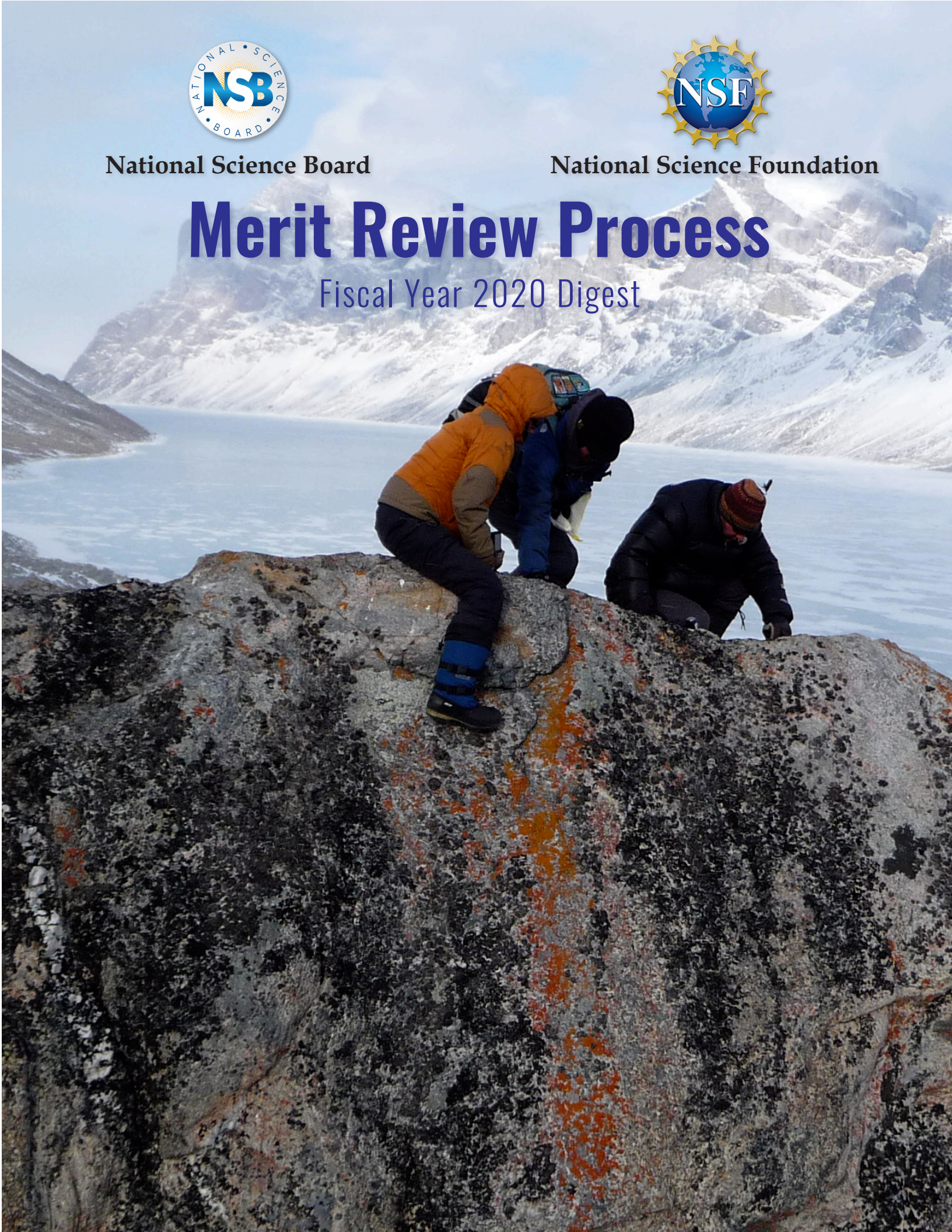National Science Board

National Science Foundation

Merit Review Process

Fiscal Year 2020 Digest

COVER IMAGE:

Jason Briner, an associate professor at the University at Buffalo, and students Sean McGrane and Elizabeth Thomas (in orange) studied boulders on Baffin Island, Canada, to learn more about past activity of glaciers there. Specifically, the researchers were studying how quickly glaciers can melt and grow in response to shifts in temperature.

The University at Buffalo (UB) team studied and dated moraines, piles of rocks and debris that glaciers leave behind when they expand, and other geological features. Their findings showed that mountain glaciers on Baffin Island, along with a massive North American ice sheet, expanded quickly when the Earth cooled about 8,200 years ago. This finding adds to the evidence that ice sheets reacted rapidly in the past to cooling or warming and raises concerns that they could do so again as the Earth heats up. The finding was particularly surprising because the cold spell was very short -- the temperature fell for only a few decades and then returned to previous levels within 150 years or so.

"One of the questions scientists have been asking is how long it takes for these huge chunks of ice to respond to a global climate phenomenon," says Briner. "People don't know whether glaciers can respond quickly enough to matter to our grandchildren, and we're trying to answer this from a geological perspective, by looking at Earth's history." He adds that "what we're seeing is that these ice sheets are surprisingly sensitive to even short periods of temperature change."

Credit: Nicholoás Young

NSB Overview of the NSF Merit Review Process
FY 2020

The National Science Board (NSB) is pleased to receive the FY 2020 Merit Review Digest (Digest) from the National Science Foundation (NSF). NSB uses the annual Digest to ensure that NSF implements the merit review process with integrity and in a fair, competitive, and transparent manner. Additional high-level NSF mechanisms for protecting and improving the merit review process include external Advisory Committees, reports from Committees of Visitors (COVs), and biennial surveys of proposers and reviewers. NSB assesses this material to the extent it is available each year.

In FY 2020, NSF achieved a funding rate of 28% for full proposals, a slight increase over the previous year and a solid 4-6% increase over the range for the previous decade. NSB believes the long-term health of the research community and NSF's ability to deliver benefits to the nation demand a funding rate closer to the average of 30% or more seen in the 1990s. NSB appreciates the increase in 2020 that results in part from the continuation and expansion of no-deadline policies in several NSF Directorates and commends NSF for managing and monitoring proposal intake, while continuing to encourage high quality proposals from a broad range of researchers. The increase is also a result of a substantially higher number of Rapid Response Research (RAPID) proposals funded by NSF last year, many addressing COVID-19 pandemic issues on an expedited basis. RAPID proposals are one of several proposal types that NSF policy specifies are not required to undergo external peer review. These proposals are reviewed internally by NSF Program Officers using the standard merit review criteria. Given the efficient and successful way NSF made RAPID awards last year it seems worthwhile to reconsider the existing limitations on awards that POs may recommend without external merit review processes.

Demonstrating a Culture of Accountability

NSB set out four overarching goals for agency investments in its recent Vision 2030 report[1]:
>   1) Delivering benefits from research and creating new knowledge
>   2) Developing STEM talent for America
>   3) Expanding the geography of innovation within the U.S.
>   4) Fostering a global S&E community

NSB continues to emphasize the importance of both Intellectual Merit and Broader Impacts in awarding research funding that benefits the nation's scientific and technical advancement. Both criteria are vital to the success of NSF-funded research. In response to the Vision 2030 Report, the Board has recently directed their attention to the Broader Impacts merit review criterion,

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[1] See NSB Vision 2030 Report, https://www.nsf.gov/nsb/publications/2020/nsb202015.pdf.

focusing on how it delivers benefits to society. Congress has also specified certain goals for NSF-sponsored research, especially in the areas of broadening participation of underrepresented groups in science, technology, engineering, and math (STEM) education and in STEM workforce development.[2] Addressing the Missing Millions gap in the nation's STEM education and workforce is already a top priority for NSB's Vision and NSB is working with the agency to demonstrate how NSF-sponsored research is delivering benefits.

NSB passed two resolutions in February 2021 to enhance the merit review process regarding the quality of reviews and fuller understanding of the Broader Impacts criterion. The first resolution recommended mandatory training for all proposal reviewers. It was informed by reviewer survey results indicating that while nearly all respondents thought orientation training helpful, only 1 out 5 respondents completed it. We anticipate this training for all reviewers will enhance the merit review process, further promote fair and transparent consideration of all proposals, mitigate implicit bias, and optimize written reviews.[3]

The second resolution recommended the addition of at least one Broader Impacts expert on COVs to provide informed analysis and specific recommendations and thereby improve the current review process. This resolution resulted in part from repeated COV reports noting that written reviews of proposed Broader Impacts tended to be less consistent and less rigorous than the reviews of the Intellectual Merit of proposals. Inclusion of subject matter experts should also enhance the evaluation for Broader Impacts.[4]

We appreciate NSF's efforts to develop plans and policies in response to these resolutions and look forward to a status report on them next year.

As noted, all NSF proposals are evaluated using Intellectual Merit and Broader Impacts. Ten years ago, the Board observed discrepancies in stakeholder perceptions of the importance of each criterion relative to the other.[5] COV reports through the present indicate some discrepancies remain. While it is important to allow reviewers the flexibility necessary to fully consider proposals, it also remains apparent that clearer guidance around both criteria is essential to the implementation of NSF policy. With a view to increasing accountability and ensuring continuing high quality in both Intellectual Merit and Broader Impacts, NSB will explore methods that would provide insight into ratings ascribed to the reviews.

It is important for Principal Investigators (PIs) to receive timely funding decisions. The time between proposal submission and funding decision is the proposal's "dwell-time". NSF tracks dwell time because of its importance in ensuring NSF's success in effectively reaching its research and public benefit goals. NSF's goal is to inform at least 75% of PIs of a funding

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[2] See NSF Act, 42 USC § 1862p-14.
[3] See NSB Resolution on training, https://www.nsf.gov/nsb/publications/2021/nsb202110.pdf, and the Supporting Statement, https://www.nsf.gov/nsb/publications/2021/nsb20218.pdf.
[4] See NSB Resolution on COV panels, https://www.nsf.gov/nsb/publications/2021/nsb202111.pdf, and the Supporting Statement, https://www.nsf.gov/nsb/publications/2021/nsb20219.pdf.
[5] See NSB Report, National Science Foundation's Merit Review Criteria: Review and Revisions (2011) https://www.nsf.gov/nsb/publications/2011/nsb1211.pdf.

decision within six months. During the past few years, NSF has not met this dwell-time goal. NSB is aware that recent external challenges, such as disruptions caused by the global COVID-19 pandemic, have impacted this metric, but timely funding decisions are vital to PIs. With the prospect of increased NSF funding and the potential launch of a new Directorate, the Board sees a real opportunity for NSF to consider internal process improvements that may result in greater efficiencies. NSB is already reviewing its processes to ensure it can take timely action on the award decisions that are within its authority.

Determining Relevant Data to Demonstrate Accountability

The Digest provides a wealth of vitally important information on the merit review process and participants, but additional data would be helpful to demonstrate how the merit review process is meeting the Board's Vision for the science and engineering enterprise in 2030, especially for the Missing Millions. For example, while race and gender are already reported in PI demographics, geographic- and institution-specific data, as well as data disaggregation, could enhance baseline information about researcher participation and institutional competitiveness, inform evidence-based policymaking, and assist NSB in its governance role for NSF. It is worth noting that current PI demographic data is self-reported and incomplete. For example, in 2020, a little over 25% of researchers who submitted proposals failed to indicate their gender. The advantage of a higher percentage of responses is obvious. NSB encourages NSF to consider how to improve self-reporting from PIs and reviewers while also exploring other strategies, as well as processes to alleviate administrative burdens.

Efforts to identify, collect, and interpret data to assess the merit review process is challenging. A 2001 National Academy of Public Administration (NAPA) report on the merit review criteria recommended that NSF develop a robust database, adequate quantitative measures, and appropriate performance indicators to determine whether progress toward the objectives for the merit review criteria was being achieved.[6] The report further urged NSF to institute long-term tracking of the effects of research projects, measuring at least 10 years out. NSB and NSF will continue to work together to identify opportunities that provide greater insights into the merit review process and its outcomes and that can be explored using a repeatable and transparent process. To this end, new data collections and revised reporting methods may be called for. For example, additional detailed information on NSF-supported graduate students and postdoctoral scholars should illuminate the impact of NSF funding on the future STEM workforce.

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[6] National Academy of Public Administration, A STUDY OF THE NATIONAL SCIENCE FOUNDATION'S CRITERIA FOR PROJECT SELECTION, February 2001, p. 7.

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APPENDICES

The National Science Foundation's Merit Review Process: FY 2020 Digest

I.   Executive Summary

This report includes data and related information about the National Science Foundation (NSF or the Foundation) Merit Review Process for fiscal year (FY) 2020.

The coronavirus disease (COVID-19) and associated pandemic that took hold in FY 2020 brought unprecedented challenges and long-lasting impacts to the nation, the scientific research community, and NSF operations. Principal Investigators (PIs), program officers, reviewers, and others adapted to new and rapidly changing workplace requirements. These adjustments included a shift to virtual panels, remote collaboration, and ad hoc innovations throughout the research community to ensure ongoing research remained as uninterrupted as possible. Additionally, the March 2020 passage of the Coronavirus Aid, Relief, and Economic Security Act (CARES Act)[1] provided vital funding to the science, technology, and engineering research communities. The CARES Act allowed NSF to leverage its partnerships with universities, industry, and other federal agencies to support the nation's immediate research needs while maintaining its ongoing commitment to contribute ground-breaking research in the interest of societal wellbeing more broadly. With the additional support provided by the CARES Act, NSF was able to fund over 500 research projects in direct response to COVID-19[2] and the coronavirus pandemic while continuing to invest in foundational research in the physical, biological, mathematical, engineering, and social and behavioral sciences.

In total, NSF acted on 42,723 competitively reviewed full proposals in FY 2020, 104% of the number acted on in FY 2019 (41,024). The Foundation made 12,168 awards in FY 2020, 925 more awards than in FY 2019, resulting in an overall funding rate of 28%, a 1% increase over FY 2019 and above the range of between 22% and 24% seen from 2011 to 2018. A more detailed breakdown of funding rates by directorate and PI demographics may be found in **Appendices 3 and 4**.

In FY 2020, approximately 82% of NSF's competitively reviewed full proposals were research proposals. The funding rate for research proposals was 28% overall. Comparatively, the funding rate for research proposals over the past decade varied between 19% and 26% from FY 2010 to FY 2019. The funding rate for research proposals from early-career Principal Investigators (PIs) within 10 years of receiving the last degree at the time of award was 25%, compared to 29% for other PIs.[3]

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[1] The Coronavirus Aid, Relief, and Economic Security Act, also known as the CARES Act, P.L. 116–136, available at https://www.congress.gov/116/bills/hr748/BILLS-116hr748enr.pdf.

[2] NSF Agency Financial Report (November 2020), available at https://www.nsf.gov/pubs/2021/nsf21002/pdf/nsf21002.pdf

[3] Prior to FY 2020, early-career PIs were defined as those within seven—rather than ten--years of receiving their last degree at the time award. Additional informaiton about this change can be found in Section III, A.9.

The funding rates for research proposals from men and women were 28% and 31%, respectively. Overall, the funding rate for research proposals from White PIs was 31%, while rates for proposals from Multi-racial PIs, Hispanic or Latino PIs, Black/African American PIs, and Asian PIs were 28%, 28%, 26%, and 25%, respectively.

In terms of individual investigators, the funding rate for PIs across the last three years – the average duration for a research grant – was 42%. That is, of PIs who submitted one or more research proposals between FY 2018 and FY 2020, 42% received an award in that period. This is compared to a low of 35%, which occurred consecutively in the three-year periods between FY 2010 and FY 2012, and FY 2011 and FY 2013. The mean duration of a research award in FY 2020 was 2.8 years.

The mean annual research award amount was $194,323. When adjusted for inflation, awards sizes have largely been flat since FY 2011. If graduate students were included in a research grant award, the mean level of graduate student support per research grant was $30,413 annually. Graduate student support via NSF research grants supports grant-related activities and does not include tuition and other benefits. NSF research awards supported 29,043 graduate students and 4,672 post-doctoral associates in FY 2020, as well as 38,865 senior research personnel. The average number of months of salary support for individual PIs or Co-PIs per research grant per year in FY 2020 was 0.51 months for single-PI and 0.53 months for multiple-PI awards, about half of the support for PIs provided in research grants in FY 2011.

Most proposals submitted to NSF are externally reviewed by one of three methods: a review panel only, ad hoc reviewers plus a panel, or ad hoc reviewers only. In FY 2020, 65% of proposals were reviewed by panel only, 22% by ad hoc plus panel, and 7% by ad hoc only. By Foundation policy some categories of proposals do not require external review. In FY 2020, approximately 6% of proposals were not reviewed externally. These included EArly-concept Grants for Exploratory Research (EAGER) proposals that enable program officers to support what they judge to be potentially transformative early-stage research and Grants for Rapid Response Research (RAPID), as well as small grants for travel, conferences, or workshops. RAPID proposals comprised a larger proportion of research proposals in FY 2020 (2.7%) compared to previous years, which is likely explained by the April 2020 request for non-medical, non-clinical-care RAPID proposals to address the COVID-19 pandemic.[4]

NSF's goal is to inform 75% of applicants whether their proposals have been declined or recommended for funding within 182 days, or six months, of deadline, target, or receipt date, whichever is later.[5] In FY 2020, 68% of all proposals were processed within six months.

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[4] A Dear Colleague Letter on the Coronavirus Disease 2019 (COVID-19) was shared by NSF on April 3, 2020 and may be found at https://www.nsf.gov/pubs/2020/nsf20052/nsf20052.jsp.
[5] NSF FY 2019 Annual Performance Report and FY 2021 Annual Performance Plan.

II. Introduction

The National Science Foundation Act of 1950 directs the Foundation, "to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels."[6] NSF is the only federal agency whose mission is to invest in fundamental, basic research and education across the full spectrum of science, technology, engineering, and mathematics (STEM) disciplines, except for medical sciences. NSF achieves its unique mission by making merit-based awards to around 1,900 colleges, universities, businesses, informal science organizations and other research organizations throughout the US.[7]

A National Science Board (NSB) policy, endorsed in 1977 and amended in 1984, 2017, and 2019, requests that the NSF Director submit an annual report on the NSF merit review process. *The NSF Merit Review Process – FY 20 Digest* and the accompanying downloadable data tables provide summary statistics covering the period from October 1, 2019 to September 30, 2020.

This section of the Digest describes the NSF Merit Review process. **Section III** provides summary data about proposals, awards, and funding rates. **Section IV** delivers more detailed information about the process by which proposals are reviewed and awarded.

The Merit Review Process

All proposals reviewed by NSF are evaluated using the two NSB-approved criteria: *Intellectual Merit* and *Broader Impacts*. These are stated in Part I of the NSF *Proposal and Award Policies and Procedures Guide*.[8] The Intellectual Merit criterion encompasses the potential to advance knowledge. The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Programs may have additional review criteria particular to the goals and objectives of the program. All relevant review criteria are described in the program announcement or solicitation.

On average, NSF proposals are reviewed by 3-5 reviewers, depending on the type of review mechanism used and the nature of the proposals. Each reviewer is chosen for specific types of expertise and adds different points of view to the decision-making process. Reviewers provide written reviews that describe the strengths and weaknesses of proposals in the context of the NSB merit review criteria. NSF program officers make funding recommendations to award or decline proposals after scientific, technical, and programmatic review and consideration of appropriate factors, such as portfolio balance and the amount of funding available. **Section IV** and **Appendix 8** of this report describe in detail the processes by which merit review is conducted and the principles and criteria that guide review and decision making. The integrity of the merit review process is assessed by external Committees of Visitors (**Appendix 11**) every 4 – 5 years.

[6] 42 U.S.C. §1862, available at https://www.law.cornell.edu/uscode/text/42/1862.
[7] NSF FY 2020 Performance and Financial Highlights: https://www.nsf.gov/pubs/2021/nsf21003/nsf21003.pdf
[8] Two versions of the NSF *Proposal and Award Policies and Procedures Guide* (PAPPG) were applicable in FY 2020: from October 1, 2019 to May 31, 2020, the applicable version may be found at: https://www.nsf.gov/pubs/policydocs/pappg19_1/nsf19_1.pdf; for June 1, 2020 on, the applicable version may be found at: https://nsf.gov/pubs/policydocs/pappg20_1/nsf20_1.pdf.

Over the past 10 years, 95% of NSF's proposals on average are evaluated by external reviewers as well as by NSF staff. The remainder fall into special categories that are, by NSF policy, exempt from external review and may be internally reviewed only. These include proposals for conferences, EArly-concept Grants for Exploratory Research (EAGERs), Grants for Rapid Response Research (RAPIDs) (see **Section III.G** and **Appendix 7**), and proposals submitted through the Research Advanced by Interdisciplinary Science and Engineering (RAISE) mechanism.

Information about Proposals and Awards

NSF's annual portfolio of funding actions (awards and declines) is associated with proposals, requests for supplements, and Intergovernmental Personnel Act agreements. Proposals are further divided into two types, full proposals and preliminary proposals. This report focuses on full proposals. In general, we will refer to these simply as proposals unless it is necessary to distinguish them from preliminary proposals. Information on preliminary proposals may be found in **Appendix 9**.

Section III.A discusses the subset of competitively reviewed proposals that are research proposals. This category consists of 82% of the competitively reviewed proposals and includes proposals for typical research projects. **Sections III.B – F** summarize data on all competitively reviewed proposals.

Funding rate, also called proposal funding rate, refers to the proportion of proposals acted on in a fiscal year that resulted in awards. For example, if a directorate processed 8,000 proposals in the year, making 2,000 awards and declining the remaining 6,000, the funding rate for that directorate in that year would be 25%.

Directorates are often referred to by their acronyms[9]: BIO (Biological Sciences), CISE (or CSE; Computer and Information Science and Engineering), EHR (Education and Human Resources), ENG (Engineering), GEO (Geosciences), MPS (Mathematical and Physical Sciences), and SBE (Social, Behavioral and Economic Sciences). Some tables and figures include data pertaining to the Office of International Science and Engineering and the Office of Integrative Activities,[10] abbreviated as OISE and OIA, respectively. In some tables, these two program offices are referred to collectively as OD since they reside within the Office of the Director.

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[9] A list of acronyms is provided in **Appendix 15**. In FY 2017, the Division of Advanced Cyberinfrastructure (ACI) and the Division of Polar Programs (PLR) were renamed the Office of Advanced Cyberinfrastructure (OAC) and Office of Polar Programs (OPP) but remain part of their parent directorates, CISE and GEO, respectively. Data for these units are not separately broken out in this report.

[10] Effective April 6, 2015, the Section for International Science and Engineering within the Office of International and Integrative Activities became a staff office, the Office of International Science and Engineering (OISE), within the Office of the Director (OD Memorandum 15-09). With this change, the name of what had been known as the Office of International and Integrative Activities (OIIA) reverted to the Office of Integrative Activities (OIA). Except where noted, the text, tables, and figures within this report reflect the nomenclature in effect at the end of FY 2019.

Impacts on the FY 2020 Merit Review Process

NSF's goal is to inform 75% of applicants whether their proposals have been declined or recommended for funding within 182 days, or six months, of deadline, target, or receipt date, whichever is later.[11] In FY 2020, 68% of all proposals were processed within six months. NSF missed this goal for several reasons. In FY 2019, NSF prioritized award actions after the FY 2019 shutdown, which resulted in a backlog of decline actions at the end of that year. This backlog did not appear in the FY 2019 statistics but in the year in which the decision was processed, FY 2020. In addition, the agency reprioritized operations in response to the COVID-19 pandemic, including providing staff with flexibilities to adjust to the changed working environment and allowing for mid-year reprioritization of workloads.

III. Proposals and Awards

A. Data on Research Grants

"Research grant" is a term used by NSF to represent a typical research award, particularly with respect to the award size. Not included in this category are awards such as operations costs for centers and facilities, grants for equipment, instrumentation, conferences, and symposia, grants in the Small Business Innovation Research program, and education and training grants.

A1. Research Proposal, Award, and Funding Rate Trends

Table 1 provides the research proposal, award, and funding rate trends.[12] The number of new research awards made in FY 2020 (9,665) represents a 12.6% increase from 2019 (8,580). The number of research proposals acted on increased by 4.5%; the funding rate for research proposals rose from 26% to 28%. Note that a proposal is included in a given fiscal year based on whether the action (division director's recommendation to award or decline)[13] was taken that year, not whether the proposal was received in that year. The increase in proposals acted on during FY 2020 may be partially explained by the FY 2019 government shutdown, which limited decision capacity and pushed some decisions into FY 2020. The increase in FY 2020 funding decisions may also be explained by an increase in Rapid Response Research (RAPID) proposals. In FY 2020, RAPID proposals comprised 2.7% of research proposals, an increase from 0.6% in FY 2019. This increase represents an expected response to the April 2020 "Dear Colleague Letter" request for non-medical, non-clinical-care RAPID proposals to address the COVID-19

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[11] NSF FY 2020 Annual Performance Report
[12] The proposal funding rate, often simply called "funding rate," refers to the proportion of proposals acted on in a fiscal year that resulted in awards. Later in the document, a funding rate for individual principal investigators will also be described.
[13] The merit review process is managed by NSF's program units (divisions and offices) and is completed when the division director or office head concurs with a program officer's recommendation to award or decline a proposal. For simplicity, this step will be referred to as completion of an award or decline action on a proposal. If that action is to recommend that an award be made, further processing takes place within the Office of Budget, Finance and Award Management (BFA) before an award is issued by NSF. More details may be found in **Section IV.B**.

pandemic.[14] RAPID proposals in FY 2020 had a funding rate of 91%, an increase from 73% in FY 2019. When RAPID proposals are excluded, the funding rate of FY 2020 research proposals drops to 26%, which is closer to the FY 2019 funding rate of non-RAPID research proposals (25%).

The continuation and expansion of no-deadline policies throughout multiple NSF Directorates may offer additional explanation for the increase in funding rate that began in FY 2019. In FY 2020, CISE removed deadlines for proposals for small projects submitted to their core research programs, joining BIO and ENG, which removed deadlines for core programs in FY 2019. Removing deadlines has been associated with a reduction in the number of proposal submissions and increased funding rates.

Table 1. Research Proposals, Awards, and Funding Rates

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Proposals	41,840	38,490	39,249	38,885	40,869	41,039	40,678	40,364	33,613	35,115
Awards	7,759	8,061	7,652	7,926	8,993	8,782	8,553	9,043	8,580	9,665
Funding Rate	19%	21%	19%	20%	22%	21%	21%	22%	26%	28%

Source: NSF Enterprise Information System, 4/27/21.

A2. Research Grant Size and Duration

In FY 2020, the annualized median award size was $150,137, a 2.4% increase from FY 2019 in nominal dollars, and the annualized mean award amount was $194,323, a 2.8% increase from FY 2019. The nominal and inflation-adjusted annual award sizes are shown in **Figure 1.**

Figure 1. Annualized Award Amounts for Research Grants in Nominal and Real Dollars
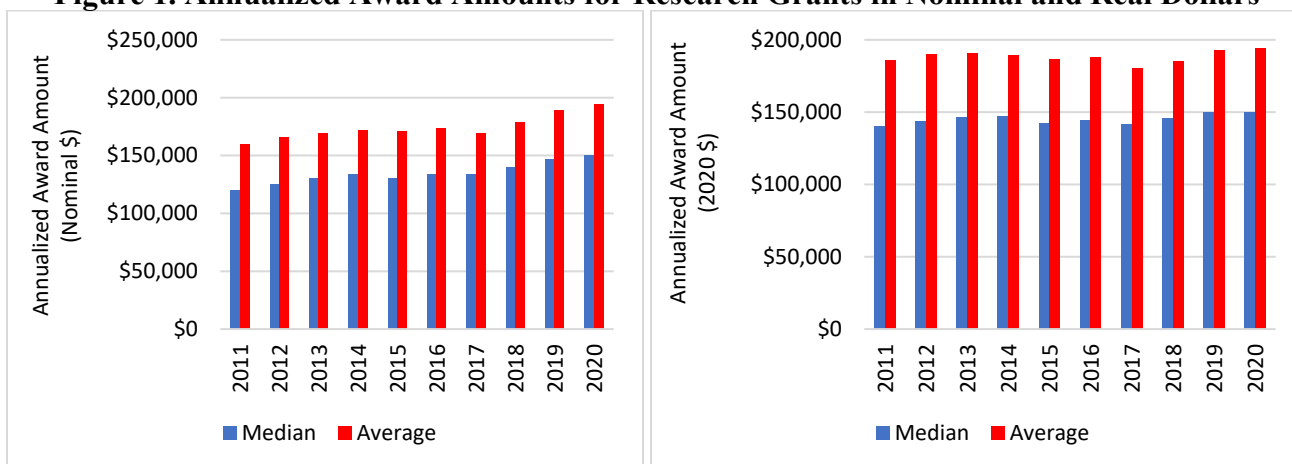
Source: NSF Enterprise Information System, 4/27/21 and Office of Management and Budget Historical Table 10.1 "*Gross Domestic Product and Deflators Used in the Historical Tables: 1940–2025*", https://www.whitehouse.gov/wp-content/uploads/2020/02/hist10z1_fy21.xlsx, accessed on 04/19/2021. Real dollars use FY 2020 as a baseline.

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[14] A Dear Colleague Letter on the Coronavirus Disease 2019 (COVID-19) was shared by NSF on April 3, 2020 and may be found at https://www.nsf.gov/pubs/2020/nsf20052/nsf20052.jsp.

In real (i.e., inflation-adjusted) dollars, the FY 2020 annualized mean award amount ($194,323) was 0.8% larger than the FY 2019 amount ($192,746), and the median award amount ($150,137) was 0.4% larger than the FY 2019 amount ($149,562).[15] The mean annual award size in *nominal* dollars increased by 22.0% from FY 2011 to FY 2020. The mean annual award size in *real* dollars fluctuated over the same period and was 4.4% higher in FY 2020 than in FY 2011. The median annual award size in *nominal* dollars increased by 25.1% from FY 2011 to FY 2020, while the median annual award size in *real* dollars increased by 7.1% over the same period.

Data on research grant award size organized by NSF directorate for the past decade are presented in **Appendix 1**. There is considerable variation among directorates; for example, BIO, CISE and GEO award larger research grants on average, while ENG, MPS and SBE award smaller grants. As **Table 2** shows, the average award duration for research grants has decreased slightly from 3.0 to 2.8 years.[16]

Table 2. Mean Award Duration for Research Grants

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Duration (Yrs)	2.9	2.9	3.0	3.0	2.9	2.9	2.9	3.0	3.0	2.8

Source: NSF Enterprise Information System, 4/27/21.

A3. Diversity of Participation

To advance the goals described in NSF's Strategic Plan[17] an important strategy is broadening the participation in NSF's activities by members of groups that are currently underrepresented in Science, Technology, Engineering, and Mathematics (STEM). This includes encouraging the participation of researchers, educators, and students from such groups in NSF's programs as well as preparing and engaging a diverse STEM workforce to participate at the frontiers of research and education. Demographic information about proposers is based on self-reported data

Proposals from Various Racial and Ethnic Groups

Tables 3 and **4** show the numbers of proposals and awards for various racial and ethnic groups.

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[15] Inflation-adjusted dollars were calculated using the Office of Management and Budget's Gross Domestic Product (GDP) (chained) Price Index. This deflator is updated by the Office of Management and Budget and is based on the U.S. Government fiscal year, October 1 to September 30. For this section and **Figure 1**, FY 2020 is the reference year (one FY 2020 dollar equals one real dollar).

[16] The slight decrease in average award duration during FY 2020 may be partially explained by an increase in RAPID proposals and awards in response to the April 2020 DCL as previously noted in section A1.

[17] NSF Strategic Plan for Fiscal Years (FY) 2018-2022 https://www.nsf.gov/pubs/2018/nsf18045/nsf18045.pdf.

Table 3. Research Proposals, by Racial and Ethnic Group

	Hispanic	Non-Hispanic	Unknown	Total
American Indian or Native Alaskan	26	40	†	††
Asian	23	6,917	516	**7,456**
Black/African American	29	576	31	**636**
Native Hawaiian or Pacific Islander	†	12	†	††
White	770	14,306	950	**16,026**
Multi-racial	55	257	16	**328**
Unknown	467	2,430	7,687	**10,584**
TOTAL	**1,370**	**24,538**	**9,207**	**35,115**

† = number less than 10; †† = row sum not available because a cell includes a number less than 10.

Table 4. Research Awards, by Racial and Ethnic Group

	Hispanic	Non-Hispanic	Unknown	Funding Rate
American Indian or Native Alaskan	†	21	†	42%
Asian	†	1,727	109	25%
Black/African American	†	150	†	26%
Native Hawaiian or Pacific Islander	†	†	†	††
White	229	4,522	285	31%
Multi-racial	12	77	†	28%
Unknown	122	576	1,802	24%
Funding Rate	**28%**	**29%**	**24%**	

† = number less than 10; †† = too few proposals and awards to compute a meaningful funding rate.

A4. Number of Investigators per Research Project

Figure 2 shows the number of new research projects with single PIs (SPI) compared to the number of new research projects with multiple PIs (MPI). Some of the MPI projects are associated with multiple awards, each to a different collaborating institution.

Figure 2. Number of New Research Projects with Single PIs (SPI) & Multiple PIs (MPI)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
By # SPI	3,478	3,545	3,295	3,253	3,606	3,549	3,401	3,644	3,365	3,697
By # MPI	2,945	3,091	2,975	3,127	3,659	3,524	3,464	3,627	3,184	3,992
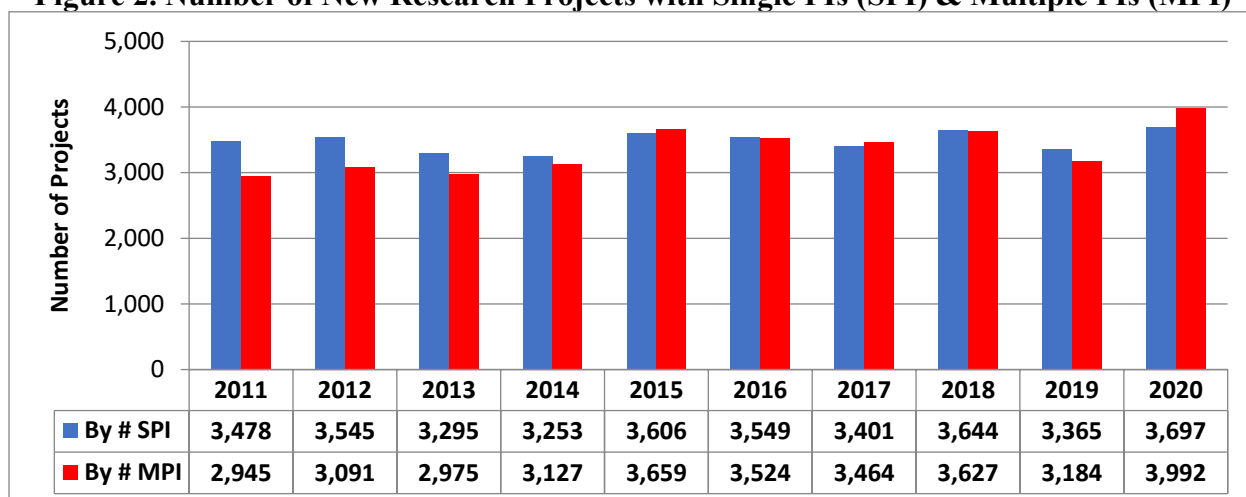
Source: NSF Enterprise Information System, 4/27/21.

In FY 2020, the number of MPI projects was 8.0% greater than the number of SPI projects. In FY 2019, the number of SPI projects was 5.7% greater than the number of MPI projects, while for FY 2014 – FY 2018, the numbers of MPI projects and SPI projects funded were more closely aligned. **Figure 3** shows the total amount of funds awarded to SPI and MPI research projects.

Figure 3. Amounts Awarded for Research Projects with Single PIs (SPI) & Multiple PIs (MPI)

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
SPI in $M	1,209	1,307	1,225	1,250	1,330	1,331	1,200	1,413	1,389	1,513
MPI in $M	1,947	2,061	2,102	2,143	2,523	2,457	2,353	2,672	2,471	3,036

Source: NSF Enterprise Information System, 4/27/21.

NSF's Merit Review Process: FY 2020 Digest
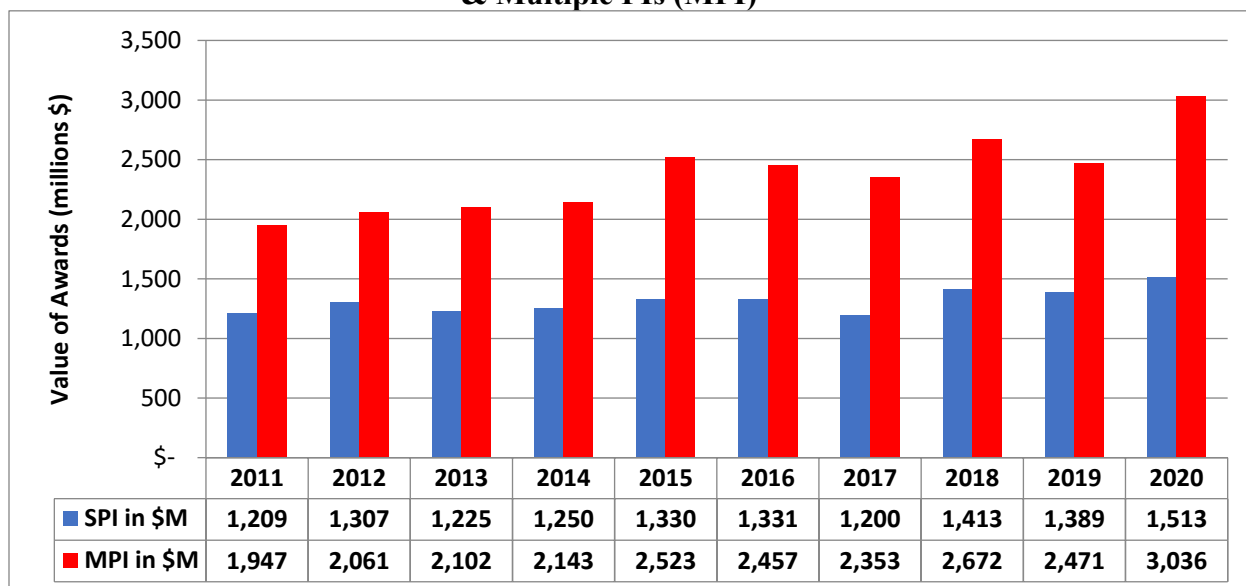
Figure 4 shows the funding rates for SPI and MPI research proposals (as distinct from projects). The difference between the SPI and MPI funding rates has varied over the last ten years, but the SPI funding rate has been, and remains, consistently higher.

Figure 4. Funding Rates for Single-PI & Multi-PI Research Proposals

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
■ **Single PI Funding Rate**	21%	22%	21%	22%	23%	23%	23%	24%	27%	28%
■ **Multi. PI Funding Rate**	16%	19%	17%	18%	20%	19%	19%	20%	23%	26%
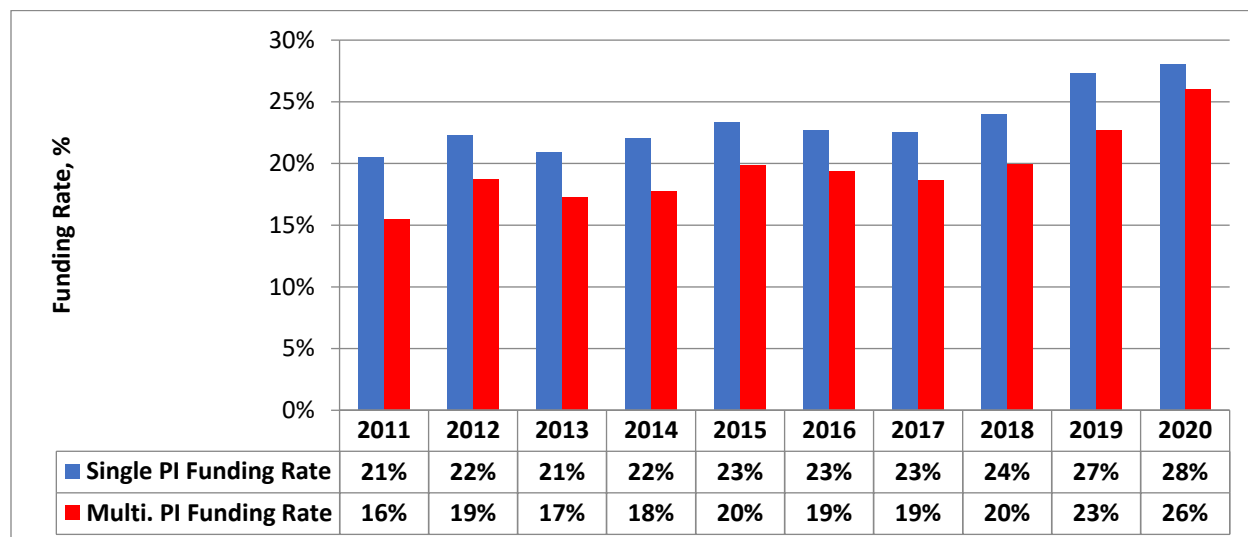
Source: NSF Enterprise Information System, 4/27/21.

A5. Number of Research Grants per PI

Table 5 shows that most PIs (81%) have one research grant, with only 4% of PIs having three or more grants. The data are averaged over the three-year period FY 2018 – 2020 and reflect similar percentages as the previous three-year period.[18]

Table 5. Number of Grants per PI, by percentage of PIs

	One	Two	Three	Four or more
Fiscal Years 2018-2020	81%	15%	3%	1%

Source: NSF Enterprise Information System, 4/27/21.

A6. Number of People Supported on Research Grants

Table 6 shows the number of graduate students, post-doctoral associates and senior personnel supported on NSF research grants.[19] These data were extracted from the budget details of research grants active in the year indicated.

From FY 2019 to FY 2020, the number of graduate students supported by research grants increased by 6.9%, a 17% increase from ten years prior in FY 2011. The number of post-doctoral

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[18] The distribution is the same as it was for 2017-2019.

[19] The research grant category does not include most individual post-doctoral fellowships, NSF Graduate Research Fellowship awards (approximately 2,000 per year; FY 2011-2020), and other individual awards to graduate students. However, most NSF-supported post-doctoral associates and graduate students are supported as part of research grants.

associates supported by research grants in FY 2020 increased by 10.4% from FY 2019, but was 2% lower than ten years prior in FY 2011.

Table 6. Number of People Supported on NSF Research Grants

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	% Change, 2011 - 2020
Senior Personnel	35,523	39,862	32,829	31,650	33,831	35,326	33,296	35,870	33,529	38,865	9%
Postdocs	4,751	4,596	4,447	4,286	4,586	4,460	4,442	4,516	4,230	4,672	-2%
Graduate Students	24,855	25,550	25,161	26,317	26,882	27,099	26,693	26,997	27,159	29,043	17%

Source: NSF Enterprise Information System, 4/27/21.

Appendix 2 provides further details on the levels of support in research grants for PIs, graduate students and post-doctoral associates across NSF's individual directorates and offices.

A7. Average Number of Months of Budgeted Salary Support for Single-PI & Multi-PI Research Grants

Figure 5 shows the mean number of months of salary support per individual for PIs and co-PIs in the award budgets of single-PI and multiple-PI research grants. (See **Appendix 2** for directorate or office level data on months of support.)

Figure 5. Average Number of Months of Salary for Single-PI & Multi-PI Research Grants

	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Single PIs	1.23	1.11	1.03	0.93	0.81	0.82	0.74	0.72	0.70	0.75	0.61	0.51
Multiple PIs	1.10	1.01	0.93	0.85	0.84	0.78	0.79	0.71	0.63	0.60	0.61	0.53
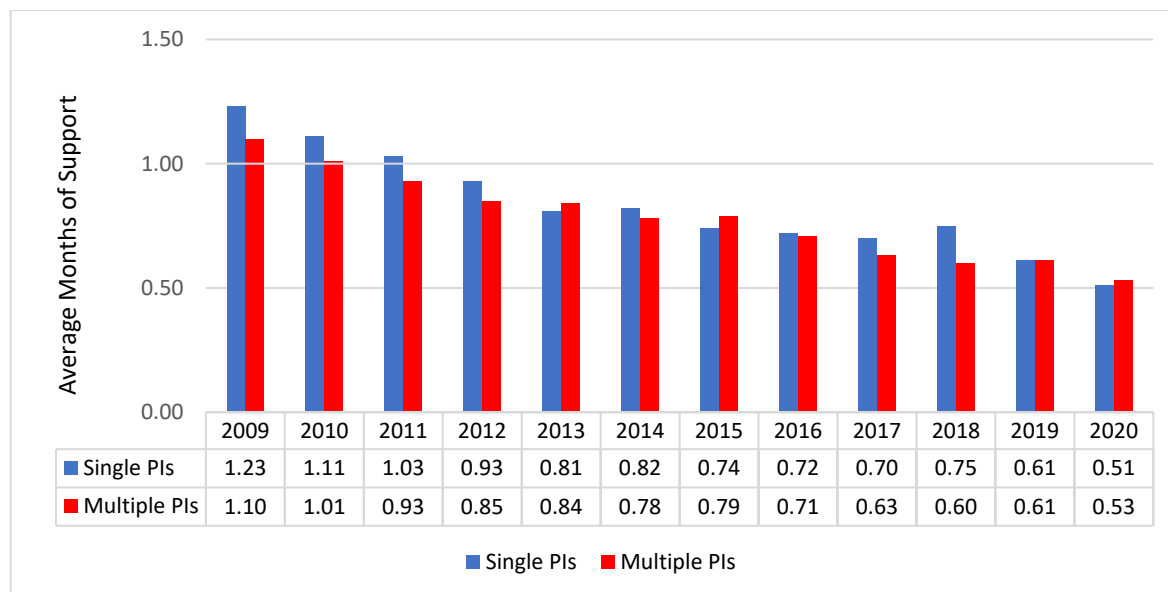
Source: NSF Report server as of 4/27/21.

The number of per-individual PI/co-PI months of support per grant has dropped considerably since FY 2011. In FY 2020, support was approximately half the levels a decade earlier. The data by directorate in **Appendix 2** show that, in comparison to NSF as a whole, ENG awards tend to provide fewer months of salary support for PIs and co-PIs, averaging 0.3 and 0.4 months of salary for single- and multi-PI research grants, respectively. While ENG has been consistently

lower over time, many directorates averaged fewer months of salary support for PIs and co-PIs in FY 2020 compared to previous years, including CISE, which averaged 0.4 months of salary for both single and multi-PI research grants in FY 2020.

A8.   Principal Investigator Funding Rates

Figure 6 shows the PI funding rate (the green curve) in a three-year period. PI funding rate is the number of investigators receiving a research grant divided by the number of investigators submitting proposals in the same three-year window. The number of PIs submitting proposals in the same three-year window, as well as the PI funding rate, increased temporarily in 2009 due to the funds appropriated under ARRA. The PI funding rate then declined, reaching a low between 2010 and 2013. Since then, it has slowly recovered, and the FY 2018-20 rate is 42%.

Figure 6. PI Funding Rates for Research Grants

	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020
PIs Applied	54.7	55.6	55.1	53.4	53.9	54.2	54.6	54.6	52.6	51.7
PIs Awarded	21.0	19.7	19.0	19.1	19.9	20.6	21.1	21.2	20.7	21.8
PIs Funded %	38%	35%	35%	36%	37%	38%	39%	39%	39%	42%

PIs Applied   PIs Awarded   PIs Funded %
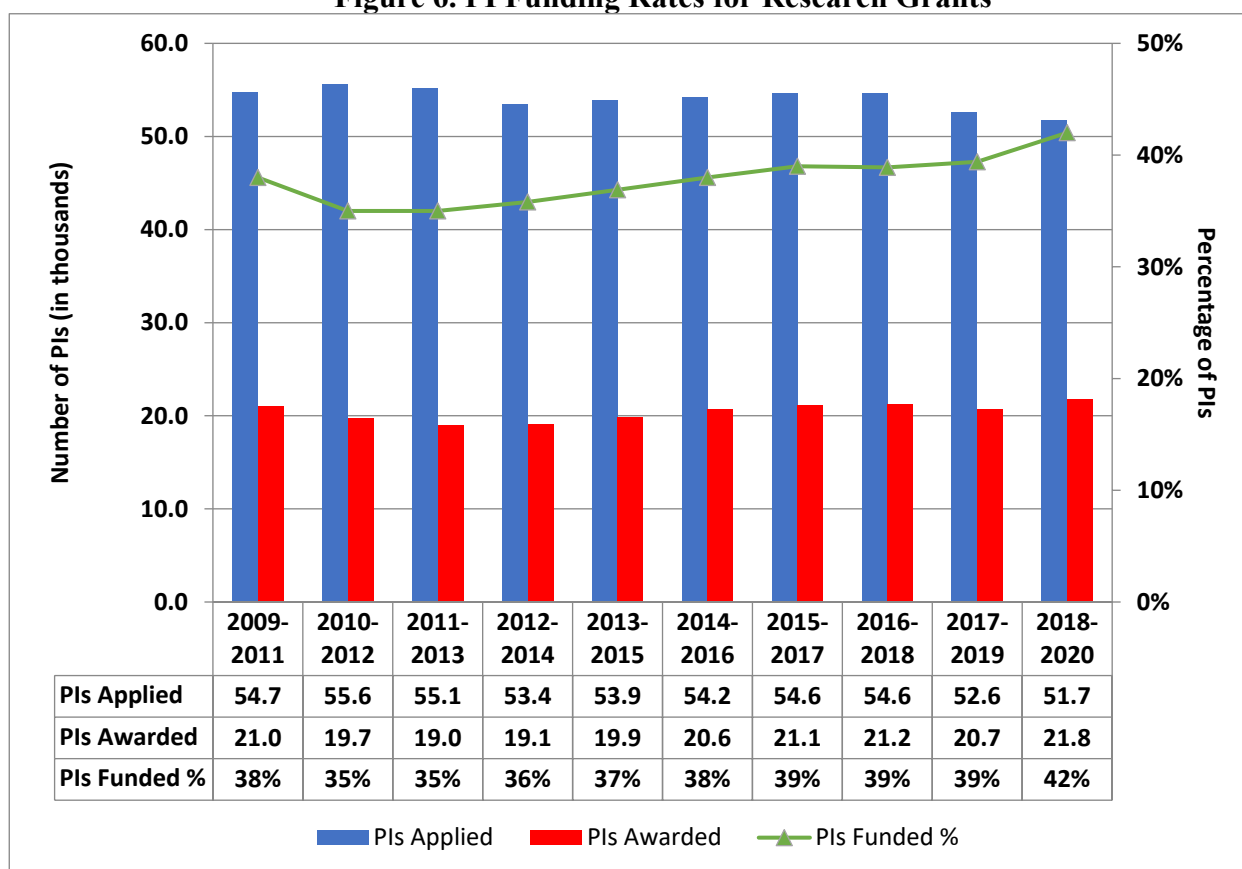
Source: NSF Enterprise Information System, 4/27/21.

In FY 2018 – 2020, PIs who received an award submitted, on average, 2.2 proposals per award. This is a slight decrease from the average of 2.3 proposals per award in FY 2019.

A9.   Early and Later Career PIs

An early career PI is defined as someone within ten years of receiving their last degree at the time of award. **Figure 7** shows the number and percentage of PIs who received research awards

and are in the early or later stages of their careers. **Figure 8** shows the proportion of awards to early career PIs.

Figure 7. Research Grants Awarded to PIs in Early and Later Stages of Career and Research Proposal Funding Rates (Early Career Defined as 10 Years)
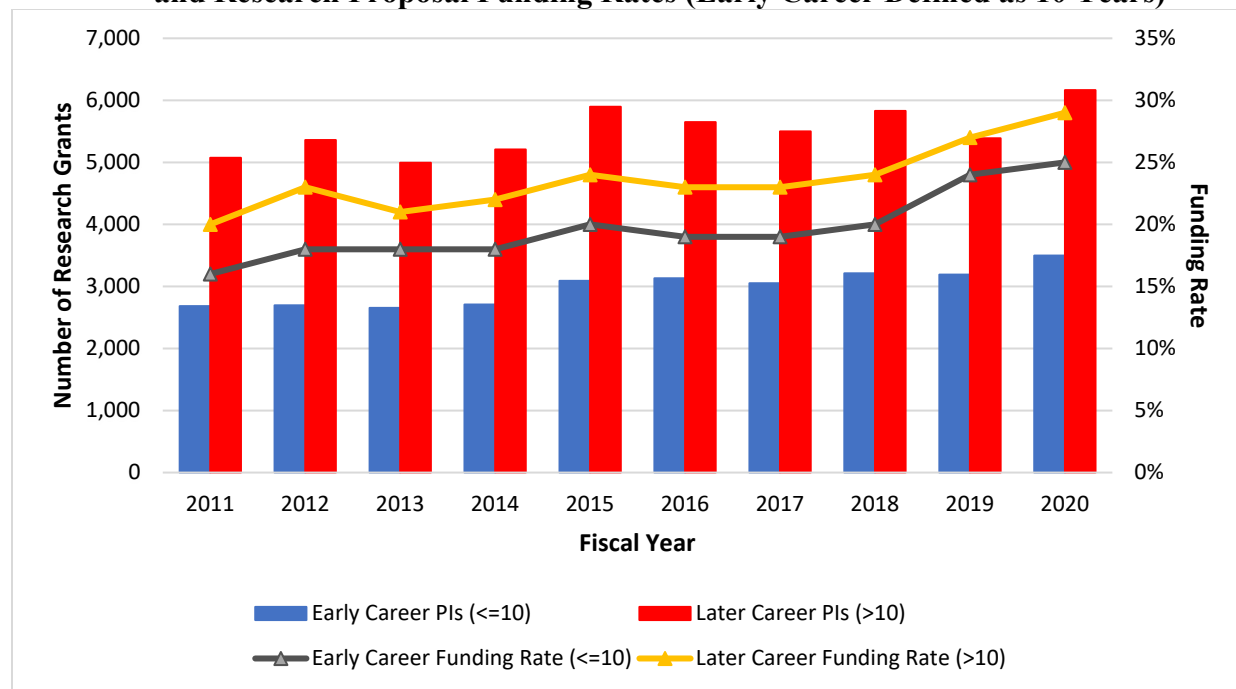
Source: NSF Enterprise Information System, 4/16/2021.

Figure 8. Proportion of Awards to PIs in Early Stage of Career (Early Career Defined as 10 Years)

Source: NSF Enterprise Information System, 4/16/2021.

NSF's Merit Review Process: FY 2020 Digest
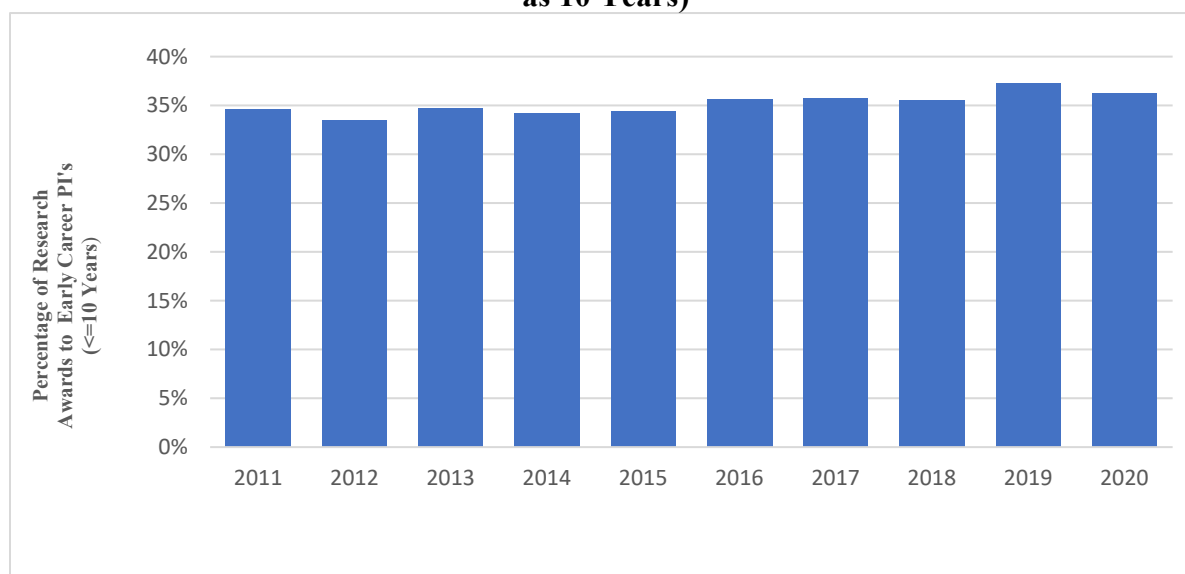
Prior to FY 2020, an early career PI was defined as someone within seven years of receiving their last degree at the time award. However, in the Early Career Doctorates Survey (ECDS) and the 2021 "Women, Minorities, and Persons with Disabilities in Science and Engineering" reports, the National Center for Science and Engineering Statistics (NCSES) defines early career researchers as individuals who received their first doctoral degree in the past 10 years. The definition enables the report to capture data on all early career researchers within an organization. In an effort to align data produced by NSF on early career researchers, the Digest will transition to defining early career researchers as someone within ten years of receiving their last degree at the time award.

In **Figure 7.1.1** and **Figure 8.1.1,** early career PIs are defined using the former definition as those who are within seven years of receiving their last degree at the time of award. Future editions of the Digest will consider early career PIs as those who earned their last degree within the past 10 years. **Figures 7.1.1** and **8.1.1** are included below as points of comparison following the definition change and will not appear in later editions of the Digest,.

While this updated definition is not associated with meaningful changes in the patterns of awards or funding rates over time, the funding rates for later career stage PIs increase only slightly when an early career PI is defined as someone who earned their last degree within 10 years rather than seven years. Additionally, the proportion of awards to early career PIs was approximately 14% higher in both FY 2019 and 2020 when the early career was defined as PIs within 10 years of last degree rather than within 7 years.

Figure 7.1.1. Research Grants Awarded to PIs in Early and Later Stages of Career and Research Proposal Funding Rates (Early Career Defined as 7 Years)

Source: NSF Enterprise Information System, 4/27/21.

NSF's Merit Review Process: FY 2020 Digest
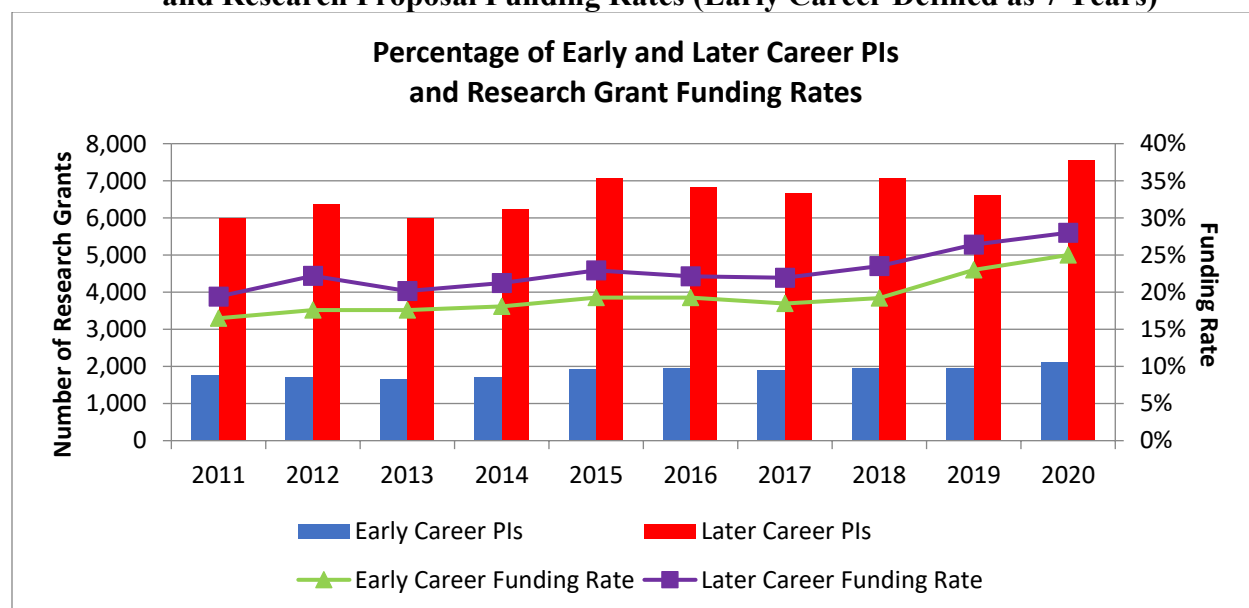
Figure 8.1.1. Proportion of Awards to PIs in Early Stage of Career (Early Career Defined as 7 Years)
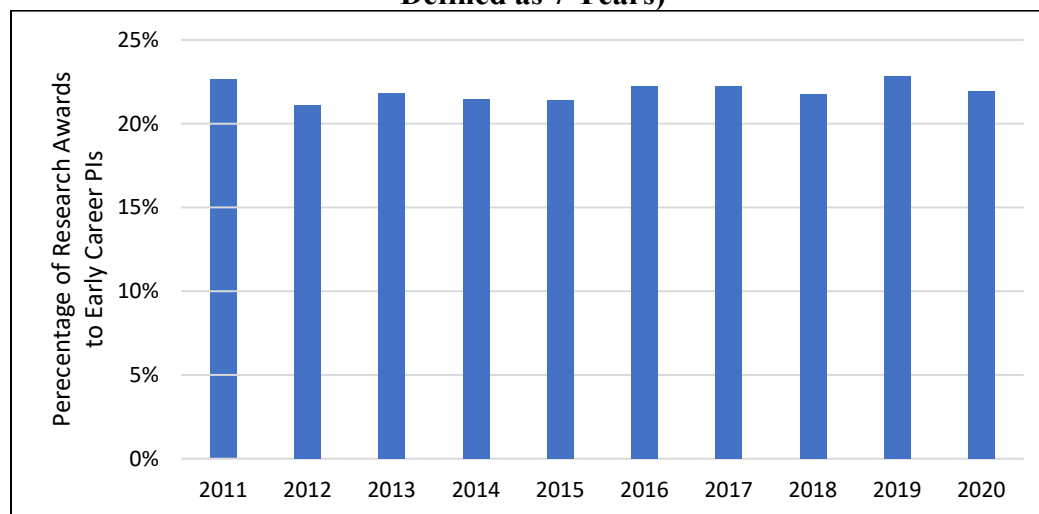
Source: NSF Enterprise Information System, 4/27/21.

A10. Geographic Distribution of Research Awards

The distribution of the total value of NSF research funds awarded in FY 2020 by state is represented in **Figure 8.1.2**. The shading indicates the NSF research support by state for FY 2020 normalized by population, based on state population estimates for July 1, 2020 from the U.S. Census Bureau. The darker colors indicate a higher average amount of funding per capita for those states. Nationally, the average amount of research funding per capita awarded by NSF in FY 2020 was $20.00.[20]

Figure 8.1.2. NSF Research Support per Capita for 2020
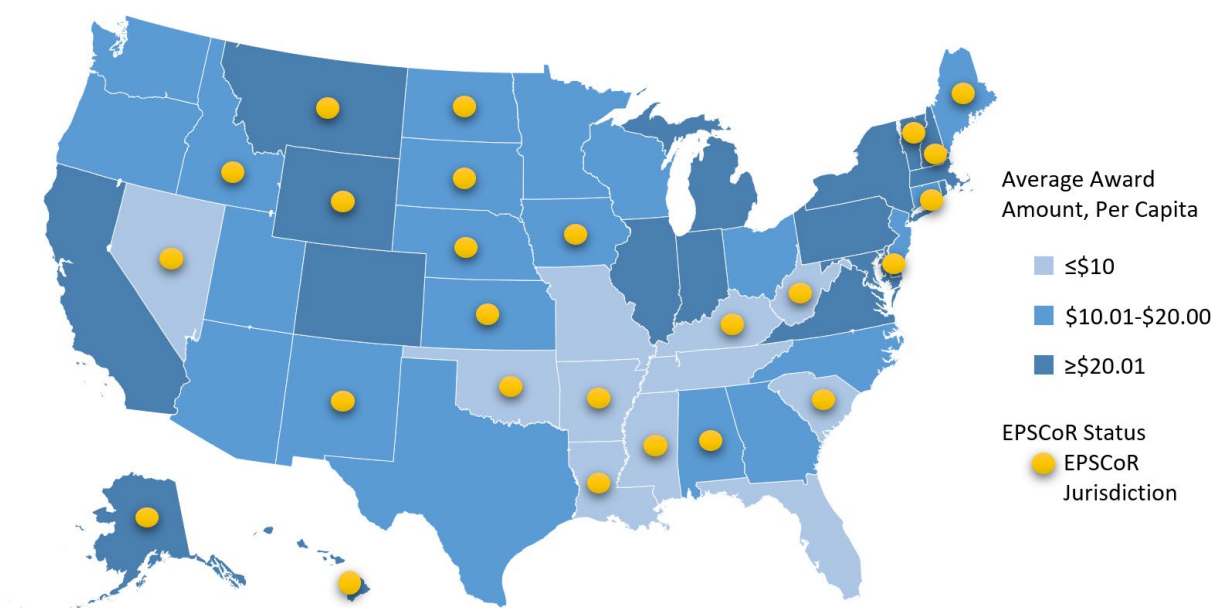
Source: State population estimates for July 1, 2020 U.S. Census and NSF 2020 funding data from NSF Budget Internet Information Systems.

B. Competitive Proposals, Awards, and Proposal Funding Rates

The larger collection of all competitive proposals acted on by NSF in FY 2020 includes, in addition to research proposals, proposals for centers and facilities, grants for equipment, instrumentation, conferences and symposia, grants in the Small Business Innovation Research (SBIR) program, and education and training grants. For this collection, **Table 7** shows the change in the number of proposals, number of awards, and proposal funding rates through time.[21]

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[20] Sources: U.S. Census state population estimates for July 1, 2020, available at https://www2.census.gov/programs-surveys/popest/tables/2010-2020/state/totals/nst-est2020.xlsx, and NSF 2020 funding data via NSF Budget Internet Information Systems, available at https://dellweb.bfa.nsf.gov/AwdLst2/default.asp

[21] The category of actions associated with "competitively reviewed proposals" excludes actions on preliminary proposals, contracts, IPA agreements, continuing grant increments, Graduate Research Fellowship applications, and similar categories.

NSF completed action on 42,723 proposals in FY 2020, a 4.1% increase from FY 2019, resulting in 12,168 awards, an 8.2% increase from FY 2019. As noted earlier, the increase in proposals may be partially explained by the deferral of some award decisions from FY 2019 to FY 2020 due to the January 2019 government shutdown, as well as the increase in RAPID proposals in response to the COVID-19 pandemic. The increase in awards appears mostly driven by the number of RAPID awards. The FY 2020 funding rate was 28%, largely unchanged from FY 2019 when NSF saw a large increase as a result of the prioritization of award actions following the FY 2019 government shutdown. **Appendix 3** provides proposal, award, and funding rate data by NSF directorate and office.

Table 7. NSF Proposal, Award, and Proposal Funding Rates

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Proposals	51,562	48,613	48,999	48,051	49,620	49,285	49,415	48,321	41,024	42,723
Awards	11,192	11,524	10,829	10,958	12,007	11,877	11,447	11,702	11,243	12,168
Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	27%	28%

Source: NSF Enterprise Information System, 4/27/21.

C. **Diversity of Participation**

Table 8 provides data on proposals, awards, and funding rates by proposer characteristics (i.e. gender, underrepresented ethnic or racial group, disability, new and prior PI status). The underrepresented ethnic/racial PIs category in **Table 8** includes American Indian /Alaska Native, Black/African American, Hispanic or Latino, and Native Hawaiian/Pacific Islander. It does not include non-Hispanic Asian or White PIs.

Table 8. Proposals, Awards, and Funding Rates, by PI Type

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All PIs (data from **Table 7**)	Proposals	51,562	48,613	48,999	48,051	49,620	49,285	49,415	48,321	41,024	42,723
	Awards	11,192	11,524	10,829	10,958	12,007	11,877	11,447	11,702	11,243	12,168
	Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	27%	28%
Female PIs	Proposals	11,488	10,795	11,152	11,142	11,444	11,598	11,322	10,858	9,076	9,511
	Awards	2,602	2,775	2,556	2,669	3,007	3,032	2,962	2,943	2,843	3,059
	Funding Rate	23%	26%	23%	24%	26%	26%	26%	27%	31%	32%
Male PIs	Proposals	35,211	32,932	32,866	31,625	32,411	31,528	30,046	28,180	22,277	22,217
	Awards	7,739	7,816	7,316	7,286	7,810	7,512	6,930	6,884	6,157	6,406
	Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	28%	29%
PIs from Under-represented racial or ethnic groups	Proposals	3,441	3,291	3,303	3,268	3,383	3,331	3,403	3,498	2,714	2,699
	Awards	735	718	651	681	788	778	806	853	766	786
	Funding Rate	21%	22%	20%	21%	23%	23%	24%	24%	28%	29%
New PIs	Proposals	19,238	17,943	17,635	17,405	18,276	18,348	18,757	18,596	15,654	16,221
	Awards	2,976	3,063	3,013	3,108	3,320	3,510	3,319	3,257	3,252	3,473
	Funding Rate	15%	17%	17%	18%	18%	19%	18%	18%	21%	21%

Prior PIs	Proposals	32,324	30,670	31,364	30,646	31,344	30,937	30,658	29,725	25,370	26,502
	Awards	8,216	8,461	7,816	7,850	8,687	8,367	8,128	8,445	7,991	8,695
	Funding Rate	25%	28%	25%	26%	28%	27%	27%	28%	31%	33%
PIs with disabilities	Proposals	543	483	488	468	562	496	491	453	373	384
	Awards	107	134	122	99	120	110	120	114	103	116
	Funding Rate	20%	28%	25%	21%	21%	22%	24%	25%	28%	30%

Source: NSF Enterprise Information System, 4/27/21.

Gender

A little over a quarter of the proposals (25.7%) in FY 2020 were from PIs who did not indicate their gender. Among proposals for which PI gender is known, fewer proposals are received from women than from men and the funding rate for proposals from female PIs is slightly higher than that for male PIs. The proportion of proposals from female PIs was 30% in FY 2020 and the proportion of awards to women was 32%.[22]

Figure 9. Percentage of Proposals from and Awards to Women
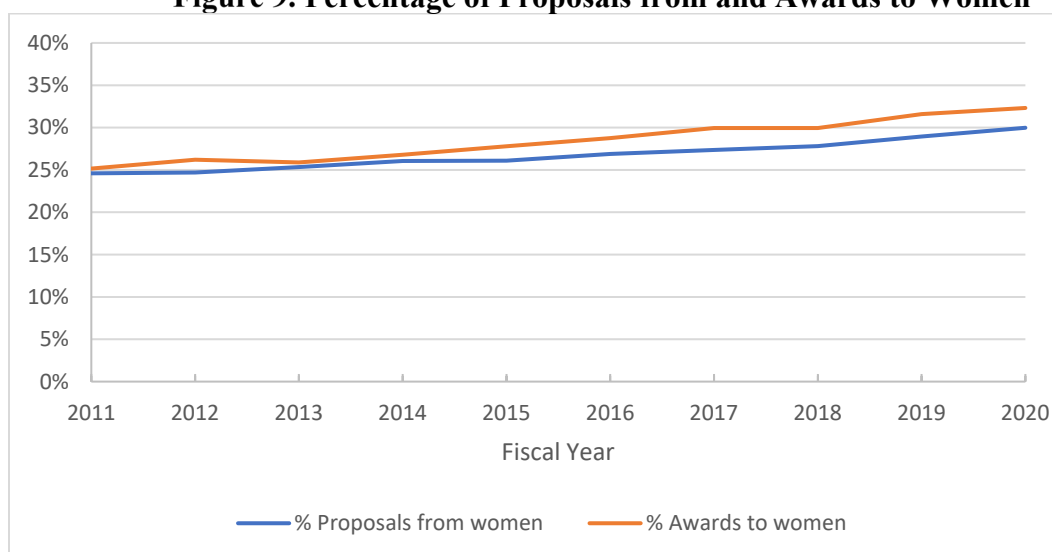
Source: NSF Enterprise Information System, 4/27/21.

As seen in **Figure 9**, over the past decade, there has been a relatively slow increase in the proportion of proposals submitted by women and a corresponding increase in the proportion of awards to women. The proportion of awards to women has remained slightly higher than the proportion of proposals from women. **Appendix 4** provides proposal, award, and funding rate information, by directorate, by PI gender.

Underrepresented Racial or Ethnic Groups

The funding rate for PIs from underrepresented racial or ethnic groups (URMs), 29%, is comparable to the average funding rate for all PIs, 28%. **Figure 10** shows the funding rate of

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[22] This is calculated as a percentage of the number of proposals from PIs who provided information about gender. The proportions for PIs from other underrepresented groups are calculated similarly.

various racial and ethnic groups that submitted more than 100 proposals in FY 2020. The proportion of proposals from such PIs remains low (between 7% and 10% since 2011; see **Figure 11**), with a slight upward trend over the last 10 years.

Table 9 provides data on proposal, award, and funding rates by PI race and ethnicity. Very few PIs identify themselves as belonging to the categories American Indian/Alaska Native or Native Hawaiian/Pacific Islander. Because of the small numbers involved, the year-to-year fluctuations in funding rates for these groups tend to be greater than those for other racial and ethnic groups. The proportion of submissions from PIs from underrepresented racial and ethnic groups in FY 2020 (8.2%)[23] is smaller than their representation in the U.S. population but similar to their representation in the full-time faculty of academic institutions (9.0%).[24]

Among racial and ethnic groups that submitted more than 100 proposals in FY 2020, the funding rate is largest for those identifying as White (33%) and Multiracial (31%). It is smallest for those identifying as Asian (26%).

Figure 10. Funding Rate of Competitively Reviewed Awards by PI Race and Ethnicity
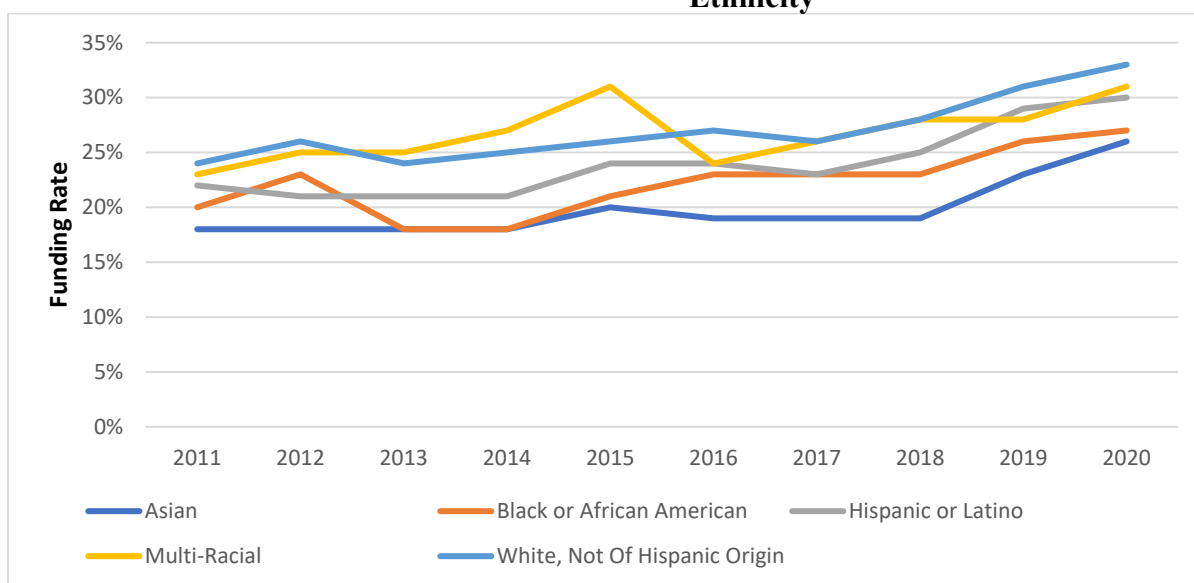
Source: NSF Enterprise Information System, 4/16/21.

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[23] The ratio of the number of PIs in an underrepresented racial or ethnic minority to the total number of PIs who provided sufficient information to determine whether they belonged to such a minority.

[24] Data for full-time faculty members of institutions of higher education who hold doctorates in physical sciences, mathematics, computer sciences, life sciences, psychology, social sciences, or engineering. Available at https://ncses.nsf.gov/pubs/nsb20198/table/S3-18 ("Science and Engineering Indicators 2020").

Figure 11. Percentage of Proposals from and Awards to Researchers from Underrepresented Racial or Ethnic Groups[25]
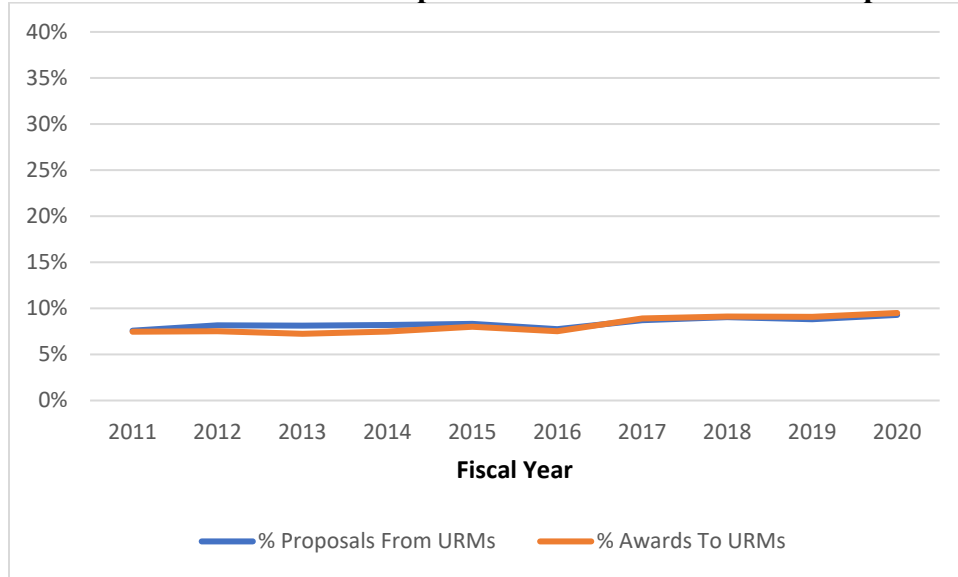
Source: NSF Enterprise Information System, 4/16/21.

Table 9. Proposals, Awards, and Funding Rates, by PI Race and Ethnicity[26]

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
American Indian/ Alaska Native	Proposals Total	129	83	113	103	104	99	134	112	90	79
	Awards	36	18	28	36	25	29	39	29	33	35
	Funding Rate	28%	22%	25%	35%	24%	29%	29%	26%	37%	44%
Black/ African American	Proposals Total	1,201	1,154	1,124	1,123	1,102	1,134	1,135	1,159	929	845
	Awards	243	263	203	204	233	264	266	262	246	229
	Funding Rate	20%	23%	18%	18%	21%	23%	23%	23%	26%	27%
Native Hawaiian/ Pacific Islander	Proposals Total	42	40	32	30	30	41	30	30	47	21
	Awards	11	6	5	5	2	7	5	5	14	4
	Funding Rate	26%	15%	16%	17%	7%	17%	17%	17%	30%	19%
Asian	Proposals Total	10,829	10,382	10,511	10,538	11,148	11,623	11,552	11,362	9,141	8,227
	Awards	1,907	1,914	1,887	1,925	2,256	2,168	2,166	2,127	2,073	2,105
	Funding Rate	18%	18%	18%	18%	20%	19%	19%	19%	23%	26%

[25] Relative proportions are calculated based on the total number of PIs who provided sufficient information to determine their racial or ethnic identity.

[26] This table differs from a similar one included in reports for years up to FY 2011. Before FY 2012, individuals who identified a race and indicated that they were Hispanic, or Latino were only counted in the Hispanic or Latino category. Beginning in FY 2012, such individuals are included in both the appropriate racial group and in Hispanic or Latino. Previously, except for those who were Hispanic or Latino, individuals who identified multiple races were not included in the table. A "multiracial" category has been added to the table.

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
White	Proposals Total	33,200	30,596	30,766	29,624	30,099	29,031	27,804	25,744	20,400	18,790
	Awards Funding	7,826	8,020	7,372	7,390	7,902	7,748	7,170	7,138	6,389	6,198
	Rate	24%	26%	24%	25%	26%	27%	26%	28%	31%	33%
Multiracial	Proposals Total	433	448	439	425	495	508	550	550	467	394
	Awards Funding	99	113	110	114	151	124	143	154	132	122
	Rate	23%	25%	25%	27%	31%	24%	26%	28%	28%	31%
Hispanic or Latino	Proposals Total	2,019	1,934	1,956	1,921	2,053	1,950	1,993	2,106	1,549	1,684
	Awards Funding	438	412	401	411	495	459	460	534	449	499
	Rate	22%	21%	21%	21%	24%	24%	23%	25%	29%	30%

Source: NSF Enterprise Information System, 4/27/21 and NSF Report Server, 4/27/21.

PIs with a Disability

The proposal funding rate for PIs identifying themselves as having a disability has varied between 20% and 30% between FY 2011 and FY 2020. This variability is due to the relatively small proportion of proposals that come from PIs with a disability (**Table 8**). Unlike the proportion of proposals from women and underrepresented racial and ethnic groups, the proportion of proposals that come from PIs with a disability has remained relatively steady from FY 2011 to FY 2020 **(Table 8)**, at approximately 1.1% in FY 2011 and 1.3% in FY 2020.[27]

New PIs

A new PI is an individual who has not served as the PI or co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or post-doctoral fellowships, research planning grants, or conferences, symposia and workshop grants). The funding rate for new PIs is lower than that for PIs who have previously submitted a funded NSF proposal (21% compared to 33%; see **Table 8**).

In FY 2020, the proportion of proposals from new PIs was 38.0% (**Figure 12**). Since FY 2011, this number has fluctuated between approximately 36.0% and 38.5%. The funding rate for prior PIs rose from 31% in FY 2019 to 33% in FY 2020, while the funding rate for new PIs remained relatively the same, at approximately 21% (see **Table 8**).

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[27] In FY 2020, 66.6% of competitively reviewed proposals were from PIs who indicated whether they had a disability. Of these, 1.3% reported that they did have a disability.

Figure 12. Percentage of Proposals from and Awards to New PIs
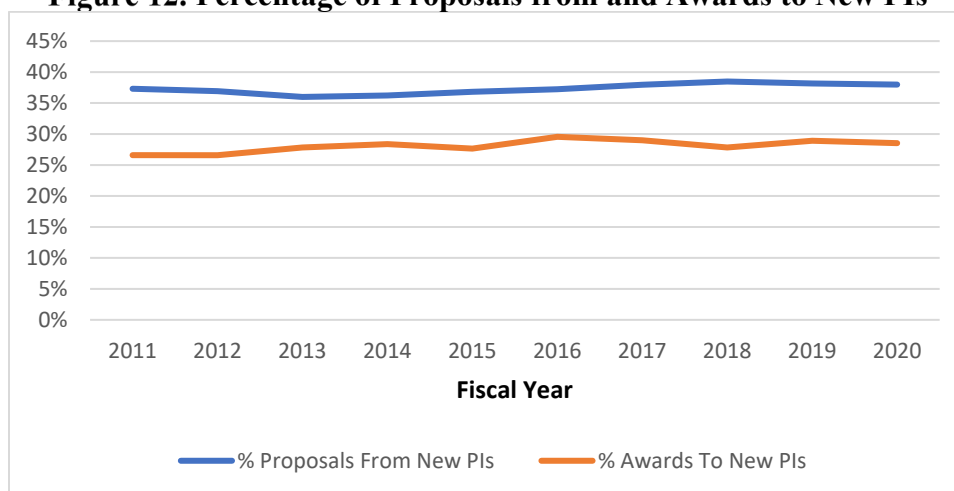
Source: NSF Enterprise Information System, 4/27/21.

D. <u>Types of Awards</u>

NSF uses three kinds of funding mechanisms: grants, cooperative agreements, and contracts. Most of NSF's projects support or stimulate scientific and engineering research and education and are funded using grants or cooperative agreements. A grant, which is the primary mechanism used by NSF, may be funded as either a standard award (in which funding for the full duration of the project, generally 1-5 years, is awarded in a single fiscal year) or a continuing award (in which funding of a multi-year project is provided in, usually annual, increments).

The use of standard and continuing grants allows NSF flexibility in balancing current and future obligations. For continuing grants, the initial funding increment is accompanied by a statement of intent to continue funding the project in subsequent increments (called "continuing grant increments" or CGIs)[28] until the project is completed. Continued funding is subject to NSF's judgment of satisfactory progress, availability of funds, and receipt and approval of required annual reports. As shown below in **Table 10**, in FY 2020, NSF devoted 42% of its total budget to new standard grants and 11% to new continuing grants.

Cooperative agreements are used when the project requires substantial agency involvement during the project performance period (e.g., research centers and multi-user facilities).

Contracts are used to acquire products, services, and studies (e.g., program evaluations) required for NSF or other government use.

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[28] While the original award is a competitive action, the continuing grant increment is a non-competitive grant.

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Table 10. Percentage of NSF Funding by Type of Award

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
New Standard Grants	34%	35%	35%	39%	39%	41%	40%	43%	43%	42%
New Continuing	11%	11%	12%	10%	10%	10%	10%	10%	11%	11%
CGIs and Supplements	23%	22%	22%	20%	18%	16%	17%	14%	14%	15%
Cooperative Agreements	23%	23%	23%	22%	22%	22%	22%	23%	22%	22%
Other	9%	10%	8%	8%	11%	11%	11%	10%	11%	10%

Source: NSF Enterprise Information System, 4/16/21. Percentages may not sum to 100 due to rounding. "Other" includes contracts, fellowships, interagency agreements, and IPA agreements.

E. Awards by Sector and Type of Institution

In FY 2020, 80% of program funds awarded by NSF went to academic institutions, 8% to non-profit and other organizations, 8% to for-profit businesses, and 3% to Federally Funded Research and Development Centers (**Table 11**).

Table 11. Distribution of Funds by Type of Organization

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Academic Institutions	77%	80%	81%	81%	78%	76%	78%	77%	78%	80%
Non-Profit and Other Organizations	13%	12%	11%	11%	11%	13%	10%	11%	9%	8%
For-Profit	6%	5%	6%	5%	8%	8%	8%	8%	9%	8%
Federally Funded R&D Centers	5%	3%	3%	3%	3%	3%	3%	4%	4%	3%

Source: NSF Enterprise Information System, 4/16/21. Percentages may not sum to 100 due to rounding. In FY 2015, some private, non-profit organizations, previously included in the For-Profit category, were moved to Non-Profit and Other Organizations.

Figure 13 shows the distribution of awards to academic institutions. Academic institutions are categorized according to the proportion of NSF funding received (i.e., grouping those receiving the largest proportion of NSF funding – the top 10, 50, and 100 academic institutions).

The Foundation tracks proposal funding rates for different types of academic institutions. For FY 2020, the average proposal funding rate was 31% for the Top 100 Ph.D.-granting institutions (classified according to the amount of FY 2020 funding received). In comparison, the rate was 23% for Ph.D.-granting institutions that are not in the Top 100 NSF-funded category. The proposal funding rate was 33% for four-year institutions[29] and 39% for two-year institutions. For minority-serving institutions, the FY 2020 proposal funding rate was 25%.[30]

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[29] Four-year institutions are those granting bachelor's degrees, regardless of whether they also offer graduate degrees.

[30] Additional information about the status of minorities in science and engineering can be found in the biennial publication *Women, Minorities and Persons with Disabilities in Science and Engineering* (https://ncses.nsf.gov/pubs/nsf21321/).

Figure 13. Percentage of Awards to Academic Institutions (By Amount Received)
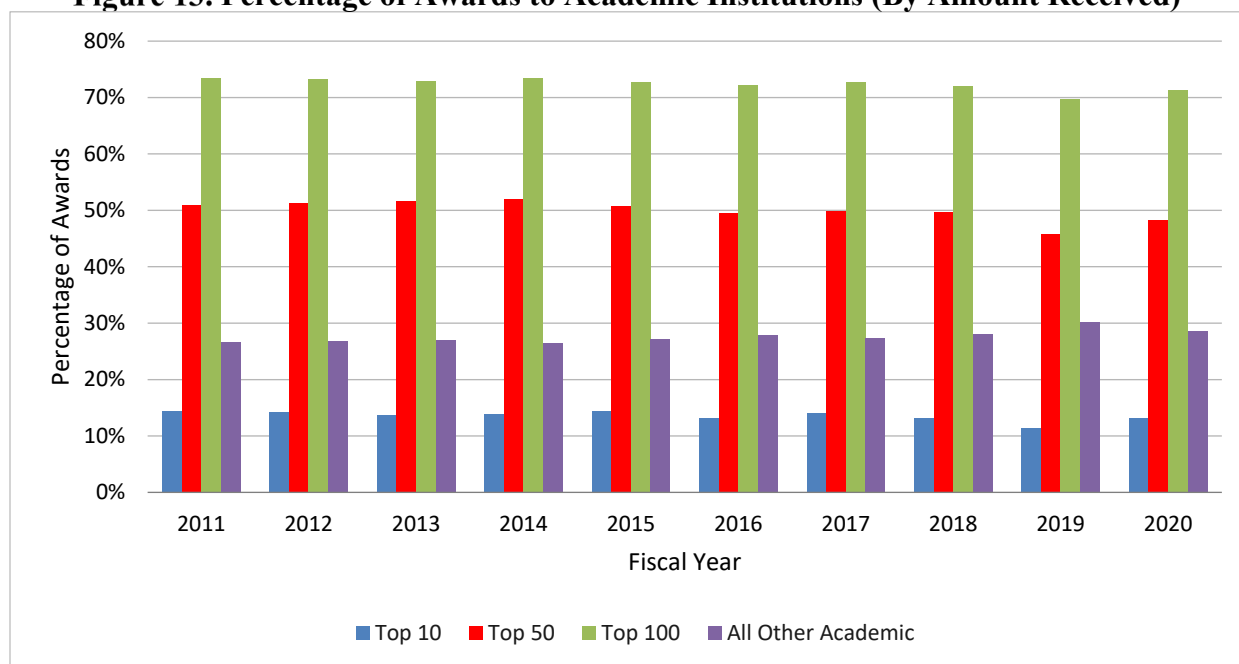
Source: NSF Enterprise Information System, 4/27/21.

The Foundation promotes geographic diversity in its programs. For example, the mission of the Established Program to Stimulate Competitive Research (EPSCoR) is to assist the NSF in its statutory function "to strengthen research and education in the sciences and engineering, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education."[31] The EPSCoR program was designed for those jurisdictions that have historically received lesser amounts of NSF Research and Development funding. In FY 2020, 25 states, the Commonwealth of Puerto Rico, the U.S. Virgin Islands, and Guam were eligible to participate in aspects of the program. **Appendix 5** provides data on proposals, awards, and proposal funding rates for the EPSCoR jurisdictions.

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[31] 42 U.S.C. §1862, https://www.law.cornell.edu/uscode/text/42/1862. EPSCoR was previously known as the Experimental Program to Stimulate Competitive Research. The name was changed in accordance with P.L. 114-329, the American Innovation and Competitiveness Act.

F. **Time to Decision (Proposal Dwell Time)**

It is important for principal investigators to receive a timely funding decision. Since FY 2015, NSF has aimed to inform at least 75% of PIs of funding decisions (i.e., award or decline) within six months of the proposal deadline, target date, or receipt date, whichever is later. However, when unique events happen and agency operations are disrupted, meeting this goal is not always attainable. The dwell time performance goal was suspended in FY 2017, FY 2019, and FY 2020.[32] In FY 2020, 68% of funding decisions were communicated within the six-month target period, 7 percentage points higher than FY 2019.

Table 12. Proposal Dwell Time: Percentage of Proposals Processed Within Six Months

2011	2012	2013	2014	2015	2016	2017*	2018[33]	2019*	2020*
78%	78%	76%	72%	76%	77%	71%	72%	61%	68%

Source: NSF Enterprise Information System, 4/27/21.
*Dwell-time goal suspended in FY2017, FY 2019, and FY 2020.

G. **Mechanisms to Encourage Transformative Research**

All NSF programs encourage and support potentially transformative research proposals. NSF also has several mechanisms developed to encourage the submission of certain types of potentially transformative research proposals. These include EArly-concept Grants for Exploratory Research (EAGER), Research Advanced by Interdisciplinary Science and Engineering (RAISE)[34], Creativity Extensions, and Accomplishment-Based Renewals. Information on the latter three types of awards may be found in **Appendix 6**.

The EAGER funding mechanism is used to support exploratory work in its early stages on untested, but potentially transformative, research ideas or approaches. The work may be considered especially "high-risk/high-payoff" in the sense that it, for example, involves radically different approaches, applies new expertise, or engages novel disciplinary or inter-disciplinary perspectives. Requests may be for up to $300,000 and up to two years duration.

The RAPID funding mechanism is used for proposals having a severe urgency regarding availability of, or access to, data, facilities, or specialized equipment, including quick-response research on natural or anthropogenic disasters and similar unanticipated events. Requests may be for up to $200,000 and of one year in duration.

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[32] In FY 2017, the dwell time goal was suspended due to the relocation of NSF's headquarters building from Arlington, VA, to Alexandria, VA. In FY 2019, the dwell time goal was suspended because from December 22, 2018 – January 25, 2019 agency operations were suspended due to a lapse in appropriations. In FY 2020, the dwell time goal was suspended to reprioritize agency operations agency operations in response to the COVID-19 pandemic, including providing staff with flexibilities to adjust to the changed working environment and allowing for mid-year reprioritization of workloads.

[33] The dwell time goal was not included in any employee performance plans for the General Work Force performance period April 2017-March 2018. The beginning of FY 2018 was marked by NSF beginning operations in its new Alexandria, VA location.

[34] The *Proposal and Award Policies and Procedures Guide* effective January 30, 2017 (NSF 17-1) introduced a new category of proposal intended to encourage transformative research, called Research Advanced by Interdisciplinary Science and Engineering (RAISE). The former Integrated NSF Support Promoting Interdisciplinary Research and Education (INSPIRE) program has been phased out.

EAGER and RAPID proposals are commonly reviewed using only internal reviewers. Program officers may also elect to obtain external reviews to inform their decisions. The PI is informed if the proposal will be reviewed externally.

Figure 14 shows the number of EAGER and RAPID awards from FY 2011 to FY 2020 by directorate. Additional information on RAPID and EAGER awards is in **Appendix 7**. For years prior to FY 2013, data for the Office of Polar Programs (OPP) and the Office of Cyberinfrastructure (OCI) are included in the numbers for GEO and CISE. Data for OISE and OIA are combined into the category OD, barely visible prior to FY 2020 in **Figure 14**.

There is considerable variation across directorates in the use of EAGER and RAPID awards. (See **Appendix 7**.) For example, during the past five years, CISE and ENG received far more EAGER proposals than any other directorate. RAPID proposals were proportionally more common in SBE than in other directorates in FY 2020, a shift from previous years in which GEO received proportionally more RAPID proposals. RAPID awards in all directorates increased significantly, from a total of 142 in FY 2019 to 869 in FY 2020, due to the COVID-19 pandemic response as previously discussed.

Figure 14. EAGER, and RAPID Awards, by Directorate or Office
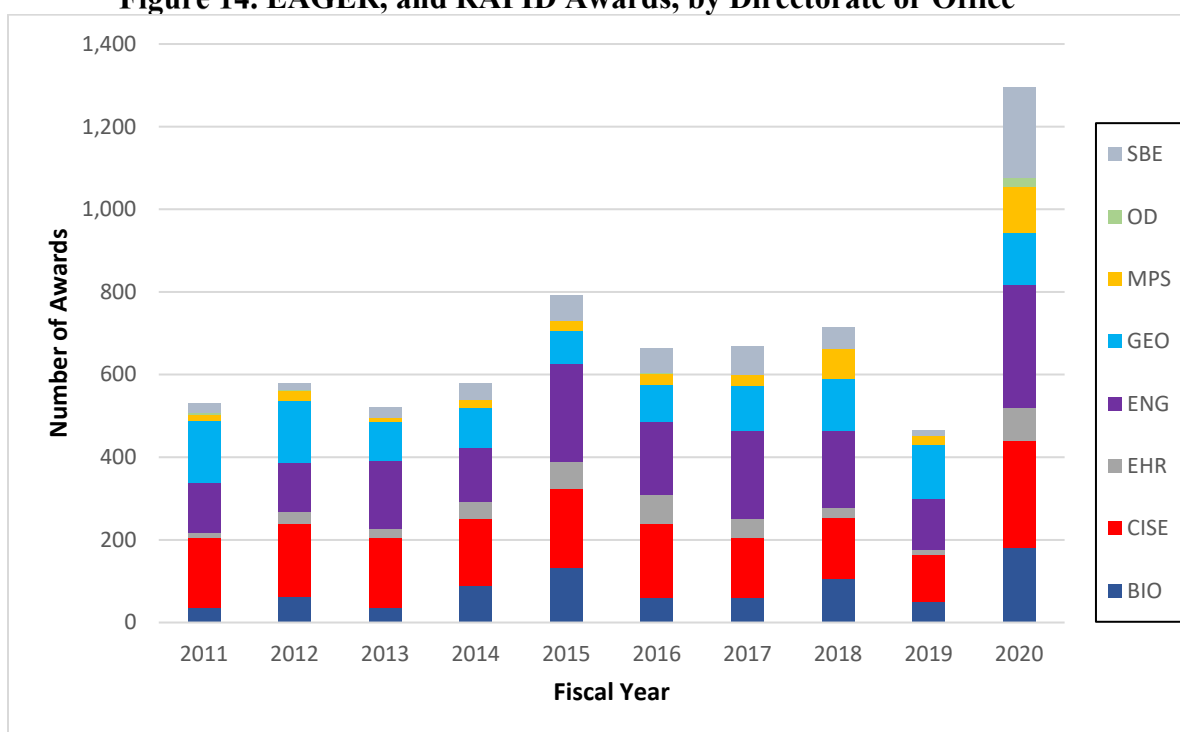
Source: NSF Enterprise Information System, 4/27/21.

In their use of EAGER and RAPID awards, the directorates fall into clusters (see **Table 13**). CISE and ENG have received the most EAGER and RAPID proposals since their introduction and made the most awards. In the past five years, together these two directorates have accounted for approximately 52% of these proposals and nearly half (48%) of the awards. GEO, BIO, and SBE each accounted for 13%, 11%, and 10% of the proposals and 15%, 12%, and 11% of the

awards, respectively. MPS and EHR each accounted for 6% of EAGER and RAPID proposals and 7% and 6% of the awards over the same period, respectively. MPS and BIO had the largest average EAGER and RAPID award sizes in FY 2020. GEO made the smallest EAGER and RAPID awards on average, in FY 2016 - 2020.

Table 13. Investments in EAGER and RAPID awards by Directorate, FY 2016 – FY 2020

	ENG	CISE	GEO	BIO	SBE	EHR	MPS
% of FY 16-20 awards	26.1%	22.2%	15.4%	12.0%	10.9%	6.1%	6.8%
FY 16-20 investment ($ million)	147.3	147.4	62.1	87.8	54.7	42.4	54.0
FY 20 investment ($ million)	44.1	38.8	14.6	32.5	30.5	13.9	25.2
Mean FY 20 award ($ thousand)	149	151	116	179	139	170	189

Source: NSF Enterprise Information System, 4/16/2021.

IV. The NSF Merit Review Process

A. Merit Review Criteria

In FY 1998, the National Science Board (NSB) approved NSF's two fundamental merit review criteria. These criteria were modified in FY 2007 to promote potentially transformative research. In FY 2012, the NSB revised the elements to be considered by reviewers in the application of the merit review criteria and articulated the principles upon which the criteria are based.[35] The language in the *Proposal and Award Policies and Procedures Guide,* describing the merit review criteria and the underlying principles, incorporates the recommendations from the NSB[36] and is reproduced in **Appendix 8**.

The two NSF merit review criteria are Intellectual Merit and Broader Impacts. Intellectual Merit encompasses the potential to advance knowledge, while Broader Impacts addresses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes. Individual programs may have additional review criteria particular to the goals and objectives of the program. All relevant review criteria are described in the program announcement or solicitation.

B. Description of the Merit Review Process

The NSF merit review process includes the steps listed below (and depicted in **Figure 15**):

The proposal arrives electronically and is assigned to the appropriate program(s) for review. Some programs include preliminary proposals as part of the application process. See **Appendix 9** for more information about preliminary proposals. NSF returns without review (RWR) proposals that fail to separately address each of the two merit review criteria within the Project Summary. Proposals are also returned without review if they duplicate an existing award, are not responsive to the funding opportunity to which they were submitted, do not comply with the requirements of the *Proposal and Award Policies and Procedures Guide* and/or specific solicitation, as well as in several other circumstances. **Table 14** and **Appendix 10** provide additional information.

Table 14. Proposals Returned Without Review (RWR)

Fiscal Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Number of Proposals RWR	1794	1813	1871	1659	1843	1399	1144	1101	770	765
Percent of all Proposal Decisions	3.4%	3.6%	3.7%	3.3%	3.6%	2.8%	2.3%	2.3%	1.9%	1.8%

 Source: NSF Report Server, 4/16/2021.

Beginning in FY 2016, NSF has continuously improved electronic pre-submission checks of proposals to help PIs ensure that their proposals comply with NSF requirements, reducing the number of proposals returned without review by Program Officers.

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[35] *The National Science Foundation's Merit Review Criteria: Review and Revisions.* (2011) NSB/MR-11-22.
[36] The NSF *Proposal and Award Policies and Procedures Guide* (PAPPG) current at the time of this writing is available at: https://www.nsf.gov/pubs/policydocs/pappg20_1/nsf20_1.pdf .

The program officer (or team of program officers) is responsible for the following:

o *Determining the appropriate level of merit review*. (Some proposal types do not require external review, e.g., EAGER, RAPID, RAISE, and proposals for small conferences, workshops, or symposia.)

o *Selecting ad hoc reviewers and/or panel members*. The NSF guidelines for the selection of reviewers are designed to ensure selection of experts who can give program officers the proper information needed to make a recommendation in accordance with the NSB-approved merit review criteria. Optimally, reviewers have:

  1. Special knowledge of the science and engineering subfields involved in the proposals to be reviewed to evaluate competence, intellectual merit, and utility of the proposed activity. Within reasonable limits, reviewers' fields of specialty should be complementary within a reviewer group.

  2. Broader or more generalized knowledge of the science and engineering subfields involved in the proposals to be reviewed to evaluate the broader impacts of the proposed activity. Reviewers with broad expertise are required for proposals involving substantial size or complexity, broad disciplinary or multidisciplinary content, or significant national or international implications.

  3. Broad knowledge of the infrastructure of the science and engineering enterprise, and its educational activities, to evaluate contributions to societal goals, scientific and engineering personnel, and distribution of resources to organizations and geographical areas.

  4. To the extent possible, diverse representation within the review group. The goal is to achieve a balance among various characteristics. Important factors to consider include type of organization represented, demographics, experience, and geographic balance.

o *Checking for conflicts of interest*. In addition to checking proposals and selecting appropriate reviewers with no apparent potential conflicts, NSF staff members provide reviewers guidance and instruct them how to identify and declare potential conflicts of interest. All NSF program officers and division directors receive annual conflict of interest training.

o *Synthesizing the comments of the reviewers and review panel* (if reviewed by a panel), as provided in the individual reviews and panel summaries.

o *Recommending action to award or decline the proposal*, after scientific, technical, and programmatic review, and consideration of appropriate factors such as portfolio balance and the amount of funding available.

The review process is overseen by the cognizant division director, or other appropriate NSF official. Program officer recommendations are reviewed by the division director, or other designated official, before the funding recommendation is made. Large awards may receive additional levels of review. The Director's Review Board examines award recommendations with an average annual award amount of 2.5% or more of the awarding division's annual budget (based on the prior year current plan). The NSB reviews recommended awards with an annual

award amount at or above 1% of the awarding directorate's prior year current plan or 0.1% of NSF's prior year total budget, whichever is greater.[37] In FY 2020, the NSB authorized three awards.

Figure 15. Diagram of the NSF Merit Review Process
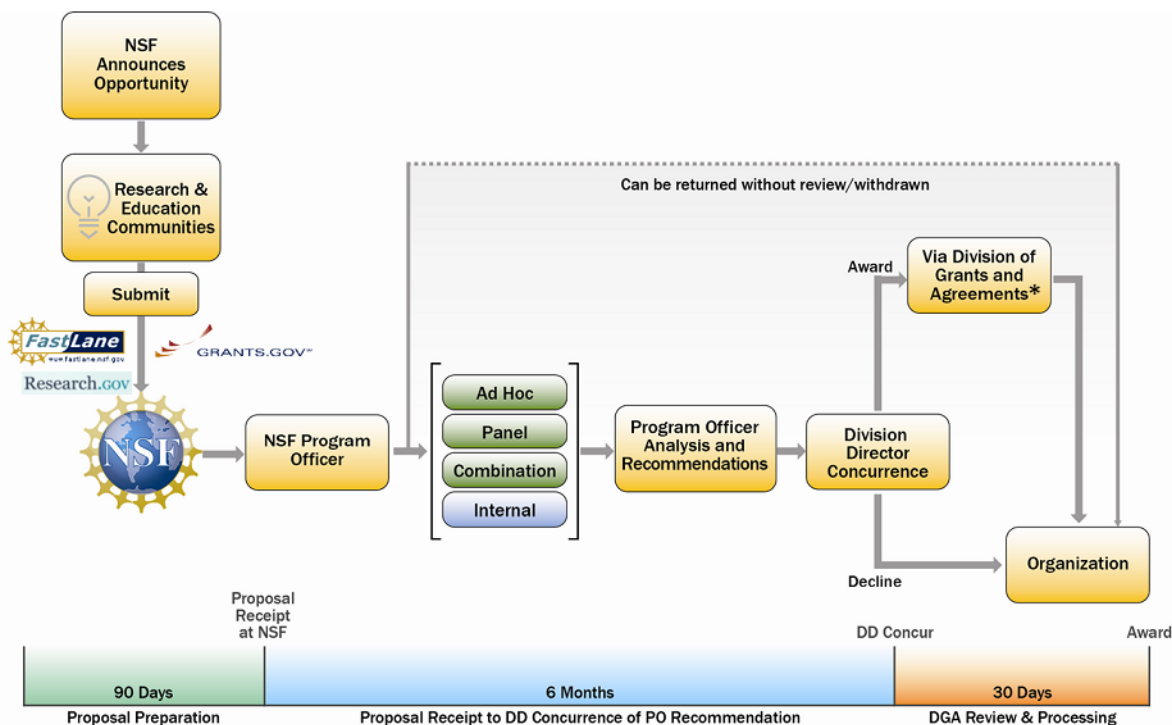
* A small number of cooperative agreements are awarded by the Division of Acquisition and Cooperative support.

If the program recommendation is for an award and final division/office or other programmatic approval is obtained, then the recommendation goes to the Division of Grants and Agreements (DGA) or the Division of Acquisition and Cooperative Support (DACS) for review of business, financial, and policy implications. After the completion of this review, a final decision is made to fund or decline the proposal.

NSF has several external oversight and advisory mechanisms that are designed to ensure the continuing integrity and efficiency of the merit review process.

- Every 4-5 years, external Committees of Visitors (COVs) assess each major NSF program or division. COVs examine the integrity and efficiency of merit review processes and the structure of the award portfolio.

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[37]Other items requiring NSB approval include any awards from the Major Research Equipment and Facilities Construction (MREFC) account. The NSB and the Director consult on programs that either represent a significant long-term investment of program resources, particularly if funded as an ongoing NSF-wide activity, or involve substantive policy, interagency, or international issues.

- Directorate and Office Advisory Committees review COV reports and responses from directorates and offices and provide guidance to the Foundation.

External oversight committees comprise scientists, engineers, administrators, and educators, from academia, other non-profit organizations, and industry, as appropriate.

C. Program Officer Recommendations

The narrative comments and summary ratings provided by external reviewers are essential inputs to program officers, who use their professional judgment to make recommendations to NSF management on award or decline decisions about proposals.

NSF program officers are experts in the scientific areas that they manage. They have advanced educational or professional training in science or engineering (e.g., a Ph.D., P.E., or equivalent credentials) and relevant experience in research, education and/or administration. All program officers are required to complete over thirty hours of training in their first six months at NSF, covering all aspects of the merit review process. Topics include conflicts of interest, unconscious bias, communications with reviewers and PIs, and tools for portfolio balance, as well as training on the logistics of proposal review and post-award management. Program officers continue to receive refresher training on these topics throughout their NSF careers.

Program officers are expected to produce and manage a portfolio of awards that encompasses a variety of considerations and objectives. When making funding recommendations, in addition to information from external proposal reviews, NSF program officers evaluate proposals in the larger context of their overall portfolio and consider issues such as:

- Support for high-risk proposals with potential for transformative advances in a field;
- Different approaches to significant research and education questions;
- Capacity-building in a new and promising research area;
- Potential impact on human resources and infrastructure;
- NSF core strategies, such as: (1) the integration of research and education and (2) broadening participation;
- Achievement of special program objectives and initiatives;
- Other available funding resources; and
- Geographic distribution.

Decisions on a given proposal are also made in the context of both other current proposals and previously funded projects.

D. Review Information for Proposers and the Reconsideration Process

Proposers receive notification of the award/decline decision on their proposals, unattributed verbatim copies of peer reviews, and a copy of the panel summary when a panel review was conducted. Program officers are expected to provide additional information to proposers in writing or by phone if the basis for the decision is not provided in the panel summary.

If, after receiving the reviews and other documentation of the decision, a declined proposer would like additional information, she or he may ask the program officer for further clarification. Most inquiries are settled through such dialogue. However, if, after considering that additional information, the proposer is not satisfied that the proposal was fairly handled and reasonably reviewed, she or he may request formal reconsideration. Information about the reconsideration process is included in decline notifications.[38] A reconsideration request can be based on the proposer's perception of procedural errors or on disagreements over the substantive issues dealt with by reviewers. If the relevant NSF Assistant Director or Office Head upholds the original action, the applicant's institution may request a second reconsideration from the Foundation's Deputy Director. In years when NSF does not have a Senate-approved Deputy Director, the second reconsideration decision is provided by the Chief Operating Officer.

NSF declines approximately 30,000 or more proposals per year and typically receives 25 – 50 requests (0.1%) for formal reconsideration annually. The number of requests for formal reconsideration and resulting decisions at both the Assistant Director (first level) and Deputy Director (second level) from FY 2011 through FY 2020 are displayed in **Appendix 11**. NSF received 17 requests for reconsideration, including 16 requests for directorate-level reconsideration and one request for second-level in FY 2020. Fourteen (14) decline decisions were upheld and 3 were reversed.

E. Methods of External Review

The Foundation's merit review process relies on the use of knowledgeable experts from outside NSF. As stated in the *Proposal and Award Policies and Procedures Guide*, proposals usually receive at least three external reviews. Under some circumstances, the requirement for external review can be waived.[39]

NSF programs obtain external peer review by three principal methods: (1) "ad hoc-only," (2) "panel-only," and (3) "ad hoc + panel" review.

In the "ad hoc-only" review method, reviewers are sent links to proposals and asked to submit their reviews to NSF through FastLane, NSF's web-based system for electronic proposal submission and review.

"Panel-only" refers to the process of soliciting reviews from panelists who convene in person or virtually to discuss their reviews and provide advice as a group to the program officer.

Many proposals submitted to NSF are reviewed using a combination of these two processes. Programs that employ the "ad hoc + panel" review process have developed several different configurations, such as:

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[38] Certain types of proposal actions are not eligible for reconsideration. See NSF *Proposal and Award Policies and Procedures Guide* Section IV.D.3 at https://www.nsf.gov/pubs/policydocs/pappg20_1/nsf20_1.pdf.

[39] Exemptions that program officers may choose to exercise, for example, include proposals for EAGER, RAPID, RAISE, and certain categories of workshop and symposium proposals. See **Appendix 7** for more information about EAGER and RAPID proposals.

- Ad hoc reviewers submit reviews before the panel convenes; the panel's discussion is informed by the ad hoc reviews.

- A panel meets to discuss proposals. The panel and/or program staff may identify proposals where additional reviewing expertise would be helpful. After the panel, appropriate reviewers are asked to submit ad hoc reviews to supplement the panel's advice.

The total numbers of individual, narrative reviews, and the average numbers of reviews per proposal obtained by the three different review methods are presented in **Table 15**.[40]

Table 15. Reviews per Proposal, FY 2020

	All Methods	Ad hoc + Panel	Ad hoc-Only	Panel-Only
Reviews[*]	160,191	44,983	10,749	104,459
Proposals	40,182	9,442	2,806	27,934
Reviews per Proposal	4.0	4.8	3.8	3.7

Source: NSF Enterprise Information System, 04/10/2021.

[*] Only written reviews prepared by individuals, whether an ad hoc reviewer or a panelist, are counted.

The ad hoc-plus-panel method resulted in the largest number of reviews per proposal, averaging 4.8, while the panel-only method averaged 3.7. The use of various review methods has changed markedly over time, as shown in **Figure 16. Appendix 12** provides FY 2020 data on the review methods used by directorates and offices.

In addition, site visits (on-site and reverse-site) by NSF staff and external members of the community are often used to review proposals for facilities and centers. NSF program officers are given discretion in the specific use of review methods, subject to approval by the division director or other appropriate NSF official.

Figure 16 shows that almost two-thirds (65%) of proposals are reviewed by panels only. The panel review process has the advantage that different perspectives can be discussed and integrated, if appropriate. Using only panels in the review process tends to reduce proposal processing time (time-to-decision) compared to ad hoc-only reviews. For example, in FY 2020, 69% of all proposals reviewed by panel only were processed within six months, compared to 60% for ad hoc + panel and 62% for ad hoc only.[41]

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[40] The table includes only reviews written by individuals. Panel discussions may, and often do, include the input of reviewers who have read the proposal but have not been asked to provide a separate written review. A panel summary therefore often represents a review perspective that is larger than that captured in the written reviews. The number of reviews per proposal in the last line of the table therefore underestimates the amount of reviewer input when a panel is part of the review process.

[41] Several factors may affect review processing time that are not a direct consequence of the method of obtaining reviews. For example, a number of the programs that use ad-hoc reviews do not have submission deadlines.

Figure 16. Proportion of NSF Proposals Reviewed by Various Review Methods, FY 2011-2020
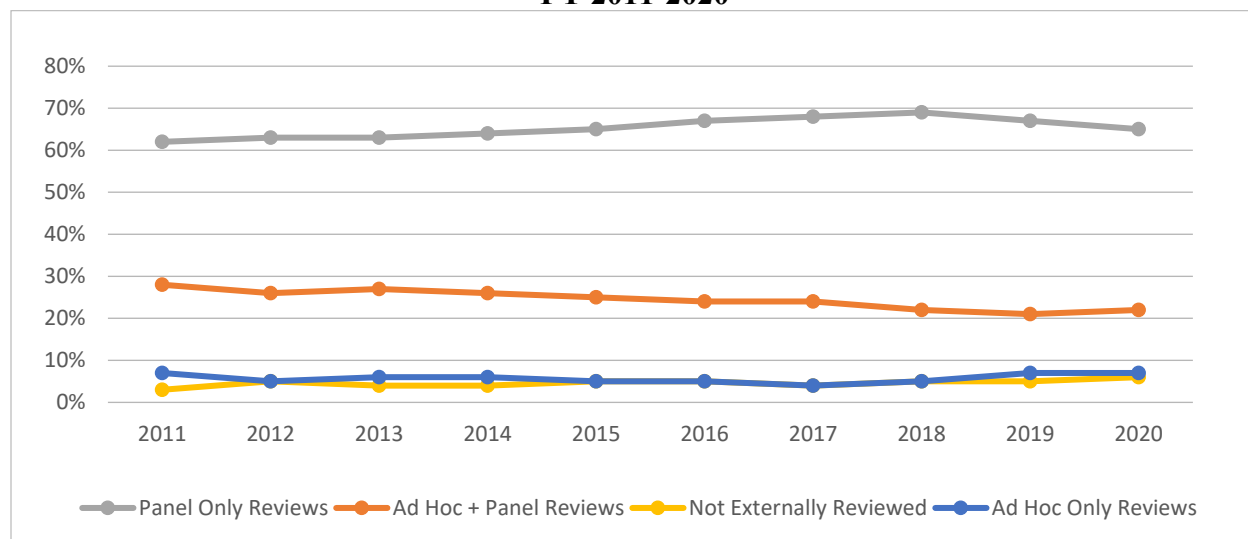
Source: NSF Enterprise Information System, 4/27/21.

One advantage of ad hoc review is that the expertise of the reviewers can be more precisely matched to the proposal. The ad hoc + panel review process combines the in-depth expertise of ad hoc review with the comparative analysis of panel review.

The average number of proposals that a panelist in a panel-only review is asked to review in a funding cycle is considerably larger than the number of reviews asked of an ad hoc reviewer. This high workload may deter some individuals who would otherwise be willing to participate in the review process.

F. Data on Reviewers

The Foundation maintains a central electronic database of nearly 485,000 reviewers who may be asked to participate in ad hoc or panel reviews. Program officers frequently add new reviewers to this database.

Approximately 30,122 individuals served on panels, conducted an ad hoc review for one or more proposals, or served in both functions for proposals for which an award or decline decision was made in FY 2020, 3.6% more than in FY 2019.[42] Of these, approximately 14,340 (48%) served as panelists (of whom about 2,957 also served as ad hoc reviewers) and 15,782 (52%) served as ad hoc reviewers only. Approximately 5,757 (19%) of these reviewers had never reviewed an NSF proposal before.

Reviewers were from all 50 states as well as from the District of Columbia, Guam, Puerto Rico, and the U.S. Virgin Islands. Approximately 2,069 reviewers were from outside the United States by address of record. This decrease represents a gradual, annual decline in the proportion of

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[42] The increase in individuals serving as reviewers during FY 2020 may be partially explained by the FY 2019 government shutdown—which limited review capacity for a 35-day period during FY 2019—and the COVID-19 pandemic, which may have increased ad hoc reviewer capacity during FY 2020.

reviewers from outside the United States over the previous ten years, from 14.3% in FY 2011 to 6.9% in FY 2020.

Reviewers were from a range of institutions, including two-year and four-year colleges and universities, Master's level and Ph.D.-granting universities, industry, for-profit and non-profit institutions, K-12 systems, informal science institutions, and government. NSF also maintains data on numbers of reviewers from each state, territory, and country as well as by type of institution.

The NSF library continually updates its resources to help NSF staff identify reviewers. This includes the collection and sharing of potential reviewer data from associations that work with underrepresented groups in science and engineering. Reviewers are also identified through literature searches and professional activities, as well as through internally developed tools that makes use of text analysis techniques to identify past reviewers of similar proposals or authors of research papers in similar fields. Some NSF divisions actively solicit new reviewers through their webpages and outreach activities. Chapter III.B of the *Proposal and Award Policies and Procedures Guide* describes how NSF program officers select reviewers.

Participation in the merit review process is voluntary. It benefits the reviewer with increased familiarity with NSF programs, knowledge of the state of research and education nationally, and increased awareness of the elements of a competitive proposal. Panelists are reimbursed for expenses, but ad hoc reviewers receive no financial compensation. For proposals in FY 2020, NSF requested 46,714 ad hoc reviews, of which there were 33,441 (72%) positive responses.[43] The response rate varies by program and is typical of recent years.

G. Reviewer Proposal Ratings and the Impact of Budget Constraints

All funded proposals are determined to be highly meritorious based on a combination of individual reviews, panel deliberations and program officer evaluations.

In FY 2020, 87% of proposals were reviewed by a panel of experts (**Figure 16**). A panel conducts its evaluation based on a discussion of the proposals. These in-depth discussions can uncover weaknesses that might not have been reflected in the initial reviews or identify strengths in proposals that might not have been rated highly by the initial reviewers.

Many potentially fundable proposals are declined each year. As shown in **Figure 17**, approximately $1.6 billion was requested for 1,421 declined proposals that received ratings at least as high as the average rating for all awarded proposals (4.1 out of 5.0). Approximately $3.9 billion was requested for declined proposals that were rated Very Good or higher in the merit review process (about 4,233 declined proposals received ratings of 4.0 or greater). These declined proposals represent a rich portfolio of unfunded opportunities – proposals that, if funded, may have produced substantial research and education benefits.

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[43] This number tracks requests that are recorded in the MyNSF system. For example, when potential reviewers are sent a formal invitation via eCorrespondence, the reviewer is entered in MyNSF. Some potential reviewers are first invited informally by email or telephone. If they decline this initial invitation, there is usually no follow-up in eCorrespondence. Numbers given here reflect the rate of positive responses to formal invitations and overestimate the practical positive response rate.

Figure 17. Cumulative Requested Amounts for Declined Proposals by Average Reviewer Rating for FY 2020
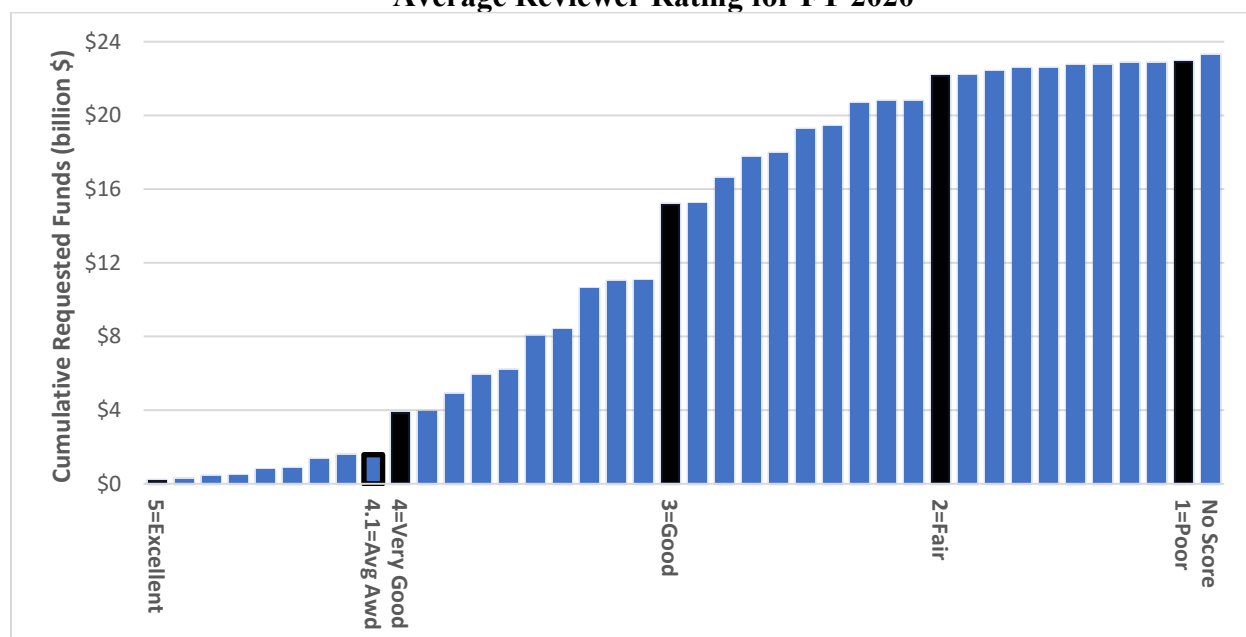
Source: NSF Enterprise Information System, 4/27/21

From FY 2011 to FY 2020, the percentage of all declined proposals that received a Very Good or higher rating dropped 5 percentage points, from 19% to 14%. Among proposals from PIs who shared their gender, disability, or URM status, the proportion of declined proposals that received a Very Good or higher rating declined for all groups, ranging from a 3 to an 8 percentage point drop.[44,45] In FY 2020, declined proposals from non-URM PIs, male PIs, and PIs without a disability that received Very Good or higher ratings made up 16%, 15%, and 15% of their respective within-group proposal declines. In comparison, declined proposals from PIs from URMs, female PIs, and PIs with a disability that received Very Good or higher ratings made up slightly smaller proportions of their respective within-group proposal declines—13%, 14%, and 10% (**Figure 17.1**).

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[44] Because PIs from URMs, female PIs, and PIs with disabilities submit proposals at lower rates than PIs who are not from URMs, male PIs, and PIs without disabilities, highly rated declines were considered as a proportion of all declines for each demographic group. For example, highly rated declined proposals from female PIs were considered as a proportion of all declined proposals from female PIs over the same period.

[45] The percentage point changes for URMs, Non-URMs, female, male, PIs with a disability, and PIs with no disability were 3, 4, 5, 4, 8, and 5 percentage points, respectively.

Figure 17.1. Percent of within-group declined proposals that received a review rating of 4 ("Very Good") or greater in FY 2020, by PI demographic groups
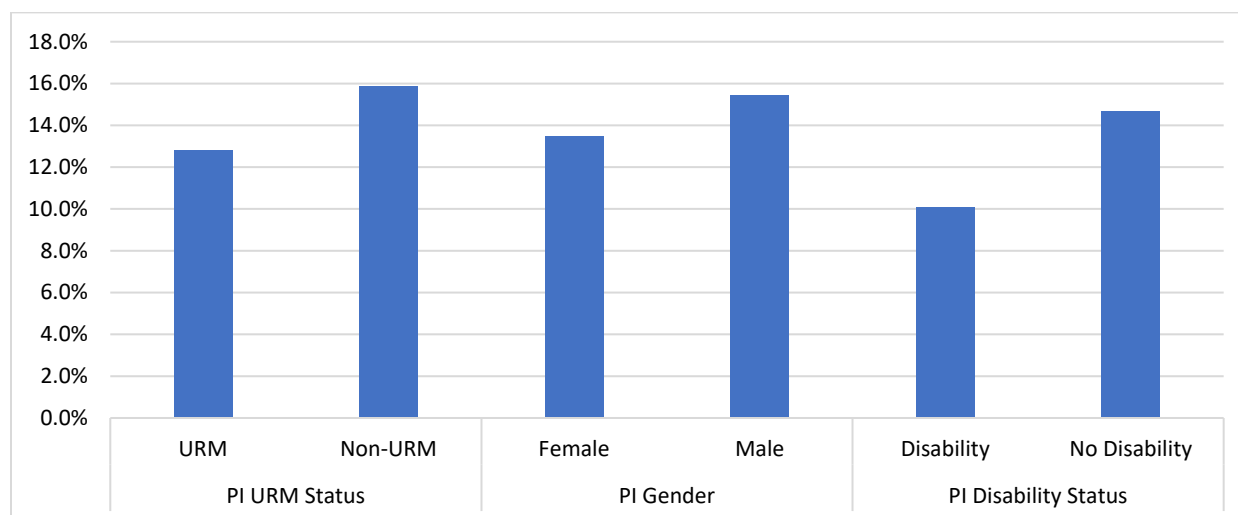
Program officers look not only at the ratings provided by reviewers but also weigh the *comments* that reviewers provide on the intrinsic merits of proposals. Program officers also take into consideration other factors that might not have been considered by expert reviewers. For example, proposals for innovative new ideas often use methods or techniques that might be considered risky by reviewers and panelists. Such "risky" proposals may result in transformative research that accelerates the pace of discovery. Although program officers consider concerns about risk expressed by panels, they also see the value of funding potentially transformative research. Even if the program officer decides not to fully fund the proposal, proposals that do not review well in a panel due to methods that are unproven or risky can be given small awards to allow enough work for a "proof of concept." Program officers will also consider broader impacts that might not be obvious to reviewers, such as filling an infrastructure need that will serve a large number of researchers. There are many dimensions of portfolio balance that may influence the final recommendation. Program officers strive to fund proposals from diverse institution types across all 50 states and U.S. territories, from both new and experienced investigators.

H. Program Officer Characteristics

Table 16 shows information about NSF's program officers. In FY 2020, the number of program officers increased 6% from 529 in FY 2019 to 561. Since 2011, the distribution of program officers from racial and ethnic minority groups has increased 7.9 percentage points. All incoming NSF program officers receive training in the merit review process.

Table 16. Distribution of NSF Program Officers by Characteristics

Program Officers	Total	Percent
Total	561	100.0%
Gender		
Male	310	55.3%
Female	251	44.7%
Race and Ethnicity		
Racial or Ethnic Minority	168	29.9%
Non-Minority	393	70.1%
Employment		
Permanent	314	56.0%
Visiting Scientists, Engineers & Educators (VSEE)	38	6.8%
Temporary	43	7.7%
Intergovernmental Personnel Act (IPA)	166	29.6%

Source NSF Division of Human Resource Management, 4/16/2021. Data are for the end of FY 2020.

Program officers can be permanent NSF employees or non-permanent employees. As shown in **Table 16**, 56% are permanent program officers and 44% are not permanent. Some non-permanent program officers are "Visiting Scientists, Engineers, and Educators" (VSEEs), "on loan" for up to three years from their host institutions. Others are supported through grants to their home institutions under the terms of the Intergovernmental Personnel Act (IPA). In FY 2020, the number of permanent program officers increased by 14 relative to FY 2019 and the number of VSEEs, Temporary, and IPAs increased by 18. Relative to FY 2019, the proportion of VSEE, Temporary program officers, and IPAs remained relatively the same (6.8%, 7.7%, 29.6%, respectively).

Compared to FY 2019, the numbers of program officers who are women increased by 3 and the number of program officers from racial or ethnic minorities increased by 16. At the end of FY 2020, approximately 45% of program officers were female, which is a 2% decrease from FY 2019 and approximately 30% were from a racial or ethnic minority, which is a 1% increase from FY 2019.

Appendices

Appendix 1 - Median and Mean Annualized Award Amounts for Research Grants, by Directorate or Office

Table 1.1 – Median and Mean Annualized Award Amounts for Research Grants (Nominal Dollars in Thousands)

		Fiscal Year									
		2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
NSF	Median	$120	$125	$130	$133	$130	$133	$133	$140	$147	$150
	Mean	$159	$166	$169	$172	$171	$173	$169	$178	$189	$194
BIO	Median	$178	$177	$182	$178	$186	$200	$198	$197	$215	$200
	Mean	$226	$214	$228	$217	$237	$243	$223	$226	$263	$243
CISE	Median	$141	$150	$161	$166	$161	$155	$156	$166	$167	$166
	Mean	$174	$206	$204	$199	$187	$198	$187	$199	$210	$203
ENG	Median	$100	$107	$103	$112	$103	$102	$107	$113	$117	$125
	Mean	$119	$125	$122	$131	$122	$124	$125	$131	$135	$148
GEO	Median	$116	$125	$141	$141	$144	$150	$150	$166	$155	$167
	Mean	$162	$170	$193	$201	$183	$185	$190	$216	$224	$225
MPS	Median	$111	$117	$116	$120	$125	$122	$120	$123	$130	$130
	Mean	$141	$143	$130	$141	$149	$142	$138	$146	$151	$166
OIA	Median	$393	$170	$156	$171	$713	$156	$152	$150	$948	$710
	Mean	$379	$178	$948	$173	$554	$514	$260	$262	$817	$655
OISE	Median	$49	$50	$31	$49	$82	$83	$84	$100	$101	$100
	Mean	$60	$200	$53	$142	$149	$102	$318	$161	$167	$163
SBE	Median	$98	$98	$101	$109	$112	$117	$119	$123	$129	$144
	Mean	$113	$120	$139	$134	$138	$136	$146	$141	$155	$154

Source: NSF Enterprise Information System, 4/27/21.

EHR is not included in this table because the number of awards included in the "research grant" category is small relative to the number of education awards managed by that directorate.

An organizational realignment was implemented in FY 2013 which moved the Office of Polar Programs and Office of Cyberinfrastructure from the Office of the Director to the Directorate for Geosciences and the Directorate for Computer & Information Science and Engineering, respectively. Additionally, the Office of International Science & Engineering became part of the Office of International and Integrative Activities.

An organizational realignment was implemented in FY 2015 which moved the Office of International Science & Engineering out of the Office of Integrative Activities.

Data from prior years have been realigned to show historical trends.

Appendix 2 - Mean Levels of PI, Graduate Student, and Post-Doctoral Associate Support in Research Grants

Table 2.1 – Mean Number of Months of Salary Support per PI/co-PI for Single- and Multi-PI Research Grants, by Directorate or Office

Directorate or Office	Type of Award	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NSF	Single PI Grants	1.0	0.9	0.8	0.8	0.7	0.7	0.7	0.8	0.6	0.5
	Multi-PI Grants	0.9	0.9	0.8	0.8	0.8	0.7	0.6	0.6	0.6	0.5
	NSF Average	1.0	0.9	0.8	0.8	0.8	0.7	0.7	0.7	0.6	0.5
BIO	Single PI Grants	1.3	1.1	1.0	1.0	0.9	0.9	0.7	0.7	0.6	0.7
	Multi-PI Grants	1.1	1.1	1.3	1.0	1.1	0.9	0.7	0.8	0.8	0.7
	BIO Average	1.2	1.1	1.1	1.0	0.9	0.9	0.7	0.7	0.7	0.7
CISE	Single PI Grants	0.9	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.4
	Multi-PI Grants	0.8	0.7	0.6	0.7	0.5	0.5	0.5	0.5	0.5	0.4
	CSE Average	0.9	0.7	0.6	0.7	0.6	0.6	0.6	0.6	0.5	0.4
EHR	Single PI Grants	1.7	1.4	1.4	1.0	0.9	0.8	0.7	0.9	1.0	1.0
	Multi-PI Grants	2.2	1.7	1.0	0.9	0.8	0.7	0.8	0.7	0.7	0.6
	EHR Average	2.1	1.6	1.1	0.9	0.8	0.7	0.8	0.8	0.8	0.7
ENG	Single PI Grants	0.4	0.6	0.4	0.3	0.4	0.4	0.3	0.3	0.4	0.3
	Multi-PI Grants	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4
	ENG Average	0.4	0.5	0.4	0.3	0.4	0.3	0.3	0.3	0.3	0.3
GEO	Single PI Grants	1.0	1.0	0.9	1.0	1.0	0.9	0.8	1.4	0.7	0.6
	Multi-PI Grants	1.0	1.3	1.3	1.2	1.2	1.1	1.2	1.0	0.9	0.6
	GEO Average	1.0	1.1	1.0	1.1	1.0	1.0	0.9	1.3	0.7	0.6
MPS	Single PI Grants	1.3	1.1	1.0	1.0	0.8	0.8	0.8	0.8	0.7	0.5
	Multi-PI Grants	1.2	0.9	0.9	0.9	0.9	0.8	0.7	0.6	0.6	0.5
	MPS Average	1.3	1.0	1.0	1.0	0.9	0.8	0.8	0.8	0.7	0.5
OIA	Single PI Grants	1.3	1.2	1.1	1.2	0.8	1.0	0.4	0.9	0.9	0.5
	Multi-PI Grants	0.2	N/A	N/A	0.7	N/A	0.4	0.6	1.4	1.3	1.2
	OIA Average	0.9	1.2	1.1	0.8	0.8	0.5	0.5	1.2	1.2	1.1
OISE	Single PI Grants	2.2	0.3	0.8	0.5	0.6	0.6	0.3	0.8	0.4	0.6
	Multi-PI Grants	0.8	0.7	0.5	0.5	0.8	0.7	0.6	1.1	0.8	0.3
	OISE Average	1.1	0.6	0.7	0.5	0.7	0.7	0.6	1.0	0.6	0.5
SBE	Single PI Grants	1.2	1.2	1.1	1.1	1.1	1.0	1.1	0.8	0.7	0.8
	Multi-PI Grants	0.9	0.9	1.2	1.2	1.6	1.4	0.6	0.7	0.8	0.6
	SBE Average	1.1	1.1	1.1	1.2	1.3	1.1	0.9	0.8	0.7	0.7

Source: NSF Enterprise Information System as of February 2, 2020 and NSF Report Server as of April 27, 2021.

Table 2.2 – Mean Annual Graduate Student Support Per Research Grant[46]

Fiscal Year	All Research Grants	Research Grants with Graduate Student Support
2011	$17,182	$24,259
2012	$19,884	$28,101
2013	$20,937	$29,101
2014	$21,028	$29,381
2015	$20,842	$29,875
2016	$21,408	$30,657
2017	$21,440	$30,766
2018	$21,547	$31,182
2019	$23,471	$32,743
2020	$22,151	$30,413

Source: NSF Report Server 4/27/21.

Table 2.3 – Mean Annual Post-Doctoral Associate Support Per Research Grant[47]

Fiscal Year	All Research Grants	Research Grants with Post-Doc. Support
2011	$5,377	$29,639
2012	$5,992	$35,593
2013	$6,060	$34,674
2014	$5,492	$34,142
2015	$5,970	$35,889
2016	$5,894	$36,339
2017	$5,680	$36,700
2018	$5,838	$35,861
2019	$6,556	$39,633
2020	$6,342	$35,526

Source: NSF Report Server 4/27/21.

[46] Not all research grant proposals request funding support for graduate students. Table 2.2 shows the average annual amount of graduate student support requested in the proposal budgets for awarded research grants divided, respectively, by the total number of research grants and by the total number of research grants that requested funding for graduate students. The requested funding support amount is the average per grant and not per student.

[47] Not all research grant proposals request funding support for post-doctoral associates. Table 2.3 shows the average annual amount of post-doctoral associate support requested in the proposal budgets for awarded research grants divided, respectively, by the total number of research grants and by the total number of research grants that requested funding for post-doctoral associates. The requested funding support amount is the average per grant and not per person.

Appendix 3 - Proposals, Awards, and Funding Rates, by Directorate or Office

Table 3.1 – Proposals, Awards, and Funding Rates by Directorate or Office

		Fiscal Year									
		2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
NSF[48]	Proposals	51,562	48,613	48,999	48,051	49,620	49,285	49,415	48,321	41,024	42,723
	Awards	11,192	11,524	10,829	10,958	12,007	11,877	11,447	11,702	11,243	12,168
	Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	27%	28%
BIO	Proposals	7,439	5,269	5,934	4,784	5,119	5,206	5,005	4,765	3,110	3,783
	Awards	1,310	1,293	1,250	1,272	1,379	1,330	1,142	1,190	1,046	1,369
	Funding Rate	18%	25%	21%	27%	27%	26%	23%	25%	34%	36%
CISE	Proposals	6,702	7,703	7,821	7,434	8,032	8,299	8,722	9,150	8,616	7,932
	Awards	1,527	1,749	1,616	1,680	1,886	1,918	1,819	2,098	2,009	1,971
	Funding Rate	23%	23%	21%	23%	23%	23%	21%	23%	23%	25%
EHR	Proposals	4,660	4,281	4,501	4,049	4,242	4,423	4,294	4,160	3,781	4,337
	Awards	807	889	793	701	830	915	899	892	842	996
	Funding Rate	17%	21%	18%	17%	20%	21%	21%	21%	22%	23%
ENG	Proposals	12,314	11,338	10,738	11,878	12,326	12,570	13,028	13,092	9,024	9,181
	Awards	2,064	2,065	2,212	2,145	2,504	2,499	2,455	2,458	2,379	2,406
	Funding Rate	17%	18%	21%	18%	20%	20%	19%	19%	26%	26%
GEO	Proposals	5,187	5,243	6,087	5,790	5,812	4,999	4,793	3,775	4,099	3,721
	Awards	1,705	1,637	1,565	1,487	1,463	1,526	1,520	1,407	1,534	1,552
	Funding Rate	31%	31%	26%	26%	25%	31%	32%	37%	37%	42%
MPS	Proposals	8,796	9,006	8,903	8,855	9,133	9,199	8,848	8,803	8,045	8,612
	Awards	2,352	2,523	2,201	2,343	2,593	2,432	2,334	2,593	2,415	2,552
	Funding Rate	27%	28%	25%	26%	28%	26%	26%	29%	30%	30%
OIA	Proposals	138	44	98	78	91	102	117	211	200	482
	Awards	25	14	27	29	36	30	54	68	89	172
	Funding Rate	18%	32%	28%	37%	40%	29%	46%	32%	45%	36%
OISE	Proposals	1,214	951	484	677	582	313	298	235	416	428
	Awards	404	333	245	307	275	236	194	53	58	74
	Funding Rate	33%	35%	51%	45%	47%	75%	65%	23%	14%	17%
SBE	Proposals	5,112	4,776	4,433	4,506	4,283	4,174	4,310	4,130	3,733	4,247

[48] Several organizational changes occurred over the decade. Data from prior years have been realigned with the organizational structure in effect for FY 2018 to show historical trends. A realignment in FY 2013 moved the Office of Polar Programs (OPP) and Office of CyberInfrastructure (OCI) from the Office of the Director to GEO and CISE, respectively, preserving their identity as separate divisions. Additionally, the Office of International Science & Engineering (OISE) and the Office of Integrative Activities (OIA) became the Office of International and Integrative Activities (OIIA). In a further realignment, in FY 2015, OIIA was again separated into the Office of International Science & Engineering (OISE) and the Office of Integrative Activities (OIA).

		Fiscal Year									
		2011	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
	Awards	998	1,019	920	994	1,041	991	1,030	943	871	1,076
	Funding Rate	20%	21%	21%	22%	24%	24%	24%	23%	23%	25%
Other[49]	Proposals		2								
	Awards		2								
	Funding Rate		100%								

Source: NSF Enterprise Information System, 4/27/21.

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[49] The 'Other' category includes, for example, non-contract awards made on behalf of the Office of the Inspector General.

Appendix 4 - Proposals, Awards, and Funding Rates, by PI Gender

Table 4.1 – FY 2020 Proposals, Awards, and Funding Rates, by PI Gender*

		Total	Female	Male	Unknown
NSF	Proposals	42,723	9,511	22,217	10,995
	% of Total		22%	52%	26%
	Awards	12,168	3,059	6,406	2,703
	Funding Rate	28%	32%	29%	25%
BIO	Proposals	3,783	1,147	1,792	844
	% of Total		30%	47%	22%
	Awards	1,369	465	660	244
	Funding Rate	36%	41%	37%	29%
CSE	Proposals	7,932	1,350	4,604	1,978
	% of Total		17%	58%	25%
	Awards	1,971	392	1,132	447
	Funding Rate	25%	29%	25%	23%
EHR	Proposals	4,337	1,592	1,539	1,206
	% of Total		37%	35%	28%
	Awards	996	395	328	273
	Funding Rate	23%	25%	21%	23%
ENG	Proposals	9,181	1,435	4,840	2,906
	% of Total		16%	53%	32%
	Awards	2,406	424	1,285	697
	Funding Rate	26%	30%	27%	24%
GEO	Proposals	3,721	1,017	2,024	680
	% of Total		27%	54%	18%
	Awards	1,552	463	820	269
	Funding Rate	42%	46%	41%	40%
MPS	Proposals	8,612	1,423	5,296	1,896
	% of Total		17%	61%	22%
	Awards	2,552	473	1,629	450
	Funding Rate	30%	33%	31%	24%
OIA	Proposals	482	97	265	120
	% of Total		20%	55%	25%
	Awards	172	36	92	44
	Funding Rate	36%	37%	35%	39%
OISE	Proposals	428	94	251	83
	% of Total		22%	59%	19%
	Awards	74	20	42	12
	Funding Rate	17%	21%	17%	14%
SBE	Proposals	4,247	1,356	1,606	1,285
	% of Total		32%	38%	30%
	Awards	1076	391	418	267
	Funding Rate	25%	29%	26%	21%

Source: NSF Enterprise Information System, 4/27/21.

*Demographic data are voluntarily self-reported by the PI. In FY 2020, approximately 74% of competitive proposals and 76 % of research proposals were from PIs who provided gender information. "Total" is the count of unique proposals. Columns are counts of proposals from PIs in the corresponding category.

Table 4.2 – FY 2020 Research Proposals, Awards, and Funding Rates, by PI Gender

		Total	Female	Male	Unknown
NSF	Proposals	35,115	7,775	18,907	8,433
	% of Total		22%	54%	24%
	Awards	9,665	2,406	5,255	2,004
	Funding Rate	28%	31%	28%	24%
BIO	Proposals	3,063	876	1,544	643
	% of Total		29%	50%	21%
	Awards	1,116	355	577	184
	Funding Rate	36%	41%	37%	29%
CSE	Proposals	7,593	1,287	4,382	1,924
	% of Total		17%	58%	25%
	Awards	1,773	350	1,002	421
	Funding Rate	23%	27%	23%	22%
EHR	Proposals	3,322	1,288	1,151	883
	% of Total		39%	35%	27%
	Awards	672	291	214	167
	Funding Rate	20%	23%	19%	19%
ENG	Proposals	6,240	1,078	3,596	1,566
	% of Total		17%	58%	25%
	Awards	1,723	323	1,001	399
	Funding Rate	28%	30%	28%	25%
GEO	Proposals	3,375	906	1,863	606
	% of Total		27%	55%	18%
	Awards	1,342	393	718	231
	Funding Rate	40%	43%	39%	38%
MPS	Proposals	7,556	1,206	4,679	1,671
	% of Total		16%	62%	22%
	Awards	2,127	387	1,357	383
	Funding Rate	28%	32%	29%	23%
OIA	Proposals	373	75	211	87
	% of Total		20%	57%	23%
	Awards	77	18	44	15
	Funding Rate	21%	24%	21%	17%
OISE	Proposals	427	94	250	83
	% of Total		22%	59%	19%
	Awards	73	20	41	12
	Funding Rate	17%	21%	16%	14%
SBE	Proposals	3,166	965	1,231	970
	% of Total		30%	39%	31%
	Awards	762	269	301	192
	Funding Rate	24%	28%	24%	20%

Source: NSF Enterprise Information System, 4/27/21.

Appendix 5 - EPSCoR: Jurisdictions, Proposal, Award, and Funding Data

Twenty-five states, the Commonwealth of Puerto Rico, Guam and the U.S. Virgin Islands were eligible to participate in aspects of the NSF Established Program to Stimulate Competitive Research (EPSCoR) program in FY 2020.[50] The states are: Alabama, Alaska, Arkansas, Delaware, Hawaii, Idaho, Iowa[51], Kansas, Kentucky, Louisiana, Maine, Mississippi, Montana, Nebraska, Nevada, New Hampshire, New Mexico[52], North Dakota, Oklahoma, Rhode Island, South Carolina, South Dakota, Vermont, West Virginia, and Wyoming.[53]

In FY 2020, the NSF EPSCoR program invested $41.85 million in co-funding 220 NSF awards, including $1.25 million provided through the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) (P.L. 116-136). This investment was leveraged with $73.84 million from NSF Directorates and other Offices, for a total investment of $115.42 million. Since 1998, when the co-funding initiative was formally established, approximately 5,000 co-funded awards have been made. The latter represent a total NSF investment of about $1.93 billion, of which $750 million was co-funding provided by the EPSCoR program.

Figure 5.1 shows the change over time for the proposal funding rate of EPSCoR jurisdictions relative to the overall NSF proposal funding rate for all of the United States. The gap in funding rates has narrowed since FY 2015.

Figure 5.1 – Proposal Funding Rates for EPSCoR Jurisdictions and all NSF Proposals

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All NSF Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	27%	28%
All EPSCoR Funding Rate	19%	20%	19%	20%	20%	21%	21%	23%	25%	27%
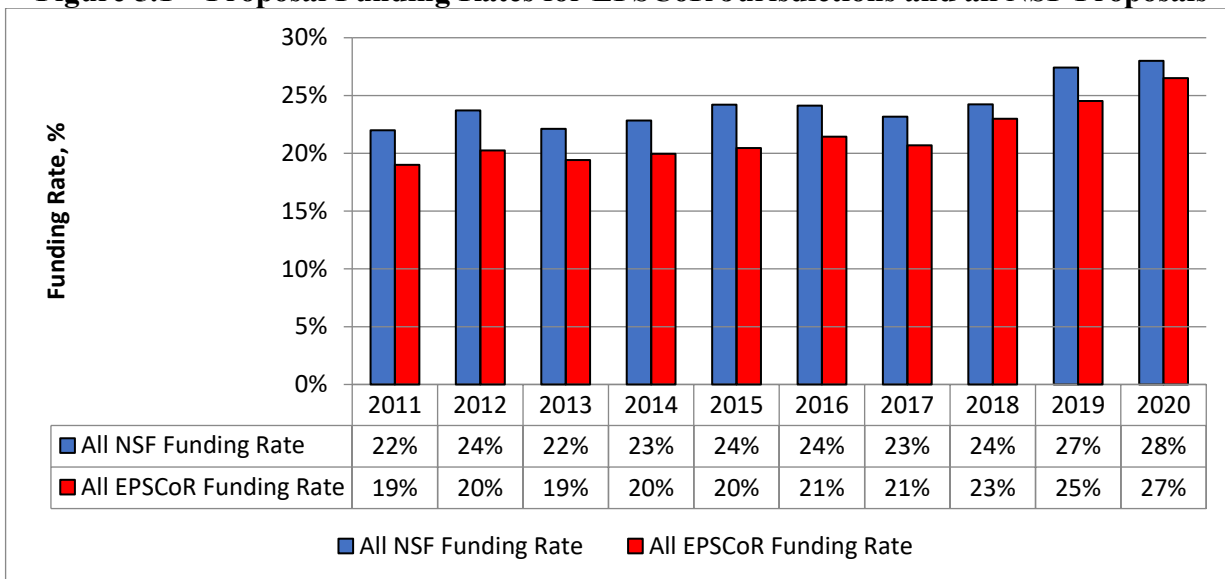
Source: EPSCoR Office 04/27/21.

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[50] In January 2017, the EPSCoR program was renamed the Established Program to Stimulate Competitive Research. Previously, it had been the Experimental Program to Stimulate Competitive Research.
[51] Iowa was first EPSCoR-eligible in FY 2009 and exited program eligibility in FY 2013. Iowa became eligible for EPSCoR again in FY 2019.
[52] Similar to Iowa, New Mexico was originally EPSCoR-eligible in 2001 and rose above the eligibility threshold in 2018. New Mexico became eligible for EPSCoR again in FY 2019.
[53] Additional information about each state's program can be found at:
https://www.nsf.gov/od/oia/programs/epscor/nsf_oiia_epscor_EPSCoRstatewebsites.jsp

Table 5.1 shows the number of proposals, awards, and proposal funding rates for EPSCoR jurisdictions. Below the name of the EPSCoR jurisdiction is the year in which the jurisdiction joined EPSCoR.

Table 5.1 – Proposal Funding Rates, by EPSCoR Jurisdiction
(Date under the state name is the year the state joined EPSCoR)

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
All NSF	Awards	11,192	11,524	10,829	10,958	12,007	11,877	11,447	11,702	11,243	12,168
	Proposals	51,562	48,613	48,999	48,051	49,620	49,285	49,415	48,321	41,024	42,723
	Funding Rate	22%	24%	22%	23%	24%	24%	23%	24%	27%	28%
All EPSCoR Jurisdictions	Awards	1,846	1,960	1,897	1,892	1,980	1,676	1,457	1,565	1,508	1,684
	Proposals	9,640	9,680	9,766	9,477	9,679	7,815	7,041	6,806	6,149	6,346
	Funding Rate	19%	20%	19%	20%	20%	21%	21%	23%	25%	27%
Alabama -1985	Awards	98	110	94	102	85	102	116	113	98	137
	Proposals	614	669	647	665	583	607	655	672	525	549
	Funding Rate	16%	16%	15%	15%	15%	17%	18%	17%	19%	25%
Alaska -2000	Awards	71	65	60	50	49	59	61	56	52	63
	Proposals	213	199	221	205	246	193	169	149	156	157
	Funding Rate	33%	33%	27%	24%	20%	31%	36%	38%	33%	40%
Arkansas -1980	Awards	40	33	46	33	30	35	45	45	41	49
	Proposals	246	229	260	207	184	196	222	229	177	186
	Funding Rate	16%	14%	18%	16%	16%	18%	20%	20%	23%	26%
Delaware -2003	Awards	70	79	70	67	64	80	50	77	65	69
	Proposals	292	278	287	283	273	301	257	278	261	260
	Funding Rate	24%	28%	24%	24%	23%	27%	19%	28%	25%	27%
Guam -2012	Awards	2	2	1	0	2	0	3	0	2	1
	Proposals	5	8	7	4	6	2	3	1	2	3
	Funding Rate	40%	25%	14%	0%	33%	0%	100%	0%	100%	33%
Hawaii -2001	Awards	80	60	54	68	62	78	64	71	68	70
	Proposals	285	281	282	294	267	285	234	217	199	215
	Funding Rate	28%	21%	19%	23%	23%	27%	27%	33%	34%	33%
Idaho -1987	Awards	37	47	41	35	37	41	40	38	30	54
	Proposals	202	185	214	230	234	206	203	201	175	172
	Funding Rate	18%	25%	19%	15%	16%	20%	20%	19%	17%	31%
Iowa* -2019	Awards	114	116	113	116	121	133	113	120	121	124
	Proposals	613	558	566	524	578	573	552	576	483	491
	Funding Rate	19%	21%	20%	22%	21%	23%	20%	21%	25%	25%
Kansas -1992	Awards	88	91	65	67	94	71	92	73	82	100
	Proposals	423	402	393	389	407	396	430	410	334	348
	Funding Rate	21%	23%	17%	17%	23%	18%	21%	18%	25%	29%

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Kentucky	Awards	64	63	58	68	69	83	59	67	51	67
-1985	Proposals	437	434	391	401	399	399	377	336	286	295
	Funding Rate	15%	15%	15%	17%	17%	21%	16%	20%	18%	23%
Louisiana	Awards	102	88	91	74	99	91	88	111	93	105
-1987	Proposals	621	484	463	402	460	459	470	501	377	435
	Funding Rate	16%	18%	20%	18%	22%	20%	19%	22%	25%	24%
Maine	Awards	42	46	52	48	50	44	42	55	38	43
-1980	Proposals	209	182	211	201	189	175	185	183	158	154
	Funding Rate	20%	25%	25%	24%	26%	25%	23%	30%	24%	28%
Mississippi	Awards	42	43	28	32	40	47	43	53	36	43
-1987	Proposals	287	264	262	260	240	256	224	253	190	218
	Funding Rate	15%	16%	11%	12%	17%	18%	19%	21%	19%	20%
Montana	Awards	35	50	50	45	51	52	59	59	46	70
-1980	Proposals	222	204	214	183	210	183	229	191	150	197
	Funding Rate	16%	25%	23%	25%	24%	28%	26%	31%	31%	36%
Nebraska	Awards	60	40	59	51	59	58	62	68	50	50
-1992	Proposals	309	258	305	281	307	300	326	297	230	236
	Funding Rate	19%	16%	19%	18%	19%	19%	19%	23%	22%	21%
Nevada	Awards	37	29	33	58	40	42	38	54	59	55
-1985	Proposals	263	236	217	245	230	266	281	296	248	261
	Funding Rate	14%	12%	15%	24%	17%	16%	14%	18%	24%	21%
New Hampshire	Awards	61	75	64	64	65	74	62	65	61	72
-2004	Proposals	282	280	273	295	253	285	256	244	210	217
	Funding Rate	22%	27%	23%	22%	26%	26%	24%	27%	29%	33%
New Mexico*	Awards	91	69	81	76	88	107	92	80	84	82
-2019	Proposals	416	399	404	398	474	449	379	394	307	320
	Funding Rate	22%	17%	20%	19%	19%	24%	24%	20%	27%	26%
North Dakota	Awards	23	18	21	26	20	32	21	24	15	31
-1985	Proposals	161	161	172	174	171	185	150	147	114	115
	Funding Rate	14%	11%	12%	15%	12%	17%	14%	16%	13%	27%
Oklahoma	Awards	79	68	59	69	68	76	76	56	70	71
-1985	Proposals	460	384	394	339	388	372	377	342	303	292
	Funding Rate	17%	18%	15%	20%	18%	20%	20%	16%	23%	24%
Puerto Rico	Awards	19	9	8	16	15	22	14	34	16	18
-1985	Proposals	163	153	105	86	102	90	111	115	74	73
	Funding Rate	12%	6%	8%	19%	15%	24%	13%	30%	22%	25%
Rhode Island	Awards	131	146	127	138	131	132	125	145	135	106
-2004	Proposals	400	393	399	404	361	349	351	390	336	305
	Funding Rate	33%	37%	32%	34%	36%	38%	36%	37%	40%	35%

		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
South Carolina	Awards	108	117	115	97	117	98	103	113	99	93
-1980	Proposals	650	562	594	585	603	556	565	495	427	435
	Funding Rate	17%	21%	19%	17%	19%	18%	18%	23%	23%	21%
South Dakota	Awards	24	20	28	32	25	24	23	23	26	26
-1987	Proposals	162	150	163	135	139	150	155	131	102	121
	Funding Rate	15%	13%	17%	24%	18%	16%	15%	18%	25%	21%
U.S. Virgin Islands	Awards	3	2	0	2	1	3	3	6	3	2
-2002	Proposals	11	5	8	7	3	10	11	11	6	8
	Funding Rate	27%	40%	0%	29%	33%	30%	27%	55%	50%	25%
Vermont	Awards	22	24	21	22	18	24	27	31	16	26
-1985	Proposals	121	90	89	104	96	133	127	94	78	68
	Funding Rate	18%	27%	24%	21%	19%	18%	21%	33%	21%	38%
West Virginia	Awards	21	32	22	23	37	29	28	29	22	31
-1980	Proposals	151	163	158	159	187	169	175	139	127	130
	Funding Rate	14%	20%	14%	14%	20%	17%	16%	21%	17%	24%
Wyoming	Awards	31	20	18	24	27	21	21	19	29	26
-1985	Proposals	122	105	115	129	129	128	119	90	114	85
	Funding Rate	25%	19%	16%	19%	21%	16%	18%	21%	25%	31%

† = award numbers suppressed to maintain privacy.
* Data for All NSF Proposals and Awards from prior years has been realigned to show historical trend.
* Iowa was first EPSCoR-eligible in FY 2009 and exited program eligibility in FY 2013. Iowa became eligible for EPSCoR again in FY 2019. Similarly, New Mexico was originally EPSCoR-eligible in 2001 and rose above the eligibility threshold in 2018. New Mexico became eligible for EPSCoR again in FY 2019.

Source: All-NSF data - NSF Enterprise Information System, 4/27/21; EPSCoR jurisdiction data - NSF Budget Internet Information System, April 2021.

Appendix 6 - Accomplishment-Based Renewals

Accomplishment-Based Renewals

In FY 2020, there were 25 requests for accomplishment-based renewals, 9 of which were awarded. **Table 6.1** shows the number of accomplishment-based renewals by directorate or office.

### Table 6.1 – Accomplishment-Based Renewals by Directorate or Office

Directorate or Office		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
NSF	Award	19	30	19	14	29	17	18	9	8	9
	Decline	43	41	52	35	44	35	26	32	19	16
	Mean Ann. Awd	$253,026	$255,959	$414,467	$174,227	$137,480	$199,034	$171,270	$279,318	$270,018	$185,057
BIO	Award	3	2	4	3	2	0	3	1	3	2
	Decline	6	3	6	5	2	4	7	5	1	2
	Mean Ann. Awd	$344,742	$78,815	$835,142	$298,359	$189,961	N/A	$156,044	$89,991	$242,145	$307,317
CISE	Award	0	0	2	0	1	5	1	4	2	0
	Decline	2	2	1	0	0	1	0	1	5	2
	Mean Ann. Awd	N/A	N/A	$819,996	N/A	$233,333	$369,350	$140,000	$461,539	$572,378	N/A
EHR	Award	1	2	0	1	0	0	2	0	0	1
	Decline	5	4	4	4	6	3	2	2	1	1
	Mean Ann. Awd	$33,352	$530,633	N/A	$354,796	N/A	N/A	$442,664	N/A	N/A	$463,049
ENG	Award	2	4	3	3	6	1	0	0	0	1
	Decline	5	7	10	2	9	9	1	5	1	2
	Mean Ann. Awd	$121,725	$194,881	$207,017	$45,309	$105,606	$50,000	N/A	N/A	N/A	$142,947
GEO	Award	4	12	5	1	6	7	6	2	0	0
	Decline	4	3	6	9	8	3	0	2	2	2
	Mean Ann. Awd	$143,699	$234,306	$222,092	$118,252	$126,876	$131,244	$140,437	$157,299	N/A	N/A
MPS	Award	8	10	5	6	14	3	4	2	2	4
	Decline	15	18	21	14	15	14	14	13	7	6
	Mean Ann. Awd	$354,936	$297,020	$155,611	$155,854	$139,064	$171,330	$109,747	$161,659	$220,000	$102,879
SBE	Award	1	0	0	0	0	1	2	0	0	1
	Decline	5	4	4	1	3	1	2	3	2	1
	Mean Ann. Awd	$82,187	N/A	N/A	N/A	N/A	$224,440	$138,476	N/A	N/A	$33,364
OD	Award	0				0			0	1	
	Decline	1				1			1	0	
	Mean Ann. Awd	N/A				N/A			N/A	$101,295	

Source: NSF Enterprise Information System, 4/27/21. "N/A" = No accomplishment-based renewals awarded.

Appendix 7 - EArly-concept Grants for Exploratory Research (EAGER) and Grants for Rapid Response Research (RAPID)
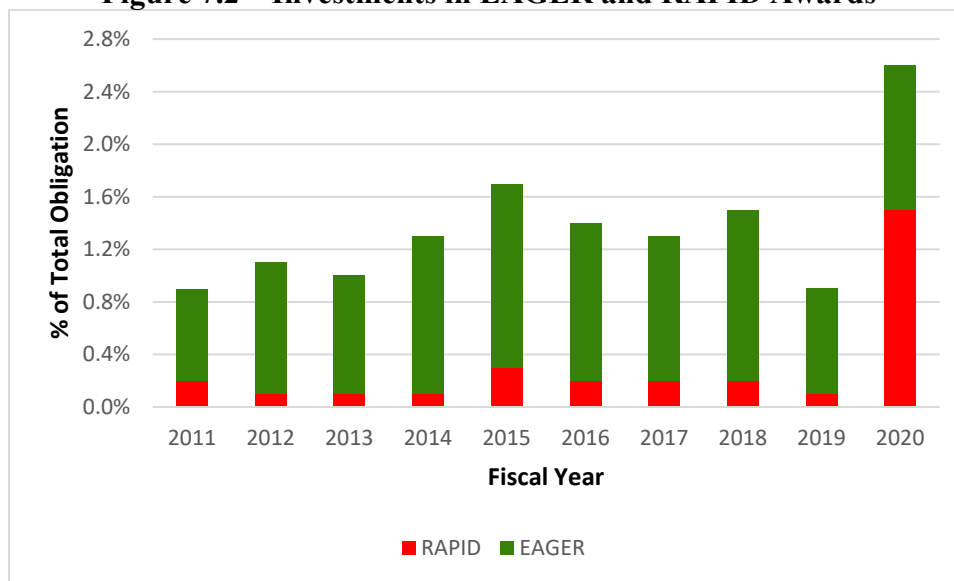
Figures 7.1, 7.2, and **Table 7.1** provide funding trends for EAGERs and RAPIDs.

Figure 7.1 – Numbers of EAGER and RAPID Awards
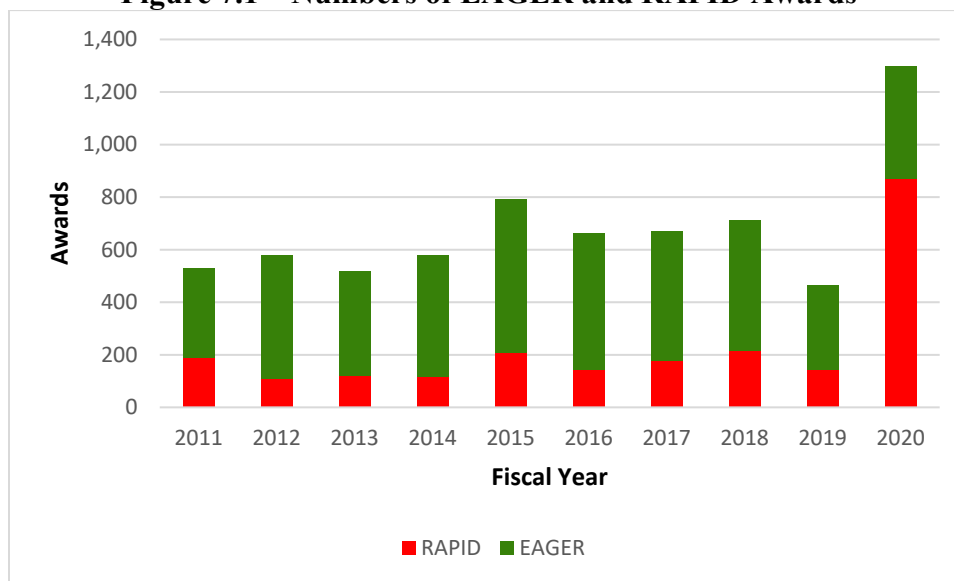
Source: NSF Enterprise Information System 4/27/21.

Figure 7.2 – Investments in EAGER and RAPID Awards

Source: NSF Enterprise Information System 4/27/21.

Table 7.1 – Early-concept Grants for Exploratory Research (EAGER) and Grants for Rapid Response Research (RAPID): Funding Trends by Directorate or Office**

		2015		2016		2017		2018		2019		2020ǂ	
		RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER
NSF	Proposals	238	743	155	765	182	681	276	666	195	454	957	510
	Awards	207	585	145	518	176	493	216	498	142	323	869	427
	Funding Rate	87%	79%	94%	68%	97%	72%	78%	75%	73%	71%	91%	84%
	Total $ (Millions)	$20.3	$103	$12.1	$90.7	$14.8	$83.6	$19.3	$102.4	$11.5	$67.5	$120.1	$86.1
	% of Obligations	.3%	1.4%	.2%	1.2%	.2%	1.1%	.2%	1.3%	.1%	.8%	1.5%	1.1%
	Average $ (1000s)	$98	$176	$84	$175	$84	$170	$89	$206	$81	$209	$138	$202
BIO	Proposals	38	117	25	44	22	40	58	81	15	64	136	65
	Awards	29	104	19	40	22	37	38	68	13	38	125	57
	Funding Rate	76%	89%	76%	91%	100%	93%	66%	84%	87%	59%	92%	88%
	Total $ (Millions)	$3.9	$19.7	$2.8	$10.4	$2.4	$8.3	$4.3	$16	$1.8	$9.3	$18.5	$14
	% of Obligations	.5%	2.6%	.3%	1.2%	.3%	1.1%	.6%	2.1%	.2%	1.2%	2.3%	1.7%
	Average $ (1000s)	$134	$190	$150	$260	$111	$225	$113	$235	$140	$244	$148	$246
CISE	Proposals	37	209	5	257	18	239	16	161	12	166	163	104
	Awards	27	163	5	176	18	129	12	136	4	109	157	100
	Funding Rate	73%	78%	100%	68%	100%	54%	75%	84%	33%	66%	96%	96%
	Total $ (Millions)	$3.3	$27.8	$.8	$33.7	$1.7	$21.5	$.6	$26.6	$.5	$23.2	$18.9	$19.9
	% of Obligations	.4%	3.1%	.1%	3.6%	.2%	2.3%	.1%	2.8%	0%	2.4%	1.9%	2%
	Average $ (1000s)	$121	$170	$168	$192	$92	$167	$51	$195	$118	$213	$121	$199
EHR	Proposals	21	81	27	72	7	54	10	16	3	10	71	28
	Awards	21	45	26	43	7	39	8	15	2	10	56	26
	Funding Rate	100%	56%	96%	60%	100%	72%	80%	94%	67%	100%	79%	93%
	Total $ (Millions)	$2.1	$10.8	$1.5	$8.1	$1.6	$10	$1.3	$3.4	$.4	$2.2	$9	$4.9
	% of Obligations	.2%	1.1%	.1%	.8%	.2%	1%	.1%	.3%	0%	.2%	.9%	.5%
	Average $ (1000s)	$100	$239	$57	$188	$228	$257	$168	$229	$213	$222	$160	$188
ENG	Proposals	41	258	24	273	38	220	42	260	73	130	203	128
	Awards	34	203	21	155	36	176	33	153	38	84	188	108
	Funding Rate	83%	79%	88%	57%	95%	80%	79%	59%	52%	65%	93%	84%
	Total $ (Millions)	$3.3	$33.7	$1.2	$22.7	$2.8	$25.7	$2.2	$30.5	$2.8	$15.3	$24.8	$19.3
	% of Obligations	.4%	3.7%	.1%	2.5%	.3%	2.8%	.2%	3.1%	.3%	1.6%	2.4%	1.9%
	Average $ (1000s)	$97	$166	$56	$146	$78	$146	$66	$199	$74	$182	$132	$179
GEO	Proposals	55	27	45	48	60	54	91	45	76	60	62	88
	Awards	55	26	45	45	57	51	87	41	74	59	61	65
	Funding Rate	100%	96%	100%	94%	95%	94%	96%	91%	97%	98%	98%	74%
	Total $ (Millions)	$3.7	$3.5	$3.5	$5.2	$3	$6.5	$7.3	$6.9	$4.6	$10.5	$5.9	$8.7
	% of Obligations	.3%	.3%	.3%	.4%	.2%	.5%	.5%	.5%	.3%	.6%	.4%	.6%
	Average $ (1000s)	$68	$135	$78	$115	$52	$127	$84	$168	$62	$179	$96	$134
MPS	Proposals	6	21	0	28	1	39	3	79	2	18	75	62
	Awards	6	17	0	27	1	27	2	69	2	18	61	51
	Funding Rate	100%	81%	N/A	96%	100%	69%	67%	87%	100%	100%	81%	82%
	Total $ (Millions)	$.9	$3.5	$0	$6	$.1	$5.8	$.2	$16	$.4	$4.3	$10.1	$11.1
	% of Obligations	.1%	.2%	0%	.4%	0%	.4%	0%	1%	0%	.3%	.6%	.7%
	Average $ (1000s)	$151	$207	N/A	$224	$79	$216	$105	$232	$186	$240	$166	$217

		2015		**2016**		**2017**		**2018**		**2019**		**2020**[‡]	
		RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER	RAPID	EAGER
OIA	Proposals	0	0	0	0	0	0	0	0	0	0	0	0
	Awards	0	0	0	0	0	0	0	0	0	0	0	0
	Funding Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total $ (Millions)	$0.0	$0.6	$0.0	$0.3	$0.0	$0.2	$0.1	$0.5	$0.0	$0.1	$0.0	$0.0
	% of Obligations	0.0%	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%	0.0%	0.0%
	Average $ (1000s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
OISE	Proposals	0	0	0	0	1	0	0	0	0	0	0	0
	Awards	0	0	0	0	1	0	0	0	0	0	0	0
	Funding Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total $ (Millions)	$0.0	$0.0	$0.0	$0.0	$0.2	$0.1	$0.1	$0.0	$0.0	$0.0	$0.0	$0.0
	% of Obligations	0.0%	0.0%	0.0%	0.0%	0.4%	0.2%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%
	Average $ (1000s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
SBE	Proposals	40	30	28	43	36	35	56	24	14	6	234	18
	Awards	35	27	28	32	35	34	36	16	9	5	208	12
	Funding Rate	88%	90%	100%	74%	97%	97%	64%	67%	64%	83%	89%	67%
	Total $ (Millions)	$3.1	$3.4	$2.1	$4.2	$3.2	$5.4	$3.3	$2.5	$1	$1.2*	$28.6	$1.9
	% of Obligations	1.1%	1.3%	.8%	1.5%	1.2%	2%	1.3%	1%	.4%	.9%	10%	.7%
	Average $ (1000s)	$88	$127	$74	$130	$91	$160	$91	$157	$114	$234	$138	$162
OD	Proposals	0	0	1	0	0	0	0	0	0	0	13	17
	Awards	0	0	1	0	0	0	0	0	0	0	13	8
	Funding Rate	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	100%	47%
	Total $ (Millions)	$0	$.6	$.2	$.4	$.1	$.2	$.1	$.5	$0	$.1	$4.3	$6.2
	% of Obligations	0%	.2%	0%	.1%	.1%	.2%	0%	.1%	0%	0%	.7%	1%
	Average $ (1000s)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	$335	$781

Source: NSF Enterprise Information System, 04/27/2021.

** In general, no distinction is made between funds obligated by a directorate to awards managed by that directorate and funds obligated by a directorate as co-funding for awards managed by other directorates. OD obligation totals include co-funding by EPSCoR and the Office of International Science and Engineering.

*The total funding for SBE EAGER awards in FY 2019 is for new awards supported by SBE. It does not include SBE co-funding on 18 awards with CISE and one continuing grant increment in that FY.

‡ OD obligation totals for FY 2020 include the combined totals from OIA and OISE, which are part of OD.

Appendix 8 - Description of Merit Review Principles and Criteria[54]

1. Merit Review Principles

These principles are to be given due diligence by PIs and organizations when preparing proposals and managing projects, by reviewers when reading and evaluating proposals, and by NSF program staff when determining whether or not to recommend proposals for funding and while overseeing awards. Given that NSF is the primary Federal agency charged with nurturing and supporting excellence in basic research and education, the following three principles apply:

- All NSF projects should be of the highest quality and have the potential to advance, if not transform, the frontiers of knowledge.
- NSF projects, in the aggregate, should contribute more broadly to achieving societal goals. These broader impacts may be accomplished through the research itself, through activities that are directly related to specific research projects, or through activities that are supported by, but are complementary to, the project. The project activities may be based on previously established and/or innovative methods and approaches, but in either case must be well justified.
- Meaningful assessment and evaluation of NSF funded projects should be based on appropriate metrics, keeping in mind the likely correlation between the effect of broader impacts and the resources provided to implement projects. If the size of the activity is limited, evaluation of that activity in isolation is not likely to be meaningful. Thus, assessing the effectiveness of these activities may best be done at a higher, more aggregated, level than the individual project.

With respect to the third principle, even if assessment of Broader Impacts outcomes for particular projects is done at an aggregated level, PIs are expected to be accountable for carrying out the activities described in the funded project. Thus, individual projects should include clearly stated goals, specific descriptions of the activities that the PI intends to do, and [have] a plan in place to document the outputs of those activities.

These three merit review principles provide the basis for the merit review criteria, as well as a context within which the users of the criteria can better understand their intent.

2. Merit Review Criteria

All NSF proposals are evaluated through [the] use of two National Science Board-approved merit review criteria. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two merit review criteria are listed below. Both criteria are to be given full consideration during the review and decision-making processes; each criterion is necessary but neither, by itself, is sufficient. Therefore, proposers must fully address both criteria. PAPPG Chapter II.C.2.d.(i) contains additional information for use by proposers in development of the Project

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[54] From NSF *Proposal and Award Policies and Procedures Guide*, http://www.nsf.gov/pubs/policydocs/pappguide/nsf13001/gpg_index.jsp. Effective from January 14, 2013.

Description section of the proposal. Reviewers are strongly encouraged to familiarize themselves with the criteria, including PAPPG Chapter II.C.2.d.(i), prior to the review of a proposal.

When evaluating NSF proposals, reviewers will be asked to consider what the proposers want to do, why they want to do it, how they plan to do it, how they will know if they succeed, and what benefits could accrue if the project is successful. These issues apply both to the technical aspects of the proposal and the way in which the project may make broader contributions. To that end, reviewers will be asked to evaluate all proposals against two criteria:

- **Intellectual Merit:** The Intellectual Merit criterion encompasses the potential to advance knowledge; and
- **Broader Impacts:** The Broader Impacts criterion encompasses the potential to benefit society and contribute to the achievement of specific, desired societal outcomes.

The following elements should be considered in the review for both criteria:

1. What is the potential for the proposed activity to:
   a. Advance knowledge and understanding within its own field or across different fields (Intellectual Merit); and
   b. Benefit society or advance desired societal outcomes (Broader Impacts)?
2. To what extent do the proposed activities suggest and explore creative, original, or potentially transformative concepts?
3. Is the plan for carrying out the proposed activities well-reasoned, well organized, and based on a sound rationale? Does the plan incorporate a mechanism to assess success?
4. How well qualified is the individual, team, or organization to conduct the proposed activities?
5. Are there adequate resources available to the PI (either at the home organization or through collaborations) to carry out the proposed activities?

Appendix 9 - Preliminary Proposals

Several NSF programs utilize preliminary proposals to reduce the workload of PIs and to increase the quality of full proposals. The number of preliminary proposals varies considerably as a result of competitions being held in a given fiscal year. For some programs, preliminary proposals are externally reviewed; other programs provide internal review only.

Decisions regarding preliminary proposals may be non-binding or binding. Non-binding decisions regarding preliminary proposals are recommendations; a PI may choose to submit a full proposal even if it has been discouraged. Binding decisions, however, are restrictive in that full proposals are accepted only from the preliminary proposal PIs invited to submit them. In general, programs obtain advice from external peer reviewers before making binding decisions about preliminary proposals.

Table 9.1 - Number of Preliminary Proposals and Subsequent Actions

Fiscal Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Total # Preliminary Proposals	965	5,135	4,691	4,911	4,251	4,584	4,564	771	1,972	1,265
Non-Binding (NB) Total*	357	459	457	92	1	239	602	447	299	79
NB Encouraged	128	222	296	29	0	122	268	312	228	37
NB Discouraged	229	237	161	63	1	117	334	135	71	42
Binding Total*	572	4,484	4,087	4,761	4,199	4,281	3,895	322	1,653	1,186
Binding Invite	245	1,236	942	1,083	1,045	1,124	1,172	100	467	342
Binding Non-invite	327	3,248	3,145	3,678	3,154	3,157	2,723	222	1,186	844

*Non-binding and binding totals do not include preliminary proposals that have been withdrawn or returned without review or deleted for another administrative reason.

Source: NSF Report Server, 4/27/21.

In FY 2012, the Directorate for Biological Sciences instituted a new requirement that PIs who wished to submit full proposals to the Divisions of Environmental Biology and Integrative Organismal Systems, in response to core program solicitations, the Research at Undergraduate Institutions solicitation, or the Long-term Research in Environmental Biology solicitation, must first submit a preliminary proposal. This pilot was terminated through the issuance of a Dear Colleague Letter (NSF 18-011) on October 5, 2017, as part of the Directorate for Biological Sciences' transition to a no-deadline submission process beginning in summer 2018.

Appendix 10 - Mean Number of Reviews per Proposal

Table 10.1 – Mean Number of Reviews per Proposal, by Method and Directorate or Office

		Methods of Review						
		All Methods	**Ad Hoc + Panel**	**Ad Hoc Only**	**Panel Only**	**Internally Reviewed**[*]	**Returned without Review**	**Withdrawn Proposals**
NSF	Reviews	160,191	44,983	10,749	104,459			
	Proposals	40,182	9,442	2,806	27,934	2,541	765	263
	Rev/Prop	4	4.8	3.8	3.7			
BIO	Reviews	15,540	9,226	362	5,952			
	Proposals	3,478	1,793	91	1,594	305	44	32
	Rev/Prop	4.5	5.1	4	3.7			
CISE	Reviews	31,779	2,886	380	28,513			
	Proposals	7,522	578	108	6,836	410	113	85
	Rev/Prop	4.2	5	3.5	4.2			
EHR	Reviews	17,470	1,103	582	15,785			
	Proposals	4,171	250	167	3,754	166	151	2
	Rev/Prop	4.2	4.4	3.5	4.2			
ENG	Reviews	31,495	3,039	1,985	26,471			
	Proposals	8,546	651	587	7,308	635	201	17
	Rev/Prop	3.7	4.7	3.4	3.6			
GEO	Reviews	15,291	10,390	2,748	2,153			
	Proposals	3,482	2,228	663	591	239	25	17
	Rev/Prop	4.4	4.7	4.1	3.6			
MPS	Reviews	29,023	6,518	3,595	18,910			
	Proposals	8,250	1,500	871	5,879	362	92	82
	Rev/Prop	3.5	4.3	4.1	3.2			
OIA	Reviews	1,527	813	47	667			
	Proposals	396	184	16	196	86	19	3
	Rev/Prop	3.9	4.4	2.9	3.4			
OISE	Reviews	1,686	717		969			
	Proposals	426	157		269	2	12	4
	Rev/Prop	4	4.6		3.6			
SBE	Reviews	16,380	10,291	1,050	5,039			
	Proposals	3,911	2,101	303	1,507	336	108	21
	Rev/Prop	4.2	4.9	3.5	3.3			

Source: NSF Enterprise Information System, 4/27/21.

[*] The proposal totals shown in the "All Methods" category do not include the proposals shown in the "Internally Reviewed" category. Proposals which are not externally reviewed typically include RAPIDs, EAGERs, RAISE proposals, and small grants for travel and symposia.

The "Internally Reviewed" category includes award and decline actions for proposals that were reviewed by NSF experts in the relevant topical areas but did not receive external reviews, while the "Returned without Review" and "Withdrawn Proposals" categories reflect proposals that were neither awarded nor declined.

Withdrawn proposals include only those that underwent merit review.

The reviews of an individual participating as both an ad hoc reviewer and a panel reviewer for the same proposal are counted as one review in this table.

Appendix 12 - Methods of NSF Proposal Review

Table 12.1 – Methods of NSF Proposal Review by Directorate or Office

Directorate	[55]Total Proposals	Ad Hoc + Panel		Ad Hoc Only		Panel Only		Internally Reviewed	
		Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
NSF	42,723	9,442	22%	2,806	7%	27,934	65%	2,541	6%
BIO	3,783	1,793	47%	91	2%	1,594	42%	305	8%
CISE	7,932	578	7%	108	1%	6,836	86%	410	5%
EHR	4,337	250	6%	167	4%	3,754	87%	166	4%
ENG[56]	9,181	651	7%	587	6%	7,308	80%	635	7%
GEO	3,721	2,228	60%	663	18%	591	16%	239	6%
MPS	8,612	1,500	17%	871	10%	5,879	68%	362	4%
OIA	482	184	38%	16	3%	196	41%	86	18%
OISE	428	157	37%	0	0%	269	63%	2	0%
SBE	4,247	2,101	49%	303	7%	1,507	35%	336	8%

Source: NSF Enterprise Information System, 4/27/21.

Totals in this column do not necessarily match those in the FY 2020 column of **Table 3.1**. The differences, if any, reflect the small number of situations in which a proposal was managed by one organization, but reviewed by a panel associated with a different Directorate.

[56] This total includes Small Business Innovation Research Program and Small Business Technology Transfer Program proposals.

Appendix 13 - Acronyms

Acronym   **Definition**

ACI   Division of Advanced Cyberinfrastructure
ARRA   American Recovery and Reinvestment Act
BFA   Office of Budget, Finance and Award Management
BIO   Directorate for Biological Sciences
CGI   Continuing Grant Increment
CISE   Directorate for Computer and Information Science and Engineering
COV   Committee of Visitors
DD   Division Director
EAGER   EArly-concept Grants for Exploratory Research
EHR   Directorate for Education and Human Resources
ENG   Directorate for Engineering
EPSCoR   Established Program to Stimulate Competitive Research
FY   Fiscal Year (October 1 – September 30)
GDP   Gross Domestic Product
GEO   Directorate for Geosciences
INSPIRE   Integrated NSF Support Promoting Interdisciplinary Research and Education
IPAs   Temporary employees hired through the Intergovernmental Personnel Act
K-12   Kindergarten to 12th grade
MPI   Multiple PI
MPS   Directorate for Mathematical and Physical Sciences
MSI   Minority-Serving Institution
NSB   National Science Board
NSF   National Science Foundation
OAC   Office of Advanced Cyberinfrastructure
OCI   Office of Cyberinfrastructure
OD   Office of the Director
ODD   Office of the Deputy Director
OIA   Office of Integrative Activities
OIIA   Office of International and Integrative Activities
OISE   Office of International Science and Engineering
OPP   Office of Polar Programs
PAPPG   Proposal and Award Policies and Procedures Guide
PARS   Proposal, PI, and Reviewer System
PI   Principal Investigator
PLR   Division of Polar Programs
PWD   PI (or Person) With a Disability
RAISE   Research Advanced by Interdisciplinary Science and Engineering
RAPID   Grants for Rapid Response Research
RWR   Return Without Review

SBE	Directorate for Social, Behavioral and Economic Sciences
SBIR	Small Business Innovative Research
SGER	Small Grants for Exploratory Research
SPI	Single PI
STEM	Science, Technology, Engineering and Mathematics
URM	Underrepresented Minority
US	United States
VSEE	Visiting Scientists, Engineers and Educators