

**Summary Minutes of the  
U.S. Environmental Protection Agency (EPA)  
Science Advisory Board (SAB)  
Committee on Valuing the Protection of Ecological Systems and Services (C-VPESS)  
Public Meeting – September 13-15, 2004**

Committee Members: (See Roster – Attachment A)

Scheduled Date and Time: From 1 p.m. to 3:45 p.m (Pacific Time) on September 13, 2004; from 8 a.m. to 6 p.m. (Pacific Time) on September 14, 2004; and from 8 a.m. to 11:30 a.m. (Pacific Time) on September 15, 2004.(See Federal Register Notice, Attachment B)

Location: US EPA Region 9 Headquarters Office, 75 Hawthorne Street, San Francisco, CA 94105

Purpose: The purpose of the meeting is for the Committee to focus on EPA regional science needs, work-products, and activities related to valuing the protection of ecological systems and services by holding panel discussions, briefings, and break-out groups. All of 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 then to identify key areas for improving knowledge, methodologies, practice, and research.

Attendees: Chair: Dr. Domenico Grasso

Committee Members: Dr. William Ascher  
Dr. Gregory Biddinger  
Dr. Ann Bostrom  
Dr. James Boyd  
Dr. Robert Costanza  
Dr. Terry Daniel  
Dr. A. Myrick Freeman  
Dr. Dennis Grossman  
Dr. Robert Huggett  
Dr. Harold Mooney  
Dr. Stephen Polasky  
Dr. Paul Risser  
Dr. Joan Roughgarden  
Dr. Kathleen Segerson  
Dr. Paul Slovic  
Dr. Buzz Thompson

SAB Staff Office: Dr. Angela Nugent, Designated Federal Officer (DFO)  
Dr. Anthony Maciorowski, Associate Director for Science

## Meeting Summary

The discussion followed the Proposed Meeting Agenda (See Meeting Agenda - Attachment C) on September 13 and 14, 2004. In response to suggestions from Committee members, the DFO and the Chair revised the Agenda for September 15, 2004 as described in Attachment D.

## **Opening of Public Meeting**

Dr. Angela Nugent, Designated Federal Officer (DFO) for the SAB Committee on Valuing the Protection of Ecological Systems and Services, opened the meeting at 1:00 p.m. Dr. Grasso welcomed members and asked them to introduce themselves. He asked Dr. Nugent to review the work to date and purpose of meeting by briefly discussing a Draft Outline of C-VPESS Major Report and Status of Activities Status Report on Committee (Attachment E).

## **Welcome from Region 9 and Questions from the Committee**

Ms. Alexis Strauss, Director, Water Division, EPA Region 9, provided an introductory overview to Region 9, which included profiles of states, tribes and Pacific islands that are within the region. She noted that the region was unique in that it spanned the largest geographic area of any EPA region, 61% of its lands are federally owned, and is marked by population growth and the importance of children's issues. It contains very diverse ecosystems and cultures and is marked by regulatory diversity. There are many co-regulators at the state and local levels. She touched on the particular major environmental issues of states, tribes, and Pacific Islands and then took questions from the Committee.

In response to a question about successes and challenges, Ms. Strauss noted that California is trying to manage the impacts of population and vehicle growth so that air quality does not deteriorate at the same pace as the population growth. Nevertheless, air pollution in the Central Valley is a major issue and air pollution impacts on children's health are significant. She noted that Region 9 has a special challenge in ensuring quality of drinking water because many drinking water systems are small. There have been successes in introducing circuit riders who provide effective technical and compliance assistance to remote locations. More funding is needed for such delivery tools that have demonstrated their effectiveness. The Associate Director, Karen Schwinn, noted that the Region sees improvements in capacity building. More entities are working on solutions, there are more watershed groups engaged, and overall more cooperation across governments at all different levels.

A Committee member asked about the friction points in regional interactions with state and local governments. Ms. Strauss responded that many environmental protection issues, especially water quality issues, touch on water quantity and land use issues, where EPA does not have authority. Those issues are sometimes points of friction with state and local governments. She also noted that some states, because of capacity issues, cannot keep pace with federal regulations to ensure state requirements are no less stringent than federal requirements. EPA, as a result, is regulating more, and working side-by-side with states. This is a situation where conflicts can occur.

Another member asked about the Region's activities to address invasive species. Ms. Strauss agreed that exotic species is a major issue. She noted that EPA has been sued for not having exotic species considered a pollutants under the Clean Water Act (CWA). EPA is currently wrestling with whether and how to set policy in this arena, while a local water board is preparing a Total Maximum Daily Load (TMDL) for exotic species. She noted that states are looking to EPA because exotic species are an international issue that individual states cannot effectively address.

A Committee member asked Ms. Strauss her thoughts on what the C-VPESSE might be able to offer her division and the region : "How would it help you to better value ecosystem service? What role does this value play? Who would be the audience?" Ms. Strauss responded that one role would be in the wetlands program, both in the wetlands permitting program and the enforcement program. The Agency faces an "uphill battle;" many land developers do not see the value of wetlands, especially ephemeral streams. Science-based information on the value of such wetlands would be useful. The Agency could also use science-based information to help set penalties in the penalty models such as BEN and ABLE. The potential audiences would be local government authorities who have regulatory authority, and also the need for a revenue base, colleagues at the Army Corps of Engineers, even EPA staff themselves. Often Headquarters doesn't appreciate the value of ephemeral streams.

A Committee member asked whether "value" information needed to be expressed in monetary terms for regional purposes or whether other qualitative or quantitative value information that was scientifically consistent would be useful. Ms. Strauss responded that she did not have a complete answer. Based on her past experience with Superfund, the numbers of fish and pelicans tainted was very powerful information; it was qualitative information that could help make the case for the value of ecological resources that were damaged. She thought also of the case of Palau, where choices are being made about a road to access a golf course and resulting damage to reefs and mangrove trees. It would benefit the Agency to have ways to make effective arguments about the value of preventing damages. She emphasized the importance of science-based information that can help people understand the value of ecological resources and that can help them make different decisions.

### **Briefings and Committee Discussion Highlighting Region 9 Issues**

Ms. Karen Schwinn, Associate Director for the Water Division, introduced regional staff who discussed activities and cases intended to give Committee members a sense of the breadth of issues involving valuing ecological resources in Region 9.

Johnson Atoll Closure and Restoration Project. Dr. Matthew Small gave a presentation on the Johnson Atoll Closure and Restoration Project, which involved a clean up decision for a military facility, based on an ecological risk assessment. Committee members asked whether the Agency had tested animal tissues to confirm estimates made from the ecological risk assessment. A member asked a question about the value of such a clean up on an island where there would be no humans and therefore no impact of ecological protection for humans on that island itself. Dr. Small responded that the thrust of the clean up effort was to leave the least impact, to leave a healthy ecosystem that can contribute to large ecosystem, rather than a death trap. Another

member asked whether the analysis focused on petroleum hydrocarbons and their potential to degrade naturally. Dr. Small noted that hydrocarbons were only one of several toxicants. He acknowledged that hydrocarbons do degrade and that monitored natural attenuation has been incorporated as a potential solution at other clean-up sites.

A member asked if the C-VPESS were to come up with a basis for valuing ecosystem serving (whether anthropocentric or non-anthropocentric), would such information have helped in setting a goal or have changed the cleanup decisions. Dr. Small responded that it would have added another criterion to the evaluation. It would have helped the Agency consider whether his is an extremely valuable ecosystem to compare against other risk based goals.

Ecological Values and Implementation of the Combined Animal Feeding Operations (CAFO) Water Rule: A Regional Perspective. Mr. John Ungvasky provided an overview of the tremendous impacts caused by the 1,550 dairies and 1.2 million cows in the San Joachim Valley and how regional activities implementing the rule and the science issues involved were different in focus from the issues highlighted in the national CAFO rule. He suggested that the Committee consider the top 10 Animal Feeding Operations Science Questions identified in an EPA Office of Research and Development-led effort with regional input and the also generally emphasized the importance of using biological measures as a tool for valuation of ecological services. A Committee member asked, given the focus on biological indicators, why the region did not track progress implementing the CAFO rule, with ecological indicators. Mr. Ungvasky responded that the Agency's tools for marking progress were primarily numbers of permits granted and other procedural measures, but that he would use information on ecological indicators in implementing the program, if he had that information available.

Bay Delta Water Quality Standards . Dr. Bruce Herbold provided a presentation with slides titled "Using Science vs. Doing Science or Estuarine Habitat vs. Salmon Passage or X2 vs. VAMP," where he focused on efforts to regulate outflow into the San Francisco Bay Estuary, and the impacts of changes in outflow and resulting salinity on salmon populations. The Vernalis Adaptive Management Program (VAMP) studied the impacts of different flow regimes on fish catches as a tool for addressing water quantity issues and issues of salmon protection. A Committee member asked about the scope of monitoring and modeling. Dr. Herbold responded that only delta smelt and salmon were modeled, but that variables driving these two species cover a lot of issues. Another member asked about the impact of introduced species on the estuary. Dr. Herbold responded that shad and striped bass have enriched the number of species, but in his view introducing species is "Russian Roulette." He spoke of the negative impacts of the introduced clam, which made the overall system "more brittle." The member noted that increasing species diversity may be considered a good thing.

Total Maximum Daily Load (TMDL). Mr. David Smith gave a presentation on the use of science tools in TMDL Design. He noted that he has never used benefit-cost analysis in his job because he understood that benefit analyses were conducted at the national level as part of setting standards. Rather than analyze benefits for a site, he sees the social science challenges as evaluating control costs and public willingness to take voluntary actions. He noted that because many TMDLs involve nonpoint sources, there is increasing interest in getting the public involved in decisions and thinking through trade-offs of alternative actions. He expressed the view that

there was a need for simple scientific tools in this regard and that the public distrusted computer-based decision support tools, which seemed like a "black box."

A member asked whether the public also distrusted models that generated costs of analyses. Mr. Smith responded that he saw a global distrust of models of any kind, whether economic or ecological. In terms of costs, EPA "gets deference from courts." In general, with methods, simpler tools work better.

Baylands Ecosystem Goals Project and Field Trip to Arrowhead Marsh. The FACA meeting adjourned at 3:30, when the Committee departed US EPA Region 9 Headquarters Offices by van for the Offices of the San Francisco Estuary Institute (SFEI). They were welcomed there by Dr. Michael Conner, Executive Director. They heard presentations from Mr. Arthur Feinstein, Conservation/Education Director of the Golden Gate Audubon Society and a citizen activist involved in a lawsuit that led to the restoration of Arrowhead Marsh, Dr. Joshua Collins, Ph.D., principal author and lead scientist for the Bay Area EcoAtlas and the Baylands Ecosystem Habitat Goals, and Dr. Andrew Cohen, who directs SFEI's Biological Invasions research program. The Committee also heard a presentation from Mr. Michael Monroe from Region 9 about the development of the "Bayland Ecosystem Habitat Goals" which touched on the scientific process for developing those goals and how they are being used.

**Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions.** The DFO opened the meeting on Tuesday, September 14, 2004 at 8:00. Ms. Patti Lynn Tyler of Region 8 provided a brief introduction to the document summarizing regional responses to the Survey of regional needs developed by the SAB Staff Office with input from the National Regional Science Council. She then took questions from the Committee. She clarified that responses to the survey were optional. Differences across regions likely resulted from different regional priorities, their different size and level of expertise, and lack of standard methods and approaches across the Agency. A member noted that it was striking that regions differed greatly, although regional boundaries are not biological. Ms. Tyler noted that some programs, like Regional EMAP, involve cooperative efforts across several regions. She noted the potential need for strengthening regional science councils or other mechanisms for enhancing communication and cooperation. In response to a question, she noted that there was no directive from Headquarter to identify common goals for ecological values. Another member asked whether the lack of regulatory imperatives calling for valuing ecological system was a real barrier or perceived barrier. Ms. Tyler responded that it was a "perceived barrier" and that many respondents noted opportunities in the NEPA, wetlands and Superfund programs and she suggested the Agency could make progress if it had common definitions, some methods and approaches to try, and improved communications. She suggested that it would be helpful to look at the work in Regions 4, 5, and 7 with Geographic Information Systems (GIS) to see if that suggested a tool that additional regions could work with.

### **Briefings on Innovative Methods Addressing Regional Issues**

Comparative Valuation of Ecosystem Services: Lents Project Case Study. Ms. Gillian Ockner of David Evans and Associates gave a presentation on this case study, and Mr. James Middaugh, Endangered Species Act Program Director, Bureau of Environmental Services, City

of Portland, provided a written statement to the Committee and participated by telephone. Ms. Ockner described the process used for developing the Stella-based model designed to support decision making by the City of Portland related to restoring and protecting natural resources. Members of the Committee thanked her for her presentation and made the comments and asked the questions below.

"What capacity does it take to develop the initial model and then to follow up?" Ms. Ockner responded that this model, developed at a site-specific scale wasn't necessarily transferable to other scales, but the method as a whole and certain elements of the model are adaptable. The project came in under budget (\$150,000) for the full development of the Stella model ecological and the economic assessment conducted by ECONorthwest. The Stella model was developed jointly by David Evans and ECONorthwest working jointly on the design and how to populate the cells. It took time and effort from the City of Portland to review and participate in the design of the model. Mr. Middaugh noted that the city was able to meet many of the data needs for model with data collected to meet current requirements. He noted that Phase 1 NPDES requirements called for much of the data needed.

A member cautioned the project not to indicate false precision by expressing values in many significant digits where there are significant uncertainties.

A member of the Committee asked whether there had been any provision in the project for *ex post* monitoring. Ms. Ockner responded that there hadn't been advance planning for such monitoring, but that important questions have arisen now that the model is complete: "You've quantified benefits -- will we really realize them? who gets the benefits?" She noted that these questions are important to address as part of communications involving the model and its results. Mr. Middaugh noted that the city will be monitoring bio-physical changes as part of implementing decisions made and it is planning to monitor recreation-related variables and to conduct an initial survey of property values, but there is no current strategic plan to do more. He suggested that support from EPA might help convince the City Council to invest in follow up monitoring.

A member asked about how the discount rate was set. Ms. Ockner acknowledged that the choice of discount rate for this project, as for many project, is controversial and raised many complex issues (e.g., ecological systems might become scarcer over time, intergenerational equity raises special issues). She noted that economists can differ. A staggered rate was chosen as a conservative way to estimate the net present value. She noted the importance of communicating that the choice of discount rate choice was critical and that there were ecological benefits there to be captured, no matter what interest rate was chosen. An economist member of the Committee commented that the discounting assumptions made were reasonable and consistent with a majority of economists' views. He noted that Ascher's concern about the opportunity cost of capital could be handled by using a shadow price of capital, (eg., Lind's 1981 work).

Another member of the Committee noted that the modeling technique used allows sensitivity analyses that can permit members of the public to test different assumptions. He asked about how the design process addressed model error, specifically whether there was a process for asking other parties whether the design should have included different attributes of

values. Ms. Ockner responded that a number of staff from the City of Portland's Planning and Environmental Services Divisions had specific targeted question regarding uncertainties in biophysical models and that this process helped designers address the question of whether assumptions were sufficiently transparent. She noted that the model's results were initially higher and met with an initial level of distrust from reviewers. The designers tried to make the output more transparent and the model and its presentation were adjusted to reflect stakeholders concerns with respect to legitimacy. She noted the importance of adjusting to the needs of stakeholders. She commented that in future presentations she will identify the stakeholders and acknowledged their contributions to assumptions in the model.

A Committee member asked about the degree of involvement of stakeholders and whether they were involved in the conceptualization stage. Ms. Ockner responded by noting a trade-off. Involving stakeholders at the conceptualization stage results in greater "buy-in" but also lengthens the process. She noted that Sandia's process for water modeling involved stakeholders in initial conceptual stages and was an extremely lengthy process. The Committee member noted that two kinds of credibility are needed, both scientific and stakeholder credibility, and noted a recent publication by Island Press on *Mediated Modeling*.

A Committee member asked about the costs of the project to the City of Portland in terms of person-hours invested by city personnel. Mr. Middaugh responded that person hours invested in conceptual efforts and new data collection (data collected expressly for this project and not collected for other purposes) totaled approximately \$30,000. Mr. Middaugh commented that this investment helped policy makers make decisions and were good investments for the short and long term.

Science to Inform Policy and Decision Making. Dr. Richard Bernknopf from the US Geological Survey (USGS) Western Geographic Science Center, provided an overview of projects underway to provide scientific information to assist in making strategic land use decisions. USGS develops geospatial decision support systems in a mean-variance choice framework that have been used for both market and non-market valuation projects.

A Committee member asked if USGS has worked with experts in visualization to assist in facilitating use of USGS models. Dr. Bernknopf stated that he had not but saw the need to make model results easier to understand. Another member suggested that the USGS work was more aligned to cost-effectiveness analysis and asked if the USGS has undertaken cost-benefit projects. Dr. Bernknopf described a project at Lake Tahoe, where they plan to adapt their model to capture information about non-market values such as the value of the appearance of the lake and the willingness to pay for the "Tahoe Experience."

### **Committee Discussion of Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions**

Drs. Bostrom, Grossman, and Polasky began the Committee discussion with a presentation representing their initial observations and conclusions. All three members expressed concern about the completeness and reliability of the survey results. Despite those

concerns, they made several observations. Dr. Bostrom provided an overview of the decision context for regional needs. She noted a broad need for tools that identify and locate ecological systems and their characteristics, defined by different regions in terms of : irreplaceability, conservation opportunity, threat, ecological diversity, current and historic landscape function, significance, ecological integrity and sustainability, intrinsic value (tribal lands) and other terms. The survey indicated that Regions and partnering groups are developing decision support tools to do this (e.g., CrEAM, MoRAP, SEF, EcoMapper, SCERP). In general, most regions effectively report that: "Economics are often not explicitly part of the decision rule at the regional/state level."

She noted an acknowledgement of the need for more standardized tools, like NEBA (National Environmental Benefit Assessment) or in the mention of Emergy, Habitat Equivalency Analysis, and Resource Equivalency Analysis, along with monetization of benefits, as ways of comparing across ecological units. Monetized approaches were mentioned rarely, such as for Supplemental Environmental Projects and impoundment-related valuations. Types of decisions and decision contexts for which the regions need or use valuation include: Supplemental Environmental Protection (SEPs); targeting projects such as wetland restoration and enhancement, assessing significance; Superfund and RCRA cleanups, Brownfield redevelopment - choosing between clean-up options; environmental impact statements and NEPA reviews; showing the value of environmental protection to influence decisions prospectively; and assisting state and local governments with land-use decisions.

Her general conclusions were that regions were beginning to tackle ecological valuation and science based approaches to valuing ecological protection, but there was wide variability. The regions generally are using biophysical measurements, which they regard as sufficient for most purposes, except when some other kind of value information is required, as in the case of the courts requirements for SEPs.

Dr. Dennis Grossman presented his observations and focused on the Regions' use of biophysical and ecological information. He noted two types of regional decisions where such "value information" was needed: efforts directly aimed at protection of identified biological and ecological values and efforts where ecological protection occurred as a result of other activities (e.g., clean-ups). He saw a need for the Agency to standardize approaches used for setting biological and ecological information on values. He suggested that the Agency clearly identify the units of record, i.e., use a standard characterization so that everyone is developing key attributes on the same units and provided specific suggestions related to characterization of ecosystems, biological and ecological communities of special conservation interest, and species of concern. He suggested that regional needs could be better met by developing a relative set of values for each of these units for their conservation importance, ecological service value, and societal value. He then suggested developing a set of information attributes for each of these units [e.g., reference conditions, relationship between the biology, chemistry and physical characteristics , quality/integrity indicators (biocriteria indices), definition of 'significant impacts,' and conservation goals (regional basis)].

Dr. Stephen Polasky completed the set of initial comments with some observations about Regions' use of economics. He noted that few regions had made use of economic information. An issue for regions is to identify the "benefit-cost of valuation" -- and so determine when

economic valuation is worth doing, because it is not easy or cheap. He noted that the experience of the Portland Lents Study was encouraging; a high quality study was completed at a reasonable cost, but noted that this high-quality study only captured a narrow range of ecological values.

He then suggested that if regions choose to develop capabilities for valuation, they will need economic expertise at the regional level or expertise and advice from EPA's National Center for Environmental Economics. He commented that a large literature on valuation was available. NCEE might provide an information clearinghouse on best practices and estimates of value and guidance on benefits transfer. He noted that the Regions could benefit from working with each other and other experts.

Dr. Grossman then offered some general conclusions, discussion points and questions to begin the committee discussion. The lead presenters suggested the following recommendations related to regional needs: 1) EPA should provide leadership on describing, valuing and monitoring the nation's ecosystems; 2) EPA should reach agreement on some common units and methods. There appears to be considerable agreement about ecological values, but little effort to standardize characterizations and measurements; and 3) perhaps the regions should develop a consistent National Ecological Framework?

One member noted the disadvantage of relying exclusively on biophysical units for expressing values; the Agency and others will not be able to compare investments and outcomes in different programs. Another member responded that effectively the Agency can't compare the loss of threatened and endangered species with preventing asthma in children. In his view, certain problems are comparable and some are not. In contrast, another member voiced the view that the Agency could compare a high visibility health effect for children with an ecological effect and that science-based value information would be valuable for that comparison. Another member noted, in addition, that some actions have multiple effects and it would be helpful to know the value of those multiple effects.

The Committee then discussed the survey and its limitations. One Committee member noted that respondents generally were not thinking creatively about what they could potentially do with information on the value of protecting ecological systems and services. The Committee asked the DFO to enquire whether there were legal requirements in civil penalties for certain kinds of monetary information about the value of damages to ecosystems. They also asked her to seek further information about the types of situations where regions use information about the value of protecting ecological systems and services to engage state and local governments or other organizations in environmental protection efforts.

The Committee discussed the nature of regional needs for information. One member noted that regional "implementers" report they have discretion in choosing strategies for implementing regulations and standards. He noted that there was no mandate for valuation at the regional level and that there could be some resistance to valuation. Another member noted that the Region 9 briefings on the previous day seem to suggest that "value information" expressed in ecological terms and related to ecological goals was helpful and that there was no necessity to link to a dollar value, but the Region 4 South East Ecological Framework example to be discussed later in the agenda seemed to call for monetized value information. Another member noted that there was not consensus in some of the briefings about the nature of the ecological

values to be protected. For example, preserving a native species was held as a value by some, but not all.

Other members noted that the regulatory system seemed to support allowing some kinds of values to operate in isolation, without trade-offs across them. EPA restoration projects, for example, called for restoration efforts at a site to be linked to damages at that site. The Endangered Species Act sets a value on endangered and threatened species, and does not invite trade-offs between protecting endangered species and other goals. Some members responded that EPA's Supplemental Environmental Projects, however, introduce the idea of identifying ecological values that could be expressed at an alternative location through investment in supplemental projects. One member stated that there should be an economic evaluation of removing introduced species. At Arrowhead Marsh, for example, there is an issue of allocating resources for conservation against removal of introduced species, which is a continual, expensive process, which is disruptive to other aspects of the ecological protection effort. She suggested that the C-VPESS should address the value of different kinds of spartina grass and the significance of nativeness vs. invasiveness. She also noted that when a threshold is set at the national level for a regulatory purpose, there should be explicit discussion of valuation issues. Another member noted that such discussions happen as part of the political process. The DFO noted that such discussions happen at the national rule-making level and were discussed as part of the C-VPESS June meeting.

The Members then discussed the potential of information on ecological values for informing decision making generally. One member noted that although it potentially offered a tool for evaluating opportunity costs, the tool has many uncertainties and one must address the question of who incurs the costs and to whom the benefits result. Ms. Ockner commented that even for the Portland Lents analysis, the contingent valuation questions were somewhat vaguely worded as "what were people willing to pay for water quality improvement to improve salmon habitat" and she noted that the study only noted value for respondents within that watershed. A member noted that despite the uncertainties, the Agency could benefit from insights from the valuation study. In the Chesapeake Bay, for example, it is important to consider the potential impact of introducing the Asian oyster.

A member suggested that the Committee could reconsider where EPA should conduct cost-benefit analyses across all scales. Another member suggested that economists will be looking for some guidance related to the ecological analyses on which they will build their reports. Rather than have the Agency produce "a million flowers blooming," there may be a convergence on indicators or measures we can gravitate toward.

Another member noted that it is important for the Committee to do two things: 1) to respond to what the Agency perceives as its needs and to strengthen the valuation process as described, and 2) to provide recommendations to improve that process through advice about how analysis should inform decision making.

In that regard, a member asked about whether the Committee was bound by comments that the current administration was not open to "mission creep," if the committee saw merit in recommendations suggesting "mission push." Dr. Anthony Maciorowski responded that EPA has no legal mandates in the area of global change, natural resource damage trustee, or in land

use. Yet the Agency, especially under the current Administrator, sees its role as a "credible convener" of affected parties. Especially under the Clean Water Act, the Agency has acted consistently in this role over the past decade. On major environmental issues related to the Agency's larger mission in protecting human health and the environment, he stated that EPA is working with other agencies at the federal and state levels.

### **Open Discussion on Directions for the Committee**

After a break for lunch, the Committee convened for a general discussion of directions for the Committee. The Chair asked the DFO to summarize the current status of committee activities designed to produce a final report (See Attachment E). The Chair introduced the discussion by noting the Steering Group's strategy to have the Committee focus on different contexts for Agency decisions and its potential use of science-based information for valuing the protection of ecological systems and services. The next step would be to focus on cross-cutting issues and related methods and tools that would be the heart of the Committee's advice. The current plan was to design meetings in 2005 to address those issues.

The Chair asked each Committee member to identify their current observations and suggestions for directions for the Committee. These comments are listed below.

- Committee should come up with specific advice for the Agency.
- Committee's report should be succinct.
- Meetings should allow more time for discussion.
- Committee should move directly to work on the report; no more information is needed on the Agency context for decision making.
- Steering Group's plan is OK.
- There's a need for recommendations that can optimize Agency's use of tools for decisions.
- Chapter 5 of the proposed report is the most important part; need to move on it.
- Provide context in parallel.
- Put write-ups of examples in the appendix. Examples needed for credibility of the report.
- Key issues recur; we need to get agreement on them (e.g., stakeholder involvement, use of contingent valuation).
- Suggests shortening the GPRA discussion and start methods earlier.
- As additional questions arise, then drill down into the context. Current workplan to gather additional data about the EPA-OMB interaction is appropriate.
- OK with Steering Group's plan.
- Exercises useful to see how recommendations would be put into practice.
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- Thinks the report should have different "pods" -- an OMB-related "pod" and a GPRA "pod."

- Report should have a huge amount of humility; need to convey weaknesses in approaches.
- Committee needs to continue to focus on what other people are getting from our conversations.
- C-VPESS is opening a window for EPA into a new dialogue.
- Input will need to be digested.
- Will recommendations have standing?
- Wants EPA to promote management and stewardship of ecological resources. Feels comfortable calling for additional legislation.
  
- Would like to push balance of committee's time toward more discussion so that committee could resolve recurring issues.
  
- Wants more time to discuss committee documents and work products under way.
- Suggests a half day on GPRA.
  
- Comfortable with proposed process
- Wants to see a clean list of unresolved issues and time on future agendas devoted to work them.
- Committee needs to keep asking: if EPA had more information, what would it do with it?
- Wants to know about other SAB Committee's reports: SAB Committee on the Report on the Environment, the Southeastern Ecological Framework, the Illegal Competitive Advantage Panel, the Framework for Assessing and Reporting on Ecological Condition.
  
- The Outline and process is OK.
- January Meeting should have reports from subgroups.
- Methods discussion should somehow go in Outline sections 5.1 and 2.3.
- Report should give significant attention to the economic approach because that's what EPA needs for rulemaking..
  
- The "how to" question is key.
- Start talking about cross-cutting issues now.
- Need examples for the Committee's credibility and to test recommendations.
  
- Committee will learn a lot from reviewing the Agency's draft *Ecological Benefits Assessment Strategic Plan*.
- Suggests accelerating the 2-3ay meeting on GPRA.
  
- Enthused about the Lents study and its possibilities.
- Sees merit in taking time for learning about GPRA and the Strategic Plan.
- Agrees that the Committee should not be limited by where the Agency is now - it should also try to agree on and communicate a new vision.
- Committee needs more discussion time, moving out of the strategic plan review.

The Chair responded that the Steering Group would consider this feedback in planning the next meetings for the Committee.

The Committee also discussed scheduling issues concerning the *Ecological Benefits Assessment Strategic Plan*, currently planned for November 2-3, 2004. Several members informed the DFO and the Committee that they could not attend the meeting, which occurred, in part, on election day. The Chair asked the DFO to identify if there were alternative times for holding the meeting.

#### **Introduction to the Example Exercise Process and Benefit Analyses for Critical Ecosystems in Region 4.**

The Committee then received a brief orientation to the example exercise process, presented by the Chair (See Attachment F) and a briefing on the Benefit Analyses for Critical Ecosystems in Region 4 provided by Mr. Richard Durbrow from EPA Region 4. Committee members asked several questions before beginning the example exercise. One member asked EPA's role in the Region 4 Critical Ecosystem project. Mr. Durbrow responded that the Agency acted as a convener. An SAB Staff Office member added that the Agency acted as an information provider, just as the Agency is planning a Report on the Environment.

Mr. Durbrow confirmed, in response to a question from another Committee member that Region 4 was seeking a dollar value that could be associated with an acre of wetland left in a preserved state. He also commented that his Region is not seeking contingent value (CV) estimates because county officials, his intended audience, do not have much confidence in CV estimates. They regard them as theoretical estimates, rather as representatives of costs they can save by preserving ecological resources, for example, by building water treatment plants to replace filtration services formerly performed by wetlands. A member then asked about the marginal utility of parts of an ecological corridor, after the ecological function of other parts have changed because of changing uses; "Wouldn't the last piece be more valuable than the first piece?" Mr. Durbrow responded that he was seeking a valuation of the whole system working together. Another member noted that the model could be recalibrated and run repeatedly to show different scenarios. A member raised a concern about viewing county-level officials only as the audience, because the benefits to local decision makers may not outweigh costs of unemployment and other development pressures county officials face.

A Committee member praised the GIS model used by Region 4 for evaluating critical ecosystems. She asked, however, why the Region 4 model differed from the Michigan model, which had specific layers for fragmentation and rarity. She noted a proliferation of models across the regions based on different criteria. She also compared the Region 4 model with the Stella model used by the Portland Lentz Project, which facilitated visualization of the conceptual scheme. She suggested that it would be useful for a scientific committee to peer review the layering scheme. Mr. Durbrow responded that the University of Florida is peer reviewing the layering scheme, and that the Natural Resource Leadership Council of the States had asked for a proposal for a nation wide approach to critical ecosystems.

A Member asked about the choices behind Region 4's current data Layers. Mr. Durbrow responded that the choice of data layers depended on the data available and that the Region was looking for suggestions on other data.

Members asked for clarification about whether Region 4 was seeking a single number or multiple numbers for a given pixel. Mr. Durbrow responded that the Agency is seeking a number that could be decomposed to its contributions to ecosystem services.

The Committee broke into two small groups to discuss the "Benefit Analyses for Critical Ecosystems in Region 4" and then reconvened for reports from the two break out leaders, Drs. Risser and Segerson (See Attachment G). Drs. Segerson and Risser agreed to write up a consolidated report from their discussions. One member asked for clarification of the purpose of the example exercise and expressed concern that it did not provide sufficient information or opportunity for the Committee to provide well-founded advice. She noted that it did not work well as a tech-transfer mechanism. The Chair responded that they were primarily intended as a learning exercise for the Committee to ensure that the Committee understood the contexts in which EPA would use eco-value information.

After the reports, several members asked if the agenda for the Committee's Friday session could be changed to replace the planned Bolsa Chica example exercise with a shorter briefing and an extended discussion for the Committee as a whole on cross-cutting themes.

The Chair and DFO agreed to work with the Steering Group to adjust the agenda. The meeting adjourned at 6:00 pm.

### **Discussion of Revised Agenda**

The DFO opened the meeting on September 15, 2004 at 8:00 a.m. The Chair discussed revisions of the Agenda (see Attachment D) to include a briefing and discussion of the Bolsa Chica Restoration Project, a general discussion of conclusions from the meeting and priorities for the Committee, and a discussion of the Committee's understanding of the term "ecological services."

### **Briefing on and Discussion of Bolsa Chica Restoration Project**

Dr. Ned Black from Region 9 discussed the ecological risk assessment of Bolsa Chica and the restoration of that area. The project had the goal of eliminating oil production and creating a wildlife refuge owned by the state of California and managed by the Department of the Interior. The risk assessment informed decisions about where and to what extent clean-up activities would occur. Committee members asked questions about how the project engaged stakeholders in problem formation. Generally, Dr. Black responded that ecological risk assessors involve other federal agencies, responsible parties (where appropriate), and the public. In the Superfund program, as the "BTAG Coordinator," he involves other stakeholders to get their input and works with responsible parties if they are willing to cooperate with the clean up.

A Member asked about the ability of Superfund programs to use the Natural Resource Damage Assessment (NRDA) Approach. Mr. Black responded that Natural Resource Damage

Trustees conduct NRDA's, but EPA is prohibited by law from doing such analyses. Dr. Black explained that EPA shares data, confers with other federal partners, but doesn't take the NRDA information and include it in the EPA risk assessment. When questioned by the member, he acknowledged that such analyses could be useful to the Agency in helping to choose remediation strategies. For a site like Bolsa Chica, for example, which was a risk-based clean-up, the goals were set as a range of values. A benefit analysis could be used to value ecosystem services within that range for portions of the remediation site. He also cautioned, however, that such an analysis could potentially be used by responsible parties to argue against a clean up decision.

Dr. Black suggested that he saw several purposes for valuation in the Bolsa Chica experience. Valuation of benefits might help decision makers determine where in a range of values a clean-up might happen. It might help decide among several remediation options, especially where there were risk/risk or benefit/benefit trade-offs to be made. He welcomed concrete suggestions from the Committee about how analysis of ecological values could be integrated into the report.

Members noted the latitude to experiment with the Bolsa Chica site, which used ecological risk assessment methods for a clean-up outside the Superfund process. One member suggested that there might be three places where valuation might play a role: 1) in the planning stage, where explicit discussions of ecological and economic values might help set assessment endpoints; 2) in the middle of the assessment when the risk characterization was being planned - valuation might help better characterize the options that managers might consider; and 3) in the choice of the final remedy.

### **General Discussion of EPA Regional Needs and How To Document Committee Advice for Inclusion in the Committee Report**

The Chair began the session by asking Committee members to consider the general conclusions that could be "teased" out of all the regional discussions and the kinds of advice that the Committee could give. He reminded the members of the topics discussed and the range of issues described in briefings, the Committee's field trip, and the example exercise.

One member noted the importance of habitat destruction, whether from global warming, or chemical, biological, or other physical stressors.

Another member noted that at the regional level, where rules are operationalized or implemented, there is generally no mandate to use valuation tools. Regions have pressures on their resources and time constraints, capacity issues in terms of people-power and tools, and likely organizational barriers to begin using a tool that is not required. Yet, he suggested that the regions might be the place in which eco-value tools can make a difference in quality outcomes. National decision-making is often more politics than ecology; at the regional level, people make better decision if information and tools are part of their repertoire. Another member seconded the view that assessments may be more meaningful at the local level. The Committee might find it useful to generalize across the types of decisions identified to show where it is worthwhile to invest in eco-valuation. Extra-statutory activities might be the area with the greatest opportunities. Another member wondered whether there was a big difference between national and regional decision making. He suggested that as the Office of Information and Regulatory

Affairs in the Office of Management and Budget is trying to increase the importance of analysis in rulemakings, rules will be less politically driven.

Another member remarked that currently there are many "immature experiments." What is needed is a structure where people can learn from experiments and not start *de novo*. He suggest that the Agency build a process to develop lessons learned from these experiments and predicted that we should have more cases soon because of the demand. Another member echoed the need for experimentation and for mechanisms to get regions together to discuss what could be common about decision frameworks and needs.

One member identified a key difference between regional and national analysis is the focus on land use decisions. This focus opens up possibilities. Site-specific info is more credible. Even the Region 4 Critical Ecosystem scale information seemed to loose the type of credibility associated with the Lents study.

One member noted the need for an institutional mechanism through which some central group, like the National Center for Environmental Economics, could work with the regions to provide them with information and help coordinate across the regions. Dr. Vanessa Vu, Director of the SAB Staff Office, noted the merits of recognizing the need for coordination and resource sharing in a time of flat budgets. Dr. Anthony Maciorowski observed that regional offices generally don't have economists; the regions might need to gain access to Headquarter tools or might need some different tools than those used at Headquarters.

Another member cautioned the Committee not to jump to a model where a "scientific priesthood delivers value." The Committee has yet to talk through the viability of a constructed value approach involving stakeholders. He suggested the Committee might not simply advise a transfer of economics expertise from Headquarters to the Regions; it could also consider translating mechanisms for translating what happens in regions to NCEE to help them communicate what they do better. Another member noted that valuation is not solely economic; it is a political psychological, and cultural process.

Another members then spoke of the need to come up with ways to value ecosystems; then advice on where and when to use such values would be more persuasive. A member spoke of the need for standard approaches and guidance to rank ecosystems. He asked if the Committee or the Agency could provide guidance to help regions make better decisions.

A member offered several suggestions for constructing the section of the Committee's report. She indicated that there are particular sets of decisions that seem salient for focus; certain kinds of analysis, such as NEBA, that merit more examination as potential tools for the Agency to use; she also saw active interagency collaboration and how to accomplish that effectively as a theme.

The Chair thanked members for their observations and asked Drs. Bostrom, Grossman, and Polasky if they would expand the section of the report they were to draft to integrate the Committee's discussion of regional needs and advice for the regions. He then turned to Dr. Buzz Thompson to chair the final session of the meeting.

## Discussion of Ecological Services - Definition, Lists, and Categories and How Such Information Might Be Used for the Committee Report

Dr. Buzz Thompson opened discussion on this agenda item by asking the DFO to distribute a definition for ecological services prepared by the Agency as part of the *Ecological Benefits Assessment Strategic Plan* and released to the Committee in June. The draft definition reads as follows:

*Ecosystem services* are those ecological functions or processes that directly or indirectly contribute to human well-being or have the potential to do so in the future. Ecosystem services include:

- the provision of natural outputs enjoyed by people – sometimes referred to as **ecosystem goods** –such as wild game, fish, and forest products, as well as those attributes that provide amenity, such as a scenic vista;
- the processes that regulate and maintain the conditions necessary for human survival, such as nutrient cycling and aquifer recharge.

He asked if the Committee might come to an agreement itself about this definition and how it might be used in the Committee's report. He noted that valuing ecosystem services were only one part of the Committee's charge, which also included valuing ecological systems.

The discussion began as one member cautioned against over-emphasizing valuing services as opposed to ecological systems. He provided the Committee with a copy of an article, *Money*, by William J Lines, from a volume entitled *Open Air Essays* (Sydney, New South Wales, 2001), which provided a critique of monetizing ecosystem services as a starting point for discussion.

Another member agreed with the EPA definition and found it a good place to start for the Committee. Assuming that ecological services then was a key concept for valuation, that member stated that the Committee should advise the Agency to change the flow diagram used for ecological risk assessment to integrate ecosystem services valuation into the process. Such advice would potentially change how assessments like the Johnson Atoll and Bolsa Chica assessments were conducted. In designing the assessment, the Agency would identify the ecological services it would like to see, and perhaps work through a "laundry list" of services. A Steering Group member noted that the Agency's *Ecological Benefits Assessment Strategic Plan* contains a proposed flowchart that suggests such an integration. A member of the Committee also stated that the Agency's chief guidance document for ecological risk assessment emphasizes the importance of identifying ecological services for problem formulation and ecological risk management. He suggested that the Agency needs guidance on how to identify these services and ensure that it happens during those stages. Another member agreed that practical and understandable guidance in this area would help analyses.

Dr. Anthony Maciorowski voiced the need for the development of case studies that might help the Agency integrate ecological risk assessment with eco-valuation. A member noted ORD's efforts to conduct case studies that were reported at the April 2004 C-VPES meeting.

Dr. A. Myrick Freeman noted that EPA's definition is compatible with his recent publication, and the work of Gretchen Dailey and the Millennium Assessment.

Another member noted, however, that the definition of ecosystem services doesn't correspond to the value of the natural world as expressed by nature writers, photographers, and film makers. Those writers and artists, and a large group of people who care deeply about the environment and nature, would reject the notion of ecological services as too narrow and limited. He clarified that he personally was not arguing that ecosystems have rights, but that there were values associated with ecosystems that were not encompassed by "ecological services." He asked: how do you develop methodology that give weight and voice to parts that are left out?

Another members responded that they saw the EPA draft definition as very broad. They viewed it as encompassing existence values and the intrinsic value of nature.

Members cautioned against using the term "services" instead of "benefits" because it connoted the idea of nature as subservient.

Dr. Douglas MacLean, who is drafting the Committee's Chapter on "Concepts and Introduction to Methods" noted that services are distinct from systems and raise more controversial issues. He emphasized the importance of distinguishing between ecological services and systems and noted the importance of both. He accepted the EPA draft definition.

Another member agreed and emphasized the importance of the Committee's including in its report a prominent discussion of other approaches to valuing ecological systems that are separate from approaches to valuing ecological services. In this context, it would be important to emphasize religious and cultural approaches. Such a format was used in the Millennium Assessment Report. Yet another member noted that the National Research Council's forthcoming report also will discuss approaches for measuring the set of services provided by ecosystems, and then make clear that information gathered through these approaches are only one dimension of the value of ecosystems, and that there are other dimensions as well.

A Committee member asked if the Committee's charge included non-economic methods for valuing services or other ecosystem values. A Steering Group member stated that she understood that the charge included an examination of non-economic methods.

A Committee member then explored the importance of the terminology and rhetoric used by the Committee. She cautioned the Committee against using language that conveys the idea of nature as a factory or as a machine. Even the terminology of "stewardship" is patronizing. She noted the necessity of making a case for the essential contribution of ecosystems to human life to help advance environmental protection, but she projected that a different paradigm or conceptual model for human interaction with the ecosystem may develop in 20 years time. Other members echoed the need for humility and discomfort with the machine metaphor and use of the term "services."

A member expressed the view that he was comfortable with EPA's valuing ecological services to humans. He asked about the component of value that was missing.

A member then expressed the view that an emphasis on ecological services might help narrow economic interests triumph in ecological protection issues. Once decisions are cast in terms of economic cost and benefits, there are winners and losers. It was important to him for the Committee to define the elements of value of which economics is an important part but only one part. He would like the Committee to talk about building a model of values in a way that was open and transparent and in a way that conveyed that values were "constructed" and not the ultimately "right" or "real" value -- but some value that has standing. He would see such an approach as better than the Agency's use of "+Bs" to characterize non-monetized benefits in the CAFO analysis. He would like some model or process to construct those values, create them, and bring them into the model.

A member spoke of the American tradition, for which Gifford Pinchot was a prominent spokesman, of exploiting nature for human good. In his view, the term "ecological services" was a way of saying everything humans do involves using nature. A problem arises when we regard nature as only valuable because we use it. Because "trees can't sit at the table," humans must represent things that can't represent their own interest.

Another member emphasized the consensus in the group. Ecological services is only a subset of what people value about nature. He emphasized that the Committee's name refers to both ecological systems and services and noted that everyone in the group agrees that value doesn't derive solely from extractive activities alone. It involves sustaining life, as the Millennium Assessment states. He also cautioned the group to use rhetoric carefully. Economic concerns are not necessarily narrow -- they can encompass broad elements of value.

Members then spoke of the challenge of operationalizing this concept. One member noted that the risk assessment paradigm was iterative. Perhaps integrating a values assessment would first involve identifying a range of ecological values at the start of an analysis. When a range between cost and benefits becomes very narrow, then the Agency would have to get increasingly better data. It might then go beyond a clear-cut economic analysis of value to assess non-monetized information. Ideally the problem formulation would recognize services. Then there would be a screening step. The process would "explicitly push to keep information on all kinds of values in the game all the way through." The process would focus analysis on what is needed at different stages. There might be a mediated process to get data, and stakeholder processes would kick in at appropriate stages. Members voiced support for such a general approach. Several members emphasized the Committee should take special care to frame the discussion and use language that defines a process, rather than language that suggests that such a process actually defines nature or nature's value. Such a process is necessary as a best current approximation for our current understanding of nature's value because of the need to protect against adverse effects associated with human domination of nature. Another member noted the importance of addressing this issue in the preamble of the report.

Operationalizing this approach also posed the practical question, framed by several members, of what advice the Committee can offer for addressing values that are not encompassed by the term "ecological services." One member asked whether the Committee can offer methods to address ecosystem value questions outside the domain of ecological services -- what it might say related to the Endangered Species Act or the Habitat Equivalency Approach.

How can that law and that approach be integrated into EPA's analysis of values? Are they part of valuation or outside valuation?

Other members spoke of the potential usefulness of the categories created by the Millennium Assessment (provisioning, regulating, cultural, and supporting services) for structuring thinking and operationalizing approaches for capturing value. The Committee asked the DFO to circulate Chapter 2 of the Millennium Assessment Report for its discussion of ecosystem services.

Another member suggests there is well-developed science in the area of conservation that suggests some options. There are direct surrogate values for ecosystem protection and techniques for assessment that the Committee should address and consider in its approach.

Dr. Thompson, acting as Chair of the Committee for this discussion, brought the discussion to a conclusion. He noted, and the group confirmed: 1) a general consensus that the scope of values associated with protecting ecosystems involve not only ecological services but also systems themselves, 2) it is important that discussion and valuation of ecological services should not dwarf other considerations; 3) the Committee report at the outset should discuss definitions and communicate that the use of the term "ecosystem services" does not assume that nature is merely an engine or machine--instead the Committee views the value of ecosystems more broadly; 4) the Committee needs to discuss how to capture all ecosystem values and how to operationalize the process of assessing values associated with ecological systems and services at a future meeting.

Dr. MacLean agreed to incorporate the sense of the group into his revisions of the draft Committee report chapter on "Concepts and Introduction to Methods."

Dr. Thompson noted that the Agency's definition of "ecological benefits" in its draft *Ecological Benefits Assessment Strategic Plan* could be read narrowly as including only the value of ecosystem services. Thus, the draft states, "Ecological benefits describe the specific manner in which ecosystem services contribute to human well-being." He noted that, based on the Committee's discussion, it was important to avoid this type of exclusive emphasis on services and suggested that this issue should be one to address in the Committee's review of the Agency's draft plan.

Before concluding this session, one member asked Committee members to consider complexities and inconsistencies in the way personal expressions and behaviors play out, related to the value of ecological systems and services. He noted that values were not simply something to be measured, they are expressed in actions and feelings. Some policies and laws, like the Endangered Species Act, express those values as an absolute, yet in some contexts it makes sense to consider investments related to that Act or other highly prized ecological values as related to other social values. He sensed a dilemma in that inconsistency reflected in his own thoughts and in the thoughts of many others, and asked the Committee to reflect on that.

Before concluding the meeting, the Acting Chair asked the DFO to address some administrative issues and summarize action items.

## **Administrative Issues and Action Items**

The DFO noted that the Steering Group had asked her to investigate options for a web-based tool for posting Committee draft documents and comments. She will be providing them information on Lotus Notes Quickplace and will likely be sending an email to the Committee about procedures for using that system.

Dr. Anthony Maciorowski spoke of the need to clearly label draft documents developed for Committee consideration with their date and draft status. It will be the DFO's responsibility to ensure such documents are clearly labeled before they are posted on the web.

### Action items

1. The DFO will gather additional information requested by Drs. Grossman, Bostrom, Boyd regarding legal requirements/guidelines for collecting benefit information relating to ecological resources in civil suits and use of ecological benefits in partnership activities with external parties.
2. Drs. Grossman, Bostrom, Polasky will develop draft text for report documenting committee discussion of regional needs and recommendations for improving science for valuing the protection of Ecological Systems and Services.
3. Drs. Segerson and Risser to work with the DFO to write consolidated report from break out groups on Region 4 Critical Ecosystem Example exercise.
4. DFO will consult with Agency and committee regarding possibilities of moving November Advisory Review to later time in November.
5. Steering Group will develop plan for accelerating Committee's work on overarching issues.
6. DFO will distribute Chapter 2 of the Millennium Ecosystem Report.
7. Dr. MacLean will incorporate discussions of ecosystem services into his draft chapter on Concepts and Introduction to Methods.

The Committee adjourned at 11:15.

Respectfully Submitted:

/s/

Angela Nugent  
Designated Federal Officer

Certified as True:

/s/

Domenico Grasso  
Chair

Acting Chair  
Barton H. Thompson

**NOTE AND DISCLAIMER:** The minutes of this public meeting reflect diverse ideas and suggestions offered by the Panel members during the course of deliberations within the meeting. Such ideas, suggestions, and deliberations do not necessarily reflect definitive consensus advice from the panel members. The reader is cautioned to not rely on the minutes to represent final, approved, consensus advice and recommendations offered to the Agency. Such advice and recommendations may be found in the final advisories, commentaries, letters, or reports prepared and transmitted to the EPA Administrator following the public meetings.

## Attachments

Attachment A	Roster
Attachment B	Federal Register Notice
Attachment C	Meeting Agenda and Material, September 13-15, 2004
Attachment D	Revised Agenda, September 15, 2004
Attachment E	Draft Outline of C-VPSS Major Report and Status of Activities
Attachment F	Notes for “Example Exercises” on Regional Issues
Attachment G: Example Exercise.	Reports from Break-out Groups on the Region 4 Critical Ecosystem

**Attachment A: Roster**

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

**CHAIR**

**Dr. Domenico Grasso**, Rosemary Bradford Hewlett Professor and Chair, Picker Engineering Program, Smith College, Northampton, MA

Also Member: Executive Committee  
Environmental Engineering Committee

**SAB MEMBERS**

**Dr. William Louis Ascher**, Dean of the Faculty, Bauer Center, Claremont McKenna College, Claremont, CA

**Dr. Gregory Biddinger**, Environmental Sciences Advisor, Exxon Mobil Refining and Supply Company, Fairfax, VA

Also Member: Ecological Processes and Effects Committee

**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**, Research Professor of Economics, Department of Economics, Bowdoin College, Brunswick, ME

**Dr. Dennis Grossman**, Vice President for Science, Science Division, NatureServe, Arlington, VA

**Dr. Geoffrey Heal**, Paul Garrett Professor of Public Policy and Business Responsibility, Columbia Business School, Columbia University, New York, NY

**Dr. Robert Huggett**, Vice President for Research and Graduate Studies, Office of Vice

President for Research and Graduate Studies, Michigan State University, East Lansing, MI

**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**, Director and 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  
Also Member: Environmental Economics Advisory Committee

**Dr. Paul G. Risser**, Chancellor, Oklahoma State Regents for Higher Education, Oklahoma City, 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. Kathleen Segerson**, Professor, Department of Economics, University of Connecticut, Storrs, CT

Also Member: Environmental Economics Advisory Committee

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

**Dr. V. Kerry Smith**, University Distinguished Professor, Department of Agricultural and Resource Economics, College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC

Also Member: Advisory Council on Clean Air Compliance Analysis

**Dr. Robert Stavins**, Albert Pratt Professor of Business and Government, Environment and Natural Resources Program, John F. Kennedy School of Government, Harvard University, Cambridge, MA

Also Member: Environmental Economics Advisory Committee

**Dr. Barton H. (Buzz) Thompson, Jr.**, Robert E. Paradise Professor of Natural Resources Law and Vice Dean, Stanford Law School, Stanford University, Stanford, CA

**Attachment B: Federal Register Notice**

**Science Advisory Board Staff Office; Notification of Upcoming Science Advisory Board Meetings**

[Federal Register: August 18, 2004 (Volume 69, Number 159)]

[Notices]

[Page 51285-51286]

From the Federal Register Online via GPO Access [[wais.access.gpo.gov](http://wais.access.gpo.gov)]

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**ENVIRONMENTAL PROTECTION AGENCY**

[FRL-7802-4]

**Science Advisory Board Staff Office; Notification of Upcoming Science Advisory Board Meetings**

**AGENCY:** Environmental Protection Agency (EPA).

**ACTION:** Notice.

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**SUMMARY:** The EPA Science Advisory Board (SAB) Staff Office announces a public face-to-face meeting of the chartered SAB. The Board will discuss science issues facing EPA Regions; review and approve of two SAB Committee draft reports; discuss and approve the FY 2005 SAB plans; and plan for the SAB annual meeting. The SAB Staff Office also announces a public meeting of the SAB's Committee on Valuing the Protection of Ecological Systems and Services (C-VPES) to focus on regional science issues related to the Committee's charge.

**DATES:**

September 13-14, 2004. A public meeting of the Board will be held from 9 a.m. to 5:30 p.m. (Pacific Time) on September 13, 2004, and from 8:30 a.m. to 4 p.m. (Pacific Time) on September 14, 2004.

September 13-15, 2004. A public meeting of the C-VPES will be held from 1 p.m. to 3:45 p.m. (Pacific Time) on September 13, 2004; from 8 a.m. to 6 p.m. (Pacific Time) on September 14, 2004; and from 8 a.m. to 11:30 a.m. (Pacific Time) on September 15, 2004.

**ADDRESSES:** The meetings of the Board and the C-VPES will be held at the U.S. EPA Region 9 Headquarters Office, 75 Hawthorne Street, San Francisco, CA 94105.

**FOR FURTHER INFORMATION CONTACT:** Members of the public who wish to obtain further information regarding the Board may contact Mr. Thomas O. Miller, Designated Federal Officer (DFO), U.S. EPA Science Advisory Board via phone (202-343-9982) or e-mail at [miller.tom@epa.gov](mailto:miller.tom@epa.gov), or Dr. Anthony Maciorowski, Associate Director for Science, U.S. EPA Science Advisory Board via phone (202-343-9983) or e-mail at [maciorowski.anthony@epa.gov](mailto:maciorowski.anthony@epa.gov).

Members of the public wishing further information regarding the C-VPESS meeting may contact Dr. Angela Nugent, Designated Federal Officer (DFO), via telephone at: (202-343-9981) or e-mail at: [nugent.angela@epa.gov](mailto:nugent.angela@epa.gov).

The SAB Mailing address is: U.S. EPA, Science Advisory Board (1400F), 1200 Pennsylvania Avenue, NW., Washington, DC 20460. General information about the SAB, as well as any updates concerning the meetings announced in this notice, may be found in the SAB Web site at <http://www.epa.gov/sab>.

**SUPPLEMENTARY INFORMATION: Background on the Board Meeting:** At this meeting, the Science Advisory Board will focus on the following: (a) Science programs of EPA Region 9, (b) the FY 2005 SAB plan, (c) the review of two draft SAB Panel reports, and (d) planning for the SAB Annual meeting scheduled for December 1-2, 2004. Any additional items that might be discussed will be reflected in the meeting agenda that will be posted on the SAB website prior to the meeting.

(a) EPA Regional Science Issues--The SAB will receive briefings from, and discuss scientific issues, with Regional senior leadership and scientists. These are designed to (1) inform the SAB about regional science issues and concerns; (2) identify opportunities for future SAB and Regional office interactions on topics of interest; and (3) provide the regions with insights into the overall SAB role in advising the Agency on the technical underpinnings of the Agency's science and environmental decisions.

(b) SAB FY 2005 Plan--The Board will finalize its operational plans for FY 2005. This will include discussions of projects nominated by Agency offices and regions, projects nominated by SAB and its Committees, and its continuing information gathering activities in support of the SAB review of EPA's science budget.

(c) Review of SAB Committee Draft Reports: The Board will review two draft SAB reports. Reports to be considered include: (1) The SAB's draft report Review of EPA's Draft Report on the Environment 2003, and (2) SAB's draft report Report of the U.S. EPA Science Advisory Board's 3MRA Panel on the Multimedia, Multipathway, and Multireceptor Risk Assessment (3MRA) Modeling System. Information on these reviews, and drafts of each report, can be found on the SAB Web site at: <http://www.epa.gov/sab/drrep.htm>.

(d) Planning for the SAB Annual Meeting: The Board will discuss its plans for its Annual Meeting of the SAB which is scheduled to be held

in Washington, DC on December 1-2, 2004.

**Background on the C-VPESS Meeting: Background on the Committee and its charge was provided in 68 FR 11082 (March 7, 2003). The purpose of the meeting is for the Committee to focus on regional science needs, work-products, and activities by holding panel discussions, briefings, and break-out groups. The SAB will receive briefings on issues related to the value of protecting ecological systems and services in Region 9 and discuss scientific issues, with Regional senior leadership and scientists.**

**All of 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 then to identify key areas for improving knowledge, methodologies, practice, and research.**

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**Availability of Review Material for the Meetings: Agendas and documents that are the subject of these meetings are available from the SAB Staff Office Web site <http://www.epa.gov/sab/>.**

**Procedures for Providing Public Comment: It is the policy of the EPA Science Advisory Board (SAB) Staff Office to accept written public comments of any length, and to accommodate oral public comments whenever possible. The EPA SAB Staff Office expects that public statements presented at Board meetings will not be repetitive of previously submitted oral or written statements. Oral Comments: In general, each individual or group requesting an oral presentation at a face-to-face meeting will be limited to a total time of ten minutes (unless otherwise indicated). For conference call meetings, opportunities for oral comment will usually be limited to no more than three minutes per speaker and no more than fifteen minutes total. Interested parties should contact the Designated Federal Official (DFO) in writing via e-mail at least one week prior to the meeting in order to be placed on the public speaker list for the meeting. Speakers should bring at least 35 copies of their comments and presentation slides for distribution to the participants and public at the meeting. Written Comments: Although written comments are accepted until the date of the meeting (unless otherwise stated), written comments should be received in the SAB Staff Office at least one week prior to the meeting date so that the comments may be made available to the committee for their consideration. Comments should be supplied to the appropriate DFO at the address/contact information above in the following formats: one hard copy with original signature, and one electronic copy via e-mail (acceptable file format: Adobe Acrobat, WordPerfect, Word, or Rich Text files (in IBM-PC/Windows 95/98 format). Those providing written comments and who attend the meeting are also asked to bring 35 copies of their comments for public distribution.**

**Meeting Accommodations: Individuals requiring special accommodation to access these meetings, should contact the relevant DFO at least five business days prior to the meeting so that appropriate arrangements can be made.**

**Dated: August 10, 2004.  
Vanessa T. Vu,  
Director, EPA Science Advisory Board Staff Office.**

## Attachment C: Agenda and Goals

**Proposed Agenda  
EPA Science Advisory Board  
Committee on Valuing the Protection of Ecological Systems and Services  
Advisory Meeting  
Sept. 13, 14, 15, 2004**

**US EPA Region 9 Headquarters Office, 75 Hawthorne Street, San Francisco, CA 94105**

**Purpose:** The purpose of the meeting is for the Committee to focus on EPA regional science needs, work-products, and activities related to valuing the protection of ecological systems and services by holding panel discussions, briefings, and break-out groups. All of 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 then to identify key areas for improving knowledge, methodologies, practice, and research.*

### **Monday, Sept. 13, 2004**

Time	Topic	Leads	Goals of Sessions
1:00-1:10 p.m.	Opening of Meeting and Welcome from the SAB Staff Office	Dr. Angela Nugent, Designated Federal Officer Dr. Anthony Maciorowski, Associate Director for Science	
1:10-1:20	Chair's Orientation to the Purpose of the Meeting  Committee Member Introductions	Dr. Domenico Grasso, Chair  Committee Members	Orientation to purpose of meeting, how it fits within Committee charge, how discussions will lead to components of Committee report.
1:20-1:45	Welcome from Region 9 and Questions from the Committee	Ms. Alexis Strauss Director, Water Division, EPA Region 9	General orientation to Region 9 and regional issues.
1:45-3:15	Briefings and Committee Discussion Highlighting Region 9 Issues		Briefings chosen to give a sense of the variety of eco-value issues in Region 9.

	Introduction of Region 9 Speakers	Ms. Karen Schwinn, Associate Director of the Water Division	
	Johnson Atoll Closure and Restoration Project	Dr. Matthew Small; Waste Management Division, EPA Region 9	To describe issues involved in clean-up of military facility. Monitoring results will be evaluated in a human health and ecological risk assessment. When the island is deemed safe for human and wildlife to inhabit, EPA will then certify the closure of the facility.
	Ecological Values and Implementation of the CAFO Water Rule: A Regional Perspective	Mr. John Ungvarsky, Water Division, EPA Region 9	To provide one regional perspective on Region 9 issues involved in implementing the CAFO rule and how the national benefit assessment fits with regional experience.
	Introduction of Region 9 Speakers	Ms. Karen Schwinn, Associate Director of the Water Division, EPA Region 9	.
	Bay Delta Water Quality Standards	Dr. Bruce Herbold, Biologist, EPA Region 9	To describe balance of ecosystem needs and water supply in water quality standards.
	Total Maximum Daily Load (TMDL)	Mr. David Smith, TMDL Program Manager, EPA Region 9	To describe the use of models and scenario testing in TMDL decision making to reconcile water quality protection needs with allocation.
	Baylands Ecosystem Goals Project	Mr. Michael Monroe, EPA Region 9	To describe a vision of San Francisco Baylands restoration. To prepare the committee for the field trip.
3:00-3:15	Break		
3:15-6:00	Field Trip: Arrowhead Marsh		Field trip touches on issues of invasion of non-native species; wetlands delineation and restoration; EPA's experience with citizen lawsuit related to restoration, and how these decisions relate to science

			used for valuing the protection of ecological systems and services.
<b><u>Tuesday, Sept. 14, 2004</u></b>			
8:00-8:05	Opening of Meeting	Dr. Angela Nugent	
8:05-8:40	Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions - Briefing and Initial Committee Questions	Ms. Patti Lynne Tyler Regional Science Liaison to ORD U.S. EPA Region 8	Introduction to Overview of Results of Survey of Regional Needs and Current Practice.
8:40-10:15	Briefings on Innovative Methods Addressing Regional Issues		Session provides an opportunity for Committee to hear presentations on and discuss examples of methods identified as innovative (Region 9 and 10). Provides an opportunity for committee to discuss how to "benchmark" regional approaches with approaches taken by others.
	Comparative Valuation of Ecosystem Services: Lents Project Case Study	Mr. James Middaugh, Endangered Species Act Program Director, Bureau of Environmental Services, City of Portland and Ms. Gillian Ockner, David Evans and Associates, Inc.	
	Science to Inform Policy and Decision Making	Dr. Richard Bernkopf, US Geological Survey Western Geographic Science Center Research Projects	
10:15-10:30	Break		

10:30-12:00	Committee Discussion of Survey Of Regional Needs For Science-Based Information On The Value Of Protecting Ecological Systems And Services And The State Of Practice In The Regions	Lead Discussants: Drs. Dennis Grossman, Stephan Polasky, and Ann Bostrom	Committee discussion on key questions <sup>1</sup> will lead to a component of the Committee report that will focus on regional needs for data, methods, and approaches for valuing the protection of ecological systems and services.
12:00-1:15	Lunch		
1:15-1:25	Introduction to the Example Exercise Process	Dr. Domenico Grasso	The purpose of the example exercise is to provide a vehicle to help the Committee identify approaches, methods, and data for characterizing the full suite of "values" affected by some of the key types of Agency actions at the regional level. Break out leaders for each example will work together after the meeting to present a consolidated document expressing conclusions and advice. Write-ups on these two examples will be part of the Committee's final report.
1:25-1:45	Briefing on Example Exercise Session 1: Benefit Analyses for Critical Ecosystems in Region 4	Mr. Richard Durbrow, EPA Region 4	Committee to discuss an Agency white paper and background documents related to protecting critical ecosystems in the South-East and to a possible national framework for ecological protection.
1:45-3:30	Example Exercise Break Out Groups, Session 1	Break out Group Leader: Dr. Paul Risser, Dr. Kathleen Segerson	

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- <sup>1</sup>1. What kinds of ecological values were of concern to EPA regions? How were those values identified, characterized, and measured? What kinds of values might be missing from these analyses?
  2. How would discussion/assessment of these values compare with discussions/assessments used elsewhere for comparable purposes?
  3. Are there suggestions for improving the use of data, approaches and methods in the short term?
  4. Looking at these regional activities as a whole, are there recommendations for research?

3:30-3:45	Break		
3:45-4:45	Continuation of Session 1 Example Exercise Break Out Groups		
4:45-5:00	Break		
5:00-5:30	Reports from Session 1 Break-Out Groups		
5:30-6:00	Discussion of Next Day	Dr. Domenico Grasso	
6:00	Adjourn		

**Wednesday, September 15, 2004**

8:00-8:05	Opening of Third Day of Advisory Meeting	Dr. Angela Nugent	
8:05-8:30	Briefing on Example Exercise Session 2; Bolsa Chica Restoration Project	Dr. Ned Black, Regional CERCLA Ecologist/Microbiologist, Superfund Division, EPA Region 9	Example focuses on a lowland area north of Huntington Beach on the coast of southern California. Originally, the habitat was a mix of estuarine and coastal scrub uplands. For almost a century it has been an oil production field. In the 1990s, a large fund of mitigation money from expansion projects at the Ports of Los Angeles and Long Beach became available. A consortium of federal and State of California agencies, including the US EPA, brokered the purchase of the Bolsa Chica with the intent of eliminating oil production and creating a large, thriving wildlife refuge. An ecological risk assessment was used

			to help make decisions about the location and extent of restoration. This example provides an opportunity to address how the Agency might develop approaches for expressing the value of this efforts and others like this for internal decision making and for working with partners.
8:30-10:15	Example Exercise Break Out Groups, Session 2	Break out Group Leaders: Dr. Robert Huggett, Dr. Gregory Biddinger	
10:15-1:30	Break		
10:30-11:00	Reports from Session 2 Break Out Groups		
11:00-11:30	Discussion of Next Steps	Dr. Domenico Grasso	
11:30	Adjourn		

**Attachment D**  
**Revised Agenda**  
**EPA Science Advisory Board**  
**Committee on Valuing the Protection of Ecological Systems and Services**  
**Advisory Meeting**  
**September 15, 2004**

**US EPA Region 9 Headquarters Office, 75 Hawthorne Street, San Francisco, CA 94105**

**Purpose:** The purpose of the meeting is for the Committee to focus on EPA regional science needs, work-products, and activities related to valuing the protection of ecological systems and services by holding panel discussions, briefings, and break-out groups. All of 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 then to identify key areas for improving knowledge, methodologies, practice, and research.*

8:00-8:10	Opening of Third Day of Advisory Meeting and Discussion of Revised Agenda	Dr. Angela Nugent Dr. Domenico Grasso
8:05-8:40	Briefing on and Discussion of Bolsa Chica Restoration Project	Dr. Ned Black, Regional CERCLA Ecologist/Microbiologist, Superfund Division, EPA Region 9 Committee
8:40-9:30	General Discussion of EPA Regional Needs and How To Document Committee Advice for Inclusion in the Committee Report	Committee
9:30-9:45	Break	
9:45-11:15	Discussion of Ecological Services - Definition, Lists, and Categories and How Such Information Might Be Used for the Committee Report	Committee
11:15-11:30	Discussion of Next Steps	Dr. Domenico Grasso
11:30	Adjourn	

## Attachment E

### Draft Outline of C-VPESS Major Report and Status of Activities

1. Executive Summary
2. Background Section
2.1. Policy and process background, history of project
2.2. Concepts and Introduction to Methods
2.3. Lessons to be learned from the Risk Assessment experience
2.4. Lessons to be learned from other efforts underway (NRC, Millenium Assessment, European experience)
3. Assessment of the Needs at the Agency and Advice related to Specific Decision Contexts . (Sections 3.2-3.5 each will include assessments that talk about special needs of that decision context and how to meet those needs by improved use of data, approaches and methods)
3.1. Summary of Managers' Stated Needs from October 2004 Workshop (benefit analyses supporting national Agency regulatory actions, local/regional analyses, GPRA reports, Communication/Information products)
3.2. Review of recent benefit analyses supporting national Agency regulatory actions
3.2.1. Summary of Conclusions from C-VPESS Advisory Review of Agency draft <i>Ecological Benefits Strategic Plan</i>
3.3. Review of regional needs and analytical approaches
3.4. Review of GPRA analyses
3.5. Review of Communication/Information products used to communicate ecological decisions
4. Discussion of Examples
4.1. Example Exercise (CAFO)
4.2. Example Exercise (Region 4 Critical Ecosystems)
4.3. Example Exercise (Bolsa Chica)
5. Advice on Fundamental Issues, Recent Research and Recommendations
5.1. Monetization Methods and Alternatives
5.2. Public Participation
5.3. Biophysical Measurements and Indices
5.4. Uncertainty
6. Key areas for research
6.1. Summary of research needs
6.2. Recommendations for a research planning and technical transfer mechanism

#### Legend

	Topics C-VPESS has discussed; draft in progress.
	Whole C-VPESS has received briefings; no draft yet.
	Topics for Discussion at September C-VPESS meeting and development of drafts immediately after meeting.

Component	Lead(s) & Status	Next Steps
7. Executive Summary		
8. Background Section		
8.1. Policy and process background, history of project	SAB SO drafted text, Summer 2004	Steering Group/committee review
8.2. Concepts and Introduction to Methods	Workgroup formed (Doug MacLean Lead). Text drafted and discussed at 08-25 teleconference	Revised draft to go for committee for comment by September 17
8.3. Lessons to be learned from the Risk Assessment experience	Paul Slovic lead. Text drafted and discussed at 08-25 teleconference	Revisions within 6 weeks. Links to fundamental issue that would be one of focuses for future meeting to be planned
8.4. Lessons to be learned from other efforts underway (NRC, Millenium Assessment, European experience)	NRC and Millenium Assessment activities discussed in June 2004  SAB Staff Office drafted text from minutes	Review of draft text  International research could be focus of discussion with Ortwin Renn in January/Feb 2005
9. Assessment of the Needs at the Agency and Advice related to Specific Decision Contexts . (Sections 3.2-3.5 each will include assessments that talk about special needs of that decision context and how to meet those needs by improved use of data, approaches and methods)		
9.1. Summary of Managers' Stated Needs from October 2004 Workshop (benefit analyses supporting national Agency regulatory actions, local/regional analyses, GPRA reports, Communication/Information products)	Discussed in October 2003; SAB SO to develop text, Su Text partially drafted summer 2004	Review of draft text
9.2. Review of recent benefit analyses supporting national Agency regulatory	Discussed in June 2004	Data gathering process to happen

Component	Lead(s) & Status	Next Steps
actions	Boyd, Biddinger, Ascher drafted preliminary text and plan for data gathering for 8/23	in Sept-Oct  Draft to incorporate data tables
9.2.1. Summary of Conclusions from C-VPESS Advisory Review of Agency draft <i>Ecological Benefits Strategic Plan</i>	??(Lead)	November 2-3 meeting
9.3. Review of regional needs and analyses	Polasky, Grossman, Bostrom leads for September meeting and follow up	September meeting and subsequent write-up
9.4. Review of GPRA analyses	Initially a proposed focus of January Meeting	Move to a future meeting? May
9.5. Review of Communication/Information products used to communicate ecological decisions	Initially a proposed focus of January Meeting	Move to a future meeting? May?
10. Discussion of Examples		
10.1. Example Exercise (CAFO)	Discussed in June 2004 Daniel and Thompson developed text for 8/23	Committee members to provide specifics on key points.  Daniel and Thompson to revise by October 10  Steering Group to decide how to address 3 overarching issues

Component	Lead(s) & Status	Next Steps
		identified
<p>10.2. Example Exercise (Region 4 Critical Ecosystems)</p> <p>10.3. Example Exercise (Bolsa Chica)</p>	<p>Leads: Risser and Segerson</p> <p>Leads: Huggett and Biddinger</p>	<p>September meeting and subsequent write-up</p> <p>September meeting and subsequent write-up</p>
11. Advice on Fundamental Issues, Recent Research and Recommendations		
11.1. Monetization Methods and Alternatives	??New Meeting	
11.2. Public Participation	??New Meeting	
11.3. Biophysical Measurements and Indices	??New Meeting	
11.4. Uncertainty	??New Meeting	
12. Key areas for research		
12.1. Summary of research needs		
12.2. Recommendations for a research planning and technical transfer mechanism	Meeting to be planned?	

## Attachment F

### NOTES FOR "EXAMPLE EXERCISES" ON REGIONAL ISSUES ASSOCIATED WITH VALUING THE PROTECTION OF ECOSYSTEMS AND SERVICES

#### PURPOSE:

The purpose of the example exercise is to provide a vehicle to help the Committee identify approaches, methods, and data for characterizing the full suite of ecological "values" affected by some of the key types of Agency actions at the regional level and appropriate assumptions regarding those approaches, methods, and data for the those types of decisions.

#### APPROACH

The Committee will use the Agency's description of two particular decisions and how they were supported scientifically as a starting point for the two example exercises. Our objectives in the exercises will be to:

- evaluate what was done by the Agency;
- consider different methods and approaches for assessing the economic benefits of and other values associated with the examples;
- identify data gaps;
- identify best practices relevant to this example and potentially relating to other examples of this type of decision (as they pertain to overarching issues such as: standards for acceptability of data and methods, analysis and characterization of uncertainty; institutional assumptions; assumptions about elasticity and substitutability; transferability; assumptions about the stability of ecological systems; and discounting benefits: and
- identify further research needs in the areas of ecology, economics, and other disciplines.

#### SCHEDULE

1. September meeting - devote 2-3 hours to breakout sessions for each group and to oral reports and follow-up discussion from each group on what was accomplished during the breakout session.
2. During the next two months, have the respective group leaders write up an integrated summary from the breakout sessions. Each summary should cover both areas of agreement between to the two breakout groups on a given example and any differences in the outcomes of the two groups' work. These summaries will be part of the Committee's final report.
3. Teleconferences to be identified in December - Presentation and discussion of the summary report.

Attachment G      Reports from Break Out Groups on the Region 4 Critical Ecosystem  
Example Exercise: Powerpoint Presentations Prepared for Committee

Report from Break Out Group Led by Dr. Risser

● **Our Tasks**

- Evaluate Southeastern Ecological Framework (SEF)
- Consider methods for assessing economic benefits within SEF
- Identify best practices for SEF and other examples (standards for acceptability of data and methods, characterization of uncertainty, institutional assumptions, elasticity and substitutability, transferability, stability of ecological systems, discounting benefits)
- Identify data gaps
- Identify further research

● **Southeastern Ecological Framework**

Original Purpose

GIS-based framework for community leaders to identify key ecological areas and develop Greenspace strategies.

● **Southeastern Ecological Framework**

Ecosystem biodiversity

- Critical aquatic biodiversity watersheds
- Threatened and endangered species
- Imperiled species
- At-risk aquatic species
- Conservation lands: size and proximity
- Interior forest areas
- Priority ecological areas (PEA classes)
- Potential black bear habitat

Ecosystem services

- Shellfish harvesting areas
- Major rivers and wild & scenic rivers
- Wetlands: size and proximity
- Surficial aquifer pollution vulnerability
- Coastal areas storm protection
- Stream start reaches

Threats and conflicts

- Context analysis (adjacent land use)
- Urban growth potential

Recreation potential

- Influence of urban areas
- Influence of conservation lands
- Water-based recreation
- Influence of points of interest
- 

● **Southeastern Ecological Framework**

Acknowledged deficiencies

- Unevenness of spatially referenced data for GIS
- Defining “hubs” as > 5000 A
- May not include all potential ecological services are included in the analyses
- No data on key processes, e.g., air purification including carbon sequestration
- No analyses to connect water-related data, e.g., acres of wetland or aquifer vulnerability to drinking water protection

Draft October 15, 2004

- No identification of upstream areas that might influence water quality.
- No good data on area of functional floodplain for estimating flood control
- Too little data on Appalachian forests
- Did not have all the data on areas of high biodiversity
- No connection with species population viability assessments
- No specific information on pollutants or pollution levels
- Did not include information on damming and channelization
- All priority ecological areas (PEA) are treated equally

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#### ●**Southeastern Ecological Framework**

Methods for assessing economic benefits of and other values within SEF

Key Question:

How to assess value to the protected natural resources (value of ecological services) in comparison to the developmental value of the land (e.g., opportunity costs as dollar gain in tax revenue)

#### ●**Southeastern Ecological Framework**

Current approach to valuation

Matrix approach: Ecological services X land characteristics

Land Characteristics

- Riparian buffers
- Wetlands
- Trees
- Connectivity

•

#### ●**Southeastern Ecological Framework**

Ecological Services

Land cover type to water and hydrology

- Drinking water supply
- Sediment reduction
- Waste water treatment
- Cloud formation
- Drought recovery via aquifer recharge or water retention/storage
- Flooding or other storm protection

Land cover type to air masses

- Urban heat island mitigation
- Particulate removal
- Carbon sequestration

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#### ●**Southeastern Ecological Framework**

Ecological Services

Land cover type to habitat connectivity or biodiversity

- Value of species
- Migratory birds
- Fish populations
- Game species
- Disturbance regime recovery

Land cover type to human use

- Recreational value
- Timber
- Pollination for agriculture
- Hunting/fishing

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### •**Southeastern Ecological Framework**

Want to develop an environmental services index to capture services in terms of valuation. This would be a value pyramid in which the values for each set of pixels could be added together to obtain a monetized value to compare ecological services to economic benefits of land use change.

### •**Southern Ecological Framework**

•Is the matrix of ecological services appropriate? Add or delete services? Would they be applicable to a National Ecological Framework? Need common approaches, methods, and protocols?

•How should stakeholders be engaged?

•How do we decide the appropriate level of pixel aggregation for each ecological service? How do we define the appropriate benefits transfer?

•How do we decide the scope for analyzing costs and benefits?

•How would we monetize the selected services, including discounting?

•How should we characterize data/model uncertainty?

•How do we “sum” the results if they are not in dollars?

•What are the institutional considerations? Interactions with other agencies and participants?

•

### •**Recommendations**

•Applications of Framework and Clients need to be thought through in more detail.

•Valuation can't be added as an afterthought – needs to be a driver of how framework is constructed.

•C-VPES cannot consider economics in isolation – needs to review University of Florida report of analysis of land cover analyses across country.

•These kinds of framework, if properly designed, with stakeholder involvement, and well planned coordination of ecological and economic analyses are necessary

•MAPS and visualization of ecological attributes are potentially very valuable

### •**Major recommendations**

•Land Cover – chooses small number of classes to map – need for more, more relevant, much finer resolution data set

•Is the matrix of ecological services appropriate? Add or delete services? Would they be applicable to a National Ecological Framework? Need common approaches, methods and protocols?

•Need clearer categorization for landscape characterization categories

•Need clearer rationale for selection of ecological services

•Matrix double counts (overlapping) and is not complete

•Need for conceptual model--Millennium Assessment breakout of services may be useful: provisioning, regulating, cultural, and supporting categories

•Value decisions were built into SEF core areas (core vs. buffer, unfragmented landscape) – but those aren't made explicit

### •**Recommendations**

How should the public be engaged?

•Develop public involvement strategies appropriate to scale and type of decision to be made (e.g., relative to National Framework, regional or local scale applications). If the topic is rollout of national framework,

•Public involvement *should* happen. Should involvement happen at front or back end with national plan or other efforts? Develop conceptual approach or react to initial strawman effort? Make conscious decision.

•Develop plan for iterative involvement of scientists and public. Look at value focused thinking frameworks where experts have distinct roles.

### •**Recommendations**

How would we monetize the selected services, including discounting?

•As screening tool, what's needed is a function per service assigned to a given parcel, instead of a constant value

Draft October 15, 2004

- For each parcel we need info on important characteristics, landscape types, which help determine ecological services
- Values for ecological services for different land characterization types need to differ across types.
- Values need to differ depending on characteristics of any given pixel.
- Value expression need not be limited to monetization

### Report from Break Out Group Led by Dr. Segerson

#### – Goals

- What was done?
  - Mapping of corridors based on black bear habitat as a surrogate for ecological significance: Useful first cut.
  - Corridors are more relevant to some types of species than others.
- Different methods/approaches?
  - Should the corridors optimize biodiversity or individual species? Consider alternative ways to evaluate spatial arrangement (e.g., critical patch size, inc. spatial/temporal).
- ID best practices.
- Research needs.

#### – Users

- Not limited to county commissioners.
- CV could be used for other audiences.
- More localized land-use decisions.
- Provide info to local, no-profit, state gov., on issues that lie outside of EPA regulatory authority.
- Allow users to decide which data (from those available) to use in analysis.

#### – Uses/Needs

- Evaluation of current mapped corridors
  - Characterize value of ecological services within corridor systems
- Tool for specific consideration of land-use options (e.g., Walmart).
- Need to identify decision-making context (e.g., whose perspective? E.g., amount of money for C sequestration is measure of costs, not benefits.
- Values dependent on individuals/communities included.
- Attention-getter.

#### – Issues

- Irreversibility of impact/recovery-Option value
- Evaluation of current mapped corridors, or broader consideration of land-use options.
- What do people want? Should EPA be trying to educate?

#### – Data Gaps-Ecological

- Good start, having accurate spatial account of vegetation.

- Need to do this for entire country, using consistent data layers.
  - Need to consider sensitivity of spatial patterns for each layer/layer inter-relationships.
    - Geometry of coupling between spatial areas are different for terrestrial and aquatic/marine systems; different concepts of “corridors.”
    - Need to consider scarcity.
  - Need to tie into National Ecological Observation Network.
- Data Gaps
- Need to utilize available benefit-related socio-economic data (haven’t yet done).
    - Amenity values, from census data.
    - Roads.
- Recommendation
- Provide range of values. Requires analysis of extent of variation with land-mass.
  - Range of values across land-use types.
  - Need to consider type of service (C sequestration not location dependent).
  - Tie valuation to spatial patterns (fn of biophysical interaction. Spatial effects impacts values themselves).
  - Maybe useful as screening mechanism to idea areas for more detailed analysis.
  - Involve community in problem-formulation/analysis.
  - Use existing valuation data to provide rough map (sloppy approach) to begin, see how far you can go.
  - Need to carefully manage communications, or screening analyses can ‘take on own lives.’
  - Allow users to decide which values/methods to use.
  - Take Millennium assessment as one start for identifying ecological layers (note-taker’s comment: consider SAB EPEC work).
  - Could use ecological (phenomenological) modeling to assess optimal corridor size. These have yet to be widely used in policy arena.
  - Keep open source, transparent, disaggregated to be most useful as a learning tool
  - Utilize academia (grad. students) to conduct sophisticated ecological-spatial analyses.
  - Provide aggregated (monetized) values to promote scrutiny of details leading to value estimate.
  - Must consider how to transfer the meaning of numbers.
  - Use innovative “game” front end (ala Sim-City).