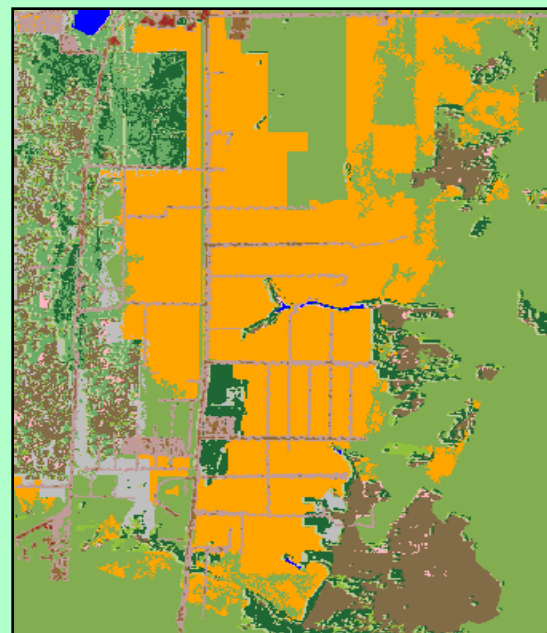
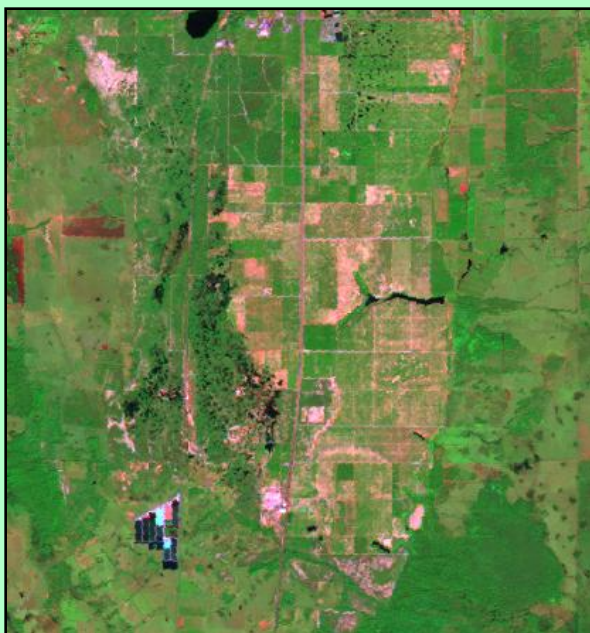


A Link Between GIS and Remote Sensing

Florida Citrus GIS Project and a Florida Cropland Remote Sensing Classification



Claire Boryan, Geographer

United States Department of Agriculture
National Agricultural Statistics Service
Research and Development Division



The National Agricultural Statistics Service

Provider of timely, accurate, and useful statistics
in service to U.S. agriculture

NASS - Data and Statistics - Microsoft Internet Explorer

Address: http://www.nass.usda.gov/Data_and_Statistics/index.asp

USDA National Agricultural Statistics Service

The 2002 Census of Agriculture is the most comprehensive source of statistics portraying our nation's agriculture

Home About NASS Newsroom Publications **Data and Statistics** Census Surveys Help Contact Us

Search NASS You are here: Home / Data and Statistics

Data and Statistics

Quick Stats (Agricultural Statistics Data Base)

NASS publishes U.S., state, and county level agricultural statistics for many commodities and data series. Quick Stats offers the ability to query by commodity, state(s) and year(s), providing the most up-to-date statistics including all revisions. The query dataset can be downloaded for easy use in your database or spreadsheet.

- Query our Quick Stats Data Base

Additional Crops County Resources

Maps of crops county estimates for acreage and yield are available from NASS as both CSV data files and maps.

County data from Quick Stats data is also available in pre-extracted data sets by year and by crop.

Census of Agriculture

To query Census of Agriculture data, choose from the Census years below. To view the Census publications, click here:

- Data Queries for 2002, select below:

Select a Census Query

- Data Queries for 1997, 1992, 1987

Interactive Data

NASS provides a variety of tools for interacting with our Census datasets.

Interactive Statistical Maps Interactive Census Maps for 2002 Census Highlights

Table Lens Table Lens Application for 1997 Census Data

Last modified: 12/30/05

NASS Home | USDA.gov | FEDSTATS | Economics Statistics System (ESS) | Site Map
FOIA | Accessibility Statement | Privacy Policy | Non-Discrimination Statement | Information Quality | FirstGov | White House

2001 Wildlife Damage Survey

7.7 Percent 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, translating to Maryland farmers losing 7.7 percent of the crop value to deer and geese. Soybeans account for the greatest economic loss, totaling \$9.1 million, 11 percent. Corn losses were \$6.6 million, 3.8 percent and wheat \$1.5 million, 5.6 percent. Deer damage resulted in losses of \$13.6 million, 6.1 percent, while losses were \$3.6 million, 1.6 percent.

Production losses totaled 4.0 million bushels. Corn losses were 3.2 million bushels, soybean losses 2.2 million bushels and wheat accounted for 0.6 million bushels. Production losses to deer were 4.7 million bushels and geese 4.3 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 0.6 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 loss of 6.1 bushels per acre.

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

Maryland 2001 Crop Loss from Deer

Region	Crop	Acres Harvested	Average Yield (bushels)	Average Loss (bushels)	Production Loss (bu)	Economic Loss (\$)
Region 1	Corn					

WISCONSIN AGRICULTURAL STATISTICS SERVICE
P.O. Box 8934 Madison, WI 53708-8934

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

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.

2002 Census of Agriculture - SVG Interactive Mapping - United States - Microsoft Internet Explorer

National Agricultural Statistics Service 2002 Census of Agriculture

United States | All data items are from Chapter 2 - Table 1, Area Summary Highlights, 2002
Selected crops harvested - Land in orchards (acres)

State: United States - County Level | Data Item: Selected crops harvested - Land in orchards (acres)

Data

United States Total: 5,330,439
State:
State Total:
County:
County Total:

Download data as CSV | XML | PDF

Help | Print | Return to Query

Legend

Scale: National

Zero or Data Withheld
 <= 20,000
 20,001 to 40,000
 40,001 to 60,000
 60,001 to 80,000
 80,001 to 100,000
 100,001 >=

Comparisons: 6

Color: Green

Source: USDA-NASS 2002 Census of Agriculture © USDA-NASS 2005-2006

Wisconsin Dairy Herds by Herd Size

Milk cow herd size	May 2002 herds	May 2007 herds (projected) †	Change 2007/2002
1-29	2,800	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	15,900	-20

†The May 2007 projection is based on farmers' opinions in 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

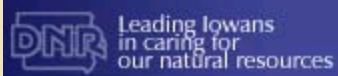
Plans for May 2007 1/2 rd Size

Keep the herd size	Increase herd size	Discontinue milking
47	17	36
71	9	20
85	19	18
83	37	10
93	59	8
22	78	0
60	29	20

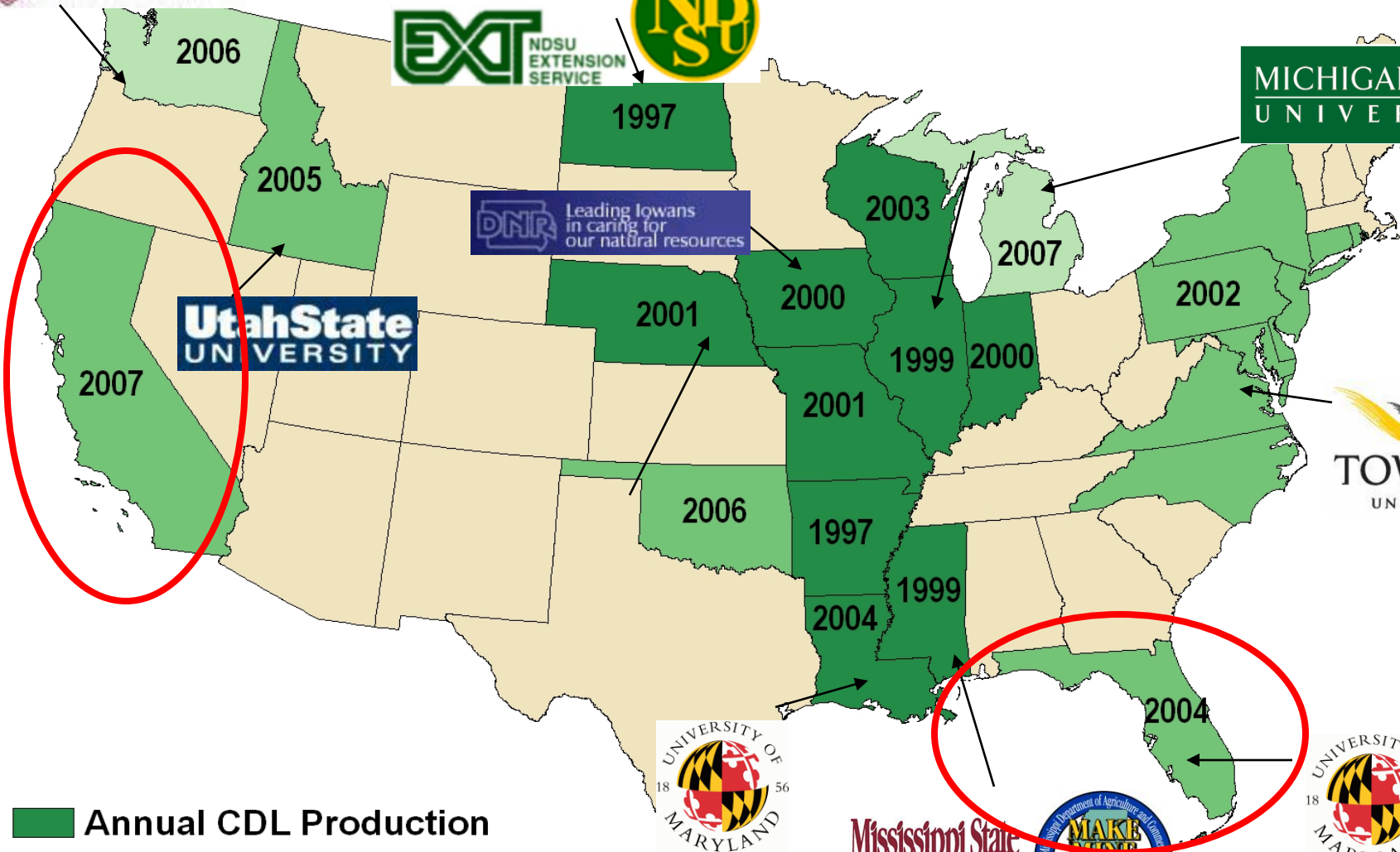
based on farmers' opinions in May-June 2002, with the assumption that milk prices for the next five years will be at the same level as the past five years.

"The Fact Finders of Agriculture."

Program Cooperators



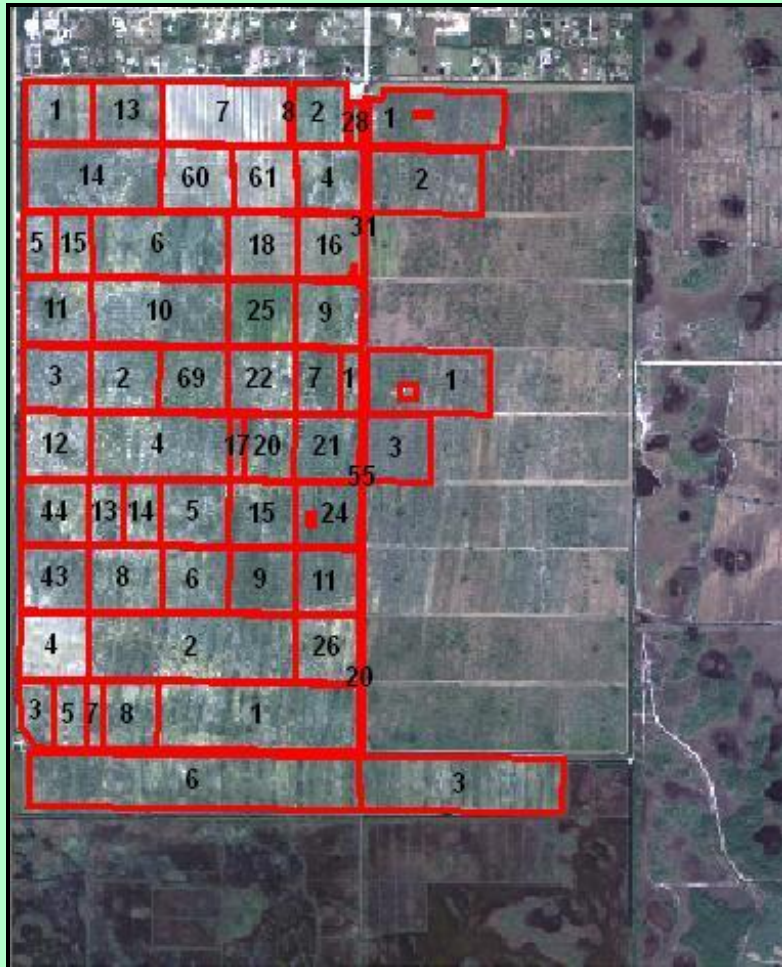
- Annual CDL Production
- One Time CDL Production
- Potential CDL Production



Past census methodology

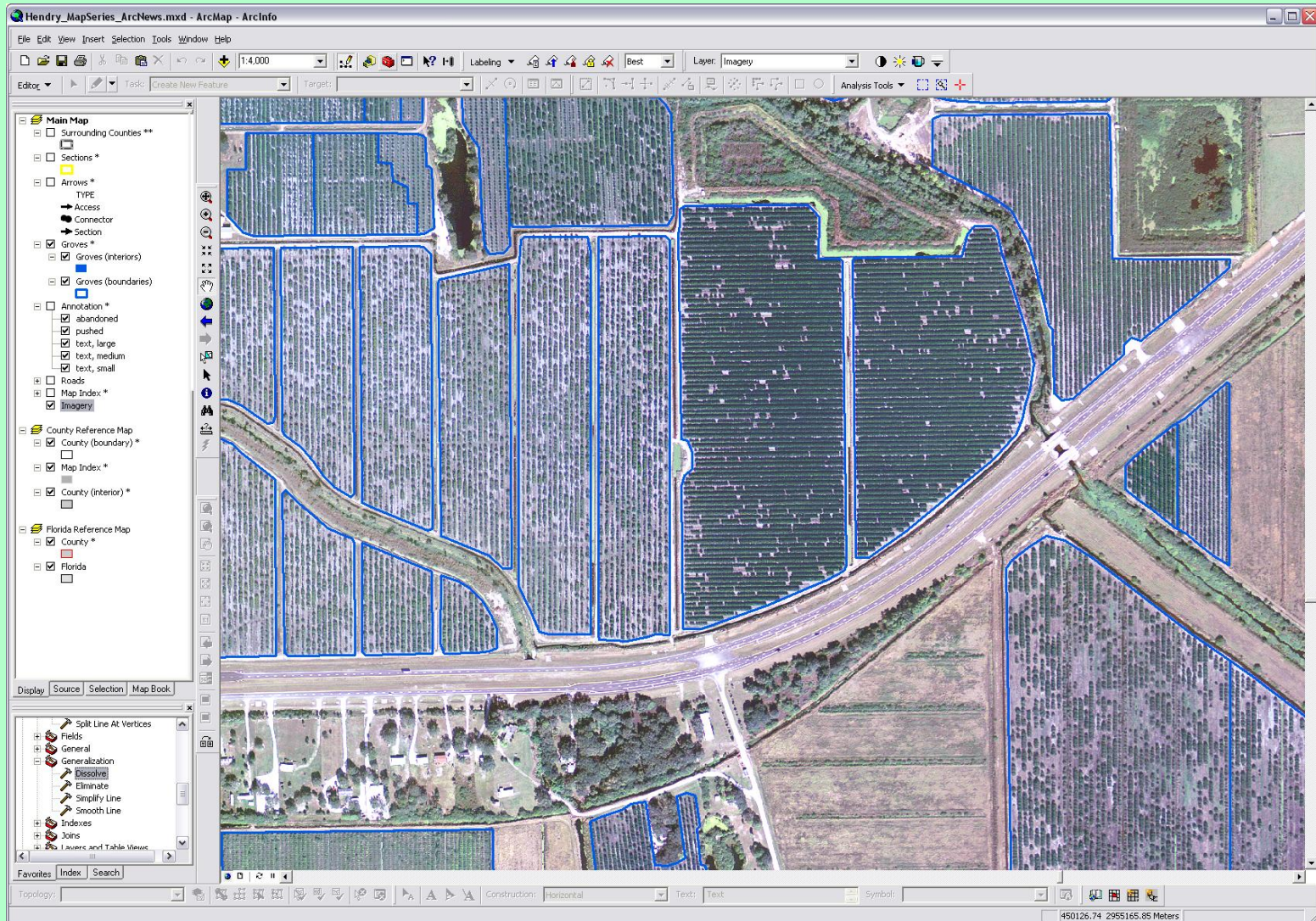


Florida Commercial Citrus Inventory Now Maintained Within a GIS



OBJECTID*	Shape*	TOWNSHIP	RANGE	SECTION	MULTIBLOCK	GROVEID*
1	Polygon	31	38	25	40	383125040
2	Polygon	31	38	25	34	383125034
3	Polygon	31	38	25	35	383125035
4	Polygon	31	38	25	43	383125043
5	Polygon	31	38	25	8	383125008
6	Polygon	31	38	25	10	383125010
7	Polygon	31	38	25	7	383125007
8	Polygon	31	38	25	33	383125033
9	Polygon	31	38	25	52	383125052
10	Polygon	31	38	25	50	383125050
11	Polygon	31	38	25	59	383125059
12	Polygon	31	38	25	32	383125032
13	Polygon	31	38	25	44	383125044
14	Polygon	31	38	25	11	383125011
15	Polygon	31	38	26	35	383126035
16	Polygon	31	38	26	16	383126016
17	Polygon	31	38	26	85	383126085
18	Polygon	31	38	26	22	383126022
19	Polygon	31	38	26	17	383126017
20	Polygon	31	38	26	19	383126019
21	Polygon	31	38	26	29	383126029
22	Polygon	31	38	26	20	383126020
23	Polygon	31	38	26	83	383126083
24	Polygon	31	38	26	88	383126088
25	Polygon	31	38	26	21	383126021
26	Polygon	31	38	26	46	383126046
27	Polygon	31	38	26	47	383126047
28	Polygon	31	38	26	45	383126045
29	Polygon	31	38	35	6	383135006
31	Polygon	31	38	36	24	383136024
32	Polygon	31	38	36	68	383136068
33	Polygon	31	38	36	1	383136001
34	Polygon	31	38	36	2	383136002
35	Polygon	32	38	14	37	383214037
36	Polygon	32	38	14	38	383214038
37	Polygon	32	38	14	39	383214039
38	Polygon	32	38	14	32	383214032
39	Polygon	32	38	14	33	383214033

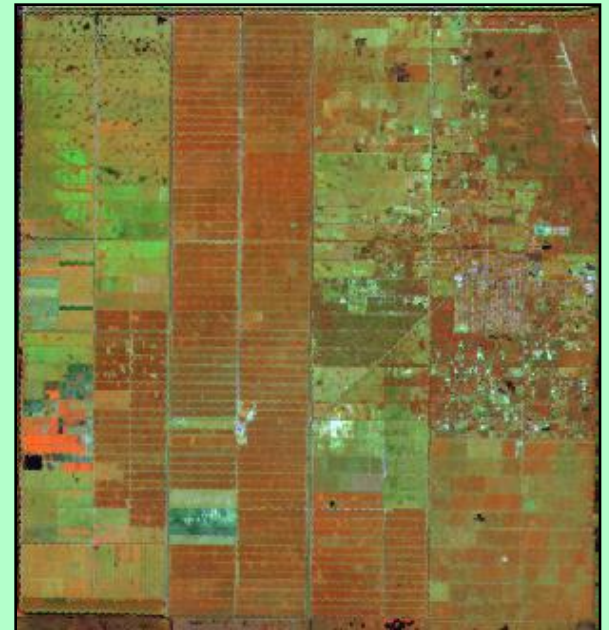
Florida Commercial Citrus Inventory Now Maintained Within a GIS



Screen capture of ArcMap in action

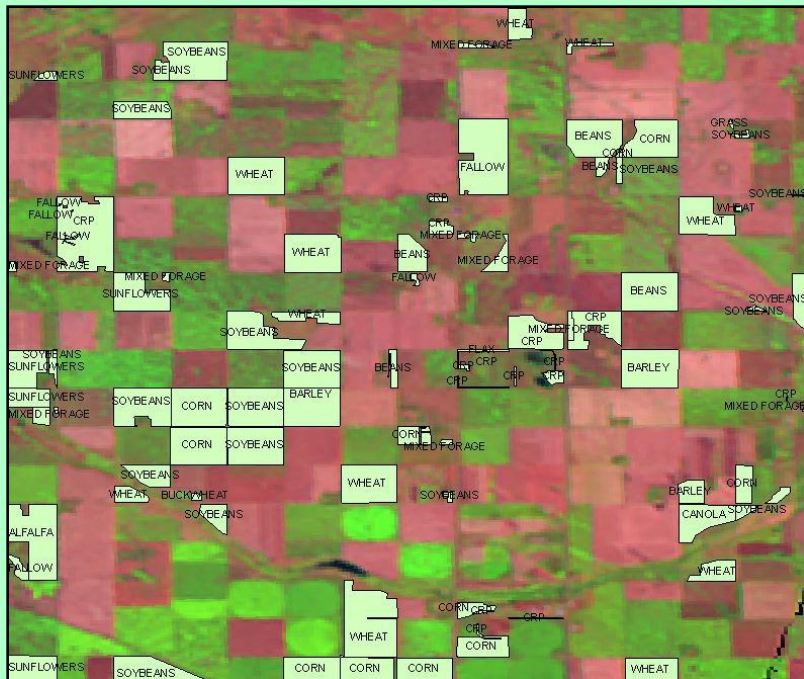
Benefits of the GIS-based citrus census

- More efficient
- Lower cost
 - ...in the long run
- Increased analytical ability
 - Spatial-based queries/summaries
 - Other GIS capabilities
 - Tracking disease (canker, greening)
 - Hurricane analysis (overlay tracks)
 - Land cover conversion (urbanization)
- Cartographic capabilities
 - Eliminates manual polygon and label redrawing
 - Customizable and consistent map layouts



Additional GIS– Ground truth

Farm Service Agency (FSA) Common Land Unit (CLU) data

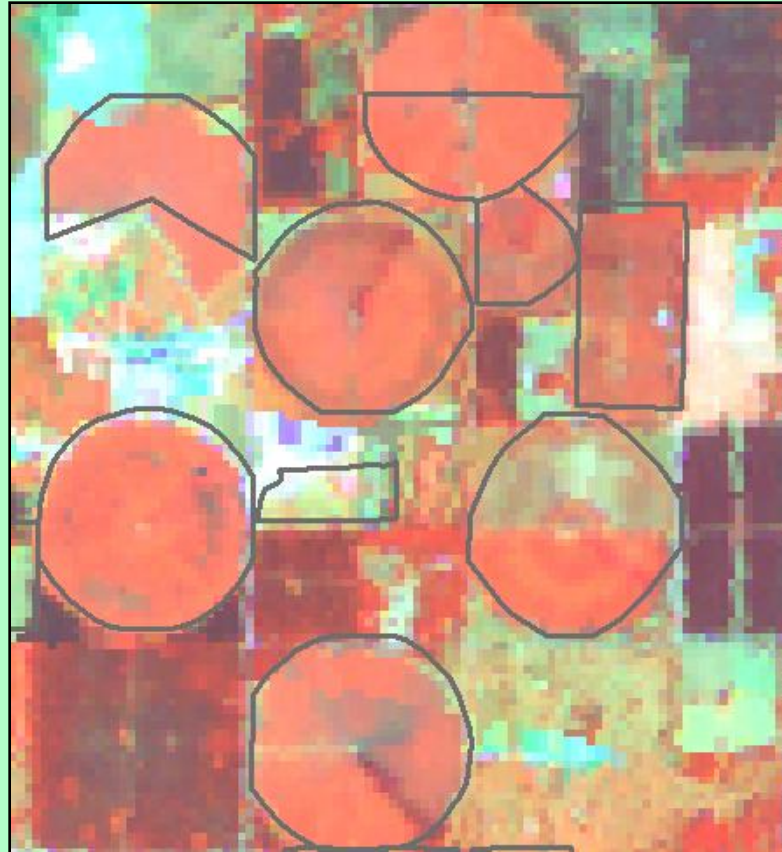


FSA CLU

OID	STATE	COUNTY_COD	FARM_NUMBE	TRACT_NUMB	FIELD_NUMB	CROP_ABBR	CROP_NAME	ACRES	PLANTED	CROP1	CROP_CD
0	12	1	2	865	2	PNUTS	RUNNER PEANUTS	20.9	20.9	RUN	75
1	12	1	2	865	3	FALLOW	N/A	9.5	9.5	N/A	101
2	12	1	2	865	4	GRASS	BAHIA GRASS	16	16	BHI	102
3	12	1	2	865	5	GRASS	BAHIA GRASS	22.9	22.9	BHI	102
4	12	1	2	865	6	GRASS	BAHIA GRASS	14.8	14.8	BHI	102
5	12	1	2	865	1A	CORN	YELLOW	7	7	YEL	41
6	12	1	2	865	1B	BEANS	VELVET BEANS	7	7	VEL	47
7	12	1	2	865	1C	PNUTS	RUNNER PEANUTS	14.1	14.1	RUN	75
8	12	1	2	865	1X	TRNAR	N/A	0.4	0.4	N/A	105
9	12	1	2	865	2X	TRNAR	N/A	0.7	0.7	N/A	105
10	12	1	13	2125	1	GRASS	BAHIA GRASS	13.1	13.1	BHI	102
11	12	1	17	627	2	PNUTS	RUNNER PEANUTS	22	22	RUN	75
12	12	1	17	627	1A	PNUTS	RUNNER PEANUTS	54.9	54.9	RUN	75
13	12	1	17	627	1B	FALLOW	N/A	4.2	4.2	N/A	101
14	12	1	17	627	1X	TRNAR	N/A	1.7	1.7	N/A	105
15	12	1	17	627	2X	TRNAR	N/A	0.7	0.7	N/A	105
16	12	1	23	2224	1	OKRA	N/A	2.1	2.1	N/A	286
17	12	1	23	2224	2	GREEN	COLLARDS	0.9	0.9	COL	4000
18	12	1	23	2224	4	CORN	YELLOW	4.4	4.4	YEL	41
19	12	1	23	2224	5	CORN	YELLOW	8.3	8.3	YEL	41
20	12	1	23	2224	1X	TRNAR	N/A	0.1	0.1	N/A	105
21	12	1	23	2224	2X	TRNAR	N/A	0.1	0.1	N/A	105
22	12	1	23	2224	3A	WATRM	COMMON	0.2	0.2	COM	757
23	12	1	23	2224	3B	PEAS	SOUTHERN ACRE	0.5	0.5	SOA	67
24	12	1	23	2224	3C	CORN	YELLOW	2	2	YEL	41
25	12	1	23	2224	3X	FALLOW	N/A	1.8	1.8	N/A	101
26	12	1	23	2224	4X	TRNAR	N/A	0.1	0.1	N/A	105
27	12	1	23	2224	5X	TRNAR	N/A	0.1	0.1	N/A	105
28	12	1	34	22116	1	GRASS	BAHIA GRASS	6.6	6.6	BHI	102
29	12	1	34	22117	1	GRASS	BAHIA GRASS	8.3	8.3	BHI	102
30	12	1	34	22117	2	WATRM	COMMON	5.5	0	COM	757
31	12	1	34	22117	3	GRASS	BAHIA GRASS	8.2	8.2	BHI	102
32	12	1	34	22117	2X	TRNAR	N/A	0.2	0.2	N/A	105
33	12	1	34	22118	1	WATRM	COMMON	1	1	COM	757
34	12	1	34	22509	1	WATRM	COMMON	1	1	COM	757
35	12	1	40	22469	1	FALLOW	N/A	7	7	N/A	101
36	12	1	40	22469	2A	PEAS	SOUTHERN ACRE	0.5	0.5	SOA	67

578 Admin Data

Farm Service Agency (FSA) Data

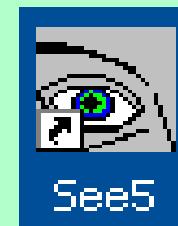
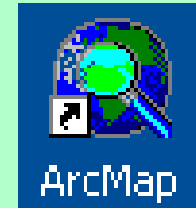


FSA (CLU) Data Used for Ground Truth Information

A Merging of Technologies

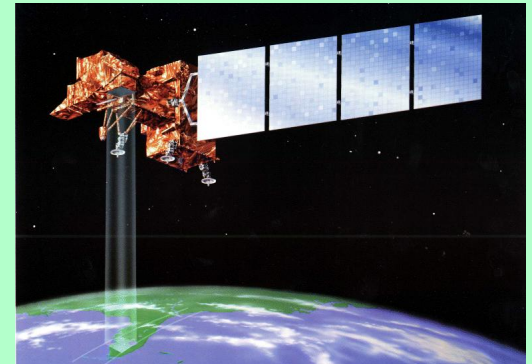
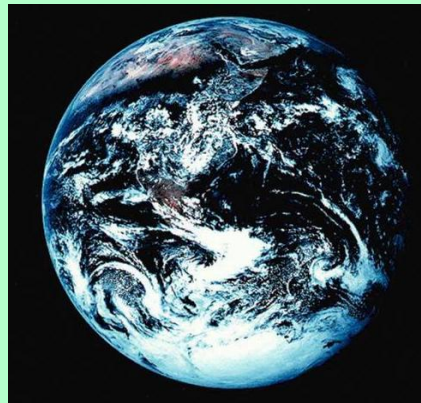
GIS and Remote Sensing

- Ground Truth Preparation
 - ESRI ArcGIS 9.1
- Imagery Preparation
 - Leica Geosystems ERDAS
Imagine 9.0
- Classification
 - Decision tree software
 - See5.0
 - www.rulequest.com



Landsat Platform

- Landsat 5 launched 1984 (3 yr design life!)
 - Thematic Mapper (TM) Sensor
- Landsat 7 launched 1999 Thematic Mapper (ETM+) Sensor



Landsat 7 Gap- Filled Images



Stripes of Missing Data



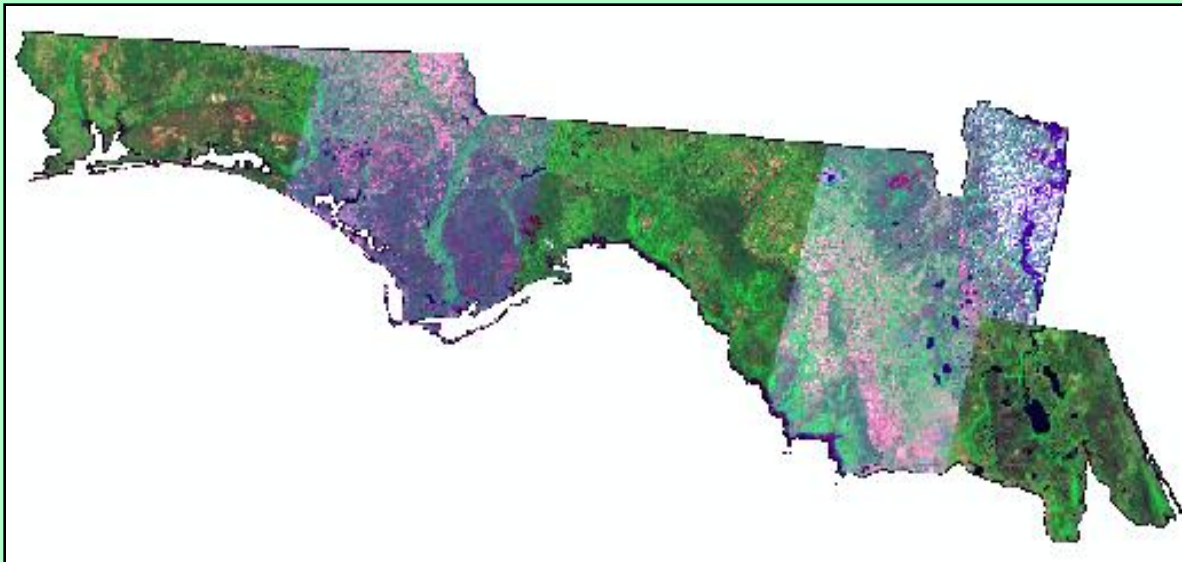
Gap Filled Product

Florida Panhandle

Imagery Mosaics created from Landsat TM and
Gap Filled Landsat ETM+ scenes



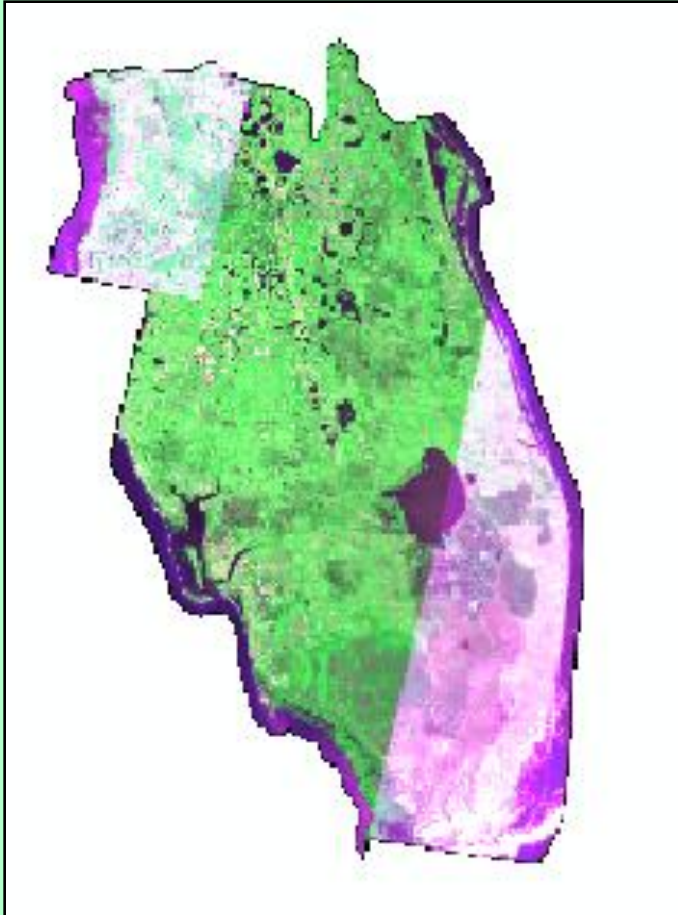
Spring Mosaic



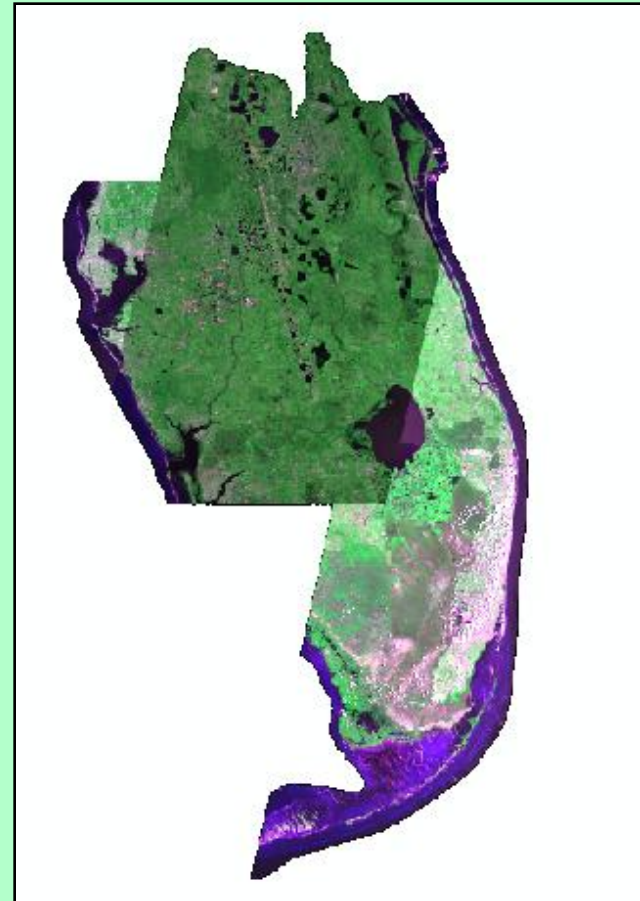
Fall Mosaic

Florida Peninsula

Imagery Mosaics created from Landsat TM
and Gap Filled ETM+ scenes



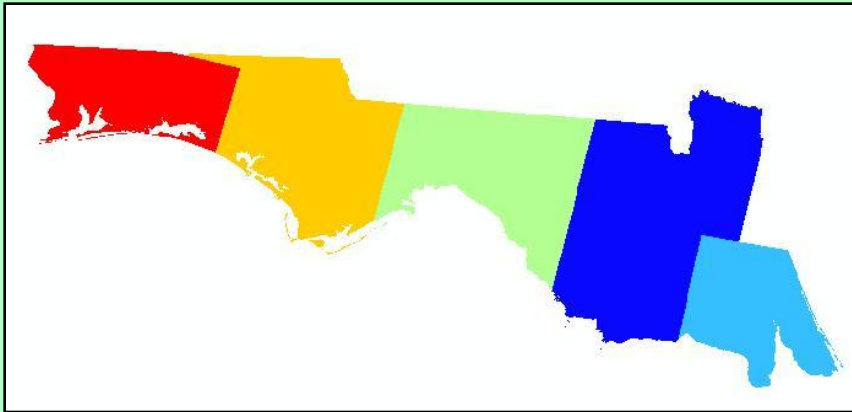
Spring Mosaic



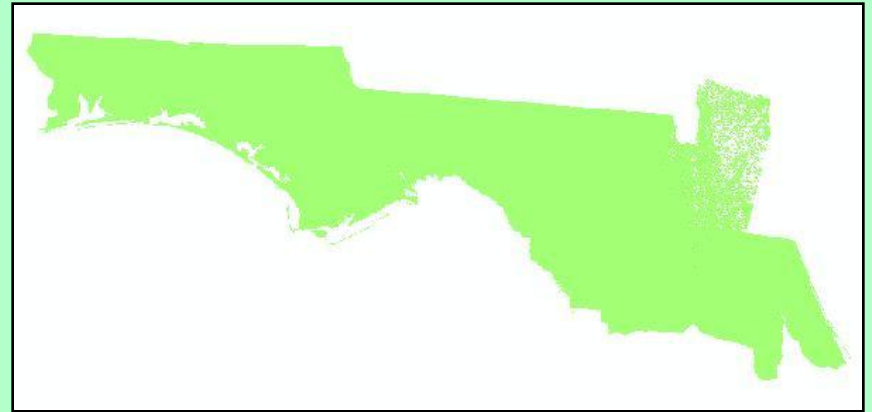
Fall Mosaic

Ancillary Data sets

- Cloud Masks
- Date Masks



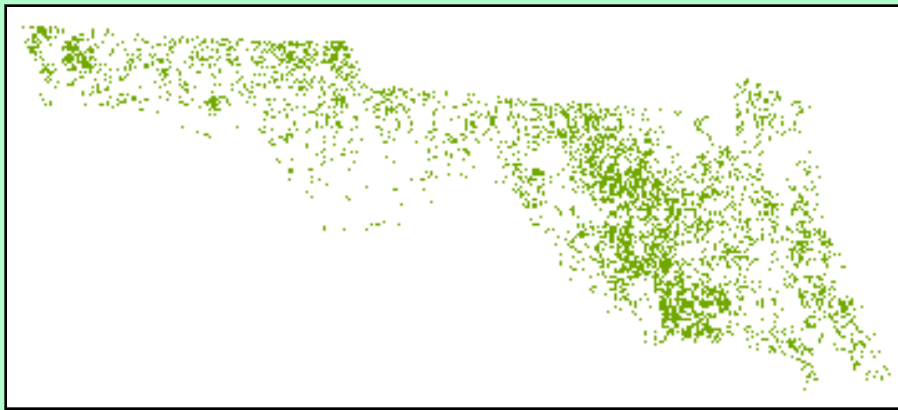
- Date Mask



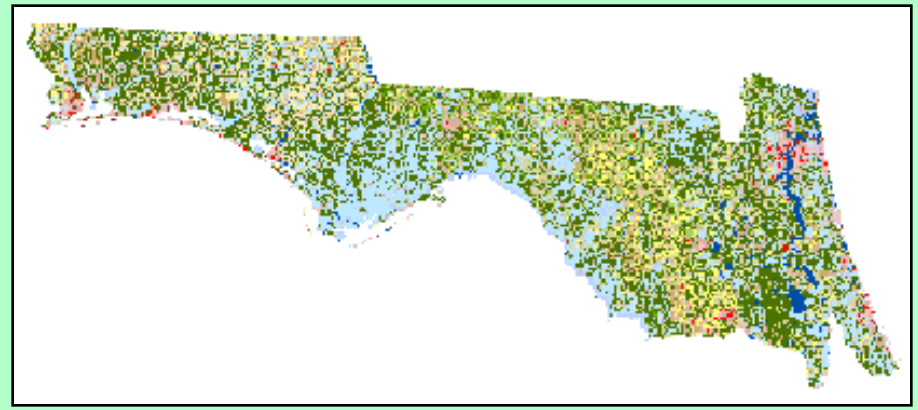
- Cloud Mask

More Ancillary Data sets

- Agricultural Masks
- National Land Cover Data Set (NLCD) 2001



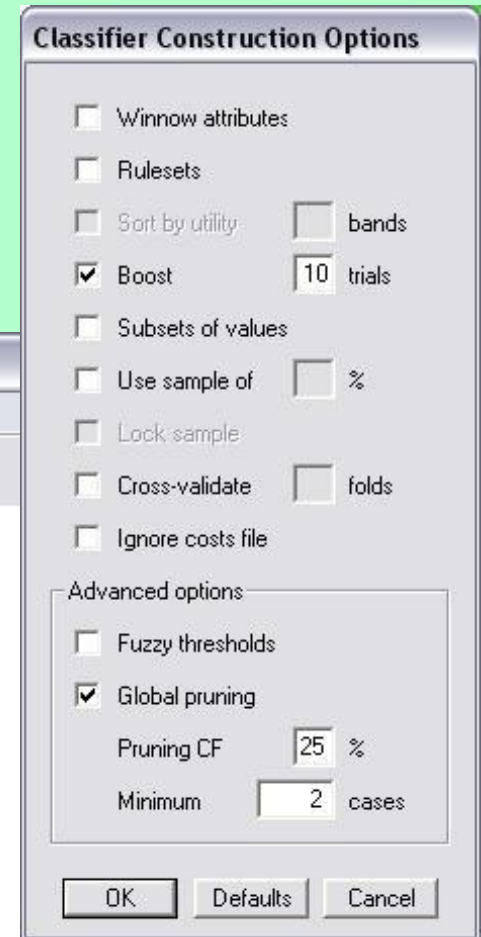
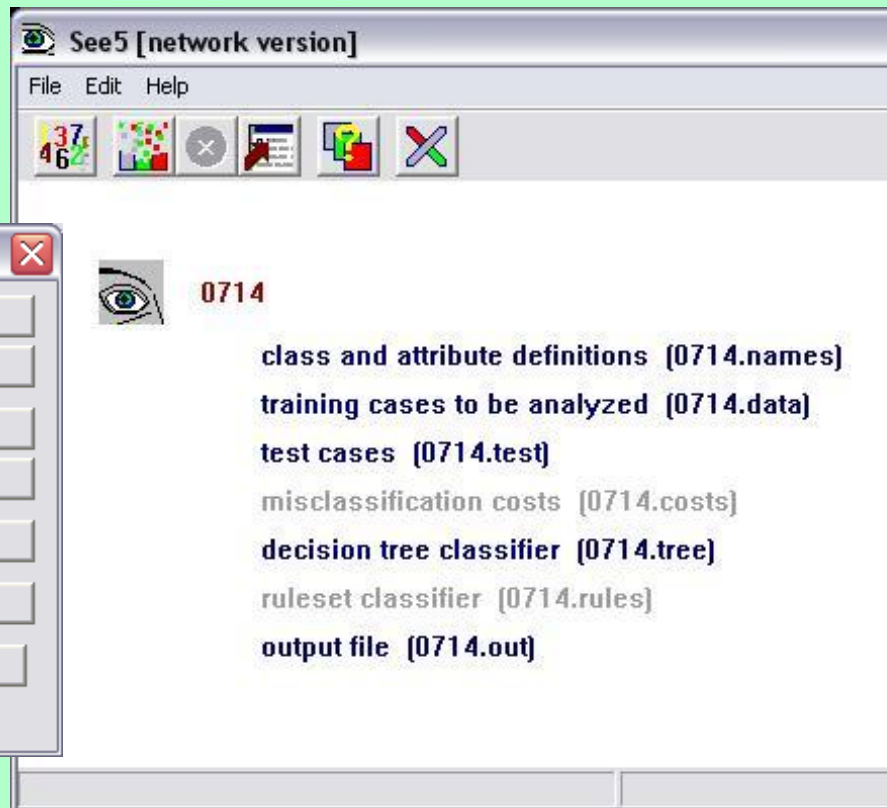
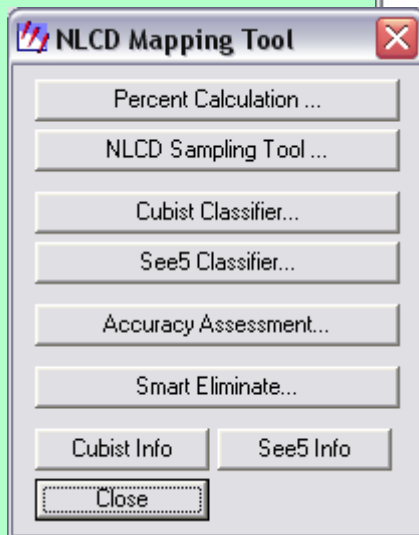
- Agricultural Mask



- (NLCD) 2001

Classification Overview (See5)

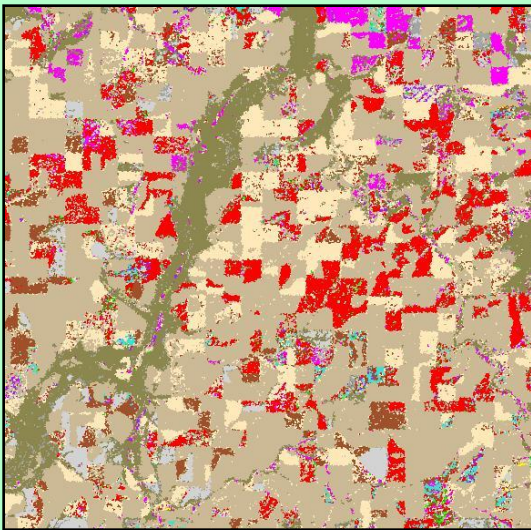
- Derive classification within each analysis district
- Combine analysis districts classification to create a single statewide product



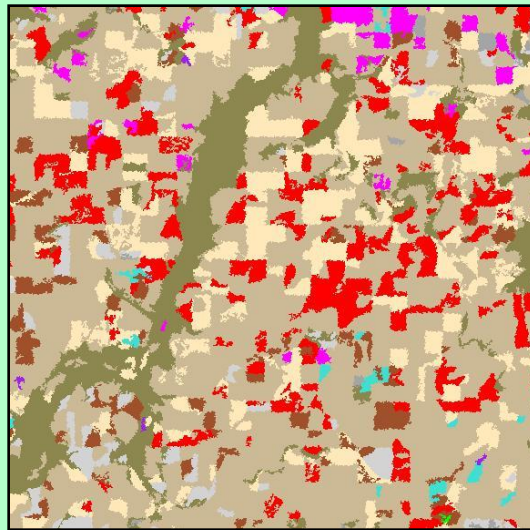
Post classification enhancements

See5

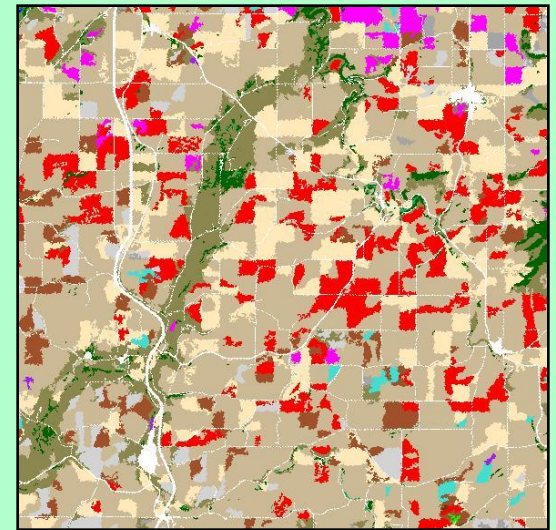
- Possible post processing refinement steps
 - Polish
 - 20 acre minimum mapping unit works best
 - Overlay non agricultural classes with those from ancillary data
 - For example: National Land Cover Dataset



Original



Polished



Ancillary added

Florida Cropland Data Layer Error Matrix

B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	Reference													
	Corn	Cotton	Sorghum	Soybeans	Peanuts	WW/Rye/	Other C	Sugarcane	Waterm	Grass/Pa	Citrus	Totals	User Accuracies	
Corn	41386	21	0	1	14	71	6	0	98	7727	275	49599	83.441	
Cotton(Upla	73	96224	0	97	453	598	47	0	13	4733	0	102238	94.118	
Sorghum	12	0	2592	0	0	0	0	0	0	21	0	2625	98.743	
Soybeans	33	35	0	17624	39	50	6	0	0	155	0	17942	98.228	
Peanuts	155	966	1	27	148665	201	135	0	357	3541	123	154171	96.429	
WW/Rye/Oa	69	150	9	9	135	69652	3277	0	0	1052	0	74342	93.691	
Other Crop_	1473	0	2618	0	0	0	4313	1	0	1306	26575	36286	11.886	
Sugarcane	134	0	0	0	0	0	1474	56013	0	0	4108	61729	90.74	
Watermelon	0	3	0	0	46	50	382	0	6812	43	0	7336	92.857	
Grass/Pastu	696	810	116	296	2356	5528	9713	428	1771	729996	454562	1E+06	60.517	
Citrus	0	0	0	0	0	0	12	0	3	525	2055068	2E+06	99.974	
Sum Classif	44031	98209	5336	18054	151708	76150	19365	56442	9054	749099	2540711	4E+06		
Accuracies	93.993	97.979	48.5757	97.618256	97.9942	91.46684	22.2721	99.23993	0.75237	97.4499	80.8855		0.8567	
	Producer Accuracies											Agriculture Accuracy (NLCD) not included		

User's Accuracies

Table 1: User's Accuracies

Corn	83.42%
Cotton (Upland)	94.12%
Sorghum	98.74%
Soybeans	98.29%
Peanuts:	96.43%
Winter Wheat/Rye/Oats/Millet	93.69%
Other Crop	11.89%
Watermelon/Other Fruit	92.86%
Grass/Pasture	60.50%
Sugarcane:	90.74%
Citrus	99.97%

User Accuracies indicate the probability that a pixel from the CDL classification actually matches the ground truth data and measures errors of commission.

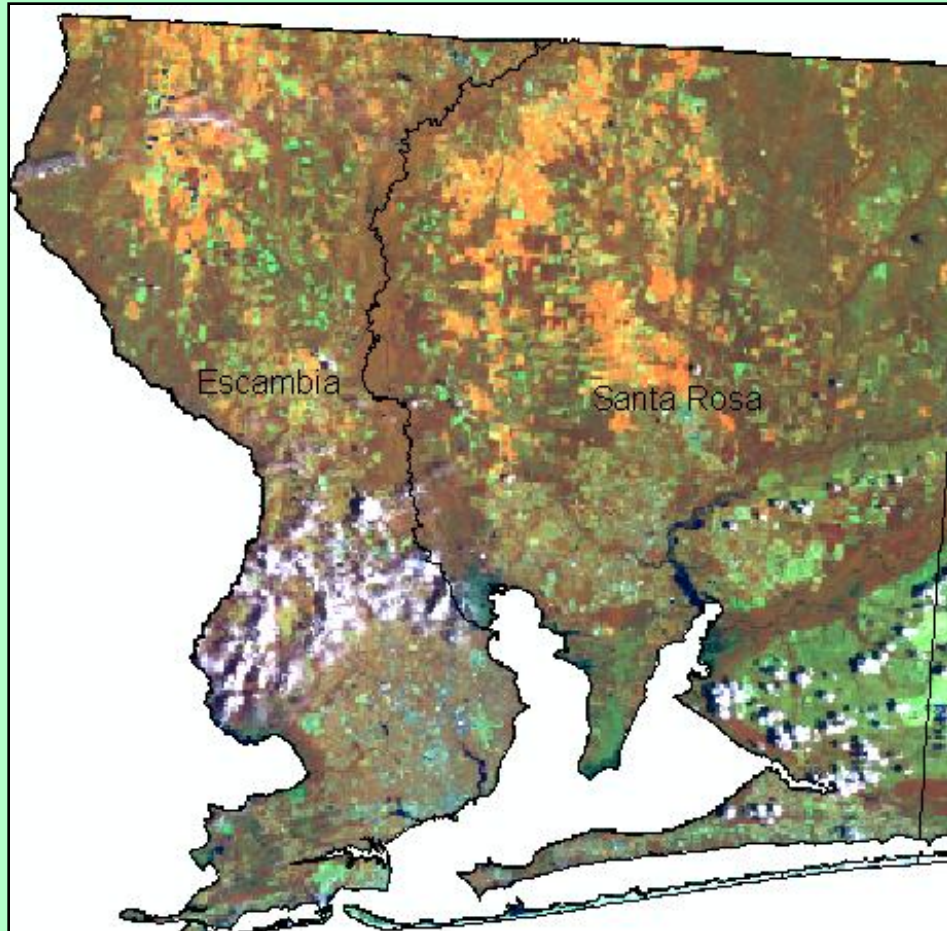
Producer's Accuracies

Table 2: Producer's Accuracies

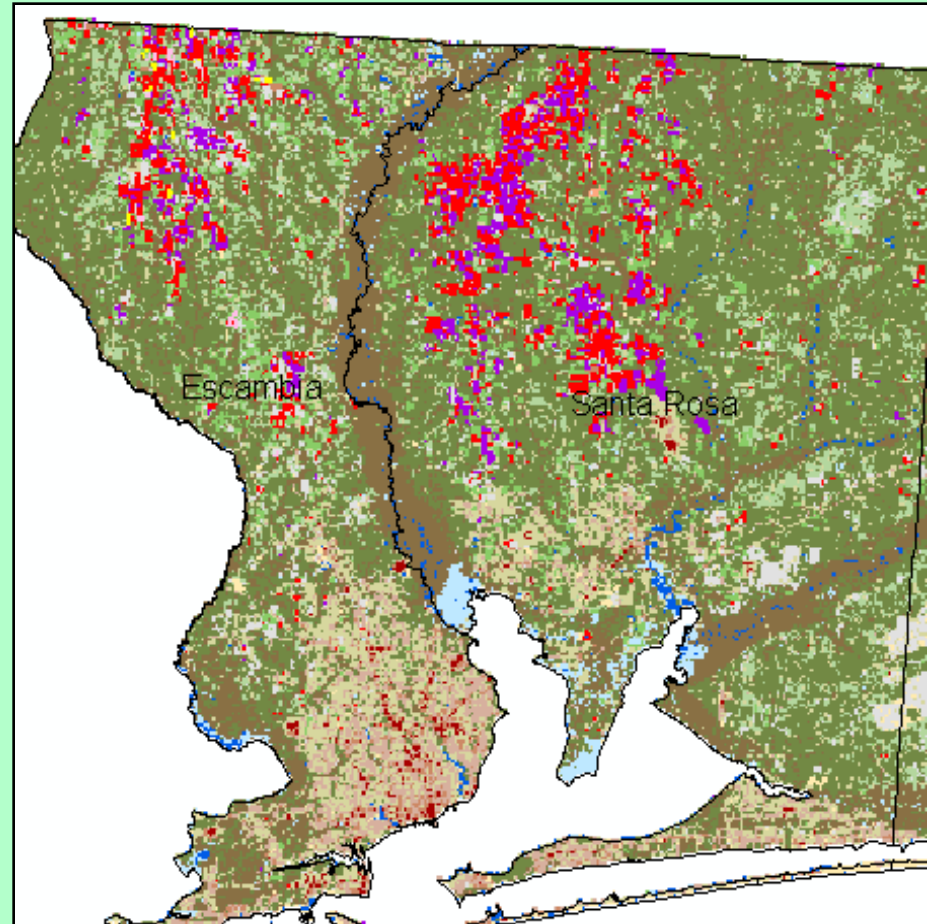
Corn	93.99%
Cotton (Upland)	97.98%
Sorghum	45.58%
Soybeans	97.62%
Peanuts:	97.99%
Winter Wheat/Rye/Oats/Millet	91.47%
Other Crop	22.27%
Watermelon/Other Fruit	75.24%
Grass/Pasture	97.45%
Sugarcane:	99.24%
Citrus	80.89%

Producer's accuracies relate to the probability that a ground truth pixel will be correctly mapped and measures errors of omission.

Santa Rosa and Escambia Counties

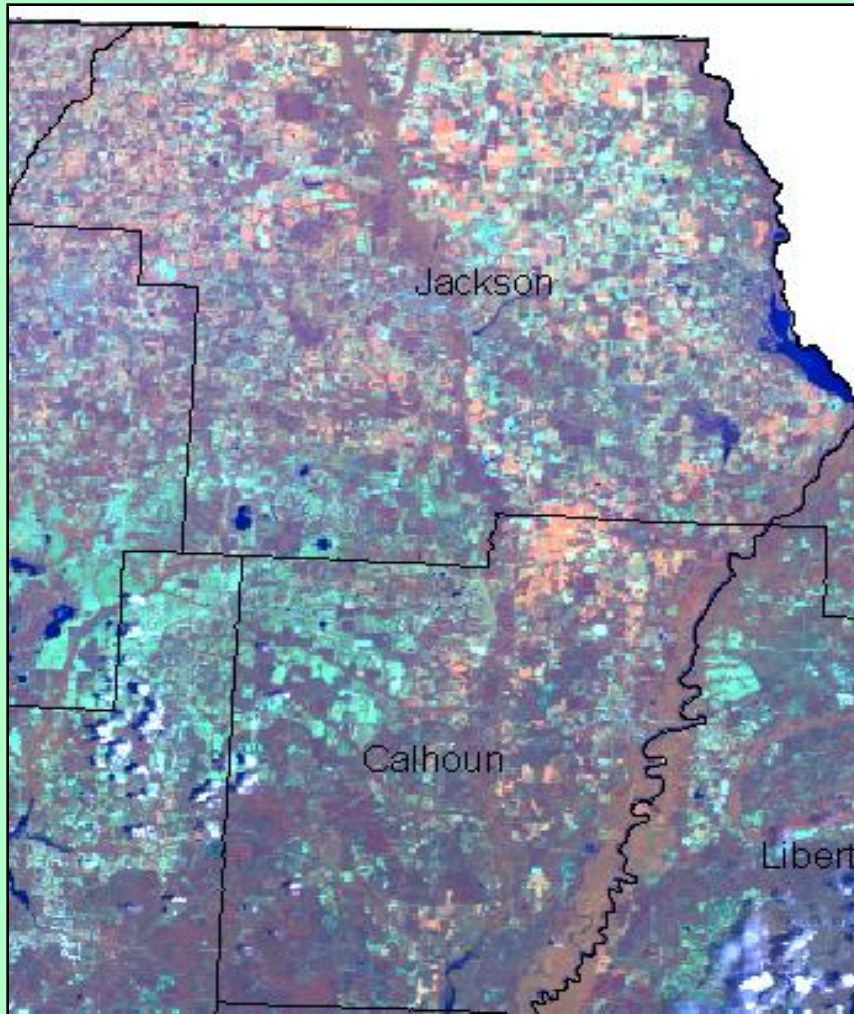


Raw Landsat TM Imagery Bands 4,5,3

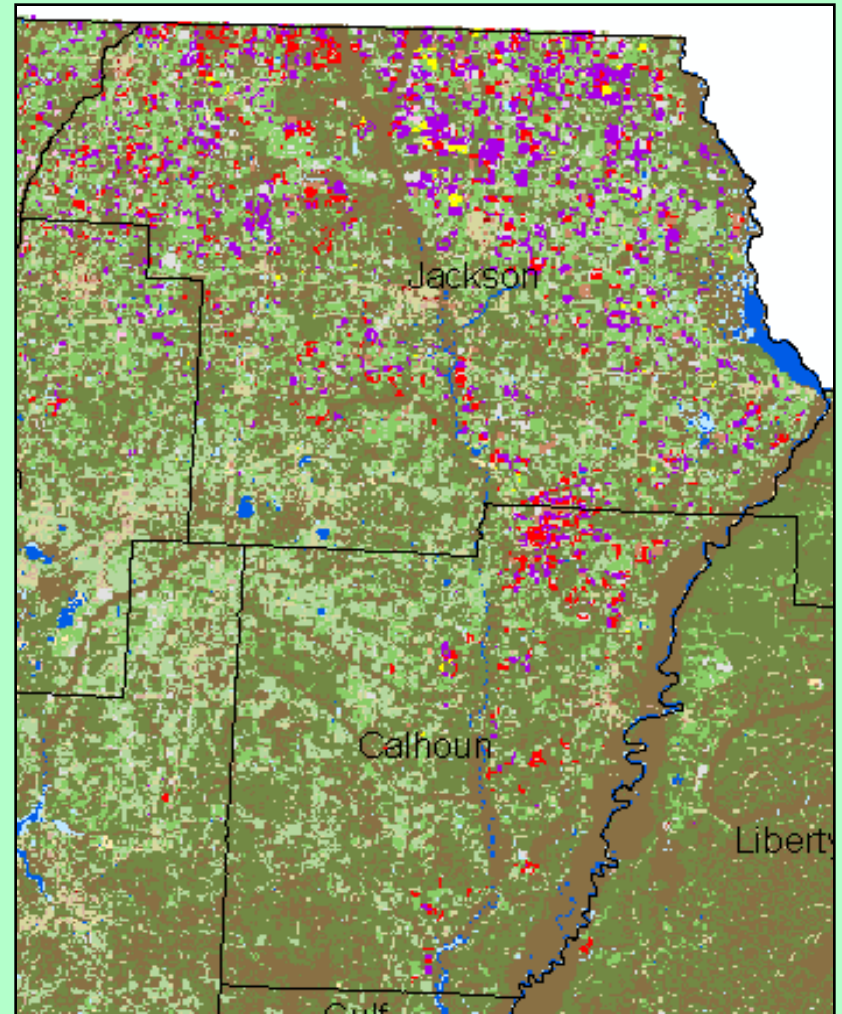


**Florida CDL Zoom
of Santa Rosa and Escambia Counties**

Jackson and Calhoun Counties

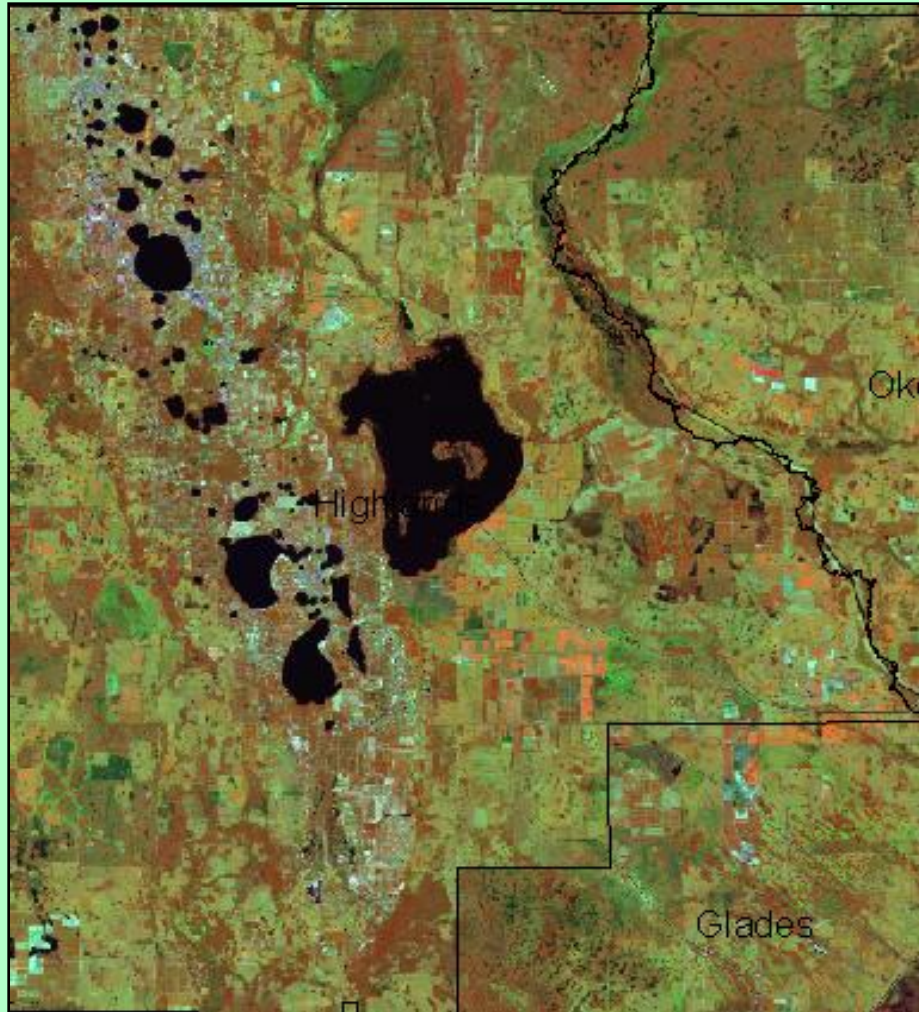


Raw Landsat TM Imagery Bands 4,5,3

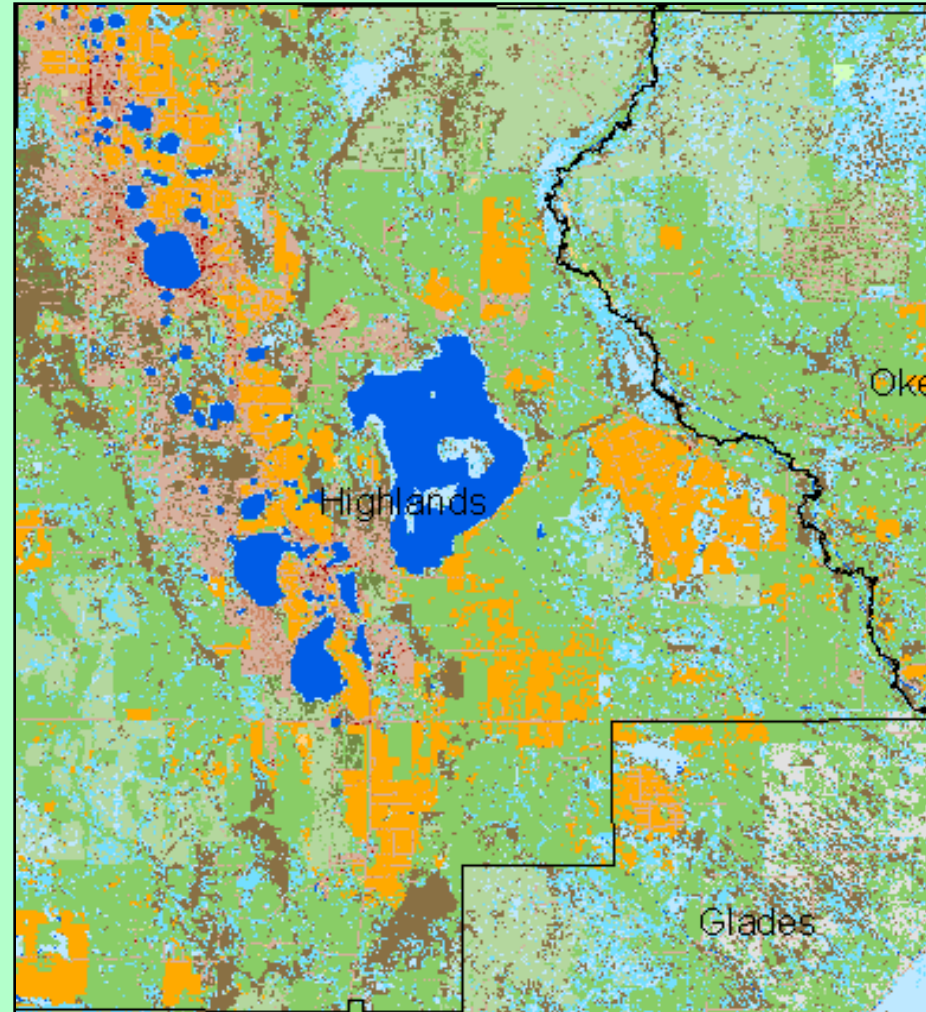


Florida CDL Zoom
of Jackson and Calhoun Counties

Highlands County



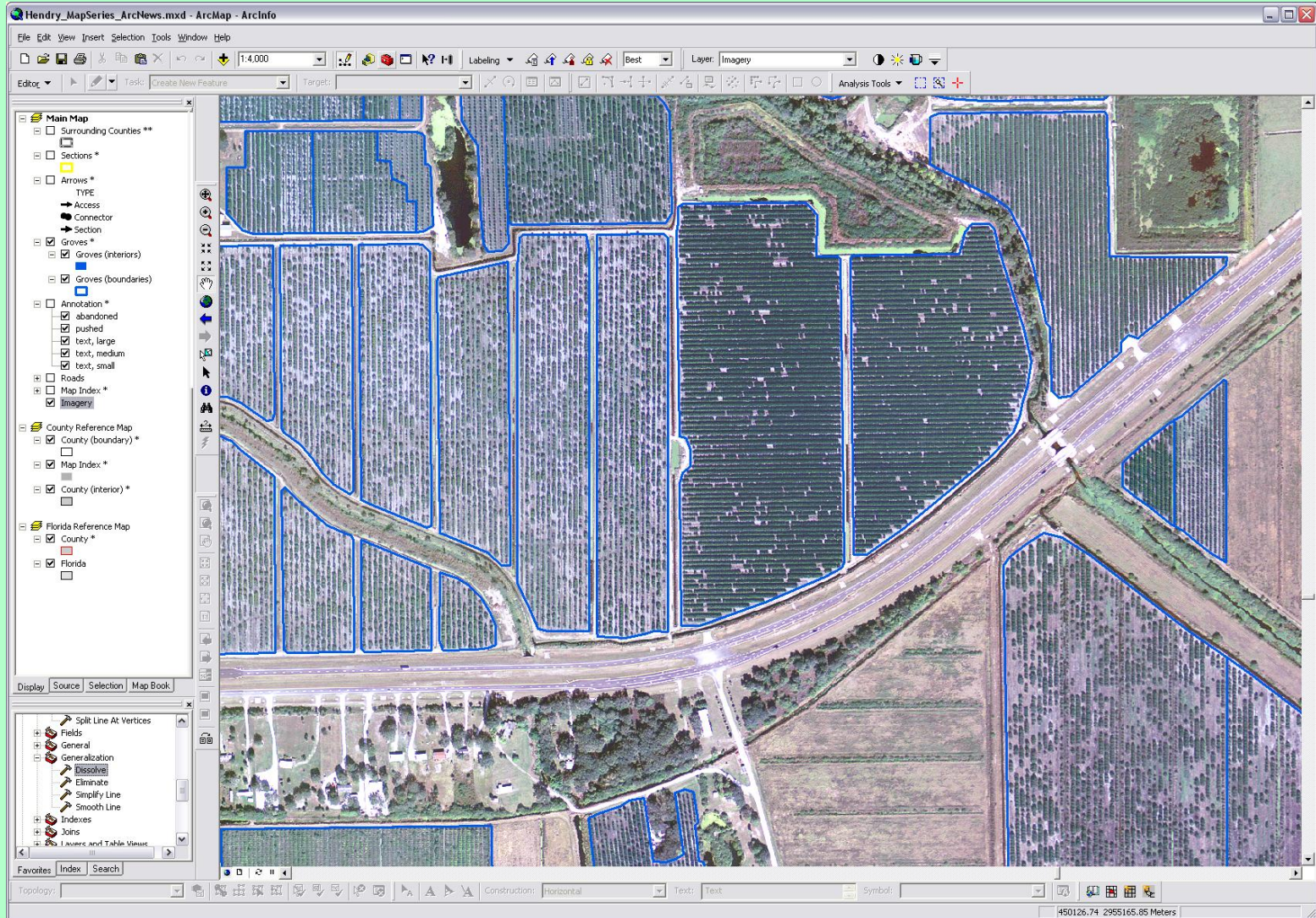
Raw Landsat TM Imagery Bands 4,5,3



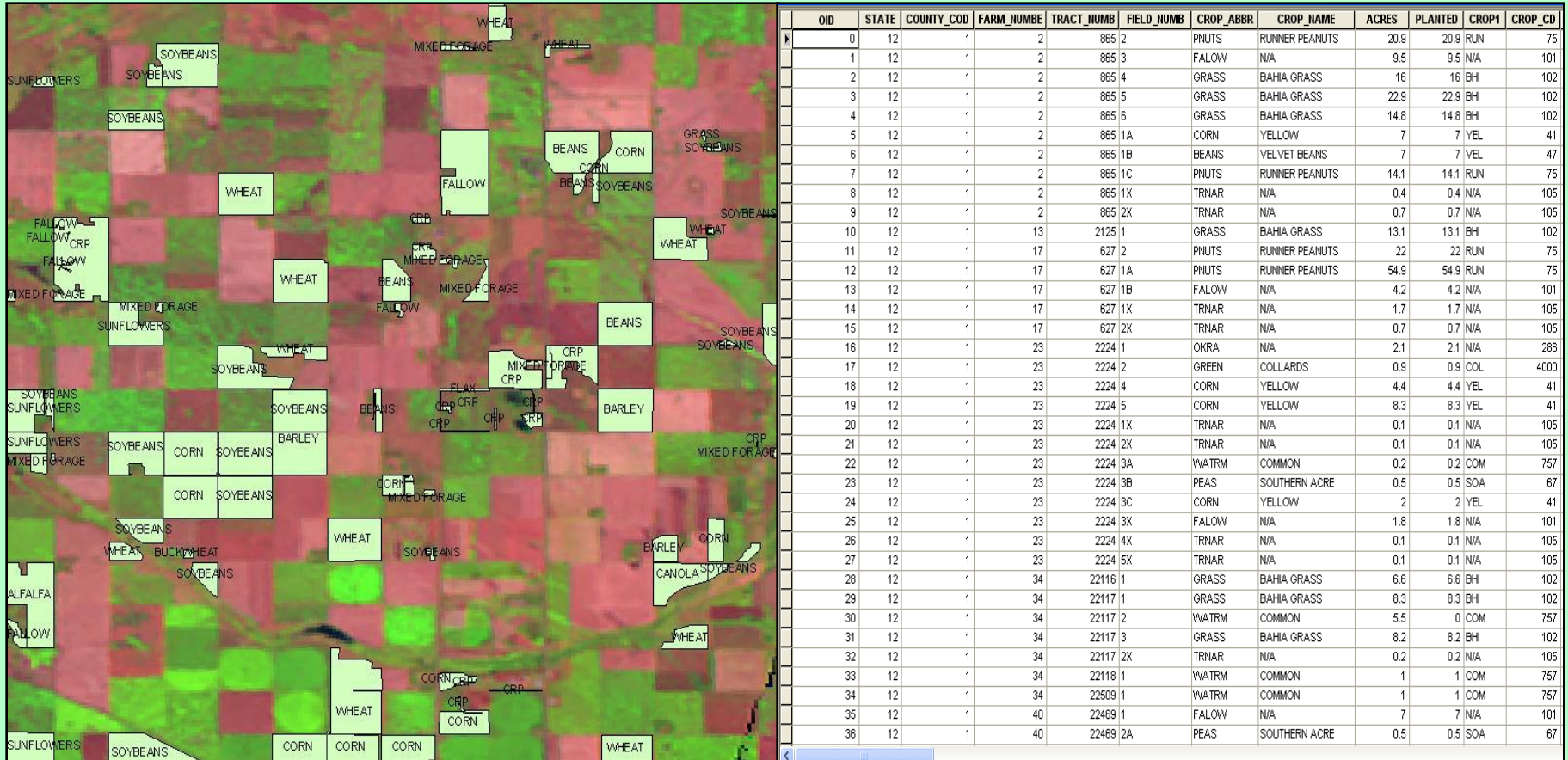
Florida CDL Zoom of Highlands County

A Link Between GIS and Remote Sensing

The Florida Commercial Citrus GIS Product



The Farm Service Agency Common Land Unit Data

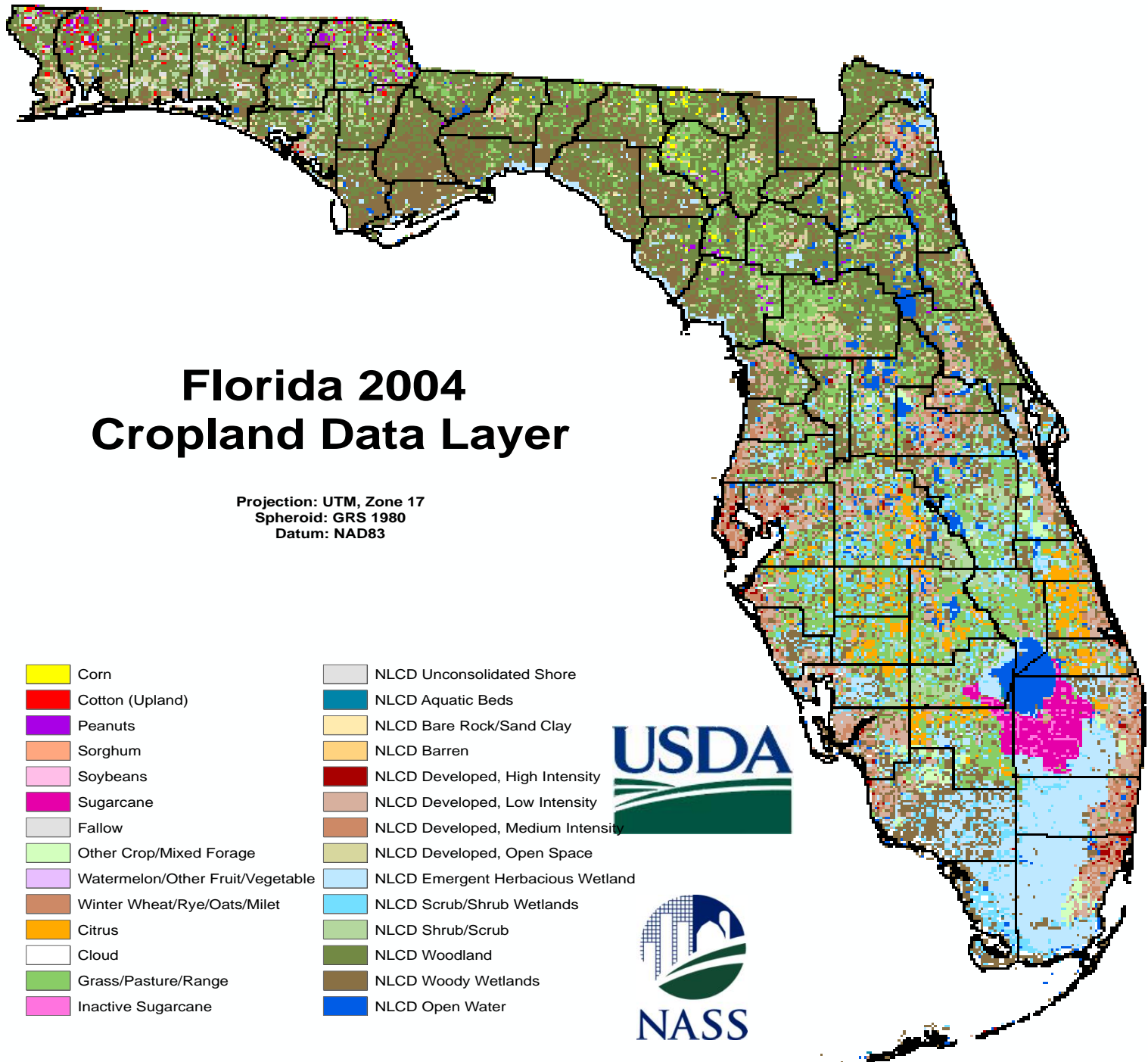
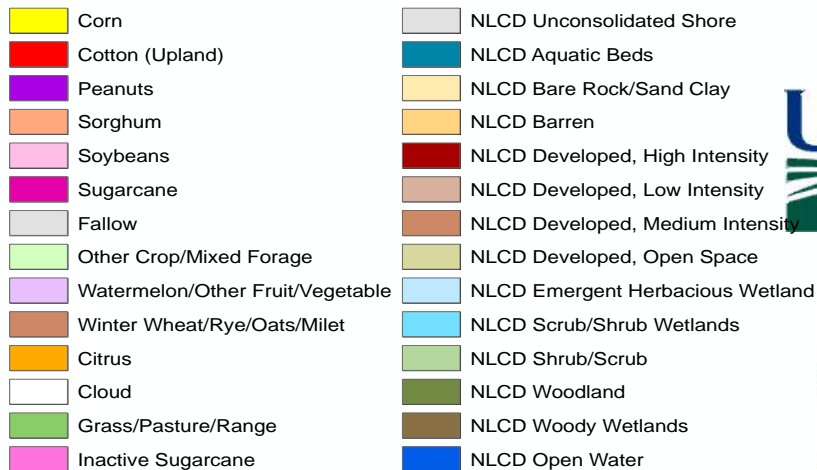


FSA CLU Data

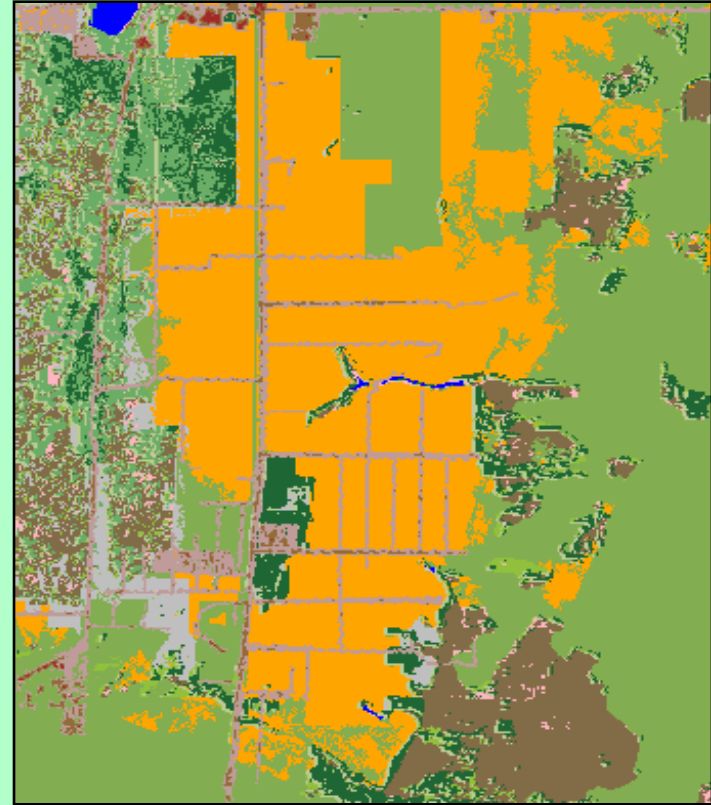
578 Admin Data

Florida 2004 Cropland Data Layer

Projection: UTM, Zone 17
Spheroid: GRS 1980
Datum: NAD83



Thank You



Claire Boryan, Geographer

United States Department of Agriculture
National Agricultural Statistics Service
Research and Development Division

