Modeling Quarterly Review Meeting
January 8th and 9th, 2013

http://www.chesapeakebay.net/calendar/event/18873/

NEXT MEETING

- Modeling Quarterly Review April 9th – 10th, 2013 10AM – 3PM Joe Macknis Memorial Conference Room (Fish Shack) CBPO 410 Severn Avenue Annapolis, MD. http://www.chesapeakebay.net/calendar/event/18874/

MINUTES JANUARY 8th, 2013 10AM – 3:30PM

Announcements and Amendments to the Agenda – Montali and Currey

- STAC is hosting a workshop "Multiple Models for Management in the Chesapeake Bay Program"
  - February 25th – 26th, 2013 at the Sheraton Hotel in Annapolis, Maryland.
  - Interested Modeling Workgroup Members please RSVP to Natalie Gardner, STAC Coordinator, at gardnern@si.edu.

Analysis of AGCHEM Sensitivities – Tian

Richard Tian described progress in an analysis of AGCHEM nutrient export sensitivities to input loads. The work will document the input-export response of all land uses in all model land-segments and provide a sound foundation for the development of an all-PQUAL based Phase 6 Watershed Model.

Conclusions relative to the AGCHEM simulation of forest:

- Forest exports are mostly linearly related to inputs.
- Organic exports are linearly related with a low slope that can be appropriately modeled as constant for all segments.
- Dissolved inorganic nitrogen (DIN) exports are linearly related to inputs. The slope of the relationship is related to the latitude.

To view the Progress Report on AGCHEM Sensitivity Analysis presentation:
http://www.chesapeakebay.net/channel_files/18873/tian_-_tianetal_quart_review_2013_1.pdf

To view the Water Quality Criteria Assessment: Code Alignment presentation:
http://www.chesapeakebay.net/channel_files/18873/tian_-_tianetal_criteria2013_1.pdf

Discussion and Questions

- **SUGGESTION**: Consider percent forest.

- Since AGCHEM is simulating one acre for each segment and the purpose of this analysis is to understand AGCHEM, the percent area would not affect the results. The CBP is using a unit area of forest/woodland that's 100% forest.

- **SUGGESTION**: Run the scenario with no atmospheric deposition.
  - This type of scenario has been run before, and the results are very interesting. The model produces nitrogen loads from organic nutrients in the forest soil, which is entirely consistent with literature.

- Slide 28: What is happening on the Lower Eastern Shore?
  - Ammonium from Poultry
    - Working to understand why this would affect the correlation between input and output. The correlations could be very low because there is no variability.

- **SUGGESTION**: Maybe this should be called a "elasticity analysis" vs. "sensitivity analysis"
  - The Modeling Team is aware that we are not using the term "sensitivity analysis" the way it is normally used and that is why there is a definition slide at the beginning of the presentation (Slide 1).
  - Sensitivity of the output to parameters was analyzed during the last calibration.
  - The point of this analysis is to understand the generalized information (i.e. Richard Tian's presentation) and to move toward a Phase 6 Model that's responds in a simple and direct way to management actions..
  - Keith Eshleman – Field data may suggest that the slope may be an order of magnitude too small.
    - This is being looked at completely different then the field data, so there needs to be further analysis.
    - **ACTION**: Lewis Linker, Gary Shenk, Richard Tian, and Keith will discuss this offline.

- **SUGGESTION**: Include a list and description of the scenarios and loads that were used in the analysis.

- Are there any studies comparing loading for old vs. new growth forests?
  - New growth forests generally uptake considerably more nutrients then old growth.
  - Application to the model? The presentation today by Phil Townsend will begin to discuss this type of application.

- If a segment is dominated by agricultural use, then are the forest parameters very important? May want to look at the relative forest area in segments that don't have a good correlation.
  - **SUGGESTION**: NEXT STEP – Compare how the parameters have been auto-correlated.
  - Does the relative forest area effect the parameter calibration?

- NEXT STEP: Pasture is the next land use that will be analyzed.

New Approaches in CBP Modeling – Keeling and Pattison

Bill Keeling and Kenn Pattison proposed a concept of a model test period and criteria that might be utilized for such an effort, as well as an additional method for model for progress reporting.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/wsm_model_evaluation__progress_reporting.pdf

Discussion and Questions

Model Test Period and Sensitivity Analysis Discussion

- Slide 7: The bottom half of these are run in PQUAL and the reason why there is not an exactly a 50% reduction is because organic phosphorus is related to organic nitrogen in HSPF. When you vary nitrogen inputs there is a change in organic phosphorus and when you vary total phosphorus inputs you don't see a change in organic phosphorus.

- Slide 7: This chart is closely related to a theory that Tom Simpson was using several years ago where he suggested using the yield reserve. When there is an input below the maximum plant uptake there will be a very large reduction, so the initial reductions will be higher.

- STAC has a workgroup that will be making recommendations for this (phosphorus only).

- **ACTION**: William Keeling will send Jeff Sweeney and Gary Shenk the exact steps he took to complete this analysis.
    - This was a 2010NoAction Bay wide average.
    - William Keeling and Ken Pattison are not requesting that this is the exact analysis that should be contacted, but rather that an analysis needs to be decided upon.

- **SUGGESTION**: Conduct sensitivities to decreases AND increases.

- **NEXT STEPS**: Establish systematic set of tests for the sensitivity analysis.

- **ACTION**: Once a test is decided upon this will go through the Modeling Workgroup, Watershed Technical Workgroup, STAC, and Modeling Team.

Constant Delivery Factors Discussion

- WQGIT decided CDF vs. Standard for Annual Progress. The decision would have to go through the WQGIT.
    - The WQGIT choose this because it made sense for trading and WIP Programs, but does it make sense for Annual Progress?

- **SUGGESTION**: Follow up conversation within this group and then bring it to the WQGIT. Explain how this will affect Annual Progress and how CDF are currently used.

Monitoring vs. Modeling Communication

- **ACTION**: Communication of the purpose of the model as a management tool.

- The Chesapeake Bay Program already has two environmental indicators that show this: Modeling vs. Monitoring, which explains the differences between them.
    - **SUGGESTION**: Need new ideas to present the information. Maybe, run the actual climate data and show how well the model matched up with the monitoring data. Currently the model is run for a 10 year average.

- The Modeling Team is currently working to extend the precipitation data to 2011.

- This group will discuss this approach again in more detail at an upcoming Quarterly Review Meeting.

Proposed Forest Disturbance Project – Townsend

Phil Townsend (University of Wisconsin) presented a proposal to better characterize seasonal and inter-annual variability of forest nitrogen loads using of remote sensing imagery to estimate variability in nitrogen export from forests due to silviculture, insect defoliation, drought, and other disturbances to improve overall estimates of forest nutrient loads.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/townsend_-_estimating_nitrate_export_from_chesapeake_bay_watersheds_using_modis_and_climate_data.pdf

Discussion and Questions

- The CBP Model simulates by land use, so it needs acres of disturbed land by model segment and it would be even better to have by disturbance (i.e. insect defoliation, logging, etc.).
    - There is a latitudinal gradient.
    - Currently, in this forest model there is no attribution to a certain type of disturbance, however this is a very fine scale model and 10 years of MODIS data, it produces a distribution of the types of disturbances that occur. Since, this is all geospatial data we can characterize the distribution and the likelihood of a disturbance occurring.
    - Can use climate data – What is the envelope of likely occurrence in a particular watershed under these types of climate parameters?
    - As part of her dissertation, Lindsay Deel will be using this type of data to work towards identifying attributions of certain types of disturbances.

- Change in satellite to VIIRS
    - To include the longer time period must use AVHRR – lower quality data and lower precision, but still able to create a comparable model.

- Currently, the model is calibrated to annual loads. This data would allow the model to be calibrated to monthly loads, which will make large changes to management.

- Choose land uses that are mostly forest, but there are other land use, point source, and atmospheric deposition inputs. In order to incorporate this into the CBP model, must make sure there is no double-counting.

- Slide 12: The segment label of the lower left hand corner graph is incorrect.

- Since this is all satellite imagery, the disturbances that are on the ground and covered by the canopy might not be incorporated.
    - Because it is monthly data, the leaf-off data may be incorporating this.
    - Currently, in the CBP Model this is not considered at all

- **ACTION**: Cacapon Institute is working on assessing the impact of deer on forest hydrology in small scale experiment. If anyone is interested, email Neil Gillies (ngillies@cacaponinstitute.org).

- **ACTION**: Continue to work with the Modeling Team at CBP and update the Modeling Workgroup at the July 2013 Quarterly Review.

Simulation of Bidirectional Ammonia with CMAQ – Bash

Jesse Bash, the lead nitrogen modeler of EPA's Atmospheric Modeling and Analysis Division, described the new version of CMAQ that will be used for the 2017 Midpoint Assessment and the advantages of the new version for nitrogen chemistry in general and for ammonia transport and fate in particular. This presentation covered the motivation of the effort, NH3 bidirectional exchange in CMAQ v5.0, temporal NH3 CAFO emissions, and next steps.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/bash_et_al_nh3_2.pdf

Current and Future Research

- Field measurements and modeling to better understand soil nitrification processes and N cycling in natural systems
    - Are these processes important to air-quality as well as climate?
    - Expand soil geochemistry to include organic N mineralization and soil nitrification processes

- Improve geochemistry in natural systems

- Couple N2O and NO fluxes with land use management

- Modeling and measurements at animal facilities to develop better mechanistic NH3 emission estimates

- Compensation points in water bodies

- Couple CMAQ with meteorological, biogeochemical, and hydrological models
    - Develop tools for robust system analysis of future climate/emission scenarios

Conclusion

- CMAQ with bidirectional NH3 exchange:
    - Represents the state-of-the-science of NH3 air-surface exchange
    - Improved NHx wet deposition and NH4+ and NO3- evaluation
    - Connects land use and agricultural management practices to ambient air-quality and acid and nutrient deposition
    - Reduces N dry deposition to terrestrial land use by ~15%
    - Increased direct N dry deposition to water bodies by ~3%

- Satellite observations, monitoring networks, and intensive NH3 measurements integrated with modeling is improving process based NH3 emission estimates
    - Allowed for robust case study evaluations
    - Necessary to identify modeling and measurement needs

Discussion and Questions

- The CBP tracks estimates of fertilizer and manure into the different land uses. If you wanted to do a comparison of national data sets to the CBP data sets, that data can be made available.

- **SUGGESTION**: Since this is showing that the dry deposition rates were previously overestimated, it would be beneficial to rerun the historical data with this new method to see if/how that changes reduction.
    - It may change the magnitude, but the trend should not change.

- How should area of the ammonia airshed change with the bi-directional approach?
    - It should increase.
        - More is converted to ammonium, the particulate which deposits out more slowly locally, which will stretch out the airshed. If the diurnal profile of the CAFO emissions is changed to emit more during the day, where it gets mixed rapidly away from the surface, it will go into long range transfer, which will also increase the size of the ammonia airshed.

- **ACTION**: Once the bi directional CMAQ is released, we must begin building our library of scenarios.
    - When would we be ready to start discussing funding and sequencing for these scenarios?
        - We ought to know where we are at in the spring. There is funding now to do some scenarios. Some scenarios can begin this summer. Must talk about which sensitivities are most informative?

Refinements to State and Sector Analysis – Dennis

Robin Dennis updated the Workgroup on refinements made to the state and sector analysis of NOx transport throughout the Chesapeake watershed, tidal Bay, and region.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/rdennis3_ches_bay_nox_sce_attribution_cbayjan13.pdf

Summary

- Now seeing a potential for significant air-water exchange load reductions in using an aggregate approach
    - Makes sense to work at the watershed level
    - Makes sense to use total state-level NOX emission reductions
    - Makes sense to combine NOX emission reductions across states
        - See if the states can combine or share efforts on this

- CBP States get estimates of their nitrogen deposition in other states and what other state emissions are doing to deposition in their state.

- Working at the state level is a viable approach that is worth pursuing.

Discussion and Questions

- The tier 3 low sulfur fuel is not part of the 2020, correct?
    - Waiting for Tier 3 to be officially proposed until we have estimates on Tier 3 effect on deposition simulated in the model. Can't commit to anything until then, but hope to begin the work this summer.

- Maryland is trying to work with other jurisdictions and EPA to decrease air emissions and Bay emission simultaneously and appreciates the work being on this. Maryland also has a fine tuned tool that we believe does a great job predicting the power sector in the future. They would like to compare tools and see if theirs can add value to the Bay objectives.

- Need to keep the conversation going between the air and water programs through the Air Directors meetings to make sure that reductions above the federal programs are credited.
    - Q: Since reductions in one jurisdiction can produce reductions in other states, who gets the credit? This needs to be brought to the WQGIT.

- **ACTION**: Follow up with an Air Directors Meeting March. Then a Modeling WG presentation in April and lastly have a presentation to the WQGIT in order to evaluate and approve the aggregate air-water exchange method.

Explaining Trends through Multiple Lines of Evidence – Blomquist

Joel Blomquist described an analysis that will use monitoring, modeling, and land management data to understand major changes in nutrient concentration and load across the Chesapeake watershed. The USGS highlighted recent information on trends in load at River Input Monitoring Stations and discussed ideas for a partnership to explain major drivers for these changes. Current plans are to focus upcoming work on the Potomac watershed.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/usgs_trends_jan82013.pdf

Discussion and Questions

- **SUGGESTION**: For Pennsylvania, an analysis of Marietta would be beneficial.
  - That is part of the work that is being done and planned for the future.

- USGS had summarized data for over a hundred stations that were suitable for long term trend analyses. Why aren't all of these stations being used in this analysis?
  - The datasets used in this specific analysis and presentation are the datasets that have the highest quality long term data. These datasets are the most suited for the WRTDS tool. They aren't the only datasets that could be used. Collaboration with universities and jurisdictions could be useful.
  - The earlier reports were on trend in concentration.

- If you review what we are reported as progress, 2/3 of the reductions in phosphorus that the Chesapeake Bay Program has estimated are below the fall line, which are measured and not part of this analysis.

- **ACTION**: USGS will update the Modeling Workgroup has the trend analysis continues.

Model Work Plan Update – Linker

Updates to the work plan on Phase 6 Model development were reviewed by the Model Workgroup.

Discussion and Questions

- **ACTION**: The Modeling Team has been putting together 2017 Midpoint Assessment Workplans, which will be discussed at upcoming Modeling Workgroup, STAR, and WQGIT Meetings.

MINUTES: JANUARY 9th, 2013 10AM – 2PM

Announcements and Amendments to the Agenda – Currey and Montali

Progress on Lower Susquehanna River Watershed Assessment – Cerco

Carl Cerco described the progress being made on the simulation of the Lower Susquehanna Reservoirs, including the initial linked Watershed Model and Water Quality and Sediment

Transport Model scenarios being developed to examine Conowingo inflow effects on Chesapeake DO and SAV-clarity.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/cerco_lswra.pdf
Discussion and Questions

- The ADH model is appropriate for simulating specific scour loads in large scale events .

- **ACTION**: Larry Sanford would like to be involved in future Conowingo discussions.

- When will the final report for this work be released?
    - The Chesapeake Bay water quality assessment is a small portion of the report since the report has a large scope.
    - The report outline is not complete and many things still need to be decided, so a date has not been determined yet.
        - The HEC-RAS model results have been presented, but there is discussion of whether the documentation and results will be included or not.
    - The LSRWA is working to answer the question of: What is the impact of the Conowingo filling and how can we medicate the impacts? The Chesapeake Bay Program is working to determine how Conowingo infill will affect the TMDL. These are related, but they are two separate management decisions with two different deadlines.

- How the Chesapeake Bay Program will address these concerns for the 2017 Midpoint Assessment and the future TMDL is an open question and will be an ongoing discussion at the Chesapeake Bay Program up to the point where decisions could be made in the 2017 Midpoint Assessment.

- A decrease of 0.1 – 0.2 milligrams/liter in the bottom dissolved oxygen is notable. In comparison, the TMDL load reductions are aimed at raising the bottom channel DO from 0 mg/l to 1 mg/l in parts of the deep trench.

- There is much that we will don't understand. It will be beneficial to start to compile the information in order to look at all of the science and determine what studies are still needed after the CoE study is completed. A STAC Workshop will be proposed by the Modeling Workgroup to do this.

- It's important to look at the effects on Conowingo infill on deep water and deep channel DO.

- The no burial or similar effects simulated in the model are limitation to the analysis and a major caveat. If seedlings are buried and don't emerge that is an impact.

- **ACTION**: STAC Workshop Proposal – Conowingo
    - Further inform the decisions that USACE and Maryland have to make.
    - June is the earliest that the workshop could be held.
    - March is the proposal deadline.

- Interested Parties: Larry Sanford, Mike Langland, Lee Currey, Carl Cerco, Joel Blomquist, William Ball, Lewis Linker, and Gary Shenk

DO Water Quality Standard Stoplight Analysis for LSRWA – Linker

Lewis Linker will update the Modeling WG on the progress of the DO water quality standard stoplight analysis for the Lower Susquehanna River Watershed Assessment (LSRWA), including a description of the decision rules, first steps, initial findings, implications, and next steps.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/linker_-_conowingo_step_1_infill_results_1-9-13.pdf

Discussion and Questions

- This initial analysis is a good first step and it is great that there are conclusions from step one, but there aren't any solid messages yet. There is a lot more work that needs to be done. Even step two might show different results. It is helpful to let the WQGIT know what is coming, but we should hold off until more progress is made.

- The message is not there yet. Do we really think that the reality is going to be like the scenario from step one? It would be beneficial to continue the analysis before bringing a message to the table.

- Communication of this information is extremely important.
  - This effort is purely academic. It is not the excepted results from the Conowingo filling.
  - Need to begin to compile the information from the different studies and they message that comes with them, as well as see how the message changes as the analysis continues.
    - April – Storm events analysis, water quality standard analysis and early indications of the findings of AHD in the Conowingo.

Proposed CoE/Maryland Workplan – Cerco

Carl Cerco presented a proposed CoE/Maryland workplan, which provides for refinements to the WQSTM to support outstanding issues in the Chesapeake TMDL including 1) refining assessment of open water DO and clarity WQ standards, 2) assessing the influence of filter feeders on water quality, 3) supporting the James chlorophyll assessment, 4) assessing the influence climate change has on the TMDL, and 5) assessing the influence of Conowingo infill on water quality.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/cerco_feasibility_study.pdf

Discussion and Questions

- Oysters and Menhaden – The CoE/Maryland Bay Model project is moving forward. The shallow water multiple model shallow water work is a separate project . The CoE/Maryland Model project will also take into account aquiculture, which does not always need shallow water (floating rafts, etc.)

- **ACTION**: The Watershed Model data is readily available. Carl Cerco will also make the other input data available.

- The Chesapeake Bay Program is working on an agreement with MDNR for funding.

James Chlorophyll Study – Butt

Progress in the multiyear study of chlorophyll in the tidal James River using augmented monitoring and modeling approaches was presented.

Major Goals of the study

(1) Remodel the James River. Revisit the James River TMDL allocations (Appendix O & X, Bay TMDL)
    - Develop a site specific James River water quality model
    - Re-assess attainability of Chl-*a* criteria

(2) Review and confirm/adjust James River Chl-*a* standard (WIP I - Appendix 2)
    - Scientific Advisory Panel to make recommendations
    - Conduct scientific study to review basis for setting chlorophyll standard

Discussion and Questions

- Working closely with USACE. In November, there was a Scientific Advisory Panel meeting and reviewed the monitoring and modeling results.
    - Following the meeting, there was a conference call between the James River group, USACE, Carl Cerco, and Gary Shenk to outline the issues, describe the modeling approaches, and match boundary conditions at the mouth of the James River between different models.

- Completed first year of the monitoring program of the 3 year study.
    - Monitoring reports will be available in spring 2013.
- Monitoring and modeling grants are all in place for the 3 year study and can be accessed on the webpage.

- Modeling Deliverable: Report – assessment of the data, methods used, data review, and update to 2010/2011.
    - Also, revisiting the critical conditions assessment.
    - Deliverable: March 2013

- Working to assess linkage between algal blooms and designated uses.

- Will the deliverables include recommendations?
    - Creating a team of investigators to examine how the standards were developed before and assess other approaches. They will be using data from last year and bioassays from this year to examine the criteria and how well they are addressing our designated uses.
    - If a change is proposed, must rerun through the model.

- **ACTION**: Arthur Butt will update the Modeling Workgroup as the reports are released.

Multiple Models Workshop – Weller

The Bay Program's Scientific and Technical Advisory Committee (STAC) is hosting a workshop "Multiple Models for Management in the Chesapeake Bay Program" taking place February 25th – 26th, 2013 at the Sheraton Hotel in Annapolis, Maryland. The workshop will discuss experiences and consider how multiple models could be used within the Chesapeake Bay Program. Invited speakers will provide a basis for productive discussion and written recommendations to the Bay Program.

Here is a brief description of the rationale and current plan for the workshop:

Scientists have documented many advantages to analyzing more than one model. Multi-model analysis can compare different conceptual models of systems, contrast the skills of different models, improve basic understanding of systems, and help quantify the level of confidence in model predictions. Despite the scientific advantages, managers and environmental advocates are often wary of multi-model approaches. They are concerned that multi-model approaches cost more and that more than one model estimate may confuse the public and decision makers, provoke legal challenges to regulations, and cripple the regulatory process, especially as implemented through TMDLs.

The workshop will address these issues in five parts:

(1) Introductions to the scientific benefits of model comparison and multiple models and to the current role of modeling in the Chesapeake Bay TMDL.

(2) Case studies of models in environmental regulation that highlight how the use of a multiple models has helped or hindered the implementation of environmental regulations.

(3) Insight from social science on how the use of multiple models might affect the perception of models and their results by decision makers and the public.

(4) Insight from legal experts on whether multiple models should be used to enhance the credibility and defensibility of regulatory decisions made to implement the TMDL program for the Chesapeake Bay? If so, how? If not, why?

(5) Extensive discussion, including whole group discussion after each of first four parts, and final breakout groups to synthesize the sense of the assembled participants on if and how multiple model approaches should be used by the Chesapeake Bay Program.

Please note that the workshop is focused on the general idea of using multiple models, not on presenting and discussing specific models that might be considered as alternatives to the current CBP model suite.

Discussion and Questions

- **ACTION**: Please RSVP to Natalie Gardner, STAC Coordinator (gardnern@si.edu)
    - Workshop logistical information and agenda will be sent to those who are planning to attend.

- **ACTION**: Arthur Butt will contact Natalie Gardner about possibly presenting at the workshop and/or attending the workshop to represent the James River project.

STAC Workshop Proposals – All

Climate Change

- STAC currently has a climate change recommendation to the Bay Program.
    - The Bay Program has yet to respond to those recommendations.
    - Must make sure that the request is separate from these recommendations and is well defined.

- Climate change is a huge and diverse issue.
    - Landuse changes, temperature limitation on eel grass, how will climate effect crops, etc.?
        - How to deal and plan for these condition changes?
        - How can we make our model more responsive?
        - What other questions need to be asked/answered?
        - Set a direction and protocol.
    - Collection of correct studies.

- This could be a continuation of 2011 Report.
    - More detail and collection of current and past studies.

- Climate Change is a broad issue, so prioritize to modeling. Work with other GITs and Workgroups if we want to take on a specific climate change issue.

- Proposal deadline is March.

Chesapeake Modeling Lab Action Team Status – Bennett

The progress of the Modeling Lab Action Team (MLAT), which was formed to respond to the NAS recommendation for a Chesapeake Modeling Laboratory, was described. MLAT will be making a presentation to the Management Board on their progress on January 10th, 2013.

To view this presentation:
http://www.chesapeakebay.net/channel_files/18873/mb_modeling_lab_january_10.pdf

Discussion and Questions

- **SUGGESTION**: Communication and Educational Outreach
    - Educate the public on current misconceptions of the Modeling Laboratory
    - Education of students

- **SUGGESTION:** Discuss the virtual vs. bricks and mortar lab
    - RFP process
    - Budget

- **SUGGESTION**: Clearly state that the issues have been around for many

- There are many examples of finite modeling.
    - Examples:
        - USGS – Community Sediment Transfer Model which was funded through a corporation of federal agencies. 5 year grant plus 2 years through USGS upfront.
        - UMD just won SYSCNC – 10 year grant
- This Modeling Laboratory is suggested as core foundation and funding.

- Should review EPA's Great Lakes Modeling Center in more detail.

- Federal Government probably will not fund a program that is specific to one region. The scope would have to become larger.

- **ACTION**: The Modeling Laboratory Action Team will present to the Management Board on January 10th, 2013.

PARTICIPANTS

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39	Karceski	Julie	jkarceski@mwcog.org	MWCOG	x	x
40	Kelly	Fred		MDNR		x
41	Kennedy	John	jmkennedy@deq.virginia.gov	VA DEQ	x	
42	Koran	Dave	David.Koran@usace.army.mil	USACE	x	x
43	Lakel	William	wlakel@vt.edu	VT	x	
44	Langland	Mike	langland@usgs.gov	USGS		x
45	Logue	Kyle		Malcolm Pirnie, Inc.	x	x
46	Mandel	Ross	rmandel@potomac-commission.org	ICPRB	x	x
47	Mawhorter	Julie	jmawhorter@fs.fed.us	USFS	x	
48	McDonald	Derrick	emcdonald@state.pa.us	PA DEP	x	
49	McNeil	Brend	Brenden.McNeil@mail.wvu.edu	WVU	x	
50	Mutsert	Kim de	kdemutse@gmu.edu	GMU		x
51	Onyullo	George	george.onyullo@dc.gov	DDOE	x	x
52	Peddicord	Herb	Herb.F.Peddicord@wv.gov	WV	x	
53	Power	Lucinda	power.lucinda@epa.gov	EPA/CBPO	x	
54	Quinn	Sheryle	sheryle.quinn@navy.mil	US Dept of Navy		x
55	Ramaswamy	Surya	surya.ramaswamy@erm.com	ERM	x	
56	Rodgers	Frank	frodgers@cacaponinstitute.org	Cacapon Institute	x	
57	Rutkowki	Mary Jane	mrutkowski@mde.state.md.us	MDE	x	
58	Sanford	Larry	lsanford@umces.edu	UMCES		x
59	Seipp	Bryan	bts@cwp.org	CWP	x	
60	Sekellich	Andrew	ajsekell@usgs.gov	USGS	x	
61	Sellner	Kevin	sellnerk@si.edu	CRC/SERC/STAC	x	x
62	Shenk	Gary	gshenk@chesapeakebay.net	EPA/CBPO	x	x
63	Sherwell	John	jsherwell@dnr.state.md.us	MDNR/PPRP	x	
64	Speiran	Gary	gspeiran@usgs.gov	USGS	x	
65	Stewart	Helen	hstewart@dnr.state.md.us	MDNR	x	x
66	Sweeney	Jeff	jsweeney@chesapeakebay.net	EPA/CBPO	x	
67	Tesler	Ted	thtesler@pa.gov	PA DEP	x	x
68	Wang	Ping	pwang@chesapeakebay.net	VIMS/CBPO	x	x
69	Wazniak	Cathy	cwazniak@dnr.state.md.us	MDNR	x	
70	Wilusz	Dano	dwilusz1@jhu.edu	JHU	x	x
71	Woodman	Michael	mwoodman@mde.state.md.us	MDE	x	

72	Xia	Meng	mxia@umes.edu	UMD Eastern Shore	x	x
73	Yactayo	Guido	gyactayo@chesapeakebay.net	UMCES/CBPO	x	x
74	Yagow	Gene	eyagow@exchange.vt.edu	VT	x	