STAC Overview and Science Directions

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BILL BALL

STAR TEAM MEETING – OCTOBER 27, 2016

Agenda

- Highlights of the workshops and reviews currently underway – Outcomes and Next steps
- STAC Review Process for ongoing Mid-Point Assessment Reviews
- Integrating Science into the Discussion
  - STAC Meeting Themes
  - 2016 EC Recommendations
- Looking Ahead

Indicators: *A summary measure that provides information on the state of, or change in, the system that is being measured.*

STAC
What are the Current Conditions? Identify need for progress.

STAC
Identify the Impacts of stressors.

STAR
How do we fill Monitoring, Research, and Assessment Gaps? Implementation.

STAC
Performance Assessment. Effectiveness of Management Actions.

STAR
Monitoring Network Design to Support Adaptive management.

STAR and STAC Support of Goal Teams

L. Rubin et al. BEI Report

STAC Highlights

FY15
- 7 workshops
- 2 reviews

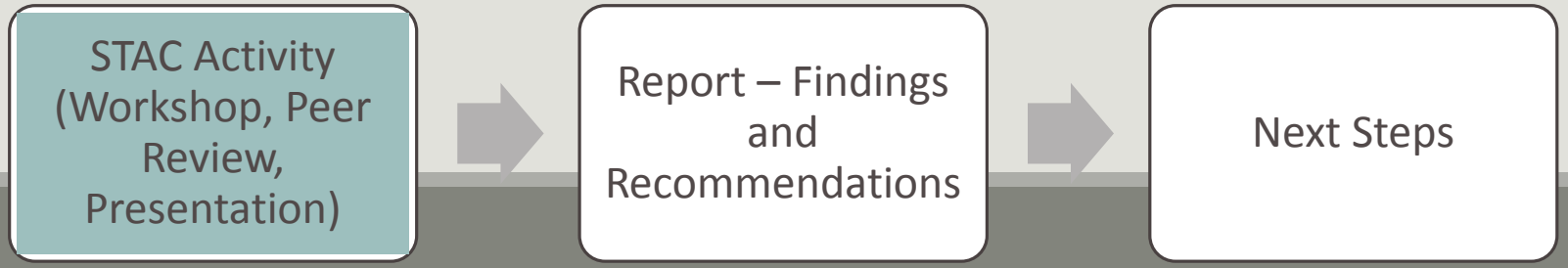
FY16
- 4 workshops
- 9 reviews

Workshop Title	Date	Report Status
Conowingo Infill Influence on Chesapeake Water Quality	January 13-14, 2016	**Complete**
Linking Wetland Workplan Goals to Enhance Capacity, Increase Implementation	January 14, 2016	Pending
Assessing Uncertainty in the CBP Modeling System	February 1-2, 2016	Pending
"Cracking the WIP": Designing an Optimization Engine to Guide Efficient Bay Implementation	February 17-18, 2016	Pending
The Development of Climate Projections for Use in Chesapeake Bay Program Assessments	March 7-8, 2016	**Complete**
Integrating and Leveraging Monitoring Networks to Support the Assessment of Outcomes in the New Bay Agreement	April 12-13, 2016	Pending
Comparison of Shallow Water Models for Use in Supporting Chesapeake Bay Management Decision-making	April 20-21, 2016	Pending
Legacy Sediment, Riparian Corridors, and Total Maximum Daily Loads	TBD – Spring 2017	Planning in progress
Quantifying Ecosystem Services and Co-Benefits of Nutrient and Sediment Reducing Best Management Practices (BMPs)	TBD – Spring 2017	Planning in progress
Understanding and Explaining 30+ Years of Water Clarity Trends in the Bay's Tidal Waters	TBD – Spring 2017	Planning in progress
An Analytical Framework for Aligning Chesapeake Bay Program Monitoring Efforts to Support Climate Change	TBD – Spring 2017	Planning in progress

Conowingo Infill Influence on Chesapeake Bay Water Quality - *January 13-14, 2016*

Objectives:

1) Address the state of the science on the influence of Conowingo Reservoir infill on tidal Chesapeake Bay water quality
2) To discuss the future status of the processes taking place in the Lower Susquehanna River reservoirs
3) Predict how future watershed - or reservoir - management approaches will impact the attainment of the Chesapeake Bay water quality criteria



Conowingo Infill Influence on Chesapeake Bay Water Quality - *January 13-14, 2016*

Report Complete. Available online.

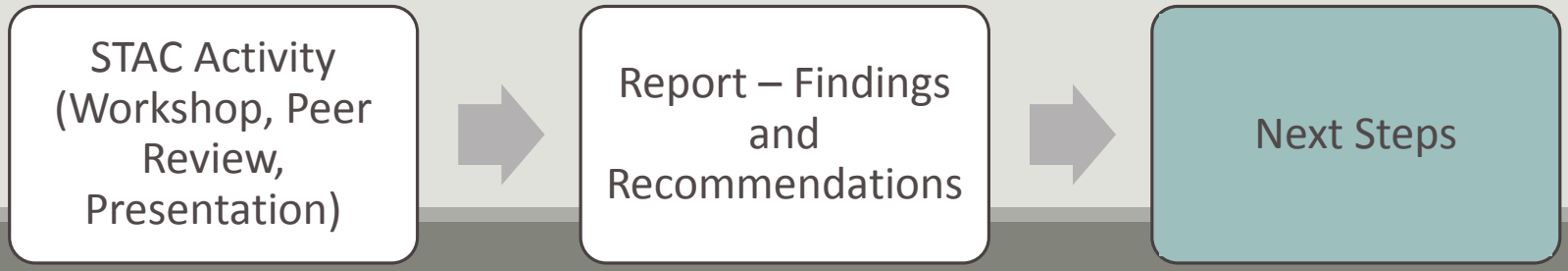
Outcomes:

- Need for sustained studies on the influences of nutrients and sediment delivered to the Bay that are a combination of monitoring, data analysis, process research, and modeling.
- Recommend that the existing body of research and monitoring data be used to constrain model simulations of the future behavior of Conowingo dam, to assist partners in efficiently achieving the TMDL – evaluate efforts based on ability to "hindcast" data from WQ observations and statistical analyses
- Moving forward, an effort should be made to link the sediment transport and biogeochemical models in the 2010 Water Quality and Sediment Transport Model (WQSTM) to enhance modeling of the transport and fate of organic nutrients in the tidal Bay.

Conowingo Infill Influence on Chesapeake Bay Water Quality - *January 13-14, 2016*

Next Steps – Addressing Conowingo in STAC Review of Phase 6 Watershed Model

9) Better simulation of the deposition and scour processes in the reservoir reach of the Lower Susquehanna is an important feature of the Phase 6 Model. It is crucial to 2017 Midpoint Assessment decision making to be able to properly represent the net deposition of sediment, nitrogen, and phosphorus in this reach of the Susquehanna. **Does the Phase 6 representation of the dynamics of the reservoir system rely on the best science available at this time? Do the simulations approximately represent the observed changes in storage of sediment, nitrogen and phosphorus as seen in the historical record from the last few decades? How can the representation of Conowingo infill be improved going forward beyond the Phase 6 Model?**

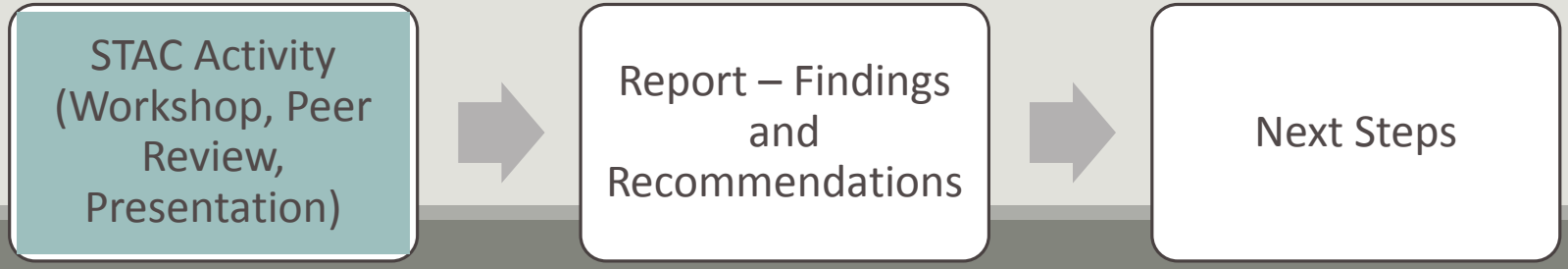


Development of Climate Projections for Use in CBP Assessments - *March 7-8, 2016*

Objectives:

1) Assess the applicability of available climate data, downscaling techniques, projections, and scenarios to establish an approach for climate analysis in CBP assessments

2) Assist the CBP with the selection process by addressing questions about climate variables of most concern, various approaches, historical observation data, and climate change scenarios.



Development of Climate Projections for Use in CBP Assessments - *March 7-8, 2016*

Report Complete. Available online.

Outcomes:

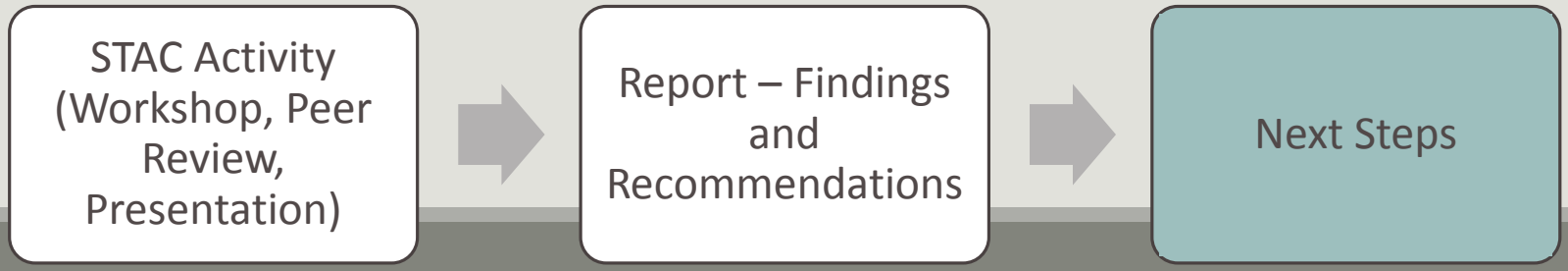
- All aspects of climate change should be addressed in the 2017 MPA
  - Examined in concurrence with land use changes; Effect on key living resources
- For the 2017 MPA, use historical (~100 years) trends to project precipitation to 2025 (**short-term recommendation**)
- Carefully consider the representation of evapotranspiration in Watershed Model calibration and scenarios
- Use a 2050 timeframe for selecting/incorporating a suite of global climate scenarios (**long-term recommendation**) - Use an ensemble or multiple global climate model approach

Development of Climate Projections for Use in CBP Assessments - *March 7-8, 2016*

Next Steps – (1) Addressing climate change in STAC Review of Phase 6 Watershed Model

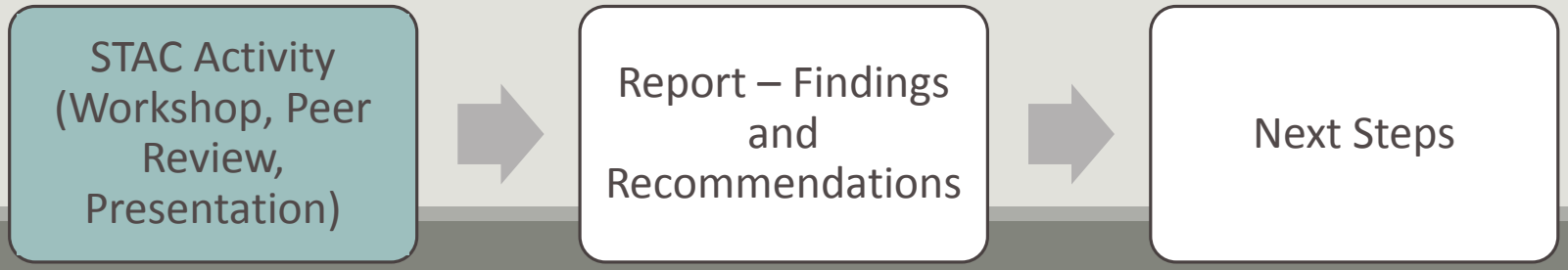
10) Please comment on the scientific appropriateness of the **methods used in the representation of climate change** in watershed nutrient and sediment loads estimated for the 2025 and 2050 time periods. How well do the models used for producing future climate scenarios show skill in hindcasting the actual climatic and hydrologic changes that have happened over the past several decades?

Upcoming Review – (2) Approach being taken to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment



Assessing Uncertainty in the Chesapeake Bay Modeling System - *February 1-2, 2016*

Objective: To develop approaches to assess uncertainty in the suite of CBP models to support the Mid-Point Assessment of the TMDL.



Assessing Uncertainty in the Chesapeake Bay Modeling System - *February 1-2, 2016*

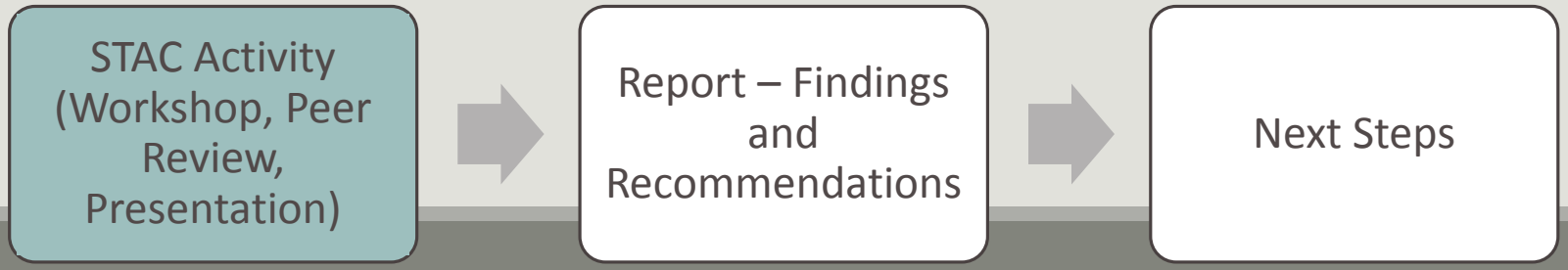
Report in Progress

Outcomes:

- Identify how uncertainty will be used in decision making
- Implement uncertainty as a part of the modeling analysis and reporting including feedback for model improvement
- Take action now: a) List uncertainties; b) Identify most sensitive parameters; c) Automatic calibration; d) Make data and skill assessment results available
- Over the long term, identify resources to develop a computationally efficient method of formal uncertainty analysis

Cracking the WIP: Designing an Optimization Engine to Guide Efficient Bay Implementation - *February 17-18, 2016*

Objective: To develop the requirements of an optimization engine that can simplify and guide Bay jurisdictions' efforts to develop WIPs and Milestones that minimize implementation costs while achieving the required reductions and maximizing co-benefits.



Cracking the WIP: Designing an Optimization Engine to Guide Efficient Bay Implementation - *February 17-18, 2016*

Report in Progress

Outcomes: Work currently underway: CRC is working with CBP to hire and mentor (via 5-member advising and review committee) a new Research Scientist to work at CBP on the tasks below.

Develop optimization around CAST (Chesapeake Assessment Scenario Tool)

- (1) Develop an operational scope of work and realistic schedule
- (2) Convene/retain team of optimization experts
- (3) Draft and distribute a 1-2 page summary of primary results to WQGIT/MB in early April
- (4) Collaborate with LGAC re: identifying top co-benefits for planning of recommendations

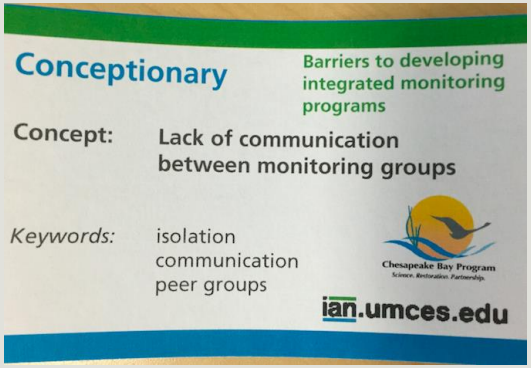
Integrating Monitoring Networks to Support the Assessment of Outcomes in the New Bay Agreement – *April 12-13, 2016*

Objectives:

1) Overview of existing monitoring networks in the Choptank River Basin related to select Bay Agreement outcomes

2) Identify barriers to integration of these monitoring networks and initial solutions to overcome barriers.

3) Prioritize and discuss opportunities and solutions to better integrating networks



STAC Activity (Workshop, Peer Review, Presentation) → Report – Findings and Recommendations → Next Steps

Integrating Monitoring Networks to Support the Assessment of Outcomes in the New Bay Agreement – *April 12-13, 2016*

Report in Progress

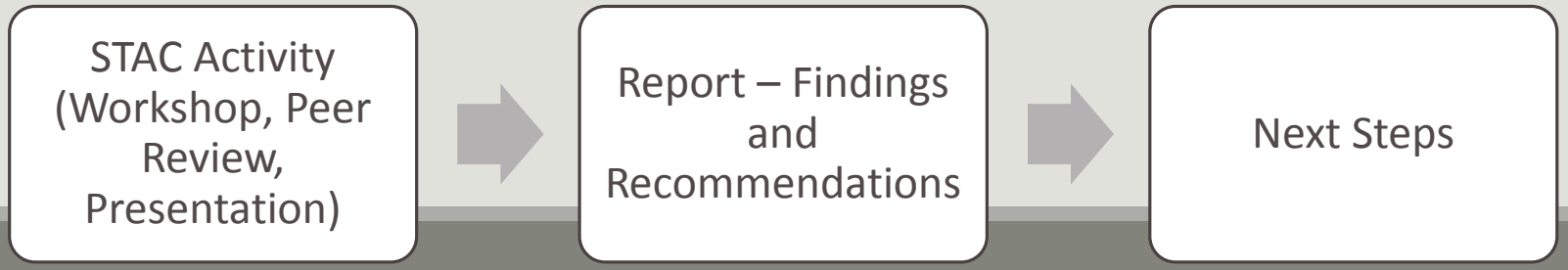
Outcomes:

- Great discussion and networking among place-based monitoring interests. Expanded communication is essential to identifying and **aligning common objectives**.
- The ability to integrate monitoring at the Watershed scale remains a daunting task.
- Open data sharing and improved awareness of available data sources and monitoring efforts is essential to a) aligning objectives, b) improving monitoring efficiency, and c) targeting new monitoring projects and technologies.
- Expanded, quality-controlled citizen science is a promising pathway toward the commitment of cost-effective new resources to additional high density monitoring.

Comparison of Shallow Water Models for Use in Supporting Chesapeake Bay Management Decision-Making - *April 20-21, 2016*

Objective: To discuss the relative skill of multiple linked hydrodynamic and water quality models in terms of their ability to simulate shallow water habitat (<3 m) through reproducing observations in the Chester River.

Report in Progress – Summary of May 2015 (Part I) and April 2016 (Part II) Workshops



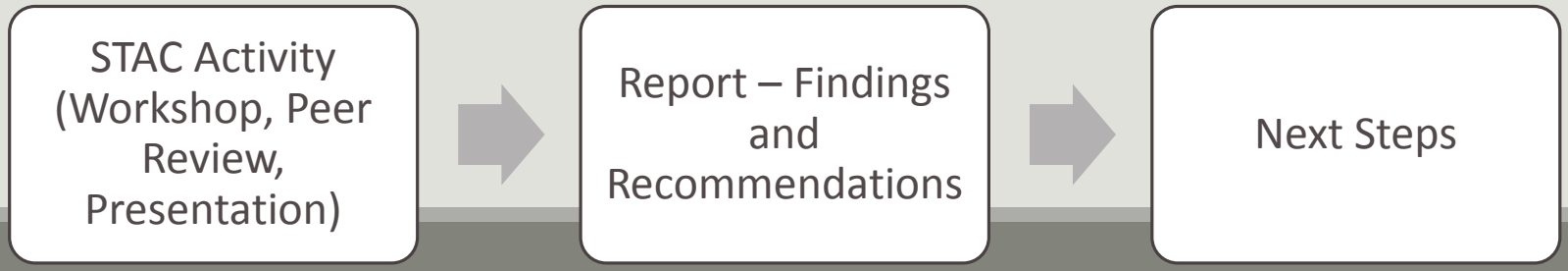
Linking the Wetland Workplan Goals to Enhance Capacity, Increase Implementation - *January 14, 2016*

Objective: (1) Identify ways to enhance capacity of the Wetland Workgroup (WWG) via 2-year Workplan, and (2) Demonstrate a pilot process on how other workgroups might similarly enhance their capacity to meet and implement their goals.

Report in Progress

Outcomes/Next Steps:

- Sent memo describing overall comments and recommendations, as well as specific comments to the Management Approaches to WWG during public comment period for workplans – Provide continued support and guidance
- Follow up with other workgroups on barriers and opportunities to enhance their capacity to meet their goals
- STAC discussion at June Quarterly Meeting – Cross GIT Collaboration



Review Title/Topic	Status	Sponsor
Technical Review of Microbeads/Microplastics in the Chesapeake Bay	**Complete**	CBC
Chesapeake Bay Scenario Builder/Nutrient Input Approach	**Complete**	WQGIT Watershed Technical Workgroup
2015 Chesapeake Bay Criteria Addendum	In progress	STAR Criteria Assessment Protocol Workgroup
Proposed revised James River chlorophyll *a* water quality criteria	**Complete***	STAR Criteria Assessment Protocol Workgroup
Phase 6 Chesapeake Bay Watershed Model	In progress	STAR Modeling Workgroup
General Additive Models (GAMs) to estuarine WQ trend analysis and explanations	In progress	STAR Integrated Trends Analysis
Evaluating boat wake wave impacts on shoreline erosion and potential policy solutions	In progress	CBC
Application of WRTDS to watershed WQ trend analysis and explanations	TBD	STAR Integrated Trends Analysis
Approach being taken to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment	TBD	STAR Climate Resiliency Workgroup
Chesapeake Bay Water Quality/Sediment Transport Model (WQSTM)	TBD	STAR Modeling Workgroup
Phase 6 Land Use Backcasting Methodology	TBD	WQGIT Land Use Workgroup

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Process for STAC Review

1. **Request for review(s) is received** by **STAC staff**
   -- Documents or description of materials to be reviewed
   -- Review 'charge' and Questions for the review panel to consider
2. **Review is approved by STAC Membership – Including review and approval of charge questions**
3. **STAC Executive Secretary identifies an appropriate review chair, STAC liaison, and builds panel**
4. **Review Panel conducts the review**
   -- Information gathering and fact finding phase (may involve working meeting, webinar, or other correspondence with CBP personnel)
   -- Review effort (individual and collaborative; TBD by panel with chair)
5. **STAC members review and approve the draft report**
6. **STAC Executive Secretary/STAC Coordinator approves, edits, and distributes final report**
7. **CBP provides response to review comments**

Three Types of Questions

Type 1: Clarity of the Charge and Documentation
How well does the document explain the approaches, procedures, protocols, and /or science issues that are to be reviewed? Is the documentation appropriate and clear?

Type 2: Review of Approach Within the Given Context
Within the context of a given overall conceptual approach (based on past decisions that are not subject to review here), how well do the proposed procedures and protocols reflect best practices in regard to available scientific understanding and the given constraints?

Type 3: Review of Conceptual Approach and Longer-Term Recommendations
For the longer term consideration of the CBP, what major shortcomings do you find in the overall approaches and procedures used and what alternative approaches and data gathering might you recommend?

Report Complete. Available online.

Chesapeake Bay 'Scenario Builder'/Nutrient Input Approach

Charge: Review the procedures used to estimate nutrient input procedures (previously referred to as 'Scenario Builder') to the landscape in the Phase 6 Watershed Model, specifically, review the appropriateness of methods used to estimate total manure and fertilizer application, and distributing applications.

Major Recommendations:

- Increasing consistency in parameter evaluation across states,
- Improving/updating data from existing sources, and
- Modifying select data transformations and assumptions used in evaluating nutrient inputs.

Reviewer	Affiliation
Amy Collick	UMES, STAC
Gene Yagow	VT, STAC
Tamie Veith	USDA-ARS
Marc Ribaudo	USDA-ERS, STAC
Wade Thomason	VT

Report Complete. Available SOON*

Proposed revised James River chlorophyll *a* water quality criteria

Charge: The VA DEQ initiated a review of the numeric chlorophyll *a* criteria, and criteria attainment assessment procedures, for the James River. VA DEQ established a Science Advisory Panel to analyze the best scientific information currently available and provide recommendations as to whether the chlorophyll *a* criteria were protective of the aquatic life designated use and scientifically defensible. The STAC panel will review the resulting reports from the Advisory Panel and new proposed criteria

Major Recommendations:

- Short term – Refine analyses by SAP, refine approach
- Long term – Effects-based sampling design

Reviewer	Affiliation
Lora Harris	UMCES-CBL
Jim Hagy	EPA
Martha Sutula	SCCWRP
Tom Fisher	UMCES-HPL
Dong Liang	UMCES-CBL

2015 Chesapeake Bay Criteria Addendum

Charge: The U.S. EPA, in cooperation with its six watershed State partners and the District of Columbia, has developed a series of eleven water quality criteria guidance documents in accordance with the Clean Water Act. Using these documents, Chesapeake Bay regional water quality criteria were developed and adopted into state water quality standards regulations protective of living resources and their habitats. The panel will review the recently developed 2016 Chesapeake Bay water quality criteria addendum.

Status: In progress

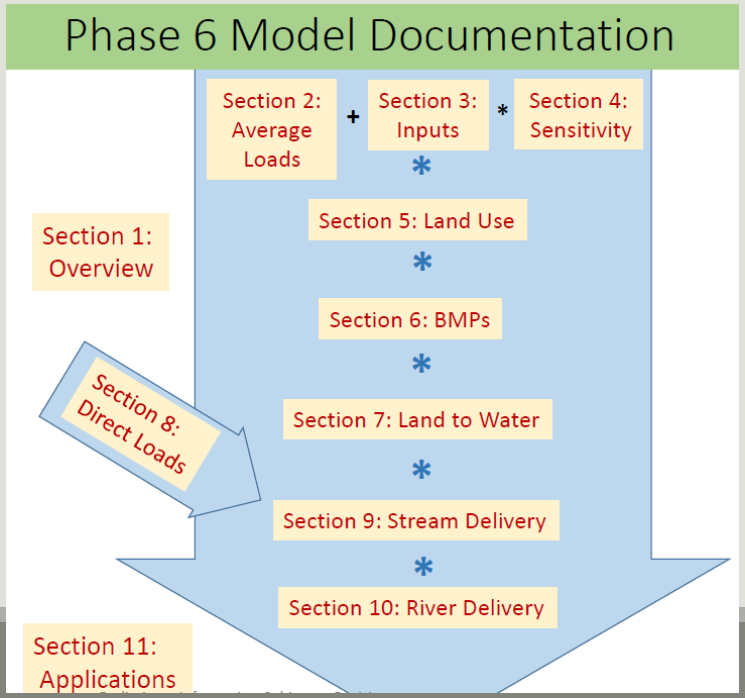
Reviewer	Affiliation
Marjy Friedrichs	VIMS, STAC
Malcolm Scully	Woods Hole
Mary Christman	U of F
Kenneth Moore	VIMS
Jian Shen	VIMS
Steve Weisberg	SCCWRP

Phase 6 Chesapeake Bay Watershed Model

Charge: Phase 6 is the most recent of a series of increasingly refined versions of the CBWM, and is a major departure from previous deterministic and mechanistic versions. the water quality simulation is an entirely new approach which relies on a structure based on multiple models. The panel will review the Phase 6 Model with particular emphasis on the new multiple model aspects of the watershed simulation

Status: In progress

Reviewer	Affiliation
Zach Easton	VT, STAC
Doug Smith	USDA-ARS
Andrew Miller	UMBC, STAC
Peter Kleinman	USDA-ARS
Don Scavia	U of Michigan
Claire Welty	UMBC
Lawrence Band	UNC
Chris Duffy	PSU
Rich Alexander	USGS
James Pizzuto	U of Del

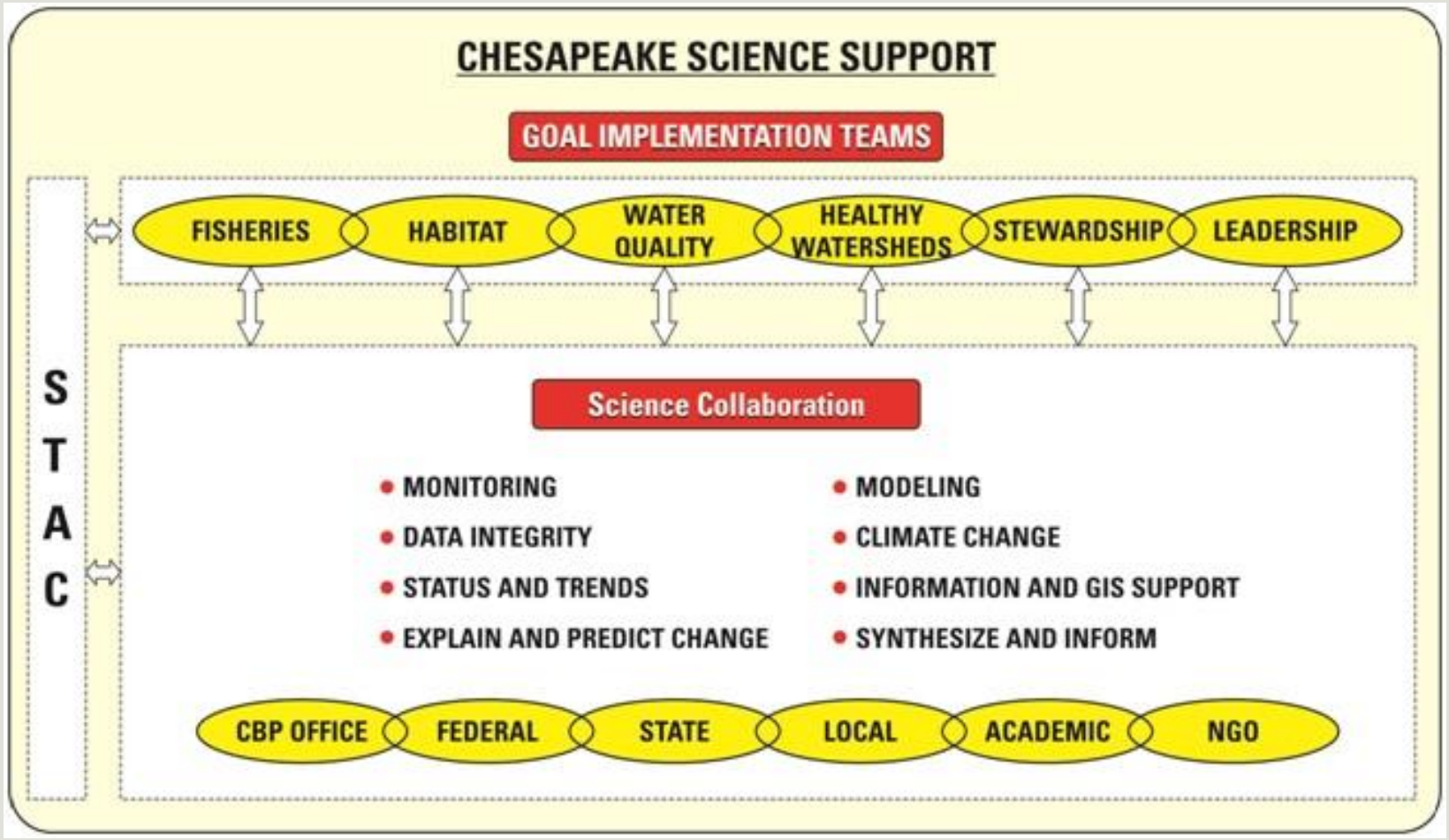


General Additive Models (GAMs)- estuarine WQ trend analysis/explanations

Charge: An approach for applying GAMs to Chesapeake Bay tidal waters has been created as a result of a 2014 STAC workshop. In the process, several different options have been tested and implemented to account for challenges such as changes in sampling and laboratory methods, censoring of data, and determination of statistical significance. The panel will review the methods developed and assumptions made in the process.

Status: In progress

Reviewer	Affiliation
Hugh Ellis	JHU
Carl Friedrichs	VIMS
Viacheslav Lyubchich	UMCES
Pang Du	VT


CHESAPEAKE SCIENCE SUPPORT
GOAL IMPLEMENTATION TEAMS
FISHERIES
HABITAT
WATER QUALITY
HEALTHY WATERSHEDS
STEWARDSHIP
LEADERSHIP
STAC
Science Collaboration
MONITORING
DATA INTEGRITY
STATUS AND TRENDS
EXPLAIN AND PREDICT CHANGE
MODELING
CLIMATE CHANGE
INFORMATION AND GIS SUPPORT
SYNTHESIZE AND INFORM
CBP OFFICE
FEDERAL
STATE
LOCAL
ACADEMIC
NGO

Restructuring STAC Quarterly Meetings

Meeting Themes

- Goal – moving away from programmatic updates and refocusing on the science
- Integrated presentations with group discussion and feedback
- Concrete goals to come out of each meeting
- 'Continuing the conversation' and linking back to GITs and workgroups

December 2015 – High Priority Science Needs with the CBP; Climate Change

March 2016 – "Humans Influencing Habitat"

June 2016 – Using Decision Science: Prioritizing Efforts and Cross GIT Collaboration

September 2016 - Water quality trends and implications for aquatic life and management

December 2016 – Toxics; Strategic Scientific Planning and identifying Research priorities

STAC Recommendations to the Executive Council (EC) 2016

1. Further investment in **developing the science** to understand endocrine disrupters and their effects on the entire aquatic food web. The related issue of microplastics also needs further attention - identify opportunities for cost-effectively controlling sources not addressed by legislation

   Toxics Workgroup

2. **Enabling adaptive management through continued investment in monitoring**; support necessary **data collection and analyses**

   STAR

3. **Applying systems thinking** to promote innovation and cost effectiveness; promote successful management by revealing co-benefits, unintended consequences and demonstrating how to establish the **social, economic and ecosystem conditions that support specific strategies**

   GIT6, STAR

Coming Up - Reviews

4 additional reviews to be completed by Spring 2017

13 activity reports (workshops and reviews) to be released by Spring 2017

Review Title/Topic	Anticipated Timeframe	Sponsor
Application of WRTDS to watershed WQ trend analysis and explanations	Spring 2017	STAR Integrated Trends Analysis
Approach being taken to factor climate change considerations into the 2017 Chesapeake Bay TMDL Midpoint Assessment	TBD	STAR Climate Resiliency Workgroup
Chesapeake Bay Water Quality/Sediment Transport Model (WQSTM)	December 2016	STAR Modeling Workgroup
Phase 6 Land Use Backcasting Methodology	November/December 2016	WQGIT Land Use Workgroup

Coming Up – FY16 Workshops

An Analytical Framework for Aligning Chesapeake Bay Program (CBP) Monitoring Efforts to Support Climate Change Impact and Trend Analyses and Adaptive Management

Goal: To develop recommendations to guide adjustments of CBP monitoring plans and efforts to better anticipate, assess and ultimately plan to address the factor of risk that climate change may have on the Partnership's ability to attain Bay Agreement Goals and Outcomes.

"Legacy" sediment, riparian corridors, and Total Maximum Daily Loads

Goal: To review the scientific evidence and understanding for how "legacy" sediment and its remediation fit within a suite of management activities to reduce nutrient and sediment loads to the Chesapeake Bay – given that incorporation of "legacy" sediment in the WIPs may significantly alter a state's plan of action from Phase II

Coming Up – FY16 Workshops

Quantifying Ecosystem Services and Co-Benefits of Nutrient and Sediment Reducing BMPs

Goal: To understand the state of the science and identifying the building blocks to design a Partnership framework for assembling information and translating a suite of eco-services into a common currency that can be considered alongside water quality during decision making

Understanding and Explaining 30+ Years of Water Clarity Trends in the Bay's Tidal Waters

Goal: To de-construct water clarity trends over the past decades and how changes have influenced the movement of sediment and suspended materials through the watershed and into the tidal waters. Within tidal waters, illustrate the current state of the science regarding influences on the long term patterns of water clarity observed across Chesapeake Bay based on analyses performed in advance of the workshop

*Timeline to be Finalized

RFP – Request for Proposals for FY17 Workshops

December 14, 2016: Request for proposals is distributed to Partnership

January 25, 2017: All proposals are due to STAC Staff

February 3, 2017: Proposal comments/necessary edits are returned by STAC Staff no later than this date

February 17, 2017: Final proposals due to STAC Staff

March 7, 2017: Deadline for STAC Members to submit preliminary scores

March 14-15, 2017: STAC reviews results of scoring and discusses final proposals at their quarterly meeting; workshop approval is determined

June 1, 2017: Funding begins for approved workshops

May 31, 2018: Deadline for workshop completion to receive funding

Proposals received after the deadline may be considered, if funding remains after consideration of proposals submitted by January 25

What is STAC looking for?

Recommended Themes – Selected by STAC Membership in December for each fiscal year (FY), included in the RFP

- Suggested areas of interest – *Not a prerequisite for successful funding*

FY16 Themes

- Climate Change
- Adaptive Management
- Multiple stressors on living resources
- Human dimensions – social and economic issues in restoration
- Nutrient Management

Clearly identify the link between your topic and CBP management needs in the workshop proposal, and the urgency of your topic at this time

Questions?

William Ball

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Rachel Dixon

STAC Coordinator

dixonra@si.edu

For more information on STAC, and for Information regarding workshops, reviews, and upcoming meetings (including reports, as available), visit our webpage at: http://www.chesapeake.org/stac/