

# USDA NASS Geospatial Data

## CropScape & VegScape

Patrick Willis

National Agricultural Statistics Service



“ . . . providing timely, accurate, and useful statistics in service to U.S. agriculture.”



# Purpose of today's talk

- Raise public awareness of free USDA NASS geospatial data



# Topics

- What is NASS?
- NASS Geospatial Products
- Cropland Data Layer (CDL)
- CropScape Web Portal
- VegScape Web Portal



# What is NASS?

- the statistical survey agency of the U.S. Department of Agriculture
  - non-political
  - non-policy making
  - independent-objective-unbiased
  - appraisers of U.S. agriculture
- collects and disseminates data on all facets of agriculture
- gathers demographic, environmental, and economic data related to agriculture
- collects data by a variety of methods including mail, phone, personal interview, or internet



# Who uses NASS official statistics?

## farmers

individual & corporate farmers  
growers' associations  
farmer cooperatives

## agribusinesses

seed companies  
equipment companies  
chemical companies  
warehouse & storage companies  
transportation companies  
food processors  
feed processors  
other suppliers & buyers

## economic firms

banks & lending institutions  
commodity traders  
insurance companies  
marketing firms

## university researchers

## government policy makers

## media

newspapers  
magazines  
radio  
television



# 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](http://www.nass.usda.gov/Data_and_Statistics/index.asp)

**USDA** United States Department of Agriculture  
**National Agricultural Statistics Service**

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

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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  
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**MASS**

## 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, translates 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, 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 are 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 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 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 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	Harvested Yield (bushels)	Average Yield Loss (bushels)	Production Loss (Bu)	Economic Loss (\$)
Western Maryland	Corn	5,550	124,419	7.7	40,700	83
	Soybeans	300	16,7	3.9	1,201,200	2,493
	Wheat	200	45,72	2.3	460	1
Central Maryland	Corn	153,200	3,824	9.9	1,201,200	2,493
	Soybeans	92,300	34,62	3.8	360,750	1,479
	Wheat	38,200	63,3	3.3	126,390	319
Southern Maryland	Corn	29,800	112,79	4.9	146,200	299
	Soybeans	43,200	38,0	3.3	142,660	384
	Wheat	16,000	57,0	0.9	14,400	36
Upper Shore	Corn	157,200	159,2	5.1	800,700	1,611
	Soybeans	232,000	39,8	2.4	156,800	2,262
	Wheat	86,900	64,0	1.1	99,150	233

**USDA**

## NEWS RELEASE

**NATIONAL AGRICULTURAL STATISTICS SERVICE**  
United States Department of Agriculture • Washington, DC 20250  
Ag Statistics Hotline: (800) 727-9540 • [www.nass.usda.gov](http://www.nass.usda.gov)

Contact: Ellen Dougherty, (202) 690-8122  
Jeff Geuder, (202) 720-2127

### USDA FORECASTS RECORD-SETTING CORN CROP FOR 2007

Washington, Aug. 10, 2007 – U.S. history in 2007, according to the Agricultural and National Agricultural Statistics Service, is 13.1 billion bushels, 10.6 percent above the 2006 record.

Based on conditions as of August 10, 2007, the U.S. corn crop is projected to be 13.1 billion bushels, up 3.7 billion bushels from last year's record of 9.4 billion bushels behind the 160.4 bushels per acre national average.

Yield forecasts are highest in the Delta. Meanwhile, hot, dry conditions in the Southeast and eastern Corn Belt, Ohio Valley and

**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 intend 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.

<http://www.nass.usda.gov/0800> - 2002 Census of Agriculture - SVG Interactive Mapping - United S - 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)

United States Total: 5,330,439

State Total:  
County Total:

Download data as CSV | XML | PDF

Help Print Return to

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

Navigate: Mouse-over a specific state/county to view the state/county level data. Right click to zoom (option-click for MAC users). Hold the Alt key and click+drag to pan. For additional assistance with this application, [click here to view the support page.](#)

**All Milk Price, Wisconsin**  
Annual Average, 1985 - 2002

**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	-46
30 - 49	4,700	3,440	-27
50 - 99	7,400	5,800	-24
100 - 199	1,900	2,080	+9
200 - 499	700	600	-29
500+	200	440	+120
Total	17,500	15,900	-20

1/77 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**

**Bin Dairy Farmer Plans for May 2007 / by Herd Size**

Herds	Keep same herd size	Increase herd size	Discontinue milking
2,800	47	17	36
4,700	71	9	20
7,400	65	19	16
1,900	53	37	10
700	33	59	8
200	22	78	0
17,500	62	29	20

1/77 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.



The InfoAg Conference  
July 16-18, 2013



**(USDA) United States Department of Agriculture**  
**(NASS) National Agricultural Statistics Service**  
**(RDD) Research and Development Division**  
**(GIB) Geospatial Information Branch**  
**(SARS) Spatial Analysis Research Section**



The InfoAg Conference  
July 16-18, 2013



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- Education and Outreach

Statistics by State

Select a State

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## Research, Science, and Technology

### Spatial Data

**CropScope**

**CropScope** is a geospatial data service which offers advanced tools such as interactive visualization, web-based data dissemination and geospatial queries and automated data delivery to systems such as Google Earth.

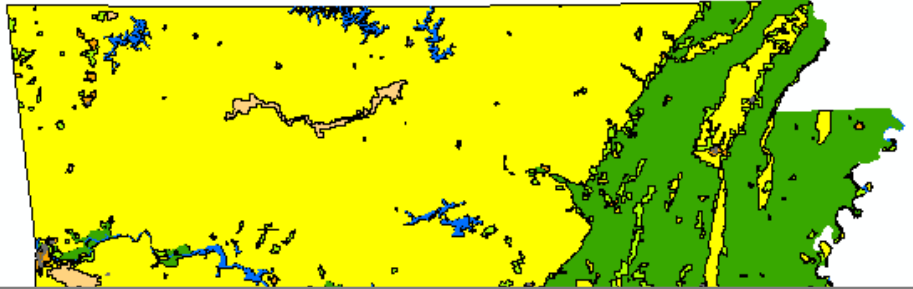
**CropScope** was developed in cooperation with the Center for Spatial Information Science and Systems at George Mason University and is hosted on their website.

**VegScope - Vegetation Condition**

**VegScope** is a geospatial data service which offers automated updates of vegetative condition at daily, weekly, and biweekly intervals. VegScope delivers interactive vegetation indices that enable quantification of U.S. crop conditions for exploring, visualizing, querying, and disseminating via interactive maps. The interface and functionality is similar to CropScope's.

**VegScope** was developed in cooperation with the Center for Spatial Information Science and Systems at George Mason University.

- Also See
- Research Fellow and Associate Program
  - Seasonal Summary of Crop Progress and Condition Remotely Sensed Data
  - Crop Acreage
  - Crop Yield
  - Future Vision



[Land Use Strata for Selected States](#)

### Animated Maps

**Crop Progress and Condition**

Animated U.S. choropleth maps of crop progress and condition state-level estimates greatly enhance current NASS offerings regarding crop progress and condition by more effectively showing the crop story to data users. Condition maps' sequential hues portray percent 'good + excellent' for the crop by state, with weekly animated change. Their legend includes national condition. Progress maps' monochromatic shades portray percent progress for the crop data item by state, and their legend also includes the national 5-year average progress.

**Vegetation Condition**      **Crop Acreage**

[Reports, Papers and Presentations](#)

- Research Reports** by Date | by Title
- Archived Research Reports GIS | Survey | Yield
- Presentations
- Conferences
- Remote Sensing Uses - White Papers
- Technology Papers

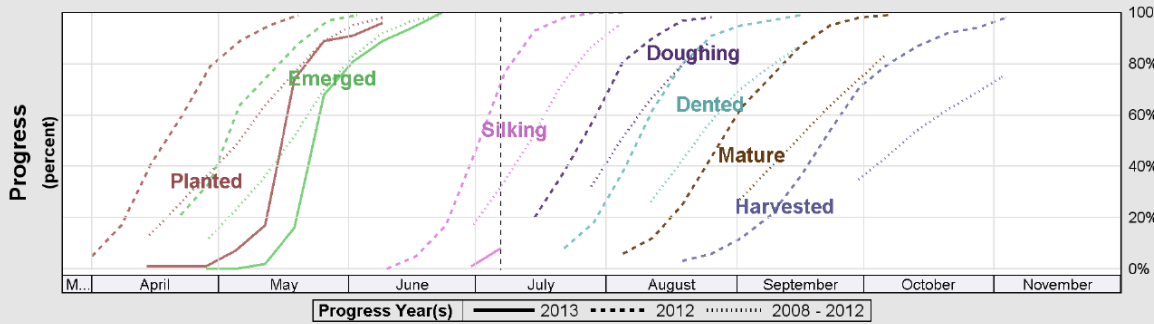
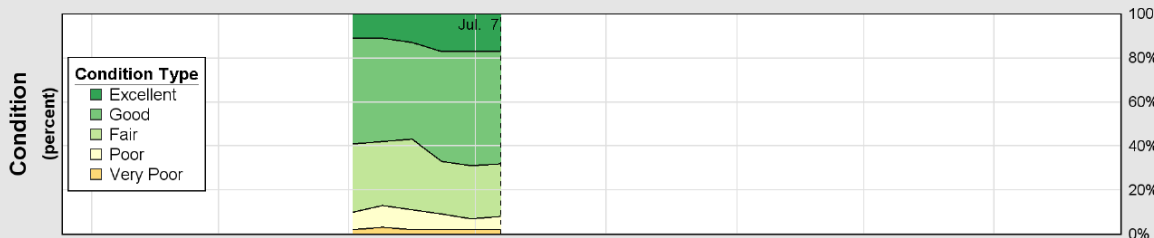
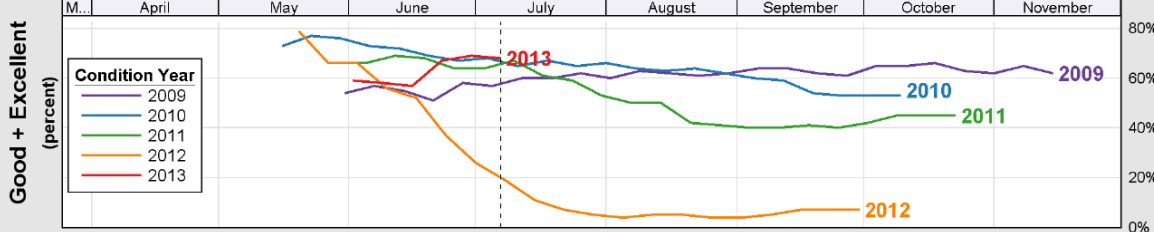
[Census of Agriculture](#)

- Interact with Data (1997)
- 2002 Maps: Gallery | Star Tree | List
- "Linked Micromap" Plots (1997):
- Corn | Cotton | Hay | Soybeans | Wheat

**2007 Census Map Gallery**



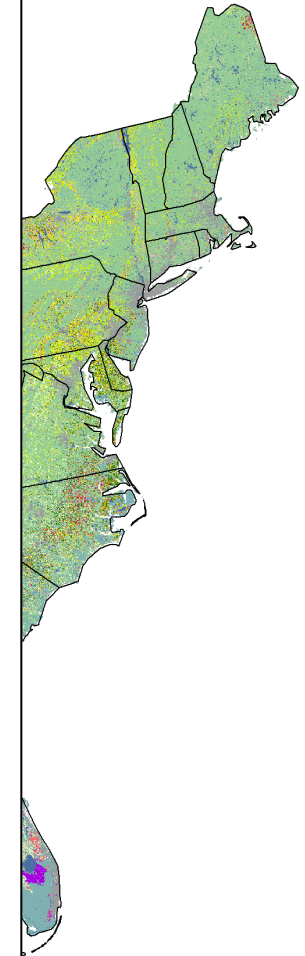
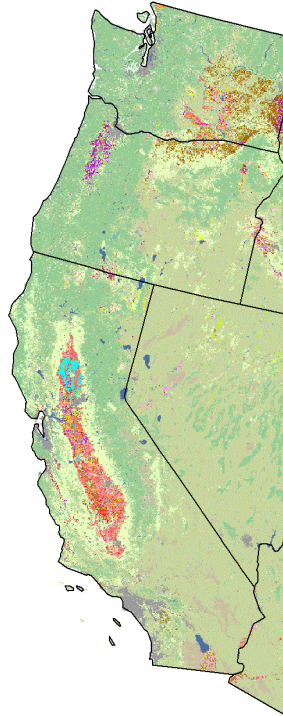
## USDA Crop Progress and Condition: Corn in Illinois, 2013



Source: National Agricultural Statistics Service (NASS), Crop Progress Report



# 2011 Continental United States Land Cover Categories (by decreasing acreage)



## Agriculture

- |                          |                            |                             |
|--------------------------|----------------------------|-----------------------------|
| Pasture/Grass            | Triticale                  | Dbl Crop Lettuce/Cotton     |
| Corn                     | Citrus                     | Mustard                     |
| Soybeans                 | Safflower                  | Plums                       |
| Winter Wheat             | Pistachios                 | Dbl Crop Barley/Sorghum     |
| Fallow/Idle Cropland     | Blueberries                | Broccoli                    |
| Other Hay/Non Alfalfa    | Christmas Trees            | Radishes                    |
| Alfalfa                  | Dbl Crop Barley/Soybeans   | Garlic                      |
| Cotton                   | Tomatoes                   | Speltz                      |
| Spring Wheat             | Onions                     | Vetch                       |
| Sorghum                  | Flaxseed                   | Apricots                    |
| Dbl Crop WinWht/Soybeans | Dbl Crop Oats/Corn         | Caneberries                 |
| Rice                     | Pop or Orn Corn            | Greens                      |
| Barley                   | Herbs                      | Nectarines                  |
| Oranges                  | Misc Veggies & Fruits      | Cucumbers                   |
| Oats                     | Olives                     | Other Small Grains          |
| Sunflower                | Other Tree Crops           | Turnips                     |
| Dry Beans                | Dbl Crop Corn/Soybeans     | Dbl Crop Lettuce/Cantaloupe |
| Peanuts                  | Sweet Potatoes             | Camelina                    |
| Durum Wheat              | Peaches                    | Cauliflower                 |
| Sugarbeets               | Cranberries                | Rape Seed                   |
| Potatoes                 | Tobacco                    | Honeydew Melons             |
| Canola                   | Cantaloupes                | Celery                      |
| Sugarcane                | Prunes                     | Dbl Crop Durum Wht/Sorghum  |
| Almonds                  | Dbl Crop Barley/Corn       | Eggplants                   |
| Sod/Grass Seed           | Dbl Crop Soybeans/Cotton   | Gourds                      |
| Grapes                   | Pears                      | Dbl Crop Lettuce/Barley     |
| Apples                   | Lettuce                    |                             |
| Rye                      | Dbl Crop Lettuce/Durum Wht |                             |
| Peas                     | Watermelons                |                             |
| Millet                   | Switchgrass                |                             |
| Walnuts                  | Asparagus                  |                             |
| Lentils                  | Carrots                    |                             |
| Pecans                   | Strawberries               |                             |
| Dbl Crop WinWht/Cotton   | Pumpkins                   |                             |
| Dbl Crop WinWht/Sorghum  | Squash                     |                             |
| Sweet Corn               | Cabbage                    |                             |
| Aquaculture              | Peppers                    |                             |
| Clover/Wildflowers       | Dbl Crop Soybeans/Oats     |                             |
| Other Crops              | Hops                       |                             |
| Dbl Crop WinWht/Com      | Mint                       |                             |
| Cherries                 | Pomegranates               |                             |

## Non-Agriculture

- Forest
- Shrubland
- Developed
- Wetlands
- Water
- Barren
- Perennial Ice/Snow

## Agriculture

- Pasture/Grass
- Corn
- Soybeans
- All Wheat
- Other Hay

- Barren
- Perennial Ice/Snow

# 2010 Cropland Data Layer McLean County, IL

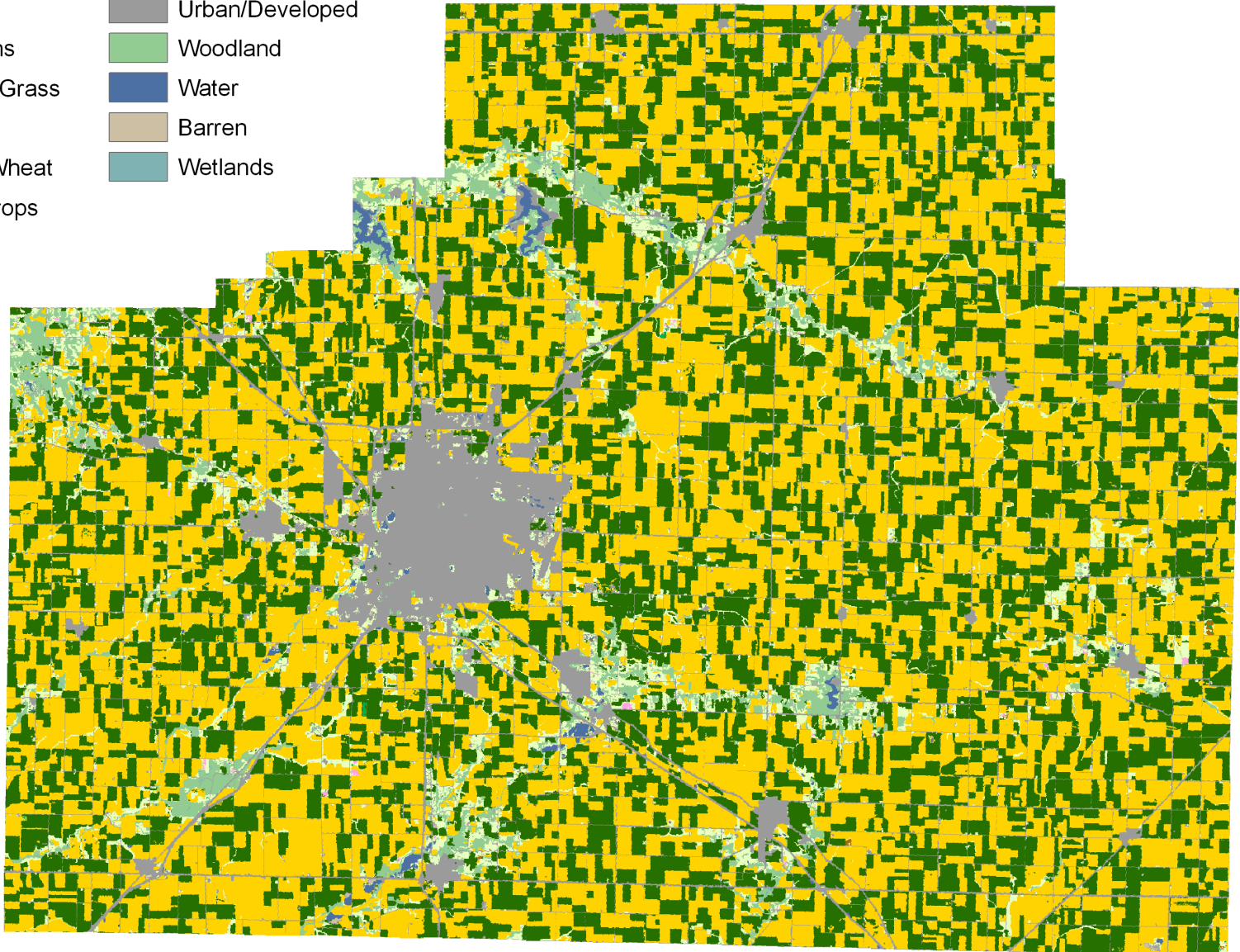
Land Cover Categories  
(by decreasing acreage)

## Agriculture

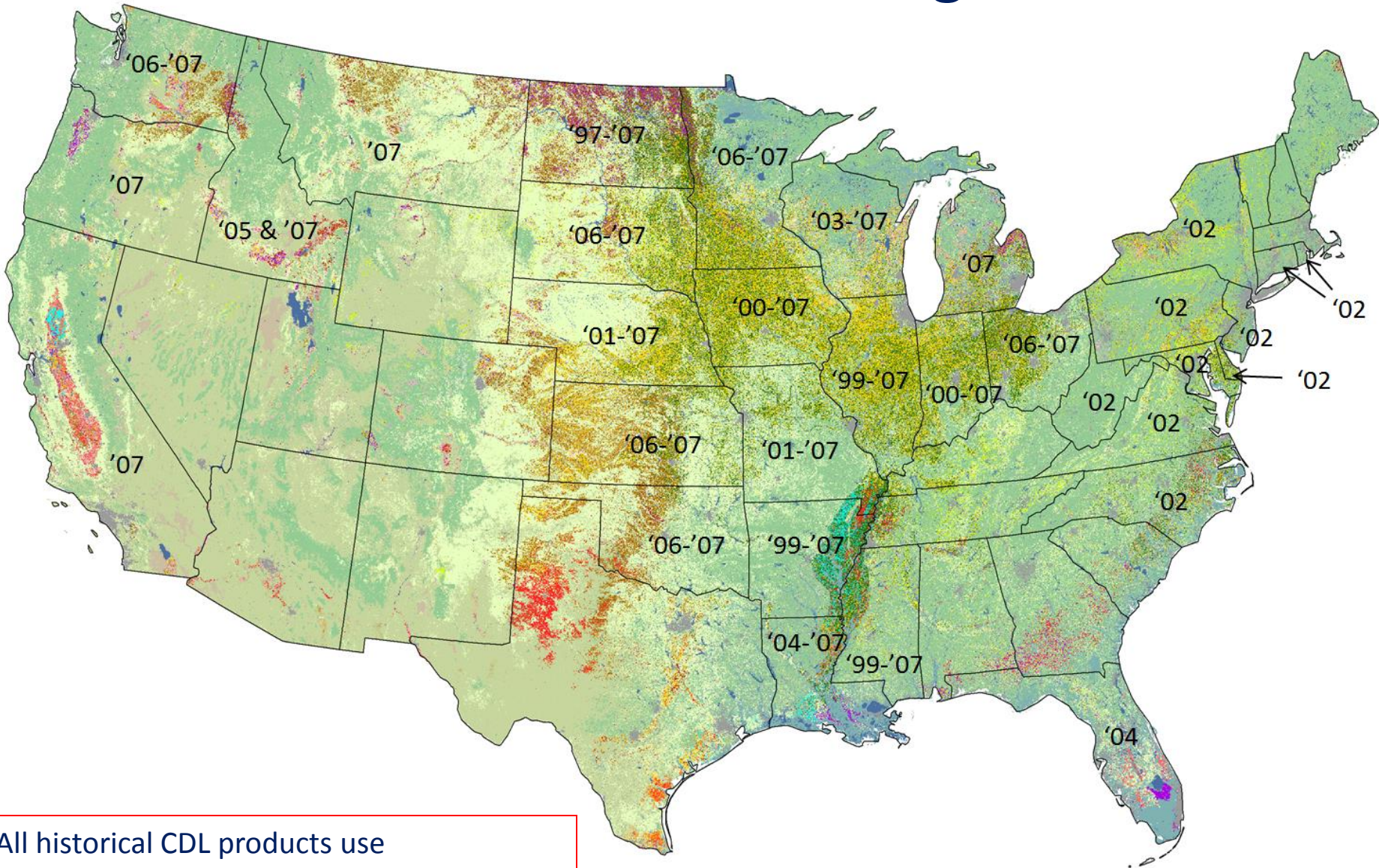
- Corn
- Soybeans
- Pasture/Grass
- Alfalfa
- Winter Wheat
- Other Crops

## Non-Agriculture

- Urban/Developed
- Woodland
- Water
- Barren
- Wetlands

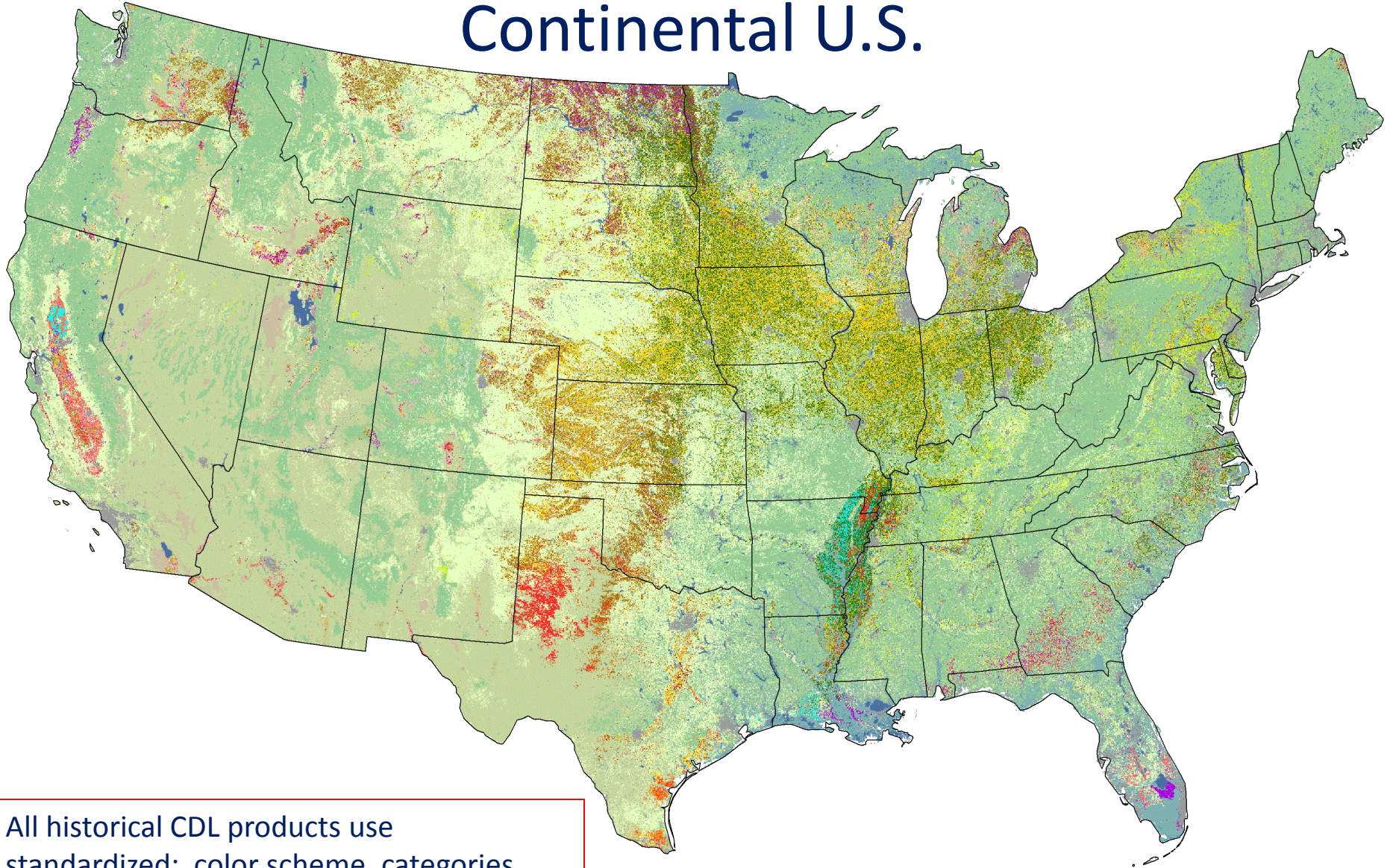


# 1997 – 2007 Coverage:



All historical CDL products use standardized: color scheme, categories names and codes, projection, metadata.

# 2008 – 2012 Coverage: Continental U.S.



All historical CDL products use  
standardized: color scheme, categories  
names and codes, projection, metadata.

# CDL Basics

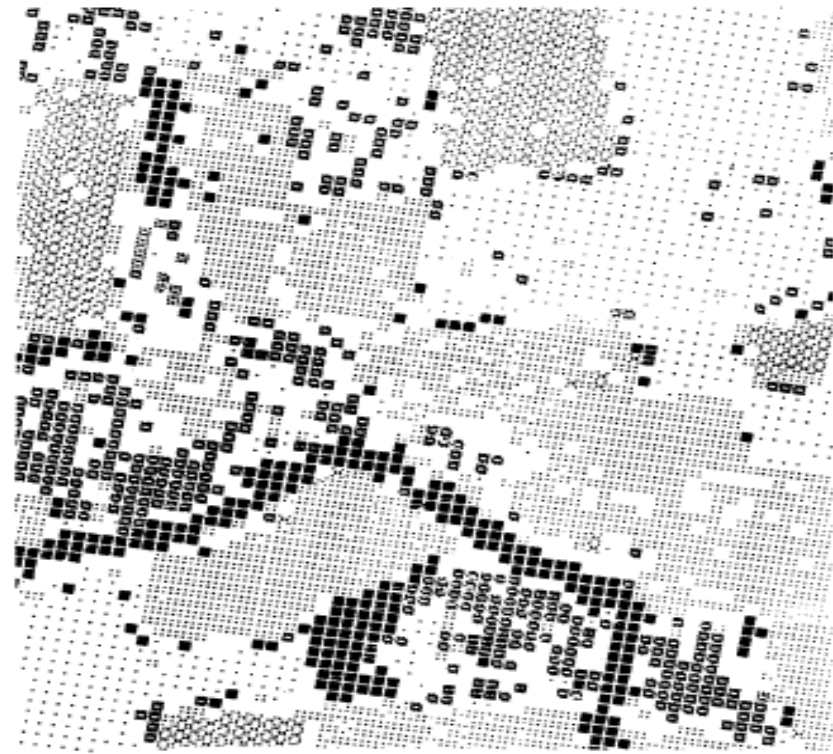
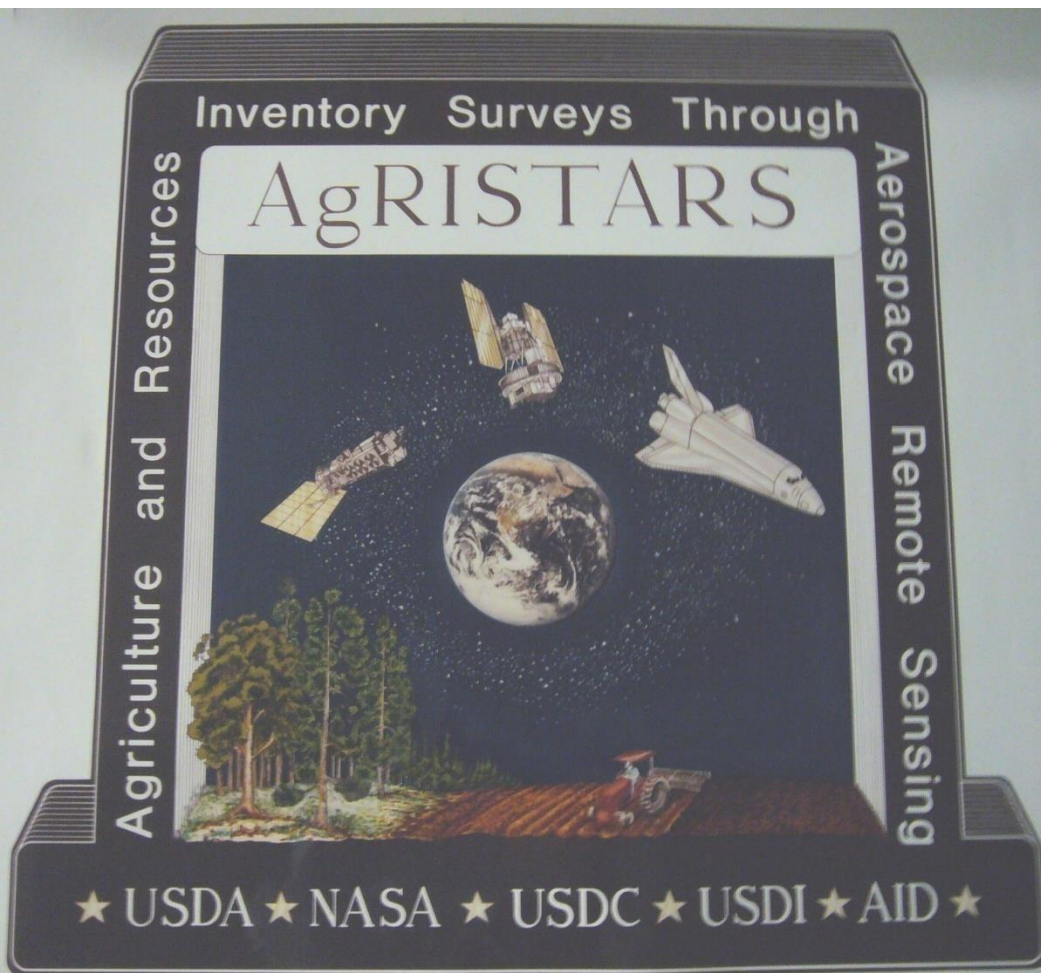
- Crop-specific land cover data layer
- Annual
- 30 meter spatial resolution
- GIS-ready
  - Georeferenced
  - Raster
- Interagency collaborations
  - Illinois Interagency Landscape Classification (IILC) Project
    - Illinois Department of Natural Resources (IDNR)
    - Illinois Department of Agriculture (IDA)
  - Foreign Ag Service (FSA), Satellite Image Archive
  - Farm Service Agency (FAS), Common Land Unit
  - US Geological Survey (USGS), National Land Cover Dataset



# Cropland Data Layer (CDL) History

- Legacy program

Early limitations: Budget/Satellites/Technology



Portion of Crop - Odds Map with  $P(c/X_1) \geq .75$ .

- ..... Small Grains
- Other Crops
- 0000000 Rice
- 00000000 Hay
- >0000000 Permanent Plantings
- 00000000 Pasture
- 00000000 Non-Agricultural Land

# Purpose of the Cropland Data Layer (CDL) Program

The CDL program goals are:

- 1) Combine remote sensing imagery, USDA/Farm Service Agency reported data and NASS survey data to produce supplemental, unbiased independent acreage estimates for the state's major commodities.
- 2) Production of a crop-specific digital land cover data layer for distribution in industry standard formats.

Annual CDL states traditionally focused in the Midwest and Mississippi Delta States  
- Corn, Cotton, Rice, Soybeans, Winter Wheat



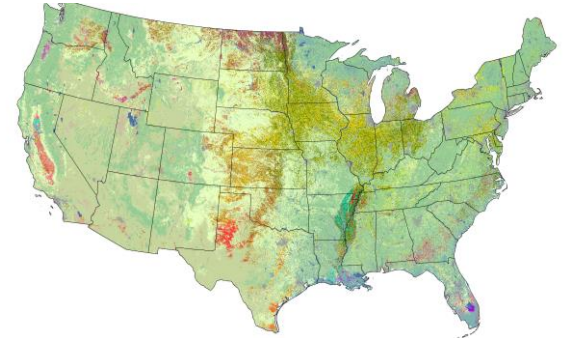
Corn



Soybeans

# CDL Program Objectives

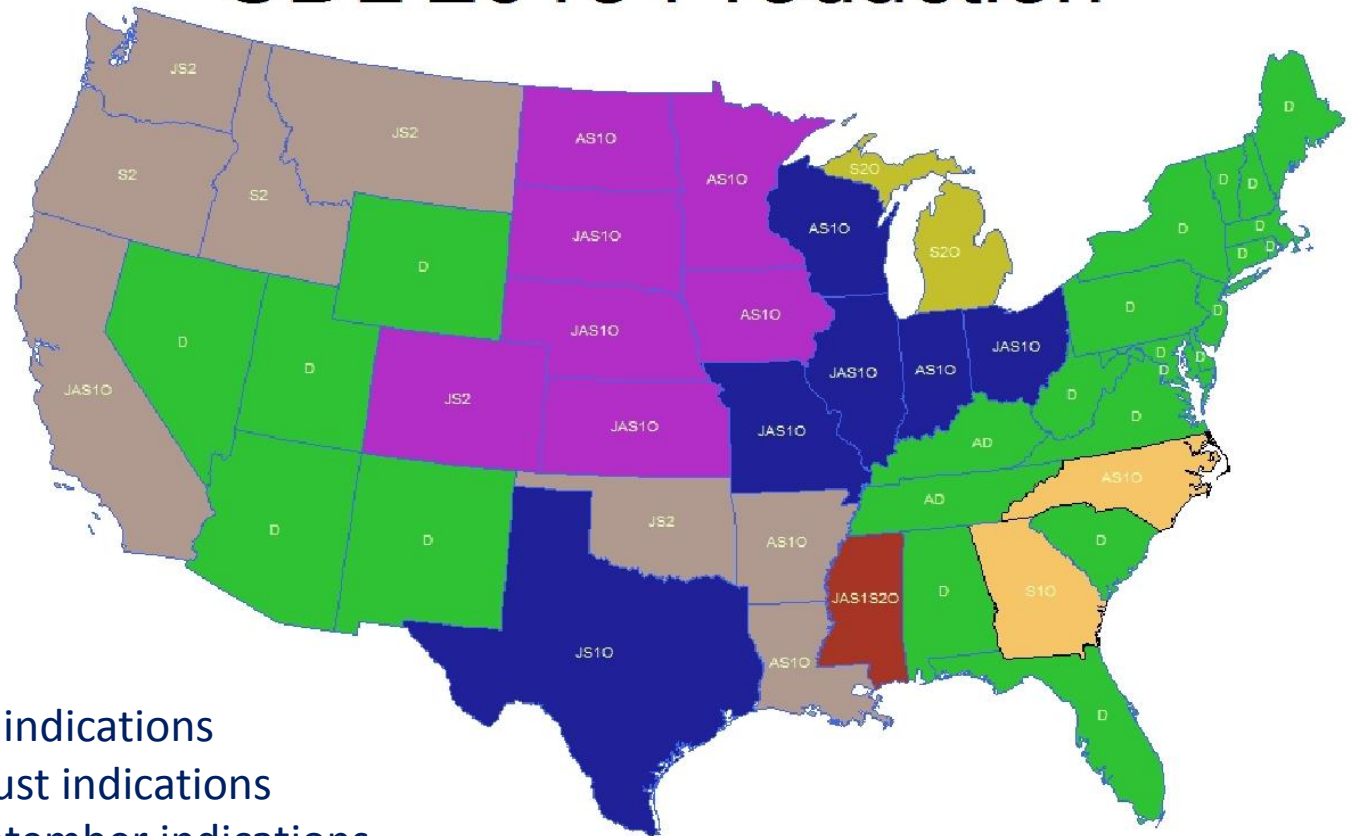
- **“Census by Satellite”**  
*Annually* cover major program crops and regions  
Crops accurately geo-located
- **Operationalize indications delivery**  
Deliver in-season June, August, September and October
  - Agricultural Statistics Board
  - Field OfficesUpdate planted area
- **Provide timely, accurate, useful indications**  
Measurable error  
Unbiased/independent estimator  
State, County, Agricultural Statistics Districts
- **Distribute to public at no cost**  
CropScape



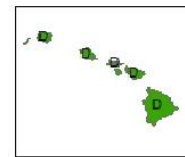


# CDL 2013 Production

- In-season acreage indications



J = June indications  
A = August indications  
S1 = September indications  
S2 = September small grains  
O = October indications  
D = December final indications



# Methodology

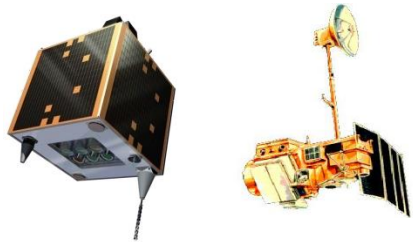
- “Stack” satellite imagery and ancillary data layers within a raster GIS
  - 30 meter grid cells, Albers Conic Equal Area projection
- Sample spatially from stack within known ground truth from FSA and NLCD
- Data-mine samples using Boosted Classification Tree Analysis to derive best fitting decision rules
- Apply derived decision rules back to input data stack
- Create land cover map
- Create probability map
- Assess map accuracy
- Derive acreage estimates



# Methodology (continued)

- Ground Truth
  - Agricultural training & validation
    - Farm Service Agency (FSA) Common Land Unit (CLU)
  - Non-Agricultural training & validation
    - USGS 2006 National Land Cover Dataset (NLCD)
- Satellite Imagery
  - Landsat 8, Disaster Monitoring Constellation (DMC)
  - NASA Terra MODIS 16-day composite NDVI
  - Past sensors (IRS ResourceSat-1 AWiFS, Landsat 5 & 7)
- Ancillary data layers
  - USGS National Elevation Dataset (NED)
  - USGS NLCD Impervious and Tree Canopy layers
- Software
  - Ground Truth Preparation: ESRI ArcGIS
  - Imagery Preparation: ERDAS Imagine
  - Decision-Tree Software: Rulequest See 5.0
  - Classification: NLCD Mapping Toolkit
  - Acreage Estimation: SAS





# Satellite Sensors

1999 - 2005

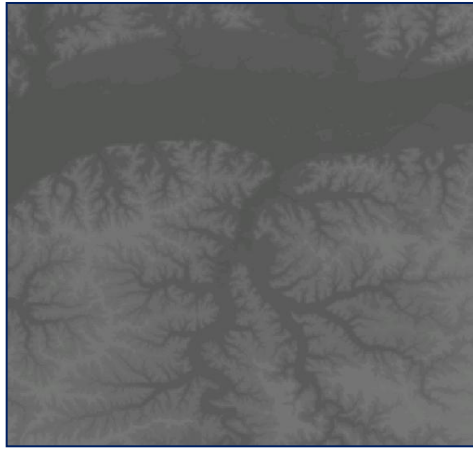
2006 - 2010

2011- Current

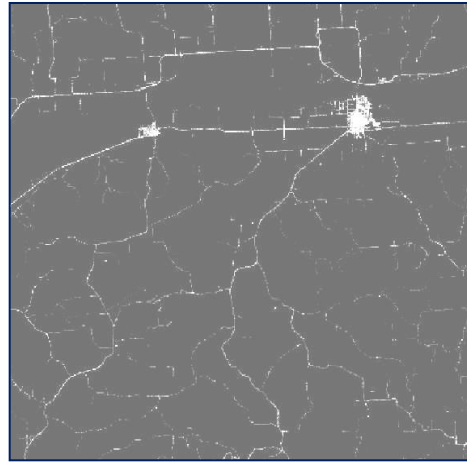
2013 - Current

	<u>TM</u>	<u>AWiFS</u>	<u>DMC</u>	<u>Landsat 8</u>
<b>Equatorial crossing time</b>	9:45 ± 15 minutes	10:30 ± 5 minutes	10:30 ± 5 minutes	10:00 ± 15 minutes
<b>Temporal Resolution</b>	16 days	5 days	2 - 3 days	16 days
<b>Spatial Resolution</b>	30 x 30 m (reflective) 120 x 120 m (thermal)	56 x 56 m	22 x 22 m (resampled to 30)	30 x 30 m (reflective) 100 x 100 m (thermal)
<b>Radiometric Resolution</b>	8 bit (256)	10 bit (1024)	10 bit (1024)	12 bit (4096)
<b>Spectral Resolution</b>	6 (B, G, R, NIR, SWIR, MIR) + Thermal IR	4 (G, R, NIR, SWIR)	3 (G, R, NIR)	10 (B, G, R, NIR, SWIR, MIR) + Thermal IR
<b>Swath wide</b>	185 km	737 km	600 km	185 km

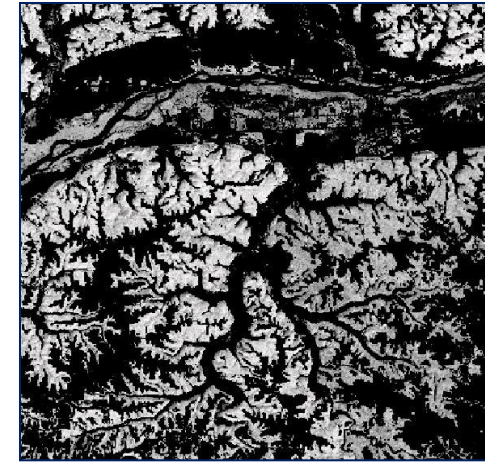
# Ancillary Data – USGS & NASA Products



Elevation

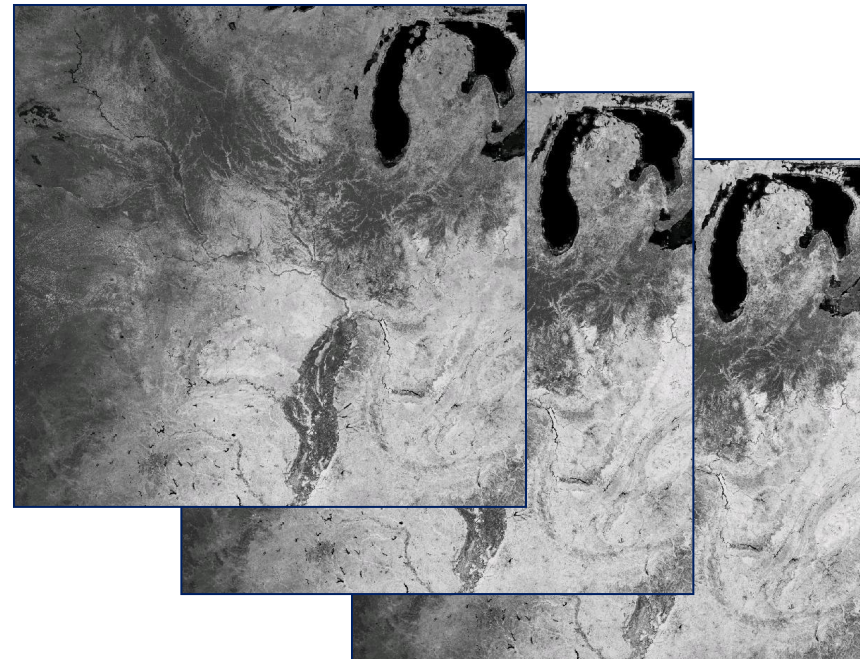


Imperviousness



Forest Canopy

- **NASA MODIS 16-day 250m NDVI composites**
- **Start in fall of previous year for winter wheat**

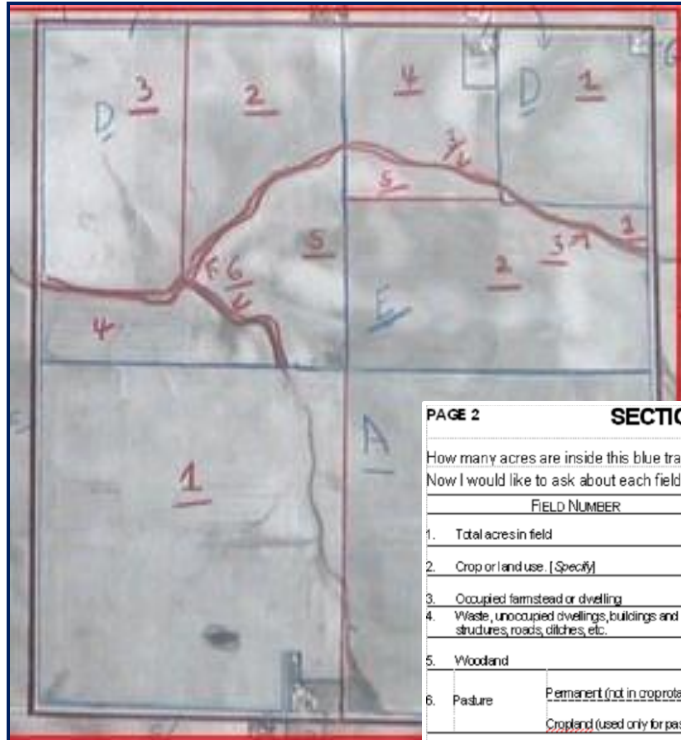


# Old Ground Truth (1997 – 2006 CDLs)

## June Agricultural Survey (JAS) – National in Scope

- 41,000 farms visited, 11,000 one-square mile sample area segments

- Illinois ~ 400 segments statewide

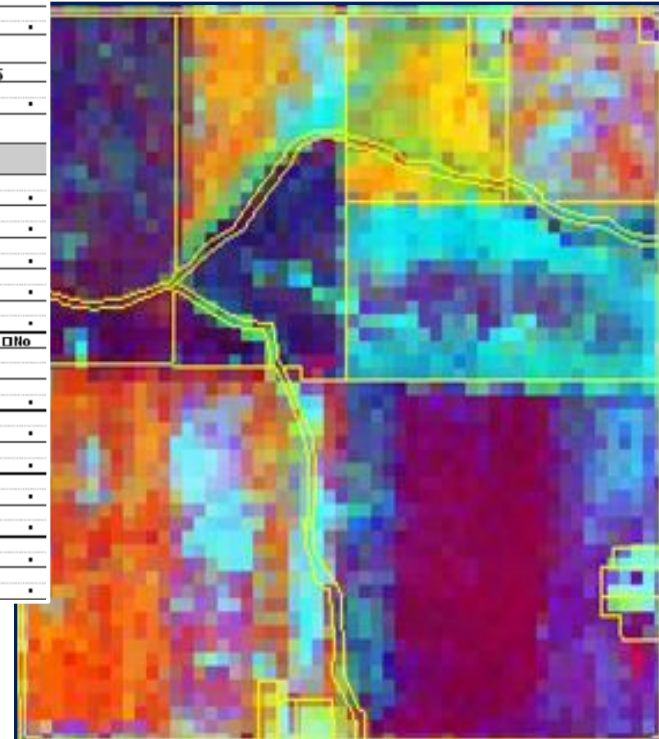


PAGE 2 SECTION D - CROPS AND LAND USE ON TRACT 17

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
	Cropland (used only for pasture)	856	856	856	856
8. Idle cropland - idle all during 2000	857	857	857	857	857
9. Two crops planted in this field or two uses of the same crop. [Specify second crop or use]	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Acres	844	844	844	844
10. Acres left to be planted	810	810	810	810	810
11. Acres irrigated and to be irrigated. [If double cropped, include acreage of each crop irrigated]	620	620	620	620	620
16. Winter Wheat (include cover crop)	Planted	540	540	540	540
	For grain or seed	541	541	541	541
18. Rye (include cover crop) [Exclude ryegrass]	Planted	547	547	547	547
	For grain or seed	548	548	548	548



# Ground Truth (2)

## Agriculture Ground Truth

### Provided by Farm Service Agency

USDA programs (crop subsidy, disaster relief)

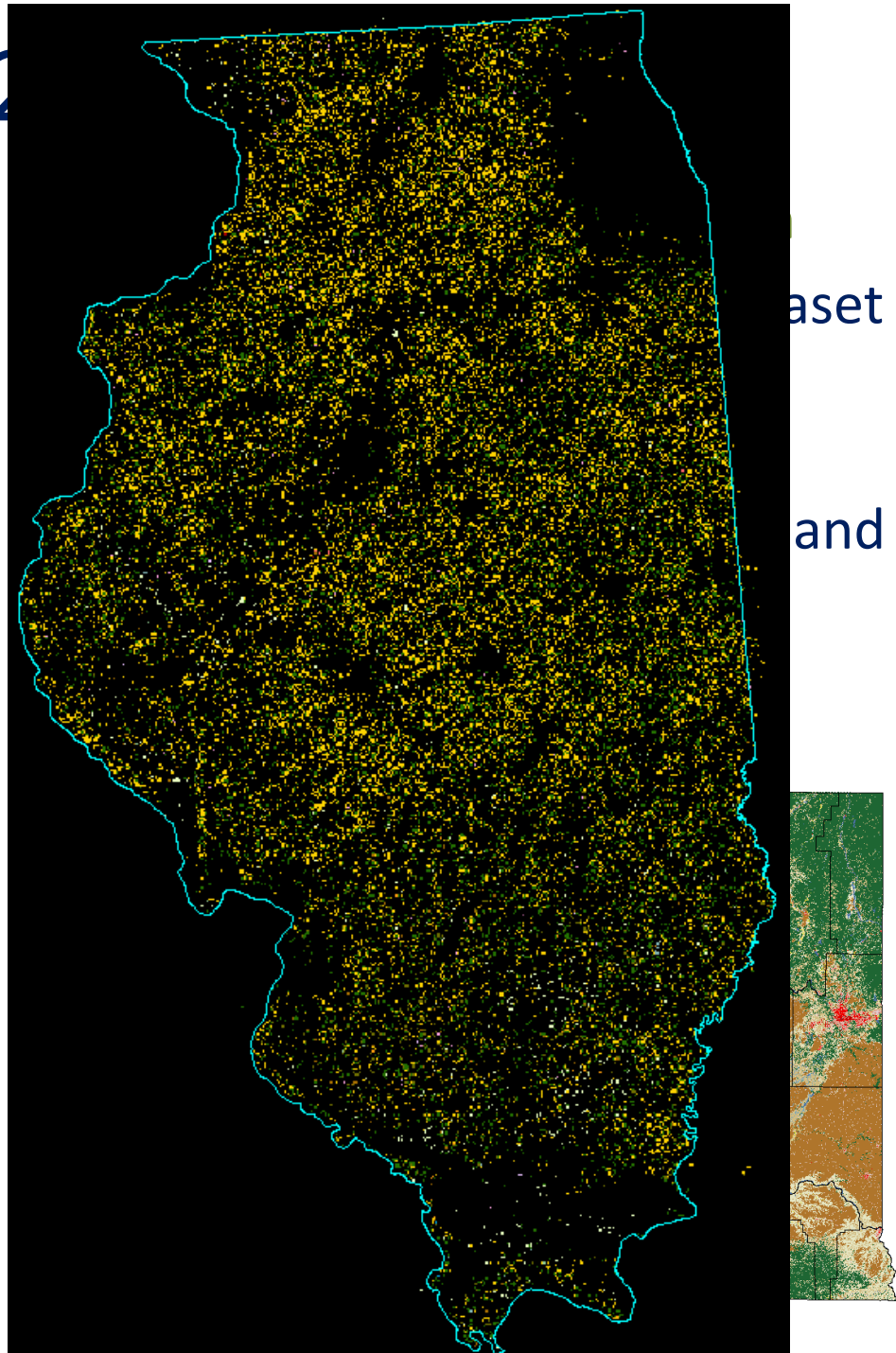
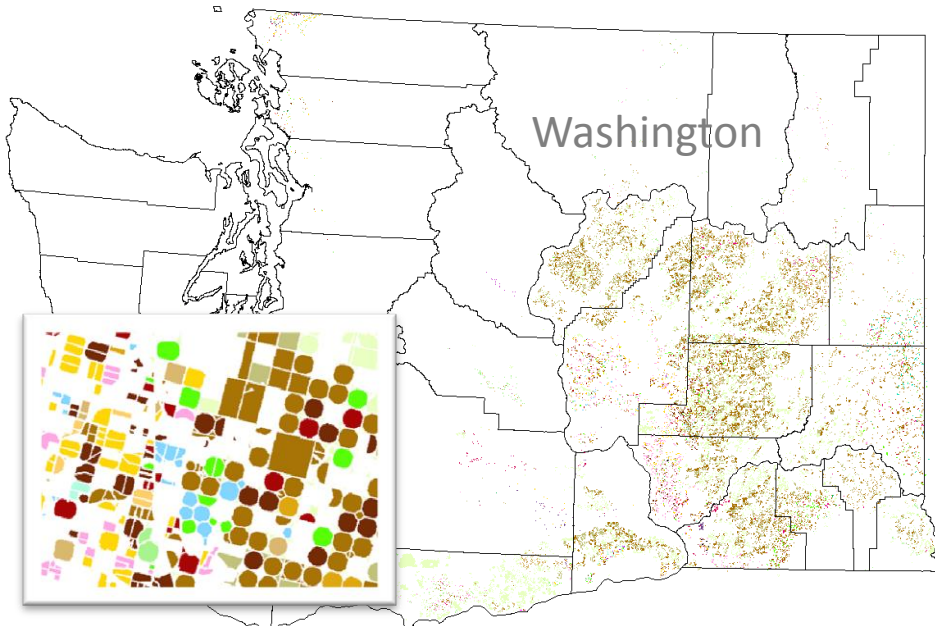
Program crops (may under report specialty crops)

GIS-ready (less labor intensive for NASS)

### Divide known fields into 2 sets

70% used for training software

30% used for validating results



# Accuracy Assessment

USDA, National Agricultural Statistics Service, 2012 Illinois Cropland Data Layer  
STATEWIDE AGRICULTURAL ACCURACY REPORT



Crop-specific covers only	*Correct	Accuracy	Error	Kappa
OVERALL ACCURACY**	651,381	92.8%	7.2%	0.865

Cover Type	Attribute Code	*Correct Pixels	Producer's Accuracy	Omission Error	Kappa	User's Accuracy	Commission Error	Cond'l Kappa
Corn	1	394316	97.69%	2.31%	0.96	96.01%	3.99%	0.93
Rice	3	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Sorghum	4	40	6.83%	93.17%	0.07	67.80%	32.20%	0.68
Soybeans	5	241126	96.39%	3.61%	0.95	94.66%	5.34%	0.93
Sunflower	6	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Tobacco	11	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Sweet Corn	12	86	33.86%	66.14%	0.34	84.31%	15.69%	0.84
Pop or Orn Corn	13	560	47.22%	52.78%	0.47	97.56%	2.44%	0.98
Barley	21	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Winter Wheat	24	1826	60.22%	39.78%	0.60	73.69%	26.31%	0.74
Dbl Crop WinWht/Soybeans	26	11609	90.03%	9.97%	0.90	82.40%	17.60%	0.82
Rye	27	7	12.50%	87.50%	0.12	63.64%	36.36%	0.64
Oats	28	21	15.67%	84.33%	0.16	56.76%	43.24%	0.57
Millet	29	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Alfalfa	36	976	30.47%	69.53%	0.30	59.62%	40.38%	0.59
Other Hay/Non Alfalfa	37	239	7.04%	92.96%	0.07	35.30%	64.70%	0.35
Dry Beans	42	41	67.21%	32.79%	0.67	69.49%	30.51%	0.69
Potatoes	43	100	42.19%	57.81%	0.42	92.59%	7.41%	0.93
Other Crops	44	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Watermelons	48	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Cucumbers	50	3	30.00%	70.00%	0.30	75.00%	25.00%	0.75
Peas	53	1	6.25%	93.75%	0.06	50.00%	50.00%	0.50
Herbs	57	14	25.93%	74.07%	0.26	73.68%	26.32%	0.74
Clover/Wildflowers	58	29	10.74%	89.26%	0.11	70.73%	29.27%	0.71
Sod/Grass Seed	59	4	3.92%	96.08%	0.04	40.00%	60.00%	0.40
Switchgrass	60	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Fallow/Idle Cropland	61	3	0.64%	99.36%	0.01	15.00%	85.00%	0.15
Peaches	67	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Apples	68	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Grapes	69	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Christmas Trees	70	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Walnuts	76	63	46.32%	53.68%	0.46	90.00%	10.00%	0.90
Aquaculture	92	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Triticale	205	0	n/a	n/a	n/a	0.00%	100.00%	0.00
Cantaloupes	209	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Peppers	216	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Strawberries	221	0	n/a	n/a	n/a	0.00%	100.00%	0.00
Squash	222	0	0.00%	100.00%	0.00	0.00%	100.00%	0.00
Dbl Crop WinWht/Corn	225	6	4.03%	95.97%	0.04	50.00%	50.00%	0.50
Dbl Crop Oats/Corn	226	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Pumpkins	229	231	57.61%	42.39%	0.58	90.59%	9.41%	0.91
Dbl Crop WinWht/Sorghum	236	2	3.17%	96.83%	0.03	66.67%	33.33%	0.67
Dbl Crop Soybeans/Oats	240	0	0.00%	100.00%	0.00	n/a	n/a	n/a
Dbl Crop Corn/Soybeans	241	77	30.08%	69.92%	0.30	89.53%	10.47%	0.90
Gourds	249	1	10.00%	90.00%	0.10	100.00%	0.00%	1.00
Dbl Crop Barley/Soybeans	254	0	0.00%	100.00%	0.00	n/a	n/a	n/a

\*Correct Pixels represents the total number of independent validation pixels correctly identified in the error matrix.  
\*\*The Overall Accuracy represents only the FSA row crops and annual fruit and vegetables (codes 1-61,66-80 and 200-255). FSA-sampled grass and pasture, aquaculture, and all NLCD-sampled categories (codes 62-65 and 81-199) are not included in the Overall Accuracy.





# Acreage not just about counting pixels

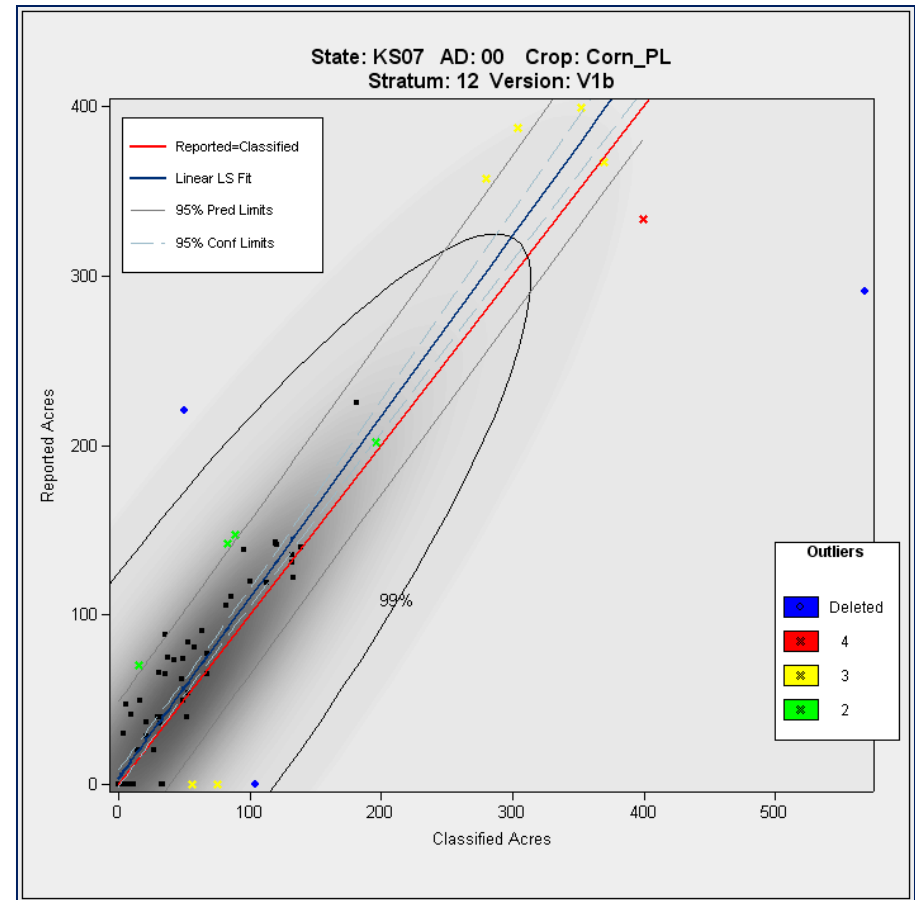
## Regression-based Acreage Estimator

Regression used to relate categorized pixel counts to the ground reference data

- (X) – Cropland Data Layer (CDL) classified acres
- (Y) – June Agricultural Survey (JAS) reported acres

Using both CDL and JAS acreage results in estimates with reduced error rates over JAS alone

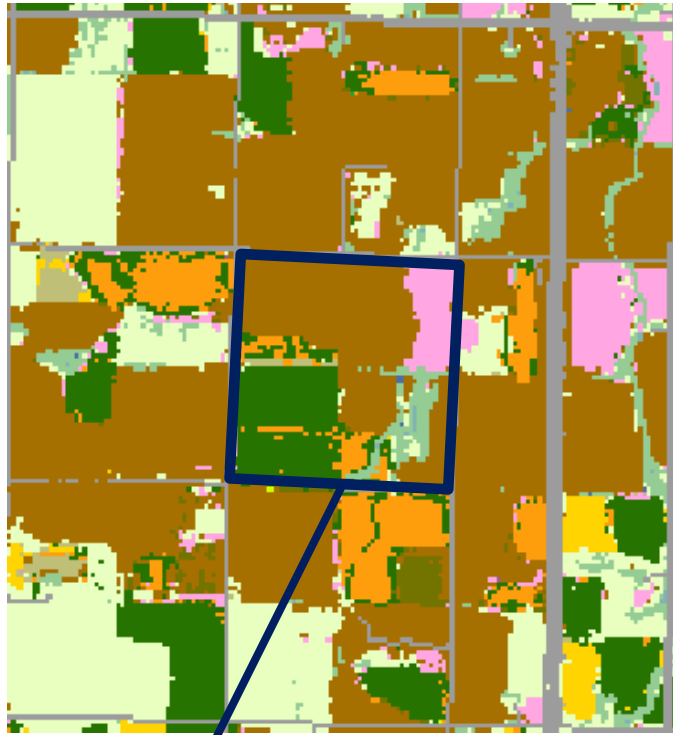
Outlier segment detection - correction or removal from regression analysis



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
	Cropland (used only for pasture)	856	856	856	856
8. Idle cropland - idle all during 2000	857	857	857	857	857
9. Two crops planted in this field or two uses of the same crop.	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> 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, include acreage of each crop irrigated]	620	620	620	620	620
16. Winter Wheat (include cover crop)	Planted	540	540	540	540
	For grain or seed	541	541	541	541
18. Rye (include cover crop) [Exclude ryegrass]	Planted	547	547	547	547
	For grain or seed	548	548	548	548



REGRESSION VARIABLES:

Dependent  
Y

Independent  
X

	Enumerated JAS Segments	CDL Classified Acres
Soybeans	227	273
Wheat	337	541

# CDL Metadata

- Detailed metadata files for each CDL state/year available online at:  
<http://www.nass.usda.gov/research/Cropland/metadata/meta.htm>

Raster		Attribute Domain Values and Definitions: ROW CROPS 1-20	
Classification Code	Land Cover	CLASSIFICATION INPUTS:	
"1"	Corn	AWIFS DATE 20080413	PATH 264 ROW(S) &QUADRANT(S) 35b 40d 45bd
"2"	Cotton	AWIFS DATE 20080418	PATH 265 ROW(S) &QUADRANT(S) 35bd 40abcd 45abd 49b
"3"	Rice	AWIFS DATE 20080427	PATH 262 ROW(S) &QUADRANT(S) 40bd
"4"	Sorghum	AWIFS DATE 20080428	PATH 267 ROW(S) &QUADRANT(S) 40d 45bd
"5"	Soybeans	AWIFS DATE 20080503	PATH 268 ROW(S) &QUADRANT(S) 35bd 40bcd 45abcd 49bd
"6"	Sunflowers	AWIFS DATE 20080512	PATH 265 ROW(S) &QUADRANT(S) 40bcd 45abd
"10"	Peanuts	AWIFS DATE 20080517	PATH 266 ROW(S) &QUADRANT(S) 35d 40bd 45b
"11"	Tobacco	AWIFS DATE 20080606	PATH 270 ROW(S) &QUADRANT(S) 40d 45b
"12"	Sweet Corn	AWIFS DATE 20080614	PATH 262 ROW(S) &QUADRANT(S) 35bd 40bd 45b
"13"	Popcorn or Ornamental Corn	AWIFS DATE 20080625	PATH 269 ROW(S) &QUADRANT(S) 40d 45b 50bd
Map_Projection_Name: Albers Conical Equal Area		AWIFS DATE 20080629	PATH 265 ROW(S) &QUADRANT(S) 40bd 45b
Albers_Conical_Equal_Area:		AWIFS DATE 20080704	PATH 266 ROW(S) &QUADRANT(S) 35a 40d 45bd
Standard_Parallel: 29.500000		AWIFS DATE 20080713	PATH 263 ROW(S) &QUADRANT(S) 35abcd 40abd 45b
Standard_Parallel: 45.500000		AWIFS DATE 20080715	PATH 273 ROW(S) &QUADRANT(S) 35cd 40abcd 45abd 50b
Longitude_of_Central_Meridian: -96.000000		AWIFS DATE 20080802	PATH 267 ROW(S) &QUADRANT(S) 35d 40abcd 45abd
Latitude_of_Projection_Origin: 23.000000		AWIFS DATE 20080808	PATH 273 ROW(S) &QUADRANT(S) 35d 40bc 45a
False_Easting: 0.000000		AWIFS DATE 20080812	PATH 269 ROW(S) &QUADRANT(S) 35c 40ac 45a
False_Northing: 0.000000		AWIFS DATE 20080904	PATH 264 ROW(S) &QUADRANT(S) 40bd 45bd
Planar_Coordinate_Information:		AWIFS DATE 20080909	PATH 265 ROW(S) &QUADRANT(S) 35bd 40bd
Planar_Coordinate_Encoding_Method: row and column		AWIFS DATE 20080914	PATH 266 ROW(S) &QUADRANT(S) 40d 45bd
Coordinate_Representation:		AWIFS DATE 20080915	PATH 271 ROW(S) &QUADRANT(S) 45bd 50b
Abscissa_Resolution: 56		MODIS 16 DAY NDVI COMPOSITE DATE 20071016	
Ordinate_Resolution: 56		MODIS 16 DAY NDVI COMPOSITE DATE 20071101	
Planar_Distance_Units: meters		MODIS 16 DAY NDVI COMPOSITE DATE 20071117	
Geodetic_Model:		MODIS 16 DAY NDVI COMPOSITE DATE 20080305	
Horizontal_Datum_Name: North American Datum of 1983		MODIS 16 DAY NDVI COMPOSITE DATE 20080321	
Ellipsoid_Name: Geodetic Reference System 80		MODIS 16 DAY NDVI COMPOSITE DATE 20080406	
Semi-major_Axis: 6378137.000000		MODIS 16 DAY NDVI COMPOSITE DATE 20080422	
Denominator_of_Flattening_Ratio: 298.257223563		MODIS 16 DAY NDVI COMPOSITE DATE 20080508	
		MODIS 16 DAY NDVI COMPOSITE DATE 20080524	
		MODIS 16 DAY NDVI COMPOSITE DATE 20080609	
		USGS, NATIONAL ELEVATION DATASET ELEVATION	
		USGS, NATIONAL LAND COVER DATASET 2001 TREE CANOPY	
		USGS, NATIONAL LAND COVER DATASET 2001 IMPERVIOUSNESS	

# Future of the CDL Program?



- Expand geographic scope?
  - Testing Hawaii in 2013
- Improved categories?
  - Grassland
    - Pasture/hay/grass
  - Specialty Crops
- Imagery?
  - Future sensors
  - Finer resolution
- Derivatives?
  - Cultivated Data Layer (Crop Mask)
  - Change detection
  - Crop rotation patterns
- Other ancillary data?
  - Soils
  - Climate

# CDL Visualization, Dissemination and Querying Needs

- Prior Dissemination Method:
  - Online bulk FTP downloading via NRCS Geospatial Data Gateway
  - Special request & delivery
    - Printed maps
    - CD/DVD delivery
    - Email generated
- NASS Needed...
  - Capabilities for on-line geospatial crop information access, geospatial query and on-line analytics via interactive maps
  - Disseminate all data to decision makers and users via real time retrieval, processing and publishing over the web through standards-based geospatial web services



# Solution - CropScape

- A web service based interactive map visualization, dissemination and querying system for U.S. cropland
  - No burden on users
    - No client software development & installation
    - No special software tools needed
- Collaboration with George Mason University/ Center for Spatial Information Science and Systems



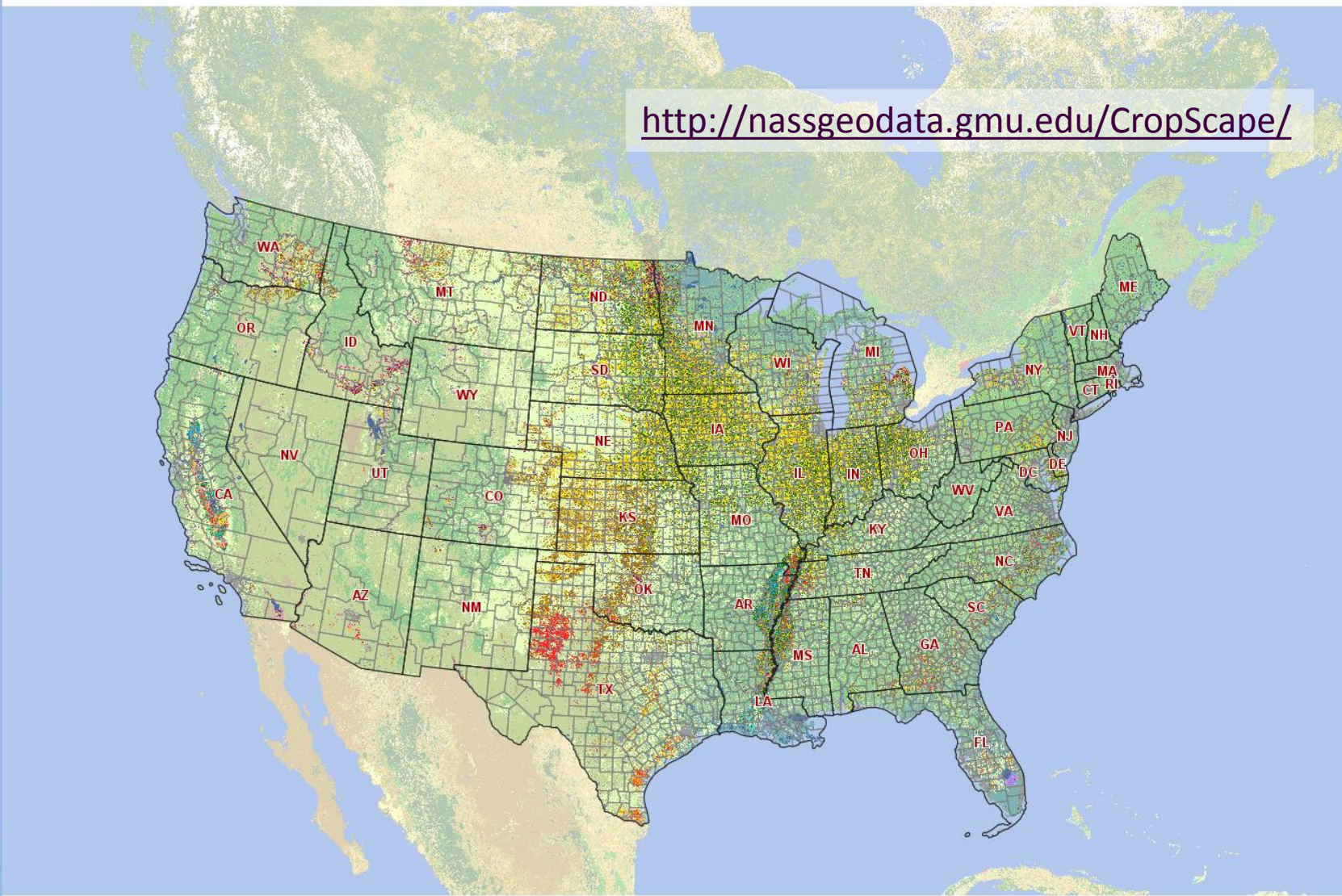
<http://nassgeodata.gmu.edu/CropScope/>

**Layers** | Legend

- Background Layers
  - Global Land Cover
  - None
- Cropland Data Layers
  - 2012
  - 2011
  - 2010
  - 2009
  - 2008
  - 2007
  - 2006
  - 2005
  - 2004
  - 2003
  - 2002
  - 2001
  - 2000
  - 1999
  - 1998
  - 1997
- Crop Mask Layer
- Crop Mask Layer (2007-20)
- Boundary Layers
  - County
  - ASD
  - State
- Water Layers
  - Rivers
  - Lakes
- Road Layers
  - Freeway System (National)
  - Major Highways (Regional)

Scale: 200 km / 100 mi

Powered by MASON



# CropScape Functions

- Select any historical CDL by state and year circa 1997
- Zoom in/out & Pan
- Search by county and year
- Sub-setting by state, county, and year
- Sub-setting for any area of interest
- Re-projecting data to a user specified map projection
  - Albers, Geographic, UTM
- Download the CDL subset in GeoTiff format
- Exporting selected CDL subset to Google Earth (KML)





# CropScape Functions –Cont.

- Online pixel counting & acreage statistics
- Online statistics graphing/charting
- Maps showing the change of crop types for a state, county, or any area specified between any two years of CDL
- On-the-fly single/multi crop map generation, display and download
- Web service implemented
  - Geospatial query statistics data delivery
  - CDL map AOI data delivery





Layers Legend

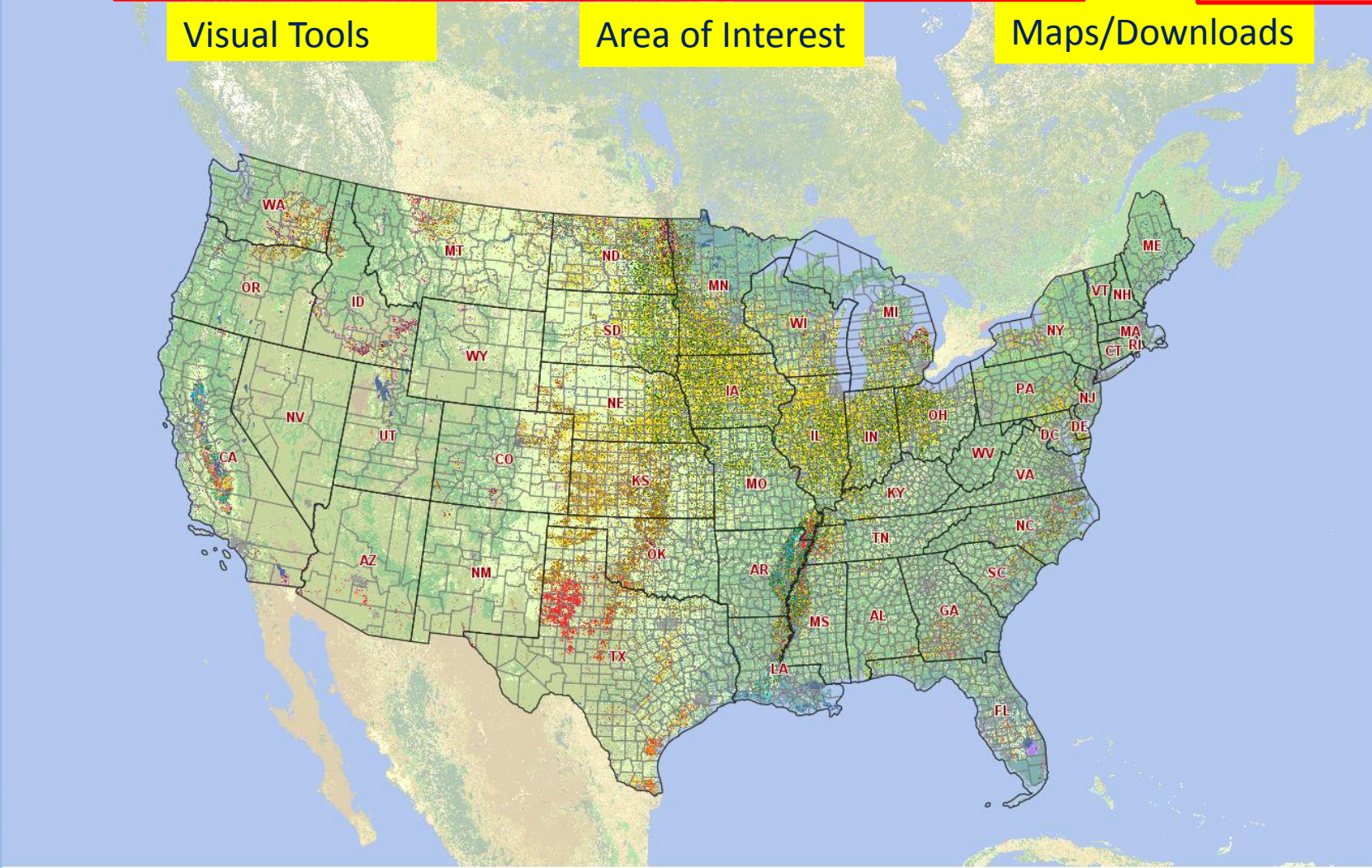


Visual Tools

Area of Interest

Maps/Downloads

- Cropland Data Layers
  - 2012
  - 2011
  - 2010
  - 2009
  - 2008
  - 2007
  - 2006
  - 2005
  - 2004
  - 2003
  - 2002
  - 2001
  - 2000
  - 1999
  - 1998
  - 1997
- Crop Mask Layer
  - Crop Mask Layer (2007-2012)
- Boundary Layers
  - County
  - ASD
  - State
- Water Layers
  - Rivers
  - Lakes
- Road Layers
  - Freeway System (National)
  - Major Highways (Regional)



200 km  
100 mi



USDA United States Department of Agriculture  
National Agricultural Statistics Service

CropScape

Layers Legend

- Background Layers
  - Global Land Cover
  - None
- Cropland Data Layers
  - 2012
  - 2011
  - 2010
  - 2009
  - 2008
  - 2007
  - 2006
  - 2005
  - 2004
  - 2003
  - 2002
  - 2001
  - 2000
  - 1999
  - 1998
  - 1997
- Crop Mask Layer
  - Crop Mask Layer (2007-2012)
- Boundary Layers
  - County
  - ASD
  - State
- Water Layers
  - Rivers
  - Lakes
- Road Layers
  - Freeway System (National)
  - Major Highways (Regional)

Pixel  
Count  
estim  
crop a

### Data Preview of Soybeans

Download Close

### Define Area of Interest By State/ASD/County

Select a State

State:

an ASD...

	Acreage
081	245096.9
076	128738.9
2	0.4
5	1.1
21	4.7
021	538.4
039	142.1
20	4.4
9	2
060	561292.4

cial estimates.  
t in biased area  
rrection. Official  
/

Title: 2012 CDL, Sangamon, Illinois

Paper Size: Letter - 11x8.5 in

Submit

Cancel



# 2012 CDL, Sangamon, Illinois



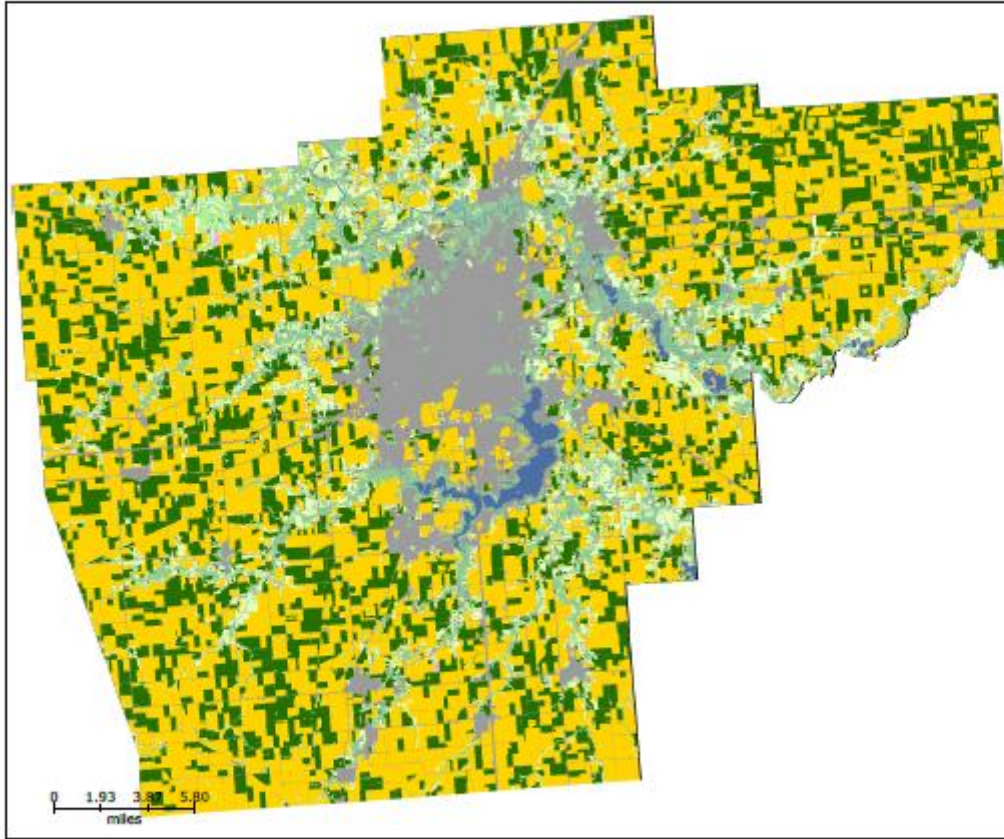
Land Cover Categories  
(by decreasing acreage)

**AGRICULTURE\***

- Corn
- Soybeans
- Pasture/Hay
- Other Hay/Non-Alfalfa
- Winter Wheat
- Alfalfa
- Grassland Herbaceous
- Oil Crop Win/Wht/Soybeans
- Fallow/Idle Cropland
- Potatoes
- Pop or Orn Corn
- Rye
- Pumpkins
- Clover/Wildflowers
- Sod/Grass Seed
- Cobs

**NON-AGRICULTURE\*\***

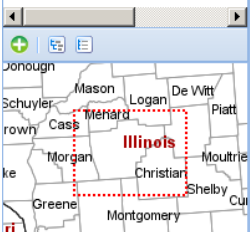
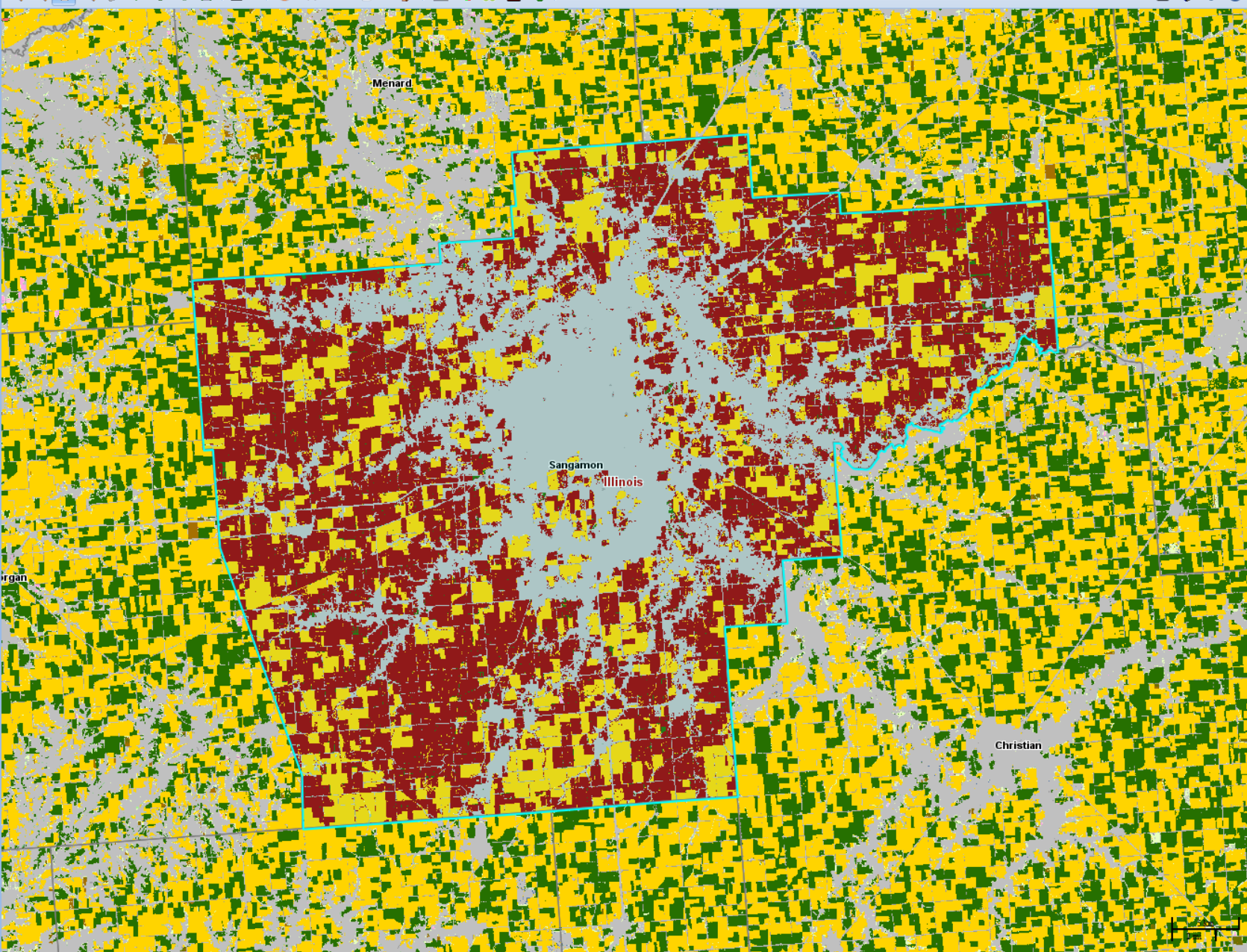
- Deciduous Forest
- Developed/Low Intensity
- Developed/Open Space
- Developed/Medium Intensity
- Open Water
- Developed/High Intensity



Download

Close

- Background Layers
  - Global Land Cover
  - None
- Cropland Data Layers
  - 2012
  - 2011
  - 2010
  - 2009
  - 2008
  - 2007
  - 2006
  - 2005
  - 2004
  - 2003
  - 2002
  - 2001
  - 2000
  - 1999
  - 1998
  - 1997
- Crop Mask Layer
  - Crop Mask Layer (2007-2012)
- Boundary Layers
  - County
  - ASD
  - State
- Water Layers
  - Rivers
  - Lakes
- Road Layers
  - Freeway System (National)
  - Major Highways (Regional)
- Other Layers
  - CDL\_clip\_compare\_201307



# CropScape Download & Export

The screenshot displays the Google Earth interface with a CropScape data overlay. The overlay is a yellow and green pixelated map centered on the Springfield, Missouri area, covering parts of Morgan, Sangamon, and Logan counties. The interface includes a left sidebar with the following elements:

- Select Year(s):** A list of years with checkboxes. The year 2013 is selected.
- Specify Project:** A checkbox that is checked.
- Projection:** A dropdown menu set to "USA".
- Layers Panel:** A list of layers with checkboxes:
  - Primary Database (checked)
  - Borders and Labels (checked)
  - Places (unchecked)
  - Photos (unchecked)
  - Roads (unchecked)
  - 3D Buildings (unchecked)
  - Ocean (unchecked)
  - Weather (unchecked)
  - Gallery (unchecked)
  - Global Awareness (unchecked)
  - More (unchecked)

The main map area shows a satellite view of the region with the CropScape overlay. Labels for "Springfield" and "Sangamon" are visible on the overlay. The interface also features a search bar, a toolbar with various navigation tools, and a "Sign in" button in the top right corner. The bottom status bar displays coordinates: 39°52'43.89" N 89°38'26.69" W, elevation of 592 ft, and eye altitude of 60.87 mi.

# CropScape “Mashups”

The screenshot displays the KDF Bioenergy Knowledge Discovery Framework web application. The header includes the KDF logo, the text "BIOENERGY KNOWLEDGE DISCOVERY FRAMEWORK U.S. DEPARTMENT OF ENERGY", and navigation links for "Login", "Request Account", and a search bar. Below the header is a navigation menu with "Home", "Map", "Data Library", "About", and "Contact". The main interface features a yellow toolbar with "My Layers", "Add Data", and "Attribute Query" buttons, alongside a set of map navigation icons. On the left, a "My Layers" panel lists several data layers: "Base Map", "Ethanol Refinery Capacity", "Transload", "Unit Train", "Biodiesel Refinery Capacity", "RFA Biorefineries", and "2010 Cropland Data Layer". The central map area shows a colorful, pixelated visualization of agricultural data with several red circles highlighting specific regions. A red banner at the bottom of the map area contains the text "From: <https://www.bioenergykdf.net/>".

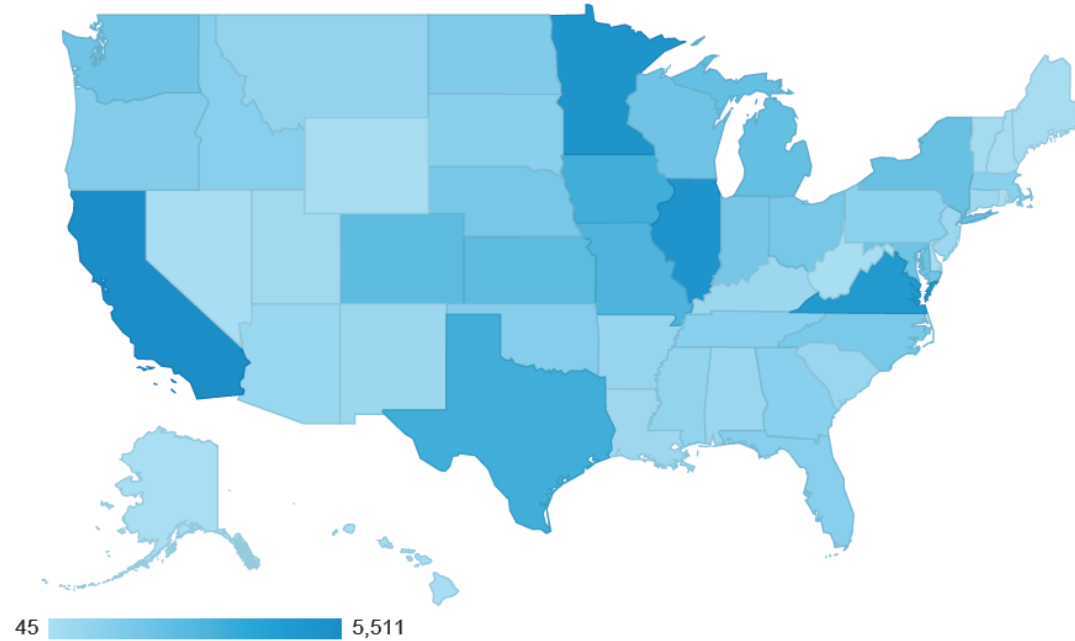
# CropScape Future Improvements

- Additional GIS layers
  - watershed, congressional districts
- More analysis functions
- Improved map production/printing services



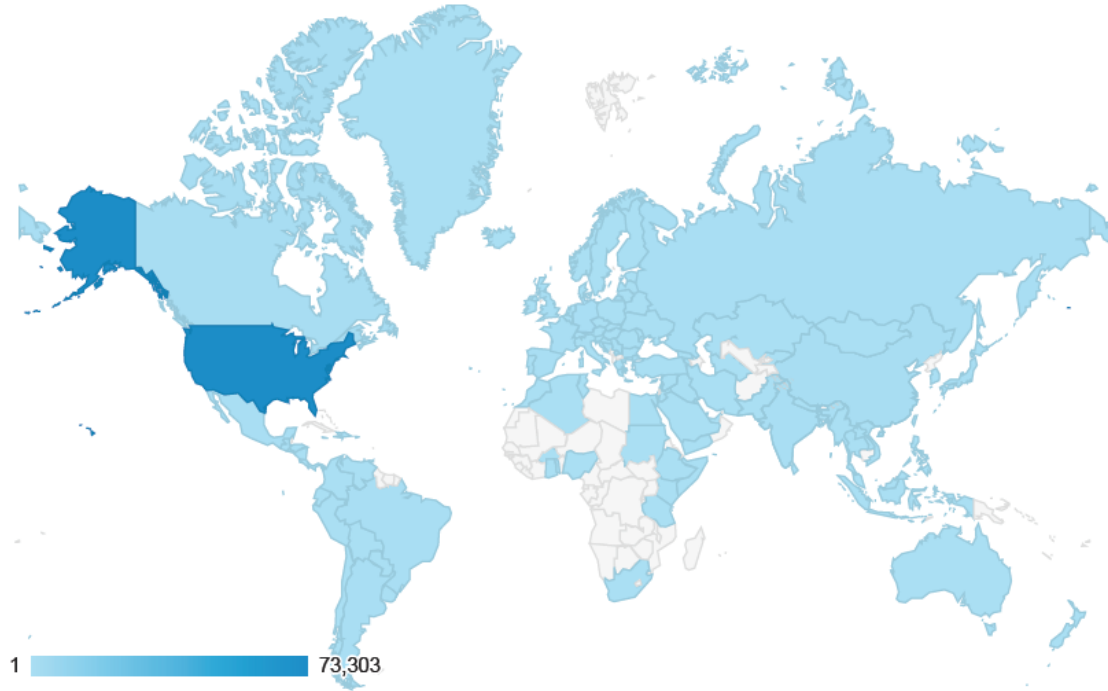


# CropScape Google Analytics



Region	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
	<b>73,303</b> % of Total: 89.78% (81,650)	<b>1.21</b> Site Avg: 1.20 (0.32%)	<b>00:01:23</b> Site Avg: 00:01:21 (1.85%)	<b>57.84%</b> Site Avg: 58.66% (-1.40%)	<b>86.33%</b> Site Avg: 86.52% (-0.22%)
1. <a href="#">California</a>	<b>5,511</b>	1.22	00:01:26	62.98%	85.18%
2. <a href="#">Illinois</a>	<b>5,018</b>	1.21	00:01:24	59.65%	86.59%
3. <a href="#">Minnesota</a>	<b>4,962</b>	1.15	00:01:03	52.58%	88.98%
4. <a href="#">Virginia</a>	<b>4,616</b>	1.46	00:02:22	36.55%	83.71%
5. <a href="#">Iowa</a>	<b>3,270</b>	1.20	00:01:27	58.01%	86.06%
6. <a href="#">Texas</a>	<b>3,253</b>	1.20	00:01:20	54.75%	85.24%
7. <a href="#">Missouri</a>	<b>2,979</b>	1.17	00:01:11	57.67%	88.02%
8. <a href="#">Colorado</a>	<b>2,438</b>	1.19	00:01:27	53.57%	85.81%
9. <a href="#">Kansas</a>	<b>2,421</b>	1.17	00:01:26	50.06%	87.40%
10. <a href="#">District of Columbia</a>	<b>2,375</b>	1.18	00:01:02	62.15%	86.61%

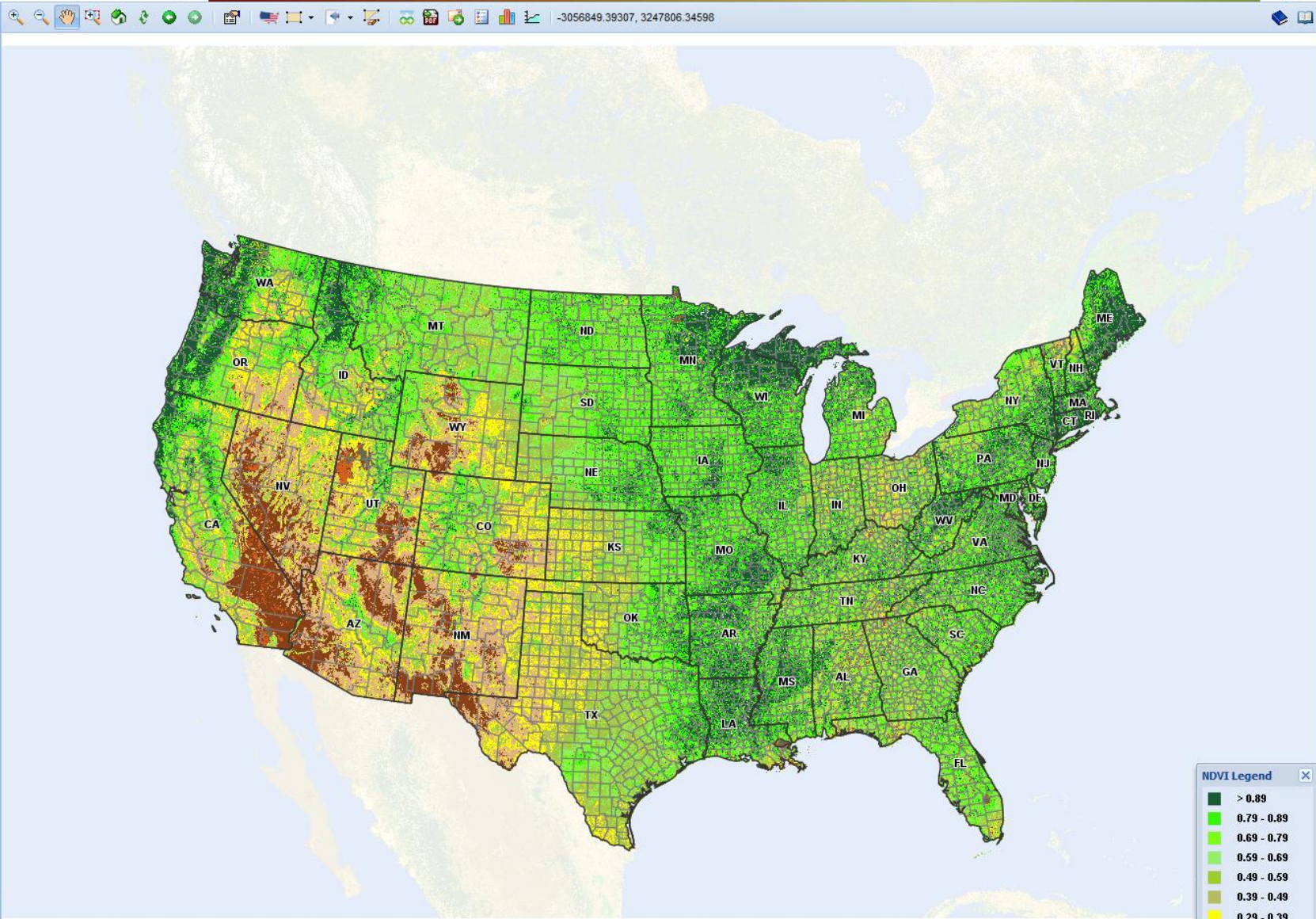
# CropScape Google Analytics



Country / Territory	Visits	Pages / Visit	Avg. Visit Duration	% New Visits	Bounce Rate
	<b>81,650</b> <small>% of Total: 100.00% (81,650)</small>	<b>1.20</b> <small>Site Avg: 1.20 (0.00%)</small>	<b>00:01:21</b> <small>Site Avg: 00:01:21 (0.00%)</small>	<b>58.69%</b> <small>Site Avg: 58.66% (0.04%)</small>	<b>86.52%</b> <small>Site Avg: 86.52% (0.00%)</small>
1. <a href="#">United States</a>	<b>73,303</b>	1.21	00:01:23	57.84%	86.33%
2. <a href="#">Canada</a>	<b>1,100</b>	1.16	00:01:07	67.36%	88.36%
3. <a href="#">China</a>	<b>913</b>	1.25	00:01:28	60.24%	82.58%
4. <a href="#">Germany</a>	<b>502</b>	1.12	00:00:47	58.76%	91.24%
5. <a href="#">United Kingdom</a>	<b>441</b>	1.15	00:01:02	64.40%	89.57%
6. <a href="#">Argentina</a>	<b>393</b>	1.13	00:00:57	48.60%	91.09%
7. <a href="#">France</a>	<b>388</b>	1.25	00:01:30	62.11%	86.34%
8. <a href="#">Brazil</a>	<b>362</b>	1.15	00:01:03	68.78%	87.85%
9. <a href="#">Spain</a>	<b>300</b>	1.14	00:00:47	69.00%	90.00%
10. <a href="#">Mexico</a>	<b>291</b>	1.19	00:01:37	54.64%	86.60%

Layers Products Legends

Type: NDVI  
 Period: Weekly  
 Year: 2013  
 Date: 27(07.02\_07.08)\_21



**NDVI Legend**

- > 0.89
- 0.79 - 0.89
- 0.69 - 0.79
- 0.59 - 0.69
- 0.49 - 0.59
- 0.39 - 0.49
- 0.29 - 0.39
- 0.19 - 0.29
- 0.05 - 0.19
- < 0.05
- No Data



200 km  
 100 mi



# Purpose of VegScape

- On-line satellite-based U.S. crop condition vegetation assessment and monitoring
- Improve objectivity, robustness, quantification, and defensibility of nationwide crop condition monitoring program
- Provide tools for data exploration and visualization
- Publically disseminate geospatial vegetation condition at *daily, weekly, and biweekly* time periods
- Supports ethos of data democratization
  - free and open access to digital geospatial data layers
  - open geospatial standards
  - supporting transparent and collaborative government initiatives



You are here: Home / Research and Science / Vegetation Condition Maps

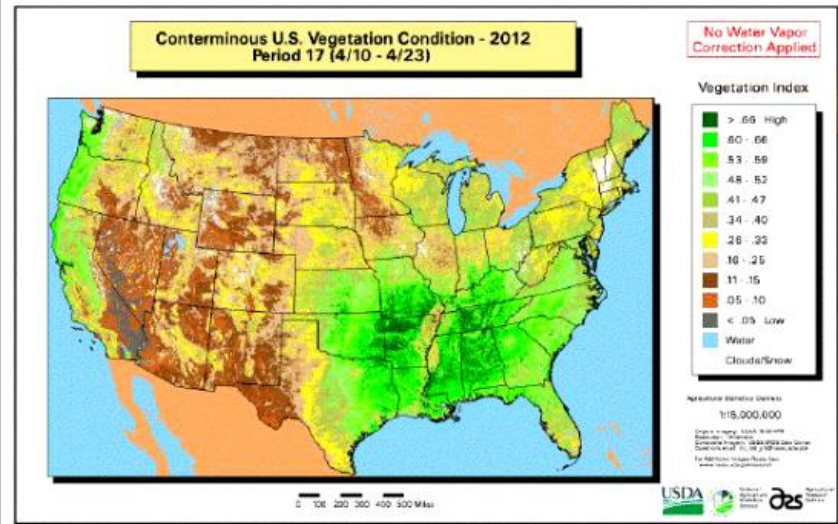
## Research and Science

### 2012 Vegetation Condition Map Animations

Click Year to Play\*

- 2012
- 2011
- 2010
- 2009
- 2008
- 2007
- 2006
- 2005
- 2004
- 2003
- 2002
- 2001
- 2000 NA
- 1999
- 1998
- 1997
- 1996
- 1995

\*Requires QuickTime (Free)



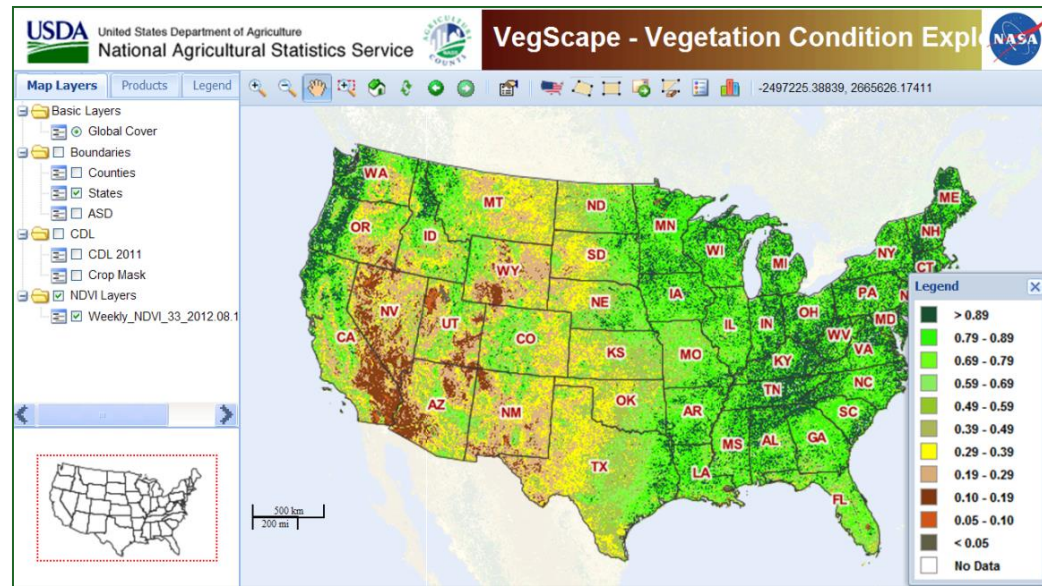
0 100 200 300 400 500 Miles

March April May June July August Sept Oct  
06 13 20 27 | 03 10 17 24 | 01 08 15 22 29 05 12 19 26 | 03 10 17 24 31 | 07 14 21 28 | 04 11 18 25 | 02 09

Click Date to View 1024x663 Image (~300 KB)

- 1995-2012
- NDVI Vegetative Condition
- Static Maps
- Based on AVHRR sensor (1.1 km spatial resolution)

- 2013
- **VegScape** – web service
- Multiple vegetation indices
- Interactive web mapping: navigate, download, etc.
- MODIS sensor: daily repeat, 250m resolution (~15 acres /6.25 hectares)
- Composites: daily, weekly, bi-weekly

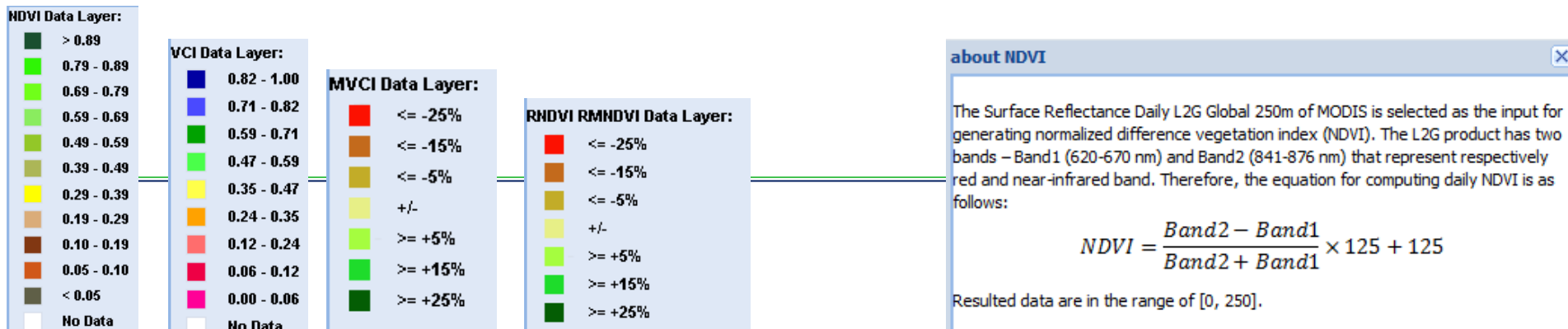


Built on CropScape framework/architecture

- Web-based interactive mapping
- Derive daily/weekly/biweekly composites
- Automated updates
- Online navigation, zooming, panning, downloading
- Hosted/maintained by George Mason University/Center for Spatial Information Science and Systems

# Vegetation Indices

- The Normalized Difference Vegetation Index (NDVI) is used to measure and monitor plant growth, vegetative cover, and biomass production
- NDVI values range from 0 to 1, where higher values indicate stronger plant vigor and high chlorophyll content
  - Lower values indicate low vegetative content/plant heartiness
- Additional derivative vegetation indices can be displayed: Vegetative Condition Index; Ratio VCI; Ratio Median VCI; Mean VCI



# Vegetation Indices

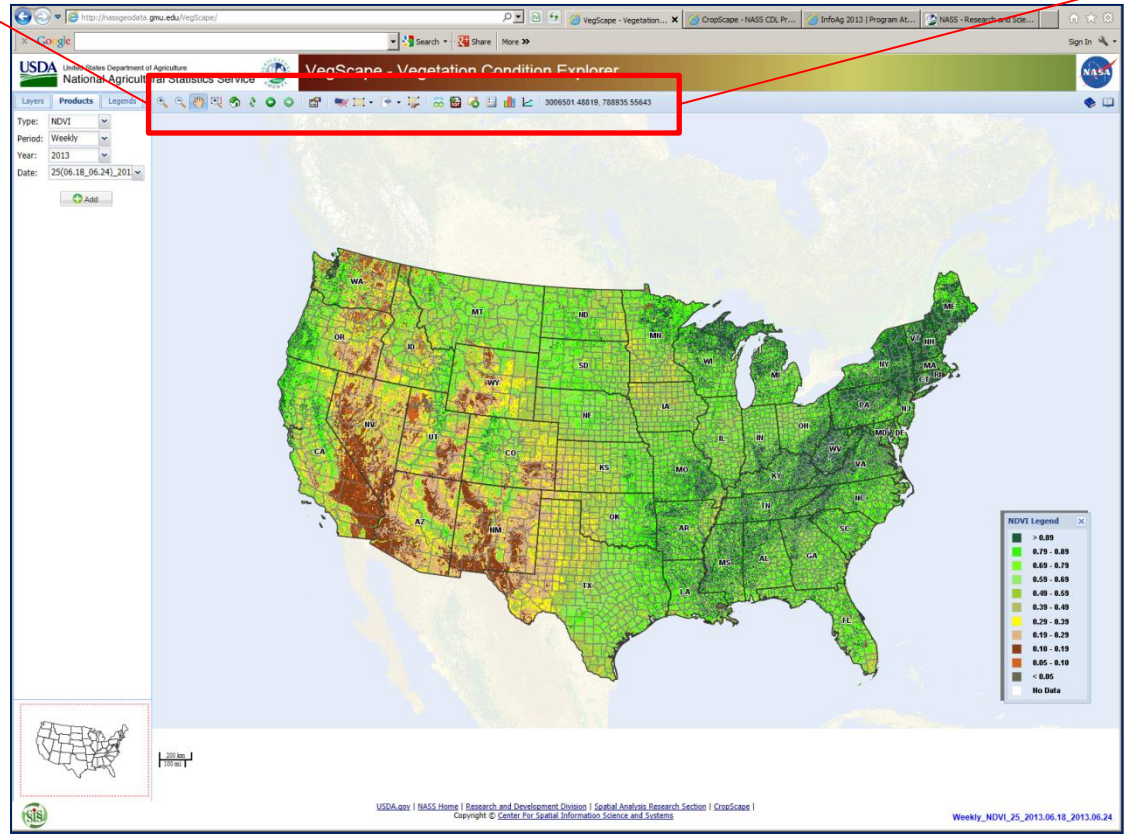
- ▶ **NDVI** – Normalized Difference Vegetation Index  
 $NDVI = (IR - Red) / (IR + Red)$  = Shows greenness  
Healthy vegetation has high NDVI ratio values (1.0 max)  
low red light & high near-infrared reflectance values
- ▶ **RNDVI** -NDVI change ratio to previous year
- ▶ **RMNDVI** - NDVI change ratio to median
- ▶ **VCI** - Relative NDVI change with respect to minimum historical (referenced) NDVI value
- ▶ **MVCI** - Mean referenced VCI (vegetation condition index)



Zoom in  
 Zoom out  
 Pan  
 Drag zoom  
 Home  
 Refresh  
 Previous view  
 Next view  
 Identify pixel value  
 Define state/county AOI  
 Define rectangle AOI  
 Import AOI  
 Clear AOI  
 Swipe layer  
 Create PDF map  
 Download AOI  
 Show/hide legend  
 Statistics  
 NDVI Profile



# VegScape GUI



# Load VegScape Indices

## 1) Select vegetative index

The 'Products' dropdown menu is open, showing a list of vegetative indices. The 'MVIC' option is currently selected and highlighted in blue. Other options in the list include NDVI, VCI, RVC, RMVIC, and MVCI.

## 2) Time period

The time period selection interface shows four dropdown menus: 'Type' is set to 'NDVI', 'Period' is set to 'Weekly', 'Year' is set to 'Daily', and 'Date' is set to 'Weekly'. The 'Weekly' option under 'Date' is highlighted in blue.

## 3) Year

The year selection interface shows four dropdown menus: 'Type' is 'NDVI', 'Period' is 'Weekly', 'Year' is '2013', and 'Date' is '2000'. The '2013' option under 'Year' is highlighted in blue. The 'Date' dropdown is open, showing a list of years from 2000 to 2003.

## 4) Date

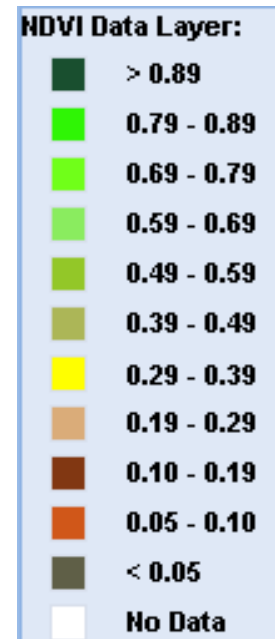
The date selection interface shows four dropdown menus: 'Type' is 'NDVI', 'Period' is 'Weekly', 'Year' is '2013', and 'Date' is '05(01.29\_02.04)\_20'. The '05(01.29\_02.04)\_20' option under 'Date' is highlighted in blue. The 'Date' dropdown is open, showing a list of dates for 2013: 01(01.01\_01.07)\_2013, 02(01.08\_01.14)\_2013, and 03(01.15\_01.21)\_2013.

The final product selection interface shows four dropdown menus: 'Type' is 'NDVI', 'Period' is 'Weekly', 'Year' is '2013', and 'Date' is '05(01.29\_02.04)\_20'. Below the dropdowns is a green '+ Add' button. The entire interface is enclosed in a red border.

Follow these five steps to add products for analysis

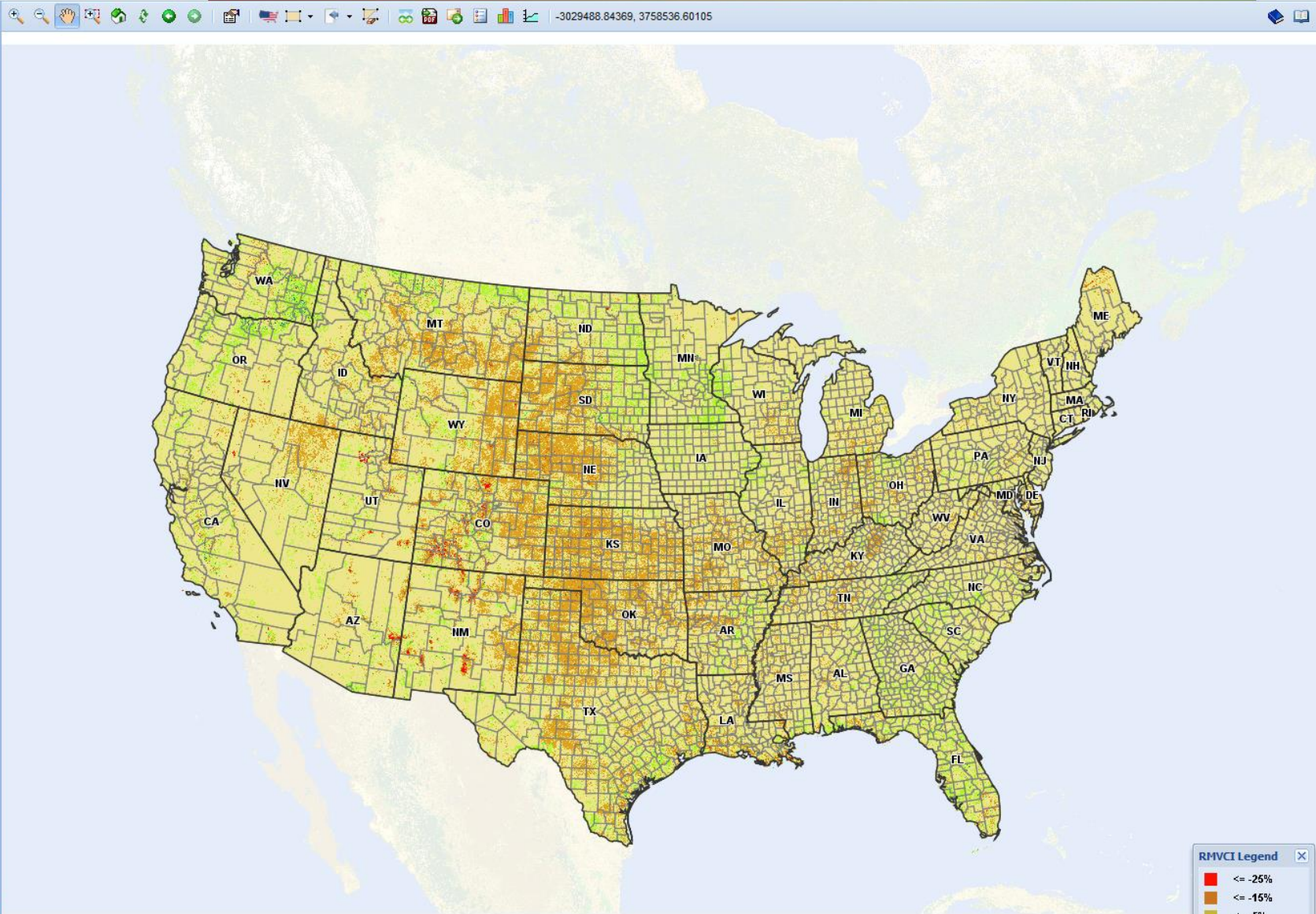
## 5) Add

A green '+ Add' button with a white plus sign and the text 'Add' in black.



**Layers** | Products | Legends

- Basic Layers
- CDL
- Crop Mask
  - Crop Mask
- Boundaries
- Water Layers
- Road Layers
- RMVCI Layers
  - Weekly\_RMVCI\_27\_2013.0
  - Weekly\_RMVCI\_27\_2012.0




200 km  
 100 mi

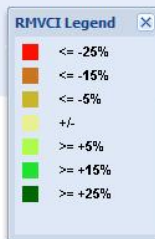
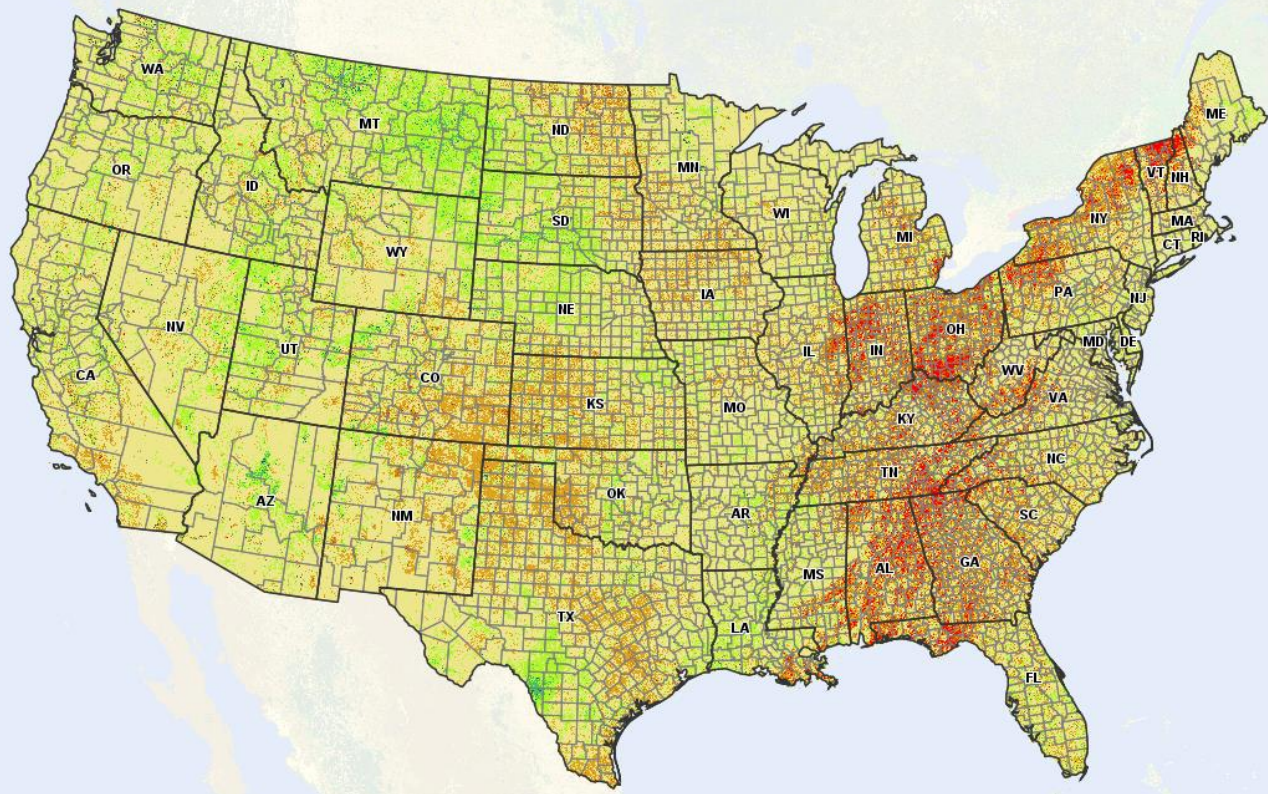
**RMVCI Legend**

	<= -25%
	<= -15%
	<= -5%
	+/-
	>= +5%
	>= +15%
	>= +25%



- Layers Products Legends
- Basic Layers
  - CDL
  - Crop Mask
    - Crop Mask
  - Boundaries
  - Water Layers
  - Road Layers
  - RMVCI Layers
    - Weekly\_RMVCI\_27\_2013.07
    - Weekly\_RMVCI\_27\_2012.07

-3020368.66056, 3311647.62786

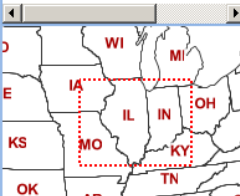
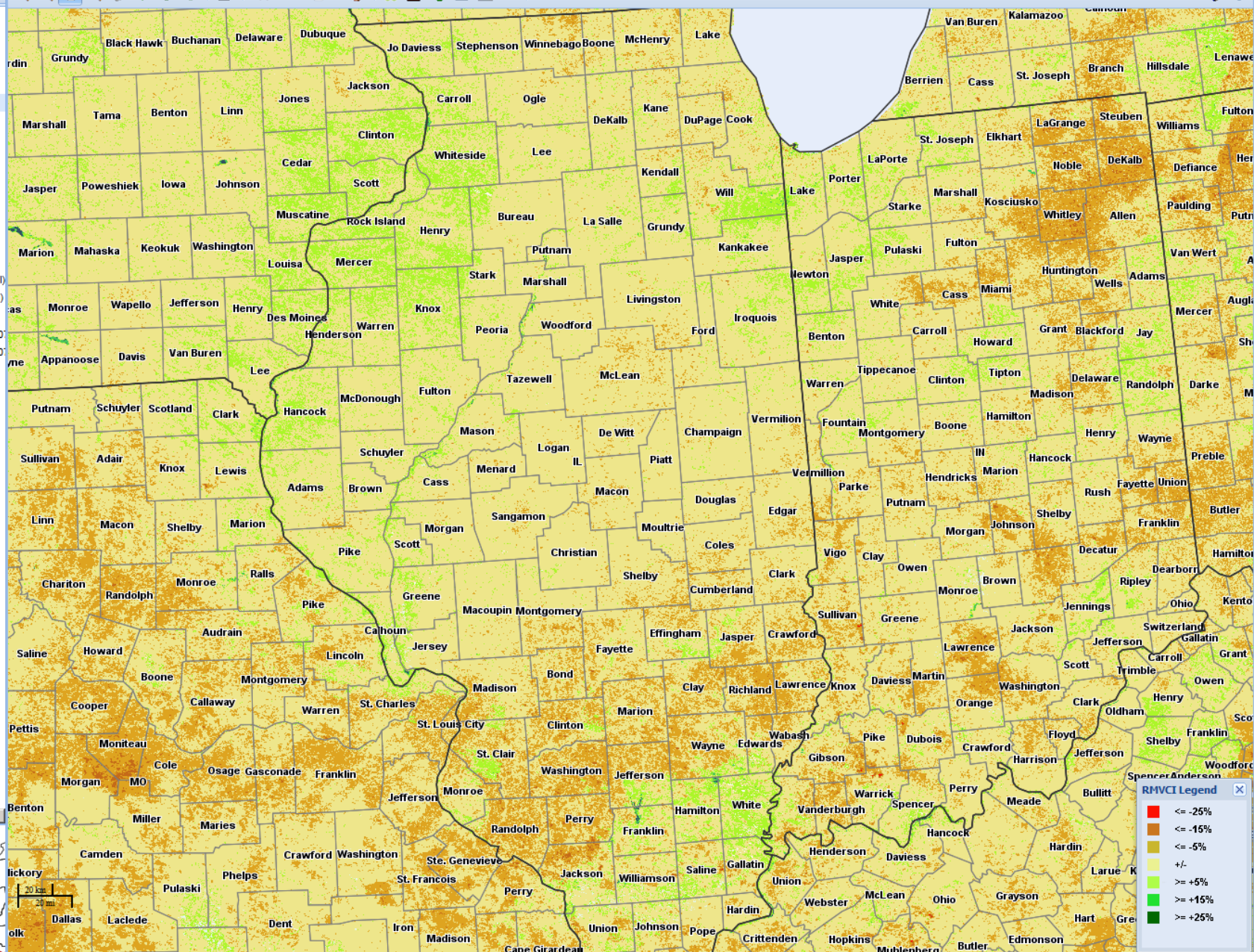




Layers Products Legends

570988.45111, 2053917.37361

- Basic Layers
  - Global Cover
  - CDL
    - CDL 2012
  - Crop Mask
    - Crop Mask
  - Boundaries
    - Counties
    - States
    - ASD
    - Region
  - Water Layers
    - Rivers
    - Lakes
  - Road Layers
    - Freeway System (National)
    - Major Highways (Regional)
  - RMVCI Layers
    - Weekly\_RMVCI\_27\_2013.0
    - Weekly\_RMVCI\_27\_2012.0



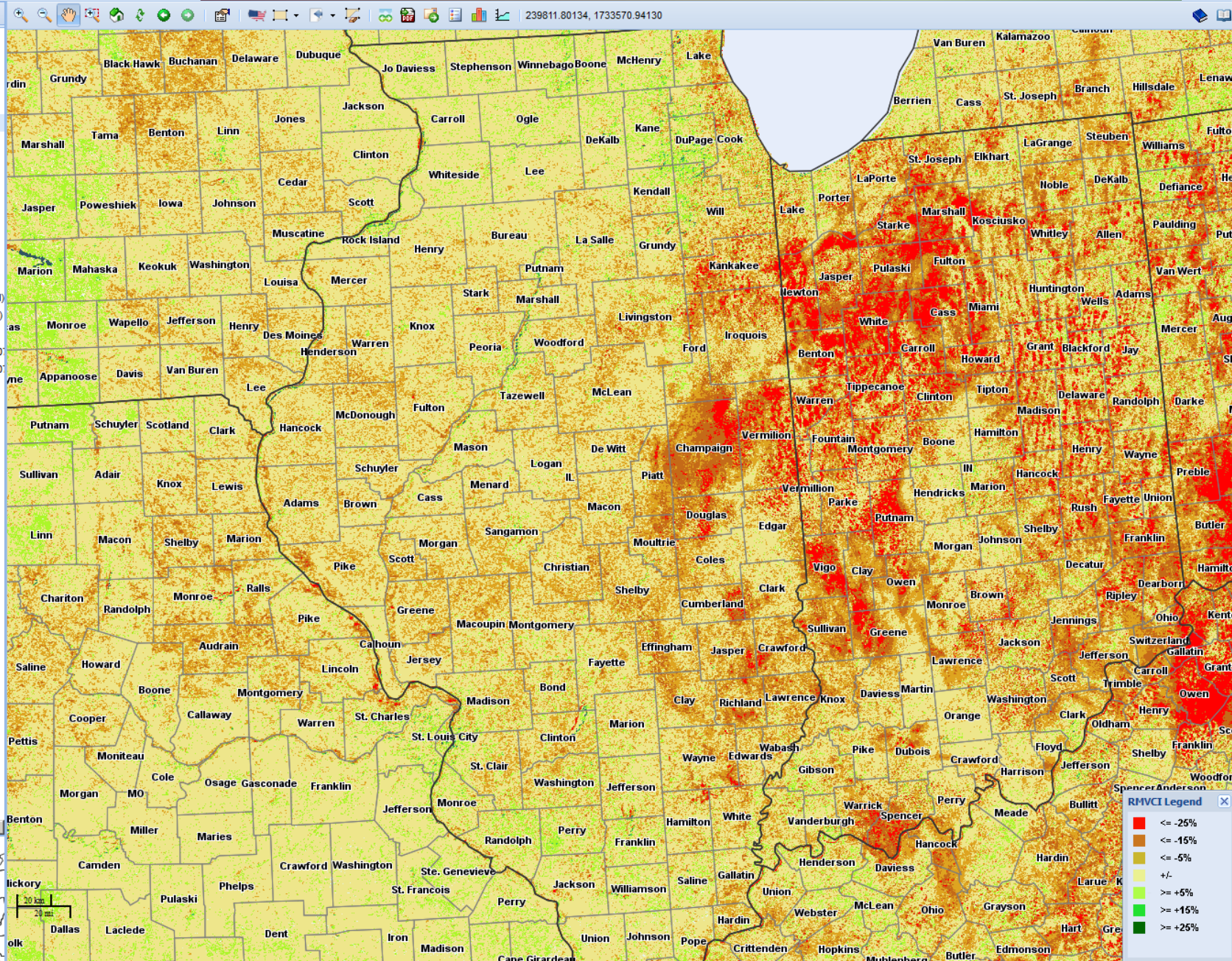
**RMVCI Legend**

Red	<= -26%
Orange	<= -16%
Yellow	<= -5%
Light Green	+/-
Green	>= +5%
Dark Green	>= +15%
Very Dark Green	>= +25%



**Layers** Products Legends

- Basic Layers
  - Global Cover
  - CDL
  - CDL 2012
  - Crop Mask
  - Crop Mask
  - Boundaries
  - Counties
  - States
  - ASD
  - Region
  - Water Layers
    - Rivers
    - Lakes
  - Road Layers
    - Freeway System (National)
    - Major Highways (Regional)
- RMVCI Layers
  - Weekly\_RMVCI\_27\_2013.0
  - Weekly\_RMVCI\_27\_2012.0



**RMVCI Legend**

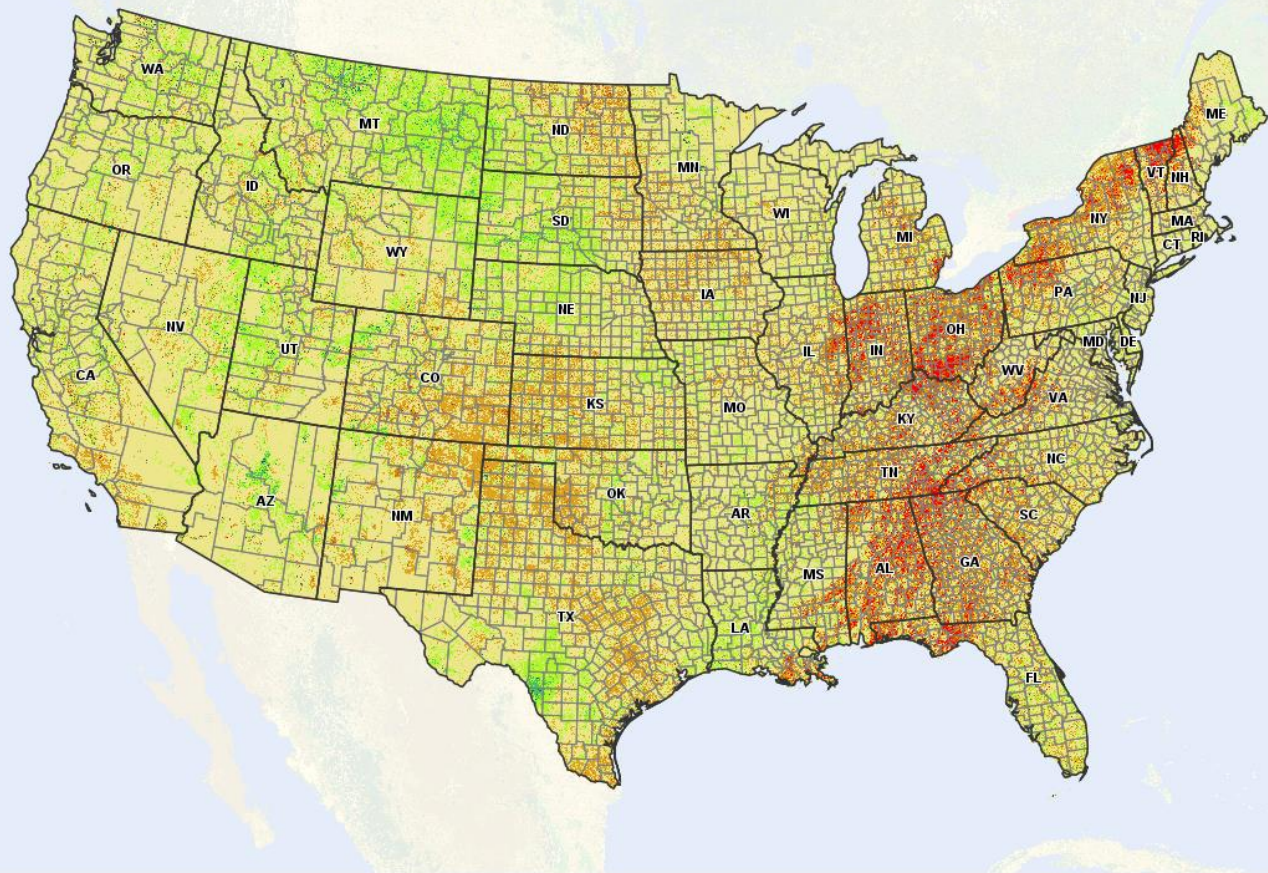
- $\leq -25\%$
- $\leq -15\%$
- $\leq -5\%$
- $\pm$
- $\geq +5\%$
- $\geq +15\%$
- $\geq +25\%$





- Layers Products Legends
- Basic Layers
  - CDL
  - Crop Mask
    - Crop Mask
  - Boundaries
  - Water Layers
  - Road Layers
  - RMVCI Layers
    - Weekly\_RMVCI\_27\_2013.07
    - Weekly\_RMVCI\_27\_2012.07

-3020368.66056, 3311647.62786



**RMVCI Legend**

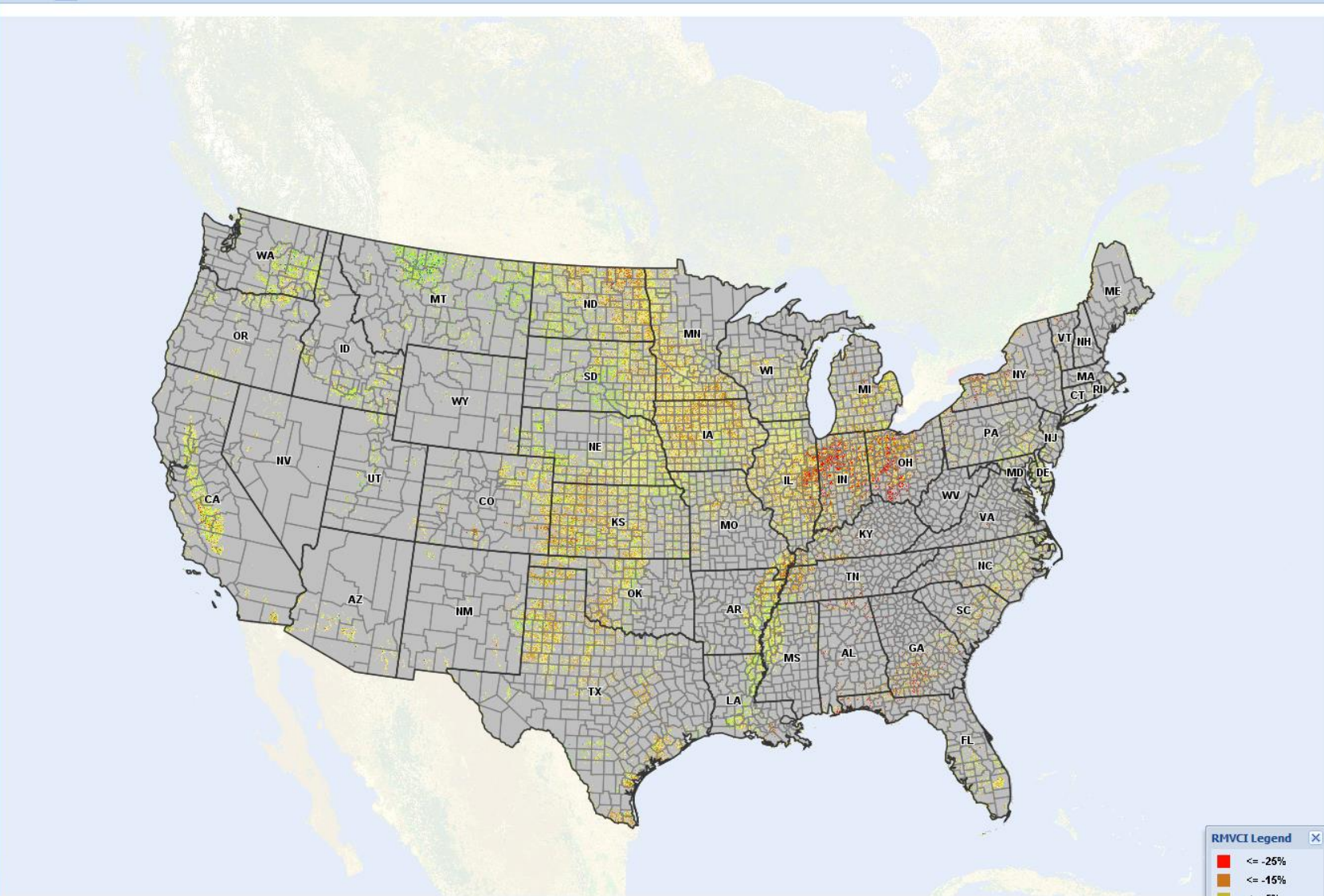
Red	<= -25%
Orange	<= -16%
Yellow	<= -5%
Light Green	+/-
Green	>= +5%
Dark Green	>= +15%
Dark Green	>= +25%



Layers Products Legends

- Basic Layers
- CDL
- Crop Mask
  - Crop Mask
- Boundaries
- Water Layers
- Road Layers
- RMVCI Layers
  - Weekly\_RMVCI\_27\_2013.0
  - Weekly\_RMVCI\_27\_2012.0

-3020368.66056, 3389169.18443



RMVCI Legend

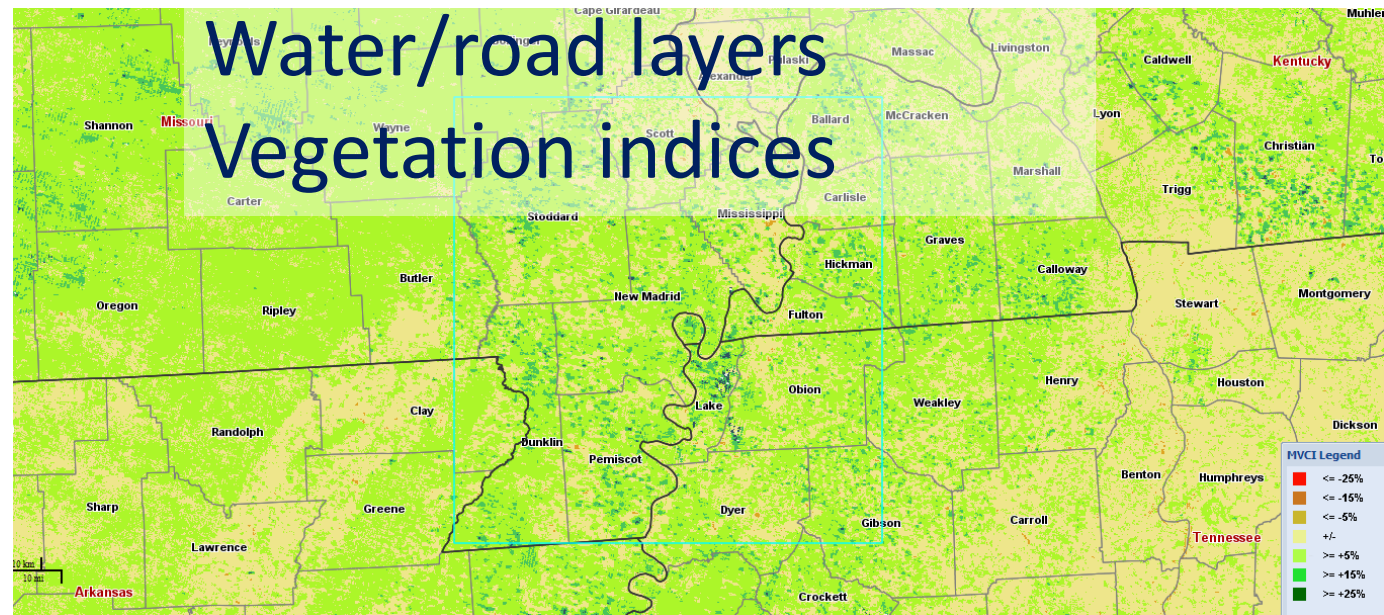
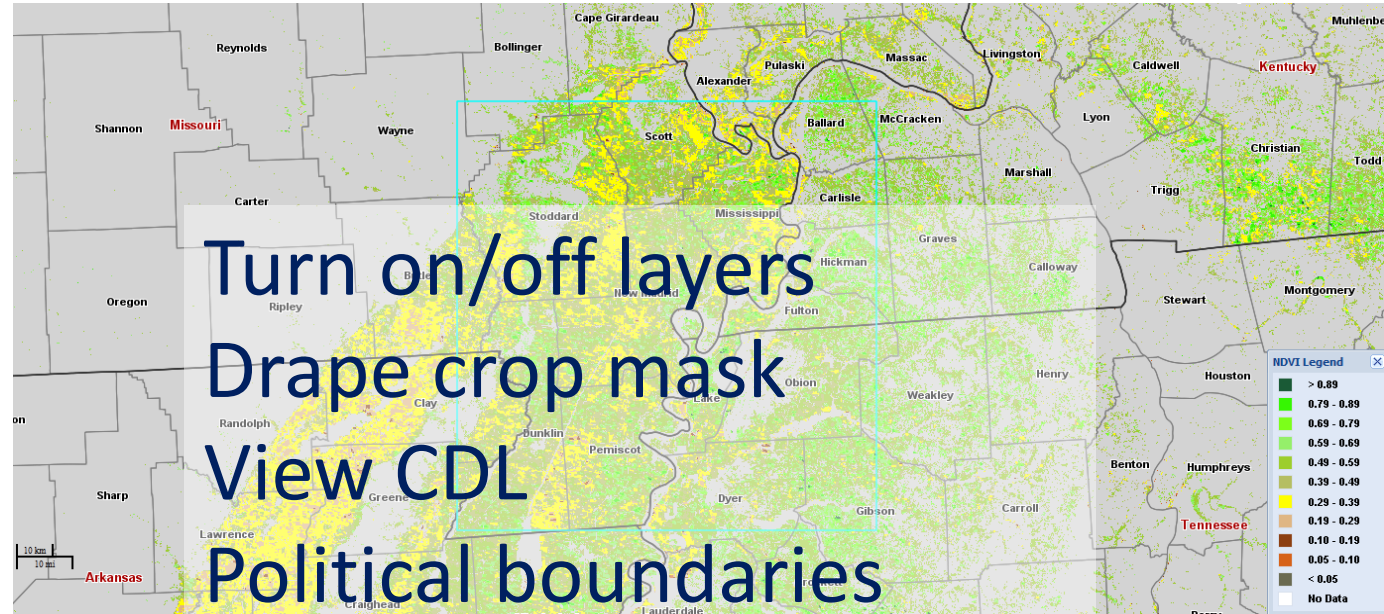
Dark Red	<= -25%
Red	<= -15%
Orange	<= -5%
Yellow	+/-
Light Green	>= +5%
Green	>= +15%
Dark Green	>= +25%

200 km  
100 mi



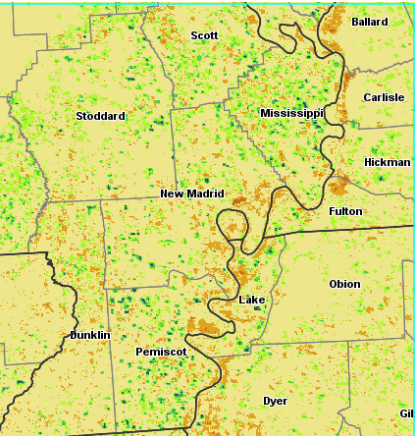
# VegScape Layers/Products/Legends Tab

The screenshot shows the 'Layers' panel in the VegScape software. It features three tabs: 'Layers', 'Products', and 'Legends'. The 'Layers' tab is active, displaying a hierarchical list of layers. The layers are organized into folders: 'Basic Layers', 'CDL', 'Boundaries', 'Water Layers', 'Road Layers', 'NDVI Layers', 'VCI Layers', 'RVCI Layers', 'RMVCI Layers', and 'MVCI Layers'. Each folder contains specific sub-layers with checkboxes to toggle them on or off. For example, in the 'Basic Layers' folder, 'Global Cover' is checked. In the 'Boundaries' folder, 'Counties' and 'States' are checked. In the 'Water Layers' folder, 'Rivers' and 'Lakes' are unchecked. In the 'Road Layers' folder, 'Freeway System (National)' and 'Major Highways (Regional)' are unchecked. In the 'NDVI Layers' folder, 'Weekly\_NDVI\_07\_2013.02.' is unchecked. In the 'VCI Layers' folder, 'Weekly\_VCI\_07\_2013.02.1.' is unchecked. In the 'RVCI Layers' folder, 'Weekly\_RVCI\_07\_2013.02.' is unchecked. In the 'RMVCI Layers' folder, 'Weekly\_RMVCI\_07\_2013.0.' is unchecked. In the 'MVCI Layers' folder, 'Weekly\_MVCI\_07\_2013.02.' is checked. A scroll bar is visible at the bottom of the panel.

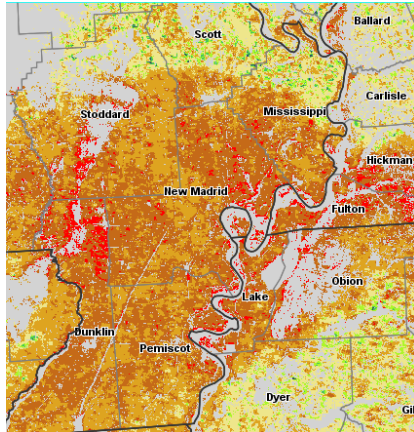


# VegScape Summary

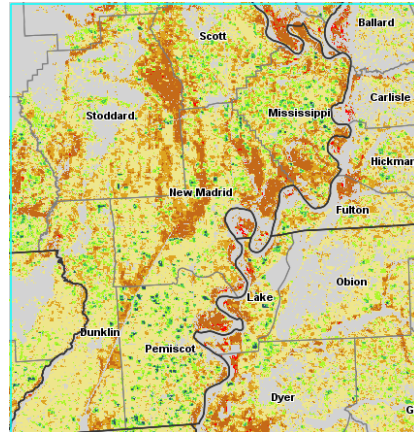
- MODIS offers high spatial/temporal resolution & data continuity
- Web-based dynamic interactive mapping
  - Online navigation, zooming, panning, downloading, on-the-fly processing
  - Leveraging CropScape framework/architecture
  - Automatic data retrieval, processing, publishing, and dissemination
- Irregular, ad-hoc data retrieval and processing for emergency assessment/reporting
- Assessing crop condition and identifying the areal extent of floods, drought, major weather anomalies, and vulnerabilities of early/late season crops
- Consider VegScape operational upon start of 2013 growing season!



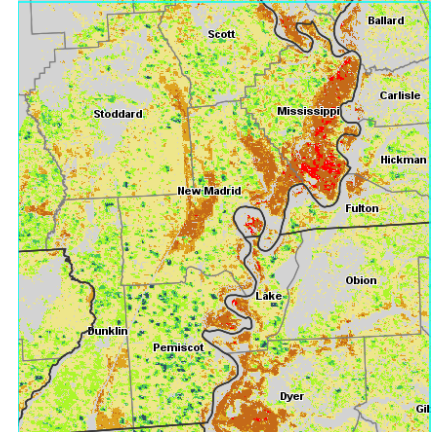
04/12-04/18/11



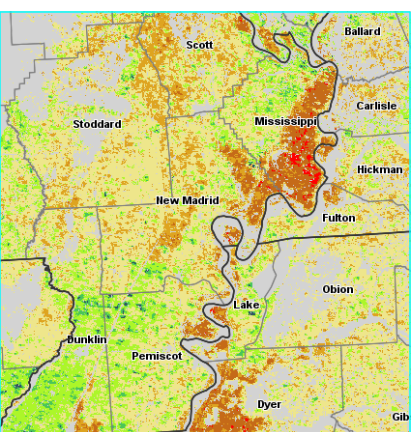
04/19-04/25/11



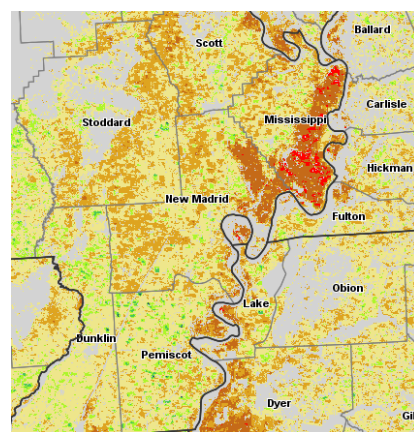
04/26-05/02/11



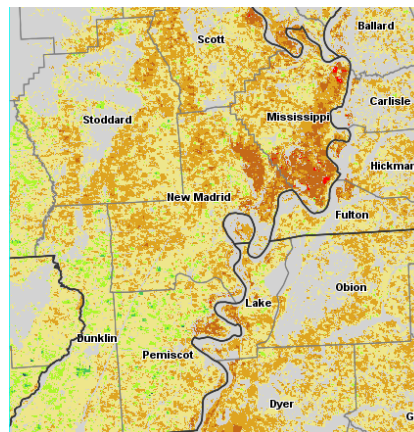
05/03-05/09/11



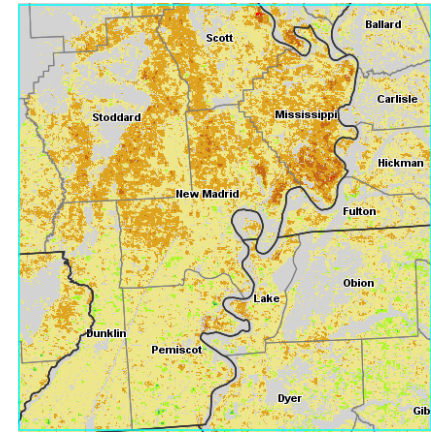
05/10-05/16/11



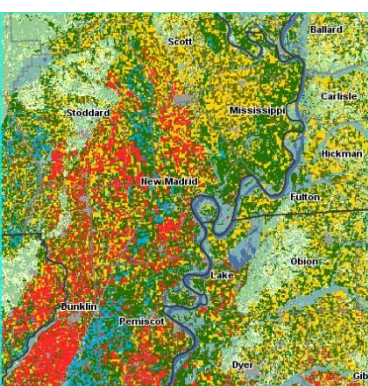
05/17-05/23/11



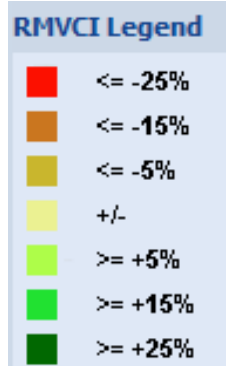
05/24-05/30/11



05/31-06/06/11

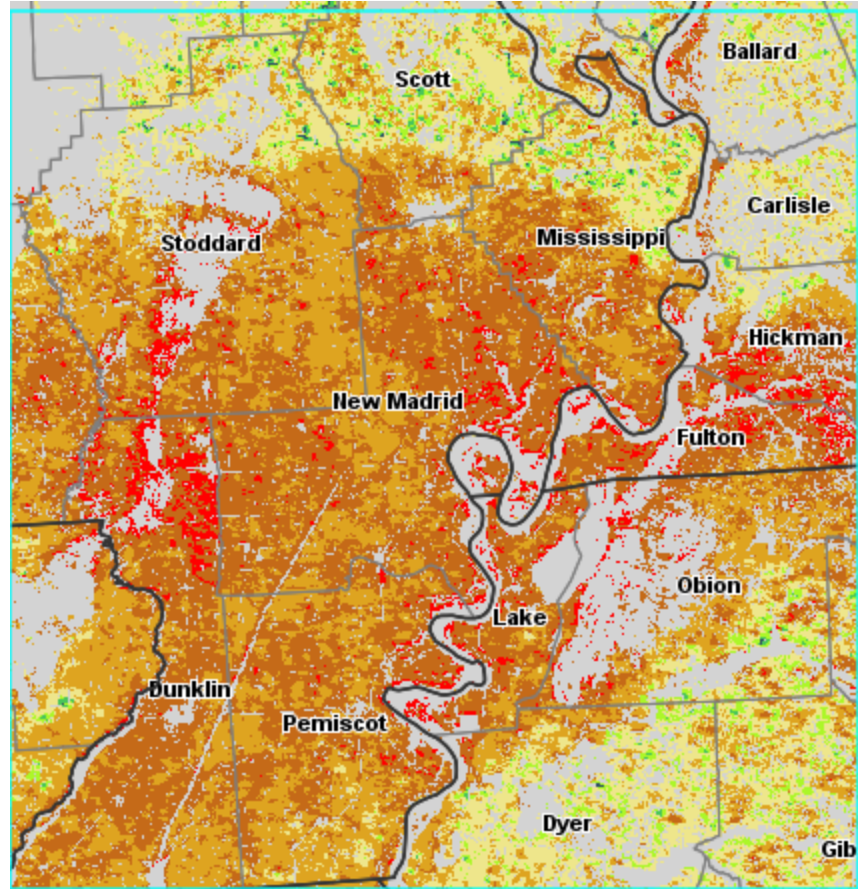


Cropland  
Data  
Layer



2011 Flood Missouri Bootheel  
Ratio Median NDVI  
(Median of 10 years NDVI)

# RatioMedian VCI- Area of Interest Statistics



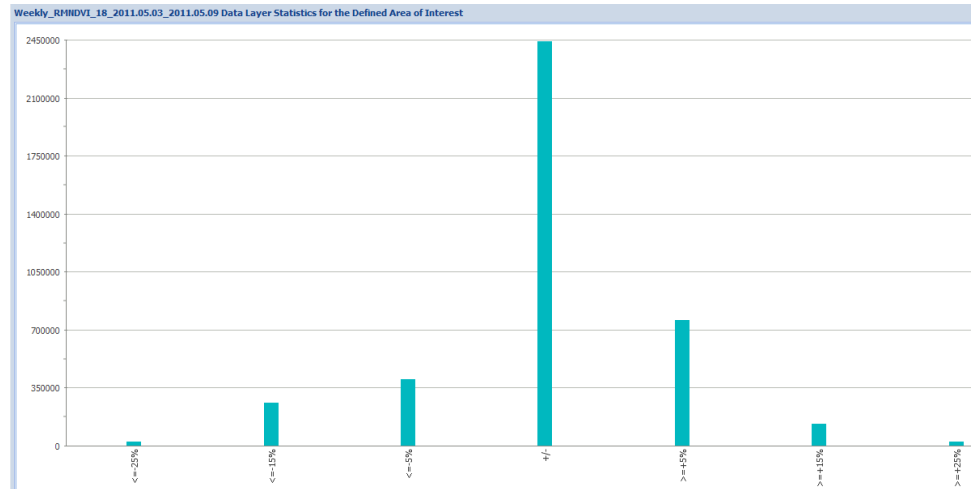
Weekly\_RMNDVI\_18\_2011.05.03\_2011.05.09 Data Layer Statistics for the Defined Area of Interest

Note: Pixel and acreage counts are not official estimates.

Value	Category	Pixel Counts	Acreage
0	<=-.25%	1931	25606.6
1	<=-.15%	19647	260535.3
2	<=-.5%	30411	403274.7
3	+/-	184180	2442377.2
4	>=+.5%	57280	759579.6
5	>=+.15%	9910	131414.7
6	>=+.25%	1765	23405.3
<b>Total</b>	<b>7</b>	<b>305124</b>	<b>4046193.4</b>

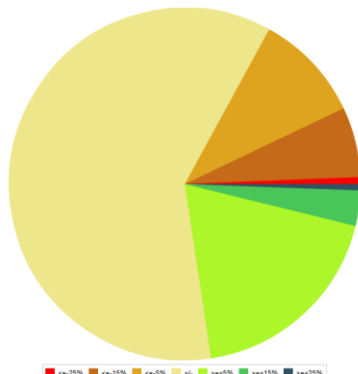
04/19-04/25/11

Quantify vegetative area condition

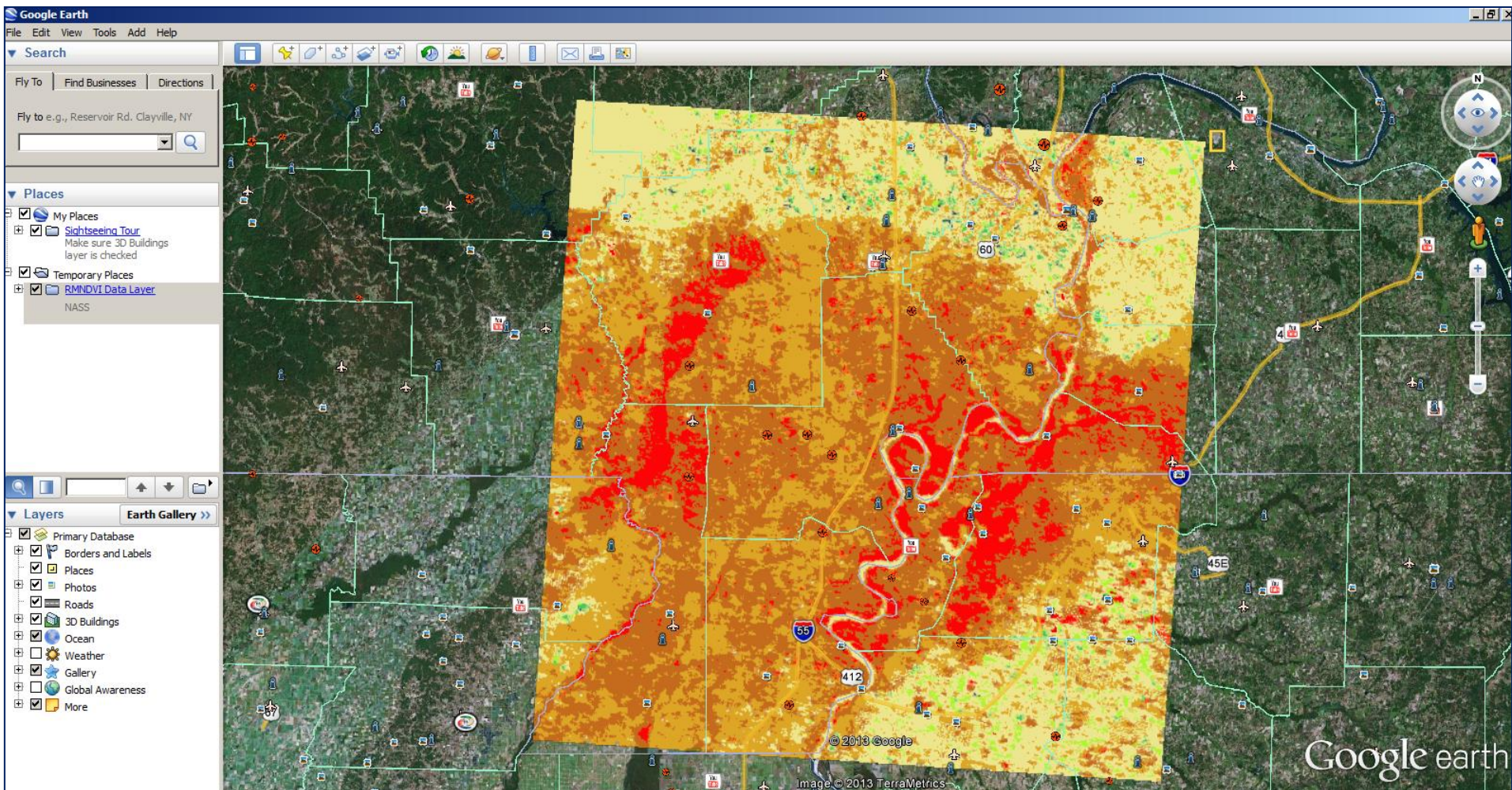


RMVCI Legend

- <= -.25%
- <= -.15%
- <= -.5%
- +/-
- >= +.5%
- >= +.15%
- >= +.25%



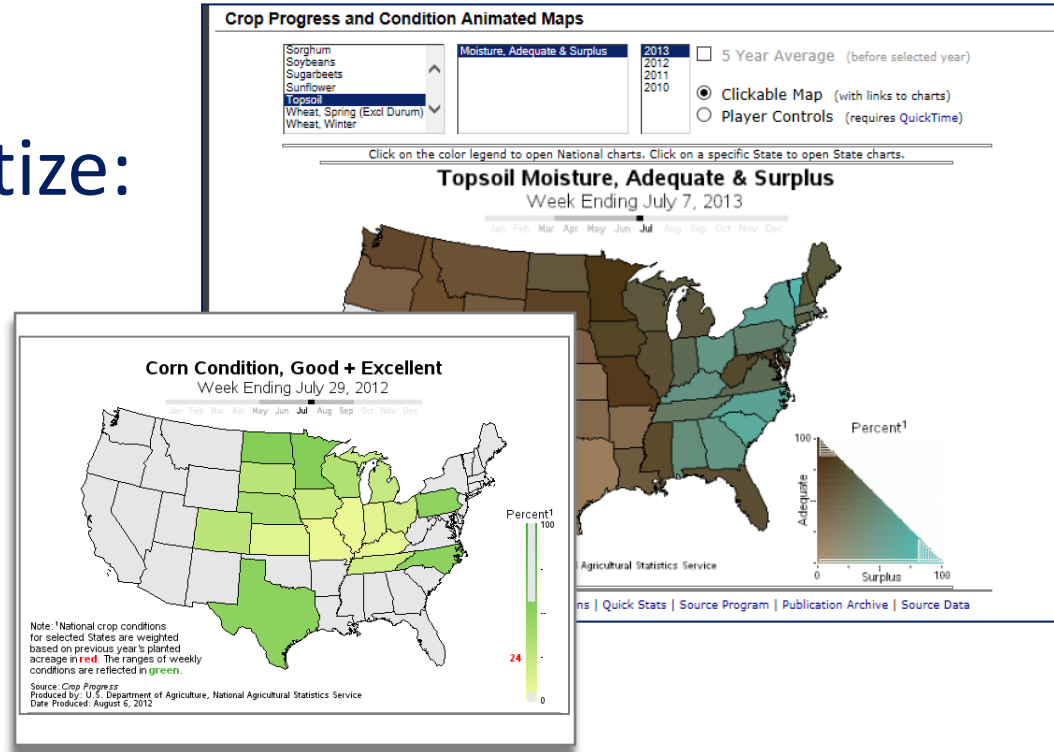
# Web Mashup



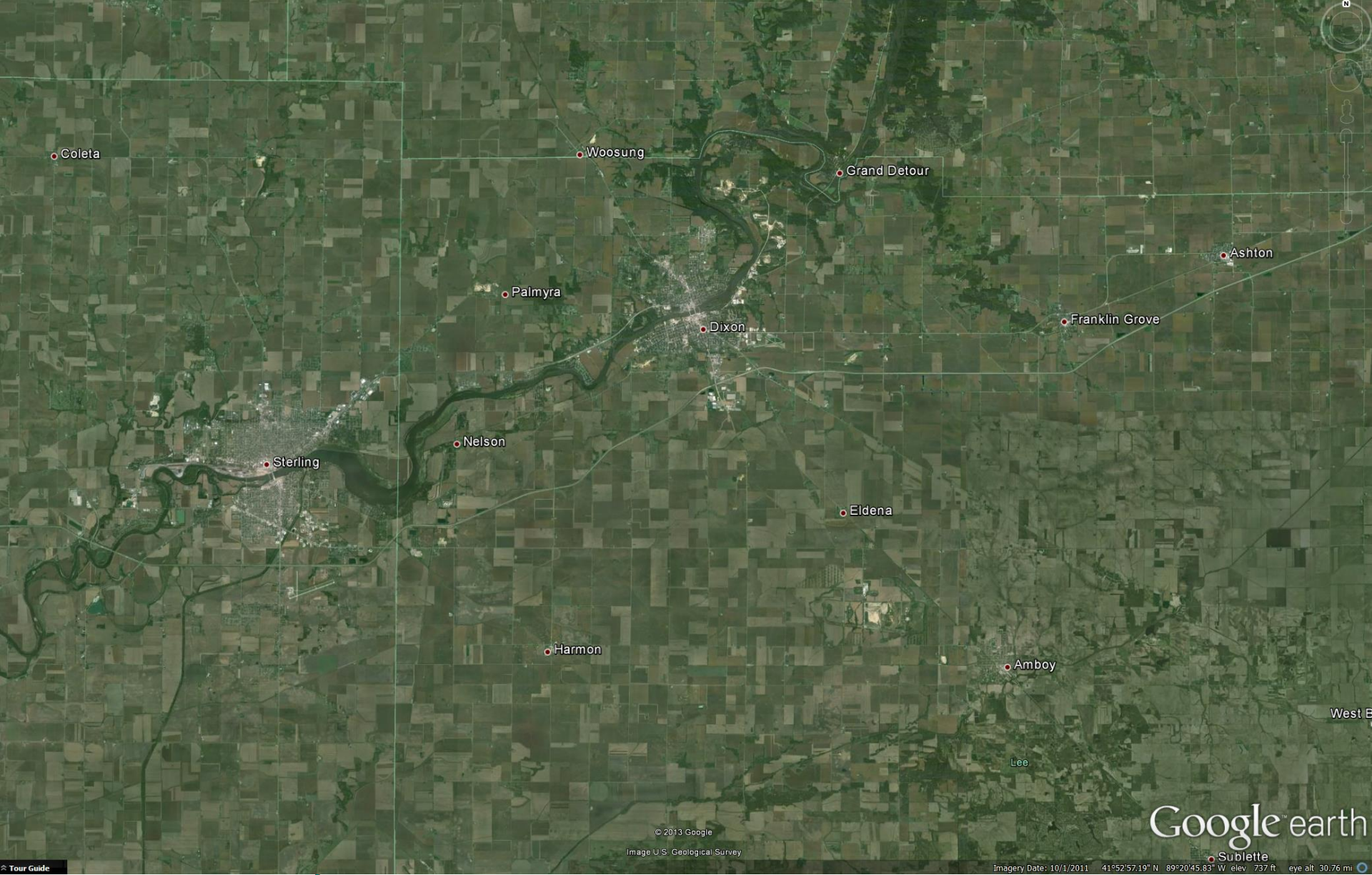
Download any selected index data directly into Google Earth

# Future Geospatial Products?

- Improve and quantize:
  - Crop Progress
  - Crop Condition
  - Soil Moisture



- Expand yield forecasting program



Coleta

Woosung

Grand Detour

Ashton

Franklin Grove

Dixon

Palmyra

Sterling

Nelson

Eldena

Harmon

Amboy

Lee

Google earth

© 2013 Google

Image U.S. Geological Survey

Sublette

Imagery Date: 10/1/2011 41°52'57.19" N 89°20'45.83" W elev. 737 ft eye alt. 30.76 mi

Tour Guide



The InfoAg Conference  
July 16-18, 2013



An aerial photograph of a rural landscape, likely agricultural, with a grid overlay. A central white rectangular box contains the text "Answers? Questions?". The map shows various colored patches (yellow, green, blue, purple) representing different land uses or data points.

# Answers? Questions?



The InfoAg Conference  
July 16-18, 2013

