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# Targeted Data Collection Efforts for the 2013 ARMS III

Melissa Mitchell  
Kathy Ott  
Heather Ridolfo  
Jaki McCarthy

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## EXECUTIVE SUMMARY

In 2012, the Research and Development Division (RDD) of National Agricultural Statistics Service (NASS) conducted a study examining targeted data collection techniques for the Agricultural Resource Management Survey Phase III (ARMS III) for likely nonrespondent operations identified by classification trees. Due to a variety of reasons, the study was not conducted as anticipated in 2012. RDD conducted the study again in 2013 using a subset of states to assess whether specific data collection techniques can be implemented and whether they improve response rates.

Likely nonrespondent operations were identified using classification trees and a measurement of the impact the operation has on the calibration targets for ARMS III, so that targeted data collection could be used to increase response rates for those operations. The targeted data collection techniques included providing enumerator incentives and using supervisory enumerators and/or regional office directors and State Statisticians to make in-person contacts with highly likely nonrespondents.

Because this was largely an exploratory study, our sample sizes are too small to demonstrate statistical differences in response rates. Overall, we found a meaningful difference in response rates (7%) for the treatment group above the control group, although it was not statistically significant. Working with the smaller number of states, we were able to obtain much needed buy-in for the study, something that was missing from the 2012 study.



## RECOMMENDATIONS

1. Continue to use the nonresponse propensity scores to identify and target likely nonrespondent operations in ARMS III.
2. Continue to use the impact scores to identify records that impact calibration targets for ARMS III so that targeted data collection strategies can be used.
3. Continue the use of enumerator incentives for likely nonrespondents to ARMS III, but also consider using varying amounts for the incentives based on the level of nonresponse.
4. Conduct a controlled, large scale study, with consistent use of the same targeted package of data collection procedures and enumerator incentives to determine if they increase response rates. This was attempted in 2012, but results were confounded by inconsistent implementation.

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# Targeted Data Collection Efforts for the 2013 ARMS III

Melissa Mitchell<sup>1</sup>, Kathy Ott<sup>2</sup>, Heather Ridolfo, & Jaki McCarthy<sup>3</sup>

## Abstract

In 2013, the Research and Development Division of the National Agricultural Statistics Service conducted a study to determine if targeted data collection for likely nonrespondents could positively impact response rates for the Agricultural Resource Management Survey (ARMS) Phase III. The methodology for the study was the same as a study done in 2012, but was implemented with only four participating regions, encompassing 12 states. This smaller sample was used in 2013 due to the unforeseen complications with carrying out the 2012 study across the United States. Likely nonrespondents were flagged using classification trees and their relative importance to the calibration target was taken into consideration with the use of impact scores. Flagged records were then assigned to targeted data collection methods including the use of enumerator incentives and having state or regional office staff make in person contacts to attempt to increase response rates for those records. Given our small sample size, this is an exploratory study.

**Key Words:** Nonresponse propensity scores, impact scores, data mining, targeted data collection, ARMS, calibration target

## 1. INTRODUCTION

### 1.1 Background

Nonresponse is a major issue for the Agricultural Management Survey (ARMS) conducted by the National Agricultural Statistics Service (NASS) in collaboration with the USDA's Economic Research Service (ERS). ARMS is conducted in three phases, but this research focuses only on the third phase. The third phase of ARMS (otherwise known as ARMS III) focuses on farm production and financial information. The ARMS III survey has traditionally been personally enumerated, however, beginning in 2012 and continued in 2013, it was mailed out, with personal visit followup for nonrespondents.

Response rates for ARMS III have been low over time (except during years ending in 2 and 7 when ARMS is collected with the mandatory Census of Agriculture), typically falling below the Office of Management and Budget (OMB) standard response rate of 80% (see Table 1). There have been several research endeavors to increase response rates and reduce bias that include

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<sup>1</sup> Melissa Mitchell was a Mathematical Statistician with the National Agricultural Statistics Service, Research and Development Division, 3251 Old Lee Highway, Room 305, Fairfax, VA 22030.

<sup>2</sup> Kathy Ott is a Mathematical Statistician with the National Agricultural Statistics Service, Methodology Division, 1400 Independence Ave SW, Washington DC.

<sup>3</sup> Heather Ridolfo is a Survey Statistician and Jaki McCarthy is the Senior Cognitive Research Methodologist with the National Agricultural Statistics Service, Research and Development Division, 3251 Old Lee Highway, Room 305, Fairfax, VA 22030.

offering incentives and calibrating to known targets (McCarthy, Beckler, & Ott, 2006; Earp, McCarthy, Schauer, & Kott, 2008; Earp, McCarthy, Schauer, & Kott, 2009; Earp, McCarthy, Porter, & Kott, 2010). Recently, work has focused on proactively identifying nonrespondents (Earp, Mitchell, McCarthy, & Kreuter, 2014; Earp, Mitchell, McCarthy, & Kreuter, 2012; Earp & McCarthy, 2011; McCarthy, Jacob, & McCracken, 2010; McCarthy & Jacob, 2009) in order to target data collection methods for those cases.

Table 1: ARMS III Response Rates 2000-2012

ARMS III Sample Year	ARMS III Sample Size ( $n$ )	ARMS III Respondents ( $n_r$ )	ARMS III Nonrespondents ( $n_n$ )	ARMS III response rates
2000	17,903	11,295	6,608	63.1%
2001	13,313	8,500	4,813	63.8%
2002	18,219	13,484	4,735	74.0%
2003	33,861	21,278	12,583	62.8%
2004	33,908	22,966	10,942	67.7%
2005	34,937	24,704	10,233	70.7%
2006	34,203	23,237	10,966	67.9%
2007	31,924	22,304	9,620	69.9%
2008	36,388	24,066	12,322	66.1%
2009	33,348	22,753	10,595	68.2%
2010	35,431	23,285	12,146	65.7%
2011	34,070	22,130	11,940	65.0%
2012	32,096	23,492	8,604	73.2%
Total	389,601	263,494	126,107	67.6%

This study was done in response to the results of a previous ARMS study (Mitchell, Ott, and McCarthy, 2015). In that study, the treatment condition procedures were not followed as RDD anticipated. Therefore, in 2013, RDD attempted the 2012 study again with a smaller group of states. Procedures are outlined below, but are identical to the 2012 study, with an added emphasis on making the first follow-up contact in person.

## 1.2 Classification Tree Models

The method NASS used to target likely nonrespondent operations is an ensemble, or set, of classification trees. Classification (or decision) trees are used to predict the outcome of a binary variable, such as survey response/nonresponse, from auxiliary data. The primary objective of classification trees is classification of groups (in our case respondent/nonrespondent operations). For the classification trees developed for predicting ARMS nonresponse, the auxiliary data used (which is available for both ARMS respondents and nonrespondents) were variables from the 2002 and 2007 Census of Agriculture.

These classification trees are created by segmenting a dataset by a set of simple rules. The rules assign an observation to a segment based on the input variable that maximizes the difference between two groups based on the target (in this case survey nonresponse). The dataset is sequentially split into subsets by these rules until no more splits can be created. No more splits



can be created when the sample size per segment is too small, no more significant splits can be created, or the maximum depth of the tree is too large.

Classification trees create a hierarchy (tree) where the segments are called nodes. The first node, known as the root node, contains the entire dataset. From the root node, there are branches which are paths to and from nodes within a tree. Terminal nodes are nodes that have no branches coming from them and are known as leaves. Each record will appear in only one of the leaves and the leaves will collectively contain all the records in the dataset. The leaves of interest are those that have the highest proportion of records with the target, in this case, nonresponse.

In addition to using classification trees to identify likely nonrespondent operations, NASS also used impact scores to identify influential operations within our likely nonrespondent group. Impact groups are related to calibration targets and are created by determining how important an operation is to meeting the calibration targets for particular data items. Operations are given a rank score from 1 to 3 depending on how important they are to the calibration target. Operations in Impact Group 3 are the most important to the calibration targets, those in Impact Group 2 are of mid-importance to calibration targets, and those in Impact Group 1 are not as important to calibration targets. Only likely nonrespondent operations were given an impact group ranking. Assignment to impact groups was based on a point system where the number of points are based on the following criteria: one point for each commodity for which the operation is in the top 10% of production or inventory within their state, one point for each commodity for which the operation is in the top 10% of sales within their state, and one point for each calibration target for which an operation has any positive value. See Appendix A for the official procedures regarding the creation of impact groups.

## **2. METHODS**

When using classification trees, usually a single tree is created with the best initial split. However, an ensemble of trees was created for ARMS III, for a variety of reasons. In the single tree framework, the tree is created with the best initial split based on a portion of the data (training data), but there is no guarantee that is the best split based on the entire dataset. Also, the initial split directly affects the subsequent splits, so although it may be a good initial split, it may not identify the greatest number of operations in the target. It is possible that a split that is not initially the most optimal will provide better subsequent splits. By growing multiple trees (an ensemble) we have a richer understanding of likely nonrespondents that will possibly bias our key estimates.

Therefore, every variable was forced to be used as an initial split in one tree for this study. There were 71 variables in the dataset that could serve as the initial split and 70 of those splits were statistically significant ( $p < 0.20$ ) (see Appendix B). These 70 variables were the same 70 that were significant in the 2012 study. The 70 statistically significant initial splits were used separately in the model to grow 70 different trees. Therefore, each variable was considered when assessing characteristics of nonrespondents. All variables were considered for subsequent splits in the tree and those splits were determined by the splitting algorithm used by SAS Enterprise Miner (SAS, 2009). A total of 140 trees were created using the 70 variables from the Census of Agriculture (COA), 70 from the 2002 COA and 70 from the 2007 COA.

In 2013, a threshold of 0.70 was chosen to act as a cut-off to distinguish between likely nonrespondents and all other operators. Therefore, all leaves (also called terminal nodes) with seventy percent nonresponse rate or higher were selected from each tree. We flagged operations whose average nonresponse propensity was greater than or equal to 0.70 across *all* trees. These most likely nonrespondent operations were flagged for targeted data collection methods.

Four regional offices, covering 12 states, were selected to participate in the study. The regional offices that participated were the Northwest Region (Washington, Oregon, Idaho), Great Lakes Region (Michigan, Indiana, Ohio), Northern Plains Region (Nebraska, Kansas, North Dakota, South Dakota), and Pacific Region (California/Nevada). When planning this experiment, RDD recognized that the sample would be too small to make any statistically significant claims about our treatment conditions. However, given the difficulty of the 2012 experiment, RDD wanted to conduct a small scale experiment with a few regions to determine if the procedures could be implemented in a production environment.

In this study, 464 operations within these 12 states were flagged as likely nonrespondent operations across all questionnaire versions. These 464 flagged operations were randomly split into a treatment group ( $n=230$ ) and comparison group ( $n=234$ ) after stratifying by state and farm type.

For 2013, as in 2012, all operations in the treatment and control group were mailed a questionnaire as the first survey contact. All mail nonrespondent records from both groups were sent to the state offices to be enumerated by field enumerators. Field enumerators were asked to make each followup visit in person (not on the phone) to gain response. Field office personnel completed a scoring supplement sheet for each case in the treatment group. The scoring supplement contained questions about the data collection techniques that were used for each operation and was used to assess the effectiveness of the treatment options. State offices could indicate multiple techniques on the sheet. See Appendix C for the Scoring Supplement Sheet that was used in 2013.

For records in the treatment group, specific follow-up contact techniques were used based on the impact group assignment. For records in impact group 3 (those highly likely nonrespondent records most important to calibration targets), no records were held out of data collection (unless there was a dangerous situation), and the follow-up contact was done in person by the director, deputy, office staff, or supervisory enumerator to set the stage for a supervisory enumerator to collect the survey data. For records in impact group 2, the follow-up contact was made by a supervisory enumerator in person to collect the data or set the stage for an experienced enumerator to collect the data. For records in impact group 1, an enumerator was sent to the operation to either collect the data or set up an appointment to collect the data. See Appendix A for the official procedures for the 2013 data collection.

Also similar to 2012, in 2013, the package of targeted follow-up contact techniques also included enumerator incentives for enumerators who completed records in the treatment sample in any of the three impact groups. Enumerators were given a bonus of twenty dollars for every flagged operation in the treatment group for which they obtained a response.

### 3. RESULTS

Comparing the response rates from the treatment and control group, there was not a significant difference in response rate ( $\chi^2(1, N=464)=2.76, p=.10$ ). However, the difference in response rates is in the expected direction with over 7 percent more completions in the treatment group (see Table 2).

Other numbers to note are the office hold and inaccessible percentages. The instructions specifically asked for states to only hold the treatment records in the office if there were safety concerns (often, records are held in the office for other reasons). The results show that they followed the procedures as there are no office holds in the treatment group. Also, for the treatment group, we asked that states go in person to make the first contact with a potential respondent, instead of calling to set up an appointment. In a short data collection period, this may lead to increased inaccessible rates, but the data collection window for ARMS is several months and enumerators could call if they could not make contact in person, so any effect would be expected to be small. The inaccessible rate is higher for the treatment group, but only slightly.

Table 2: Response Rates for the Control and Treatment Groups

	Control Group	Treatment Group
Complete	40.2%	47.8%
Refusal	52.6%	45.2%
Inaccessible	5.5%	7.0%
Office Hold	1.7%	0.0%
N	234	230

Although it is important to assess specific treatments in order to best use limited resources, the small sample size did not allow us to make any statistically valid conclusions. Enumerators and state offices were not limited to a certain number or combination of treatment options to try, and we did not have big enough sample size to test all possible combinations. There may be a combination that works best, but we were unable to identify that combination in this study.

#### 3.1 Field Office Adherence with Interview Instructions

Overall, for the treatment sample, offices followed the instructions about who should contact a targeted operation for 60% of the cases. Compared to 2012, this study had much more compliance.

Impact Group 3 contained the operations that were highly likely nonrespondents with the most impact on calibration targets. There were 25 operations in this group and offices were able to comply with the instructions in 68% of the cases. For 40% of the cases, a director/deputy/state statistician contacted the operation in addition to a supervisory enumerator. For 12% of the cases, only a director/deputy/state statistician contacted the operation. In another 16% of these cases, only a supervisory enumerator contacted the operation. The first follow-up was completed in person 64% of the time.

Operations in Impact Group 2 were highly likely to be nonrespondents and of mid-importance to calibration targets. There were 58 operations in this group and offices were able to follow the instructions regarding who should make contact with an operation in 31% of cases. The instructions specified the use of a supervisory or experienced (or refusal conversion) enumerator, but for most cases, RFOs used a standard field enumerator. Fifty percent of the first contacts made for these operations were done in person. It may be too difficult logistically for RFOs and State Statisticians to assign supervisory enumerators to this many individual cases.

Operations in Impact Group 1 were those operations that were highly likely to be nonrespondents and were the least likely to impact calibration targets. This group had the largest subset of the treatment group (N=147). The instructions given for this group closely mirrored current procedures carried out by the regions. In this group, offices were able to follow the instructions regarding who should contact the operations 100% of the time. As stated above, the instructions provided for this group mirror the current data collection strategy employed in the RFOs, likely the main reason for the high compliance for this group. However, the first follow-up was only completed in person 42% of the time.

### **3.2 Enumerator Incentives**

For all of the operations in the treatment group, the instructions called for enumerator incentives (\$20) to be provided to any enumerator that completed a report for these likely nonrespondent operations. The intention of the enumerator incentives was to emphasize the importance of these operations and increase enumerator emphasis on encouraging cooperation from likely nonrespondents. The treatment and control group in this experiment were a small part of the overall sample. Interviewers knew which cases were in the treatment group, but could not distinguish between cases in the control group and the cases that were not included in study. In 2013, all states in all of the regions (Northwest Region, Great Lakes Region, Pacific Region, and Northern Plains Region) that participated in the study used the enumerator incentives except for North Dakota (in the Northern Plains region). North Dakota only had two operations in the treatment group.

All of the enumerators were informed of the incentive prior to data collection. Ten incentives were given in the Northwest Region (6 in Washington, 1 in Oregon and 3 in Idaho). In the Great Lakes Region, 11 were given (0 in Ohio (only operation eligible for incentive was mail refusal), 4 in Indiana (out of 9), and 7 were given in Michigan (out of 14)). In the Pacific Region, 56 incentives were given. Finally, in the Northern Plains region, there were 10 incentives given (1 in Kansas, 6 in Nebraska, and 3 South Dakota).

HQ recommended that any leftover funds be put towards the general incentive fund. There were also some additional modifications of how the incentives were used in the regions. In the Northwest Region, they used the incentive funds to give separate awards or incentives to enumerators that were able to turn an incomplete or refusal mail response into a completed interview. In the Pacific Region, they allocated the incentive money relative to the impact score. For operations with an impact score of 1 (denoted 21) – a \$10 incentive was given, for operations with an impact score of 2 (denoted 22) – a \$25 incentive was given and for operations with an impact score of 3 (denoted 23) – a \$50 incentive was given.

Unlike 2012 when only half of the offices used the enumerator incentives, in 2013 the incentive money was allocated as recommended and enumerator incentives were given. These incentives could have motivated enumerators to work harder for those cases deemed very difficult to obtain a response, helping lead to the 7% increase in response we saw in the treatment group. Moving forward, enumerator incentives could be used for these hard to get cases. It may make more sense to use a tiered system where operations with an impact score of 3 would have a higher incentive amount linked to it than impact group 2 or 1 as was done in the Pacific Region as opposed to a flat rate of \$20, but that will have to be evaluated and established by Survey Administration Branch (SAB).

#### **4. CONCLUSION AND RECOMMENDATIONS**

This study was an exploratory study on data collection techniques for ARMS III because sample sizes were too small to evaluate the treatment. Compared to the study in 2012, this study in 2013 had better compliance by the participating regional and field offices. This experience should allow us to move forward with a larger national study, similar to 2012, but with better compliance across all offices. However, not all regions may be able to devote the time to implement in-person interviews by office management and staff for an experiment. If the study is conducted with a larger and more representative sample i.e., the entire sample of likely nonrespondents, RDD and SAB may be able to outline the best data collection techniques that should be used in ARMS III.

Although the sample size was too small to show statistical significance, we saw a 7% increase in the response rate for the treatment group in the four participating regions. These regions used targeted data collection methods including using supervisory enumerators and office staff for first follow-up contacts and enumerator incentives. This is promising and could indicate that when used consistently, in-person visits by high level staff to highly likely nonrespondent impact operations and enumerator incentives could increase response rates across all states for the ARMS Phase III.

## **4.1 Recommendations**

Based on the research done, the following are recommended:

1. Continue to use the nonresponse propensity scores to identify and target likely nonrespondent operations in ARMS III.
2. Continue to use the impact scores to identify records that impact calibration targets for ARMS III so that targeted data collection strategies can be used.
3. Continue the use of enumerator incentives for likely nonrespondents to ARMS III, but also consider using varying amounts for the incentives based on the level of nonresponse.
4. Conduct a controlled, large scale study, with consistent use of the same targeted package of data collection procedures and enumerator incentives to determine if they increase response rates. This was attempted in 2012, but results were confounded by inconsistent implementation.

## 5. REFERENCES

- Earp, M.S, McCarthy, J.S., Shauer, N.D., & Kott, P.S. (2008). Assessing the Effect of Calibration on Nonresponse Bias in the 2005 ARMS Phase III Sample Using Census 2002 Data, Appendix A. Research and Development Division Staff Report RDD-08-01. United States Department of Agriculture, National Agricultural Statistics Service.
- Earp, M.S, McCarthy, J.S., Shauer, N.D., & Kott, P.S. (2009). Assessing the Effect of Calibration on Nonresponse Bias in the 2006 ARMS Phase III Sample Using Census 2002 Data. In *JSM Proceedings*, American Statistical Association. Washington, D.C: American Statistical Association.
- Earp, M.S., McCarthy, J.S., Porter, E., & Kott, P.S. (2010). Assessing the Effect of Calibration on Nonresponse Bias in the 2008 ARMS Phase III Sample Using Census 2007 Data. In *JSM Proceedings*, American Statistical Association. Vancouver, British Columbia: American Statistical Association.
- Earp, M. and McCarthy, J. (2011). Using Nonresponse Propensity Scores to Improve Data Collection Methods and Reduce Nonresponse Bias. In *JSM Proceedings*, American Association of Public Opinion Research. Phoenix, AZ: American Statistical Association.
- Earp, M, Mitchell, M., McCarthy, J., & Kreuter, F. (2012) Who is Responsible for the Bias? Using Proxy Data and Tree Modeling to Identify Likely Nonrespondents. In *ICES IV Proceedings*, American Statistical Association. Montreal, Quebec, Canada: American Statistical Association.
- Earp, M., Mitchell, M., McCarthy, J. and Kreuter, F. (2014). Modeling Nonresponse in Establishment Surveys: Using an Ensemble Tree Model to Create Nonresponse Propensity Scores and Detect Potential Bias in an Agricultural Survey. *Journal of Official Statistics*, Vol 30 (4).
- McCarthy, J.S., Beckler, D.G., and Ott, K. (2006). The Effect of Incentives on Response in 2005 ARMS Phase III Interviews. Research and Development Division Staff Report RDD-06-07, United States Department of Agriculture, National Agricultural Statistics Service.
- McCarthy, J.S., & Jacob, T. (2009). Who Are You?: A Data Mining Approach to Predicting Survey Non-respondents. In *JSM Proceedings*, American Association for Public Opinion Research. Hollywood, Florida: American Statistical Association.
- McCarthy, J.S., Jacob, T, & McCracken, A. (2010). Modeling Non-response in National Agricultural Statistics Service Surveys Using Classification Trees, Research and Development Division Research Report Number RDD-10-05, US Department of Agriculture, National Agricultural Statistics Service.

Mitchell, M., Ott, K., & McCarthy, J. (2015). Targeted Data Collection Efforts for the 2012 ARMS III. Research and Development Division Research Report Number RDD-15-01, US Department of Agriculture, National Agricultural Statistics Service.

SAS Institute Inc., Enterprise Miner 6.2 Help and Documentation, Cary, NC: SAS Institute, 2009.



## APPENDIX A: TARGETED PROCEDURES FOR 2013 ARMS

### 2013 ARMS Phase III Data Collection Procedures Experiment

Kathy Ott and Melissa Mitchell, January 2014

#### A. Background/Introduction

Similar to the 2012 ARMS, during the 2013 ARMS III data collection, slightly different data collection procedures will be used for operations based on their propensity to be a non-respondent on the ARMS survey and their importance to the calibration target for specific commodities. The main differences in the data collection methodology are the mode of the first data collection follow-up contact, the person making that contact, and the use of enumerator incentives for the operations that are the highly likely to be non-respondents. To analyze the impact of the procedures, a sample of operations that are identified as highly likely to be non-respondents was selected for a treatment sample and a control sample, with an “Impact Group Code” assigned for each operation in those samples. Response rates, non-response rates, and cost for the two groups will be analyzed to determine if the procedures improve response and at what cost.

Unlike 2012 ARMS, only selected ROs will participate in the study. Four regional offices, covering 12 states will be asked to participate in this study – Northwest Region (Washington/Oregon/Idaho), Great Lakes Region (Michigan/Indiana/Ohio), Northern Plains Region (Nebraska/Kansas/North Dakota/South Dakota), and Pacific Region (California/Nevada). The participating states agree to use the data collection methods described below and to document what they do for each case in the treatment sample.

Operations in the treatment sample in each of the impact groups will follow a specific follow up data collection methodology as outlined below. Regional and Field Offices can identify operations in the treatment group using the “Scoring” variable from the sample master. A [2013 ARMS—Phase III Scoring Supplement](#) is required for all records with a scoring indicator of 21, 22 or 23. The scoring variable and POID from the sample master should be recorded on the scoring supplement and matched with the appropriate ARMS III record to determine the required follow-up strategy and to document the actual follow-up methods used. Treatment group records submitted to the SPS edit without the Scoring Supplement will trigger a critical error. Details on how the Impact Group Codes were assigned are in the Appendix.

#### B. Data Collection Procedures

All cases selected for all ARMS versions will be initially mailed a questionnaire in late December to fill out and mail back or fill out through EDR. Non-respondents will be mailed a second questionnaire 3-4 weeks later. The procedures below describe the follow-up contacts to those mailings for the treatment sample.

Procedures are identified for different groups of operations based on their impact group and previous notes about the operation. The main differences in the procedures are the mode of the first follow-up contact and the person making the contact.

### **1. For operations in the treatment sample:**

An enumerator incentive will be provided to the enumerator for each operation that is identified as highly likely to be a non-respondent, that is, all operations in the treatment sample (Scoring = 21, 22, or 23). The incentive will be given just for those cases where the initial follow-up contact is made by an enumerator. If the case is mailed in, or if the initial follow-up contact is made by the RO director, deputy director, state statistician or other office person, then the incentive money for that case can be used in the general enumerator incentive pool.

**Operations in Impact Group 3** – Operations in the treatment group that are highly likely to be nonrespondents and have the most impact on calibration targets (the variable “Scoring” =23; for information on the “Scoring” variable, see the Appendix).

- **Office Hold:** Do not assign these to Office Hold unless it is a dangerous situation.
- **Initial In-Person Followup contact:**
  - This contact should be made IN PERSON by the regional director, deputy director, state statistician, survey coordinator, or supervisory enumerator. Do NOT call ahead to make an appointment. Try to reach the operation at least two times in person before calling.
    - If the supervisory enumerator makes this contact, they may collect data at this time or set up an appointment for data collection.
    - If a non-enumerator makes the contact, they should bring a questionnaire with them, but the intent of this contact is not to collect data, but to set the stage for a supervisory enumerator to contact the operation to collect data. The questionnaire can be filled out, however, if the respondent wishes to at this time.
  - Whoever collects the data should:
    - Provide a data product, ARMS report, or other token item to the operator,
    - Provide information about the survey and relevant ARMS data,
    - Describe that this operation in particular is important to the survey and that is why they have been visited in person, and
    - Give the operator the name of the enumerator who will contact them if applicable.
- **Enumerator assignment:**
  - Assign these cases to a supervisory or very experienced enumerator to contact after the in-person follow-up contact by the regional director, deputy director, state statistician, survey coordinator, or supervisory enumerator.
- **Data collection:**

- Provide detailed notes about the data collection experience.
- Before making contact, review all known information about an operation (size, type, special instructions, ELMO comments, etc.) to tailor data collection if needed.
- Fill out the Scoring Supplement.

**Operations in Impact Group 2** – Operations in the treatment group that are highly likely to be nonrespondents and have medium impact on calibration targets (“Scoring” =22).

- **Office Hold:** Assign Office Holds as you normally would, using guidance from SAB.
- **Initial In-Person Followup contact:**
  - This contact should be made in person by a supervisory enumerator, with a telephone contact used only if necessary.
  - The supervisory enumerator may collect data at this time, set up an appointment for data collection at a later time, or set the stage for a non-supervisory enumerator to come at a later time.
  - The supervisory enumerator should:
    - Provide a data product, ARMS report, or other token item to the operator,
    - Provide information about the survey and relevant ARMS data,
    - Describe that this operation in particular is important to the survey and that is why they have been visited in person.
- **Enumerator assignment:** Assign these cases to a supervisory enumerator or a non-supervisory enumerator with the best refusal conversion techniques.
- **Data collection:**
  - Follow other procedures as usual.
  - Fill out the Scoring Supplement.

**Operations in Impact Group 1** – Operations in the treatment group that are highly likely to be nonrespondents and have a low impact on calibration targets (“Scoring” =21).

- **Office Hold:** Assign Office Holds as you normally would, using guidance from SAB.
- **Initial In-Person Followup contact:**
  - This contact should be made in person by an enumerator as normally assigned, with a telephone contact used if necessary.
  - The enumerator should provide information about the survey and relevant ARMS data.
- **Enumerator assignment:** Assign these cases to enumerators as you normally would.
- 
- **Data collection:**

- Follow other procedures as usual.
- Fill out the Scoring Supplement.

Talking points for in-person follow-up contact:

- Remind the operator that they received a questionnaire in the mail in late December 2013 or early January 2014 and another one in late January 2014.
- Tell the operator that they can fill out the questionnaire on paper to mail back, through EDR, or with an enumerator.
- If data are not collected at the initial visit, give the operator the name of the enumerator who will conduct the actual interview, if possible.
- Give a brief description of the ARMS survey and selection of their operation.
- Give information on why this particular operation is important (it has a particular commodity, is a certain size, etc.) and that you are visiting them in person because of their importance.
- Give examples of how the data are used.
- Ask if they have any questions.

### **C. For operations that you have previous data collection agreements**

Conduct data collection according to your previous agreement. For operations in the treatment sample, note this on the Scoring Supplement.

### **D. For all other operations in the ARMS sample:**

- **Office Hold:** Assign Office Holds as you normally would, using guidance from SAB.
- **Initial In-Person Followup contact:**
  - This contact should be made by an enumerator as normally assigned. A telephone contact can be used to set up an appointment.
  - The enumerator should provide information about the survey and relevant ARMS data.
- **Enumerator assignment:** Assign these cases to enumerators as you normally would.
- 
- **Data collection:**
  - Follow other procedures as usual.

# Assignment and Labeling of Impact Group Codes

## Assignment of Impact Group Codes

There were two steps in the assignment of the Impact Group for the 2013 ARMS III.

### 1. Nonresponse Propensity Score Flags

RDD assigned Nonresponse Propensity Score flags to the entire ARMS Phase III sample using the classification tree models. For ARMS Phase III, 140 classification trees were grown using Census of Agriculture variables. For each tree, a propensity was calculated for each operation which indicates their likelihood of being a nonrespondent. Operations that had an average propensity of .70 across all 140 trees were flagged to signify that they were highly likely to be a nonrespondent.

The operations that were identified by the models as the most likely to be nonrespondents were then divided into either the control sample or the treatment sample. Using all ARMS sample from all versions, 803 operations with an average nonresponse propensity score of .70 across all trees were flagged, with 395 in the treatment sample and 408 in the control sample. For the 12 states participating in the study, there are 450 flagged operations with 223 in the treatment sample and 227 in the control sample.

### 2. Impact Group Score

The treatment and control sample cases were then sent on to SMB. SMB divided those operations in the control and treatment samples into 3 “impact groups”, based on their importance to the calibration targets, by state. The control sample was divided into impact groups for analysis purposes only.

To make the assignments, SMB downloaded the control data that matched each calibration target for the records in the ARMS sample. Then, point assignments were made using the following criteria:

- a. A record received 1 point for having any positive value for each calibration target or for value of sales. For example, if an operation had 5 acres of corn and 10 cattle, it automatically received 2 points, one for each item of interest.
- b. If a record was in the top 10% of production or inventory within their state (from the approximately 803 records in the control and treatment groups) for any particular item, that record received 3 points.
- c. If a record was in the top 10% of sales within their state, they would also receive 3 points.

The points across all states ranged from 1 – 30.

Finally, using the point totals, the records were split into 3 groups: 1 = Impact Group 1, 2 = Impact Group 2, and 3 = Impact Group 3. Since Group 3 records require the most intensive follow-up work, our target for Group 3 was to have less than 20 operations selected for each state to make this task manageable. The splits resulted in the following breakdowns:

Group 3: Points  $\geq 7$

Group 2: 4 – 6 points

Group 1: 0 – 3 points

## APPENDIX B: COA SPLITTING VARIABLES

Rank	Variable Name
1	Total Sales Not Under Production Contract (NUPC)
2	Total Value of Products Sold + Government Payments
3	Total Production Expenses
4	The Number of Hired Workers Employed More than 150 Days
5	Machinery and Equipment Value in Dollars
6	Acres of Cropland Harvested
7	Cropland Acres
8	Total Reported Acres of Crops Harvested
9	Acres of Land Owned
10	State
11	Total Acres Operated
12	The Number of Hired Workers Employed Less Than 150 Days
13	Any Migrant Workers Y/N
14	Total Cattle and Calf Inventory
15	Total Expenditures
16	Farm Type Code
17	Type of Organization
18	Percent of Principle Operator's Income from the Farm Operation
19	Computer Used for the Farm Business Y/N <sup>4</sup>
20	Acres of All Other Land
21	Principal Occupation of Principle Operator is Farming Y/N
22	Total Government Payments
23	ARMS III Production Region (Atlantic, South, Midwest, Plains, or West)
24	Acres of Land Rented from Others
25	Any Hired Manager Y/N
26	Operation had Internet Access Y/N
27	Number of Households Sharing in Net Farm Income
28	Acres of all Irrigated Hay and Forage Harvested
29	Number of Days Principle Operator Worked off Farm
30	Total Fruit Acres
31	Total Acres of Vegetables
32	Acres of Woodland Pasture
33	Principal Operator's Age
34	Acres of Woodland Not in Pasture
35	Number of Operators
36	Acres on Which Manure Was Applied
37	Acres of Permanent Pasture & Rangeland
38	Acres of all Hay and Forage Harvested
39	Total Poultry Inventory
40	Partnership Registered Under State Law Y/N

<sup>4</sup> Only asked on the 2002 Census of Agriculture.

41	Acres of Cropland Used for Pasture
42	Total Hog and Pig Inventory
43	Principal Operator Lives on Operation Y/N
44	Percent of Operators that are Women
45	Acres of Cropland for Which All Crops Failed
46	Acres of Cropland in Summer Fallow
47	ARMS III Questionnaire Version
48	Total Sales Under Production Contract (UPC)
49	Total Citrus Acres
50	Nursery Indicator Y/N
51	Principal Operator's Sex
52	Principal Operator – Race, Black
53	Acres of Land Rented to Others
54	Operation Farm Tenure (1=full owner, 2=part owner, or 3=tenant)
55	Number of Persons Living in Principle Operator's Household
56	Acres of Cropland Idle or Used for Cover Crops
57	Have other farm Y/N
58	Principal Operator – Race, White
59	Sheep and Lamb Indicator Y/N
60	Year Principal Operator Began this Operation
61	Number of Women Operators
62	Other Livestock Animals
63	Agriculture on Indian Reservations Y/N
64	Principal Operator – Race, American Indian
65	Acres of Christmas Trees and Short Rotation Woody Crops
66	Acres of Certified Organic Farming
67	Possible duplicate Y/N
68	Principal Operator is of Spanish Origin Y/N
69	Principal Operator – Race, Asian
70	Aquaculture Indicator Y/N
71	Principal Operator – Race, Native Hawaiian or Pacific Islander <sup>5</sup>

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<sup>5</sup> Not significant at the 0.20 level.



## APPENDIX C: Scoring Supplement Sheet



I

### 2013 AGRICULTURAL RESOURCE MANAGEMENT SURVEY (ARMS) – PHASE III SCORING SUPPLEMENT

SCORING	VERSION _____	ID _____	TRACT <b>01</b>	SUBTRACT _____
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[NOTE: This supplement must be completed for ALL operations with a scoring indicator of 21, 22, or 23. Include BOTH respondents and non-respondents.]

1. In the last column, enter a 1 for ALL data collection methods used.

Method	Mark ALL methods that were used YES = 1
a. First followup contact was made in-person (did not call first). <i>This method is required for all records with a scoring indicator of 21, 22, or 23.</i> .....	1348
b. RFO Director / Deputy Director / State Statistician made in-person visit prior to data collection. ....	1321
c. Sent RFO Director / Deputy Director / State Statistician to collect data during data collection. ....	1322
d. RFO Director / Deputy Director / State Statistician contacted respondent by telephone. ....	1323
e. Sent Supervisory Enumerator to collect data. ....	1326
f. Sent Refusal Conversion Enumerator to collect data. ....	1325
g. Sent Field Enumerator to collect data. ....	1324
h. Sent someone else to collect data (include note below). ....	1327
i. Sent personalized/customized letter. ....	1329
j. Provided token incentive item. ....	1330
k. Provided ARMS specific data product. ....	1331
l. Other method used, specify: _____	1332
m. Questionnaire was received by mail or EDR. ....	1345

2. Do you have any comments on how you handled this record?

YES - [Enter code 1, then write comments below]     NO - [Enter code 3]. ....

CODE

1345
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