

**FY 2009 NSF COMMITTEE OF VISITOR (COV) REVIEW OF THE GRADUATE  
RESEARCH FELLOWSHIP PROGRAM SEPT 1-2 2009**

**Graduate Research Fellowship Program Response to COV Report October 29, 2009**

On September 1-2, 2009 a Committee of Visitors was convened to review the Graduate Research Fellowship Program from FY 2007 –2009. The program directors thank the COV members for their thorough review of the program and recommendations. This response addresses the recommendations included in the COV report. Responses are organized in accordance with the order provided by the FY 2009 Report Template for NSF Committees of Visitors.

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

**A.1 QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS:**

**1. Are the review methods (for example, panel, ad hoc, site visits) appropriate? YES**

**Recommendation: Explore the use of new technologies to screen the Q3-4 applicants in order to enhance the face to face interaction/discussion of Q2 applicants.**

**RESPONSE:** The program office will take this recommendation under consideration with the operations contractor, by examining feedback from previous panelists and by soliciting feedback from future panelists.

**1. Are both merit review criteria addressed? YES**

**Recommendation: The materials provided to the COV suggest that applicants receive a single overall rating. Rather than give applicants a single ranking that requires reviewers to subjectively weigh the importance of the two NSB review criteria, the COV recommends that reviewers give an overall ranking to each candidate in each of the two NSB review criteria areas and allow NSF to assign the weight to each criterion.**

**RESPONSE:** The current practice is consistent with NSF policy in that a single rating is provided by the reviewer, who takes both review criteria into account.

**3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals? YES**

**Recommendations:**

**1. In order to make good use of panelists' time, it might be a good idea to "triage" applications before the panel meeting. Applicants who rank in the bottom group should be eliminated from further consideration and discussion prior to the panel meeting so that the panel can spend its valuable time reviewing the competitive applications. This might also allow for smaller panels.**

**RESPONSE:** The program will take this under consideration with the operations contractor, by examining feedback from previous panelists and by soliciting feedback from future panelists.

**2. Providing constructive feedback via written comments can be very helpful for applicants who are not awarded a fellowship. For the applicants that are judged to be competitive but not receiving funding, reviewers might provide comments that are as constructive and extensive as possible given the time constraints.**

**RESPONSE:** The program will continue to encourage reviewers to provide constructive feedback. We will continue to emphasize this in the panel orientation and during the practice exercise for panelists.

**3. Ideally the two reviewers of the panel meeting would provide an opportunity for panelists to see comments prior to the meeting and avoid conflicting reviews as seen, for example, in the documentation provided for the decline of 1000088091 in which one reviewer commented that the applicant had no prior publications, while the other stated that he/she already had a peer-reviewed journal paper.**

**RESPONSE:** We concur and will continue to emphasize this to the panel chairs, who bear this responsibility. However, when panelists disagree, the review content may reflect this fact.

**4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)?** **NOT APPLICABLE**

**5. Does the documentation in the jacket provide the rationale for the award/decline decision?** **YES**

**Recommendation: It is not clear whether the Recommendation Memo and/or the Final Selection Report is/are provided to applicants and whether or not program staff have ready access to these documents via the internal NSF system. Due to the helpful nature of the information contained within these documents, it would be useful to allow as much access to them as is possible and appropriate given their content.**

**RESPONSE:** Per NSF policy, the Recommendation Memo and Final Selection Reports are internal documents. The information contained in these documents would not assist an applicant with preparing a more competitive application. The program office will work with the NSF Office of Legislative and Public Affairs to determine if there are data that would be useful to the public.

**Recommendation: The final recommendations to award fellowships or honorable mentions should be documented.**

**RESPONSE:** The Recommendation Memo documents the selection criteria. The program will review the Memo for clarity of description of the selection criteria.

**6. Does the documentation to PI provide the rationale for the award/decline decision?** **YES**  
**For GRFP review, the term "Applicant" is the appropriate term rather than "PI".**

**Recommendation: The Recommendation Memo provides a great deal of background information that would be helpful to prospective applicants. It is not clear from the materials provided the COV whether or not this information is communicated to the applicants. If not, we recommend that this be done.**

**RESPONSE:** This is addressed in Response #5.

**7. Is the time to decision appropriate?** **YES**

**Comment/Recommendation:**

It is important that prospective fellows be notified at least two weeks in advance of the April 15 Council of Graduate Schools approved deadline for students to notify schools whether or not they plan to accept an offer of admission (see <http://www.cgsnet.org/?tabid=201>). The sooner students can receive notification the better because some schools base admission decisions on funding availability. If a student who applied for an NSF GRFP student receives funding through the program, the student's prospective school may be able to reallocate funding from the GRFP-supported student to another student who might not have originally received an offer of support (or admission). Early decisions also give students the opportunity to explore options (in terms of potential advisors or schools).

**Recommendation:** Is the timeline available on the web to potential applicants? If not, could it be made available? For some at-risk, low-income applicants, the availability of NSF GRFP funding might be a key in a prospective fellow's decision to attend graduate school.

**RESPONSE:** The anticipated timeline is in the program Solicitation and will be added to the GRFP.org website. The awards are announced as early as possible and normally prior to the Council of Graduate Schools April 15 deadline for accepting offers to graduate programs.

**8. Additional comments on the quality and effectiveness of the program's use of merit review process:**

**Recommendation:** The website <http://www.nsfgrfp.org/> contains much helpful information. The NSF GRFP website [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=6201](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201) should contain an explicit link or reference to the nsfgrfp.org site. Some students (and/or their mentors) may only search for information about the GRFP on the NSF website and may never find out about the nsfgrfp.org site. Students who visit nsfgrfp.org have a distinct advantage over those who do not visit the site. The interests of the STEM community at large would be best served if all potential applicants were counseled to make use of the information at nsfgrfp.org. The easiest way to do this is through a simple (but prominent) link to nsfgrfp.org from the NSF GRFP website.

**RESPONSE:** The link to the GFRP.org website will be added to the NSF GRFP website.

**Recommendation:** The question of whether or not GRE scores should be submitted should be revisited. As it currently stands, GRE scores are optional, but the large majority of students submit them and NSF will even reimburse students for the cost of the subject area GRE test if the student takes the test primarily so the score can be submitted as part of the NSF GRFP application package. This sends a clear message to students and their mentors that GRE scores are important. It seems likely that only students who scored poorly on the tests will choose not to submit, and reviewers probably are aware of this. Given the fact that there is controversy regarding whether or not the mean of GRE scores for underrepresented minority test takers are many points below those of majority test-takers, it seems that the use of GRE scores may unfairly bias reviewer's decisions toward majority applicants. Low-income students may also find the cost of the general GRE test prohibitive (it currently costs \$150). Low-income prospective applicants and applicants from rural areas may face an additional challenge in getting to an approved GRE test center. Although the NSF GRFP does not charge an application fee, they are essentially levying such a fee on applicants by requiring the GRE. From a reviewer's perspective, inclusion of a GRE score (or not) in an application does not encourage holistic review of an applicant's file. For the reasons

described above, we recommend that NSF eliminate GRE scores from the application package.

**RESPONSE:** The program will revisit the inclusion of GRE scores in the applications.

**Recommendation:** It is good that reviewers are given the opportunity to rescore files if they wish to do so. One concern with this practice is that “strong” reviewers may end up influencing the decisions of “weak reviewers” so that one perspective may dominate. It would be good if program staff would explicitly counsel reviewers to only rescore an application if they missed seeing some part of it on their initial review. Since part of NSF’s goal is to take some risk, the NSF GRFP program should be willing to provide support to some applicants who show strong promise, but do not receive the highest overall ranking or the highest scores on either of the two NSB review criteria.

**RESPONSE:** The program directors will continue to provide guidance to reviewers on when an application should be rescored during the review.

**Recommendation:** The program solicitation should explicitly state that applicants are allowed to include work or industry research experiences in their personal background statement. This would encourage students who are inclined toward an industry career to participate in the program by submitting applications.

**RESPONSE:** Applicants are encouraged to include all relevant research experiences.

**Recommendation:** The members of the COV were of different minds regarding the distribution of funding based on proposal pressure. Although this method allows the community to drive the allocation of funds, it reduces the potential for NSF to make foundation-wide strategic decisions. The COV recommends that program staff attempt to build collaborations with the research directorates that could result in funding of additional fellows in strategic areas (as was done with GEO in 2009). As state-funding for higher education continues to decline, the cost of tuition is rising rapidly at public schools. It is becoming increasingly difficult for faculty PIs who are funded to conduct research through a single-investigator award to be able to support a PhD student for the entire 3-5 years required for completion of a degree. The NSF GRFP is the only NSF program that specifically provides for the graduate students who will be the future STEM leaders in academia, industry, and government.

**RESPONSE:** The distribution of awards across research areas and themes will be researched and considered but is beyond the scope of the GRFP. With the recent changes to the application module (keywords and research title), we will have a rich foundational data set to explore how applicant/award pool proposed research fits with strategic areas.

**Recommendation:** It would be good to require a random sample of awardees to participate in a verbal (perhaps online) interview prior to receiving funding. This would help to eliminate the possibility that some applicants are not writing their own applications.

**RESPONSE:** The current application certification page addresses whether the application is the applicant’s own work. It is unclear how the additional suggested measures would address the concerns raised.

**Recommendation:** It would be desirable to understand whether the application really represents the student’s skills and competencies (especially those whose primary language is NOT English).

**RESPONSE:** The application includes external letters of recommendations that address the student’s skills and competencies.

**Recommendation:** It would also be interesting to bring a selected group of awardees to NSF to have them share their experiences (good and bad) regarding the process, their experience and the outcomes – have the event broadcasted to all high schools in the country to promote the program nationwide.

**RESPONSE:** The program will take this under consideration with the operations contractor in developing the program outreach plan.

## A.2 Questions concerning the selection of reviewers.

**SELECTION OF REVIEWERS: YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE<sup>1</sup>**

1. Did the program make use of reviewers having appropriate expertise and/or qualifications? **YES**

**Recommendation:** The documentation provided to the COV does not include information about the disciplinary expertise of the people selected to serve on the panels. This information should be provided to future COVs. Ideally the number of panelists with expertise in a specific area should be directly related to the number of proposals submitted to that area (which is probably what is currently done). It is not clear how panelists are selected to review the “interdisciplinary” applicants. The COV members would appreciate receiving more information about this process.

**RESPONSE:** The number of panelists with expertise in a specific area is directly related to the number of proposals submitted in that area. Proposals are reviewed by panelists with expertise in the applicant’s proposed research area.

**Recommendation:** The virtual absence of industry representatives and past fellows among panelists is worrisome. The COV highly recommends that more than a “handful” of industry representatives participate in panel evaluations. Panels should also include past fellows.

**RESPONSE:** The program is continually revisiting the composition of the reviewer panels with respect to this issue.

**Recommendation:** If possible, program might consider forming panels that include individuals drawn from multiple disciplines to review the interdisciplinary proposals.

**RESPONSE:** The program will take this into consideration based on the number of interdisciplinary applications. Panelists with interdisciplinary expertise are included on each panel.

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<sup>1</sup> If “Not Applicable” please explain why in the “Comments” section.

**Recommendation:** The COV highly recommends including criteria in the application pertaining to the student's plan to engage with industry research collaborators as well as international collaborations.

**RESPONSE:** The current application module will be reviewed to see where it might be appropriate to accept input from applicants on present and future collaborations.

1. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups? **YES**

**Recommendation:** It seems that private schools may be over-represented among the panelists (31%).

**RESPONSE:** The program is continually revisiting the composition of the reviewer panels.

**Recommendation:** Community college faculty members do not appear to have been represented among the panelists until 2009 (when there were three). Consider including community college faculty members (who have the PhD in a STEM field) in the future. Inclusion could lead to more broad dissemination about the NSF GRFP to low-income, first-generation, and underrepresented minority students who may have their first college experience at a community college. Dissemination of information of this type may help at-risk students learn that they may have the opportunity to attend graduate school – with full funding – which may help to diversify the graduate application pool nationwide. Serving on a panel would also be an outstanding professional development opportunity for the community college faculty.

**RESPONSE:** The program is continually revisiting the composition of the reviewer panels in collaboration with our outreach efforts.

3. Did the program recognize and resolve conflicts of interest when appropriate? **YES**

**Recommendation:** We recommend that NSF GRFP staff emphasize the opportunities that exist to voice concerns if they arise. Make it clear that panelists know that program staff are available for confidential discussions and responsible for resolving any and all issues that may arise during a panel meeting. This includes conflicts between panel members.

**RESPONSE:** This is covered in the Panel Chair Briefing and will continue to be emphasized.

4. Additional comments on reviewer selection:

**Recommendations:**

- We recommend that NSF provide an explicit link to <http://www.nsfgrfp.org/> on the NSF GRFP website [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=6201](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=6201) to help enhance the size of the reviewer pool.

**RESPONSE:** This will be done.

- We further recommend that panels include past fellowship recipients, and that NSF consider taking proactive actions intended to assemble a more diverse group of

**panelists, rather than rely solely on the website. For example, program staff might request that panelists recommend other colleagues to serve on future panels.**

**RESPONSE:** The program and operations contractor actively recruit panelists and continually revisit the reviewer panel composition.

**A.3 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.

**RESULTING PORTFOLIO OF AWARDS: APPROPRIATE, NOT APPROPRIATE<sup>2</sup>, OR DATA NOT AVAILABLE**

**1. Overall quality of the research and/or education projects supported by the program. APPROPRIATE**

**Recommendation: We recommend that NSF prepare samples of expectations for the Broadening Participation aspect of Fellow's work during the period of support in graduate school.**

**RESPONSE:** The program will be revising the Annual Activities Report to better reflect expectations for, and participation in, broader impact activities, such as broadening participation. A post-award follow up with the Fellow and institutional contacts that outlines the expectations is being explored.

**2. Does the program portfolio promote the integration of research and education? YES, APPROPRIATE**

**Recommendations:**

- **The NSF should establish expectations for graduate students to engage in activities to integrate education and research, and possibly teaching, for some portion of their graduate study.**

**RESPONSE:** The program's flexibility provides Fellows opportunities to engage in activities of their choosing that integrate education and research.

- **In an effort to further develop this integration we recommend that the GRFP consider extending eligibility to students entering their third year of graduate school. Students at this stage are more likely to understand how their research interacts with education.**

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies.

**3. Are awards appropriate in size and duration for the scope of the projects? APPROPRIATE FOR THE STUDENTS, BUT PERHAPS NOT FOR THE UNIVERSITIES.**

**Recommendation: In view of the economy and the rising costs of education (and tuition, especially at private institutions), the NSF/Congress should consider increasing the education allowance funding level to universities.**

**RESPONSE:** We have provided appropriate data for consideration of this recommendation. While this decision is outside our sphere of influence, we will provide input when solicited to support this recommendation.

4. Does the program portfolio have an appropriate balance of innovative/potentially transformative projects? **YES, APPROPRIATE**

**Recommendation:** We recommend that the GRFP consider broadening eligibility to include students who are starting their third year of graduate study within a field. As these students will be commensurately further along in their research, panelists will have more information regarding the quality of research, in contrast to simply the promise of quality research.

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies, as such a change would mean there is less funding available to attract new individuals into STEM.

5. Does the program portfolio have an appropriate balance of: Inter- and Multi- disciplinary projects? **YES, APPROPRIATE**

**Recommendations:**

- Because the future of science will be greatly influenced by and focused on interdisciplinary arrangements that will cut across the natural sciences, the social sciences and even the humanities, the NSF should consider establishing standards and expectations for all recipients to have an interdisciplinary experience, preferably including the SBE fields, during their matriculation as graduate students.
- The NSF/Congress should consider changing its budgetary allocations model in such a way as to give a greater allocation to interdisciplinary projects than would be the case from a simple distribution based on the number of applications within the area.
- The NSF should consider giving extra/bonus points to ALL applications within disciplines that have an interdisciplinary component.

**RESPONSE:** Interdisciplinary applications are currently encouraged and reviewed by experienced, interdisciplinary panelists. Reviewers assess the interdisciplinary potential contributions of the proposed research and strong interdisciplinary applications rise to the top. Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies.

6. Does the program portfolio have an appropriate balance considering, for example, award size, single and multiple investigator awards, or other characteristics as appropriate for the program?

7. Does the program portfolio have an appropriate balance of awards to new investigators?  
**NOTE:** A new investigator is an investigator who has not been a PI on a previously funded NSF grant.

8. Does the program portfolio have an appropriate balance of geographical distribution of principal Investigators?

**Recommendation:** The NSF should consider the development of a strategy for soliciting (and providing technical assistance to facilitate) applications in states with low incomes and relatively high percentages of underrepresented racial/ethnic minorities. For example NSF might use the EPSCOR network for increasing GRFP outreach and applications and pursuing EPSCOR co-funding opportunities within NSF. We further suggest that NSF increase outreach to the EPSCOR states through the use of former fellows as disseminators of information.

**RESPONSE:** We concur. The program is developing an outreach plan with the operations contractor that takes these issues and the advancement of technology into account. We will take this recommendation under advisement as we develop our enhanced Outreach Network in conjunction with our contractor to broaden the participation of applicants from Minority-serving Institutions and a diverse set of Carnegie classification institutions. We will use data from previous applicant cycles to guide this outreach and explore the use of technology to support more extensive outreach to these communities.

**9. Does the program portfolio have an appropriate balance of institutional types? NO, NOT APPROPRIATE**

**Recommendations:**

- The COV recommends that NSF develop an aggressive campaign to solicit (and provide technical assistance on Fellowship application preparation at minority serving institutions. We suggest that NSF staff prepare a data-based report on applications and awards by Carnegie classification type as a first step in developing this campaign.
- In an effort to continue to attract students from a broader range of institutions, we recommend that GRFP officials enhance recruiting efforts in two areas. First, many disciplines have programs designed to prepare disadvantaged minority students for graduate training (for example, the Summer Training Program in Economics, sponsored by the American Economic Association). Some of these programs are also funded by the NSF (often through the Research Experiences for Undergraduates program) but an exhaustive search across disciplines should be undertaken. Second, the GRFP should target government and industry sources of potential graduate students. For example, within Economics, the Board of Governors of the Federal Reserve is the largest employer of research assistants, and this pool of more than 75 potential graduate students would be an excellent source of GRFP applicants.
- We recommend bringing a selected group of awardees to NSF to share their experiences (good and bad) regarding the application process, and broadcast the discussion on-line to promote the program and inform applicants nationwide.

**RESPONSE:** The program is working with the operations contractor to provide more training- versus information-oriented outreach sessions. The goal is for the operations contractor managing the outreach program to engage a resource network that includes current and former Fellows, faculty, career professionals and others. The program and operations contractor are currently targeting recruiting efforts to other NSF programs, such as the NSF Research Experiences for Undergraduates program.

**10. Does the program portfolio have an appropriate balance across disciplines and sub disciplines of the activity?**

**Recommendations:**

- As noted above in section A.1.8, the COV recommends that NSF/Congress consider a modification of the current model for determining the “quota” for disciplinary representation by reserving or setting aside a certain percentage of the annual pool of slots for distribution to specified areas of national need or designated priority.

**RESPONSE:** The distribution of awards across research areas and themes will be researched and considered but is beyond the scope of the GRFP.

- One question that arises concerns the presence of Public Policy as a field of NSF and GRFP support. We recommend that the NSF review the presence of Public Policy to ensure that it is a field that is worthy of support. Further, we recommend that the NSF consider closer coordination between the GRFP and the research directorates to ensure that areas of emphasis receive appropriate support.

**RESPONSE:** The program solicitation will be reviewed and the advice of the research directorates will be sought as appropriate.

**11. Does the program portfolio have appropriate participation of underrepresented groups?**

**Recommendations:**

- The COV recommends that NSF provide comparative data on minority representation on applications and awards in relationship to the old Minority Graduate Research Fellowship program, data on the representation of women of color for applications and awards in relation to women in general and to men within their racial/ethnic group, and data on the application/awards rates for native Americans and other underrepresented groups and for persons with disabilities.

**RESPONSE:** The program statistics with respect to underrepresented groups in STEM are reported in the Recommendation Memo and are used to guide outreach efforts.

- NSF might consider using the characteristics of the undergraduate population as a whole (including students enrolled in community colleges) as a guide to the composition of panels. This will help to ensure that decisions are made that may eventually lead to the demographic characteristics of academia, industry, and government to be more like the population at large.

**RESPONSE:** In general, the undergraduate population as a whole does not represent the GRFP applicant pool. However, we will take this under advisement in building the panel reviewer database.

**12. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports.**

**13. Additional comments on the quality of the projects or the balance of the portfolio:**

**A.4 Management of the program under review.**

## 1. Management of the program.

**Recommendation:** As noted in Section A.1.8, the COV recommends that NSF consider aligning GRFP investments with NSF's overall portfolio investments. We believe that the human resources development – especially in new areas of technology – needs to be consonant with NSF goals.

**RESPONSE:** The program will open/continue a dialog with the NSF research directorates and offices concerning this issue. Modifications to the application module implemented in 2009 allow us to identify proposal themes. These will be used to inform our dialog and outreach efforts with the research directorates. The data will provide useful feedback on the alignment of the applicant pool with NSF's strategic areas.

## 2. Responsiveness of the program to emerging research and education opportunities.

**Recommendations:** We recommend that GRFP Officials proactively and strategically plan the investment portfolio for alignment with NSF research priority areas.

**RESPONSE:** See response to A.4 #1 above.

## 3. Program planning and prioritization process (internal and external) that guided the development of the portfolio.

**Recommendation:** The COV believes that it would be highly desirable for NSF program officials to proactively align program investments with NSF strategic directions as well as industry research investments, and to benchmark with other countries, investments to enhance US competitiveness in science and technology.

**RESPONSE:** See response to A.4 #1 above.

## 4. Responsiveness of program to previous COV comments and recommendations.

### Recommendations:

- The COV recommends that a comprehensive “business model” be developed wherein all possible sources of funding for graduate fellows (internal as well as external to NSF) be considered (for example, partnerships with industry, other federal agencies as well as other countries). Now that the GRFP budget is likely to triple in the next few years, this business model could be especially important as resources could be considerably increased by these partnerships. In addition, awardees could have a greater opportunity to engage in more interdisciplinary, multi-stakeholder, multinational research experiences that would be of great benefit to them.
- GRFP should consider holding back some proportion of the total funding available for each competition to allocate toward strategic areas that align with areas of national need. This will help NSF contribute to the growth of future researchers and leaders in emerging research areas.

**RESPONSE:** The program looks forward to forging new partnerships with external entities that can provide Fellows with new professional opportunities. A challenge that must be overcome is identifying a “business model” approach that is appropriate for a federal agency.

## 5. Additional comments on program management:

### PART B. RESULTS OF NSF INVESTMENTS

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

**B.1 OUTCOME GOAL for Discovery:** *"Foster research that will advance the frontier of knowledge, emphasizing areas of greatest opportunity and potential benefit and establishing the nation as a global leader in fundamental and transformational science and engineering."*

#### Recommendations:

- The COV strongly recommends that NSF develop and implement plans for a longitudinal study in which fellowship recipients are followed for a significant portion of their professional lives and compared with a cohorts of individuals who applied but did not receive awards and who did not apply. Quality indicators such as employment history, scientific productivity, citation index, number of patents, number of students and supervised postdocs, history of grant support, major awards, should be monitoed. This analysis should also examine the predictive value of the GRE in these different groups and for students of various ethnic and cultural backgrounds.
- The COV recommends that the GRFP contract to conduct this longitudinal outcomes study to determine the long-term impact of the program. The COV anticipates that data collected will be useful to many people within and outside of the foundation. It will be particularly useful for policy decisions. The honorable mentions group forms a natural control group for the study (to use for comparison with the fellows). Some of the outcomes that should be tracked include completion rates, placement of the recipients after the PhD, achievements (Nobel laureates, companies started, patents, etc.).

**RESPONSE:** A longitudinal study is already underway to address these concerns.

- The COV further recommends that in order to maximize benefits of the fellowships NSF should encourage awardees to interact and spend time conducting research in organizations other than their PhD program institution.

**RESPONSE:** The program encourages Fellows to take advantages of research opportunities beyond their home institutions, such as the **Nordic Research Opportunity** for NSF Graduate Fellows. The program looks forward to expanding such opportunities for Fellows in the future.

**B.2 OUTCOME GOAL for Learning:** *"Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens."*

#### Recommendations:

- The COV recommends that the GRFP identify all such discipline-specific programs and visit them annually. Moreover, the site visits, which are currently designed

principally to tell the students about the existence of the program, should be more focused on tips for applying, perhaps covering the information that is currently condensed from the previous experience of fellows.

**RESPONSE:** In collaboration with the operations contractor, the program is developing a revised in-reach and outreach plan. Future outreach will be more training- versus information-oriented.

- The COV recommends that in drawing conclusions regarding outcomes both in graduate school and in work years beyond graduate school, NSF use honorable mention awardees as one of the potential control groups, Perhaps an even better study would be to focus particularly on students in Quality Group II and compare those awarded fellowships with those given honorable mention.

**RESPONSE:** A longitudinal study is already underway, and it uses the honorable mentions as the control group.

- We recommend that the GRFP consider another year of funding, based on the fellows outreach and education accomplishments and plans. In determining the best way to fund such fellows, it may be that the GRFP turns to other forms of evaluation than the current annual panel. Perhaps the IGERT boards, which themselves award NSF funds to graduate students, could serve as an alternative platform for evaluating students as they may be more closely aligned with the mission of innovative education.

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies, as such a change would mean that there is less funding available to attract new individuals into STEM.

- The COV suggests that making outreach and training in education more explicit goals in the application and review process would focus attention and investment on these areas. Universities could be asked to provide NSF Fellows with opportunities or explicit training in outreach and education. Most of the faculty members at research universities in this country had little or no training in teaching, particularly with methods involving discovery and project-based instruction rather than teaching in a lecture format. This pattern could be broken if NSF made training in learning and teaching a part of the fellowship program. This might also have the beneficial effect of increasing emphasis on teaching and teacher training in some of our most prestigious research universities.

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies. The program's flexibility provides Fellows opportunities to engage in activities of their choosing that integrate education and research.

**B.3 OUTCOME GOAL for Research Infrastructure:** *“Build the nation’s research capability through critical investments in advanced instrumentation, facilities, cyber infrastructure and experimental tools.”*

**Recommendation:** The COV recommends that as part of the fellowship, awardees be given access to the major NSF-funded national research facilities. NSF could also make special opportunities available for universities hosting fellows to apply for funds for major research equipment.

**RESPONSE:** The feasibility and coordination of this activity with the research directorates and entities outside NSF will be explored.

## **PART C. OTHER TOPICS**

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

### **Recommendations:**

- **The program is currently open to applicants who are pursuing master's or PhD degrees but have not yet had much prior graduate experience. We recommend that the program be modified to focus on funding students pursuing the PhD, but allow students who already have a master's degree to apply.**

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies.

- **We recommend that the GRFP tap the pool of students from the undergraduate summer programs funded either by NSF, universities, foundations or industry, to introduce undergraduate students to the opportunity available to them through the NSF GRFP. These programs are often targeted to undergraduate minorities and are therefore an excellent, diverse pool of potential graduate students.**

**RESPONSE:** Currently, the program targets recruiting efforts to NSF programs, such as Research Experiences for Undergraduates. The program will continue to expand these efforts by working with the research directorates and student-centered programs in the Education and Human Resources directorate. The outreach plan will include outreach to other programs, as recommended.

- **We recommend that annual reporting templates should require fellows to explicitly report achievements relative to all of the programs goals (e.g., integrate research and education, broader impacts, intellectual merit, interdisciplinary experience, industry experience, international experience, etc.).**

**RESPONSE:** The program will revise the Annual Activities Report to better reflect expectations for and participation in all program goals.

- **We recommend that NSF consider awarding \$5k to applicants that receive honorable mention to broaden their education and research experiences.**

**RESPONSE:** Changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies, as such a change would mean that there is less funding available for new awards.

- **We recommend that NSF consider awarding up to \$5k supplements to students who are willing to pursue an opportunity that is outside of the traditional academic training. For example, students who wish to participate in public outreach, formal K-12 education, informal education, international experience, etc.**

**RESPONSE:** The program encourages Fellows to take advantages of research opportunities beyond their home institutions, such as the **Nordic Research Opportunity**. The program looks forward to expanding such opportunities for Fellows in the future. However, changing the scope of the program requires thoughtful discussions with key stakeholders and constituencies, as such a change would mean that there is less funding available for new awards.

**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.**

**Recommendation:** The COV suggests that the GRFP consider conducting a pilot program with industry to host fellows on their sites. This program could be modeled after the Nordic program. Some industries may be willing to host fellows, and some industries may be willing to host fellows and provide some funding for the fellows while they are at the industry site.

**RESPONSE:** The program will follow up on this recommendation to consider how best to expand the availability of such opportunities for Fellows.

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

**Recommendation:** There appears to be a need for interaction between the GRFP and other NSF programs. Most research proposals include budgets to support graduate students, but their selection is left to the proposal's PIs. Given the experience and success of the GRFP in selecting top graduate students and supporting underrepresented minorities, it may be worth looking into the possibility of the GRFP making available the list of students to PIs funded by NSF programs (including the honorable mentions).

**RESPONSE:** The program is formulating an in-reach plan to strengthen our ties with the research directorates. While the list of GRF awardees is publicly available on the FastLane GRFP page, we will explore with the research directorates ways to publicize the fellowship and honorable mention awardees to their disciplinary communities and to engage the awardees and honorable mentions in professional activities.

**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.**