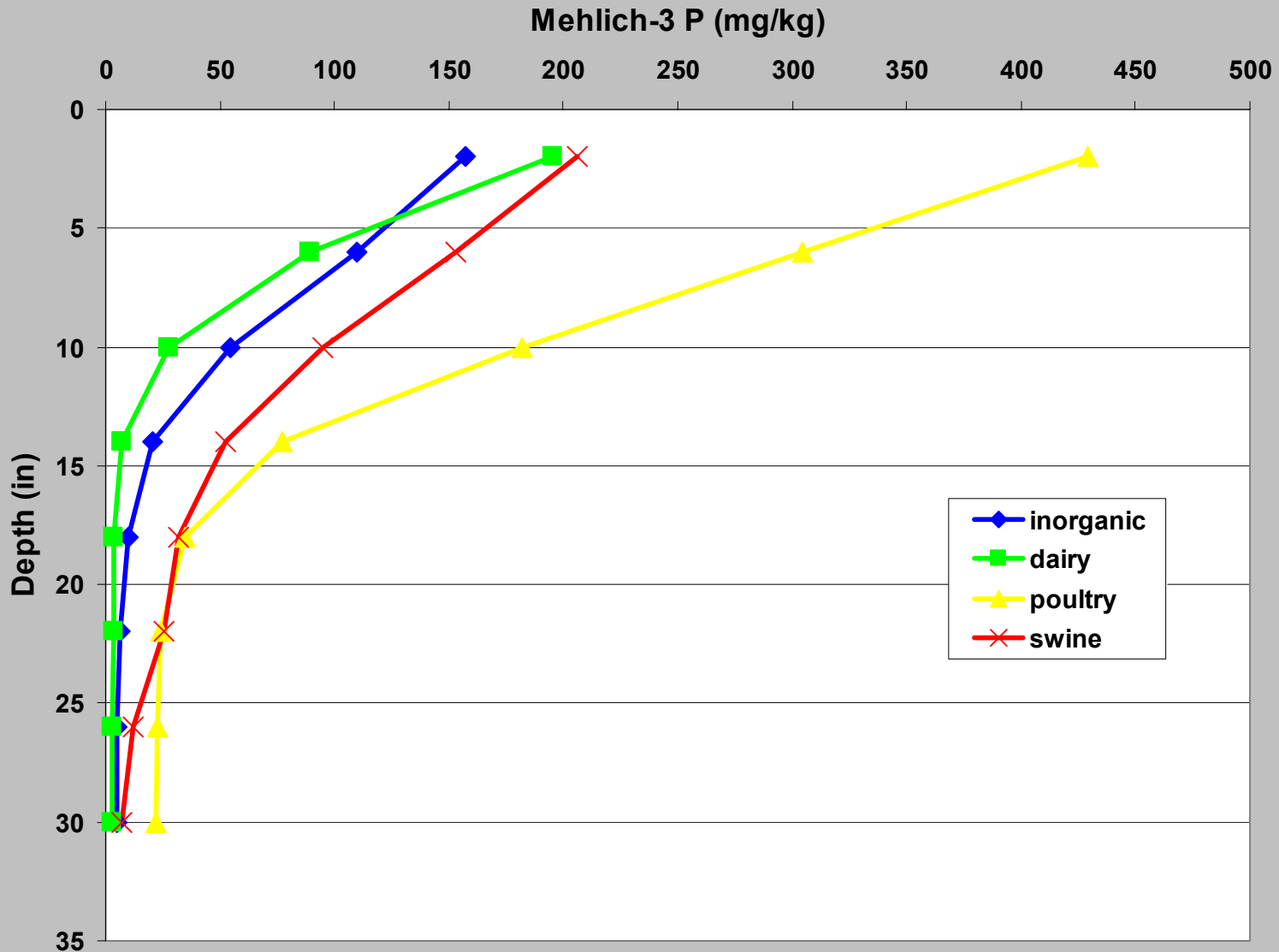
From each site:

- Sampled soil to 32 inch depth at 4 inch increments
- Analyzed soil samples for Mehlich-3 extractable P
- Collected data on topography, cropping system, drainage, cropping history, amount of P applied, et

M3P With Depth for Different Soil Types



M3P With Depth for Different Fertilizers



Phase I Data

Category	Very High	High	Medium	Low
P Loss (PLAT Index)	> 100	51-100	26-50	0-25
% in Category	8	11	19	62

Phase I Data By Phosphorus Type

	Dairy	Poultry	Swine	Fertilizer
PLAT Rating	------%-----			
Very High	11	15	6	0
High	22	19	6	0
Medium	33	27	13	12
Low	34	39	75	88

Field Verification of PLAT

Phase II

Phase II PLAT Sampling Project

County	Pasture /Hay	Crops
Pamlico	1	10
Union	9	23
Johnston	16	13
Clay	10	1

County Sample Numbers for PLAT Phase II Sampling

Number of Samples	Number of Counties
0-9	8
10-19	44
20-29	42
≥ 30	6

Crop Distribution in Phase II

Type of Crop	Number of Fields
Row Crop	545
Pasture	371
Hay	473

Example of Soil Test P Data for Phase II

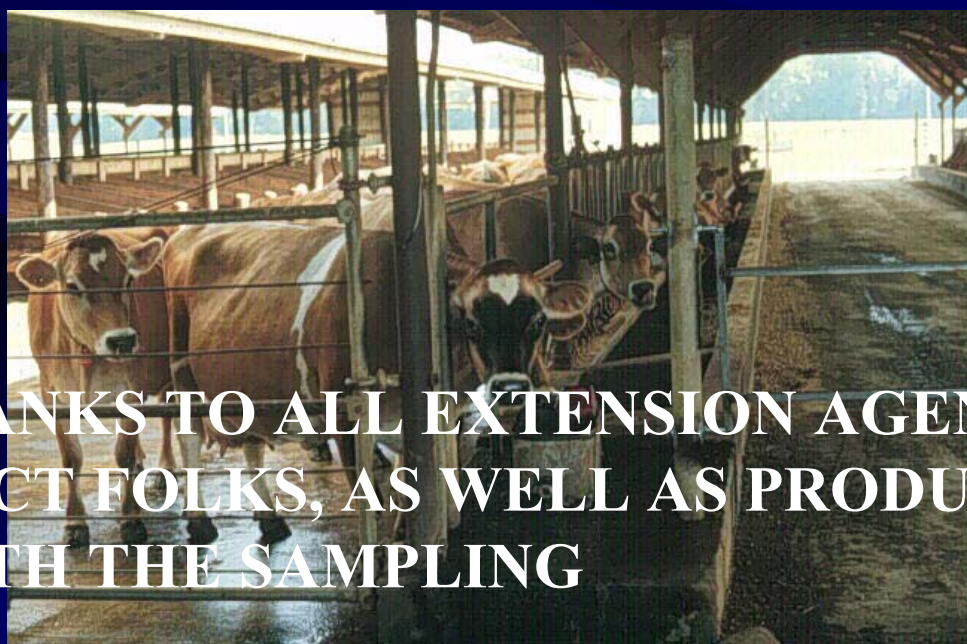
- Duplin County: 23 samples
 - 21 samples **very high**
 - 2 samples **high**
- Madison County: 15 samples
 - 4 samples **very high**
 - 3 samples **high**
 - 3 samples **medium**
 - 5 samples **low**

P Soil Test Data for Phase II

County	Soil series	P-Index (surface)	P-Index (sub)
Union	Cid channery silt loam	1593.6	7.08
Duplin	Autryville	135.2	185.8
Hyde	Scuppernong muck	25.1	27.08
Yadkin	Buncombe sand	212	178.7

Phase II PLAT Results

TYPE	LOW	MEDIUM	HIGH	VERY HIGH
Poultry	60	16	18	6
Dairy	60	15	20	5
Swine	49	19	22	10
Inorganic	86	10	3	1



**A HUGE THANKS TO ALL EXTENSION AGENTS, NRCS
AND DISTRICT FOLKS, AS WELL AS PRODUCERS WHO
HELPED WITH THE SAMPLING**