REPORT OF THE 2015 COMMITTEE OF VISITORS
RESEARCH AND EDUCATION PROGRAMS
DIVISION OF OCEAN SCIENCES (OCE)
YEARS 2012-2014

OVERARCHING COMMENT.

Our COV is very impressed with the overall quality of the OCE Programs we reviewed. We note specifically that during the period under review (2012-2014) these programs served the best interests and needs of the nation by enabling the United States ocean sciences research and education community to pursue high quality research and innovative education.

We emphasize this important finding up front in our report because it provides a framing statement for our more detailed comments and recommendations that follow. These comments and recommendations are intended to inform actions for maintaining and/or improving the existing high quality of the program overall. In the very few instances where we have specific serious concerns, they are so identified.

In some sections of our report, we provide separate comments on education programs because of the special characteristics of several of these programs.

INTRODUCTION.

We were provided with a selection of proposal jackets that were chosen by program staff: "The NSF Budget Office provided OCE with a spreadsheet with Program Element, Proposal ID, mail reviewer average score and panel average score, and overall average of the proposals for FY 12-14. The number of proposals per program to be reviewed was prorated based on the total number submitted per program, with the exception of the Ocean Education and Ocean Technology programs (which, if prorated, would be limited to 1-4 proposals). Proposals were randomly selected from each of the following categories: award-low rating, decline-high rating, award-high rating, decline-low rating, and some in the middle." We, as is OCE, were cognizant of the fact that these are not a statistically random sample of proposal e-jacket portfolios.

Of equal importance, we were provided with numerous plots from the NSF Data Base summarizing key aspects of single and inter-/multi-disciplinary proposal submission, review processes, and proposal award percentages of total proposals submitted for individual programs in our review portfolio including BO, PO, MGG, CO, OTIC, RIG, and REU. In addition, we received numerous data charts with relevant information on demographics, geographic distributions, institutional type, and first-time versus established PI proposal submissions and awards/declines.

We note that because of NSF policy we were not allowed to present the data charts as figures in our report. We summarize succinctly, where needed, data from these charts.

ACKNOWLEDGEMENTS. We are appreciative of the efforts of NSF Program Officers and staff, Geosciences Directorate and Ocean Sciences Division and Sections leadership for very productive interactions during our visit that informed our report. We are particularly appreciative of the guidance of Dr. Eric Itsweire during our review process before, during and after our onsite meeting. His advice, founded in his extensive experience at NSF, proved valuable in several instances. We are very appreciative of the support of Ms. Meagan Thompson throughout the review process for providing initial data plots and responding to COV requests for additional and/or modified graphs of relevant data and for coordinating logistics. She exemplifies the high quality of staff support available to Program Officers and OCE leadership. We are aware that she called on several NSF staff to assist her and we are appreciative of their efforts.

Terminology.

In our report we use the term Program Officers to collectively refer to Program Directors and Assistant or Associate Program Directors.

We use the following abbreviations in our report and for some terms did not use abbreviations to avoid confusion.

COV- Committee of Visitors, GEO- Geosciences Directorate, OCE – Ocean Sciences Division, PI- Principal Investigator, BO-Biological Oceanography, CO – Chemical Oceanography, MGG – Marine Geology and Geophysics, PO-Physical Oceanography, REU – Research Experience for Undergraduates, OTIC – Ocean Technology and Interdisciplinary Programs, Intellectual Merit – IM, Broader Impacts – BI, LTER – Long-Term Ecological Research, RIG – Research Initiation Grants, EAGER – Early Concept Grants for Exploratory Research, RAPID – Grants for Rapid Response Research, IPA – Intergovernmental Personnel Act.

FY 2015 REPORT TEMPLATE FOR NSF COMMITTEES OF VISITORS (COVs)

Date of COV: June 4 – 5, 2015
Program/Cluster/Section: BO, CO and PO Programs in the Ocean Section, MGG and IODP science programs in the Marine Geosciences section, Ocean Education and Ocean Technology programs in the Integrative Programs Section
Division: Ocean Sciences (OCE)
Directorate: Geosciences (GEO)
Number of actions reviewed: 330 Projects (512 proposals) **Awards: 118 Projects + 10 RAPID Proposals** **Declinations: 212 Projects** **Other:**
Total number of actions within Program/Cluster/Division during period under review: **Awards: 820 Proposals** **Declinations: 3012 Proposals** **Other:**
Manner in which reviewed actions were selected: **The NSF Budget Office provided OCE with a spreadsheet with Program Element, Proposal ID, mail reviewer average score and panel average score, and overall average of the proposals for FY 12-14. The number of proposals per program to be reviewed was prorated based on the total number submitted per program, with the exception of the Ocean Education and Ocean Technology programs which, if prorated, would be limited to a very small number of proposals for each. For Ocean Education, all of the REU Site proposals were included. For OTIC proposals were selected to get the full range of high and low rating like the disciplinary programs described below. Proposals were randomly selected from each of the following categories: award-low rating, decline-high rating, award-high rating, decline-low rating, and some in the middle. Individual investigator proposals and large collaborative proposals were also included. This group of proposals was selected to provide an overview of the types of proposal submitted and the decision process.**

COV Membership

	Name	Affiliation
COV Chair or Co-Chairs:	Dr. John Farrington	Woods Hole Oceanographic Institution
COV Members:	Dr. Mary-Elena Carr	Columbia University
	Dr. Deidre Gibson	Hampton University
	Dr. Miguel Goni	Oregon State University
	Dr. Keith Julien	University of Colorado at Boulder
	Dr. Ellen Martin	University of Florida Research Foundation
	Dr. Jeffrey Karson	Syracuse University
	Dr. Christopher Sabine	NOAA Pacific Marine Environmental Lab
	Dr. Mary-Louise Timmermans	Yale University
	Dr. Mary Voytek	National Aeronautics & Space Administration
	Dr. Gerardo Chin-Leo	Evergreen State College

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(s) under review. Quantitative information may be required for some questions. Constructive comments noting areas in need of improvement are encouraged.

I. Questions about the quality and effectiveness of the program's use of merit review process. Please answer the following questions about the effectiveness of the merit review process and provide comments or concerns in the space below the question.

QUALITY AND EFFECTIVENESS OF MERIT REVIEW PROCESS	YES, NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Are the review methods (for example, panel, *ad hoc*, site visits) appropriate? Comments: In general, the review methods used in OCE are suitable and have been appropriately adapted and applied to match the needs of the variety of programs supported in OCE. The review process requires a tremendous amount of time and energy from OCE and scientific communities. However, this effort is appropriate given the influence of the process on the quality of the programs and the importance of the programs to the NSF mission and national needs. The success of the review process relies on the relationship between its three essential components—*ad hoc* reviews, panel assessments, and program analyses—much like a three-legged stool depends on each of its three legs. If all are functioning ideally, the process provides comprehensive, fair reviews of proposals, which are then placed in the context of current programmatic priorities, opportunities and limitations. *Ad hoc* reviews inform the panel. The panel discussions inform the Program. Because the Program Officers choose both the *ad hoc* reviewers and the panel, they play a key role throughout. This emphasizes the importance of having both seasoned Program Officers with a wealth of experience and breadth in their fields and Intergovernmental Personnel Act (IPA) scientists (often termed rotators) who bring a fresh perspective to the review process and who are trained in program procedures. Programs with smaller budgets and/or limited number of proposals, such as the	YES

OTIC program or the REU program (see comments below) rely on a mix of external reviews and Program Officer assessments to arrive at funding decisions. *Ad hoc* reviews are not sought and no panels are convened for RAPID proposals, for many EAGER proposals, or for workshops because of the requirement for expeditious evaluations and decisions. Program Officers evaluate these proposals within the guidelines for proposals, and most often involving more than one Program Officer. This process seems effective for the intent of these Programs. It is not clear for the RAPID proposals how the review process avoids overlap or duplication of related research effort other than personal knowledge of the Program Officer as to research undertaken by other entities such as NOAA and USGS, or even within the Foundation. Given the nature of RAPID-type events, erring on the side of overlap or duplication seems preferable to missing an important and/or unique research opportunity. For a limited subset of the provided proposals, there was inadequate panel expertise to properly evaluate the proposal. This led to a concerning tendency for low panel scores even in the face of high scores in the *ad hoc* reviews provided by expert reviewers. While we realize there are numerous ways of dividing individual disciplines into sub-disciplines and then further into sub-sub-discipline categories, the presence of someone with expertise similar to that of proposals being reviewed by the panel would provide appropriate balance in panel reviews. For example, there could be the need for a balance of laboratory experimentalists with field-oriented scientists and theoreticians. We are not aware of any site visits specific to programs, proposals and awards we reviewed with the exception of LTER proposals. We applaud the visits that Program Officers make to selected institutions to reach out to the community and we encourage more site visits while acknowledging the limitations inherent to travel budgets and time commitments. The attendance of Program Officers at relevant national and international scientific research and education meetings can be viewed as "site visits," given the interaction with PIs and exposure to new and novel areas of research. We believe that attendance and participation in such meetings by Program Officers is critical to the continuing success of the Programs we reviewed. We also encourage participation of Program Officers in webinars (both live and recorded) as they become increasingly important as a means of keeping current in a wide variety of cutting edge research and education innovation with a much reduced carbon footprint and efficient use of Program Officers' time. **RECOMMENDATION 1. Within each of the disciplines (e.g. PO, BO, CO, MGG), panel membership should reflect, to the extent possible, an appropriate balance of sub-disciplines reflecting the types of proposals being considered. In situations where the composition of the panel underrepresents a particular area or topic covered by a proposal, panels should be guided to pay special attention to expert ad-hoc reviews.**	

Specific Comments about the REU Program and Postdoctoral Fellowship Program. REU proposal evaluations did not use panels and used *ad hoc* external reviews only. The current strategy is to have a few reviewers examine several proposals each. This provides both in-depth review and opportunity for the reviewer to compare the quality of several proposals. Given the small number of proposals and high rate of funding possible with the current budget, the mail-in review process is appropriate. If the number of submitted proposals increases relative to the available budget or making the competition tougher, then virtual panels and or in-person panels, in addition to *ad hoc* external reviews, would be the preferred pathway. The Postdoctoral Fellowship proposals are reviewed by a virtual panel that is sometimes supplemented with mail-in reviews. The use of a virtual panel for this program represents a test bed for the use of virtual panels elsewhere within OCE. **Recommendation 2. A review panel (in-person or virtual) phase should be the preferred method for REU review whenever practicable, as it is for other programs. A panel provides opportunity for dialogue and comparison among all the proposals. The panel meeting also serves the purpose of identifying "best practices," which also benefits the review process by identifying the elements of a successful proposal/program.**	
2. Are both merit review criteria addressed **a) In individual reviews?** **b) In panel summaries?** **c) In Program Officer review analyses?** Comments: Generally, both merit review criteria, Intellectual Merit (hereafter IM) and Broader Impacts (hereafter BI) are addressed in individual reviews, panel summaries, and Program Officer review analyses. The extent of details varies among ad hoc reviewers, as was noted by the previous COV (2009-2012). This inconsistency is generally recognized by panels and by Program Officers in their reviews and Review Analyses. Individual programs can have specific objectives within the IM and BI criteria, which are duly stated within instructions for proposals to these programs. However some PIs do not adequately address these requirements in their proposals, adversely affecting the decision outcome. Generally, the interpretation and evaluation of BI, including for those programs with specific criteria, is less consistent within *ad hoc*, panel and/or Program Officer reviews/assessments. This seems to result from widely divergent	YES YES YES

expectations on behalf of reviewers. In many cases the panel, assisted no doubt in many instances by careful guidance from the Program Officer, makes up for the confusion in the mail reviews, but sometimes confusions and even errors can be propagated. In almost all cases, this divergence is addressed and corrected by the Program Officers in their comments.

Broader Impact criteria have a pivotal role in the REU Program. Our assessment of the REU proposal review process indicates that the main reason for declining a proposal were connected with weaknesses in how the proposal addressed issues other than IM, e.g. the 6 considerations listed in the program announcement as review criteria considerations such as logistics, recruitment plans, student follow up.

Recommendation 3. Broader Impact. NSF should continue to educate the community about expectations for BI.

Discussions with Program Officers made it clear that the scientific contributions important to others in science, infrastructure enhancement, societal relevance, education outcomes, or outreach in general can all fulfill this requirement. However many in the ocean sciences community (including *ad hoc* reviewers) seem to be under the impression that both education and outreach aspects are expected. In addition, the nature of the BI offered by a proposer is often controlled by the type of institution, position held or career stage of the PI.

One Program Officer summarized it well by stating that reviewers should think about whether there is an obvious educational or outreach opportunity that is being missed in the BI plan, or alternatively, whether the PI is proposing activities designed to fulfill that requirement that are not appropriate for the proposal.

With regards to Intellectual Merit, some proposals appeared to receive much greater scrutiny than others. At the *ad hoc* reviewer level this depends to a large degree on individual expertise and the volunteer efforts of a busy community, but it is not as acceptable at the panel level, where the Program can aim to steer a uniform treatment, and much less at the Program level. On occasion, given human nature and workload, assessments by *ad hoc* reviewers (or a panel member or panel) are inappropriate, i.e. biased, incorrect or excessively harsh.

Recommendation 4. Intellectual Merit. The Program Officers should provide clear guidance to the PI when assessments made by reviewers (or panel) are inappropriate (whether biased, incorrect, or excessively harsh) and that such assessments have not been taken into account in the final award decision.

Recommendation 5. OCE should continue to recruit and attract short term Program Officers (often referred to colloquially as rotators) who come into NSF and then return to academic or other federal agency or private organization employment via the Intergovernmental Personnel Act (IPA) or other appointment mechanisms such that there is a continual influx of scientists with recent experience at the cutting edge of ocean sciences research and innovative ocean science education activities.

This provides important collegial input and connects career Program Officers on a

daily basis with a cross section of the ocean sciences community engaged in research and education activities. **Recommendation 6. Given the importance of IPA and other short-term personnel and the importance of the proposal review process, OCE should review periodically its processes and implement improvements where warranted for training and mentoring non-career Program Officers (and new Program Officers who are on an NSF career track) such that those incoming Program Officers have appropriate training and guidance by experienced Program Officers with respect to all aspects of the review process, especially (1) assessments of *ad hoc* reviews and panel reviews, (2) how to document the reviews in the proposal jacket portfolio, (3) factors to take into account in final decisions, and (4) various means of formally communicating final decisions about a proposal to PIs.** We believe that continued attention to training and mentoring of newly appointed short-term and Career Programs officers is important to maintaining a high quality proposal review process.	
3. Do the individual reviewers giving written reviews provide substantive comments to explain their assessment of the proposals? Comments: In general, mail-in reviews were thorough and constructive and the comments substantive, independent of length. The collective expertise of the selected mail reviewers was usually appropriate. In those instances where the reviews are not constructive or substantive, panels and/or Program Officers take note and, appropriately, such reviews have little to no influence on final recommendations. Discounting some reviews means that some proposals have fewer *ad hoc* reviews and introduces some unevenness into the peer review process. While most reviews were well-conceived, the following concerns were noted • Not all reviews are equally comprehensive. Exceptionally good or exceptionally bad proposals seemed to have more succinct responses than the "Very Good" proposals. • The individual questions on the review forms were often not used by reviewers and, when used, less comprehensive or fewer incisive insights were provided. (See further comment below about questions for *ad hoc* review forms). • There can be an apparent disparity between review scores and the comments. Simple advice can be construed as serious flaws that could compromise the success of the project. These minor comments can become amplified in panel discussions, with negative impact on the overall ranking of a proposal. The Program must work to discern thoroughness versus criticism. • Substantive disparity between review scores and comments leads to speculation as to the reviewer's intent and re-evaluation of their rating. While this is appropriate and necessary, it should be addressed beyond a summary statement and more detailed justification provided for the	YES

revised interpretation.

- Disparity between review scores and the interpretations or reassessments of those scores by the panel (or Program) without proper documentation can confuse and frustrate PIs and compromise their confidence in the review process. In some cases, the panel or Program dismissed a positive review/score as unsubstantiated when in fact a considered, albeit concise, justification was provided. In other cases, a negative comment or score was readily accepted with an equally brief justification.

Our assessment of *ad hoc* reviews for the education programs portfolio noted that there was variation in the quality and length of comments. Usually the comments were substantive and reflected thoughtful review. However, reviewers often differed on what criteria they used to determine their score. For example, some reviewers would focus on intellectual merit while others based their score on broader impacts or completeness of logistical details. In these instances the Program Officer did a great job of using program objectives to identify the relevant comments in the reviewer's analysis.

Recommendation 7. If allowed by overall NSF Policy, OCE should post on their website examples of hypothetical good reviews and reviews which do not meet the desired level of substantive comments in support of ratings. Such examples would be helpful in graduate education/training programs. At the very least, a listing of the elements of a good review and those of a bad review should be posted on the website. If such actions are not allowed currently, the Geosciences Advisory Committee should evaluate this recommendation and, if in agreement, proceed to forward it to appropriate leadership levels of NSF for consideration.

Comment about questions on the *ad hoc* review form. Members of our COV have been told by some colleagues that the *ad hoc* external review form is ineffective and/ or inefficient. These comments are anecdotal and we do not have survey data for this issue. However, given the importance of the *ad hoc* external reviews to the overall review process, we believe it is important to raise this issue. Perhaps some survey of *ad hoc* external reviewers NSF-wide would be in order to ascertain the utility of the questions in the review form and to inform modifications or improvement in the form if needed.

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

Comments:

Panels in the past three years have included an appropriate mix of seasoned and early career investigators, who can both benefit from one another's perspective and contribute in a meaningful way to the review process. The panel summaries generally did an excellent job of summarizing the mail reviews and the panel discussion, providing a broader context on how proposals fit within the program. The COV found that the most useful summaries highlighted the specific strengths and weaknesses identified in the proposals and gave good rationalization for considering (or not) the comments of the *ad hoc* reviews.

However, some potential problems could be seen:

- Some panel summaries fail to convey any conclusion, of consensus or lack thereof, presenting instead a summary of *ad hoc* reviews, a synopsis of the panel discussion, or a list of strengths and weaknesses. While these are valuable in the context of a conclusion, they can be confusing without it.
- As in individual reviews, a mismatch between score and comments is common: panel ratings often converge to "Very Good" regardless of the balance in the strengths and weaknesses provided.
- A strong influence on the panel summary by the reviewing panelist is often noted. This is inevitable and, in many cases, completely appropriate given the attention they have applied to the proposal and reviews. In other instances, this influence can appear to unduly sway the panel assessment.
- As noted in question 3, when the panel and mail reviews diverged, the panel sometimes suggested that mail reviewer's scores did not adequately represent the mail reviewer's comments. This interpretation must be carefully supported and documented.

This question does not apply to most REU proposals because they were reviewed by *ad hoc* external reviewers and Program Officer only.

For the Postdoctoral Fellowship Program proposals, the panel summaries and Review Analysis provided adequate rationale for decisions. In some cases, however, when there were disagreements over the ratings, or adjustments were made based on broader impacts, this information was not provided to the PI in the Program Officer summary. It seems that such information might be communicated to the Postdoctoral applicant to assist early career ocean scientists in preparing future proposals of this type.

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

[Note: Documentation in the jacket usually includes a context statement, individual reviews, panel summary (if applicable), site visit reports (if applicable), program officer review analysis, and staff diary notes.]

Comments:

Yes, the rationale generally conveys the strengths and weaknesses, in both IM and BI categories. The review analyses provide a clear explanation about all internal evaluations, placing the ad hoc and panel critiques in context, and noting which comments were a factor or not (and why) in the decision.

Inherent limitations can compromise the process: a limited number of reviews returned, un-substantive reviews, or reviews from generalists rather than specialists. Program Officers usually provide good insight for proposals that suffer from these limitations. This is yet another aspect highlighting the need for Program Officers with the breadth, experience and wisdom to handle these situations. We commend the thoughtful analyses in which the comments of different reviewers or panelists were identified, contrasted, and integrated. The previous COV recommended this format for analysis and it has been widely adopted.

In cases where the decision relied clearly on more than a simple assessment of the mail in reviews, the panel and Program Officer may appear to exert excessive influence in the selection process. However, we deem it appropriate for the decision to include overall portfolio balance and, in the cases of larger focused efforts within a discipline (e.g. GEOTRACES) decisions involving connections with other components of the larger effort. Especially in cases of disparity between ratings and funding decision, we noted that the quality of the analysis might vary with Program Officer. While inevitable differences in style are valuable, the Program should continue to train new Officers and to apply checks and balances to ensure consistency in how the decision rationale is conveyed. Concerns include a few instances of almost identical evaluation language–and rating–for both awards and declines, unsubstantiated assertions of excitement of the panel that were not clearly supported by the panel summary. (See Recommendation 4 above). There is ample documentation to explain the rationale for the REU and Postdoctoral Fellowship funding decisions. The Program Analysis (in e-Jacket) was a particularly useful tool to understand the funding decision. The Program Officers did a great job of summarizing individual reviews and of applying NSF criteria to balance the strengths and weaknesses presented by the reviewers (*ad hoc* and panel). Program Officers also did a good job of detecting errors or misconceptions made by the reviewers. **6. Does the documentation to the 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 in the Program Officers comments field or emailed, with a copy in the e-jacket, or telephoned with a diary note in the jacket) of the basis for a declination.] Comments: The combination of mail review comments, panel summaries and Program Officer comments tends to provide the PI with detailed explanation of award/decline decisions. In addition, these documents provide guidance and advice that could be applied for an improved resubmission. The fact that there have been no appeals in recent history supports the idea that the PIs understand the evaluative process. There were clear recommendations and encouragement for resubmission of some proposals, although active discouragement of poor proposals was rare. While most jackets had a wealth of comments to guide a revision, some critiques are contradictory or lack context. Program Officers are usually very good at identifying the primary concerns, or which evaluations were incorrect, value judgments, or inappropriate, and stating clearly which assessments most influenced the decision. However, there were cases of declines when reviews (mail and panel) were strongly positive and the comments to the PI were too brief to explain why. Greater consistency in this feedback, especially when numerical	YES

evaluations were positive or for proposals involving junior investigators that need to learn, would be valuable.

Our Committee had considerable discussion about the need to convey to PIs the panels', and most importantly Program Officers', considerations of the "balance" of a specific program portfolio. Issues such as national priorities and goals reflected in NSF Strategic Plans and accompanying goals are taken into account as final decisions are made by Program Officers about proposals. While factors entering into program balance (e.g. demographics, sub-discipline inclusion, and high risk-high reward) are stated in several instances in the Review Analysis section of the proposal jackets we reviewed, the use of the balance factor was not uniformly stated and/or explained when it was obviously influencing a decision. Informed by our discussion with OCE Leadership and Program Officers about this concern, we realize that the Review Analysis section of the e-jacket is intended for internal NSF use. This led us to the following recommendation.

Recommendation 8. OCE should consider including in the decision communication to PIs a specific link to the NSF Review Process which is described on the NSF website at http://www.nsf.gov/bfa/dias/policy/merit_review/facts.jsp#3. When possible and appropriate, OCE should consider providing information regarding portfolio balance and priorities.

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

The combination of mail/panel reviews was generally effective. Intellectual Merit and Broader Impact considerations were effectively dealt with in this context.

We commend the Program Officers for being vigilant in demanding appropriate postdoctoral investigator supervision and data management plans. They make good use of the advice from the panelists in these areas.

Additional criteria such as balance of portfolio, risk, geographical, and diversity considerations were often not explicit, and should be better expressed in the Review Analysis.

From the point of view of energy efficiency and minimizing carbon footprint associated with travel, we encourage the exploratory adoption of new virtual meeting technologies for panels as such technologies improve. Existing virtual meeting technologies might be especially helpful for instances where there are a small number of proposals (e.g. for REU and OTIC) or when one or two panel members cannot easily travel to the panel location.

Program Officers should take care to provide objective information to PIs regarding possible revisions of declined proposals. PIs need to understand that correcting shortcomings for a proposal is not a guarantee of a future high ranking or success. The opinion of new reviewers who did not see the original proposal may provide a fresh perspective.

The determination of "high risk" was not uniform amongst Programs, calling into question the statistics regarding award success rates for proposals deemed as

such. In some Programs, despite commonly identifying proposals as being "high risk," the basis was not always completely clear. In all Programs it was hard to discern whether this criterion played a role in the fate of a proposal (See further comments in Section IV). In a limited number of cases in the subset of proposal jackets provided to the COV, decision rationale and process (for example giving a PI a chance to address critiques) was uneven and not justified explicitly. Best practices, which include multiple checks and balances should be continued and strengthened, towards an effort for uniform treatment. The success rates (awards received given the number of proposals submitted) for 2012 through 2014 of the majority of the programs we reviewed ranged between 15% (BO) and 45% (PO). This is somewhat lower than during the period 2009-2011, when success rate for most programs were around 30%. The success rate of Ocean Education proposals ranged between 70% and 80%. We note that, based on the average *ad hoc* review rankings and typical panel scoring, many very strong proposals are not being funded. Note that the NSF *ad hoc* review criteria for G (=good) proposals are deemed "worthy of support." Data on the mean scores for awarded and declined proposals illustrates that the median score for awards is between Very Good and Excellent. There are many declined proposals of considerable merit rating Good and Very Good (the median score for declines) that cannot be awarded because of lack of sufficient funds. Even some proposals rated Excellent cannot be awarded once various considerations of program balance are taken into account because of lack of funds.	

II. Questions concerning the selection of reviewers. Please answer the following questions about the selection of reviewers and provide comments or concerns in the space below the question.

SELECTION OF REVIEWERS	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Did the program make use of reviewers having appropriate expertise and/or qualifications? Comments: Based on the proposal jackets provided, our general impression is that the *ad hoc* reviewers had appropriate expertise and qualifications. The geographic distribution of *ad hoc* reviewers-with 22% to 26% located in each the Southeast, Northeast and West-reflected the geographic distribution of both proposal submissions and	YES

awards; we believe this is a good approximation of the current geographic distribution of ocean research scientists. The gender distribution of *ad hoc* reviewers is between 19% (REU) and 70% (PO) male; in the other programs 45-50% of the reviewers are female. Our impression from the statistics provided is that there has been significant improvement over the years in involving women scientists and educators in the *ad hoc* review process. We encourage continuing efforts to ensure that the gender distribution of the *ad hoc* reviewers reflects the gender distribution of the ocean sciences research and education community. Involvement of minorities from underrepresented groups in the *ad hoc* review process is very limited because of the paucity of minorities in the ocean sciences research and education community. There is an appropriate and encouraging involvement of early career research scientists in the *ad hoc* review process. Panels in the past three years have included an appropriate mix of seasoned and early career investigators, who can both benefit from one another's perspective and contribute in a meaningful way to the review process. The geographic distribution of panel membership (22% Southeast, 27% Northeast, and 30% West) mirrors the distribution of *ad hoc* reviewers and, as we noted previously, generally is in accord with our impression of the geographic distribution of ocean science researchers and educators. We were informed by some Program Officers that the difficulty in recruiting more women to serve on review panels (who consisted of 10% women in CO to 22% in MGG) might be the result of too many professional responsibilities being requested of too few women. We discussed the burdens of balancing personal responsibilities such as raising a family (some of which is increasingly shared by men) with professional responsibilities. The issue of having virtual panels was discussed with Program Officers and we were informed that in experiments with virtual panels, surveys of panelists revealed a preference for in-person panels. As noted elsewhere in our report (Section I.7), we believe it is appropriate for NSF-OCE to continue experimentation with the evolving technology of virtual meetings as one way that has potential to increase involvement of busy people in the panel review process. The REU Program Officer informed us that reviewers for REU proposals are previous PIs, mentors in REU programs and people with relevant expertise in undergraduate education and marine science. For the postdoctoral fellowship program, which examined a wide range of disciplines, reviewers were selected by various Program Officers in OCE. This pool was adjusted for demographic and geographic balance. In both cases the selection of reviewers seemed appropriate.	
2. Did the program recognize and resolve conflicts of interest when appropriate? Comments: We were impressed with the care with which Program Officers and Panels (and	YES

NSF in general) identified, dealt with, and noted in the jackets real or potential conflicts of interest for reviewers or panel members. This was also evident in the identification of known or potential conflicts of interest for members for our COV and identifications of jackets which fell into conflict of interest categories for individual COV members. We learned that preparing conflict of interest databases by each Program Officer or group of Program Officers is labor intensive. In addition, the process of reviewers recording a conflict of interest is cumbersome and often not used. Thus, conflicts of interest only become apparent for some reviewers after they have submitted a review that then cannot be used. This causes Program Officers to scramble at the last minute, sometimes without success, to secure an additional review. **Recommendation 9. OCE should inform GEO and NSF leadership of the need for a simple, easy to use, online system for proposing PIs and reviewers to note potential conflicts of interests as defined by NSF policy. The system should be configured to inform the Program Officers expeditiously of potential reviewer conflicts.** Our COV members are aware of efficient systems in use by many journals in seeking reviewers for submitted papers, including timely information to editors and associate editors.	
Additional comments on reviewer selection: None.	

III. Questions concerning the management of the program under review. Please comment on the following:

MANAGEMENT OF THE PROGRAM UNDER REVIEW	YES , NO, DATA NOT AVAILABLE, or NOT APPLICABLE
1. Management of the program. Comments: We are impressed with the Program Officer management of the OCE programs we reviewed, and how this reflects positively on the Management/Leadership of the OCE Program and Sections. Individually and collectively, their tasks are challenging given the various constituencies to which they respond and serve: e.g. general public and their elected and appointed officials, the ocean scientific research and	YES

education community. The workload of OCE Program Officers and their supporting staff is substantial. We heard concerns during our visit about staff turnover rates, but had insufficient data to arrive at any conclusions or recommendations. We can emphasize the obvious. To the extent practicable, given budget constraints, it is critical to have sufficient staff with appropriate skills and expertise to support the Program Officers and OCE Leadership and to ensure proper training for Program Officers and staff.	
2. Responsiveness of the program to emerging research and education opportunities. Comments: The OCE Programs continue in a long tradition of responding to emerging research and education opportunities. A few examples during the 2012- 2014 time interval are proposals funding: (1) emerging chemical, biological and biochemical research needs related to the process of and response to ocean acidification, (2) Paleo Perspectives on Climate Change, (3) GEOTRACES - new capabilities in measuring chemical tracers in the ocean. In the education arena, an example is an award to a REU project targeting lower GPA students and another REU project from a community college focusing on freshman and sophomore students. The Postdoctoral Fellowship Program responds to the national need for increasing diversity at all levels from undergraduate to professional. We are aware that this program currently is tabled while an assessment of its effectiveness can be completed.	YES
3. Program planning and prioritization process (internal and external) that guided the development of the portfolio. Comments: Addressing this section of the report was bedeviled by considerable confusion over the exact charge to the COV that was only recognized late in the process. This is addressed below under Other Comments in section 5 of this report. We had insufficient data to comment in an informed manner about how the planning and prioritization is accomplished other than general knowledge within and among the COV members, and limited discussions onsite with Program Officers. It seems that prioritization is a "bottom up" process, coming from PIs and potential PIs and	MAINLY DATA NOT AVAILABLE

informed by internal committee deliberations (e.g. GEO Advisory Committee deliberations) and external deliberations within professional society sessions and workshops, and periodic National Research Council reports such as the recent report "Sea Change: 2015-2025 Decadal Survey of Ocean Sciences" (National Research Council, National Academies Press, 2015). One concern we have is with the role of OCE-funded workshops to evaluate and/or develop more fully ideas for focused research efforts. There is a perception in the ocean sciences community that on occasion there is an "in crowd" which attends the workshop and develops the essence of the program. These insiders are then among the main recipients of funding. Care should be taken to ensure a balanced attendance at the workshops, including some scientists who might be legitimate skeptics of the need for the focused program. We recognized that planning and prioritization for the REU program needs to recognize the necessity of continuity in several programs if the quality is to remain high and objectives met. There are few universities, colleges and institutions where there are other significant sources of funds for these types of programs. Thus, continuity of NSF OCE funding for Ocean Sciences REUs with a track record of success is needed to achieve goals of introducing undergraduates to ocean science research and recruitment of the next generation of ocean scientists into graduate programs. We are aware that the Program Officer strives to fund 1 or 2 new proposals each call for proposals to provide opportunities for innovation and for new REU sites. This is especially important with respect to ensuring the most effective efforts for increasing diversity among the REU students.	
4. Responsiveness of program to previous COV comments and recommendations. Comments: The OCE Program has responded in writing in 2012, with annual updates in 2013and 2014, to the 2012 COV report. In many instances thoughtful, substantive responses appear to have improved the OCE programs and activities. OCE has made significant progress in evaluating proposals for NSF's Data Management and Postdoctoral Mentoring requirement for research proposals. Another example of significant success in responding to a 2012 COV recommendation is the reestablishment of the OCE Newsletter. A third example is the encouragement for each REU site to host seminars and workshops on the breadth of careers available to ocean science researchers completing M.S and Ph.D. programs. Nevertheless, we have the following concerns about some responses to the 2012 COV. **Concern 4.1** Recommendation 22 (p66) of the 2012 COV Report states : "The COV recommends that the Program check through documentation provided to ensure:	YES/ Some Concerns

a) The charge to the COV is consistent,
b) The questions in the template are consistent with the charge,
c) Sufficient data are provided to address the charge,
d) All graphs and tables provided to the COV include detailed descriptive captions or footnotes.

NSF Response 22 states "We will ensure that the charge to future COVs in the invitation letter is in sync with the revised COV Report Template. With regards to the questions in the report template, these are used NSF-wide and are not always well matched to the data collected by individual units, meaning that some of the questions can only be answered qualitatively based on discussion with the programs. We will strive to include more detailed captions and footnotes for graphs and tables provided to future COVs. (The latter was done for our 2015 COV and we appreciate that effort). The 2014 NSF update to response for recommendation 22 states "We are currently preparing for the next COV and will include these comments in our planning."

Despite good intentions at NSF, and we recognize that mistakes can happen, the letter providing us with our charge caused the same or similar confusion as for the 2012 COV. Initially the 2015 COV wasted time attempting to understand how we could respond to the second of two charges in our letter of appointment and then we were informed that the inclusion of the second charge was a "clerical mistake."

In addition, while recognizing that the report templates are NSF-wide, the questions in the template were important questions and we were disappointed to have to note in our report that "data were not available" for answers to some of the template sections. We believe that there should be some manner in which data, even if it is qualitative, could be provided to answer all questions in the template. The quality of the evaluation of these questions lies in the quality of the data and information the COV is provided.

On a few occasions we were informed that the specific type of program data we sought was not collected in the NSF Database and/or could not be extracted from the database in the format requested. While our COV members are generally familiar with large central database operations, and we realize that some appropriate government regulations apply, we believe that NSF, or the programs themselves, needs to devote more attention to collecting data that can be extracted to address the template questions as they apply to each NSF Program. Questions for which there are no appropriate data should be eliminated from the template, or addressed in a Self-Study type exercise (see our suggestion under the "Other" Section at the end of our report).

Concern 4.2. In several instances in the NSF response to the 2012COV, the 2013 or 2014 update states "Done" without any explanation of what actually was done. This brief response was not helpful in our efforts to evaluate the results of that action or the anticipated results.

IV. Questions about Portfolio. Please answer the following about the portfolio of awards made by the program under review.

RESULTING PORTFOLIO OF AWARDS	APPROPRIATE, NOT APPROPRIATE, OR DATA NOT AVAILABLE
1. Does the program portfolio have an appropriate balance of awards across disciplines and sub-disciplines of the activity? Comments: Several compilations of data were used to assess balance of awards across the different sub-disciplines and programs in OCE. There were around 10 new projects in OTIC, Education and ODP, and between 40 and 75 each in PO, MGG, CO and BO. The annual award sizes generally ranged between $100,000 and $300,000, the smallest award sizes were in Education and the largest ones in PO and BO. Awards last between two and just over three years. Overall the data provide a general sense of balance between the programs within OCE; the observed fluctuations are those expected from year to year. For the entire portfolio we have insufficient data to answer the question with respect to sub-disciplines within a program. There did not appear to be a systematic bias in sub-disciplines in the data we examined. However, our sense from discussions with some Program Officers was that there was some prioritization of research areas but we were not provided clear insight into program specific priorities. The COV discussed the philosophical divergence between Program leadership in defining research directions and the mantra of community-driven, bottom-up definition. Our examination of the selected proposals provided by the various disciplines is consistent with a bottom-up research portfolio. It appears that Core is driven by assessing the proposals that arrive, while projects such as Ocean Acidification, LTERs and programs such as GEOTRACES reflect a greater interplay of NSF leadership and community organizations. While recognizing that the overall program portfolio is the result of the dynamic relationship between NSF leadership and community-driven proposal pressure and initiatives, the COV struggled to answer this question for a variety of reasons including the lack of comprehensive information on the current portfolio balance and the difficulty of assessing what is meant by 'appropriate.' Future COV panels would benefit by a more explicit identification of Program Priorities, that can be used to assess 'appropriateness,' as well as	?? DATA NOT AVAILABLE??

information on the existing funded projects at the sub-discipline scale for all disciplines within OCE. (See suggestions in the Other Topics.5 section at the end of this report).	
2. Are awards appropriate in size and duration for the scope of the projects? Comments: Overall, we have a sense that awards are appropriate for the size and duration of the projects. (See also discussion for question IV.1.) However, a detailed and quantitative assessment by the COV would require us to read a much broader set of proposals to assess the proposed goals/objectives of the project and requested time and funding, and the modifications of the proposed objectives of the PI considering any reductions in funding.	YES/DATA NOT AVAILABLE.
3. Does the program portfolio include awards for projects that are innovative or potentially transformative? Comments: The move to identify a subset of submitted proposals in the category of High Risk – High Reward (HR-HR) proposals was driven by the perception of the ocean sciences research community almost ten years ago that OCE was progressively moving over time towards risk aversion in funding proposals and thus missing those with a high element of risk in proposed research that might yield significant impact if successful, i.e. be transformative. We realize that not all research having significant transformative potential is high risk and that only a limited number of such proposals in each round of evaluations may be in that category. The previous 2012 COV (reviewing years 2009-2011) recommended (2012 COV recommendation 1) that all panels be provided with consistent instructions with regard to "Identifying and evaluating transformative and high risk proposals at the onset of the panel process." The OCE response to this recommendation (NSF Response to 2012 COV) was as follows: "We will review our procedures to ensure that all OCE panelists are given consistent instructions on how to identify and evaluate potentially transformative and high risk-high reward proposals [...] Currently each member of each disciplinary panel are asked ahead of time by their parent program to identify proposals they found to be the most creative, innovative, potentially transformative or high risk/high reward proposals and articulate why during the panel discussions." Given the previous COV recommendation and OCE response, there was significant interest by this 2015 COV about the selection process for categorizing proposals as HR-HR. Somewhat disappointedly, there appeared to be significant differences between the various programs in	YES

definition, reporting, and underlying rationale. Some programs actively identified high-risk, high-impact proposals and ensured that they were not summarily filtered out by the review process. Mindful of these caveats, we note that around 20% (MGG and PO), 15% (BO) and 8% (CO) of proposals were identified as high-risk in 2012; these numbers fell in subsequent years to 10-15%, except for CO which identified no proposals as high-risk in 2013 and 2014. The success rate of high-risk proposals ranged between 10% (PO, 2013) and 90% (BO, 2012). BO proposals deemed high-risk appeared to have consistently high success rates (>80%), while it varied more for PO and MGG. In 2012, the success rate for high-risk CO proposals was 35%. **Recommendation 10. There should be continued inter-program discussion on consistent approaches for identifying HR-HR proposals and their funding rates with concerted and continued action on this topic across OCE.** Despite the recommendation noted above from the 2012 COV and NSF response to that recommendation, there remains a challenge as we have noted. Perseverance may be the watch word for this challenge, much as it has been with the introduction and evolution/implementation of the Broader Impact Criterion discussed elsewhere in our report.	
4. Does the program portfolio include inter- and multi-disciplinary projects? Comments: Based on the data provided to the COV it is clear that multidisciplinary projects (defined as those reviewed by more than one discipline) are part of OCE's portfolio. There are marked differences in the absolute and relative numbers of multidisciplinary proposals considered and funded by each discipline and the data provided in the informational slides are not ideal to assess key statistics. For example, we were told the number of proposals reviewed by more than one disciplinary panel, but not the number/relative proportion of proposals that were requested to be considered but were not (because the second Program deemed it to be 'service' instead of new disciplinary science). In the opinion of this COV, given the multidisciplinary nature of transformative oceanographic research, the fact that less than ~20% of all proposals reviewed were 'multidisciplinary' according to this definition seems low. We discussed whether there could be a better definition for 'multidisciplinary,' whether this results from how the proposals are submitted (i.e. to a single discipline), or whether there is pressure on the various disciplines to limit funding outside disciplinary boundaries. The COV suggests that OCE could consider strategies designed to enhance multidisciplinary projects, reserving funds targeted to such proposals and/or delineating regular (even if infrequent) specific calls for multidisciplinary	YES

projects (with allowance for increased page limits) in OCE. A possible model could be the former Frontiers in Earth System Dynamics Program in the GEO directory. **Recommendation 11. OCE should review present mechanisms designed to facilitate multidisciplinary projects across the various units within OCE and undertake appropriate actions to further facilitate interdisciplinary and multidisciplinary proposals.**	
5. Does the program portfolio have an appropriate geographical distribution of Principal Investigators? Comments: Our assessment of the geographic distribution of proposal awards (~250 in the Northeast and West, and 170 in the Southeast), in concert with our understanding of the current distribution of ocean science researchers in the United States and the geographic distribution of submitted proposals, is that the program portfolio has an appropriate geographic distribution of PIs. We were surprised to learn that the geographic distribution of REU Sites (Awards) does not have a similar representation in that there are far fewer west coast US sites than expected (six, compared to the many on the east coast and four in the Gulf of Mexico). We were informed by the Program Officer that this reflects far fewer proposals to the OCE-REU Program from the west coast institutions in comparison to what the Program Officer (and we) expected, despite efforts to stimulate such proposal submissions. Many of the east coast sites are tied to field laboratories and many of the west coast sites are funded by BIO REU Program. **Recommendation 12. We recommend continued efforts to attain geographic distribution balance in REU proposals and grants, consistent with REU Program goals and objectives.**	YES
6. Does the program portfolio have an appropriate balance of awards to different types of institutions? Comment: The COV found that there was a very strong predominance of funding going to research-intensive (RI) institutions (70% or more) and very few awards made to two-year and four-year institutions (around or less than 10%). This seems to reflect the fact that most of the proposals come from the RI institutions, as success rates hover around 20% for most institution types. Some may believe that this is an appropriate distribution given the respective missions of the different institutions and NSF's mission.	YES

We realize that teaching and committee work at four-year colleges, and especially at two-year colleges, may preclude proposals from faculty at these colleges for academic year research. Lack of appropriate research laboratories and equipment may be another hindrance. On the other hand, low submissions from two- and four-year colleges may partially reflect a perception that NSF doesn't fund proposals from these smaller institutions. Collaborations between faculty of four-year and two-year colleges and researchers at RI institutions are an appropriate and very effective way to entrain the four-year and two-year college faculty and their students in NSF funded research. We did not have data available to us during our deliberations concerning these types of collaborations because it occurred to us too late in our deliberations to request such data. However, some anecdotal evidence available to the COV suggests that this is a fruitful pathway forward for increasing participation of faculty and students from four- and two-year colleges and an important pathway for increasing recruitment and participation of minorities in ocean sciences education. There are data supporting this contention. Between 13% and 27% of minorities earning a Ph.D. in Life Sciences or Physical Sciences attended a community college during their college education (Table 30 of The Survey of Earned Doctorates, 2013, conducted by NSF, NIH, USED, USDA, NEH and NASA). According to the American Institutes for Research, Historically Black College and University (HBCU) are key institutions for black STEM PhDs: 72% of those earned their undergraduate degree at an HBCU. Stimulating research opportunities at HBCUs could strengthen a significant pathway for black individuals to become involved with ocean sciences research and education. **Recommendation 13. OCE should explore and test proactive efforts to educate and promote opportunities for collaborations and for individual proposals to the faculty at Minority Serving Institutions (MSIs), four-year, and two-year institutions.** This could be effective in increasing the proportion of proposals from non-RI institutions. These partnerships could also help improve OCE's efforts to improve representation of proposals that impact underrepresented students as well as by enhancing the IM and BI by employing a diversity of scholarly thought. Also note that Recommendation 13 is relevant to section IV.9 below.	
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. Comments: **We are impressed with the extent to which the programs have continued to involve new investigators.** New PIs enjoy essentially the	YES

same success rate as more experienced PIs, 10-30% compared to 15-30%. The success rate is much more variable for new investigators, as is to be expected. New investigators make up a healthy component of the awarded proposals (15-20%) f and appear to be on an increasing trend during 2012-2014. In the jackets we saw, Program Officers carefully outlined strengths and steps to improvement to the new investigators, and provided other helpful feedback. With respect to new investigators in general, the COV commends OCE on their continued effective effort to include new investigators in all aspects of the program; they are called upon for both mail reviews and as panelists.	
8. Does the program portfolio include projects that integrate research and education? Comments: The program portfolio includes projects that integrate research and education, although we do not have data across the entire spectrum of funded proposals indicating the number or percentage of individual proposals which integrate research and education. It is clear from the funded proposals we reviewed and from discussions with Program Officers that such integration is inherent to many successful proposals. Education and research are combined in the shape of support for graduate students, undergraduate student involvement (REU programs and individual PI REU supplements), K-12 student and teacher involvement, and general public outreach. We are aware that the portfolio contains examples of all these types of activities.	YES
9. Does the program portfolio have appropriate participation of underrepresented groups[1]? Comments: We are aware that NSF commonly uses three general groupings of scientists when reporting and discussing aggregated demographic data for underrepresented groups: "Women, Minorities and Persons with Disabilities" (NSF Website <www:nsf.gov/statistics/sed/2013/data-tables.cfm>. We also note that Veterans as a group are included in the definition of underrepresented groups, e.g. the RIG program (see comments below in the subheading Minorities). **Women in Ocean Sciences.** We specifically take note that just prior to our COV, there was a special issue of OCEANOGRAPHY "Women in Oceanography: A Decade Later" published (Volume 27[4]: Supplement,	YES with caveats.

[1] NSF does not have the legal authority to require principal investigators or reviewers to provide demographic data. Since provision of such data is voluntary, the demographic data available are incomplete. This may make it difficult to answer this question for small programs. However, experience suggests that even with the limited data available, COVs are able to provide a meaningful response to this question for most programs.

December 2014. The 258 pages of that Special Issue contain a wealth of information and advice with respect to women in ocean sciences and programs and suggest processes to increase recruitment and retention of women in ocean science research and education.

There has been significant progress in the recruitment and retention of women through Ph.D. completion in several subfields of ocean sciences, but the recruitment and retention in the academic sector still lags. "The twenty-first century has seen women oceanographers assume several prominent roles in the scientific community, and there have been many firsts, with women receiving prestigious professional society award medals. However, the ocean sciences remain far from gender parity, especially when it comes to academic positions." (S. O'Connell, 2014, "Women of the Academy and the Sea: 2000-2014". OCEANOGRAPHY 27[4] Supplement. Page 15-22).

Our examination of data for the 2015 COV time frame, and looking back over the past decade, leads to the observation that the number of proposals within OCE awarded to men is a factor of 2.5 to 3 times higher than the number of proposals awarded to women. While the demographic data indicates movement towards parity of women and men with respect to proposals awarded 2011 to 2012, there may be indications of a leveling off in 2013 to 2014, well short of gender parity.

The lack of parity for men and women in grants awarded seems influenced in large measure by the vast majority of proposals being submitted from faculty in ocean sciences and the lack of gender parity in faculty in ocean sciences discussed in a preceding paragraph. This contention is supported by our examination of the success rate for proposals in the sub-disciplines of ocean sciences for men and women. While there is noise in the temporal trends, the general indication is gender parity for rates of success for proposals submitted to PO, MGG, BO, and CO is ranges between 10% to 30% for women and 15% to 30% for men for the years 2012 to 2014.

This highlights the importance of OCE continuing to focus on efforts appropriate to NSF, and in partnership with universities and ocean sciences professional societies, to enhance recruitment and retention of women ocean researchers in faculty positions. We commend NSF-OCE for support of programs such as MPOWIR (Mentoring Physical Oceanography Women to Increase Retention) and commend NSF for the ADVANCE (Increasing the Participation and Advancement of Women in Academic Science and Engineering Careers) program.

Recommendation 14. We recommend that OCE continue their support of mentoring programs and other novel strategies aimed at reaching gender parity in academia and other positions of responsibility, proposal review processes, and other professional activities. We also recommend continued vigilance in terms of parity of proposal success rates

Minorities in Ocean Sciences.

The information on minority PI success rates (0-30%) and number of awards (<30 each year) to minorities demonstrate that the numbers of both proposals and awards are too few compared to demographics of the U.S. population: minorities continue to be underrepresented in these programs.

There are focused programs addressing this issue. The following synopsis, taken from the OCE–NSF website describes the Research Initiation Grants program: "The Division of Ocean Sciences (OCE) offers Research Initiation Grants in an effort to increase the participation of under-represented groups in the ocean sciences. Research Initiation Grants provide start-up funding for researchers who have been recently appointed to tenure track (or equivalent) positions, with the twin goals of enhancing the development of their research careers and broadening the participation of under-represented groups in ocean sciences. In this solicitation, the term under-represented groups will refer to and include the following: veterans, persons with disabilities, African Americans, Hispanics, Native Americans, Alaska Natives, and Pacific Islanders."

The demographic data for the RIG program indicates that the program is having modest success (five of thirty-five proposals and three of ten awards) in providing NSF grant funding to recent appointees in tenure track positions who are from underrepresented groups.

A detailed look at the jackets chosen for our review by OCE (see description of the process in the beginning of this report) yielded the following information.

Of the 512 proposals submitted to the 2015 COV for review, the Underrepresented Minority participation in that portfolio is as follows:

- 23 Asian men applied; 3 received awards and 20 were declined
- 9 Asian women applied; 4 received awards and 5 were declined
- 1 Native American man applied and received an award
- No Native American women were represented
- 1 Native Hawaiian/Pacific Islander man applied and received an award
- 1 Native Hawaiian/Pacific Islander woman applied and received an award
- 1 African American man applied and received an award
- No African American women were represented
- 11 Hispanic men applied; 7 received awards and 4 were declined
- 7 Hispanic women applied; 2 received awards and 5 declined
- The unknown group.
    - 8 unknown men, 5 unknown women, and 17 unknown/unknown applied; 9 received awards and 21 were declined
- 3 multiracial men applied; 1 received an award and 2 were declined
- 1 multiracial woman applied and received an award

We note that within the Ocean Sciences research community, Asians are underrepresented and thus are included in the above synopsis. Not adding the category of individuals who decline to identify their status as underrepresented or not, the total number of grant applications from those submitting proposals from underrepresented groups was 58 which is 11% of the total applications. This is progress but slow progress in increasing the involvement of underrepresented groups in the grants process.

Twenty-two of the fifty-eight proposals submitted were funded for a success rate of 38% which compared quite favorably with the overall success rates for all OCE proposals (30%), and curiously, was higher than the reported success rates for minorities in the entire OCE portfolio (<30%). We did not have time to ascertain why this is the case.

Our collective COV experience, while not a quantitative assessment, is that there is involvement of an increasing number of minorities in REU and similar programs progressively over the past two decades. Attendance of minority undergraduate students associated with REU and other similar programs has become a regular aspect in ocean sciences activities at national meetings of ASLO, AGU, and the biennial Ocean Sciences Meetings.

The need to increase minorities in ocean sciences from graduate education onward to faculty positions and then proposal submissions to NSF has been obvious for decades. Numerous programs have been planned and funded by NSF and other agencies. There has been progress, but slow progress.

Recommendation 15. OCE and NSF in general, should continue to plan, execute and evaluate programs whose goal is to increase recruitment and retention of minorities in ocean sciences with a focus on continuity and complementarity of programs from K-12 grades and the general public education/outreach through graduate education, postdoctoral programs, faculty recruitment and retention, grants submission to NSF and success with grant awards. Such efforts are not the purview and responsibility of only a few in OCE. They should be embraced proactively by all at OCE with the recognition that such efforts will need to be sustained for years to have the desired and much needed outcome.

One example illustrative of efforts we have in mind are to provide targeted webinars, or workshops for ASLO Minority Program participants and at SACNAS meetings.

Persons with disabilities and Veterans. We did not realize until very late in our deliberations that we did not have available to us data for persons with disabilities or for veterans who are in ocean sciences research and education, although members of our COV know of several colleagues with disabilities or who are veterans. They contribute substantively to the health and well-being of ocean sciences research and education.

Recommendation 16. We recommend that OCE make available to future COVs, and that the COV consider early in its deliberations, data and

information appropriate to assess the programs and progress that pertain to inclusion of persons with disabilities and veterans in ocean sciences research and education funded by NSF.	
10. Is the program relevant to national priorities, agency mission, relevant fields and other constituent needs? Include citations of relevant external reports. Comments: Our assessment is that the program is relevant to national priorities, agency mission, as expressed on the NSF website, to ocean sciences as a field, and to other constituent needs. We include here a modest number of references among many we could cite to document our assessment. https:// www.whitehouse.gov/administration/eop/oceans. National Academies Press, 2015. Sea Change: 2015-2025 Decadal Survey of Ocean Sciences. Committee of Guidance for NSF on National Ocean Science Research Priorities: Decadal Survey of Ocean Sciences. Ocean Studies Board, Division of Earth and Life Studies, National Research Council of the National Academies, Washington, DC (www.napo.edu). 86 pages. (and references therein). National Ocean Council 2013. National Ocean Policy Implementation Plan. Executive Office of the President, Washington, DC. NSF, 2014. Investing in Science, Engineering, and Education for the Nation's Future: Strategic Plan for 2014-2018. National Science Foundation, Arlington, VA. NSTC (National Science and Technology Council), 2013. Science for an Ocean Nation: Update of the Ocean Research Priorities Plan. Executive office of the President, Washington, DC. .	YES
11. Additional comments on the quality of the projects or the balance of the portfolio. None.	

OTHER TOPICS

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

No comments other than those in answer to specific questions in the template.

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.

Program Specific goals and objectives were not provided to us. Thus any comments we make would be of a very general and speculative nature.

Recommendation 16. OCE should make available to the COV program specific goals and objectives in writing. Relying on communication by discussion during teleconferences or during the COV site visit is inefficient and may result in such information not being effectively communicated and understood.

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

a) Examples of good and poor reviews posted on the NSF website. (See Recommendation 7 In a preceding section I.3)

b) See comment about *ad hoc* external review form directly after recommendation 7 in Section I.3 page 11.

c) As noted in Recommendation 9, Section II.2, NSF should consider a more efficient process for identifying conflicts of interest and maintaining a data base of conflicts of interest.

d) An easy to use electronic reply system for those asked to be external reviewers of proposals that receives responses and notifies Program Officers of responses should be considered.

e) See below 5.b regarding the NSF Data Base for proposals.

f) There was a general sense among the 2015 COV that the NSF website is excellent for outreach and highlighting important findings, but sometimes difficult to navigate when trying to find information relevant to aspects of programs and information for existing and prospective PIs. Some of our members found that using Google as a start for their search was more effective than going to the NSF website and searching. We are aware that constructing and maintaining a website to satisfy internal and external constituencies the sizes of those of NSF is a herculean task and offer our comment in the spirit of trying to be helpful.

g)

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

We have no comments that pertain to this section.

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

a) **Reduction in confusion as to the Charge to COV** in the letter from the Associate Director and in discussions with the liaison person with the unit being reviewed. Harmonizing the template to the data actually being provided or provide the data and write up from the Programs(s) to fit the Template being used. Verbal Instructions to "ignore" certain things seemed odd to us.

b) **Data Base concerns.** We were very appreciative of having proposal jackets available to us for review over a two month period and also having various plots of data relevant to our charge. We recommend that NSF review across all the Directorates and Divisions types of data collected, how collected (entered) and the various ways data could be exported to support the needs of COVs. We realize that designing, populating and maintaining such a large data base with a plethora of potential uses and users is an arduous task. An example of ease and appropriate use is the capability in a user friendly manner to plot data with "n" as a mean and appropriate confidence intervals.

c) **Self-study approach to a COV.** We recommend that NSF consider having a Self-Study Process prior to actual COV activities and visits. Perhaps OCE could undertake this as a trial process prior to the next COV in 2018 and use the template and data to be made available for the COV to assess for themselves where they are. For those familiar with academic reviews, this would be similar to self-studies being prepared for Re-accreditation Committee visits or Departmental or College Visiting or *ad hoc* External Committees. It would not eliminate the COV accessing data and discussing issues with OCE Leadership and Program Officers, but it would provide written and more detailed insight about how folks in OCE believe they are doing. We believe that it would be advantageous to OCE. Those of us who have participated in such processes have found them to be helpful in general despite an initial reaction of "not yet another thing to do!" At the very least it would result in gathering information relevant to several questions for which we had minimal information.

d) **Portfolio and Priority.** If c) above is not undertaken, or within the Self Study, each program should highlight their portfolio and priorities for the period in question for the review and provide this to the COV?

e) **Provide more jackets of proposals where the ratings and award/decline decision were more straightforward.**

f) **Provide clear indications and descriptions of when and how major research initiatives or budgetary events occurred in the designated review period.** For example, for the next 2018 COV any adjustments in response to the "Sea Change" report (National Academies Press, 2015) will have an impact, as will access to OOI sites and data streams.

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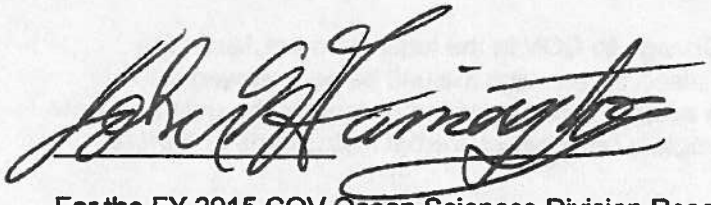

For the FY 2015 COV Ocean Sciences Division Research and Education Programs
John W. Farrington
Chair