Scientific and Technical Advisory Committee
June 7-8 Quarterly Meeting Minutes
Hilton Garden Inn – Annapolis, MD

June 7 Minutes

Attendance:

Members: Charles Abdalla, Donna Bilkovic, Russ Brinsfield, Randy Chambers, Marjy Friedrichs, Kurt Gottschalk, Kirk Havens, Robert Hirsch, Robert Howarth, Susan Julius, Doug Lipton, Jack Meisinger, Raymond Najjar, Michael Paolisso, Vikram Pattarkine, Jim Pease, Chris Pyke, John Randolph, Ali Sadeghi, David Sample, Lisa Wainger, Denice Wardrop, Donald Weller

Guests: Anna Stuart Burnett, Sarah Brzezinski, Deb Caraco, Kevin DeBell, Mike Fritz, Jamie Heisig-Mitchell, Megan Hession, Jeni Keisman, Mike Kemp, Victoria Kilbert, HyeYeong Kwon, Sarah Lane, Lewis Linker, Mindy Selman, Peter Tango, Holly Waldman

Administration: Melissa Fagan, Natalie Gardner, Matthew Johnston, Kevin Sellner

Introduction and Consent Agenda

STAC Chair, Denice Wardrop (PSU) called the meeting to order shortly after 10:00 am. Following member introductions, Wardrop requested any comments or revisions to the March meeting minutes. Ray Najjar (PSU) suggested that some language summarizing Gary Shenk's (EPA-CBPO) comments regarding the Chesapeake Bay Program's Watershed Model (CBWM) being spatially lumped was inaccurate, and requested a correction to the minutes. No further comments were made on the March meeting minutes.

VOTE: Wardrop asked members for a motion to approve the changes made to the March quarterly meeting minutes. Results: Motion carried - change approved.

Wardrop also reminded members that before every quarterly meeting, all members should review the agenda, and bring up any potential conflicts of interest. At that time, the Committee as a whole would decide, if in fact, a conflict of interest existed or not. Wardrop then asked if any members had a conflict of interest for the June quarterly meeting agenda. Jim Pease (VT) asked for clarification of what constitutes a conflict of interest. Wardrop and Kirk Havens (VIMS) specified that a conflict of interest could arise if a member worked for an agency that STAC would have close interaction with on any activity or item of correspondence. Kevin Sellner (CRC) also specified that if a potential conflict of interest was brought to the attention of STAC members ahead of time then individuals could ask the group as a whole to determine if a conflict existed or not.

In other announcements, Sellner suggested STAC should listen closely to Ken Reckhow's (NAS) presentation on the National Academy of Science's (NAS) review of the Chesapeake Bay Program (CBP). In particular, Sellner pointed out that NAS proposed a different approach to modeling within the CBP, including recommending a Chesapeake Bay Modeling Center where modelers could learn from each other and improve CBP modeling capabilities.

Wardrop then reviewed the Executive Board (EB) discussions that occurred between the March and June quarterly meetings to give the Committee an opportunity to discuss and approve the EB's decisions. While all motions were individually discussed, STAC took special interest in new language

changes to the bylaws. Several members gave their thoughts regarding the suggested bylaw changes describing the positions of "at-large member and "emeritus member." The changes proposed by the EB and discussed by all members are included below:

STAC Bylaws, Section IIIA. 6e.
"…At-large appointees may be re-appointed following the completion of two consecutive terms (8 years) and a leave of absence of two years."

STAC Bylaws, Section IIIA. 8.
"Emeritus Member – At the conclusion of any member's term, that member will become a nonvoting Emeritus Member for a period of four years. During this time period, past members are encourage to continue to collaborate with current members and attend activities and meetings when appropriate."

Discussion: Committee members voiced some concerns over the inclusion of the above language in STAC's bylaws. Specifically, some members believed allowing the re-appointment of past STAC members would lessen the amount of membership turnover on STAC. Other members did not see a need for an official "emeritus member" status. Johnston explained that STAC already had an emeritus member status in practice, and that the words in the bylaws would make the status official.

Wardrop mentioned that EB members went over the agenda for the June QM. EB members mentioned that having workshop updates prior to the QM would be more helpful. Previous workshop updates included unnecessary information that did not contribute to productive discussions. STAC Staff will work with members to make sure presenters only discuss relevant information.

VOTE: Wardrop asked members to vote to approve or reject the EB consent agenda. Results: Motion carried – consent agenda approved.

STAC Membership Needs
Matthew Johnston, STAC Coordinator, began by reviewing a voting ballot for membership nominations. Johnston explained that five at-large membership positions and one federal appointment membership position would become vacant by September, 2011. Members were asked to review the CV's of the nominees, vote, and return the ballot to Matt Johnston the following morning.

Johnston led the Committee in a discussion of expertise needs and the priority science issues STAC members developed following the 2010 STAC Retreat. Based on those issues, Johnston clarified which areas STAC does and does not have expertise in. The expertise gaps showed that STAC is lacking in climate change, risks/vulnerability, human dimensions, markets, political ecology, and economics (social science). Jim Pease (VT) pointed out that these categories have nothing to do with what STAC considers a priority but rather where STAC is lacking expertise at this point in time. Other members mentioned an area of expertise that STAC is lacking may be wastewater/point source/treatment methodologies/opportunities for improvement. Wardrop mentioned how STAC members talked about the issue of having a more reactive and responsive role versus a proactive role. This analysis demonstrates STAC's reactive and immediately responsive role and thinking of areas that we need to be keeping an eye on as problems emerge.

Chris Pyke (USGBC) stirred up a conversation about the need for expertise in issues of environmental law and regulations. While all STAC members have some knowledge in this area, STAC does not have experts on the Committee. Similarly, STAC may want to consider improving its public policy expertise

due to the current issues STAC is involved in. In addition, the Social Science Workgroup raised the issue that the title of "social science" is confusing and should not just include social scientists or economists, because a need exists for experts in the areas of public policy and urban/suburban land use. Wardrop agreed it might be a good idea to have a public policy or law member to guide STAC in the right direction with issues related to the Chesapeake Bay Total Maximum Daily Load (TMDL).
Kevin Sellner (CRC) asked STAC members if an environmental lawyer would really have a place on the STAC. Instead, he suggested STAC should consider appointing an environmental lawyer as an ad-hoc member of STAC.

In order to appoint the best candidate possible and learn more about the candidates' background, experience and expertise, Wardrop proposed members hold a discussion during lunch about each candidate's expertise.

Past STAC Workshop Updates

Thresholds and Non-Linear Trajectories in Recovery of Eutrophic Coastal Ecosystems - Mike Kemp
Mike Kemp (UMCES) presented an overview of a 2007 workshop to investigate thresholds in estuarine ecosystems funded by STAC, the EPA and Maryland Sea Grant. There was an interest among STAC members to hear what this workshop had accomplished over the years. The workshop focused on five different studies in areas of the Chesapeake Bay including Back River, Upper Patuxent, Gunston Cove, Main Bay, and the Susquehanna Flats. Kemp began the presentation by explaining what each ecosystem's response would be if there was an increase or decrease in nutrient loading. Kemp explained that the CBP should want to understand ecological system responses prior to implementing the TMDL. For example, is there a certain typology where different kinds of systems might be expected to respond with different kinds of trajectories? Are these kinds of trajectories even relevant to the real world and what really happened? The preliminary conclusion in the Back River study concluded that further nutrient control will lead to big benefits. However, there is a three year lag on those benefits. The Upper Patuxent study concluded that small improvements in water clarity led to the opening of a new habitat for the growth of SAV. In addition, improvement to the wastewater treatment plant in that watershed reduced nutrient loading in Gunston Cove. The Susquehanna Flats has an extremely sparse SAV beds that have shown growth after 2000. The reasons for recovery of this bed remain. Kemp suggested that improvements could be due to the implementation of best management practices (BMP) unbeknownst to STAC.

Exemplary Local Stormwater Strategies to Protect and Restore Urban Watersheds - Dave Sample
Dave Sample (VT) gave a presentation on how certain areas of the Watershed can, and should, better prepare for the Chesapeake Bay TMDL and watershed implementation plans (WIPS). Sample explained the goal of the 2010 STAC-funded workshop was to highlight several exemplary stormwater programs. The three programs picked for this workshop were Montgomery County, Fairfax County, and the City of Portland. The first step was to try and extract information from the three groups by asking a set of twenty questions to get feedback on how government programs are trying to reach the TMDL requirements. After performing the research, Sample and the steering committee found that all three governments were struggling with the same issues. For example, Portland's case history of its program showed that it made several wrong decisions throughout the process. Instead of being the front runner like everyone thought, Portland is now playing catch-up for all of the mistakes the program made in the past.

Sample highlighted several questions asked of exemplary program such as: "What critical means does your program need to survive?" and "Where do you see the program going in the next ten years?" The steering committee believes the CBP needs to determine whether or not it is possible to mass produce Low Impact Development (LID). According to Sample, the cost associated with production of LID would be driven down if LID was able to be mass produced. The steering committee suggested the CBP should identify strategies that result in successful exemplary stormwater programs. Additionally, it would be useful to develop educational tools for managers such as, a "Chesapeake Bay for Dummies," or an "Idiots' Guide to Project Management."

Following the presentation, members expressed an interest in conducting follow-up STAC workshops which led to the recommendation of hosting a workshop to investigate connecting stormwater management in the Bay TMDL and the Phase II WIPS. One STAC member championed investigating retro-fitting LID in ultra urban areas, in particular, monitoring the effects of these retro-fits. Furthermore, members suggested there was a broad category of needs in understanding the economics of stormwater management, which was championed by Sample himself. After receiving feedback from STAC members, Sample announced he intends to write a proposal for a follow-up workshop. Additionally, Sample indicated the steering committee will complete the workshop report in the next month.

Social Science and Chesapeake Bay Restoration - Michael Paolisso

Michael Paolisso (UMD) gave a presentation on STAC's recently held Social Science and Chesapeake Bay Restoration Workshop. One goal from this workshop was to identify the priority needs for social science research to meet Chesapeake Bay restoration goals. The steering committee identified the top priorities for the social science research needs. It also identified that human dimensions need to be better integrated in the efforts to restore ecosystem function, reduce pollution, and manage natural resources. Paolisso explained that the workshop project had three phases. The first phase was to identify the social science research needs to advance Chesapeake Bay restoration. This phase developed about twenty over lapping, key priority topics and actions that should be taken. The second phase was to interview key informants from the Chesapeake Bay Program. The interviewees were asked to provide examples of when social science was used in Chesapeake Bay restoration. As anticipated, there were not many examples of the use of social science in Bay restoration. The third phase was to take the answers from the interview and code the answers to identify themes consistent across the interviews. The codes were then analyzed for links and categorized for similarity. From those results, themes were developed for the March 10th workshop.

The workshop started out with a presentation about the interviews and their resulting themes. Following this presentation, participants heard from two panels of social science experts. The first panel focused on what social science approaches were useful for studying individual behavior change, while the second panel focused on how to elevate the individual behavior change in groups or community organizations. Workshop members then broke out into small groups to discuss the panel presentations, challenges for managers including wide-spread behavior change, and what issues and solutions social scientists and managers should concentrate on in the near-future.

Assessing the Umbrella Criteria - Jeni Keisman

Jeni Keisman (UMCES) gave an overview of the discussions from STAC's recently held Assessing the Umbrella Criteria Workshop. Keisman explained the purpose of this workshop was to determine if the 30-day mean dissolved oxygen criteria or "umbrella criteria" would correctly protect designated uses within the Bay. This 30-day mean dissolved oxygen criteria was used to develop the TMDL. The

workshop participants investigated the monitoring data to determine if the 30-day mean protected designated uses as well as the 7-day mean, 1-day mean and instantaneous mean. The participants found that the 30-day mean can be assumed to be protective of the 7-day and 1-day means. However, the 30-day mean is not protective of the instantaneous mean.
Additionally, workshop participants discussed the following areas where the CBP should consider improving its data assessments:

- Communicate decision errors in data
- Collect monitoring data more frequently than twice per month
- Collect monitoring data in vertical profiles in mid-channel and deep water regions of the Bay.

The group hopes to complete the workshop report within the next few months.

STAC FY 2011 Workshop Updates
Victoria Kilbert (CRC) in place of Tanya Spano (MWCOG) presented updated information on the STAC-funded sustainable wastewater practices workshop proposal that was brought to STAC back in March. At this point, the Wastewater Workgroup has not made many changes to the proposal. However, it has decided to have a separate workshop for septic systems. The only time the workgroup wants to discuss septic systems at this proposed workshop is when it talks about wastewater treatment plants. Kilbert informed STAC that it plans on proposing the second workshop about septic systems and decentralized systems in the future (perhaps for FY 2012). Additionally, the Phase II WIPS deadline has recently changed and will be due by the end of March, so the original workshop will be planned for April, 2012. The workgroup wants to focus on real world examples with innovative practices, implemented on a larger scale throughout the Watershed. Furthermore, Kilbert informed STAC members of the results of a recent workshop planning meeting. The goal of the meeting was to organize a draft agenda for the workshop. The steering committee determined the agenda would be broken into three distinctive tracks: known technologies, current regulations, and cutting edge technologies. This steering committee is planning for a three-day meeting in a non-urban setting.

Action: Victoria Kilbert (CRC) will send around the draft agenda for the workshop to STAC members in the next few days

CRC Staffer Presentations - Megan Hession, CRC
Protect and Restore Vital Habitats GIT staffer, Megan Hession, presented an overview of her teams' most recent activities. In addition to Hession's work as a staffer, she also discussed her career development and long-term plans. Hession began her presentation by briefly describing the background of Chesapeake Research Consortium (CRC) and what staffers, like herself, are involved in. Megan also talked about the different projects and specific goals that each subgroup within her team was focused on. According to Hession, Each GIT has long-term restoration goals it is constantly working towards and then a few short- term initiatives that will help them accomplish those long-term goal. The four workgroups within the Protect and Restore Vital Habitats GIT are SAV, Wetlands, Fish Passage, and Stream Health. Additionally, while most of Megan's career development is coordinated by CRC, she is also an active participant in the Mid-Atlantic Panel for Aquatic Invasive Species (specifically its small grant competition) as well as online training courses and conferences.

Watershed Implementation Plan Cost Estimate Project - Kevin DeBell, EPA-CBPO
Kevin DeBell (EPA-CBPO) announced the EPA is undertaking a project to estimate the costs of actions proposed by each jurisdiction in their WIP's. DeBell introduced the project to STAC and engaged members in a discussion regarding the specifics of the economic analysis plan. DeBell is hoping to

gather advice and knowledge from STAC members on what the next steps in this project should be, and he hopes to benefit from the expertise and knowledge of STAC before the project moves forward. Several members suggested that if this project is going to continue, it better consider the benefits side of the TMDL because they should not have a number only on one side of the ledger. According to DeBell, the EPA-CBPO is hoping the EPA's National Center for Environmental Economics (NCEE) will head the effort for the benefits side with David Simpson (EPA) as the lead for this portion of the project. Since the separate studies have been established, EPA has determined through a series of conversations with the jurisdictions, that the analysis will consider only those costs associated with actions indentified in each jurisdiction's WIP. Actions to be considered include BMPs, stormwater and wastewater upgrades or retrofits. The deadline for completing this project is being set for June of 2012.

Discussion: Members began the discussion by asking if a collaborative, multi-institutional approach will be taken for this project. DeBell stated he was optimistic that different organizations and agencies will approach this study together. However, most agencies have different reasons for doing this type of work. Overall, it would be advantageous to have an ensemble approach for this study. A different member mentioned that it is sometimes more important to document how you got to the end (the methodology), then it is to publish a final estimate of costs. Another recommendation from a STAC member was to start talking with the Local Government Advisory Committee (LGAC) because they might offer help determining implementation costs at the local level. Additionally, members pointed out that the scope of STAC's involvement becomes limited if DeBell wants STAC to review this document at the end of the process. STAC members indicated they would like DeBell to come back at the September QM with more information so STAC can figure out what role it can play in this project.

ACTION: Kevin DeBell (EPA-CBPO) will return to the next meeting and update STAC on this project.

World Resources Institute's Nutrient Trading Platform Project - Mindy Selman

Mindy Selman (WRI) gave a presentation on WRI's project to adapt a region-wide trading platform based on the Nutrient Net Trading Platform. Partners in this project include Pennsylvania, West Virginia, Virginia, Maryland, and Delaware. Nutrient Net is an online tool with a registry and a marketplace for nutrient trading and a credit calculation tool for non-point sources. The idea behind this project was to create a single platform to help facilitate the trading between each state while respecting unique elements of each state's trading program. Additionally, the project hoped to include Virginia and Delaware, two states that currently do not have a trading platform tool. The benefits of this platform is avoiding the double dipping of nutrient credits and also using a single tool. Each state would essentially be able to register a project, assign a credit to that project, and track those credits from "the cradle to the grave." This platform would also have a single calculation tool instead of the three calculation tools that are currently available. Challenges WRI faces include: gathering permits, baseline data, different visions about interstate trading programs, and differences in types of projects that will be credited since the states have different standards.

Discussion: Many members had questions about nutrient trading for Selman. One member mentioned was interested to know if the wastewater industry would develop a demand for nutrient trading. In response, Selman foresees West Virginia and Pennsylvania, allowing credits from nonpoint sources to satisfy National Pollutant Discharge Elimination System (NPDES) permits or buyers of wastewater treatment plants wanting to purchase credits. Overall, Selman does see a demand for this kind of nutrient trading. Lewis Linker (EPA-CBPO) questioned if a trade between basins could be tracked with this tool and stressed the importance of tracking between basins. Selman agreed it is very important to track between basins. Russ Brinsfield (UMD) commented that unless there is criteria tied to how

manure is handled at the point of application, transporting manure from one location to another location will not necessarily solve the problem. Selman agreed that we need to have criteria for manure transportation and manure-to-energy projects. She also thinks there should be a consensus on how these projects are credited and how we determine if they meet requirements. This three-year project is currently finishing up the requirements stage and has promised the USDA's Natural Resources Conservation Services a tool/website that can be used by the states.

ACTION: Russ Brinsfield (UMD), Charles Abdalla (PSU) and **others** interested in WRI's Nutrient Net should contact **Mindy Selman**, mselman@wri.org.

Center for Watershed Protection's Watershed Treatment Model - Deb Caraco, CWP

Deb Caraco (CWP) gave an overview presentation about the CWP's Watershed Treatment Model, and then began a broader discussion about the model's use on a local level and how the model could be "scaled up" and used in a model such as the Chesapeake Bay Program Watershed Model (CWM). The Watershed Treatment Model is a spreadsheet that estimates the cumulative effect of structural and non-structural management practices in a watershed under both current and future development conditions. The outputs are pollutant loads and pounds per acres, bacteria calculations, and run-off volume. This model was intended for local watershed planning on a small-scale, but has also been used for Municipal Separate Storm Sewer System (MS4) accounting, TMDLs, and an individual stormwater retrofit analysis. The goal for this model is to help with local watershed modeling and to help local governments figure out how to implement changes. Caraco explained how several details need to be worked out for any local model to be consistent with the CWM. Additionally, she described how local models can potentially inform the way practices are modeled in the Chesapeake Bay Watershed. Several STAC members expressed concern that local models might not line up with CWM. STAC members wanted to know how to line up the two models. Members asked if there is a review process to determine which models would provide the EPA reasonable assurance and thus could be used by local governments in TMDL implementation. Caraco explained that local governments are not using the Watershed Treatment Model to develop allocations in contrast with the CWM, but are instead using the model to develop implementation plans.

STAC's Submerged Aquatic Vegetation Review - Lisa Wainger, UMCES

Lisa Wainger (UMCES) presented preliminary findings from the current draft on STAC's review of CBP submerged aquatic vegetation (SAV) restoration activities. Wainger explained the CBP's Submerged Aquatic Vegetation Workgroup requested the STAC external review to determine if current SAV restoration techniques are generating sufficient returns on investment. The external reviewers began by defining restoration success, then evaluating program techniques and monitoring results, as well as barriers to and opportunities for successful restoration. The findings of this review showed potential for restoration success. According to reviewers, work in the coastal bays clearly reveals the CBP's large-scale SAV restoration techniques are viable for overcoming apparent recruitment limitations for *Zostera marina*. Additionally, reviewers believe the CBP has developed the most successful eelgrass large-scale restoration methods in history. A major problem with SAV restoration has to do with water quality because without water quality improvements, SAV restoration is not yet a viable, large-scale alternative. It is also apparent that the failure of the site selection process to screen sites unsuitable for eelgrass survival contributed significantly to restoration failure and signals an important research need. Additional barriers to success could be increasing temperatures. The review committee recommended the following:

- Limit SAV restoration efforts in the Chesapeake Bay are warranted in areas of historical success

- Improve site selection criteria
- Test whether the understanding of: multiple stressors; other target SAV species; and cultivation and propagation and cultivation techniques are adequate to achieve restoration goals
  The final report is set to be released in the coming months.

STAC FY 2011 Workshop Updates

Mike Fritz (EPA CBPO) and Mark Bryer (TNC) hosted a recently STAC-funded workshop scoping meeting for STAC's Crediting the Maintenance for a Healthy Watershed Workshop. Fritz presented the workshop proposal that was recently developed and indicated the steering committee hoped to get approval from STAC members to continue planning the workshop using the outcomes from the scoping meeting to develop an agenda. One question this workshop would like to answer is if there is a way to give credit to land conservation in the TMDL framework or recognize the value in the protection of existing forests. Fritz and other members are hoping to somehow work this into the TMDL framework and CWM in a quantitative way or by utilizing the concept of "reasonable assurance" as defined by the TMDL. Fritz explained that leaders in the conservation community met at this meeting to discuss possible ways to credit actions for forest protection. Concepts that were part of the discussions included:

- A possible premium added to BMP's that are already quantitatively recognized or places that are under permanent conservation
- Development of a new map for risk reduction could be developed which might open the conversation for ideas to change that trajectory
- Identifying landscape functions provided by land protection and quantifying the importance of maintaining a watershed's current land cover

VOTE: Wardrop asked members to vote to reserve STAC funds for the steering committee lead by Mike Fritz to host a Crediting the Maintenance for a Healthy Watershed Workshop in FY 2011. Result: Motioned carried - steering committee was approved for workshop funds.

ACTION: STAC members should contact **Mike Fritz (EPA)**, fritz.mike@epa.gov if they would like to be involved in the workshop steering committee.

June 8 Minutes

Attendance:

Members: Charles Abdalla, Donna Bilkovic, Russ Brinsfield, Randy Chambers, Marjy Friedrichs, Kurt Gottschalk, Kirk Havens, Robert Hirsch, Robert Howarth, Susan Julius, Doug Lipton, Jack Meisinger, Raymond Najjar, Michael Paolisso, Vikram Pattarkine, Jim Pease, Chris Pyke, John Randolph, Ali Sadeghi, David Sample, Lisa Wainger, Denice Wardrop, Donald Weller

Guests: Jamie Heisig-Mitchell

Administration: Melissa Fagan, Natalie Gardner, Matthew Johnston, Kevin Sellner

Marcellus Shale Natural Gas Greenhouse Gas Emissions

Bob Howarth (Cornell) presented results from a recent study investigating the effects of Marcellus shale gas production on greenhouse gas emissions. Howarth briefly summarized the Marcellus shale formation and the hydraulic fracturing process before focusing on greenhouse gas emissions caused by natural gas production. According to Howarth, many media and industry reports claim that natural gas is a "cleaner burning fuel" than traditional coal or oil because natural gas releases less CO_2 when combusted. While it is accurate to claim that the combustion of shale gas releases less CO2 emissions than the combustion of coal or diesel oil, the new study argues that shale gas contains large amounts of methane which is vented and leaked into the atmosphere during drilling, hydraulic fracturing, processing and transmission, storage and distribution. Methane is a much more potent greenhouse gas than CO2.

The study finds, on average, approximately 3.6 to 7.9 percent of methane produced from shale gas drilling is leaked into the atmosphere during the lifetime of production and transmission, storage and distribution. Comparatively, the study claims that 1.7 to 6.0 percent of methane is leaked by conventional natural gas drilling methods. Almost all of the difference in methane leakage can be attributed to methane leaked during the initial drilling and hydraulic fracturing of shale gas wells. Following the presentation, members expressed an interest in learning more about various effects Marcellus shale natural gas production could have on the environment. Later in the morning, members of the Land-Based Effects Workgroup also discussed hosting a Marcellus shale workshop to learn more about these effects.

LimnoTech Review Update

Don Weller (SERC) updated STAC members on the LimnoTech review. Weller explained that the review panel had decided to proceed with a meeting of all reviewers at some point in July following the release of a revised report from LimnoTech. Weller suggested STAC submit a letter to LimnoTech asking them to accelerate the release of the July report. Following the release of this LimnoTech report, the reviewers will meet with USDA and EPA modeling experts to discuss the technical aspects of both the Chesapeake Bay Watershed Model (CBM) and the Conservation Effects Assessment Project (CEAP) Model. Reviewers will then review both the initial and revised LimnoTech reports for factual accuracy, and provide recommendations for future useful model comparisons.

Following Weller's comments, some members expressed reservations that STAC was moving forward with a review of the LimnoTech report, as they believed the LimnoTech report's findings were not completed in a scientific way, and did not warrant a scientific peer review. Other members suggested that the review panel include recommendations for future model comparisons so that STAC would not

be required to review each model comparison report released in the future. Weller agreed that the LimnoTech report did not present very credible evidence, and agreed that the reviewers would consider a more general review of how models are compared and how models should be used. Finally, STAC members agreed that STAC would submit a letter to LimnoTech asking them to accelerate the release of the revised report.

ACTION: STAC will submit a letter to LimnoTech asking them to accelerate the release of the revised report.

National Academy of Sciences Review of the CBP

Ken Reckhow (NAS) summarized a recently released NAS report titled *Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: Evaluation of Program Strategies and Implementation*. The report reviews the tracking and accounting mechanisms currently employed and the two-year milestone strategy currently employed by the CBP to determine of these tools would achieve the nutrient and sediment goals established by the Chesapeake Bay TMDL. According to Reckhow, the report suggests the following improvements to these tools:

- Consolidation of BMP programs into a regional BMP program that could utilize geo-referencing and track voluntary practices
- Conduct targeted monitoring programs in subwatersheds to help refine BMP efficiency estimates
- Develop more timely mechanisms for reporting and synthesizing implementation progress
- Adopt an adaptive management framework
- Develop a better understanding of the effects that future population levels, development and climate change
- Communicate the ideas of lag times and uncertainties associated with water quality improvements
- Establish a Chesapeake Bay "modeling laboratory" to bring together state-of-the-art models and top modelers
- Use multiple models to represent nutrient reduction.

Following the presentation, STAC members expressed great interest in a few of the recommendations above. Multiple members suggested that the CBP has to address lag times both in the model and in communications with the public. Members agreed that STAC should continue to emphasize the advantages of adaptive management. Finally, members also agreed that the CBP should consider creating a modeling laboratory. Lewis Linker (EPA-CBPO) explained that the CBP's Modeling Workgroup agrees with the modeling laboratory concept, but is having a difficult time convincing managers that a modeling laboratory would be worth establishing. Doug Lipton (UMD) then explained that he is a member of the CBP's Independent Evaluator Action Team which has been tasked with drafting the CBP's response to the NAS report. Lipton asked STAC members to forward him any thoughts regarding the report.

ACTION: If you are interested in working on the Independent Evaluator Action Team, or would like to submit comments regarding the NAS report, please contact **Doug Lipton**, dlipton@arec.umd.edu.

Pennsylvania State University's Recent Climate Change Research

Ray Najjar (PSU) presented preliminary results from an ongoing climate change research project funded in part by STAC. The researchers ran six global climate models using an "A2" emissions scenario, as

defined by the Intergovernmental Panel on Climate Change (IPCC), to test the potential impacts climate change would have on future temperatures, precipitation, streamflows and pollutant loadings for the Chesapeake Bay Watershed. The researchers' initial findings suggest that streamflows would decrease by 5-10 percent into the Chesapeake Bay under an A2 emissions scenario. The study's initial results suggest pollutant loadings could vary dramatically, and these shifts are not necessarily correlated with reductions in precipitation. Najjar believes the study's results suggest that evapotranspiration is much more important than precipitation. In fact, the researchers found evapotranspiration rates increased by 6 percent for every degree C increase in temperature.

Following Najjar's presentation, STAC members suggested that STAC and the CBP use the results of this study only the first study of its kind to understand the effects of climate change on nutrients in the Chesapeake Bay. Members suggested the CBP support and/or conduct similar studies prior to incorporating climate change modeling into the 2017 version of the Chesapeake Bay Watershed Model.

Climate Change Workshop Update

Chris Pyke (USGS) presented preliminary results from STAC's Climate Change Workshop held in March, 2011. The workshop gathered state and federal agency personnel, CBP managers, industry leaders and scientific experts to envision what an effective, state-of-the-art response to climate change could look like. Following presentations from experts and managers, the participants were each asked to create a vision statement for the CBP's response to climate change. These vision statements were used to generate discussion amongst participants which eventually led to the following recommendations:

- Embed climate change in all Chesapeake Bay Program decision making
- Focus on solutions to specific problems that are easy for the public to understand
- Identify and prioritize vulnerabilities and opportunities for adaptation
- Integrate climate predictions into the Chesapeake Bay Watershed Model
- Develop curriculum for educating professionals already working on Chesapeake Bay issues

Pyke explained that one of the more popular recommendations was to develop education curriculum for current professionals. He explained that most workshop participants understood there is a lack of funding available for climate change work, but developing a professional certification program to educate workers on climate change would be a cost-effective program.

Proactive Workgroup Discussion

Wardrop asked members to divide into their proactive workgroups to discuss specific actions or activities they could begin over the coming months. Following the discussion, representatives from the workgroups emphasized the following issues and actions:

Social Science Workgroup:

- Complete the workshop report and reinforce the message from the workshop
- Consider a workshop to investigate the social science issues related to adaptive management
- Continue to monitor the EPA's nutrient trading program review
- Draft a letter to the EPA expressing concern over proposed costs and benefits analyses for the TMDL

Monitoring and Modeling Workgroup:

- Consider a workshop to investigate how different modeling approaches deal with lag times
- Continue discussing how the CBP can use adaptive management effectively

Land-Based Effects Workgroup:

- Consider a workshop investigating Marcellus shale drilling effects on small watersheds

- Consider a workshop for FY 2012 to investigate how small watershed models could help inform the Chesapeake Bay Watershed Model

Climate Change Workgroup:

- Complete the workshop report
- Emphasize the needs for a Chesapeake Bay modeling laboratory
- Collaborate with steering committee for National Integrated Drought Information System (NIDIS) Chesapeake Bay Workshop