# AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009

NSF received $3.0 billion in funding under the American Recovery and Reinvestment Act (Public Law 111-5). This chapter of the FY 2011 Budget Request to Congress analyzes the results of our ARRA spending, reporting FY 2009 Actuals along with subsequent investment updates.

**ARRA GOALS:** NSF established a set of goals to be met with ARRA funding. These are listed in the chart below with the corresponding FY 2009 Actuals or results as of September 30, 2009.

| Goal | Target | FY 2009 Actuals |
|---|---|---|
| Number of competitive R&RA awards | 4,000 | 4,599 |
| Number of competitive R&RA awards for MRI and ARI | 500 | TBD in FY 2010 |
| Number of investigators supported on competitive R&RA awards | 6,400 | 6,762 |
| Number of new investigators or co-investigators on competitive R&RA awards | 2,400 | 2,352 |

As of FY 2009, NSF has made 4,599 awards, 599 more competitive R&RA awards than expected with ARRA funding, and has supported 362 investigators above its target of 6,400 investigators. NSF set an ambitious target of 2,400 new investigators, a goal that exceeded the baseline level (FY 2008) by roughly 20 percent. The 2,352 new investigators funded by the Recovery Act fell 2 percent short of this aggressive target. The number of new investigators and co-investigators will be further discussed later in this chapter.

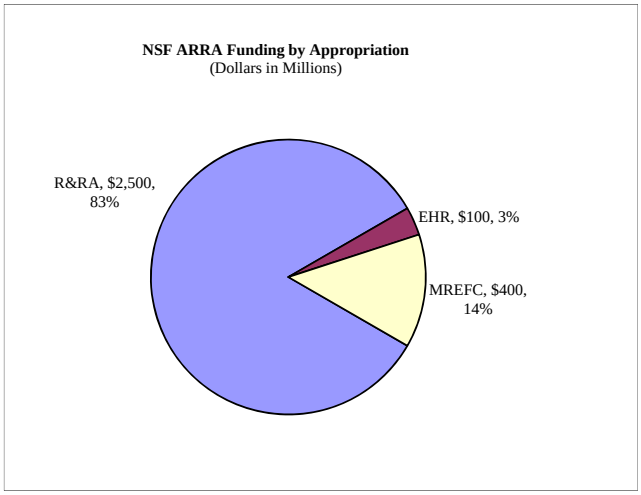
NSF obligated 80 percent of its ARRA funding by September 30, 2009. The largest carryover items include:

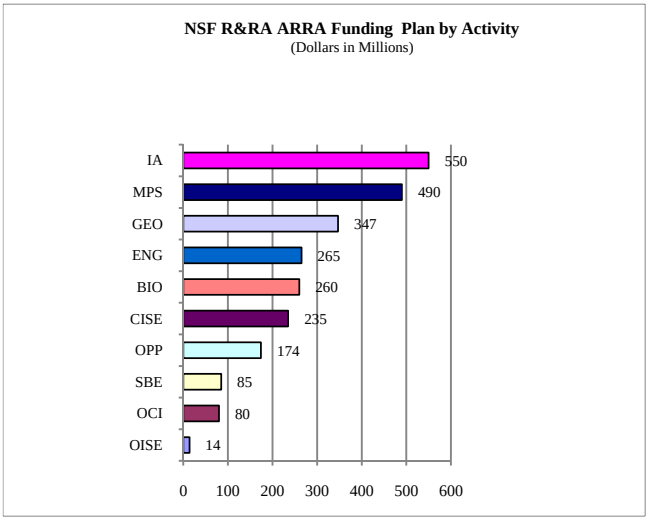
- Major Research Instrumentation ($200.15 million) – awards are expected in Q2 FY 2010;
- Academic Research Investment ($200.0 million) – awards expected in Q2/Q3 FY 2010;
- EPSCoR ($20.0 million) – awards are expected in Q3 FY 2010;
- 21-Tesla magnet for the National High Magnetic Field Laboratory ($15.0 million) was awarded in Q1 FY 2010;
- Science Masters program ($15.0 million) – awards are expected in Q2/Q3 FY 2010; and
- Construction funding for the Advanced Technology Solar Telescope ($146.0 million) was awarded in Q2 FY 2010.

Combining the recent FY 2010 awards cited above with FY 2009 Actuals raises NSF's obligation rate for ARRA funding to 85 percent at the time of this submission.

**ANALYSIS OF NSF ARRA FUNDS:**

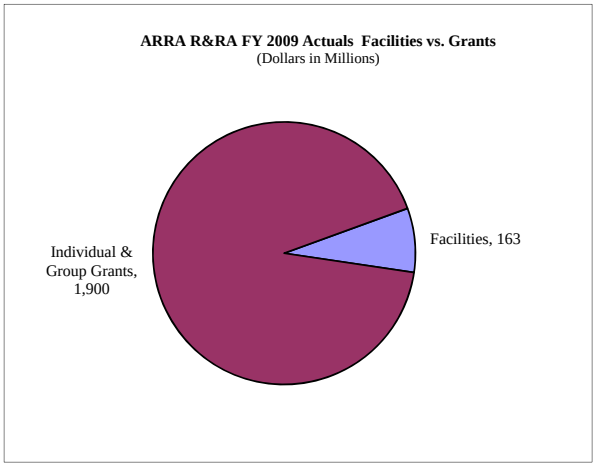
Of the total $3.0 billion in funding provided to NSF by ARRA, $2.5 billion was slated for Research and Related Activities, including $300.0 million for the Major Research Instrumentation program and $200.0 million for the Academic Research Infrastructure program which are funded through Integrative Activities (IA). In addition, NSF received $100.0 million for programs in the Education and Human Resources Directorate, including a Science Masters program, and $400.0 million for construction projects in the Major Research Equipment and Facilities Construction account.




RESEARCH AND RELATED ACTIVITIES PLAN: Within R&RA, NSF used ARRA funding to invest in research in all of its programmatic directorates. Investment decisions were based on overall NSF and Administration priorities, including climate change and energy research as well as increasing the science and technology workforce and maintaining cutting-edge research infrastructure.

Most of NSF's ARRA funding (92 percent) in Research and Related Activities went into grants to individual investigators and small groups; however, a significant portion was used to support ongoing operations at NSF user facilities (8 percent). This chapter will go into additional detail for both of these categories.



EDUCATION AND HUMAN RESOURCES PLAN: The Recovery Act stipulated that funds be used by the Directorate for Education and Human Resources (EHR) for the following activities:

| | ARRA Funding (in millions) |
|---|---|
| Undergraduate Education | $85.00 |
| Robert Noyce Teacher Scholarship Program | $60.00 |
| Math and Science Partnership | $25.00 |
| Graduate Education | $15.00 |
| Science Masters Program | $15.00 |
| TOTAL | $100.00 |

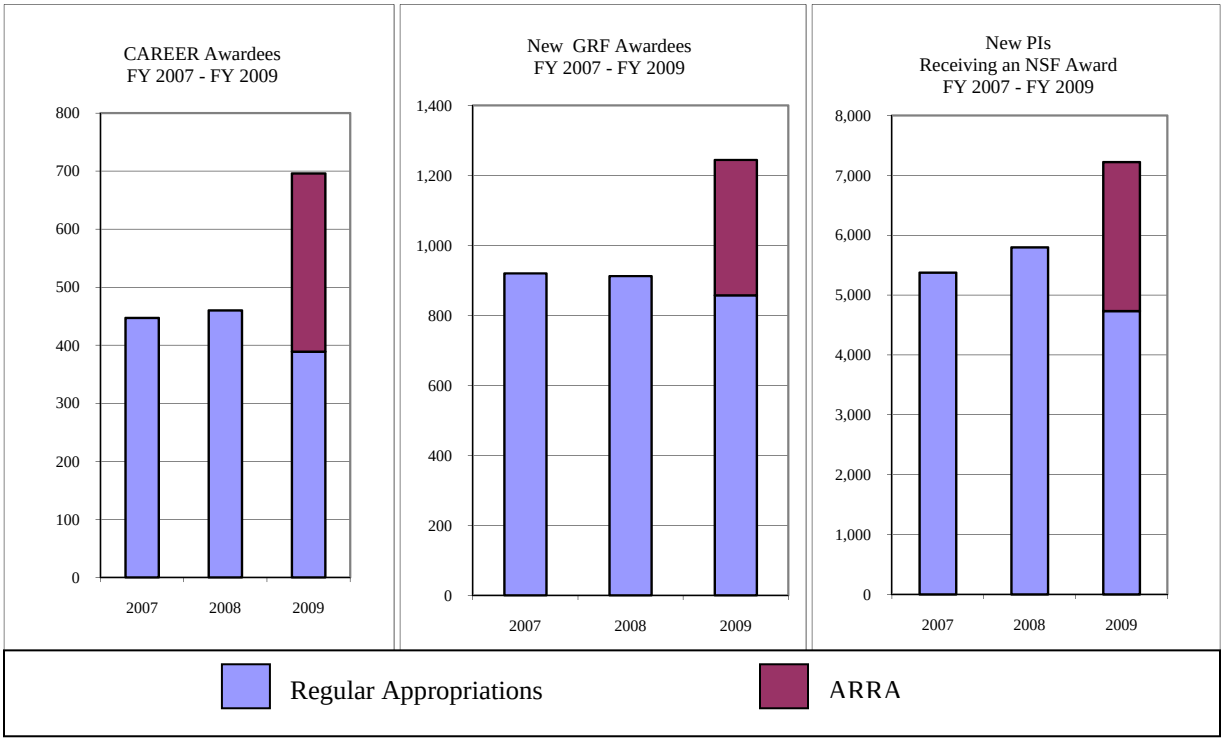
MAJOR RESEARCH EQUIPMENT AND FACILITIES CONSTRUCTION PLAN: The Act designated $400.0 million for Major Research Equipment and Facilities Construction, supporting and accelerating development of the three U.S.-based facilities listed below.

| | ARRA Funding (in millions) |
|---|---|
| Advanced Technology Solar Telescope (ATST) | $146.00 |
| Ocean Observatories Initiative (OOI) | $105.93 |
| Alaska Region Research Vessel (ARRV) | $148.07 |
| TOTAL | $400.00 |

Detailed information on these activities can be found in the MREFC chapter.

**FUNDING OF YOUNG INVESTIGATORS:** Since a major focus of the ARRA legislation was to develop a science and technology workforce, NSF invested a large amount of its ARRA funding in the Faculty Early Career Development (CAREER) and Graduate Research Fellowship (GRF) programs, making a strong push to support new[1] principal investigators and co-PIs with ARRA funds.

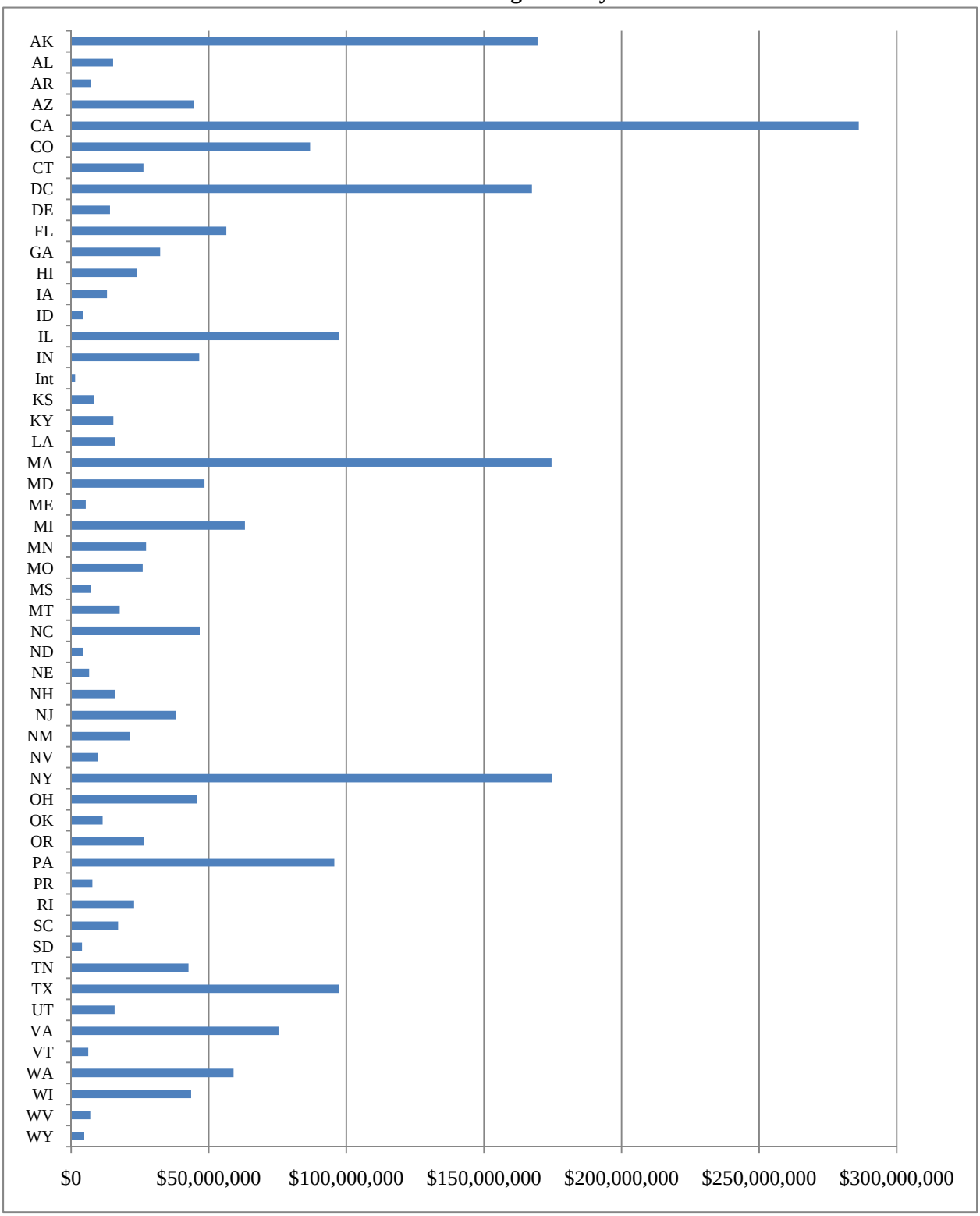
The three charts below show that NSF was successful at increasing the number of CAREER and GRF awardees, as well as funding new principal investigators and co-investigators. Increasing the number of individuals receiving CAREER and GRF awards and funding new PIs develop the science and technology workforce of the Nation, a stated goal of ARRA funding. The funding rate for new PIs for FY 2009 is 29 percent, compared to a funding rate of 23 percent in FY 2008. Our analysis shows that without the additional ARRA awards, the new PI funding rate would have dropped to around 19 percent.



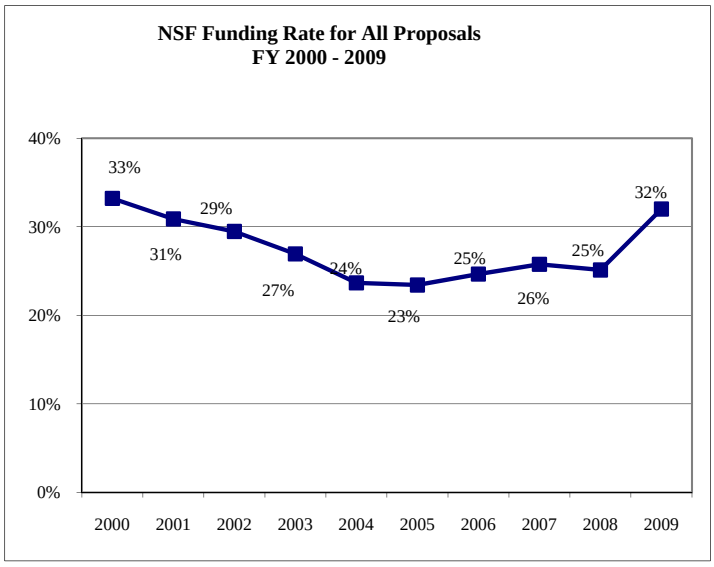

**GEOGRAPHICAL DISTRIBUTION:** NSF put a strong emphasis on ensuring that ARRA funding was spread out across the United States; all 50 states received at least some funding. The figure below shows the amount of ARRA funding obligated by jurisdiction in FY 2009. With the exception of Alaska, which received significant ARRA funding in the Alaska Region Research Vessel, the geographical distribution of ARRA funding is similar to that of other funding years.

[1] A New PI is an individual who has not served as the PI or co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or postdoctoral fellowships, research planning grants, or conferences, symposia and workshop grants).

**FY 2009 ARRA Obligations by State**



**FUNDING RATE:** The competition for NSF funds has always been intense, but it has grown more so in recent years. The overall average proposal funding rate for all NSF proposals decreased from 33 percent in FY 2000 to 23 percent in FY 2005, while the number of proposals grew 43 percent in this same time period. From 2005 to 2008, the number of competitive proposals received averaged around 43,000 per year and the funding rate hovered around 25 percent as the graph indicates. In FY 2009, NSF received slightly more proposals than previous years for a total of 45,228 proposals. At the same time, the additional Recovery Act funds enabled NSF to increase its funding rate to 32 percent in FY 2009, the highest since FY 2000.




**PREVIOUSLY DECLINED PROPOSALS:** ARRA funds were made available for obligation in May 2009, seven months into FY 2009. At that time, many programs had already declined proposals in the "very good" to "excellent" categories in order to meet their Government Performance and Results Act of 1993 (GPRA) goals of responding to proposals within a six-month window. NSF determined that, for FY 2009 only, programs could make awards to previously declined proposals. Three hundred eighteen proposals of the 4,599 awarded with ARRA funds fell into this category (7 percent).

**ARRA SUPPORT FOR USER FACILITIES:** Supporting NSF user facilities means not only maintaining the infrastructure that provides long-term economic benefit to the Nation, but also jobs in many different parts of the country, ranging from Alaska to Florida, Hawaii to Puerto Rico. The NSF was particularly interested in recapitalization of U.S. facilities where maintenance and enhancements had been deferred or staff had been reduced. Facilities supported by NSF ARRA funding include:

| NSF User Facilities | FY 2009 ARRA Actuals (dollars in millions) |
|---|---|
| Antarctic Facilities and Operations | $15.50 |
| Arctic Logistics | 7.00 |
| ARF- Academic Research Fleet, Ship Operations and Upgrades | 18.00 |
| Cornell Electron Storage Ring (CESR) & High Energy Synchrotron Source (CHESS) | 14.99 |
| EarthScope: USArray, SAFOD, PBO | 9.00 |
| Energy Recovery Linac (ERL) | 5.20 |
| Integrated Ocean Drilling Program (IODP) | 25.00 |
| National Nanotechnology Infrastructure Network (NNIN) | 10.27 |
| National Astronomy and Ionosphere Center (NAIC) | 3.10 |
| National High Magentic Field Laboratory (NHMFL) | 5.00 |
| National Optical Astronomy Observatories (NOAO) | 5.60 |
| National Radio Astronony Observatories (NRAO) | 5.40 |
| National Solar Observatory (NSO) | 1.40 |
| National Superconducting Cyclotron Laboratory (NSCL) | 2.00 |
| National Center for Atmospheric Research (NCAR) | 13.20 |
| Networking and Computational Resources Infrastructure and Services | 17.00 |
| Synchrotron Radiation Center (SRC) | 4.99 |
| **TOTAL** | **$162.64** |

**AWARD DURATION:** A real concern with increasing the NSF budget by 50 percent in one year was the impact this would have in increasing renewal requests as those awards came to an end. Increasing the funding rate dramatically in FY 2009 could have potentially forced the funding rate to plummet in FY 2012, as about 40 percent of all NSF awards are 3-year awards.

NSF attempted to ameliorate this effect in a number of ways. First, by increasing the number of standard awards made with regular FY 2009 appropriations, out-year "mortgages" could be bought down. In an average year, 40 percent of NSF programmatic funds are already committed for annual increments on awards. By making more standard grants (full funding for an entire multi-year award obligated at once, rather than in yearly increments), NSF could ensure that there was more freedom in FY 2010, FY 2011 and FY 2012 to make new awards.

Second, with ARRA funds themselves, NSF changed the proportion of award durations. Below is a chart showing the distribution of award durations for FY 2007, FY 2008, FY 2009, and ARRA. With the increased number of 4- and 5-year awards made with ARRA funds, renewals for those awards will be submitted in FY 2013 and FY 2014, reducing the number of renewal submissions expected in FY 2012. The shift in average award duration from 2.5 and 2.6 years in FY 2007 through FY 2009 to 2.9 years for the ARRA portfolio reflects this purposeful change; NSF was able to increase both award duration and funding rate as a result of ARRA funding.