Scenario Builder and Watershed Model Progress toward the MPA

Gary Shenk WQGIT 7/14/14



Midpoint Assessment Timeline

BMP panel
recommendations for
Phase 6.0 inclusion

Evaluation of 60% by Jurisdiction Implementation of WIPs & Two Year Milestones 2017 target using Evaluation of Programmatic and Load Reduction Commitments Phase 5.3.2 modeling Monitoring data assessments/factors affecting trend findings tools •2018 Comprehensive monitoring and trend Approval of decision Complete Phase III Agreement on framing Establish Phase III Agreement on path findings through 2016 support tools WIP targets WIPs forward and data the priority issues inputs •2018 •2017 •2016 •2015 2014 Support for Phase III Phase III WIP Final partnership · Early review of New land use WIP development expectations finalized comments on suite of decision support tools classifications and using Phase 6.0 tools Partnership informs loading rates James River modeling tools final decisions on Partnership input to approved chlorophyll any updates to local reallocation process assessment criteria BMP panel area target completed recommendations for expectations Conowingo Dam Phase 6.0 inclusion Review and study complete Agreement on incorporate decisions Midpoint Assessment Review and of climate change Schedule incorporate decisions impacts of climate change impacts

Midpoint / ssessment Timeline Evaluation of 60% by Jurisdiction Im ementation of WIPs & Two Year Milestones 2017 target using Evaluation of Pr rammatic and Load Reduction Commitments Phase 5.3.2 modeling Monitoring dat assessments/factors affecting trend findings •2018 Comprehensive monitoring and trend Approval of decision Agreement on path Agreement on framing ablish Phase III Complete Phase III findings through 2016 support tools P targets WIPs forward and data the priority issues •2017 •2018 •2016 •2014 •2015 Support for Phase III Phase III WIP Final partnership · Early review of New land use WIP development expectations finalized comments on suite of decision support tools classifications and using Phase 6.0 tools Partnership informs loading rates James River modeling tools final decisions on Partnership input to approved chlorophyll any updates to local reallocation process assessment criteria BMP panel area target recommendations for completed expectations Phase 6.0 inclusion Conowingo Dam Review and study complete Agreement on incorporate decisions Midpoint Assessment Review and of climate change incorporate decisions Schedule impacts of climate change impacts BMP panel recommendations for Phase 6.0 inclusion

CREATE The Models

REVIEW The Models

USE The Models

Draft Modeling Schedule for MPA

Dec 20, 2016 - All models are final. The partnership decision-making process begins to discuss how these new models will be used in the WIP3 process

September 2016 – Final comments on the draft Phase 6 model

REVIEW
The Models

Dec 20, 2015 - Phase 6 draft model is complete. Evaluation followed by fine tuning during this year

Oct 20, 2015 – All inputs are final and delivered to the WSM by the scenario builder team for the final calibration run

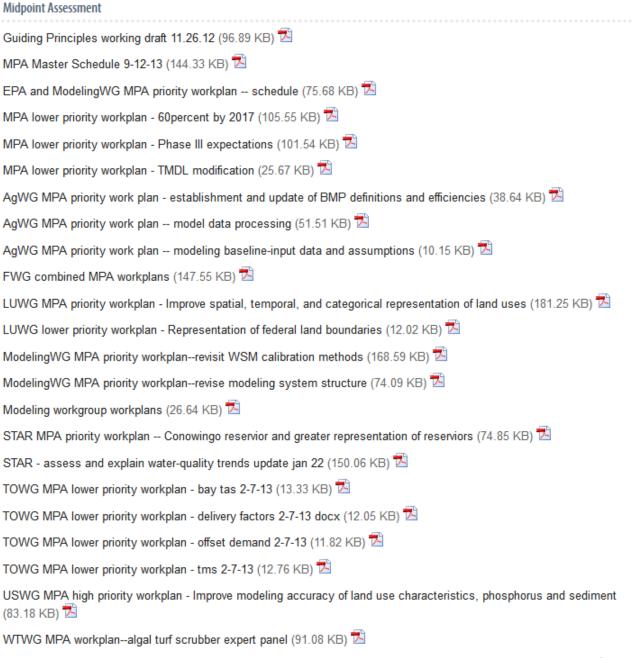
March 20, 2015 – All major partnership decisions are made on changes to scenario builder processing and data. Scenario builder final modifications begin.

Oct 20, 2014 – Rough Draft of major changes to nutrient processing in Scenario Builder will need to be complete. (Examples: land use types and manure application rules)

CREATE The Models



Already Here, but Partnership needs to be able to get the whole picture "at a glance"



Patient Land Developie Managing of Fallent presents to well-rise is imported to recovered the entire ingress recovered the formulated ment lead reductions. The CEP DO Team has a period addition CEP Address Apolitics Team to Scenario Builder and Watershed Model Plan for the MPA anne Clas Indianal arrange (a Casa-Gera Caladona, "The CO Trave For sing Complex and a rest-Casa Casa) for DRAFT 20140710 in proportion for the 2017 MO Paint Asset Final Conditional model developments find an obtained index ments under To Projects and Ensurement to be not the <u>Valley South Offices</u> in high principles are not exist October 2011 index quality Offices in the <u>Valley South Offices</u> in public developed by greater in the province of the principles of of the land to the or the left of land come by Oct 2010 with Ord Lannage by No. 2013 subsequent mediates and Officeatings. The <u>MAS made solution</u> into the sprinting is a table Fertilizer and manureapplication format. Additional dissempts on the endinger proposition and plane to assempte follows tasks CEP CHANGE CONTRACT / CANADA Out of namedly place 0 development is assuring stary multiple parallel patter. These multi-mediate med in a Graff prime 0 malerated medicional semants builder (factoril Cornectly for full performing CEPT Contact the Colonian reter Engineery Lancery 1 1000. These parallel public encompass of all Tim CIP priorities. This description is properly as the principles and the lifes had recognitive for each other. The County Claims Fore are Crist and Minds Common Collabed in ordinary. Committeers The digital along Subsement Conjuits (I) of The digital regroup is conting on updates to further and nanura application as part up To update for committe Solder. Mall influedon in To committe des To CEF Charaly 60: Land Dis Medigram rregress. The SMSI has prior thank the built of publish updates teasoners builter banden. Her impedien mediate vulneret er bedimente aberd is described as definitions. The SMSI is making progress an determining deleasance in the submitted about their. les construint formand and after the construint and files of the construint and after the construint and the The Land Use Martigracy (LUMB) is leading the decale proof of the Flore 5 land use data including Symilal Completion Date Oct 1, 1013 Both historical and future projections. The LUMB is moving stocky with communitar configuration under the MCST and with obtainments and less governments to ensure that the land was information and in Planck is assertly screent, and reliable To state of To science and man EMP effectiveness CEF County 60: WIQET Lands done Velly James Coule Markly British Seeland adians for order quality reducation. Through the association of ACC 1922 to a rigroups, To USSS has developed a mader left of proposed near left can be Flow 0. The CSF Lee Code flow and dishappening are actively programs have been as the Princip. The LEF and Disk forms and subfragments are admitted benefating any of the gas of subsiding requires principle from the principle of the pri The MCCT is evaluating near 1975, and inversely the definitions or descended of eclassics release a. Medited the addition with a tage to a four arranger and misstance are 2 Calibration matte Cariate Communicate a form at the WOM. Persible improvement simulate using parameter 6. PSUSS anti-simulation Consider responded in classes a Consultancial of consension in the inconsectation, and Coning No. Commercial in maligate sement retiems retains to mentaring data Denting that had at retaining input timing to subject sementialism Symplet Compilation Data 041,3013 Scenario Builder Development and Code Versioning CEP Charage Colleges Standard making making the Stan Madifications to Resultinates matter to Matien interessed of the Superstative (In CSC ted Stewar CEPT was now...

Provided the Communication of the Cading of trial salidration methods. Squaded Completion Cale Oct 1, 1013 nargande desistant van TaCP perkendig. Tad til ad leda diesampliens dateg desisperati di van mendalana. Pershalara sanaria balike sala ta inargani aras mendalana Marking on mel field of a refuse analysis of angional feature by using a priori data in selfting land use larget leading rates. The USES Sparrers from is running largeted analysis that may be used in This Program: Redirectured solicite material angle mana solicing temporal sol Manada sinudi and Carlors

041,3013 Calibration Methodology Senzitivities to in outs CEF Charage Collections Westgroup Land, Lan Currey and David Mental CBPO Contact, October Testings CAPO Cardial, Deal Stat. Dec Start Spirit authorized model self-ration methods, 1998

North to improve the self-retire present, particularly in the area of FGUSS, self-retire and regio

Impresements in hydrology and landautiment grossess - Depai incremental allerges have been made to the satisfaction procedures that produce better consent Colonia with the year rainful distance in uniform for the

Complete Frametal at MASS MAS/MW

Ned Steps: Ceding of groundwater module Atmospheric Data

CSF Change C. Mediding Minigrap Land-Lan Currey and Describe Call CSFO Contact, Land-Links and Department

malified that there exists as That There delicates the splitful each year

The Phase 2 promptiation, realisating, and already finite deposition data second the period 2003-2003. In order to take absorbage of the information states realization to day, now understad

stations, and report Committing Site with the materials simulated will need to be extended Quest \$5,000 from a flower first 17 to 10,000-0 data and antitivation the 10011 fig. 0 ratings on a real or 17 a present was USSS NO data set. NLCAS-3 is preferred Consumed larger form availability. An automated Generalis

Allega ghant Deposition - Cause Circles The CBPD will be filter a recognised rainful, NSDF, CATRITIANS of the Subsequence. It is they that

Red Stern

Lands Lan Correspond Contributed CBFO Contact Lava Links, Climate Charge Condition to be for inFragmen The CDF will be firing a simula shange sear Smaler in fact the simula sharpe a serige separater 2005. Climate allenge is already Coing addressed in the medicing through several solid and he of tests already

The regard freedund alongs to place 0 is the incorporation of reality in realist attraction for concluding to realize the six follow the regime processing to said attraction find components of single in regular of attraction dependent periods, and realized the six of resident is considered to remove the of attraction dependent periods, and remove they have breakly to be sentiment from which is

e Calleria analabile en 18e se propositi de Canaridado (Aredalho mortis naiolado

records, industrial PSP (and other mediantity metals, communication statistical methods, and

Ned Exper Continue to Grig new information to seek making quarterly review and update the desumentation

Children's area Area - 7/37/8/30 gregies - 7/60, VoCophONOUS size A large 107 great on the off acts of almost othergo has been accorded to a been of recognitive from regional vertication had by Bill Ball of Inflam Haptine. And of the configient is be used in Office national at weight to incorporate variable source are and by time of toda into the simulation. This is a very promising assesso for improvement, Outmay Consuming in the late to the emperated in top flow 0

Sec Sec.

. Special Completion Cale Congwings and other Reservoirs CEP Charaly St. Maching Minigracy

Oct 1, 1013

Land: Lan Curray and David Marchi CBPO Can Cash Lands Links

Terrane (Transprince) süljatina. 2. Dendes and assas spilans kraditasing insassad ansurts of salment and release ham.

 Hallance Amparlame Formula
 Balla should be propried to describe
 Design on approach to similar that of improvements in the lay underfact. The Communicate reservoir is Daing studied Hessayl The Lancer Association of Finer Michaelled Associated

The groups depending a property open depending on the latter that it common define the The participation of the section of the

Committed manufacturer's artificial on Community & A committee of a part for \$107 parel manufacts Street presented

EMP Implementation accounting

CEF Charaly 60-WIQET Land John Vell, James Controlled in

Caurip Carry The of Technology of CSF performing authorited medicing in guiding decisions is dependent on assumin assuming of BMP implementation. This implains of allowed federal resembles and as the conferential.

There are constructed affects on BMF implementation

Malamia (2007s - joji 2 vesnoj - 167160) left is marking with the performing on the updating of the hide and their deletions

Jeff is supervising the sharps to NBBN Good an input from the partnership New Could have Deterfated Diggs in 6,600

False is working an getting NRC2 implementation detailed as from that can be used publish by the CP.

Land Use Loading Rates CSF Consight the duting Minigroup Local Landscript and Considerabil CSFC Contact Table Test, Day Short

Land Use Loading Rates CSF Consight Medicing Medigroup Lands for Correspond Considerated CEPS Contact Titles Test, Day Stock

land use leading largets will be based on multiple from all middense. Of femality on all medicing and manifered intermitation of the interpreted for moving section. The MATE will account the present the off a statement put from the MEST and the cartigraph, perfectively for midden all publishess of the est autorizado e Chie a large sias. Atrafiañ e il assesant la pressua as fallare.

states in office a large state. All offices on the consection present in these vi-to-distances being refuse to distances on differentifered belower types registering useds analyses. Oranizary relationships to distance land use subdistances taking it benchman and marking display relationships about part (from glint for tends. a. Descriptly in regula.

6. Regional Salvery Officer Ciclian

1. Productival ments through Calibration to nation quality data

The LESS will be under the bearing model with the CEP beduce should be be determined by a real

ratio of leading rate Colonom Officer Darge land constant feature in the Champania Bay Violential Adjunctions reviews - Takes Set Tabralladi film already sampled ad a literature review of united tenders a reducil factor during a reser-

arricultural land year. Several Manufarra reviews already mint, which obsuides incommented as well Faculty sides of Facultius Micrishay - 2740

2000 will be delivering a markeling mound that will have recommendations for under land absolute law.

Rine-scale Processes CSF Consists Cond the Medicine and Medicine Medicine

interestingly, research is allowing that seasons and horought mentionisms of rechievists of defined beginned for high sanishing of time spatial seator. The seator's the materials make largest fallow is season relative

Communicated in the manifestives will be performed forward region to use the resulting incremental villanges in results results. Tragram

1. Flore 2.1.2 N.COST ren'tel Salared rather than Tel NC Salared. Available part ISCS
 National and the salared ren'ter ren'ter to ren'te ren'ter and a women Size Salared
 Salared rathers.

National control of larger to the collected medicination that the present from differ parallel public

Send understall made address methods 1998

Desing relationally a Column lead on sub-visual sales a
 Apply relationally a Conteyed Through the Tests
 Best Soft to reputs
 Regional Soft register
 Regional Soft register
 Regional Soft register
 Regional Soft registering to relation to the Soft registering to the Sof

Watershed Model Development and Code Versioning

Program

Dress d State Analysis - 0303

Editorations reviews - Table Bath

and leading rates.

Appelled Completion Date

Paralle ridge of Paraleus Mitcheles err 27.00

CEF Charaly Co. Mediating Medigracy

CEPO Contact Days (State, Day Start)

and contending largets will be based on multiple transit or domes. Of fever 1 types of multiple and

nd naturani ingus from The MCOT and its narrigoups, perfectivity for eletionally statement of the est sub-alaman of this alogo size. This field in ill narrows the present in his ex-1. Let navel harding of this sub-alaman of the entire of the dual region using large scale engine.

Dening relationships between land are submissed in time using the other and multiling

The USSS will be using the Sparrace model with the CEP for Succedary feedings to Scheming the second ratio of leading rate California Officer Clarge land use should be be the Champania Bay Victor (Inc.).

agricultural land uses. Several Consturer reviews already wist, which should be incorporated as well.

This will be delivering a marketing report that self-free recommendations for order land stars

<u> Lind Sein Meditor Tourism 2005</u> Crass at Department or researcy for all stanges to Touris deing standard

Le folklande de analysiske disamplemente. Effektive vedente te desake fermade affektiv sen Programs in a supervise along second parallel Cradio, level to an California (The Code parall Clausel Carloin Clausel)

Swell-street and larger Contactor for Material Periodics Traces and right a fatfaireding has the ordered as define accessed using Generaly of the six

of a CEP argraph, the charmouth artifacts as a not sint. The CEP performing the promound information madificing the surrest matted of all obtains the entire delicand antiment lead take differed search

NaCVF will reduce a remarkable to be send only \$40 land and in drawn searces of \$50 in-

Swell-Stein revenues - Level Sale Stern The CSF Land Color Soon, led by Falor Claggett, are insuctinglying methods to map and evaluate the nutrient and settiment of leats of impervious surface community, under stream comform, rigarian Terratio, riserine confliction, and within the compay, incorporating of some comform joileannet, Comis, and The effective of an experience of which has end her to and end weeks for an in-finite addressing the insured importants conferencementally. Research conducted by McClinia (UMIC) and Day Male (2000) is under review to proceedings the subject of educing system breats. Researches of Male Vegets Johnson, approximation agreed run 1993, are insufficient agliest formatting flexibles and parameterizing their collimant deposition patential. The US Forest Services' Organization program is Coing makes (all for a promoterising the followings of facts of union from processes). If they feel are send of

diagnosticky Controlled, They was the utilized to differentiate leading of tech between tenderors within a

Red Stewar Symilal Completion Date Oct 1, 2012

CEF Charage Collections Medigracy CEPC Contact Committee and Devilled

second, or from second foresteed.

Drawn Constanting Times may Continue label for salid ration Time of a simple Continue saly Zilmed Tank Resolve model. To personal extention model, the legitime will have to be estimated from a deliberations. For all modes of the moderal of the recognitional of models may be general of through collections for and win and new 2000 has what the CRF to include this parable an exulta-

errenne kantine Some Volgelle Stimmente Ber Frenner. George Som Toes Toes (Allerian et le toes en monte Histor Graffie in De Stimmente Be.

Not Quite "At a glance"

Major Topics – Modeling WG

- Watershed Model Development and Code Versioning
- Calibration Methodology
- Land use Loading Rates (with WQGIT and WGs)
- Sensitivities to inputs
- Fine Scale Processes (with LUWG)
- Lag Time
- Atmospheric Data
- Climate Change
- Conowingo and other Reservoirs

Major Topics - WQGIT

- Land use
- Fertilizer and Manure Applications
- BMP effectiveness
- BMP implementation accounting
- Scenario Builder Development and Code Versioning

BMP effectiveness

CBP Oversight: WQGIT

Lead: Jenn Volk, James Davis-Martin, Brian Benham

CBPO Contact: Lucinda Power

Priorities:

establishment and update of BMP definitions and efficiencies: AgWG

Description:

The WQGIT is evaluating new BMPs, and improving their definitions and associated effectiveness values through the partnership approved BMP protocol process.

WQGIT BMP Review Protocol

Progress:

The panels have been very active and continue to deliver BMP recommendations to the partnership. A consortium of universities under the leadership of Virginia Tech has received funding to help coordinate BMP expert panels as a supplement to the CBP process. In addition, Tetra Tech is available to provide technical and logistical support as well.

Completed panel reports are listed on ChesapeakeStat.

A separate web page for BMP panel reports is being prepared.

Next Steps:

•••

Expected Completion Date:

Summary

- Document / Web site being prepared to keep the Partnership up-to-date on model development
- Hierarchical structure allows
 - At-a-glance overview
 - Drill down to detailed information
- Continual updates
- Your name is on the page
 - You own the content.

Major Topics - WQGIT

 Land use Fertilizer and Manure Applications BMP effectiveness BMP implementation accounting Scenario Builder Development and Code Versioning

BMP implementation accounting

CBP Oversight: WQGIT

Lead: Jenn Volk, James Davis-Martin

CBPO Contact: Jeff Sweeney

Priorities:

Revisit watershed model calibration methods: MWG

Assess and explain water-quality trends: STAR

Description:

The effectiveness of CBP partnership watershed modeling in guiding decisions is dependent on accurate accounting of BMP implementation. This includes state and federal records as well as the systems that are used to collect the data

Progress:

There are several related efforts on BMP implementation

Historical BMPs - Jeff Sweeney - WTWG

Jeff is working with the partnership on the updating of the historical BMP database

NEIEN updates – Jeff Sweeney – WTWG

Jeff is supervising the changes to NEIEN based on input from the partnership

Non-Cost-Shared Data -Peter Claggett- AgWG

Peter is working on getting NRCS implementation data into a form that can be used publicly by the CBP.

Next Steps:

• • •

Expected Completion Date:

Land use

CBP Oversight: Land Use Workgroup Lead: Jenny Tribo and Karl Berger CBPO Contact: Peter Claggett

Priorities:

Improve Spatial, temporal, and categorical representation of land uses: LUWG

Review and refine modeled assumptions about forest: FWG

Representation of federal land boundaries: LUWG

Description:

The Land Use Workgroup (LUWG) is leading the development of the Phase 6 land use data, including both historical and future projections. The LUWG is working closely with source sector workgroups under the WQGIT and with state agencies and local governments to ensure that the land use information used in Phase 6 is accurate, current, and reflects the state of the science and management actions for water quality restoration.

Progress:

Through close coordination with the WQGIT workgroups, the LUWG has developed a master list of proposed new land uses for Phase 6. The CBP Land Data Team and state agencies are actively developing, refining, and evaluating mapping protocols for each proposed land use. To map these new land uses, the LUWG distributed a request for local land use and land cover to state resource agencies. Tetra Tech is currently soliciting additional information from county and municipal governments. To date, data have been received from over 40 counties. Because the categories and resolution of land use/land cover data varies across jurisdictions, the LUWG is beginning the process to reconcile and cross-walk these data to the proposed Phase 6 classes.

Federal Land Boundaries

Mapping of federal property boundaries is important for accurately assigning responsibility for nutrient and sediment load reductions. The CBP GIS Team has worked with the CBP Federal Facilities Team to assemble a federal property boundary database. The GIS Team has also developed a web-based tool for federal facility managers to review and revise boundary and land use information.

Next Steps:

Need to know the list of land uses by Oct 2014 with draft acreage by Feb 2015

Expected Completion Date:

Scenario Builder Development and Code Versioning

CBP Oversight: WQGIT

Lead: Jenn Volk and James Davis-Martin

CBPO Contact: Jeff Sweeney

Priorities:

Model Data Processing: AgWG

modeling baseline-input data and assumptions

Cross-cutting priority as necessary for all changes to the modeling structure

Description:

Incorporate decisions from the CBP partnership. Test the effects of assumptions during development of recommendations. Re-structure scenario builder code to incorporate recommendations

Progress:

Restructured code to make future changes more easily implemented

Next Steps:

Move to cloud architecture

Expected Completion Date:

Fertilizer and manure application

CBP Oversight: WQGIT / AgWG

Lead: Curtis Dell

CBPO Contact: Matt Johnston

Priorities:

Model Data Processing: AgWG

modeling baseline-input data and assumptions

Improve Spatial, temporal, and categorical representation of land uses: LUWG

Description:

The Ag Modeling Subcommittee (AMS) of the Ag Workgroup is working on updates to fertilizer and manure application as part up the update for scenario builder. Matt Johnston is the coordinator for this group.

Progress:

The AMS has prioritized the list of potential updates to scenario builder based on their impact on modeled nutrient and sediment loads and is discussing land use definitions. The AMS is making progress on determining data sources for nutrient and sediment loads.

Next Steps:

••

Expected Completion Date:

Land Use Loading Rates

CBP Oversight: Modeling Workgroup Lead: Lee Currey and Dave Montali CBPO Contact: Tetra Tech, Gary Shenk

Priorities:

Improve Spatial, temporal, and categorical representation of land uses: LUWG

Revisit watershed model calibration methods: MWG

Improve modeling accuracy of land use characteristics land uses: USWG

Description:

Land use loading targets will be based on multiple lines of evidence. Different types of modeling and monitored information will be incorporated from many sources. The MWG will oversee the process, but will welcome input from the WQGIT and its workgroups, particularly for relationships between different sub-classes within a large class. TetraTech will oversee the process as follows: Set overall loading ratios between different broad land use types using large scale analyses.

Develop relationships between land use sub-classifications using literature and modeling

Apply relationships developed through other tracks

Sensitivity to inputs

Regional delivery differentiation

Small scale effects

Final adjustments through Calibration to water quality data

Progress:

Broad Scale Analysis - USGS

The USGS will be using the Sparrow model with the CBP land use classifications to determine the overall ratio of loading rate between different large land use classifications in the Chesapeake Bay Watershed.

Literature reviews - TetraTech

TetraTech has already completed a literature review of urban land uses and will be conducting one on agricultural land uses. Several literature reviews already exist, which should be incorporated as well.

Peculiarities of Pervious Workshop - STAC

STAC will be delivering a workshop report that will have recommendations for urban land classifications and loading rates.

Expected Completion Date: