U.S .Environmental Protection Agency
Science Advisory Board (SAB)
Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS)
Summary Meeting Minutes of a Public Teleconference Meeting
12:30 p.m. - 2:30 p.m. (Eastern Time)
March 27, 2007

Committee: The SAB Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS). (See Roster - Attachment A.)

Date and Time: March 27, 2007, 12:30 pm - 2:30 pm (Eastern Time) (see Federal Register Notice – Attachment B)

Location: Participation by Telephone Only

Purpose: The purpose of the teleconference is to discuss draft text developed by committee members for a draft report related to valuing the protection of ecological systems and services. (See Meeting Agenda - Attachment C.)

Attendees: Members of the C-VPESS:
Dr. Barton H. (Buzz) Thompson, Jr. (Chair)
Dr. Kathleen Segerson (Vice-Chair)
Dr. Gregory Biddinger
Dr. James Boyd
Dr. Terry Daniel
Dr. A. Myrick Freeman
Dr. Dennis Grossman
Dr. Douglas MacLean
Dr. Louis Pitelka
Dr. Stephen Polasky
Dr. Paul Risser
Dr. Mark Sagoff
Dr. Paul Slovic

Consultants to the C-VPESS
Dr. Joseph Arvai

EPA SAB Staff
Dr. Angela Nugent (Designated Federal Officer)

Other Members of the public (see Attachment D)

Teleconference Summary:

The teleconference agenda (see Meeting Agenda - Attachment C) was adjusted because there were no written comments submitted to the SAB and no requests for public comment.

The DFO opened the meeting by noting that the proceedings conformed to the requirements of the Federal Advisory Committee Act.

Dr. Buzz Thompson, chair of the committee, expressed thanks for written comments received from committee members prior to the teleconference and members' participation in the teleconferences. He viewed the teleconferences as valuable for identifying ways to improve the report. He noted that he was working with the vice-chair, Dr. Segerson, and the DFO to identify ways to improve sections of the report based on teleconference discussions, with the goal of producing a new version of the report prior to the May meeting.

Habitat Equivalency Analysis (HEA) (Part 3, Section 7.3, pp. 304-310)

Dr. Gregory Biddinger began the discussion by thanking members for the written comments. He noted three principal areas of comments: 1) the need for improved proof-reading of the report, clearer communication of some basic concepts (including the incorporation of a process figure to communicate how HEA compensates for lost resources that rebound over time), and shortening the section; 2) the addition of a discussion of how HEA, which is used by experts in "constrained situations" (e.g., local decision making, to help select among alternative approaches, based on relative service for one approach vs. another) might be coupled with a mediated process where non-experts were involved and "helped to see" equivalency; and 3) whether the method belongs in the C-VPESS report, since it might be considered "too coarse a methodology to even be considered by EPA."

Dr. Biddinger responded that the text could be revised to describe more fully the types of analyses that experts conduct to establish equivalency between units of habitat. Applications are at the site-specific scale. Analyses can be refined to address the quality and condition of the acreage in question. EPA makes a plethora of decisions at the site level (e.g., permits, watershed decisions, and decisions about airsheds) that select among alternative technological or management practices. In his view, including a discussion of HEA in the report would address a methodology that would help the Agency consider alternatives that present the best outcome from an ecological service perspective that would help the Agency identify a net environmental benefit analysis.

Dr. Thompson suggested that it would be helpful to include an example of how HEA was used at the local level in a text box. He also suggested that it would be helpful to include more detail about how experts determine equivalency across units of acreage, because these "equivalency" decisions are a type of valuation. Another committee member suggested that many examples exist related to wetlands.

Another member asked whether the approach had sufficient "standardization behind it" and expressed concerns that it might not be the "most appropriate technology" for making equivalency decisions for mitigation purposes. He voiced a desire for a more standardized, more transparent approach. Dr. Biddinger responded that standardization of methodologies to characterize ecological condition per unit of acreage would help people make value comparisons.

A member asked whether HEA had two separate stages. She asked whether characterizing ecological change in one geographic location as comparable in terms of services to another location was the first stage (comparison of delta Qs). She then asked whether identification of what it would cost to secure the second delta Q to replace the first delta Q would then be the second stage, involving a replacement cost.

Dr. Biddinger responded that the HEA calculation does not necessarily involve a cost function, but does involve "discounting of equivalency" in ecosystem services. He gave the following example. Assume Acre A is equivalent to Acre B in terms of ecosystem services. No dollars are involved and equivalency is established, allowing for discounting of lost services. He noted, however, that HEA has also historically been used in Natural Resource Damage Assessment, which has an injury phase (that characterizes lost services); an offset phase (where equivalency analysis identifies how to offset the injury); and a cost phase (which identifies the value of replacement worth through a variety of techniques including contingent valuation and hedonics).

The committee discussed how the injury phase is similar to prediction of ecological effects. Analysts must address potential damage issues, scaling issues, and identify potential equivalent services produced by resources, whether they operate in a "hindcasting" mode for resource compensation or a "forecasting mode" to explore how a new habitat might replace a current habitat). In response to a question, Dr. Biddinger noted that although the method has been used historically in a "reactive mode," it could be used for prospective site-specific decisions.

One member suggested that the C-VPESS report might benefit most from viewing HEA as an application of science for predicting ecological effects for decisions. She suggested that she saw three possibilities for placement of the method in the C-VPESS report: in the Part 2 discussion of prediction of ecological effects; in Part 3 under biophysical ranking methods; or in Part 3 as a separate method under cost as a proxy for value.

Another member responded that the method was a form of valuation. It allows experts and perhaps publics, learning from experts, to determine equivalent ecosystem services in terms limited to ecosystem services. The task is constrained to express decisions in terms of ecosystem services, whatever they might be worth. He viewed the exercise as a "step further toward valuation" than simply generating an ecological production function because comparative judgments are "built in."

The committee then discussed the importance of the "replacement cost" concept to HEA. Dr. Biddinger noted that replacement costs can be expressed in dollar terms or as units of acreage. A member responded that the same caveats discussed earlier by the committee related to cost as a proxy for value apply to HEA, because the decision maker is trying to replace damaged (or potentially damaged) acres with their equivalent.

Another member raised two questions about HEA decisions. He asked for the write-up to address HEA-related decisions that replace lost ecosystem services with

options preferred by a community that do not replace the lost services (e.g., a boat dock that would replace a lost wetland) and whether those decisions were legitimate. He also asked for an explanation of how discounting relates to decisions where one habitat is replaced by another. Dr. Biddinger noted that most habitats do repair themselves. Discounting is important to HEA because there are multiple ways to replace lost services over time. If a damaged habitat had grasses, the analyst must compare the recovery of the damaged habitat over time from an injury against the planting of the new habitat with grasses and evaluate those changes over time. The time calculation would involve a discount rate and factor in the damage for lost years of grasses. The committee agreed that an example or more detail on this aspect of HEA would be useful in revising the write-up.

Dr. Thompson concluded the discussion by asking Dr. Biddinger to provide more discussion of how the HEA process works with some specific examples. Once the revised text is received, Dr. Thompson said he would work with Dr. Segerson and the DFO to identify where the text might best fit into the report draft for the C-VPESS May meeting.

Implementing the Concept of Ecosystem Services (Part 2, Section 2, pp. 47-52)

Dr. Thompson asked Dr. Boyd to begin the discussion of implementing the concept of ecosystem services with reference to text included in the March 9th report draft and additional text provided in his written comments.

Dr. Boyd talked of his interest in supplementing draft text on pp. 47-62 with a discussion of the need for EPA to develop consensus on "ecological endpoints" that would be similar to the consensus he has seen emerge related to human health endpoints that have facilitated economic analysis (e.g., a movement from expressions of endpoints in terms of pulmonary dysfunction to "asthma days lost"). A member of the committee agreed that agreement on endpoints is important but, based on his experience, the health endpoint history is more an illustration of difficulties than successes.

Dr. Boyd talked of the importance of expressing outcomes in biophysical sciences in terms that normal people can understand. Such expression of outcomes would provide a linkage between the biophysical, economic, and social sciences. He suggested that the C-VPESS text acknowledge this problem and advise EPA "to go further and deeper on this point."

Members then discussed how the committee might link this discussion to Part 2, section 3.2 in general and to an evaluation of EPA's work on Generic Ecological Assessment Endpoints, and how such Agency-wide endpoint work might be strengthened to better support valuation.

Members then raised several issues related to a focus on endpoints.

- Several members discussed the need to relate choice of endpoints to scarcity. Another member observed that the public often does not have sufficient ecological understanding to evaluate endpoints in an informed way.
- Yet another member asked whether an analytical process focusing on endpoints would trigger or involve ecological analysis that would capture variables that affect those endpoints (e.g., if an endpoint was drinking

water, would impacts of contamination on nematodes be explored). He suggested that EPA focus on ecological impacts of stressors or ecological effects of EPA policies and use " production functions to start at the bottom of an ecological model and work your way up" to endpoints. He noted the major complexity and difficulty in the undertaking. The existing text's emphasis on double counting issues imposes an additional layer of difficulty on an already complex process and suggested that the balance and order of the section could be improved.

- A member expressed concern about unduly simplify EPA's analysis by generating a list of endpoints.
- Several members argued against introducing the term "ecological endpoint" since the report text already had defined "ecological services" and developed advice related to that term. Dr. Boyd responded that the term "ecological endpoint" might be agreeable to all.
- A member asked that Part 3, Section 2 be clarified to explain the relationship of the discussion of ecological services, ecological endpoints, and functional groups – to clarify how those concepts might be related, integrated, or be used separately.

Members did agree that Figure 4 well illustrated the relationship of the stressor, ecological production function, and ecological endpoint/ecological service in a simple way. Several members also stated that it would be helpful to reorder parts of chapters 3 and 2 to provide text explaining issues associated with prediction of ecological effects before related issues on ecological endpoints/ecological services are discussed. A member reiterated his written comments about some confusing features of Figure 3 and asked that it be revised.

Dr. Boyd responded that the discussion of ecological endpoints was important to him and that he was comfortable with de-emphasizing or deleting the discussion of double counting. He expressed his concern about whether the committee will be able to offer consensus advice to the Agency on how to "solve the endpoint problem."

The DFO expressed her understanding of EPA's interest in advice from the committee on practical ways to implement the concept of ecosystem services and biophysical ways to quantify potential impact of policy options. She noted that criteria or general principles could be useful to the Agency.

Committee members asked that this topic be included on the Agenda for the face-to-face meeting on May 1-2, 2007. Dr. Thompson asked Dr. Boyd to work with him, Dr. Segerson and the DFO to develop new draft language in light of comments received. New text would

- address and resolve the terminology issue (ecological services vs. ecological endpoint)
- rearrange materials in chapters 2 and 3, especially section 3.2
- provide some guidance to EPA about how to make progress on the ecological endpoint/service idea that moves the Agency ahead
- Discuss EPA's Generic Ecological Assessment Endpoint work and what is needed to build on/or that is different from this effort to advance the use of ecological endpoints/ecological services

- Relate to figures 3 and 4.

Dr. Boyd agreed to undertake this work and provide draft text by April 12th.

Prediction of Ecological Effects (Part 2, Section 3, pp. 53-70)

Dr. Paul Risser introduced discussion of Section 3 by noting that he had drafted the report with the explicit goal of being practical to EPA. He outlined the structure of the section and acknowledged Dr. Louis Pitelka's help in drafting the chapter and the written comments received from members of the committee. He briefly summarized comments received and noted that he would review suggestions regarding citations and will add them where appropriate and characterize desired characteristics of models as "desired characteristics or goals" not mandates.

Members discussed the merits of expanding the discussion of endpoints in section 3.2 to include discussion of ecosystem services or move that subsection to section 2. Dr. Risser responded that he was "OK" with moving the text, but felt it fit logically in Section 3.

Dr. Risser agreed to revise the section for the May meeting.

Conclusion of Teleconference

Dr. Thompson asked members for additional comments. Several members asked for an opportunity to discuss the agenda for the May meeting at an upcoming teleconference. Dr. Thompson committed to providing a draft agenda for brief discussion and written comment at the April 10th teleconference.

Dr. Thompson concluded the meeting with thanks to participants.

The teleconference was adjourned at 2:15 p.m.

Respectfully Submitted:

/s/

Angela Nugent
Designated Federal Official

Certified as True:

/s/

Dr. Barton H. (Buzz) Thompson, Jr.
Chair
SAB Committee on Valuing the Protection of Ecological Systems and Services

List of Attachments

Attachment A: Roster of the SAB C-VPESS

Attachment B: Federal Register Notice

Attachment C: Meeting Agenda

Attachment D: Attendees from the Public Who Requested or Were Provided Call-in Information

Attachment E: Comments from Members and Consultants of the SAB Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS) on the 3/09/07 draft report for discussion at the 3/20/07 C-VPESS public teleconference call

Attachment A:

Roster of the U.S. Environmental Protection Agency Science Advisory Board Committee on Valuing the Protection of Ecological Systems and Services

CHAIR

Dr. Barton H. (Buzz) Thompson, Jr., Robert E. Paradise Professor of Natural Resources Law, Stanford Law School, and Director, Woods Institute for the Environment, Stanford University, Stanford, CA

VICE-CHAIR

Dr. Kathleen Segerson, Professor, Department of Economics, University of Connecticut, Storrs, CT

MEMBERS

Dr. William Louis Ascher, Donald C. McKenna Professor of Government and Economics, Claremont McKenna College, Claremont, CA

Dr. Gregory Biddinger, Coordinator, Natural Land Management Programs, Toxicology and Environmental Sciences, ExxonMobil Biomedical Sciences, Inc, Houston, TX

Dr. Ann Bostrom, Associate Professor, School of Public Policy, Georgia Institute of Technology, Atlanta, GA

Dr. James Boyd, Senior Fellow, Director, Energy & Natural Resources Division, Resources for the Future, Washington, DC

Dr. Robert Costanza, Professor/Director, Gund Institute for Ecological Economics, School of Natural Resources, University of Vermont, Burlington, VT

Dr. Terry Daniel, Professor of Psychology and Natural Resources, Department of Psychology, Environmental Perception Laboratory, University of Arizona, Tucson, AZ

Dr. A. Myrick Freeman, William D. Shipman Professor of Economics Emeritus, Department of Economics, Bowdoin College, Brunswick, ME

Dr. Dennis Grossman, Principal Associate - Biodiversity Protection and Conservation Planning, Environmental and Natural Resources Department, Abt Associates Inc., Bethesda, MD

Dr. Geoffrey Heal, Paul Garrett Professor of Public Policy and Business Responsibility,

Columbia Business School, Columbia University, New York, NY

Dr. Robert Huggett, Consultant and Professor Emeritus, College of William and Mary, Williamsburg, VA

Dr. Douglas E. MacLean, Professor, Department of Philosophy, University of North Carolina, Chapel Hill, NC

Dr. Harold Mooney, Paul S. Achilles Professor of Environmental Biology, Department of Biological Sciences, Stanford University, Stanford, CA

Dr. Louis F. Pitelka, Professor, Appalachian Laboratory, University of Maryland Center for Environmental Science, Frostburg, MD

Dr. Stephen Polasky, Fesler-Lampert Professor of Ecological/Environmental Economics, Department of Applied Economics, University of Minnesota, St. Paul, MN

Dr. Paul G. Risser, Chair, University Research Cabinet, University of Oklahoma, Norman, OK

Dr. Holmes Rolston, University Distinguished Professor, Department of Philosophy, Colorado State University, Fort Collins, CO

Dr. Joan Roughgarden, Professor, Biological Sciences and Evolutionary Biology, Stanford University, Stanford, CA

Dr. Mark Sagoff, Senior Research Scholar, Institute for Philosophy and Public Policy, School of Public Affairs, University of Maryland, College Park, MD

Dr. Paul Slovic, Professor, Department of Psychology, Decision Research, Eugene, OR

Dr. V. Kerry Smith, W.P. Carey Professor of Economics, Department of Economics, W.P. Carey School of Business, Arizona State University, Tempe, AZ

CONSULTANTS TO THE COMMITTEE

Dr. Joseph Arvai, Professor**,** Environmental Science and Policy Program, and Department of Community, Agriculture, Resource and Recreation Studies (CARRS), Michigan State University, East Lansing, MI

Dr. Allyson Holbrook, Assistant Professor of Public Administration and Psychology, Survey Research Laboratory, University of Illinois at Chicago, Chicago, IL

Dr. Jon Krosnick, Frederic O. Glover Professor in Humanities and Social Sciences, Professor of Communication, Director, Methods of Analysis Program in the Social Sciences, Associate Director, Institute for Research in the Social Sciences, Stanford

University, Palo Alto, CA

SCIENCE ADVISORY BOARD STAFF

Dr. Angela Nugent, Designated Federal Officer, 1200 Pennsylvania Avenue, NW 1400F, Washington, DC, Phone: 202-343-9981, Fax: 202-233-0643, (nugent.angela@epa.gov)

Attachment B: Federal Register Notice

Science Advisory Board Staff Office; Notification of Six Public Teleconferences of the Science Advisory Board Committee on Valuing the Protection of Ecological Systems and Services

[Federal Register: December 28, 2006 (Volume 71, Number 249)]
[Notices]
[Page 78202-78203]

ENVIRONMENTAL PROTECTION AGENCY
[FRL-8262-8]

Science Advisory Board Staff Office; Notification of Six Public Teleconferences of the Science Advisory Board Committee on Valuing the Protection of Ecological Systems and Services

AGENCY: Environmental Protection Agency (EPA).
ACTION: Notice.

SUMMARY: The EPA Science Advisory Board (SAB) Staff Office announces six public teleconferences of the SAB Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS) to discuss components of a draft report related to valuing the protection of ecological systems and services.

DATES: The SAB will conduct six public teleconferences on February 5, 2007, February 13, 2007, February 27, 2007, March 6, 2007, March 20, 2007, and March 27, 2007. Each teleconference will begin at 12:30 p.m. and end at 2:30 p.m. (eastern standard time).

LOCATION: Telephone conference call only.

FOR FURTHER INFORMATION CONTACT: Any member of the public wishing to obtain general information concerning this public teleconference may contact Dr. Angela Nugent, Designated Federal Officer (DFO), via telephone at: (202) 343-9981 or e-mail at: nugent.angela@epa.gov. General information concerning the EPA Science Advisory Board can be found on the EPA Web site at: http://www.epa.gov/sab.

SUPPLEMENTARY INFORMATION: The SAB was established by 42 U.S.C. 4365 to provide independent scientific and technical advice, consultation, and recommendations to the EPA Administrator on the technical basis for Agency positions and regulations. The SAB is a Federal advisory committee chartered under the Federal Advisory Committee Act (FACA), as amended, 5 U.S.C., App. The SAB will comply with the provisions of FACA and all appropriate SAB Staff Office procedural policies.

Background: Background on the SAB C-VPESS and its charge was provided in 68 Fed. Reg. 11082 (March 7, 2003). The purpose of the teleconference is for the SAB C-VPESS to discuss components of a draft advisory report calling for expanded and integrated approach for valuing the protection of ecological systems and services. The Committee will discuss draft assessments of methods for ecological valuation and application of those methods for valuing the protection of ecological systems and services.

These activities are related to the Committee's overall charge: to assess Agency needs and the state of the art and science of valuing protection of ecological systems and services and to identify key areas for improving knowledge, methodologies, practice, and research.

Availability of Meeting Materials: Agendas and materials in support of the teleconferences will be placed on the SAB Web Site at: http://www.epa.gov/sab/ in advance of each teleconference.

Procedures for Providing Public Input: Interested members of the public may submit relevant written or oral information for the SAB to consider during the public teleconference and/or meeting.

Oral Statements: In general, individuals or groups requesting an oral
presentation at a public SAB teleconference will be limited to three minutes per speaker, with no more than a total of one-half hour for all speakers. To be placed on the public speaker list, interested parties should contact Dr. Angela Nugent, DFO, in writing (preferably via e-mail) 5 business days in advance of each teleconference.

Written Statements: Written statements should be received in the SAB Staff Office 5 business days in advance of each teleconference above so that the information may be made available to the SAB for their consideration prior to each teleconference. Written statements should be supplied to the DFO in the following formats: One hard copy with original signature, and one electronic copy via e-mail (acceptable file format: Adobe Acrobat PDF, WordPerfect, MS Word, MS PowerPoint, or Rich Text files in IBM-PC/Windows 98/2000/XP format).

Accessibility: For information on access or services for individuals with disabilities, please contact Dr. Angela Nugent at (202) 343-9981 or nugent.angela@epa.gov. To request accommodation of a disability, please contact Dr. Nugent preferably at least ten days prior to the teleconference, to give EPA as much time as possible to process your request.

Dated: December 22, 2006.
Anthony Maciorowski,
Associate Director for Science, EPA Science Advisory Board Staff Office.

Attachment C: Meeting Agenda

EPA Science Advisory Board
Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS)
Public Teleconference
March 27, 2007, 12:30 p.m. - 2:30 p.m. Eastern Time

Purpose: The purpose of the teleconference is to discuss draft text developed by committee members for a draft report related to valuing the protection of ecological systems and services.

12:30 – 12:35	Opening of Teleconference	Dr. Angela Nugent, Designated Federal Officer
12:35 – 12:40	Review of Agenda	Dr. Buzz Thompson, Chair Dr. Kathleen Segerson, Vice-Chair
12:40 – 12:50	Public Comments	TBA
12:50 – 1:15	Habitat Equivalency Analysis (Part 3, Section 7.3, pp. 304-310)- Summary of written comments and response	Dr. Gregory Biddinger
	- Committee Discussion	Committee
	- Next Steps	Dr. Buzz Thompson
1:15 – 1:40	Implementing the Concept of Ecosystem Services (Part 2, Section 2, pp. 47-52) - Summary of written comments and response	Drs. Kathleen Segerson and James Boyd
	- Committee Discussion	Committee
	- Next Steps	Dr. Buzz Thompson
1:40 – 2:25	Prediction of Ecological Effects (Part 2, Section 3, pp. 53-70) - Summary of written comments and response	Dr. Paul Risser
	- Committee Discussion	Committee
	- Next Steps	Dr. Buzz Thompson
2:25 – 2:30	Summary and Next Steps	Dr. Buzz Thompson

Attachment D: Attendees from the Public Who Requested or Were Provided Call-in Information

Mary Jane Calvey

Pat Casano

Nancy Beck

Jim Christman

Patrick Frey

Pieter Booth

Paul Hendley

Traci Iott

Darrell Osterhoudt

Jean Public

Matt Shipman

Wayne Munns

Attachment E: Compilation of Comments from Members and Consultants of the C-VPESS

Comments from Members and Consultants of the SAB Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS) on the 3/09/07 draft report for discussion at the 3/27/07 C-VPESS public teleconference call
Comments received as of 8:00 am 3/27/07

Comments Received

A. Habitat Equivalency Analysis (Part 3, Section 7.3, pp. 304-310)- 15
Comments from Terry Daniel 15
Comments from Rick Freeman 16
Comments from Dennis Grossman 16
Comments from Lou Pitelka 16
B. Comments on Implementing the Concept of Ecosystem Services (Part 2, Section 2, pp. 47-52) 16
Comments from Jim Boyd 16
Comment from Terry Daniel 18
Comments from Rick Freeman 18
Comments from Dennis Grossman 18
Comments from Lou Pitelka 18
C. Prediction of Ecological Effects (Part 2, Section 3, pp. 53-70) 20
Comments from Terry Daniel 20
Comments from Rick Freeman 21
Comments from Dennis Grossman 22
Comments from Lou Pitelka 22

A. Habitat Equivalency Analysis (Part 3, Section 7.3, pp. 304-310)-

Comments from Terry Daniel

This is generally a well written section, aside from a significant number of minor typos and missed words, etc. The sentence on p 305, line 21-22, seems to end in mid thought. An important strength of this method that does not get sufficient emphasis is that it seems to allow relevant experts to come to a comparative value for lost and replaced ecosystem services in terms of the services (and perhaps underlying supporting services) themselves. Within a given (constrained) context, it seems that HEA (or similar methods) could be effectively applied by relevant experts to arrive at convincing trades or compensations for damaged or lost services. If this method were opened up to systematic input and participation by non-expert public stakeholders (along the lines of the Mediated Modeling or Deliberative Group methods), more widely accepted trade/compensation decisions could be determined for otherwise intractable ecosystem value situations.

Comments from Rick Freeman

This whole section needs some rewriting and careful editing to make the main points more clear.

Comments from Dennis Grossman

The text itself shows the effects of first drafts and has many small editorial errors which need to be addressed – e.g. lots of incomplete thoughts and sentences.

I struggle to clarify how this section contributes to this report. It does not provide any guidance or clarity relative to the Committee's charge – valuing ecosystems and their services – but points out a historical way that coarse surrogate values (habitat acre equivalents and the like) have been used to mitigate environmental damages. I think that it points more to the shortcomings of prior efforts than a guiding light – not that it is presented as such. The underlying challenge is to present methods that better represent the 'real' values of these ecosystems and their services and have that information available for decision-making.

Comments from Lou Pitelka

Page 305, lines 1-2 and 4-5. Something appears to be missing. These sentences do not make sense.

Page 305, lines 21-22. Not a complete sentence; something is missing.

B. Comments on Implementing the Concept of Ecosystem Services (Part 2, Section 2, pp. 47-52)

Comments from Jim Boyd

"Endpoint" language for CVPESS discussion for a new subsection in Part 2, Section 2.?

draft by Jim Boyd
3/23/07

One of the Committee's fundamental conclusions – and one commonly voiced elsewhere -- is that the coordination or full integration of ecological and social analysis is necessary. The analytical challenge facing this committee is the translation of agency actions and decisions into, first, biophysical outcomes. Then a second translation must occur: from biophysical outcomes to social outcomes. If there is no coordination between the biophysical and social assessments the total analysis is likely to be more difficult, flawed, and unsatisfying to both scholars and professionals asked to follow the experts' recommendations.

The methods and examples described in this report do not themselves always live up to this standard, largely because there is no standard. The organization of this report is yet another example of the distinctions drawn between biophysical and a social analysis (refer to the

separate “biophysical” and “social” sections). The Committee hopes for a day when reports of this kind will feature truly integrated biophysical and economic analysis.

A specific need – and one we think deserves much more attention – is the development of ecological endpoints for social science analysis.

Ecological endpoints are concrete statements, intuitively expressed and commonly understood, about what matters in nature.

Technical expressions or descriptions meaningful only to experts are not ecological endpoints.

The success EPA has had with the translation of human health impacts into social, legal, and regulatory analysis is due in large part to the development of health endpoints 15 years ago [check date].

Prior to the development of health endpoints, the health sciences expressed health problems and outcomes in technical terms meaningful within the scientific community, but not outside it. The search for health endpoints – the linkage between health and social sciences – thus was a search for a “common man” translation of medically complex outcomes.

The social sciences demand these “common man” units of success and failure because the social sciences tend to assume that people are reasonably well informed when they make choices. [Though cite the vast literature that does not assume this.]

If changes in the world – good things and bad – cannot be expressed in terms society understands it is nearly impossible for social scientists to say anything about how society values those changes.

The point is this: consistently defined endpoints were instrumental in the government’s (and science’s) ability to bridge the gap between technical medical outcomes and understandable social outcomes. They will be even more important to the assessment of ecological conditions.

One can easily argue that the ecological assessment problem is more difficult than the health assessment problem – it is certainly more multi-dimensional. For one thing, ecological systems are very broad in space and time. All the more reason that consistent endpoints are necessary.

While the Committee has not delivered a coherent, practical set of such ecological endpoints, we are optimistic about their development (Boyd, 2007). Further, we urge the development of such endpoints as the next logical step for the agency to take.

[NOTE: I have zero personal knowledge of the health endpoints history. This story should be reviewed by those in the know. On the Committee, I know Kerry Smith was involved. At EPA, the name that comes to mind is Rob Wolcott. But I am sure there are many others with reflections on the health experience. We should verify my journalistic understanding with those who were there.

Comment from Terry Daniel

p. 48-14 ", it reduces the potential for double-counting."

In this context, somewhere between page 48 and 49 the admonition to avoid double counting runs pell-mell into the complexity of the ecological networks that "produce" the endpoints that are of interest in a given analysis. For the balance of the section it is clear that we not only can't avoid double counting (and perhaps triple and quadruple), but we will frequently not know exactly what elements of the network (or even functional groups) are responsible for what measure of the end product, nor what other end products that are valuable somewhere else or at some other time to some other humans might also be supported to some extent by those same elements/groups. How far down and up and inward and outward in the ecological net and how far forward and backward in time do we have to go to avoid double counting of ecosystem values?

This double counting problem may not be especially problematic if we are focusing on a particular end-point service to particular humans at a particular place over a reasonably circumscribed time, and seek only to determine the value of (or just skip more directly to a decision about protecting or not) those parts of the neighboring ecosystem that most directly and importantly support the targeted end-points. It is much more problematic, and likely intractable altogether, when we seek to claim some valuation or decision that is "optimal" and orthogonal over a much larger (even universal) space encompassing other values for other humans from other ecosystems that are almost surely interrelated with the targeted system, and with each other.

Comments from Rick Freeman

p. 49, lines 1-17: This is important material about avoiding double counting and determining what people are valuing and why. But I think that there is an issue that perhaps hasn't been recognized that complicates things. At lines 8-8, it says "Do individuals care about about insects for their own sake, or ... [as] a food source ..." Suppose the answer is "Both." Then I think that there is what I would call a "joint value allocation problem" (analogous to the joint cost allocation problem in accounting). And it is further complicated by the possibility that to the extent that insects contribute to fish, there are fewer insects for people to care about for their own sake.

Figure 3: I am comfortable with this.

p. 51, line 17: I can't find an earlier mention of nematodes.

Comments from Dennis Grossman

Fix the numbering of 3.1, 3.2, etc.

We need to be clear about what we mean when we say "value assessment". In many cases we are talking about the assessment of ecosystem values through a various number of approaches. In this section, the phrase is used to refer to impact of certain actions, therefore the changes to the earlier usage of "value assessment" resulting from specific actions (or lack thereof). We should figure out how to clearly refer to these two conceptual subjects.

I think your model step c) needs to refer to ecological endpoints rather that identify significant ecological services. Having said that, I stumble to understand the concept of endpoints in this context.

The discussion regarding a) Characterizing the Relevant Ecosystem needs more detail to be useful. It currently mixes the concepts of geographic scale with identification of relevant ecosystem types. We should refer to the variety of ecosystem characterizations that are available to use, and provide guidance where different approaches are more appropriate.

First paragraph of current 3.2 is confusing ecosystems, indicators and functional groups. These relationships need to be made much more clearly.

There is an important advance that should be included in the bullets on page 63 under **Closing the Gap**. That is the significant recent advances in the understanding, classification, characterization and mapping of ecosystems across the country. These efforts are providing a robust basis for the development of baseline information and spatial representation of values, that then lead to a robust and transparent representation of spatial effects of different actions and associated changes in values.

Comments from Lou Pitelka

Page 47, line 25 to Page 48, line 29. I am a little concerned about recommending a definition of ecosystems services that is narrower than that of the MEA. Does this encourage EPA to limit the services they consider. While I see the appeal of the "end products" approach, what are the trade-offs? In that context, and at the least, this section should explicitly explain what types of services would be missed by this approach.

Page 50, Figure 3. I still don't like this figure because the horizontal arrows don't make sense. The boxes on the right are simply definitions of the terms in the boxes on the left. The figure could be revised to be a single column of boxes. In each box there would be a heading such as "Functional Groups" or "Ecosystem Function" in bold font, and then underneath in parentheses would be the definitions, from the corresponding box on the right. This would seem more logical and conceptually cleaner.

Page 51, line 17. The sentence refers to "the array of nematodes mentioned earlier", but I think this is the first mention of nematodes. The paragraph on pages 49-50 just refers to "soil organisms" which include nematodes but lots of other things as well.

Page 52, lines 10 and 12. Kathy asks Hal for references or something more specific. I am not sure references would be helpful here. I assume that Kathy wants something more to indicate

that there are methods for the quantification of the properties listed in Figure 3. I think that methods are so abundant and standard that it could even be misleading to cite specific references other than maybe text books on ecological methods. Perhaps a could of sentences such as the following would do:

> There are statistically rigorous sampling methods for determining the distribution and abundance of virtually any kind of plant and animal. There also are well-established methods for tracing links between organisms and the fluxes of energy and nutrients through an ecosystem, i.e., ecosystem processes.

C. Prediction of Ecological Effects (Part 2, Section 3, pp. 53-70)

Comments from Terry Daniel

P 53, L 20 "guide the process and to incorporate …"

The conceptual model should not be overly constrained by current ecological (or economic or social or whatever) knowledge, but even the general model should be built with an eye to eventually incorporating the more detailed ecological models (production functions)—especially those that are relatively well-known and might be expected to be applied.

P 53, L 25 "and the public with legitimate interests (standing) in the outcome."

The question here is whether there is any US citizen who would not have a "legitimate interest" in a regulatory action of the EPA. If the idea here is that some regulations and actions have restrictions on who has (legal) "standing" to make filings or register concerns and opinions, then this needs to be made more clear.

P 59, L 9-15

This section makes it very clear that "eliminating double counting" in valuations of ecosystems/services is an unrealistic goal.

P 62, section 3.5

This section repeats some of the material from Part 2, Section 2, and it could well incorporate much of that discussion as well as the economic/valuation issues (especially double counting) that lead off the earlier section. The advantage of treating these issues here (instead of in the earlier section) is that the ecological context, and the limitations imposed by that context has been well established, allowing the economic issues to be addressed more realistically. Indeed this section, as billed, does a good job of discussing the interface between ecology and value assessment. The statements on P 62, L 14-21 present a useful characterization of the situation and set the stage for appropriate two-way negotiations between ecological and value assessment systems. The discussion in 3.5 could be extended to cover the material from the beginning of Section 2 (especially double counting), but with greater acceptance of the compromises that will surely be required. As it is now in Section 2 the goal (or perhaps even requirement) of orthogonal partitioning in the valuations of ecosystems/services seems to clash with the "butterfly in Brazil" complexity and interconnectedness of ecosystems, and with the current lack of complete knowledge of either the ecological or human-social components of most important ecosystems/services problems.

Comments from Rick Freeman

p. 53, line24/p. 4, line 19/p. 55, line 15: These are places that it might be appropriate to mention mediated modeling as a technique. See the discussion during last week's conference call.

p. 60, lines 6-8: It says, "EPA could mandate that models ... should meet the following seven conditions." This is a pretty stringent set of conditions (esp. d)). Do we think that there is a set of models out there now that meet these seven conditions? I am skeptical partly on the basis of Section 3.4). Or is it an empty set? If the latter, how long will it be before we have such a set of models? What needs to be done to close the gap?

Section 3.4: This section (and probably other parts of Section 3) needs to be revised to be consistent with the discussion of defining ecosystem services in a consistent manner in Section 2.

p. 67, line 29: Is the Barbier reference his 2001 Note in Ecological Economics? Cite it.

p. 67, line 11/p. 68, line 3: Hoagland and Jin, 2006 is not in the reference list.

I just realized that the article by Claire Kremen ("Managing Ecosystem Services: What Do We Need to Know About Their Ecology?") was not cited in this section. I think that it should be and that there should be some discussion of the issues she raises and of the research needs that she identifies. Probably the best place for this is Section 3.4 & 3.5 where a "gap" is identified and suggestions made for closing the gap. My sense is that the present text doesn't go quite far enough in emphasizing the gap and explaining the role it has played in EPA's difficulties in valuing ecosystem services in the recent past.

Comments from Dennis Grossman

Fix the numbering of 3.1, 3.2, etc.

We need to be clear about what we mean when we say "value assessment". In many cases we are talking about the assessment of ecosystem values through a various number of approaches. In this section, the phrase is used to refer to impact of certain actions, therefore the changes to the earlier usage of "value assessment" resulting from specific actions (or lack thereof). We should figure out how to clearly refer to these two conceptual subjects.

Comments from Lou Pitelka

Page 55, line 21. Perhaps mention more than nematodes or bacterial types, since these already have been used as an example. "…functional groups present as exemplified by nematode or bacterial types, or guilds of birds or insects."

Page 58, line 13. Insert "possible" before "outcomes" to make it clear that the models do not predict the future.

Page 66, lines 8-16. This example was discussed in essentially the same words and detail in an earlier section, so at most it should just be referred to.

Page 67, line 2. The term "meta-analysis" means different things to different people. To some, it has a very precise definition with regard to statistical methods that are used. To others it simply means looking at a lot of different studies to see what common results emerge. I wonder if we should use the term.

Page 67, lines 14-26. I think another and perhaps better reference is the Heinz report on The State of the Nation's Ecosystem (2002). This report built on the NRC report but involve many more people and much more effort invested in identifying workable indicators and discussing the availability of data.

Page 70, line 4. I think "six" should be "seven.