

Georeferencing the NASS List Frame Using New Crop Sequence Boundaries and Georeferenced Administrative Datasets

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

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Disclaimer

The findings and conclusions in this report are those of the authors and should not be construed to represent any official USDA or U.S. Government determination or policy.



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Presentation outline:

1. Problem statement
2. Study area
3. Georeferencing data and processes
4. Results
5. Conclusions



National Agricultural Statistics Service (NASS)

NASS is the primary statistical agency for the US Department of Agriculture (USDA) that surveys and collects data from agricultural operators using a list frame.

- A farm is any place with \$1,000 or more in sales or potential sales.
- The NASS list frame is inherently in-complete.



Problem statement

In 2017, a report by the National Academies of Sciences, Engineering, and Medicine (NASEM) **recommended** that NASS update the list frame to a georeferenced farm-level database and develop linkages to other administrative sources to improve the coverage of the list frame.



Study area

In 2019, NASS began implementing georeferencing the NASS list frame.

Georeferencing and analysis have been completed for these 11 states.



Georeferenced administrative data:

USDA Farm Service Agency (FSA) Common Land Units (CLUs)

FSA maintains CLUs that are individual contiguous farming parcels, which is the smallest unit of land that has:

1. A permanent, contiguous boundary
2. Common land cover and land management
3. A common owner, and/or
4. A common producer association



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Georeferenced geospatial data: Crop Sequence Boundaries (CSB)

CSB represents field-level boundaries over a set time frame in a homogeneously cropped area and is a new geospatial layer developed by NASS and USDA Economic Research Service (ERS).

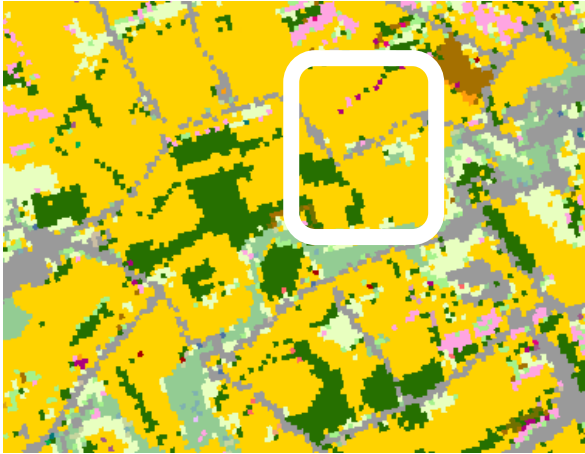
1. Automatically delineated field boundaries.
2. Homogeneously cropped field over a set time frame.
3. Physical boundaries and boundaries between different crop types.
4. The dataset has complete coverage.



Georeferencing process: overlays and intersects

Base layers

NASS Cropland Data Layer (CDL)



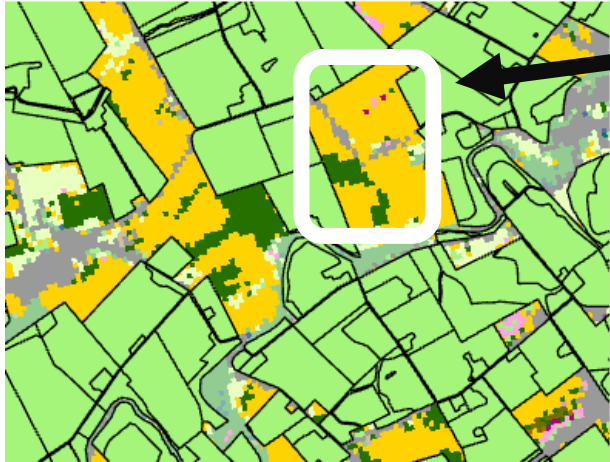
Imagery (Esri base layer)



Overlays

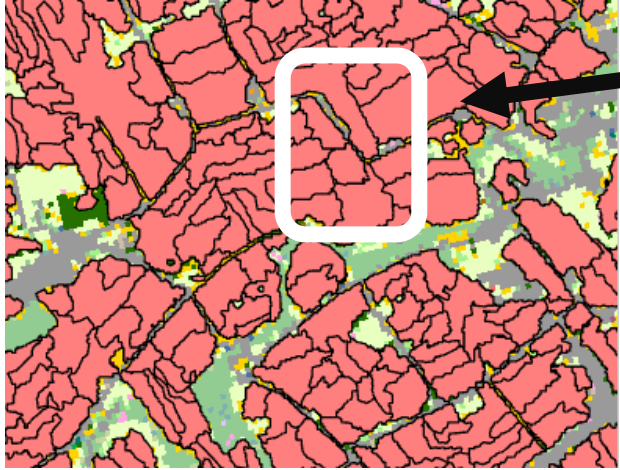
No FSA data

Common Land Unit (CLU)



CSB identified

Crop Sequence Boundaries (CSB)



Georeferencing process: Manual identification

Manual identification of non-FSA fields are completed by image analysts after CSB and CLU polygons are overlaid.

Georeferenced Data

■ FSA CLUs

▨ CSBs

➔ ▨ Digitized Polygons

Crop Categories (CDL)

■ Corn

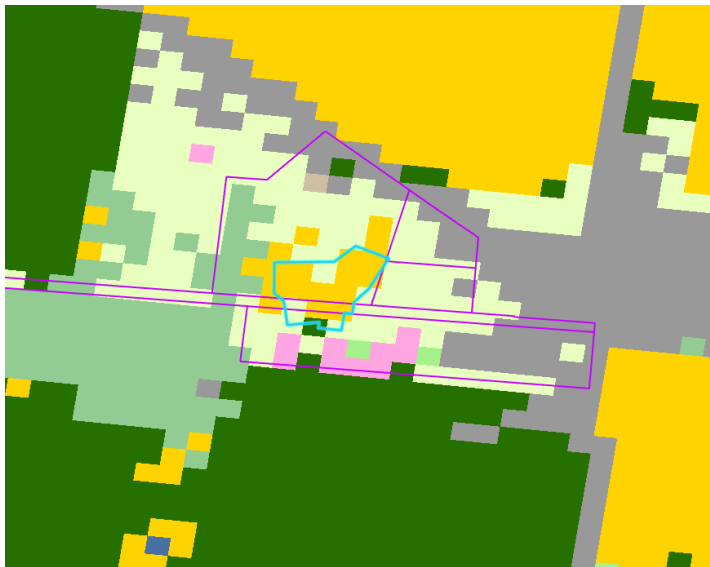
■ Soybeans



Georeferencing process: Retrieving parcel data

Tax assessors' parcel information for landowners across the US is retrieved for identified non-FSA field locations. This parcel information is linked to the list frame and new records added to the NASS list frame.

1. Identify non-FSA fields



2. Retrieve parcels



3. Record link parcel data



FID	Shape *	PARCEL_ID	STATE_CODE	CNTY_CODE	APN	APN2	ADDR	CITY	STATE	ZIP	PI
1	2085	Polygon									
2	2086	Polygon									

Parcel data



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Georeferencing process: Record linkage completed by the NASS

1. Probability record linkage was conducted.
2. Parcels can be linked to an existing list frame record.
3. If the parcel is not linked to a list frame record, the owner is sent a survey to determine whether the parcel is associated with a farm.
4. Based on the response to the survey, the record is added to the list frame.



Results methodology

The analysis in this study focuses on records with 'clean matches' due to limitations in the NASS list frame.

A clean match is when a parcel and a list frame record can be positively linked back together.



Results

- Total 'clean link' parcels identified: **47,311**
 - 39,332 (83%) parcels originated from CSB
 - 7,979 (17%) parcels originated from hand-digitized
 - 10,083 (21%) parcels linked to list frame (georeferenced)
 - 7,792 operators linked to list frame had a record
- 32,502 operators sent criteria surveys; 20,634 (63%) responded.
- Operators that responded as agricultural operations: **3,933** (18% of responding operators)
 - High numbers located in metro areas
 - Many new farms are in counties with known Amish populations



Conclusions

1. NASS has successfully started to georeference its list frame using previously georeferenced administrative data through record linkages.
2. The automated approach of utilizing CSB are finding many non-FSA parcels which is greatly reducing labor intensive methods by image analysts to identify the remaining agriculture manually.
3. The georeferencing methods are likely identifying and adding new farms in more urban counties and potentially in under-represented populations like Amish communities.



Thank you!

Questions?

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