USDA-NASS Cropland Data Layer
(Chesapeake Bay Watershed)

Patrick Willis & Rick Mueller

United States Department of Agriculture,
National Agricultural Statistics Service
& Towson University

Who is NASS?

- Each year, the USDA's National Agricultural Statistics Service (NASS) conduct hundreds of surveys and prepares reports covering virtually every facet of U.S. agriculture.

- Traditional NASS crop acreage estimates are based primarily on mailing, telephone, and face-to-face surveys of producers and agribusiness who voluntarily provide information on a confidential basis.

Wisconsin Agricultural Statistics Service

P.O. Box 8934 Madison, WI 53708-8934

In cooperation with WI Department of Agriculture, Trade and Consumer Protection

USDA

2002 Dairy Producer Opinion Survey

November 2002

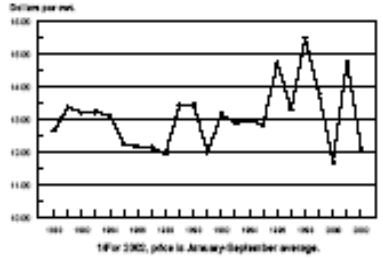
Wisconsin Milk Production To Recover

Milk production is expected to increase in Wisconsin during the next five years according to a survey conducted by the Wisconsin Agricultural Statistics Service. This statewide survey of producers asked for their plans with the assumption that milk prices for the next five years will be at the same level as the past five years. The survey was conducted during May and June 2002.

Based on the survey, 60 percent of producers expect to keep the same herd size, 20 percent plan to increase herd size, and 20 percent intend to discontinue milking by 2007. Actual results will depend on future milk prices, input prices, financing availability, crop yields, and other factors.

The number of herds projected for 2007 shows that the diversity of small to large herds will continue. The most prevalent herd size will remain at 50 to 99 cows.

All Milk Price, Wisconsin
Annual Average, 1980 - 2002 1/



1/For 2002, price is January-September average.

Wisconsin Dairy Herds by Herd Size

Milk cow herd size	May 2002 herds	May 2007 herds (projected) 1/	Change 2007/2002
	Number		Percent
1 - 29	2,600	1,440	-45
30 - 49	4,700	3,440	-27
50 - 99	7,400	5,600	-24
100 - 199	1,900	2,080	+9
200 - 499	700	900	+29
500+	200	440	+120
Total	17,500	13,900	-20

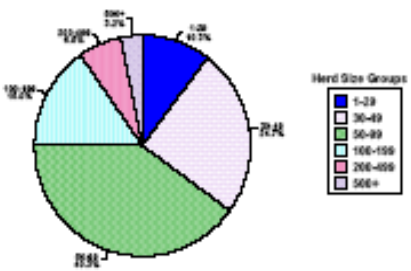
1/The May 2007 projection is based on farmers' opinions May-June 2002, with the assumption that milk prices for the next five years will be at the same level as the past five years.

Wisconsin Dairy Farmer Plans for May 2007 1/ by Herd Size

Milk cow herd size	Herds	Keep same herd size	Increase herd size	Discontinue milking
	Number	Percent		
1 - 29	2,600	47	17	36
30 - 49	4,700	71	9	20
50 - 99	7,400	63	19	18
100 - 199	1,900	53	37	10
200 - 499	700	33	59	8
500+	200	22	78	0
Total	17,500	60	20	20

1/The May 2007 projection is based on farmers' opinions May-June 2002, with the assumption that milk prices for the next five years will be at the same level as the past five years.

Percent of Herds by Size Group
2007 Projection



2001 Wildlife Damage Survey

Released March 15, 2002 by the Maryland Agricultural Statistics Service a cooperative service of the Maryland Department of Agriculture, and the National Agricultural Statistics Service. For more information call (410)-841-5740.

7.7 Pecent of Crop Value Lost to Deer and Geese

Maryland farmers lost $17.2 million of corn, soybeans and wheat to deer or geese during 2001. This translates to Maryland farmers losing 7.7 percent of the crop value to deer and geese. Soybeans accounted for the greatest economic loss, totaling $9.1 million, 11 percent. Corn losses were $6.6 million, 5.8 percent and wheat $1.5 million, 5.6 percent. Deer damage resulted in losses of $13.6 million, 6.1 percent, while geese losses were $3.6 million, 1.6 percent.

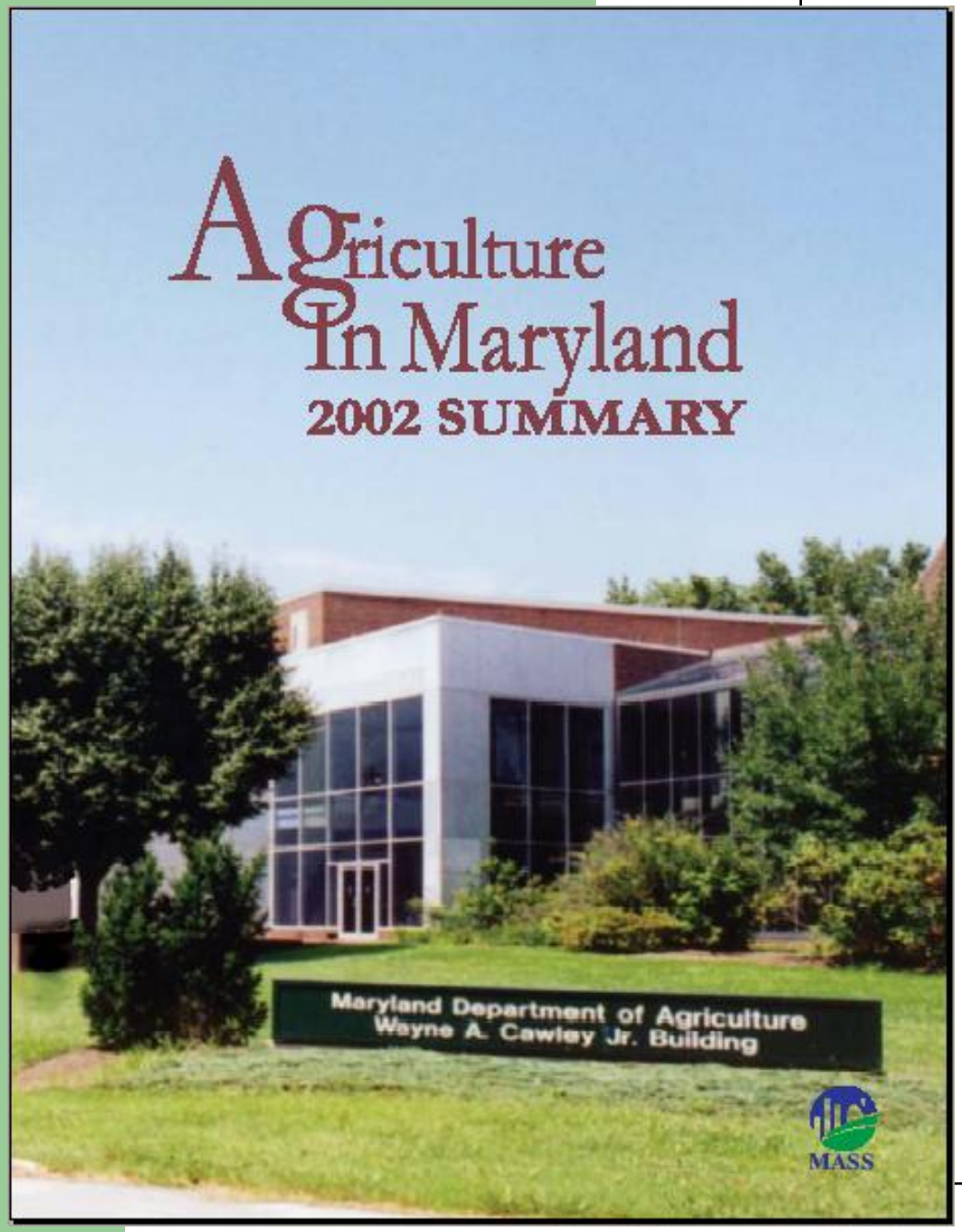
Production losses totaled 6.0 million bushels. Corn losses were 3.2 million bushels, soybean losses totaled 2.2 million bushels and wheat accounted for 0.6 million bushels. Production losses to deer were 4.7 million bushels and geese 1.3 million bushels.

In terms of yield, losses to deer were most severe in Central and Western Maryland, while geese damage was greater on the Eastern Shore. Corn yield losses of 9.6 bushels per acre and 7.4 bushels per acre were reported in Central and Western Maryland, respectively. The Lower Eastern Shore reported the highest soybean losses of 6.1 bushels per acre.

Sixty-two percent of farms reported deer or geese damage to one or more crop. Damage was reported on 61 percent of farms raising corn, 58 percent of farms growing soybeans and 27 percent of farms with wheat.

Maryland 2001 Crop Loss from Deer

Region1	Crop	Acres Harvested	Harvested Yield (bu/acre)	Average Yield Loss (bu/acre)	Production Loss (bu)	Economic Loss ($)
Western Maryland	**Corn**	5,500	104.9	7.4	40,700	83,435
Allegany, Garrett	**Soybeans**	300	36.7			
	Wheat	200	45.0	2.3	460	1,127
Central Maryland	**Corn**	125,200	98.2	9.6	1,201,920	2,463,936
Baltimore, Carroll, Frederick, Harford, Howard, Montgomery, Washington	**Soybeans**	92,500	34.0	3.9	360,750	1,479,075
	Wheat	38,300	63.3	3.3	126,390	309,656
Southern Maryland	**Corn**	29,800	132.7	4.9	146,020	299,341
Anne Arundel, Calvert, Charles, Prince Georges, St. Mary's	**Soybeans**	43,200	38.0	3.3	142,560	584,496
	Wheat	16,000	57.0	0.9	14,400	35,280
Upper Shore	**Corn**	157,000	159.2	5.1	800,700	1,641,435
Cecil, Caroline, Kent, Queen Anne's, Talbot	**Soybeans**	232,000	39.9	2.4	556,800	2,282,880
	Wheat	86,500	64.0	1.1	95,150	233,118
Lower Shore	**Corn**	92,500	150.7	4.1	379,250	777,463
Dorchester, Somerset, Wicomico, Worcester	**Soybeans**	147,000	41.0	6.1	896,700	3,676,470
	Wheat	34,000	63.0	0.9	30,600	74,970
Maryland	**Corn**	410,000	136.0	6.4	2,624,000	5,379,200
	Soybeans	515,000	39.0	3.6	1,854,000	7,601,400
	Wheat	175,000	63.0	1.5	262,500	643,125
	All Crops				4,740,500	13,623,725



1997
Census of Agriculture

AC97-A-49

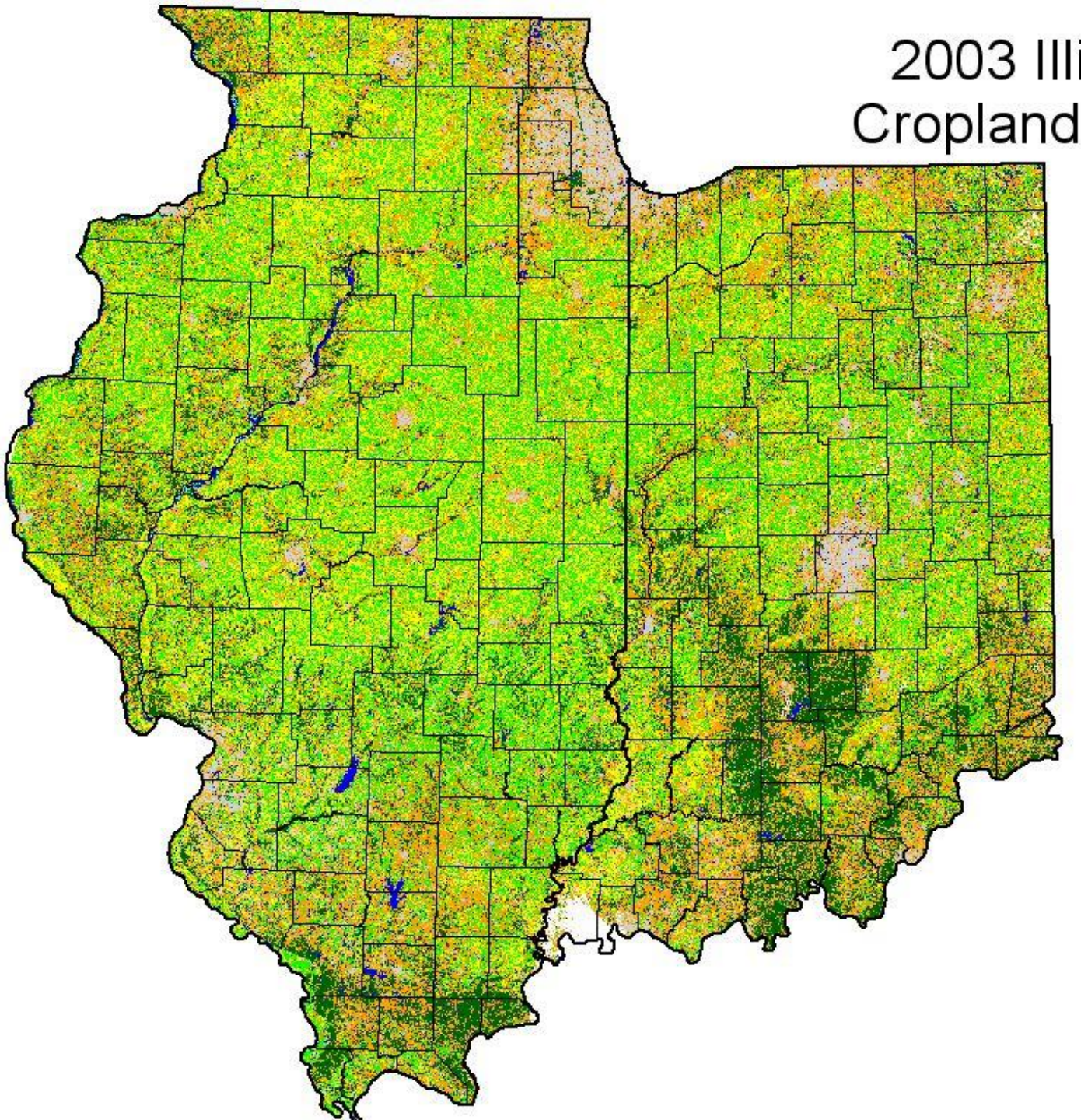
Wisconsin
State and County Data

Volume 1, Geographic Area Series
Part 49

Issued March 1999

U.S. Department of Agriculture
Dan Glickman, Secretary
Miley Gonzalez, Under Secretary for
Research, Education, and Economics
NATIONAL AGRICULTURAL STATISTICS SERVICE
Donald M. Bay, Administrator

2003 Illinois/Indiana Cropland Classification



Categories

- Corn
- Soybeans
- Winter Wheat
- Other Small Grains & Hay
- Double Cropped WW/Soybean
- All Other Crops
- Fallow/Idle Cropland
- Pasture/Grassland/NonAg
- Woods
- Clouds
- Water
- Urban/Buildings/Subdivisions
- Wetlands

ILLINOIS DEPARTMENT OF NATURAL RESOURCES

USDA

NASS

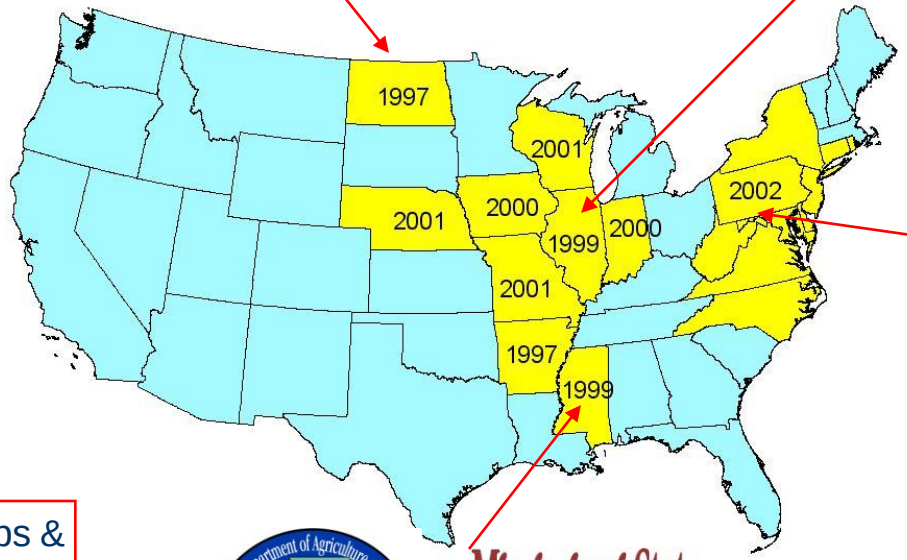
Illinois Department of Agriculture

Purpose of the USDA-NASS Cropland Data Layer (CDL)

- Combine remote sensing imagery and NASS survey data to produce *supplemental* acreage estimates for the state's major commodities

- Production of a crop-specific digital land cover data layer for distribution in industry standard "GIS" format

Cropland Data Layer States

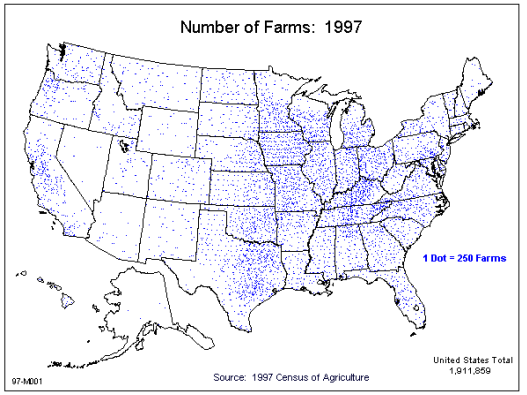


Cooperative partnerships & year implemented

NASS Methodology

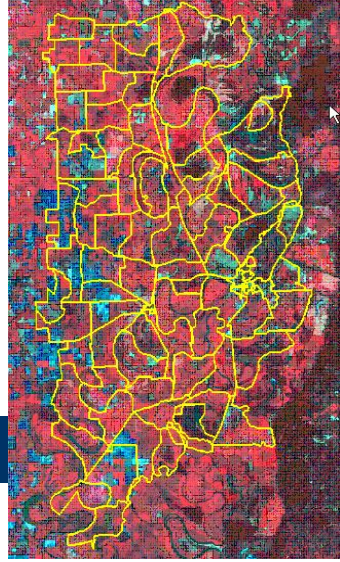
1. Hundreds of farms throughout each state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

Cropland Data Layer Background

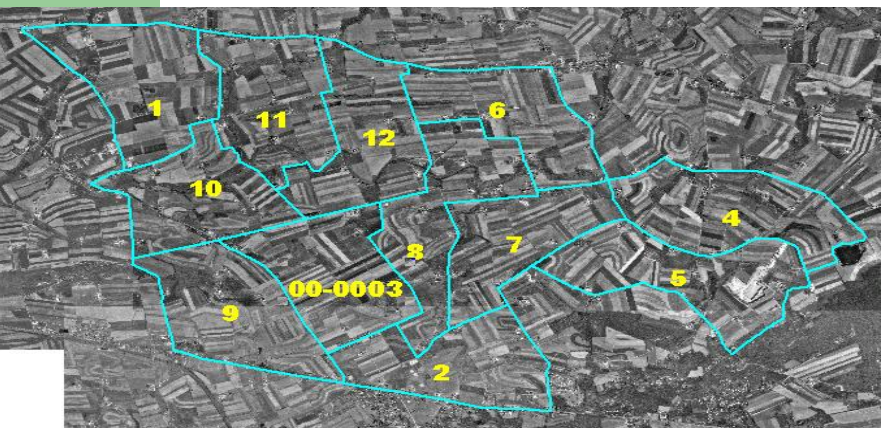


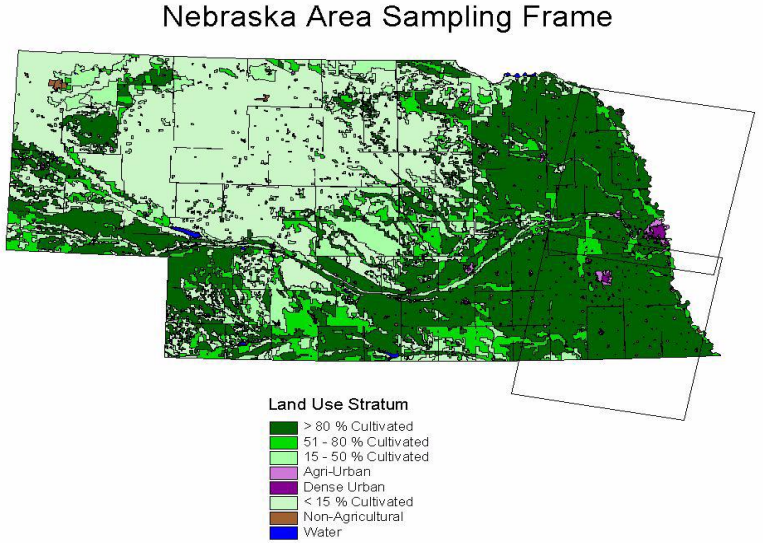
- National Agricultural Statistics Service
  - June Agricultural Survey (JAS) – National in Scope
    - 41,000 farms visited
    - 11,000 one-square mile sample area segments visited
    - Most states contain between 150 – 400 segments
    - Planted acreage estimate
  - Cropland Data Layer depends on the JAS data
    - Unbiased statistical estimator of crop area
      - State and county level estimates

Area Sampling Frame



- Stratify based on percent cultivated land
- Subdivide strata into primary sampling units or PSU's
  - Selected PSU's divided into secondary sampling units or segments



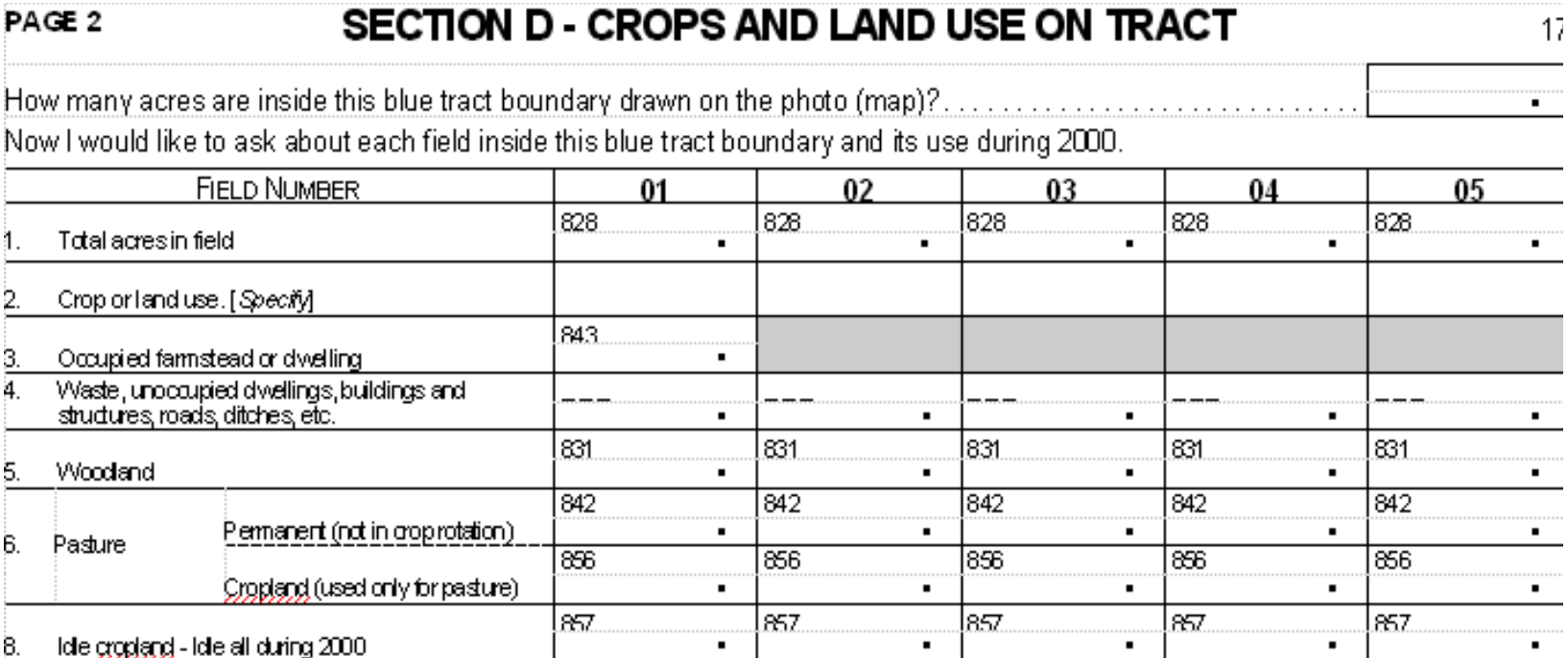


NASS Methodology

1 sq. mi. JAS segment annotated by enumerator on a 1:8,000-scale NAPP photo

JAS Questionnaire

- Enumerators account for all land usage in segment
  - Draw off field location by direct observation
  - Directly link questionnaire to segment photo



PAGE 2

SECTION D - CROPS AND LAND USE ON TRACT

17

How many acres are inside this blue tract boundary drawn on the photo (map)? . . . . . .

Now I would like to ask about each field inside this blue tract boundary and its use during 2000.

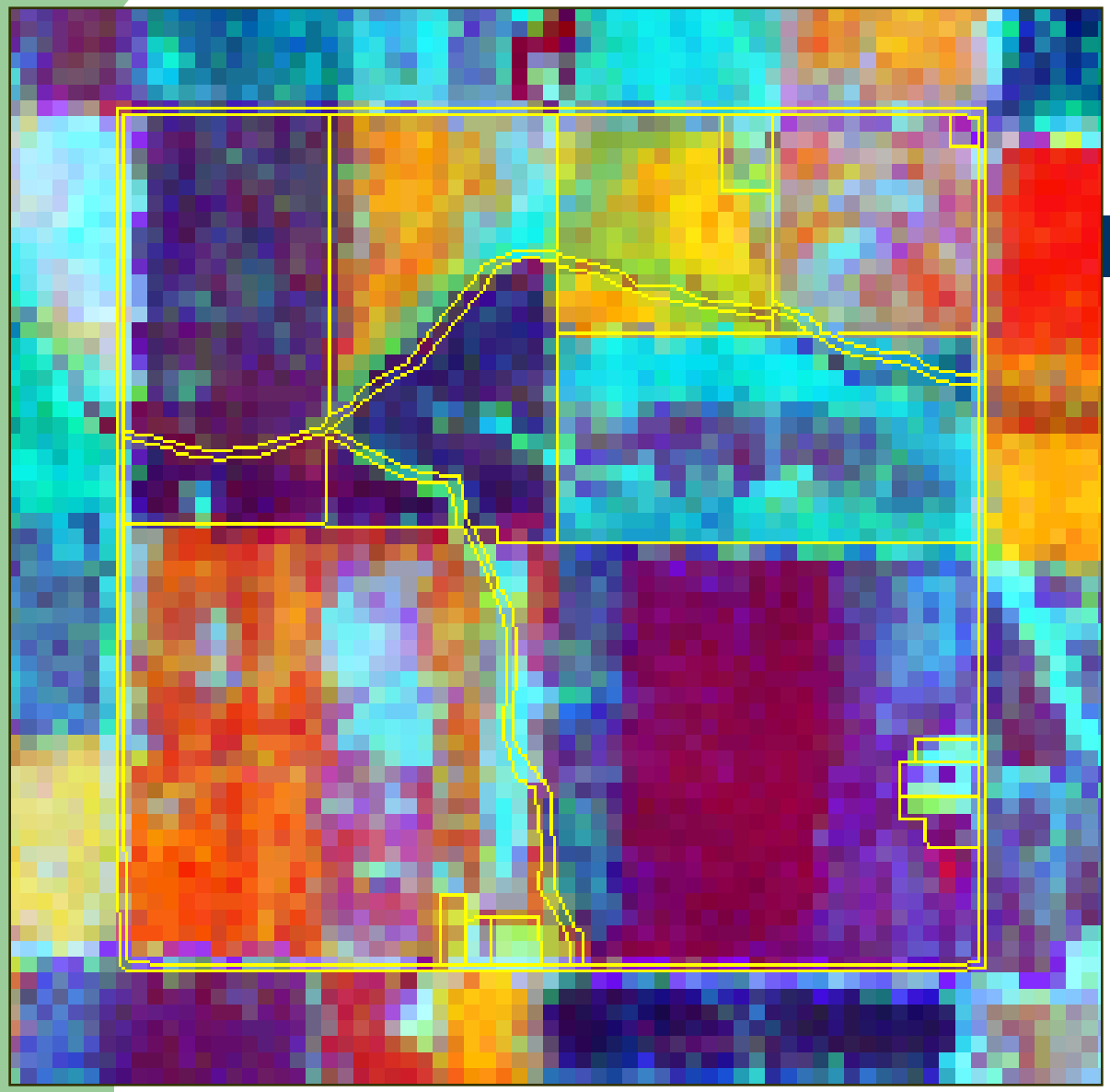
FIELD NUMBER	01	02	03	04	05
1. Total acres in field	828	828	828	828	828
2. Crop or land use. [*Specify*]					
3. Occupied farmstead or dwelling	843				
4. Waste, unoccupied dwellings, buildings and structures, roads, ditches, etc.	___	___	___	___	___
5. Woodland	831	831	831	831	831
6. Pasture — Permanent (not in crop rotation)	842	842	842	842	842
6. Pasture — Cropland (used only for pasture)	856	856	856	856	856
8. Idle cropland - Idle all during 2000	857	857	857	857	857

NASS Methodology

1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. **The land use and acreage information is entered into a database and the field boundaries are digitized.**

NASS Methodology



- Each field is digitized by the NASS field office staff through direct interpretation of the enumerator's annotated NAPP photo of the JAS segment onto an enlarged Landsat TM image.

Satellite Specs

Landsat 5 (TM) and Landsat 7 (ETM+)

Spatial Resolution:

- One picture element (pixel) represents an area of 30 meters by 30 meters, 185 kilometer swath width
- 43 Scenes used for the 2002 Mid-Atlantic Cropland Data Layer

Temporal Resolution:

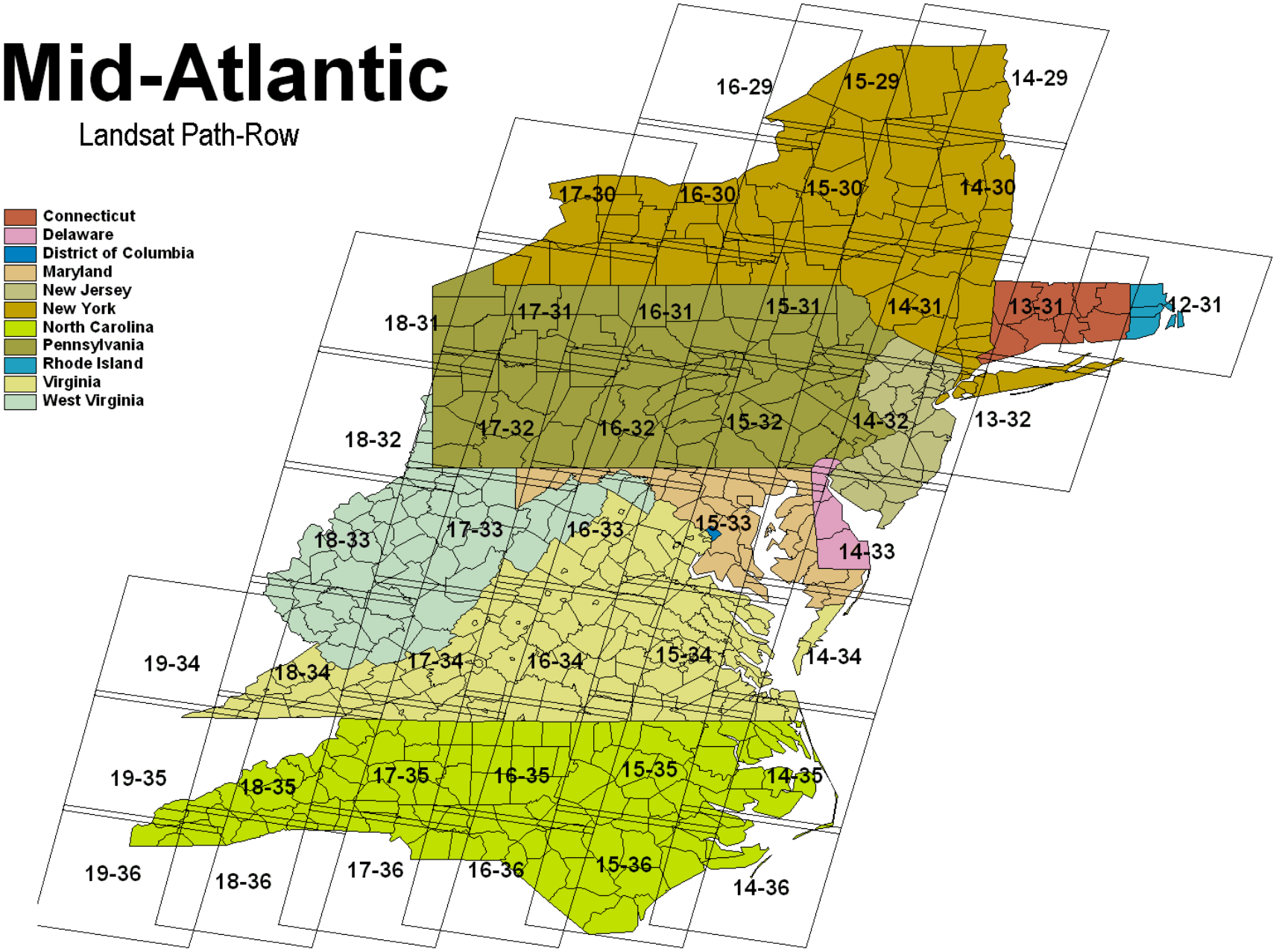
- 16 day repeat coverage (two satellites in 2002 = once every 8 days)
- NASS uses 2 dates for our classification process (Spring & Summer)

Spectral Resolution:

- 3 Visible Bands@ 30m
- 1 Near Infrared (IR) Band @ 30m
- 2 Shortwave IR Bands @ 30m
- 1 Thermal IR Band (TM @ 120m, ETM @ 60m)
- 1 Panchromatic Band @ 15m res. (ETM only)

Mid-Atlantic

Landsat Path-Row



NASS Methodology

1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. **A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.**

Program Resources

Hardware

Computational intensive jobs (i.e. cluster/classify)
- Windows XP

Digitizing/editing
- Windows XP

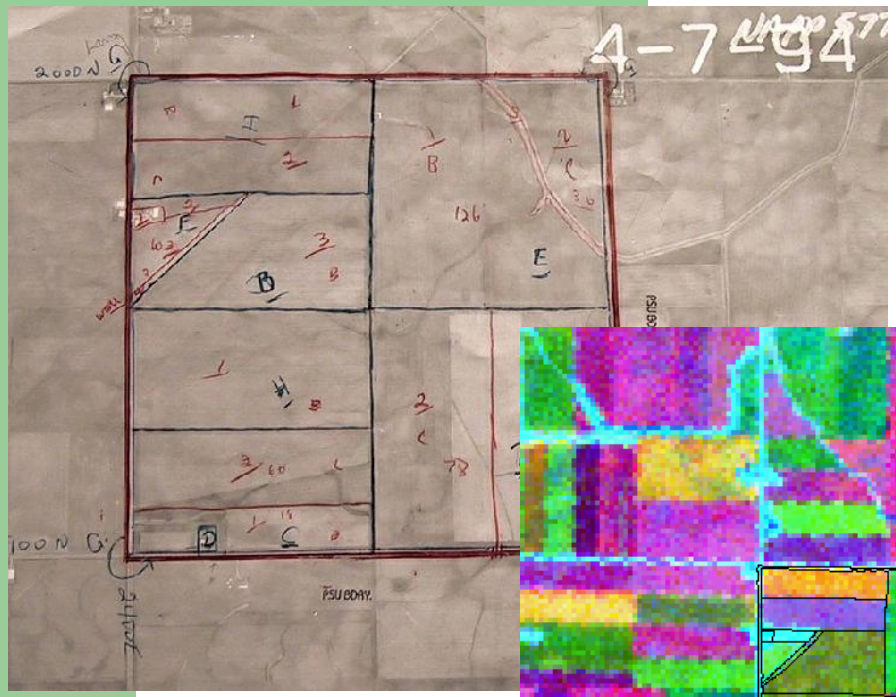
Software

Image processing PEDITOR
- Developed internally

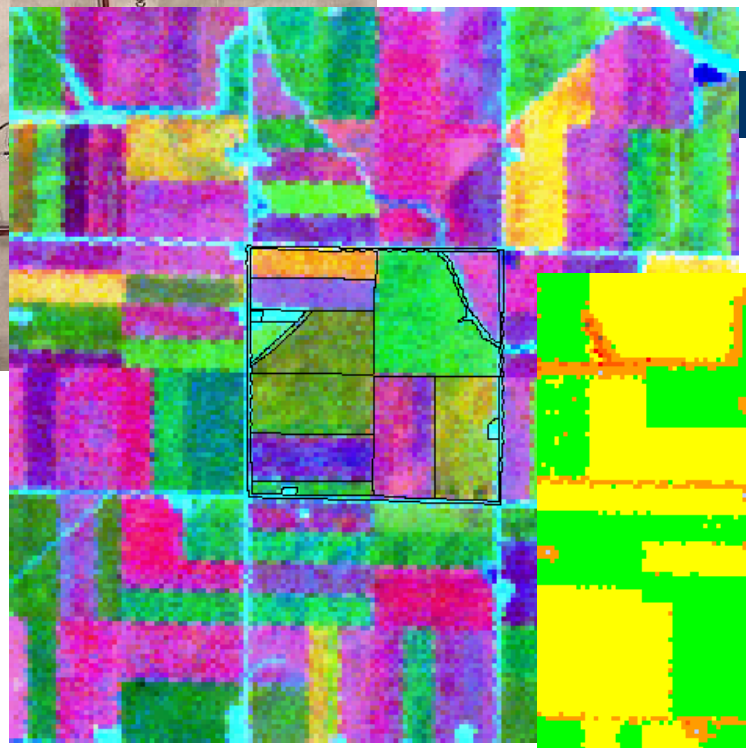
Digitizing/editing
- Remote Sensing Project
  - Developed internally

Batch job processing
- XLNT – Commercial software

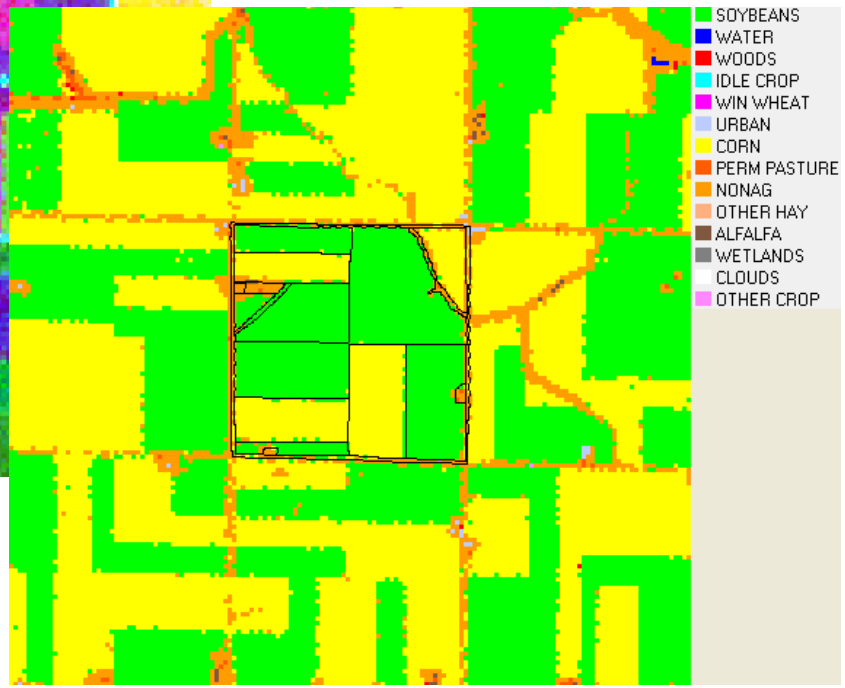
Segment Processing



Field Enumeration



Digitizing & Labeling



Classification

NASS Methodology

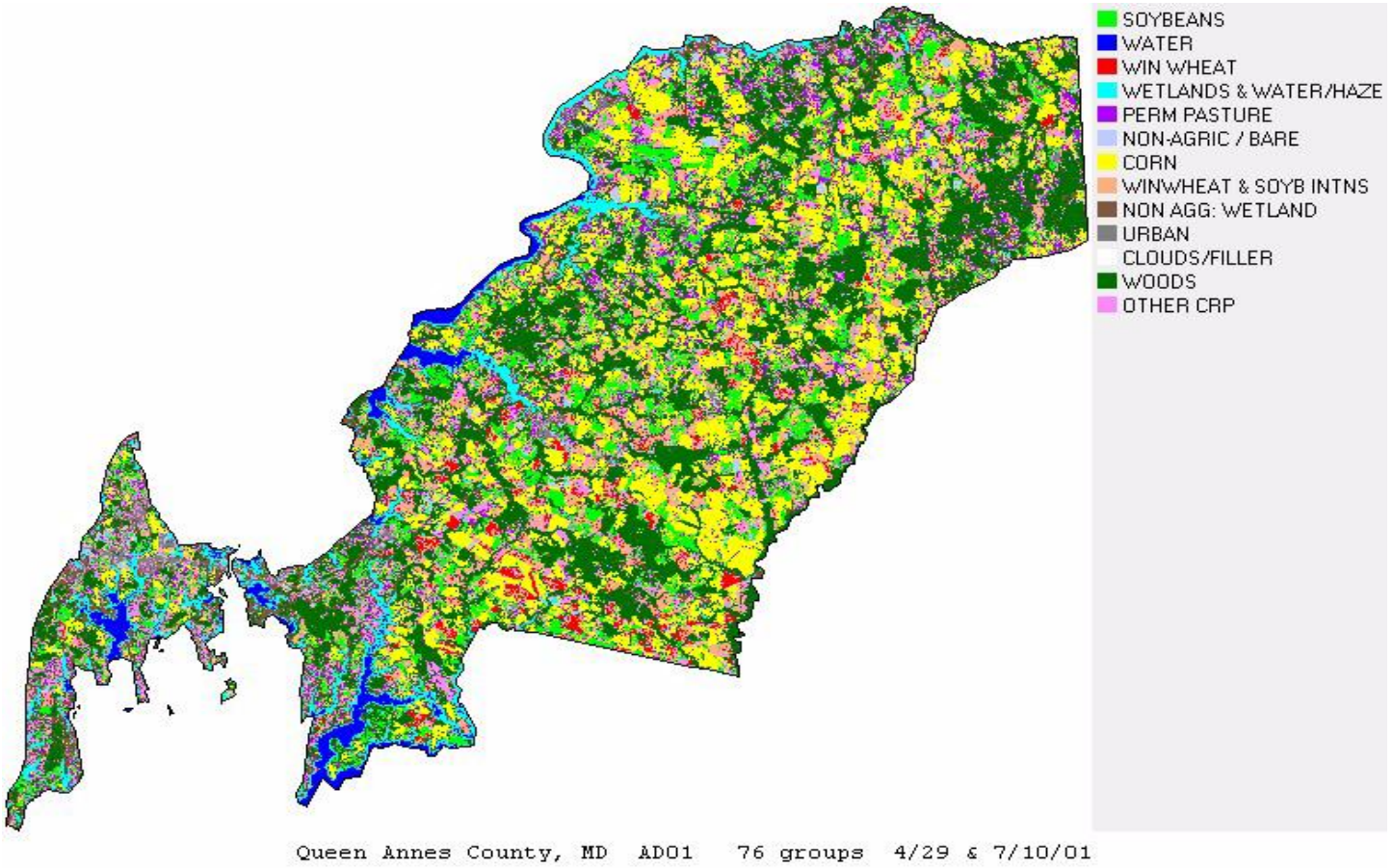
1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

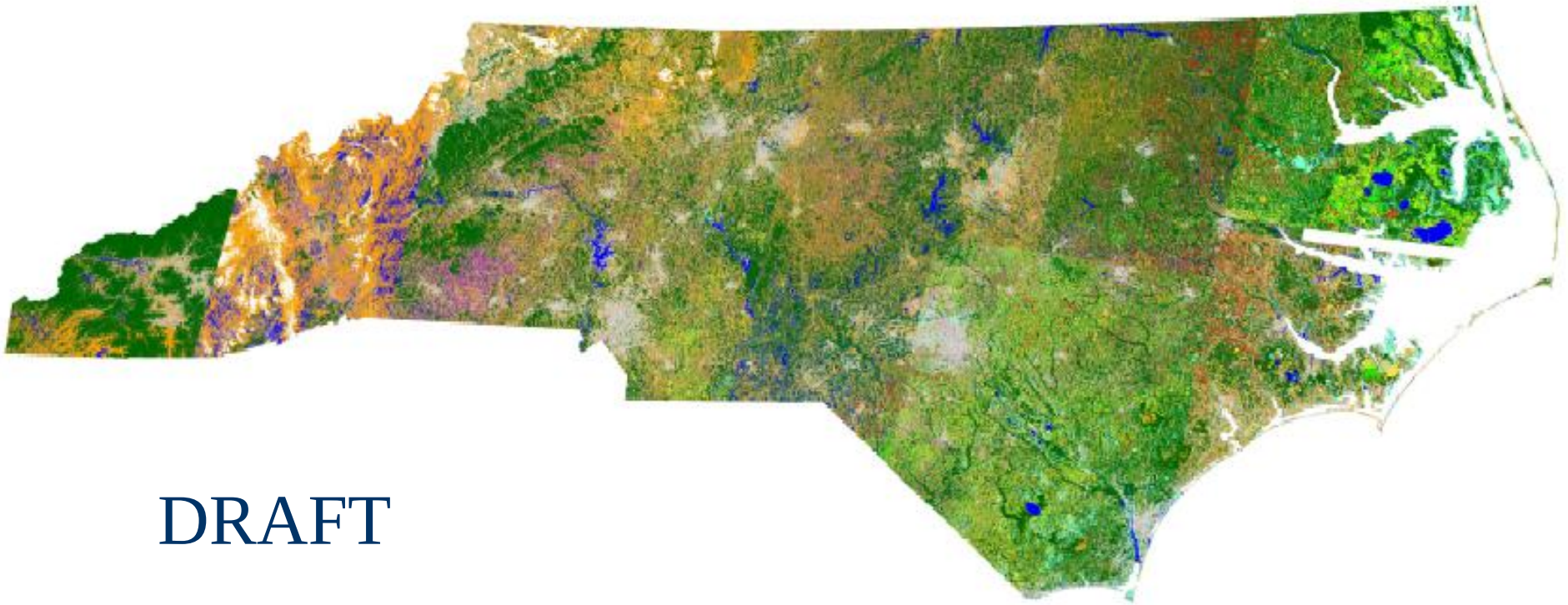
2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.

4. **All the categorized scenes comprising a state are stitched together to produce a statewide land cover classification map (GIS layer).**

2001 Maryland Cropland Data Layer
(Pilot Project) Queen Anne's County



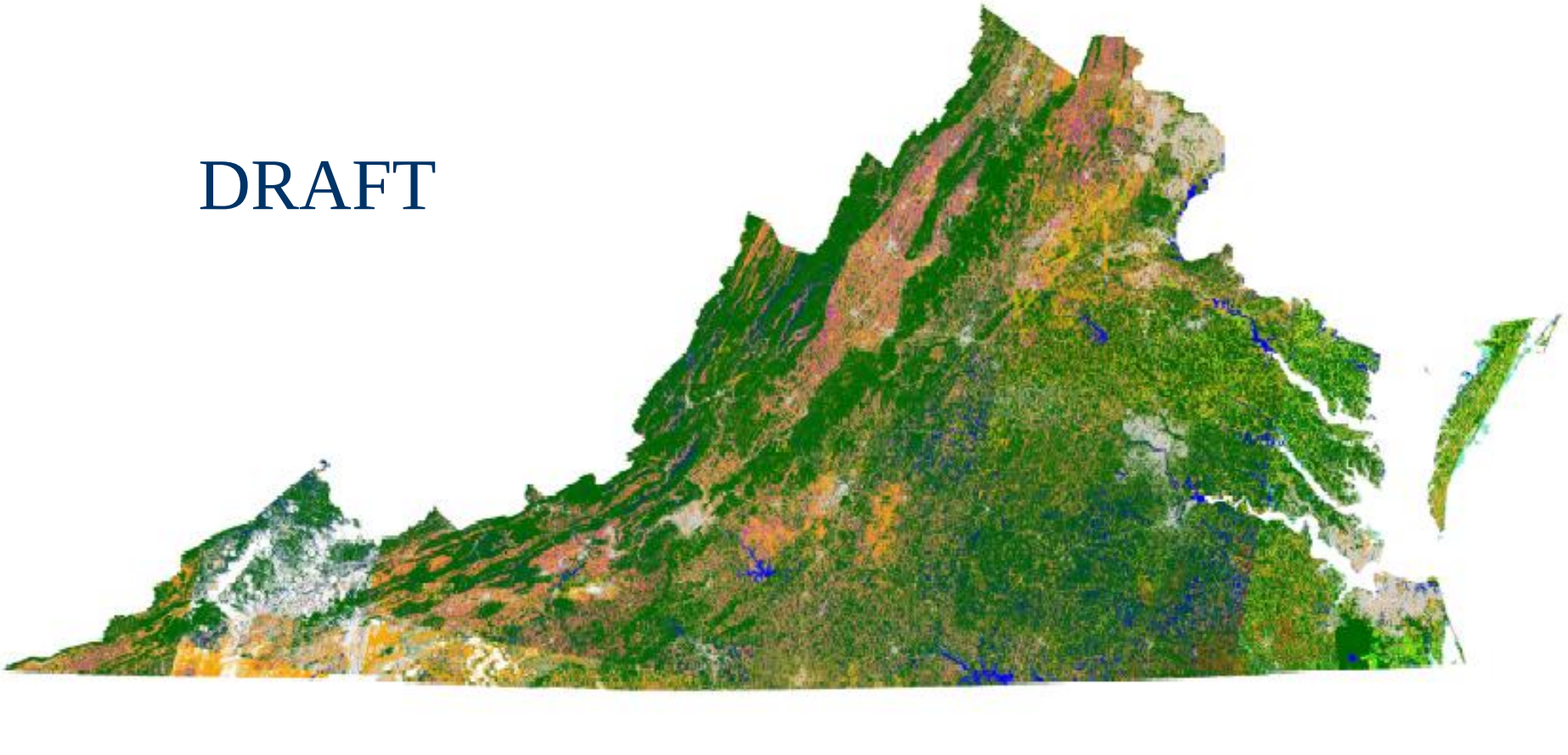


DRAFT

2002 North Carolina Cropland Data Layer

Class_Names	Class_Names	Class_Names	Class_Names
Corn	Other Small Grains & Hay	Idle Cropland/CRP	Clouds
Cotton	Double-Cropped WW/SB	Popcorn	Urban
Sorghum	Rye	Sweet Corn	Water
Soybeans	Oats	Other Crops	Roads/RR
Peanuts	Alfalfa	Pasture/Garssland/Nonag	Wetlands
Tobacco	Potatoes	Pasture/Grassland/Nonag	Pasture/Grassland/Nonag
Barley	Other Crops	Woods	Aquaculture
Winter Wheat	Sweet Potatoes	Orachards	

DRAFT


2002 Virginia Cropland Data Layer
Class Names
Corn
Cotton
Sorghum
Soybeans
Peanuts
Tobacco
Barley
Winter Wheat
Class Names
Other Small Grains & Hay
Double-Cropped WW/SB
Rye
Oats
Alfalfa
Potatoes
Other Crops
Sweet Potatoes
Class Names
Idle Cropland/CRP
Popcorn
Sweet Corn
Other Crops
Pasture/Garssland/Nonag
Pasture/Grassland/Nonag
Woods
Orachards
Class Names
Clouds
Urban
Water
Roads/RR
Wetlands
Pasture/Grassland/Nonag
Aquaculture

NASS Methodology

1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.

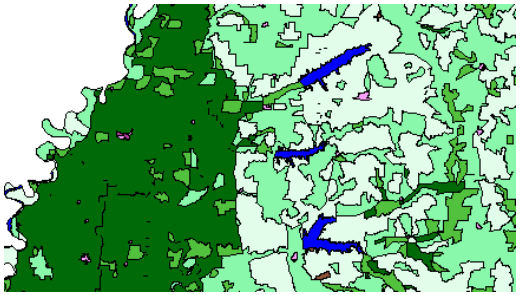
4. All the categorized scenes comprising a state are stitched together to produce a statewide land cover classification map (GIS layer).

5. **This land cover data layer is then used to produce state and county-level crop estimates using a regression estimator and/or raw pixel counts.**

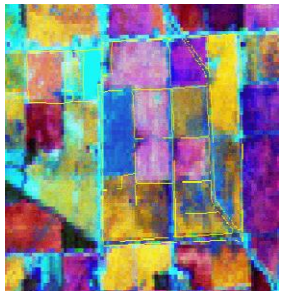
Program Summary

Raw Satellite Image

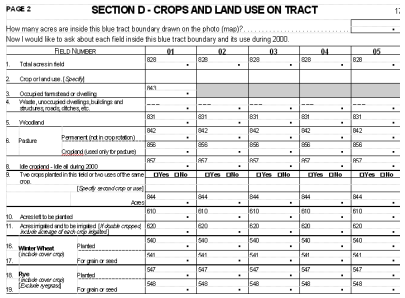
Area Sampling Frame



Segment Boundaries



JAS Questionnaire

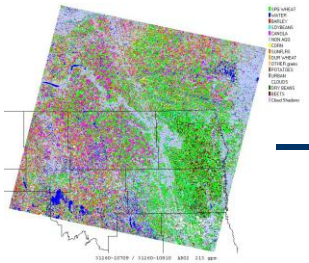


PAGE 2 **SECTION D - CROPS AND LAND USE ON TRACT**

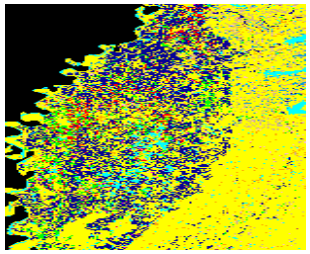
How many acres are inside this blue tract boundary drawn on the photo (map)?

Now I would like to ask about each field inside this blue tract boundary and its use during 2000.

FIELD NUMBER		01	02	03	04	05
1. Total acres in field		828	828	828	828	828
2. Crop or land use. [Specify]						
3. Occupied farmstead or dwelling		841				
4. Waste, unoccupied dwellings, buildings and structures, roads, ditches, etc.		---	---	---	---	---
5. Woodland		831	831	831	831	831
6. Pasture	Permanent (not in crop rotation)	842	842	842	842	842
	Cropland (used only for pasture)	856	856	856	856	856
8. Idle cropland - Idle at during 2000		857	857	857	857	857
9. Two crops planted in this field on two uses on the same acre.		☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No	☐Yes ☐No
	[Specify second crop or use]					
	Acres	844	844	844	844	844
10. Acres left to be planted		610	610	610	610	610
11. Acres irrigated and to be irrigated (If double cropped, indicate acreage of each crop irrigated)		620	620	620	620	620
16. Winter Wheat (include cover crop)	Planted	540	540	540	540	540
17.	For grain or seed	541	541	541	541	541
18. Rice (include cover crop) (Exclude ryegrass)	Planted	547	547	547	547	547
19.	For grain or seed	548	548	548	548	548



Categorized Images



Mosaicked CDL

soybeans	2001	AR	Clay	21	129000	127000
soybeans	2001	AR	Conway	29	21000	20000
soybeans	2001	AR	Craighead	31	87000	85500
soybeans	2001	AR	Crawford	33	13000	12500
soybeans	2001	AR	Crittenden	35	166000	162500
soybeans	2001	AR	Cross	37	150000	149000
soybeans	2001	AR	Desha	41	87000	86000
soybeans	2001	AR	Drew	43	21000	20500
soybeans	2001	AR	Faulkner	45	7000	7000
soybeans	2001	AR	Franklin	47	2000	2000

Estimates

Importance of Land Cover Data

Agricultural Business Planning

Land Use Summary by Unit Area

Farmland Conversion

Resource Management

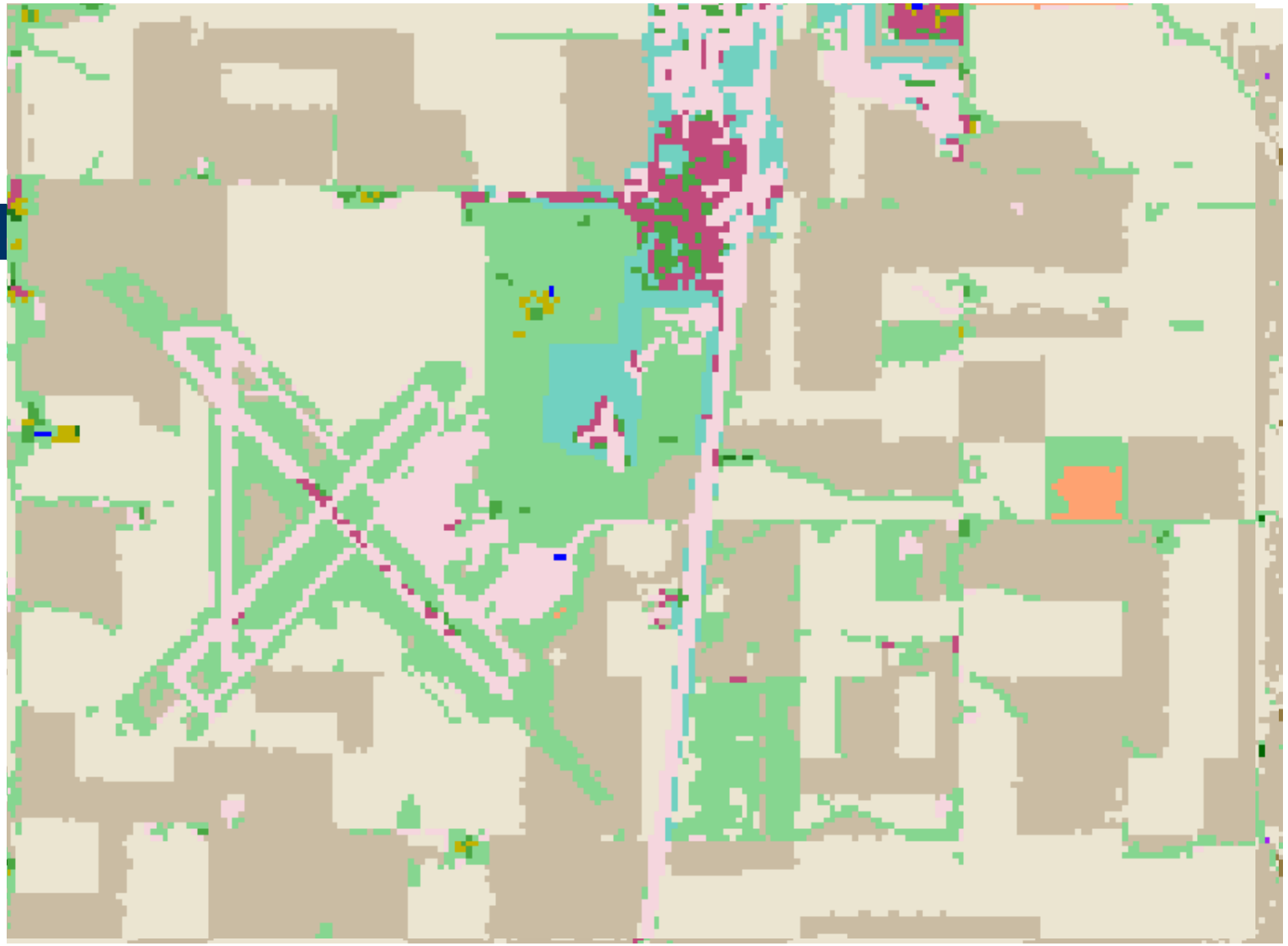
- **Soil Erosion Rates**
- **Acres of Crops in Prime Farmland**
- **Woodland Management**

Hydrologic Modeling Input

CDL Customers

Farmers, farm org, seed companies, fertilizer & pesticide companies, farm equipment dealers, grain transit/storage companies, farm real estate, global change, water quality, soils, & environmental assessment, crop insurance, universities, federal, state, & county gov, value added RS/GIS resellers, agribusinesses

1999 CDL 2000 CDL 2001 CDL Interagency



Champaign, Illinois - Willard Airport

Limitations of NASS Land Cover Data

- 30 m x 30 m ground resolution
- Emphasis on agricultural land cover
- Classification limitations
- Potential cloud cover
- Dependent upon continued health of the Landsat 5 satellite
  - USDA stopped purchasing Landsat 7 ETM in 2004

Benefits of NASS Land Cover Data

- **Low Cost for CD-Rom**
- **Spatially Referenced**
- **Attributed**
- **Updated Annually**
- **Statewide Coverage**
- **Quality Control for Other Data**
- **Generate Summary Analysis Quickly**

Address http://www.nass.usda.gov/research/Cropland/cdorderform.htm

NASS

Cropland Data Layer CD-ROM Order Form

If you experience difficulties submitting this form, call 1-800-727-9540. For technical questions about this product, call the Spatial Analysis Research Section, USDA NASS (703)877-8000.

Mosaicked Precision Registered Final

Arkansas:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25) ☐ **1999/2000** ($25) ☐ **1997*/1998***($25)
** mosaicked but not precision registered*

Illinois:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25) ☐ **1999/2000** ($25)

Indiana:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25)

Iowa:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25)

Mississippi:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25) ☐ **1999/2000** ($25)

Missouri: *(boot heel only)*
☐ **2002/2003** ($35) ☐ **2001/2002** ($25)

Nebraska:
☐ **2002/2003** ($35) ☐ **2001*/2002** ($25)
** 2001 is southeast only*

North Dakota:
☐ **2002/2003** ($35) ☐ **2001/2002** ($25) ☐ **2000/2001** ($25) ☐ **1999/2000** ($25) ☐ **1997/1998** ($25)

Wisconsin:
☐ **2003** ($35)

http://www.nass.usda.gov/research/Cropland/cdorderform.htm

Questions?