

Proposed Disposition of Quality Review Comments the Draft SAB Report, SAB Advisory on the EPA Ecological Research Program Multi-Year Plan

Dr. David Dzombak

Comment: The SAB Ecological Processes and Effects Committee (EPEC) review has addressed all of the charge questions. Each of the charge questions appears to be addressed in sufficient depth, and specific recommendations have been developed for each of the charge questions and sub-questions.

Suggested response: No change necessary.

Comment: The organization of the draft report and its executive summary by the SAB EPEC follows the charge questions directly and is easy to follow.

Suggested response: No change necessary.

Comment: There are some aspects of the review that I would encourage the committee to reconsider. There are some specific instances where the recommendations of the committee are not consistent. More importantly, the committee did not recommend dropping any of the proposed activities to achieve focus and perhaps more impact.

(i) The committee report makes clear that the comprehensive, broad-scope plan set forth by ORD is commendable in many respects, but also highly ambitious and unlikely to be achievable within existing budgetary and personnel constraints. After reading the detailed committee support for this position, it seems to me that many aspects of the comprehensive plan have no chance of being achieved. Financial and human resources available to the Agency appear to be far below what would be needed to implement the plan. I get the sense that if ORD embarks upon implementation of the current plan and attempts to advance on all fronts, progress on each front will be very slow. I would ask that the committee consider making recommendations of activities that should be omitted in order to focus available resources on high priority issues and make an impact. More recommendations such as the one made by the committee to concentrate on terrestrial systems rather than coral reefs (pages 16, 17) would be helpful.

Suggested response: The Multi-Year Plan is intended to describe EPA's goals and objectives in undertaking a comprehensive ecological research program. In our review of the goals, objectives, and research questions articulated in the Multi-Year Plan we have commented on the scope of proposed research and recommended improvements and additions. However, we would need additional budget information (including potential for cross-program and multi-agency partnerships to accomplish work) in order to recommend elimination of various research components. These are difficult decisions that really must be made in the context of EPA's overall research budget, and as such are beyond the scope of this review. However, the Committee agrees with the comment that

the current resources available to support the ecological research program appear to be well below what is needed. The Committee has stated in the letter to the Administrator and in the body of the report that we are extremely concerned that the budget is too small to support the ambitious program. We have noted that the objective of completing much of the proposed research within the time frame of the multi-year plan is unrealistic. In the report we have noted concerns about the feasibility of developing the proposed decision support platform, have recommended that the program focus on research to measure and predict changes in ecosystem services rather than alternative valuation methods, and in one case (coral reef research) have suggested that research in other human dominated systems might be more useful. In the discussion of ecosystem assessments on page 18 we have recommended that ORD follow a strategy of undertaking simpler pilot projects initially, where tangible products showing the process from beginning to end can be produced within a three-year period.

(ii) On page 4, in the next to last bullet, the committee discusses the speed with which new ecological challenges are developing, and recommends that ORD put into place an adaptive structure that can address high priority, rapidly changing problems. If this is indeed the view of the committee, then other recommendations urging ORD to focus its resources better would seem to be in order.

Suggested response: Please see previous response. Because the Committee did not review EPA's research budget, specific recommendations concerning the allocation of resources are beyond the scope of this review. However, we have noted numerous concerns about resources and suggested ways that EPA might leverage available resources.

(iii) On page 11 (bottom) and page 12 (top), the committee comments on the proposed outreach and education activities, noting that "OE has not historically been a significant part of ORD's work and, therefore, additional expertise may be needed in this area." The committee goes on to call for a more comprehensive OE plan. This recommendation, for ORD to build significant new capacity and use scarce funds on non-research activity, seems hard to justify given the scope of the research needed and the concern about having funds to do it.

Suggested response: We wish to keep this recommendation in the report and think that EPA should make additional resources available for outreach and education. The Committee found that the success of the Ecological Research Program will depend in large part upon outreach and education efforts. This is because (as stated on page 1 of the report) the overall goal of the Program is to "change the ways in which policy and management choices affect the type, quality, and magnitude of goods and services that are received from ecosystems." To accomplish this, buy-in from economists, social scientists, and others involved in valuation and the policy-making process is essential. Therefore, outreach and education efforts will be needed. Outreach efforts will also be needed to build partnerships critical to the success of the Program.

(iv) On page 28, the committee recommends that ORD “make the STAR program a priority in efforts to leverage resources and achieve goals by: enhancing the STAR Graduate Fellowships program; providing funds for non-targeted, exploratory extramural research ...; and developing a competitive grants program to run summer credit workshops for teachers...” This recommendation for non-targeted investment seems inconsistent with the concerns expressed about inadequate resources to implement the core aspects of the program. It seems inconsistent to comment about an overly ambitious plan and then recommend such non-targeted investments. I suggest that more recommendations for narrowing focus and targeting resources are needed, rather than recommendations of the sort offered here.

Suggested response: The sentence will be revised to remove the words “non-targeted” and emphasize support for ecological research projects. The Committee felt that it was important to provide STAR funds for projects that could support the Program. The revised bullet on page 28 would be as follows: “We strongly encourage ORD to make the STAR program a priority in efforts to leverage resource and achieve goals of the Ecological Research program by: enhancing the STAR Graduate Fellowships Program to support ecological research, providing funds for exploratory extramural research to develop tools and procedures to accomplish the goals of the Plan, and developing a competitive grants program to run summer credit workshops for teachers through STAR that would support the goals of the Plan.”

Comment: The conclusions drawn and recommendations made are supported by the information in the body of the draft report. My only recommendation in regard to this question is that the inconsistencies noted should be addressed.

Suggested response: no change necessary.

Dr. Baruch Fischhoff

My reading of the draft report and review raises the following concerns:

Comment: The Decision Support Platform is likely to be a waste of money, diverting limited resources from ecological research to expensive computer exercises that bring little value to anyone but their developers, unless the following issues are addressed:

Suggested response: The second sentence on page 10, line 20 will be revised as follows. “In addition, it is important to note that the DSP could divert limited resources from ecological research to expensive computer exercises and be of limited value unless members of an explicitly identified user community are involved in all stages of its development so that the DSP has specific uses. As further discussed below, The DSP should also be subjected to rigorous empirical evaluation of its usability.”

- (a) Members of an explicitly identified user community must be involved in all stages of its development, so that the DSP has some specific uses and not just an ill-defined set of conceivable uses.

Suggested response: The report states (on page 10 line 24) that EPA should explicitly identify potential clients who will use the DSP. The sentence will be revised as follows: "In the Plan, EPA should explicitly identify potential clients who will use the DSP. Members of the explicitly identified user community must be involved in all stages of its development, so that the DSP has some specific uses and not just an ill-defined set of conceivable uses."

- (b) The DSP is subjected to rigorous empirical evaluation of its usability, with individuals drawn from that identified user population, performing tasks like those for which the DSP is intended. These evaluations must meet the highest standards of human-computer interaction research and, as mentioned, begin with the earliest stages of system development – so that usability is essential to the design, not an afterthought tacked on at the end.

Suggested response: The following text will be added to the bullet on page 11, line 18. "Furthermore, the DSP should be subjected to rigorous empirical evaluation of its usability, with individuals drawn from that identified user population, performing tasks like those for which the DSP is intended. These evaluations must meet the highest standards of human-computer interaction research and, as mentioned, begin with the earliest stages of system development so that usability is essential to the design, not an afterthought tacked on at the end."

Comment: The draft review raises very serious concerns in this regard (p. 9ff). To my mind, it is not skeptical enough. As the authors note (quoting Goosen et al., 2007, on p. 41), the general problem of creating useful DSP's has not been solved. It takes a leap of faith that a few additional suggestions will do the trick, and justify this investment. I am not convinced that the program's stated goals would not be better served by investing its resources in sound research, with enough set aside to ensure that they are communicated effectively to decision makers (a belief that may underlie the draft review's concern about the minimal education and outreach budget). One can support decisions without decision support systems.

Suggested response: See suggested changes above. The report raises concerns about the feasibility of accomplishing Long-term Goal 1, indicating on page 12, line 24 that the Committee questions whether ORD can realistically achieve the objectives and accomplish the tasks set forth. The Committee has also stated that it is not clear how the DSP would be designed and developed (page 10, line 44) and recommends that more information be provided (page 11, line 14). In addition, the committee also recommends that the program focus on research measuring and evaluating changes in ecosystem services (page ix, line 26; page 9, line 36).

Comment: The commitment to assessing the value of ecosystem services is commendable. However,

- (a) As the draft review notes, the lack of resources makes the realization of this commitment infeasible. Not only is the NCEE underfunded as is, but the SAB has heard a proposal to eliminate it. This report could be very useful if it led to strengthening the NCEE, not so useful if it added an additional demand to a threatened common pool resource.

Suggested response: No change necessary.

- (b) The report appears to be open to non-economic methods of valuation (as will be summarized in the SAB C-VPES report that it cites on p. 31. I would like to see that openness made more explicitly. Monetization can serve some purposes (e.g., in regulatory proceedings). However, there are other contexts (e.g., community planning, restoration, communication, education) where it can be a distraction. Moreover, as the report notes (Section 1.2.3), there are situations in which it is hardly viable. Requiring monetization implicitly devalues those resources that economics does not yet know how to handle.

Suggested response: The following sentence will be inserted on page 8, line 15. "It is important to note that although monetization can serve some purposes (e.g., regulatory proceedings), there are some situations where monetization is not possible. Unless EPA accepts the use of non-economic valuation approaches, resources that cannot be monetized will implicitly be devalued."

Comment: I am skeptical of any Outreach and Education activities without explicit empirical evaluation. I see unconscionable amounts of resources wasted on what seem like useless (even counterproductive) websites, PSAs, etc. People naturally exaggerate how well they understand their audience and how well they have communicated. There is no substitute for evidence – which must be collected to social science standards (i.e., not just web hits or TV views). Partnering solves nothing unless the partners have sound practices.

Suggested response: The following sentence will be inserted on page 12, line 18. "It is important that all outreach activities be evaluated to determine their effectiveness. The data used for such evaluations should be collected according to social science standards (i.e., not just using "web hit" or television view data)."

Comment: It seems strange that a report on ecosystem health would have only one reference to invasive species. It is also my sense that the activities proposed here move at too slow a pace to facilitate EPA's response to invasives. Rather, these activities may just serve the forensic purpose of documenting the damage that invasives have done (perhaps in terms). If so, then, with its limited budgets, EPA may be choosing comprehensiveness over effectiveness. The report may envision some (unspecified) others picking up the action. However, I didn't see the explicit plan and resources to make that happen. (The draft review discusses these issues in more general terms in its answer to Charge Question 3, and elsewhere.)

Suggested response: The following sentence will be inserted on page 4, line 38. "For example, EPA's research activities must advance at a rapid pace to respond to the threats posed by invasive species. An adaptive management plan is needed to show how EPA and its partners can effectively address this problem."

Comment: Generalizing this last point, I had the feeling that there was relatively little ecology in the report, given the program's mission, outside the two case studies (and, to a lesser extent, the wetlands and coral reef sections). Rather, the plan seems to emphasize data management and highly selected chemical threats. That makes me wonder whether the Agency's scientific resources in ecology have been depleted and the report is written to take advantage of the capabilities that it has left, rather than pushing for strengthening of its resources in ecology. Continuing my first two worries, I wonder whether the systems being proposed (DSP, valuation, etc.) will be able to accommodate the broad range of ecological knowledge, or just variables that appear across places and scales (just as I fear that they will not be able to accommodate the broad range of human concerns).

Suggested response: The Committee's report states on page 4, line 23 that the Program goals cannot be accomplished without answering basic science questions. To emphasize the need for ecology in the Multi-year Plan, the sentence on this line will be revised as follows: "The Program goals cannot be accomplished without ecological research to answer basic science questions. It is recommended that knowledge gaps be identified in the Plan, and that EPA plan and appropriately fund the basic ecological research needed to fill these gaps."

Comment: Overall, my inclination would be to build out from case studies, ensuring that they are addressed adequately, with an eye to developing general methods – rather than assuming that a general method exists, investing a lot in its creation, and then hoping that it can be applied. Decision makers (broadly defined) might be best served by having someone else's, perhaps very different, problem solved well, so that they can see what a full solution looks like.

Suggested response: No change necessary. The report states that the timing of developing the decision support platform and place-based projects is unclear. However it is suggested on page 13, line 7 that the place-based projects could be used to test the decision support platform.

Drs. James Galloway and Tom Theis

In general we feel that the committee has done a good job with its review, however we believe that the negative tone of the review of Goal #3 is not appropriate. Specifically, we are getting a mixed message from this review; it appears that the advisory committee is split on the importance of Goal 3. Unfortunately, the disagreement comes across as apparently recommending that EPA not pursue an integrated nitrogen assessment. In our view this is unwise. The issues of nitrogen are of such current importance now, and will only grow in the future, that what the committee should do is to advise EPA on how to make the proposed program better in both the short term and the long term.

In addition to this general comment, we have the following specific responses to the bulleted items in the committee's review.

1. The report is in at least one important way forward-thinking in its endorsement of the ecosystem services approach to evaluating environmental quality, but seems misinformed on the importance of Nr to the production (positive and negative) of goods and services produced by ecosystems.

Suggested response: See response to comment 3.

2. The suggestion to substitute Hg for Nr effects research would move the MYP in a very different direction. Hg impairs ecosystem functions by virtue of its toxicity. Nr has both positive and negative impacts, and presents policy makers with a useful example of the need to incorporate tradeoffs into policy.

Suggested response: see the response to the following comment.

3. Hg already has a MYP. If EPEC wished to endorse studies involving Hg then they should be sure to note this, and encourage EPA to work cooperatively.

Suggested response: p. 15, lines 41-42 will be revised as follows: "However, given the relatively modest available resources, we have some concern about what can be accomplished in this area, and how EPA's contribution will complement what is being done in other agencies." The bullet on page 16, line 30 will be revised as follows: "The discussion of Long-term Goal 3 in the Plan should contain a clearer explanation of why Nr was chosen for study. The Plan clearly states that Nr can have both positive and negative effects on ecosystem services and that both positive and negative ends of the spectrum must be examined. We strongly agree with that conclusion and note that this departure from the "negative only" approach is commendable. However we recommend that EPA more fully discuss the rationale for choosing to study N." (this change removes specific reference to mercury and phosphorus)

4. The sentiment of some committee members to use the funds for other areas in the Ecological Research Program (e.g., outreach and education) is puzzling. This would not only delay the establishment of a needed national program, but would send a strong signal that such a program is not needed.

Suggested response: The following sentences will be removed from the report: 1) "However, given the relatively modest effort that can be undertaken with available resources, we have some concern about investing in this area (page 15, line 41)" and 2) "However, there is some sentiment among Committee members that perhaps the Nr research could be dropped in favor of focusing more effort in other areas of the Ecological research Program (e.g., outreach and education)." (page 16, line 11).

5. We agree with the advisory committee that ORD should partner not only with other EPA entities (i.e., OAR) but also other agencies. From our understanding, these partnerships have always been planned.

Suggested response: No change needed.

6. Apparently some members of the advisory committee felt that the research description was too general to be evaluated, while others felt the proposed research was tractable. In the spirit of a constructive Advisory, it would be useful for the former group to be more specific of what they are looking for.

Suggested response: The last bullet on page 15 will be rewritten as follows: "The Committee recommends that a more detailed description of the research proposed under Long-term Goal 3 be provided. The Committee expects that it is EPA's intention to provide this in the implementation phase of the program. At this point, however some Committee members find that the fundamental question to be addressed by the Nitrogen Assessment is not clearly presented. We suggest that this fundamental question might be, "How can Nr be more effectively managed so as to lower its environmental, health and economic costs?"

Dr. Rogene Henderson

Comment: I found this advisory to be clearly written and well organized. Each of the charge questions was carefully addressed. The report was clear and logical and the recommendations appeared to be well-supported by the text of the report. I especially agreed with the recommendation (page 7) to combine and integrate the HHWB and ESV elements of the Plan. The effect of the ecosystems services on human well-being is a link that must be made.

Suggested response: No change necessary.

Dr. Agnes Kane

I concur with the Committee's review of this draft plan. This review was thorough and thoughtful and provides clear guidelines for revision. As a physician, I support the committee's first suggestion to place greater emphasis on the relationship between ecosystem services and human health and well-being. This should be considered at multiple levels: individuals (especially susceptible individuals), local communities, and the entire population. Specific case studies or examples should be developed to illustrate potential or demonstrated human health impacts at each of these levels.

Suggested response: The following text will be inserted on page 7, line 33. "The relationship between ecosystem services and human health and well-being should be considered at multiple levels: individuals (especially susceptible individuals), local communities, and the entire population. Specific case studies or examples should be

developed to illustrate potential or demonstrated human health impacts at each of these levels.”

Outreach and education is an important issue that applies to all Agency environmental programs. Other community and education outreach programs have been developed by external funding mechanisms (e.g., SBRP Grants and NIEHS Center Grants). EPA should consider utilizing the resources and expertise that have already been developed by these funding mechanisms.

Suggested response: The following sentence will be inserted on page 12, line 18. “In addition, community and education outreach programs have been developed by external funding mechanisms (e.g., Superfund Basic Research Program grants and National Institute of Environmental Health Sciences center grants). EPA should consider utilizing the resources and expertise that have already been developed.”

Dr. Catherine Kling

Comments on the SAB Advisory on the EPA Ecological Research Program Multi-Year Plan

Comment: This report is very clearly written and entirely responsive to the charge questions. The report is logical and the conclusions drawn are supported by the information in the body of the report. The message that EPA is entirely on the right track with its new focus on ecosystem services comes through loud and clear; this is an important and clear message that the committee has done a great job at delivering.

Suggested response: no change necessary

Comment: A general comment: one of the tensions in considering a research program like the one presented here is to cut the right balance between undertaking the research that answers the right questions for a particular decision that must be addressed (which suggests waiting until those questions are clear and then formulating a specific research project) vs. having a set of ecosystem values sitting on the shelf waiting for use when a decision need arises. In the latter case, the values that will be “on the shelf” will no doubt not quite fit the research question. And, it is these values that are most likely to be misinterpreted or misused. In the former case, the analysis needed will often be too slow to be of use in making the decision. (Related to this point is the need to avoid valuing ecosystem services just for the sake of doing so; indeed, many decisions related to ecosystems will not need formal valuation to support good decision making. In other cases, explicit valuation will be a very key input to a decision process.) The Ecological Research Program at EPA somehow needs to do their best to balance these two competing needs (easy to say, hard to do).

Suggested response: The following new bullet will be inserted before the last one on page 4. “In the Plan, it is important for EPA to balance the need for research to

answer questions for a particular decision (which suggests waiting until those questions are clear and then formulating specific research projects) vs. research to develop a set of ecosystem service values for a range of decisions. In the latter case, the available values may not quite fit questions to be answered, and the values can be misinterpreted or misused. In the former case, the analysis needed may not be completed rapidly enough to be of use in making the decision. The Committee notes that EPA should not value ecosystem services simply for the sake of doing so. Indeed, many decisions related to ecosystems will not need formal valuation to support good decision making. In other cases, explicit valuation will be a very key input to a decision process.”

1. Comment: On page 5, the committee provides a fantastic suggestion: that EPA should collaborate with other federal agencies and scientists to conduct an assessment of status and trends of ecosystem services in the U.S. (they draw an analogy to the IPCC). This strikes me as a very valuable enterprise for which EPA should obviously be the lead. Further, this could be a significant component of the effort to intelligently leverage EPA (and other agencies and NGOs) resources in this important area. Two suggestions: 1) make this recommendation more prominent by adding it to the Executive Summary and possible the letter to the Administrator and 2) to mention this idea again in the report in reference to the section and discussions related to leveraging of EPA resources on ecosystems research.

Suggested response: The third bullet on page x of the executive summary will be revised as follows: “The Committee recommends that EPA collaborate with other federal agencies and academic scientists to conduct a review of all federal agency ecosystem and ecosystem services inventory, mapping, and monitoring type projects. This review should be undertaken in order to determine how such projects can provide data to meet the objectives of the Ecological Research program. The review could be conducted through a workshop, with the aim of coordinating all of the federal agency components to provide synergy and avoid duplication of effort. Subsequent to the workshop EPA should collaborate with other federal agencies and academic scientists to conduct a scientific community assessment of status and trends of ecosystem services in the U.S. (similar to the Intergovernmental Panel on Climate Change [IPCC] assessments). Such an assessment would be an appropriate and very important output from the research that is described in the Plan. It would be a high impact, visible product from EPA that could have a large influence on decision makers.”

Suggested response: The last sentence on page 28, line 20 will be revised as follows: “In addition, funding incentives for cross-agency collaborations, such as the scientific community assessment of status and trends of ecosystem services in the U.S. (discussed previously) could enhance these partnerships.”

Suggested response: Insert the following on line 33 page ii “(in this regard, the SAB recommends collaborating with other federal agencies and academic scientists to

conduct a scientific community assessment of status and trends in ecosystem services in the U.S.)”

2. Comment: The entire issue of how best for EPA to develop and support decision support platforms has been a continuing struggle in the ecosystems research area. I wonder if it might be useful for EPA to examine in depth one or more DSPs that have been developed and implemented by other agencies (or by EPA in another area?) to learn what approaches have been effective both in terms of model and data and in terms of the delivery of the DSPs to the end users. Are there DSPs related to superfund sites? There is a large multi-state, multi-agency effort to restore the Chesapeake Bay, are there DSPs that have been developed in that effort? Have they been effective? What can be learned from them (positive or negative)?

Suggested response: The following sentence will be inserted after the first sentence on page 11, line 1: “The Committee suggests that it could be useful for EPA to examine in depth, one or more DSPs that have been developed and implemented by EPA or other agencies to learn what approaches have been effective.”

3. Comment: Thank you for noting that “biofuels” are not the only environmental issue in the 13 state region of the Midwest (page 19)

Suggested response: no change necessary.

4. Comment: There is discussion r.e. Charge Question 5 on the new NRC report on evaluating research efficiency at EPA. While I assume that the NRC report deals with the “PART” process that has been such a thorn in the past, I was not clear whether the recommendations provided by the SAB review on page 25 were based on the NRC report and/or whether they would be consistent with being successful in whatever PART-like process will evaluate the ecological research program in the future. While I think the comments provided in the SAB review are very sensible, I just want to be sure that SAB is not suggesting things that will later be problematic (e.g., is the point that it is “premature to prescribe specific measures to evaluate annual performance/progress goals for the program” (lines 34-35, page 25) going to be a problem for EPA later?)

Suggested response: The following text will be inserted on page 25, line 10. “In some of our comments we have referred to specific and quantitative measures of program accomplishment. We therefore preface these comments by noting the NRC recommendations that quantitative efficiency metrics should only be used to measure the process efficiency of research programs, and that process efficiency should be evaluated only after the relevance, quality, and effectiveness of a research program have been evaluated.”

5. Comment: Very minor point: there is an occasional monster paragraph in the report that makes reading the manuscript a bit more daunting than necessary. See pages 8 and 13 for examples.

Suggested response: The paragraphs on pages 8 and 13 will be reviewed and edited.

Comment: This was an extremely thoughtful and thorough report.

Suggested response: No change necessary.

Dr. Michael McFarland

Comment: The SAB Ecological Processes and Effects Committee (Committee) is commended for providing a clear and unambiguous report summarizing their scientific review of the Office of Research and Development's (ORD) Ecological Research Program Multi-Year Plan (Plan). The letter to the administrator is well balanced and highlights the salient findings of the Committee's scientific assessment. Similarly, the Executive Summary provides a detailed synopsis of the Committee's full responses to each of the Agency charge questions with each response followed by concise descriptions of specific recommendations. Given the quality of the Committee's responses to Agency charge questions, I fully support approval of the report pending any modifications/revisions agreed to by the SAB.

Suggested response: No change necessary.

Comment: Although the Committee, in principle, supports that the strategic direction of the Agency's Ecological Research Program Multi-Year Plan as well as its conceptual framework, it has a number of serious reservations regarding the Plan's ability, as currently described, to generate the information necessary for reaching scientifically defensible decisions. The Committee acknowledges that many of the Plan's technical limitations are associated with its proposed implementation program as well as the acute lack of funding and absence of vital in-house Agency expertise. The following section provides specific responses to the quality review charge questions followed by supplemental observations presented for consideration by the Committee.

Suggested response: No change necessary.

Comment: The Committee is applauded for providing clear, concise and detailed responses to each of the Agency charge questions. In each of the Committee's responses, a bulleted list of specific recommendations was provided for Agency consideration. It is particularly gratifying to note the Committee's strong support for the need to align ORD's ecological research program with the Agency's ecological risk assessment goals.

Suggested response: No change necessary.

Comment: On the whole, the report is clear and logical. However, there is one statement that is repeated both in the Executive Summary (page xii lines 23-24) and in the body of the report (page 9 lines 17-19) that is confusing. The Committee suggests that ORD “consider a non-Western value system most notably that of Native Americans to ensure that well-being is parameterized in an accurate multidimensional manner”.

Although I believe that I understand the intent of the Committee's statement, I am not entirely convinced that it is appropriate. At best, the statement is fraught with confusion particularly to a reader unfamiliar with Native American culture and, at worst, the statement could be misinterpreted as patronizing (or at least judgmental). In my opinion, the degree to which Western value systems and Native American value systems diverge on the importance of ecosystem services is not sufficiently defined in the body of the report to merit inclusion of this statement.

Suggested response: The sentences on page 9 line 17 will be revised as follows: “It will be important to consider a range of cultural value systems to ensure that...”

The sentence on page xii line 23 will be revised as follows: “This should include consideration of a range of cultural value systems.”

Where the conclusions drawn and/or recommendations made supported by information in the body of the draft report?

Comment: The conclusions/recommendations articulated by the Committee are fully consistent with information found in the body of the report. The Committee has highlighted the need to address a number of overarching program limitations specifically the lack of sufficient program funding as well as the absence of requisite expertise in ORD to fully execute the Plan. The Committee is applauded for its support of ORD's decision to pursue financial leveraging opportunities both within and outside the Agency for funding vital ecological research as well as its acknowledgement that a sustainable ecological research program requires investment in the training of future scientists through an extramural grants program.

SUPPLEMENTAL INFORMATION

1. Page 4 (line 34). Should the sentence that begins with “A 10-year plan ...” be rewritten to state “A 5-year plan ...” since multiyear plans have a five (5) year time horizon?

Suggested response: This change will be inserted.

2. Page 9 (line 11). Should the word “physical” be placed in between ORD and scientists to distinguish physical scientists from social scientists?

Suggested response: The sentence will be revised as follows. "The Committee notes, however, that even this will require interaction of a team comprised of ORD scientists from biological, physical and social science disciplines."

3. Page 12 (lines 14 – 18). What is the current or potential role of the Agency's Office of Information with respect to outreach and education (OE)?

Suggested response: the following sentence will be inserted on page 12, line 3. "ORD should coordinate outreach activities with other EPA Offices, such as the Office of Environmental Information, to take advantage of available expertise."

4. Page 12 (lines 41-42) There are a number of other federal agencies that maintain and have jurisdiction over large tracts of land (terrestrial ecosystems) including the US Dept. of the Interior (Bureau of Land Management), US Dept. of Agriculture (US Forest Service) and US Dept. of Defense (test and training ranges). Each of these agencies (as well as others) is required to conduct ecological assessments (as mandated under the National Environmental Policy Act or NEPA) of the property under their management. These federal agencies also support well funded ecological research programs whose activities may be leveraged by the ORD.

Suggested response: The following will be inserted on page 12, line 42. "However, the Committee notes that EPA should draw upon available expertise in the U.S. Department of the Interior (Bureau of Land Management), U.S. Department of Agriculture (U.S. Forest Service), and U.S. Department of Defense (test and training ranges). These agencies are required to conduct ecological assessments of property under their jurisdiction and they support well funded ecological research programs whose activities may be leveraged by ORD."

5. Page 24 (lines 10 – 11). The statement that begins "We find that this amount (1%) is insufficient to support effective outreach efforts..." should be revised to reflect the fact that this statement is an opinion and not the result of an actual cost analysis.

Suggested response: This sentence will be revised as follows. "It is the opinion of the Committee that this amount is insufficient to support effective outreach efforts."

6. Page 27 (lines 39-42). The Committee should consider adding Interagency Personnel Agreements (or IPAs) to this list. IPAs allows government employees (local, state or federal) with specific skill sets to be detailed to ORD (or other EPA offices) to meet program needs.

Suggested response: The following sentence will be inserted on page 27, line 42. "In addition, EPA should consider negotiating Intergovernmental Personnel Agreements to

enable government employees (local, state, or federal) with specific skill sets to be detailed ORD or other EPA offices to meet program needs.”

Dr. Jana Milford

My review of the draft report raises the following concerns.

Comment: 1. It is not clear to me that the first charge question has been adequately addressed. This charge question asks specifically if the proposed strategic direction will offer “meaningful contributions to the ecological sciences” and provide “research that will be useful to decision makers at EPA and other levels of governance.” The question of how the Agency’s proposed focus on ecosystem services will contribute to/fit in with the broader field of ecological sciences seems an especially appropriate subject for SAB comments, yet it is barely addressed in the report. In particular, I expected the panel to discuss the opportunity costs of the proposed focus (and the apparent shift away from EPA ORD’s prior focus on ecological risk assessment). Does the strategic direction still accommodate necessary research in monitoring ecosystem status? Does the utilitarian focus of “ecosystem services” risk losing important potential research contributions to improved understanding of ecosystem functions/responses that are unrelated to recognized “services” to human health and well-being? Similarly, is there a risk that over-emphasis on ecosystem services that are too narrowly defined will prove to be a disservice to decision makers in the long run? The panel might consider these questions and nevertheless conclude they enthusiastically support the new direction, but I wish the broader questions could be addressed.

Suggested response: The following text will be inserted after the first sentence on page 1, line 30: “EPA’s Ecological Research Program Multi-Year Plan contains a relatively detailed discussion of the importance of quantifying ecosystem services and their contribution to human health and well-being in order to advance ecological science and improve decision making. In addition, the SAB Committee on Valuing the Protection of Ecological Systems and Services has identified benefits associated with strengthening the EPA’s approaches for valuing the protection of ecological systems and services (U.S. EPA Science Advisory Board, 2008a).” A detailed discussion of why and how valuation of ecosystem services is important to decision makers is somewhat beyond the scope of this report. These topics are addressed in considerable detail in the Ecological Research Program Multi-year Plan itself and in the report of the SAB Committee on Valuing the Protection of Ecological Systems and Services. As stated in the Committee’s report, we support the new strategic direction and we have focused our comments on how the proposed research plan could be improved. If additional discussion of the benefits of this new strategic focus, is needed the report could include some additional information that has already been presented in the Multi-Year Plan or the CVPESS report.

In its review of the components of the Multi-year Plan (e.g., ecosystem assessments and place based demonstration projects), the Committee has commented on the appropriateness of each component of the program and how it could be improved.

Providing detailed comments on opportunity costs associated with a shift in strategic direction is somewhat beyond the scope of this review. This would require a review of detailed information on specific components of the ORD research program that are being eliminated or changed. Such information was not available to the Committee for this review, and it is not clear that EPA has made all of these decisions yet. The Agency is in the process of developing implementation plans for the research program and has asked EPEC for continuing advice. We may have an opportunity to address opportunity costs in reviewing EPA's implementation plans.

The following bullet will be inserted on page viii: "This Multi-Year Plan represents a considerable change in the research direction for EPA's Ecological Research Program. Previous research in the Ecological Research Program has made significant contributions to the science of ecological monitoring and assessment. As this program is moved into other parts of the Agency, it is essential that EPA's strength and leadership in monitoring and assessment be maintained."

The following text will be added on page 15, line 11 "The Committee notes that significant advances in monitoring have been realized through work conducted by ORD's Environmental Monitoring and Assessment Program. This work should be continued as the responsibility for that monitoring is assumed by other programs in the Agency."

2. Comment: The very first recommendation on p. viii of the Executive Summary suggests that resources are inadequate to accomplish the goals of the research program and urges EPA to provide STAR grant support for ecosystem services. This may be a rather off-putting start to the Committee's report, since it could be perceived as self serving. The Committee might reconsider the placement of that recommendation, and also consider whether there are other ways to fill the needed research/capacity gaps (e.g., new hires at ORD with increased in-house research, contracting out work to consulting companies, etc.).

Suggested response: It is the strongly held opinion of the Committee that because assessment of ecosystem services is a new area of research, additional extramural support should be provided through the STAR program, and therefore this point was listed at the beginning of the executive summary.

3. Comment: On p. xi and p. 16, the Committee advises ORD to eliminate its proposed research focus on coral reef ecosystems under Long-term Goal 4, because coral reefs "are a relatively low priority in the U.S." This statement is not supported by any evidence, and moreover seems rather narrow-minded. EPA has historically had and arguably should continue to have an important role in research and policy development related to "globally important" environmental problems. But perhaps instead of making value judgments about whether coral reef ecosystems are an important U.S. priority, the Committee might ask ORD for a better explanation of how studying the dynamics of ecosystem service flows in coral reefs will advance ecological sciences and ultimately help inform decision making.

Suggested response: The third bullet on page xi and the third bullet on page 17 will be rewritten as follows: "Although coral reef ecosystems are globally important, the Committee finds that other more common "human dominated" ecosystems may provide services to more U.S. citizens, and greater opportunities for coordination and collaboration with other studies within the ecological research program. We therefore recommend that in the Plan EPA provide a better explanation of how studying the dynamics of ecosystem service flows in coral reefs will advance ecological sciences and ultimately help inform decision making."

4. Comment: On p. xi and p. 20, the Committee needs to explain more clearly why consideration of "transboundary" issues is important. I don't see how the fact that an ecosystem extends across political jurisdictions (e.g., the U.S. and Canada) would come into play in assessing the production function of ecosystem services it provides.

Suggested response: The Committee thought that important transboundary issues (such as atmospheric transport) were ignored in the discussion of place-based project research. The committee argues that transboundary issues should be considered in developing ecological production functions to investigate ecosystem service flows.

5. Comment: The recommendation on p. xiii and p. 12 that ORD develop a grants program for teacher education is not adequately justified. No one would disagree that teacher training is valuable, but is this an appropriate use of ORD time and resources? Likewise, the Committee needs to better explain/justify its recommendations that ORD should focus its limited resources on public education/outreach efforts.

Suggested response: The Committee found that the success of the Ecological Research Program will depend in large part upon outreach and education efforts. This is because (as stated on page 1 of the report) the overall goal of the Program is to "change the ways in which policy and management choices affect the type, quality, and magnitude of goods and services that are received from ecosystems." To accomplish this, buy-in from economists, social scientists, and others involved in valuation and policy making process is essential. Therefore, outreach and education efforts will be needed. Outreach efforts will also be needed to build partnerships critical to the success of the Program.

The Committee thought that providing funds for a competitive grants program to run summer credit workshops for teachers through STAR would be a valuable outreach activity to build support for and understanding of the importance of ecosystem services. This recommendation can, however, be removed from the report if the Board strongly disagrees with it.

6. Comment: The recommendation on p. 5 that EPA work with other agencies to produce an IPCC-style assessment of status and trends of ecosystem services requires clarification. The IPCC assessment cycle represents an enormous international activity. Is that really what the Committee had in mind?

Suggested response: As stated in the report, the Committee is recommending that EPA collaborate with federal agencies and academic scientist to conduct an assessment of status and trends of ecosystem services in the U.S. This is not viewed as an international activity. Additional details would have to be provided as plans for such an assessment are developed. The IPCC was provided simply as an example assessment drawing from a wide range of scientific expertise.

7. Comment: The recommendation on p. 14 that EPA “develop forecasting models from the information in available databases” isn’t clear. What does the Committee have in mind here?

Suggested response: The bullet on page 14, line 26 will be rewritten as follows: “EPA’s Ecological Research Program should plan to use information in available databases to develop ecological production functions and models that can be used to forecast the effects of various stressors on ecosystem service flows.”

8. The list of “principles” for judging the locations of “place-based demonstration projects” on p. 19 seems likely to over-constrain the problem for ORD. Perhaps these could be more clearly presented as principles for the Agency to consider, without suggesting that they must all be met.

Suggested response: The sentence on page 19, line 6 will be rewritten as follows: “To this end, we recommend that EPA consider using the following organizing principles ...”

Dr. Rebecca Parkin

- a) Comment: Nearly all of the charge questions were addressed adequately. The responses to Questions 1 and 3-5 are adequate. The responses to Charge Question 2 are more difficult to assess because the organizational structure of the report does not go down to the level of the elements within the bulleted questions. While the goals were clearly addressed for Long-Term Goals (LTG) 1 and 4, they were less obviously considered for LTGs 2, 3, and 5. The objectives for LTGs 1, 2, and 4 and the research questions for LTGs 1 and 2 were explicitly discussed. Elements within each of the bulleted questions seem to have been missed in part for each of the LTGs.

Suggested response: We wish to clarify that in its report, the Committee did not explicitly comment on every goal, objective, and question in the Multi-year Plan. However, we did focus on areas where we believed improvement was needed and/or recommendations should be provided. In some cases these were broad areas addressed by more than one objective or question. The following sentence will therefore be inserted on line 16, page 6. “The Committee has not explicitly commented on every goal, objective, and question in the Multi-year Plan. We have focused our comments on areas where we found that improvement was needed and/or recommendations should be provided.”

- b) Other than the comment in a), the draft report was clearly written. Throughout it was written in a logical manner.

Suggested response: No change necessary.

- c) The conclusions stated in the letter to the Administrator, Executive Summary (ES) and report were supported by evidence presented in the report. Many points made repeatedly in the report (e.g., limited resources, lack of internal expertise, need to develop partnerships) were stated in the letter and/or ES. However, there are points of urgency or emphasis in the report which were not noted in the letter and/or ES. These discontinuities may be readily addressed in a variety of ways (e.g., rephrasing, ensuring consistency in capturing major points in the ES and the most urgent and important points in the letter). Examples of mismatches between the report and the letter and/or ES include the following:

- Pages 10, 17, 18: The need to obtain “buy-in” from stakeholders and partners is repeatedly noted and stated as “essential” in the report, but this need is not stated either in the letter or ES.

Suggested response: This point will be included in the first bullet on page ix.

- On various pages (e.g., pp. 12, 21 and 29) outreach and education (O&E) are noted as elements of the plan, but functions for which ORD has little expertise. It is curious to this reviewer that, if this issue merits repeated mentions, there is no mention of O&E in the letter and only a brief listing of this issue in the ES. Further, the importance of ensuring an empirical basis for O&E has often been stressed by the SAB, but is not mentioned in the report (p. 29). This reviewer sees this omission as a key, missed opportunity for reinforcing this important point.

Suggested response: See change concerning empirical basis for O&E in response to comments from Dr. Fischhoff. The following will also be added to the fourth bullet in the letter on page ii: “(the SAB notes that outreach and education has not historically been a part of ORD’s work and therefore additional expertise may be needed in this area)”

- Defining ecosystem services too narrowly, and thereby overemphasizing human health and welfare goals, is raised as an important issue (p. 13, line 38 through p. 14, line 4), but it is not noted in the letter or ES. Without bringing this concern forward to at least the ES, it appears to this reviewer that the committee does not see this issue as important as the text implies.

Suggested response: The following will be added as a new bullet on page x, line 22: “Ecosystem services should not be defined so narrowly that they overemphasize human

health and welfare goals and fail to appropriately value non human dominated-landscapes.”

- The committee notes that understanding why ecosystem services are lost is a “key missing piece,” which is crucial to the overall success of the plan (p. 18). However, this point, which is emphasized in the report, is not mentioned in the letter or ES.

Suggested response. The following sentence will be inserted after the first sentence on page xi, line 2: “We note that a key missing piece in the Plan is research to develop an understanding of the linkage between multiple stressors and ecosystem attributes and service.”

- Selecting sites which are widely representative and offer the opportunities for generalization to other areas is noted as important (page 19), but is not stated in the ES or letter.

Suggested response: This is one of the recommended principles for selection of place-based sites. On page xi, line 27 of the executive summary it is stated that the Committee has suggested principles that could guide selection of the place-based sites.

- Another issue which is addressed repeatedly in the report (e.g., pp. 15, 19, 20 and 23) is the importance of ensuring that the scale of measurements is appropriate for the decision problem and that that scale can be adequately characterized using available data. This issue is not stated in the ES or letter.

Suggested response: The following sentence will be inserted on page x, line 8. “In this regard, the Committee notes that the scale of data provided must be appropriate to support decision making. Thus the suitability of various databases for use in developing Program products supporting decision making should be assessed as soon as possible, and definitely before 2013.”

- Is “as soon as possible” the correct meaning on p. 15, line 13? If so, shouldn't this issue be noted at least in the ES?

Suggested response: See previous response.

- The question raised asking why ORD has chosen to focus on N instead of P (p. 16) seems important enough to merit mention in the ES.

Suggested response: See response to Drs. Galloway and Theis.

- The use of life cycle analysis is “strongly urged” by the committee (p. 20), but only in the report.

Suggested response: the following sentence will be inserted on page xi line 31. "In addition, the application of life cycle analysis in demonstration projects should be expanded to show the utility of this approach in future decision making."

- On pages 23, 24 and 30, the point is made that ORD should enlist the support and input of potential partners "immediately" and "as soon as possible." This need for early action, if it is what the committee as a whole intends, is not expressed in the letter or ES.

Suggested response: The following sentence will be inserted on page xii, line 29 after the first sentence. "In addition, immediate efforts are needed to enlist the input and cooperation of potential users and clients of the Ecological Research Program to ensure that planned research will address issues of greatest interest to them."

- A "tremendous opportunity" to advance ecological research is noted on p. 24 only. If it is so significant, this reviewer would expect to see it at least in the ES as well.

Suggested response: The following sentence will be inserted on page xii, line 14. "However, developing strategies to deal with these inherent challenges provides an opportunity to advance the way that ecological research is conducted."

Additional comments to consider:

- Two acronyms are used before they are defined (e.g., ORD and STAR).

Suggested response: These acronyms will be defined.

- Some acronyms are defined but are not used again in the report after being defined (e.g., NRDAR, LTER and ERA).

Suggested response: These acronyms will be removed.

- Some portions of the report (e.g., page 7) become tedious to read due to heavy use of acronyms.

Suggested response: We recognize that the use of acronyms on this page makes reading the report somewhat tedious. However, we wish to keep them in the report because they are used throughout the Multi-year Plan.

- P. 1, line 24: This reviewer recommends deleting "understand" as it is not measurable, but "respond" is if it is assessed in terms of specific types of response.

Suggested response: We will include this phrase in quotes because it is taken directly from EPA's Multi-Year Plan.

- Combining types of information and functions are described as “quite dangerous” (p. 11) in the report, but are not highlighted elsewhere. This reviewer wondered whether this description fits the committee's actual intent or whether rewording would be more appropriate.

Suggested response: We will replace the word “dangerous” with “challenging”

- Wherever 1% is pointed out as insufficient for O&E (e.g., pp. 21 and 24), a means to determine what would be a sufficient percentage should be indicated.

Suggested response: An analysis of the resources needed for outreach and education is beyond the scope of this report. On page 12, line 14, the committee recommends development of a comprehensive OE plan.

The sentence on page 21 line 46 will be revised as follows: “... is not likely to provide what will be necessary...”

The sentence on page 24 line 10 will be revised as follows “... is likely to be insufficient to support...”

- This reviewer questions the appropriateness of calling upon ORD to work with organizations to “raise funds” (p. 28).

Suggested response: The words “to raise funds” will be deleted from this sentence.

- This reviewer does not agree with the first bullet on page 29, suggesting that ORD leverage universities by getting them to accept reduced indirect costs. In this era of reduced federal funding, many universities are not able to offer such options. Federal agencies are usually some of the few places where universities CAN get full indirects. Most other funders (e.g., foundations and not-for-profits) do not allow full indirect cost recovery.

Suggested response: The Committee felt that this was an appropriate recommendation. It can be removed if the Board strongly disagrees.

Dr. Valerie Thomas

Letter to administrator, p. i, lines 25-26: “the SAB strongly supports this strategic direction and commends the Agency for developing a research program that has the potential to be transformative for environmental decision-making as well as for environmental science.” Where are these claims, “potential to be transformative for

environmental decision-making as well as for environmental science” supported? The statement is repeated in the Executive Summary, p. vii, lines 35-36. There should be at least one paragraph somewhere that describes how this research will be transformative for environmental science. Throughout the document, the doubt cast on the feasibility of the plan, and the lack of funding for fundamental research, casts doubt on the transformative potential of the research plan. If there is transformative potential, that needs to be explained and highlighted. What does EPA need to do to achieve the transformation?

Suggested response: The following text will be inserted after the first sentence on page 1, line 30: “EPA’s Ecological Research Program Multi-Year Plan contains a relatively detailed discussion of the importance of quantifying ecosystem services and their contribution to human health and well-being in order to advance ecological science and improve decision making. In addition, the SAB Committee on Valuing the Protection of Ecological Systems and Services has identified benefits associated with strengthening the EPA’s approaches for valuing the protection of ecological systems and services (U.S. EPA Science Advisory Board, 2008a).” As indicated in the response to Dr. Milford, a detailed discussion of why and how a new focus on valuation of ecosystem services is transformative (in the sense that it is important to decision makers) is somewhat beyond the scope of this report. These topics are addressed in considerable detail in the Ecological Research Program Multi-year Plan itself and in the report of the SAB Committee on Valuing the Protection of Ecological Systems and Services. As stated in the Committee’s report we support the new strategic direction and we have focused our comments on how the proposed research plan could be improved to better support the advancement of ecological science and decision making. If additional discussion of the benefits of this new strategic focus, is needed the report could include some additional information that has already been presented in the Multi-Year Plan or the CVPESS report.

Letter p. i, lines 33-35. “we have a number of concerns about the draft Plan... related to the tension between stating an important and ambitious vision and producing a practical implementation.” Overall the meaning of the letter is not clear. It reads as if the SAB supports the plan, but thinks, as usual, that there should be more money for research. But from the details of the body of the report, the Panel really seems to be saying, perhaps, that it strongly supports the “direction” but not the Plan, because the Plan seems unlikely to accomplish its stated goals. If that is what the Panel is trying to say, the Letter should be revised to make this clear.

Suggested response: The Committee is stating that it supports the strategic direction, but it has concerns about the Plan because: 1) the resource allocation for the program is too small to accomplish the ambitious goals and 2) more detailed information and improvements are needed in the Multi-year plan. We think these points were included in the letter but please let us know if additional clarification is needed.

Executive Summary, p. viii.lines 2-3: "goals are unlikely to be accomplished" lines 15-16: "goals cannot be accomplished without basic ecological research" These statements don't line up with the Committee's support for the research plan.

Suggested response: The Committee supports the strategic direction of the Plan, but on lines 2-3 is pointing out the need for additional resources, and on lines 15-16 is pointing out that the Plan should contain a more detailed discussion of knowledge gaps. This sentence will be clarified by adding the following: "In particular, empirical data are needed to test hypotheses regarding why changes in ecosystem services are occurring, and at which scales."

Executive Summary p. ix:

Line 5: "the Committee supports long-term Goal 1"

Lines 38-39: "the Committee is concerned about the overall feasibility of accomplishing Long-term Goal 1." These two statements don't add up with the support of the Committee for the Plan. Why does the committee support the Goal if it can't be achieved?

Suggested response: The Committee's report supports the development of a Decision Support Platform but expresses concern about the challenges facing the Agency and recommends improvements in the Plan. In addition, the Committee report states that more information is needed to fully understand how the DSP would be developed and used.

pp. 3-4. The report says that \$68M will be dedicated to the program, and the Committee recommends use of STAR program funds as well as more internal funds. It would be helpful if the Committee could say how much funding would be enough, and the relative balance of external and internal funding.

Suggested response: Developing a budget for the program is beyond the scope of this report. The Committee notes that extramural funds will not be available to support this program and the available in-house expertise will not be sufficient. More detailed information on the research to be completed would be needed to develop a program budget and to suggest the relative balance of external and internal funding.

p. 7, lines 16-46 – the suggestion to combine HHWB and ESV seems useful, as does the suggestion to combine DSP and OE.

Suggested response: No change needed.

pp. 10 line 30 – p. 11 line 42. This entire section calls into question the validity of the plan for developing the DSPs (Decision Support Platforms). The Committee recommends, on p. 11 line 14, that "EPA should more clearly describe how the DSP would actually work." The benefit of this recommendation is unclear: the Committee seems to be saying that the idea of the DSP has not been thought through, and that making one at all will face significant obstacles. So asking EPA to describe how it would

work seems to be a rhetorical question – by describing how it would work it would become clearer that it would not work. Rather than this pedagogical recommendation, it seems that the Committee should clearly say that the DSP does not seem to be feasible and should be cut from the plan or significantly revised.

Suggested response: The Committee is stating that the Plan does not contain enough information to provide a complete understanding of how the DSP would be developed or work. The Committee has offered recommendations for further development of the Plan but is not recommending elimination of the DSP.

p. 16, lines 9-16: The Committee recommends dropping the study of reactive nitrogen. I think that in the SAB review of the sustainability research plan, we recommended that EPA take on one or two high profile important case studies, to demonstrate the actual value of the research on a major problem. This proposed focus on reactive nitrogen seems to be in that spirit. So I wonder if SAB is giving EPA conflicting advice in reviews of different but related research programs. On the other hand, Long-term goals 4 and 5 also address specific case studies; how all of these fit together, and which ones are scientifically stronger, or more important for EPA's mission, is not very clear.

Suggested response: See response to Drs. Galloway and Theis.

Drs. Otto Doering and Willilam Moomaw (Members of the Committee)

We have been “missing members” in the EPEC review process, and are commenting now on a specific portion of the 7/03/08 Deliberative Draft.

In reading through the draft, we have some observations on the comments concerning Long Term Goal 3 – Nitrogen Assessment. As you know we are also members of the SAB Integrated Nitrogen Committee. We recognize that the long-term plan may not have made an effective case for developing an integrated reactive nitrogen (Nr) research and management program as you note in your report. We would like to clarify some points. As noted, Nr management is imbedded in both the Clean Air and Clean Water acts, yet experience demonstrates that this media specific approach has proven inadequate to address the wide range of problems that arise from the accelerating release of Nr into the environment. Persistent violations of the ozone and small particulate standards, continuing acid rain deposition, the inability to restore Chesapeake Bay and increasing hypoxic zones in the Gulf of Mexico and off of our coasts implicate nitrogen as a complex pollutant that requires new modes of management. Other environmental issues that are influenced by unregulated Nr include fisheries decline, forestry and agricultural yield reductions from ozone and acid rain and biodiversity loss. Airborne forms of Nr have important direct implications for human mortality and morbidity, while water borne releases compromise drinking water quality. The overall damage costs are very substantial.

Instead of considering single impacts of Nr by chemical form and medium, it appears that a systems dynamics perspective, the nitrogen cascade, is a more effective way to analyze

the role of nitrogen, and identify intervention points for reducing multiple risks in an integrated fashion.

We are concerned that the Deliberative Draft Report recommends that EPA give nitrogen assessment a lower priority for several reasons including (in order):

- “What is the major question to be addressed by Nitrogen Assessment?” We see the major question as being “How can we more effectively manage Nr so as to lower its environmental, health and economic costs?”

Suggested response: See response to Drs. Galloway and Theis above.

- The draft report argues that the plan does not convincingly state why EPA's Ecological Research Program should include Nitrogen Assessment. It seems to us that the current high level of health and ecosystem damage because of our current management strategy and policies more than justifies addressing Nr. Advocating dropping of Nr in favor of other priorities does not seem to be justified given the seriousness and urgency of addressing current and future releases of Nr with mandates for biofuels and commitments for expanded electric power production and transportation. Increased food production alone will greatly increase Nr and further degrade essential ecosystem services unless management is improved through better understanding of Nr.

Suggested Response: The suggestion that Nr research could be dropped will be removed.

- We strongly agree that EPA should work with other agencies including the Department of Agriculture (non-point sources), Department of Energy and Department of Transportation as well as NOAA. It is also noteworthy that NSF and several foundations are increasing funding for Nr research. As noted, Nr needs to be seen in a multimedia context with major implications for human health as well as environmental quality. EPA is in the best position to coordinate this effort to better understand Nr and develop improved technologies and practices for Nr management and control.

Suggested response: This recommendation will be inserted on page 16.

- The selection of Nr over other chemicals is justified because of its ubiquitous nature, and the scale of its impacts on multiple ecosystems and human health. Nitrogen is most often the limiting nutrient in eutrophication (rather than phosphorous), and hence most responsible for algae blooms and other impacts. Nitrogen is deliberately spread across the environment as fertilizer in massive amounts (12 million tons /year) in addition to being inadvertently released from livestock production, fossil fuel combustion, waste water treatment and industrial processes.

Suggested response: The following text will be inserted on page 15, line 40: The decision to study Nr instead of other chemicals is justified because of its ubiquitous nature, and the scale of its impacts on multiple ecosystems and human health.

Nitrogen is often the limiting nutrient in eutrophication, and hence responsible for algae blooms and other impacts. Nitrogen is deliberately spread across the environment as fertilizer in massive amounts (12 million tons /year) in addition to being inadvertently released from livestock production, fossil fuel combustion, waste water treatment and industrial processes.

- The implications of Nr for wetlands have two-way implications. Not only does Nr eutrophy wetlands, but also engineered wetlands can play an important role in mitigating Nr for agricultural runoff, livestock and human waste management in a cost effective manner with ecosystem benefits.

In short, reactive nitrogen is responsible for a growing set of environmental and human health issues. Arguing that this issue is too large for the modest financial resources that are currently available seems to us to be reversing the argument and accepting a defeatist attitude. The urgency and scale of reactive nitrogen argues for getting started with the resources at hand to develop risk reduction strategies, and continue to work to increase financial and human resources over time. Innovative approaches are being introduced in Europe where the problem of Nr grew well beyond the problems we face in the United States. We can piggyback on their research and policy developments, and shape their insights to our specific needs.

Response: See response to comments of Drs. Galloway and Theis.

We hope that the negative tone of the Deliberative Draft can be muted, while remaining true to concerns expressed by some members, and a more positive tone, consistent with the coming recommendations of the SAB Integrated Nitrogen Committee, can be substituted instead.

Response: We hope the changes that have been made mute the negative tone.

We apologize for not being more available during the deliberations, but hope that this intervention will be noted and will strengthen your report.