

# Field Data Collection Utilizing iPADS on the USDA's June Area Survey

National Agricultural Statistics Service

Presented by: Michael Gerling & Claire Boryan



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



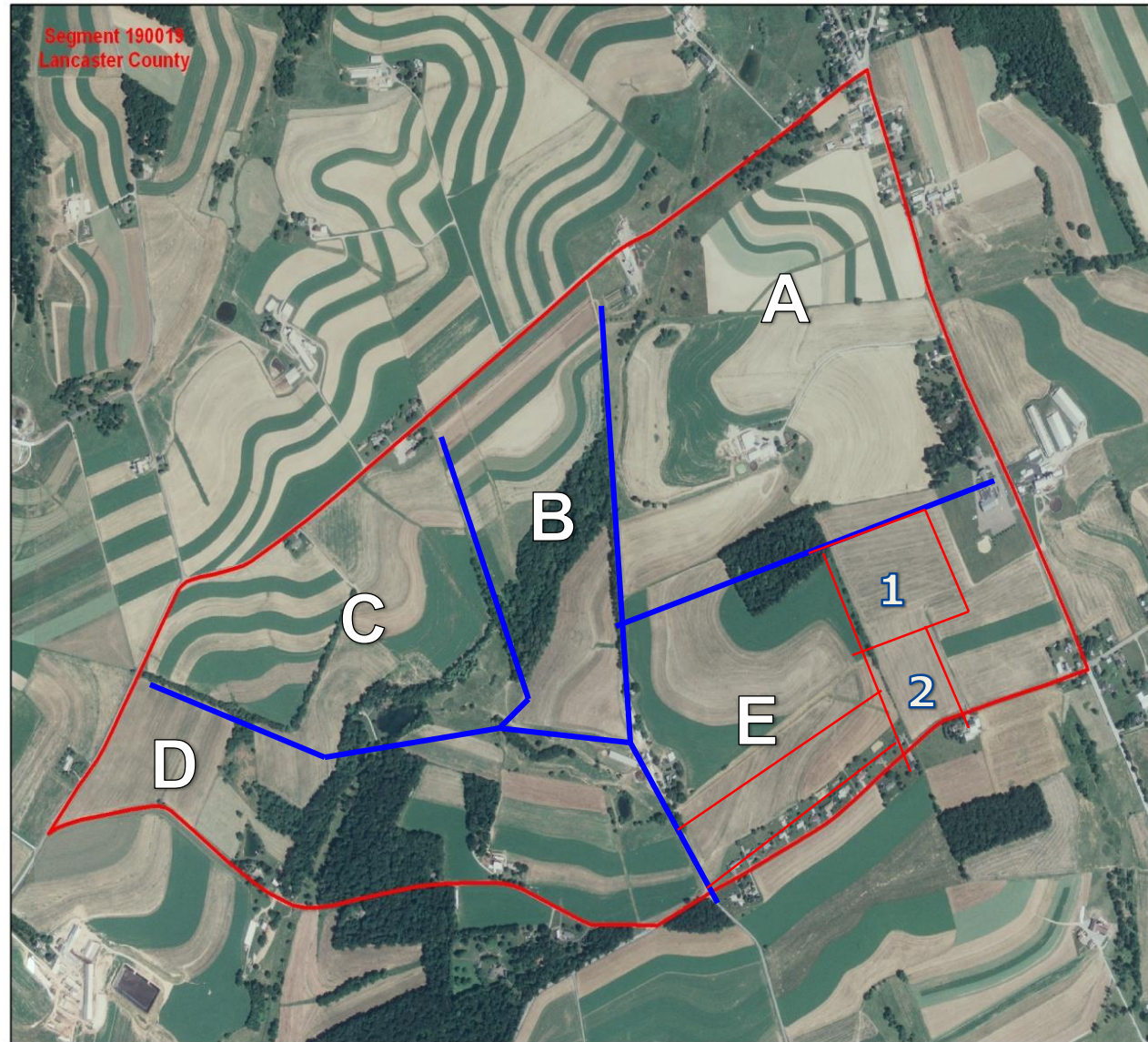
# Overview of June Area Survey

- ▶ Annual survey that provides data on U.S. crops, livestock, grain storage capacity, and type and size of farm.
- ▶ Comprised of designated land areas (segments). Each segment is about 640 acres (1 square mile).
- ▶ 11,000 segments surveyed across the U.S.



# Overview of June Area Survey

- ▶ Using a provided aerial photo, the interviewer divides segment into tracts representing unique land operating arrangements.
- ▶ Interviewers screen for whether tract is part of a farm and collect crop and livestock information for each tract.
- ▶ 42,000 Agricultural Tracts.
- ▶ Paper questionnaire used to record data.



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 2013.

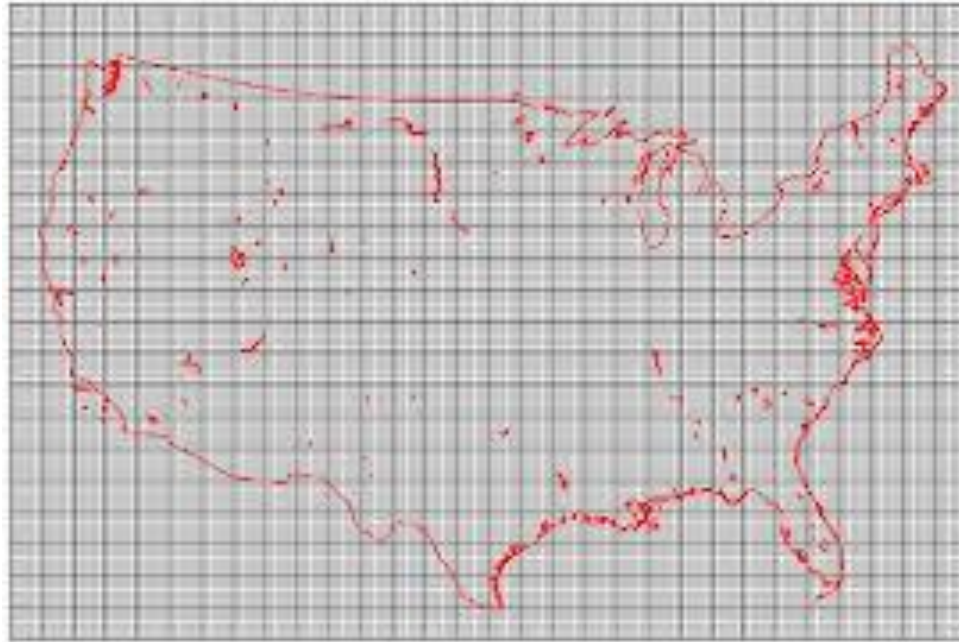
Field Number	01	02	03	04	05
1. Total acres in field	020	020	020	020	020
2. Crop or land use. [Specify]					
3. Occupied farmland or dwelling	043				
4. Waste, unoccupied dwellings, buildings and structures, roads, ditches, etc.	041	041	041	041	041
5. Woodland NP = Not Pastured (031) P = Pastured (032) [Check (x) type]	03_	03_	03_	03_	03_
	<input type="checkbox"/> NP <input type="checkbox"/> P	<input type="checkbox"/> NP <input type="checkbox"/> P	<input type="checkbox"/> NP <input type="checkbox"/> P	<input type="checkbox"/> NP <input type="checkbox"/> P	<input type="checkbox"/> NP <input type="checkbox"/> P
6. Pasture Permanent (not in crop rotation)	042	042	042	042	042
	056	056	056	056	056
Cropland (used only for pasture)					
8. Idle cropland – idle all during 2013	057	057	057	057	057
9. Two crops planted in this field or two uses of the same crop. [Specify second crop or use.]	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
	Acres	044	044	044	044
10. Acres left to be planted	010	010	010	010	010
11. Acres irrigated and to be irrigated [If double cropped, include acreage of each crop irrigated.]	020	020	020	020	020
16. Winter Wheat (include cover crop)	540	540	540	540	540
17. For grain or seed	541	541	541	541	541
20. Oats (include cover crop)	533	533	533	533	533
21. For grain or seed	534	534	534	534	534
24. Corn (exclude popcorn and sweet corn)	530	530	530	530	530
25. For grain or seed	531	531	531	531	531
29. Other uses of grains planted. (Abandoned, silage, green chop, etc.)	Use				
	Acres				
30. Alfalfa and Alfalfa Mixtures	053	053	053	053	053
31. Hay (Cut and to be cut for dry hay)	056	056	056	056	056
	Grain				
33. Other Hay	054	054	054	054	054
34. Soybeans Planted and to be planted	000	000	000	000	000
35. Following another harvested crop	002	002	002	002	002
51. Other crops Acres planted or in use	----	----	----	----	----

**Current Paper Version 24 or more pages.**

Shows one of two pages used to collect tract and field level information.

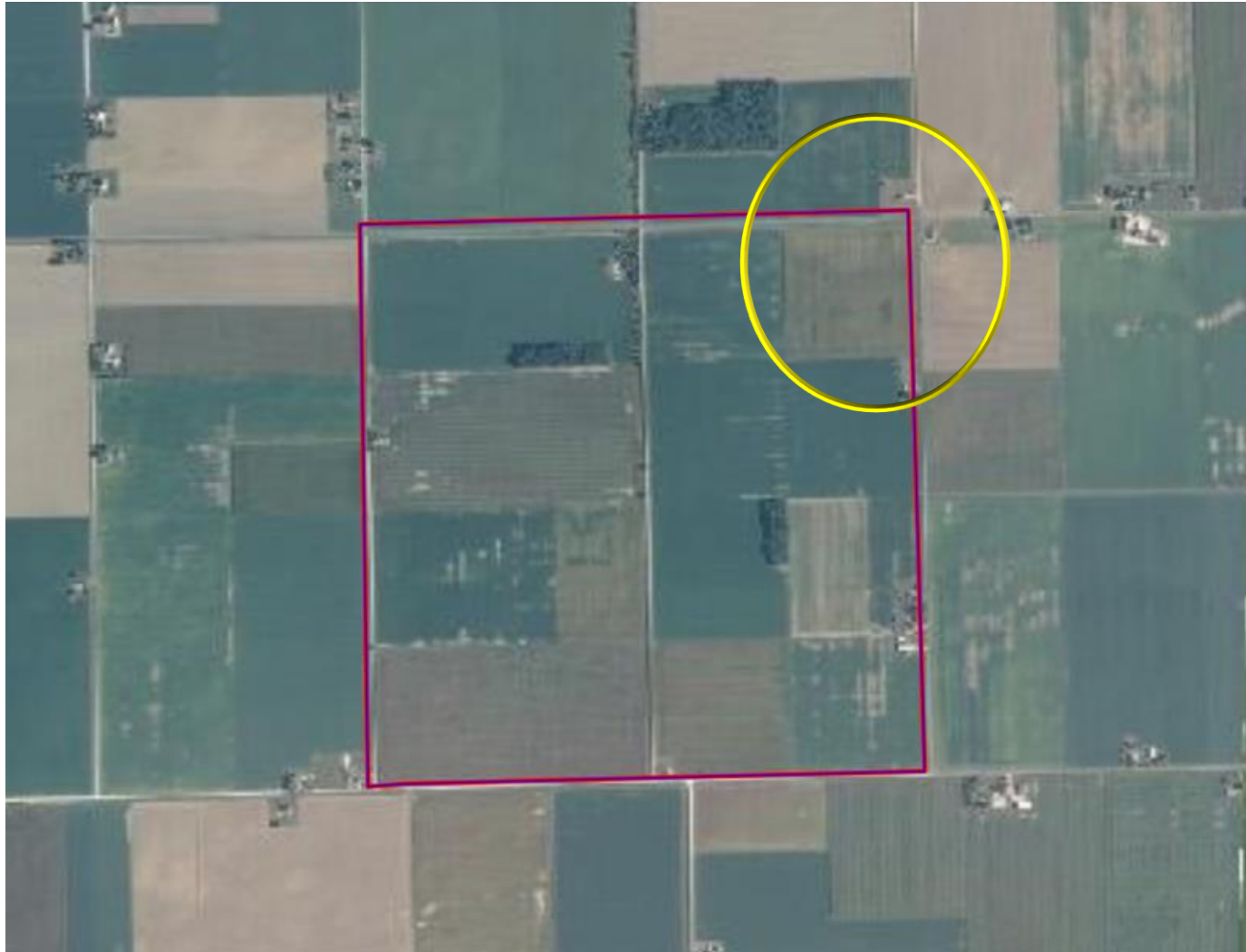
**Lots of rows and columns.**

# Permanent Area Frame Research Grid Sampling



Laying a grid over the entire United States  
and sampling from this permanent frame.

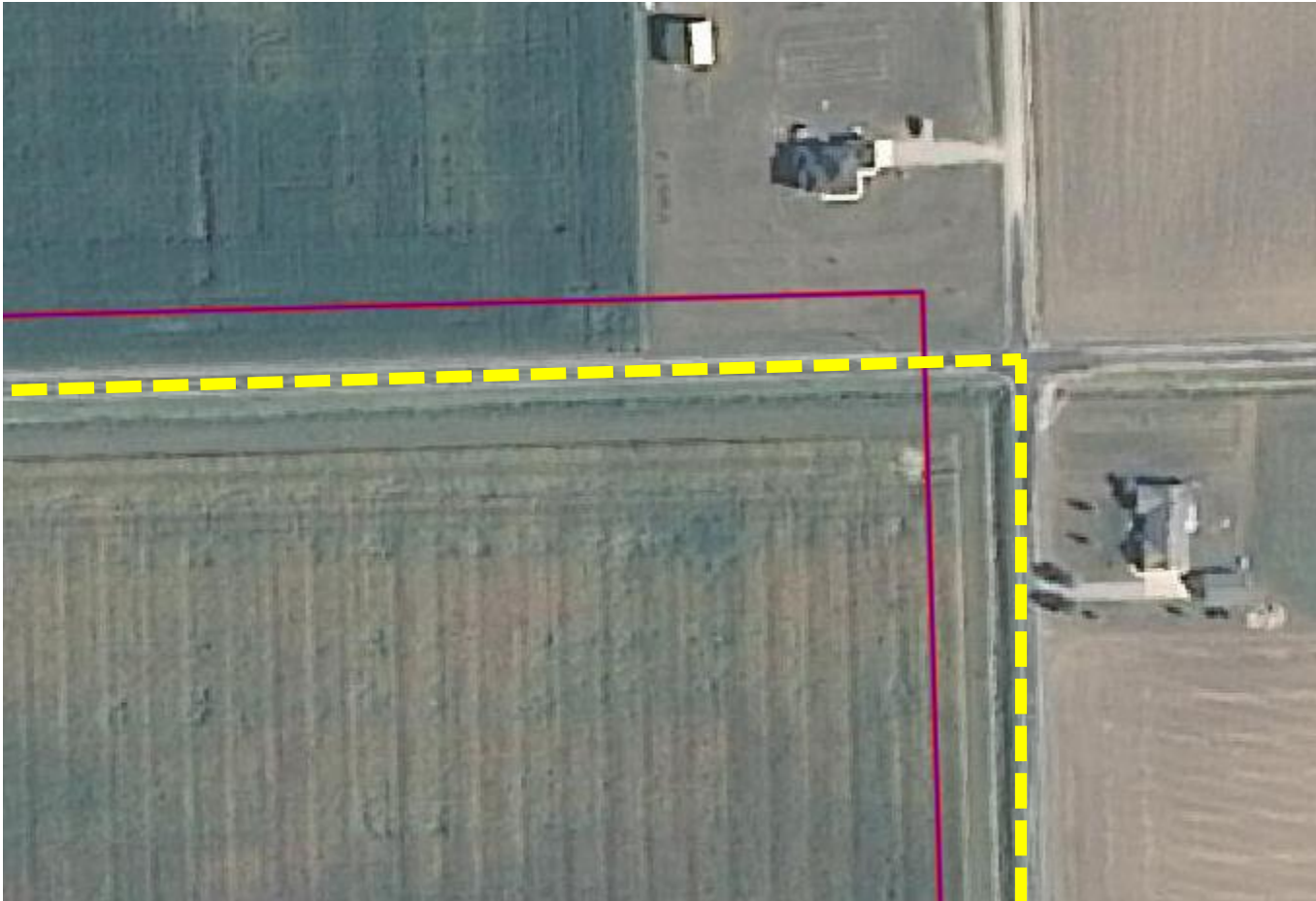
# Grid Segment Example



# The Grid Challenge



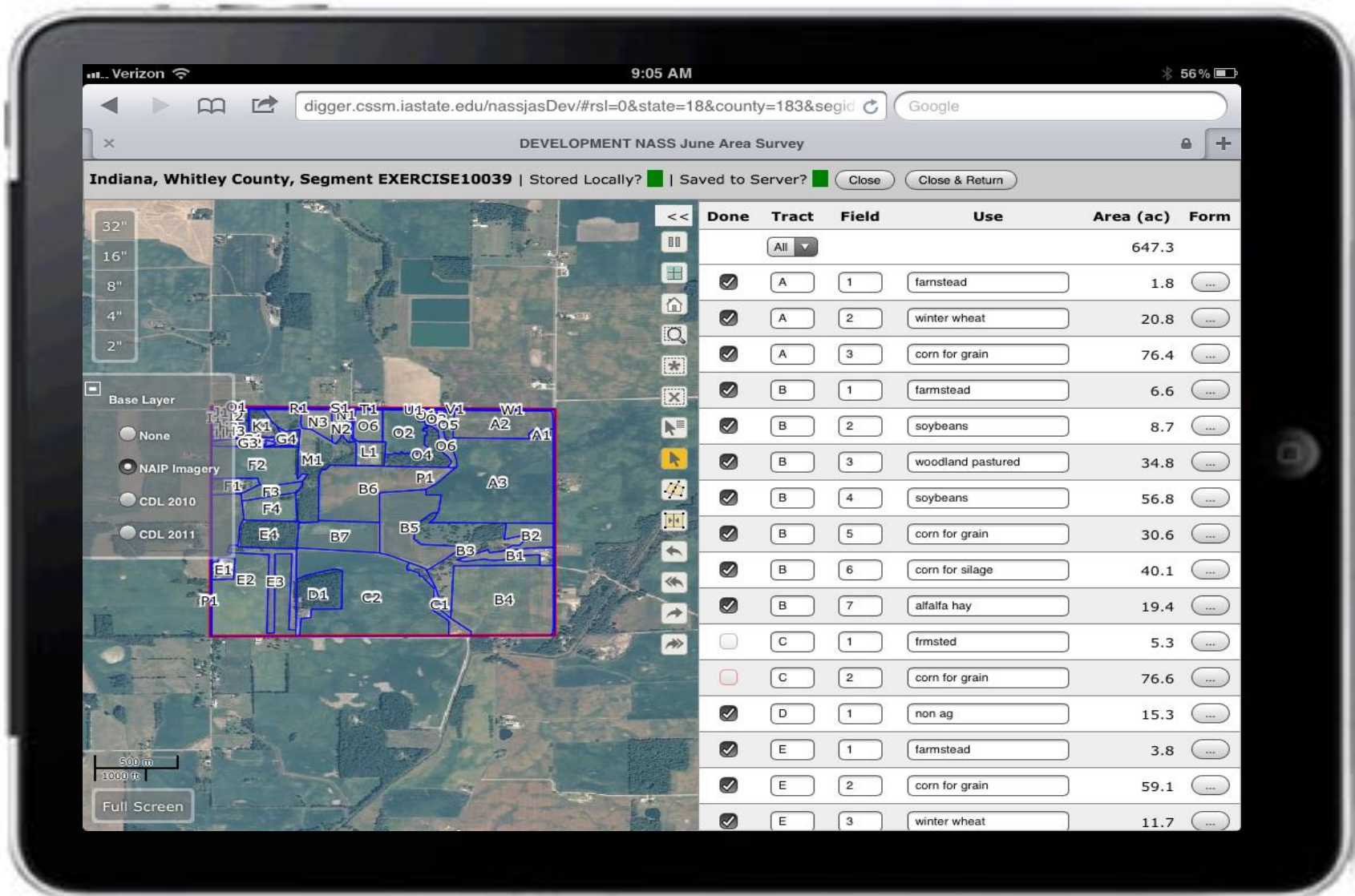
# The Grid Challenge





# The Grid Challenge





Download imagery and application in the morning.



Verizon 3G 1:33 PM 85%

www.nrsurvey.org/nassjasDev/#rsl=0&state=18&county=183&segid=181

DEVELOPMENT NASS June Area Survey

Indiana, Whitley County, Segment EXERCISE10039 | Stored Locally? | Saved to Server? Close Close & Return

<input checked="" type="checkbox"/>	A	3	corn for grain	76.4	...
<input checked="" type="checkbox"/>	B	1	farmstead	6.6	...
<input checked="" type="checkbox"/>	B	2	soybeans	8.7	...
<input checked="" type="checkbox"/>	B	3	woodland pastured	34.8	...
<input checked="" type="checkbox"/>	B	4	soybeans	56.8	...
<input checked="" type="checkbox"/>	B	5	corn for grain	30.6	...
<input checked="" type="checkbox"/>	B	6	corn for silage	40.1	...
<input checked="" type="checkbox"/>	B	7	alfalfa hay	19.4	...
<input type="checkbox"/>	C	1	frmsted	5.3	...
<input type="checkbox"/>	C	2	corn for grain	76.6	...
<input checked="" type="checkbox"/>	D	1	non ag	15.3	...
<input checked="" type="checkbox"/>	E	1	farmstead	3.8	...
<input checked="" type="checkbox"/>	E	2	corn for grain	59.1	...
<input checked="" type="checkbox"/>	E	3	winter wheat	11.7	...
<input checked="" type="checkbox"/>	E	4	woods	13.2	...
<input checked="" type="checkbox"/>	F	1	farmstead	5.4	...
<input checked="" type="checkbox"/>	F	2	corn for silage	24.9	...
<input checked="" type="checkbox"/>	F	3	...	...	...

Verizon 3G 1:40 PM 82%

www.nrisurvey.org/nassjasDev/#rsl=0&state=18&county=183&segid=181

DEVELOPMENT NASS June Area Survey

Indiana, Whitley County, Segment EXERCISE10039 | Stored Locally? | Saved to Server? | Close | Close & Return

Tract: A Field: 1 Use: farmstead X

Land use: Occupied farmstead or dwelling

Total acres in field (disregarding red and blue lines). 1.8

Does any part of the field extend beyond the red boundary? No

Acres within this blue boundary. (This is the area we are referring to for the remainder of this form.) [Project Acreage] 1.8

Occupied farmstead or dwelling 1.8

[What was the response for Project Acreage?] [Redacted]

[Who was the respondent?] [Redacted]

[Is the form complete for this field? Choosing "Yes" will close form.] [Redacted]

# Styluses

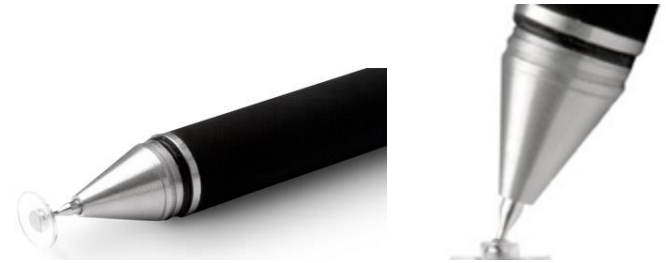
Ten One Design Pogo Sketch Stylus



Wacom Tech Corp  
- Bamboo Stylus



Adonit Jot Pro  
Fine Point Stylus



# Challenges for Field Staff

1. CAPI

2. iPADs

3. Instrument

4. Grid Segments

# Number of Attempted Segments, Tracts and Fields by State

State	No. of Field Staff	Segments	Non-Ag Tracts	Ag Tracts	Fields
Indiana	4	26	134	112	347
Pennsylvania	4	8	31	51	130
Washington	1	2	6	5	13
<b>Total</b>	9	36	171	168	490

# Problems with Aerial Imagery (Zooming, Splitting, Overall Functionality)

Problems with Aerial Imagery	Number of Tracts	Percentage
Yes	13	7.7
Sometimes	13	7.7
None	142	84.5
Total <sup>1/</sup>	168	99.9





# Connectivity - 3G/4G Problems

Connectivity Problems 3G/4G	Number of Tracts	Percent
Yes	2	1.2
Sometimes	5	3.0
No	158	94.0
No Answer	3	1.8
Total	168	100.0



# Battery Life Problems Encountered



Battery Life Problems Encountered	Number of Tracts	Percent
Yes	3	1.8
Sometimes	1	0.6
<b>No</b>	<b>161</b>	<b>95.8</b>
No Answer	3	1.8
Total	168	100.0



# Screen Visibility Problems (Glare, Sunlight, etc.)

Screen Visibility Problems	Number of Tracts	Percent of Total Frequency
Yes	11	6.5
Sometimes	17	10.1
No	137	81.5
No Answer	3	1.8
Total	168	99.9



## Time of Day Interview was Conducted

Time of Day	Number of Tracts	Percent
Afternoon	110	65.5
Morning	55	32.7
Evening	2	1.2
No Answer	1	0.6
Total	168	100.0



# Location of Interview

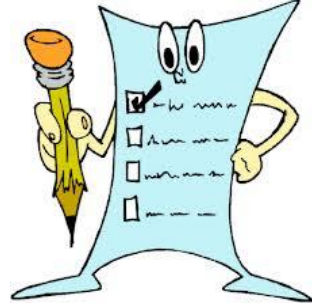


Location of Interview	Number of Tracts	Percent
Indoors	99	58.9
Outside	43	25.6
Other	5	3.0
No Answer	21	12.5
Total	168	100.0

# Respondent's Acceptance of the Technology



Respondents' Acceptance of the Technology	Number of Tracts	Percent
Enthusiastic	55	32.7
Ambivalent	79	47.0
Reluctant	7	4.2
No Answer	27	16.1
Total	168	100.0



# Length of Interview Compared to Paper Questionnaire

Length of Interview Compared to Paper Questionnaire	Number of Tracts	Percent
Shorter by at 1 to 9 min	43	25.6
Shorter by at least 10 min	24	14.3
No Difference	60	35.7
Longer by 1 to 9 min	21	12.5
Longer by 10 min or more	12	7.1
No Answer	8	4.8
Total	168	100.0

# Minimal Issues

- ▶ Battery Life
- ▶ Connectivity
- ▶ Training Program: In-Person and Self-Paced/Remote Training
- ▶ Complex Paper Questionnaire - dynamic logic transforms to a short CAPI form.



# Challenges

- ▶ Screen Visibility (Glare)
- ▶ Weather Conditions – rain, snow, extreme temps.
- ▶ Larger Screen wanted by field staff.
- ▶ Speed – improve drawing out tracts and fields.

# Possible Solutions – Eliminating Glare



# Attempt at Humor



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# Possible Solution for Rain/Snow Weather Conditions



# 2013 Consumer Electronic Show

## Panasonic unveils 20-inch Windows 8 Tablet



2013 - Test for differences in

Farmer Reported Acres (June Area Survey)

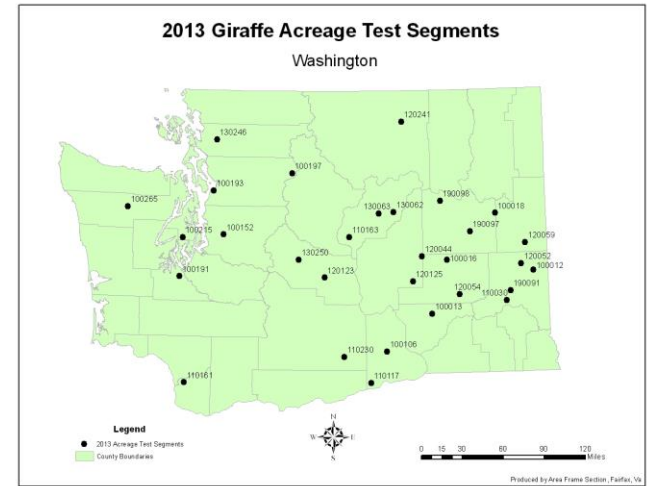
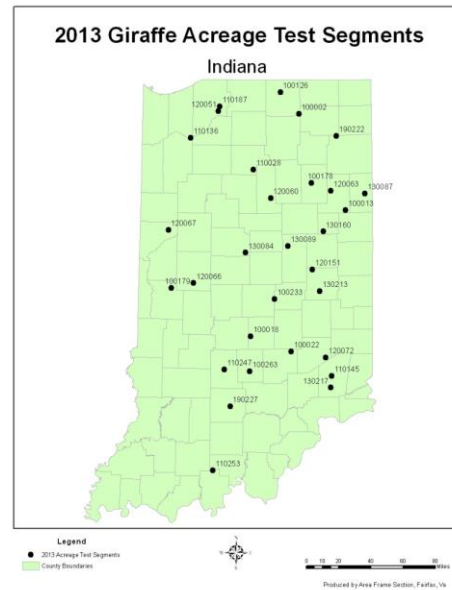
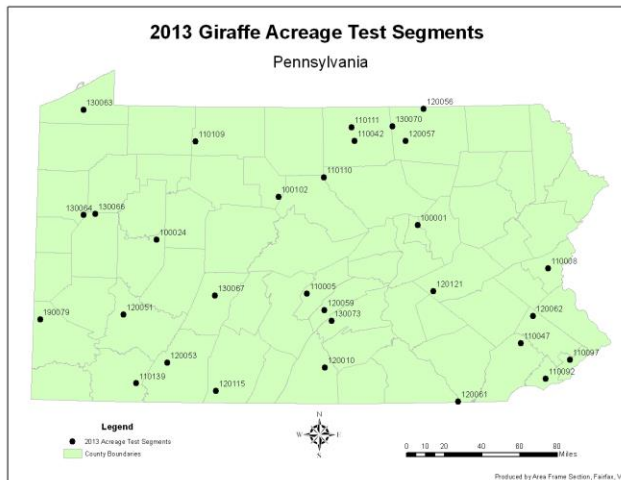
VS.

Geographic Information Systems (GIS) Calculated Acres



# Pennsylvania, Indiana and Washington

## Ninety Segments



Enumerators copied the tract and field information from the Aerial photo and into GIS instrument.





# Shown in GIS Instrument

The screenshot displays a GIS application interface with a central map area. The map shows a large parcel outlined in red, containing several smaller parcels outlined in blue. These parcels are labeled with alphanumeric codes: O1, K1, F8, F1, L1, L2, F2, F3, F4, F12, F10, F11, B1, B2, F13, L3, F3, F4, F12, F10, F16, B3, L4, L5, F6, F5, F9, L10, L11, L9, L8, L7, L6, N1, N2, N3, J1, G1, O1, M1, I1, G1, H1, P1, R1, R2, P3, P2, P4, R3, and R2. The map includes a scale bar at the bottom left showing 500 meters and 1000 feet. A toolbar on the right side contains various icons and labels: Pause, Cache Imagery, Locate Me, Zoom to Segment, Zoom to Selected, Select All Visible, Select None, Open Sec. D Form, Select/Deselect, Split Feature(s), Merge Selected, Undo, Undo All, Redo, and Redo All. On the left side, there is a 'Base Layer' menu with options: None, NAIP Imagery, Bing Roads, CDL 2011, and CDL 2012. A 'Track Position' checkbox is located at the bottom center of the map area.

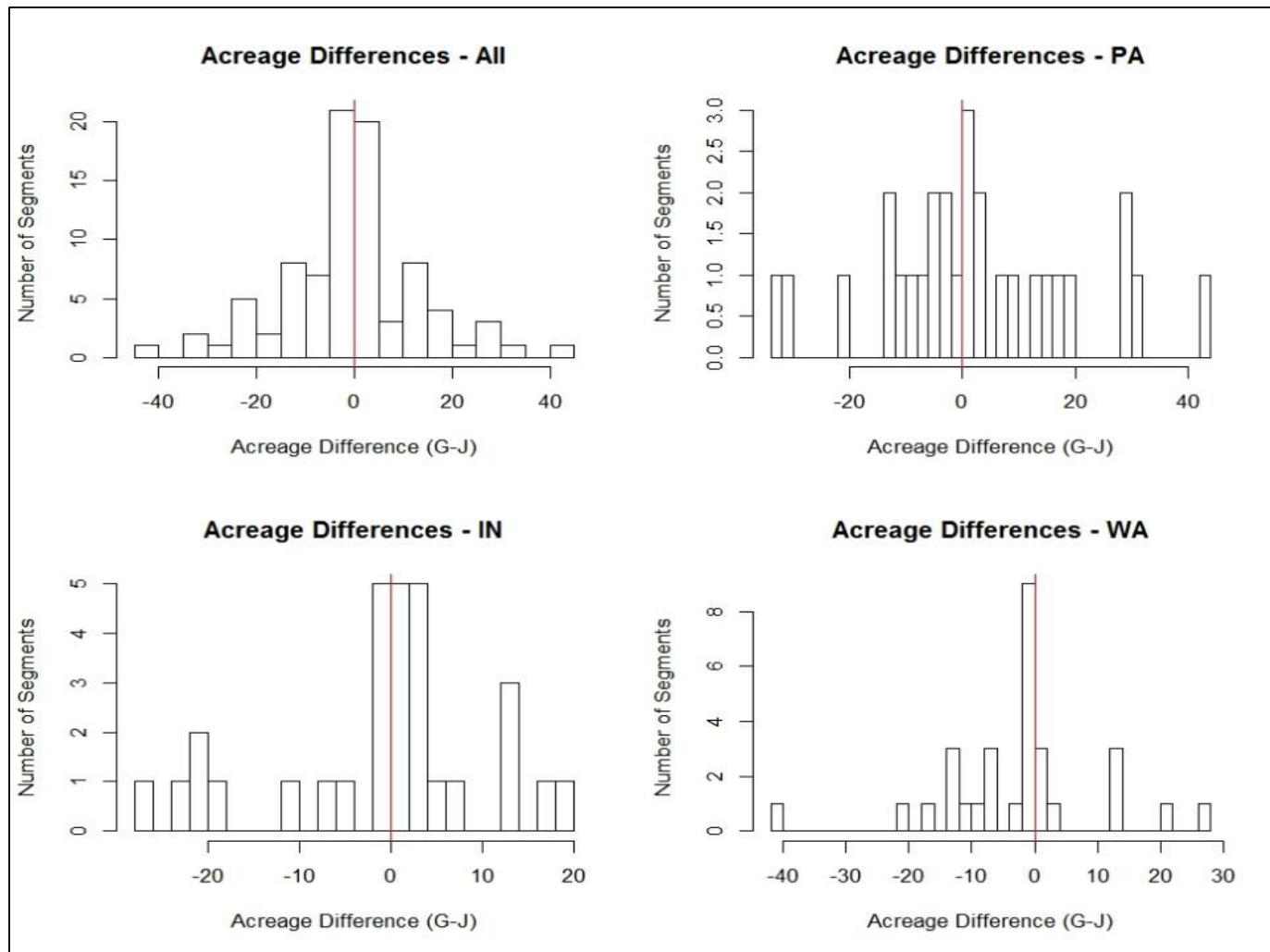
# GIS Calculation vs. Farmer Reported (JAS) Acreage Test

- ▶ Data with matching fields from (GIS) and JAS (farmer reported) contain 2,246 fields from 90 sampling segments from three states (PA, IN, WA).
- ▶ Errors in data that could be traced prior to analysis of the fields in GIS were removed from the analysis. Any fields in which acreage is not reported in JAS or estimated in GIS were also removed.
- ▶ There are 2,096 fields remaining once the above errors were removed

# GIS vs. Farmer Reported Acreage Test

- ▶ All Ag Tract fields
- ▶ Interior Ag Tract fields
- ▶ Exterior or Boundary Ag Tract fields
- ▶ Permanent Pasture fields
- ▶ Wooded fields

# GIS vs. Farmer Reported (JAS) Segment Totals



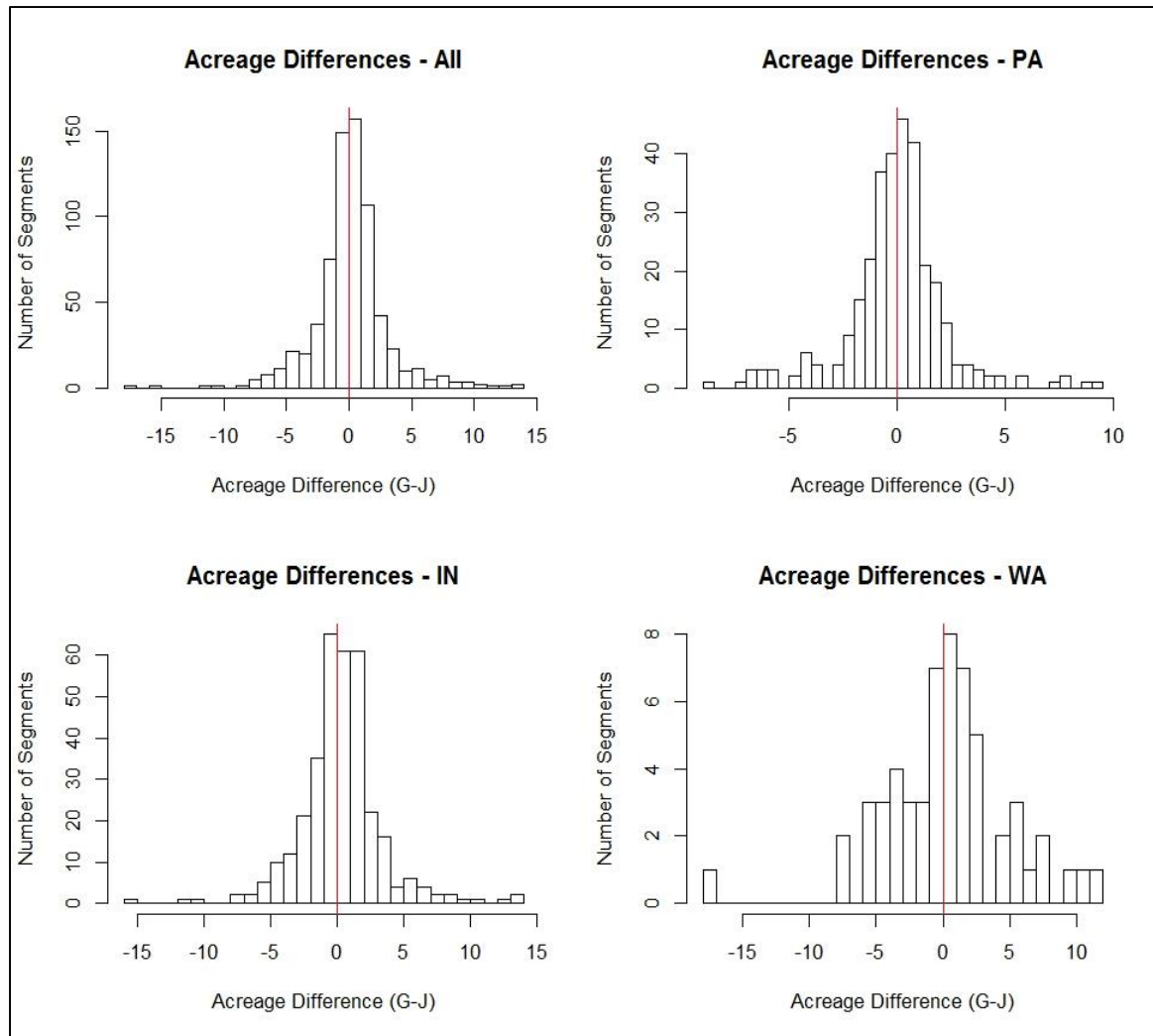
Acreage differences for all data and states individually.

# P-values for Wilcoxon signed rank test to test acreage differences for segment totals

State	Number of Segments	p-value
All Data	85	0.642
PA	27	0.662
IN	29	0.831
WA	29	0.110

- ▶ Tests the hypothesis that the mean (average) difference between GIRAFFE and JAS acreage estimation is equal to 0.
  - P-value < 0.1 = SLIGHT evidence that difference is NOT EQUAL to 0
  - P-value < 0.05 = STRONG evidence that difference is NOT EQUAL to 0
  - P-value < 0.01 = VERY STRONG evidence that difference is NOT EQUAL to 0
- ▶ Tests indicate that the mean difference is approximately 0 for all states (i.e., the difference between GIS and JAS acreage estimates is equal to 0 on average).

# GIS vs. Farmer Reported (JAS) All Agricultural Fields



Acreage differences for all agricultural fields and agricultural fields from each state.

## Agricultural Fields P-Values - Wilcoxon Signed Rank Test

State	Number of Segments	p-value	p-value (sampled)
All Data	706	0.232	0.453
PA	310	0.965	0.874
IN	338	0.162	0.342
WA	58	0.704	0.757

- ▶ Tests for difference in agricultural fields (fields in which area used for agriculture is greater than 0).
- ▶ Tests indicate that acreage estimates are approximately equal on average.

# Conclusion

- Most tests resulted in the conclusion that the average difference in acreage estimates between GIS and JAS is approximately 0.
- Exterior Ag fields showed that there was moderate statistical evidence (p value, 0.035) that the mean difference in GIS and JAS acreage estimates is different than 0. Especially in IN (p-value, 0.040). GIS appears to overestimate acreage based on plots of acreage difference.



# Future.....

- ▶ Have Iowa State University (ISU) build the whole questionnaire and NASS port everything over to our servers, etc...
- ▶ Take what we learned from this JAS-CAPI experience and build an in-house solution.
- ▶ Work with ISU and update current JAS-CAPI to handle all states and build the rest of the questionnaire in EDR-CAPI. (*Two window approach*)



# Contact Information

- ▶ Michael Gerling [michael.gerling@nass.usda.gov](mailto:michael.gerling@nass.usda.gov)
- ▶ Claire Boryan [claire.boryan@nass.usda.gov](mailto:claire.boryan@nass.usda.gov)