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The National Science Foundation: FY2018 Appropriations and Funding History

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Summary

The National Science Foundation (NSF) supports basic research and education in the non-medical sciences and engineering. NSF is a major source of federal support for U.S. university research, especially in certain fields such as computer science. It is also responsible for significant shares of the federal science, technology, engineering, and mathematics (STEM) education program portfolio and federal STEM student aid and support.

Overall, the Trump Administration is seeking $6.653 billion for NSF in FY2018, an $819 million decrease (-11%) from the FY2017 enacted level of $7.472 billion. NSF has six appropriations accounts: Research and Related Activities (RRA), Education and Human Resources (EHR), Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), National Science Board (NSB), and Office of Inspector General (OIG). The FY2018 request would decrease total budget authority primarily in three accounts relative to FY2017 enacted funding: RRA by $672 million (-11%), EHR by $119 million (-14%), and MREFC by $26 million (-12%). The request would provide slight decreases to AOAM ($1.5 million decrease, -0.5%) and OIG ($200,000 decrease, -1.3%), and no change for NSB.

As reported by the House Committee on Appropriations, H.R. 3267 would provide a total of $7.340 billion to NSF for FY2018. This amount is $133 million below (-1.8%) the FY2017 enacted funding level and $687 million (10.3%) above President Trump's FY2018 request. The bill would keep funding for the RRA, EHR, NSB, and OIG accounts the same as the FY2017 enacted amounts and decrease the MREFC and AOAM accounts by $131 million (-62.8%) and $1.5 million (-0.5%), respectively. The text of H.R. 3267 was incorporated into the omnibus appropriations bill, the Make America Secure and Prosperous Appropriations Act, 2018 (H.R. 3354, Division C), and passed, as amended, by the House on September 14, 2017. H.R. 3354 would provide the same total funding amounts for NSF accounts as provided in H.R. 3267.

As reported by the Senate Committee on Appropriations, S. 1662 would provide a total of $7.311 billion to NSF for FY2018. This amount is $161 million below (-2.2%) the FY2017 enacted funding level, and $658 million above (9.9%) President Trump's FY2018 funding request. Compared to the FY2017 enacted level, this bill would keep funding for the NSB and OIG accounts the same and decrease funding for four accounts: RRA by $116 million (-1.9%), MREFC by $26.2 million (-12.5%), EHR by $17.6 million (-2%), and AOAM by $1.5 million (-0.5%).

The Continuing Appropriations Act, 2018 (P.L. 115-56, Division D), signed by the President on September 8, 2017, provided funding for NSF through December 8, 2017, at the FY2017 level, subject to a 0.6791% across-the-board decrease. The Further Continuing Appropriations Act, 2018 (P.L. 115-90, Division A) amends P.L. 115-56 to extend funding through December 22, 2017.

Overall growth in the NSF budget has slowed since FY2003. Average annual growth in NSF appropriations was 8% between FY1997 and FY2003, 4% from FY2004 to FY2010, and 1% between FY2011 and FY2017. Among NSF's appropriations accounts, RRA has accounted for the lion's share of growth in obligations since FY2003. Agency appropriations levels were last authorized in FY2010 and expired in FY2013. Various reauthorization measures were introduced in the 114th Congress that included proposed funding levels; none were enacted. In the 115th Congress, the American Innovation Act (H.R. 1569 and S. 641), introduced as companion bills in March 2017, would authorize increasing appropriations for NSF through FY2021 and adjust the discretionary spending limits to accommodate those increases.

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Introduction

The National Science Foundation (NSF) supports basic research and education in the non-medical sciences and engineering. Congress established the foundation through the National Science Foundation Act of 1950 to "promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and for other purposes." The NSF is a major source of federal support for U.S. university research, especially in certain fields such as computer science. It is also responsible for significant shares of the federal science, technology, engineering, and mathematics (STEM) education program portfolio and federal STEM student aid and support.

This report describes selected items from the Trump Administration's FY2018 budget request for NSF and tracks legislative action on FY2018 appropriations to the agency.[1] It also details selected measures proposed in the 115th Congress to authorize increases in NSF appropriations limits and presents information on historical funding for the agency.

NSF has six appropriations accounts: Research and Related Activities (RRA), Education and Human Resources (EHR), Major Research Equipment and Facilities Construction (MREFC), Agency Operations and Award Management (AOAM), National Science Board (NSB), and the Office of the Inspector General (OIG). Appropriations are generally provided at the account level; program-specific direction may be included in appropriations acts or in accompanying conference reports or explanatory statements. At times, authorizations and appropriations have been specified at the RRA subaccount level, and NSF's budget justifications detail activities and obligations at that level.[2] The majority of NSF's primary mission activities are funded through RRA, EHR, and MREFC. NSF adopted its current appropriations account structure in FY2003. In general, NSF's accounts have been comparable since then.[3]

For FY2017, the Consolidated Appropriations Act, 2017 (P.L. 115-31), signed by the President on May 5, 2017, provided appropriations at the account level. Congress also directed funding for a subset of programs within the RRA, EHR, and MREFC accounts in the accompanying explanatory statement.[4] In this report, because NSF states that FY2017 amounts were not available when the FY2018 budget request was prepared, requested funding at the account level (and program-specific funding, where directed by Congress) is compared to FY2017 enacted funding. In contrast, requested funding at the subaccount level is generally compared to FY2016 actual levels.[5]

[1] Appropriations to NSF are typically included in annual Commerce, Justice, Science and Related Agencies Appropriations Acts. The Congressional Research Service tracks these acts on CRS.gov, at http://www.crs.gov/AppropriationsStatusTable/index.

[2] NSF's budget justifications are published on the agency's website at http://www.nsf.gov/about/budget/.

[3] In FY2008, NSF shifted the EPSCoR program from the Education and Human Resources (EHR) account to the Research and Related Activities (RRA) account. For more information on EPSCoR, see CRS Report R44689, *Established Program to Stimulate Competitive Research (EPSCoR): Background and Selected Issues*, by Laurie A. Harris.

[4] Explanatory Statement, Consolidated Appropriations Act, 2017, Division B (Commerce, Justice, Science, and Related Agencies Appropriations Act, 2017), *Congressional Record*, vol. 163, no. 76—Book II (May 3, 2017), p. H3375.

[5] Long-term, multi-year construction projects supported through the MREFC account are an exception, as NSF is able to provide FY2017 estimated funding amounts for these projects.

FY2018 Budget and Appropriations Actions

The Trump Administration is seeking $6.653 billion for NSF in FY2018, an $819 million decrease (-11%) from the FY2017 enacted level of $7.472 billion (see **Table 1**).The request would decrease budget authority primarily in three accounts relative to the FY2017 enacted levels: RRA by $672 million (-11.1%), EHR by $119 million (-13.6%), and MREFC by $26.2 million (-12.5%). The request would provide slight decreases to the AOAM ($1.5 million decrease, -0.5%) and OIG ($200,000 decrease, -1.3%) accounts. The NSB account would receive $4.4 million, the same amount as in FY2017.

As reported by the House Committee on Appropriations on July 17, 2107, H.R. 3267, the Commerce, Justice, Science, and Related Agencies Appropriations Act, 2018, would provide a total of $7.340 billion to NSF for FY2018. This would be a decrease of $133 million (-1.8%) from the FY2017 enacted funding level and an increase of $687 million (10.3%) over President Trump's FY2018 request. The bill would keep funding for the RRA, EHR, NSB, and OIG accounts the same as the FY2017 enacted amounts, and decrease the MREFC and AOAM accounts by $131 million (-62.8%) and $1.5 million (-0.5%), respectively.[6] The text of H.R. 3267 was incorporated as Division C into the omnibus appropriations bill, the Make America Secure and Prosperous Appropriations Act, 2018 (H.R. 3354), and passed, as amended, by the House on September 14, 2017. H.R. 3354 would provide the same total funding amounts for NSF accounts as provided in H.R. 3267.[7]

As reported by the Senate Committee on Appropriations on July 27, 2017, S. 1662, the Commerce, Justice, Science, and Related Agencies Appropriations Act, 2018, would provide a total of $7.311 billion to NSF for FY2018. This would be a decrease of $161 million (-2.2%) from the FY2017 enacted funding level and $658 million (9.9%) over President Trump's FY2018 funding request. Compared to the FY2017 enacted level, this bill would keep funding for the NSB and OIG accounts the same and decrease funding for four accounts: RRA by $116 million (-1.9%), MREFC by $26.2 million (-12.5%), EHR by $17.6 million (-2%), and AOAM by $1.5 million (-0.5%).[8]

The Continuing Appropriations Act, 2018 (P.L. 115-56, Division D), signed by the President on September 8, 2017, provided funding for NSF at the FY2017 level through December 8, 2017, subject to a 0.6791% across-the-board decrease. The Further Continuing Appropriations Act, 2018 (P.L. 115-90, Division A) amends P.L. 115-56 to extend funding through December 22, 2017.

The FY2018 NSF budget justification highlights many of the same programs as in FY2016 and FY2017. Specifically, NSF identifies seven ongoing agency-wide investments that aim to bring researchers from different fields of science and engineering together to address cross-disciplinary questions. Compared to the FY2016 actual amounts, a slight increase in funding is requested for one of these initiatives—the Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES, $15 million requested,

[6] U.S. Congress, House Committee on Appropriations, *Commerce, Justice, Science, and Related Agencies Appropriations Bill, 2018*, report to accompany H.R. 3267, 115th Cong., 1st sess., July 17, 2017, H.Rept. 115-231 (Washington: GPO, 2017), pp. 68-72.

[7] H.Amdt. 382 to H.R. 3354, agreed to by voice vote in the House, aims to shift funding for certain research areas within amounts provided to the RRA account. The amendment is discussed in the "Research and Related Activities (RRA)" section of this report.

[8] U.S. Congress, Senate Committee on Appropriations, *Departments of Commerce and Justice, Science, and Related Agencies Appropriations Bill, 2018*, report to accompany S. 1662, 115th Cong., 1st sess., July 27, 2017, S.Rept. 115-139 (Washington: GPO, 2017), pp. 114-121.

+6.5%). Decreases of between 12% and 70% from FY2016 actual amounts are requested for the remaining six investments. These include:

- Cyber-Enabled Materials, Manufacturing, and Smart Systems (CEMMSS, $222 million requested, -18%);
- Innovations at the Nexus of Food, Energy, and Water Systems (INFEWS, $24 million requested, -70%);
- Innovation Corps (I-Corps, $26 million requested, -12%);
- Risk and Resilience ($31 million requested, -27%);
- Secure and Trustworthy Cyberspace (SaTC, $114 million requested, -12%); and
- Understanding the Brain (UtB), $134 million requested, -22%).

The committee reports to accompany H.R. 3267 (H.Rept. 115-231) and S. 1662 (S.Rept. 115-139) provide direction for one of these programs, recommending no less than the FY2017 level ($30 million) for I-Corps.

NSF's budget request reports that three additional multi-directorate programs highlighted in prior years are ending in FY2017. The Cyberinfrastructure Framework for 21st Century Science, Engineering, and Education (CIF21) program is sunsetting, though some of the program's activities will be incorporated into NSF's work on the National Strategic Computing Initiative (NSCI) and the Harnessing the Data Revolution Big Idea. The Research at the Interface of Biological, Mathematical, and Physical Sciences (BioMaPS) program is ending "as it has achieved its goal, leading to a cultural change within NSF cross-directorate collaboration [among the participating directorates] having become standard practice." Though funding is concluding for the Science, Engineering, and Education for Sustainability (SEES) program, NSF plans to continue investing in "research necessary for a sustainable human future" through other programs, such as the Risk and Resilience and INFEWS programs.[9]

The budget request also highlights NSF's 10 "Big Ideas," introduced by the agency in 2016 as long-term research and process ideas that identify areas for future investment. The budget request includes various activities related to these ideas, though specific funding is requested only for the INCLUDES program ($14.9 million). Research ideas include:

- Harnessing the Data Revolution;
- Work at the Human Technology Frontier: Shaping the Future;
- Windows on the Universe: The Era of Multi-messenger Astrophysics;
- The Quantum Leap: Leading the Next Quantum Revolution;
- Understanding the Rules of Life: Predicting Phenotype; and
- Navigating the New Arctic.

Process ideas include:

- Mid-scale Research Infrastructure;
- NSF 2026: Seeding Innovation;

[9] National Science Foundation, *FY2018 Budget Request to Congress*, May 23, 2017, p. Performance-36. NSF announced $18.7 million in FY2017 awards through the Risk and Resilience program; see the NSF press release, "In Wake of Hurricanes, Floods and Wildfires, NSF Awards $18.7 Million in Natural Hazards Research Grants," September 12, 2017, at https://www.nsf.gov/news/news_summ.jsp?cntn_id=242941.

- NSF INCLUDES; and
- Growing Convergent Research at NSF.[10]

The committee reports do not specify funding for the Big Ideas. Broadly, both reports express support for such topics as scientific infrastructure investments, astronomy facilities, cybersecurity research, and broadening participation of underrepresented groups in STEM. The reports also encourage NSF to explore partnerships with the private sector in supporting various facilities, equipment, and programs.

Table 1. NSF Funding by Account, FY2016-FY2018

(budget authority in millions of dollars)

			FY2018			
Account	**FY2016 Actual**	**FY2017 Enacted**	**Request**	**House Committee-Reported**	**Senate Committee-Reported**	**Enacted**
Research and Related Activities (RRA)	$5,998.1	$6,033.6	$5,361.6	$6,033.6	$5,917.8	
Education and Human Resources (EHR)	884.1	880.0	760.6	880.0	862.4	
Major Research Equipment and Facilities Construction (MREFC)	241.5	209.0	182.8	77.8	182.8	
Agency Operations and Award Management (AOAM)	351.1	330.0	328.5	328.5	328.5	
National Science Board (NSB)	4.3	4.4	4.4	4.4	4.4	
Office of the Inspector General (OIG)	14.8	15.2	15.0	15.2	15.2	
NSF, Total	**$7,493.9**	**$7,472.2**	**$6,652.9**	**$7,339.5**	**$7,311.1**	

Source: FY2018 *NSF Budget Request to Congress*; H.R. 3267 as reported by the House Committee on Appropriations on July 17, 2017, and H.Rept. 115-231; H.R. 3354 as passed by the House of Representatives on September 14, 2017; S. 1662, as reported by the Senate Committee on Appropriations on July 27, 2017, and S.Rept. 115-139.

Notes: Totals may not add due to rounding.

Research and Related Activities (RRA)

The Trump Administration is seeking $5.362 billion for RRA in FY2018, a $627 million decrease (-11%) compared to FY2017 enacted funding. Compared to FY2016 actual levels, the FY2018 request includes decreases for all 10 of the RRA subaccounts except for the U.S. Arctic Research Commission (USARC), which would not change (see **Table 2**). The largest decrease in dollars would go to Mathematical and Physical Sciences (MPS, $129 million decrease, -9.6%), and the largest percentage decrease would go to Integrative Activities (IA, $111 million decrease, -26%).

[10] National Science Foundation, *FY2018 Budget Request to Congress*, May 23, 2017, p. Overview-3. See also National Science Foundation, "10 Big Ideas for Future NSF Investments," at https://www.nsf.gov/about/congress/reports/nsf_big_ideas.pdf.

The other subaccounts would receive decreases between 7.1% and 10.6%. The FY2018 request also includes $100 million for the RRA program Established Program to Stimulate Competitive Research (EPSCoR), a decrease of $60 million (-37.5%) from the $160 million directed in the explanatory statement for FY2017 enacted funding.

The House and Senate bills would both provide funding for RRA and EPSCoR at the same, or slightly below, FY2017 enacted funding levels. As reported by the House Committee on Appropriations, H.R. 3267 would provide a total of $6.034 billion for RRA, equal to the FY2017 enacted level. The House committee report states:

> The Committee does not adopt the Administration's proposal to reduce Research and Related Activities. The Committee believes that strategic investments in the physical science areas are vitally important for the United States to remain the global leader in innovation, productivity, economic growth, and good-paying jobs for the future.[11]

As reported by the Senate Committee on Appropriations, S. 1662 would provide a total of $5.918 billion for RRA, a decrease of $115.8 million (-1.9%) from the FY2017 enacted level.

For EPSCoR, the House committee report recommends $170.7 million, $70.7 million (71%) more than the FY2018 request and $10.7 million (7%) above the FY2017 enacted level. The Senate committee report recommends no less than $160 million for EPSCoR, equal to the FY2017 level, and directs NSF to make efforts to ensure that no more than 5% of program funding is used for administrative and overhead costs.

Neither report specifies funding amounts at the RRA subaccount levels, a practice that has been a point of congressional debate in prior years, though the reports do specify funding levels for certain divisions and programs within RRA directorates. The House report directs the Division of Astronomical Sciences, located in the Directorate for Mathematical and Physical Sciences, to support programs and scientific facilities at no less than the FY2017 levels. Additionally, the House committee report directs $48 million (the requested amount) for the International Ocean Discovery Program, within the Geosciences Directorate. Further, H.Amdt. 382 to Division C of the omnibus appropriations bill (H.R. 3354), agreed to by voice vote in the House, supports physical science funding. While not changing the total funding amount for the RRA account, the amendment's purpose is to "increase physical and biological science research by one-half of one percent, or $30.2 million, over the current funding within [RRA]. Total spending is not increased, as NSF will adjust other areas of spending accordingly."[12]

As in FY2017, Senate committee report language for FY2018 specifies funding levels for the Historically Black Colleges and Universities Excellence in Research program ($10 million) and the Advancement of Women in Academic Science and Engineering Careers program (ADVANCE, $18 million). The House and Senate committee reports both contain language supporting the inclusion of national security and economic competitiveness criteria as part of the merit review processes for research grant proposals. Both reports also encourage NSF to examine its funding portfolio to ensure adequate support of fire research.

[11] H.Rept. 115-231, p. 69.

[12] Remarks by Rep. Lamar Smith during House debate, *Congressional Record*, daily edition, vol. 163, no. 147 (September 12, 2017), p. H7257.

Table 2. NSF Funding by RRA Subaccount, FY2016-FY2018

(budget authority in millions of dollars)

			FY2018			
Account	**FY2016 Actual**	**FY2017 Enacted**	**Request**	**House Committee-Reported**	**Senate Committee-Reported**	**Enacted**
Biological Sciences (BIO)	$723.8	n/s	$672.1	n/s	n/s	
Computer and Information Science and Engineering (CISE)	935.2	n/s	838.9	n/s	n/s	
Engineering (ENG)	915.7	n/s	833.5	n/s	n/s	
Geosciences (GEO)	876.5	n/s	783.3	n/s	n/s	
Mathematical and Physical Sciences (MPS)	1348.8	n/s	1219.4	n/s	n/s	
Social, Behavioral, and Economic Sciences (SBE)	272.2	n/s	244.0	n/s	n/s	
Office of International Science and Engineering (OISE)	49.1	n/s	44.0	n/s	n/s	
Office of Polar Programs (OPP)	448.9	n/s	409.2	n/s	n/s	
International and Integrative Activities (IIA)	246.6	n/s	315.7	n/s	n/s	
U.S. Arctic Research Commission (USARC)	1.4	n/s	1.4	n/s	n/s	
Research and Related Activities (RRA), Total	**$5,998.1**	**$6,033.6**	**$5,361.6**	**$6,079.4**	**$6,033.6**	

Source: FY2018 *NSF Budget Request to Congress*; H.R. 3267 as reported by the House Committee on Appropriations on July 17, 2017, and H.Rept. 115-231; H.R. 3354 as passed by the House of Representatives on September 14, 2017; S. 1662, as reported by the Senate Committee on Appropriations on July 27, 2017, and S.Rept. 115-139.

Notes: The term "n/s" means "not specified." Totals may not add due to rounding.

Education and Human Resources (EHR)

The FY2018 budget request includes $761 million for EHR, a $119 million decrease (-13.6%) from the FY2016 estimate. This represents the largest percentage reduction requested among NSF's appropriations accounts. As reported by the House Committee on Appropriations, H.R. 3267 would provide $880 million for EHR, equal to the FY2017 enacted level and $119.4 million (16%) above the FY2018 request. As reported by the Senate Committee on Appropriations, S. 1662 would provide $862.4 million for EHR, a decrease of $17.6 million (-2%) from the FY2017 enacted level and $101.8 million (13.4%) above the FY2018 request.

Within EHR, there are four divisions: Division of Graduate Education (DGE), Division of Undergraduate Education (DUE), Division of Human Resource Development (HRD), and Division of Research on Learning in Formal and Informal Settings (DRL). By program division, the largest decrease in the FY2018 request is for DGE ($57 million decrease, -20.5%), which would receive $221 million. HRD, DRL, and DUE would receive decreases of 9.4% ($200

million requested), 11% ($135 million requested), and 12% ($204 million requested), respectively.

Programs of particular interest to congressional policymakers within EHR include the Graduate Research Fellowship (GRF) and those with a focus or emphasis on broadening participation among underrepresented minorities in STEM.[13] The FY2018 request for GRF is $246 million, a reduction of $86 million (-26%) from the FY2016 actual level. The requested amount would support 1,000 new fellows, a reduction from the 2,000 new fellows supported through the GRF each year since 2011.[14] Across EHR divisions, NSF's FY2018 budget justification classifies programs as one of three core research areas (also called themes): learning and learning environments, broadening participation and institutional capacity, and STEM professional workforce.[15] Total requested funding for EHR programs as part of the broadening participation and institutional capacity theme for FY2018 is $196 million, $12 million less (-5.7%) than in FY2016. Specifically, the budget request includes:

- Advancing Informal STEM Learning (AISL, $62.5 million requested, no change from the FY2016 amount);
- Science, Technology, Engineering, and Mathematics + Computing Partnerships (STEM+C, $20 million requested, -61.4%);
- Historically Black Colleges and Universities Undergraduate Program (HBCU-UP, $35 million requested, no change);
- Tribal Colleges and University Programs (TCUP, $13 million requested, -7.1%);
- Louis Stokes Alliance for Minority Participation (LSAMP, $41 million requested, -10.9%); and
- Improving Undergraduate STEM Learning: Hispanic Serving Institutions program (IUSE: HSI, $15 million requested, no change).[16]

The House and Senate committee reports recommend $35 million for the HBCU-UP program, $14 million for the TCUP program, $46 million for the LSAMP program, and $15 million for the HSI program. The Senate committee report also recommends $62.5 million for AISL and $52 million for STEM+C, equal to FY2016 funding levels. The Senate committee report further states:

> The Committee does not adopt the proposed funding reductions for the NSF Scholarships in STEM, Robert Noyce Scholarship Program, or the Graduate Research Fellowship and instead provides the fiscal year 2017 funding level for these programs.[17]

[13] While NSF includes broadening participation as a review criterion for all funding proposals, certain program solicitations and announcements include additional, specific requirements or encouraging language. NSF categorizes these programs as part of its "broadening participation portfolio," within which programs are classified as focused programs, emphasis programs, or geographic diversity programs. See NSF's budget justification, p. Summary Tables-11, for more information.

[14] In addition to new fellows, funding would continue for an estimated 5,000 active fellows.

[15] For additional information on this categorization structure for EHR programs, see NSF Federal Advisory Committee for Education and Human Resources, *Strategic Re-envisioning for the Education and Human Resources Directorate*, May 1, 2014, at http://www.nsf.gov/ehr/Pubs/AC_ReEnvisioning_Report_Sept_2014_01.pdf.

[16] The explanatory statement accompanying the Consolidated Appropriation Act, 2017 (P.L. 115-31) directed NSF to provide at least $15 million to establish an HSI program. For FY2018, NSF is requesting $15 million for HSIs through the IUSE program with program support from DUE and HRD (see NSF's budget justification, p. EHR-6).

[17] S.Rept. 115-139, p. 118.

NSF's budget justification states that "overall, there are no significant shifts in EHR's priorities between FY2016 and FY2018." One of the ongoing EHR priority programs is CyberCorps: Scholarships for Service, for which NSF requests $40 million, $10 million below (-27%) the FY2017 directed level. The Senate committee report recommends $55 million for this program (10% increase); the House committee report does not specify an amount.

Major Research Equipment and Facilities Construction (MREFC)

The Major Research Equipment and Facilities Construction (MREFC) account supports large construction projects and scientific instruments.[18] The Trump Administration is seeking just over $183 million for MREFC in FY2018, a decrease of $26 million (-12.5%) from the FY2017 enacted amount. Requested MREFC funding would support three main projects, including continued construction of the Large Synoptic Survey Telescope (LSST, $58 million requested, -13.6% compared to the FY2017 estimate) and the Daniel K. Inouye Solar Telescope (DKIST, $20 million requested, no change). Most of the request ($105 million) would fund the Regional Class Research Vessels (RCRV) program to build ships to support science in U.S. coastal waters. The FY2018 request—prepared in advance of final FY2017 appropriations action by Congress—included support for two ships. Subsequently, in the Consolidated Appropriations Act, 2017, Congress directed NSF to provide $122 million to build three RCRVs. This amounts to $41 million per ship, compared to the FY2018 request of $52.5 million per ship. The budget request notes that the direction from Congress for three RCRVs will impact current and future funding requirements at unspecified amounts.

As reported by the House Committee on Appropriations, H.R. 3267 would provide a total of $77.8 million for MREFC in FY2018, $131 million below (-63%) the FY2017 enacted level, and $105 million below (-57%) the FY2018 request. The House committee report directs $57.8 million for LSST and $20 million for DKIST; no funding is recommended for RCRVs. As reported by the Senate Committee on Appropriations, S. 1662 would provide a total of $182.8 million for MREFC in FY2018, $26.2 million below (-12.5%) the FY2017 enacted level, and equal to the FY2018 request. The recommended amount includes funding at the requested levels for DKIST and LSST, and directs planning and construction of three RCRVs. The Senate committee report also encourages the Government Accountability Office (GAO) to "continue its annual review of programs funded within MREFC so that GAO can report to Congress shortly after each annual budget submission and semiannually thereafter on the status of large-scale NSF projects and activities."

Other Accounts and Initiatives

The Trump Administration seeks $328.5 million for the Agency Operations and Award Management (AOAM) account, a $1.5 million decrease (-0.5%) from FY2017 enacted funding. In recent years, AOAM funding has included support for relocation activities of NSF's headquarters from Arlington, VA, to Alexandria, VA. NSF is requesting $1 million in FY2018 for decommissioning the prior headquarters buildings and any unanticipated changes. Both the House and Senate bills recommend the requested amount for AOAM.

[18] MREFC funding supports the acquisition, construction, and commissioning phases of major research infrastructure. The RRA account provides funding for the initial planning and design, as well as post-construction operations and maintenance.

The budget request includes $15 million for the Office of Inspector General (OIG), which is a decrease of $200,000 (-1.3%) from the FY2017 enacted level, and $4.4 million for the National Science Board (NSB, no change). The House and Senate bills would both provide funding equal to the FY2017 enacted amounts.

The FY2018 request highlighted funding for NSF activities under three multi-agency initiatives:[19]

- National Nanotechnology Initiative (NNI, $389 million requested, a decrease of $122 million [-24%] from FY2016),[20]
- Networking and Information Technology Research and Development (NITRD, $1.062 billion requested, a decrease of $157 million [-12.9%] from FY2016),[21] and
- U.S. Global Change Research Program (USGCRP, $264 million requested, a decrease of $85 million [-25.6%] from FY2016).[22]

The Senate and House committee reports do not provide specific direction for NSF's investments in these initiatives in FY2018.

Authorizations of Appropriations

Authorizations of appropriations for NSF, which were last enacted in the America COMPETES Reauthorization Act of 2010 (P.L. 111-358), expired in FY2013. Various reauthorization measures were introduced in the 114th Congress that included proposed funding levels, but no authorizations of appropriations were enacted. Members of the 115th Congress have introduced measures that would address authorizations of appropriations to NSF.

The American Innovation Act (H.R. 1569 and S. 641), introduced as companion bills in March 2017, would adjust annual discretionary spending limits for federal science agencies conducting basic research, including NSF, in FY2017-FY2021 to allow for specified increases in appropriations and would authorize appropriations at these increased levels. The bills also specify that annual appropriations for NSF through FY2021 be at least the amount appropriated in FY2016. **Table 3** shows the FY2013 authorization levels, appropriations to NSF in FY2016 and FY2017, FY2018 requested amounts, and proposed authorized maximum funding levels for NSF in FY2018 under selected measures from the 115th Congress.

[19] See the National Science and Technology Council (NSTC) activities under the "NSF-Wide Investments" section of the NSF FY2017 budget request, pp. 33, 38, and 42.

[20] For more information on the NNI program, see CRS Report RL34401, *The National Nanotechnology Initiative: Overview, Reauthorization, and Appropriations Issues*, by John F. Sargent Jr.

[21] For more information on the NITRD program, see CRS Report RL33586, *The Federal Networking and Information Technology Research and Development Program: Background, Funding, and Activities*, by Patricia Moloney Figliola.

[22] For more information on FY2018 federal R&D funding, including the multi-agency NNI, NITRD, and USGCRP initiatives, see CRS Report R44888, *Federal Research and Development Funding: FY2018*, coordinated by John F. Sargent Jr.

Table 3. NSF Appropriation Authorizations

(in millions of dollars)

Account	FY2013 Authorized	FY2016 Actual	FY2017 Enacted	FY2018 Request	Proposed Authorization Acts (FY2018)[a] S. 641 and H.R. 1569
Research and Related Activities (RRA)	$6,637.8	$5,998.1	$6,033.7	$5,361.6	*n/s*
Biological Sciences (BIO)	*n/s*	*723.8*	*n/s*	*672.1*	*n/s*
Computer and Information Science and Engineering (CISE)	*n/s*	*935.2*	*n/s*	*838.9*	*n/s*
Engineering (ENG)	*n/s*	*915.7*	*n/s*	*833.5*	*n/s*
Geosciences (GEO)	*n/s*	*876.5*	*n/s*	*783.3*	*n/s*
Mathematical and Physical Sciences (MPS)	*n/s*	*1348.8*	*n/s*	*1219.4*	*n/s*
Social, Behavioral, and Economic Sciences (SBE)	*n/s*	*272.2*	*n/s*	*244.0*	*n/s*
Office of International Science and Engineering (OISE)	*n/s*	*49.1*	*n/s*	*44.0*	*n/s*
Office of Polar Programs (OPP)	*n/s*	*448.9*		*409.2*	
Integrative Activities (IA)	*n/s*	*426.6*	*n/s*	*315.7*	*n/s*
U.S. Arctic Research Commission (USARC)	*n/s*	*1.4*	*n/s*	*1.4*	*n/s*
Education and Human Resources (EHR)	1,041.8	884.1	880.0	760.6	*n/s*
Major Research Equipment and Facilities Construction (MREFC)	236.8	241.5	209.0	182.8	*n/s*
Agency Operations and Award Management (AOAM)	363.7	351.1	330.0	328.5	*n/s*
National Science Board (NSB)	4.9	4.3	4.4	4.4	*n/s*
Office of the Inspector General (OIG)	15.0	14.8	15.2	15.0	*n/s*
NSF, Total	**$8,300.0**	**$7,493.9**	**$7,472.2**	**$6,652.9**	**$8,306.0**

Source: America COMPETES Reauthorization Act of 2010 (P.L. 111-358); FY2018 NSF congressional budget justification; S. 641 as introduced on March 15, 2017, and H.R. 1569 as introduced on March 16, 2017.

Notes: The term "n/s" means "not specified." Totals may not add due to rounding. Amounts in the "FY2016 actual" column represent total, actual budgetary resources, including annual appropriations, unobligated balances, transfers, and other adjustments. Italicized account names represent RRA subaccounts.

a. These acts include proposed discretionary funding adjustments through FY2021. This table only includes proposed maximum funding amount for NSF for FY2018.

NSF Funding History

The following sections provide information on authorizations of appropriations, as well as funding data and trends, since the foundation was established in 1950.

Long-Term Funding Trends

Table 4, **Figure 1**, and **Figure 2** show the trends in NSF authorizations, budget requests, and appropriations since the foundation was first authorized in the early 1950s. Except in FY1957, current and constant dollar actual appropriations to NSF grew rapidly between FY1951 and FY1966. After FY1967, appropriations fluctuated (up some years and down in others) until about FY1988. NSF experienced periods of generally sustained growth in current and constant dollar appropriations between FY1989 and FY1995 and again between FY1998 and FY2003. Since FY2003, growth in the NSF budget has slowed compared to prior years. Average annual growth in NSF appropriations was 8% between FY1997 and FY2003, 4% from FY2004 to FY2010, and 1% between FY2011 and FY2017.

Table 4. NSF Authorizations, Budget Requests, and Appropriations: FY1951-FY2018

(in millions of current and constant [FY2018] dollars)

	Current ($ millions)			Constant (FY2018 $ millions)		
Fiscal Year	Authorization	Request	Appropriation	Authorization	Request	Appropriation
1951	such sums	—	0	such sums	—	2
1952	such sums	14	4	such sums	109	27
1953	such sums	15	5	such sums	115	36
1954	such sums	15	8	such sums	113	60
1955	such sums	14	14	such sums	105	107
1956	such sums	31	53	such sums	226	387
1957	such sums	41	40	such sums	291	281
1958	such sums	65	52	such sums	444	353
1959	such sums	140	138	such sums	941	925
1960	such sums	160	153	such sums	1,063	1,014
1961	such sums	190	176	such sums	1,243	1,150
1962	such sums	210	263	such sums	1,360	1,705
1963	such sums	358	323	such sums	2,290	2,063
1964	such sums	589	353	such sums	3,722	2,230
1965	such sums	488	420	such sums	3,029	2,610
1966	such sums	530	480	such sums	3,222	2,917
1967	such sums	525	481	such sums	3,097	2,838
1968	such sums	526	495	such sums	3,000	2,824
1969	525	500	400	2,863	2,727	2,181
1970	478	500	440	2,472	2,587	2,277

	Current ($ millions)			Constant (FY2018 $ millions)		
Fiscal Year	**Authorization**	**Request**	**Appropriation**	**Authorization**	**Request**	**Appropriation**
1971	538	513	513	2,649	2,527	2,527
1972	653	622	622	3,068	2,925	2,925
1973	697	653	649	3,140	2,943	2,925
1974	633	583	579	2,663	2,452	2,438
1975	808	672	764	3,080	2,563	2,914
1976	787	755	715	2,807	2,694	2,551
1977	811	802	776	2,697	2,668	2,582
1978	879	944	863	2,742	2,943	2,691
1979	930	934	911	2,683	2,695	2,629
1980	1,002	1,006	992	2,659	2,671	2,633
1981	1,115	1,148	1,025	2,695	2,776	2,478
1982	n/a	1,354	1,039	n/a	3,062	2,350
1983	n/a	1,073	1,094	n/a	2,325	2,370
1984	n/a	1,292	1,341	n/a	2,705	2,806
1985	n/a	1,502	1,502	n/a	3,043	3,043
1986	1,517	1,569	1,524	3,005	3,109	3,019
1987	1,685	1,686	1,623	3,265	3,266	3,145
1988	n/a	1,893	1,717	n/a	3,553	3,223
1989	2,050	2,050	1,923	3,700	3,700	3,470
1990	2,388	2,149	2,082	4,160	3,744	3,627
1991	2,782	2,485	2,316	4,681	4,181	3,897
1992	3,245	2,742	2,571	5,329	4,504	4,221
1993	3,505	3,037	2,734	5,623	4,872	4,385
1994	n/a	2,753	2,983	n/a	4,322	4,683
1995	n/a	3,200	3,264	n/a	4,919	5,017
1996	n/a	3,360	3,220	n/a	5,071	4,859
1997	n/a	3,325	3,270	n/a	4,931	4,849
1998	3,506	3,367	3,431	5,135	4,932	5,026
1999	3,773	3,773	3,676	5,458	5,458	5,318
2000	3,886	3,921	3,912	5,507	5,557	5,544
2001	n/a	4,572	4,431	n/a	6,328	6,132
2002	n/a	4,473	4,823	n/a	6,091	6,569
2003	5,536	5,036	5,323	7,399	6,730	7,114
2004	6,391	5,481	5,589	8,334	7,148	7,288
2005	7,378	5,745	5,482	9,329	7,264	6,932

	Current ($ millions)			Constant (FY2018 $ millions)		
Fiscal Year	**Authorization**	**Request**	**Appropriation**	**Authorization**	**Request**	**Appropriation**
2006	8,520	5,605	5,589	10,433	6,864	6,844
2007	9,839	6,020	5,890	11,730	7,177	7,022
2008	6,600	6,429	6,125	7,708	7,509	7,154
2009	7,326	6,854	6,494[a]	8,458	7,913	7,497[a]
2010	8,132	7,045	6,873	9,306	8,063	7,865
2011	7,424	7,424	6,806	8,327	8,327	7,634
2012	7,800	7,767	7,033	8,592	8,555	7,747
2013	8,300	7,373	6,884	8,988	7,984	7,455
2014	n/a	7,626	7,172	n/a	8,119	7,636
2015	n/a	7,255	7,344	n/a	7,621	7,715
2016	n/a	7,724	7,463	n/a	7,987	7,718
2017	n/a	7,964	7,472	n/a	8,091	7,591
2018		6,653			6,653	

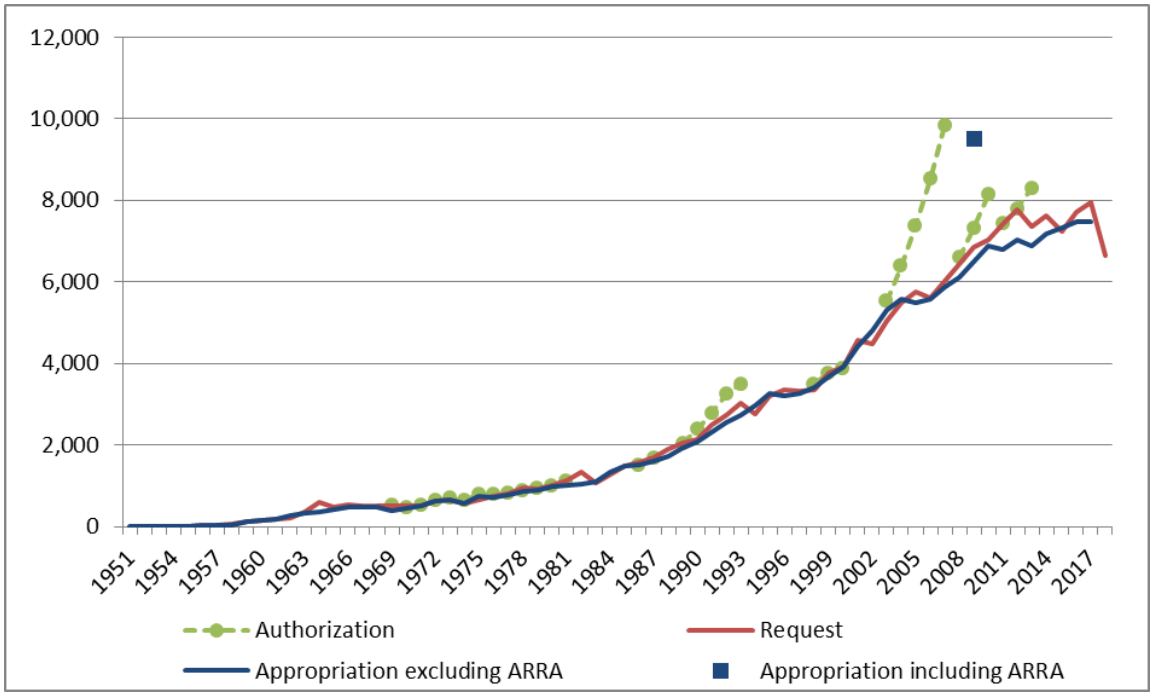
Source: Funding data in the "Authorization" columns are from selected FY1951 to FY2013 NSF authorization acts. Funding data in the "Request" and "Appropriations" columns are from National Science Foundation, Budget Internet Information System, "NSF Requests and Appropriations History," NSF.gov, August 14, 2017, http://dellweb.bfa.nsf.gov/NSFRqstAppropHist/NSFRequestsandAppropriationsHistory.pdf, and P.L. 115-31. To calculate constant FY2018 dollars, CRS used the Gross Domestic Product (Chained) Price Index found in Office of Management and Budget, *Historical Tables*, Table 10.1, May 16, 2017, available at https://www.whitehouse.gov/sites/whitehouse.gov/files/omb/budget/fy2018/hist10z1.xls.

Notes: As per communication between CRS and NSF dated March 20, 2014, the "Appropriation" column shows funding provided in annual appropriations acts plus adjustments required in those acts, other laws, committee reports, etc. Adjustments include rescissions, sequestration, funding transfers across NSF accounts, supplemental appropriations (not including American Recovery and Reinvestment Act, P.L. 111-5, funding in FY2009), and other changes. Resulting amounts most closely align with NSF's approved Current Plans. The term "n/a" means "not available." The term "such sums" means "such sums as may be necessary" to carry out agency powers and duties.

a. FY2009 appropriation amounts do not include American Recovery and Reinvestment Act (ARRA; P.L. 111-5) supplemental funding, which provided an additional $3,002 million to NSF. With ARRA included, total FY2009 appropriations to NSF were $9,496 million in current dollars and $10,791 million in constant (FY2017) dollars.

Figure 1. Current Dollar NSF Authorizations, Budget Requests, and Appropriations: FY1951 to FY2018

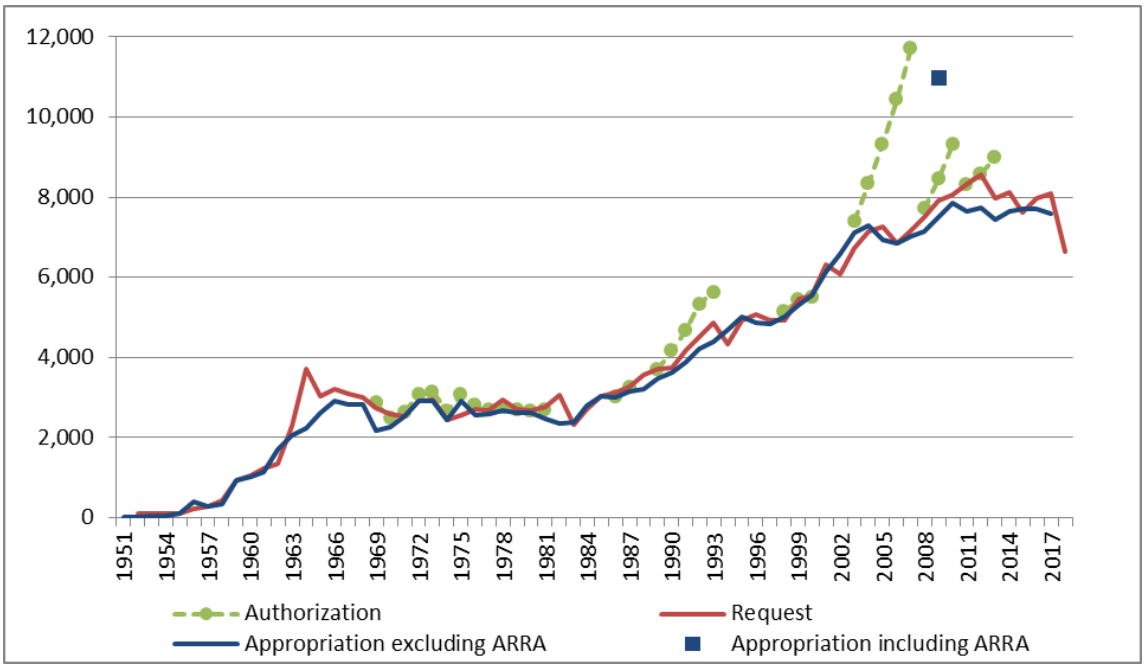
(in millions of current dollars)



Source: Table 4.

Figure 2. Constant Dollar NSF Authorizations, Budget Requests, and Appropriations: FY1951 to FY2018

(in millions of constant 2018 dollars)



Source: Table 4.

NSF Obligations by Account

Table 5 shows NSF obligations by account since FY2003. Prior years are not comparable due to changes in NSF account structure. Most of the growth in total NSF obligations since FY2003 has accrued to the main research account, RRA, which increased by about $1.890 billion in current dollars (45.6%) between FY2003 and the FY2017 enacted amount. Total NSF obligations increased by about $2.103 billion (39%) during this same period. If funded at requested levels, total NSF appropriations would be the lowest since FY2009 in current dollars, and the lowest since FY2002 in constant (FY2018) dollars (excluding ARRA funding in both cases).

Table 5. NSF Obligations by Account, FY2003-FY2018 Request

(in millions of current dollars)

Fiscal Year	RRA	EHR	MREFC	AOAM	NSB	OIG	NSF Total
2003	4,144	846	179	189	3	9	5,369
2004	4,388	850	184	219	2	9	5,652
2005	4,328	750	165	223	4	10	5,481
2006	4,449	700	234	247	4	11	5,646
2007	4,758	696	166	248	4	12	5,884
2008	4,853	766	167	282	4	12	6,084
2009[a]	5,152	846	161	294	4	12	6,469
2010[a]	5,615	873	166	300	4	14	6,972
2011	5,608	861	125	299	4	14	6,913
2012	5,758	831	198	299	4	14	7,105
2013	5,559	835	196	294	4	14	6,902
2014	5,775	832	200	306	4	14	7,131
2015	6,042	886	145	307	4	15	7,398
2016	5,998	884	242	351	4	15	7,494
2017[b]	6,034	880	209	330	4	15	7,472
2018 Request	*5,362*	*761*	*183*	*328*	*4*	*15*	*6,653*

Source: FY2005 to FY2018 annual NSF congressional budget justifications.

Notes: NSF adopted its current appropriations account structure in 2003. For this table, CRS adjusted FY2003 to FY2007 RRA and EHR obligations data to reflect the transfer of the EPSCoR program between these accounts in FY2008. This table treats EPSCoR as part of RRA for all years in the data set.

a. FY2009 and FY2010 amounts do not include American Recovery and Reinvestment Act (ARRA; P.L. 111-5) supplemental funding. With ARRA included, appropriations in FY2009 were $9,496 million ($3,002 supplemental) total for NSF; $7,686 million ($2,500 million supplemental) for RRA; $945 million ($100 million supplemental) for EHR; $552 million ($400 million supplemental) for MREFC; and $14 million ($2 million supplemental) for OIG. Of the $3,002 million supplemental appropriation for NSF, $2,402 million was obligated in FY2009 and $600 million was obligated in FY2010.

b. Enacted budget authority, per P.L. 115-31.

Policy Considerations

To guide decisionmaking for funding reductions in the FY2018 budget request, NSF leadership applied an overarching set of principles, including continuing to fund all science and engineering disciplines, supporting early career scientists, protecting "core" research, and reducing some of the program budgets that have slowly scaled up over the past decade (aka, accretions). Directorates then proposed strategic, prioritized reductions within their program portfolios. Broadly, the request reflects NSF's attempts to maintain an emphasis on cross-disciplinary programs and prioritize programs that will lead to longer-term progress on the Big Ideas.[23]

As in recent years, policymakers are considering congressional funding directives for specific scientific fields within NSF's RRA account. H.Amdt. 382 to Division C of the FY2018 omnibus appropriations bill (H.R. 3354), as well as language in the House committee report accompanying H.R. 3267, emphasize funding support for research in the physical and biological sciences over other scientific fields, such as the social, behavioral, and economic sciences. Supporters of such directives assert that federal dollars should be spent on disciplines they perceive to be more closely tied to research in the national interest (e.g., national security or health) and that such direction falls within Congress's oversight role. Opponents argue that scientists managing NSF programs ought to determine the distribution of funding by scientific field based on their deep knowledge of research merits and needs in each field, and how these needs are best balanced across NSF's research portfolio.

In recent years, a substantial portion of NSF (and other agency) funding has come through continuing appropriations. Continuing appropriations acts—often known as continuing resolutions or CRs—that provide short-term funding until appropriations decisions are finalized can lead to uncertainty for agencies. On one hand, CRs allow for ongoing appropriations discussions without a funding gap. On the other hand, they may lead to reductions or delays in agency operations, such as hiring staff, granting awards and contracts, and beginning new projects, as CRs typically prohibit new activities not funded in the previous fiscal year. Since FY1997, CRs have been enacted on average almost six times per year and provided an average of almost five months of funding annually.[24] The Continuing Appropriations Act, 2018 (P.L. 115-56, Division D), provides funding for NSF through December 8, 2017, at the FY2017 level, subject to a 0.6791% across-the-board decrease.

Further, when funding for an agency and its programs remains at prior year levels, overall purchasing power of appropriated monies is effectively reduced due to the impacts of annual inflation, which has been targeted at 2% by the Federal Reserve in recent years.[25] Both the House and Senate committee reports direct "not less than the fiscal year 2017 enacted level" for multiple programs. As shown in **Figure 1** and **Figure 2**, though current dollar appropriations for NSF have generally increased since FY2010, inflation-adjusted appropriations have remained flat on average. Some analysts argue that even small sustained losses in federal science funding may lead to long-term negative impacts to scientific research and innovation. This may be particularly true for basic research, which often has more uncertainty and longer timelines for generating returns on investment than applied research. Others argue that appropriations levels have remained strong

[23] See remarks and presentations materials by Dr. James Ulvestad, Acting Assistant Director of the Mathematical and Physical Sciences (MPS) Directorate, at the NSF MPS Advisory Committee Meeting (MPSAC), June 15-16, 2017, Arlington, VA, available at https://www.nsf.gov/events/event_summ.jsp?cntn_id=191705&org=MPS.

[24] See CRS Report RL34700, *Interim Continuing Resolutions (CRs): Potential Impacts on Agency Operations*, by Clinton T. Brass; and CRS Report R42647, *Continuing Resolutions: Overview of Components and Recent Practices*, by James V. Saturno and Jessica Tollestrup.

[25] See CRS In Focus IF10477, *Introduction to U.S. Economy: Inflation*, by Jeffrey M. Stupak.

for NSF given the budget constraints of recent years and that funding from other public and private sources should be sought to support scientific research broadly.

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