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**MID-CYCLE REVIEW OF THE OFFICE OF
RESEARCH AND DEVELOPMENT'S
ECOLOGICAL RESEARCH
AT THE
U.S. ENVIRONMENTAL PROTECTION
AGENCY**

Final Report

**BOSC MID-CYCLE SUBCOMMITTEE ON
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August 23, 2007

BOSC Ecological Research Mid-Cycle Review Report

This report was written by the Ecological Research Mid-Cycle Subcommittee of the Board of Scientific Counselors, a public advisory committee chartered under the Federal Advisory Committee Act (FACA) that provides external advice, information, and recommendations to the Office of Research and Development (ORD). This report has not been reviewed for approval by the U.S. Environmental Protection Agency (EPA), and therefore, the report's contents and recommendations do not necessarily represent the views and policies of the EPA, or other agencies of the federal government. Further, the content of this report does not represent information approved or disseminated by EPA, and, consequently, it is not subject to EPA's Data Quality Guidelines. Mention of trade names or commercial products does not constitute a recommendation for use. Reports of the Board of Scientific Counselors are posted on the Internet at <http://www.epa.gov/osp/bosc>.

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I. SUMMARY

The U.S. Environmental Protection Agency's (EPA) Office of Research and Development (ORD) enlists its Board of Scientific Counselors (BOSC) to conduct independent expert reviews of ORD's environmental research programs every 4 to 5 years. Mid-cycle reviews, scheduled midway through the review cycle, are a critical step in the process. Narrower in focus than the in-depth technical evaluation that constitutes a full program review, the objectives of a mid-cycle review are to gauge the program's progress and to offer advice and feedback with respect to future directions and performance and accountability.

At a public meeting in March 2005, a seven-member BOSC Subcommittee completed a full review of the Ecological Research Program (ERP), culminating in a BOSC report submitted to ORD in August 2005. Since that time, the research program has progressed to further define the scope of its long-term goals (LTGs) and to implement research activities in the midst of changing Agency resources and priorities. To assess progress in advancing the ERP in line with BOSC comments, ORD requested that the BOSC conduct a mid-cycle review to assess the ERP's activities and plans in light of changes in Agency and ecological research priorities.

Following two conference calls to discuss the review materials provided to the Ecological Research Mid-Cycle Subcommittee, a public meeting was held on May 23, 2007, in Newport, Rhode Island, to further evaluate the ERP. The mid-cycle review focused on ORD's detailed documentation of changes in the program; a revised focus on ecosystem services and other changes in the scope and focus of research activities; metrics of performance; and adaptations to budgetary and other programmatic changes. The purpose of the review was to provide general feedback on ORD's efforts to date, and to assist ORD in addressing issues and opportunities surrounding continued development of the ERP's scope. This was accomplished through a set of specific charge questions (provided in Appendix A) used to guide the BOSC Subcommittee through its review of the materials prepared for this process.

The BOSC Ecological Research Mid-Cycle Subcommittee members are a subset of the Subcommittee that conducted the 2005 program review—three of the four Mid-Cycle Subcommittee members participated in that program review. The BOSC Mid-Cycle Subcommittee developed a number of recommendations for ORD based on the material reviewed and discussions organized as part of this mid-cycle review. The recommendations captured in this Summary are intended to highlight general topics on which ORD should focus its efforts. Readers are referred to the text of this report to understand the full context and detail of these comments, additional specific programmatic recommendations, and the full scope of the Subcommittee's efforts and detailed comments.

Program Rating and Recommendations

A rating of Meets Expectations was assessed for work completed to date. As a specific charge question, the BOSC Subcommittee was asked to provide a summary rating of ORD progress in advancing the ERP consistent with recommendations from the BOSC review of 2005. Based on

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review of the textual information and data provided, presentations and discussions during conference calls, and exchanges during the face-to-face meeting that was conducted in the course of the mid-cycle review, the BOSC Subcommittee agreed that the ERP has earned a rating of meets expectations in accordance with the definitions provided in the BOSC's guidance for rating program performance. ORD has met most of the goals set after the program review, has been responsive to most of the recommendations developed during the 2005 BOSC program review and to all of the higher priority recommendations, provided a great deal of detail to help the BOSC Subcommittee address the charge questions for the mid-cycle review, and has been responsive to the BOSC's requests for clarification or additional detail over the past few months. In particular, the BOSC recognizes that progressing development and refocusing of the ERP and meeting expectations generated in response to the 2005 review are significant accomplishments in light of the significant budget reduction and planning turmoil that have occurred in the past 2 years. The Subcommittee encourages ORD to sustain its commitment to action items and follow-ups developed as part of the 2005 program review and the 2007 mid-cycle review.

Additional performance metrics should be considered to supplement the current indicators used for regularly assessing research progress. The metrics used by the ERP for evaluating and communicating the effectiveness of the whole and the parts of the program are good, but are not yet being applied or appreciated to the extent that was recommended in the 2005 BOSC program review. The inclusion of the bibliometric parameters that are now incorporated as two of the Office of Management and Budget (OMB) Program Assessment Rating Tool (PART) measures are helpful, but ORD must be cognizant of the realities of the new budget situation and the nature of the Agency's scientific efforts historically supported by both EPA and extramural scientists. Reduced participation by extramural scientists could affect both the quality and breadth of science supported in the ERP. In addition, the culture of ORD is changing so that outcomes-based evaluations and communication of programmatic success now are more evident as meaningful measures of accomplishment. The BOSC is fairly certain that this aspect was not absent from ORD's administrative and scientific perspective in 2005; however, the clarity that is developed by articulation and communication of these outcomes is now more appreciated and has more importance in ERP activities. Realization of these outcomes as core aspects of the ERP will have benefits at several levels, both internally and externally.

The evolving emphasis on ecosystems services and value is appropriately laid out and justified. The move to focus a greater percentage of research and development effort on areas that support decision-making based on ecosystem services is substantiated in the discussions and material provided for review. The rationale for the revised Ecological Strategy makes it clear that it is time for ORD to move away from the focus on supporting the Environmental Monitoring and Assessment Program (EMAP) and on to broader activities. The strategy still recognizes the importance of continuing ORD's support to ensure that appropriate environmental and ecological data are collected in monitoring programs, especially use of sampling and analysis approaches that can be corroborated by ORD research. The next hurdle will be deciding how the revised LTGs and ongoing research programs will be altered to support the new focus. ORD is encouraged to commit time and resources to strategically planning these changes,

including gaining input from a variety of stakeholders, such as The Nature Conservancy and other land trusts that have a significant history in managing lands for valued ecosystem services.

Assistance in successfully addressing the emerging research in ecosystem services and their relationship to selected economic and human health endpoints will most likely come in the course of interactions with the expanded partnerships and stakeholder community ORD is developing. Discussions with organizations that focus on ecosystem services as part of land management will be a ready source of information for these areas of research. ORD should be prepared, however, to deal with confusing, if not conflicting, information or advice on emerging issues, as the diversity of sources will reflect a broad diversity of perspectives and values.

Achieving needed partnerships to conduct the future research will come from collaborations that involve ongoing, two-way communication. The ERP has established productive collaborations on specific research projects, especially with clients within EPA. In many cases, however, ERP's collaborations, especially those outside the Agency, appear to be *ad hoc* with fortuitous collaborations formed based on requests. True partnerships that involve ongoing two-way communication are not as numerous. For the program's research to be successfully translated into on-the-ground positive results for the environment, it is necessary to foster more partnerships rather than just project-specific collaborations. Partners must be involved from the beginning of any project with an established system of communication that allows for meaningful input. The ERP must be prepared to listen and integrate stakeholder input into the planning process. One model for ORD to investigate is the collaborative learning technique that is used by the U.S. Forest Service in the public process for forest plan revisions. Collaborative learning is effective at encouraging communication among disparate and often conflicting interests and helping people to understand other viewpoints.

II. CHARGE QUESTION # 1:

How responsive has the Ecological Research Program been to recommendations from its 2005 program review?

Overall, the progress made since the 2005 program review has been responsive to most of the BOSC's comments and recommendations and has focused on all the high priority items identified in the 2005 report. The Mid-Cycle Subcommittee found evidence of a variety of changes in program activities and in efforts to coordinate and/or leverage ORD activities with those of agencies and institutions inside and outside of federal and state government. Notable examples include:

- ✧ Significant communication, coordination, and outreach to develop partnerships and leverage research with other federal agencies in the United States and internationally, states, and other interested stakeholders (EMAP examples and publications, coordination, and communication examples).
- ✧ A focused and effective effort to communicate with stakeholders and decision-makers using the "Tiger Teams" referenced in the review materials.¹
- ✧ Activities and coordination efforts to integrate data collection activities of LTG 1 (*Tools and technologies for scientifically-defensible assessments and management decisions*) into the overall program accomplishments.
- ✧ A number of tools have been developed or are in progress to support LTG 2 (*Provide improved tools and methods to states and tribes for protection and restoration of ecological resources*) activities where EPA and stakeholders can use quantitative measures for diagnosing impacts, quantifying ecological health status, and planning restoration approaches.
- ✧ Refocus of the program, using LTG 3 (*Using ecosystem services as factors in informed decision-making, considering a range of alternative outcomes*) to center priorities and assess the impacts of outcomes.
- ✧ Continued focus on strong scientific approaches to research and its applications.

A number of efforts are still "works in progress" as ORD advances through the dynamic program activities and challenging efforts to refocus ERP priorities. This includes progressing efforts to find the basis for definitive recommendations regarding indicators and metrics used for quantifying ecosystem services. In addition, the Subcommittee heard discussion of various options for models and tools that could be used to develop and address ecosystem services assessments, but no specific commitment to a path forward was evident. **Eventually, decisions**

¹ A "Tiger Team" is a group of ERP staff members selected to interact with specific stakeholders to ensure that the input and advice relevant to these stakeholder needs were considered by the program.

regarding the specific approaches that will be used to incorporate ecosystem services as key assessment and management approaches will have to be made and incorporated into a revised Multi-Year Plan (MYP). The Subcommittee recommends that this remain a high priority effort of the ERP.

It is apparent that the ERP continues to struggle with identifying sustainable approaches to funding valuable extramural programs. Although there have been viable transitions for many EMAP activities formerly funded by ORD and now funded through the Office of Water (OW) and various state water programs, other R&D activities that were funded or could be funded with grants for extramural research are still in discussion.

A few other areas that were identified as recommendations or action items during the 2005 program review and ORD response were not addressed in the review materials, or as part of the panel discussions. Although the Subcommittee agreed that these are lower priority items, they remain important areas for future consideration and **ORD is encouraged to continue to develop plans that address the following:**

- ✧ Document efforts to reach out to non-traditional stakeholders to enhance robustness of ecological assessments and provide greater diversity of input that will support decision-making.
- ✧ Quantify the commitments and activities where R&D funds are leveraged with other agencies and stakeholders.
- ✧ Document the variety of ORD procedures that are being followed and developed to communicate research results to stakeholders.
- ✧ Incorporate a sufficient degree of external peer review into the ERP to ensure the science is defensible.
- ✧ Follow through on commitments to technology transfer regarding the systems, tools, and approaches developed by ORD to assist stakeholders in ecological assessments and decision-making.

The Subcommittee encourages ORD to sustain its commitment to action items and follow-ups developed as part of the 2005 program review and the 2007 mid-cycle review.

III. CHARGE QUESTION # 2:

Are there performance metrics the Program should be using in addition to the current indicators for regularly assessing research progress?

As part of the review materials, ORD shared the *Ecological Research Program: Draft Progress Report (2005-2007)* (referred to as the DPR). This document presents a number of approaches for developing performance metrics that are compatible with the BOSC's recommendations from the 2005 program review regarding programmatic metrics and indicators for leveraging resources and tracking outcomes. There are a number of other areas, however, where the Subcommittee can make additional recommendations.

A variety of performance measures are identified in the *Draft Ecological Research Program Strategic Directions (2008-2014)* (referred to as the DSD), in the presentations from the Newport, Rhode Island, meeting and in the DPR. These performance measures are identified generically in the discussion of the overall programmatic description(s) (e.g., p. 8) and sometimes in specific project descriptions. The purpose of these metrics is to optimize long-term organizational strengths internally and externally. **Although the metrics for evaluating the effectiveness of both the entire program and its parts are good, there is much room for improvement in the application of these metrics.** In some cases, the application of these metrics may be forthcoming or unstated, but they are evidence of how the culture of performance metrics needs to be instilled throughout the project lifetime and within the institutional behaviors. Some examples include:

- ✧ **Match funding provided in leveraged programs is a metric recommended in the 2005 review that remains undocumented as a formal or informal metric among projects, although the Subcommittee discussions continued to reveal appreciation of the amount of match.**
- ✧ **The DSD description of the Nitrogen Component has good milestones, but is missing metrics to determine how “decision-makers regularly apply information and methods developed” per the Wetland milestones.**
- ✧ **The Willamette and Tampa Bay place-based studies identify work products, but do not identify the user groups in the performance measures (Willamette) or how to measure adoption of tools developed (both).**
- ✧ **LTG 3 (*Using ecosystem services as factors in informed decision-making, considering a range of alternative outcomes*) (from the DPR) includes a three-tiered articulation of proposed outcomes to be completed before the program starts, which effectively means that the identified outcomes become benchmarks for progress. These could be applied for the other LTGs, although it is not clear that it is being done for all goals.**

- ✧ **Web site visits can be easily documented (number, time, pages visited), but there was little indication that this was being done systematically.**

The absence of progress in some areas is notable. For example, the statement that “Leadership within ERP will develop a formal process for sharing and disseminating research results with stakeholders in 2007-08” (p. 20, DSD) is a programmatic intention acknowledging a need identified in the BOSC’s 2005 report, but the mid-cycle review did not reveal any substance about this formal process. ORD’s response to the BOSC recommendation regarding tracking outcomes lacked substance, as the Subcommittee expected some analysis of use of programmatic results by the intended user group(s). The 2005 BOSC Subcommittee saw evidence that the ERP was already doing this, but perhaps not communicating the results well enough either internally or externally. Because this impression continued during the mid-cycle review, the **BOSC recommends that ORD put greater emphasis on tracking and documenting applications of ERP research results by decision-makers—a key outcome identified in the ERP.**

The bibliometric parameters that now are incorporated as two OMB PART measures are helpful in assessing ERP contributions. Reliance on these metrics to assess future program accomplishments, however, must be cognizant of the realities of the new budget situation where contributions by extramural scientists may be diminished due to funding constraints. Currently, the Agency’s scientific efforts are advanced by efforts of both EPA and extramural scientists, working independently and collaboratively. Loss of contributions by university scientists could have significant impacts on the breadth and quality of research conducted through the ERP. **The BOSC recommends that ORD closely assess the contributions of EPA and extramural scientists and find ways to continue to support and enhance collaborative research.**

The bibliometric data provided, which lag several years because of publication requirements, demonstrate significant scientific contributions by ORD-funded research, and the successful collaboration between EPA and non-EPA scientists. The publication metrics provided also demonstrate the significant contributions of academic research. The records show that 75 percent and 14 percent of the high quality publications are by academics and EPA, respectively. On publications with EPA scientists as the first author, the second authors are overwhelmingly from academia, not EPA. On publications with academic scientists as the first author, all of the second authors also were from universities. This suggests that disproportionate cuts in extramural funding could have serious implications on the quality of science and breadth of science in the ERP; as the extramural authors contributing to these important publications will no longer receive funding from EPA. Normalized bibliometrics per dollar expended and per full-time equivalency position could be developed and categorized by field or partnership, but applied only cautiously because of differences among disciplines and because ORD is heavily involved in mostly applied research.

ORD staff discussed a number of possible approaches to developing ecological indicators that could be used to quantify ecosystem services and the value of system preservation. **ORD is encouraged to continue these discussions among Agency researchers and decision-makers, as well as with the other stakeholder groups that are part of the widening group of ORD partners and contacts.**

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In summary, the metrics for evaluating and communicating the effectiveness of the whole and the parts of the ERP are good, but are not being applied or appreciated to the extent that was recommended by the 2005 BOSC program review. In addition, the culture of ORD is changing so that outcomes-based evaluations and communication of programmatic success now are more evident as meaningful measures of accomplishment. The BOSC is fairly certain that this aspect was not absent from ORD's administrative and scientific perspective in 2005; however, the clarity that is developed by articulation and communication of these outcomes is now more appreciated and has more importance in ERP activities. Realization of these outcomes as core aspects of the ERP will have benefits at several levels, both internally and externally. These kinds of changes take several years to implement, if only because of the stability of institutional behaviors and the already demanding nature of the work and because responsibilities are increasing while the funding to address significant new and existing problems declines.

IV. CHARGE QUESTION # 3:

How clear is the rationale for the proposed Ecological Strategy?

The move to focus a greater percentage of R&D effort on areas that support decision-making based on ecosystem services is substantiated in the discussions and material provided for the mid-cycle review. The rationale for the revised Ecological Strategy makes it clear that it is time for ORD to move away from the focus on supporting EMAP and on to broader activities. The strategy still recognizes the importance of continuing ORD's support to ensure that appropriate environmental and ecological data are collected in monitoring programs, especially use of sampling and analysis approaches that can be corroborated by ORD research. The evolving emphasis on ecosystem services and value is appropriately laid out and justified. Although the development of the idea to change and the rationale are clear, the specific path forward has not been fully determined and the specific services and functions that will be the focus of the new research effort have not been decided. This is somewhat confusing as the focus on LTG 2 (*Provide improved tools and methods to states and tribes for protection and restoration of ecological resources*) has remained on development of interpretations and tools using the existing databases on health conditions, and not ecosystem services. So the rationale is laid out and known, but it is apparent that the specifics for implementation—the steps in the path forward—are still in development.

The Subcommittee recognizes that ecosystem services has only recently emerged as the conceptual basis to develop a unifying theme for ERP, and thus only limited material had been developed to support and direct thinking in this area. In the course of the review, ORD offered considerable insight into the thinking behind this approach and the review panel participated in discussions of options available for setting a path forward. The next hurdle will be deciding how the revised LTGs and ongoing research programs will be altered to support the new focus. **ORD is encouraged to commit time and resources in strategically planning these changes, including gaining input from a variety of stakeholders, such as The Nature Conservancy and other land trusts that have a significant history in managing lands for valued ecosystem services.**

V. CHARGE QUESTION # 4:

What advice can the BOSC provide to assist in successfully addressing the emerging research in ecosystem services and their relationship to the selected economic and human health endpoints?

The issues of emerging research will likely be addressed with the expanded partnerships and stakeholder community ORD is developing. Discussions with organizations that focus on ecosystem services as part of land management will be a ready source of information for these areas of research. As discussed during both the 2005 program review and the 2007 mid-cycle review, a key component of interactions with stakeholders is soliciting input regarding how various ecosystem components are valued by different cultures and in different regions. **The BOSC encourages the ERP to engage non-traditional EPA partners and stakeholders in discussions focusing on economic and human uses in addition to working with more traditional state and local stakeholders.** The continued practice of hosting extramural program reviews and external peer reviews also will provide opportunities to discover new and emerging concepts in the realm of ecosystem services. Working and interacting with recipients of Science To Achieve Results (STAR) and other extramural grant awards also will expose ORD scientists to new ideas and approaches to resolving information gaps. Feedback obtained by the “Tiger Teams”¹ also can be a useful source of ideas on emerging issues as well as how challenges are being met. However, **ORD should be prepared to deal with confusing, if not conflicting, information or advice on emerging issues, as the diversity of sources will reflect a broad diversity of perspectives and values.** The BOSC suggests that ORD may also benefit from an assessment of skills and areas of expertise among its current staff and subsequent efforts to fill identified gaps, including previously identified areas of need such as ecosystem valuation and economics.

VI. CHARGE QUESTION # 5:

What suggestions can the BOSC offer in best achieving needed partnerships to conduct the future research?

ERP has established productive *collaborations* on specific research projects, especially with clients within EPA. In many cases, however, ERP's collaborations, especially those outside EPA, appear to be *ad hoc* with fortuitous collaborations formed based on requests. True *partnerships* that involve ongoing two-way communication are not as numerous. For ERP's research to be successfully translated into on-the-ground positive results for the environment, it is necessary to foster more partnerships rather than just project-specific collaborations.

ERP's 2005 survey of client satisfaction indicated that respondents were "only moderately satisfied" with the ERP's efforts to communicate results as well as efforts to involve clients in planning. Both of these are critical in forming meaningful and ongoing partnerships. The ERP's response is a "communication strategy" that includes fact sheets, newsletters, an improved Web site, and presentations. None of these proposed responses encourages or allows for input from stakeholders. This communication strategy in reality is *dissemination* of information rather than *communication*. **ORD is encouraged to engage stakeholders and collaborators with communication strategies that allow for input and dissemination of information.**

Partners must be involved from the beginning of any project with an established system of communication that allows for meaningful input. **The ERP must be prepared to listen and integrate stakeholder input into the planning process.** One model for ORD to investigate is the collaborative learning technique that the U.S. Forest Service has used in the public process for forest plan revisions. Collaborative learning is effective at encouraging communication among disparate and often conflicting interests and helping people to understand other viewpoints.

Training end users is an integral part of successful partnerships. ERP scientists regularly present their research at scientific and technical conferences, but outreach to land managers and practitioners seems to be lacking. **Workshops, short courses, and field demonstrations should become core aspects of ERP's communication strategy.**

Because the end goal is "ultimately changing the way we as citizens view ecosystems" (*Draft Ecological Research Program Strategic Directions (2008-2014)*), **ERP must continue to expand its clients beyond the present core of other EPA offices. It will be especially important to increase partnerships with other natural resources agencies and with organizations (those concerned with the social sciences and educators) that can assist in translating ERP research into action.** Reaching policy- and decision-makers at all levels of government also is key in achieving results. Involving the for-profit sector, especially extractive industries (mining, forest products) and businesses based on natural resources (ecotourism), is a special challenge that must not be overlooked.

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ERP staff involvement at all levels is essential to this broad outreach. **As possible, staff with communication and education expertise should be hired. In addition, research teams should be encouraged to engage in outreach and education activities relevant to their areas of research.** Having researchers interacting in various ways with non-scientists could have great benefits for all involved. Such strategies are common practice in many museums, colleges, and universities.

VII. CHARGE QUESTION # 6:

Please rate the progress made by the Ecological Research Program in moving the program forward in response to the BOSC review of 2005 as exceptional, exceeds expectations, meets expectations (formerly satisfactory), or not satisfactory in accordance with the BOSC Research Program Review Guidance for Rating Program Performance.

Based on a review of the textual information and data provided, presentations and discussions during conference calls, and exchanges during the face-to-face meeting that was conducted in the course of the mid-cycle review, the BOSC Subcommittee agreed that the ERP has earned a rating of Meets Expectations in accordance with the definitions provided in the BOSC's guidance for rating program performance. ORD has met most of the goals set after the program review and has been responsive to most of the recommendations developed during the 2005 BOSC review and to all of the higher priority recommendations, provided a great deal of detail to help the BOSC address the charge questions for the mid-cycle review, and has been responsive to BOSC requests for clarification or additional detail over the past few months. The Subcommittee benefited greatly from the professional and thoughtful responses to its requests, and the detail and frankness that accompanied ORD responses. It is obvious that one of the program's greatest assets is its very capable and dedicated staff that has not lost its enthusiasm in light of significant programmatic challenges.

In particular, the BOSC recognizes that progressing development and refocusing of the ERP and meeting expectations generated in response to the 2005 review are significant accomplishments in light of the significant budget reduction and planning turmoil that has occurred over the past 2 years. The ERP's budget has been reduced by more than 25 percent since the 2005 review with particular impact on the extramural research programs, and yet it is apparent that the morale and effectiveness of the ORD staff and participating scientists have remained high. The significant reduction in ORD's participation in a very effective federal-state collaboration (EMAP) and the virtual elimination of ERP's participation in the STAR Program are serious downgrades to the mission of ORD.

The BOSC commends ORD for maintaining a long-term perspective among the changing funding outlook that immediately followed the 2005 review and compliments the staff for perseverance in developing a program that is realistic in scope and consistent with the program's resources. The *Draft Ecological Research Program Strategic Directions (2008-2014)* and presentations on the ERP's path forward demonstrated flexibility with strategic development of crosscutting efforts among LTGs, several new ecosystem services projects, efforts to develop a culture of "outcomes-based" perspectives, and greater degrees of coordination within EPA. It is apparent the staff made significant progress within the short period of time between the 2005 program review and 2007 mid-cycle review.

VIII. APPENDICES

Appendix A: Subcommittee Charge

05-07-07

ECOLOGICAL MID-CYCLE SUBCOMMITTEE CHARGE

May 23, 2007

Narragansett, Rhode Island

1.0 Objectives. The objectives of this mid-cycle review are:

- Primarily to evaluate the progress made by the Office of Research and Development's (ORD's) Ecological Research Program relative to the commitments it made following its last review (March 7-9, 2005), and
- Secondly to obtain advice and feedback on issues related to the future directions of the research program and measures of success

2.0 Background Information. Independent expert review is used extensively in industry, federal agencies, Congressional committees, and academia. The National Academy of Science (now the National Academies) has recommended this approach for evaluating federal research programs.²

For the Agency's environmental research programs, periodic independent reviews are conducted at intervals of 4 or 5 years to characterize research progress, to identify when clients are applying research to strengthen environmental decisions, and to evaluate client feedback about the research. Mid-cycle evaluations are an important part of this program review process. Scheduled midway through the review cycle, these independent assessments give ORD an opportunity to gauge the program's progress relative to the commitments it made following its last review.

For the upcoming mid-cycle review, the Ecological Research Program has prepared a progress report that will provide the context for our discussions during the meeting. The report outlines the changes implemented by the program in response to the major recommendations from its 2005 review and the progress made in each previously established research Goal area.

As a secondary issue for this mid-cycle review, the Ecological Research Program also is in the process of making significant revisions to its Multi-Year Plan to emphasize a redirection as a result of the combination of recommendations from the BOSC review, a recognized need by the Agency, and a reduction in the extramural budget. A draft of the overall concept and approach, a strategy, including the proposed long-term goals has been provided to the Subcommittee. We anticipate a more complete peer review of the proposed direction by the EPA Science Advisory

² Evaluating Federal Research Programs: Research and the Government Performance and Results Act, National Research Council, 1999.

Board later in 2007, followed by a full program review by the BOSC. The purpose of this discussion is to get suggestions relating to the redirection at this early stage of plan development.

This review is not intended to be the in-depth technical evaluation of a full program review. Presentation time will be minimized in favor of discussion.

3.0 Draft Charge Questions for ORD's Ecological Research Program. ORD is interested in receiving feedback concerning the following questions:

1. How responsive has the Ecological Research Program been to the recommendations from its 2005 program review?
2. Are there performance metrics the Program should be using in addition to the current indicators for regularly assessing research progress?
3. How clear is the rationale for the proposed Ecological Strategy?
4. What advice can the BOSC provide to assist in successfully addressing the emerging research in ecosystem services and their relationship to the selected economic and human health endpoints?
5. What suggestions can the BOSC offer in best achieving needed partnerships to conduct the future research?
6. Please rate the progress made by the Ecological Research Program in moving the program forward in response to the BOSC review of 2005 as exceptional, exceeds expectations, meets expectations, or not satisfactory in accordance with the BOSC Research Program Review Guidance for Rating Program Performance detailed below.

For the last question, the BOSC Ecological Mid-cycle Subcommittee is being asked to assign a qualitative score that reflects the extent to which the program is making progress in moving the program forward in response to the previous BOSC review. The score should be in the form of one of the adjectives defined below and is intended to promote consistency among BOSC program reviews. The adjectives should be used as part of a narrative summary of the review, so that the context of the rating and the rationale for selecting a particular rating will be transparent. For mid-cycle reviews, the rating should be based on the quality, speed, and success of the program's actions in addressing previous BOSC recommendations. The adjectives to describe progress are:

- **Exceptional:** indicates that the program is meeting all and exceeding some of its goals, both in the quality of the science being produced and the speed at which research result tools and methods are being produced. An exceptional rating also indicates that the program is addressing the right questions to achieve its goals. The review should be specific as to which aspects of the program's performance have been exceptional.
- **Exceeds Expectations:** indicates that the program is meeting all of its goals. It addresses the appropriate scientific questions to meet its goals, and the science is competent or better. It exceeds expectations for either the high quality of the science or for the speed at which work products are being produced and milestones met.

- **Meets Expectations** (formerly Satisfactory): indicates that the program is meeting most of its goals. Programs that meet this rating live up to expectations in terms of addressing the appropriate scientific questions to meet its goals, and work products are being produced and milestones are being reached in a timely manner. The quality of the science being done is competent or better.
- **Not Satisfactory**: indicates that the program is failing to meet a substantial fraction of its goals, or if meeting them, that the achievement of milestones is significantly delayed, or that the questions being addressed are inappropriate or insufficient to meet the intended purpose. Questionable science is also a reason for rating a program as unsatisfactory for a particular long-term goal. The review should be specific as to which aspects of a program's performance have been inadequate.

4.0 Potential Subcommittee Approach for Mid-Cycle Review

- Hold one (1) administrative call in the month preceding the face-to-face meeting.
 - ▶ Allows the subcommittee Chair to make review and writing assignments
- Hold two (2) teleconference calls prior to the face-to-face meeting.
 - ▶ Allows the ORD to present background and other relevant materials to the subcommittee
 - ▶ Allows the subcommittee to ask clarifying questions
- EPA shall distribute background materials and documents requested by the subcommittee in advance of the teleconference calls.
- Hold a one-day face-to-face meeting for the mid-cycle review.
 - ▶ The meeting will include brief ORD presentations on program progress and discussions with members of the Ecological Mid-Cycle Subcommittee.
 - ▶ The meeting will conclude with the presentation of a draft letter report that addresses all of the charge questions.
- If needed, hold one (1) teleconference call within one month following the face-to-face meeting to finalize the draft letter report.

Appendix B: Ecological Research Mid-Cycle Subcommittee

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Appendix C: List of Acronyms

BOSC	Board of Scientific Counselors
DPR	Draft Progress Report
DSD	Draft Strategic Directions
EMAP	Environmental Monitoring and Assessment Program
EPA	Environmental Protection Agency
ERP	Ecological Research Program
FACA	Federal Advisory Committee Act
LTG	Long-Term Goal
MYP	Multi-Year Plan
OMB	Office of Management and Budget
ORD	Office of Research and Development
OW	Office of Water
PART	Program Assessment Rating Tool
STAR	Science To Achieve Results