

Supporting Statement  
**VEGETABLE SURVEYS**

OMB No. 0535-0037

**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.**

The End of Season (EOS) Vegetable Growers Inquiry sampling frame comprises active operations on NASS’s List Frame that have control data for targeted commodities in program states.

The California Processing Tomato Survey sampling frame comprises active entities on NASS’s California List Frame that have a processing tomato indicator. The sampling frame is sampled at a 100% rate.

Vegetable Surveys Response Rates - 2021 Crop Year						
Survey	Sample Size	Waves of Data Collection	Total Contacts	Total Responses (Positive, Non-estimated)	Average Response Rate	Coverage of Commodity Rate (%) 1/
<b>End of Season Vegetables</b>						
End of Season Vegetables	7,983	1	7,983	3,451	43.2%	57.3%
<b>Cooperator-Funded Surveys</b>						
Tomatoes for Processing Planted Under Contract - May (For County Estimates) - California	25	1	21	19	90.5%	99.9%
Processing Tomatoes - August - California	24	1	21	17	81.0%	97.5%
Processing Tomatoes - End of Year Production & Upcoming Year Intentions - January - California	24	1	21	17	81.0%	97.7%
<b>Totals</b>	8,056		8,046	3,504	43.5%	NA

1/ The reported commodity coverage rate was for sweet corn planted acres in the Federal Program and cooperative funded States. This was used in the

- 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**

The California Processing Tomato Survey is sampled at a 100% rate. In contrast, the EOS Vegetable Growers Inquiry is a Multivariate Probability Proportional to Size (MPPS) sampling design<sup>a</sup>. This design takes advantage of the efficiencies of a Probability Proportional to Size (PPS) design, while adding the dimension of utilizing multiple variables in the sample allocation. Additionally, this design makes it easy to target a sample size for every target item. The target sample size for each commodity was derived using the SRS sample size formula.

For a MPPS design the probability of selection is:

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$$\pi_i = \max \left( n_1 \times \frac{x_{i1}^r}{\sum_{i=1}^k x_{i1}^{0.75}}, \dots, n_h \times \frac{x_{ih}^r}{\sum_{i=1}^k x_{ih}^{0.75}} \right)$$

Where:

$\pi_i$  is the maximum probability of selection for farm operator i.

i is the farm operator,

h is the target commodity,

x is the value of target commodity h, and

r is the power.

The target sample size for each targeted commodity is:

$$n_h = \frac{N_h s_h^2}{\frac{(f_h T_h)^2}{N_h} + s_h^2}$$

Where:

n is the sample size for target commodity h,

$N_h$  is the target commodity population,

$s_h$  is the target commodity standard deviation,

$f_h$  is the target commodity coefficient of variation, and

$T_h$  is the target commodity total.

A sample is chosen by generating a uniform random number (RN), calculating the cumulative probability for unit i as  $\text{Cumulative}_i = \text{Cumulative}_{i+1} + \pi_i$ , and selecting unit i if  $\text{Cumulative}_{i+1} < \text{RN} + k \leq \text{Cumulative}_i$  for any  $k = 0, 1, 2, \dots, n$  where n is the total number of units selected for the sample<sup>b</sup>.

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<sup>a</sup>Bailey, Jeff and Kott, Phillip (1997), "An Application of Multipurpose List Frame Sampling For Multi-Purpose Surveys, Proceedings of the Section on Survey Research Methods, American Statistical Association, pp. 496-500.

Currently, questionnaire content, survey timetables, and survey administration are established by HQ and followed by all States. In addition, there are individual State surveys that are administered directly by the respective Regional Field Offices (RFOs). The master questionnaires submitted are reduced in size to only include the commodities of interest in each State. Data are gathered by telephone interviews, mailed paper questionnaires, faxed questionnaires, personal interviews, and Computer Aided Self-Interview (CASI)/Computer Aided Web Interview (CAWI) or Internet. Data accuracy and respondent burden are taken into account in conducting the surveys. Because of the variable nature of the vegetable industry, mail lists are frequently updated to ensure maximum coverage.

The sampling frame and sample for the California Tomato Processor Survey surveys are California tomato processing operations. Complete enumeration is employed from the Regional Field Office since there are relatively few processing operations.

At a minimum, State level questionnaires will contain the commodities of interest for US level estimates. In addition, there are agreements in place with State governments that have asked NASS to collect data for vegetables not in the Federal program, so some questionnaires will contain additional crops that do not appear in NASS's national publications. To help reduce burden on both the respondent and on RFO staff, we include these extra crops on existing questionnaires when possible, so we only have to contact the respondent one time each season. The data will be published in State level releases or will appear in the State's Annual Bulletin.

- 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.**

Data reported on vegetable inquiries are used by the National Agricultural Statistics Service to estimate acreage, yield, production, and utilization for 27 crops sold through both fresh markets and to processors. Data are used by many State and Federal agencies and Departments, the vegetable industry, agribusinesses, manufacturing, transportation organizations, educational institutions, foreign governments, and international groups.

While seeking these data, the Regional Field Offices (RFOs) take great care to keep respondent burden to a minimum. Most contacts have a long-standing relationship with the servicing RFOs. Most fresh market farmers who produce

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<sup>b</sup> Hicks, Susan, Amrhein, John and Kott, Phil (1996), Methods to Meet Target Sample Sizes Under a Multivariate PPS Sampling Strategy, Proceedings of the Section on Survey Research Methods, American Statistical Association, pp. 234-238.

multiple crops are sent one questionnaire listing all of the commodities grown so they only need to complete one form. When more than one questionnaire must be mailed at the same time, they are combined into one mailing.

Information for the vegetable surveys (list frame) is collected via mail, Internet, telephone interview, and face-to-face interview. The mix of data collection modes allows the respondents to reply by whichever mode they are most comfortable with. NASS is implementing reminder E-Mail capability for the End of Season Vegetable survey in 2022 with a link for the respondent to complete the survey online. Over half of the information is obtained by telephone. Mail and telephone non-contacts are followed up with face-to-face enumeration. The entire sample is accounted for during data collection. Large operations and operations requiring special handling (previous survey refusals and inaccessible, complex operations, etc.) are generally contacted for a face-to-face interview only.

Survey data are subject to non-sampling errors such as omissions and mistakes in reporting and in processing the data. While these errors are not measured directly, they are minimized by carefully reviewing all reported data for consistency and reasonableness. An estimation manual helps in maintaining consistency across surveys and RFO's.

For the EOS Vegetable Growers Inquiry, NASS has been exploring new estimators to supplement the reweighted direct expansion and combat potential nonresponse bias. Different types of multiple imputation methods have been evaluated, and SAS PROC MI using the Predictive Mean Matching (PMM) method has shown the most promising results for other NASS surveys (Dau and Miller, 2018). Similar research is being conducted on our EOS Fruit and Nut Production and Disposition Inquiry. However, unlike tree fruit crops which are in the ground for many years, there is more potential variability in what kind of vegetables are planted each year which has presented additional challenges. Research is still ongoing, and results are preliminary. Manual selection of the covariates for the PMM models is time and resource intensive so NASS has been exploring using Classification and Regression Trees (CART) to automate the covariate selection process. Additional research is planned once 2022 Census of Agriculture data are final.

Dau, A. and Miller, D. (2018). "Dancing With the Software: Selecting Your Imputation Partner". 2018 Joint Statistical Meetings Proceedings.

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

The main validation of current procedures is to remain in contact with vegetable growers, processors, and industry leaders and solicit their expert advice. Following each Census of Agriculture (every 5 years), NASS conducts a

complete program review of all crop and livestock commodities. NASS verifies which States are included in the different surveys for each commodity in order to produce accurate estimates. Included in this request is an annual fifty interviews for cognitive testing to improve how the respondents provide data.

**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.**

The Summary, Estimation and Disclosure Methodology Branch Chief is Jeff Bailey, (202) 690-8141.

The Sampling, Editing, Imputation Methodology Branch Chief is Mark Apodaca, (202) 690-8141.

Data collection is carried out by NASS Regional Field Offices; Eastern Field Operation's Director is Jody McDaniel, (202) 720-3638 and the Western Field Operation's Director is Troy Joshua (202) 720-8220.

The Fruits, Vegetables, and Special Crops Section of the Crops Branch, Statistics Division is responsible for the Estimation Manual, national summaries, analysis, presenting the summarized data to the Agricultural Statistics Board for final estimates, and publications. The Crops Branch Chief is Lance Honig (202) 720-2127.

The survey administration of the vegetable program is carried out by the Survey Administration Branch, Census and Survey Division; Branch Chief is Gerald Tillman, (202) 720-3918.

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