

National Science Foundation in the FY 2003 Budget

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HIGHLIGHTS

- The President's FY 2003 request for the National Science Foundation (NSF) is \$5.0 billion (see Table II-7). This represents an increase of \$239.9 million, or 5.0 percent, over the estimated FY 2002 level of \$4.8 billion.
- Research and Related Activities (R&RA) would increase by 5.1 percent under the President's request, from \$3.6 billion in FY 2002 to \$3.8 billion in FY 2003.
- The budget request continues four major interdisciplinary initiatives begun under the Clinton Administration: Biocomplexity in the Environment (BE), Information Technology Research (ITR), Nanoscale Science and Engineering, and Learning for the 21st Century.
- The budget request also proposes \$200 million for the second year of a Math and Science Partnership initiative focused on K-12 math and science education.
- Three programs are proposed to be transferred to the NSF from other agencies: Environmental Education (presently at the Environmental Protection Agency); the National Sea Grant program (presently at the National Oceanic and Atmospheric Administration); and Hydrology of Toxic Substances (presently at the U.S. Geological Survey).

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- In addition, the budget request proposes \$30 million for the second year of an interdisciplinary mathematics initiative, focusing on managing large data sets, modeling uncertainty, and modeling and predicting complex non-linear systems such as brain function, economic behavior and weather prediction.
- Another important increase within the NSF budget request is \$37 million to increase stipends for the Graduate Research Fellowships (GRF), Graduate Teaching Fellowships in K-12 Education (GK-12) and Integrative Graduate Education and Research Traineeship (IGERT) programs from their current level of \$21,500 to \$25,000 for academic year 2003-2004.

AGENCY OVERVIEW

NSF's Mission: Since its founding in 1950, the Foundation has had an extraordinary impact on American scientific discovery. Despite its small size, it is the only federal agency with responsibility for research and education in all major scientific and engineering fields.

NSF accomplishes its mission with remarkable efficiency. Approximately 95 percent of the agency's total budget goes directly to support the actual conduct of research and education, while less than five percent is spent on administration and management. NSF was the only agency in the entire federal government to receive a "green light" for Financial Management in a review utilizing the "traffic light" grading system by the Treasury Department, GAO and OMB. The review was published in the FY 2003 budget request. All other agencies were graded either with "yellow" or "red" lights.

NSF Support: NSF plays a crucial role in the support of university research. Although NSF represents less than four percent of the total federal budget for research and development, it supports roughly 50 percent of all non-medical basic research at colleges and universities. In several fields, it is the lead federal source.

The agency funds approximately 10,000 research, education and training projects through grants, contracts, and cooperative agreements to more than 2,000 colleges, universities, and other research and/or education organizations in all parts of the United States. More than 200,000 people

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are involved directly in NSF research and education programs and activities. In FY 2003, these are projected to include nearly 30,000 senior researchers and other professionals, more than 65,000 postdoctoral, graduate and undergraduate students, 11,405 K-12 students and 84,580 K-12 teachers.

The agency does not operate its own laboratories, but does support national research centers, user facilities, oceanographic vessels and Antarctic research stations. NSF also supports university-industry research partnerships, U.S. participation in international scientific efforts, and efforts to improve K-12 education as well as education in universities and colleges.

Agency Structure: NSF is an independent federal agency run by a presidentially appointed, Senate-confirmed director and deputy director. The agency's policy direction is established by the National Science Board, which consists of 24 scientists, mathematicians, engineers, top university officials, and industry leaders.

NSF has a staff of roughly 1,200 people and is divided into seven directorates. Six of the directorates are directly responsible for funding discipline-oriented basic and applied research: Biological Sciences (BIO); Computer and Information Science and Engineering (CISE); Engineering (ENG); Geosciences (GEO); Mathematical and Physical Sciences (MPS); and Social, Behavioral and Economic Sciences (SBE). The remaining directorate is responsible for overseeing the Foundation's Education and Human Resources (EHR) activity.

Congressional Support: NSF has traditionally enjoyed broad Congressional support. While the agency's appropriation dipped slightly between FY 1995 and FY 1996, the total appropriation has increased each year since then, even when other agencies under the VA, HUD and Independent Agencies appropriations bill were cut. For FY 1999 and FY 2000, Congress provided the agency with increases of 7.1 percent and 6.9 percent, respectively, over the previous year. Both of these appropriations were considered significant demonstrations of support, and were greater than the increases received by any other scientific research agency with the exception of the National Institutes of Health (NIH). In FY 2001, Congress provided the largest single increase in both percentage and dollar terms in the history of the agency, an increase of 13.3 percent over FY 2000. Last year, Congress substantially exceeded

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the President's request, which provided for essentially flat funding between FY 2001 and 2002. The final FY 2002 appropriation provided an increase of 8.5 percent over FY 2001.

Given the record of recent years, many observers expect that Congress will again this year exceed President Bush's spending recommendation for NSF. Advocates for the agency, including the Chairman and ranking Democrat on the Senate VA, HUD and Independent Agencies Subcommittee, Barbara Mikulski (D-MD) and Christopher Bond (R-MO), have proposed that the agency budget should double from its FY 2000 level of approximately \$4 billion to approximately \$8 billion in FY 2005. The FY 2001 and FY 2002 appropriations have been interpreted as the first steps in this doubling initiative. House VA, HUD and Independent Agencies Subcommittee Chairman James T. Walsh (R-NY) has also said that NSF is his top priority within the VA, HUD bill.

RESEARCH AND RELATED ACTIVITIES (R&RA)

Research and Related Activities (R&RA) would receive \$3.8 billion, an increase of 5.1 percent above the FY 2002 plan of \$3.6 billion. Please see Table II-7 for details of the NSF budget.

Requests for specific R&RA directorates are as follows:

Biological Sciences (BIO): \$526 million (up 3.4 percent). In FY 2003, BIO expects to make 3,460 awards with an average annualized award size of \$155,400 per year and an average duration of 3.1 years. Among the activities supported within BIO are Molecular and Cellular Biosciences, Integrative Biology and Neuroscience, Environmental Biology, Biological Infrastructure, Emerging Frontiers and Plant Genome Research. (For detailed information on BIO activities, see Chapter 18.)

Computer and Information Science and Engineering (CISE): \$527 million (up 2.3 percent). In FY 2003, CISE expects to make 2,150 awards with an average annualized award size of \$151,000 per year and an average duration of three years. The largest activity within the CISE directorate is the Information Technology Research initiative, which is proposed to receive \$190.67 million in FY 2003, an increase of \$17 million over FY 2002. Activities supported within CISE include Computer-Communications Research; Information and Intelligent

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Systems; Experimental and Integrative Activities; Advanced Computational Infrastructure and Research; and Advanced Networking Infrastructure and Research. (For more information on CISE, please see Chapter 23.)

Engineering (ENG): \$488 million (up 3.3 percent). In FY 2003, ENG expects to make 3,100 awards with an average annualized award size of \$105,000 per year and an average duration of three years. Activities supported within ENG include Bioengineering and Environmental Systems; Chemical and Transport Systems; Civil and Mechanical Systems; Design, Manufacture and Industrial Innovation; Electrical and Communications Systems; and Engineering Education and Centers.

Geosciences (GEO): \$691 million (up 13.4 percent). The largest component of the proposed increase for GEO is the transfer of three programs from other agencies (Environmental Education, the National Sea Grant program and Hydrology of Toxic Substances). If these three programs, totaling \$74 million, are subtracted, the total increase for GEO comes to just over \$6 million, or less than one percent. In FY 2003, GEO expects to make 3,310 awards with an average annualized award size of \$104,246 per year and an average duration of three years. Activities supported within GEO include Atmospheric Sciences; Earth Sciences; and Ocean Sciences. Funding for the National Center for Atmospheric Research (NCAR) would be cut by 3.9 percent to \$73.6 million. The Academic Research Fleet would receive \$62 million in FY 2003, an increase of 3.5 percent. Approximately 2,500 scientists and students use the fleet's 28 ships annually. (For detailed information on the Atmospheric Sciences and Ocean Sciences Divisions, see Chapter 15. For detailed information on the Earth Sciences Division, see Chapter 17.)

Mathematical and Physical Sciences (MPS): \$942 million (up 2.3 percent). In FY 2003, MPS expects to make 4,750 awards with an average annualized award size of \$124,000 per year and an average duration of three years. Activities supported within MPS include Astronomical Sciences; Chemistry; Materials Research; Mathematical Sciences; Physics; and Multidisciplinary Activities. Facilities supported by MPS include the Gemini Observatories, three major astronomical facilities, the Laser Interferometer Gravitational-Wave Observatory (LIGO), Cornell Electron Storage Ring, Michigan State University's National Superconducting Cyclotron Laboratory, the National High

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Magnetic Field Laboratory, National Astronomy Centers, and several other facilities. (For more information on NSF mathematics research, see Chapter 22; for more information on NSF physics research, see Chapter 13; for more information on NSF astronomy research, see Chapter 14.)

Social, Behavioral and Economic Science (SBE): \$196 million (up 15.9 percent). SBE is the principal source of federal support for basic research in the social, behavioral and economic sciences. For fields such as anthropology, archaeology and political science, NSF is the sole source of federal research support. In other fields, such as sociology and social psychology, NSF provides more than half of all federal support. NSF supports more than one-third of federal support for basic research in economics. In FY 2003, SBE expects to make 2,060 awards with an average annualized award size of \$69,305 per year and an average duration of 2.4 years. (For more information on SBE, please see Chapter 20; for more information on Science Resources Statistics within SBE, please see Chapter 21.)

U.S. Polar Programs: \$304 million, up 2.0 percent. The FY 2003 request for U.S. Polar Programs includes \$236 million for U.S. Polar Research Programs and \$68 million for U.S. Antarctic Logistical Support. The extreme environments and geographically unique characteristics enable research to be performed in both the Arctic and Antarctic that is not feasible elsewhere.

Arctic programs conducted by NSF include Arctic and sub-Arctic Long Term Ecological Research (LTER) sites in Alaska, field stations and large instrument facilities in Alaska, Greenland and Arctic Canada, and research ships, submarines, planes, helicopters and other field support.

Each year, about 650 science personnel from institutions in 30 states travel to Antarctica for research purposes. NSF facilities there include the Center for Astrophysical Research at the South Pole and two Antarctic LTER sites, one near Palmer Station that focuses on marine research, and another in the Dry Valleys near McMurdo Station, that studies polar desert oases and permanently ice-covered lakes.

Integrative Activities: \$111 million, up 3.8 percent. Integrative Activities (IA) was created in FY 1999 within the Research and Related Activities appropriation to support cross-disciplinary research efforts and major research instrumentation. The Integrative Activities program

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also supports the Science and Technology Policy Institute, which provides analytical support to the Office of Science and Technology Policy (OSTP) to identify short- and long- term objectives for research and development and identify options for achieving those objectives.

In FY 2003, the Major Research Instrumentation program is projected to receive \$54 million, a cut of 29 percent below FY 2002. The Partnerships for Opportunity program, which supports innovative, cross-disciplinary research and education, is projected to receive \$5 million in FY 2002.

EDUCATION AND HUMAN RESOURCES (EHR)

The EHR directorate would receive \$908 million in FY 2003, an increase of 3.8 percent. This figure does not include an estimated additional \$92.5 million expected to result from H-1B Nonimmigrant Petitioner Fees.

The new Math and Science Partnerships Initiative proposed by President Bush is projected to receive \$200 million, an increase of \$40 million above FY 2002. This initiative is intended to use research-based approaches, improve teacher quality and increase accountability, by providing funds for state and local school districts to join with colleges and universities.

The Experimental Program to Stimulate Competitive Research (EPSCoR) would receive \$75 million, a decline of 17.6 percent below FY 2002. For more on NSF's EHR programs, please see the Education and Human Resources chapter (Chapter 5).

MAJOR RESEARCH EQUIPMENT

The agency's request includes \$126.3 million for Major Research Equipment, a cut of 9 percent below the FY 2002 plan. Funds will be used for projects including the Atacama Large Millimeter Array, (ALMA; a radio telescope consisting of 64 large antennas), EarthScope, the Network for Earthquake Engineering Simulation (NEON), Terascale Computing Systems, and the High-performance Instrumented Airborne Platform for Environmental Research (HIAPER). (For more information on ALMA, see Chapter 14; for more information on EarthScope, see Chapter 17; for more information on NEON, see Chapter 18.)

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