

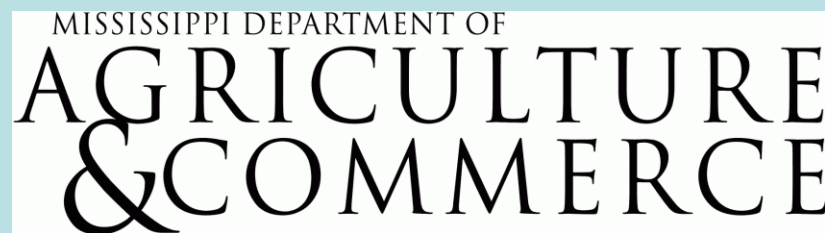
ArcGIS Agricultural Land Use Maps from the Mississippi Cropland Data Layer

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Dr. Joseph H. McGilberry, Director, Mississippi Cooperative Extension Service,
James Brown, Mississippi Department of Transportation,
and the USDA Field Enumerators in
Mississippi were critical to the success of this project.



The Cropland Data Layer in Mississippi

Cropland Data Layer Program Development

- Based on USDA-NASS programs started in the 1970s
- LARSYS software from Purdue University
- Produced state and county acreage estimates for major crops grown in a state
- Migrated system to a personal computer

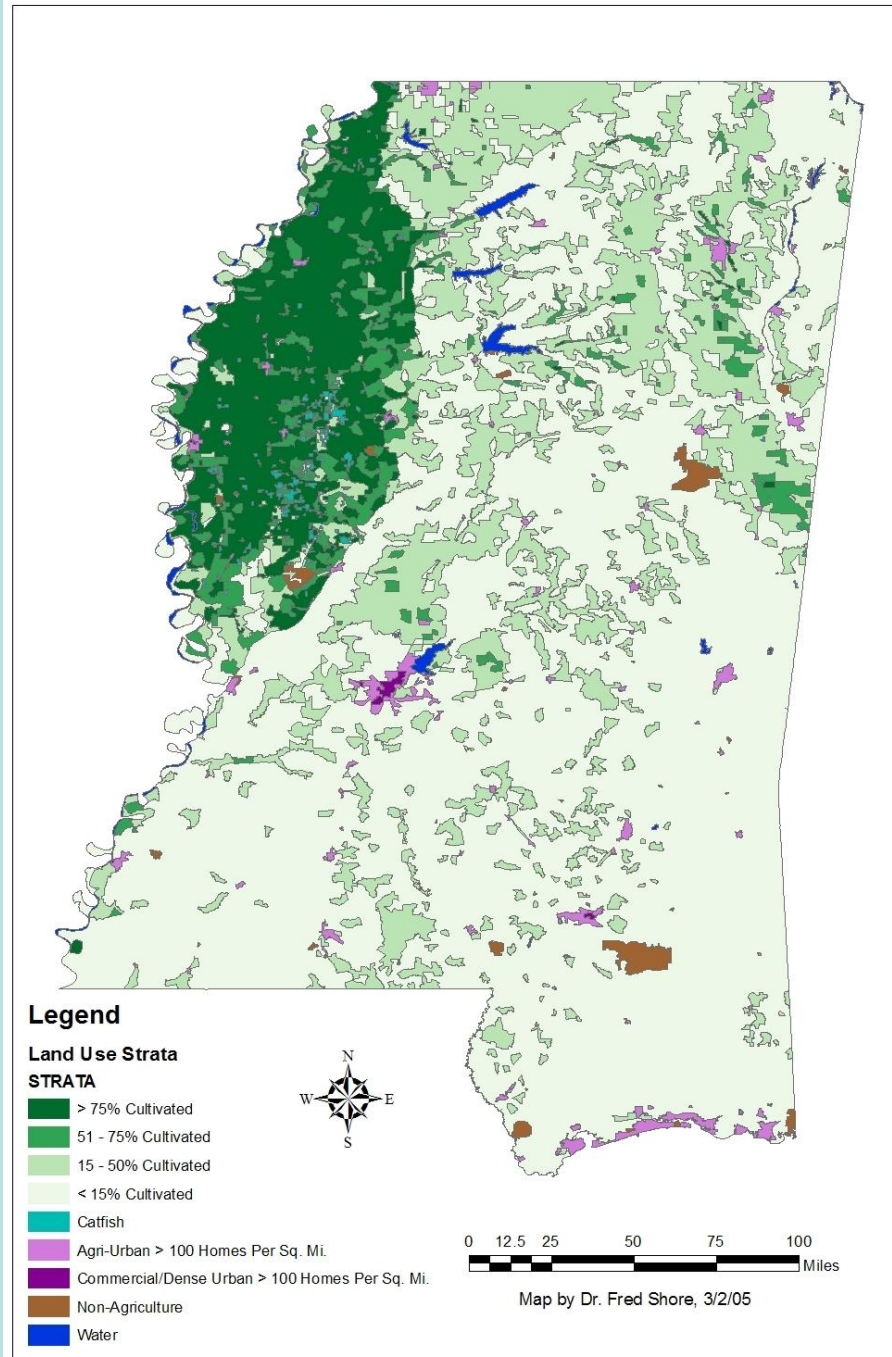
Mississippi Cropland Data Layer Project

- A cooperative project of USDA-NASS, Mississippi State University, and the Mississippi Department of Agriculture and Commerce
- Started in 1999 using the Peditor and RSP software programs of USDA-NASS
- Began creating the public domain Cropland Data Layer product

ESRI ArcGIS Applications

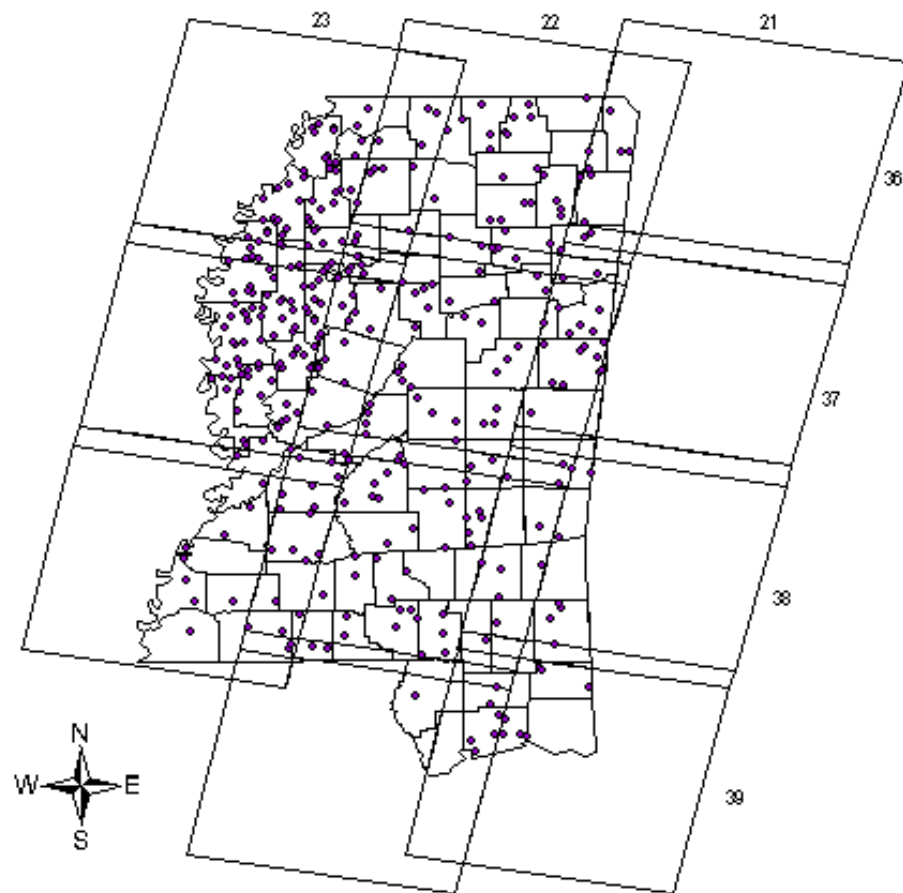
- Maps for use by the team generating the Cropland Data Layer product
- Maps to present information to clients

June Agricultural Survey Segment Selection



Mississippi Data Collection

Landsat Path/Row Scenes and 2004 Segments



Legend

- Scenes
- MS 2004 segs

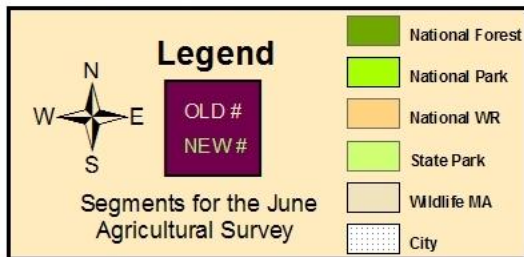
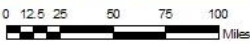
Map by Dr. Fred Shore, 4/29/04

Segment Locator Map

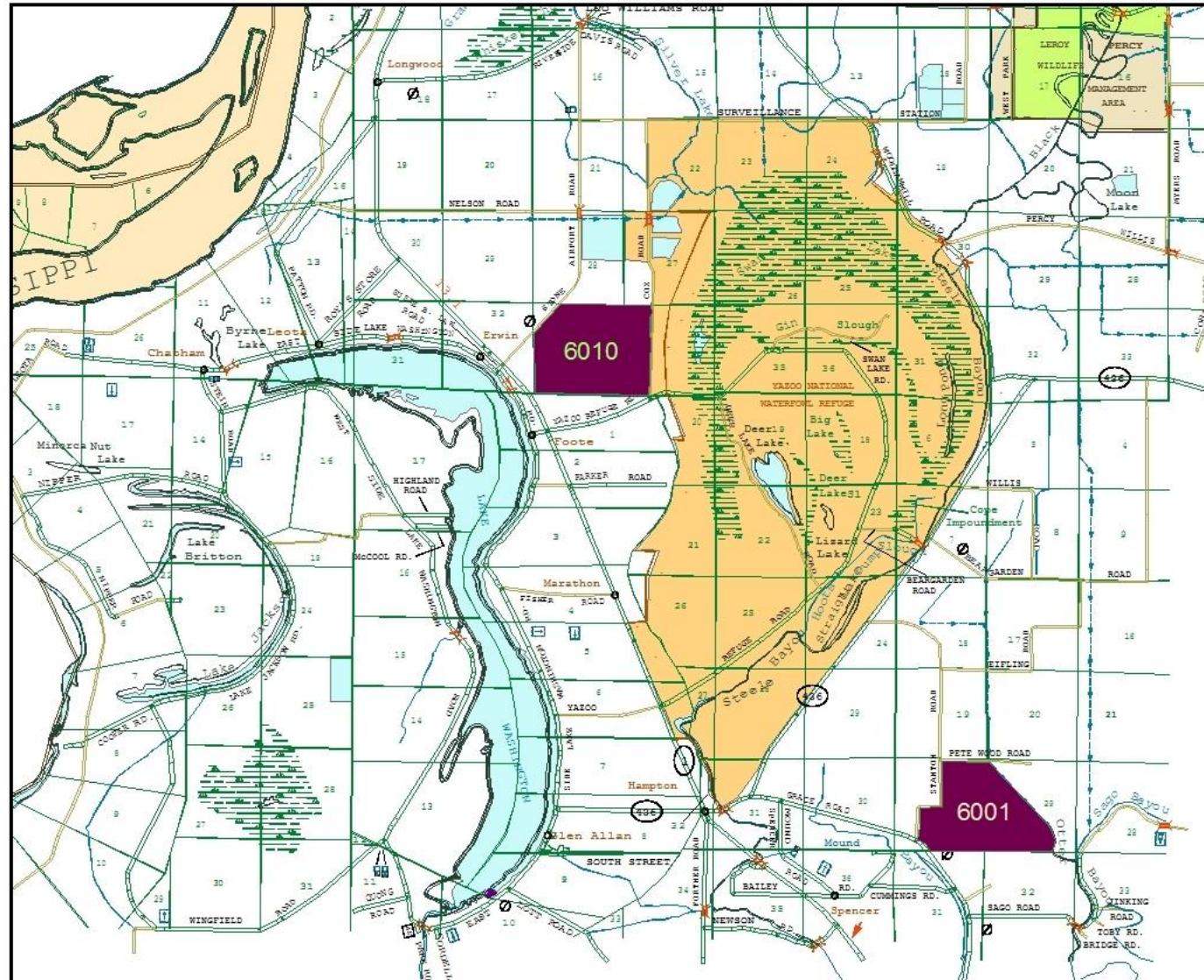
2004 Sample County Segments 6001 and 6010



Map Locator



USDA/NASS/MDAC/MSU
Map by Dr. Fred Shore

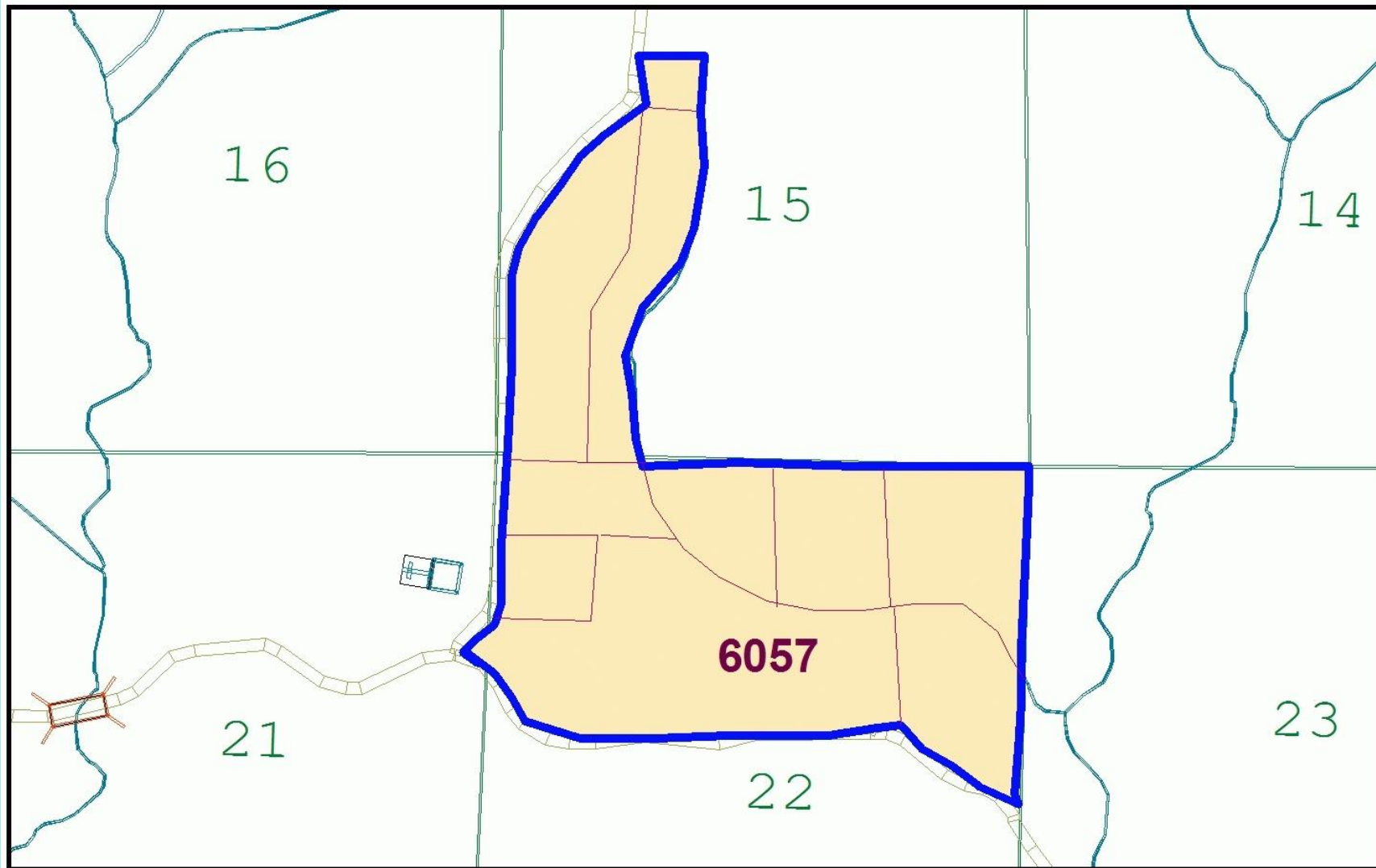


Segment Area Map



Segment Locator Map and Field Locations

2004 Test County Segment 6057



Field/Segment Boundaries on a High Resolution Photo

The segment boundary is shown in blue and the field boundaries in red with acres shown for each field.

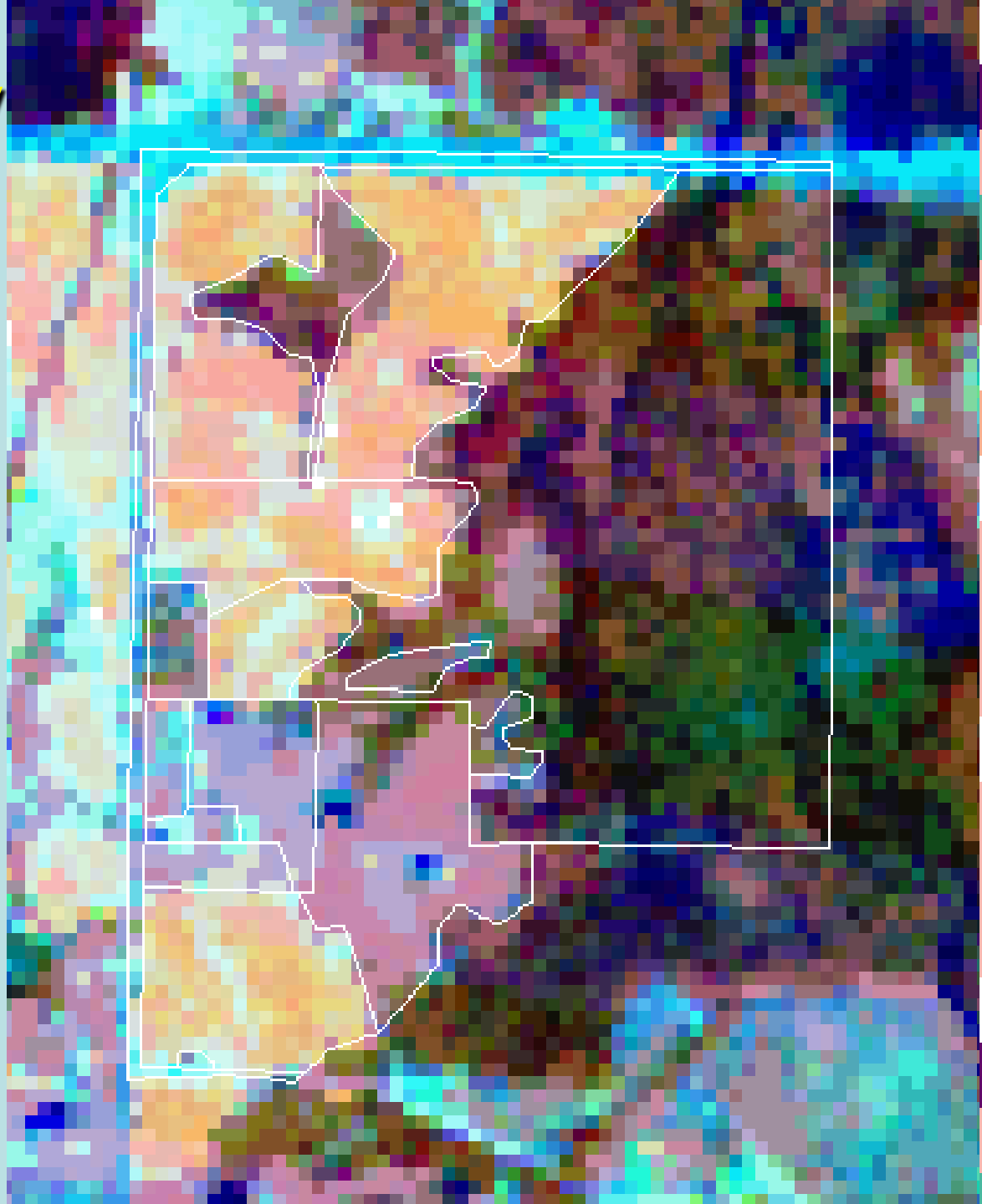


2005 Segment 6030, Test County

MSU, USDA-NASS, MDAC Map by Dr. Fred Shore, 6/7/05

Field Boundary Digitizing

With the help of
a Landsat image,
training field
boundaries are
digitized.



MS Landsat Scenes 2005

Each scene, bounded in yellow, is easy to select using the USGS Viewer.

The screenshot displays the USGS Global Visualization Viewer interface. The main window shows a satellite image of a landscape with a yellow rectangular bounding box highlighting a specific area. The interface includes a menu bar with options: Sensor, Resolution, Map Layers, Tools, File, and Help. On the left side, there is a map of the United States with a red dot indicating the current scene's location. Below the map, there are input fields for WRS-2 Path/Row (22/37), Latitude (33.2), and Longitude (-89.4), each with a 'Go' button. There is also a 'Max Cloud' control set to 100% with navigation arrows. The 'Scene Information' section provides details: ID: 5022037000531410, Cloud Cover: 0%, Qlty: 9, and Date: 2005/11/10. Navigation buttons for 'Prev Scene' and 'Next Scene' are present, along with a 'Landsat 4-5 TM Scene List' link. The Windows taskbar at the bottom shows the Start button, open applications (Logitech Me..., Microsoft P..., 2 Intern...), and the system clock (1:43 PM).

Indian Remote Sensing (IRS)

RESOURCESAT-1

Advanced Wide Field Sensor (AWiFS) scene 280-48-A, 9/04/05. Each scene covers 350 km² at an average resolution of 56 m (vs. Landsat TM scenes at 185 km² and 30 m resolution).

Shown as false color IR: Band 5 (SWIR) / Band 3 (red) / and Band 2 (green) as red/green/blue. An additional IR band is also obtained (vs. 7 bands for Landsat TM scenes).

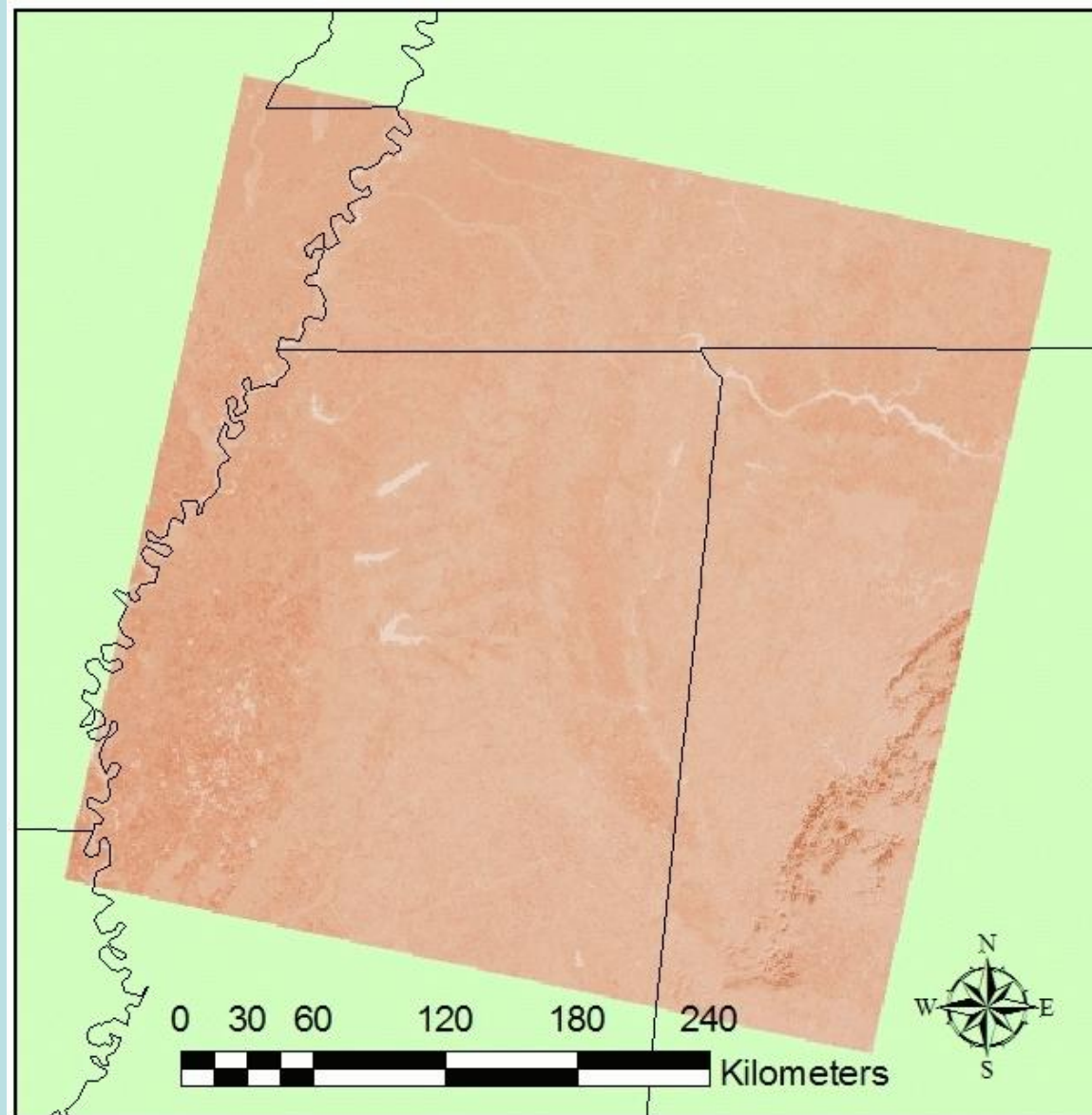


Image Processing Using Multi- temporal Scenes for MS CDL, 2004

MS04 Analysis Districts, 2004

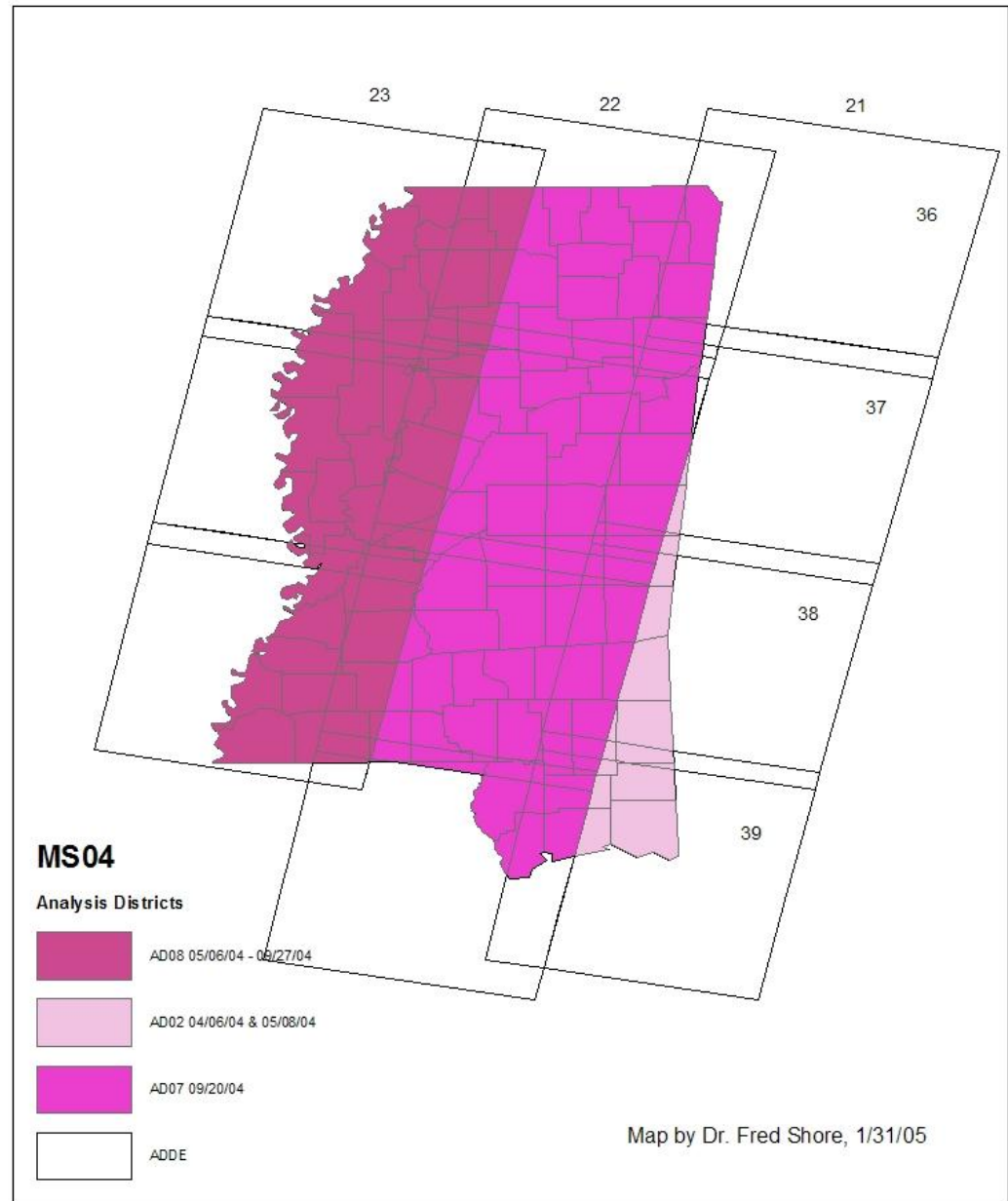
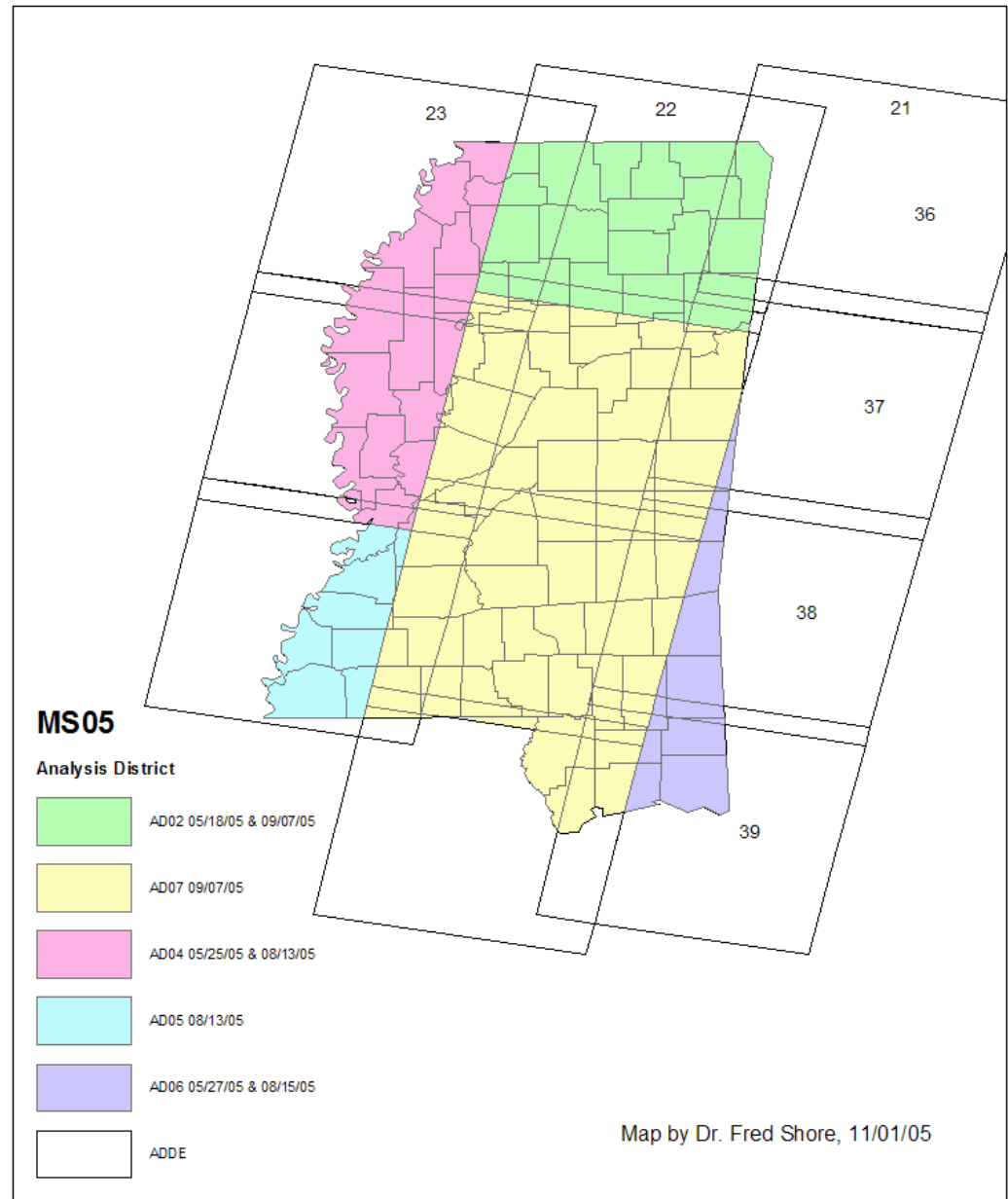
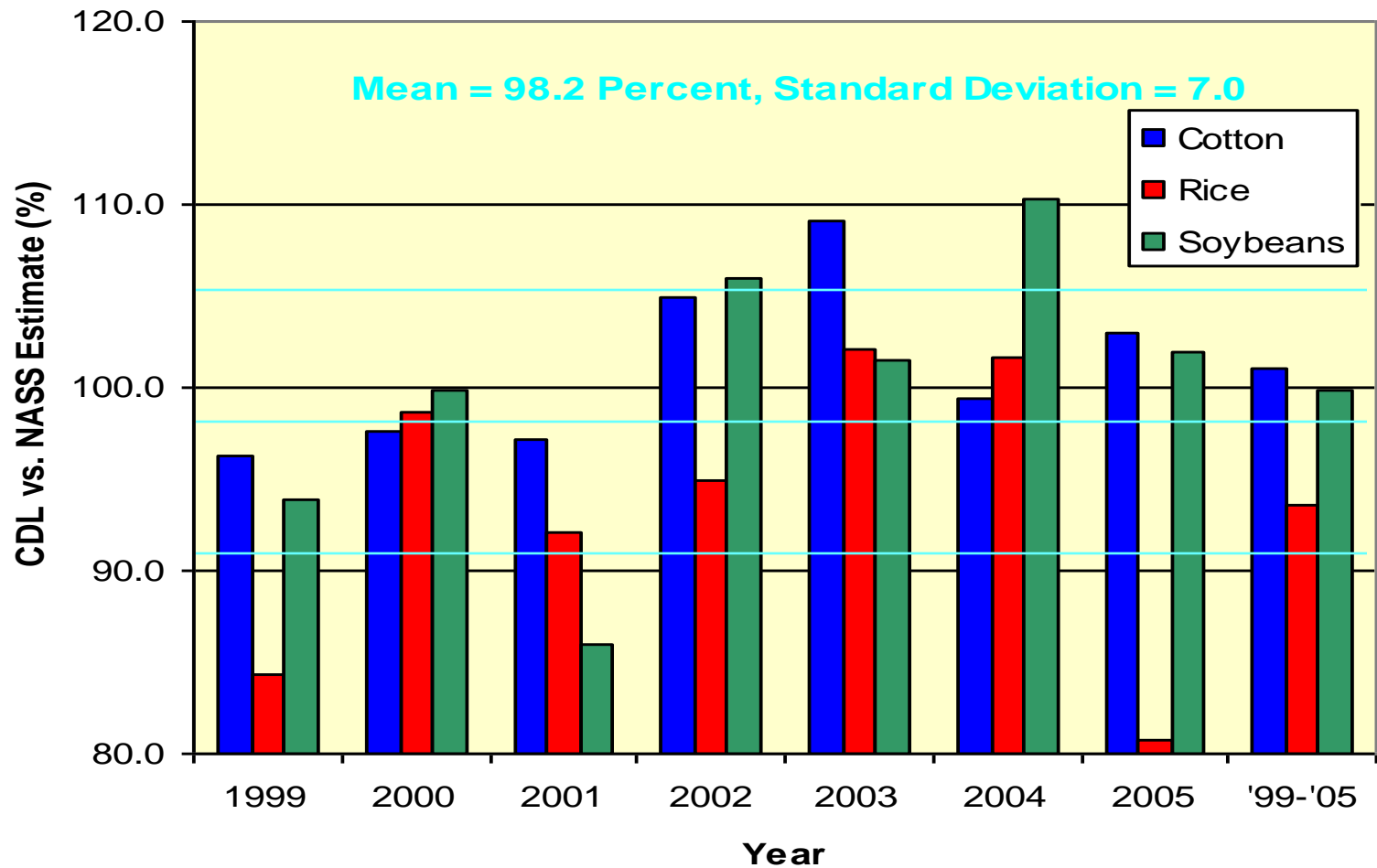


Image Processing for MS CDL, 2005

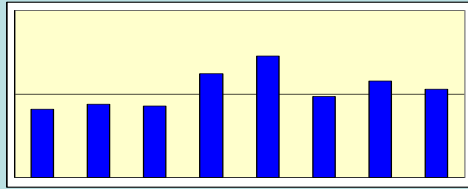


Mississippi Major Crop Planted Acres Estimates, 1999-2005 Cropland Data Layer Value as Percent of the Official Estimate

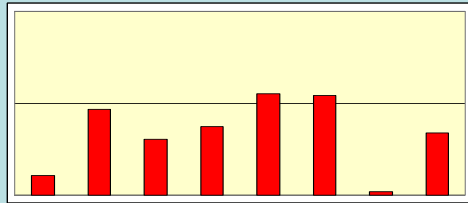


Cropland Data Layer Indications vs. NASS Official Estimates in Percentages of Official Estimates by Crop, Planted Acres

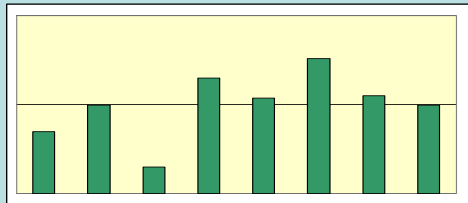
Percent of Range Shown: 80-120%



Cotton, Mean = 101.1 %, St. Dev. = 4.8



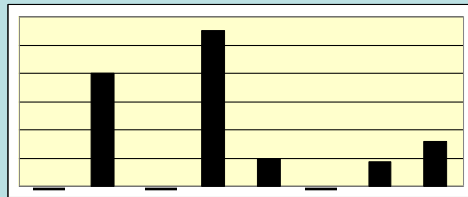
Rice, Mean = 93.5 %, St. Dev. = 8.4



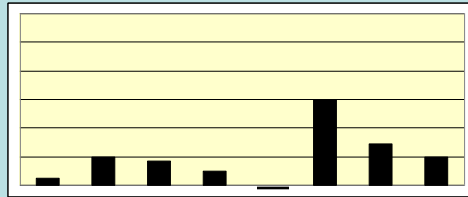
Soybeans, Mean = 99.9 %, St. Dev. = 8.0

Scene Date vs. Optimum Date (Delta Area)

Range of Weeks Shown: 0-12 Weeks



Early Scene Dates, Mean = 3.2 Weeks, St. Dev. = 4.4



Late Scene Dates, Mean = 2.0 Weeks, St. Dev. = 2.0

Year
1999
2000
2001
2002
2003
2004
2005
'99-'05

The Mississippi Cropland Data Layer, 2005

The Cropland Data Layer
classifications from
satellite images, the
June Agricultural Survey,
and image processing.

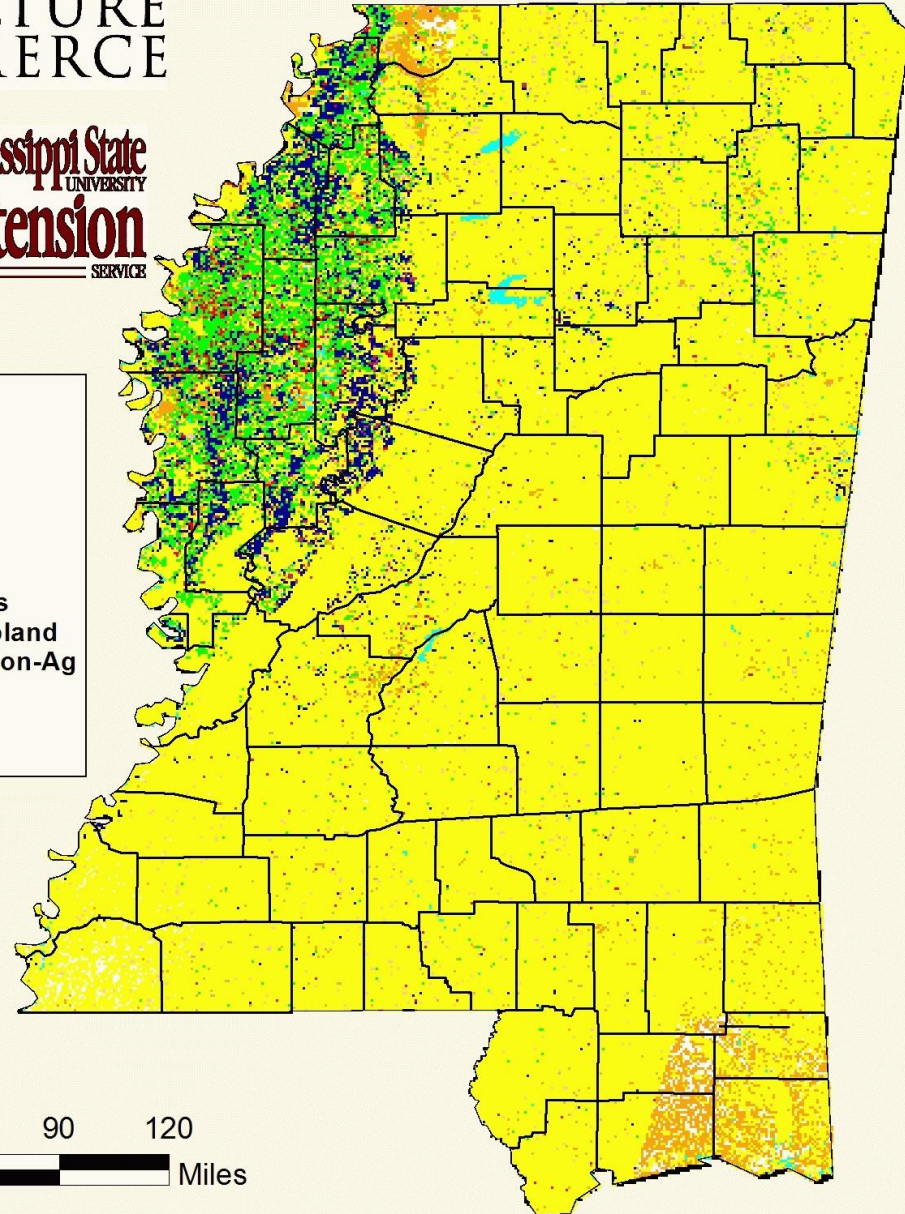
MISSISSIPPI DEPARTMENT OF
AGRICULTURE
& COMMERCE



Mississippi State
UNIVERSITY
Extension
SERVICE

CROPS

- Corn
- Cotton
- Rice
- Sorghum
- Soybeans
- Hay/Other Crops
- Fallow/Idle Cropland
- Trees/Pasture/Non-Ag
- Clouds
- Urban
- Water



The Mississippi Delta, 2005











MISSISSIPPI DEPARTMENT OF
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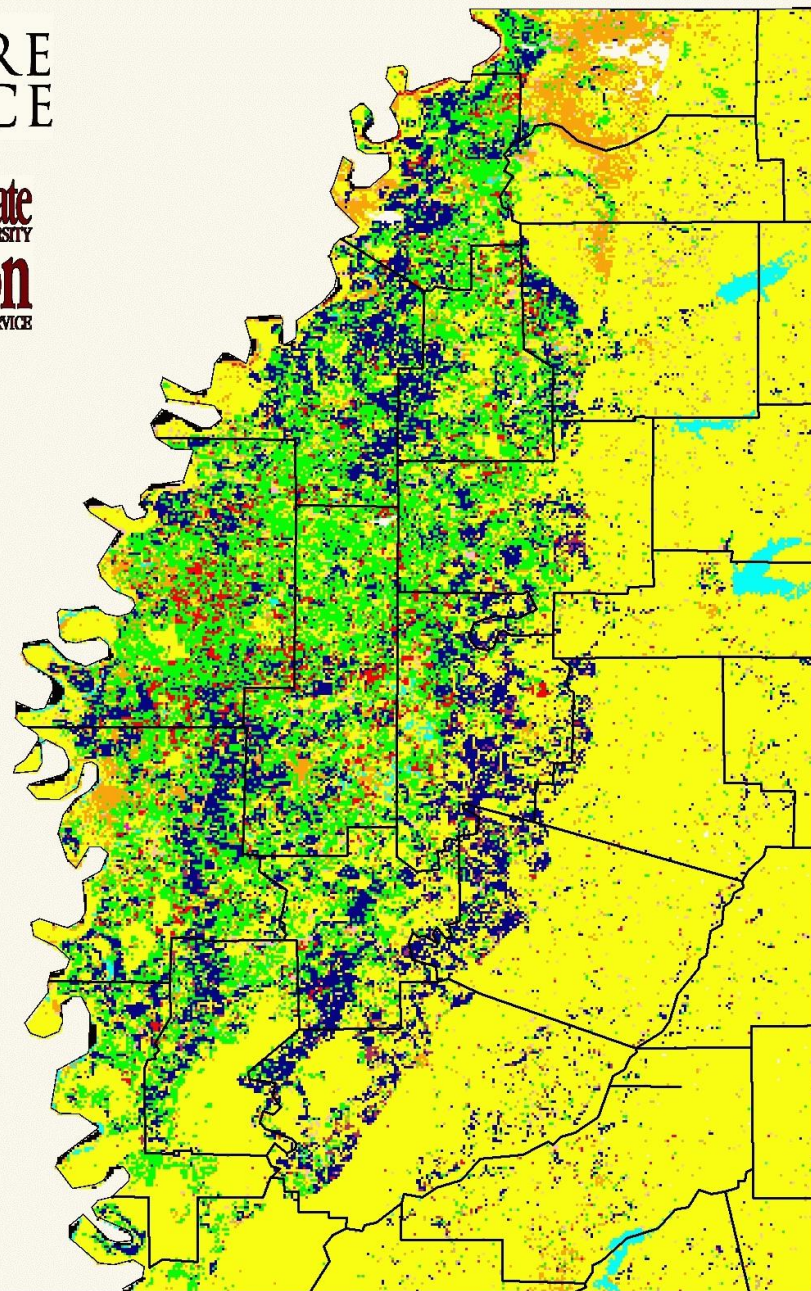
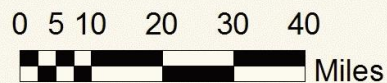


Mississippi State
UNIVERSITY
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NASS

CROPS

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-  Trees/Pasture/Non-Ag
-  Clouds
-  Urban
-  Water



Bolivar County Cropland Data Layer, 2005

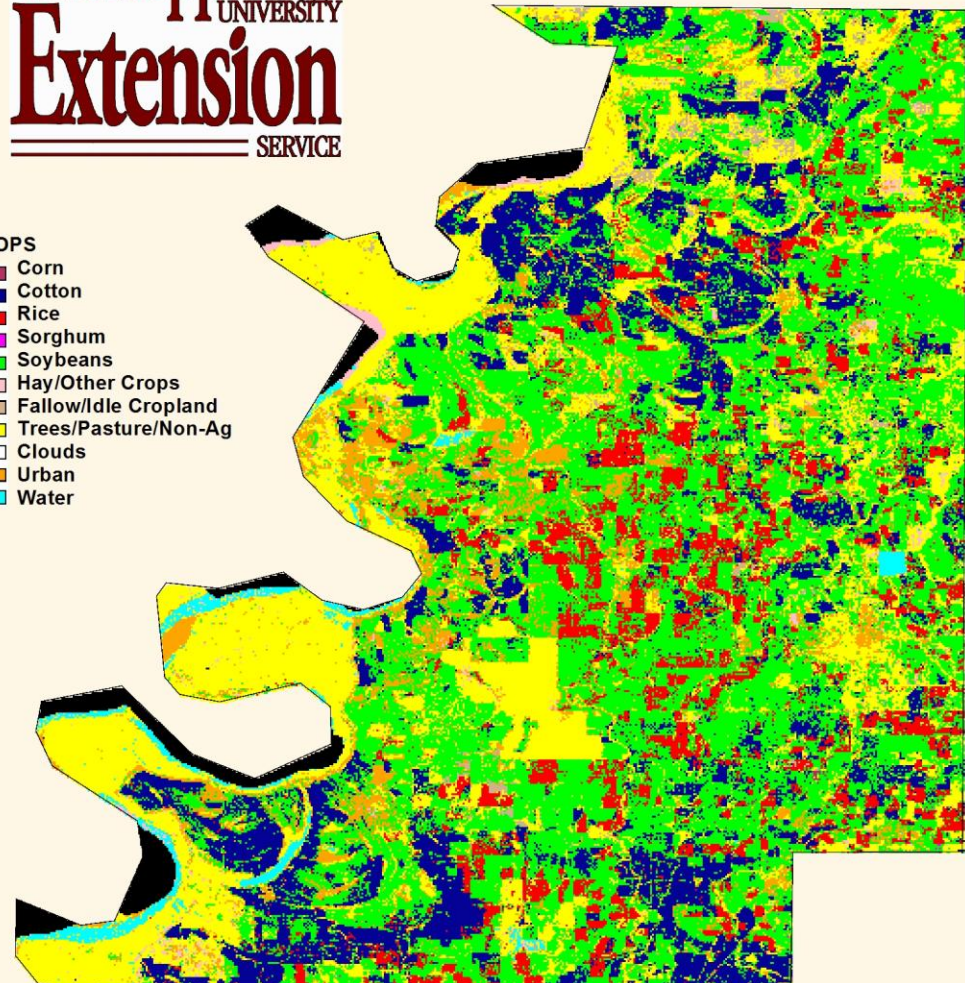
MISSISSIPPI DEPARTMENT OF
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& COMMERCE**



NASS

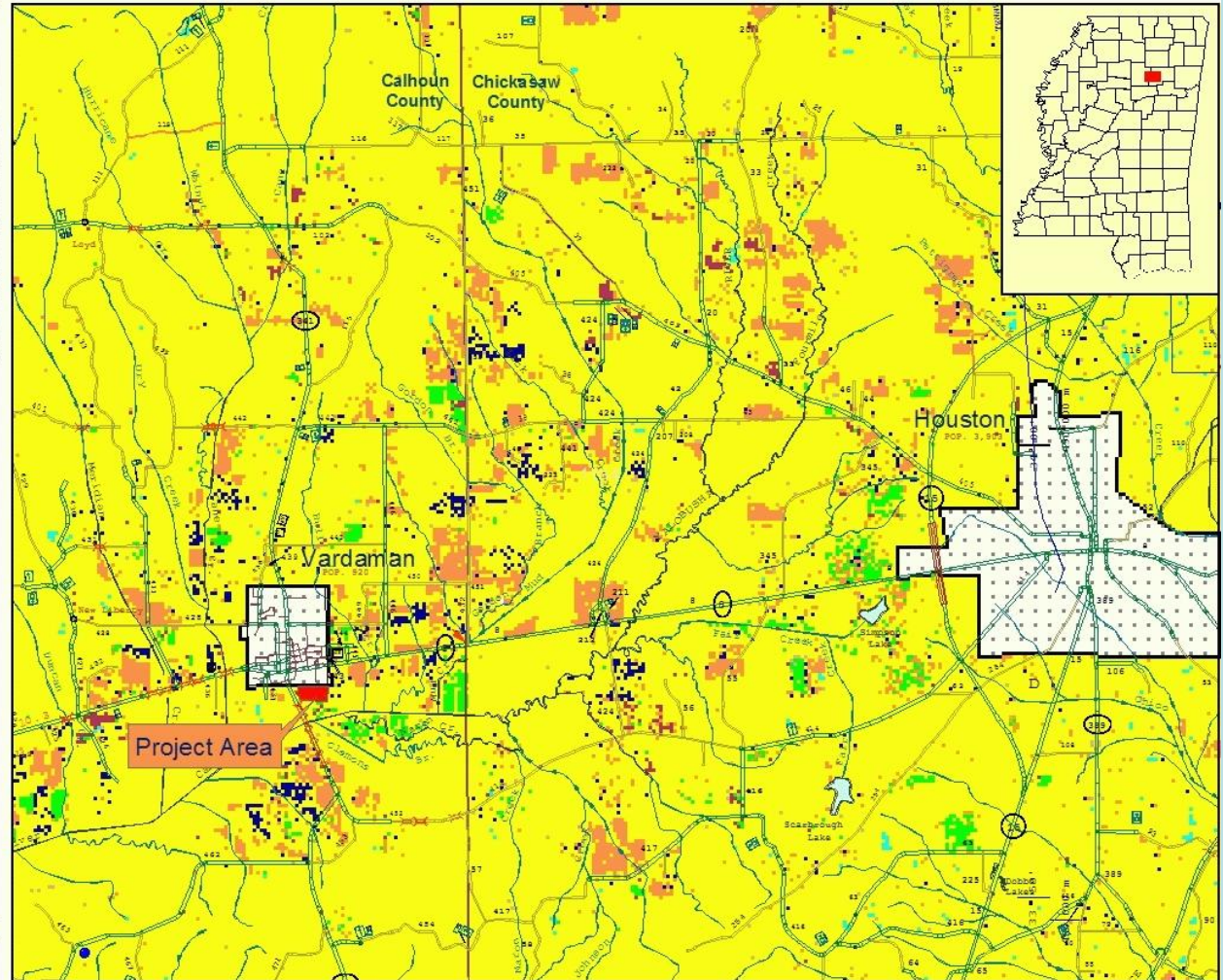
Mississippi State
UNIVERSITY
Extension
SERVICE

- CROPS**
- Corn
 - Cotton
 - Rice
 - Sorghum
 - Soybeans
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 - Fallow/Idle Cropland
 - Trees/Pasture/Non-Ag
 - Clouds
 - Urban
 - Water



Locating a Processing Plant

2004 Sweet Potatoes Vardaman - Houston Area



Cropland Data Layer Crops



USDA-NASS Official Estimates
15,300 Harvested Acres in Mississippi
Average Yield of 170 Cwt./acre

USDA-Farm Service Agency
Planted Acre Estimates
Calhoun County 6,770 acres
Chickasaw County 5,290 acres

MDAC/USDA-NASS/MSU
Map by Dr. Fred Shore

Vardaman - Houston Area Map



Multiyear Overlays Cotton



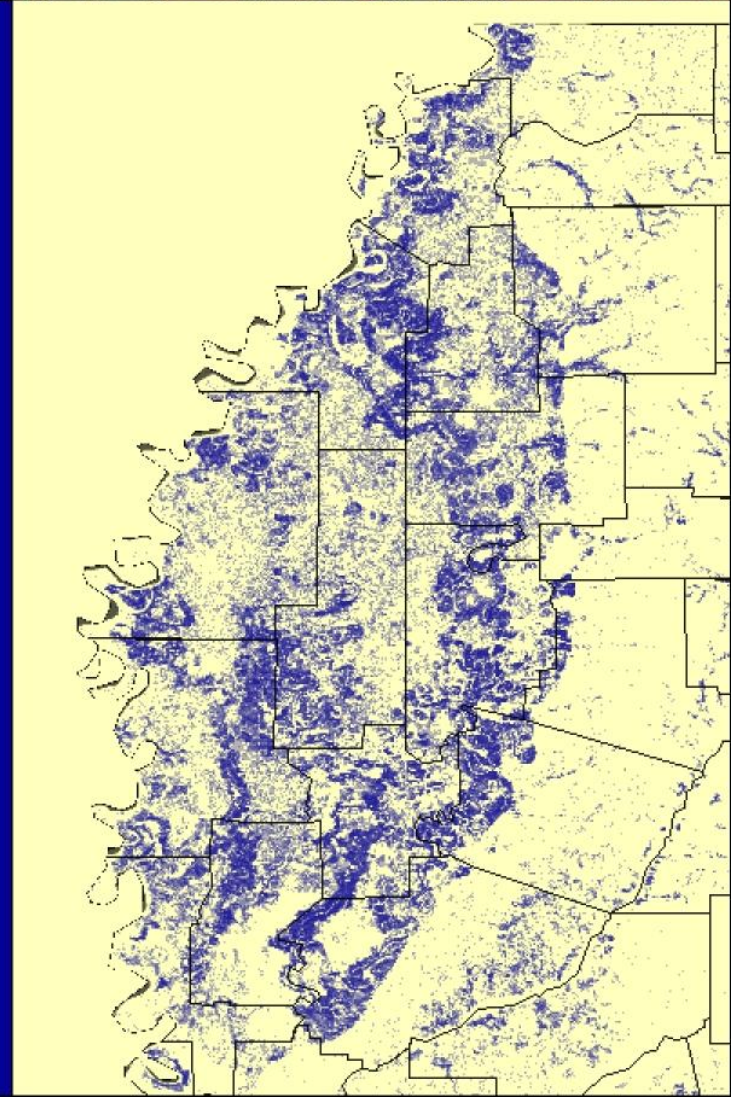
The variation of land use for cotton in the Delta over a 6 year period is shown in this map.

The darker the shade of blue the more years of cotton land use with some land used for cotton every year.

In the crescent moon-shaped part of northwestern Mississippi known as The Delta, cotton is usually planted in sandy soil along existing or ancient rivers and creeks.

Cotton crop rotations are used but high cotton prices can lead to the same land being used for cotton every year.

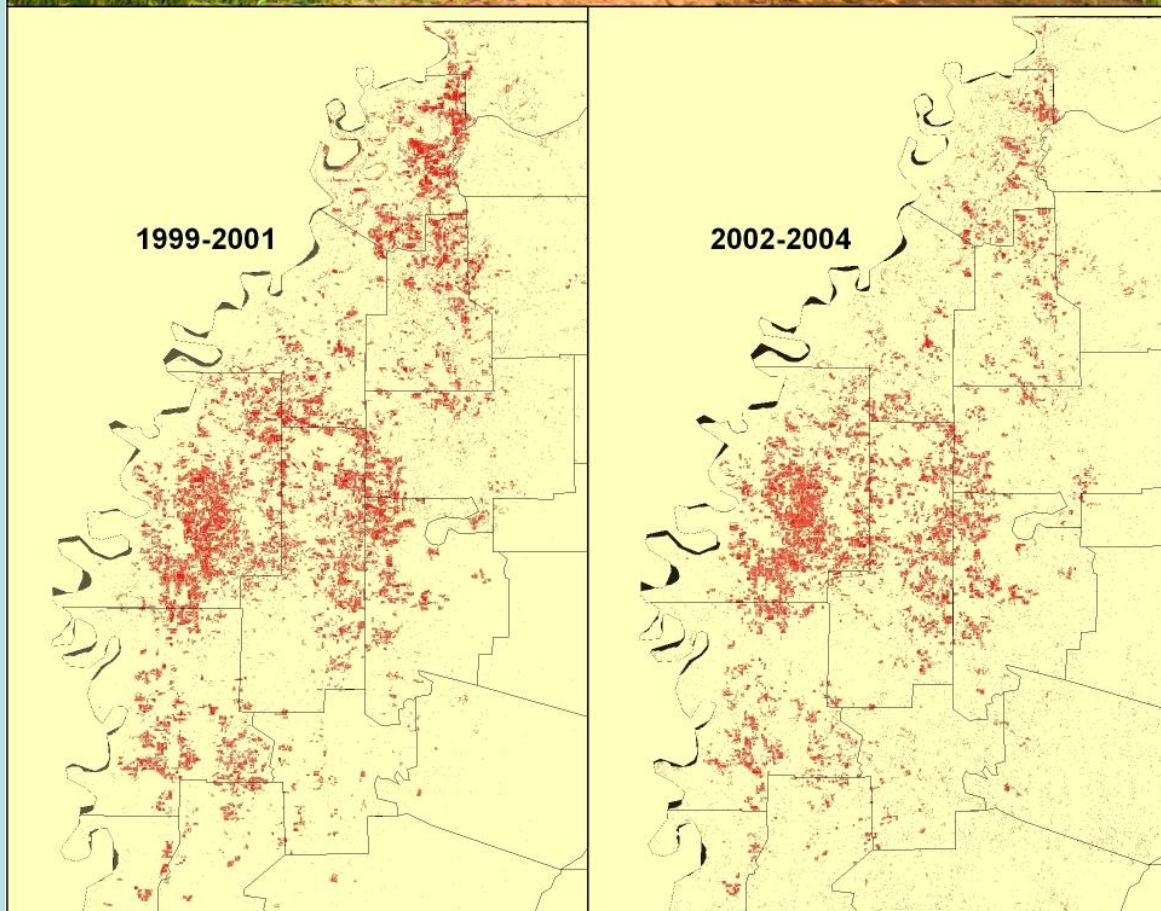
Map shows satellite cotton classification range from the Cropland Data Layer by Dr. Fred Shore.



Multiyear Overlays Rice

With the three year rotation schedule, comparing two 3-year periods gives similar land use areas. Note that the shade of red color is even indicating a single year of rice land use per location.

Frequency of Acreage Planted to Rice, 1999-2001 vs. 2002-2004



In the crescent moon-shaped part of northwestern Mississippi known as The Delta, rice is usually planted in heavy clay soils.

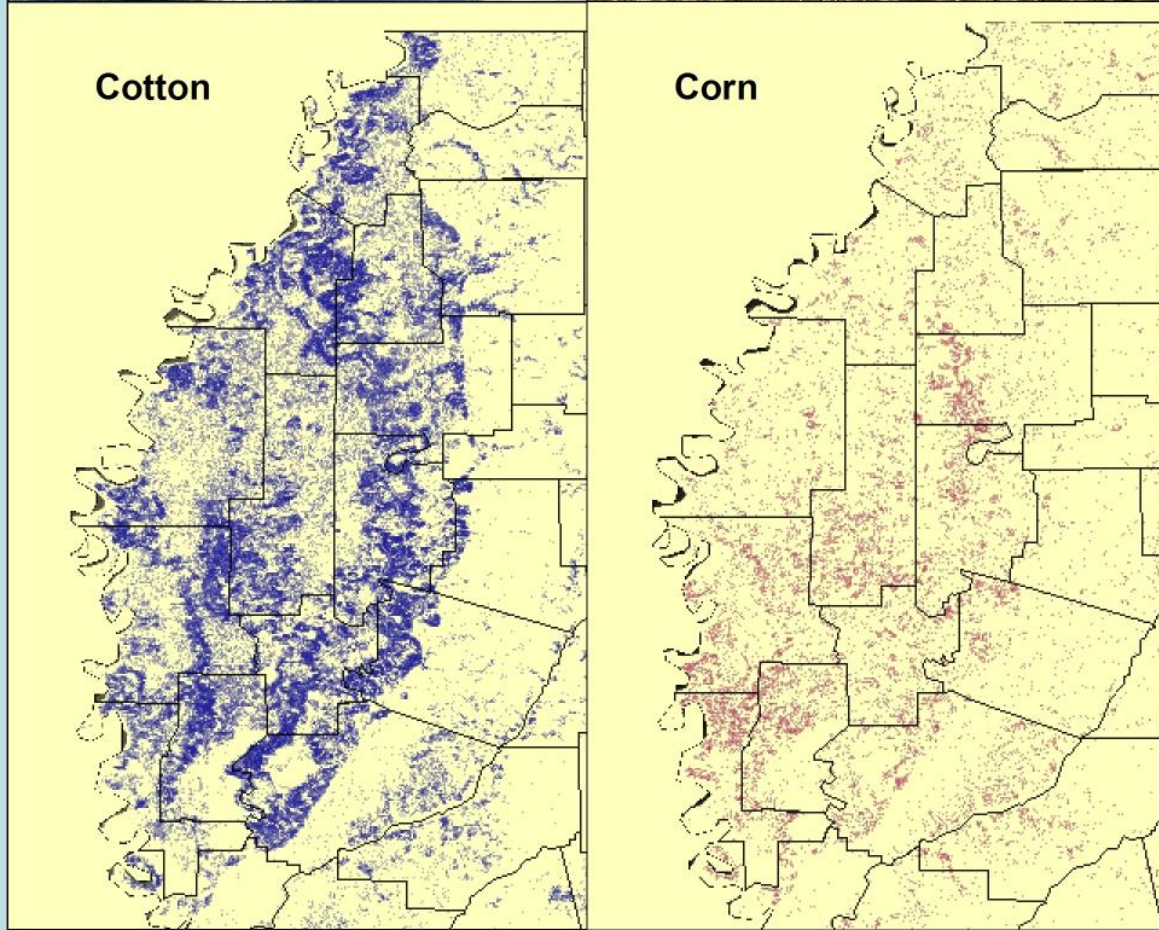
Rice rotation with 2 years of soybeans is recommended. Notice the similar rice land use patterns for each of these 3 year periods.

Maps show satellite rice classification range from the Cropland Data Layer by Dr. Fred Shore.



Comparing Crop Overlays Cotton and Corn

Similar land use patterns
are observed for these crops.
Corn in the Delta is primarily
grown in rotation with cotton.



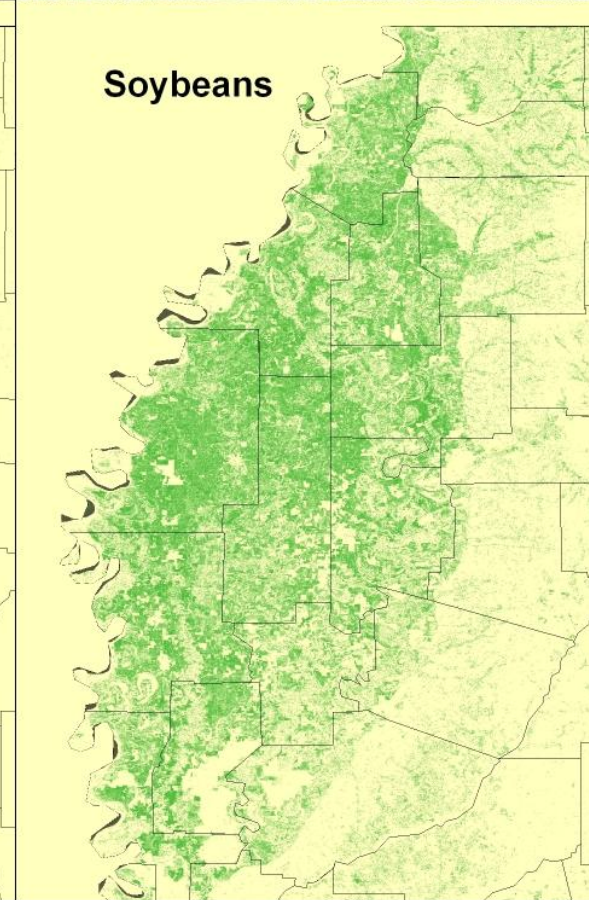
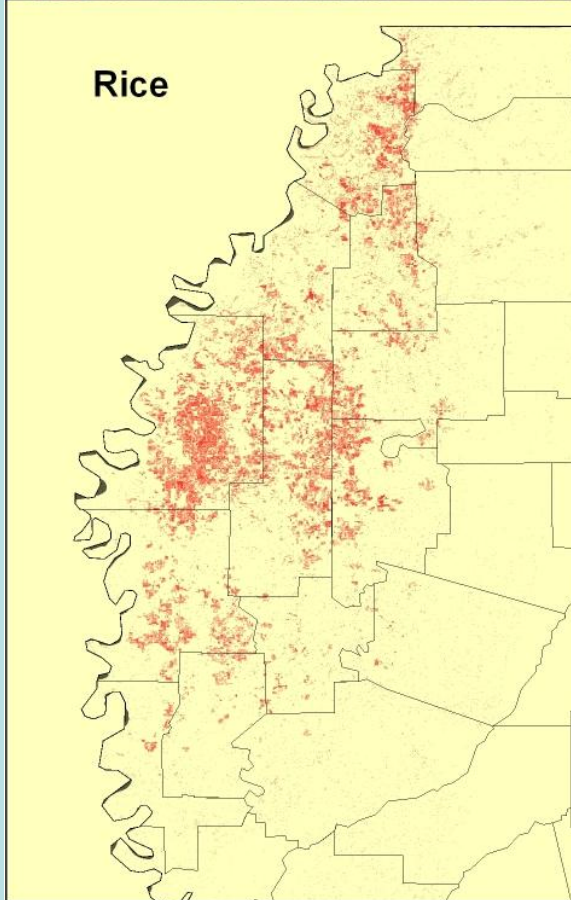
In the crescent moon-shaped part of northwestern Mississippi known as The Delta, cotton is often rotated with corn.

Cotton is the most profitable crop in Mississippi and the yields of cotton following corn can be much improved.



Comparing Crop Overlays Rice and Soybeans

The rotation of land from rice to soybeans is evident. Soybeans are grown in most areas of the Delta.



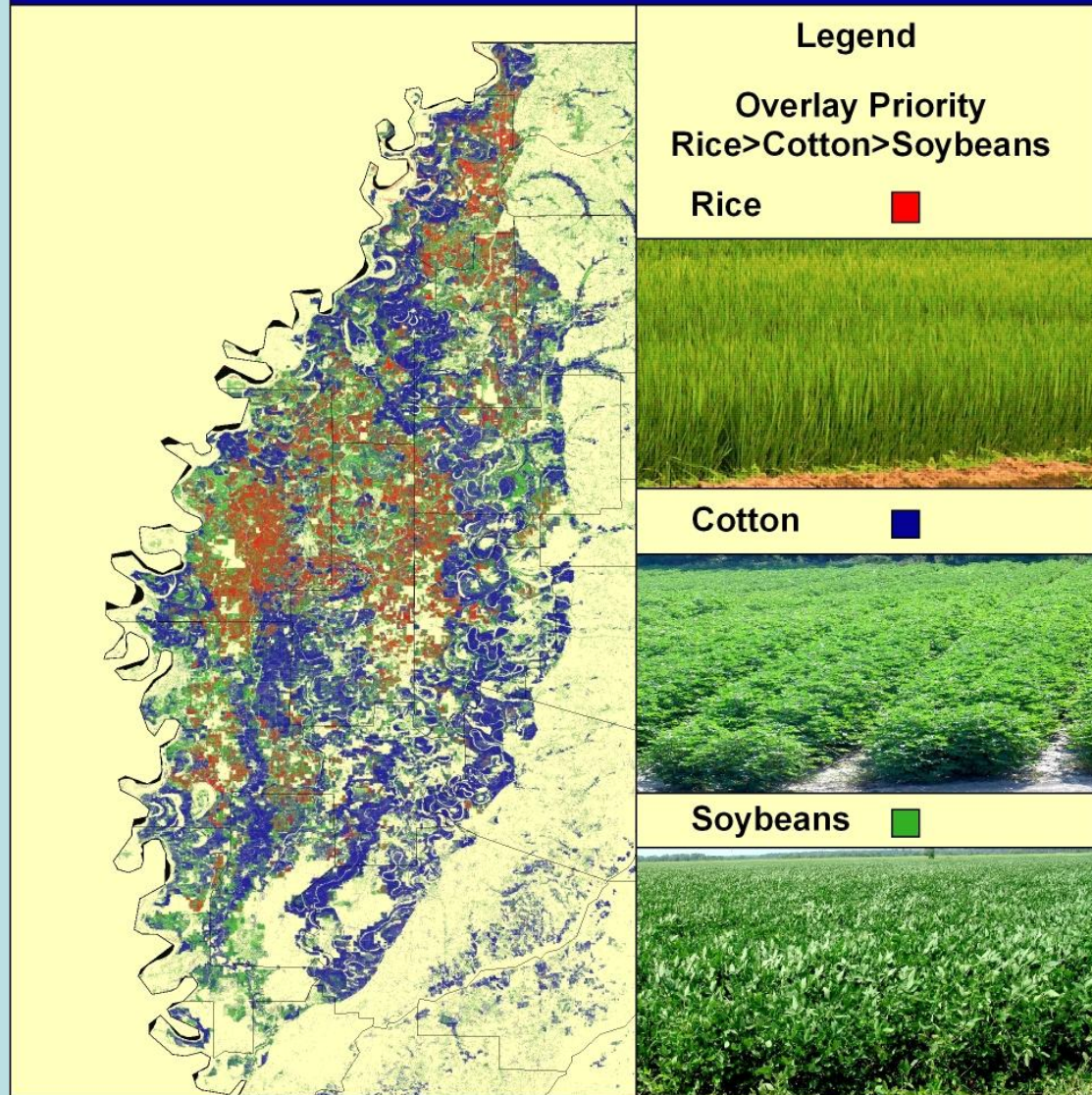
In the crescent moon-shaped part of northwestern Mississippi known as The Delta, rice is usually rotated with soybeans.

Rice rotation with 2 years of soybeans is recommended. In addition, soybeans are also rotated with other crops.

Map shows satellite crop classification ranges from the Cropland Data Layer by Dr. Fred Shore.

Crop Overlays by Priority

Overlaying soybeans with cotton and then overlaying both with rice reveals that potential rice acreage is nearly equivalent to the cotton acreage.



In the crescent moon-shaped part of northwestern Mississippi known as The Delta, cotton is the most profitable crop with rice second.

On an annual basis there are more acres planted to soybeans than any other crop. This overlay display shows good land for cotton and rice and land used for soybeans that could be used in rotation with rice.

Map shows satellite classification ranges from the Cropland Data Layer by Dr. Fred Shore.

ArcGIS Agricultural Land-Use Maps from the Cropland Data Layer

Conclusions

ArcGIS maps are:

- **Help for the Field Enumerators in finding the USDA-NASS study segments.**
- **Quality control maps for Supervisors to check the field data vs. Farm Service Agency images and field outlines.**
- **Presentation of the Geotiff Cropland Data Layer to determine land use for the year.**
- **Displays of overlays of multiple year Cropland Data Layer maps for individual crops allow land suitability and crop rotation determinations.**
- **Good public relation tools for Mississippi agriculture.**

Annual Cropland Data Layers are available on disk from USDA-NASS (800) 727-9540 and on-line at www.mdac.state.ms.us and

<http://www.nass.usda.gov/research/Cropland/SARS1a.htm>.