Supporting Statement

FIELD CROPS OBJECTIVE YIELD SURVEYS
OMB No. 0535-0088

B. COLLECTION OF INFORMATION EMPLOYING STATISTICAL METHODS

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection has been conducted previously, include the actual response rate achieved during the last collection.

Respondents to the Field Crop Objective Yield Survey are a sub-sample of farmers who participated in one of the following surveys a few weeks earlier: March Agriculture Survey, June Agriculture Survey, or June Area Survey (OMB No. 0535-0213). The only strata that is used is for identifying the target states.

The 2014 completion rates for the Field Crop Objective Yield Survey (Form A) appear below, by survey crop. U.S. estimates of planted acres and sampled units are also shown. Sample fields are selected with probabilities proportional to acreage.

Table B.1.a Projected Counts and Actual Completion Rates, Form A, By Crop

Survey Crop	Sampling Frame	No. of States	Questionnaires	2014 Allocation		2014 Com-pletion Rate%
			ID Numbers	Planted Acres (000)	No. of Sample Units	
Corn	Area	10	120032 A, B, C-1, C-2, E	70,050	1,787	84
Cotton	Area	6	120033 A, B, C, E	8,975	1,135	92
Potatoes	List	7	120038 A, B, C-1, C-2, E	773	1,246	81
Soybeans	Area	11	120034 A, B, C-2, C-2R, E, R	66,740	1,767	82
Wheat	Area & List	10	120031 A, B, C-1, C-2, E	31,590	1,228	83
Totals				178,128	7,163	83

The completion rate for the Field Crop Objective Yield Survey, Form A is calculated as follows:

Completion rate = a / (n – p)

Where a = complete Form A and any field observations (status code 1)
p = commodity sample field was planted but plowed or abandoned before first visit or not planted (status codes 11, 12 and 13)
n = number of sample units excluding sample units that did not contain the crop of interest upon data collection

The respondent is only present during the completion of the Form A, therefore respondent burden only occurs at that time. The other forms are completed by the enumerator in the field on subsequent visits to the farm.

The acre to be observed (Form B) is selected from the parent survey and the operator of the farm containing that acre is identified and interviewed. The response to the Form A determines if the enumerator has permission to enter the field. Once Form A is completed, a sample field is identified for observation. The field is visited by a field observer at multiple time points to observe, collect and measure crop specimens.

The available field observation data, by crop and visit for 2014 appear below. These percentages reflect a completed Form A.

Table B.1.b. Completion Rate of Form B Instruments per Month, by Crop, 2014

	Wheat	Corn	Cotton	Soybeans	Potatoes
May	74				
June	83				
July	81				
Aug	81	72	88	70	
Sept		82	87	79	
Oct		82	87	79	
Nov		83	89	80	72
Dec			87		74
Jan			87		

The sample units for the Field Crop Objective Yield surveys are selected proportional to size for both the overall sample eligible to receive Form A, and within a given farmer's tract, sampled plots for field observations. In this way, the sample is self-weighting. There are no non-response adjustments made to these data.

2. Describe the procedures for the collection of information including:

- **Statistical methodology for stratification and sample selection**
- **Estimation procedure**
- **Degree of accuracy needed for the purpose described in the justification**
- **Unusual problems requiring specialized sampling procedures**

Objective Yield (OY) surveys are conducted in major producing States for corn, cotton, potatoes, soybeans, and winter wheat. For each commodity except potatoes, a series of monthly net yield forecasts culminates in a final net yield at maturity. Only the final net yield is measured for potatoes.

Forecasts of acreage, yield, and production are made monthly from May through August for winter wheat. Monthly forecasts of acreage, yield and production are made from August through November for corn and soybeans, and August through January for cotton. For potatoes, estimates of acreage, final yield, and production are made in November and December. These forecasts and estimates, based on data obtained from the Objective Yield surveys as well as NASS' base agricultural surveys (OMB No. 0535-0213), are published in the monthly *Crop Production* reports.

For corn, cotton, and soybeans, the sampling universe is made up of all acres identified in the June Area Survey as being planted to the target commodity. The June Area Survey is sampled from NASS' Area Frame, in which each state's complete land area is divided up into segments. After segments are randomly selected, enumerators are sent to account for all land in the segments, identifying any agricultural activity, demarcating boundaries of individual fields, and calculating their acreages. Sample fields for the Objective Yield surveys are then selected from within the segments.

For wheat, the sampling is done at the operation level. The sample is drawn from all operations identified in the March Agriculture Survey as having planted or intending to plant wheat for harvest as grain. The March Agriculture Survey, makes use of a Multiple Frame made up of NASS' list of producers (List Frame) and producers identified by the Area Frame.

For potatoes, sampling is done at the operation level. Sample farms are drawn from farms reporting potatoes planted in the List Frame portion of the June Agriculture Survey (OMB No. 0535-0213).

For all five commodities, samples are selected with probability proportional to size (PPS) and the net effect is a self-weighting sample of areas for the commodity of interest in each State. The detail of the recorded area frame survey data allows sample selection at the field level for corn, cotton, and soybeans. Potato and winter wheat acres are collected at the farm level.

Sample potato fields are selected proportional to size within a farm by the enumerator during the initial interview with the farm operator. Fields with large acreage or expansion factors may be selected for more than one sample.

The major goal of the OY program is to produce indications of expected yield and final harvest yield using actual plant counts and measurements. OY indications calculated from actual plant counts and measurements eliminate some of the biases found in the farmer reported yields from other surveys.

The OY surveys produce indications for harvested acres, yield, and production. Objective measurements (counts of plants, ears, pods, bolls, etc.) are made on small plots of land. At maturity, the small plots are harvested and yield is calculated based on the actual production taken from these small plots.

OY surveys collect data at different times during the growing season. During the initial OY interview (Form A), the operator is asked to verify the acreage reported on the parent survey. This is done on a field by field basis. The main purpose is to verify the sub-sampling frame by checking the acreage reported on the parent survey and recording any changes. Changes may be due to recording or reporting errors in the parent survey, failure to fulfill planting intentions, or switching to other utilizations. Only total farm winter wheat and potato acreage were asked on the base survey(s). Therefore, farmers are asked to report individual fields of winter wheat or potatoes during the initial interview. Other data that must be obtained from the operator are collected at this time: planting date, planter row width, seeding practices, irrigation use, and application of pesticides. Enumerators ask for permission to enter the sample field to make counts and measurements on subsequent visits. For more information on NASS's Objective Yield Sample Design, please reference Chapter 2, pages 4-9 of "The Yield Forecasting Program of NASS." (Attached in the ROCIS submission system)

Ratio indications comparing the initial interview acres to the parent survey are computed to determine if acreage revisions are in order. The planting date gives an indication of harvesting date so enumerators are aware of when the final pre-harvest field visit will occur. Enumerators use the planter row width as an indicator of when the sample plots will be laid out. For example, narrow row soybean sample units are laid out as early as possible to limit the amount of destruction which can occur to the plants. When analyzing the data, the use of: biological pest controls, such as Bacillus thuringiensis (Bt) seed; herbicide resistant plant varieties; or irrigation are taken into consideration. Enumerators ask about applications of pesticides for data collection safety reasons, since they will be handling the live plants.

Two units are laid out for each sample. The units are located and laid out according to specific procedures to assure randomness in field location. Plant and fruit counts, fruit measurements, and maturity determinations are recorded each month using the Form B until the crop is mature or harvested. Early season data are entered into regression equations used to forecast gross yield and the components of yield--number of fruit and weight per fruit. At maturity, the final visit obtains crop cutting data used to directly calculate final gross yield. The counts and measurements from all visits are added to the historical database used to derive future forecast equations.

Regional laboratories record measurements of fruit on the Form C. Lab samples are submitted for every sample hand-harvested by field enumerators. Lab measurements include weighing the fruit (ears, pods, bolls, heads, or tubers), weighing the grain after threshing, and determining moisture content. These data are obtained in a controlled environment. The data are used to calculate a threshing fraction and adjust to standard moisture. For wheat, labs count spikelets and grain from “green” heads early in the season which are used to forecast grain weight per head.

After the farmer has harvested the sample field, post-harvest gleaning data are collected on the Form E. All unharvested fruit and loose grains are gleaned from plots laid out after harvest in a subset of the sample fields. The gleanings are sent to the regional labs where they are weighed and tested for moisture. Harvest loss computed from these data is deducted from estimates of gross yield (calculated from Form B) to arrive at a net yield. During pre-harvest forecasting, historical average harvest loss is used.

A series of equations are used in forecasting the components of yield. In the case of wheat for example, the two components are weight of grain per head and number of heads for each sample. These regression equations utilize current monthly counts and measurements as the independent variables.

Linear regression equations relate historic number of plants per unit to number of plants at the end of the season. The correlation coefficient provides a measure of the relative effectiveness of the models and is used to weight equations together. For more information on this topic, please reference Chapter 8, pages 78-85 in “The Yield Forecasting Program of NASS.” (Attached in the ROCIS submission system.)

3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.

The National Association of State Departments of Agriculture (NASDA), under a cooperative agreement with NASS, hires and helps NASS train quality field enumerators. The majority of the field enumerators come from rural or agricultural backgrounds. They are aware of many of the complexities of the farming industry and the importance of having accurate and timely data when making operating decisions. Many of the field enumerators have been collecting data for NASS for multiple years. The majority of the field supervisors have been collecting data for NASS for over 20 years.

In addition to their experience in the farming industry and in prior data collections, enumerators receive rigorous initial and on-going interviewer training from NASS and NASDA. Specifically, Objective Yield enumerators attend State training workshops in which field procedures, measurement techniques, and interview skills are reviewed. Enumerators also learn how the survey information is used, which enables them to communicate the purposes and use of survey data to potential survey participants. All enumerator procedures are subject to quality control review in order to keep non-sampling errors at a minimum.

To maximize response rates, NASS utilizes the same enumerators across all field enumerated surveys. This helps farm operators to become accustomed to providing data to the same enumerator on a regular basis.

The OY survey data are found to be reliable predictors of actual yield. In 2014 data, the coefficient of variation produced from models using data from the OY survey ranged from 1 to 6 percent in the major States, across all observed crops. When these major States are grouped together, the coefficient of variation is further reduced to 1.5 percent on average, across all participating States and all observed crops, which is considered a very reliable indicator of yield.

4. Describe any tests of procedures or methods to be undertaken.

No tests of procedures or methods are planned.

5. Provide the name and telephone number of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), or other person(s) who will actually collect and/or analyze the information for the agency.

Survey design and methodology are determined by the Summary, Estimation, and Disclosure Methodology Branch, of the Methodology Division; Branch Chief is Jeff Bailey (202)720-4008.

The sample size for each State is determined by the Sampling, Editing, and Imputation Methodology Branch of the Methodology Division; Branch Chief is Mark Apodaca, (202)720-5805.

Data collection is carried out by NASS Regional and State Field Offices, the Director is Kevin Barnes (202)720-8220.

Coordination of data collection, training, and quality control is the responsibility of the Survey Administration Branch in the Census and Survey Division; the Division Director is Barbara Rater, (202)720-4557, the current survey administrator is Barbara Ward (202)690-3622.

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