Biennial Strategy Review System: Logic Table and Work Plan

Instructions: The following Logic Table should be used to articulate, document, and examine the reasoning behind your work toward an Outcome. Your reasoning—or logic—should be based on the Partnership's adaptive management decision framework. This table allows you to indicate the status of your management actions and denote which actions have or will play the biggest role in making progress.

Some Management Strategies and Work Plans will not immediately or easily fit into this analytical format. However, **all GITs should complete columns one through four** to bring consistency to and heighten the utility of these guiding documents. The remaining columns are recommended for those who are able to complete them. If you have any questions as you are completing this table, please contact SRS Team Coordinator Laura Free (free.laura@epa.gov).

The instructions below should be used to complete the table. An example table is available on the GIT 6 webpage under "Projects and Resources".

1. For the first round of strategic review (2017-2018): Use your existing Work Plan actions to complete the **Work Plan Actions** section first. Make sure to number each of the actions under a high-level Management Approach, as these numbers will provide a link between the work plan and the logic table above it. Use color to indicate the status of your actions: a green row indicates an action has been completed or is moving forward as planned; a yellow row indicates an action has encountered minor obstacles; and a red row indicates an action has not been taken or has encountered a serious barrier.
2. **Required:** In the column labeled **Factor**, list the significant factors (both positive and negative) that will or could affect your progress toward an Outcome. The most effective method to ensure logic flow is to list all your factors and then complete each row for each factor. Consult our Guide to Influencing Factors (Appendix B of the Quarterly Progress Meeting Guide on the GIT 6 webpage under "Projects and Resources") to ensure your list is reasonably comprehensive and has considered human and natural systems. Include any factors that were not mentioned in your original Management Strategy or Work Plan but should be addressed in any revised course of action. If an unmanageable factor significantly impacts your outcome (e.g., climate change), you might choose to list it here and describe how you are tracking (but not managing) that factor.
3. **Required:** In the column labeled **Current Efforts**, use keywords to describe existing programs or current efforts that other organizations are taking that happen to support your work to manage an influencing factor but would take place even without the influence or coordination of the Chesapeake Bay Program. You may also include current efforts by the Chesapeake Bay Program. Many of these current efforts may already be identified in your Management Strategy; you may choose to link the keywords used in this table to your Management Strategy document for additional context. You may also choose to include some of these efforts as actions in your work plan; if you do, please include the action's number and hyperlink.
4. **Required:** In the column labeled **Gap**, list any existing gap(s) left by those programs that may already be in place to address an influencing factor. These gaps should help determine the actions that should be taken by the Chesapeake Bay Program through the collective efforts of Goal Implementation Teams, Workgroups, and internal support teams like STAR, or the actions that should be taken by individual partners to support our collective work (e.g., a presentation of scientific findings by a federal agency to a Chesapeake Bay Program workgroup). These gaps may already be listed in your Management Strategy.
5. **Required:** In the column labeled **Actions**, list the number that corresponds to the action(s) you are taking to fill identified gaps in managing influencing factors. Include on a separate line those approaches and/or actions that may not be linked to an influencing factor. To help identify the action number, you may also include a few key words. Emphasize critical actions in **bold**.
6. **Optional:** In the column labeled **Metric**, describe any metric(s) or observation(s) that will be used to determine whether your management actions have achieved the intended result.
7. **Optional:** In the column labeled **Expected Response and Application**, briefly describe the expected effects and future application of your management actions. Include the timing and magnitude of any expected changes, whether these changes have occurred, and how these changes will influence your next steps
8. **Optional:** In the column labeled **Learn/Adapt**, describe what you learned from taking an action and how this lesson will impact your work plan or Management Strategy going forward.

2017 and 2025 WIP Outcomes Logic Table and Work Plan

Primary Users: Goal Implementation Teams, Workgroups, and Management Board | Secondary Audience: Interested Internal or External Parties
Primary Purpose: To assist partners in thinking through the relationships between their actions and specific factors, existing programs and gaps (either new or identified in their Management Strategies) and to help workgroups and Goal Implementation Teams prepare to present significant findings related to these actions and/or factors, existing programs and gaps to the Management Board. | Secondary Purpose: To enable those who are not familiar with a workgroup to understand and trace the logic driving its actions.
Reminder: As you complete the table below, keep in mind that removing actions, adapting actions, or adding new actions may require you to adjust the high-level Management Approaches outlined in your Management Strategy (to ensure these approaches continue to represent the collection of actions below them).
Long-term Target: (the metric for success of Outcome):
Two-year Target: (increment of metric for success):

KEY: Use the following colors to indicate whether a Metric and Expected Response have been identified.	
Metric	Specific metrics have not been identified
	Metrics have been identified
Expected Response	No timeline for progress for this action has been specified
	Timeline has been specified

Factor	Current Efforts	Gap	Actions (critical in bold)	Metrics	Expected Response and Application	Learn/Adapt
What is impacting our ability to achieve our outcome?	***What current efforts are addressing this factor?***	***What further efforts or information are needed to fully address this factor?***	***What actions are essential to achieve our outcome?***	***Optional: Do we have a measure of progress? How do we know if we have achieved the intended result?***	***Optional: What effects do we expect to see as a result of this action, when, and what is the anticipated application of these changes?***	***Optional: What did we learn from taking this action? How will this lesson impact our work?***
1. Continuing to enhance and sustain the capacity of state and local governments and the private sector to implement practices	Continued funding and technical assistance support for BMP implementation, tracking, verifying, and reporting through voluntary and	Connecting water quality practices to other local priorities (co-benefits); continuous and stable funding stream to support implementation efforts;	1.1, 1.2, 5.65, 5.6, 5.7, 6.1	METRIC EXISTS: Consistent grant administration is one measure of progress: Fed (examples): • CBRAP	State funding efforts for cover crops is one example: certification each year and expenditure figures attest to program	Successful and popular program, reinforces education; High level of buy in. Costly investment by the State.

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	regulatory (NPDES permits) measures	strengthened coordination between federal, state and local levels to accelerate implementation (e.g., better coordination with LGAC).		• CBIG • CREP • NFWF SWG/INSR State (examples): • SRF • Trust Fund • Bay Restoration Fund (BRF) • Open Space Reports on dollars spent, results achieved in reductions (N,P,TSS)	implementation. See example:	
2. Delivering the necessary financial capacity to implement practices and programs	Development of citizens monitoring programs; CBPO Grant Programs (CBIG, CBRAP); WIP Assistance Funding; state programs targeted towards delivering funding and technical assistance to local programs and initiatives; Farm Bill/NRCS funding; exploration of private investment options	Ensuring funding is targeted towards priority practices and watersheds; continued federal, state and local funding coupled with the identification and leveraging of other (e.g., private) funding sources	5.1, 5.2, 5.3, 5.4, 6.1	CURRENT METRIC EXISTS BUT COULD BE REFINED. While funding programs are in place, refinement of the assessment of need and best use can be improved. This is an ongoing factor which will be a focal point in the Phase III WIP, as modeling results are finalized and finer grained goals are developed.	State funding efforts to distribute BRF and Trust Fund dollars currently use priority funding metrics to evaluate projects and implementation in MD. These metrics rank best performance on a pound of reduction per dollar spent. This example from MD could be shared with the other jurisdictions for potentially exploring or adopting	We have learned that targeted frameworks for spending millions of dollars are complex and important economic drivers. Ongoing evaluation of results and implementation success is always needed. New initiatives to incentivize private sector participants are being pursued in MD. Would be good to see if similar examples exist in the other jurisdictions.

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					for their own use. See, e.g., MDE Program webpage: See also DNR Program webpage: See also, areas designated by MDP called PFA's which direct state dollars to targeted urban areas)	
3. Improving the identification of sources and their contributions to nitrogen, phosphorus and sediment pollutant loads	Explaining trends project provided initial findings on relation between nutrient sources and trends in the watershed. Developing methods to measure and report on incremental progress towards attaining Water Quality Standards. Information shared with WQ GIT reps, and the findings being used to inform WIP development; High resolution land cover and land use data produced and used to improve Phase 6 model inputs; Phase 6 model calibration; Maintained monitoring networks and provided trend updates.	Continuation of current efforts and future data collection efforts to coincide with two-year milestones and annual progress runs. Better translate the scientific findings into management implications and work with State and local governments to apply findings toward implementing water-quality practices (improved targeting). This information will provide additional lines of evidence to measure progress, including changes in aquatic conditions.	1.3, 4.1, 4.2, 4.11, 4.14	METRIC EXISTS. The Mid Point Assessment is complete. New modeling tools were finalized in 2017 and Phase III WIPs are to be completed in 2019.	More refined local goals; more study and remedies in response to new sources with implementation planning improvements. See e.g., the MDE webpage related to Water Quality Certification of the Conowingo Dam and solutions to sediment infill.	This is an ongoing effort. Use of USGS's new modeling approach to identifying sediment source to aid in targeting sediment sources and management actions

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4. Develop a business strategy for sustaining and growing monitoring programming that supports information needs	Gap-filling opportunities have been discussed by STAR and its workgroups in meetings and STAC workshops	Negative pressures on program information maintenance derive from the annual cost inflation reducing the power of a dollar to accomplish the same work, replacing aging infrastructure and lost partnerships.	3.1			
5. Support the use of new data streams having classified their integrity	The Chesapeake Monitoring Cooperative has developed a Memorandum of understanding that has been approved by STAR and its workgroups, has support from GITs and Advisory Committees, and is poised to be signed by Partnership signatories.	The monitoring program provides limited support for assessing water quality standards attainment in the Bay and adequate, but not recommended, levels of monitoring in evaluating pollution inputs from the watershed to the Bay. Centralizing monitoring data from varied sources (non-CB grants) to make it available to the partnership for analysis. STAR will use information from enhanced analysis to help explain water quality trends information from Chesapeake Monitoring Cooperative	3.2			

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6. Quantifying the reductions from pollution control practices and verifying their continued performance	BMP expert panels and implementation of BMP verification programs Updating the Manure Treatment Technology Expert Panel Report with specific calculation methodology that provides more advanced considerations in the calculation of credits.	Streamlining and simplification of the requirements for BMP verification as described in the 2014 BMP Framework to recognize resource limitations; implementation of BMP verification programs; continued crediting of new, innovative practices. Routine review of BMP expert panels to ensure accurate reduction quantifications, especially for innovative practices (e.g., use of data from INSR grants).	4.3, 2.2, 4.4, 7.6	METRIC EXISTS. Current annual progress is one method to assess implementation relative to achievement of the 2025 goals.	This is an ongoing effort. There will be further review of methods to quantify reduction scenarios as needed local goals are developed.	This is an ongoing effort. One lesson has become evident: BMP verification must be robust and applicable across sectors.
7. Enhancing the existing decision support tools (Phase 6) and accelerate the time to fully utilize a new BMP in the model (e.g., time from completion of BMP expert panel report to crediting in model).	Completed - Phase 6 model development occurred over past 5 years, approval by PSC for management application.	Continue to build in optimization system to address costs and effectiveness. Explore approaches to build in co-benefits of water quality practices with other CBP outcomes into decision support tools. Refine Phase 6 Model as agreed to address simulation of phosphorus in soil.	1.4, 7.2, 1.7	METRIC EXISTS. The Mid Point Assessment is complete. New modeling tools were finalized in 2017 and Phase III WIPs are to be completed in 2019.	Better understanding and application of modeling framework has become possible. The models represent better and more land use categories, take advantage of refined land use capture methods and incorporate local data in some jurisdictions,	State agencies, NGOs and local government and citizen advisory committees will continue to participate in Chesapeake Bay Partnership meetings, decisions and to contribute to the assessment of progress toward 2025.

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		Updating modeling tools may not be consistent with the PSC decision on the stopping rule and freezing planning targets through 2025. Modeling workgroup and WQGIT will consider options in April and May 2019.			all of which improves the accuracy and resolution of the products which in turn helps to better guide Chesapeake Bay restoration decisions.	
8. Ongoing review and update historical implementation data that has been submitted by the jurisdictions to the CBP partnership, confirming that BMPs are still in place and ensuring that accurate information is included in the modeling tools	Completed – jurisdictions have spent the last couple years updating their BMP historical data, as well as developing their BMP verification programs	The Basin-wide BMP Verification Framework needs to be streamlined and simplified to allow for realistic verification programs based on available resources. BMP verification program implementation and annual progress submissions	2.1, 2.2	METRIC EXISTS. Annual progress reviews will continue.	Verification protocols were developed. See response to # 4 above	This is an ongoing effort.
9. Support the ongoing need for synthesis and communications of science findings and needs	Through the Midpoint Assessment, there was significant Partnership investment in updating the science that underpinned advances in modeling, monitoring and management tools and assessments. Substantial	While key products were provided, the need for additional synthesis and communications of new findings remains to explain factors affecting water quality trends (including local water quality) and linkages between sources and	4.5, 8.1, 4.6, 4.7, 4.8, 4.16			

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	publication efforts were initiated under the Midpoint Assessment	ecosystem response to support adaptive management. Will link to data dashboard (http://gis.chesapeakebay.net/wip/dashboard/). However, no current website postings for presentations of storylines. Appropriate presentations will be posted to the Integrated Trends Analysis Team (ITAT) webpage (https://www.chesapeakebay.net/who/group/integrated_trends_analysis_team) and Phase III WIP development webpage on chesapeakebay.net. USGS will get presentations approved for posting.				
10. The Management Board directed the WQGIT to consider co-benefits for a selected set of CBP outcomes: Improving Habitats; Reducing Toxic Contaminants; Conserving Lands; Addressing Climate	The EPA expectations document for the Phase III WIP development process included encouragement for the jurisdictions to consider multiple benefits of watershed management practices and policy. The Climate Resiliency	Need for technical understanding from monitoring and modeling science to support inclusion of selected co-benefits	7.1, 7.3, 8.3, 4.9, 7.4, 7.5, 7.6, 7.7			

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Resiliency; Public Access. There was a stakeholder survey done by LGAC (Local Government Advisory Committee) to identify outcomes most of interest to local governments. Of those, this selection is MB's best judgement as most closely related to the water quality outcomes. The selected outcomes have had co-benefits identified with them, according to the "Estimation of BMP Impact on Chesapeake Bay Program Management Strategies" (Tetra Tech 2017) report: https://www.chesapeakebay.net/channel_files/25159/draft_bmp_impact_scoring_report_-_20170421.pdf .	Workgroup, with WQGIT support, has been charged with developing and communicating understanding of climate-resilient BMP siting and design. The Urban Stormwater Workgroup and the Stream Health Workgroup have submitted a proposed GIT project to explore opportunities for enhanced ecological uplift in stream restoration practices for nutrient and sediment reductions, which did not receive funding; however ad-hoc stream committees are ongoing anyways in the Urban Stormwater Workgroup (USWG).					

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11. Understanding the factors affecting the ecosystem response to pollutant load reductions to focus management efforts and strategies	Better understanding of "lag times", which has been built into the Phase 6 suite of modeling tools for planning purposes. Explaining trends project (through STAR) provided initial findings for both the watershed and estuary. Held a STAC workshop, with WQ GIT reps, on ways to integrate the findings and inform WIP development. Explaining trends project also providing a better understanding of other factors in addition to nitrogen, phosphorus and sediment pollutant load reduction that affect response of DO, clarity, SAV and chlorophyll; the effects of climate change due to increased temperatures and sea level rise in the estuary	The relationships between water quality improvements and the recovery of habitat conditions for fish and shellfish populations and how increases in plant and animal biomass in response to improved water quality improves the assimilative capacity of the system for nutrients and sediment. Assess the time it will take for different tidal segments to achieve water-quality standards to better understand responses restoration efforts	4.10, 4.11, 4.12, 4.14, 8.4	SEVERAL METRICS WILL BE NEEDED HERE. This is an ongoing effort.	Many options are available and could include: • Technical, scientific studies of the uncertainties, such as time lag in restoration or targeting more effective practices and implementation locations • Financial studies and gap analyses to determine innovative funding initiatives and needs • Population projections and trends coupled with economic estimates related to restoration and growth capacity analysis Development of co-benefits analysis and promotion of multi-faceted interventions	This is an ongoing effort. Jurisdictions engage with Chesapeake Bay partners that range from NGOs to academic institutions to develop economic solutions that improve environmental outcomes.

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					that produce economic activity in addition to resulting in higher eco system service benefits	
12. Factoring in effects from continued climate change	CBP partnership developed the tools to quantify the effects of changes in watershed flows, storm intensity and changes in hypoxia due to increased temperatures and sea level rise in the estuary. Current efforts are to frame an initial future climate change scenario based on estimated 2025 conditions	Better understanding of climate resilient BMPs and the quantification of climate change impacts on hypoxia in 2025 and beyond. The partnership will be looking at projected climate change effects expected by 2025, 2035, 2045, and 2050 from the baseline of 1995.	1.5, 4.4, 4.13			
13. Assessing the implementation potential of filter feeders for nutrient and sediment reductions	The oyster model has been revised as necessary to incorporate aquaculture operations and additional oyster biomass brought about by restoration activities including sanctuaries. First part of oyster BMP panel completed and approved by the CBP partnership.	Complete second part of oyster BMP panel in the 2018 timeframe and update modeling tools as a result of this information. Updating modeling tools may not be consistent with the PSC decision on the stopping rule and freezing planning targets through 2025. Modeling workgroup and WQGIT will consider		METRIC EXISTS. The Oyster Recovery Partnership's 2017 presentation on metrics and ways to measure progress of oysters as a BMP can be found here	Oyster Recovery Partnership Further information is posted on ORP's website: https://oysterrecovery.org/water-quality-improvement/	The ORP'S Oyster Recovery Partnership 2016 – 2021 Strategic Plan is available here. The phase 2 report to be completed in Sumer of 2019. A public webinar on the work of the panel will be held in May 2019.

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		options in April and May 2019.				
14. Addressing the impact the lower Susquehanna dams have on the pollutant loads to the Bay, including changes over time	Numerous studies have been completed to understand the trapping capacity behind dams, especially the Conowingo, as well as greater representation of local impoundments and reservoirs throughout the Phase 6 Watershed Model.	Development of a Conowingo WIP and Planning Targets, as well as a financing strategy to fund implementation of the Conowingo WIP and its associated two-year milestones over time. Also, development of a timeline for implementing the Conowingo WIP and achieving the Conowingo Planning Targets.	1.6, 4.15	Phase 6.0 Modeling and planning metrics are being developed and will be elaborated upon through the Conowingo WIP	This effort is ongoing by state and federal agencies in cooperation with several private and NGO partners. Partners have developed a draft Framework for the Conowingo Watershed Implementation Plan.	
15. Addressing chlorophyll in the tidal James River	CBP partnership is working closely with the principal investigators of the James River chlorophyll-a criteria assessment to determine the criteria necessary to meet water quality standards in the James River.	Modeling and criteria and assessment alternatives analysis have delayed final rule making that will establish new Chlorophyll-a criteria for the James until summer 2019.	2.3			

WORK PLAN ACTIONS

Green – action has been completed or is moving forward as planned. Yellow - action has encountered minor obstacles.
Red - action has not been taken or has encountered a serious barrier.

Action #	Description	Performance Target(s)	Responsible Party (or Parties)	Geographic Location	Expected Timeline
Management Approach 1: WIPs, and Two-Year Milestones to reach attainment of target loads to reduce N, P, and sediment provided in the Chesapeake Bay TMDL.					
1.1	Support the development and implementation of Phase III WIPs.	Draft and final Phase III WIPs	Jurisdictions, WQGIT and source sector workgroups, EPA, CBPO, STAR, Habitat GIT, co-benefit GITs	Chesapeake Bay Watershed and jurisdictions	Draft Phase III WIPs due April 12, 2019 and final Phase III WIPs due August 9, 2019
1.2	Support development and implementation of two-year milestones.	Final 2020-2021 milestones and final status report on 2018-2019 milestones Use of USGS's new modeling approach to identifying sediment source to aid in targeting sediment sources and management actions	Jurisdictions, WQGIT and source sector workgroups, EPA, CBPO, STAR, Habitat GIT, co-benefit GITs	Chesapeake Bay Watershed and jurisdictions	Jan 2020
1.3	Continue to incorporate additional/more recent local land use data.	Updated land use data in the Phase 6 model, as approved by the PSC, to inform the 2020-2021	Land Use Workgroup, Watershed Technical Workgroup,	Chesapeake Bay Watershed and jurisdictions	2019

		milestones (referring to July 2018 Stopping Rule decision).	WQGIT, state and local jurisdictions		
1.4	Modeling tools will be updated with new information every two years, to coincide with two-year milestone development. These updates will be consistent with the decisions approved by the PSC in July 2018. Phase 6 suite of modeling tools released and approved by the CBP partnership for management application in the Phase III WIPs and two-year milestones.	Work with CBPO to identify the soil P data made available to CBPO and subsequently incorporated into the Phase 6 Model as approved by the PSC.	AgWG and CBPO	Chesapeake Bay Watershed and Jurisdictions	2018/2019
		Identify possible additional sources of county-level soil phosphorus data			
1.5	Document current state and local programs, policies, and strategies to address climate change	Draft and final WIPs and 2-year milestones			
1.6	Development and implementation of a Conowingo WIP, two-year milestones, and financing strategy to achieve the nutrient and sediment load reduction targets because of Conowingo dam reaching its trapping capacity.	Draft and final Conowingo WIP	PSC, RFP award recipient	Susquehanna Basin	TBD pending PSC decision
1.7	Improve the quality and representation of soil P input data in the Phase 6 watershed model to improve development of Phase III WIPs.	1. The AgWG will work with CBPO to identify the soil P data made available to CBPO and subsequently incorporated into	AgWG and CBPO	Chesapeake Bay Watershed and State Jurisdictions	2018/2019

		the CBP Phase 6.0 Watershed Model. Updating modeling tools may not be consistent with the PSC decision on the stopping rule and freezing planning targets through 2025. Modeling workgroup and WQGIT will consider options in April and May 2019.			
		2. Identify possible additional sources of county-level soil P data.	AgWG and CBPO	Chesapeake Bay Watershed and State Jurisdictions	2018/2019
		3. Address CBP Management Board's *Recommended Path Forward: Incorporating Soil Phosphorus in the Phase 6 Model* (Sept 21, 2017)	AgWG	Chesapeake Bay Watershed and State Jurisdictions	2018/2019

Management Approach 2: Chesapeake Bay TMDL Accountability Framework to ensure cleanup commitments are established and met, including WIPs, and short and long-term benchmarks.					
2.1	Annual implementation progress reporting for inclusion in modeling tools and annual reporting on progress on programmatic milestones.	Final progress data submission and annual programmatic milestone report.	Jurisdictions, CBPO, EPA	Chesapeake Bay watershed and State Jurisdictions	December 1, 2018 and December 1, 2019 (progress reports) and January 15, 2019 and January 15, 2020 (programmatic)
2.2	Quantifying changes in Best Management Practices (BMP) performance over time through verification	Provide support for development and implementation of jurisdictions' BMP verification plans	Jurisdictions, Source Sector Workgroups, BMP Verification Committee, CBPO, EPA		
2.3	Planning targets developed for the James River for dissolved oxygen only. Any additional actions needed to meet new chlorophyll-criteria will be developed separate from the Phase 3 WIP planning process.	Final planning targets for the James River	VA DEQ, EPA	James River estuary	
2.4	Development of an indicator to measure incremental progress towards attaining WQS				
Management Approach 3: Enhance monitoring to address data limitations with the use of new data streams to better estimate water quality conditions.					
3.1	Commitments to incorporating new partners, new technologies, and new assessment protocols that leverage existing programming while adapting and enhancing approaches that improve information gathering resolution and efficiency		STAR: Integrated, Monitoring WG		2019-2020
3.2	Partnership support and use of new and existing data streams such as those being assembled by the Chesapeake Monitoring Cooperative from volunteer networks and data available in the Water Quality Exchange (WQX) (e.g., STORET) and nontraditional partner efforts will expand spatial and temporal resolution of decision-support assessments. STAR will	Provide support for the reporting of monitoring data (tidal and non-tidal) into the Chesapeake Bay	STAR,Integrated, Monitoring WG, and Chesapeake Monitoring Cooperative		2019-2020

	use information from enhanced analysis to help explain water quality trends.	clearinghouse and the WQX from traditional and nontraditional partners.			
3.3	Expand continuous monitoring in tributaries and the bay to improve the understanding of direct responses in the bay to watershed inputs		USGS, MD DNR, STAR: Integrated, Monitoring WG		2019-2020
Management Approach 4: Enhance analysis of modeled and monitored data to better target pollution reduction practices and to better measure progress towards attaining Water Quality Standards.					
4.1	Refine information on the factors affecting the changes in sources and loads through the Bay watershed, and their delivery and impacts on the estuary. Better understand response times to management of nitrogen, phosphorus, and sediment.		USGS, STAR Integrated Trends and Assessment WG, WQGIT, State Agencies		2019-2020
4.2	Better predict future impacts of population growth and climate change in the Bay watershed and impacts on water quality.	More detail in Climate Resiliency Strategy and logic table/workplan	STAR Climate Resiliency Workgroup, and Modeling WG		2019-2020
4.3	Quantifying the effect of variations in watershed properties (such as soils, geology) on nutrient and sediment reduction practices				
4.4	Evaluating the potential future impacts of climate change on BMP performance		STAR Climate Resiliency Workgroup, and Modeling WG		2019-2020
4.5	Continued and enhanced development of metrics to assess change, such as GAMS for tidal water quality trends, including salinity or flow-adjustment and modeling predictors to analyze factors influencing tidal water quality trends	New methods for assessing incremental progress towards water quality standards	STAR Monitoring Team and ITAT		2019-2020

		attainment, for assessing trends in estimated water quality standards attainment over time, and for analyzing the spatial-temporal changes in estimated water quality standards attainment.			
4.6	Analyses that compare monitoring results to model outputs to identify drivers of inconsistencies and assess the ability to account for these drivers		STAR monitoring team and Modeling Workgroup		2019-2020
4.7	Employ statistical methods or models to assess and quantify interactions		STAR workgroups		
4.8	Analyze linkages between the loads and flow from watershed and response of tidal waters. Emphasize understanding of influence of BMP implementation on watershed and estuary response (see next bullet)		STAR monitoring team, ITAT, USGS		2019-2020
4.9	Build capacity for analysis and communication of linkage between watershed changes and estuary response		STAR ITAT, USGS, UMCES, CBP monitoring and modeling teams		2019-2020
4.10	The WQGIT will collaborate with the Climate Resiliency Workgroup to pursue research, policies and practices to address climate impacts in the Watershed with regards to water quality management practices.	More detail in Climate Resiliency Strategy and logic table/workplan	WQGIT and STAR Climate Resiliency Workgroup		2019-2020

4.11	Provide enhanced focus how population changes and economic influences may affect nutrient and sediment loads, and estuary changes.				2019-2020
4.12	improved understanding of uncertainty associated with model projections. The partnership needs to have a better understanding of uncertainty quantification. Performance targets will be developed in future time periods, as the partnership develops additional data/information on uncertainty associated with model projections. The partnership will decide what to do with uncertainty quantification in future time periods.		CBPO Modeling Team, STAR Modeling Workgroup		2019-2020
4.13	Continue to refine the estimate of pollutant load changes due to 2025 conditions so that jurisdictions will be able to meet the expectation to account for these additional nutrient and sediment pollutant loads beginning in 2022.		CBPO Modeling Team, STAR Modeling Workgroup		2019-2020
4.14	Updating the high-resolution land cover and land use datasets to remap the Chesapeake Bay Watershed.		The Chesapeake Conservancy		2019-2020
4.15	Provide analyses of Conowingo and estuarine monitoring through 2018 high flows to support Conowingo WIP development		USGS UMCES		2019
4.16	Prioritization of research needs. Prioritization is underway by STAR and USGS. The Management Board will review this prioritization of research needs.		STAR, USGS, MB		2019
Management Approach 5: Phase III WIP implementation of actions jurisdictions will take to have all practices on the ground by 2025 to achieve their respective Phase III planning targets.					
5.1	Evaluation of the Phase III WIPs and 2-year milestones		Jurisdictions, WQGIT, Source Sector Workgroups, Finance Workgroup, LGAC, CBC		

5.2	On-going sharing of lessons learned to help inform future 2-year milestones from WIP development and implementation		Jurisdictions, WQGIT, Source Sector Workgroups, Finance Workgroup, LGAC		
5.3	"Return on Investment" analysis of installed BMPs from data in grants (costs and pollution reductions) to better target BMPs and funding		WQGIT		
5.4	Evaluation of BMP implementation and maintenance costs and actual nutrient and sediment reductions	On-going sharing of lessons learned to help inform future 2-year milestones; reporting and/or sharing of select BMP monitoring studies	Jurisdictions, WQGIT, Source Sector Workgroups, BMP Verification Committee, CBPO, EPA		
5.5	Provide Support for continued BMP implementation, tracking and reporting on agricultural loads	1. NRCS will continue to support voluntary actions by farmers and landowners to improve water quality by providing financial and technical assistance from the Environmental Quality Incentives Program (EQIP),	USDA	Chesapeake Bay Watershed and Jurisdictions	2018/2019

		Regional Conservation Partnership Program (RCPP), Agricultural Management Assistance (AMA) Program, Agricultural Conservation Easement Program (ACEP), Conservation Stewardship Program (CSP), and Conservation Technical Assistance (CTA) funds.			
		2. Support the development and implementation of agricultural certainty programs in Bay watershed states.	USDA, EPA and State Agencies	Chesapeake Bay Watershed and Jurisdictions	2018/2019
6	Work with other federal agencies to build capacity that will support an efficient and robust trading market	Participate in calls and meeting with other federal agencies providing advice and suggestions regarding the use of nutrient and	EPA, USDA, DOT, USACOE	Chesapeake Bay Watershed and Jurisdictions	2018/2019

		sediment credits. (e.g, use of oyster reef creation / restoration as a means of generating nutrient credits).			
5.7	Guide development of jurisdictions' trading and offset programs	Issue draft "MS4 and construction mitigation" technical memoranda setting forth EPA expectations for the Bay jurisdictions' offset and trading programs and explore means for addressing "interstate trading" considerations.	EPA	Chesapeake Bay Watershed and Jurisdictions	2018/2019
Management Approach 6: Approaches targeted to local participation including municipalities, counties, soil and water conservation districts, and local private sector groups and individuals.					
6.1	Communication of funding needs to elected officials		State Agencies, WQGIT, LGAC		
6.2	Development of success stories/lessons learned to share with local entities (focus on local water quality, improvements in flood protection, livability, economic growth, in addition to improvements to the Bay)				
6.3	Developing and supporting state or regional approaches to improve local implementation (e.g., circuit rider programs)		State Agencies, WQGIT, LGAC		

Management Approach 7: Cross-outcome collaboration and multiple benefits					
7.1	Optimization tools for co-benefits will be explored. An optimization framework with respect to cost and water quality in CAST is under development, and this framework is being built to be flexible enough that we can incorporate co-benefits, as optimization goals or constraints, once we have quantitative information regarding the ecosystem services. So, incorporating co-benefits in an optimization procedure will be possible once the co-benefits are quantified	See 7.3 as it relates to CAST.	CBPO Modeling Team, CAST Team, WQGIT		2019-2020
7.2	Develop approaches to better quantify co-benefits with other outcomes into decision-support tools	See 7.3 as it relates to CAST.	CBPO Modeling Team, CAST team, Cross-Outcome Coordination Team, and selected WGs from other Goal Teams		2019-2020
7.3	Develop improved understanding of the potential benefits, and risks, of selected practices and policies to provide benefits to multiple outcomes.	Quantification of the Value of Green Infrastructure Hazard Mitigation Related to Inland and Coastal Flooding RFP to develop the following. Purpose of the	Cross-Outcome Coordination Team, selected WGs from other Goal Teams, USGS		2019-2020

		research: Demonstrate how to quantify or monetize the value of natural assets (BMPs) to help planners realize this value and make decisions to optimize for considerations beyond just cost effectiveness; Improve ability to identify and quantify ecosystem services associated with natural green infrastructure and with watershed agreement outcomes; Identify methods for quantifying and valuing ecosystem services in such a way that values can be associated with BMP			

		implementation levels in CAST and for future CAST optimization models; Delineate a process or methodology by which the Bay Program can identify ecosystem services associated with the watershed agreement outcomes or with other goals and priorities, identify which of these services can be quantified or valued, associate services with nutrient and sediment reduction BMPs, quantify services for use in CAST.			

7.4	Collaborate with source-sector workgroups to identify projects of mutual interest that support collective reductions of toxic contaminants, nutrients and sediments. Explore and develop approaches for estimating BMP removal effectiveness for PCBs and other selected toxic contaminants. Collaborate on reductions from stream restoration practices (with Stream Health Workgroup and USWG). Explore approaches to integrate Phase III WIP development for stormwater practices with stormwater reductions (e.g. MS4) under local toxic contaminants TMDLs.	Approaches for collaboration and prioritization of toxics/source sector issues are documented in the management strategies and workplans for Toxics Policy & Prevention and Toxics Research outcomes. Can reference Toxics documents in this item's performance targets. Conduct STAC workshop on either agricultural or stormwater settings, to inform benefits of nutrient, sediment, and contaminant reductions (2019)	Toxic Contaminants Workgroup (Collaboration with WQ Source Sector Workgroups), USGS, USWG, STAC		2019-2020
7.5	Cross—outcome consideration of applications, management practice implications, and next steps from report on PCB removal and WWTP ENR upgrades		Toxic Contaminants		

			Workgroup and WWTWG		
7.6	Review and refine stream restoration technical protocols in order to preserve and enhance ecological function in stream restoration, floodplain connection, and urban stream practices.		USWG, Stream Health Workgroup, Wetlands Workgroup and WTWG		
7.7	Ecosystem Services Valuation Project		WQGIT, Cross-GIT Coordinators, CAST team		
Management Approach 8: Consistent scientific and technical communications and outreach to provide managers the opportunity to incorporate science into decision making.					
8.1	Communicate findings on management-relevant time frames (e.g., reporting of incremental progress in attaining Water Quality Standards).		STAR workgroups, CBPO GIS team, working with WQ source sector WGs		2019-2020
8.2	Enhanced and continued synthesis projects that utilize interdisciplinary teams to: explain changes in water quality or ecosystem response in terms of management efforts or actions	Development of dashboard to create storylines	STAR ITAT, USGS, working with WQ source sector WGs		2019-2020
8.3	Existing technical tools will be expanded, and new tools may be developed, to provide the information for decision makers to consider practices that provide benefits for multiple outcomes. Tools include Watershed Data Dashboard (http://gis.chesapeakebay.net/wip/dashboard/); currently developing planning, tracking and reporting tools in coordination with PA. These tools will be developed in coordination with WQGIT, EPA and jurisdictions. Currently working to build on the Cross GIT mapping effort (http://gis.chesapeakebay.net/intergit/mapviewer.html), and are preparing to coordinate with all GITs in this effort. Current story maps (Conservation and		STAR GIS team, CBP modeling team, WQGIT, jurisdictions		2019-2020

	Restoration) are available online, and report on these mapping efforts is being developed.				
8.4	Establish stronger use of results to inform implementation of WIPs and 2-year milestones through 2025.	Partnership provide technical staff assistance to state and local governments to aid in developing plans and 2-year milestones	STAR interacting with WQ GIT and jurisdictions.		2019-2020
8.5	Development of success stories				