CORE QUESTIONS and REPORT TEMPLATE
for
FY 2010 NSF COMMITTEE OF VISITOR (COV) REVIEWS

Guidance to NSF Staff: This document includes the FY 2010 set of Core Questions and the COV Report Template for use by NSF staff when preparing and conducting COVs during FY 2010. 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 <www.inside.nsf.gov/od/oia/cov>.

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.

ARRA Addendum: If awards funded by the American Recovery and Reinvestment Act (ARRA) were made during the period of time under review by the COV, you will need to add guidance to the COV on review of these activities and some specific questions to the template that cover the ARRA award processes and the resulting portfolio of awards. While the COV need not review all ARRA awards, there should be ARRA awards included as part of the sample of awards, and there should be materials that explicitly describe the ARRA portfolio and its characteristics. The NSF Recovery Act Policies and Procedures can be found at: http://infoshare.nsf.gov/showFile/3370/2009RecoveryPoliciesProcedures1009.pdf. The NSF Funding Priorities are found in Section III.

Suggested sources of information for COVs to consider are provided for each item. As indicated, a resource for NSF staff preparing data for COVs is the Enterprise Information System (EIS) –Web COV module, which can be accessed by NSF staff only at http://budg-eis-01/eisportal/default.aspx. In addition, NSF staff preparing for the COV should consider other sources of information, as appropriate for the programs 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. 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.

ARRA Addendum: Awards funded by the American Recovery and Reinvestment Act (ARRA) were made during the period of time under review by the COV. We have included questions on the template that deal explicitly with this subset of the overall portfolio and the extent to which it met the objectives of the Act and the priorities articulated by the NSF Director. Key information regarding ARRA and NSF priorities as well as optional program-specific priorities will be provided to you.

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. For past COV reports, please see http://www.nsf.gov/od/oia/activities/cov/covs.jsp.

FY 2010 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

The table below should be completed by program staff.

Date of COV: July 12-14, 2010
Division: Division of Biological Infrastructure (DBI)
Directorate: Directorate for Biological Sciences (BIO)
Number of actions reviewed: 96 Awards: Declinations: Other:
Total number of actions within Division during period under review (including ARRA): **Awards:** 599 (includes ARRA awards) **Declinations:** 1368 **Other:** 0
Manner in which reviewed actions were selected: Each CoV member reviewed the 2010 DBI self-study analysis based on 96 award and decline jackets (36 Human Resources Cluster; 45 Research Resources Cluster; 15 ARRA awards) that had been randomly chosen. Each CoV member also chose a specific program within DBI and looked at individual jackets at random to assess the quality and accuracy of the self report for that program. The CoV then had an open discussion, met with program directors and staff, requested some additional information, and compiled the following report from these analyses and discussions.

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 process. Provide comments in the space below the question**.** Discuss areas of concern in the space provided.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	**YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE**[1]
1. Are the review methods (for example, panel, ad hoc, site visits) appropriate? Comments: Sample shows uniform review process with no departures from Standard NSF set.	Yes
1. Are both merit review criteria addressed a. In individual reviews? b. In panel summaries? c. In Program Officer review analyses? Comments: Published selection criteria are not a good match for all of the program elements. For example, Human Resources should emphasize broader impact, but issues were observed in all 3 years in the Human Resources cluster, including missing broader impacts (7-8%), and missing Program Manager Review Analyses 8-17% of the time. No issues of missing selection criteria were observed in the Research Cluster.	Most of the time Almost always Always

3. Do the individual reviewers provide substantive comments to explain their assessment of the proposals? Comments: The majority does, but there is consistently a single digit percentage that does not.	Yes

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

4. Do the panel summaries provide the rationale for the panel consensus (or reasons consensus was not reached)? Comments: Most summaries are reflective of the conclusion of the discussion but occasionally the summary also described disagreement between panelists. Interestingly, proposals with disagreements were particularly well represented among those ARRA recovered.	Yes
5. Does the documentation in the jacket provide the rationale for the award/decline decision? (Note: Documentation in jacket usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.) During FY 2009, NSF permitted reversal of a declined decision for funding through ARRA for proposals declined after October 1, 2008. (NOTE: This question does not apply to programs for which the reversal decline option was not used.) i. Were the reversals of the decision to decline based on both the high quality* of the reviews received on the initial submission and the lack of available funding at the time the origin was made? *Rated "Very Good or above" or the functional equivalent by review panels. ii. Is documentation provided, including a revised Review Analysis, to support the award decisions? Comments: The CoV did not see multiple Review Analyses for the ARRA awards, only the final Review Analysis. It is not clear to what extent this was a limitation of the eJacket system.	Yes Yes No

6. Does the documentation to PI provide the rationale for the award/decline decision? (Note: Documentation to PI usually includes context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), and, if not otherwise provided in the panel summary, an explanation from the program officer (written or telephoned with diary note in jacket) of the basis for a declination.) Comments:	Yes

7. Is the time to decision appropriate? Note: Time to Decision --NSF Annual Performance Goal: **For 70 percent of proposals, inform applicants about funding decisions within six months of proposal receipt or deadline or target date, whichever is later**. The date of Division Director concurrence is used in determining the time to decision. Once the Division Director concurs, applicants may be informed that their proposals have been declined or recommended for funding. The NSF-wide goal of 70 percent recognizes that the time to decision is appropriately greater than six months for some programs or some individual proposals. Comments: The objective was not met in about half of the programs over the past three years, and there is not a clear trend toward improvement across DBI. In one program (e.g. living stocks), the majority of decisions were not reached even within 9 months, which seriously compromises the ability of applicants to manage their research programs. The Division Directors are aware of the issue and expressed a commitment to meet the performance goal this year. The CoV recommends continued attention to the long tail of decision times, as well.	Did not meet the objective
8. Additional Comments a. Additional comments on the quality and effectiveness of the program's use of merit review process. Documentation seems adequate b. To what extent does the documentation in the jacket or otherwise available provide the rationale for use of ARRA funding? A search through the jackets had to be done to discover those actions associated with ARRA funding. It is currently difficult to track certain information about postdoctoral fellowship applications, including the identity of the mentor, the host institution, and the nature of any letters of support provided. This information should be provided using a clearer method.	

A.2 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**[2]
1. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Reviewer expertise covered a broad range of sciences and engineering.	Yes
1. Did the program use reviewers balanced with respect to characteristics such as geography, type of institution, and underrepresented groups? Note: Demographic data are self reported, with only about 25% of reviewers reporting this information. Comments: The diversity and geographic distribution appeared reasonable though baselines for comparison (ie relative to previous years) were not provided. There appears to be an institutional under-representation among 2 and 4 yr colleges. The need for this balance is especially critical for the Human Resource Cluster.	Difficult to evaluate due to lack of a baseline.
3. Did the program recognize and resolve conflicts of interest when appropriate? Comments: No issues were observed in the furnished data.	Yes.

4. Additional comments on reviewer selection:

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

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[3], OR DATA NOT AVAILABLE
1. Overall quality of the research and/or education projects supported by the program. Comments: The portfolio is excellent and the Highlights recognize the accomplishments on an individual project basis, but there was no synthesis that conveyed the critically important role of human resource and research infrastructure in enabling transformative research over the longer term. A good metric for education that would allow an evaluation of the REU and URM programs was also lacking.	Appropriate, and generally excellent
2. Does the program portfolio promote the integration of research and education? Comments: The integration of research and education varies in emphasis among the programs. Given the diverse nature of these programs, this is generally appropriate. The URM and REU have particularly well integrated education and research components, while educational aspects are generally less prevalent within the RRC projects.	Appropriate, with caveats
3. Are awards appropriate in size and duration for the scope of the projects? Comments: A few were shorter or longer, but most were three years, which seems to be standard in the research community. Some infrastructure projects by their nature will require awards larger in size and duration.	Appropriate, generally.
4. Does the overall program portfolio (including ARRA funded awards) have an appropriate balance of innovative/potentially transformative projects? ARRA Specific Question: Does the ARRA funded portfolio have an appropriate balance of innovative/potentially transformative projects? Comments: Less than ½ of the highlights were claimed to be transformative. Discussions with the staff indicated that this may be due to the role of infrastructure in *enabling* transformative research rather than funding it	Not appropriate Appropriate

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

directly, and the challenges of tracing transformative research results to infrastructural advances funded many years earlier (e.g. early career scientists such as undergraduates or postdocs, or instrumentation). Although it is a bit early to tell, the CoV had the impression that some of the ARRA funded projects were higher risk, and had a greater potential to be transformative, than projects in the standard portfolio.	
5. Does the program portfolio have an appropriate balance of: ● Inter- and Multi- disciplinary projects? Comments: It was difficult to identify cross (inter and multi) disciplinary projects, except through co-funding; however, co-funding is not a good metric. There appeared to be about an equal number of outgoing and incoming sharing of funding of projects; however, it is clear from reading many of the proposals that there are cross-disciplinary projects not captured in the self-study. The solicitations do encourage the submission of such projects. DBI has the potential to play a major and important leadership role due to the cross-disciplinary nature of their programs, and it is important to improve the ability to assess this aspect of its portfolio.	Appropriate

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? Comments: In 2008, there was a large inequality between single and multiple investigators in the human resources cluster. Otherwise, the balance is near parity. There is no baseline for comparison to other programs or years.	Appropriate, usually
7. Does the program portfolio have an appropriate balance of: ● Awards to new investigators? ARRA Specific Question: Does the ARRA funded portfolio have an appropriate balance of awards to new investigators? 64% is reported NOTE: A new investigator is defined as an individual who has not served as the PI or co-PI on any award from NSF (with the exception of doctoral dissertation awards, graduate or postdoctoral fellowships, research planning grants, or conferences, symposia & workshop grants.) Comments: The definition of “new investigator” does not completely agree with that contained in the ARRA guidelines from the Office of the Director.	Appropriate Appropriate

8. Does the program portfolio have an appropriate balance of: • Geographical distribution of Principal Investigators? Comments:	Appropriate
9. Does the program portfolio have an appropriate balance of: • Institutional types? Comments: 2- and 4-year programs are under-represented. Crafting proposal calls for projects that better reflect contributions that could be made by these institutions may have an impact on the number of submissions. In section	Not Appropriate
10. Does the program portfolio have an appropriate balance: • Across disciplines and sub disciplines of the activity? Comments: There are not adequate metrics or data available to evaluate this topic.	Data not available
11. Does the program portfolio have appropriate participation of underrepresented groups? Comments: Success rates, as detailed in the self-study, are reasonably well distributed across groups, with the caveat that there are small numbers for comparison. Application rates are disappointingly low for some groups. There is particularly low diversity among the bioinformatics postdoctoral applicants in terms of race.	Data confusing
12. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports. Comments: One of the pillars of the NSF Stategic Plan is infrastructure and DBI is in a position to play a very important and central role in the field of biology. See appendix with list of recommendations.	
13. Additional comments on the quality of the projects or the balance of the portfolio: ARRA Specific Comments: Additional comments regarding the portfolio of ARRA awards addressing the NSF or program-specific priorities for ARRA funding?	

A.4 Management of the program under review. Please comment on:

1. Management of the program. The attention to detail necessary to track participation in training programs (such as REU and URM) is greatly appreciated by the panel, as well as by those in other BIO programs. To the extent possible in an environment with rotating positions, DBI should retain personnel to minimize the loss of institutional memory.
2. Responsiveness of the program to emerging research and education opportunities. Comments: See **APPENDIX: COV RECOMMENDATIONS**
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: See **APPENDIX: COV RECOMMENDATIONS**
4. Responsiveness of program to previous COV comments and recommendations. Comments: See **APPENDIX: COV RECOMMENDATIONS**
5. Additional comments on program management: See **APPENDIX: COV RECOMMENDATIONS**

PART B. RESULTS OF NSF INVESTMENTS

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The NSF mission is to:

- promote the progress of science;
- advance national health, prosperity, and welfare; and
- secure the national defense.

To fulfill this mission, NSF has identified four strategic outcome goals: Discovery, Learning, Research Infrastructure, and Stewardship. The COV should look carefully at and comment on (1) noteworthy achievements based on NSF awards; (2) ways in which funded projects have collectively affected progress toward NSF's mission and strategic outcome goals; and (3) expectations for future performance based on the current set of awards.

NSF investments produce results that appear over time. Consequently, the COV review may 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.

To assist the COV, NSF staff will provide award "highlights" as well as information about the program and its award portfolio as it relates to the three outcome goals of Discovery, Learning, and Research Infrastructure. The COV is not asked to review accomplishments under Stewardship, as that goal is represented by several annual performance goals and measures that are monitored by internal working groups that report to NSF senior management.

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."*
Comments: DBI's funding of early career students and postdocs, as well as the development and application of new instruments and sensors, enables the all-important goal of discovery through existing disciplinary programs. See **APPENDIX: COV RECOMMENDATIONS**.

B.2 OUTCOME GOAL for Learning: "*Cultivate a world-class, broadly inclusive science and engineering workforce, and expand the scientific literacy of all citizens."*
Comments: DBI's funding of early career students and postdocs is one of the most effective ways to support learning and inclusiveness. See **APPENDIX: COV RECOMMENDATIONS**.

B.3 OUTCOME GOAL for Research Infrastructure: "*Build the nation's research capability through critical investments in advanced instrumentation, facilities, cyberinfrastructure and experimental tools."*
Comments: DBI is at the center of this goal for biology at the NSF and is positioned to play an even greater leadership role in cyberinfrastructure, in particular. See **APPENDIX: COV RECOMMENDATIONS**.

PART C. OTHER TOPICS

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

See APPENDIX: COV RECOMMENDATIONS

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.

See APPENDIX: COV RECOMMENDATIONS

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

See APPENDIX: COV RECOMMENDATIONS

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

See APPENDIX: COV RECOMMENDATIONS

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

Improvements in electronic jackets have increased the accuracy, availability, and efficiency of proposal and reporting processes. We appreciate the learning curve for becoming proficient in this new method.

APPENDIX: CoV RECOMMENDATIONS

The panel appreciates the preparation for our visit, the materials provided before and during the review, and the openness of the NSF DBI and other personnel interviewed as part of the review process.

In our meetings with the officers and staff of DBI and other programs the members of the CoV really homed in on the issue of whether or not DBI should exist in its current form, whether it should be integrated into current thematic programs, or whether there was a more significant role for DBI to play within the BIO Directorate and beyond. What emerged from these challenging but ultimately very productive discussions was the unanimous conclusion by the CoV that not only does DBI play a central role in providing essential, high quality infrastructure, and training opportunities across the BIO Directorate, but also that there is an important need and unique window of opportunity for DBI to play an enhanced, and mission-critical, leadership role for BIO. DBI shepherds some of the most vital, cross-cutting programs within BIO. The need and opportunity for enhanced leadership is particularly urgent in the area of cyber-infrastructure. There exists an unhealthy legacy, one that needs to be actively erased by higher levels of management, that DBI is a 'service organization' for the supply of instruments, databases and educational programs to other Divisions in BIO. On the contrary, DBI's cross-disciplinary perspective and contribution is essential to the future health of the BIO Directorate at NSF.

DBI/BIO asked the CoV for advice on several questions related specifically to DBI. These focus on questions of (1) infrastructure, (2) synergy, and (3) metrics. The CoV sees synergy as a common and necessary central theme for a cross-cutting program like DBI and presents below a series of recommendations focused on points (1) and (3) with a pervasive theme of synergy.

1) Infrastructural Challenges.

Research infrastructure (advanced instrumentation and facilities) is one of four strategic outcome goals highlighted in the NSF Strategic Plan for 2006-2011. Within BIO, DBI serves a critical and unique role in the coordination of NSF activities with respect to infrastructure, including cyberinfrastructure, biocollections, training, and long-term research facilities. The CoV commends DBI for its leadership and commitment to these goals, including their critical role in providing input from the biological community to OCI.

Recommendation 1.1. Building on the progress described in the updated response to #8 from the previous CoV, as well as a recent DBI strategic planning document on infrastructure life cycle costs and sustainability (see below), we recommend that DBI catalyze the development of a cyberinfrastructure research agenda across the thematic areas of the BIO directorate. This agenda should identify both strategic opportunities and the appropriate scale of investment needed for their implementation. This agenda should allow DBI to leverage significant NSF-wide investments, through OCI, in support of new and expanded programmatic opportunities for transformational research with high impact on the BIO directorate and NSF.

The CoV commends DBI's ongoing long-term commitment to the health of the nation's biocollections and field research stations, a commitment that is greatly appreciated by the wider scientific community. Furthermore, the committee recognizes that long-term data derived from these resources are of unique value for understanding numerous phenomena with significant social impact, including climate change, biological invasions, disease epidemics, and environmental degradation.

Recommendation 1.2. The CoV recommends that DBI continue its critical support for these long-term resources and expand opportunities for synergy within the BIO directorate to optimize the

programmatic impact of these resources. There was some feedback from other divisions within BIO suggesting that DBI is perceived as performing a service function, as opposed to enabling bona fide scientific activity. Thus, the committee recommends that DBI, with the support and assistance of the higher levels of BIO, take a more proactive role in (a) promoting the use of the infrastructure it supports for scientific discovery, and (b) communicating the transformative impact of these resources to the wider community.

The CoV was impressed by the vision of the new DBI leadership, while also being struck by the apparent tension between the relatively strong mandate for long-term programmatic stewardship, on the one hand, versus opportunities for creative leadership, on the other. The CoV sees a current unique window of opportunity for DBI, based both on planning documents and its current leadership and expertise with cyberinfrasctructure. DBI's contribution to the CiC and SI2 initiatives reflect this capacity for creative innovation.

Recommendation 1.3. The CoV recommends that NSF provide latitude in support of DBI leadership for the creative development of new initiatives within BIO, more broadly within NSF, and with agency partners, particularly in the area of cyberinfrastructure.

The CoV commends the strategic planning by DBI's leadership for life cycle costs along the lines discussed in "Sustaining Biological Research Infrastructure, July 10, 2010". A strong recommendation is therefore made that these efforts be continued and be treated as being mission-critical.

Recommendation 1.4. To complement internal strategic planning at NSF, the CoV recommends that the agency undertake an external assessment and study (by, for example, the NAS) of these opportunities and possibilities for synergy at all levels: within and across programs at DBI, BIO and NSF.

As stated in other recommendations, the CoV was impressed by the very active role DBI is taking in shaping agency-wide cloud computing, semantic web, and other cyberinfrastructure initiatives. It was also apparent that other BIO divisions came to expect DBI to take that leadership role. DBI engagement in the underlying science beyond NSF's walls was less forthcoming.

Recommendation 1.5. The CoV recommends that DBI seeks to engage the relevant communities more closely in their leadership efforts, including those that originated in DBI. The World Wide Web (W3C) consortium and the federal government wide data.gov in particular come to mind. That engagement brings the opportunity not only of significant scientific advancements, but also also very substantial cost savings by leveraging wider investments in computational infrastructure. DBI should also maintain close contact and interface with a number of large scale initiatives, such as the Plant Genome Research Program (PGRP) and the National Ecological Observatory Network (NEON), that were incubated by DBI and later moved to other offices within BIO. DBI should also pay attention to supporting and interfacing with grass roots networking efforts that leverage other resources external to NSF to accomplish their mission. One example is the Global Lake Ecological Observatory Network (GLEON).

2) Impact Metrics

The mission of DBI is to facilitate biological discoveries through supporting development and enhancement of biological resources and human capital. These endeavors are fundamental to all areas of biological research, as well as contributing to research in other disciplines. Thus, synergy is the key to determining the impacts for DBI on the Directorate of Biological Sciences, NSF as a whole, and finally, to the larger community of science and society. The CoV has a number of recommendations for improving the assessment of DBI impacts:

Recommendation 2.1. Develop an electronic application process that will facilitate having the applicant enter this information in a way that can be integrated with the current electronic information database.

The information provided to the CoV was inadequate to assess the extent of interdisciplinary research. While both staff and program officers described the e-jackets as being of great assistance to internal communication, there appears to be a legacy effect of turning paper forms into simple electronic forms that has subsequently inhibited the development of an effective information database. This ability to gather accurate information of the extent of interdisciplinary representation by DBI projects is essential due to it being a central part of the mission of DBI.

Recommendation 2.2. Evaluate the effectiveness of the e-jacket tools. Request that PIs classify proposals according to disciplines represented, as well as classify research activities in terms of NSF mission activities found in the DBI self study, page 23. Another option might be to study co-authorship and co-funding networks using newly available technologies (e.g. that used by BioMedExperts) to aid in assessment of the breadth of impact of DBI across BIO.

Assessment of the impact of human resource and research infrastructure is inherently difficult due to the fact that often early career scientists are the subjects and there is a learning curve until transformative research is enabled. Similarly, purchase of instruments or improvements to field stations or other infrastructure are likely to spawn important research only after a period of time.

Recommendation 2.3. Improve assessment of education/training and disciplinary association throughout BIO by tracking of undergraduates participating in research through standard REU supplements.

The CoV felt that the DBI Highlights that they were given did not match either the realized or the potential important central role that DBI plays in providing critical infrastructure for BIO. The CoV perception is that the Program Officers are primarily crafting Highlights that they believe acceptable to Senior Management. These Highlights did not necessarily reveal the full impact of the DBI portfolio. The goal should be to document the full extent of DBI's impact.

Recommendation 2.4. Request that POs produce Highlights that are explicitly targeted to these longer timelines, and demonstrate the unique contributions enabled by the support of infrastructure such as field stations, training programs, living stocks, instrumentation, etc.

The CoV noted an under-representation of awards to 2 and 4 yr degree institutions.

Recommendation 2.5. Look for creative solutions to improve outreach and tailor programs to be more accessible and attractive to potential participants from these 2-4 yr organizations. With respect to improving demographic diversity among its beneficiaries, DBI should explore synergies with EHS as well as with initiatives such as the STEM Coalition. This is also an example of an area where DBI could leverage the outreach capabilities of the centers that its funds to broaden participation in its programs. A solicitation that specifically targets 2 and 4 yr degree institutions may be the most effective way to increase their participation in DBI.

SIGNATURE BLOCK:

See separate paper copy of signature block signed by all members of the CoV.

Craig Williamson, CoV Chair

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