Comparing Data Collection Methods for the June Area Survey

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Abstract
The USDA's National Agricultural Statistics Service is exploring the use of an electronic mobile mapping instrument in an effort to incorporate newer technologies in its June Area Survey (JAS) data collection. The JAS is based on an area sampling frame comprised of segments of land that make up the sampling units. JAS field enumerators use a paper aerial photograph to locate and interview all operators within the segment boundary. Then, they draw off all fields by hand on the aerial photograph and fill out a paper questionnaire. Research conducted in 2014, using a mobile mapping prototype, indicated that drawing fields during the interview took longer than is operationally feasible. Testing in 2016 focused on providing enumerators with pre-delineated fields in the mobile mapping instrument in order to reduce interview time. Completion times were compared to current procedures using the paper aerial photograph. Using a Latin-square design, enumerators recorded previous year's JAS data using a mock interview format in two states. Research results are discussed in this paper.

Key Words: Area Frame, Mobile Mapping, Evaluation

1. Introduction and Background

The June Area Survey (JAS) is one of the USDA's National Agricultural Statistics Service's (NASS) largest surveys. It is based on an area frame and collected through in-person interviews using pencil and paper procedures. The JAS field enumerators use a hard copy aerial photograph to locate and interview all farm operators within the segment boundary. Then, they outline the fields by hand on the aerial photograph and complete a field-level paper questionnaire. In an effort to incorporate newer technologies in its data collection activities, NASS is evaluating the use of a mobile mapping instrument that would replace the aerial photograph and paper questionnaire. Some advantages of using mobile mapping technology include: 1) extends the data collection window; 2) allows for flexibility with field enumerator assignments; 3) provides improvements in data quality through embedded edit checks; and 4) saves money by eliminating the cost of mailing the aerial photographs and all questionnaires.

In 2012, NASS partnered with Iowa State University's Center for Survey Statistics and Methodology to develop a prototype mobile mapping instrument for the JAS (Gerling et. al, 2015). The goal of the instrument was to replace both the aerial photograph and the paper questionnaire that collects the field-level data. The prototype was tested in the field for several years by well-trained enumerators; enhancements were made based on feedback from the field enumerators as well as the need to reduce the time it took to outline the fields (Abreu et. al, 2015; Lawson et. al, 2015; Boryan et. al, 2017; Barboza et. al, 2017).

This paper documents the results of a study conducted in 2016 that primarily focused on evaluating data collection times on the JAS segments using the mobile mapping instrument in an attempt to reduce interview times. The study consisted of a series of mock interviews that compared interview times using the mobile mapping instrument for the JAS segments with pre-delineated boundaries to times using the paper data collection method. The mock interviews were timed and simulated actual live data collection activities. Section 2 provides the background information on the JAS. In Section 3, the features and functionality of the mobile mapping prototype instrument are presented. Section 4 outlines the design of the study. Section 4 presents the results. Finally, Section 6 wraps up with some concluding remarks and recommendations for future research.

2. June Area Survey (JAS)

The JAS is conducted annually and uses an area frame, which ensures complete coverage of all land within the 48 coterminous United States. For each state, land within the area frame is divided into homogeneous strata based on percent cultivated land and further into substrata based on similarity of agricultural content. The land is divided into primary sampling units (PSUs) and then assigned to a stratum. PSUs are sampled from each substrata, then smaller and similar-sized segments of land (about one square mile) are delineated within these selected PSUs. One segment is randomly sampled from each selected PSU to be fully enumerated during the JAS (See Figure 1).

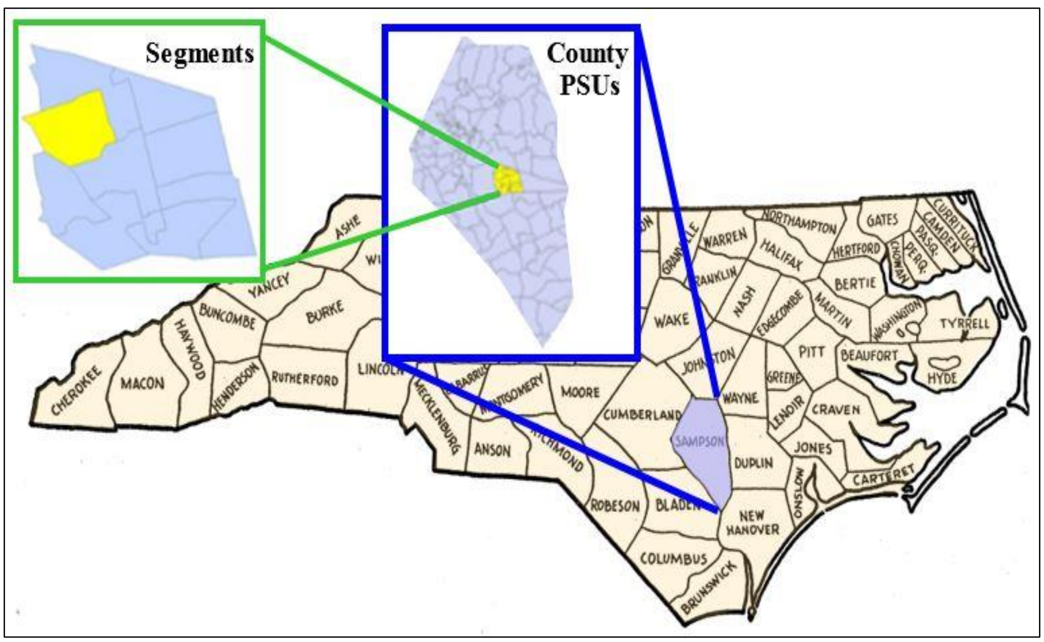

Figure 1: NASS area sampling frame for North Carolina

The selected JAS segments (outlined in red in Figure 2) usually have physical boundaries that follow the infrastructure on the ground (See Cotter et. al 2010 for further details on the JAS design). These are pre-screened in May prior to the June data collection period. Field enumerators are provided a paper aerial photograph showing the sampled segment area and must account for all land inside the segment boundary. They divide each segment into tracts of land (outlined in blue in Figure 2). Obvious non-agricultural areas, such as roads, rivers, etc., are assigned a tract letter and automatically classified as a non-agricultural tract. Each of the remaining tracts of land is assigned a tract letter that represents a unique land operating arrangement. These tracts are then screened for agricultural activity and classified as either an agricultural tract or a non-agricultural tract. JAS data collection is conducted during the first two weeks of June when field enumerators return to interview the agricultural tract farm operators. A separate paper questionnaire is completed for each agricultural operation within the segment. Farm operators identify all field boundaries (outlined in red in Figure 3) on the aerial photograph and report acreage, crops planted or other land use (pasture, woods, wasteland, etc.) of each individual field within the tract using Section D of the paper questionnaire.

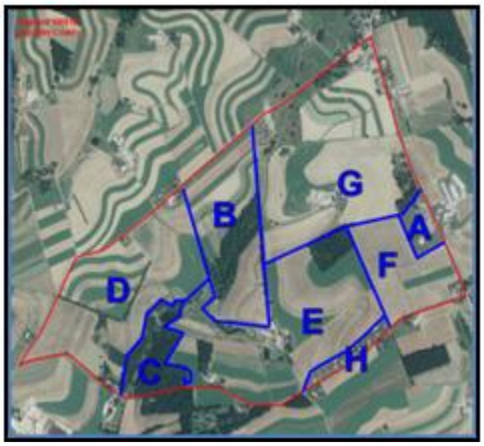

Figure 2: The area outlined in red is the segment. Tracts are outlined in blue and labeled with letters.

Figure 3: Tracts are outlined in blue and labeled. Individual fields are outlined in red within the tracts and labeled with numbers.

3. Overview of the Prototype Mobile Mapping Instrument

The mobile mapping instrument is a web application designed to run within the Safari browser on an iPad. The instrument has two main parts (Figure 4). The left side of the screen contains the aerial imagery where fields are delineated in place of the paper aerial photograph. The right side of the screen displays general field information and contains a streamlined electronic version of Section D of the paper questionnaire (See Attachment A).

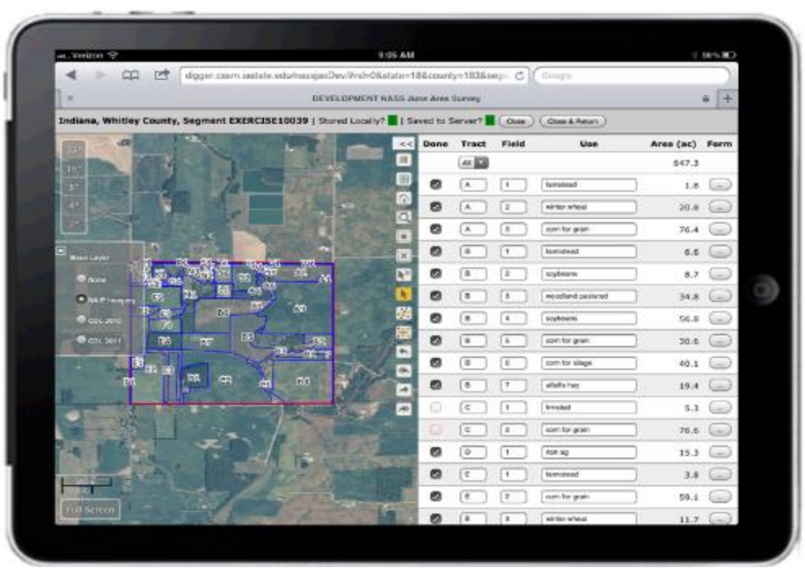

Figure 4: Mobile Mapping Instrument

The mobile mapping instrument is offline-capable. A substantial amount of the JAS data collection takes place in rural areas that tend to have intermittent signal; therefore, it is essential that the instrument be able to operate without an Internet connection. Prior to data collection, enumerators run a cache routine to store the required imagery in the iPad's memory. If a wireless connection is available, the instrument transmits a copy of the data to the web server as it is entered or modified by an enumerator. Otherwise, the data remains stored locally on the iPad. All data are automatically transmitted to the web server whenever a wireless connection is available. Up-to-date traffic light symbols are displayed to indicate if the data has been stored locally on the iPad, saved to the server, or both.

The instrument contains a wide range of GIS tools and features. The aerial imagery on the left side of the main instrument screen can also be displayed in full screen mode (Figure 5). In Figure 5, the red segment boundary is overlaid on digital imagery that is obtained from the National Agricultural Imagery Program (NAIP), which acquires aerial imagery during the agricultural growing seasons in the continental United States. Typically, this digital ortho-rectified aerial photography is available to governmental agencies and the public within two to four months after acquisition.

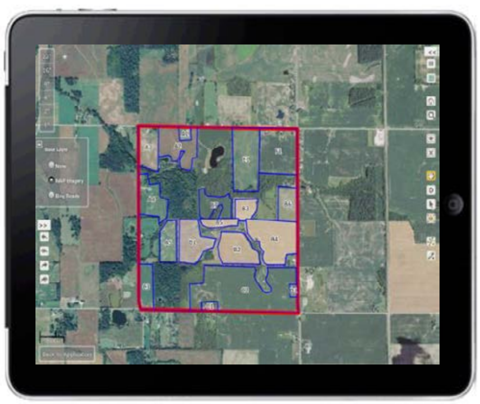

Figure 5: Instrument shown in full screen mode

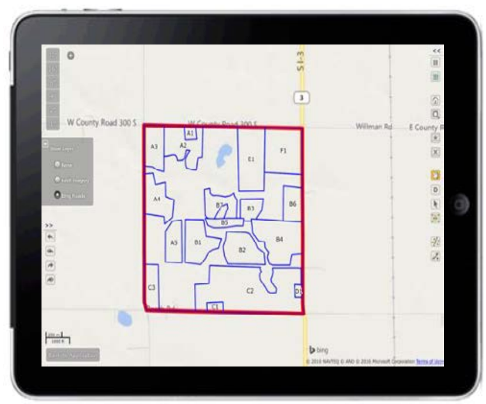

Figure 6: Displaying the Bing roads layer

The instrument is capable of presenting additional resource material using Web Map Service (WMS) overlays so the NAIP imagery can be replaced with another layer, such as Bing roads (Figure 6). The Bing roads layer is similar to a road map, which shows road names, parks, golf courses, cemeteries, etc. This is helpful in locating fields and identifying land features.

The majority of the functions are performed within the aerial imagery part of the instrument using the various tools created within OpenLayers, which is an open-source JavaScript mapping library and provides basic web and GIS functionality.

In the JAS enumeration process, enumerators use a blue grease pencil to outline tracts and a red grease pencil to outline fields on the paper aerial photograph. Although fields are pre-delineated within the mobile mapping instrument, a farmer may report that a field is actually comprised of two fields. In that case, the mobile mapping instrument requires "splitting" the field into two fields instead of outlining them. The polygons representing each of the fields are created by using the "Split Features" tool. Splitting ensures that all land parcels are accounted for within the segment boundary.

The right side of the mobile mapping instrument's main screen (Figure 7) displays the calculated GIS acreage, column heading "Area (ac)", along with general information about all of the polygons or fields that have been delineated on the aerial imagery. A button to the right of each field is used to open the electronic field-level data collection form (Figure 8) referred to as Section D.

Figure 7: The right side of main screen displays the calculated GIS acreage and general field

Figure 8: A view of the opened Section D form for the first field in the information table

The mobile mapping instrument provides a highly optimized version of the paper Section D form. The specific details for each field are captured in a survey-like format containing drop down menus and basic edit checks. Skip rules and validation logic are specified per question dynamically. This effectively reduces the complex paper table as shown in Attachment A, to a handful of questions that relate to the specific crop or land use.

4. Study Design

The goal of the 2016 mobile mapping prototype research was to compare interview times between the current pencil and paper procedures and the mobile mapping instrument for JAS segments in Indiana (IN) and North Carolina (NC). The study consisted of a series of mock interviews that compared interview times using the mobile mapping instrument for the JAS segments with pre-delineated boundaries to times using the paper data collection method. Timed interviews were conducted using a mock interview format that simulated actual live data collection activities.

Field staff and other NASS personnel served in the role of the farm operator. No interviews were conducted with actual farm operators for this part of the study. Instead, real-life situations were simulated in an effort to avoid burden on farm operators.

Segments from the 2015 JAS were selected in Indiana and North Carolina. The segments loaded to the instrument had pre-delineated field boundaries. Mock interviews were conducted to accurately time realistic data collection in the field. Using a replicated Latin-square design, each segment was completed 2 times in the mobile mapping instrument (1 time indoors and 1 time outdoors) and 2 times using the aerial photo with colored pencils (1 time indoors and 1 time outdoors) for each of two replicates. Eight enumerators participated from each state, with each Latin-square replicate consisting of 4 enumerators.

The interest of this study is to determine whether the mobile mapping instrument increases the burden on JAS survey respondents by taking longer to complete. Interview times vary based on many tract and segment characteristics, as well as by the enumerator conducting the survey. Fields and tracts differ by state due to differences in area, boundary shape and length, and infrastructure used to define them. These differences result in some segments taking longer to enumerate. In addition, some enumerators with more experience may conduct interviews faster than others. In order to assess enumeration time differences resulting from the use of the mobile mapping instrument, these variations based on state, segment and enumerator must be accounted for.

During the JAS, enumerators are sent to a segment to collect information from all tracts within it. Thus, multiple interviews are often conducted within a given segment and multiple interview times are recorded. Because enumerators must collect data for the full segment, data collection methods are administered at the segment level. However, data collection times are recorded for all tracts within the segment. Enumeration times vary greatly based on the tract being enumerated. Tracts have different acreage, number of fields, complexity and length of field boundaries and other characteristics that make them more or less difficult to collect data or trace boundaries. Previous work has shown the single largest characteristic affecting enumeration time is the number of fields that the tract contains. To adjust for differences in the complexity of tracts, the average enumeration time per field is calculated. This enables enumeration methods to be more accurately compared across different tracts.

The study aimed to answer the following research questions:

1. Do the average interview times significantly differ between the instrument and the current pencil and paper procedures?
2. Do the average interview times significantly differ if the interviews are conducted indoors or outdoors for either method?
3. Do the average interview times significantly differ by state?

The experiment was designed to determine the effects that using the mobile mapping instrument to enumerate JAS segments had on the time it takes to enumerate a JAS sampled tract with the farm operator. A sample of 16 JAS segments was chosen in each state and each segment was enumerated using each of four treatments:

A. JAS paper survey – Indoors
B. JAS paper survey – Outdoors
C. Instrument enumeration – Indoors
D. Instrument enumeration – Outdoors

The time taken to complete the JAS interview with the tract operator was recorded for each tract within a sampled segment.

Eight enumerators were randomly assigned a position of 1 – 8. The enumerators were assigned segments to enumerate and treatment order based on a Latin-square design. Previous work has shown that enumerators become faster at enumerating a segment, if they repeatedly enumerate it. Thus, a Latin-square design was used to eliminate the effects of "learning" a segment during enumeration using all treatments. An enumerator enumerated each of the four segments using a different method. The method used to enumerate each segment and the order in which each treatment (enumeration method) were based on a 4x4 Latin-square design. Thus, each segment was enumerated 4 times each with a different enumerator and with a different method. Two Latin-squares were used in the study. Table 1 shows the interview administration scheme for the experimental design for each segment in both replicates. The letters A-D represent one of the four treatments detailed above.

Table 1: Actual treatment scheme and segments assigned to enumerators.

Segment	Latin-square Replicate #1					Latin-square Replicate #2			
	Enum 1	Enum 2	Enum 3	Enum 4		Enum 5	Enum 6	Enum 7	Enum 8
1	A	B	C	D		C	D	B	A
2	B	A	D	C		D	C	A	B
3	C	D	A	B		B	A	C	D
4	D	C	B	A		A	B	D	C
.	.	.	.	.		.	.	.	.
.	.	.	.	.		.	.	.	.
13	B	C	A	D		C	A	B	D
14	A	D	C	B		A	C	D	B
15	C	B	D	A		B	D	A	C
16	D	A	B	C		D	B	C	A

The selected segments were delineated using a variety of sources such as topology maps, satellite derived Cropland Data Layer (CDL) information and Common Land Units (CLUs) from the Farm Service Agency (FSA). First, JAS segments were intersected with the FSA CLU polygons. Then, NASS cartographers delineated additional areas using available topology, road maps, NAIP imagery and information from the CDL. Figure 9 shows a JAS segment before the pre-delineated boundaries and Figure 10 shows the same segment with the pre-delineated boundaries.

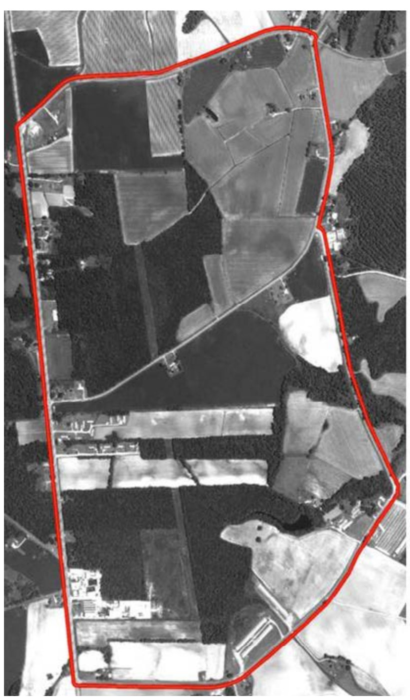

Figure 9: JAS segment without any field boundaries

Figure 10: JAS segment after the field boundaries were delineated

The final product, a segment with pre-delineated field boundaries, was loaded to the mobile mapping instrument. Enumerators were not able to discern differences between a cartographer's delineation and an FSA delineation. This process was implemented in all segments in the study.

Enumerators were trained on the instrument's functionality prior to interviews. The first part of their training consisted of an independent training course that each enumerator completed on their own. Enumerators were provided an independent training manual along with instructional videos; and they completed practice exercises designed to teach them the basic fundamentals of the instrument. The second tier of training consisted of a training workshop. The workshop devoted 1.5 days for new enumerators and 1 day for enumerators with prior experience with the instrument. This included presentations and discussion of more complex functions of the instrument along with practicing interviewing techniques using the iPad.

An enumerator completed all the interviews within each segment. For example, if there were five operations in a given segment, the enumerator conducted five separate interviews. An answer key was prepared for each operation within a segment. Staff members acting in the role of the farm operator would study the answer key prior to survey administration. Within a segment, enumerators timed each interview and recorded the time on a form that was provided (see Attachment B). The form was designed to record the interview time with the farm operator for each agricultural tract within a segment.

5. Results

Table 2 shows the total number of mock interviews conducted in each state by interview location and mode of data collection. A total of 600 interviews were completed. Twelve of the interviews were removed due to a problem with the answer key, errors in the instrument, or related to a training issue that should have been resolved outside of interview time. A total of 588 interviews were utilized in the final analysis.

Table 2: Number of Mock Interviews for Each State by Location and Mode of Data Collection

State	Interview Location				
	Instrument Indoors	Instrument Outdoors	Paper Indoors	Paper Outdoors	Total
Indiana	80	106	92	94	372
North Carolina	55	53	45	63	216
Total	135	159	137	157	588

To compare interview times for JAS segments using the mobile mapping instrument with pre-delineated fields to the pencil and paper procedures, the average interview time per field was calculated for each tract.

$$Average\ interview\ time\ per\ field = \frac{total\ tract\ interview\ time}{number\ of\ fields\ in\ the\ tract}$$

The average interview time per field was calculated for each state involved in the study (See Figure 11). Overall, the interview time per field increased by about ¾ of a minute when the instrument was used as compared to the pencil and paper procedures for all states involved in the study (1.7 minutes and 1 minute, respectively). North Carolina had the largest difference in enumeration time based on the method of data collection. This is most likely explained by field sizes being smaller and uneven terrain causing boundaries to be more complex. Fields in Indiana tend to have straighter boundaries making them easier to input into the instrument.

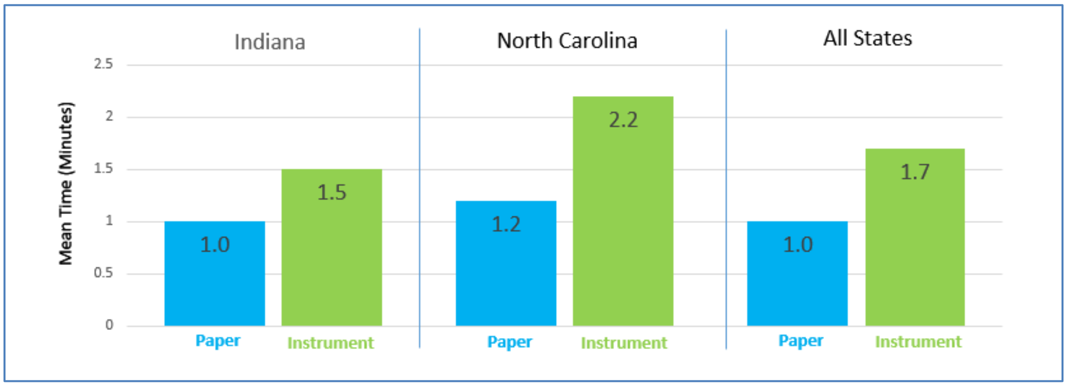

Figure 11: Average Interview Time per Field Paper vs. Instrument

Figure 12 shows the average interview time per field by mode of data collection and by whether the interviews were conducted indoors or outdoors. Overall, instrument conducted interviews had higher interview times as compared to the paper procedures. In Indiana, outdoors interviews with the instrument took longer than those conducted with the instrument indoors. The reverse happened in North Carolina.

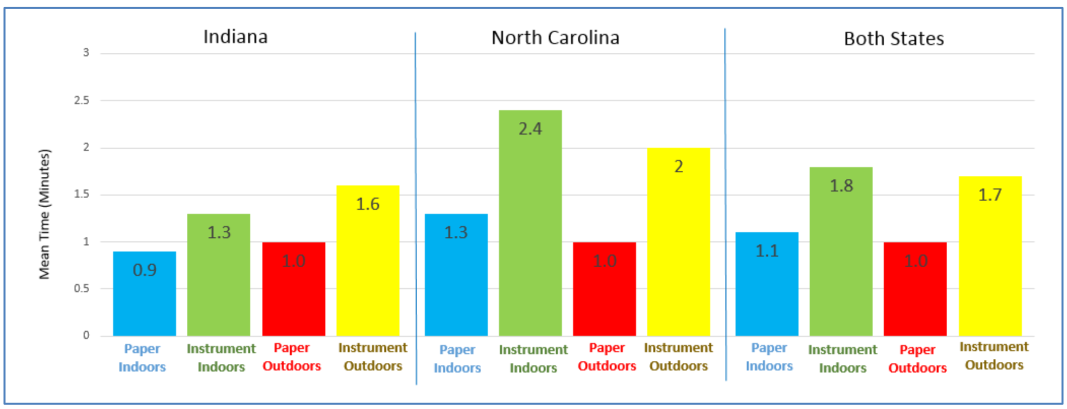

Figure 12: Average Interview Time per Field Indoors vs. Outdoors & Paper vs. Instrument

The amount of time taken to complete the interview with the tract operator was recorded for each tract within the segment. The numbers of tracts vary by segment and the time taken to enumerate the tract may depend on the number of fields, the area of the tract, and/or the state the tract is in. An evaluation of the residuals for the average interview time per field for each tract indicated that the residuals were not normally distributed. As a result, a log transformation was performed on the average interview time per field for each tract. Using SAS's proc Glimmix, a linear model was fit to determine which factors are significant predictors of the log average interview time per field. Analysis of the least squares means was also conducted. The model is described as follows:

$$y = \mu + \beta_{State} + \beta_{Mode} + \beta_{Interview\ location} + \beta_{Mode*State} + \beta_{Mode*Interview\ location} + e_{Enum} + \epsilon$$

where $e_{Enum} \sim N(0, \sigma_e^2)$ **and** $\epsilon \sim N(0, \sigma_e^2)$.

The dependent variable, *y*, represents the log of the average interview time per field. Three predictors were considered in the model: the mode of data collection (paper and instrument), state (Indiana and North Carolina), and interview location (whether the interview was conducted indoors or outdoors). Also, the interactions between mode of data collection with state and with interview location were included in the model. In addition, a random effect was fit for the enumerator collecting the data. Random effects were also considered for the segment being enumerated but did not explain a significant portion of the variance after adjusting interview times for the number of fields in the tracts. Estimates, standard errors, and *p*-values for parameters in the fit model are presented in Table 3.

Table 3: Full Model Results

Parameter	Estimate	Standard Error	t	p - value
Intercept	**-0.1503**	**0.08718**	**-1.72**	**0.1155**
State (North Carolina=1)	**0.2535**	**0.1211**	**2.09**	**0.0368**
Mode of Data Collection (Instrument=1)	**0.4269**	**0.06106**	**6.99**	**<.0001**
Interview Location (Indoors=1)	**-0.01286**	**0.05552**	**-0.23**	**0.8169**
Mode of Data Collection * State	**0.1673**	**0.08083**	**2.07**	**0.0389**
Mode of Data Collection*Interview Location	**-0.07053**	**0.07920**	**-0.89**	**0.3735**

Table 3 shows the estimates, standard errors, *t*-statistics, and *p*-values from the resulting *t*-tests for each coefficient in the linear model. The results indicate that state and mode of data collection are significant predictors of the average interview time per field at an α =0 .05 level (*p*-values equal 0.0368 and 0.0001 respectively). Interviews in North Carolina took longer than interviews in Indiana on average. Also, interviews with the instrument took longer than the pencil and paper interviews on average. However, the location of the interview (indoors or outdoors) is not significant at explaining the average interview time per field. The effect of instrument enumeration in North Carolina was also significant at an α=0.05 level indicating the enumeration on the instrument took longer in this state. Figure 13 shows the least square means of the interaction between mode of data collection and state. From the analysis of the least squares means, it is clear that interview times per field were greater when using the instrument as compared to traditional paper data collection, especially in North Carolina.

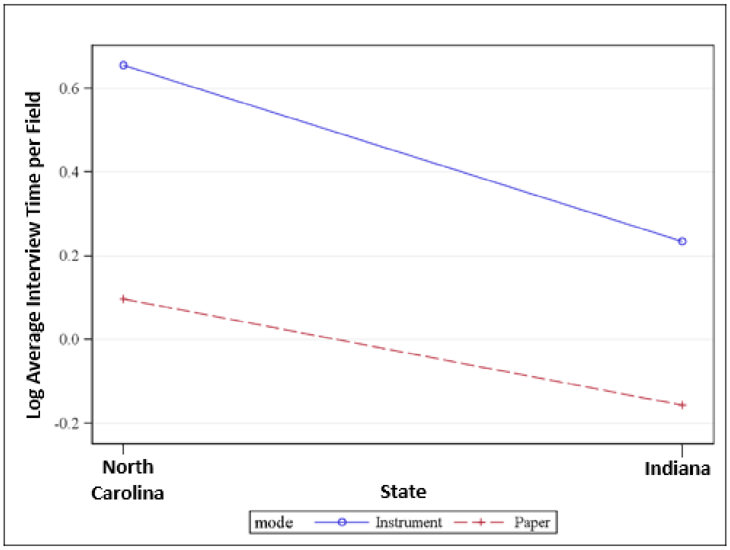

Figure 13: LS Means Mode of Data Collection by State

6. Conclusions

In conclusion, using a mobile mapping instrument shows promise in modernizing NASS's data collection efforts. The results showed that it took on average of about ¾ of a minute longer per field to collect data with the mobile mapping instrument compared to current pencil and paper procedures. Even though it took slightly longer to conduct interviews, utilizing mobile mapping technology to conduct the interviews provides a number of benefits. First, using a mobile mapping instrument will allow for a longer data collection window as it eliminates shipping time, field office hand editing and numerous hours of data entry when the questionnaire is returned to the field office. The quality of the data collected is improved because the instrument has embedded edit checks. When enumerators go into the field with the aerial photograph, they may miss some sections of land. In other words, not all land in the sampled segment is always accounted for using the pencil and paper method. This would not be the case with the mobile mapping instrument, as ALL land within the sampled segment is accounted for and identified.

The use of mobile mapping technology allows for flexibility with field enumerator assignments. For example, currently, if a field enumerator is unable to complete his/her workload, the information needs to be mailed to the supervisor in order to be given to someone else. With the mobile mapping instrument, field enumerators only need to return a segment to the server and another staff member can work on and continue where the first enumerator left off. Another benefit is that using the instrument gives the enumerators more time to conduct interviews. Currently, enumerators have to stop interviews three days prior to the end of the data collection period. Using the instrument allows them to do more interviews in the three day period and then they can just submit their work at the end of the third day. Finally, utilizing mobile mapping technology eliminates the cost of the field enumerators mailing the aerial photographs and all questionnaires back to the field office upon completion of their work.

The use of mock interviews provides a reasonable platform to evaluate collecting data using the mobile mapping instrument. However, this method does not capture all possible interactions between the enumerators and the farmers or data collection conditions that could affect interview times. Further research should focus on evaluating the mobile mapping instrument in the field with actual farm operators to be able to gage real-life interviewing conditions.

7. References

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Attachment A

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 (year).

Field Number		01	02	03	04	05
1.	Total acres in field	828 .	828 .	828 .	828 .	828 .
2.	Crop or land use. [*Specify*]					
3.	Occupied farmstead or dwelling	843 .				
4.	Waste, unoccupied dwellings, buildings and structures, roads, ditches, etc.	841 .	841 .	841 .	841 .	841 .
5.	Woodland — **NP = Not Pastured**, **P = Pastured**	83_ . ☐ NP ☐ P	83_ . ☐ NP ☐ P	83_ . ☐ NP ☐ P	83_ . ☐ NP ☐ P	83_ . ☐ NP ☐ P
6.	Pasture — Permanent (not in crop rotation)	842 .	842 .	842 .	842 .	842 .
	Pasture — Cropland (used only for pasture)	856 .	856 .	856 .	856 .	856 .
8.	Idle cropland – idle all during (year)	857 .	857 .	857 .	857 .	857 .
9.	Two crops planted in this field or two uses of the same crop.	☐ **Yes** ☐ **No**	☐ **Yes** ☐ **No**	☐ **Yes** ☐ **No**	☐ **Yes** ☐ **No**	☐ **Yes** ☐ **No**
	[*Specify second crop or use.*]					
	Acres	844 .	844 .	844 .	844 .	844 .
10.	Acres left to be planted	610 .	610 .	610 .	610 .	610 .
11.	Acres irrigated and to be irrigated [*If double cropped, include acreage of each crop irrigated.*]	620 .	620 .	620 .	620 .	620 .
16.	**Winter Wheat** (*include cover crop*) — Planted	540 .	540 .	540 .	540 .	540 .
17.	For grain or seed	541 .	541 .	541 .	541 .	541 .
20.	**Oats** (*include cover crop*) — Planted and to be planted	533 .	533 .	533 .	533 .	533 .
21.	For grain or seed	534 .	534 .	534 .	534 .	534 .
24.	**Corn** [*exclude popcorn and sweet corn*] — Planted and to be planted	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.	**Hay** [*Cut and to be cut for dry hay.*] — Alfalfa and Alfalfa Mixtures	653 .	653 .	653 .	653 .	653 .
31.	Grain	656 .	656 .	656 .	656 .	656 .
33.	Other Hay	654 .	654 .	654 .	654 .	654 .
34.	**Soybeans** — Planted and to be planted	600 .	600 .	600 .	600 .	600 .
35.	Following another harvested crop	602 .	602 .	602 .	602 .	602 .
51.	**Other crops** — Acres planted or in use	--- .	--- .	--- .	--- .	--- .

Attachment B

ENUMERATOR'S DATA COLLECTION FORM (Front)

Area Frame Modernization Research Team 2014 JAS-CAPI Phase 3Test Enumerator Evaluation Form Project Code: 504	State	Segment	USDA	National Agricultural Statistics Service	U.S. Department of Agriculture Rm 5030, South Building, 1400 Independence Ave., S.W. Washington, DC 2025,0-2000 Phone: 1-800-727-9540, Fax: 202-690-2090 Email: nass@nass.usda.gov
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Item	Description	TRACT																
	TRACT LETTER	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
		Enter: 1-Yes, 3-No, 2-Sometimes																
101	Problems with Grid Segments (Partial field problems, etc.)																	
102	Problems with Aerial Imagery Part (Zooming, Splitting, Functionality, NAIP, etc)																	
201	Any Problems with Section D Form Experienced (Navigation, Questions, Drop Downs, etc.)																	
301	Connectivity Problems (3G/4G)																	
302	Screen Visibility Problems (glare, sunlight, etc.)																	
		Enter: Number of Minutes																
406	Time spent **with** the farmer completing Section D & Photo?																	
407	Time spent **without** the farmer completing Section D & Photo?																	
		Enter: 1-Morning, 2-Afternoon, 3-Evening																
401	Time of Day that the interview was Conducted																	
		Enter: 1-Indoors, 2-Outside, 3-Other																
402	Where was the interview Conducted																	
		Enter: 1-Enthusiastic, 2-Ambivalent, 3-Reluctant																
403	Respondent's Receptiveness to this Technology in data collection																	

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Attachment B

ENUMERATOR'S DATA COLLECTION FORM (Back)

Please Comment on All Aspects of this Data Collection Process with Comments as Detailed as Possible for this Segment.

099 Grid Segments: If Item 101 is" Yes" or "Sometimes", please comment and include tract letter where applicable.
100 GIS/Aerial Imagery: If Item 102 is" Yes" or "Sometimes", please comment and include tract letter where applicable.
200 Section D Form Comments: If Item 201 is" Yes" or "Sometimes", please comment and include tract letter where applicable.
300 iPAD Specific Comments: If any of items 301-302 are " Yes" or "Sometimes", please comment and include tract letter where applicable.
400 General Comments: Relating to Items 401-407, Respondent Burden, Training, or Anything else.

Enumerator Name:	501 Enumerator ID ______	502 MM DD YY Date: __ __ __