

BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program



Logic and Action Plan: Pre Quarterly Progress Meeting

Water Quality Standards Attainment and Monitoring Outcomes – 2018-2019

[NOTE: make sure to edit **pre-** or **post-** in the text above, to tell the reader whether this logic and action plan is in preparation for your quarterly progress meeting or has been updated based on discussion at the quarterly progress meeting.]

Long-term Target: (the metric for success of Outcome)

Two-year Target: (increment of metric for success)

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| Instructions: Before your quarterly progress meeting, provide the status of individual actions in the table below using this color key. |
| Action has been completed or is moving forward as planned. |
| Action has encountered minor obstacles. |
| Action has not been taken or has encountered a serious barrier. |

Additional instructions for completing or updating your logic and action plan can be found on [ChesapeakeDecisions](#).

| Factor | Current Efforts | Gap | Actions | Metrics | Expected Response and Application | Learn/Adapt |
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| <i>What is impacting our ability to achieve our outcome?</i> | <i>What current efforts are addressing this factor?</i> | <i>What further efforts or information are needed to fully address this factor?</i> | <i>What actions are essential (to help fill this gap) to achieve our outcome?</i> | <i>What will we measure or observe to determine progress in filling identified gap?</i> | <i>How and when do we expect these actions to address the identified gap? How might that affect our work going forward?</i> | <i>What did we learn from taking this action? How will this lesson impact our work?</i> |
| Continuing to enhance and sustain the capacity of state and local governments and the private sector to | Continued funding and technical assistance support for BMP implementation, tracking, | Connecting water quality practices to other local priorities (co-benefits); continuous and stable funding stream to support | <p>1.1 Support the development and implementation of Phase III WIPs.</p> <p>1.2 Support development and implementation of two-year milestones.</p> | METRIC EXISTS: Consistent grant administration is one measure of progress: | State funding efforts for cover crops is one example: certification each year and expenditure figures attest to program implementation. See example : | Successful and popular program, reinforces education; High level of buy in. Costly |

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| implement practices | verifying, and reporting through voluntary and regulatory (NPDES permits) measures | implementation efforts; strengthened coordination between federal, state and local levels to accelerate implementation (e.g., better coordination with LGAC). | <p>5.5 Provide Support for continued BMP implementation, tracking and reporting on agricultural loads</p> <p>5.6 Work with other federal agencies to build capacity that will support an efficient and robust trading market</p> <p>5.7 Guide development of jurisdictions' trading and offset programs</p> <p>6.1 Communication of funding needs to elected officials</p> | <p>Fed (examples):</p> <ul style="list-style-type: none"> • CBRAP • CBIG • CREP • NFWF SWG/INS R <p>State (examples):</p> <ul style="list-style-type: none"> • SRF • Trust Fund • Bay Restoration Fund (BRF) • Open Space <p>Reports on dollars spent, results achieved in reductions (N,P,TSS)</p> | | investment by the State. |
| 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; | 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 | <p>5.1 Evaluation of the Phase III WIPs and 2-year milestones</p> <p>5.2 On-going sharing of lessons learned to help inform future 2-year milestones from WIP development and implementation</p> <p>5.3 "Return on Investment" analysis of installed BMPs from data in grants (costs and pollution reductions) to better target BMPs and funding</p> | 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 | 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 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) | 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 |

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| | Farm Bill/NRCS funding; exploration of private investment options | | <p>5.4 Evaluation of BMP implementation and maintenance costs and actual nutrient and sediment reductions</p> <p>6.1 Communication of funding needs to elected officials</p> | results are finalized and finer grained goals are developed. | | being pursued in MD. Would be good to see if similar examples exist in the other jurisdictions. |
| 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 | 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 | <p>1.3 Continue to incorporate additional/more recent local land use data.</p> <p>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.</p> <p>4.2 Better predict future impacts of population growth and climate change in the Bay watershed and impacts on water quality.</p> <p>4.11 Provide enhanced focus how population changes and economic influences may affect nutrient and sediment loads, and estuary changes.</p> | 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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| | land use data produced and used to improve Phase 6 model inputs; Phase 6 model calibration; Maintained monitoring networks and provided trend updates. | in aquatic conditions. | 4.14 Updating the high-resolution land cover and land use datasets to remap the Chesapeake Bay Watershed. | | | |
| 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 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 | | | |
| 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 | 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. | 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 use information from enhanced analysis to help | | | |

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| | Partnership signatories. | 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 | explain water quality trends. | | | |
| 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 | 4.3 Quantifying the effect of variations in watershed properties (such as soils, geology) on nutrient and sediment reduction practices 2.2 Quantifying changes in Best Management Practices (BMP) performance over time through verification 4.4 Evaluating the potential future impacts of climate change on BMP performance 7.6 Review and refine stream restoration technical protocols in order to preserve and enhance ecological function in stream restoration, floodplain | 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. |

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| | | of data from INSR grants). | connection, and urban stream practices. | | | |
| 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 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. | 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, all of which improves the accuracy and resolution of the products which in turn helps to better guide Chesapeake Bay restoration decisions. | 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. |
| | | 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. | 7.2 Develop approaches to better quantify co-benefits with other outcomes into decision-support tools | | | |
| | | | 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. | | | |

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| <p>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</p> | <p>Completed – jurisdictions have spent the last couple years updating their BMP historical data, as well as developing their BMP verification programs</p> | <p>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</p> | <p>2.1 Annual implementation progress reporting for inclusion in modeling tools and annual reporting on progress on programmatic milestones.</p> <p>2.2 Quantifying changes in Best Management Practices (BMP) performance over time through verification</p> | <p>METRIC EXISTS.</p> <p>Annual progress reviews will continue.</p> | <p>Verification protocols were developed. See response to # 4 above</p> | <p>This is an ongoing effort.</p> |
| <p>Support the ongoing need for synthesis and communication of science findings and needs</p> | <p>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 publication efforts were initiated under the Midpoint Assessment</p> | <p>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 ecosystem response to support adaptive management. Will link to data dashboard. However, no current website postings for</p> | <p>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</p> <p>8.1 Communicate findings on management-relevant time frames (e.g., reporting of incremental progress in attaining Water Quality Standards).</p> <p>4.6 Analyses that compare monitoring results to model outputs to identify drivers of inconsistencies and assess the ability to account for these drivers</p> | | | |

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| | | <p>presentation of storylines. Appropriate presentations will be posted to the Integrated Trends Analysis Team (ITAT) webpage and Phase III WIP development webpage on chesapeakebay.net. USGS will get presentations approved for posting.</p> | <p>4.7 Employ statistical methods or models to assess and quantify interactions</p> <p>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)</p> <p>4.16 Prioritization of research needs. Prioritization is underway by STAR and USGS. The Management Board will review this prioritization of research needs.</p> | | | |
| <p>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 Resiliency; Public Access. There was a stakeholder</p> | <p>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</p> | <p>Need for technical understanding from monitoring and modeling science to support inclusion of selected co-benefits</p> | <p>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</p> | | | |

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| <p>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).</p> | <p>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).</p> | <p>7.3 Develop improved understanding of the potential benefits, and risks, of selected practices and policies to provide benefits to multiple outcomes.</p> <p>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 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, and are preparing to coordinate with all GITs in this effort. Current story maps (Conservation and Restoration) are available online, and report on these mapping efforts is being developed.</p> <p>4.9 Build capacity for analysis and communication of linkage between watershed changes and estuary response</p> | | | |
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| | | | <p>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.</p> <p>7.5 Cross—outcome consideration of applications, management practice implications, and next steps from report on PCB removal and WWTP ENR upgrades</p> <p>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.</p> | | |
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| | | | 7.7 Ecosystem Services Valuation Project | | | |
| 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, | 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 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. | SEVERAL METRICS WILL BE NEEDED HERE. This is an ongoing effort. | Many options are available and could include: <ul style="list-style-type: none"> • 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 that produce economic activity in addition to resulting in higher eco system service benefits | 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. |
| | | | 4.11 Provide enhanced focus how population changes and economic influences may affect nutrient and sediment loads, and estuary changes. | | | |
| | | | 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. | | | |

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| | SAV and chlorophyll; the effects of climate change due to increased temperatures and sea level rise in the estuary | | <p>4.14 Updating the high-resolution land cover and land use datasets to remap the Chesapeake Bay Watershed.</p> <p>8.4 Establish stronger use of results to inform implementation of WIPs and 2-year milestones through 2025.</p> | | | |
| 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. | <p>1.5 Document current state and local programs, policies, and strategies to address climate change</p> <p>4.4 Evaluating the potential future impacts of climate change on BMP performance</p> <p>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.</p> | | | |
| 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 | Complete second part of oyster BMP panel in the 2018 timeframe and update modeling tools as | | METRIC EXISTS. The Oyster Recovery Partnership's 2017 presentation | 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 |

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| | additional oyster biomass brought about by restoration activities including sanctuaries. First part of oyster BMP panel completed and approved by the CBP partnership. | 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 options in April and May 2019 | | on metrics and ways to measure progress of oysters as a BMP can be found here | | report to be completed in Sumer of 2019. A public webinar on the work of the panel will be held in May 2019. |
| 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 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. 4.15 Provide analyses of Conowingo and estuarine monitoring through 2018 high flows to support Conowingo WIP development | 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. | |
| Addressing chlorophyll in the tidal James River | CBP partnership is working closely with the principal investigators of the James River chlorophyll-a criteria | Modeling and criteria and assessment alternatives analysis have delayed final rule making that will establish new Chlorophyll-a | 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. | | | |

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| | assessment to determine the criteria necessary to meet water quality standards in the James River. | criteria for the James until summer 2019. | | | | |
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ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
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| 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 milestones (referring to July 2018 Stopping Rule decision). | Land Use Workgroup, Watershed Technical Workgroup, WQGIT, state and local jurisdictions | Chesapeake Bay Watershed and jurisdictions | 2019 |

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
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| 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 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. | AgWG and CBPO | Chesapeake Bay Watershed and State Jurisdictions | 2018/2019 |
| | | 2. Identify possible additional sources of county-level soil P data. | AgWG and CBPO | Chesapeake Bay Watershed and State Jurisdictions | 2018/2019 |

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
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| | | 3. Address CBP Management Board's <i>Recommended Path Forward: Incorporating Soil Phosphorus in the Phase 6 Model</i> (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 | Publication and Methods for communicating implemental progress towards water quality attainment | CBP Monitoring Team, STAR | Chesapeake Bay Tidal Waters | 2018 |

Management Approach 3: Enhance monitoring to address data limitations with the use of new data streams to better estimate water quality conditions.

Commented [BS1]: Methods and examples are published 2018
 Next two years would like to communicate this more broadly

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
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| 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. | Engagement – Citizen science New Technologies – pilot project on DO vertical profiling, Satellite data | 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 use information from enhanced analysis to help explain water quality trends. | Provide support for the reporting of monitoring data (tidal and non-tidal) into the Chesapeake Bay clearinghouse and the WQX from traditional and nontraditional partners. | STAR, Integrated, Monitoring WG, and Chesapeake Monitoring Cooperative | | 2019-2020 |
| 3.3 | Expand continuous monitoring in tributaries and the bay to improve the understanding of direct responses in the bay to watershed inputs. | Expansion of continuous monitoring use in the tribs, pilot project for hypoxia vertical profiling, shallow water monitoring | 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. | Tributary reports USGS synthesis reports Attainment Deficit report UMCES publications | USGS, STAR Integrated Trends and Assessment WG, WQGIT, State Agencies | | 2019-2020 |

Commented [BS2]: Monitoring Outcome: ongoing action, green because making progress but it will be included in the action plan in the future because it is ongoing. Need more definitions of performance targets when completing the next Action Plan

Commented [BS3]: Monitoring Outcome: Performance Target is completed, can put new targets in the next action plan since the description is broad and ongoing

How the information is being integrated/applied in ongoing. The process part is complete.

Commented [BS4]: Monitoring Outcome: shallow water monitoring in trouble due to funding, ongoing moving forward, didn't expand as much as we would like, room for improvement

Need more definitions of performance targets when completing the next Action Plan

Commented [BS5]: Monitoring Outcome: Jeni and team is working on these and Lew and Gary has reviewed one; Ongoing

Scott will provide more detail on USGS reports

Need more definitions of performance targets when completing the next Action Plan

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|----------|--|--|--|---------------------|-------------------|
| 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 | Who is working on this? Is it still a priority? Scott isn't sure for the performance targets but had one action that might match | | | |
| 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 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. | STAR Monitoring Team and ITAT | | 2019-2020 |
| 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) | Linkages from Jeni and Rebecca STAC Gap analysis | STAR monitoring team, ITAT, USGS | | 2019-2020 |
| 4.9 | Build capacity for analysis and communication of linkage between | STAC Gap analysis – pull on results Linkages from Jeni and Rebecca | STAR ITAT, USGS, UMCES, CBP monitoring | | 2019-2020 |

Commented [BS6]: Monitoring Outcome: Emily suggested it was work USGS did with WIP3

Scott said USGS did make progress to understand effects of carbonate geology on nitrogen occurrence. The findings were recently published:
Ator, S.W., Blomquist, J.D., Webber, J.S. and Chanut, J.G. (2020), Factors driving nutrient trends in streams of the Chesapeake Bay watershed. J. Environ. Qual. Accepted Author Manuscript. doi:[10.1002/eq2.20101](https://doi.org/10.1002/eq2.20101).

Need more definitions of performance targets when completing the next Action Plan

Commented [BS7]: Monitoring Outcome: Ongoing; IDF Curves GIT Funding project with USWG (David Wood); STAC funded Climate Change and Uncertainty Science Synthesis (Zach Easton); Interagency agreement with CBPO (Julie)

Obstacles: still need more research done on this topic and CRWG can't do it themselves. Still developing RFP to support performance assessment of BMPs with NOAA and EPA

Need more definitions of performance targets when completing the next Action Plan

Commented [BS8]: Monitoring Outcome

Commented [BS9]: Monitoring Outcome: ongoing; Jeni and Cuiyin's work on how the estuary model is breaking down (tidal segments where they were not meeting the attainment standards). Non-tidal side is underway, Gary and Isabella are working on it.

Commented [BS10]: Monitoring Outcome: Red because we need to connect it to more targets.

Jeni – Gam building with flow and season interactions (any temporal trend analysis); SEM; CART for nutrient limitation; Attainment Deficit and factors driving it (Jeremy and Qian)

Commented [BS11]: Monitoring Outcome: Need to reach out and see what work falls under this action. Still working on it but there has been progress

Commented [BS12]: Monitoring Outcome

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|-----------------|---|---|---|----------------------------|--------------------------|
| | watershed changes and estuary response | | and modeling teams | | |
| 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 |

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|---|--|--|---|----------------------------|--------------------------|
| 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 | | |

Commented [BS13]: Monitoring Outcome: Partnership agreed to move forward with SSRF

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|--|--|---|---------------------------------------|--|--------------------------|
| 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), 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. | USDA | Chesapeake Bay Watershed and Jurisdictions | 2018/2019 |
| | | 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 |
| 5.6 | 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 sediment credits. (e.g. use of oyster reef creation / restoration as a means of generating nutrient credits). | EPA, USDA, DOT, USACOE | Chesapeake Bay Watershed and Jurisdictions | 2018/2019 |
| 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 | Package of materials addressing implementation | Communications Workgroup | | |

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|---|--|---|--|----------------------------|--------------------------|
| | 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 research: Demonstrate how to quantify or monetize the value of natural assets (BMPs) to help planners | Cross-Outcome Coordination Team, selected WGs from other Goal Teams, USGS | | 2019-2020 |

Commented [BS14]: I will reach out to Lucinda about what we have for the targets; Lucinda was unsure about the status of this one.

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|----------|--|--|---|---------------------|-------------------|
| | | 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 |

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|--|---|---|---|---------------------|-------------------|
| 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 currently developing planning, tracking and | | STAR GIS team, CBP modeling team, WQGIT, jurisdictions | | 2019-2020 |

Commented [BS15]: Monitoring Outcome

Commented [TE16R15]: Incremental progress for WQS attainment was published and those metrics are being generated. We have run into some obstacles with actually communicating progress to the jurisdictions. This is ongoing. In addition, we are currently working to get monitoring data into the hands of the jurisdictions on a timeframe that allows them to use it to inform their next Milestone development period.

Commented [BS17]: Monitoring Outcome

Commented [TE18R17]: Data Dashboard has been developed (and will have been released by the time we submit this). Funding was given to STAC to fund synthesis projects ongoing into the future – Jeremy Testa’s group is current recipient of this.

ACTIONS – 2018-2019

| Action # | Description | Performance Target(s) | Responsible Party (or Parties) | Geographic Location | Expected Timeline |
|----------|--|--|---|---------------------|-------------------|
| | 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 , and are preparing to coordinate with all GITs in this effort. Current story maps (Conservation and 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 | | | | |

Commented [BS19]: Monitoring Outcome

Commented [TE20R19]: Watershed Data Dashboard has been developed with feedback from the WQGIT and its workgroups. We plan to provide trainings and conduct user testing on this over the coming year. Work has been underway to help PA develop planning, tracking and reporting tools and the pilot of that project will be presented to the WQGIT on June 22. We have surveyed the GITs and WGs on their Cross-GIT mapping needs and are going to have a user research expert conduct user research to move the cross-GIT mapping project forward.

Commented [BS21]: Monitoring Outcome

Commented [TE22R21]: We have been providing technical assistance to state and local governments for Phase III WIP implementation. CBP is currently developing a technical assistance strategy to collaborate with the jurisdictions on specific analyses of interest or technical requests that will aid Milestone development.