

FROM THE HILL

With the end of the border wall brouhaha, Congress passed omnibus legislation that set funding levels for fiscal year 2019. As anticipated, the budget includes substantive increases for key science agencies including the National Aeronautics and Space Administration (NASA), the Department of Agriculture (USDA), and the National Science Foundation (NSF). This builds on previous congressional actions to boost research at the National Institutes of Health (NIH), the Department of Defense (DOD), and the Department of Energy (DOE). Agencies focused on environmental and climate research—the Environmental Protection Agency (EPA), the US Geological Survey (USGS), and the National Oceanic and Atmospheric Administration (NOAA)—were protected from the administration’s proposed cuts (see Figure 1 for comparisons).

AAAS currently estimates R&D spending in the FY 2019 omnibus at \$151.5 billion, an increase of 6% or \$8.6 billion above FY 2018 estimated R&D. This increase was enabled by the 2018 bipartisan budget deal, which raised the discretionary spending caps for FY 2018 and FY 2019. Looking ahead, the new Congress will need to negotiate another budget agreement that would raise spending limits in FY 2020 and FY 2021, the final two years subject to sequestration legislation that called for tight limits on federal spending.

A deeper look into the omnibus reveals that basic research would fare somewhat better than applied research, as seen in Figure 2. This reflects strong congressional support for key basic science agencies, including NIH, DOE’s Office of Science, NSF, NASA’s Science Directorate, and DOD. In contrast, Congress had sought more limited

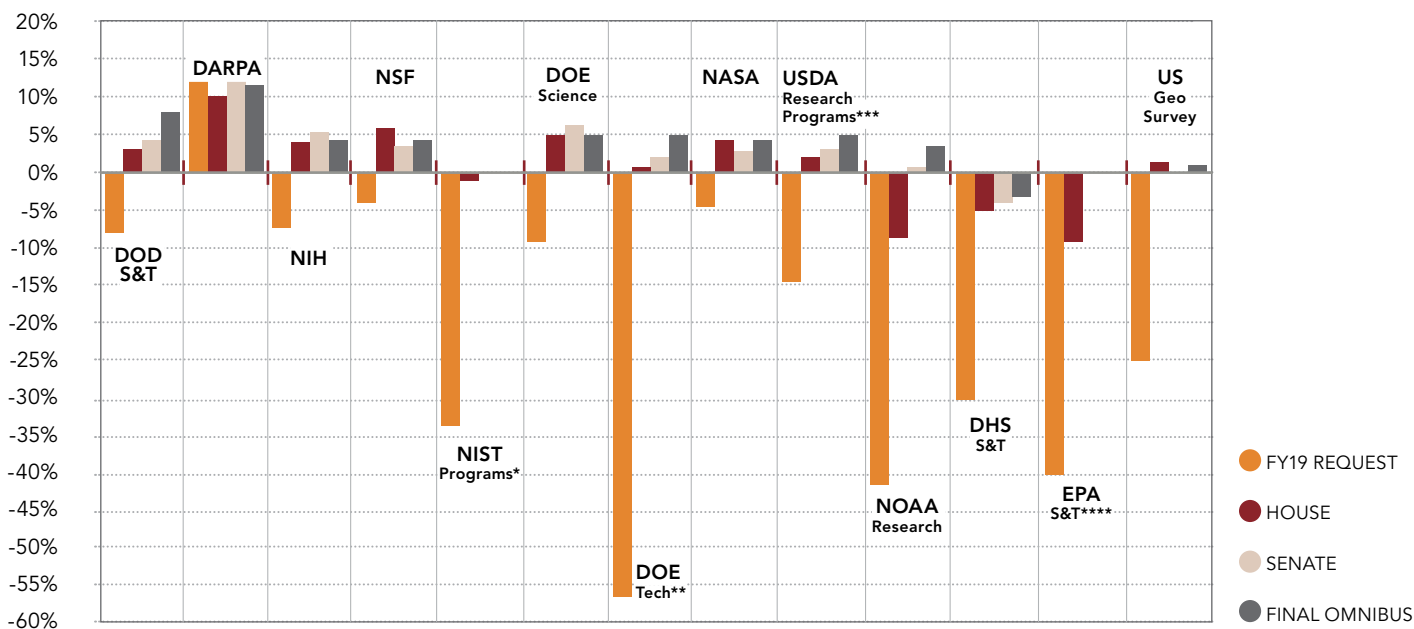
changes for the larger applied research funders such as USGS and DOE’s technology offices.

Total research (basic and applied) in the omnibus is roughly \$86.5 billion—the highest amount ever for such spending. Research as a share of gross domestic product (GDP) in FY 2019 would fall slightly to 0.41%.

National Science Foundation. NSF is slated for a moderate 4% increase overall, roughly the same growth rate as in FY 2018. The agency’s core research account was given a 2.9% increase, which is not quite as much as envisioned by House appropriators. NSF’s Education Directorate received a targeted increase for the Hispanic-Serving Institutions Program. The omnibus funds construction of three research vessels rather than the two requested by the administration and initiates funding for the Antarctic Infrastructure Modernization for Science

Fig 1. Select Science & Tech Agencies and Programs in FY 2019 Appropriations

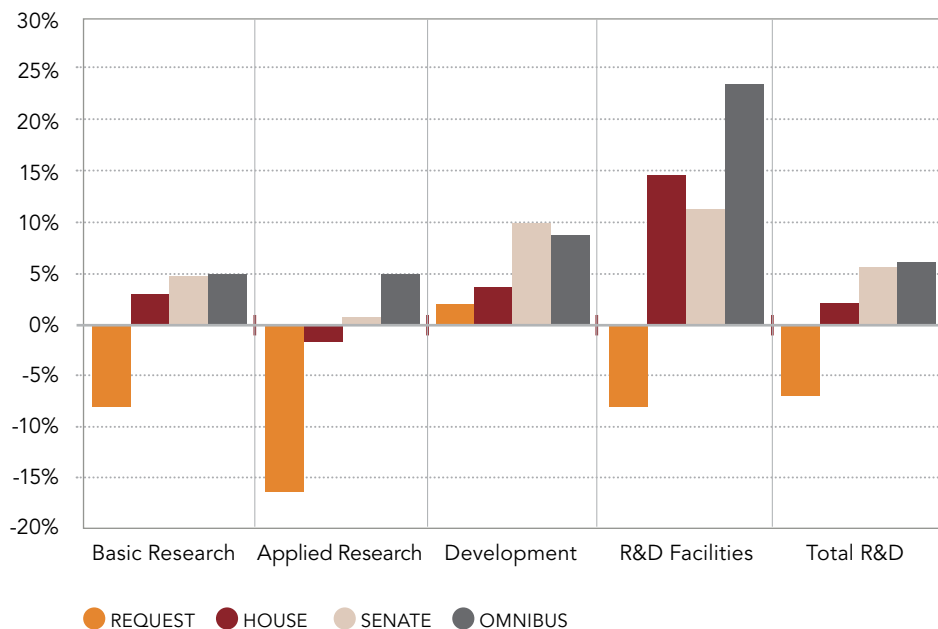
Estimated percentage change from FY 2018 enacted omnibus, nominal dollars



*Includes labs and industrial technology, excludes construction; flat in Senate and omnibus. **Includes renewables and efficiency, nuclear, fossil, grid research, cybersecurity, ARPA-E. ***Includes ARS, NIFA, ERS, NASS, Rangeland Research, excludes ARS construction. ****Flat in Senate and omnibus.

Fig 2. R&D by Type in FY 2019 Appropriations

Estimated percent change from FY 2018, nominal dollars



AAAS estimates based on OMB, agency, and Congressional data. © 2019 AAAS

project, part of a long-range investment program for McMurdo Station.

NASA. The space agency was granted a large \$764 million boost in the omnibus, building on recent budget growth. NASA's FY 2019 budget totals \$21.5 billion, which is just shy of the agency's peak in FY 2010, after adjusting for inflation. Exploration programs and planetary science were the big winners, with robust funding for the Europa mission and the new lunar gateway, and Earth Science was shielded from the administration's proposed cuts. Notably, the Wide Field Infrared Survey Telescope—the highest priority astronomy mission in the latest decadal survey—was spared from the White House attempt to eliminate it.

Other notable outcomes:

- NASA's Space Launch System (SLS) obtained an additional \$48 million for construction of a second mobile launch platform, which will be ready by 2024. The administration did not request funding for the second platform.
- The new Lunar Discovery and Exploration Program received \$218 million

to develop instruments and other payloads for missions on the Moon's surface.

- The robotic satellite servicing spacecraft known as Restore-L secured a \$50 million boost requested by Senate appropriators, whereas the House and administration sought to limit its overall cost.
- As part of the 5.8% increase for NASA Aeronautics, the omnibus includes no less than \$35 million for hypersonic research aimed at solving the challenges of high-speed flight.
- James Webb Space Telescope (JWST) development is fully funded thanks to a provision in the bill that adjusts the cap for the telescope to \$8.8 billion, an increase of about \$800 million above the previous cap. The bill warns that "NASA should strictly adhere to this cap or, under this bill, JWST will have to find cost savings or cancel the mission."

Department of Agriculture. USDA's intramural Agricultural Research Service (ARS) was handed an 8.5% increase for

core research, alongside a massive \$381 million total for construction and modernization of research facilities in accord with the agency's capital improvement strategy. Meanwhile, the extramural National Institute of Food and Agriculture (NIFA) received a 4.5% increase, which is above both House and Senate appropriations levels. The Agriculture and Food Research Initiative (AFRI), the department's competitive grants program, ended up with the higher House-proposed level of \$415 million, a 3.8% increase above FY 2018 levels.

Another noteworthy outcome: the legislation sidelines the administration's attempt to relocate the Economic Research Service and NIFA out of the National Capital Region and directs USDA to report on the costs and benefits of the proposed move as part of the FY 2020 request. However, Congress approved the transfer of National Bio and Agro-Defense Facility (NBAF) operations from the Department of Homeland Security (DHS) to USDA. NBAF will serve as a biosafety level 4 research center when construction is completed within the next five years.

National Oceanic and Atmospheric Administration. NOAA's core Office of Oceanic & Atmospheric Research (OAR) was given an overall 3.2% increase, with limited funding gains across most research programs. Climate research was spared the large cut requested by the House and administration. Also protected from elimination was the National Sea Grant College Program, which received a \$3 million increase to \$68 million. The US Weather Research Program saw a \$3.9 million funding uptick, and funding for ocean exploration and research was increased by \$5.5 million.

Funding for the Geostationary Operational Environmental Satellite (GOES-R) and the Joint Polar Satellite System (JPSS) were subject to funding reductions in line with House and administration levels, reflecting a scheduled ramp-down of both programs. Meanwhile, funding for the Polar Follow-On (PFO) was decreased by \$89 million to a total \$330 million in FY 2019. NOAA's proposal to combine

the PFO with JPSS was rejected, but will continue to be considered by Congress.

National Institute of Standards and Technology (NIST). Two initiatives, the Hollings Manufacturing Extension Partnership and Manufacturing USA, were flat-funded at FY 2018 levels. The administration had sought cuts or outright eliminations of these programs. Following a large one-time boost in last year's omnibus, NIST's research facilities construction account is slated for a 67% funding drop.

Environmental Protection Agency. Congress dismissed the administration's proposed 24% cut to the EPA budget and provided an overall flat appropriation. EPA's Science & Technology account is correspondingly flat, versus a severe 40% cut requested by the administration. Climate change research grants were protected from proposed elimination.

Congress also rejected the administration's attempts to implement a "workforce reshaping" program that would have reduced the number of EPA scientists through organizational restructuring. Meanwhile, the bill continues to prohibit EPA from using funds to implement a mandatory greenhouse gas reporting system for livestock producers.

In total, the FY 2019 omnibus would leave EPA's estimated R&D budget approximately 36% below FY 2005 levels, after adjusting for inflation.

US Geological Survey. The agency's total budget is up by 1.1%—a better outcome than the 25% cut proposed by the administration. Most research areas saw limited funding change. Energy and mineral resource activities received the largest increase, with \$9.6 million provided for a new critical mapping initiative and \$3.8 million to jump-start energy production in the National Petroleum Reserve in Alaska. Climate Adaptation Science Centers funding, which the administration sought to cut, remains equal to FY 2018.

Meanwhile, the National Land Imaging Program was granted a \$5.8 million increase, but core land-change science was flat-funded. Landsat-9 is fully funded at \$32 million. The Earthquake Early

Warning System was shielded from proposed elimination and flat-funded, and the Volcano Hazards Program was trimmed.

Notably, the omnibus includes funding that allows the Interior Department to implement reorganizations as part of an overhaul plan spearheaded by former Interior secretary Ryan Zinke. The proposed reorganization has raised concerns within the scientific community. The omnibus legislation does, however, urge the department to notify and consult with Congress about planned workforce restructures and reshaping.

Department of Homeland Security. The agency's science & technology account was cut by a total of \$21 million below FY 2018, largely as a result of the transfer of operational responsibility for the National Bio and Agro-Defense Facility from DHS to USDA, as noted above. Core research and development funding was essentially flat-funded. University programs would also remain equal to the FY 2018 level of \$41 million. The omnibus agrees with the administration's request to replace the Domestic Nuclear Detection Office with a new Countering Weapons of Mass Destruction Office funded at \$435 million, with \$83 million for R&D programs.

Census Bureau. As part of the ramp-up toward the 2020 decennial headcount, the United States Census Bureau received a full \$1 billion increase, matching the Senate and administration's proposed level.

More budget news

Administration to propose FY 2020 budget cuts. In an op-ed published February 25, the acting director of the White House Office of Management and Budget, Russ Vought, signaled that the administration plans a 5% cut to nondefense discretionary spending, which includes funding for key research agencies, in its FY 2020 budget request. It's unclear what baseline the administration is using; nondefense spending is currently scheduled to drop by about 9% in FY 2020 under the Budget Control Act (BCA) spending

caps (see related item below). Meanwhile, Vought indicated that the administration intends to increase defense funding using the Overseas Contingency Operations account, which is not subject to the BCA spending caps. Fiscal conservatives have previously criticized use of that account as a way to get around the spending caps.

Will budget sequestration be blocked again? On February 27, the Senate Budget Committee held a hearing to review the Budget Control Act, with the assistant director for budget analysis at the Congressional Budget Office, Terri Gullo, the sole witness. The BCA, which was signed into law in 2011, mandated across-the-board cuts known as "sequestration." Under the BCA, the discretionary portion of the budget, which funds virtually all R&D programs, is set to drop by \$126 billion or 10% in FY 2020. Congress previously acted to roll back the sequestration caps through a series of two-year budget deals. Reaching another bipartisan agreement to lift the spending caps would provide greater fiscal room for science investments.

GAO seeks larger S&T role. In late February, the Government Accountability Office (GAO), a legislative branch agency that focuses on auditing and evaluating federal programs, announced that it is seeking a \$50.3 million budget boost to \$686 million for FY 2020. One purpose of the increase is to support GAO technology assessment efforts, an emerging role of importance for the agency. The GAO established a new Science, Technology Assessment, and Analytics office earlier this year.

House says no to earmarks. House Appropriations chairwoman Nita Lowey (D-NY) announced that the House will continue to prohibit budget earmarks in its FY 2020 appropriations bills. Lawmakers in both chambers have been debating whether to resurrect earmarks, which have been banned since 2011.

NIH addresses sexual harassment

The director of the National Institutes of Health, Francis Collins, and several senior

NIH officials released an update on the agency's efforts to address sexual harassment in science. "To all those who have endured these experiences," the statement says, "we are sorry that it has taken so long to acknowledge and address the climate and culture that has caused such harm. The National Academies report on sexual harassment of women in science found that 'federal agencies may be perpetuating the problem of sexual harassment.' We are concerned that NIH has been part of the problem. We are determined to become part of the solution."

A working group of the Advisory Council to the Director plans to release interim recommendations in June. In the meantime, NIH has been working to demonstrate accountability and transparency regarding sexual harassment, clarify expectations for institutions and investigators, provide clear channels of communication to NIH, and listen to victims and survivors and incorporate their perspectives into future actions. In 2018, NIH followed up on complaints from more than 24 institutions, resulting in the replacement of 14 principal investigators on NIH extramural grants. The awardee institutions themselves took disciplinary action against 21 principal investigators, including termination in some cases.

Fourth space policy directive signed

On February 19, President Trump issued Space Policy Directive-4 to further establish a US Space Force. The directive requires the secretary of defense to develop and submit to the Office of Management of Budget for the president's approval a legislative proposal establishing a US Space Force as an armed service within the Department of the Air Force. The legislative proposal is to outline how the Space Force will "organize, train, and equip forces to provide for freedom of operation in, from, and to the space domain; to provide independent military options for national leadership; and to enhance the lethality and effectiveness of the Joint Force."

OSTP comes to life

In early February, the White House Office of Science and Technology Policy (OSTP) issued a report, *Science & Technology Highlights in the Second Year of the Trump Administration*, outlining the achievements of the administration in a range of areas, including artificial intelligence, cybersecurity, lab-to-market initiatives, ocean science, R&D fundamentals, and space exploration. Some of the achievements highlighted include signing legislation to encourage advancements in unmanned aircraft systems technologies, supercomputer development, and increased investments in artificial intelligence research. The report was released shortly after OSTP welcomed its new director, Kelvin Droegemeier, and with its release, the agency tweeted, "As our Nation stands on the verge of a new era in science and technology, OSTP looks forward to continued work to ensure that American researchers lead the world, and that the United States remains the best place on Earth to explore, create, and innovate."

Droegemeier gave his first official speech to the scientific community at the AAAS annual meeting in Washington, DC, in February. He discussed the US R&D ecosystem and highlighted three pillars that OSTP will address as a means of developing a new construct for the nation's innovation system. The first of the three pillars involves conducting a quadrennial assessment of the nation's research enterprise, including the four sectors that fund research: government, academia, industry, and the private sector. A second pillar involves creating new partnerships and areas of collaboration between the sectors as a means of leveraging its collective strength, and a third pillar will focus on reducing the regulatory burden on the research enterprise.

Call for national research policy board

Stating that the United States has a "fractured, inefficient, inconsistent system" to foster research integrity, the authors of an article in *Nature*, including

National Academy of Sciences president Marcia McNutt, have called for the establishment of a national research policy board. Because individuals in the research enterprise typically meet only with their peers, the board would bring together individuals from all sectors of the research community—including funders, journals, academic administrators, and others—to determine best practices in setting an environment of scientific quality and integrity. The board would not adjudicate allegations of research misconduct.

Warning of foreign influences on research integrity

An NIH-appointed panel of experts has warned that US institutions receiving money from NIH need to tighten their security procedures. The eight-member panel, which includes five university presidents, was commissioned to investigate "foreign influences on research integrity" and presented its findings to NIH director Francis Collins in January. In a subsequent letter to more than 10,000 institutions that receive NIH grants, Collins and FBI director Christopher Wray warned about "non-traditional collectors of information" and presented cases where data thieves had shared intellectual property with Beijing, run "shadow laboratories" in China, and stolen confidential information from grant applications.

Although peer review violations are uncommon, several NIH institutes have confirmed "breaches in the integrity" of the peer-review process, and Collins stated that "the magnitude of these risks is increasing." The Trump administration has moved to limit the duration of visas for some Chinese students in certain high-tech fields. Collins acknowledged that the "vast majority" of foreign nationals make valuable contributions to US science, but Wray told Congress last year that the "level of naïveté on the part of the academic sector about this creates its own issues."

"From the Hill" is derived from the weekly Policy Alerts and the reports of the R&D Budget and Policy Program of the American Association for the Advancement of Science.