

**SF-83-1 SUPPORTING STATEMENT**

**for the**

**2015**

**National Survey of College Graduates**

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## **2015 NATIONAL SURVEY OF COLLEGE GRADUATES SUPPORTING STATEMENT**

### **A. JUSTIFICATION**

This request is for a three-year renewal of the previously approved Office of Management and Budget (OMB) clearance for the National Survey of College Graduates (NSCG). The NSCG has historically served as a valuable source of information on the education and career paths of the Nation's college-educated population. The most recent NSCG was conducted in 2013 (OMB approval number 3145-0141). The current OMB clearance for the NSCG expires November 30, 2015, which does not cover the complete survey cycle for the 2015 NSCG.

The NSCG introduced substantial design changes during the 2010 and 2013 survey cycles, with additional changes planned for the 2015 cycle. These NSCG design changes are described in Appendix J of this document. As part of planning effort for the 2015 NSCG survey cycle, the full set of NSCG questionnaire items underwent an evaluation that included an expert review and cognitive interviews. As a result, a new questionnaire section on certifications and licenses is being added as well as minor question wording revisions to numerous items throughout the NSCG questionnaire. The specific revisions are discussed in section B.4. of this report.

### **1. NECESSITY FOR INFORMATION COLLECTION**

In 2010, the America COMPETES Reauthorization Act of 2010<sup>1</sup> established the National Center for Science and Engineering Statistics (NCSES) at the National Science Foundation (NSF) and directed NCSES to "...collect, acquire, analyze, report, and disseminate statistical data related to the science and engineering enterprise in the United States and other nations that is relevant and useful to practitioners, researchers, policymakers, and the public..." Information obtained through the NSCG is critically important to NCSES's ability to measure the education and employment of scientists and engineers. Furthermore, the NSCG is the centerpiece of NCSES's statistical data system that produces the nation's only source of comprehensive information about the size and characteristics of the science and engineering (S&E) workforce<sup>2</sup>. These data are solicited under the authority of the NSF Act of 1950<sup>3</sup>, as amended, and are central to the analysis presented in a pair of congressionally mandated reports<sup>4,5</sup> published by NSF – *Science and Engineering Indicators* and *Women, Minorities, and Persons with Disabilities in Science and Engineering*.

In addition, the Science and Engineering Equal Opportunities Act of 1980 directs NSF to provide to Congress and the Executive Branch an "accounting and comparison by sex, race, and ethnic

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<sup>1</sup> Section 505, Pub. L. No. 111-358. See Appendix A.

<sup>2</sup> The S&E workforce includes the individuals with degrees or occupations in computer and mathematical sciences, life sciences, physical sciences, social sciences, engineering, and health sciences.

<sup>3</sup> See Appendix B.

<sup>4</sup> 42 U.S. Code § 1863(j)(1)

<sup>5</sup> 42 U.S. Code § 1885(a), 1885(d)

group and by discipline, of the participation of women and men in scientific and engineering positions.”<sup>6</sup> NCSES’s Science and Engineering Statistical data system (SESTAT), of which the NSCG comprises a large majority of records, provides much of the information to meet this mandate. The SESTAT system of surveys, created for the 1993 survey cycle and developed throughout the past two decades, is closely based on the recommendations of the National Research Council’s Committee on National Statistics (CNSTAT) report to NSF.<sup>7</sup>

### **NSCG Background**

The NSCG provides data on the nation’s college graduates, with particular focus on those in the S&E workforce. The NSCG samples individuals who are living in the United States, have at least a bachelor’s degree, and are under the age of 76. This survey is a unique source for examining various characteristics of college-educated individuals, including occupation, work activities, salary, the relationship of degree field and occupation, and demographic information.

The NSCG and the Survey of Doctorate Recipients (SDR) are the two surveys that provide data for the NCSES’s SESTAT data system. The purpose of SESTAT is to provide information on the entire U.S. population of scientists and engineers with at least a bachelor’s degree. Historically, the SESTAT surveys have been conducted every two to three years. The integrated SESTAT data system provides longitudinal data on the education and employment of the college-educated U.S. science and engineering workforce. SESTAT is the only available source for detailed information to support a wide variety of policy and research analyses on the S&E workforce and personnel.

The NSCG constitutes approximately 75% of the records in SESTAT and slightly over 97% of the 2013 SESTAT population estimate. As the core of SESTAT, the NSCG provides information on individuals educated or employed in S&E fields including individuals who received degrees only from foreign institutions. The SDR supplements SESTAT with the stock and inflow of U.S.-degreed doctoral level scientists and engineers. Through 2010, the National Survey of Recent College Graduates (NSRCG) supplemented SESTAT with the inflow of U.S.-degreed bachelor’s and master’s level scientists and engineers. Beginning in 2013, the NSCG began capturing the bachelor’s and master’s level inflow population and eliminated the need for the NSRCG. As a result, the NSRCG was discontinued after the 2010 survey.

The longitudinal data from the NSCG provides valuable information on careers, training, and educational development of the nation’s college graduate population. These data enable government agencies to assess the scientific and engineering resources available in the U.S. to business, industry, and academia, and to provide a basis for the formulation of the nation’s science and engineering policies. Educational institutions use the NSCG data in establishing and modifying scientific and technical curricula, while various industries use the information to develop recruitment and remuneration policies.

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<sup>6</sup> 42 U.S. Code § 1885(d)

<sup>7</sup> National Research Council, Committee on National Statistics. 1989. *Surveying the Nation’s Scientists and Engineers: A Data System for the 1990s*. Washington: National Academy Press.

## 2. USES OF INFORMATION

Policymakers, researchers, and other data users use information from SESTAT to answer questions about the number, employment, education, and characteristics of the S&E workforce. Because it provides up-to-date and nationally representative data, policymakers and researchers use the data system to address questions on topics such as the role of foreign-born or foreign-degreed scientists and engineers, the transition from higher education to the workforce, the role and importance of postdocs, diversity in both education and employment, the implications of an aging cohort of scientists and engineers as baby boomers reach retirement age, and information on long-term trends in the S&E workforce.

### Uses for Policy Discussion

Data from NCSES's SESTAT component surveys are used in policy discussions of the executive and legislative branches of Government, the National Science Board, NSF management, the National Academy of Sciences, professional associations, and other private and public organizations. Some recent specific examples of the use of the NSCG and SESTAT data are:

- The Executive Office of the President used NSCG data to examine the contributions of immigrants in S&E occupations<sup>8</sup>;
- The National Science Board (NSB) used SESTAT data in its investigation to develop national policies for the S&E workforce<sup>9</sup>;
- The importance of information on the S&E workforce to inform public policy can be seen in discussions of the NSB's Task Group on Science, Technology, Engineering, and Math (STEM) Innovators. The task group used SESTAT data to inform its deliberations about the S&E workforce and SESTAT data were part of the final report<sup>10</sup>;
- The Committee for Equal Opportunity in Science and Engineering (CEOSE), an advisory committee to NSF and other government agencies, established under 42 U.S.C. §1885c, has been charged by the U.S. Congress with advising NSF in assuring that all individuals are empowered and enabled to participate fully in science, mathematics, engineering and technology. Every two years CEOSE prepares a congressionally mandated report that makes extensive use of the SESTAT data to highlight key areas of concerns relating to students, educators and technical professionals.
- The Council of Graduate Schools (CGS) used NSCG data to estimate the potential monetary cost and return on investment of pursuing advanced degrees<sup>11</sup>, which is a key element of CGS's financial education website – [www.gradsense.org](http://www.gradsense.org); and
- The Educational Testing Service (ETS) and CGS used SESTAT data to examine national benchmarks for career outcomes of master's and doctoral degree recipients by specific field<sup>12</sup>.

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<sup>8</sup> <http://www.whitehouse.gov/sites/default/files/docs/report.pdf>

<sup>9</sup> <http://www.nsf.gov/nsb/documents/2003/nsb0369/nsb0369.pdf>

<sup>10</sup> <http://www.nsf.gov/nsb/publications/2010/nsb1033.pdf>

<sup>11</sup> <http://www.gradsense.org/gradsense/methodology>

<sup>12</sup> [http://www.ets.org/c/19574/19089\\_PathwaysReptqp.pdf](http://www.ets.org/c/19574/19089_PathwaysReptqp.pdf)

### **Uses by NSF**

The SESTAT data were used extensively in the latest versions of the congressionally mandated biennial reports *Science and Engineering Indicators, 2014* and *Women, Minorities and Persons with Disabilities in Science and Engineering, 2015*. In addition, *Science and Engineering Indicators, 2016*, set for release in January 2016, will use SESTAT data.

NSF used the NSCG and SESTAT integrated data in recent reports such as:

- *Employment Decisions of U.S. and Foreign Doctoral Graduates: A Comparative Study*, December 2014
- *Unemployment among Doctoral Scientists and Engineers Remained Below the National Average in 2013*, September 2014
- *Employment and Educational Characteristics of Scientists and Engineers*, January 2013
- *International Mobility and Employment Characteristics among Recent Recipients of U.S. Doctorates*, October 2012
- *International Collaboration of Scientists and Engineers in the United States*, August 2012
- *Diversity in Science and Engineering Employment in Industry*, March 2012
- *Racial and Ethnic Diversity among U.S.-Educated Science, Engineering, and Health Doctorate Recipients: Methods of Reporting Diversity*, January 2012
- *Community Colleges: Playing an Important Role in the Education of Science, Engineering, and Health Graduates*, July 2011
- *The End of Mandatory Retirement for Doctoral Scientists and Engineers in Postsecondary Institutions: Retirement Patterns 10 Years Later*, December 2010
- *Foreign Science and Engineering Students in the United States*, July 2010

All NSF Publications can be accessed on the NCSES website at

<http://www.nsf.gov/statistics/reports.cfm>.

### **Uses by Researchers and Analysts**

NCSES makes the data from the SESTAT surveys available through published reports, the SESTAT online data tool, downloadable public use files, and restricted-use licenses. The SESTAT online data tool, available at <http://ncesdata.nsf.gov/sestat/sestat.html>, allows users to create customized data tabulations with a user-specified subject area. The NSCG and SESTAT public-use files are available for download through the NCSES data downloads web page at <http://ncesdata.nsf.gov/download>.

Since 2005<sup>13</sup>, NCSES has distributed over 600 copies of the more than decade-old 1993 NSCG public-use data set and over 1,300 copies of the 2003 NSCG public-use files to researchers in government, academia, and professional societies. And, since its release in January 2013, over 800 copies of the 2010 NSCG public-use files have been downloaded from the NCSES data downloads page. The 2013 NSCG data are in the final stages of data review and will be available later this year as a standalone public-use file. The NSCG public-use files receive heavy use because they are the only data sets analysts can use to compare the S&E workforce to the general population of college degree holders in the U.S.

The SESTAT public-use files have been downloaded from the NCSES data downloads page over 5,000 times since 2005. In addition to the users of the SESTAT public-use files, there are currently 28 restricted-use licensees with access to the SESTAT integrated micro data files under a licensing agreement with NCSES. As previously noted, the majority of the records in the SESTAT file come from the NSCG.

Some of the research based on the public-use NSCG data, the public-use SESTAT data, and the restricted-use SESTAT data resulted in papers such as:

- *Trends in Earnings Differentials across College Majors and the Changing Task Composition of Jobs*, Yale University, 2014
- *Are Asian American Women Advantaged? Labor Market Performance of College Educated Female Workers*, Kansas University, 2014
- *Opting Out among Women with Elite Education*, Vanderbilt University, 2013
- *Startups by Recent University Graduates and their Faculty: Implications for University Entrepreneurship Policy*, Carnegie Mellon University, 2012
- *Findings from an Examination of the Labor Force Participation of College-Educated Immigrants in the United States*, Department of Education, 2012
- *Evolution of Gender Differences in Post-Secondary Human Capital Investments: College Majors*, New York University, 2011
- *Earning Trajectories of Highly Educated Immigrants: Does Place of Education Matter?*, Cornell University, 2011
- *Which Immigrants are Most Innovative and Entrepreneurial? Distinctions by Entry Visa*, National Bureau of Economic Research, 2011
- *Labor Market Penalties for Foreign Degrees Among College Educated Immigrants*, University of Minnesota, 2010

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<sup>13</sup> The America COMPETES Reauthorization Act of 2010 mandated the name and responsibilities of NCSES. Prior to 2010, the organizational unit that would become NCSES was referred to as the National Science Foundation's (NSF) Division of Science Resource Statistics (SRS). For simplicity, NCSES will be used throughout this report when referring to work completed by SRS or NCSES.

- *Do Teachers have Education Degrees? Matching Fields of Study to Popular Occupations of Bachelor's Degree Graduates*, Indiana University, 2010
- *Why Do Women Leave Science and Engineering?*, National Bureau of Economic Research, 2010
- *Functional Impairment and the Choice of College Major*, University of South Florida, 2010
- *How Much Does Immigration Boost Innovation?*, McGill University, 2010
- *Increasing Time to Baccalaureate Degree in the United States*, National Bureau of Economic Research, 2010
- *Higher Education and Disability: Education Needs a Coordinated Approach to Improve Its Assistance to Schools in Supporting Students*, GAO Report, 2009
- *Diversifying Science and Engineering Faculties: Intersections of Race, Ethnicity, and Gender*, Georgia Institute of Technology, 2010

### **3. CONSIDERATION OF USING IMPROVED TECHNOLOGY**

The data for the 2015 NSCG will be collected by the U.S. Census Bureau under an interagency agreement between NCSES and the Census Bureau. The 2015 NSCG data collection will use a multi-mode approach that begins with a web invitation letter mailed to sample persons asking them to complete the survey on the Internet. Nonrespondents will be followed up using a paper questionnaire mailing and computer assisted telephone interviews (CATI). The data will be collected and managed by the Census Bureau using multiple complementary systems including: Docuprint, Intelligent Mail Barcoding, Enterprise Internet Solutions, Adaptive Design and Daily Processing, and the Unified Tracking System. These systems are described below.

#### **Mail Materials**

Web invitation letters are produced through an in-house on-demand print process using a Docuprint system which allows personalization and the ability to tailor items to each specific respondent. A new addition for the 2015 NSCG cycle is that letters and questionnaire packets will be tracked using Intelligent Mail Barcoding (IMB). IMB requires separate outgoing and return barcodes to be placed on NSCG envelopes for tracking purposes. Using IMB has the potential to increase the overall efficiency of data collection enabling the collection of detailed tracking information including:

- When an outgoing questionnaire or other mail piece reached a respondent's local post office;
- When an outgoing mail piece left the post office with a postmaster for delivery;
- If the outgoing mail piece was identified as undeliverable-as-addressed (UAA) and is being rerouted for return;
- When a return questionnaire reaches a respondent's local post office; and



- When a return questionnaire reaches its destination.

This information will allow the NSCG to put cases on hold while the returned questionnaire is reviewed to determine whether it is a “good complete.” Placing cases on hold will reduce respondent burden by limiting unnecessary contacts. In addition, the IMB tracking will alert the NSCG staff to undeliverable mail pieces while they are still in circulation, allowing the Census Bureau to reduce the NSCG data collection costs by eliminating any future mailings to undeliverable addresses.

### **Archiving**

Images will be scanned and archived on a secured server in case they are needed later. This eliminates the need to save paper copies of the completed questionnaires.

### **Data from a Web Instrument**

The Enterprise Internet Solutions (EIS) area of the Application Services Division (ASD) at the Census Bureau will host a web-based data collection instrument. Data will be transmitted and processed daily. The web application will be hosted on the fully certified and accredited Centurion system (infrastructure, security, and framework). New to the 2015 NSCG, the Telephone Questionnaire Assistance (TQA) and Email Questionnaire Assistance (EQA) systems will utilize the Centurion system. This enhancement to the TQA and EQA systems will enable faster data review and a seamless transition from telephone assistance to data collection for the TQA interviewing staff.

### **Adaptive Design and Daily Processing**

The 2015 NSCG will continue to expand the scope of adaptive design in an effort to attain high-quality survey estimates in less time and at less cost than traditionally executed survey operations. First, the Census Bureau will implement daily processing (editing, imputation, weighting) of the response data throughout the data collection period. In addition to operational efficiencies, daily processing will allow the NSCG survey team to monitor several quality measures throughout data collection, including R-indicators, benchmarking, stability of estimates, and response propensities by mode.

Second, the 2015 NSCG will include an adaptive design experiment that aims to document the adaptive design goals most appropriate for NSCG, and in turn, identify appropriate data collection interventions and the monitoring methods that can be used to drive those interventions. More detail about the 2015 NSCG adaptive design experiment is provided in section B.4. of this report. A larger sample size in the adaptive design experiment for the new sample cases will provide the statistical power to make more definitive statements about statistical differences between the treatment group and the control group on various measures, including response rates, R-indicators, cost, and effect on key estimates. Including returning sample members as part of the adaptive design experiment will provide insight into whether adaptive design is an appropriate technique to use with returning sample cases in future NSCG rounds.

### **Unified Tracking System**

In 2015, the NSCG will be expanding its use of the Census Bureau’s Unified Tracking System (UTS) to assist in various aspects of survey management. As in 2013, the UTS will provide a

full contact history report for the NSCG, giving survey managers a single place to view all contacts integrated from all three modes in the NSCG along with the outcomes of those contacts. This report was useful in 2013 for following up on contact strategies in a number of ways. As an example, if respondents called in to check on the status of their response, NSCG staff were able to quickly and easily access the respondents' contact history and outcomes to provide the current status of their response. In addition, this report provides an easily accessible and interpretable audit trail of all contacts, allowing survey managers to immediately verify if NSCG interviewers are following proper contact protocols, particularly when questions or complaints from respondents arise. For 2015, this contact report will also integrate the previously mentioned IMB data.

The 2015 NSCG will utilize two additional survey management reports: a cases-on-hold report and a TQA-completes report. The cases-on-hold report will provide information about which cases are on hold in CATI for any given day as well as the reason they are on hold (e.g., due to a paper or web questionnaire response in processing, or due to adaptive design data monitoring). The TQA completion report provides up-to-date information about which telephone interviewers are assisting respondents in completing the survey from an incoming call. Both of these reports will help the telephone centers at the Census Bureau better understand and manage the NSCG workload.

#### **4. EFFORTS TO IDENTIFY DUPLICATION**

Duplication, in the sense of similar data collections, does not exist. No other data collection captures all components of scientists and engineers in the United States. There is no similar information available other than from this survey, conducted by the U.S. Census Bureau for NSF since the 1960s. Data from the Current Population Survey provides occupational estimates but does not collect information on degree field for higher education degrees. The American Community Survey (ACS) collects the field of bachelor's degrees but does not collect detailed information on education history, work activities, and employment characteristics as the NSCG does, nor is the ACS longitudinal in nature.

Overlap does exist in the target populations for the NSCG and the SDR. As a result, it is expected there will be between 100-200 individuals selected for sample in both the 2015 NSCG and the 2015 SDR.

In the 2013 NSCG survey cycle, the NSCG and SDR survey contractors identified the individuals selected for both surveys, removed the individuals from the NSCG data collection effort, and, at the completion of the SDR data collection effort, used the SDR responses for these individuals to complete the individual's record on the NSCG data file. This NSCG/SDR deduplication process required the SDR survey contractor to create numerous files containing all SDR sample cases for use by the NSCG survey contractor. Furthermore, given file format and processing differences between contractors, the NSCG survey contractor needed to reformat and manually manipulate many of the SDR files to use them in combination with the NSCG files. The NSCG/SDR deduplication process adds over a week of staff time to both the NSCG and SDR processing.

Given recent changes to the NSCG questionnaire content, there are noticeable differences in the information collected on the NSCG and SDR. Examples of topics planned for collection on the 2015 NSCG, but not on the 2015 SDR include attainment of certifications and licenses, financial support for education, and community college enrollment. Because of the content differences, the small number of expected duplicates, and the operational challenges of the deduplication process, NCSSES will not deduplicate individuals selected for sample in both the NSCG and SDR in the 2015 survey cycle.

## **5. EFFORTS TO MINIMIZE BURDEN ON SMALL BUSINESS**

Not applicable. The NSCG collects information from individuals only.

## **6. CONSEQUENCES OF LESS FREQUENT DATA COLLECTION**

The NSCG and SESTAT data are central to the analysis presented in a pair of congressionally mandated reports published by NSF – *Science and Engineering Indicators and Women, Minorities, and Persons with Disabilities in Science and Engineering*. Since these reports are published on a biennial schedule, they rely on the availability of updated data on the S&E workforce every two years. Conducting the NSCG on a less frequent basis would prohibit NSF from meeting its congressional mandate to produce a report that contains an accurate accounting and comparison, by sex, race, and ethnic group and by discipline, of the participation of women and men in scientific and engineering positions. The impact of not being able to meet this congressional mandate is that government, business, industry, and universities would have less recent data to use as a basis for formulating the nation's science and engineering policies.

A less frequent data collection would also impact the quality of the NSCG data. Follow-up surveys every two to three years on the same sampled persons are necessary to track changes in the S&E workforce as there are large movements of individuals into and out of S&E occupations over both business and life cycles. To ensure the availability of current national S&E workforce data, the NSCG has been conducted and coordinated with the NSRCG and the SDR on a biennial basis since 1993. The degradation of either component jeopardizes the integrity and value of the entire SESTAT data system.

Finally, because the NSCG is a panel survey, conducting the survey less frequently would make it more difficult and costly to locate the persons in the sample because of the mobility of the U.S. population. The impact would be a higher attrition rate, higher potential for nonresponse bias, and less reliable estimates.

## **7. SPECIAL CIRCUMSTANCES**

Not applicable. This data collection does not require any one of the reporting requirements listed.

## 8. FEDERAL REGISTER ANNOUNCEMENT AND CONSULTATION OUTSIDE THE AGENCY

### Federal Register Announcement

The Federal Register announcement for the NSCG appeared on July 18, 2014 (See Appendix C). NSF received no public comment in response to the announcement as of the close date of September 16, 2014.

### Consultation Outside the Agency

NCSES has sought the advice and guidance of survey methodologists, statisticians, demographers, researchers, data analysts, and policymakers to examine numerous issues related to the development of the NSCG and the SESTAT data system.

- Survey Content

As part of the 2015 NSCG planning effort, NCSES conducted developmental work on new questionnaire items to capture information on alternative credentials including industry-recognized certifications, occupational licenses, and educational certificates. As a starting point for this developmental work, NCSES used the vast amount of research on this topic conducted by the Interagency Working Group on Expanded Measures of Enrollment and Attainment (GEMEnA). GEMEnA is a collaboration among federal statistical agencies established by the OMB Office of Statistical and Science Policy, the Council of Economic Advisors, and the Under Secretary of Education to improve federal data on the attainment of non-degree credentials.

### Survey Methodology Experts: GEMEnA Member Agency Representatives

**Census Bureau**  
Bob Kominski  
Stephanie Ewert

**Bureau of Labor Statistics**  
Dori Allard  
Harley Frazis

**NCSES – National Science Foundation**  
Dan Foley  
John Finamore

**Council of Economic Advisors**  
Jordan Matsudaira

**OMB Office of Statistical and Science Policy**  
Shelly Martinez

**Department of Education**  
Jon O’Bergh

**National Center for Education Statistics**  
Sharon Boivin  
Lisa Hudson  
Kashka Kubzdela  
Sarah Crissey  
Sarah Carroll  
Andy Zukerberg

In order to maintain the currency of the SESTAT survey content and to obtain ongoing input from the public and researchers, NCSES has convened four Human Resources Experts Panel (HREP) workshops. At the HREP workshops, panel members are asked to contribute to the continued success of the SESTAT surveys by 1) Suggesting methods to publicize and promote the SESTAT data; 2) Providing advice on efforts to improve the timeliness and

accuracy of S&E workforce data; 3) Providing a mechanism for obtaining ongoing input from both researchers and policy analysts interested in S&E personnel data; 4) Providing perspectives on the data needs of policy makers; 5) Identifying issues and trends that are important for maintaining the relevance of the data; 6) Identifying ways in which S&E personnel data could be more useful and relevant for analyses; and 7) Proposing ways to enhance the content of the NCSES human resources surveys.

Three HREP workshops were held over the past year to discuss survey content issues relevant to the NSCG and SESTAT. The August 2013 panel discussed issues related to the collection and value of data on education and career pathways. The January 2014 panel continued the education and career pathways discussion, but also included time discussing alternative credentials like certifications, licenses, and educational certificates. The June 2014 panel focused on the concepts of job mobility and occupational change.

**HREP Members – August 2013 and January 2014 Workshops**

Nathan Bell  
Associate Director, Education Research & Policy  
American Educational Research Association

Brian Hartz  
Vice President of Client Services  
TORQworks

Roman Czujko  
Director, Statistical Research Center  
American Institute of Physics

Beverly Karplus Hartline  
Vice Chancellor for Research and Graduate Studies  
Montana Tech

Ronni Denes  
President and Executive Director  
New Jersey SEEDS

Cheryl Leggon  
Associate Professor, School of Public Policy  
Georgia Institute of Technology

Catherine Didion  
Senior Program Officer  
National Academy of Engineering  
Director, Committee on Women in S&E  
National Academies

Sharon Levin  
Professor of Economics  
University of Missouri, St. Louis

Earnestine Psalmonds Easter  
Program Director, Division of Graduate Education  
National Science Foundation

Duncan McBride  
Program Director, Division of Undergrad Ed.  
National Science Foundation

Cary Funk  
Senior Researcher  
Pew Research Center

Catherine Millett  
Research Scientist  
Educational Testing Service

Donna Ginther  
Professor of Economics  
University of Kansas

Cathee Johnson Phillips  
Executive Director  
National Postdoctoral Association

George Wimberly  
Director, Professional Development/Social Justice  
American Educational Research Association

## **HREP Members – June 2014 Workshop**

Jake Bartolone  
Senior Research Scientist  
National Opinion Research Center

Kirk Doran  
Assistant Professor of Economics  
University of Notre Dame

Donna Ginther  
Professor of Economics  
University of Kansas

Shulamit Kahn  
Associate Professor of Public Policy & Law  
Boston University

Morris Kleiner  
Professor of Public Affairs/Industrial Relations  
University of Minnesota

Iouri Manovskii  
Associate Professor of Economics  
University of Pennsylvania

Erika McEntarfer  
Supervisory Economist  
U.S. Census Bureau

Donna Rothstein  
Research Economist  
Bureau of Labor Statistics

Hal Salzman  
Professor of Planning and Public Policy  
Rutgers, The State University of New Jersey

Marc Scott  
Associate Professor of Applied Statistics  
New York University

John Skrentny  
Professor of Sociology  
University of California at San Diego

Albert Sumell  
Associate Professor of Economics  
Youngstown State University

Omari Swinton  
Assistant Professor of Economics  
Howard University

John Bound  
Professor of Economics  
University of Michigan

Charlie Brown  
Professor of Economics  
University of Michigan

Pamela Herd  
Professor of Public Affairs and Sociology  
University of Wisconsin-Madison

Sheila Kirby  
Senior Fellow  
National Opinion Research Center

Cheryl Leggon  
Associate Professor, School of Public Policy  
Georgia Institute of Technology

Audrey Light  
Professor of Economics  
Ohio State University

Mike Pergamit  
Senior Fellow  
Urban Institute

Jeff Strohl  
Senior Research Fellow  
Georgetown University

Josh Trapani  
Director of Policy Analysis  
Association of American Universities

- **Questionnaire Evaluation and Instrument Usability**

The staff at the Census Bureau's Center for Survey Measurement conducted an expert review of the proposed 2015 NSCG questionnaire, usability testing of the proposed 2015 NSCG web instrument, and two rounds of cognitive interviews of the NSCG questionnaire in all three data collection response modes – web, mail questionnaire, and CATI. The findings from these tasks influenced decisions regarding questionnaire content, questionnaire and

instrument format, and question wording. The specific revisions made to the NSCG questionnaire since the 2013 survey cycle are discussed later in this document.

- Adaptive Design

The 2013 NSCG Terms of Clearance stated that “OMB looks forward to NCSES collaborating actively with the National Center for Education Statistics and the Census Bureau on ways to experiment with and apply "responsive design" methods to the NSCG in order to better measure and reduce bias and improve overall survey efficiency.” Over the past two years, NCSES staff participated in multiple outreach and collaboration efforts with the Census Bureau, NCES, and other agencies to take stock of the progress made in the field of adaptive design, to identify the obstacles that currently exist, and to explore the adaptive design possibilities for the future. Below are some examples of NCSES’s outreach and collaboration efforts related to adaptive design.

- NCSES, Census Bureau, and NCES held a meeting in 2013 to exchange ideas related to adaptive design metrics.
- NCSES and Census Bureau organized and participated in a topic-contributed session on adaptive design at the 2013 American Association for Public Opinion Research (AAPOR) annual conference in May 2013.
- The survey contractors for NCES surveys and NCSES surveys (Research Triangle Institute, Inc. and the Census Bureau, respectively) attended an adaptive design workshop in December 2013 sponsored by Statistics Netherlands. Workshop attendees included employees from the U.S. federal government, academia, private sector, and foreign governments.
- NCSES staff organized and chaired an invited session at the 2014 Joint Statistical Meetings in August 2014. Session presenters were from a U.S. federal government agency (Census Bureau), an educational research institute (University of Michigan) and foreign government agency (Statistics Netherlands). The session discussed adaptive survey designs.
- NCSES, Census Bureau, and NCES staff attended meetings of the recently-formed Adaptive Design Interagency Working Group in 2014. This working group, established by the OMB Office of Statistical and Science Policy, is a collaboration among federal statistical agencies.
- NCSES, Census Bureau, and NCES staff have organized and will participate in a topic-contributed panel at the 2015 AAPOR annual conference. The conference is scheduled for May 2015. The panel topic is “Innovation in Federal Surveys – Opportunities, Progress, and Challenges.”

- Survey Design and Methodology

NCSES has sponsored and collaborated on multiple survey design and methodology research projects in an effort to ensure that the NCSES surveys, including the NSCG, are incorporating best practices for survey design and methodology. NCSES holds ongoing

discussions with staff from NCES and the Census Bureau to discuss survey design and methodological issues of interest. In addition, NCSES funds research on survey design and methodological issues. The following provides a listing for some of the ongoing research funded by NCSES related to the NSCG and the SESTAT surveys:

- To ensure accurate variance estimation under the NSCG's complex ACS-based sample design, NCSES funded research to examine how to appropriately derive variance estimates in a two-phase sample design setting. Jean Opsomer (Colorado State University) was the principal investigator for this research.
- For transparency and documentation purposes, and to create a more knowledgeable data user community, NCSES funded research to examine and document the properties of the successive difference replication methodology. The successive difference replication methodology is used in the NSCG for variance estimation purposes. Jean Opsomer (Colorado State University).
- To produce more reliable survey estimates, NCSES funded research to examine and mitigate extreme sample weight variation within the NSCG. Jean Opsomer and Jay Breidt (Colorado State University) were the principal investigators for this research.
- To examine the full potential of the ACS data as a source for data on the S&E workforce, NCSES funded research to conduct an initial examination of whether ACS data can be used along with ACS and NSCG model-based results to conduct off-year estimation<sup>14</sup> for characteristics of the college-educated population. Michael Larsen (George Washington University) was the principal investigator for this research.
- To address the increasing nonresponse trends for governmental surveys, NCSES funded research to examine contract strategies for the NCSES surveys. Jolene Smyth and Kristen Olson (University of Nebraska – Lincoln) were the principal investigators for this research.

## **9. PAYMENT OR GIFTS TO RESPONDENTS**

The 2010 NSCG and 2013 NSCG included incentive experiments to examine the impact of offering incentives on response, data quality, and cost. The results from the incentive experiments<sup>15,16</sup> provided NCSES and the Census Bureau with guidance and direction for using incentives in the 2015 NSCG data collection effort. Please see Appendix J for more information on the results from the 2013 NSCG incentive experiments.

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<sup>14</sup> Off-year estimation would provide estimates for the college educated population, using only ACS data, in the years where the NSCG is not in the field. For example, as the NSCG is conducted in 2013, 2015, and 2017, off-year estimation would produce estimates for the college-educated population in 2014 and 2016.

<sup>15</sup> Zotti, Allison, "Report for the 2013 National Survey of College Graduates Methodological Research Incentive Timing Experiment," Census Bureau Memorandum from Reist to Finamore and Rivers, April 15, 2014 draft.

<sup>16</sup> Thornton, Thomas, "2013 National Survey of College Graduates (NSCG) Incentive Conditioning Study," Census Bureau Memorandum from Reist to Finamore and Rivers, April 15, 2014 draft.



Based on the results from the 2013 NSCG incentive timing study, we plan to offer a \$30 prepaid debit card incentive to a subset of highly influential new sample cases at week 1 of the 2015 NSCG data collection effort. “Highly influential” refers to the cases with a large base weight and a low response/locating propensity. The highly influential cases will be identified by a model-based approach using a weighted response influence, which is the product of a sampled case’s base weight and predicted response propensity. We expect to offer \$30 debit card incentives to approximately 8,000 of the 42,000 new sample cases included in the 2015 NSCG. The weighted response influence factor is calculated as follows:

$$W_i = \omega_i * \hat{\phi}_i, \text{ where } \hat{\phi}_i = \left( \frac{1}{\hat{\rho}_{Li}} \right) \left( \frac{1}{\hat{\rho}_{Ri}} \right).$$

The weighted response influence for a case,  $W_i$ , is the product of the base weight,  $\omega_i$ , and the response influence,  $\hat{\phi}_i$ . The response influence is the inverse of the product of the locating propensity,  $\hat{\rho}_{Li}$ , and the response propensity,  $\hat{\rho}_{Ri}$ .

In addition, using the findings from the 2013 NSCG incentive conditioning study, we plan to offer a \$30 prepaid debit card incentive to past incentive recipients at week 1 of the 2015 NSCG data collection effort. We expect to offer \$30 debit card incentives to approximately 14,500 of the 93,000 returning sample members.

The \$30 incentive amount proposed for use in the 2015 NSCG was chosen based on findings from the 2010 NSCG late-stage incentive experiment targeting hard to enumerate cases that had not responded to the survey after multiple contacts. As part of the 2010 experiment, the hard to enumerate cases were allocated to three treatment groups:

- \$30 debit card incentive
- \$20 debit card incentive
- No incentive

Other than the use and amount of the debit card incentive, the three treatment groups in the 2010 NSCG late-stage incentive experiment received the same data collection contact strategy. At the conclusion of the experimental period (approximately six weeks), the response rate for the three treatment groups differed significantly. The \$30 incentive treatment group had a response rate of 29.5%, the \$20 incentive treatment group had a response rate of 24.1%, and the no incentive group had a response rate of 6.4%.

In addition to the increase in the response rate for the hard to enumerate cases that were targeted as part of this experiment, the use of the incentive also had a profound effect on the overall representation of the responding sample. The incentive was successful in obtaining responses from individuals who are demographically different than the set of respondents prior to the

incentive stage. This ability to increase the demographic diversity of our responding sample helps decrease the potential for nonresponse bias in our estimates.

## **10. ASSURANCE OF CONFIDENTIALITY**

NCSES and the Census Bureau are committed to protecting the confidentiality of all survey respondents. The NSCG data will be collected in conformance with the Privacy Act of 1974, the NSF Act of 1950, as amended, Title 13, Section 9 of the United States Code, and the Confidential Information Protection and Statistical Efficiency Act (CIPSEA) of 2002. The Census Bureau is conducting the NSCG under the authority of Title 13, Section 8 of the United States Code.

The statement on the questionnaire cover will cite the appropriate data collection authority as the NSF Act and confidentiality assurances under the CIPSEA. The questionnaire cover statement will also inform the respondents that the data will be used for statistical purposes only, and the voluntary nature of their response. The cover letters will include additional statements in the Frequently Asked Questions section about the Census Bureau's Title 13 as the data collection authority and assurances of confidentiality (see Appendix E). The Census Bureau will include the same appropriate notices of confidentiality and the voluntary basis of the survey in the introduction to respondents contacted during the web phase and CATI phase of the data collection.

NCSES and the Census Bureau will operate within the guidelines established by the Privacy Act to protect respondents' privacy and the confidentiality of the data collected. The Privacy Act states "microdata files prepared for purposes of research and analysis are purged of personal identifiers and are subject to procedural safeguards to assure anonymity."

The Census Bureau has demonstrated experience in handling sensitive data. Routine procedures will be in place to ensure data confidentiality, including the use of passwords and encrypted identifiers to prevent direct or indirect disclosures of information. Furthermore, the Census Bureau's management system is in full compliance with the government's automatic data processing systems requirements.

## **11. JUSTIFICATION FOR SENSITIVE QUESTIONS**

No questions of a sensitive nature are asked in this data collection.

## **12. ESTIMATE OF RESPONDENT BURDEN**

NCSES estimates that it will contact approximately 135,000 sample persons by web, mail or computer-assisted telephone interviewing as part of the 2015 NSCG data collection. Based on experience administering the NSCG interviews, the questionnaire takes an average of 30 minutes to complete. An overall response rate of about 70 percent is estimated from the 42,000 new sample cases, and an overall response rate of about 80 percent from the 93,000 returning sample cases. Based on an estimate of approximately 103,800 completed cases, the total burden hours

for the 2015 NSCG data collection are 51,900. The total cost to respondents for the 51,900 burden hours is estimated to be \$1,442,820. This estimate is based on an estimated median annual salary of \$58,000 per NSCG employed respondent. Assuming a 40-hour workweek and a 52-week salary, this annual salary translates to an hourly salary of \$27.88. Salary estimates were obtained using data from the 2013 NSCG.

### **13. COST BURDEN TO RESPONDENTS**

Not applicable. This survey does not require respondents to purchase equipment, software or contract out services.

### **14. COST BURDEN TO FEDERAL GOVERNMENT**

The total estimated cost to the Government for the 2015 NSCG is approximately \$14.3 million, which includes survey cycle costs, and NCSES staff costs to provide oversight and coordination with the other SESTAT survey. The estimate for survey cycle costs is approximately \$13.7 million, which is based on sample size; length of questionnaire; administration; overhead; sample design; mailing; printing; sample person locating, web instrument development; telephone interviewing; incentive payments, critical items data retrieval, data keying and editing; data quality control; imputation for missing item responses; weighting and estimating sampling error; file preparation and delivery; and preparation of documentation and final reports. The NCSES staff costs are estimated at \$562,500 (based on \$150,000 annual salary of 1.5 FTE for 2.5 years).

### **15. REASON FOR CHANGE IN BURDEN**

There were two main changes in the NSCG between the 2013 and 2015 survey cycles that impact burden. First, the sample size for the 2015 NSCG (135,000 cases) is slightly less than the 2013 NSCG sample size (144,000 cases). The main explanation for this difference is a smaller young graduate oversample will be selected in the 2015 NSCG compared to what was selected in the 2013 NSCG. The second change that impacted burden was a change in the length of the questionnaire. For the 2015 NSCG survey cycle, the NSCG questionnaire was revised to include questions on certifications and licenses. The addition of the certifications and licenses questions increased the estimated survey completion time from 25 to 30 minutes. In addition to these changes, the inclusion of past nonrespondents into the eligible sample created the need to reduce the expected response rate for returning sample cases. When these factors are considered, there was a slight increase in the burden hours estimate between the 2013 and 2015 NSCG survey cycles.

**16. SCHEDULE FOR INFORMATION COLLECTION AND PUBLICATION**

NCSES does not plan to use any complex analytical techniques in publications using this data. Normally cross tabulations of the data are presented in NCSES reports and other data releases.

The time schedule for 2015 data collection and publication is currently estimated as follows:

Data Collection	April 2015 – October 2015
Coding and Data Editing	April 2015 – February 2016
Final Edited/Weighted/Imputed Data File	March 2016
NSCG Info Brief	Summer 2016
NSCG Integrated Public Use Data File	Summer 2016

**17. DISPLAY OF OMB EXPIRATION DATE**

The OMB expiration date will be displayed on the 2015 NSCG questionnaires, postal contacts, and the web instrument introduction page.

**18. EXCEPTION TO THE CERTIFICATION STATEMENT**

Not Applicable.