Acreage Estimate Production Throughout the Growing Season: An Update on the Cropland Data Layer

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Head, Spatial Analysis Research

October 20, 2008
Cropland Data Layer (CDL) Discussion

• Legacy program
  – Issues: Budget/Satellites/Agency Support/Technology
CDL Program Objectives

- “Census by Satellite”
  - Annually cover major producing corn and soybean regions
  - Indications reflect actual location of the crops
    - Not address on record via survey

- Provide timely, accurate, useful indications
  - Measurable error
  - Unbiased/independent estimator
  - State, county, district (ASD)

- Operationalize indications delivery
  - For June, August, and October
    - Ag Statistics Board
    - Update planted area

- Output crop specific CDL
  - Distribute to public at the cost of reproduction
    - NRCS Geospatial Data Gateway
# CDL States and Commodities

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<tr>
<th>State</th>
<th>Corn</th>
<th>Soybeans</th>
<th>Winter Wheat</th>
<th>Cotton</th>
<th>Spring Wheat</th>
<th>Rice</th>
<th>Sorghum</th>
<th>Sugar-beets</th>
<th>Sugar-cane</th>
<th>Durum Wheat</th>
<th>Dry Beans</th>
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Green shading indicates states new to program in 2008.

1 Unable to complete the MS 2008 Aug. RS estimation due to flooding & unusually late FSA signup.

**Program Definitions:**
- **S**: Speculative State
- **F**: Full Program State
- **A**: Annual State
- **P**: Estimates published
- **U**: Estimates submitted, published in other states
- **L**: Limited forecast state (none in Oct.)
- **RS**: Remote Sensing
- **O**: Objective Yield State
CDL Program

- **Inputs**
  - Resourcesat-1 AWiFS Imagery
  - Farm Service Agency – Common Land Unit
  - Ancillary data
  - Commercial software suite
- **Outputs**
  - Acreage Estimates
  - Cropland Data Layer
Agricultural Ground Truth

- Farm Service Agency (FSA)
- Common Land Unit (CLU)
- 578 attributed reporting data
Agricultural Ground Truth

- Farm Service Agency (FSA)
- Common Land Unit (CLU)
- 578 attributed reporting data
Matching CLU’s used for sampling CDL Classification

½ sample for training & ½ sample for testing
Filter multi-field CLU/high acreage variance
Comprehensive program crop coverage
- Proportional sampling
- 2001 National Land Cover Dataset from USGS
- Improve CDL coverage of non-ag classes
Ancillary Data – USGS/NASA Products

Elevation

Imperviousness

Forest Canopy

NASA MODIS Terra
(16-day NDVI composite)
Commercial Software Suite

- Imagery Preparation
  - ERDAS Imagine

- Image classification
  - Decision tree software
    - See5.0 [www.rulequest.com](http://www.rulequest.com)

- Ground Truth Preparation
  - ESRI ArcGIS

- Acreage Estimation
  - SAS/IML workshop
Classification – See5 Decision Tree

- Capable of handling large and complex data sets
- Able to incorporate missing and non-continuous data
- NLCD Mapping Tool acts as an interface between Imagine and See5
# Accuracy Statistics

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<tr>
<th>Crop-specific covers only</th>
<th>Correct</th>
<th>Accuracy</th>
<th>Error</th>
<th>Kappa</th>
<th>User's Accuracy</th>
<th>Commission</th>
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<th>Producer's Accuracy</th>
<th>Omission Error</th>
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*Correct Pixels represents the total number of independent validation pixels correctly identified in the error matrix.
Kansas 2008 Cropland Data Layer

Land Cover Categories
(Ordered by Decreasing Acreage)

Agricultural
- Winter Wheat
- Corn
- Sorghum
- Soybeans
- Alfalfa
- Sunflowers
- Rye
- Cotton
- Other Small Grains
- Clover/Wildflowers
- Oats
- Potatoes
- Seed/Sod Grass
- Canola
- Millet
- Other Crops
- Barley
- Other Tree Nuts
- Peas
- Apples
- Misc. Veggies. & Fruits

Non-Agricultural
- Grass/Pasture/Non-Ag
- Urban/Developed
- Woodland
- Fallow/Idle Cropland
- Water
- Wetlands
- Shrubland
- Barren
Cropland Data Layer Future

- Improve acreage timing
  - Sept. Small Grain Summary
  - August district level estimates
- Expand geographic scope
  - Cotton, Winter, Durum and Spring Wheats
- Derivatives
  - Change detection
  - Crop rotations
- National program
  - Leverage resource partnerships

Primary Wheat States

Primary Cotton States