Cropland Mapping with Satellite Data

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Border-Area Water Management Remote Sensing Workshop

Agenda

- Cropland Data Layer
  - Objective
  - Coverage
    - Fallow/idle
  - Geospatial Dissemination & Analytics
    - CropScape
- Call for industry geospatial data
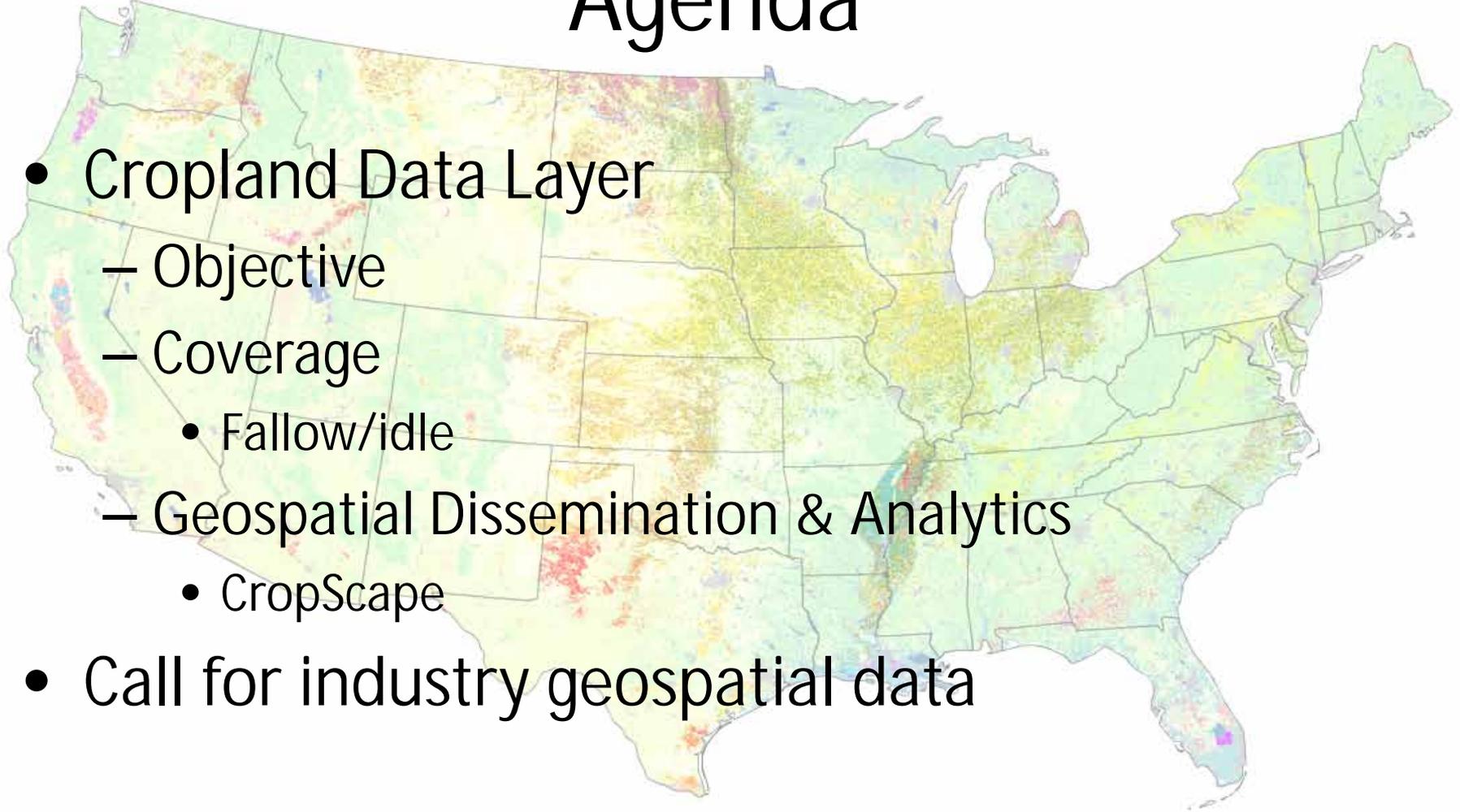
# Cropland Data Layer (CDL) Objectives

- "Census by Satellite"
  - *Annually* cover major program crops and regions
  - Operational Program

- Deliver in-season remote sensing acreage estimates
  - For June, August, September, and October Official Reports
  - Update planted area
  - Reduce respondent burden

- Provide timely, accurate, useful estimates
  - Measurable error
  - Unbiased/independent estimator
  - State, District, County

- Public domain crop specific crop classification
  - http://nassgeodata.gmu.edu/CropScape
  - NRCS Geospatial Data Gateway
  - http://www.nass.usda.gov/research/Cropland/SARS1a.htm
  - Google "CropScape"
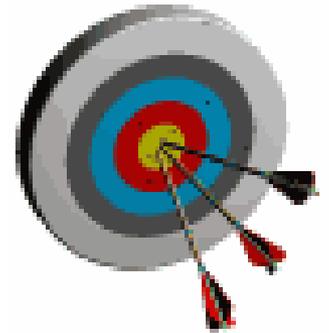
2010 Cropland Data Layers
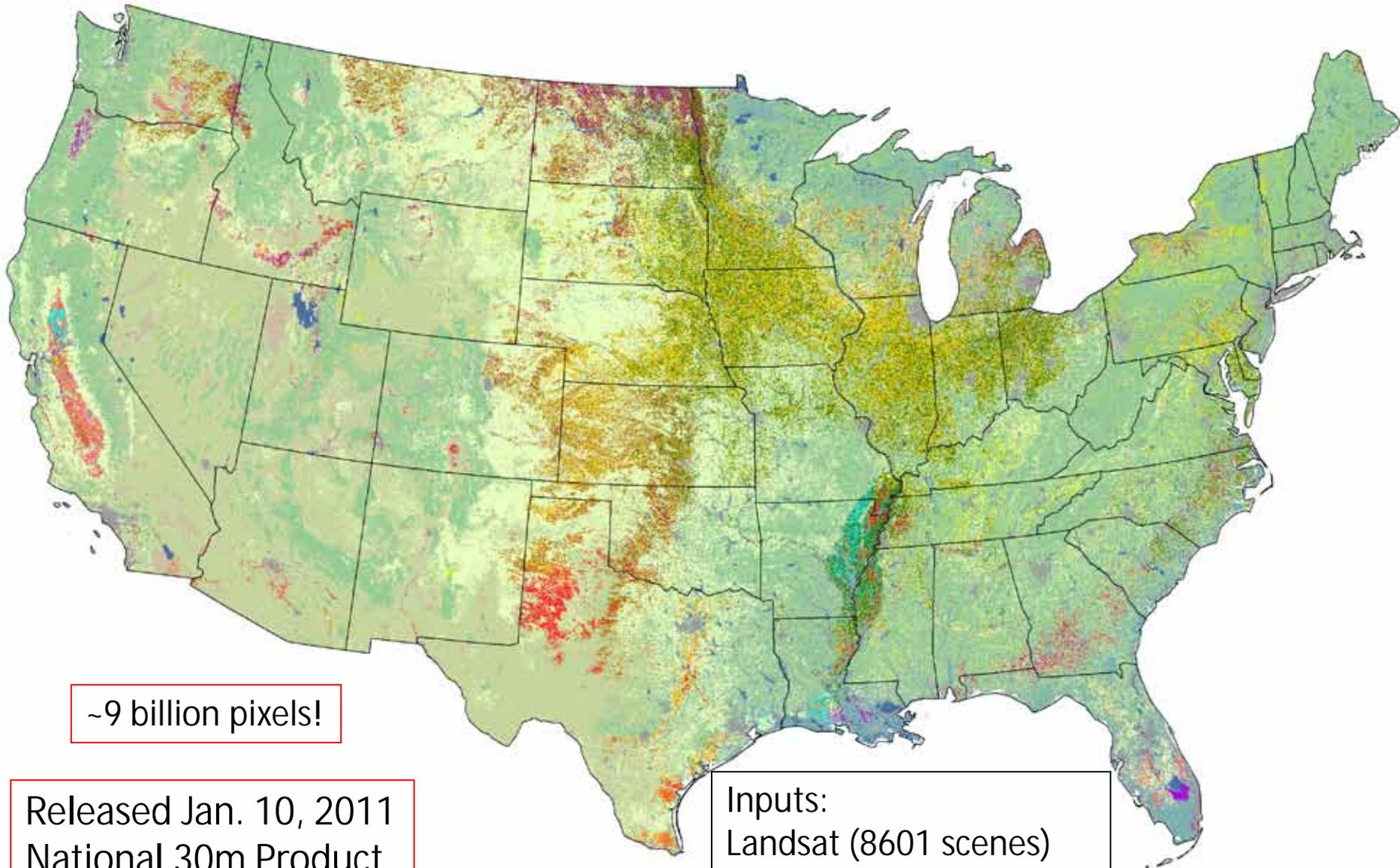
~9 billion pixels!

Released Jan. 10, 2011
National 30m Product

Inputs:
Landsat (8601 scenes)
AWiFS (1194 scenes)

2011 Production Plans

2011 CDL Assignments & Due Dates
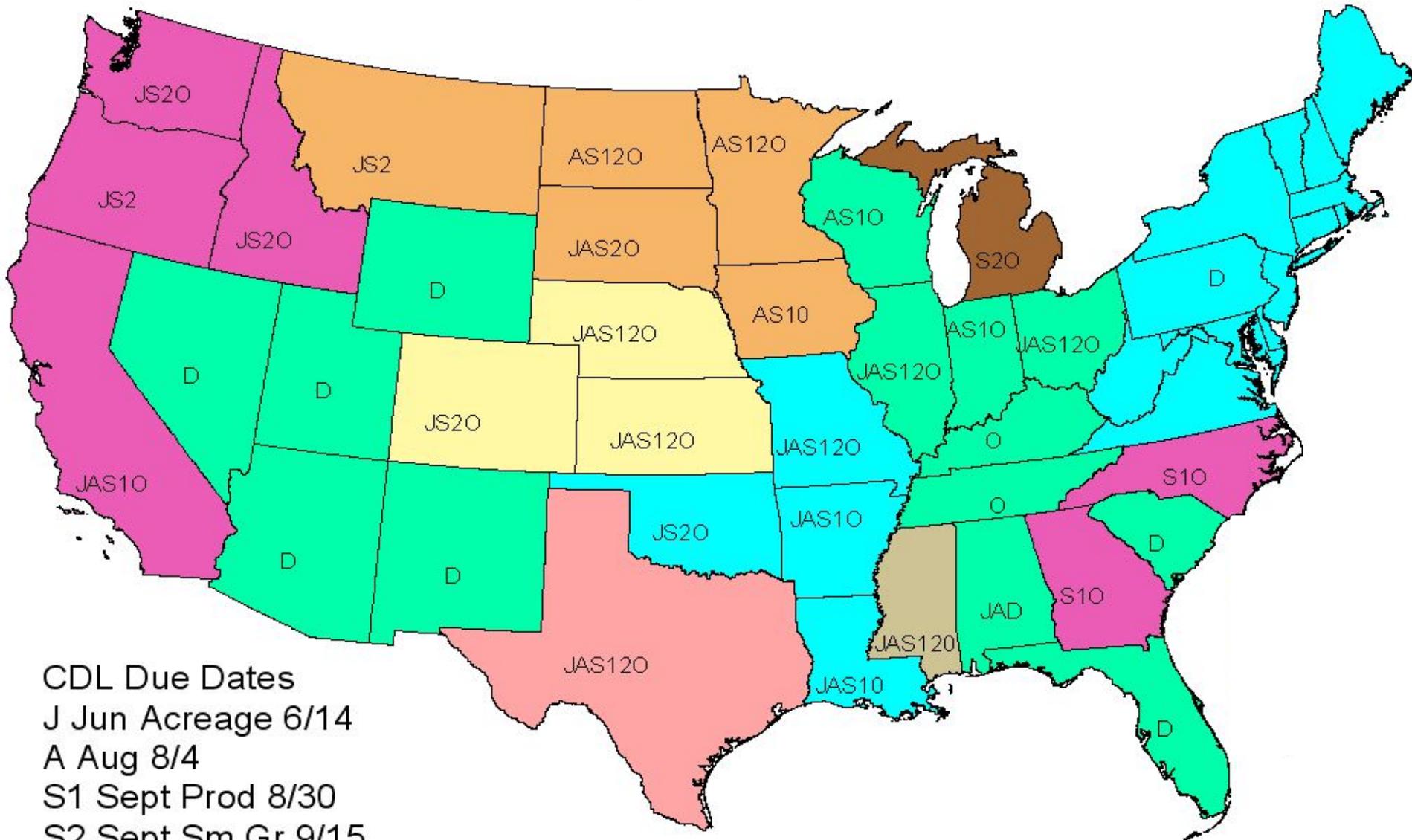
CDL Due Dates
J Jun Acreage 6/14
A Aug 8/4
S1 Sept Prod 8/30
S2 Sept Sm Gr 9/15
O Oct Prod 9/29
D Dec 15

Cropland Data Layer Analyst Coverage

Jun winter wheat

Aug assessment

Sep cotton/peanuts

Sep all small grains

Oct all crops

Total season analyst coverage

2011 Cropland Data Layer Inputs

Satellite Imagery – DMC & Landsat
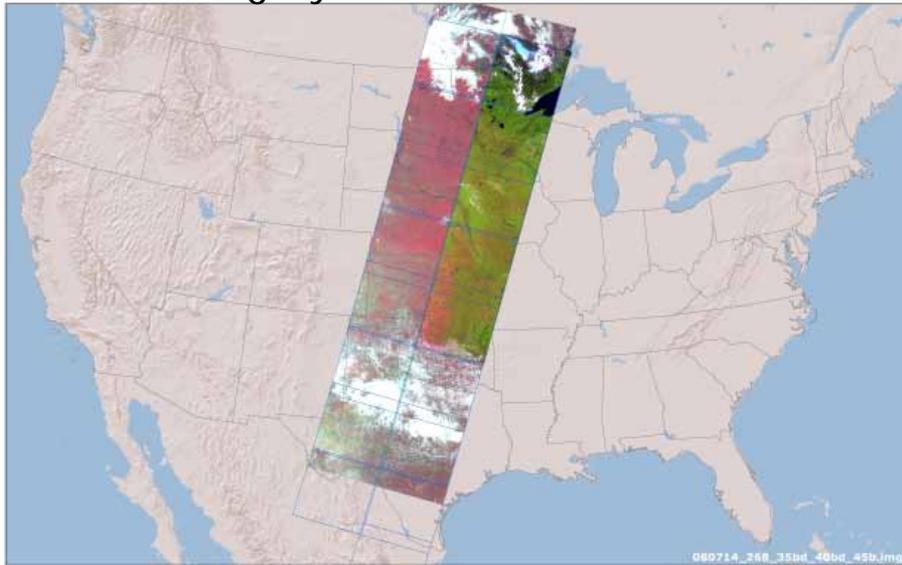
Farm Service Agency: Common Land Unit Unit
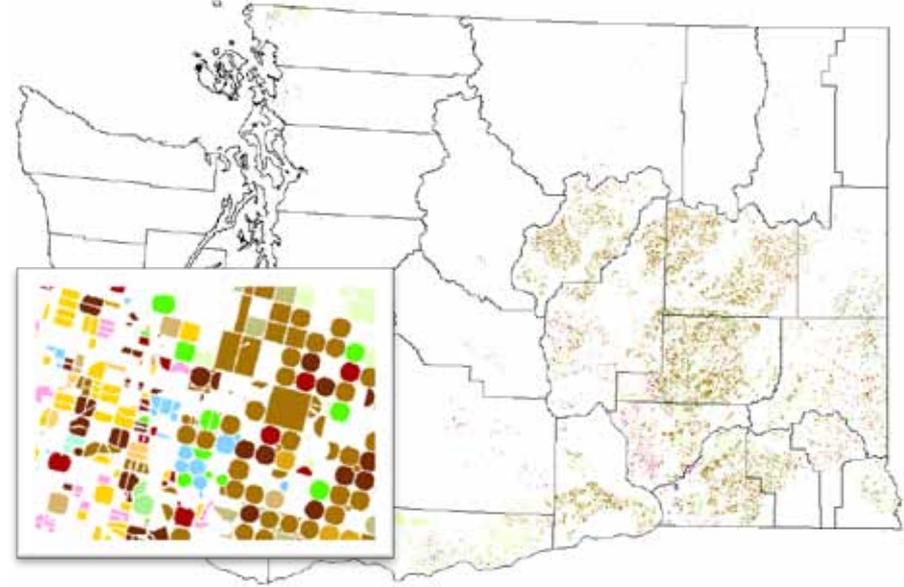
2006 NLCD & Derivative products

NASS June Agricultural Survey
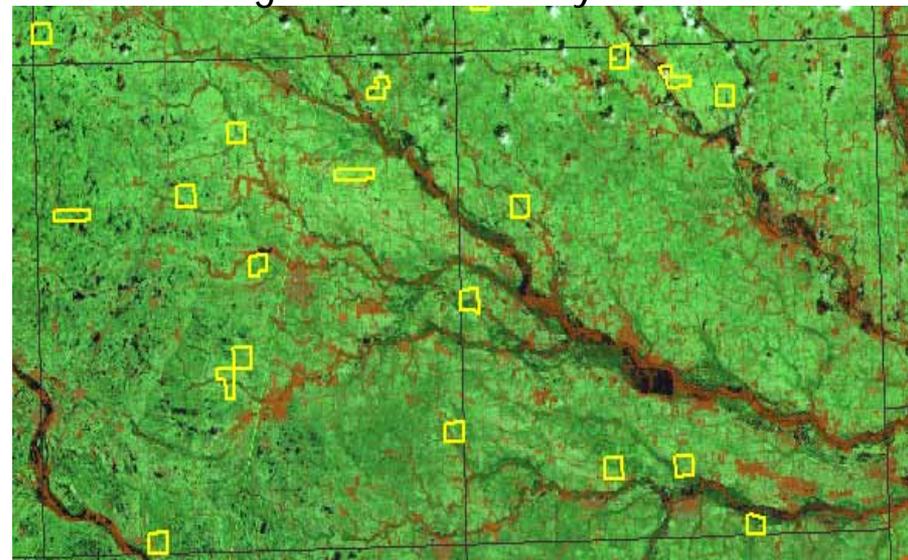
2011 Deimos-1/UK2 Satellite Tasking

Windowing: Multiple acquisitions per orbit

Full Swath maximum image size : 600 by 600 Km

Along track maximum 16 tiles (1280 Km)

ASTRIUM
AN EADS COMPANY
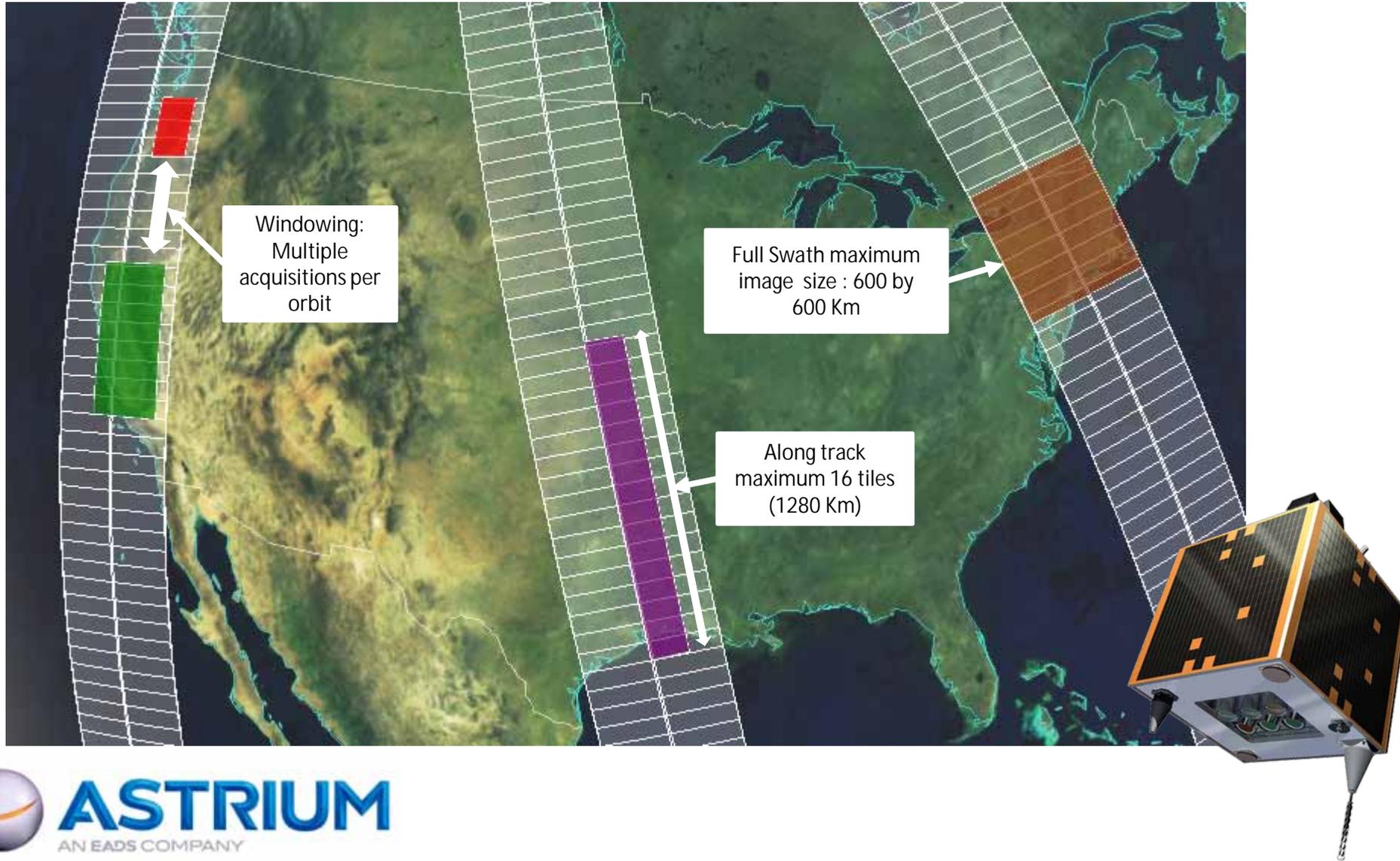
Deimos-1 & UK2 June 5, 2011 Collects
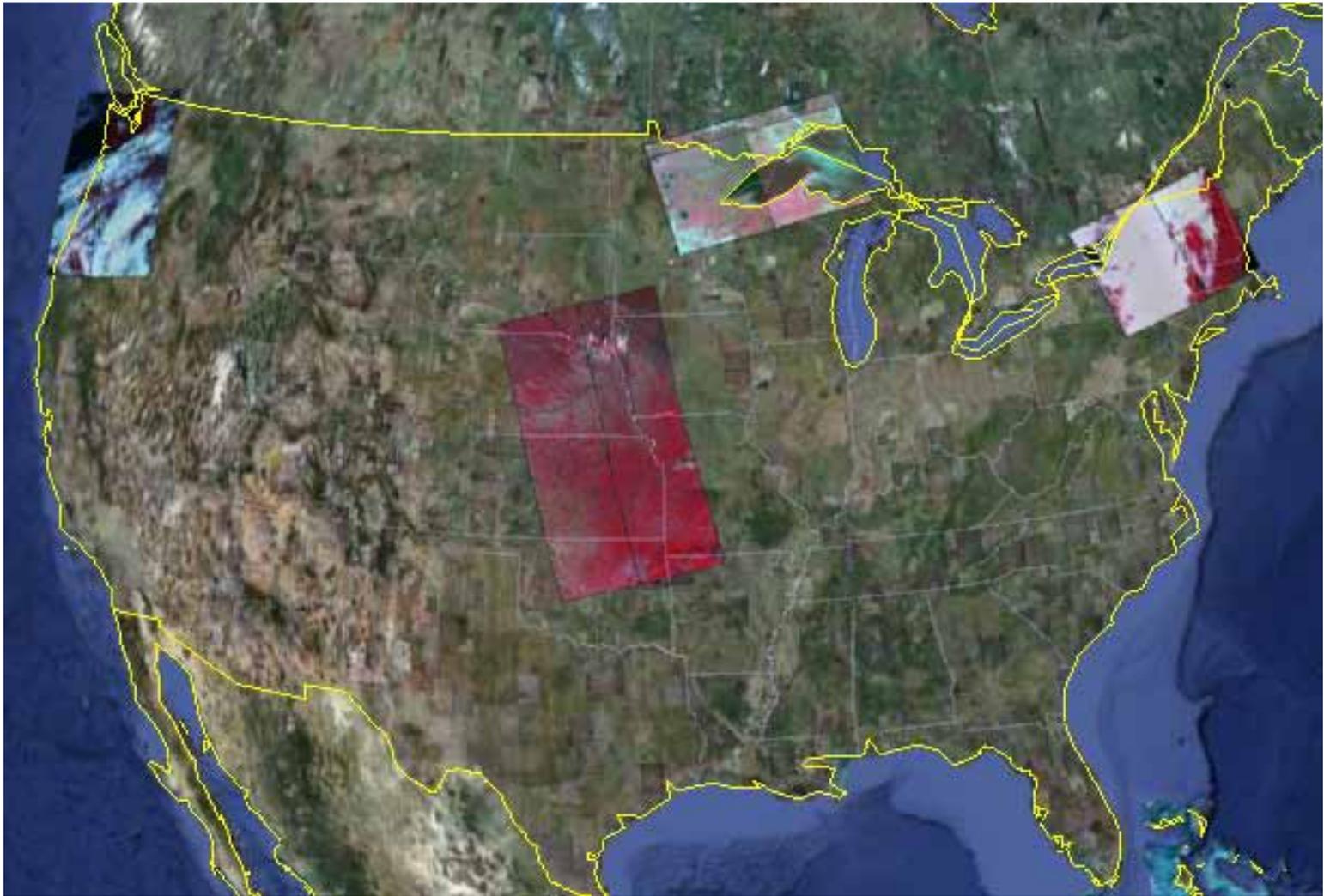
Comparative Satellite Information

	Deimos-1/UK2	AWiFS	Landsat	
Launch Date	Jul 2009	Oct. 2003	1984 & 1999	
Resolution	22m	56m	30m	
Spectral Bands	B2: 0.52 – 0.60 B3: 0.63 – 0.69 B4: 0.77 – 0.90	B2: 0.52 - 0.59 B3: 0.62 - 0.68 B4: 0.77 - 0.86 B5: 1.55 - 1.70	B2: 0.52 - 0.60 B3: 0.63 - 0.69 B4: 0.75 – 0.90 B5: 1.55 – 1.75	
Swath	600km	740km	185km	
Revisit Rate	4 Days	5 Days	16 Days	
Radiometric Resolution	8 or 10 bit	10 bit	8 bit	

Farm Service Agency
Common Land Unit Coverage

Farm Service Agency
Common Land Unit
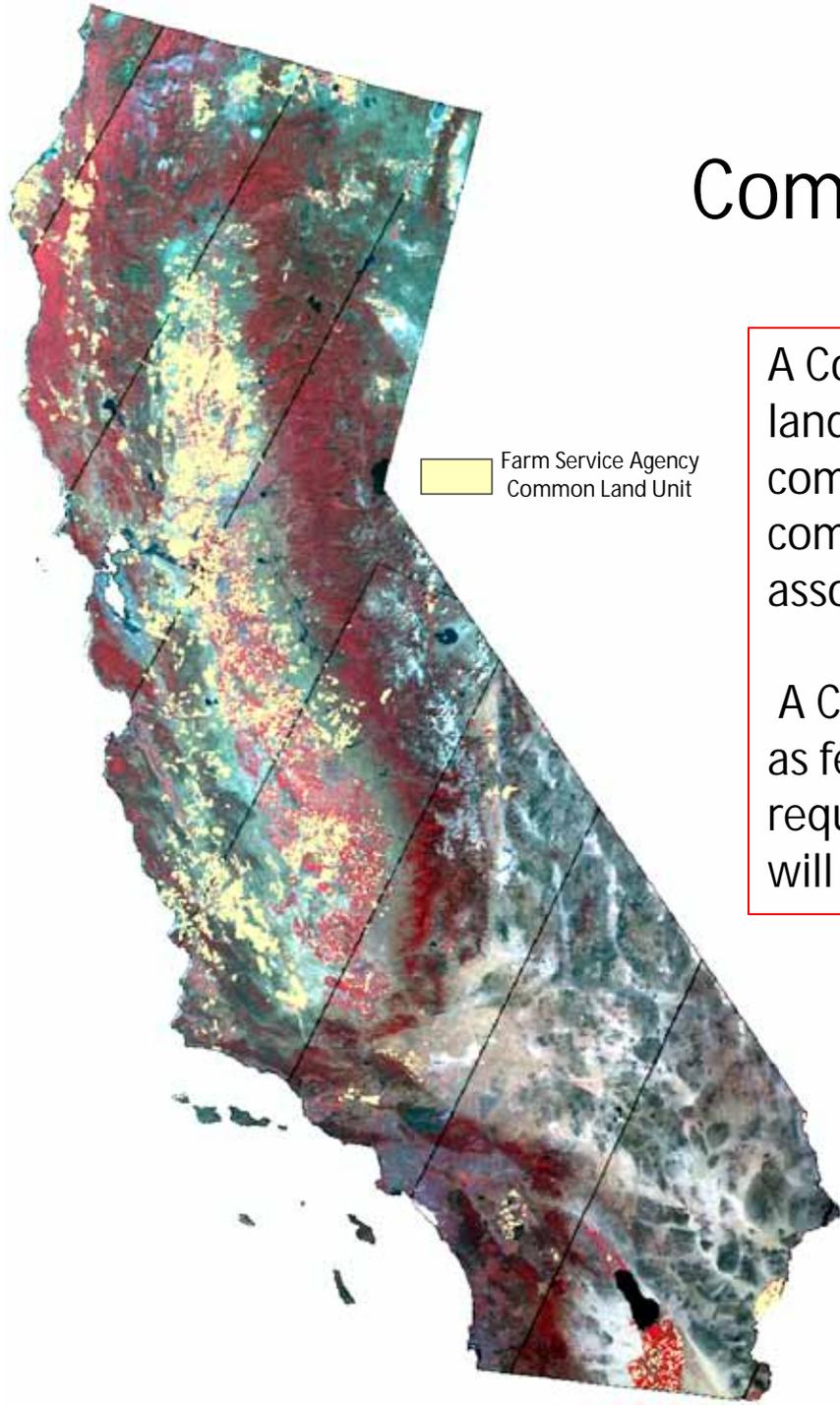
A Common Land Unit (CLU) is the smallest unit of land that has a permanent, contiguous boundary, a common land cover and land management, a common owner and a common producer association.

A CLU is delineated from permanent features such as fence lines, roads, and or waterways. This requirement minimizes the number of changes that will be required in the CLU boundary.

USDA
Farm Service Agency

# Common Land Unit (CLU) Overlay

CLU overlay onto raw AWiFS   CLU overlay onto CDL CLU only   Filtered CLU for processing
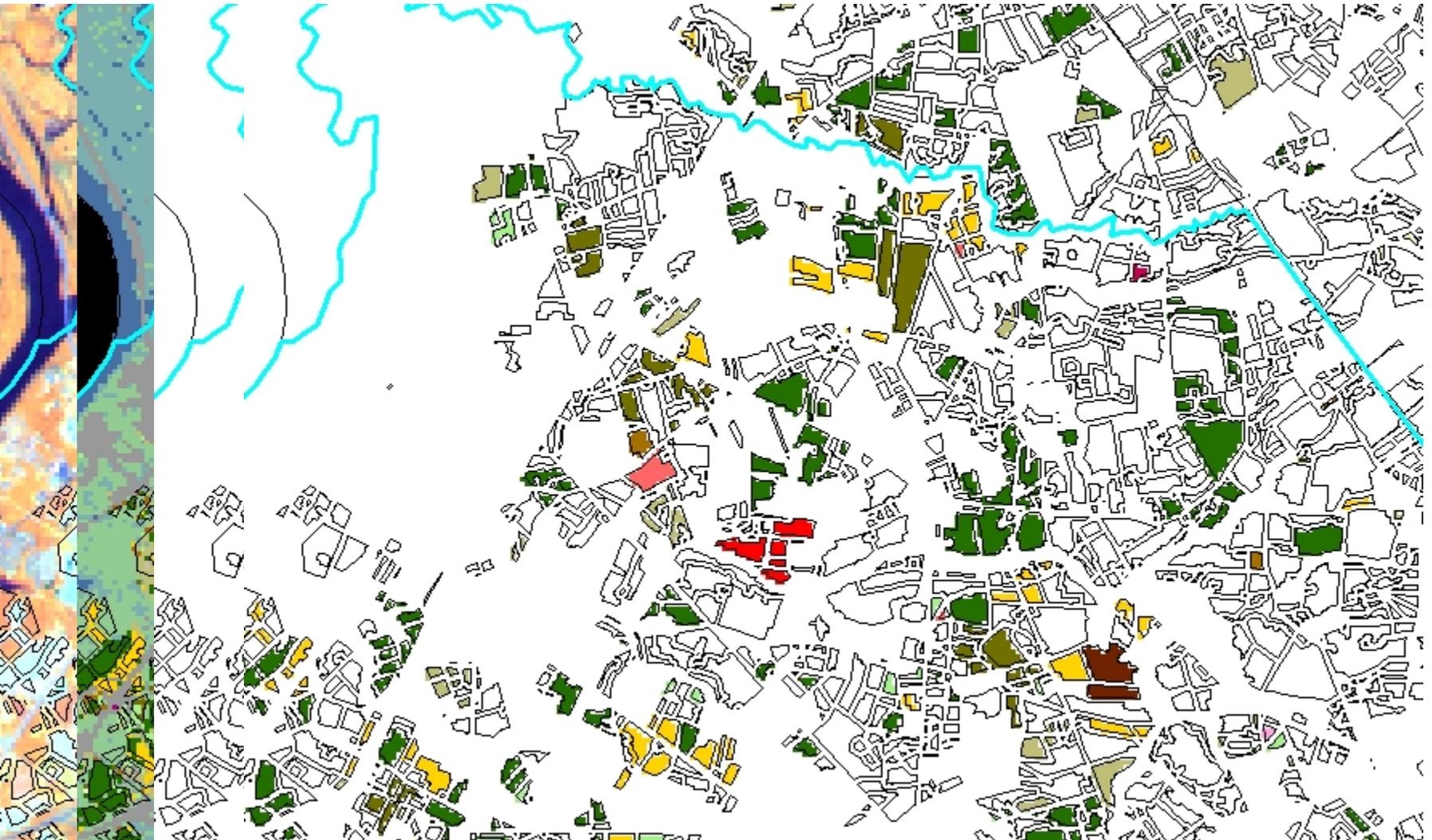
California Crop Identification

2007
Fallow/Idle Crop Mask

Derived from the CDL
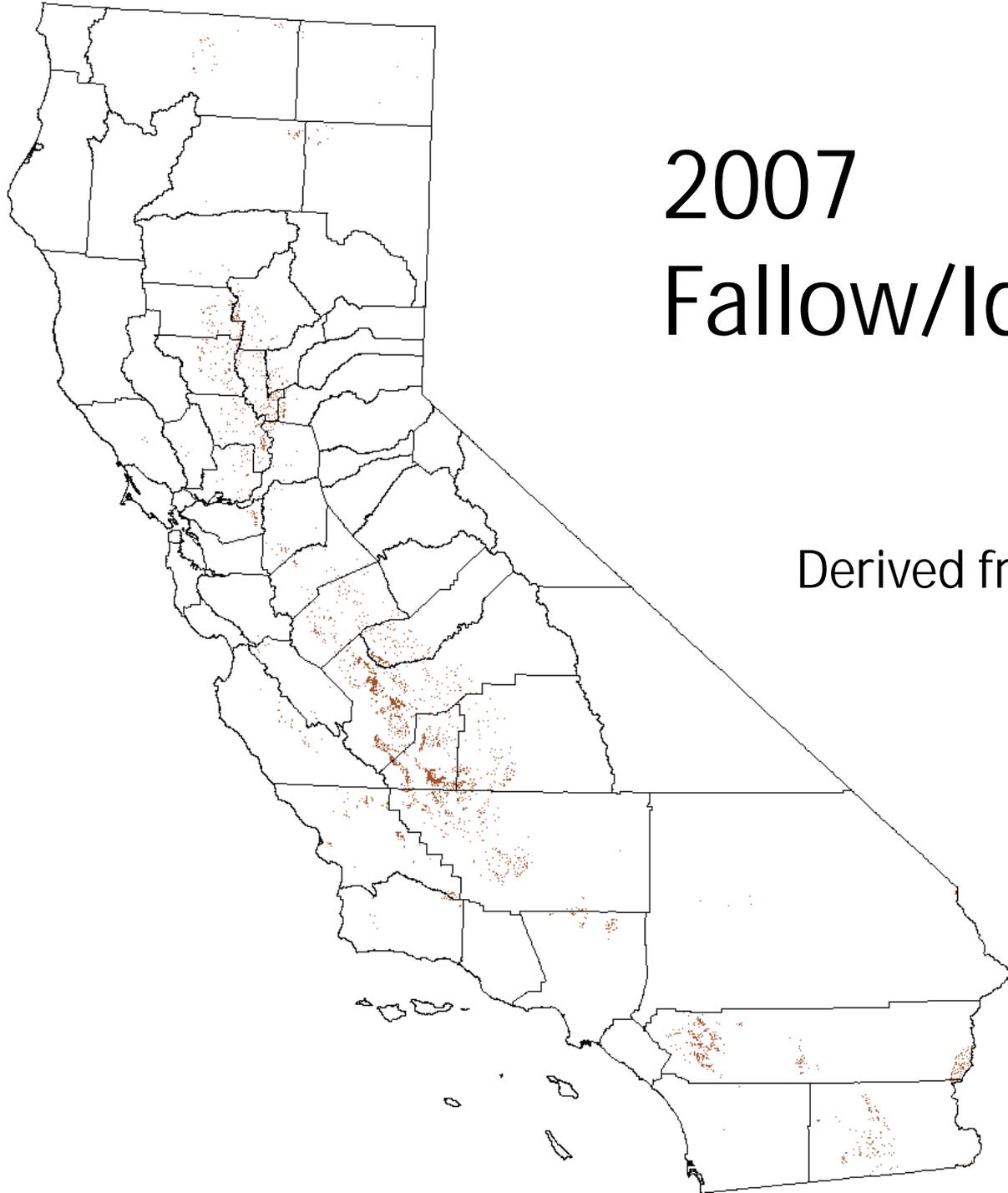
2009
Fallow/Idle Crop Mask

Derived from the CDL
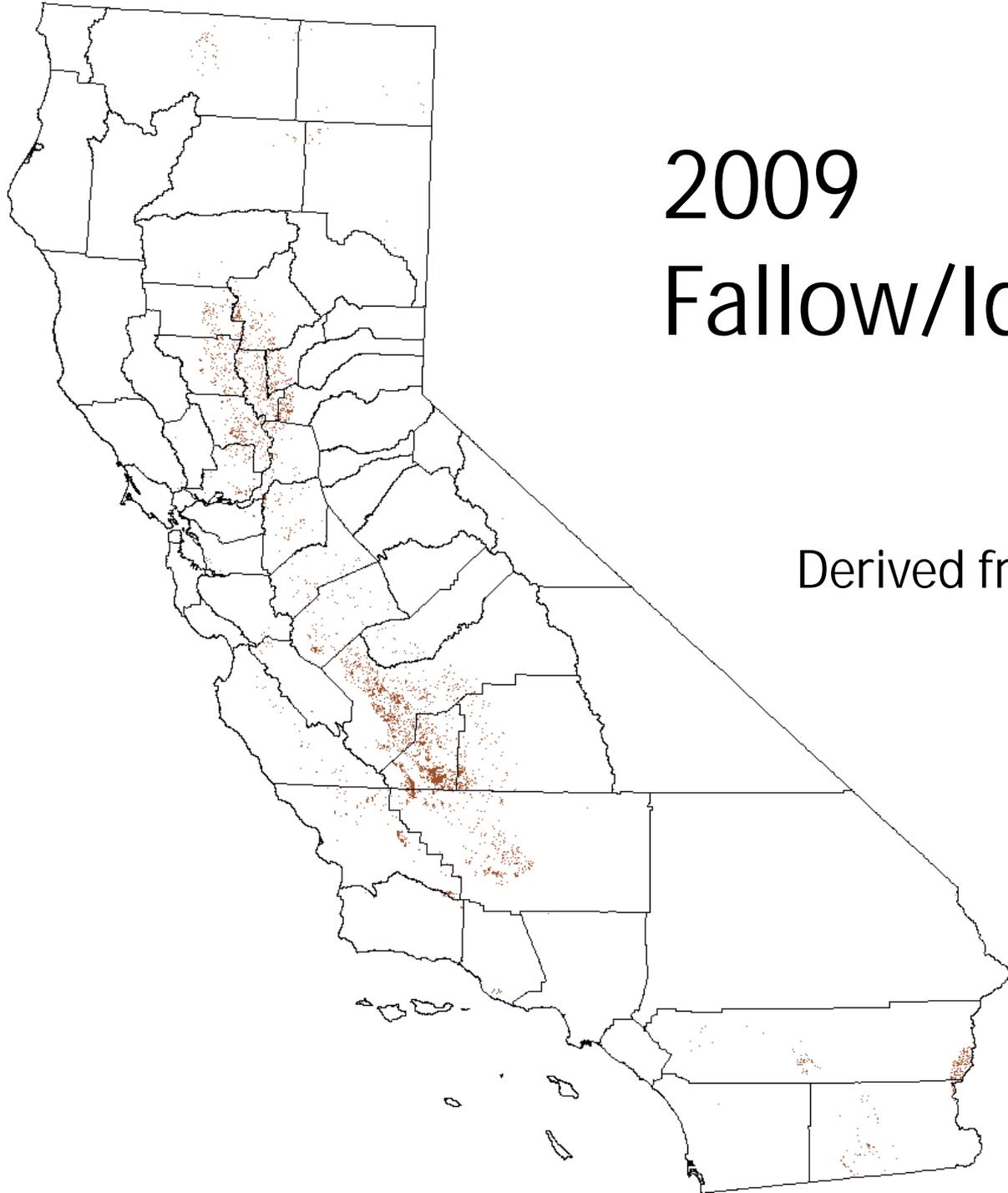
2010
Fallow/Idle Crop Mask

Derived from the CDL
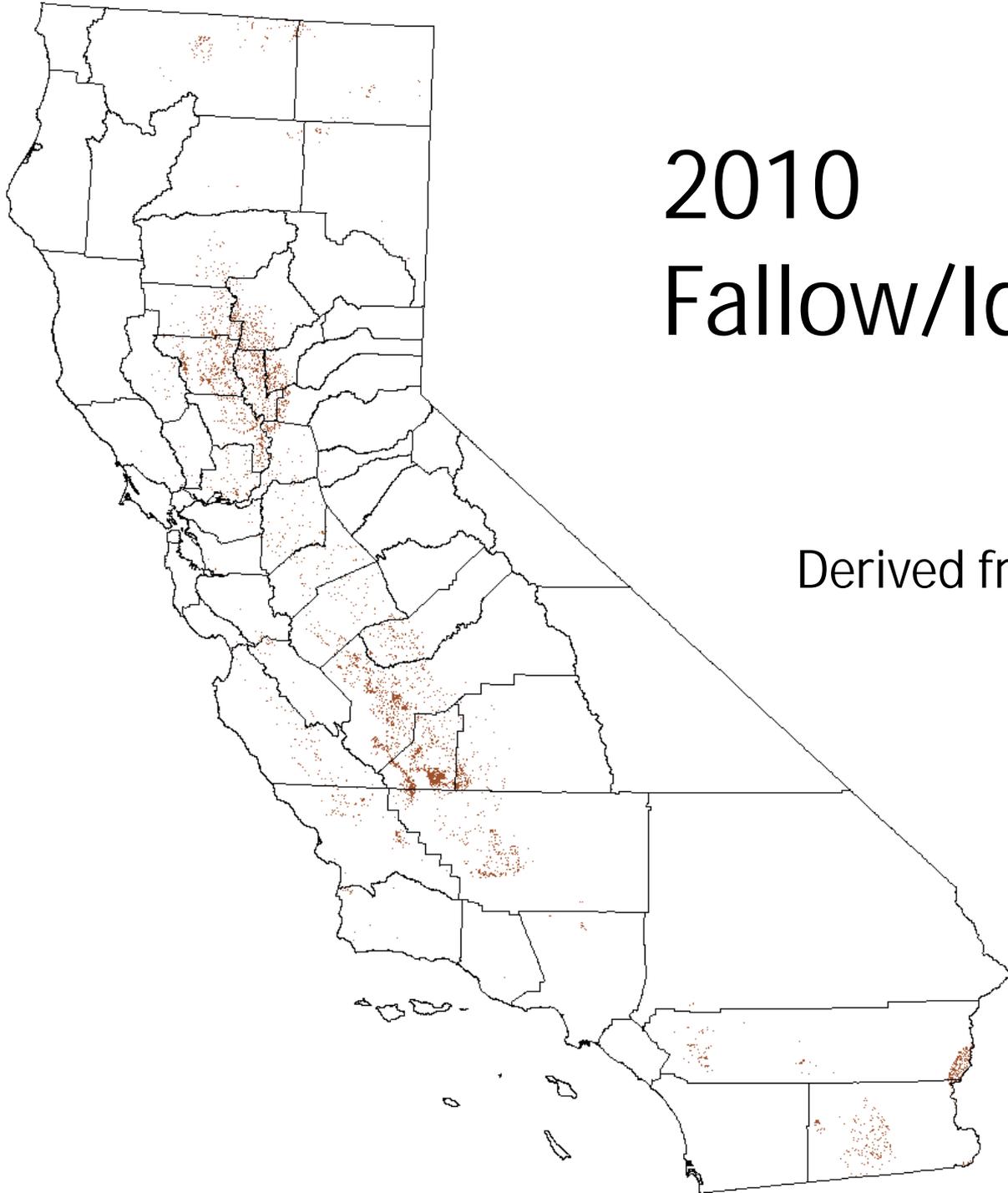
2007, 2009, and 2010 Fallow/Idle Crop Mask

Fields classified fallow/idle in all three years

Derived from the CDL

2007, 2009, or 2010
Fallow/Idle Crop Mask
Fields classified fallow/idle in at least one of the three years

Derived from the CDL
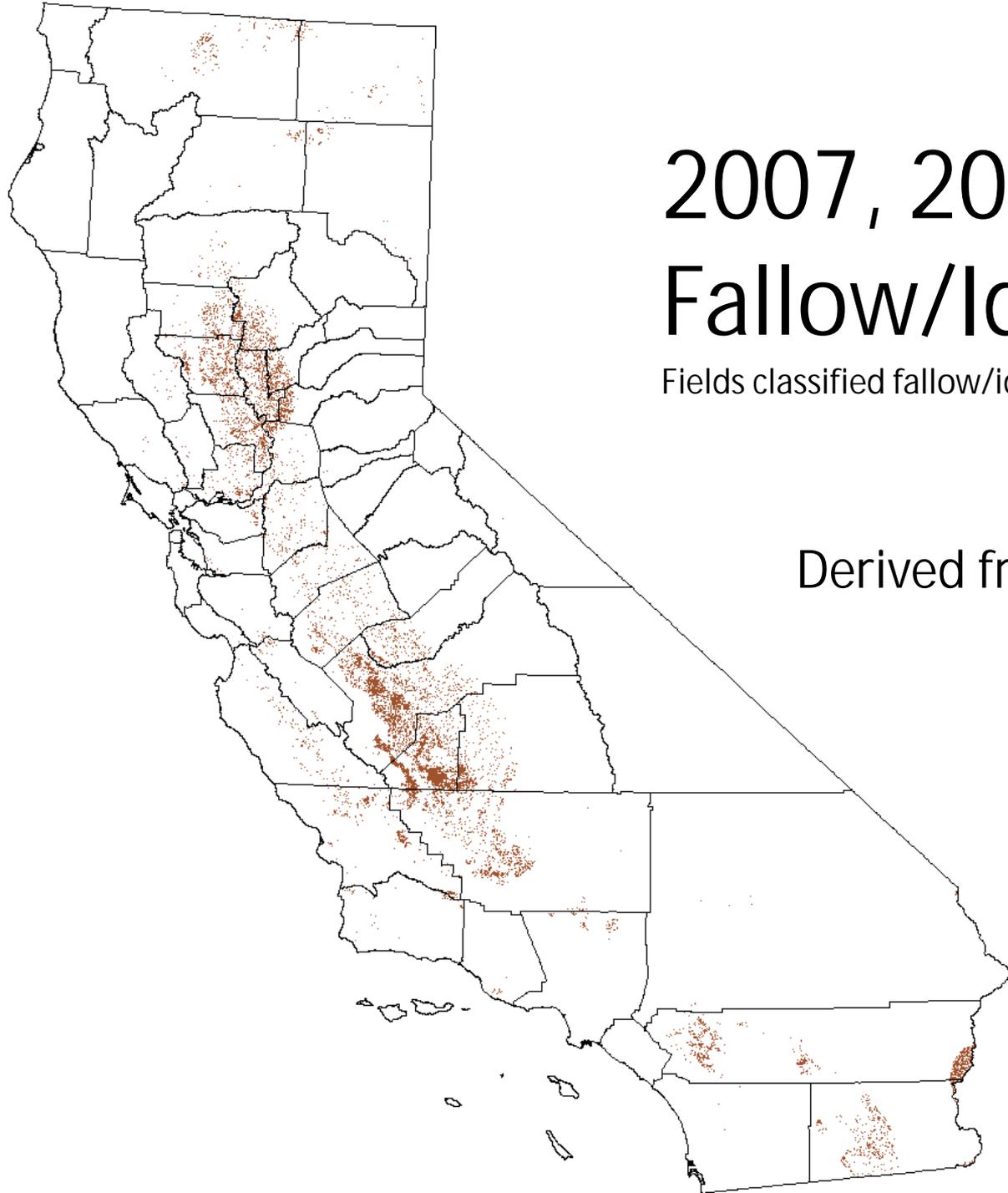
California Change Map
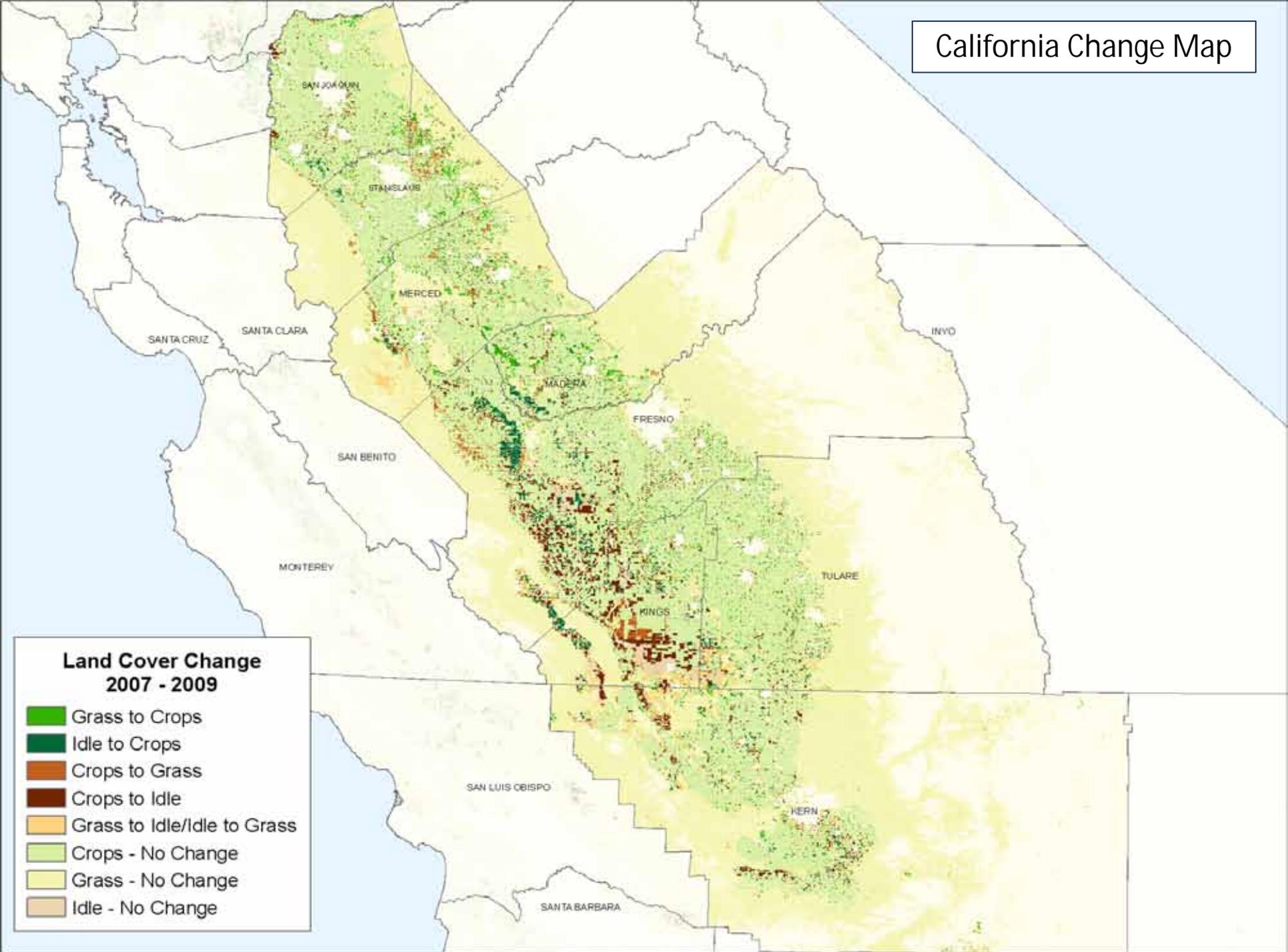
**Land Cover Change
2007 - 2009**

- Grass to Crops
- Idle to Crops
- Crops to Grass
- Crops to Idle
- Grass to Idle/Idle to Grass
- Crops - No Change
- Grass - No Change
- Idle - No Change

Geospatial Dissemination & Analytics

## CropScape Web Service Portal

http://nassgeodata.gmu.edu/CropScape
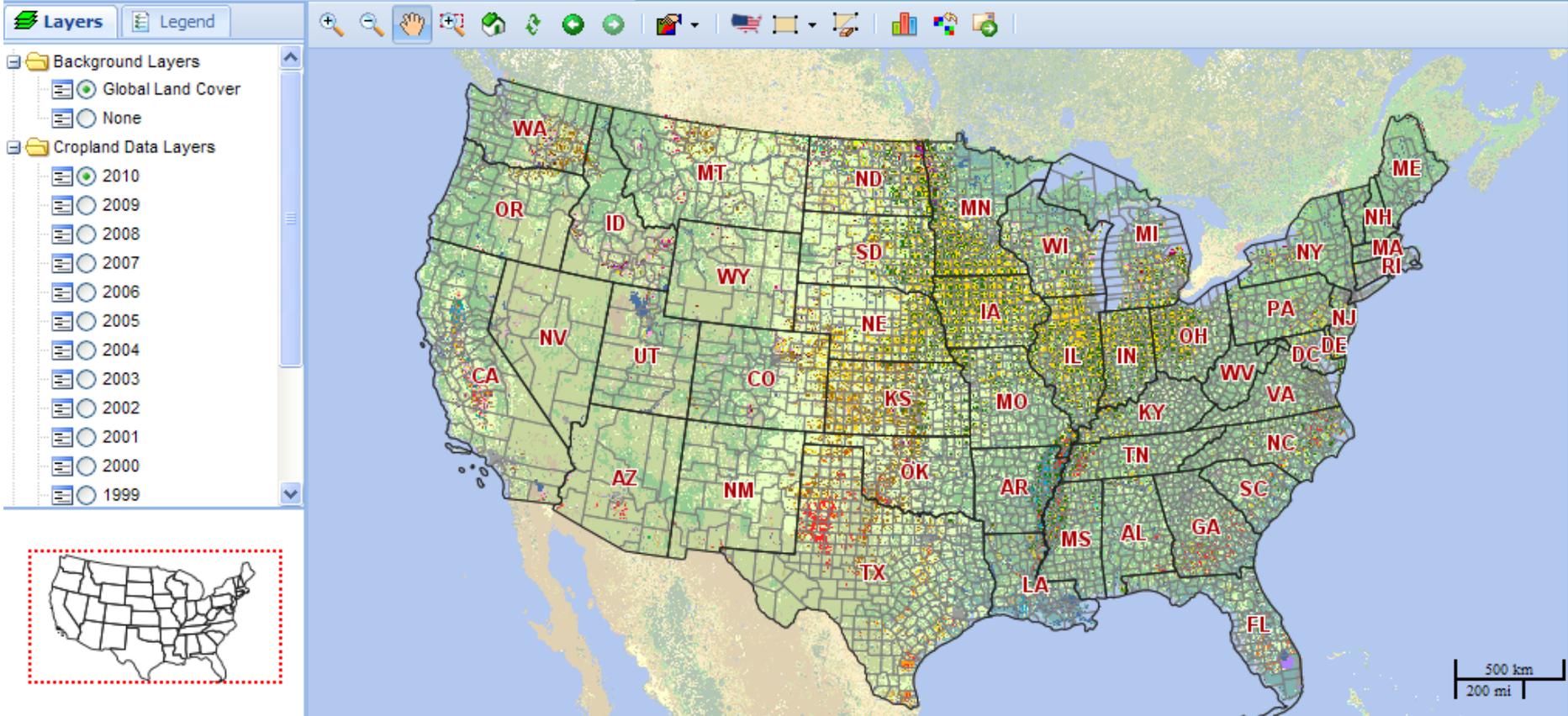
A web service based interactive map visualization, dissemination and querying system for U.S. cropland

CropScape Mashups
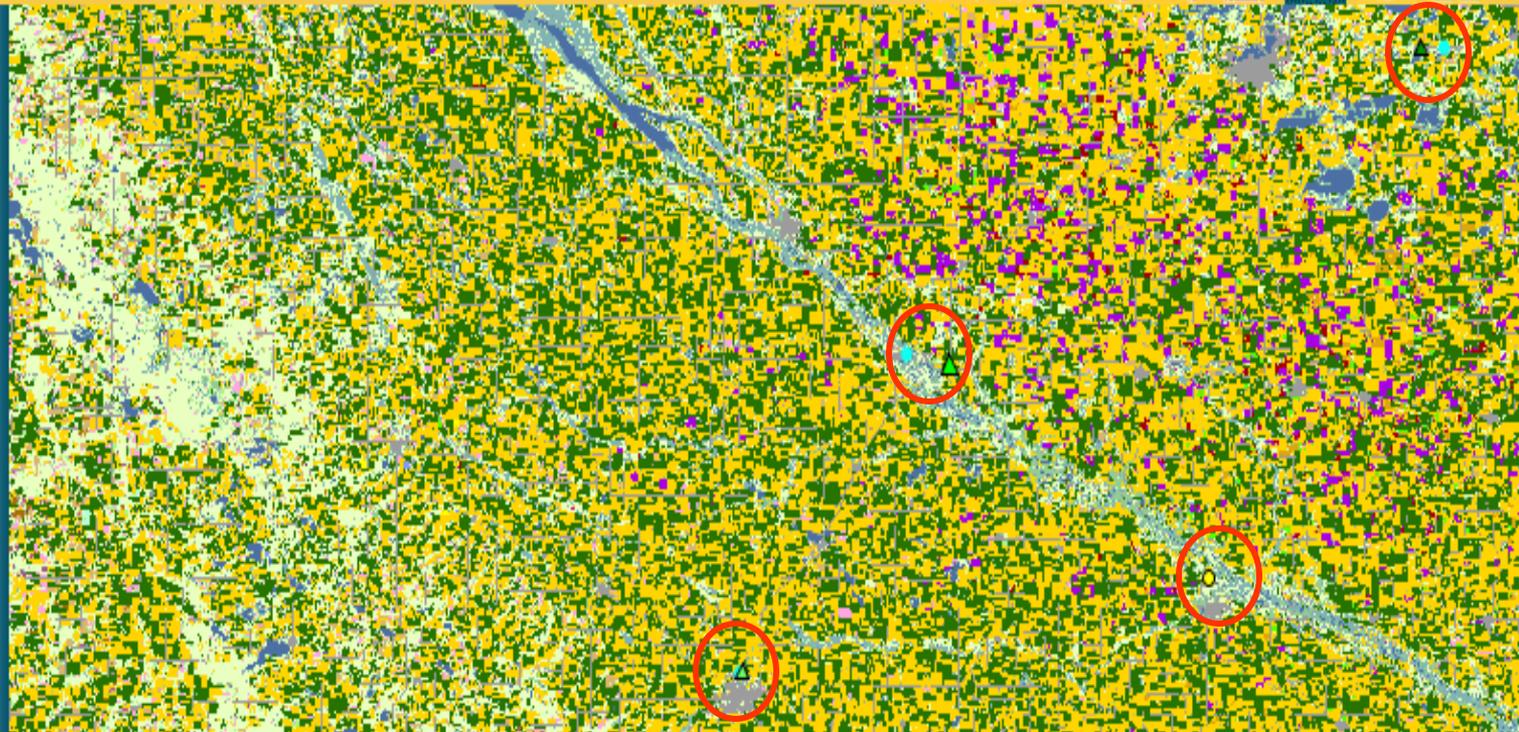
Need for Timely Industry Geospatial Data

- Improve fruit/nut tree classification accuracy
- Improve small area/specialty crop identification
  - Current focus on summer crops (i.e., April – October)

2007 Pixel Count Acreage vs. 2007 Census of Agriculture

	ORANGE ACREAGE			
County	Pixel Acreage	Census of Ag	Difference	%
Tulare	14,089	89,671	-75,582	16%
Kern	29,356	52,049	-22,693	56%
Fresno	1,470	35,503	-34,033	4%
Riverside	328	9,272	-8,944	4%

	ALMONDS ACREAGE			
County	Pixel Acreage	Census of Ag	Difference	%
Kern	202,473	143,473	59,000	141%
Stanislaus	97,968	123,528	-25,560	79%
Fresno	189,267	123,117	66,150	154%
Merced	109,159	103,736	5,423	105%
Madera	73,351	70,299	3,052	104%

	WALNUT ACREAGE			
County	Pixel Acreage	Census of Ag	Difference	%
San Joaquin	68,921	39,859	29,062	173%
Butte	34,660	30,798	3,862	113%
Sutter	31,615	28,149	3,466	112%
Tulare	24,991	26,418	-1,427	95%
Stanislaus	20,551	24,414	-3,863	84%
Tehama	12,155	15,119	-2,964	80%
Glenn	16,890	14,664	2,226	115%
Kings	12,354	12,161	193	102%
Yolo	17,102	10,999	6,103	155%
Fresno	12,200	7,842	4,358	156%
Yuba	16,057	7,193	8,864	223%
Merced	4,774	5,164	-390	92%

Useable remote sensing training data (acres) after filtering
Oranges: 3100
Walnuts: 46300
Almonds: 79300

Summary

§ CDL program improves agricultural statistics and paramount to other NASS geospatial activities

§ Partnerships with cooperating agencies critical for success

§ Timely delivery of geospatial data and statistical information are critical

http://cal-adapt.org/

Thank you!

Spatial Analysis Research Section
USDA/NASS R&D Division

nassgeodata.gmu/CropScape