Purpose of the USDA-NASS Cropland Data Layer (CDL)

- Combine remote sensing imagery and NASS survey data to produce *supplemental* acreage estimates for the state's major commodities.

- Production of a crop-specific digital land cover data layer for distribution in industry standard "GIS" format.
Cropland Data Layer States

Cooperative partnerships & year implemented
Cropland Data Layer Background

- National Agricultural Statistics Service

  June Agricultural Survey (JAS) – National in Scope
  - 41,000 farms visited
  - 11,000 one-square mile sample area segments visited
  - Most states contain between 150 – 400 segments
  - Planted acreage estimate

Cropland Data Layer depends on the JAS data
- Unbiased statistical estimator of crop area
  - State and county level estimates
NASS Methodology

1. Hundreds of farms throughout each state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).
Area Sampling Frame

- Stratify based on percent cultivated land
- Subdivide strata into primary sampling units or PSU's
  - Selected PSU's divided into secondary sampling units or segments
NASS Methodology

1 sq. mi. JAS segment annotated by enumerator on a 1:8,000-scale NAPP photo
JAS Questionnaire

- Enumerators account for all land usage in segment
  - Draw off field location by direct observation
  - Directly link questionnaire to segment photo

**SECTION D - CROPS AND LAND USE ON TRACT**

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.

<table>
<thead>
<tr>
<th>FIELD NUMBER</th>
<th>01</th>
<th>02</th>
<th>03</th>
<th>04</th>
<th>05</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Total acres in field</td>
<td>828</td>
<td>828</td>
<td>828</td>
<td>828</td>
<td>828</td>
</tr>
<tr>
<td>2. Crop or land use. [Specify]</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Occupied farmstead or dwelling</td>
<td>843</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Waste, unoccupied dwellings, buildings and structures, roads, ditches, etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Woodland</td>
<td>831</td>
<td>831</td>
<td>831</td>
<td>831</td>
<td>831</td>
</tr>
<tr>
<td>6. Pasture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permanent (not in crop rotation)</td>
<td>842</td>
<td>842</td>
<td>842</td>
<td>842</td>
<td>842</td>
</tr>
<tr>
<td>Cropland (used only for pasture)</td>
<td>856</td>
<td>856</td>
<td>856</td>
<td>856</td>
<td>856</td>
</tr>
<tr>
<td>8. Idle cropland - Idle all during 2000</td>
<td>857</td>
<td>857</td>
<td>857</td>
<td>857</td>
<td>857</td>
</tr>
</tbody>
</table>
1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.
Each field is digitized by the NASS field office staff through direct interpretation of the enumerator’s annotated NAPP photo of the JAS segment onto an enlarged Landsat TM image.
Satellite Specs
Landsat 5 (TM) and Landsat 7 (ETM+)

Spatial Resolution:
One picture element (pixel) represents an area of 30 meters by 30 meters, 185 kilometer swath width
43 Scenes used for the 2002 Mid-Atlantic Cropland Data Layer

Temporal Resolution:
16 day repeat coverage (two satellites in 2002 = once every 8 days)
NASS uses 2 dates for our classification process (Spring & Summer)

Spectral Resolution:
3 Visible Bands @ 30m
1 Near Infrared (IR) Band @ 30m
2 Shortwave IR Bands @ 30m
1 Thermal IR Band (TM @ 120m, ETM @ 60m)
1 Panchromatic Band @ 15m res. (ETM only)
NASS Methodology

1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.
Program Resources

Hardware

Computational intensive jobs (i.e. cluster/classify)
  Windows XP

Digitizing/editing
  Windows XP

Software

Image processing PEDITOR
  Developed internally

Digitizing/editing
  Remote Sensing Project
  Developed internally

Batch job processing
  XLNT – Commercial software
NASS Methodology

1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.

4. All the categorized scenes comprising a state are stitched together to produce a statewide land cover classification map (GIS layer).
2001 Maryland Cropland Data Layer
(Pilot Project) Queen Anne's County
1. Several hundred farms throughout the state are visited annually by enumerators as part of the USDA/NASS June Agricultural Survey (JAS).

2. The land use and acreage information is entered into a database and the field boundaries are digitized.

3. A modified supervised classification is performed using the digitized segments as training samples. NASS uses software developed and maintained in-house.

4. All the categorized scenes comprising a state are stitched together to produce a statewide land cover classification map (GIS layer).

5. This land cover data layer is then used to produce state and county-level crop estimates using a regression estimator and/or raw pixel counts.
Program Summary

Raw Satellite Image  Area Sampling Frame  Segment Boundaries  JAS Questionnaire

Categorized Images  Mosaicked CDL  Estimates
Importance of Land Cover Data

Agricultural Business Planning
Land Use Summary by Unit Area
Farmland Conversion
Resource Management
  Soil Erosion Rates
  Acres of Crops in Prime Farmland
  Woodland Management
Hydrologic Modeling Input

CDL Customers
  Farmers, farm org, seed companies, fertilizer & pesticide companies, farm equipment dealers, grain transit/storage companies, farm real estate, global change, water quality, soils, & environmental assessment, crop insurance, universities, federal, state, & county gov, value added RS/GIS resellers, agribusinesses
Limitations of NASS Land Cover Data

- 30 m x 30 m ground resolution
- Emphasis on agricultural land cover
- Classification limitations
- Potential cloud cover
- Dependent upon continued health of the Landsat 5 satellite
  - USDA stopped purchasing Landsat 7 ETM in 2004
Benefits of NASS Land Cover Data

- Low Cost for CD-Rom
- Spatially Referenced
- Attributed
- Updated Annually
- Statewide Coverage
- Quality Control for Other Data
- Generate Summary Analysis Quickly
## Mosaicked Precision Registered Final

<table>
<thead>
<tr>
<th>State</th>
<th>Available Years</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkansas</td>
<td>2000 and 2001 ($35)</td>
<td>6/02</td>
</tr>
<tr>
<td></td>
<td>1999 and 2000 ($25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997 and 1998 ($25)</td>
<td></td>
</tr>
<tr>
<td>Note: Mosaicked but not precision registered</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mississippi</td>
<td>2000 and 2001 ($35)</td>
<td>available 6/02</td>
</tr>
<tr>
<td></td>
<td>1999 and 2000 ($25)</td>
<td></td>
</tr>
<tr>
<td>Illinois</td>
<td>2000 and 2001 ($35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1999 and 2000 ($25)</td>
<td></td>
</tr>
<tr>
<td>Missouri</td>
<td>Boot heel only NEW</td>
<td>2001 ($25) available 6/02</td>
</tr>
<tr>
<td>Nebraska</td>
<td>Southeast only NEW</td>
<td>2001 ($25) only available for 2001</td>
</tr>
<tr>
<td>Iowa</td>
<td>2000 and 2001 ($35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1999 and 2000 ($25)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1997 and 1998 ($25)</td>
<td></td>
</tr>
<tr>
<td>North Dakota</td>
<td>2000 and 2001 ($35)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1999 and 2000 ($25)</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

To order a CD-ROM (see prices as noted above) please fill out this order form and submit it either electronically (invoice will follow with the CD(s)) or mail the completed form with your check to USDA/NASS Customer Service, 1400 Independence Avenue, SW, Room 5829-S, Washington DC 20250-9410. Please note "Cropland Data Layer - (State)" in the "Memo" part of your check. Checks should be made out to "USDA-NASS". Allow 1 week for delivery.

## Enter the mailing address information below.

Please be sure to include your phone number or E-mail address, in case we have any questions.

http://www.nass.usda.gov/research/Cropland/cdorderform.htm