NSB-06-21

Report to the National Science Board

on the

National Science Foundation's

Merit Review Process

Fiscal Year 2005

March 2006

FY 2005 Report on the NSF Merit Review System

Summary

The National Science Foundation received nearly 42,000 new proposals for funding between October 1, 2004 and September 30, 2005. The Foundation awarded 23 percent of the proposals received, making the decisions through the process of merit review. The merit review process includes the steps listed below and depicted in the diagram on the following page:

•The proposal arrives electronically, and NSF staff see that it is placed with the appropriate program(s) for review.

•The program officer (or team of program officers) reviews the proposal and assigns it to at least three experts from outside the Foundation (review generally takes place by mail, advisory panel, or combination of mail and advisory panel). Reviewers and panelists use two general criteria: intellectual merit and broader impacts. The Division leadership (Division Directors, Deputy Division Directors, and/or Section Heads) oversees the review process. The program officer or team:

•selects reviewers and panel members, based on program officer's knowledge, references listed in proposal, recent publications in science and engineering journals, presentations at professional meetings, reviewer recommendations, bibliographic and citation databases, and proposal author's suggestions.

•receives the recommendation of the reviewers/panel, based on merit review criteria and other factors such as risk, balance of priorities, and budget constraints.

•The program officer makes a recommendation to award or decline the proposal, taking into account external reviews, panel discussion, and other factors such as portfolio balance and amount of funding available.

•A higher-level official (usually a Division Director, Deputy Division Director, or Section Head) reviews all program officer recommendations. For award recommendations, a grants officer in the Office of Budget, Finance, and Award Management performs an administrative review. Recommendations for large awards receive additional review by higher-level organizations such as the Director's Review Board and the National Science Board.

•The Division leadership performs an annual assessment of the program portfolio.

•An external Committee of Visitors (scientists, engineers, and educators) assesses each program every 3-5 years, examining the integrity and efficiency of merit review processes and the quality of results from the programmatic investments.

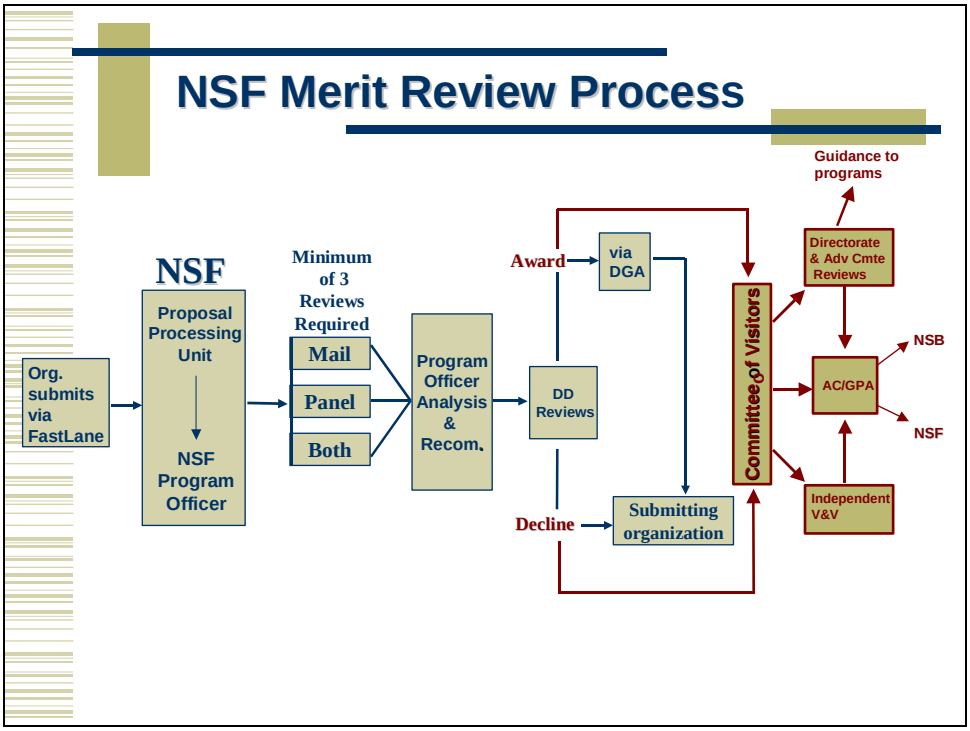
•Advisory Committees (scientists, engineers, educators) review Committee of Visitor reports and directorate/office responses and provide guidance to the Foundation's directorates and offices regarding the reports and other matters pertaining to past investments and future research and education activities.

•The NSF-wide Advisory Committee for Government Performance and Results Act (GPRA) Performance Assessment, a single committee of external experts convened yearly to assess results, evaluates the Foundation's portfolios and their linkages to strategic outcome goals. The Advisory Committee for GPRA Performance Assessment uses Committee of Visitor reports, internal and external directorate assessments of particular programs, investigator project reports, and directorate/division collections of outstanding accomplishments from awards in order to perform the evaluation.

•An external contractor performs an independent verification and validation of Foundation performance measurement.

•The National Science Board's Audit and Oversight Committee reviews the findings presented by the Advisory Committee for GPRA Performance Assessment.

The FY 2005 Report on the NSF Merit Review System provides information about the levels of proposal and award activity for the fiscal year 2004 (October 1, 2004 – September 30, 2005) and the process by which proposals are reviewed and awarded. A brief list of highlights is provided, followed by an introduction and information on numbers of proposals and awards, award sizes, and principal investigator and awardee institution characteristics. The next section details the steps in the merit review process, and the final section outlines government performance issues related to merit review and provides information on special types of proposal and grant mechanisms. Appendices include more detailed or illustrative material. This report to the Board is required by NSB policy, and has been provided annually since 1977.



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HIGHLIGHTS

1. NSF took action on 41,722 competitively reviewed proposals, and provided funding to 9,757 of them during FY 2005. This resulted in an overall success rate of 23 percent. The number of proposals decreased by 5 percent compared to FY 2004. Since FY 2000, the number of proposals received has increased by 41 percent.

2. The average annualized award amount for research grants in FY 2005 was $143,662, an increase of 3 percent above the previous year.

3. For research grants, the number of people supported by NSF -- including graduate students, postdoctoral associates, principal investigators, and co-principal investigators -- has increased by 18 percent between FY 2000 and FY 2005. The number of graduate students supported in FY 2000 was 15,650. By FY 2005, the number had climbed to 20,442, representing a 31 percent increase. This suggests that larger award sizes can help to build capacity.

4. In FY 2005, 76 percent of all proposals were processed within six months, compared to 77 percent in FY 2004. Once again, the agency exceeded its Government Performance and Results Act (GPRA) target goal of 70 percent.

5. Effective October 1, 2002, NSF returned without review proposals that failed to address separately both merit review criteria within the Project Summary. In FY 2005, NSF returned a total of 176 proposals without review due to the failure to address both merit review criteria. In FY 2004, NSF returned a total of 236 proposals without review.

6. NSF made 387 small grants for exploratory research (SGER) awards in FY 2005 for a total of $27 million, compared to 382 SGER awards made last year for a total of $29 million. The average size of the FY 2005 SGER award was about $70,000, compared to $77,000 in FY 2004 and $68,000 in FY 2003. NSF will initiate an evaluation of SGERs in FY 2006.

7. In FY 2005, while the number of proposals received dropped overall by 5 percent compared to the previous year, the number of proposals from minority Principal Investigators (PIs) decreased by 3 percent. The success rate for minority PIs was 23 percent, the same as the overall rate. During FY 2005, the number of proposals received from women PIs decreased 2 percent. The success rate for women PIs was 25 percent, two percentage points higher than the overall rate of 23 percent.

8. The number of program officers has increased by 4 percent (from 385 to 400) between FY 2004 and FY 2005, and the number of science assistants has increased by 9 percent (from 32 to 35). NSF continues to examine workforce issues through its business analysis.

9. In FY 2005, the National Science Board evaluated the Foundation's merit review process and provided recommendations to improve the transparency and effectiveness of the process. During FY 2005 and FY 2006 NSF has taken steps toward systematic implementation of the recommended actions.

10. A large number of potentially fundable proposals are declined each year. In FY 2005, close to $1.8 billion of declined proposals were rated as high as the average rating for an NSF award (4.1 on a 5-point scale). These declined proposals represent a rich portfolio of unfunded research and education opportunities.

FY 2005 Report on the NSF Merit Review System

1. Introduction

The National Science Foundation Act of 1950 directs the Foundation "to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels."[1] NSF achieves its unique mission by making merit-based awards to researchers, educators, and students at approximately 1,700 U.S. colleges, universities and other institutions. In Fiscal Year (FY) 2005, NSF awards directly involved an estimated 195,000 people, including senior researchers, post-doctoral associates, teachers, and students from kindergarten through graduate school.

This year NSF made nearly 10,000 new awards from more than 40,000 competitive proposals submitted. Over 96 percent of NSF's awards are selected through its competitive merit review process, combining external and internal evaluation. All proposals for research and education projects are evaluated using two criteria: the *intellectual merit* of the proposed activity and its *broader impacts*, such as impacts on teaching and learning. Reviewers also consider how well the proposed activity fosters the integration of research and education and broadens opportunities to include a diversity of participants, particularly from underrepresented groups. The merit review system is at the very heart of NSF's selection of the projects through which its mission is achieved.

This *FY 2005 Report on the NSF Merit Review System* responds to a National Science Board (NSB) policy endorsed in 1977 and amended in 1984, requesting that the NSF Director submit an annual report on the NSF proposal review system. The report provides summary information about proposal and award activity and the process by which proposals are reviewed and awarded. Section 3 of this year's report describes NSF's response to the recommendations of the Board's September 2005 report on NSF's merit review processes.[2]

2. Proposals and Awards

Competitively Reviewed Proposals, Awards and Success Rates

During FY 2005, NSF took action on 41,722 competitive, merit reviewed research and education proposals, as shown in **Text Figure 1**, page 7. This represents a slight decrease from the previous year.

During FY 2005, NSF made 9,757 awards, slightly fewer awards than in the previous fiscal year. This resulted in an overall success rate of 23 percent. As shown in **Appendix Table 1,** page 31, there are differences in the success rates of the various NSF directorates,[3] ranging from 17

[1] 42 CFR 16 §1862, available at <http://www4.law.cornell.edu/uscode/html/uscode42/usc_sec_42_00001862----000-.html>.

[2] *Report of the National Science Board on the National Science Foundation's Merit Review System*, NSB-05-119. Available on the web page at < http://www.nsf.gov/nsb/documents/reports.htm>.

[3] The term "directorates" as used in this report, refers to NSF's seven programmatic directorates and the Office of Polar Programs (OPP). The Office of International Science and Engineering (OISE), formerly a division within the

percent for Engineering to 65 percent for the newly established Office of Cyberinfrastructure (OCI). The variation may be due to factors such as the relative size and nature of the disciplines and communities being served.

Text Figure 1
NSF Proposal, Award and Success Rate Trends

Fiscal Year

	2000	2001	2002	2003	2004	2005
Proposals	29,508	31,942	35,165	40,075	43,851	41,722
Awards	9,850	9,925	10,406	10,844	10,380	9,757
Success rate	33%	31%	30%	27%	24%	23%

The slight decline in proposal submissions from FY 2004 may be explained by the transition of the Information Technology Research (ITR) cross-disciplinary focus area back into NSF's core research and education programs. A decline in proposals submitted to the Small Business Innovation Research (SBIR) program was also observed.

Types of Proposals and Awards

In general, NSF makes two kinds of competitive grants for the support of research and education:

> **Standard grants** provide funding in a single fiscal year award to cover all of the proposed activities for the full duration (generally 1-5 years) of a project.
>
> **Continuing grants** provide funds for an initial period (usually one year) of a multiple year project with a statement of intent to continue funding in yearly increments, called "continuing grant increments" or CGIs, until completion of the project.

Of the 9,757 competitive awards made in FY 2005, 5,943, or 61 percent were standard grants, and the rest were continuing grants. In addition to the standard and continuing awards, NSF awarded 8,307 continuing grant increments (CGIs) based on proposals that had been competitively reviewed in earlier years.[4] As shown below in **Text Figure 2**, NSF devotes 21 percent of its total budget to new standard grants and 16 percent to new continuing grants. The use of standard grants allows NSF the flexibility to make new awards each year without carrying a large burden of continuing grant obligations.

Directorate for Social, Behavioral and Economic Sciences, is now located within the NSF Director's Office. Similarly, the Office of Cyberinfrastructure, formerly the Division of Shared Cyberinfrastructure in Computer & Information Science & Engineering (CISE), is now located in the NSF Director's Office. See NSF Organization Chart in Appendix Table 15, page 59.

[4] While the original award is a competitive action, the CGI is a non-competitive renewal grant. Continued incremental funding is based on NSF review of annual project reports and additional oversight mechanisms established by specific programs.

Text Figure 2
Percentage of NSF Budget by Type of Award

	2000	2001	2002	2003	2004	2005
Standard Grants	23%	25%	26%	23%	23%	21%
Continuing Grants	21%	19%	21%	21%	17%	16%
Continuing Grant Increments	38%	38%	35%	36%	39%	43%
Centers, Facilities, and Other[5]	18%	18%	18%	20%	20%	20%
100% = $Billion	$3.92	$4.46	$4.77	$5.37	$5.66	$5.49

People and Institutions

NSF's Strategic Plan (FY 2003 – 2008) includes as an objective the promotion of greater diversity in the science and engineering workforce through increased participation of underrepresented groups and institutions in all NSF programs and activities. NSF is committed to increasing the participation in all NSF activities of researchers, educators and students from groups currently underrepresented in the science and engineering enterprise. Success rates over the last five fiscal years for all Principal Investigators (PIs), female and minority PIs[6], and prior and new PIs[7] are shown in **Text Figure 3** below. Proposals, awards and success rates by PI characteristics are presented in **Appendix Table 2** on page 32.

Text Figure 3
Success rate by Fiscal Year and PI Characteristic

	2000	2001	2002	2003	2004	2005
All	33%	31%	30%	27%	24%	23%
Female	35%	32%	30%	28%	25%	25%
Male	33%	31%	30%	27%	24%	23%
Minority	32%	30%	29%	27%	23%	23%
New	25%	24%	22%	19%	17%	17%
Prior	40%	36%	35%	33%	29%	28%

During FY 2005, the number of proposals submitted to NSF declined slightly from FY 2004 but remained about the same or greater than the number submitted in FY 2003. This was true for all categories of PIs listed above in **Text Figure 3**. In FY 2005, the number of proposals received dropped overall by 5 percent. The number of proposals from minority Principal Investigators (PIs) decreased by 3 percent. The success rate for minority PIs was 23 percent, the same as the

[5] "Other" includes Organizational Excellence activities.
[6] Minority includes American Indian or Alaskan Native, Black, Hispanic, and Pacific Islander and excludes Asian and White, not of Hispanic Origin. Please note that the data on underrepresented groups are derived from information that the principal investigators submit on a voluntary basis. About 90 percent of principal investigators supply this information.
[7] A proposal is counted in the New PI category if the PI did not have an NSF award in the current or prior years.

overall rate. During FY 2005, the number of proposals received from women PIs decreased 2 percent. The success rate for women PIs was 25 percent, two percentage points higher than the overall rate of 23 percent. Details can be seen in **Appendix Table 2**, on page 32. In addition, **Appendix Table 3**, page 33, provides a breakdown of success rates by the race/ethnicity of the minority Principal Investigators.

The major gap in success rates continues to be between *new PIs* and *prior PIs* (17 percent and 28 percent, respectively, in FY 2005). There are a number of possible reasons for this; for example, prior PIs are more likely to have established research agendas and are thus able to cite the results of previously funded projects in their subsequent proposals. In the case of new PIs who have conducted research, but are approaching NSF as a funding source for the first time, it may take more than one proposal submission to experience success.

For research grants, the number of people supported by NSF -- graduate students, postdoctoral associates, principal investigators, and co-principal investigators -- has increased by 18 percent between FY 2000 and FY 2005. **Text Figure 4**, below, shows that while the number of NSF research grants has decreased from 6,501 in FY 2000 to 6,231 in FY 2005, the number of people supported has increased. The increase in the number of graduate students supported has been most striking, from 15,650 in FY 2000 to 20,442 in FY 2005, or a 31 percent increase. This increase has taken place in the context of increasing award size and suggests that larger award sizes can help to build capacity (see below, page 13).

Text Figure 4
Competitive Research Awards and People Supported, FY 2000 - 2005

Year	2000	2001	2002	2003	2004	2005	% Change, 2000 - 2005
Competitive Research Awards	6,501	6,221	6,720	6,851	6,510	6,231	-4.15%
PIs Supported	15,538	15,827	16,322	16,592	17,013	16,954	9.11%
PIs and Co-PIs Supported	21,041	21,739	22,949	23,649	24,612	24,572	16.78%
Postdocs Supported	3,743	4,367	4,320	4,629	4,399	4,068	8.68%
Graduate Students Supported	15,650	18,717	19,303	20,384	21,105	20,442	30.62%

Note: Competitive Research Awards reflect the new awards made in a given year and do not include continuing grant increments.

Personnel counts reflect all personnel supported in the year, on both competitive research awards and continuing increments made on awards reviewed.

Post-doc and graduate student counts are from the personnel counts reported on research award budgets. Data from NSF's Enterprise Information System, as of 7 January 2006.

In addition to tracking the success rates of individuals, NSF also looks at success rates for academic institutions. For FY 2005, the success rate for *research-intensive Ph.D. institutions*, defined as the top 100 Ph.D.-granting institutions ranked according to the amount of FY 2005 funding received from NSF, was 25 percent. In comparison, the rate for *non-research intensive Ph.D. institutions* in FY 2005 (i.e., the Ph.D.-granting institutions that are not in the top 100 NSF-funded category) was 17 percent. Two- and four-year institutions experienced success rates of 22 percent and 24 percent, respectively for FY 2005. For minority-serving institutions, the FY 2005 success rate was 18 percent, down from 20 percent last year.

In the past year, NSF made a number of outreach presentations to diverse institutions across the country in an effort to increase awareness of the NSF merit review process and to encourage the submission of proposals submitted by scientists and engineers from underrepresented groups. Outreach efforts included workshops for tribal colleges and those institutions eligible for support through the Experimental Program to Stimulate Research (EPSCoR).[8]

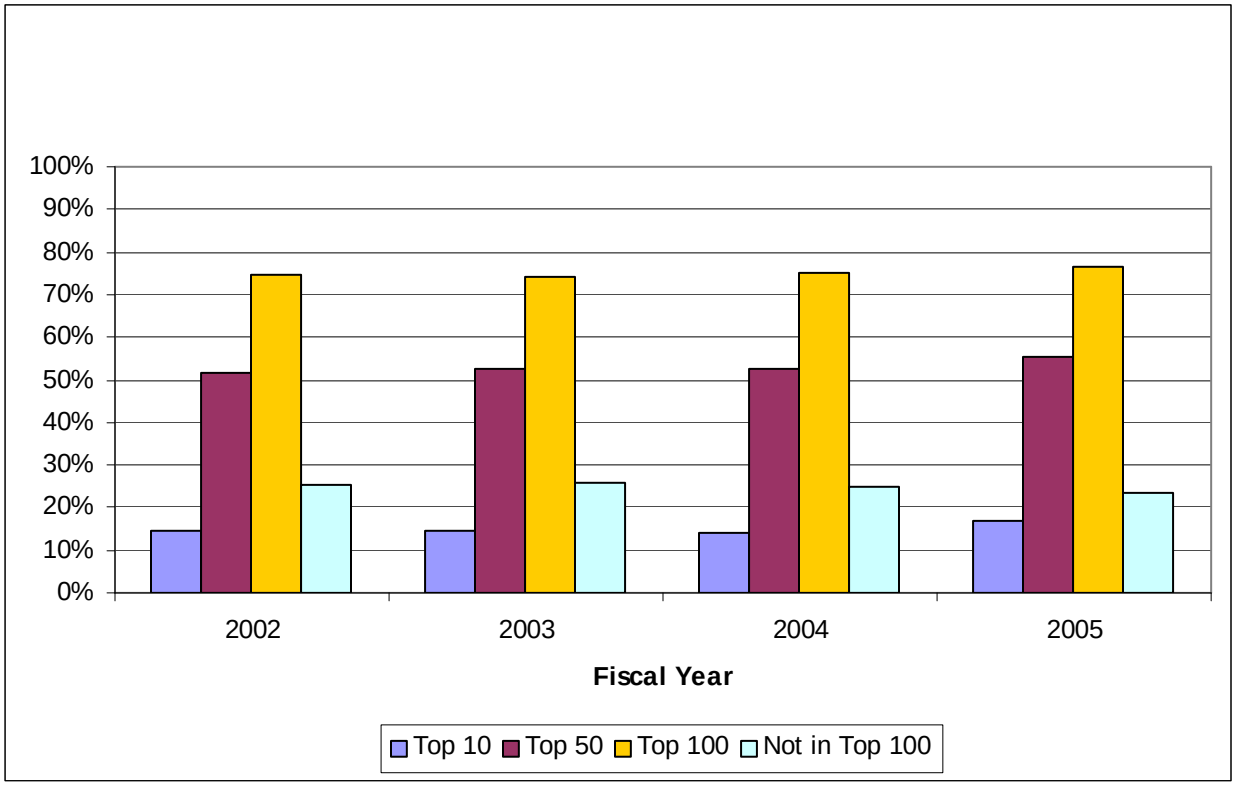
Distribution of Budget and Awards by Sector/Institution

Through its Budget Internet Information System,[9] NSF tracks the distribution of dollars by type of organization: academic, non-profit, for-profit, and federal. In FY 2005 NSF awarded 76 percent of its budget to academic institutions, 15 percent to non-profit and other organizations, 7 percent to for-profit businesses, and 2 percent to Federal agencies and laboratories. This overall distribution of funds by type of organization has remained fairly constant over the past five years.

With regard to academic institutions, NSF classifies them according to the proportion of NSF funding they receive. As seen in **Text Figure 5**, next page, the percentages of NSF awards made to the "top funded" (i.e., the institutions receiving the largest proportion of NSF funding) ten, top funded fifty, and top funded one hundred academic institutions have varied little over the past four years. In FY 2005, the top 10 funded institutions received 17 percent of NSF awards while 23 percent of NSF awards are made to institutions that are not in the top 100 funded schools. By far the largest proportion of dollars went to the top 100 schools (77 percent in FY 2005). NSF has as a performance goal for FY 2007 to increase or maintain the percentage of proposals received from academic institutions not in the top 100 of NSF funding recipients in several investment categories, including fundamental science and engineering.[10]

[8] A description of outreach events, both past and planned, is available on the NSF web page at <http://www.nsf.gov/events/>.
[9] The Budget Internet Information System is available on the web at < http://dellweb.bfa.nsf.gov/>.
[10] See NSF's FY 2007 Budget Request to Congress, 6 February 2006, "Performance Information,"available on the web at <http://www.nsf.gov/about/budget/fy2007/toc.jsp>.

Text Figure 5
Percent of Awards to Top Funded Academic Institutions
Fiscal Year 2002 – 2005



Award Amounts and Duration

The average annualized award amount for *research grants*[11] in FY 2005 was $143,669, an increase of 3 percent from the previous year. The median award[12] was $103,965, a 2 percent increase over the previous year.[13] **Text Figure 6**, next page, displays average and median NSF award amounts from FY 1998 to FY 2005. Data by NSF directorate for the last five years are presented in **Appendix Table 4**, page 33.

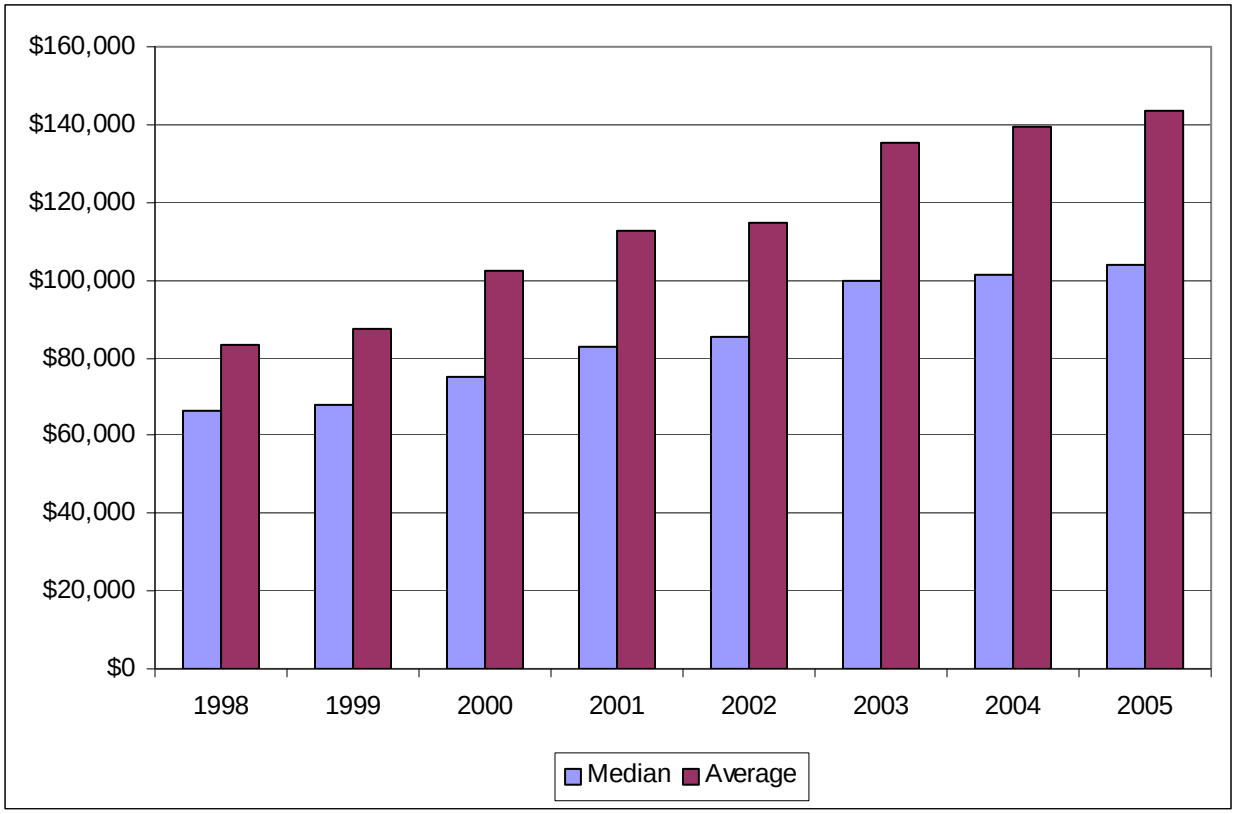
Adequate award size is important both for attracting high-quality proposals and for ensuring that proposed work can be accomplished as planned. Larger awards permit the participation of more students and allow scientists and engineers to devote a greater portion of their time to actual research rather than writing and reviewing proposals.

[11] *Research Grants* is a subset of total NSF awards associated primarily with individual investigator and group research projects. These do not include education and training grants, which are primarily multi-institution and of a much larger average size.

[12] The difference between the median and average award amounts reflects the effect of numerous small awards on the median, and a few large awards on the average award amount.

[13] Beginning in FY 2003 collaborative proposals submitted as individual proposals from the collaborating institutions were counted as a single proposal as NSF treats them as a single proposal for review and award/decline decisions. If collaborative proposals were counted individually in FY 2003, the average award size would have been $121,380.

Text Figure 6
Award Amounts
Competitively Reviewed Research Awards



Longer award terms are important in increasing the effectiveness of principal investigators and graduate students. Graduate students are able to have more time to do their thesis work. NSF's FY 2005 GPRA goal was to achieve an average award duration of 3.0 years for research grants. The actual result was 2.96 years, thus NSF was not successful for this goal. Program directors must balance competing requirements, such as increasing award size, increasing duration of awards, and/or making more awards. NSF will continue to give careful attention to award size and duration in the context of recent declines in success rates.

Proposal Processing Efficiency – Time to Decision (Proposal Dwell Time)
It is important for applicants to receive a timely funding decision. NSF's FY 2005 GPRA performance goal was, for at least 70 percent of proposals, to inform applicants whether their proposals have been declined or recommended for funding within six months of receipt. As indicated in **Text Figure 7**, below, NSF surpassed this goal. In FY 2005, 76 percent of all proposals were processed within six months, slightly less than in FY 2004. The achievement of this goal is particularly significant because of the trend toward major increases in the number of proposals submitted, thus adding to the merit review workload of program staff.

Text Figure 7
Proposal Dwell Time
Percentage of Proposals Processed Within 6 Months

Fiscal Year	**2001**	**2002**	**2003**	**2004**	**2005**
Percentage	63%	74%	77%	77%	76%

3. The Proposal Review Process

The NSF proposal process starts with electronic receipt of the proposal, which is then forwarded electronically to the appropriate NSF program for review. All proposals are reviewed by a scientist, engineer, or educator serving as an NSF program officer, and usually by three or more experts from outside NSF in the particular fields represented in the proposal. Program officers at NSF follow the merit review process guidelines found in NSF Manual #10, *The Proposal and Award Manual*, Chapter V, available on the internal NSF web page. For example, the program officer exercises care to assure that the external reviewers have no conflicts of interest. *The Proposal and Award Manual* also requires a minimum of three external reviews for most proposals.

Proposers may suggest names of persons they believe are especially well qualified to review the proposal, along with persons who they believe should not review the proposal. These suggestions may serve as an additional resource in the reviewer selection process, at the program officer's discretion. Program officers also rely on their knowledge of what is being done by whom in their research and education area, the references listed in the proposal, recent publications and professional meetings, bibliographic databases, and recommendations from other reviewers. Program officers may obtain comments from assembled review panels or from site visit teams before recommending final action on proposals.

Senior NSF staff at the division or section level further review the program officer's recommendations for awards and declinations. When a decision has been made, verbatim copies of reviews, excluding the names of the reviewers, and summaries of review panel deliberations, if any, are provided to the proposal author.

Review Processes Used at NSF

NSF's proposal review system relies on extensive use of knowledgeable experts from outside the Foundation. Expert judgments of which proposals best address the merit review criteria established by the National Science Board inform Foundation staff and influence funding recommendations. NSF programs obtain external peer review by three principal methods: (1) "mail-only," (2) "panel-only," and (3) "mail-plus-panel" review. In addition, site visits by NSF staff and external members of the community are often used to review proposals for facilities and centers. NSF program officers are given discretion in the specific use of review methods, subject to higher-level review.

In the "mail-only" review method, reviewers are sent proposals and asked to submit written comments to NSF through FastLane, NSF's web-based system for electronic proposal submission and review. These mail reviews are then used by the NSF program officer in his or her decision to recommend an award or declination.

"Panel-only" review refers to the process of soliciting reviews only from those who meet in a panel review setting to discuss their reviews and provide advice directly to the program officer. Most programs that use this process provide proposals to panelists and receive their reviews before the panel meeting. The program officer uses this panel advice to decide to recommend an award or declination.

Many proposals submitted to NSF are reviewed using some combination of these two processes ("mail-plus-panel" review). Those programs that employ the mail-plus-panel review process have developed several different configurations, such as:

- A reviewer is asked to submit a written mail review and also serve as a panelist; and

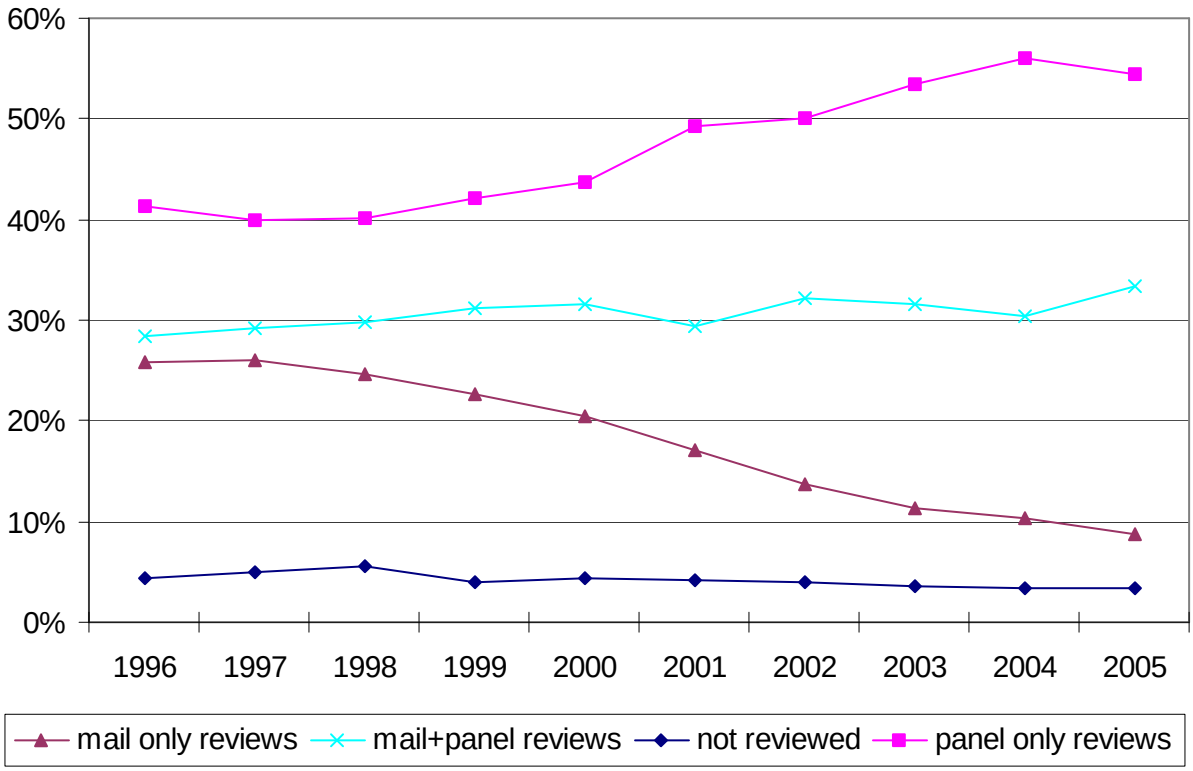
- A reviewer is asked to participate only as a panelist, with responsibility only for reviewing and discussing mail reviews written by others and providing verbal and/or written advice to the program officer.

The use of various review methods has changed markedly over time, as shown below in **Text Figure 8**, next page, and the corresponding **Appendix Table 5** (page 34). Between 1996 and 2004, the percentage of NSF proposals reviewed by panel-only increased from 41 to 56 percent of all proposal. In FY 2005, the percentage of proposals reviewed by panel-only dipped slightly from 56 to 54. From 1996 through 2005, there has been a steady decline in the use of mail-only review from 26 to 9 percent. The use of mail-plus-panel review increased to 33 percent in FY 2005.[14]

[14] During this period of about 10 years, between three and six percent of the proposals were not externally reviewed; these include proposals for conferences or symposia, small grants for exploratory research, and other special types of proposals that are subject to internal but not external review.

There are a number of reasons for the trend away from mail-review only. Panels allow reviewers to discuss and compare proposals. Panels tend to be used for programs that rely on concrete deadlines as opposed to target dates. The panel review process has advantages in the evaluation of multidisciplinary proposals or interdisciplinary proposals in new or developing research areas because, unlike mail-only review, viewpoints representing several disciplines can be openly discussed and integrated. In a similar fashion, the panel review discussion facilitates consideration of both merit review criteria. Finally, the panel review process usually requires fewer individual reviewers per proposal than the mail-only process. A panel of 25 reviewers could possibly review 200 proposals, while it may require several hundred requests for mail reviewers to review the same proposals. Also, using panels in the review process tends to reduce proposal processing time (time-to-decision), compared to mail-only reviews. For example, in FY 2005, 79 percent of all proposals reviewed by panel-only were processed within six months, compared to 73 percent for mail-plus-panel and 59 percent for mail-only.

Text Figure 8
FY 1996 - 2005 Trend, NSF Review Method
(Percentage of Proposals)



Mail review often takes more time because additional reviews must be requested when some of the reviewers in the first set decline to review the proposal. The chief advantages of mail review are: (1) the expertise of the reviewers can be more precisely matched to the proposal, and (2) it

is less expensive (there are no travel costs). The mail-plus-panel review process is used frequently because it combines the in-depth expertise of mail review with the more comparative analysis of panel review.

Some programs are continuing to experiment with "virtual panels". In virtual panels, panelists participate from their offices or homes and interact electronically using NSF's Interactive Panel System (IPS), accompanied by a teleconference. Around 95 percent of panels, whether they assemble at NSF, offsite at a common location, or virtually, are using IPS. A part of FastLane, IPS permits the viewing of proposals, reviews, basic panel discussions, collaboration on panel summaries, and approval of the draft panel summary through the web. Some programs are making use of NSF's videoconferencing facilities to enhance the participation of panelists whose schedules do not permit them to be physically present at the time of the panel. Videoconferencing is also employed in award management and oversight for large center-type projects. NSF is continuing its efforts to improve web-based and electronic means of communication to contribute to the quality of the merit review and award oversight processes.

Directorate-level data on the use of different review processes during FY 2005 are presented in **Appendix Table 6,** page 34. NSF Directorates vary in their use of proposal review methods. Mail-plus-panel review was the predominant review process used in the Office of Polar Programs and the Directorates of Biological Sciences, Geosciences, and Social, Behavioral and Economic Sciences, while panel-only review was the predominant method in the Office of Cyberinfrastructure and the Directorates of Computer & Information Science & Engineering, Education and Human Resources, Engineering, and Mathematical & Physical Sciences. Mail-only review was the most common mode of review in the Office of International Science and Engineering.

Reviews and Reviewers

NSF policy, as stated in *The Proposal and Award Manual* requires at least three external reviews for each award or decline recommendation on a proposal, unless the requirement has been waived.[15] The total numbers of reviews and the average numbers of reviews per proposal obtained by the three different review methods are presented in **Text Figure 9**. As expected, the mail-plus-panel method had the highest number of reviews per proposal, averaging nearly eight, while the mail-only method averaged around four.

Directorate-level data for FY 2005 are presented in **Appendix Table 7,** page 35. The variation among directorates in the number of reviews per proposal reflects both their preferences for the different review methods, and differences in the way directorates count reviewers in the panel review process.

[15] See Section V-3 of *The Proposal and Award Manual*. Exceptions include proposals for Small Grants for Exploratory Research (SGER) and workshop and symposia proposals. For workshop and symposia proposals, however, the program officer may obtain external reviews whenever he or she deems that such review is appropriate.

Text Figure 9
Reviews per Proposal, FY 2005

	All Methods	Mail-plus-Panel	Mail-Only	Panel-Only
# of Reviews	246,273	108,591	15,552	122,130
# of Proposals	40,310	13,919	3,656	22,735
Reviews per Proposal	6.1	7.8	4.3	5.4

NSF maintains a central electronic database of more than 300,000 reviewers. Program officers identify potential reviewers using a variety of sources including their own knowledge of the discipline, applicant suggestions, references attached to proposals, published papers, scientific citation indexes and other similar databases, and input from mail reviewers, panelists, and visiting scientists. During FY 2005, approximately 50,000 reviewers were sent one or more proposals for mail review. In all, approximately 41,000 individuals served on panels, were sent a proposal for mail review, or served in both functions. About 14,000 of these reviewers had never reviewed an NSF proposal before. The reviewers came from all 50 states in addition to the District of Columbia, Puerto Rico, Virgin Islands, and other U.S. jurisdictions. More than 5,000 reviewers came from outside of the United States. Moreover, reviewers came from a range of institutions, including two-year and four-year colleges and universities, Master's level and Ph.D.-granting universities, industry, and government. FY 2005 data are available on numbers of reviewers from each state, territory, and country as well as by type of institution.

In FY 2001, NSF developed systems and policies to request demographic data electronically from all reviewers to determine the participation of underrepresented groups in the NSF reviewer pool. The goal was to establish a baseline for participation of underrepresented groups in NSF proposal review activities. In FY 2005, out of a total of 40,992 distinct reviewers who returned reviews, 8,980 – about 22 percent -- provided demographic information. Out of the 8,980 who provided information, 3,180 (35%) indicated they were members of an underrepresented group (i.e., minority or women; see Note 6, page 8, for a definition of minority). Provision of demographic data is voluntary and, given the low response rate, there is not enough information to establish a baseline. During FY 2004, NSF altered the FastLane reviewer module to make it more convenient for reviewers to provide demographic information and, as a result, NSF has seen a slight increase in the proportion of reviewers providing information after the FastLane change. In FY 2005 22 percent provided information in comparison to 17 percent in FY 2004.

NSF continually updates its Library resources, including databases, web pages, and directories, and conducts frequent tutorials on finding reviewers. Other activities include the collection and sharing of potential reviewer data from associations serving groups that are underrepresented in science and engineering, and encouraging participation of members of underrepresented groups in NSF workshops and conferences. Some NSF divisions actively solicit new reviewers through their web pages and their outreach activities.

Participation in the peer review process is voluntary. Panelists are reimbursed for expenses; mail reviewers receive no financial compensation. In FY 2005, 60 percent of requests for mail reviews elicited positive responses, slightly up from 59 percent in FY 2004 and 58 percent in FY 2003.

Merit Review Criteria

In FY 1998 the National Science Board approved the use of the two current NSF merit review criteria now in effect:

> **What is the intellectual merit of the proposed activity?** How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?
>
> **What are the broader impacts of the proposed activity?** How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

In FY 1999 NSF established annual Government Performance and Results Act (GPRA) performance goals to increase reviewer and program officer attention to both merit review criteria. Currently NSF Committees of Visitors and NSF Staff provide an annual evaluation of the Foundation's use of the merit review criteria. In the National Science Board discussions, members expressed concern that the broader impacts criterion was not being fully integrated into the review process, and that principal investigators and reviewers are unsure how it should be addressed. They agreed that efforts to ensure that both criteria are addressed in proposals and reviews should be continued and they asked staff to periodically report on these efforts.

Since then, the Foundation has completed the following actions to raise awareness of the importance and use of the merit review criteria:

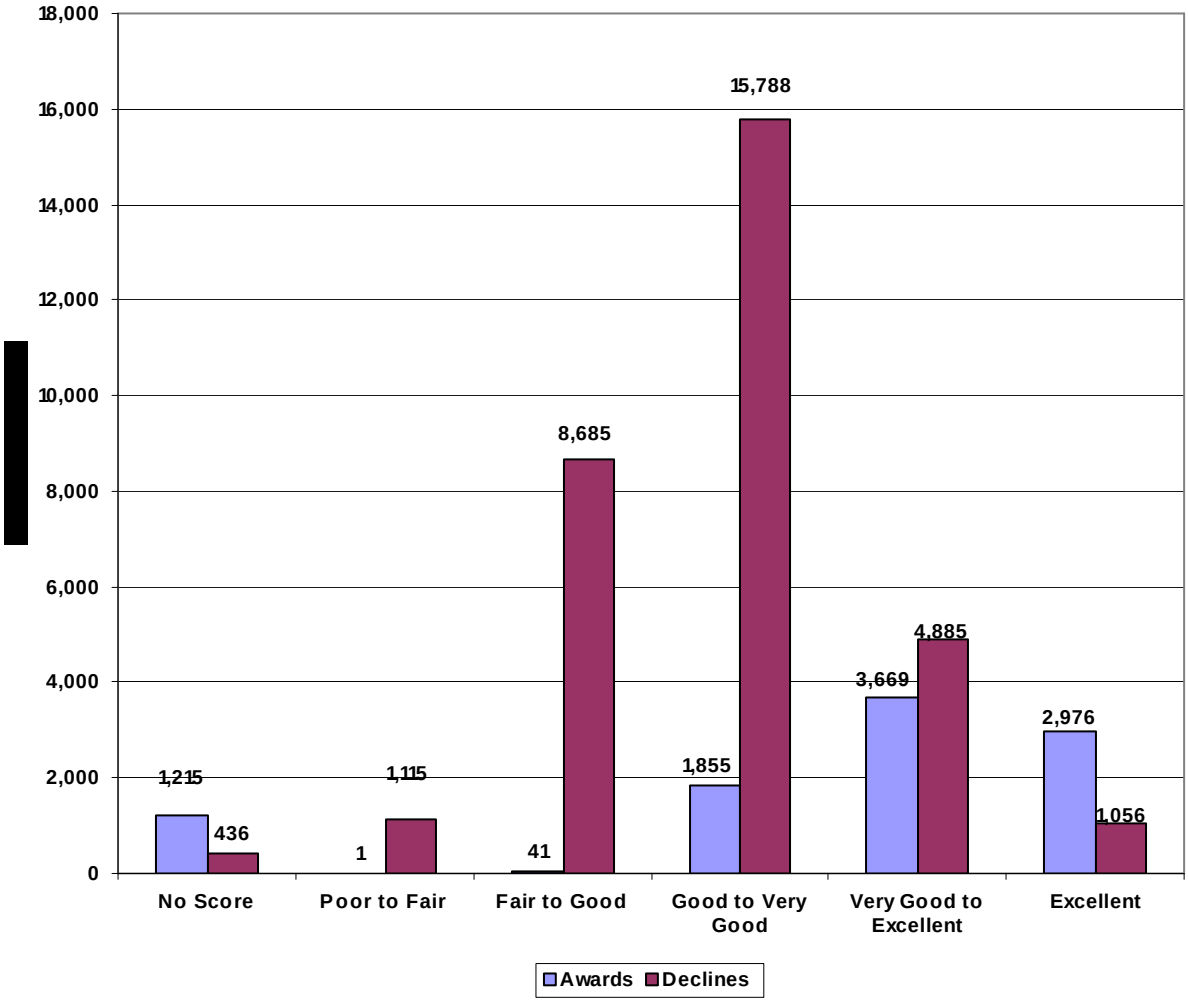
- Provided a set of examples of activities that address the broader impacts criterion and made the examples available to proposers via a link embedded in the Grant Proposal Guide (http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf). In addition, the examples are available to proposers and reviewers via FastLane.
- Revised the FastLane Proposal Preparation Guidelines and the standard language in the Program Information Management System (PIMS) that instructs proposers that they *must* clearly address broader impacts in the project summaries of their proposals.

- Provided guidance to proposers in the Grant Proposal Guide that Principal Investigators must address both merit review criteria in separate statements within the one page Project Summary. The Grant Proposal Guide also reiterates that broader impacts resulting from the proposed project must be addressed in the project description and described as an integral part of the narrative. Effective October 1, 2002, NSF returned without review proposals that failed to separately address both merit review criteria within the project summary. For FY 2005, 176 proposals were returned with out review due to the failure to address the merit review criteria in the summary; the number of returned proposals for the previous fiscal year was 236.
- Revised guidance in the Proposal and Award Manual to require program officers to comment on both the intellectual merit and the broader impacts of the proposed activity as part of the review analysis of the proposal.
- Updated NSF's reviewer forms to provide the capability for reviewers to comment separately on both criteria in the review of a proposal.
- Examined reviewer use of the broader impacts criterion and concluded that approximately 90 percent of reviews addressed both intellectual merit and broader impacts in the last three fiscal years.

Reviewer Proposal Ratings

The NSF merit review system emphasizes reviewer narratives in addition to numerical ratings. The written comments provided by reviewers, the summary of panel discussions, and the expert judgments of program officers are important components of the merit review system. Summary ratings are another indicator of reviewer judgment. The distribution of average summary ratings of reviews for awarded and declined proposals is provided in **Text Figure 10,** next page**.**

Text Figure 10
Distribution of Average Reviewer Ratings



These data indicate considerable overlap among the average reviewer ratings of successful and unsuccessful proposals, most notably in the range of "very good" average ratings.[16] **Appendix Tables 8-10,** pages 36-38**,** indicate that this overlap among the average reviewer ratings is present and similar in degree for each of the three proposal review methods used by NSF (panel-only, mail-only, and mail plus panel).

NSF Program Officer Recommendations

As noted above, the narrative comments and summary ratings provided by external reviewers are essential inputs that inform the judgment of the program officers who formulate award and decline recommendations to NSF's senior management.

[16] The corresponding numerical ratings, on a five-point scale, are as follows: Excellent (4.5 – 5.0); Very Good – Excellent (4.0 - <4.5); Good – Very Good (3.0 - <4.0); Fair – Good (2.0 - <3.0); and Poor – Fair (<2.0). Proposals with "No Score" include small grants for exploratory research and workshop/symposia proposals that do not require external review.

NSF program officers produce and manage a portfolio of awards. They must balance the portfolio among various considerations and objectives. In addition to information contained in the external proposal reviews, NSF program officers consider issues such as:

- Potential impact on human resources and infrastructure;
- Different approaches to significant research questions;
- Capacity building in a new and promising research area;
- Support for high-risk proposals with potential for transformative advances in a field;
- NSF core strategies, such as the integration of research and education;
- Achievement of special program objectives and initiatives;
- Other available funding sources; and
- Geographic distribution.

Program Officer Characteristics and Workload

The number of program officers increased from 385 in FY 2004 to 400 in FY 2005, a 4 percent increase. The characteristics of NSF program officers are presented in **Text Figure 11**.

Text Figure 11
Distribution of NSF Program Officers by Characteristics
As of October 1, 2005

Program Officers	Total	Percent
Total	**400**	**100%**
Gender		
Male	**242**	**61%**
Female	**158**	**40%**
Race		
Minority	**83**	**21%**
White, Non-Hispanic	**317**	**79%**
Employment		
Permanent	**202**	**51%**
Visiting Scientists, Engineers & Educators (VSEE)	**38**	**10%**
Temporary	**49**	**12%**
Intergovernmental Personnel Act (IPA)	**111**	**28%**

Source: NSF Division of Human Resource Management
Notes: VSEE: Individual employed as a Visiting Scientist, Engineer, or Educator (formerly termed "Rotator"). IPA: Individual employed under the Intergovernmental Personnel Act.

Program Officers can be permanent NSF employees or non-permanent employees (includes Visiting Scientist, Engineer, or Educator; Temporary; and Intergovernmental Personnel Act categories). About half of the program officers fall into the non-permanent category. Some non-permanent program officers are "on loan" as visiting scientists, engineers, and educators (VSEEs) for up to three years from their host institutions. Others are employed through grants to the home institutions under the terms of the Intergovernmental Personnel Act (IPA). Non-permanent employees provide NSF with new ideas and fresh science and engineering perspectives. They bring knowledge of the most recent disciplinary and interdisciplinary developments to enhance NSF's responsiveness and agility. Whether they are hired as temporary or permanent, incoming NSF program officers receive training in the merit review process.

While NSF was able to increase the number of program officers in FY 2005, workload concerns are still present and frequently highlighted by NSF's external review committees, the Committees of Visitors. NSF developed an overall human capital management plan and is taking steps to address the program officer workload issue through, for example, the addition of Science Assistant positions. NSF had 35 Science Assistant positions in FY 2005, compared to 32 positions in FY 2004, a 9 percent increase in these positions.

NSF has revitalized its professional development opportunities for program staff, offering in-house courses in project management, leadership, and communication through the NSF Academy. In addition, the Office of Integrative Activities is holding focus groups and forums for program staff to share effective practices for merit review, given workload concerns.

Assuring Objectivity in the Merit Review Process

NSF program officers check all proposals for potential conflict of interest and select expert outside reviewers with no apparent potential conflicts. All reviewers are provided guidance and instructed to declare potential conflicts. All program officers receive conflict-of-interest training annually.

Each program officer's recommendation to award or decline a proposal is subject to a programmatic review by a higher level reviewing official (usually the Division Director), and an administrative review by a grants officer in the Office of Budget, Finance, and Award Management (BFA). The Director's Review Board (DRB) reviews all award recommendations with an average annual award amount of 2.5 percent or more of a Division's annual budget. The National Science Board reviews and approves all recommended awards where the average annual award amount is 1 percent or more of the awarding Directorate's annual budget.[17] Every applicant whose proposal undergoes merit review receives a letter stating the results, a panel summary explaining the rationale for the decision (if panel review was used), along with an anonymous verbatim copy of each review that was considered in the review process. Some NSF programs also send "context statements" that explain the broader context under which any given proposal was reviewed (e.g., the number of proposals received and the number awarded and declined). There is an increasing interest among program staff in the use of context statements and other communications to proposers, particularly in the case of difficult award/decline recommendations (e.g., proposals with "very good" average ratings).

[17] Other items requiring NSB prior approval are new programs and major construction projects that meet certain specifications. In FY 2005, the Board reviewed and approved nine recommended awards.

If, after receiving the reviews and other documentation of the decision, an unsuccessful proposer would like additional information, he or she may ask the program officer for further clarification. If, after considering the additional information, the applicant is not satisfied that the proposal was fairly handled and reasonably reviewed, he or she may request formal reconsideration. In response to concerns from the National Science Board and the Office of Inspector General, NSF implemented a uniform policy to inform all declined proposers of the reconsideration process beginning in FY 2006.[18] A reconsideration request can be based on the applicant's perception of procedural errors or on disagreements over the substantive issues dealt with by reviewers. If the AD upholds the original action, the applicant's institution may request a second reconsideration from the Foundation's Deputy Director.

NSF declines approximately 30,000 proposals a year but receives only 30-50 requests for formal reconsideration. The number of requests for formal reconsideration and resulting decisions at both the AD and O/D levels from FY 2001 through FY 2005 are displayed in **Appendix Table 11**, page 39. NSF had 35 reconsideration requests in FY 2005 and all were upheld.

NSF's merit review process is evaluated regularly by external Committees of Visitors in addition to the Advisory Committee for GPRA Performance Assessment. In FY 2005, the National Science Board also evaluated the merit review process, concluding that the NSF merit review process is a fair and effective way to review the more than 40,000 proposals the Foundation receives annually in a wide variety of subject areas. The Board provided several recommendations for NSF to improve the transparency and effectiveness of the NSF merit review process, while preserving the ability of the program officers to identify the most innovative proposals and effectively diversify and balance NSF's research and education portfolio.[19]

In response to the Board's recommendations, NSF has undertaken an agency-wide effort to address quality of reviews, transparency of the award/decline decision, and support of transformative research. To date the following actions have been taken:

- The FY 2007 NSF Performance Plan includes the operation of a credible, efficient merit review system as a strategic goal.
- A merit review performance indicator has been added to the Senior Executive Service (SES) annual personal performance plans.
- Standards have been developed for the Major Research Instrumentation Program and are being tested as possible agency-wide standards for the merit review process.
- Sessions have been conducted with senior staff of all NSF Directorates and Offices to raise issues regarding merit review process. All directorates currently have underway activities that address the transparency and effectiveness of the merit review process.
- A focus of the Annual Division Director retreat was the merit review process and mechanisms to address quality of review, transparency of award/decline decision, and support of transformative research.

[18] Please note that certain types of proposals are not eligible for reconsideration. See NSF's Grant Policy Manual, Chapter 10, available on the NSF web page at < http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpm>.
[19] See Note 2, page 6.

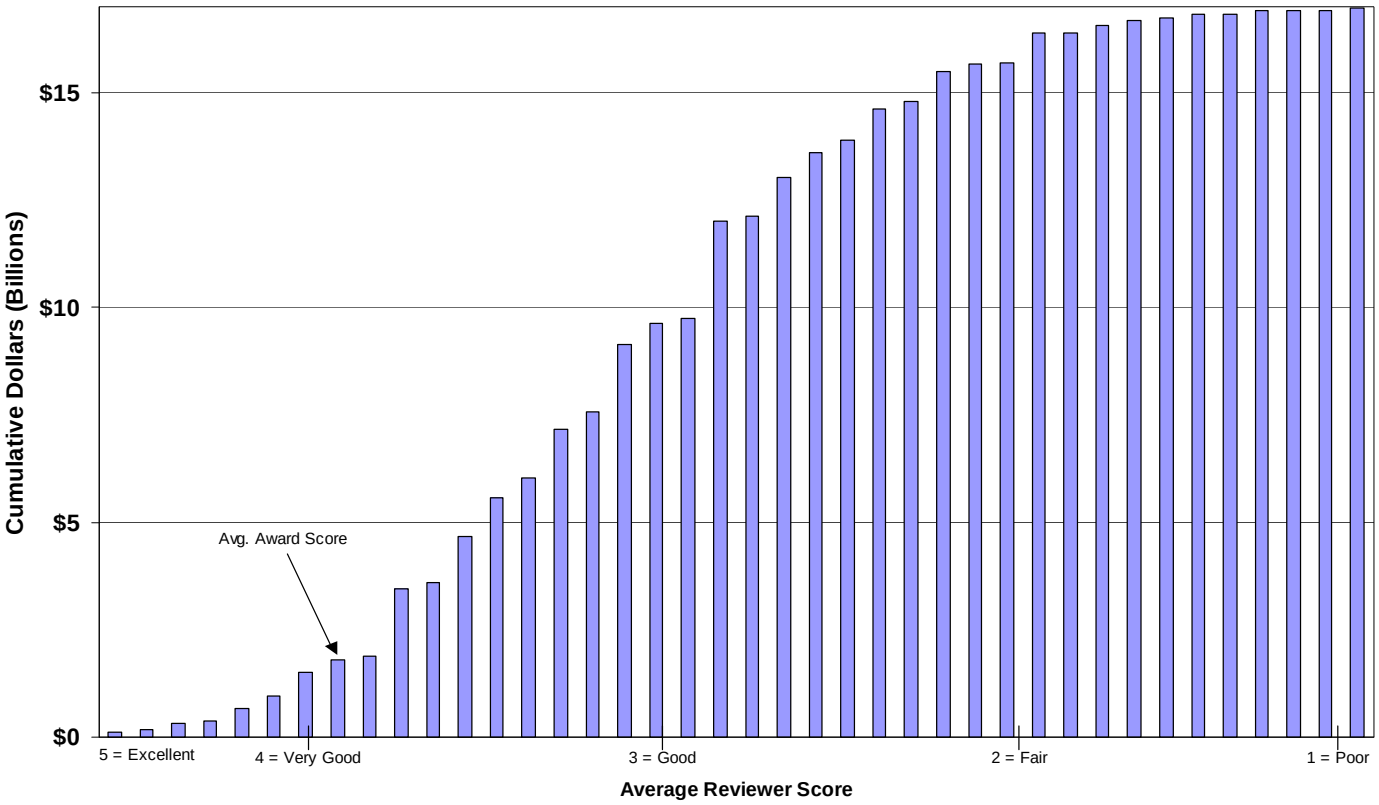
- Sessions have been conducted with NSF Administrative Officers (AOs) regarding their role and responsibilities in help ensure the quality of documentation of the merit review. AOs have supervisory responsibilities for administrative staff and oversee general operations.
- An external web page is being designed to inform the research and education community of the NSF review process.
- An internal NSF web page is being designed to provide merit review process information to NSF staff. The website will include the standards expected, effective practices, and examples of reviews, panel summaries, Program officer analyses, and program officer communications to principal investigators.
- An enhancement of training sessions for NSF staff is planned.

4. Other Issues Related to Merit Review

Budgetary Considerations

A large number of potentially fundable proposals are declined each year. **Text Figure 12**, next page, indicates that in FY 2005, close to $1.8 billion was requested for declined proposals that had received ratings at least as high as the average rating (4.1) for an awarded proposal. These declined proposals represent a rich portfolio of unfunded opportunities – fertile ground for learning and discovery that lies fallow. There may be a large number of proposals in the declined Good to Very Good range of proposals that, if supported, could produce substantial research and education benefits.

Text Figure 12
Cumulative Requested Amounts for Declined Proposals
by Average Reviewer Score for FY 2005



Performance Evaluation

The NSF Strategic Plan for FY 2003-2008 established the goal of Organizational Excellence, and the goal was first evaluated in FY 2004. Two external advisory committees led the evaluation: the Advisory Committee for Business and Operations (AC/B&O) and the Advisory Committee for GPRA Performance Assessment (AC/GPA). The operation of a credible, efficient merit review system has been an important objective within the Organizational Excellence goal.[20] Performance evaluation, with respect to the operation of the merit review system, is currently supported with information from the following activities:

- **Proposer and Grantee Information/Merit Review.** All proposers and grantees provide results from previous NSF support, information about existing facilities and equipment available to conduct the proposed research, biographical information on the primary investigators, other sources of support, and certifications. Such information is required at the time of proposal submission, at the time of an award, and in annual and final project reports. It is reviewed by NSF staff, used during merit review and included in the package of information available to external committees conducting performance assessment.

- **Program Evaluation by Committees of Visitors (COVs).** To ensure the highest quality in processing and recommending proposals for awards, NSF convenes external groups of experts, called Committees of Visitors (COVs), to review each program approximately every three to five years. This includes disciplinary programs in the various directorates and offices, and the cross-disciplinary programs managed across directorates. The COVs are comprised of scientists, engineers and educators who convene at NSF for a two to three day assessment. These experts evaluate the integrity and efficiency of the processes used for proposal review and program decision-making. In addition, the COVs provide a retrospective assessment of the quality of results of NSF's programmatic investments. The COV reports, written as answers and commentary to specific questions (see "Core Questions and Report Template," **Appendix Table 12** on pages 40-47) are submitted for review through Advisory Committees to the directorates and the NSF Director. Questions include aspects of the program portfolio, such as the balance of high-risk, multidisciplinary, and innovative projects. The recommendations of COVs are reviewed by management and taken into consideration by NSF when evaluating existing programs and future directions for the Foundation.[21] See **Appendix Table 13**, pages 48-57, for a schedule of COV program evaluations.

- **Advisory Committee (AC) Reporting on Directorate/Office Performance.** Advisory committees regularly provide community perspectives to the research and education directorates, the Office of Polar Programs, and Office of International Science and Engineering. They are typically composed of 15-25 experts who have broad experience in academia, industry and government. The role of the ACs is to provide advice on priorities, address program effectiveness, review COV reports, and examine directorate/office

[20] The NSF Strategic Plan, FY 2003 – 2008, is available at <http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf04201>.

[21] The COV reports and directorate responses are available electronically as a link from the NSF GPRA web page, <http://www.nsf.gov/about/performance/>.

responses to COV recommendations. In FY 2001 and previous years, directorate/office advisory committees assessed directorate/office progress in achieving NSF-wide GPRA goals. With the advent of the AC/GPA (see below), advisory committees no longer assess directorate progress toward these goals.

- **Advisory Committee for GPRA Performance Assessment (AC/GPA)** During FY 2002, NSF determined that a more efficient and effective process for the assessment of agency performance with respect to GPRA strategic goals was to charge a single external committee of experts with review of all Foundation accomplishments. The AC/GPA consists of approximately 25 external experts from various fields of science, engineering, mathematics and education. The AC/GPA looks at Foundation-wide portfolios linked to the agency's strategic outcome goals of Ideas, People, Tools, and Organizational Excellence and their associated performance indicators. In June 2005, the AC/GPA convened to assess results, using COV reports, investigator project reports, and collections of outstanding accomplishments from awards as reported by NSF program officers. This external assessment found that, overall, in FY 2004, NSF achieved all four of its strategic outcome goals. With regard to merit review, the AC/GPA concluded "that the MRP [Merit Review Process] is effective in the processing and reviewing of a large and increasing volume of proposals and in the engagement of a broad and diverse segment of talent in the NSF's science and engineering enterprises. While the MRP will always, in our view, require vigilance and a commitment to continuous improvement, when taken as a whole and when one looks at the results as illustrated in the People, Ideas, and Tools portfolios, clearly the process remains a major positive force in advancing the frontiers of science, mathematics, and engineering."[22] (See also discussion above, page 23.)

- **Assessment Utilizing the Program Assessment Rating Tool (PART).** The Program Assessment Rating Tool was developed by the Office of Management and Budget (OMB) to assess program performance in four areas: Program Purpose and Design, Strategic Planning, Program Management, and Program Results / Accountability. In February 2005, results from PART assessments were released on the "Institutions," "Collaborations," and "Polar Research Tools, Facilities, and Logistics" programs and the Biocomplexity in the Environment priority area. All four areas were rated "effective," the highest possible rating from OMB for the PART. Again, NSF received the top three scores of all research and development programs assessed, and NSF programs were ranked with five in the top fifteen out of the over 600 programs assessed across the entire government that year. Each year, additional programs will be assessed for the first time and previous assessments will be updated to reflect new information and actions taken to enhance program management and results. All NSF programs and current priority areas will be assessed by the end of FY 2008.

- **Independent Verification and Validation of Performance Measurement for the Government Performance and Results Act and the Program Assessment Rating Tool.** NSF contracted with IBM Business Consulting Services to assess the validity of the data and reported results of NSF performance goals and to verify the reliability of the methods used by NSF to compile and report data for the performance measurement goals and objectives.

[22] *Report of the Advisory Committee for GPRA Performance Assessment*, July 2005, page 48. Available at http://www.nsf.gov/pubs/2005/nsf05210/nsf05210.pdf.

> The contractor's independent review, completed in October 2005, concluded that NSF made a concerted effort to report its performance results accurately and has effective systems, policies, and procedures to promote data quality. The review also verified that NSF relied on sound business policies and internal controls, and maintained adequate documentation of its processes and data.[23]

Special Proposal and Grant Mechanisms

Preliminary Proposals

Some NSF programs invite the submission of preliminary proposals. The intent of preliminary proposals is to limit the burden imposed on proposers, reviewers and NSF staff. Normally, preliminary proposals require only enough information to make fair and reasonable decisions regarding encouragement/discouragement of a full proposal. Review practices for preliminary proposals range from non-binding advice from program officers to proposers to formal recommendations from external reviewers or panels.[24] In FY 2005, NSF received a total of 2,120 preliminary proposals, compared to 2,310 preliminary proposals in FY 2004 and 2,469 preliminary proposals in FY 2003.[25] For those proposals subject to non-binding advice, NSF encouraged the submission of full proposals in 512 cases and discouraged submission of a full proposal in 790 cases. For the proposals subject to binding advice through formal recommendations, NSF invited the submission of a full proposal in 246 cases, and did not invite the submission of a full proposal in 570 cases. Two preliminary proposals were withdrawn.

Small Grants for Exploratory Research (SGER)

Since the beginning of FY 1990, the Small Grants for Exploratory Research (SGER) option has permitted program officers throughout the Foundation to make small-scale grants *without formal external review*. Characteristics of activities that can be supported by an SGER award include: preliminary work on untested and novel ideas; ventures into emerging research and potentially transformative ideas; quick-response research on unanticipated events, such as natural disasters and infrequent phenomena; and similar efforts likely to catalyze rapid and innovative advances.

Several science and engineering teams received SGERs to collect ephemeral data immediately following Hurricane Katrina. Program officers across the Foundation welcomed proposals following the disaster and, through the SGER mechanism, were able to act swiftly to make the awards.

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[23] IBM Business Consulting Services, "National Science Foundation: Government Performance and Results Act (GPRA) and Program Assessment Rating Tool (PART) Performance Measurement Validation and Verification, Report on FY 2005 Results," October 2005. In NSF's *FY 2005 Performance and Accountability Report*, Section 2, page 92. Available on the web at <http://www.nsf.gov/about/performance/reports.jsp>.

[24] A binding (invite/non-invite) decision is the type of mechanism used when the NSF decision made on the preliminary proposal is final, affecting the PI's eligibility to submit a full proposal. A non-binding (encourage/discourage) decision is the type of mechanism used when the NSF decision made on the preliminary proposal is advisory only. This means that submitters of both favorably and unfavorably reviewed proposals are eligible to submit full proposals (Source: *NSF Proposal and Award Manual*).

[25] Please note that preliminary proposals are not included in the total count of proposals received and competitively reviewed at NSF as reported on page 5, above.

Potential SGER applicants are encouraged to contact an NSF program officer before submitting an SGER proposal to determine its appropriateness for funding. Directorate-level data on SGER proposals and awards are presented in **Appendix Table 14,** page 59. In FY 2005, NSF made 387 SGER awards, compared to 382 awards in FY 2004, compared to and 344 awards in FY 2002. The total amount awarded to SGERs in FY 2005 was approximately $27 million compared to $29 million in the previous year. This represents about 0.5 percent of the operating budget for research and education.

The average size of SGER award in FY 2005 was around $70,000, down from $77,000 in FY 2004. In September 2003 NSF raised the maximum SGER award threshold from $100,000 to $200,000. Program officers may obligate no more than five percent of their program budget per fiscal year for SGER awards. NSF is initiating a study of the SGER portfolio in FY 2006.

Accomplishment Based Renewals

In an accomplishment-based renewal, the project description is replaced by copies of no more than six reprints of publications resulting from the research supported by NSF (or research supported by other sources that is closely related to the NSF-supported research) during the preceding three- to five-year period. In addition, a brief (not to exceed four pages) summary of plans for the proposed support period must be submitted. All other information required for NSF proposal submission remains the same. The proposals undergo merit review in the tradition of the specific program. In 2005 there were 101 requests for accomplishment-based renewals, 28 of which were awarded.

Appendix Table 1
Competitively Reviewed Proposals, Awards and Success Rates
By Directorate, FY 2001 – 2005

		Fiscal Year				
		2001	**2002**	**2003**	**2004**	**2005**
NSF	Proposals	31,942	35,165	40,075	43,851	41,722
	Awards	9,925	10,406	10,844	10,380	9,757
	Funding Rate	31%	30%	27%	24%	23%
BIO	Proposals	5,131	5,143	5,591	6,063	6,475
	Awards	1,431	1,400	1,448	1,432	1,355
	Funding Rate	28%	27%	26%	24%	21%
CISE	Proposals	3,578	4,317	5,270	6,276	5,238
	Awards	884	1,039	1,175	1,017	1,088
	Funding Rate	24%	24%	22%	16%	21%
EHR	Proposals	3,449	3,966	4,111	4,644	3,699
	Awards	1,157	1,044	890	925	736
	Funding Rate	34%	26%	22%	20%	20%
ENG	Proposals	5,983	6,883	9,076	8,994	8,692
	Awards	1,426	1,726	1,945	1,753	1,493
	Funding Rate	24%	25%	21%	19%	17%
GEO	Proposals	3,580	4,114	4,230	4,267	4,676
	Awards	1,417	1,450	1,515	1,419	1,315
	Funding Rate	40%	35%	36%	33%	28%
MPS	Proposals	5,692	5,996	6,694	7,184	7,083
	Awards	1,996	2,105	2,268	2,175	2,071
	Funding Rate	35%	35%	34%	30%	29%
OCI	Proposals	288	223	342	220	116
	Awards	39	54	56	47	75
	Funding Rate	14%	24%	16%	21%	65%
OPP	Proposals	634	572	557	689	816
	Awards	201	264	241	268	281
	Funding Rate	32%	46%	43%	39%	34%
OISE	Proposals	610	608	670	851	822
	Awards	358	334	373	386	333
	Funding Rate	59%	55%	56%	45%	41%
SBE	Proposals	2,900	3,279	3,491	4,619	4,089
	Awards	942	931	894	939	1,004
	Funding Rate	32%	28%	26%	20%	25%
Other	Proposals	97	64	12	44	16
	Awards	74	59	12	19	6
	Funding Rate	76%	92%	100%	43%	38%

Notes:

- The following are not included in the above statistics: 8,307 CGIs, 3,616 supplements, 420 contracts, and 2 cooperative agreements that underwent merit review in a prior FY.

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 2
Competitively Reviewed Proposals, Awards and Success Rates
By PI Characteristics, FY 1998 – 2005

		Fiscal Year							
		1998	1999	2000	2001	2002	2003	2004	2005
All PIs	Proposals	28,422	28,578	29,508	31,942	35,165	40,075	43,851	41,722
	Awards	9,381	9,189	9,850	9,925	10,406	10,844	10,380	9,757
	Funding Rate	33%	32%	33%	31%	30%	27%	24%	23%
Female PIs	Proposals	5,627	5,315	5,509	5,839	6,704	7,335	8,427	8,266
	Awards	1,938	1,682	1,949	1,894	2,012	2,090	2,118	2,107
	Funding Rate	34%	32%	35%	32%	30%	28%	25%	25%
Male PIs	Proposals	22,513	23,022	23,671	25,510	27,500	31,238	33,300	31,456
	Awards	7,323	7,428	7,778	7,867	8,203	8,495	7,923	7,305
	Funding Rate	33%	32%	33%	31%	30%	27%	24%	23%
Minority PIs	Proposals	1,410	1,434	1,480	1,728	1,906	2,141	2,551	2,468
	Awards	403	424	472	509	548	569	597	569
	Funding Rate	29%	30%	32%	29%	29%	27%	23%	23%
New PIs	Proposals	12,255	11,803	12,327	13,280	15,085	17,584	19,052	17,660
	Awards	3,117	2,689	3,024	3,136	3,329	3,390	3,256	3,001
	Funding Rate	25%	23%	25%	24%	22%	19%	17%	17%
Prior PIs	Proposals	16,167	16,775	17,181	18,662	20,080	22,511	24,799	24,062
	Awards	6,264	6,500	6,826	6,789	7,077	7,478	7,124	6,756
	Funding Rate	39%	39%	40%	36%	35%	33%	29%	28%

Notes:

- "Gender" is based on self-reported information from the PI's most recent proposal.
- "Minority" is based on the PI's ethnic/racial status as reported to NSF on the most recent proposal.
- PIs can decline to report their ethnic/racial status. Includes American Indian, Alaska Native, Black, Hispanic, and Pacific Islander and excludes Asian and White-Not of Hispanic Origin.

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 3
Competitively Reviewed Proposals, Awards and Success Rates By Minority PI Ethnic/Racial Status, FY 1998 – 2005

		Fiscal Year							
		1998	1999	2000	2001	2002	2003	2004	2005
American Indian/Alaska Native	Proposals	61	58	90	118	100	112	93	94
	Awards	17	19	34	52	30	28	23	24
	Funding Rate	28%	33%	38%	44%	30%	25%	25%	26%
Black/ African American	Proposals	541	539	522	668	748	822	900	813
	Awards	144	146	169	180	207	192	208	193
	Funding Rate	27%	27%	32%	27%	28%	23%	23%	24%
Hispanic or Latino	Proposals	779	807	854	955	1,041	1,191	1,432	1,436
	Awards	234	245	258	285	300	342	347	322
	Funding Rate	30%	30%	30%	30%	29%	29%	24%	22%
Native Hawaiian/ Pacific Island	Proposals	46	37	41	23	32	37	47	21
	Awards	14	13	19	6	7	12	4	4
	Funding Rate	30%	35%	46%	26%	22%	32%	9%	19%

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 4
Median and Average Award Amounts by Directorate, Research Awards FY 2000 – 2005

		Fiscal Year					
		2000	**2001**	**2002**	**2003**	**2004**	**2005**
NSF	Median	$75,810	$84,387	$85,839	$100,000	$101,566	$103,965
	Average	$104,905	$113,833	$115,656	$135,609	$139,522	$143,669
BIO	Median	$99,854	$108,333	$110,000	$126,000	$133,191	$140,000
	Average	$117,378	$143,512	$136,509	$177,305	$171,074	$183,939
CISE	Median	$100,000	$92,000	$93,511	$113,333	$113,333	$112,431
	Average	$149,432	$130,289	$135,788	$158,899	$166,517	$150,523
ENG	Median	$75,000	$80,946	$83,965	$99,997	$96,677	$97,054
	Average	$87,601	$99,506	$102,060	$119,470	$119,704	$117,456
GEO	Median	$72,828	$76,667	$80,168	$102,667	$114,730	$116,492
	Average	$94,920	$98,917	$103,439	$146,475	$150,181	$147,690
MPS	Median	$75,100	$86,243	$83,319	$100,000	$100,000	$100,000
	Average	$108,804	$114,421	$111,617	$128,585	$130,043	$135,423
OCI	Median	$104,180	$75,000	$125,000	$134,333	$365,408	$160,522
	Average	$341,504	$82,882	$176,289	$160,262	$401,828	$315,044
OISE	Median	$7,939	$8,784	$9,800	$10,000	$10,000	$14,996
	Average	$14,193	$17,429	$16,441	$20,869	$15,003	$90,980
OPP	Median	$72,729	$77,789	$81,517	$126,143	$141,452	$122,106
	Average	$141,221	$113,164	$130,343	$144,392	$204,126	$180,487
SBE	Median	$52,778	$63,377	$62,950	$77,388	$77,948	$84,050
	Average	$60,538	$80,709	$78,035	$89,488	$90,373	$110,184

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 5
Methods of NSF Proposal Review
FY 1993 – 2005

	Total	Mail + Panel		Mail-Only		Panel-Only		Not Externally Reviewed	
FY	Proposals	Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
2005	41,722	13,919	33%	3,656	9%	22,735	54%	1,412	3%
2004	43,851	13,345	31%	4,496	10%	24,553	56%	1,457	3%
2003	40,075	12,683	32%	4,579	11%	21,391	53%	1,388	3%
2002	35,164	11,346	32%	4,838	14%	17,616	50%	1,364	4%
2001	31,942	9,367	29%	5,460	17%	15,751	49%	1,364	4%
2000	29,507	9,296	32%	6,048	20%	12,886	44%	1,277	4%
1999	28,579	8,918	31%	6,452	23%	12,046	42%	1,163	4%
1998	28,422	8,486	30%	6,974	25%	11,396	40%	1,566	6%
1997	30,258	8,812	29%	7,855	26%	12,109	40%	1,482	5%
1996	30,199	8,562	28%	7,812	26%	12,490	41%	1,335	4%
1995	30,432	8,400	28%	8,581	28%	11,912	39%	1,539	5%
1994	30,336	7,059	23%	8,687	29%	12,986	43%	1,604	5%
1993	30,038	7,032	23%	8,886	30%	12,338	41%	1,782	6%

Panel-Only includes cases where panel was mailed proposal for review prior to panel.

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 6
Methods of NSF Proposal Review, By Directorates
FY 2005

	Total	Mail + Panel		Mail-Only		Panel-Only		Not Externally Reviewed	
Directorate	Proposals	Proposals	Percent	Proposals	Percent	Proposals	Percent	Proposals	Percent
NSF	**41,722**	**13,919**	**33%**	**3,656**	**9%**	**22,735**	**54%**	**1,412**	**3%**
BIO	6,475	4,913	76%	56	1%	1,296	20%	210	3%
CISE	5,238	411	8%	95	2%	4,540	87%	192	4%
EHR	3,699	88	2%	95	3%	3,479	94%	37	1%
ENG	8,692	416	5%	210	2%	7,725	89%	341	4%
GEO	4,676	3,488	75%	585	13%	477	10%	126	3%
MPS	7,083	1,542	22%	1,872	26%	3,441	49%	228	3%
OCI	116	3	3%	14	12%	76	66%	23	20%
OISE	822	165	20%	332	40%	222	27%	103	13%
OPP	816	461	56%	249	31%	55	7%	51	6%
SBE	4,089	2,432	59%	139	3%	1,417	35%	101	2%
Other	16	0	0%	9	56%	7	44%	0	0%

Source: NSF Enterprise Information System as of October 1, 2005.

Appendix Table 7
Average Number of Reviews per Proposal
By Method & Directorate, FY 2005

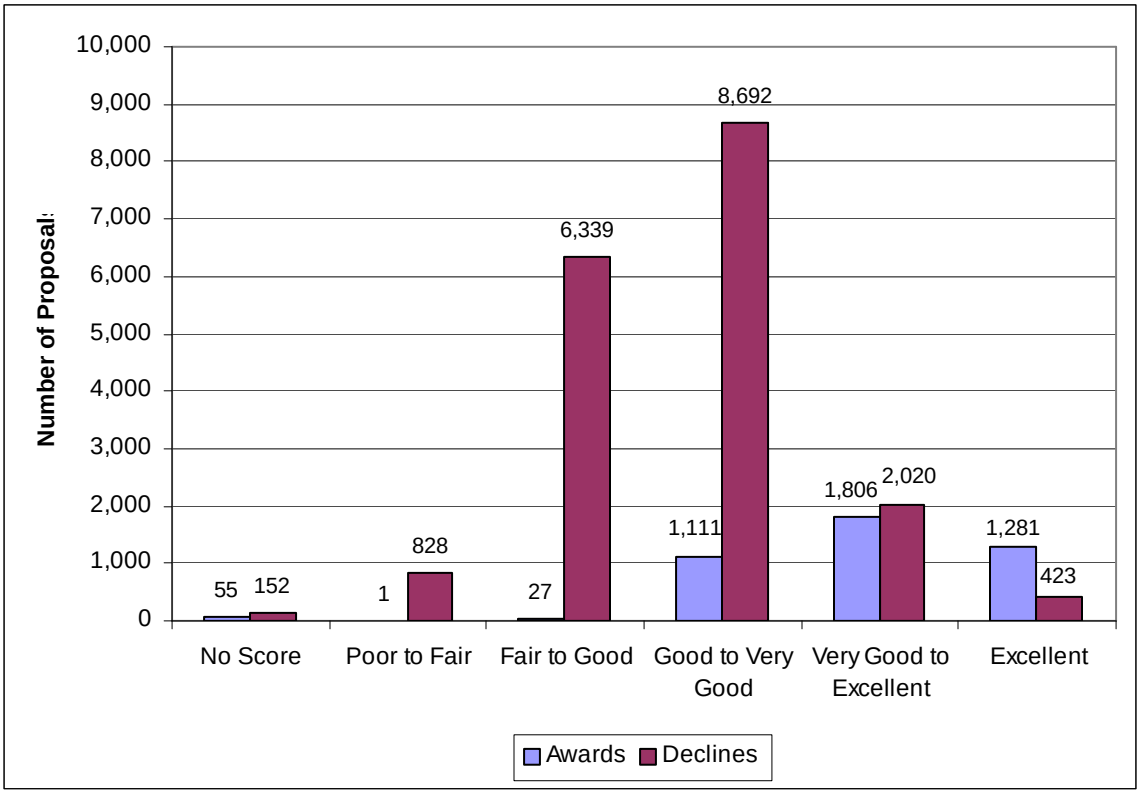
		Methods of Review						
		All Methods	Mail + Panel	Mail-Only	Panel-Only	Not Externally Reviewed *	Returned without Review	Withdrawn Proposals
NSF	Reviews	246,273	108,591	15,552	122,130			
	Proposals	40,310	13,919	3,656	22,735	1,412	1,237	398
	Rev/Prop	6.1	7.8	4.3	5.4			
BIO	Reviews	38,498	32,807	243	5,448			
	Proposals	6,265	4,913	56	1,296	210	288	57
	Rev/Prop	6.1	6.7	4.3	4.2			
CSE	Reviews	26,470	2,528	360	23,582			
	Proposals	5,046	411	95	4,540	192	85	39
	Rev/Prop	5.2	6.2	3.8	5.2			
EHR	Reviews	23,348	493	332	22,523			
	Proposals	3,662	88	95	3,479	37	106	6
	Rev/Prop	6.4	5.6	3.5	6.5			
ENG	Reviews	42,066	2,511	854	38,701			
	Proposals	8,351	416	210	7,725	341	408	49
	Rev/Prop	5.0	6.0	4.1	5.0			
GEO	Reviews	43,331	37,284	2,793	3,254			
	Proposals	4,550	3,488	585	477	126	30	50
	Rev/Prop	9.5	10.7	4.8	6.8			
MPS	Reviews	40,634	11,788	8,200	20,646			
	Proposals	6,855	1,542	1,872	3,441	228	164	120
	Rev/Prop	5.9	7.6	4.4	6.0			
OCI	Reviews	529	19	73	437			
	Proposals	93	3	14	76	23	0	4
	Rev/Prop	5.7	6.3	5.2	5.8			
OISE	Reviews	3,206	1,310	1,073	823			
	Proposals	719	165	332	222	103	28	29
	Rev/Prop	4.5	7.9	3.2	3.7			
OPP	Reviews	5,060	3,695	1,046	319			
	Proposals	765	461	249	55	51	4	6
	Rev/Prop	6.6	8.0	4.2	5.8			
SBE	Reviews	23,040	16,156	546	6,338			
	Proposals	3,988	2,432	139	1,417	101	66	38
	Rev/Prop	5.8	6.6	3.9	4.5			
Other	Reviews	91	0	32	59			
	Proposals	16	0	9	7	0	58	0
	Rev/Prop	5.7	N/A	3.6	8.4			

Notes:

- * The proposal totals shown in the "All Methods" category do not include the proposals shown in the "Not Externally Reviewed" category. Proposals which are not reviewed include SGERs and grants for travel and symposia.
- The "Not Externally Reviewed" category includes award and decline actions such as SGERs and workshops, while the "Returned without Review" and "Withdrawn Proposal" categories reflect proposals which were neither awarded nor declined.
- Panel reviews include panel summaries. There were 38,331 panel summaries in FY 2005.
- Peers participating as both a mail and a panel reviewer for the same proposal are counted as one review in this table.
- Withdrawn proposals include only those that underwent merit review.

Source: NSF Enterprise Information System as of October 1, 2005.

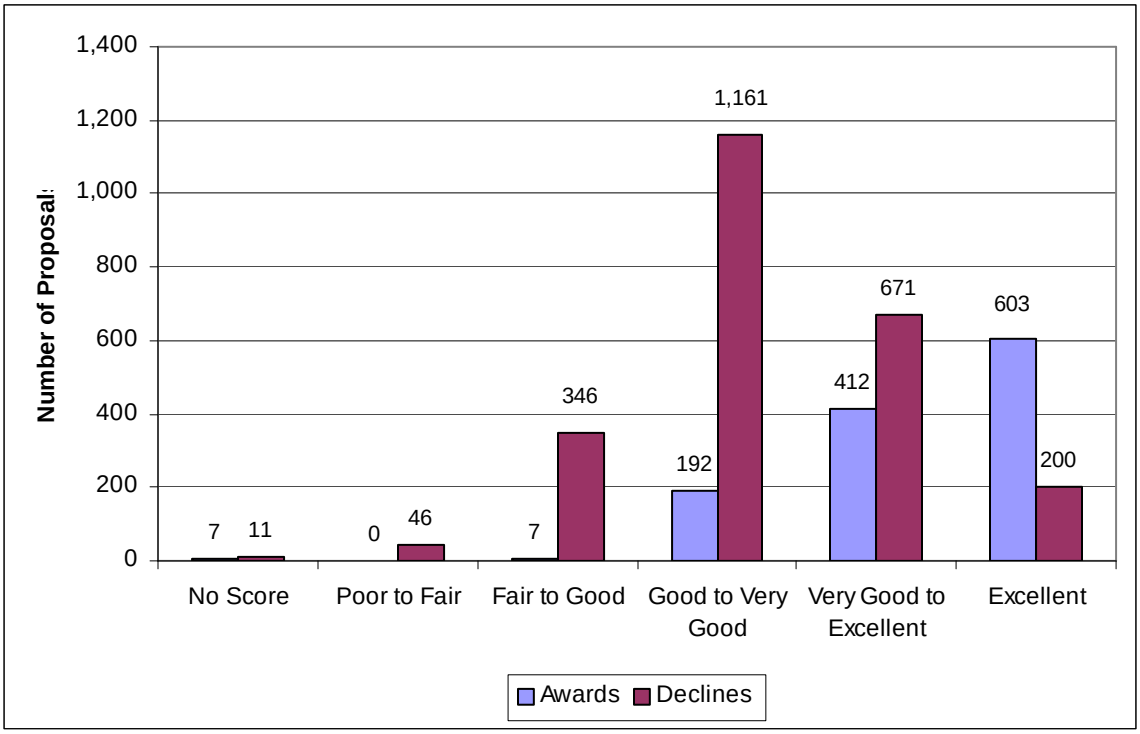
Appendix Table 8
Distribution of Average Reviewer Ratings
Panel-Only Reviewed



Note:

- Number of FY 2005 Proposals – 18,454 Declines, 4,281 Awards

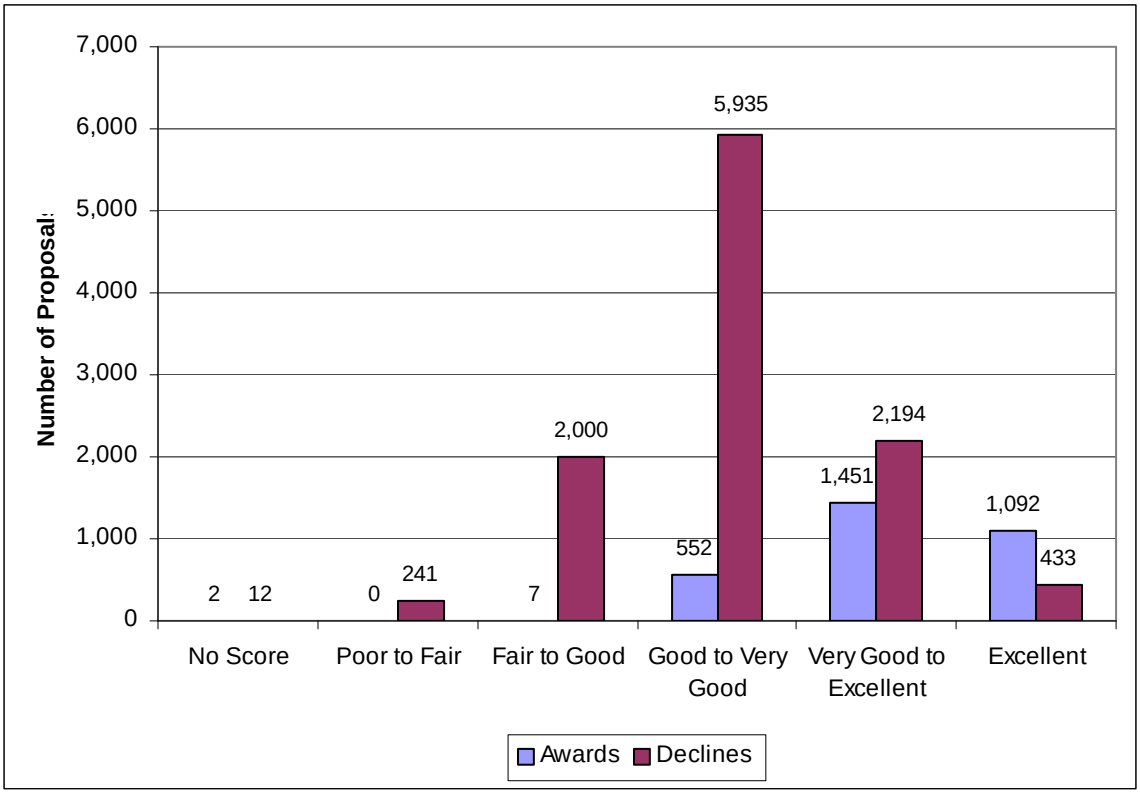
Appendix Table 9
Distribution of Average Reviewer Ratings,
Mail-Only Reviewed



Note:

- Number of FY 2005 Proposals – 2,435 Declines, 1,221 Awards

Appendix Table 10
Distribution of Average Reviewer Ratings
Mail and Panel Reviewed



Note:

- Number of FY 2005 Proposals – 10,815 Declines, 3,104 Awards

Appendix Table 11
Requests for Formal Reconsideration of Declined Proposals
By Directorate, FY 2001-2005

		Fiscal Year				
		2001	**2002**	**2003**	**2004**	**2005**
First Level Reviews (by Assistant Directors):						
BIO	Request	8	4	4	3	2
	- Upheld	6	4	4	3	2
	- Reversed	2	0	0	0	0
CISE	Request	1	1	1	2	3
	- Upheld	1	0	0	2	3
	- Reversed	0	0	1	0	0
EHR	Request	4	2	3	2	7
	- Upheld	3	2	3	2	7
	- Reversed	1	0	0	0	0
ENG	Request	1	2	2	3	3
	- Upheld	1	2	2	3	3
	- Reversed	0	0	0	0	0
GEO	Request	2	1	4	4	0
	- Upheld	2	1	4	4	0
	- Reversed	0	0	0	0	0
MPS	Request	24	15	4	24	15
	- Upheld	22	15	4	24	15
	- Reversed	2	0	0	0	0
SBE	Request	2	1	2	3	3
	- Upheld	1	0	2	3	3
	- Reversed	1	1	1	0	0
Other	Request	0	0	0	0	0
	- Upheld	0	0	0	0	0
	- Reversed	0	0	0	0	0
Second Level Reviews (by Deputy Director):						
O/DD	Request	2	4	5	7	2
	- Upheld	1	4	4	7	2
	- Reversed	0	0	1	0	0
Total Reviews First & Second Level						
NSF	**Request**	**44**	**30**	**26**	**49**	**35**
	- Upheld	**37**	**29**	**24**	**48**	**35**
	- Reversed	**6**	**1**	**2**	**1**	**0**

Note:
The number of decisions (upheld or reversed) may not equal the number of requests in each year due to the carryover of the pending reconsideration request.
Source: Office of the Director

Appendix Table 12

CORE QUESTIONS and REPORT TEMPLATE for FY 2005 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2005 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2005. Specific guidance for NSF staff describing the COV review process is described in Subchapter 300-Committee of Visitors Reviews (NSF Manual 1, Section VIII) that can be obtained at http://www.inside.nsf.gov/od/gpra/.

NSF relies on the judgment of external experts to maintain high standards of program management, to provide advice for continuous improvement of NSF performance, and to ensure openness to the research and education community served by the Foundation. Committee of Visitor (COV) reviews provide NSF with external expert judgments in two areas: (1) assessments of the quality and integrity of program operations and program-level technical and managerial matters pertaining to proposal decisions; and (2) comments on how the results generated by awardees have contributed to the attainment of NSF's mission and strategic outcome goals.

Many of the Core Questions are derived from NSF performance goals and apply to the portfolio of activities represented in the program(s) under review. The program(s) under review may include several subactivities as well as NSF-wide activities. The directorate or division may instruct the COV to provide answers addressing a cluster or group of programs – a portfolio of activities integrated as a whole – or to provide answers specific to the subactivities of the program, with the latter requiring more time but providing more detailed information.

The Division or Directorate may choose to add questions relevant to the activities under review. NSF staff should work with the COV members in advance of the meeting to provide them with the report template, organized background materials, and to identify questions/goals that apply to the program(s) under review.

Guidance to the COV: The COV report should provide a balanced assessment of NSF's performance in two primary areas: (A) the integrity and efficiency of the ***processes*** related to proposal review; and (B) the quality of the ***results*** of NSF's investments that appear over time. The COV also explores the relationships between award decisions and program/NSF-wide goals in order to determine the likelihood that the portfolio will lead to the desired results in the future. Discussions leading to answers for Part A of the Core Questions will require study of confidential material such as declined proposals and reviewer comments. *COV reports should not contain confidential material or specific information about declined proposals.* Discussions leading to answers for Part B of the Core Questions will involve study of non-confidential material such as results of NSF-funded projects. It is important to recognize that the reports generated by COVs are used in assessing agency progress in order to meet government-wide performance reporting requirements, and are made available to the public. Since material from COV reports is used in NSF performance reports, the COV report may be subject to an audit.

We encourage COV members to provide comments to NSF on how to improve in all areas, as well as suggestions for the COV process, format, and questions.

Appendix Table 12 (cont.)

FY 2005 REPORT TEMPLATE FOR
NSF COMMITTEES OF VISITORS (COVs)

Date of COV
Program/Cluster:
Division:
Directorate:
Number of actions reviewed by COV[26]: Awards: Declinations: Other:
Total number of actions within Program/Cluster/Division during period being reviewed by COV[27]: Awards: Declinations: Other:
Manner in which reviewed actions were selected:

PART A. INTEGRITY AND EFFICIENCY OF THE PROGRAM'S PROCESSES AND MANAGEMENT

Briefly discuss and provide comments for *each* relevant aspect of the program's review process and management. Comments should be based on a review of proposal actions (awards, declinations, and withdrawals) that were *completed within the past three fiscal years*. Provide comments for *each* program being reviewed and for those questions that are relevant to the program under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

A.1 Questions about the quality and effectiveness of the program's use of merit review procedures. Provide comments in the space below the question. Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCEDURES	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[28]
Is the review mechanism appropriate? (panels, ad hoc reviews, site visits) Comments:	
Is the review process efficient and effective? Comments:	

[26] To be provided by NSF staff.
[27] To be provided by NSF staff.
[28] If "Not Applicable" please explain why in the "Comments" section.

Appendix Table 12 (cont.)

Are reviews consistent with priorities and criteria stated in the program's solicitations, announcements, and guidelines? Comments:	
Do the individual reviews (either mail or panel) provide sufficient information for the principal investigator(s) to understand the basis for the reviewer's recommendation? Comments:	
Do the panel summaries provide sufficient information for the principal investigator(s) to understand the basis for the panel recommendation? Comments:	
Is the documentation for recommendations complete, and does the program officer provide sufficient information and justification for her/his recommendation? Comments:	
Is the time to decision appropriate? Comments:	
Discuss issues identified by the COV concerning the quality and effectiveness of the program's use of merit review procedures:	

A.2 Questions concerning the implementation of the NSF Merit Review Criteria (intellectual merit and broader impacts) by reviewers and program officers. Provide comments in the space below the question. Discuss issues or concerns in the space provided.

IMPLEMENTATION OF NSF MERIT REVIEW CRITERIA	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE[29]**
Have the individual reviews (either mail or panel) addressed whether the proposal contributes to both merit review criteria? Comments:	

[29] In "Not Applicable" please explain why in the "Comments" section.

Appendix Table 12 (cont.)

Have the panel summaries addressed both merit review criteria? Comments:	
Have the *review analyses* (Form 7s) addressed both merit review criteria? Comments:	
Discuss any issues the COV has identified with respect to implementation of NSF's merit review criteria.	

A.3 Questions concerning the selection of reviewers. Provide comments in the space below the question. Discuss areas of concern in the space provided.

SELECTION OF REVIEWERS	**YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE[30]**
Did the program make use of an adequate number of reviewers? Comments:	
Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments:	
Did the program make appropriate use of reviewers to reflect balance among characteristics such as geography, type of institution, and underrepresented groups? Comments:	
Did the program recognize and resolve conflicts of interest when appropriate? Comments:	
Discuss any issues the COV has identified relevant to selection of reviewers.	

A.4 Questions concerning the resulting portfolio of awards under review. Provide comments in the space below the question. Discuss areas of concern in the space provided.

[30] If "Not Applicable" please explain why in the "Comments" section.

Appendix Table 12 (cont.)

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE[31], OR DATA NOT AVAILABLE
Overall quality of the research and/or education projects supported by the program. Comments:	
Are awards appropriate in size and duration for the scope of the projects? Comments:	
Does the program portfolio have an appropriate balance of: • High risk projects? Comments:	
Does the program portfolio have an appropriate balance of: • Multidisciplinary projects? Comments:	
Does the program portfolio have an appropriate balance of: • Innovative projects? Comments:	
Does the program portfolio have an appropriate balance of: • Funding for centers, groups and awards to individuals? Comments:	
Does the program portfolio have an appropriate balance of: • Awards to new investigators? Comments:	
Does the program portfolio have an appropriate balance of: • Geographical distribution of Principal Investigators? Comments:	
Does the program portfolio have an appropriate balance of: • Institutional types? Comments:	

[31] If "Not Appropriate" please explain why in the "Comments" section.

Appendix Table 12 (cont.)

Does the program portfolio have an appropriate balance of: • Projects that integrate research and education? Comments:	
Does the program portfolio have an appropriate balance: • Across disciplines and subdisciplines of the activity and of emerging opportunities? Comments:	
Does the program portfolio have appropriate participation of underrepresented groups? Comments:	
Is the program relevant to national priorities, agency mission, relevant fields and other customer needs? Include citations of relevant external reports. Comments:	
Discuss any concerns identified that are relevant to the quality of the projects or the balance of the portfolio.	

A.5 Management of the program under review. Please comment on:

Management of the program. Comments:
Responsiveness of the program to emerging research and education trends. Comments:
Program planning and prioritization process (internal and external) that guided the development of the portfolio under review. Comments:
Additional concerns relevant to the management of the program.

Appendix Table 12 (cont.)

PART B. RESULTS OF NSF INVESTMENTS

NSF investments produce results that appear over time. The answers to the first three (People, Ideas and Tools) questions in this section are to be based on the COV's study of award results, which are direct and indirect accomplishments of projects supported by the program. These projects may be currently active or closed out during the previous three fiscal years. The COV review may also include consideration of significant impacts and advances that have developed since the previous COV review and are demonstrably linked to NSF investments, regardless of when the investments were made. Incremental progress made on results reported in prior fiscal years may also be considered.

The following questions are developed using the NSF outcome goals in the NSF Strategic Plan. The COV should look carefully at and comment on (1) noteworthy achievements of the year based on NSF awards; (2) the ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcomes; and (3) expectations for future performance based on the current set of awards. NSF asks the COV to provide comments on the degree to which past investments in research and education have contributed to NSF's progress towards its annual strategic outcome goals and to its mission:

- To promote the progress of science.
- To advance national health, prosperity, and welfare.
- To secure the national defense.
- And for other purposes.

Excellence in managing NSF underpins all of the agency's activities. For the response to the Outcome Goal for Organizational Excellence, the COV should comment, where appropriate, on NSF providing an agile, innovative organization. Critical indicators in this area include (1) operation of a credible, efficient merit review system; (2) utilizing and sustaining broad access to new and emerging technologies for business application; (3) developing a diverse, capable, motivated staff that operates with efficiency and integrity; and (4) developing and using performance assessment tools and measures to provide an environment of continuous improvement in NSF's intellectual investments as well as its management effectiveness.

B. Please provide comments on the activity as it relates to NSF's Strategic Outcome Goals. Provide examples of outcomes (nuggets) as appropriate. Examples should reference the NSF award number, the Principal Investigator(s) names, and their institutions.

B.1 <u>OUTCOME GOAL for PEOPLE</u>: Developing "a diverse, competitive and globally engaged workforce of scientists, engineers, technologists and well-prepared citizens." Comments:
B.2 <u>OUTCOME GOAL for IDEAS</u>: Enabling "discovery across the frontier of science and engineering, connected to learning, innovation, and service to society." Comments:

Appendix Table 12 (cont.)

B.3 <u>OUTCOME GOAL for TOOLS:</u> Providing "broadly accessible, state-of-the-art S&E facilities, tools and other infrastructure that enable discovery, learning and innovation." Comments:
B.4 <u>OUTCOME GOAL for ORGANIZATIONAL EXCELLENCE</u>: Providing "an agile, innovative organization that fulfills its mission through leadership in state-of-the-art business practices." Comments:

PART C. OTHER TOPICS

C.1 Please comment on any program areas in need of improvement or gaps (if any) within program areas.

C.2 Please provide comments as appropriate on the program's performance in meeting program-specific goals and objectives that are not covered by the above questions.

C.3 Please identify agency-wide issues that should be addressed by NSF to help improve the program's performance.

C.4 Please provide comments on any other issues the COV feels are relevant.

C.5 NSF would appreciate your comments on how to improve the COV review process, format and report template.

SIGNATURE BLOCK:

_____

For the [Replace with Name of COV]
[Name of Chair of COV]
Chair

Appendix Table 13

Committee of Visitors Meetings
By Directorate

(COV meetings held during FY 2005 are highlighted in bold)

DIRECTORATE *Division* Program or Cluster	Fiscal Year of Most Recent COV	Fiscal Year of Next COV
BIOLOGICAL SCIENCES		
Biological Infrastructure	2004	2007
Research Resources (includes former Instrument-Related Activities)	2004	2007
Human Resources (includes former Training Cluster)	2004	2007
Plant Genome Research Program	2004	2007
Environmental Biology	2003	2006
Ecological Biology (Ecol. Studies held COV in 2002)	2002	2006
Ecosystem Science (Thematic Review held COV in 2001)	2001	2006
Population and Evolutionary Processes (Systematic and Population Biology held COV in 2000)	2000	2006
Systematic Biology and Biodiversity Inventories		2006
Integrative Organismal Biology(formerly Int. Biology and Neuroscience)	**2005**	2008
Behavioral Systems	**2005**	2008
Developmental Systems	**2005**	2008
Environmental and Structural Systems	**2005**	2008
Functional and Regulatory Systems	**2005**	2008
Molecular and Cellular Biosciences	**2005**	2008
Biomolecular Systems (formerly Biomolecular Structure and Function	**2005**	2008
and Biomolecular Processes)	**2005**	2008
Cellular Systems (formerly Cell Biology)	**2005**	2008
Genes and Genome Systems (formerly Genetics)	**2005**	2008
Emerging Frontiers (new in '03)	N/A	2006

Appendix Table 13 (cont.)

COMPUTER AND INFORMATION SCIENCE AND ENGINEERING		
Please note that CISE programs and divisions were reorganized in FY 2003. COVs for IIS, ANIR, and CCR were held in FY 2003.		
Computing & Communication Foundations (CCF)		2006
Emerging Models & Technologies for Computation		2006
Formal & Mathematical Foundations		2006
Foundations of Computing Processes & Artifacts		2006
Computer & Network Systems (CNS)		2006
Computer Systems		2006
Computing Research Infrastructure		2006
Education & Workforce		2006
Network Systems		2006
Information & Intelligent Systems (IIS)		2006
Data, Inference & Understanding		2006
Science & Engineering Informatics		2006
Systems in Context		
Shared Cyberinfrastructure (SCI)	**2005**	2008

Appendix Table 13 (cont.)

EDUCATION AND HUMAN RESOURCES		
Educational Systemic Reform (discontinued)		
Statewide Systemic Initiatives	2004	
Urban Systemic Initiatives	2004	
Rural Systemic Initiatives	2004	
Office of Innovation Partnerships		
EPSCoR	**2005**	2008
EDUCATION AND HUMAN RESOURCES (continued)		
Elementary, Secondary and Informal Education		
Informal Science Education	**2005**	2008
Teacher Enhancement (now Teacher Professional Continuum)	2003	2006
Instructional Materials Development	**2005**	2008
Centers for Learning and Teaching (new in ’01)	2004	2007
Undergraduate Education		
Teacher Preparation (subsumed under Teacher Professional Continuum)		
Advanced Technological Education	2003	2006
NSF Computer, Science, Engineering and Mathematics Scholarships (new in ’01)	2003	2006
Distinguished Teaching Scholars (new in ’02)	**2005**	2008
Scholarship for Service (new in ’01)	2004	2007
National SMETE Digital Library (new in ’01)	**2005**	2008
Course, Curriculum, and Laboratory Improvement	2003	2006
The STEM Talent Expansion Program (STEP) (new in ’02)	2006	2009
Graduate Education		
Graduate Research Fellowships	2003	2006
NATO Post doctorate Fellowships (program discontinued)	2004	
IGERT (new in ’97)	**2005**	2008
GK-12 Fellows (new in ’99)	**2005**	2008
Human Resource Development		
The Louis Stokes Alliances for Minority Participation	**2005**	2008
Centers for Research Excellence in Science and Technology (CREST)	**2005**	2008
Programs for Gender Equity (PGE)	2003	2006
Programs for Persons with Disabilities (PPD)	2003	2006
Alliances for Graduate Education and the Professoriate (AGEP)	**2005**	2008
Tribal Colleges Program (TCP) (new in ’01)	2004	2007
Historically Black Colleges and Universities (HBCU)	2005	2008

Appendix Table 13 (cont.)

Research, Evaluation & Communications		
REPP/ROLE (new in '96)	**2005**	2008
Evaluation	2003	2006
Interagency Education Research Initiative (IERI) (new in '01)	**2005**	2008
Other		
H-IB VISA K-12	**2005**	
Math and Science Partnership (MSP) (new in '02)	**2005**	

ENGINEERING		
Bioengineering and Environmental Systems	**2005**	2008
Biochemical Engineering & Technology	**2005**	2008
Biomedical Engineering & Research to Aid Persons with Disabilities	**2005**	2008
Environmental Engineering & Technology	**2005**	2008
Civil and Mechanical Systems	2004	2007
Dynamic System Modeling, Sensing and Control	2004	2007
Geotechnical and GeoHazard Systems	2004	2007
Infrastructure and Information Systems	2004	2007
Solid Mechanics and Materials Engineering	2004	2007
Structural Systems and Engineering	2004	2007
Network for Earthquake Engineering Simulation	2004	2007
Chemical and Transport Systems		2006
Chemical Reaction Processes	2003	2006
Interfacial, Transport and Separation Processes	2003	2006
Fluid and Particle Processes	2003	2006
Thermal Systems	2003	2006
Design, Manufacture and Industrial Innovation		
-Engineering Decision Systems Programs (new in '02)	2003	2006
Engineering Design	2003	2006
Manufacturing Enterprise Systems (new in '02)	2003	2006
Service Enterprise Systems (new in '02)	2003	2006
Operations Research	2003	2006
-Manufacturing Processes and Equipment Systems	2003	2006
Materials Processing and Manufacturing	2003	2006
Manufacturing Machines and Equipment	2003	2006
Nanomanufacturing (new in '02)	2003	2006

Appendix Table 13 (cont.)

-Small Business		
Small Business Innovation Research (SBIR)	2004	2007
Small Business Technology Transfer	2004	2007
-Crosscutting		
Grant Opportunities for Academic Liaison w/ Industry	2003	2006
Innovation and Organizational Change	2003	2006
Electrical and Communications Systems		
Electronics, Photonics and Device Technologies	**2005**	2008
Control, Networks, and Computational Intelligence	**2005**	2008
Integrative Systems (new in '02)	**2005**	2008
Engineering, Education and Centers		
Engineering Education	2004	2007
Engineering Research Centers	2004	2007
Industry/University Cooperative Research Centers	2004	2007
Partnerships for Innovation (new in '01)	2004	2007

Appendix Table 13 (cont.)

GEOSCIENCES		
Atmospheric Sciences		
-Lower Atmosphere Research Section		
Atmospheric Chemistry	2004	2007
Climate Dynamics	2004	2007
Mesoscale Dynamic Meteorology	2004	2007
Large-scale Dynamic Meteorology	2004	2007
Physical Meteorology	2004	2007
Paleoclimate	2004	2007
-Upper Atmosphere Research Section		
Magnetospheric Physics	**2005**	2008
Aeronomy	**2005**	2008
Upper Atmospheric Research Facilities	**2005**	2008
Solar Terrestrial Research	**2005**	2008
-UCAR and Lower Atmospheric Facilities Oversight Section		
Lower Atmospheric Observing Facilities	2003	2006
UNIDATA	2003	2006
NCAR/UCAR	2003	2006
Earth Sciences		
Instrumentation and Facilities	2004	2007
-Research Support		
Tectonics	**2005**	2008
Geology and Paleontology	**2005**	2008
Hydrological Sciences	**2005**	2008
Petrology and Geochemistry	**2005**	2008
Geophysics	**2005**	2008
Continental Dynamics	**2005**	2008
Ocean Sciences		
-Integrative Programs Section		
Oceanographic Technical Services	**2005**	2008
Ship Operations	**2005**	2008
Oceanographic Instrumentation	**2005**	2008
Ship Acquisitions and Upgrades (new in '02)	**2005**	2008
Shipboard Scientific Support Equipment (new in '02)	**2005**	2008
Oceanographic Tech and Interdisciplinary Coordination	2003	2006
Ocean Science Education and Human Resources	2003	2006
-Marine Geosciences Section		
Marine Geology and Geophysics	2003	2006
Ocean Drilling	2003	2006

Appendix Table 13 (cont.)

-Ocean Section		
Chemical Oceanography	2003	2006
Physical Oceanography	2003	2006
Biological Oceanography	2003	2006
Other Programs		
Global Learning and Observation to Benefit the Environment	2003	2006
Opportunities to Enhance Diversity in the Geosciences	2003	2006
Geoscience Education	2003	2006

MATHEMATICAL AND PHYSICAL SCIENCES		
Astronomical Sciences	**2005**	2008
Planetary Astronomy	**2005**	2008
Stellar Astronomy and Astrophysics	**2005**	2008
Galactic Astronomy	**2005**	2008
Education, Human Resources and Special Programs	**2005**	2008
Advanced Technologies and Instrumentation	**2005**	2008
Electromagnetic Spectrum Management	**2005**	2008
Extragalactic Astronomy and Cosmology	**2005**	2008
-Facilities Cluster		
Gemini Observatory	**2005**	2008
National Radio Astronomy Observatory (NRAO)	**2005**	2008
National Optical Astronomy Observatories (NOAO)	**2005**	2008
National Solar Observatory (NSO)	**2005**	2008
National Astronomy and Ionosphere Center (NAIC)	**2005**	2008
Atacama Large Millimeter Array (ALMA)	**2005**	2008
Chemistry	2004	2007
Analytical & Surface Chemistry	2004	2007
Chemistry Research Instrumentation and Facilities	2004	2007
Collaborative Research in Chemistry	2004	2007
Inorganic, Bioinorganic and Organometallic Chemistry	2004	2007
Organic & Macromolecular Chemistry	2004	2007
Physical Chemistry	2004	2007
Undergraduate Research Centers (pilot program, new in ‘04)		2007
Materials Research	**2005**	2008
-Base Science Cluster		
Condensed Matter Physics	**2005**	2008
Solid-State Chemistry	**2005**	2008
Polymers	**2005**	2008

Appendix Table 13 (cont.)

-Advanced Materials and Processing Cluster		
Metals	**2005**	2008
Ceramics	**2005**	2008
Electronic Materials	**2005**	2008
-Materials Research and Technology Enabling Cluster		
Materials Theory	**2005**	2008
Instrumentation for Materials Research	**2005**	2008
National Facilities	**2005**	2008
Materials Research Science and Engineering Centers	**2005**	2008
-Office of Special Programs (new in ’03)	N/A	2008
Mathematical Sciences	2004	2007
Applied Mathematics	2004	2007
Geometric Analysis, Topology and Foundations	2004	2007
Computational Mathematics	2004	2007
Infrastructure	2004	2007
Analysis	2004	2007
Algebra, Number Theory, and Combinatorics	2004	2007
Statistics and Probability	2004	2007
Mathematical Biology (new in ‘04)		2007
Physics		
Atomic, Molecular, Optical and Plasma Physics	2003	2006
Elementary Particle Physics	2003	2006
Theoretical Physics	2003	2006
Particle and Nuclear Astrophysics (new in ’00)	2003	2006
Nuclear Physics	2003	2006
Biological Physics (new in ’03)		2006
Physics at the Information Frontier (new in ’03)		2006
Physics Frontier Centers (new in ’02)		2006
Education and Interdisciplinary Research (new in ’00)	2003	2006
Gravitational Physics	2003	2006
Office of MultidisciplinaryResearch	2003	2006

Appendix Table 13 (cont.)

SOCIAL, BEHAVIORAL, AND ECONOMIC SCIENCES		
Science Resource Statistics (SRS)		
All programs		**2006**
Behavioral and Cognitive Sciences (BCS)		
Cultural Anthropology	2003	2006
Linguistics	2003	2006
Social Psychology	2003	2006
Physical Anthropology	2003	2006
Geography and Regional Sciences	2003	2006
Cognitive Neuroscience (new in ’01)	2003	2006
Developmental and Learning Sciences (formally Child Learning & Development)	2003	2006
Perception, Action, and Cognition (formally Human Cognition & Perception)	2003	2006
Archaeology	2003	2006
Archaeometry (formally part of Archaeology)	2003	2006
Environmental Social and Behavioral Science (new in ’99)	2003	2006
Social and Economic Sciences (SES)		
Decision, Risk, and Management Sciences	2004	2007
Political Science	2004	2007
Law and Social Science	2004	2007
Innovation and Organizational Change	2004	2007
Methodology, Measurement and Statistics	2004	2007
Science and Technology Studies	2004	2007
Societal Dimensions of Engineering, Science, and Technology	2004	2007
Economics	2004	2007
Sociology	2004	2007
ADVANCE (Cross-Directorate Program, new in FY01/FY02)	**2005**	2008
Science of Learning Centers (new in FY03/FY04)		2007
Human and Social Dynamics (new in FY04)		2008

Appendix Table 13 (cont.)

OFFICE OF POLAR PROGRAMS		
Polar Research Support	2004	2007
Antarctic Sciences	2003	2006
Antarctic Aeronomy and Astrophysics	2003	2006
Antarctic Biology and Medicine	2003	2006
Antarctic Geology and Geophysics	2003	2006
Antarctic Glaciology	2003	2006
Antarctic Ocean and Climate Systems	2003	2006
Arctic Sciences		
Arctic Research Support and Logistics	2003	2006
Arctic System Sciences	2003	2006
Arctic Natural Sciences	2003	2006
Arctic Social Sciences	2003	2006

OFFICE OF INTEGRATIVE ACTIVITIES		
Major Research Instrumentation (MRI)	**2005**	2008
Science and Technology Centers (STC)	1996*	2007*
*External Evaluations		

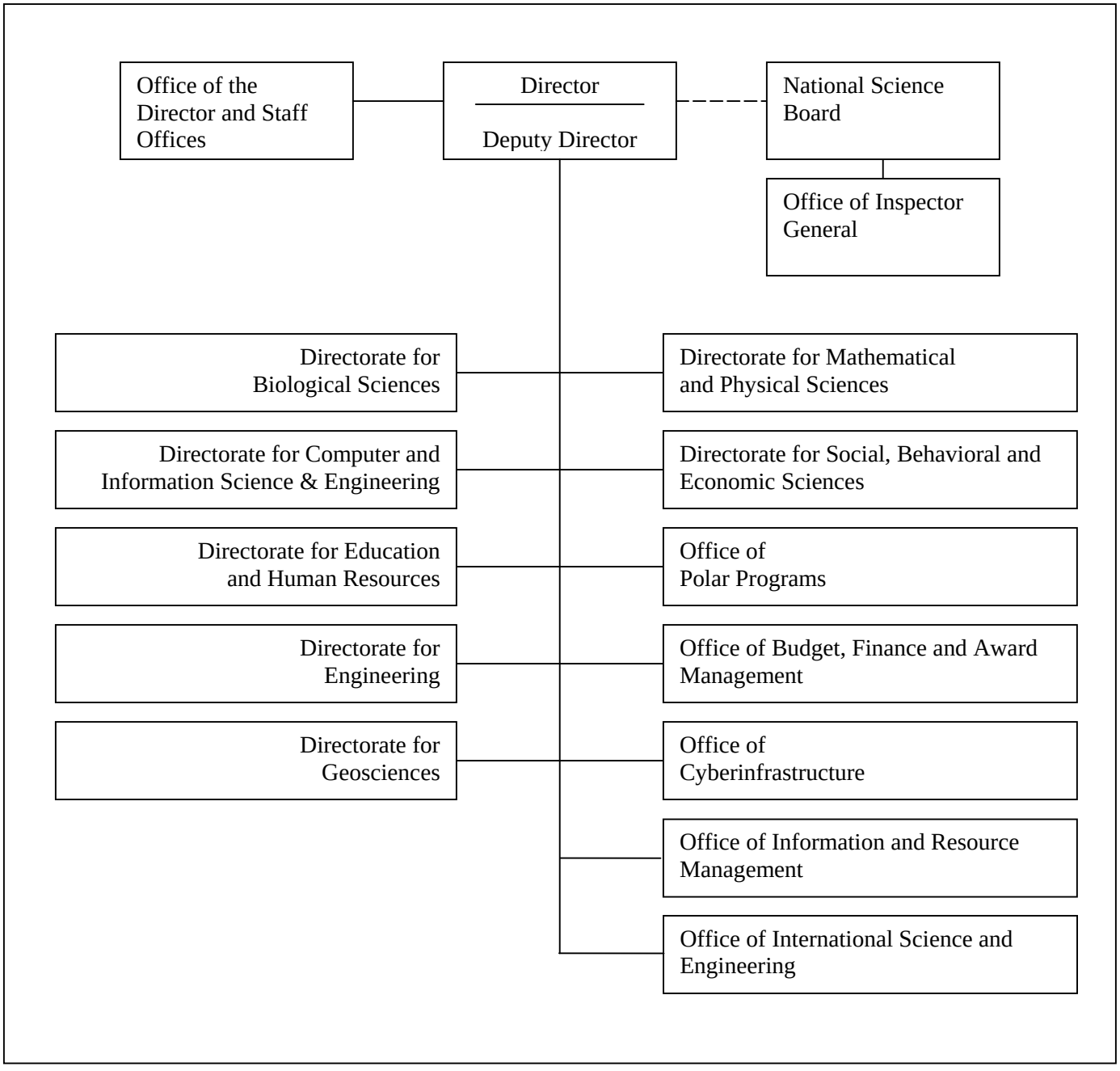
OFFICE OF INTERNATIONAL SCIENCE & ENGINEERING	**2005**	2008

NSF PRIORITY AREAS AND CROSSCUTTING PROGRAMS		
Nanoscale Science and Engineering Priority Area	2004	2007
Biocompexity in the Environment	2004	2007
CAREER	2001	2006*
Information Technology Research (new in '00; no longer active)	**2005**	
*External Evaluations		

Appendix Table 14
Small Grants for Exploratory Research (SGER)
Funding Trends by Directorate, FY 2003 – 2005

		Fiscal Year		
		2003	2004	2005
NSF	Proposals	435	640	504
	Awards	344	382	387
	Total $	$23,424,191	$29,493,932	$26,980,122
	% of Obligations	0.4%	0.5%	0.5%
	Average $	$68,094	$77,209	$69,716
BIO	Proposals	52	65	55
	Awards	48	52	38
	Total $	$3,417,138	$5,392,558	$3,020,321
	% of Obligations	0.6%	0.9%	0.5%
	Average $	$71,190	$103,703	$79,482
CISE	Proposals	59	51	82
	Awards	51	48	71
	Total $	$3,934,783	$3,170,389	$6,678,905
	% of Obligations	0.8%	0.6%	1.4%
	Average $	$78,133	$87,814	$94,069
EHR	Proposals	6	17	15
	Awards	5	16	11
	Total $	$418,335	$2,092,916	$1,498,645
	% of Obligations	0.1%	0.2%	0.2%
	Average $	$83,667	$130,807	$136,240
ENG	Proposals	128	127	176
	Awards	110	119	126
	Total $	$7,522,161	$8,147,351	$6,708,778
	% of Obligations	1.3%	1.4%	1.1%
	Average $	$68,383	$68,465	$53,244
GEO	Proposals	62	68	62
	Awards	60	64	59
	Total $	$2,915,587	$3,508,457	$3,414,557
	% of Obligations	0.4%	0.4%	0.5%
	Average $	$48,593	$54,820	$57,874
MPS	Proposals	97	272	21
	Awards	43	45	18
	Total $	$3,820,670	$4,423,294	$1,663,544
	% of Obligations	0.3%	0.4%	0.1%
	Average $	$88,853	$98,295	$92,419
OCI	Proposals	0	0	11
	Awards	0	0	11
	Total $	$50,000	$1,044,683	$1,458,472
	% of Obligations	0.0%	0.8%	1.2%
	Average $	N/A	N/A	$132,588
OISE	Proposals	0	0	0
	Awards	0	0	0
	Total $	$59,326	$62,200	$102,000
	% of Obligations	0.1%	0.2%	0.2%
	Average $	N/A	N/A	N/A
OPP	Proposals	14	18	24
	Awards	13	16	24
	Total $	$681,087	$695,961	$1,197,306
	% of Obligations	0.2%	0.2%	0.3%
	Average $	$52,391	$43,498	$49,888
SBE	Proposals	17	22	58
	Awards	14	22	29
	Total $	$605,104	$820,999	$1,237,594
	% of Obligations	0.4%	0.4%	0.6%
	Average $	$47,459	$37,318	$42,676

Appendix Table 15
National Science Foundation Organization Chart



Terms & Acronyms

Acronym	Definition
A&M	Administration and Management
AC	Advisory Committee
AD	Assistant Director
BFA	Office of Budget, Finance and Award Management
BIO	Directorate for Biological Sciences
CAREER	Faculty Early Career Development Program
CGI	Continuing Grant Increments
CISE	Directorate for Computer and Information Science and Engineering
COV	Committee of Visitors
EHR	Directorate for Education and Human Resources
EIS	Enterprise Information System
ENG	Directorate for Engineering
EPSCoR	Experimental Program to Stimulate Competitive Research
FFRDC	Federally Funded Research and Development Center
FTE	Full-Time Equivalent
FY	Fiscal Year
GPRA	Government Performance and Results Act
IA	Integrative Activities
IPA	Intergovernmental Personnel Act (appointee)
IPS	Interactive Panel System
IPERS	Integrated Personnel System
MPS	Directorate for Mathematical and Physical Sciences
NSF	National Science Foundation
OCI	Office of Cyberinfrastructure
ODS	Online Document System
OIG	Office of Inspector General
OISE	Office of International Science & Engineering
OMB	Office of Management and Budget
OPP	Office of Polar Programs
PARS	Proposal, PI and Reviewer System
PI	Principal Investigator
R&D	Research and Development
R&RA	Research and Related Activities (account)
S&E	Science and Engineering
S&E	Salaries and Expenses (account)
SBE	Directorate for Social, Behavioral and Economic Sciences
SGER	Small Grant for Exploratory Research
VSEE	Visiting Scientists, Engineers and Educators