Georeferencing Process

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Introduction

The **georeferencing process** identifies cultivated fields not represented in the Farm Service Agency (FSA) Common Land Unit (CLU) program, providing a big boost to NASS's coverage of all farms on its master list sampling frame. The team highlights these fields using the Crop Sequence Boundary (CSB) layer, a new layer derived from eight years of Cropland Data Layer (CDL) history.

- Fields not identified using the CSB layer are found using the CDL, then manually digitized in ArcGIS Pro.
- ArcGIS Pro's zonal statistics tool calculates percent cultivation and determines which parcels have the highest probability of being a farm by NASS' definition **(any operation from which $1000 or more of agricultural products were produced and sold).**
- The parcels are assigned a unique ID called the NASSGEO ID, linking fields to the parcel data.
- Land parcel data, such as ownership information, is obtained from Corelogic LLC for these crop polygons via an API tool.

Cropland Data Layer (CDL)

The NASS Cropland Data Layer (CDL) are 30-meter, crop-specific data layers produced annually, with an average 85%-95% accuracy for major crops. Rulequest Research's See5 Decision Tree software is used to perform supervised classifications of satellite imagery for all 48 conterminous states. Currently, the satellite images used for CDL production include Landsat 8 & 9, Sentinel-2 A & B, and LISS-3.

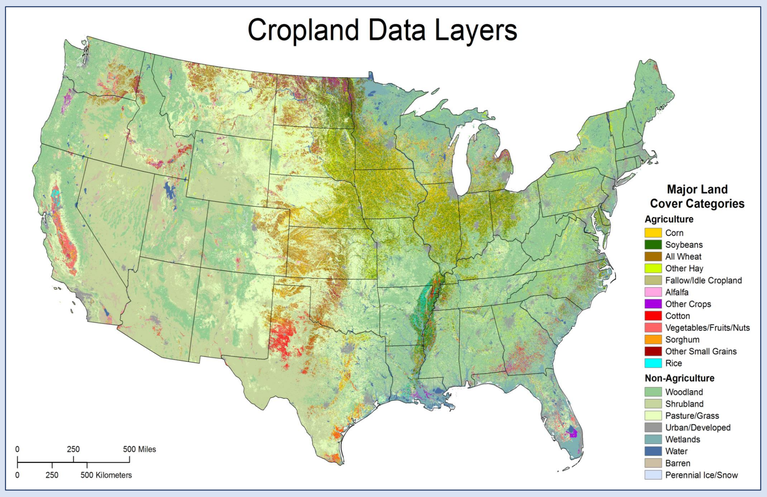


Figure 1: The National Agricultural Statistics Service (NASS) Cropland Data Layer (CDL) can be viewed and downloaded online at https://cropcros.azurewebsites.net/.

Crop Sequence Boundary (CSB) Layer

Crop Sequence Boundaries (CSBs) are geospatial algorithm-based field polygons. A CSB using synthetic field boundaries represents a homogenously cropped area. CSBs use a specified time frame of historic CDLs together with road and rail networks to capture the crop sequence.

CSBs are:

- Geospatial algorithm-based field boundaries
- Field geometries are calculated including area and XY point location
- Utilized as a proxy for fields

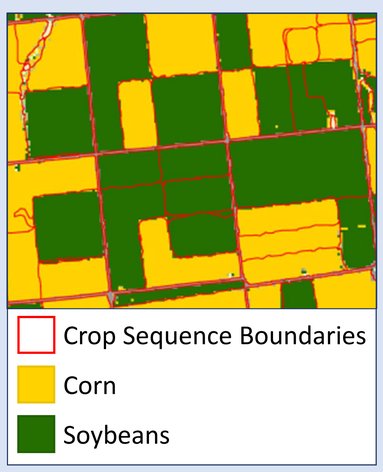


Figure 2: CSBs overlaid onto the CDL

Method

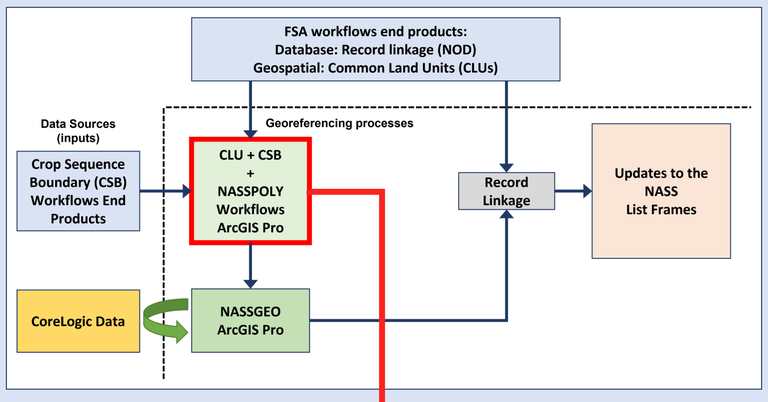
Inputs:

- Crop Sequence Boundaries (CSBs)
- Farm Service Agency (FSA) Common Land Unit (CLU)
- Cropland Data Layer (CDL)

Process:

1. Overlap CSBs with FSA CLU polygons
2. Invert selection to find CSBs that are not overlapping with the FSA CLUs
3. Use the CDL and the World Imagery layer to identify and digitize fields not covered by the CSB layer
4. Merge CSBs and digitized polygons
5. Send merged polygon layer to CoreLogic for parcel data
6. Add parcel data to the NASS List Frame

A) Georeferencing Workflow



B) Detailed Process

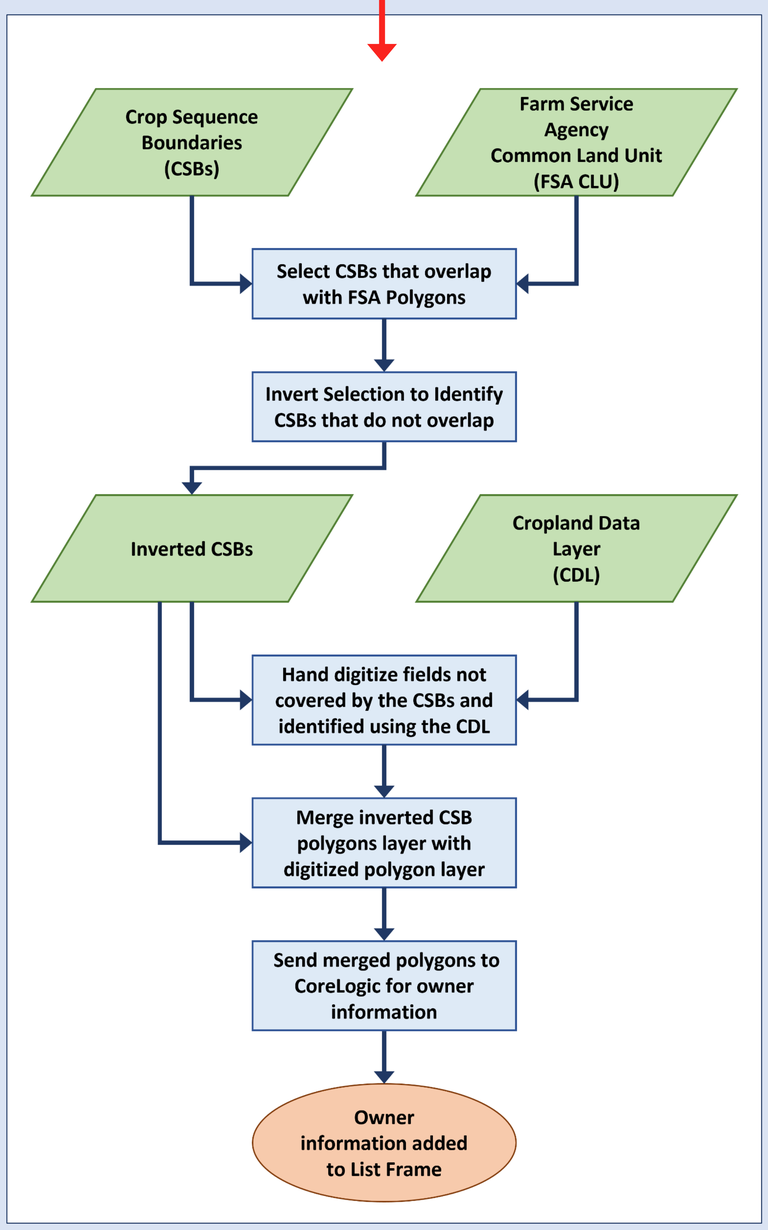


Figure 3: A) Georeferencing workflow and B) detailed georeferencing process.

Results

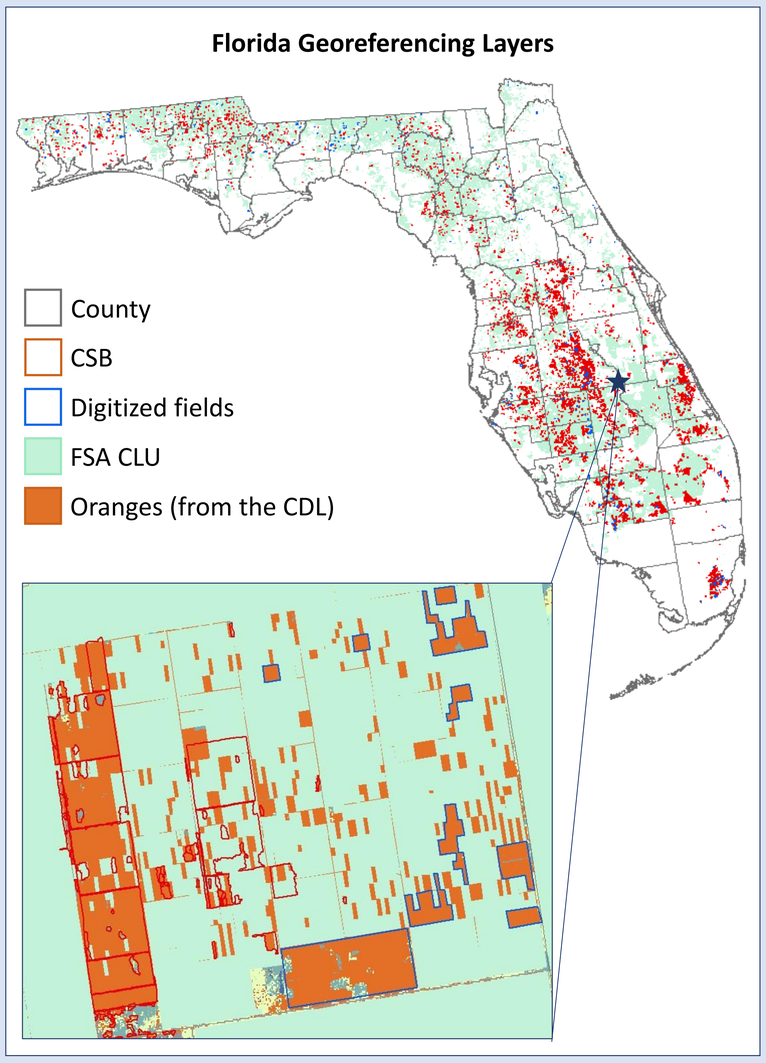


Figure 4: Florida georeferencing layers, including CSBs and digitized polygons, overlaid onto the FSA CLU layer and CDL. Map created using ArcGIS 10.7

Table 1: Number of Parcels received from Corelogic based on the number of polygons and CSBs.

Number of Florida Polygons Created	Number of Florida CSBs	Number of Parcels received from CoreLogic
1,216	28,032	295,170

Impact

USDA NASS has implemented novel methods to identify cultivated fields not represented in the Farm Service Agency Common Land Unit program. Including these fields in the NASS List Sampling Frame improves the representativity of farms selected for ongoing survey programs. This may also help modernize disaster impact assessments. NASS is currently conducting List Sampling Frame linkage assessments of non-FSA polygons, i.e., fields not currently included on the Frame. Where available, land parcel data are linked to non-matches. Non-matches meeting specific criteria will be assessed for farm activity in NASS's National Agricultural Classification Survey with the goal of increasing coverage of farming operations for censuses and surveys. An evaluation of these coverage improvements is planned for the summer of 2022 to refine georeferencing and linking activities for the NASS List Frame.

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