



Analysis of the President's Fiscal Year 2016 Budget Request for Biological Sciences Research and Education

**A Report from the American Institute of Biological Sciences
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Summary

On 2 February 2015, President Obama released his proposed budget for fiscal year (FY) 2016. The plan would provide \$1.091 trillion for discretionary spending, an increase of \$75 billion above the budget caps set by Congress. The increase would be equally divided between defense and non-defense programs. To pay for the new spending, the President proposes new revenue from taxes, trimming mandatory spending programs, and immigration reform.

Most federal science agencies will receive a budget increase if the President's budget plan is enacted. The administration proposes \$146 billion for federal research and development, an increase of 5.5 percent relative to the FY 2015 enacted level.

The proposed funding is subject to congressional appropriations. Moreover, any effort to raise the caps on total government spending will require a change to the *Budget Control Act of 2011*. Some lawmakers have expressed an interest in raising the budget limits, especially for defense spending, but policy analysts and lawmakers expect such adjustments to the budget caps to be an uphill battle.

Agency Budget Summaries

Department of Energy Office of Science

- *Department of Energy request: \$29.9 billion (+\$2.5 billion)*
- *Office of Science request: \$5.3 billion (+\$272.1 million)*
- *Biological and Environmental Research request: \$612.4 million (+\$20.4 million)*

All calculations in this report are relative to the FY 2015 enacted level, unless otherwise noted.

The Department of Energy Office of Science is slated to receive a 5.4 percent increase in the President's budget request. Funding for Biological and Environmental Research would grow at a rate of 3.4 percent. The proposed level of funding is only slightly higher than the program received in FY 2011.

New funding would be provided for core research in genomic science, three Bioenergy Research Centers, and research to understand interdependencies among water, energy, and climate change.

Biological systems science would receive \$294.3 million, a cut of \$5.6 million. Support would ramp down for radiological sciences and structural biology infrastructure as activities are completed. These declines would partially offset new funding for foundational genomics research in support of bioenergy and environmental research.

The Climate and Environmental Sciences program would benefit from an increase of \$26.0 million, for a total of \$318.1 million. The largest increase would be directed to climate and earth system modeling (+\$30.8 million) for new research to evaluate geographic regions that are significant sources of climate prediction uncertainty. The terrestrial ecosystem science program, which supports research on Arctic and tropical ecosystems, would lose nearly \$4.0 million dollars (-9.1 percent).

Workforce development for teachers and scientists would be boosted by \$1.0 million. Most of the proposed increase would be directed to undergraduate internships at Department of Energy labs. There would be no change in funding for graduate research fellowships.

Environmental Protection Agency (EPA)

- *EPA request: \$8.6 billion (+\$451.8 million)*
- *Science and Technology request: \$769.1 million (+\$34.4 million)*

Spending at EPA would increase by 5.6 percent in the proposed budget. The proposed staffing level would represent a small uptick from last year, but is still a significant reduction from 2012. Funding for science and technology programs would increase by 4.7 percent.

Within the Office of Research and Development, funding for research for sustainable and healthy communities—a program that includes some ecosystem research—would decline to \$139.2 million (-7.2 percent). Three million dollars would be cut from ecosystem services research. Research on pollinator health and a study of the toxicity of pesticides on honeybees would receive \$1.5 million in new funding.

Research on safe and sustainable water resources would increase by 3.3 percent. Most of this increase would be directed to investigations on the impacts of hydraulic fracturing on water quality and ecosystems. Additionally, a proposed \$3.8 million increase would allow the EPA to expand its work with the Department of Energy and United States Geological Survey to understand the potential impacts of hydraulic fracturing on air quality.

A competitive grant program to support water quality and availability research would be eliminated. The \$4.1 million program was congressionally directed, however EPA is not requesting funds to support the program in FY 2016.

EPA proposes to end the Science to Achieve Results (STAR) and Greater Research Opportunities fellowship programs, a savings of \$11.1 million. These graduate and undergraduate research fellowships would be consolidated into education programs in other agencies.

National Institutes of Health (NIH)

- *NIH request: \$31.3 billion (+\$1.0 billion)*

The President's budget proposes a 3.3 percent increase for NIH. Most of the proposed increase would be directed to research project grants (+\$873.0 million). Intramural research would receive a \$94.7 million increase.

New funding is proposed to support several initiatives President Obama highlighted in his 2015 State of the Union address. Two hundred million dollars would support the new Precision Medicine Initiative that aims to tailor medical treatments to individual patients. Research on antimicrobial resistance and the development of new antibiotics would be supported with \$100 million in new funding. The Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, which seeks to revolutionize our understanding of the human brain, is proposed to receive an additional \$70 million.

Funding for Research Project Grants (RPGs) would increase by 5.3 percent. The number of new competing RPGs would increase by 1,227 to more than 10,300. The proposed budget would result in the proposal funding rate increasing by 2 percent to 19 percent.

Training programs would grow by 3.1 percent, with stipend rates increasing by 2 percent. Full-time trainee positions would rise by 204 positions.

One science education program is proposed for elimination. The Diversity Research Education Grants in Neuroscience program would be zeroed out from the FY 2015 level of \$1.0 million in order to support higher priority education programs.

National Oceanic and Atmospheric Administration (NOAA)

- *NOAA request: \$6.0 billion (+\$533.7 million)*

Under the President's budget, funding for NOAA would increase by 9.8 percent. Although the trend of escalating procurement costs for weather and climate satellites continues, funding would also rise for many research and natural resource management activities.

The Office of Oceanic and Atmospheric Research would receive a 13.6 percent increase. Climate research activities would be boosted by \$29.2 million. New funding would be available for research on the impacts of climate change on fish stocks and for ocean acidification, among other topics. Ocean, coastal, and Great Lakes research would increase by \$11.2 million, although funding would be cut for ocean exploration and the National Sea Grant College Program's competitive research grants.

The FY 2016 budget proposes increased funding for the National Ocean Service (+7.1 percent). An increase is proposed for competitively awarded research to address coastal ocean issues including harmful algal blooms, hypoxia, and coastal ecosystem management (+\$4.0 million).

Funding for the National Marine Fisheries Service would increase by 3.3 percent. Increases are sought for ecosystem-based solutions for fisheries management (+\$5.0 million) and for fisheries stock assessments (+\$2.8 million).

NOAA proposes to make a smaller contribution to education programs. Competitive education grants would be terminated (-\$4.0 million), as would regional watershed education programs (-\$7.2 million).

National Science Foundation (NSF)

- *NSF request: \$7.7 billion (+\$379.3 million)*
- *Research and Related Activities request: \$6.2 billion (+\$252.7 million)*
- *Major Research Equipment and Facilities Construction request: \$200.3 million (-\$0.5 million)*
- *Education and Human Resources request: \$962.6 million (+\$96.6 million)*
- *Biological Sciences Directorate request: \$747.9 million (+\$16.9 million)*

The President's budget request for NSF would provide a 5.2 percent increase over the FY 2015 appropriation.

The largest portion of the proposed increase would be directed to research, which would see a boost of \$252.7 million across the agency. NSF projects that the research grant funding rate would remain unchanged at 21 percent for the entire agency due to an anticipated increase in proposals submitted. Education activities are also proposed for significant new funding (+11.2 percent).

A nine percent increase would support Agency Operations and Award Management, especially the relocation of NSF's headquarters and the government-wide 1.3 percent salary increase for federal employees.

Major Research Equipment and Facilities Construction would remain essentially flat. Within this account, \$80.6 million is proposed for the final year of construction of the National Ecological Observatory Network (NEON).

Four cross-disciplinary initiatives would receive significant increases if the budget request were enacted. Innovations at the Nexus of Food, Energy, and Water Systems is a new initiative proposed to receive \$75 million to support research on the natural, social, and human-built factors involved in these interconnected systems. Fifteen million would be allocated for a new project to address broadening participation of underrepresented groups, with a special emphasis on activities that lead to demonstrable progress. An ongoing initiative, Understanding the Brain, would receive an increase of \$37 million, and research on risk and resilience for natural and manmade disasters would be supported with an additional \$38 million.

NSF would continue to increase its support for graduate students. In addition to increasing funding—but not the number of new fellowships—for the Graduate Research Fellowship, the agency plans to expand the research themes for the NSF Research Traineeships. Proposals will be solicited in two additional research areas: Innovations at the Nexus of Food, Energy, and Water Systems and Understanding the Brain.

NSF's Biological Sciences Directorate

The proposed 2.3 percent boost for the Biological Sciences Directorate (BIO) is the second smallest increase proposed for an NSF research directorate on a percentage basis. With the exception of the Math and Physical Sciences, other directorates would receive between a 3.5 and 7.1 percent increase. BIO provides about 66 percent of federal funding for non-medical, basic life sciences research at academic institutions.

The number of BIO research grants awarded and the median award size would increase slightly from FY 2015. The funding rate for BIO research grants is expected to remain at 23 percent, a figure that does not include pre-proposals. When pre-proposals are accounted for, the funding rates are much lower.

Within the request for BIO, funding would be allocated among the five divisions accordingly:

- Molecular and Cellular Biosciences: \$136.2 million (+1.5 percent)
- Integrative Organismal Systems: \$215.4 million (+0.8 percent)

- Environmental Biology: \$144.8 million (+0.9 percent)
- Biological Infrastructure: \$145.4 million (+2.0 percent)
- Emerging Frontiers: \$106.1 million (+9.4 percent)

Priority funding areas include cognitive science and neuroscience research, cyberinfrastructure for the biological sciences, synthetic biology (including ecological applications and implications), and NEON operations. The largest amount of new funding (\$7.5 million) would be directed to the NSF-wide Innovations at the Nexus of Food, Energy, and Water Systems initiative.

Workforce development programs within BIO would receive new investments. Contributions for CAREER grants to support young investigators who excel as educators would increase by 5 percent. Funding for a new broadening participation initiative would receive \$1.4 million from BIO, as well as support from other NSF directorates. The Research Experiences for Undergraduates program would be infused with \$2.2 million in new funding from BIO.

The Long-Term Ecological Research network would receive \$28.0 million (+1.3 percent). Funding for the National Ecological Observatory Network operations would increase by \$6.0 million. NSF estimates that up to 5.9 percent of BIO's total funding would be dedicated to operations and maintenance of the network.

Support would be sustained for digitization of scientific information associated with biological specimens held in U.S. research collections through the Advancing Digitization of Biodiversity Collections program.

The Science, Engineering, and Education for Sustainability (SEES) initiative will continue to phase-down in preparation for a 2017 sunset. The Dimensions of Biodiversity program—the last BIO program within SEES—would be sustained in FY 2016.

Smithsonian Institution

- *Smithsonian Institution request: \$935.8 million (+\$116.3 million)*

Federal support for the Smithsonian Institution would increase by 14.2 percent. Smithsonian is also funded by private donations and a trust fund.

New funding is once again proposed for care of and access to collections. The budget includes an increase of \$1.8 million to digitize collections and make them accessible online. Nearly two million dollars is proposed for strengthening curatorial staffing. Support for preservation of collections would increase by \$3.0 million. This funding level would allow Smithsonian to address deficiencies and implement recommendations made by the Smithsonian Inspector General.

A new research initiative to better understand biodiversity genomics would receive \$360,000. The effort builds upon the findings of NSF's Tree of Life program. The research will shed light on the origins of life, evolution, and ecosystem resilience.

Funding for the Marine Global Earth Observatories would increase to support network expansion in order to better understand changes in marine ecosystem structure and function.

The budget request includes an additional \$5 million for STEM education. Smithsonian would work with federal agencies to identify and disseminate content that "takes advantage of each agency's unique assets; create complementary materials and avoid duplication of effort; and share a centralized portal for the broad dissemination of our engagement offerings," according to budget documents.

Several Smithsonian facilities used for research and curation of scientific collections would be renovated under the proposed FY 2016 budget. The National Museum of Natural History would receive \$23.0 million for revitalization work. Smithsonian's two environmental research centers would also receive new funding for construction.

United States Department of Agriculture (USDA)

- *Department of Agriculture request: \$24.9 billion (+\$604 million)*
- *Research, Education, and Economics request: \$3.2 billion (+\$443 million)*

The proposed budget for research, education, and economics is 16.2 percent more than the FY 2015 level.

The National Institute of Food and Agriculture (NIFA) partners with extramural academic institutions to conduct research, education, and extension activities. NIFA would receive \$1.5 billion (+16.4 percent) in FY 2016. Within NIFA, the Agriculture and Food Research Initiative (AFRI) would receive \$450 million for competitive extramural research grants. At this level, AFRI would receive a 38.5 percent budget increase. Funding is included for presidential initiatives on pollinator health and combatting antimicrobial resistance.

The Agricultural Research Service (ARS) conducts intramural research in the areas of natural and biological science. It would receive \$1.4 billion in FY 2016, \$221 million more than FY 2015. Funding for six of the eight research areas within ARS would be increased, including an additional \$5 million for research in support of environmental stewardship. As part of broader government efforts to combat antimicrobial resistance, ARS would receive \$17 million in new funding to study resistance in pathogens of humans and livestock. Research would also be expanded on the risks of climate change to agriculture. Other priority research areas include genetic improvements and translational plant breeding, and development and testing of the efficacy of best management practices to prevent colony collapse disorder.

Funding is also included for the construction of a new poultry research lab to study emerging and exotic poultry diseases and the modernization of several ARS research facilities.

Agricultural research education programs, including graduate and postgraduate fellowship grants, would be consolidated into the Department of Education and NSF. This is the third year that the Obama Administration has proposed this government-wide change; Congress has previously rejected the proposal.

USDA Forest Service

- *Forest Service request: \$4.9 billion (-\$130.4 million)*
- *Forest and Rangeland Research request: \$292.0 million (-\$4.0 million)*

Funding for Forest Service research would decrease by 1.4 percent, whereas the agency's overall budget would decline by 2.6 percent. Research funding has been depressed since FY 2010, when program funding hit a high of \$312 million.

Nearly all Forest Service research program areas are targeted for budget cuts. Six of the seven research areas would be cut by 7 to 8 percent, including invasive species; wildlife and fish; water, air, and soil; wildland fire and fuels; resource management and use; and recreation R&D. Conversely, the inventory and monitoring R&D account would be increased by 16 percent for completion of national forest inventory and analysis. The additional funds would allow the interior of Alaska to be surveyed for the first time.

Some priority research programs would be continued through reallocation of funds. Research on the introduction and spread of non-native species would be supported by eliminating some research on established invasive species. In the resource management account, emphasis would be placed on sustainable bioenergy production, urban sustainability, and climate adaptation research. Wildlife and fish research would focus on habitat restoration and innovations in inventory and monitoring.

United States Fish and Wildlife Service (FWS)

- *FWS request: \$1.6 billion (+\$135.7 million)*

The proposed budget includes a 9.4 percent overall increase for the Fish and Wildlife Service. FWS is the only federal agency whose primary responsibility is management of biological resources. It is charged with protection of endangered species, migratory birds, marine mammals, and other fish and wildlife species.

The budget for science support for FWS activities would nearly double to \$31.7 million. Adaptive science funding would increase to support the work of Landscape Conservation Cooperative partnerships. The increased funding would allow the agency

to continue to support the best performing cooperatives, but also build the science capacity of other locations.

Science in support of decision-making for refuge management, endangered species recovery, regulatory decisions, and other needs would increase significantly. Examples of how the funding would be used include research on the impacts and mitigation of renewable energy transmission corridors in the western United States, biological carbon sequestration, and research on white-nose syndrome in bats.

United States Geological Survey (USGS)

- *USGS request: \$1.2 billion (+\$149.8 million)*
- *USGS Ecosystems Activity request: \$176.3 million (+\$19.3 million)*

The budget for the USGS would increase by 14.3 percent in FY 2016. Among the proposed programs changes are new funding for climate resilience, landscape understanding, and science infrastructure. Research and development funding would increase by \$95.3 million and represent 64 percent of the total USGS budget in FY 2016.

The Ecosystems activity within USGS would receive an increase of 12.3 percent. Science in support of critical landscapes, such as the Arctic, sage steppe, Puget Sound, and Columbia River, would be boosted by \$6.7 million. Other research foci would be emerging invasive species, as well as declining species and pollinators. Research on ecosystem services would increase by \$1.8 million, including continued development of a national ecosystems framework to inform cross-governmental activities. The Cooperative Research Units would receive \$2.0 million in new funding to expand their education programs to undergraduates in addition to their existing focus on graduate education.

The proposed budget for the USGS includes an increase of \$55.0 million above the FY 2015 enacted level for climate and land use change science. Climate change adaptation and resilience would receive new funds for emerging science needs, interagency coordination, and improving our understanding of the connections between climate and land cover change. New funding would be directed to research on the medium- and long-term patterns of drought in the western and southeastern U.S. Monitoring of biological carbon sequestration would receive an additional \$6.5 million.

The Water Resources activity would be funded at \$222.9 million (+\$10.6 million). New investments would be made in research on the timing and quantity of water flows to inform fisheries management. The streamgauge network would expand by 35 sites through the construction of new sites, reactivation of discontinued sites, or the maintenance of sites currently supported through less stable funding sources. Additional funding would be directed to research on water use, groundwater monitoring, and science to support drought decision-making.

Workforce development programs are another area targeted for new funding. Among the USGS programs that would benefit are Interior's youth and education in science program, a postdoctoral research program, and youth in underserved communities.

What's Next?

The President's budget request is only a proposal; it does not have binding authority. Congress uses the President's budget request as a starting point for their budget negotiations. Congress has already begun their consideration of the FY 2016 budget, although it will be several months before any final decisions are made. Because the President's request includes \$75 billion in funding beyond the spending caps set in the *Budget Control Act of 2011*, Congress would have to amend the law in order to appropriate this amount of funding.

About AIBS

The American Institute of Biological Sciences is a nonprofit 501(c)(3) scientific association dedicated to advancing biological research and education for the welfare of society. AIBS works to ensure that the public, legislators, funders, and the community of biologists have access to and use information that will guide them in making informed decisions about matters that require biological knowledge. The organization does this through informing decisions by providing peer-reviewed or vetted information about the biology field and profession and by catalyzing action through building the capacity and the leadership of the community to address matters of common concern.

Founded in 1947 as a part of the National Academy of Sciences, AIBS became an independent, member-governed organization in the 1950s. Today, AIBS has nearly 140 member organizations and is headquartered in Reston, VA, with a Public Policy Office in Washington, DC. Its staff members work to achieve its mission by publishing the peer-reviewed journal *BioScience* and the education Web site *ActionBioscience.org*, by providing scientific peer-review and advisory services to government agencies and other clients, and by collaborating with scientific organizations to advance public policy, education, and the public understanding of science. For more information, please visit www.aibs.org.

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