Date of COV: 17-19 June, 2015

Program/Cluster/Section: All Managed Programs

Division: Division of Environmental Biology (DEB)

Directorate: Directorate for Biological Sciences (BIO)

Number of actions reviewed: 583

Awards: 90

Declinations: 222

Other: 4 Withdraws; 21 Return without review; 61 Invites; 185 Non-invites

Total number of actions within Program/Cluster/Division during period under review: 11161

 Awards: 2030

 Declinations: 4095

Other: 26 Withdraws; 245 Return without review; 1082 Invites; 3682 Non-invites

Manner in which reviewed actions were selected:

The full list of DEB proposal actions from FY2012 to FY2014 was downloaded from the NSF Enterprise Information System. Non-lead collaborative jackets were removed from the sampling pool because they duplicate documentation of the lead jackets, leaving a pool of 9753 unique actions during the period. Five percent of the jackets were selected for the sample by numbering each jacket from 1 – 20, selecting a random number from 1 – 20 and taking every jacket with the matching number, producing a sample of 488 jackets.

This sample was checked for inclusion of all DEB programs, proposal types, award types, and action types. Additional jackets were randomly selected from the missing sub-populations and added to the sample to ensure representatives of these categories were available to the COV; this resulted in a sample of 501 projects (573 jackets including non-lead collaboratives). The sample was also compared to the full proposal list for geographic, institutional, and PI demographic representation and found to be sufficiently representative such that no additional proposals were added in these categories.

Ten additional jackets were added during the course of the COV in response to specific requests for additional examples of topics discussed by the COV.

Division of Environmental Biology
Committee of Visitors
June 17-19, 2015

Executive Summary

The Committee of Visitors (COV) applauds the Division of Environmental Biology (DEB) as a widely respected, well-managed Division comprised of exceptionally dedicated staff and program officers. DEB prepared the COV well to do our job and were very responsive to our requests for information and access; in particular, the self-study and annual reports were very welcome, valuable resources for completing our task. Our analysis covers the whole of DEB activities, but pays particular attention to the new pre-proposal mechanism. We understand the justification for the pre-proposal as an attempt to adapt to ever rising proposal submissions, and heartily support the independent assessment of the process as a valuable exercise for DEB and the scientific community it serves.

Our analysis of the pre-proposal mechanism has identified emerging concerns regarding the review process. In particular, the COV questions whether the goal of the pre-proposal review is to provide substantive feedback and advice, or simply to provide a justification for an invite/do not invite decision. Fundamentally, the major point of clarification is how pre-proposals differ from full proposals. Our perception is that pre-proposals are being treated by reviewers and applicants alike as smaller versions of full proposals. This perception produces the following concerns: (1) a lack of clarity regarding the nature of the feedback in reviews and panel summaries, (2) the quality of the explanations for outcomes of review (panel summaries and review analyses) is often inadequate, and (3) the lack of clarity in how the weighing of factors (e.g., broader impacts or methodological detail) should be balanced in the review and decision process of full vs. pre-proposals.

In addition to concerns regarding the pre-proposal process, the COV also recognized other issues requiring DEB's attention. (1) There is a confusing diversity of opinions among proposal reviewers on how to evaluate broader impacts. (2) Challenges remain regarding whether pre-proposal panel-only reviews are comprehensive enough in expertise. (3) There remains a need for increased personnel support to aid program officers (PO) in focusing more on scientific issues and less on purely administrative activities.

Furthermore, the COV notes that portfolio balance between core and special programs captures the breadth of scientific endeavor in the DEB mission. However, we see emerging concerns regarding a degradation of long-term, integrative research programs (e.g., LTER, LTREB, Macrosystems). The COV applauds the efforts of program officers to maintain core capacity, while using special programs to increase scope and connections to other divisions and agencies.

The majority of questions listed in the charge to the committee and in Framework Item V are folded into the sections I through IV of the template. Two remaining questions are addressed in Section V of the report. Recommendations by the COV are identified as such and numbered sequentially in the body of the report.

I. Quality and effectiveness of merit review process

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

Overview:
In our review of over 300 proposal eJackets we found that DEB uses appropriate review methods. Indeed we found that in general review methods maintain a very high standard and ensure a high degree of integrity in the review process. A major change in the merit review process in the core program to a preliminary proposal approach occurred during the period considered by this COV. Overall, this change increased the ratio of panel-only reviews to ad hoc and panel reviews and is in line with the ratio of these review methods in other divisions of NSF. The data provided in the self study show that the pre-proposal process has accomplished the goals of: 1) reducing program officer (PO) workload, 2) reducing the review burden on the scientific community, and 3) providing high quality reviews at the full proposal stage. Here, we evaluate the panel review process focusing on individual reviews and panel summaries but we are not able to fully evaluate the effectiveness of this new merit review process. We commend DEB particularly for commissioning an external study of the effectiveness and impact of the pre-proposal process that includes feedback from the scientific community and will address concerns such as potential impacts on early career investigators.

Emerging Issues:
We identified several concerns in the new method of pre-proposal merit review, discussed more fully in (2) through (6) below. We found particularly that the substance and quality of pre-proposal reviews and panel summaries was lower than that for full proposals. This decreased feedback is particularly concerning for early career professionals, who have limited opportunities to improve their work given the cap in proposals per PI and the once-a-year submission process relative to their tenure deadlines. We identify at least two potential reasons for this shift in review quality at the pre-proposal stage: 1) the increased number of pre-proposals to be reviewed by a panelist may lead to shorter, less substantive reviews, 2) the limited number of pre-proposal panelists means that they are more likely to be reading outside of their core knowledge resulting in divergent views.

2. Are both merit review criteria addressed? Yes.
>   *a. In individual reviews?* Yes.
>   *b. In panel summaries?* Yes.
>   *c. In program officer review analyses?* Yes.

Overview:
With few exceptions, we feel that all three levels of review successfully address both merit criteria. However, it is clear that the individuals and panels preparing those reviews place different degrees of emphasis on the criteria. Not surprisingly, reviews of intellectual merit were often more substantive and helpful than were reviews of broader impacts**.**

Emerging Issues:
Reviewers usually provided substantive feedback on the Intellectual merit criterion. In situations where intellectual merit reviews were uninformative, the explanation often seemed to be that there was a poor match between the expertise of the reviewer and the proposal content (see *II. Selection of Reviewers*). One aspect of intellectual merit that often received inadequate attention from reviewers was the "Results from Prior Research Support" section. Individual reviews rarely comment on this portion of the proposal and yet this should be an important consideration when rating the promise of any proposal.

Reviews of broader impacts were usually less extensive. Indeed, many reviews of broader impacts looked to be boilerplate text. In our assessment, this style of review reinforces the idea that broader impacts is a less important criterion. Moreover, some reviews over-emphasized the broader impacts criterion to a degree that is inconsistent with NSF guidelines. For these reasons, few reviews of broader impacts provide constructive feedback to PIs.

3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals? Yes, but see comments below.

Overview:
The COV strongly agrees that the review method is adequate and aimed to fund the best possible research projects. The expert assessment through panels and ad hoc reviews makes the review process exceptionally rigorous. The COV also recognizes the tremendous effort the POs make to ensure an adequate number of expert reviewers.

Emerging issues:
The COV's primary concern with the review process relates to quality of the feedback provided to PIs to justify the final decision. The COV's review of random eJackets revealed significant variability in the quality of the reviews. While the majority of reviews are comprehensive and constructive, our sampling of the eJackets demonstrated that the pre-proposal reviews are often substantially shorter than full proposal reviews. In practice, we often observed that ad hoc reviews were higher quality (in terms of substantive content or feedback provided) than those of panelists. This last observation is especially troublesome for proposals that receive only panel review (e.g., pre-proposals). Some were exceedingly substantive and extremely helpful to a PI; others were inconsequential. The panel summaries in the latter group often did not provide the feedback necessary to justify the final decision. Variability in quality of the reviews might in part have to do with the mismatch between reviewers' expertise and a proposal, a mismatch that is likely more common with pre-proposals (when only panelists provide reviews). Other potential reasons for these non-informative reviews might have to do with the reviewers' lack of understanding about the nature of pre-proposals (e.g., degree to which methods should be detailed) and the workload on panelists.

4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)? Yes, but see emerging issues below.

Overview:
In the vast majority of eJackets that we had the opportunity to review, panels did a very good to excellent job of summarizing the reviewers' (whether both ad hoc and panel or just the latter) main points as the rationale for the panel consensus. In the best cases, the panel summary clearly had 'value added' content that emerged from discussion of the proposal at panel rather than just restating the written reviews.

Emerging Issues:
However, exceptions to this were encountered in a number of the pre-proposal eJackets that we reviewed. In these, the panel summary did little more than refer back to the individual reviews (which were written by the same individual panelists). Whereas this is understandable from the perspective of panel members who must move quickly through a large number of proposals in a short period of time, this practice does not contribute to fully documenting the rationale behind

the decision and has the potential to undermine trust in the review process. This becomes especially problematic when combined with the analysis at the PO level. In program officer analysis, the use of standard phraseology in clear 'do not invite' cases does not adequately document the decision process: "The program agrees with the panel on the merits of this preliminary proposal. The proposal is deficient in one or more critical components: its conceptual justification, the compelling nature of the research questions, the feasibility of plans to address them, or a convincing plan by which broader impacts of this project could be realized. The specific weaknesses for this proposal are described in the panel summary and individual reviews."

We know that the instructions provided to the pre-proposal panelists to guide them in both the 'reviewer' and the 'panelist' phases are detailed and call for assessments of the pre-proposal using logical and highly relevant criteria. It seems to the COV that the review and panel process would be improved in quality if adherence to these instructions were monitored and enforced. It was further indicated that assessment following these review criteria should be included in panel summaries.

5. Does the documentation in the jacket provide the rationale for the award/decline decision? Yes, but see emerging issues below.

Overview:
On full proposals the rationale for decisions is almost invariably well documented through program officer review analyses and panel summaries. These are typically very effective in summarizing how the specific strengths and weaknesses of proposals in relation to intellectual merit and broader impacts led to the award decision. Panel summaries and program officer analyses are normally thoughtful and convey well the strengths and weaknesses identified in the separate reviews and in the panel discussions.

Emerging Issues:
In panel summaries for pre-proposals in the core program, the rationale for the decision is also provided. However, on pre-proposals, we observe that program officer review analyses often consist of boilerplate text that defers to the panel summaries rather than providing a separate analysis that addresses the strengths and weaknesses of the specific pre-proposal. We concur that this is a necessary approach to streamline the processing of the large number of pre-proposals but it is now imperative that specific strengths and weaknesses be identified in panel summaries since these contain the only substantive information available to PIs that is specific to the proposal. As we discussed in (4), in contrast to panel summaries from full proposals, many summaries for pre-proposals contain less substantive information.

6. Does the documentation to the PI provide the rationale for the award/decline decision? Yes.

Overview:
Panel summaries are essential to document the reasoning behind the final decision. In particular, panel summaries are aimed to reflect the discussion that addressed issues like disparate reviews or recommendations that may not fully align with the review rankings. For a considerable number of proposals the COV found that the documentation provided, i.e., individual reviews and panel summaries, fully substantiated the decision. This was particularly true for full proposals but was highly variable at the level of pre-proposal as commented on in points 3-5, above.

Emerging issues:
Given the high variability in review quality, in particular for pre-proposals, panel summaries do not always reflect the discussion that addressed issues like contrasting reviews or 'borderline outcomes.'

7. Additional comments on the quality and effectiveness of the program's use of merit review process:
a.   We ask the COV to comment on the Preliminary Proposal process and changes to the review process in general.

Overview:
We were very pleased to learn that an external review of the pre-proposal process is being pursued. Regardless of the effectiveness of the pre-proposal process today, a common perception in the community is that there are many problems and unintended consequences. Conducting this study with involvement of the scientific community and communicating the study findings to that community will be essential.

Emerging issues:
The work of this COV suggests that the quality of reviews at the pre-proposal stage is significantly more variable than at the full proposal stage. If the external review confirms this finding, adjusting this portion of the process should be a high priority for DEB if the pre-proposal process as a whole is to be maintained. Enforcing high standards for reviews by panelists can ensure a quality product that does credit to the NSF merit review process.

Recommendations Concerning Question I.

Recommendation 1. Ensure that panel summaries are informative and a fair representation of the panel discussion. This is especially important in the pre-proposal stage where PIs receive only panel reviews.

Recommendation 2. Emphasize instructions to panelists and monitor panel summaries in real time as they are being prepared to ensure that they provide documentation for their recommendation, especially in cases of disparate reviews.

Recommendation 3. Consider providing panelists with a panel summary checklist or rubric that re-emphasizes the criteria provided to panelists in advance, including Intellectual merit, Broader impacts, and Results from Prior Research Support.

The following recommendations pertain to the pre-proposal process.

Recommendation 4. The COV recommends that DEB consider entirely different models for the first phase of a two-phase annual proposal process. Currently, the pre-proposal is perhaps both too similar to and too different from the full 15-page format. The COV recommends research into alternate formats (e.g., two page summaries focusing on big ideas and research approach; or formats used by other agencies and foundations).

Recommendation 5. To facilitate continuity into full proposal evaluation, DEB might ask panelists to self identify if they are willing to serve on both the pre- and full-proposal panels.

Recommendation 6. We encourage DEB to continue to educate pre-proposal panel members about the very different nature of pre-proposals and full proposals, and to provide a list of "best practices" in reviewing, such as via the DEBrief blog.

Recommendation 7. We encourage DEB to increase expectations of the level of detail in the pre-proposal panel summary.

Recommendation 8. We encourage the externally commissioned analysis of the pre-proposal process, including examining the success rates of and career impacts to beginning investigators in the years before and since implementation of the process.

II. Selection of Reviewers
1. Did the Program make use of reviewers having appropriate expertise and or qualifications?
Yes.

Overview:
In general, DEB does an excellent job of engaging appropriate expertise when evaluating proposals. We applaud the care and diligence of the program officers in their efforts to convene panels and engage ad hoc reviewers who represent the diversity required to properly evaluate proposals. The extent to which the program officers can find reviewers having appropriate expertise may depend on the panel and the particular award program. The traditional model of convening a panel of experts, plus additional ad hoc reviews, generally ensures that the proper expertise is consulted and that applicants receive substantive feedback. Special programs (e.g., EEID, CNH) with more than three panel reviews per proposal also seem to work well.

Emerging issues:
The COV identified the following concerns: (1) use of only three reviewers at the pre-proposal stage may constrain appropriate expertise to thoroughly evaluate some proposals, (2) the turnover of panel membership between pre-proposal and full proposal evaluation increases the possibility for stochasticity in feedback provided by these panels, and (3) the reviewer/panelist pool is limited when scientists decline to participate in the review process, particularly when established scientists decline to participate.

2) Did the program recognize and resolve conflicts of interest when appropriate? Yes.

The program has done an outstanding job of recognizing and resolving conflicts of interest. We especially applaud the new approach that involves easily searchable spreadsheets, which has reduced failures to identify COI. For example, the DEB self-study reports that in 2014, in a survey of 155 proposals of which 64 had potential conflicts, only 2 cases of improperly documented conflicts were found. The few COIs found are typically the result of the failure of PIs to report or recognize a valid COI.

Recommendations Concerning Question II:

Recommendation 9. Panel size limitations coupled with the breadth and diversity of scientific disciplines in the DEB mission make it difficult to ensure that the required expertise will be available to fully evaluate all preliminary proposals. We encourage NSF to explore approaches to optimizing the range of expertise brought to bear on pre-proposals, which might include, for example, virtual participation by additional reviewers or ad hoc reviews, when deemed necessary.

Recommendation 10. Explore additional incentives that increase the number of panelists who consistently serve on consecutive panels and that encourage all funded scientists to contribute to the review process.

III. Management of the Program Under Review.
1. Management of the program.

Overview:
This is a well-managed program. We heard extremely positive feedback from administrative staff, and from program officers both within the BIO directorate and from units across NSF. The lack of cluster barriers among administrative staff is noted to be a real strength. The "best practices" group is important and to be commended, especially as it provides flexibility for staff to move from program to program within the division. The administrative manager position is perceived as adding significant value in the form of facilitating collaboration, creativity, and the dissemination of good ideas, all of which contribute to the high morale of the administrative staff. Staff appreciate training opportunities, noting that these opportunities increase their immediate effectiveness, and improve their chances of career advancement, even if those opportunities arise outside of DEB or the BIO directorate. It appears that previous COV observations of low morale and high turnover among administrative staff has been noted and the resultant changes have been successful.

DEB is also noted for the dedication of its program staff and their creativity in making the most of the division's funding. Their willingness and ability to cooperate effectively with other units is notable, and is a commendable strength. Outside program directors noted this as one reason they see DEB as a role model. Overall program management at the Division and Directorate level has been in such flux that the COV can provide little insight other than that the division appears to have weathered this period successfully, with minimal effect on fulfilling its core mission. This is to be commended.

Limited Information Technology resources and outmoded and inflexible technology are agency-wide issues, and DEB's encouragement of staff to create and share work-arounds is to be commended.

Emerging Issues
Difficulty in recruiting rotators, especially for terms of greater than one year, and even more, in recruiting permanent program directors, is a significant concern. This concern is made more acute by the potential impact of the move to Alexandria, including the possibility of a wave of retirements.

The willingness to implement the pre-proposal process is an example of a commendable effort to think creatively about reducing the workload of program staff while maintaining the integrity of the review process. Even so, increasing numbers of proposals, in both core and special programs, as well as DEB participation in intra- and interagency working groups (which is valuable), mean that maintaining staffing at all levels, from program directors to the support staff, is crucial. The difficulty in attracting permanent program directors may create a serious issue. Redistributing some responsibilities may allow program officers to focus on the aspects of the mission that make the best use of their considerable and unique talents.

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

Overview:
It is critical that DEB continues to fund the cutting edge of research, which depends on identifying emerging areas and needs. DEB has been very successful in doing so, developing numerous venues in which the community may provide input and advice. DEB also interacts well with Foundation-wide initiatives, and though funding in collaboration with other directorates and divisions. The development of special programs to augment core programs continues to be a prime mechanism for responding to opportunities and changes in research direction.

Emerging Issues:
Maintaining a diversity of approaches to identify emerging opportunities is important. The lack of funding for program officer travel could have a significant negative impact on the ability of the programs to identify and respond to emerging research and educational areas and needs. Gathering community opinion and ideas is critical, and finding creative new ways to do so is important (e.g., in town hall meetings, convening groups at professional society meetings). We encourage the continued use of panel debriefing, which is a very positive development. We note that virtual panels do not have as great a potential to facilitate the exchange of ideas between the community and the division. Rotating program officers are a key resource in connecting to cutting edge science so continued persistence in recruiting rotators is important. The use of EAGERs and RAPIDs to fund creative and emerging areas is a useful and flexible tool. It is essential that special programs reflect Program-Officer based initiatives as much as is possible.

Sharing information about emerging opportunities within the NSF community is also important. The committee received mixed messages about the effectiveness of leading edge presentations, their regularity, and whether or not these are the best mechanism to convey information. It is important to ensure that ideas are widely shared one way or another – both across NSF and up and down the BIO directorate. The ability of program officers to travel and remain well informed about changes in the research foci or approaches in the scientific community has an impact here as well.

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

Overview:
DEB has a dynamic and effective process for program planning and prioritization that is guided by input from diverse constituencies within and external to NSF. Interactions between Programs within DEB, between DEB and other Divisions within NSF, and with other Federal agencies have yielded creative, interdisciplinary endeavors, such as the GoLife, Coupled Natural and Human systems, Advances in Digitization of Biological Collections, and Ecology and Evolution of Infectious Diseases Programs, among others. International programs are well represented in DEB and are commended. The international partnerships embodied in PIRE provide opportunities for further internationalization throughout DEB and BIO. DEB is seen as a great partner throughout the agency.

It is noted and commended that DEB seeks input from members of the scientific community through workshops, consultations with panelists, which have become regular elements of review panels, and periodic debriefings of program officers. DEB has pursued creative approaches to program development, such as the Ideas Lab activity. Collectively, these efforts allow DEB to

perceive and respond to the rapidly changing research landscape in developing its portfolio of sponsored programs.

Emerging Issues:
Efforts toward program planning and prioritization are constrained by factors beyond the control of DEB, including workload of program officers and limits on the ability of program officers to interact with the community through conferences and site visits. Turnover in senior management has also created challenges to program development. Finally, the preliminary proposal system has limited the ability for co-review of proposals with some Divisions, but this is solely due to changes in the scheduling of panels.

Special programs are critical to ensure that the research portfolio is able to evolve and exploit new interdisciplinary opportunities. However, the core programs, which are the bread and butter of DEB and NSF, must also actively evolve. Development of core programs should be driven by diverse groups, so that their priorities reflect the leading edge of science. While we still use the same terminology – population ecology, evolution, systematics, etc. – the growth of usable tools has integrated approaches across Programs in DEB and across Divisions.

Special programs create or enable new communities of researchers, but consideration must be given to how these communities are sustained once the special program ends. The issue of invasive species is a good example – a strong community has developed, but it is not clear where it fits within core programs. Do one or more "cores" need to change? Another example is Ecology and Evolution of Infectious Diseases. It is not just the community's problem to find a way for these emergent groups to continue; DEB needs to consider how these new areas of research can be supported as well.

4. Responsiveness of program to previous COV comments and recommendations.
   a) Comment on the COV perception of the DEBrief blog, and to suggest improvements to DEB's interactions with the community.

Overview:
It is clear that DEB takes the COV process seriously and pays attention to the report. The responses are, in the main, positive and effective. The DEBrief blog, for example, is an excellent mechanism to engage with the scientific community and we are highly supportive of this effort and its positive effects.

Emerging issues:
While overall the Division responded well to the previous COV report, we did note that the response seemed to attend to implied recommendations as much as to explicit recommendations in the COV document. In terms of areas where responses involved no change, the previous COV commented extensively on broader impacts and the response was that this is an issue above DEB. We again have concerns over the way broader impacts are used, assessed, and the role they play in funding decisions. We reiterate that DEB can help the scientific community understand broader impacts better. There are places where DEB could work harder to make changes, even if not exactly those that are suggested by the COV.

The DEBrief blog is a very positive approach to fostering communication with the community. We were especially impressed with the quality of the blog, the accessibility of the writing and consider it to be pitched at the right level. It is comfortable and informative, successfully communicates that NSF, DEB, and program officers are accessible and open to the scientific community. The blog has been especially effective in communicating funding rates, rationales,

and keeping the community updated on issues and trends at NSF. The blog serves the purpose of being both more accessible and more informative than official communications on the often impenetrable NSF website. For this value to be fully realized, however, it is important to ensure the blog is advertised. Twitter and other social media can be a useful tool to highlight when new DEBrief blogs appear. We encourage linking to other blogs that quote DEBrief so that readers of DEBrief can comment. We recognize that there are too few comments now, and that this is beyond the control of DEB, but we encourage efforts to create an online community through the blog.

Recommendations Concerning Question III.

Recommendation 11. We encourage DEB to think creatively about how program responsibilities might be shared among personnel in new ways, with the goal of broadening the reach of recruitment efforts and engaging the potential pool to exceptional individuals who are not currently eligible to be program officers. Given that the number of FTEs available to the division is likely fixed, it may be necessary to consider diversifying the seniority level of the program staff, for example, by including one or more Assistant Program Officers or Senior Analysts. DEB should consider widening the pool of senior program staff applicants, and increasing the likelihood of successful recruitment by increased flexibility with respect to specific areas of expertise required, and by facilitating, to the degree possible, spousal hires and opportunities.

Recommendation 12. Outreach to the scientific community via meetings and workshops is critical and should be continued. We reiterate the importance of supporting program officer travel to meetings, and to pursuing diverse ways to solicit input from the relevant research communities, and prioritizing the use of EAGER and RAPID awards to fund creative and emerging research areas.

Recommendation 13. Encourage the scientific community to use workshops to identify emerging areas of research for their field, especially at the interfaces among disciplines. Creative approaches such as Ideas Labs should be considered when appropriate (e.g., to solve recalcitrant problems and generate novel programs).

Recommendation 14. Identify and pursue opportunities to communicate to the Directorate level emerging areas of research and educational opportunities within DEB areas of funded research.

Recommendation 15. DEB should identify opportunities to facilitate interactions at disciplinary interfaces of core programs as well as in special programs.

Recommendation 16. DEB should examine how core clusters might incorporate and continue to nurture communities created by special competitions or programs when those programs terminate.

Recommendation 17. The DEBrief blog should be regularly updated with new posts, including those that make available analyses of grant programs and outcomes to help the community understand funding opportunities, program development and performance efforts. DEB should increase efforts to encourage comments on the blog and to ensure that it is well advertised to the community.

IV. Resulting Portfolio of Awards.

1. Does the program portfolio have an appropriate balance of awards between core activities and special competitions? Yes.

Overview:
DEB has a large proportion of funding dedicated to special competitions relative to the core and the program officers do an excellent job at making use of these special competitions by engaging with the community of PIs.

Emerging Issue:
The COV is concerned that special competitions not lead to the erosion of core programs moving forward.

2. Does the program have an appropriate balance of award sizes? Yes.

Overview:
Award size reflects request size, and the portfolio includes a broad range of award sizes reflecting the range of activities in which the community engages. We recognize that the DDIG program is unusual within the NSF, and carries a large administrative burden relative to award size, but we believe that the program is valuable for mentoring and development of promising young scientists.

Emerging Issues:
a) We ask the COV to comment on the usefulness and award size of the Small Grants track in DEB.

The COV supports the inclusion of the Small Grants track. This track will not be equally useful for all investigators and all types of science but it provides a mechanism for broadening the portfolio of awards while maintaining high quality science. We request that DEB remain mindful that the program not be associated exclusively with RUI, small schools, or beginning investigators.

3. Does the program portfolio have an appropriate balance of investments in long-term research? Currently, yes.

Overview:
The COV values sustained support for long-term research as a necessary component of the DEB funding portfolio. Long-Term Ecological Research is a crown jewel of DEB which supplies continuous and irreplaceable records of ecological and environmental change in a dynamic world. In addition to their scientific value, LTER sites provide effective venues in which to train scientists at all career stages in collaborative work and in the management and analysis of complex data. We trust results from the LTER 30-year review will be used to evaluate the portfolio with respect to the appropriate balance of multi-decadal projects.

Emerging Issues:
Erosion of support for long term research could impact the entire portfolio within DEB. We note several issues suggesting a decline in support (1) LTREB funding has declined over the past three years, (2) support for some LTER sites has been discontinued during the review period, (3) decline and/or withdrawal of participation in LTER by other directorates (SBE) and agencies

(NASA), (4) hiatus in Macrosystems activity, and (5) a year long gap in oversight and data curation associated with changes in the LTER network office.

We recognize that NEON has been identified as a new mechanism for gathering long-term data, but we would like to emphasize that NEON infrastructure and associated support cannot replace the long-term research carried out through the LTER or LTREB funding mechanisms.

4. Does the program portfolio include inter- and multi-disciplinary projects? Yes.

   a) We ask the COV to comment on the connectivity of DEB science to science elsewhere in and beyond NSF.

Overview:
The COV commends DEB on a balanced portfolio, including inter- and multi-disciplinary projects. It is evident from examining eJackets that DEB encourages the academic community to work across disciplines and demonstrates leadership in building interdisciplinary teams with superb results. This efficacy is manifested in various ways:
1. Within DEB, co-review and co-funding between programs supports the development of an intellectually vibrant community with broad interdisciplinary expertise.
2. DEB program officers often initiate co-reviews with other programs, both within and outside of the Biological Science Directorate. The pre-proposal system has made it more challenging for full co-review with some programs, but DEB program officers continue to seek input from relevant program officers in other divisions.
3. All DEB special programs (e.g., CNH, DoB, EEID, and GoLife) are inherently interdisciplinary and developed, administered and evaluated collaboratively.
4. DEB has been an active partner in international initiatives including PIRE and working to develop co-review and co-funding with equivalent agencies in Brazil, China, and Israel.

Emerging Issues:
None identified

5. *Does the program portfolio have an appropriate distribution of awards across geographic, institutional and PI demographic criteria?* Yes.

Overview:
DEB strives to create a balanced and representative portfolio across diverse demographics. Support is provided for all 50 states and territories and to investigators at a diversity of institutions and career stages.

Emerging Issues:
The COV was pleased to see that female PIs were funded in proportion to submission rates, but we note that the proportion of proposals submitted by female PIs is still low, accounting for only about 28% according to the DEBrief blog entry summarizing 2014 award demographics. (https://nsfdeb.wordpress.com/2015/01/20/deb-numbers-fy2014-wrap-up/)

The COV notes that the proportion of proposals awarded to PIs at primarily undergraduate institutions is also low, and that the funding rate for such proposals has consistently trailed the submission rate over the past seven years, with the exception of 2014 when proposal success equaled submission rate.

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

Overview:
The COV is impressed by the quality and quantity of science evaluated by the DEB program, which contributes centrally to the NSF mission of supporting excellence in science and science education.

DEB makes important contributions to national priorities in science and technology as identified by the 2016 OMB memo for agency heads. Research in DEB addresses several multi-agency R&D priorities, including those supporting Earth observations, innovation in life sciences and biology, global climate change, and emerging infectious diseases. The DEB community also plays a leadership role in devising tools to manage large data sets, which is another Presidential priority.

DEB has been nimble in responding to its constituents in recognizing emerging frontiers in science. For example, in 2011, DEB funded an Ideas Lab workshop focused on assembling, visualizing, and analyzing the Tree of Life (doi:10.1371/currents.tol.0fdb85e1619f313a2a5a2ec3d7a8df9e) which led to GoLife. A series of workshops in 2013-14 supported a community assessment on Frontiers in Ecosystem Ecology (in prep; expected publication 2015).

DEB supports the central NSF mission by funding basic research that has immediate scientific, societal, and educational impacts. We cite a few examples: (1) response to Dear Colleague letter relating to Ebola outbreak, (2) contributions to National Academy of Sciences Report on Vision and Change in Undergraduate Biology and Education, and (3) training students and educators in STEM fields.

Emerging Issues: none identified

7. *Additional comments on the quality of the projects or the balance of the portfolio:*
Comments: No additional comments. All comments about the quality of the projects and portfolio balance are incorporated above.

Recommendations Concerning Question IV

Recommendation 18. Develop strategies to exploit external resources derived from NEON in support of core activities. Ensure that core activities are not relied on to support NEON-related science at the expense of core programs.

Recommendation 19. Continue to evaluate the small grants program with respect to its impact on the PI community, scientific benefits and outcomes.

Recommendation 20. Address aggregate warning signs of erosion of long-term research portfolio.

V. Other Topics

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

Recommendation 21: The 2015 COV strongly supports the recommendations of past COVs (2012, 2009, 2006) to develop opportunities for postdoctoral funding in DEB, and across the BIO Directorate.

5. NSF would appreciate your comments on how to improve the COV review process.

There are two areas for improvement for the COV process. One comprises the information available in eJacket, and is based on our experience in using eJacket. The second suggests the need to have access to group editing applications.

Recommendation 22: Please link pre-proposal and full proposal jackets, when such are invited, explicitly so that the review can be readily examined through the entire cycle.

Recommendation 23: Please provide access to an on-line, group-editing application, such as Google docs, to facilitate preparation of the report.

We have folded the answers to the remaining questions from Section V into the body of the document under items I through IV.

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JUN 17 .. 19, 2015

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