

Biological and Ecological Sciences in the FY 2015 Budget

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HIGHLIGHTS

- *National Science Foundation (NSF)*. Funding for biological research would decrease by \$12.8 million.
- *US Department of Agriculture (USDA)*. \$75 million is proposed for three new innovation institutes.

INTRODUCTION

Biological and ecological research provides the scientific basis to address the nation's most challenging issues. These include food security and energy needs, maintaining vital resources such as freshwater, and coping with emerging wildlife diseases that also affect people. The biological sciences inform our understanding of these issues while inspiring innovative research and new economic opportunities.

Numerous federal agencies conduct and support biological and ecological research. Intramural research is conducted at mission-driven agencies such as the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Department of Agriculture (USDA), the U.S. Geological Survey (USGS), and the Department of Energy.

Federal agencies also support extramural research programs that complement the work government scientists conduct. The National

Science Foundation (NSF) is the primary funder of fundamental, non-medical science, supporting 66 percent of this research at universities and non-profit research institutions.

NATIONAL SCIENCE FOUNDATION (NSF)

NSF's Directorate for Biological Sciences (BIO) funds research upon which our understanding and response to complex issues, such as climate change, food safety and security, bio- and nanotechnology, and human well-being, is built. In short, biological systems, including entire organisms, increasingly inspire research and innovation in other disciplines.

The budget request for BIO is \$708.5 million, a decrease of \$12.8 million from the 2014 enacted level. The proposed cut is significantly larger than for any other NSF research directorate. BIO forecasts that the number of research grants awarded would increase slightly, but that the directorate-wide funding rate would decrease from 22 percent to 21 percent. The median award size would not change relative to the current level.

BIO supports research through five divisions. Integrative Organismal Systems would increase by 1.1 percent to \$218.2 million. Biological Infrastructure would grow to \$136.7 million (+3.3 percent). Molecular and Cellular Biosciences, and Environmental Biology would be cut by 0.8 percent and 1.0 percent, bringing these areas to \$128.6 million and \$137.5 million, respectively. Funding for Emerging Frontiers would decline by 16.3 percent to \$87.6 million.

NSF proposes three major activities within BIO for FY 2015. First, increased investment in basic research on neural circuitry as part of the administration's broader BRAIN initiative. Second, continued investment in the Research at the Interface of the Biological, Mathematical and Physical Sciences (BioMaPS) program. Third, support for infrastructure, such as the National Ecological Observatory Network (NEON), digitization of biological collections, field stations, and synthesis centers. Support for several ongoing multidisciplinary initiatives, including the Science, Engineering, and Education for Sustainability initiative, would decline.

STEM education is a major priority across NSF and within BIO in the FY 2015 budget request. BIO's contributions to CAREER grants would

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increase by \$0.4 million. Funding for Research Experiences for Undergraduates would increase by \$1.1 million.

NSF has requested \$96.0 million, a slight increase, for continued construction of the National Ecological Observatory Network (NEON). This request is included in the Major Research Equipment and Facilities Construction account. An additional \$38.0 million from BIO is requested for NEON operations. NEON is continental-scale infrastructure that will collect data on the impacts of climate change, land use change, and invasive species on natural resources and biodiversity. Construction is about halfway completed.

The Opportunity, Growth, and Security Initiative would provide an extra \$552 million for NSF, though BIO's share of this funding is not clear.

DEPARTMENT OF AGRICULTURE (USDA)

The Agriculture and Food Research Initiative (AFRI) would increase by nine million from FY 2014 to FY 2015, receiving \$325 million. AFRI's priorities include climate variability and change research that will seek to improve tracking of invasive species; water resources research to prepare for future challenges to irrigated agriculture; and research and education into food security to develop sustainable and economically viable agricultural production systems.

The R&D budget of USDA's intramural scientific research agency – the Agricultural Research Service (ARS) – would decline by \$18 million. The agency's mission includes research on monitoring the nation's agricultural ecosystems and predicting crop responses to changing environmental conditions. Three new innovation institutes on pollinator health, antimicrobial resistance, and bioproducts manufacturing would be funded at \$25 million each.

Discretionary spending for the Animal and Plant Health Inspection Service would increase by \$13 million. Funding for the Natural Resources Conservation Service, which has seen its funding reduced within the past few years, would once again drop by \$5 million. The 2015 budget would also reallocate \$44 million towards the development of more climate resilient agriculture production systems.

Also within the USDA budget, the Forest Service (FS) would see its discretionary funding decrease by \$725 million. The budget proposes to

shift 30 percent of wildfire suppression funding to an off-budget emergency account to prevent the FS from borrowing funds from other agency accounts to address wildfire outbreaks. The increasing cost of wildfire management has constrained other FS programs. The Forest and Rangeland Research program focuses on developing the knowledge and technology needed to improve the economic and environmental value of national forests. The program is slated to receive \$275 million, an \$18 million reduction from FY 2014.

The Opportunity Growth and Security Initiative would provide additional USDA funding for a new biosafety research laboratory. The Initiative would also provide an additional \$60.0 million for AFRI, \$42.2 million for ARS research, and \$18.0 million for FS research.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA is the primary regulatory agency for the environment. Its portfolio includes science research into energy production, chemical safety, watershed management, and climate change. For the fifth consecutive year, the White House's proposed budget request includes decreased funding for EPA. Under the FY 2015 request, the agency would receive \$7.89 billion, a 3.7 percent cut from the FY 2014 enacted level. Funding for total research and development initiatives at EPA would be \$537 million, level with FY 2014.

EPA's Clean Air and Global Change program would receive \$260 million for federal efforts to enforce greenhouse gas and other air quality regulations, down from \$272 million in FY 2014. The Great Lakes Restoration Initiative would receive \$275 million, a \$25 million reduction from FY 2014. The Chesapeake Bay program would increase by \$3 million to \$73 million in the FY 2015 budget proposal.

In accordance with the Administration's plans to reorganize STEM education initiatives, Science to Achieve Results (STAR) and the Greater Research Opportunities (GRO) fellowship programs would be eliminated.

Additional funding provided by the president's Opportunity, Growth and Security Initiative includes a proposed \$1 billion Climate Resiliency Fund to help the agency mitigate the impacts of climate change. The agency would focus on preserving coastal wetlands and urban forest systems.

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION (NOAA)

NOAA R&D activities are supported through a combination of intramural and extramural research related to the agency's mission to understand and forecast environmental changes and conserve and manage coastal and marine resources for economic, social, and environmental purposes.

Funding for the National Ocean Service would rise by \$26 million over FY 2014 to \$496.2 million. This would fund efforts to address higher intensity coastal storms, changing sea levels and coastal flooding. The request includes an additional \$1 million to accelerate the development and implementation of new marine sensor technologies. An increase of \$6 million would be directed toward competitive research into ecological stressors, including harmful algae, bacteria, and hypoxia.

The National Marine Fisheries Service would significantly increase support for programs related to recovery of threatened and endangered species, despite lower overall funding for the service. An additional \$5 million is included for the Species Recovery Grant Program. Funding for the NOAA Office of Education and related initiatives would decrease in favor of administration goals to streamline investment in STEM education.

Funding for the NOAA Office of Oceanic and Atmospheric Research would increase by \$35.4 million over the FY 2014 enacted level. Ocean, coastal, and Great Lakes research would decrease by \$4.6 million. New funding would be directed to ocean acidification research.

The Opportunity, Growth, and Security Initiative would provide an additional \$180 million for NOAA for weather, climate and oceans observation research. This includes investments to improve heat advisories, mitigation of sea level rise as well as improvement in understanding impacts of drought on industries, ecosystems and human communities.

U.S. GEOLOGICAL SURVEY (USGS)

The USGS is dedicated to providing reliable and objective scientific information to describe and understand the Earth, minimize loss of life and property from natural disasters, and assist others in managing water, biological, geological, geographical, and other natural resources.

The Ecosystems area would receive \$162.0 million, an increase of 6.0 percent or \$9.2 million. The new funding would be distributed across all six programmatic areas. The largest increase is proposed for Invasive Species (+34.9 percent). Fisheries and Cooperative Research Units would each receive nearly a 7 percent increase. Increases are also proposed for Status and Trends (up 2.2 percent); Wildlife (up 0.8 percent); and Environments (up 3.6 percent).

Asian carp eradication and control would continue to be a priority for USGS. Additionally, a \$2.0 million increase would support efforts to integrate ecosystem services frameworks into decision-making.

The proposed Opportunity, Growth, and Security Initiative would provide an additional \$75 million in new funding for USGS. The initiative would fund five scientific objectives, including several ecosystem priorities such as landscape scale ecosystem management and studying and mitigating the impacts of energy on rare species.

DEPARTMENT OF ENERGY

The Biological and Environmental Research program within the Department of Energy Office of Science supports genomic research, studies the drivers of climate change, and furthers foundational knowledge of ecology, biology, and biogeochemistry.

The Office of Science discretionary budget would receive a 0.9 percent increase in FY 2015. Funding for Biological and Environmental Research would grow at a higher rate (+3.0 percent), with proposed funding of \$628.0 million.

The Climate and Environmental Sciences program would benefit from an increase of \$30.2 million. The largest increase would be directed to climate model development and validation. The terrestrial ecosystem science program, which supports research on Arctic and tropical ecosystems, would lose nearly one million dollars (-2.1 percent).

Funding for the Biological Systems Science program would be cut by \$11.9 million. Most of this reduction would come from research on the radiological sciences. Most other programs would be flat funded, including foundational genomics research, computational biosciences, and bioenergy research centers.