

**U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
SUBCOMMITTEE ON INVESTIGATIONS & OVERSIGHT
HEARING CHARTER**

Brain Drain: Rebuilding the Federal Scientific Workforce

Wednesday, March 17, 2021
10:00 a.m. ET
Cisco WebEx

PURPOSE

The purpose of the hearing is to assess recent widespread departures of career scientists from the Federal Government. The Subcommittee will examine the cause and extent of the employment decline within the federal scientific workforce, as well as the implications of a smaller scientific workforce for science-based agencies. The Subcommittee will also discuss potential policies to rebuild federal scientific capacity.

WITNESSES

- **Ms. Candice Wright**, Acting Director, Science, Technology Assessment, and Analytics, U.S. Government Accountability Office
- **Mr. Max Stier (STY-ur)**, President and CEO, Partnership for Public Service
- **Dr. Andrew Rosenberg**, Director, Center for Science and Democracy, Union of Concerned Scientists
- **Dr. Betsy Southerland (SUH-thur-lund)**, Former Director of Science and Technology, Office of Water, Environmental Protection Agency

OVERARCHING QUESTIONS

- How significantly have declining workforces impacted science agencies?
- What are the causes of scientific brain drain from the Federal Government?
- What are the implications of the loss of career scientists for federal scientific capacity and the ability of scientific agencies to fulfill their missions?
- How did recent workforce challenges impact longstanding efforts to promote greater diversity within the federal scientific workforce?
- What policies can most effectively support and rebuild a diverse, inclusive, and robust scientific workforce for the federal government?

The Federal Scientific Workforce: An Overview

No single definition establishes the parameters of the federal “scientific workforce.” Within any federal program charged with conducting or overseeing science and using scientific analysis to

inform decision-making, a wide range of career scientific personnel carry out the necessary functions to ensure that government policies are guided by accurate scientific knowledge. These career employees, largely employed within science, technology, engineering, and mathematics (STEM) occupations, constitute the civil service scientific workforce. The expertise and institutional knowledge that they develop over decades in government service provides the foundation of federal scientific capabilities.¹

Scientific Workforce Trends in the Federal Government

In recent years, an increasing number of scientific advocacy groups, academic stakeholders, and former federal scientists have expressed concern about the declining size of the federal scientific workforce.² In a 2018 survey of 63,000 scientific experts employed by the federal government, 79% reported workforce reductions in their agency over the previous twelve months. 87% believed that the workforce reductions had undermined their agency's mission.³ Additional analyses have identified large employment declines within key scientific agencies and offices over the previous four years.⁴

Committee staff reviewed employment data pertaining to seven science-based agencies within the Committee's jurisdiction:

- National Science Foundation (NSF)
- National Aeronautics and Space Administration (NASA)
- Department of Homeland Security's Science and Technology Directorate (DHS S&T)
- National Institute of Standards and Technology (NIST)
- Environmental Protection Agency (EPA)
- Department of Energy (DOE)
- National Oceanic and Atmospheric Administration (NOAA)

The following sections summarize the data findings. The employment data figures reflect the number of employees in pay status on the last day (September 30) of the fiscal year listed.

¹ Congressional Research Service, "Science and Technology Issues in the 116th Congress," R45491, February 6, 2019, accessed here: <https://crsreports.congress.gov/product/pdf/R/R45491/3>.

² For example, see Annie Gowan, Juliet Eilperin, Ben Guarino, and Andrew Ba Tran, "Science ranks grow thin in Trump Administration," *Washington Post*, January 23, 2020, accessed here: https://www.washingtonpost.com/climate-environment/science-ranks-grow-thin-in-trump-administration/2020/01/23/5d22b522-3172-11ea-a053-dc6d944ba776_story.html.

³ Center for Science and Democracy, "Science under Trump: Voices of Scientists across 16 Federal Agencies," *Union of Concerned Scientists*, August 7, 2018, accessed here: <https://www.ucsusa.org/sites/default/files/inline-images/2018/08/science-under-trump-report.pdf>.

⁴ Emily Badger, Quoc Trung Bui, and Alicia Parlapiano, "The Government Agencies That Became Smaller, and Unhappier, Under Trump," *New York Times*, February 1, 2021, accessed here: <https://www.nytimes.com/2021/02/01/upshot/trump-effect-government-agencies.html>.

Total Agency Employment, FY 2009-2016-2020 (Full-Time Equivalent Employment, or FTEs)

	FY 2009	FY 2016	FY 2020	% Change (2016-2020)	% Change (2009-2020)
NSF	1,180	1,208	1,283	+ 6.2%	+ 8.7%
NASA	16,970	16,985	17,099	+ 0.7%	+ 0.8%
DHS S&T	359	442	421	- 4.8%	+ 17.3%
NIST	2,605	2,919	2,980	+ 2.1%	+ 14.4%
EPA	16,456	14,287	13,732	- 3.9%	- 16.6%
DOE	15,134	14,499	14,047	- 3.1%	- 7.2%
NOAA	12,323	11,148	11,260	+ 1.0%	- 8.6%

Over the past four years, NSF and NIST saw sizable workforce increases. Employment at NASA and NOAA was largely flat, with small increases at each agency equivalent to one percent growth or less. DHS S&T, EPA and DOE experienced significant workforce declines. EPA and DOE lost more than 1,000 employees combined between FY 2016 and FY 2020.

Over the past decade, NSF, NIST and DHS S&T increased their workforces substantially. NASA's workforce remained essentially flat extending back to FY 2009. EPA, DOE and NOAA underwent enormous workforce declines of 16.6%, 7.2% and 8.6%, respectively. The combined workforces of those three agencies have decreased by 4,874 employees since FY 2009. EPA alone lost more than 2,700 employees during the period.

Agency STEM Employment, FY 2009-2016-2020 (FTEs)

	FY 2009	FY 2016	FY 2020	% Change (2016-2020)	% Change (2009-2020)
NSF	355	423	492	+ 16.3%	+ 38.6%
NASA	10,479	11,133	11,548	+ 3.7%	+ 10.2%
DHS S&T	181	194	166	- 14.4%	- 8.3%
NIST	1,378	1,696	1,802	+ 6.3%	+ 30.8%
EPA ⁵	**	8,632	8,294	- 3.9%	**
DOE	4,703	4,993	4,993	0.0 %	+ 6.2%
NOAA	7,191	6,939	7,076	+ 2.0%	- 1.6%

Over the past four years, NSF, NIST, NASA and NOAA increased the size of their STEM workforces to varying degrees. NSF and NIST experienced very large STEM employment increases, including more than a 16% increase at NSF. NASA and NOAA experienced considerably smaller increases. DOE's STEM workforce did not increase by a single employee over four years and ended FY 2020 at exactly the same size as it had ended FY 2016. The STEM

⁵ Due to an apparent reclassification of certain STEM occupations during the Obama Administration, it is difficult to utilize STEM workforce data to reliably compare EPA STEM employment over the course of the entire decade. This analysis is limited to EPA STEM workforce data between the years FY 2016 and FY 2020, for which the data can be consistently applied.

workforces of EPA and DHS S&T declined outright. EPA lost 338 STEM employees over four years and DHS S&T lost over 14% of its STEM workforce.

Over the past decade, NSF, NIST, NASA and DOE increased the size of their STEM workforces. NSF and NIST enjoyed extraordinary STEM increases of more than 30%. NASA’s STEM employment increased by more than 10%. The DOE STEM workforce increased by slightly more than 6%, with the entire increase occurring between FY 2009 and FY 2016. The STEM workforces at NOAA and DHS S&T actually declined over the course of the decade.

Agency Gender Employment, FY 2020 (FTEs)

	Male Employment	Female Employment	Workforce Male : Female Ratio	STEM Male Employment	STEM Female Employment	STEM Male : Female Ratio
NSF	503	780	1.0 : 1.5	268	224	1.2 : 1
NASA	11,229	5,870	1.9 : 1	8,721	2,827	3.1 : 1
DHS S&T	262	159	1.6 : 1	130	36	3.6 : 1
NIST	1,904	1,076	1.8 : 1	1,375	427	3.2 : 1
EPA	6,591	7,141	1 : 1.1	4,445	3,849	1.2 : 1
DOE	8,967	5,080	1.8 : 1	3,693	1,300	2.8 : 1
NOAA	7,380	3,880	1.9 : 1	5,180	1,896	2.7 : 1

Gender employment gaps persisted at all seven agencies at the end of FY 2020 between STEM workforces and total agency workforces. NSF and EPA employed majority-female agency workforces but majority-male STEM workforces. NASA, DHS S&T, and NIST had more than 3 men for every 1 woman employed in their STEM workforces. DOE and NOAA had nearly 3 men for every 1 woman employed in their STEM workforces.

Agency Racial and Ethnic Employment⁶, FY 2020 (FTEs)

	White Employment	Minority Employment	Workforce White : Minority Ratio	STEM White Employment	STEM Minority Employment	STEM White : Minority Ratio
NSF	700	579	1.2 : 1	351	138	2.5 : 1
NASA	12,095	4,994	2.4 : 1	8,657	2,885	3.0 : 1
DHS S&T	282	139	2 : 1	116	50	2.3 : 1
NIST	2,181	799	2.7 : 1	1,393	409	3.4 : 1
EPA	8,934	4,782	1.9 : 1	5,829	2,458	2.4 : 1

⁶ OPM’s FedScope database defines “Minority” employees as those federal employees identifying as: Hispanic or Latino; American Indian or Alaska Native; Asian; Black or African American; or Native Hawaiian or Other Pacific Islander. Additionally, FedScope’s “Minority” employment data includes federal employees who identify as “more than one race.”

DOE	10,174	3,868	2.6 : 1	3,687	1,303	2.8 : 1
NOAA	8,959	2,301	3.9 : 1	6,084	992	6.1 : 1

All seven agencies also exhibited racial and ethnic employment gaps between STEM workforces and total agency workforces at the end of FY 2020. NSF, DHS S&T, EPA and DOE employed more than 2 white STEM employees for every 1 member of a minority group employed in their STEM workforces. NASA and NIST employed at least 3 white STEM employees for every 1 member of a minority group employed in their STEM workforces. NOAA employed over 6 white STEM employees for every 1 member of a minority group employed in its STEM workforce.

Extensive research has demonstrated that group diversity encourages creativity and innovation in scientific fields, which leads to more successful research outcomes.⁷ Diverse teams outperform homogeneous teams due to their ability to elevate talented individuals from a larger cross-section of society and benefit from the resulting broader range of perspectives.⁸ Additionally, the increasing diversity of American society as a whole makes it essential for the Federal Government to encourage access for historically underrepresented groups to the federal STEM workforce in order to meet STEM workforce demands in the years and decades ahead.⁹ Gender, racial and ethnic employment gaps within the federal STEM workforce risk undermining the ability of science agencies to properly support federal scientific responsibilities.

Causes and Consequences of Scientific Workforce Declines at Certain Agencies

Several factors contribute to the trends identified above. Long-term budget cuts forced some science agencies to implement hiring freezes, early retirement and buyout programs for career employees in order to operate within budgetary constraints. The federal hiring process for civil servants via USAJobs.com can take significantly longer for applicants than the private sector. Structured pay scales and ceilings for civil servants make some federal scientific jobs less financially lucrative than comparable private sector opportunities.

Additionally, the past four years witnessed a number of prominent controversies pertaining to the role of science in federal policymaking that impacted the scientific workforce. The Trump Administration’s budget proposals called for deep cuts to federal science programs and signaled a lack of political support for the work of federal scientists, despite their rejection by Congress. Agency leaders imposed bureaucratic obstacles upon scientific activities that undermined the ability of career scientists to advance the missions of their agencies. In a few instances, entire agencies such as the Economic Research Service and Agricultural Research Service in the Department of Agriculture were moved from the National Capital Region to other parts of the country, resulting in the departures of hundreds of civil servant economists and researchers from

⁷ Interagency Policy Group on Increasing Diversity in the STEM Workforce By Reducing the Impact of Bias, “Reducing the Impact of Bias in the STEM Workforce,” *Office of Science and Technology Policy (OSTP) and Office of Personnel Management (OPM)*, Report Digest, November 2016, accessed here: https://www.si.edu/content/OEEMA/OSTP-OPM_ReportDigest.pdf.

⁸ *Id.*

⁹ *Id.*

government service.¹⁰ Finally, a series of conspicuous scientific integrity violations caused federal scientists to question whether political leadership in their agencies respected the proper role of science in policymaking. Varying procedures, uneven implementation, and differing methods for identifying and addressing violations of scientific integrity policies contributed to uncertainty among career employees regarding scientific integrity in certain agencies.¹¹

As a result, the morale of the federal scientific workforce declined during the Trump Administration. The same 2018 survey found that censorship, political interference and poor leadership at key science-based agencies had weakened the morale of the federal scientific workforce and reduced the job effectiveness and satisfaction of career scientists.¹² A reduced scientific workforce risks undermining the Federal Government’s scientific capabilities and affecting the quality of federal policymaking based on science. As large numbers of career scientists departed in recent years, work backlogs have increased, research grants have been hindered, and the pace of scientific research has slowed due to the increased workload borne by the smaller number of scientists who remain. Environmental enforcement efforts have also suffered due to the presence of fewer expert personnel.¹³

Tools for Consideration

A host of policy options exist to rebuild the federal scientific workforce, including:

- Increasing budgets for science agencies and offices;
- Strengthening agency scientific integrity policies;
- Utilizing direct-hire authorities for scientific occupations, such as the direct hire authorities authorized in October 2018 by OPM for a series of STEM occupations, which were utilized for fewer than 100 new STEM hires through August 2020¹⁴;
- Expanding fellowship opportunities for scientists early in their careers, such as the reinstatement of the Presidential Management Fellowship STEM-specific track¹⁵;

¹⁰ Ben Guarino, “Many USDA workers to quit as research agencies move to Kansas City: ‘The brain drain we all feared,’” *Washington Post*, July 18, 2019, accessed here: <https://www.washingtonpost.com/science/2019/07/18/many-usda-workers-quit-research-agencies-move-kansas-city-brain-drain-we-all-feared/>.

¹¹ U.S. Government Accountability Office, “Scientific Integrity Policies: Additional Actions Could Strengthen Integrity of Federal Research,” GAO-19-265, April 2019, accessed here: <https://www.gao.gov/assets/gao-19-265.pdf>.

¹² Center for Science and Democracy, “Science under Trump: Voices of Scientists across 16 Federal Agencies,” *Union of Concerned Scientists*, August 7, 2018, accessed here: <https://www.ucsusa.org/sites/default/files/images/2018/08/science-under-trump-report.pdf>.

¹³ Tammy Webber and Matthew Brown, “Biden environmental challenge: Filling vacant scientist jobs,” *Associated Press*, January 30, 2021, accessed here: <https://apnews.com/article/joe-biden-donald-trump-climate-climate-change-environment->.

¹⁴ United States Office of Personnel Management Memorandum, “Announcing Government-wide Direct Hire Appointing Authorities,” October 11, 2018, accessed here: <https://www.sfs.opm.gov/Documents/GovHireAppointingAuthorityMemo.pdf>.

¹⁵ Jacob Carter, Taryn MacKinney, and Gretchen Goldman, “The Federal Brain Drain: Impacts on Science Capacity, 2016-2020,” *Union of Concerned Scientists*, January 30, 2021, accessed here: <https://www.ucsusa.org/resources/federal-brain-drain#top>.

- Strengthening diversity and inclusion benchmarks within the recruitment, hiring and promotion processes for scientific agencies and occupations;
- Deepening collaborative initiatives between science-based agencies and Historically Black Colleges and Universities (HBCUs) and other Minority Serving Institutions (MSIs) to promote greater access for students from historically underrepresented groups to federal scientific occupations;
- Broadening mentorship programs to better cultivate the professional development of early and mid-career STEM employees;
- Intensifying the recruitment of retired scientists to return to government service for short-term employment in order to fill immediate capacity shortfalls;
- Supporting the morale of career scientists by elevating the role of scientific evidence in the policymaking process and reinforcing the independence of scientific research activities.