

Goal Team	SRS Outcome	Need	Completed? (Y/N)	More specific detail	Why is this needed?	Category	Other Goals/Outcomes This Addresses	Current resources/ efforts (Enter "Full", "Partial", or "None", and Responsible Party)	Future opportunities/ capabilities that could address this need	Priority (Enter "High" or "Low")	GIS Comment	
Over-Arching Needs: Ecosystem Services		oyster reef restoration benefits and ecosystem services	No	Building on Choptank research by Morgan State - what are the benefits of oyster restoration? Beyond having oyster fishery, water quality, habitat, economic, fishery productivity benefits	To explain to the public/justify costs of restoration, need to synthesize existing results and determine gaps, and implementing oysters as BMP	Synthesis, Research	water quality, habitat	Partially - NCDI funded 6 research projects baywide, ex. study by Tom Ihle and Scott Knoche evaluated the economic benefits of oyster reefs in Harris Creek showed expanded fishery resources		high		
	Fish Habitat	Potentially modify current BMP matrix to focus on habitat conditions		Under whether this refers to WIP factheets, or a quantitative study (e.g. TetraTech)	Not a priority						Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners?	
Sustainable Fisheries	Fish Habitat	Regional Fish Habitat Assessment: 1. compile habitat and environmental, stressor, biological dataset; 2. analyze biological response data for relevance; 3. pilot fish habitat assessment; 4. conduct watershed regional assessment; 5. ID/develop spatial tools useful to partners	No	Incorporated under Fish Habitat Assessment	Needed to quantify existing habitat area and condition, and provide a tool to prioritize areas for conservation and restoration	Analysis	habitat, water quality	Partially - step 1 initiated through STAC workshop but wasn't quite complete, so ongoing GIT funded project led by USGS and NOAA is completing step #1 and step #2 (analyze biological response)	NFHP habitat assessment, MAFMFC efforts	high		
	Fish Habitat	ID healthy habitat criteria		Incorporated under Fish Habitat Assessment								
	Fish Habitat	ID spatial tools and datasets to map ranges and stressors		Incorporated under Fish Habitat Assessment								
	Fish Habitat	Convert fish and habitat survey data to spatial datasets		Incorporated under Fish Habitat Assessment								
	Fish Habitat	Explore options for monitoring programs to cover range of species			multi-species monitoring?							
	Fish Habitat	Explore cost-effective methods/approaches to phytoplankton and zooplankton monitoring	No	Determine key sub-sampling locations for intermittent monitoring, and develop cost-effective methods for collecting snapshots of data, continues to be brought up as a need	Needed to provide data for environmental modeling, and inform ecosystem factors influencing fishery populations	Monitoring	water quality	Dr. Bi at UMCES using sonar and other imaging techniques to understand plankton distributions, previously funded at DNR		low		
	Fish Habitat	Develop shallow water monitoring survey proposal for gaps	No	Develop a shallow water monitoring plan that can incorporate monitoring needs of other outcomes	Needed to identify existing surveys and gaps in tributaries sampled, and standardize across	Monitoring	habitat	several surveys exist, conducted by MD DNR and VIMS (always nice to have more data, not critical at this time)		low		
	Fish Habitat / Water Quality	Monitoring vertical water column habitat (DO volume and spatial extent for hypoxia)	No	Methods are being developed through FY2018 GIT Funded hypoxia pilot project	Needed to pair WQ data with living resources data	Monitoring		Partially - pilot project initiated for GIT funded study, will need to expand on pilot project to implement on a larger scale		low		
	Fish Habitat	Pair WQ data with living resources data										
	Fish Habitat	improved fish habitat maps		Incorporated under Fish Habitat Assessment								
	Oysters	Shoreline indicator development		Closely related to shoreline threshold analysis and inventory								
	Oysters	Oyster restoration monitoring	Ongoing		Research by ORP to develop standardized, cost-effective monitoring restoration methods based on success metrics	Needed to compare methods for restored (inhabited) across MD/VA, will require long-term planning as more and more reefs need to be assessed. Also need to standardize across states to discuss Baywide restoration - needed to assess if restoration is working	Monitoring		partially - NOAA has funded monitoring; NCDI and state jurisdictions support; post-restoration will go on 3-6 years; monitoring funds can't match monitoring needs; used GIT funding for methods to reduce cost of monitoring in MD - need multiple years of restoration and funding for monitoring	What will happen after 2025?	high	
	Forage Fish	Shoreline threshold analysis	No	Knowing the threshold is not meaningful without understanding the existing baseline through an inventory of shoreline condition/type (below)	Needed to understand coastal development impacts to nearshore species	Analysis	habitat	Partially - ongoing GIT funded project, need depending on outcome of project recommendations		low		
	Fish Habitat	Baywide inventory of shoreline condition/type	No	Inventory to quantify the amount/percentage of shoreline type - natural or hardened; more data exist for VA but are lacking for MD	Needed to understand coastal development impacts to nearshore species	Data Gathering	habitat, stakeholder engagement/stewardship	Already underway at VIMS and to be completed in April - will be		low	Will GIS data be developed or assembled? Will this data be made available to partners?	
	Forage Fish	Shallow water monitoring plan that can incorporate monitoring needs of other outcomes		Addressed above								
	Forage Fish	Forage fish indicator	No	Pilot project based on 2016 GIT funded study	Needed to evaluate relative abundance of key forage species from year to year, informing ecosystem-based management approach	Data Gathering / Analysis		Partially - previous GIT funded projects have given pilot or one method, now looking at how that would be aggregated and on what scale, spatially or temporally; GIT funded project and quantitative methods now being developed by NCDI		low		
	Blue Crab Abundance	Identify and describe ecosystem factors affecting natural mortality of blue crabs	No	Rank varying factors influence on population dynamics, understand links between habitat, climate, predator-prey, water quality and blue crab population dynamics	Needed to inform ecosystem-based approaches to blue crab management	Analysis	water quality, habitat	GIT Funded research initiated to address this	ecosystem modeling STAR workgroup	low		
	Blue Crab Abundance	Recreational harvest survey	No	After MD DNR adopted new licensing system for recreational crab fishing, there is limited data to inform estimates of recreational harvest - is rec harvest actually 8% of overall harvest?	Needed to quantify/characterize the blue crab recreational fishery	Data Gathering		partially - SERC Matt Ogburn survey, DNR contracted survey		low		
	Blue Crab Abundance	Stock assessment update	No	Stock assessment update completed this year (not peer reviewed yet) saying that current framework is successful and effective (no change in reference points); scientists are working to finalize a report with updated data included in the existing stock assessment model; and to develop decision tools; when would we conduct a new update using the same model with new data? Need more concrete path for what would trigger next benchmark	Needed to determine when management action is warranted for the blue crab stock	Analysis		Partially - supported by MD DNR and CBSAC; no funding in place for full benchmark stock assessment - eventually might reach a point where that is necessary and would take years to come up with funding		high		
	Blue Crab Management	None										
Blue Crab Management	Blue catfish predation in tidal reaches of tributaries	No	The impact of invasive blue catfish on native species (e.g. blue crab) is uncertain	Needed to understand the potential ecological impacts of an expanding blue catfish population in the Chesapeake	Research	blue crab abundance	partially - VMRC funded study to examine predation on blue crab		low			
Blue Crab Management	Climate related changes in fish distribution	No	Fish species range/distributions are changing due to temperature-driven shifts	Needed to determine local impacts of climate change on coastal fisheries, how management can respond	Data gathering, Analysis	Climate Resiliency Workgroup	Part of CRWG workplan (one of the recommended indicators), partially related to Woodland et al. GIT funded study - but no resource currently devoted	GIT-funded project possible	high			
Blue Crab Management	Gauging public perceptions & commercial fishery stakeholder views on key Bay resources	No	How do we balance the interests of various use groups? Ex: support for oyster sanctuaries or regulations on invasive catfish	In order to gain support for restoration efforts, increase public investment, better understand public opinions and tools to be responsive	research	stewardship, habitat, communications workgroup	Ex: VIMS survey of crabbers on derelict pots		low			
Stream Health	Support for reporting progress for Chesie BIBI	No	This is requisite of the Bay Program and Stream Health Outcome. Need to analyze and report on the indicator.	To report on Stream Health Outcome.	Data Gathering, Analysis	Healthy Watersheds (no overall Bay wide indicator, scalable in terms of reporting process. Will help to reinforce to their overall goal)	ICRIB has done work but we need to report. No funding to report on annual progress. Potential USGS end of year money.	Continued in kind support from jurisdictions for data collection.	High	Is GIS Team assistance desired to map indicator in ChesapeakeProg ress? Will this data be made available to partners?		
Stream Health	Stream Corridor Restoration efforts have demonstrated ability to reduce sediment and nutrient loadings; however, the ability to achieve biological lift has been more challenging. Build on function based restoration approach to document restoration success stories and lessons learned to guide better design and construction to improve stream health outcomes. Need to understand how to design project to give biological lift beyond load reduction.	No		To make progress towards stream health outcome through better restoration efforts. Forum necessary for key stakeholders to discuss best practices for stream restoration.	Data gathering through primary (monitoring) or secondary (literature) research. Synthesis via forum discussion.	Fish Habitat, Fish Passage, Water Quality	The Verification Workgroup will provide recommendations on verification for restoration practices with scope beyond just water quality. Verification Workgroup will begin to explore function uplift, but it is only one	2019 GIT Funding	High			
Stream Health	Stream Health/Toxics/Habitat: The identification and extent to which water quality stressors and sources of impairments associated with a TMDL may limit recovery of stream health.	No	Biological recovery is often the outcome by which stream health is measured. Progress towards biological recovery may be limited if stressors associated with sustaining populations are not addressed through management actions. Known stressors may include: toxics, temperature, flow, habitat, pH, chlorides, bacteria, DO. Need to review other stressors impacting biological recovery of streams other than nutrient and sediment pollution.	Delivery of N, P and S affects Bay Health (Bay TMDL) however there are other local impairments and stressors that affect recovery of local stream health and thus the Stream Health Outcome. Management actions that address both of these desired outcomes need to align resources to address recovery of both local stream and Bay health.	Literature review and interview/survey with State representatives working on TMDLs	Toxic Contaminants, Fish Habitat.	None. Seed money could provide an intern/graduate student to synthesize this information. Scott Phillips and Scott Strawn are willing to provide oversight to this position.	Full recovery of stream health will result from removal of stressors not limited to nitrogen, phosphorus, and sediment. Current funding per TMDL does not recognize this scope.	High			
Brook Trout	Cross-GIT collaboration on monitoring efforts (e.g. eDNA, stream health, fish passage, GIT project funding)	N	Leveraging resources across groups could result in more efficient monitoring efforts. Coordinate cross-outcomes, co-benefits from GIT-Funded projects. Need new monitoring and alignment of state monitoring (they are currently doing it differently). Reporting	To ensure accurate Outcome progress reporting, identify geographic priority areas, identify co-benefits; tied directly to indicator.	Monitoring, Data Gathering, Analysis	Fish Passage, Stream Health, Fish Habitat.	None. Tried to work with Fish Passage for joint GIT proposal, but they ultimately declined. Funding for pilot project would demonstrate proof of concept and provide baseline for identifying opportunities to contribute to other Goal Outcomes.	Can work with BTAT, EBTV partners on possible collaborative efforts.	High			

Color key	SRS-identified need
	GIT-identified need

Category	Description
Modeling	Need requires some sort of modeling effort, either with CBP modeling team or outside support
Monitoring	Need is pertaining to monitoring efforts including new efforts, utilizing existing efforts, coordinating efforts, etc.
Research	Need requires to original research to address or generation of new data
Synthesis	Need requires synthesizing existing research or advancing science by pulling from multiple current lines of research
Analysis	Need requires new analysis be conducted on existing data or information
Data Gathering	Need requires identifying, finding, consolidating, etc. existing datasets or data layers
Coordination	Data, information or efforts exist or are ongoing, but coordination is needed between groups
Training/Outreach/Communication	Scientific need is met, but resources are necessary to disseminate information, data, product, etc.
GIS Analysis and Mapping	Items where the CBPO GIS team could provide support.
Other	Does not fit into the above categories; please feel free to assign your own.

Habitat	Brook Trout	Funding for brook trout monitoring	N	Funding to support data collection by partners, research eDNA, other monitoring methods, etc. Need to look deeper into use of eDNA and other efficient methods using latest science.	To ensure accurate Outcome progress reporting, identify geographic priority areas; tied directly to indicator.	Monitoring, Research, Data Gathering, Analysis	Fish Passage, Stream Health, Fish Habitat	None, no funding secured.	New USGS Project eTrout designed to use virtual reality and crowdsourcing platforms to collect data on brook trout occupancy, abundance, behavior, and habitat use for ecological analysis and engage students/citizen scientists educational opportunities. Pilot project in 2018-2019 in selected Chesapeake Bay watersheds including Shenandoah National Park, Catoctin Mountain Park, and various Trout Unlimited restoration projects. This effort could be expanded to include video collection by visitors to recreational areas (e.g., National/State Parks) as well as NGO partners throughout the Bay Watershed.	High		
	Brook Trout	Expand spatial-temporal groundwater model to rest of Chesapeake Bay Watershed to predict groundwater influence in headwater streams.	N	Current groundwater from USGS Potomac/Shenandoah modeling only applies to Shenandoah National Park. Additional data are needed to parameterize current model to other landscape settings/geologies.	Groundwater can mitigate stream temperatures providing more suitable habitat and prevent loss of Brook Trout occupancy due rising temperatures from changes in climate and land use. Identifying those stream reaches with significant groundwater upwelling is important to informing management and restoration efforts.	Research, Data Gathering, Analysis, Modeling		None	None in the near term	Low	Will GIS data be developed or assembled? Will this data be made available to partners? Is this relate to existing geospatial support agreement with Chesapeake Conservancy?	
	Wetlands	Work with partners (NCEC, Chesapeake Conservancy, etc.) to explore development opportunities for expansion of LSC wetland mapping model and compile the most accurate and up-to-date wetland GIS information available. Prioritize the use of this data to identify large-scale project opportunities.	N	The Wetland Workgroup needs STAR's assistance to complete best existing data; explore and pursue data development opportunities with partners.	The Wetland Workgroup needs updated data; development to identify areas of opportunity and update to fulfill Workplan action items.	Data Gathering, Analysis, Research, Synthesis					High	Is GIS Team assistance desired to implement ACN/ bioenergetics model? Will GIS data be developed or assembled? Will this data be made available to partners?
	Black Duck	Development of new black duck indicator; new baseline acreage target	N	Currently, CBP does not have a habitat-based acreage/baseline. No ADM filed yet. Will use ACN/ Bioenergetics model to adopt a habitat-based indicator. We need STAR's assistance to develop this (using ACN's bioenergetics model).	Adopting a habitat-based indicator will better reflect Outcome language and progress. With the adoption of a habitat-based indicator, an accompanying baseline/acreage target with which to work toward progress with becomes necessary.	Analysis, Modeling, Data Gathering	Wetlands	None	None	High	Is GIS Team assistance desired to implement ACN/ bioenergetics model? Will GIS data be developed or assembled? Will this data be made available to partners?	
	SAV	Assessment of future SAV habitat availability in relation to climate change, sea level rise, shoreline alteration, and nearshore development to determine if segment-specific and Bay-wide SAV restoration goals are feasible.	N	This project would use the 1 meter resolution land cover data combined with bathymetry data, SAV data, and future sea level rise projection scenarios to determine if the segment-specific and Bay-wide SAV restoration goals are feasible. Results would inform potential updates to the goals.	Chesapeake Bay restoration success is measured by a number of factors, one of which is SAV acreage in the Bay and its tributaries. Each of the 92 CBP segments has an SAV restoration target, and significant resources are allocated to SAV restoration—both direct and indirect restoration efforts. If climate change impacts, such as sea level rise, coupled with population growth and development in the watershed will prevent SAV from being fully restored in any or all segments, this analysis will inform a review of the goals and any changes deemed necessary.	Data Gathering, Analysis	Wetlands	None	Becky Golden, MD DNR, is a co-PI on a proposal w/ GMU and TNC for a project entitled "FY2019 Quantifying the benefits of natural and nature-based features in Maryland's Chesapeake and Atlantic Coastal Bays to inform conservation and management under future sea level rise scenarios." This proposal will be submitted to NOAA once the federal shutdown is over. Some of the objectives of this project include re-running the SLAMM model with the SAV component and mapping SAV habitat under future sea level rise scenarios. If funded, this "need" would be at least partially addressed as part of this project.	High	Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners?	
Fish Passage	None											
WQGIT/Modeling	Finer scale modeling	N		1) refine urban phosphorus sensitivities & 2) investigate the impact of urban BMPs using SWAT and/or SWMM models.		Modeling						
WQGIT/Modeling	Implement an estuary model in local waters	N		Investigate if other models can better represent tidal tributaries		Modeling						
WQGIT/Modeling/Climate	Characterize uncertainty in the removal performance of BMPs due to climate change	N		http://www.chesapeake.org/stac/workshop.php?activity_id=280		Modeling						
Toxics Policy/Prevention	Explore establishing a consortium to share information on addressing PCB TMDLs and reducing their impacts	N		Many CBP stakeholders and jurisdictions have local PCB TMDLs. There is a need have a consortium for facilitation and technical exchange throughout the lifecycle of the PCB TMDLs for more effective reduction of PCBs. Need to bring together people that can guide future analysis.	Providing an opportunity for direct technical exchange between scientists and stakeholders, and between stakeholders to implement the local PCB TMDLs	Data gathering and synthesis		None. Effort underway to explore feasibility of the consortium.				
Toxics Policy/Prevention	Improved understanding of PCB sources and fate in the environment to better inform PCB mitigation	N		Summarizing best practices for PCB track down, informing stakeholders of findings of ongoing studies in various source sectors, and status and change in the environment as more data become available using EPA 1668 analytical methods.	Contribute to achieving local PCB TMDLs and their overall reduction to improve conditions for fish and aquatic resources.	Research and synthesis		Partially. Studies by academic partners, regulatory bodies dealing with PCB TMDLs. Very limited CBPO Resources.				
Toxics Policy/Prevention	Improved understanding of BMP effectiveness for removal of PCBs	N		Quantifying co-benefits for PCBs from most commonly used practices for nutrient and sediment reduction.	Helpful to identify and encourage use of BMPs that may provide PCB removal in addition to nutrient or sediment reduction	Research and synthesis		None.				
Toxics Research	Generate further information on mercury in the watershed (water, sediment, fish tissue)	N		Create a story map to summarize impairments due to mercury, and communicate ongoing studies of mercury and fish in the watershed; inventory data to help document status and trends of mercury. Need to inventory and develop communication and education materials for data collected by the states as part of 305(b) reports.	Determine whether further Chesapeake strategies are needed to impact on fish and fish consumption advisories.	Synthesis and Data gathering	Fish Habitat		Partially. States, DC, and EPA monitoring of mercury; USGS compilation of mercury and fish consumption advisories. (No CBPO resources).			
Toxics Research	Assess the effects of toxic contaminants on fish and shell fish in tidal waters	N		Need to inform presence of certain contaminants of emerging concern in fish and shell fish; ongoing studies to inform health of particular fish species in urban environments; to inform fish consumption advisories	Understand the influence of contaminants in degrading the health, and contributing to mortality, of fish.	Research, monitoring, data gathering		Partially. USGS edc study, PA Susquehanna study, small mouth bass, USFWS Anacostia and Potomac studies, NOAA studies on fish kills. (No CBPO resources).				
Toxics Research	Synthesize and communicate information to document fish health and wildlife conditions in the Bay watershed	N		Report and communicate results of studies to improve understanding of the influence of contaminants and other factors degrading the health of fish, EDC compounds and effects on fish conditions, risk assessment of EDC compounds with occurrence of interest and other fish health conditions.	Provide technical summaries to stakeholders of results for management decisions. Many of these summaries will be completed in FY19.	Synthesis	Fish Habitat, oysters		Partially. USGS edc study, PA Susquehanna study, small mouth bass, USFWS Anacostia and Potomac studies, NOAA studies on fish kills. (No CBPO resources).			
Toxics Research	Document occurrence, concentrations, and sources of contaminants in different landscape settings	N		Inventory monitoring efforts by jurisdictions and groups for toxic contaminants and contaminants of emerging concern in surface waters, and identify any co-occurrence with nutrients and sediments in urban and agricultural settings	Understand occurrences and sources of toxic contaminants in landscape settings, and their relation to nutrients and sediment, to infer appropriate targeting of future resources for monitoring and mitigation	Data gathering and monitoring		Partially. States, DC, and EPA monitoring of selected contaminants; USGS EDC study, NOAA National Status and Trends Program, academic research on contaminants of concern. USDA Forest Service investigations of contaminants in urban settings. (No CBPO Resources) Upcoming STAC Workshop on contaminants				
Toxics Research	Prioritize options for mitigation of toxic contaminants to help inform policy and prevention	N		Summarize further information about direct and co-benefits for mitigation of toxic contaminants and nutrient and sediment reductions, and compile quantitative assessments of toxic contaminant removal by BMPs. Further interaction between toxic contaminant workgroup and other source sector groups (i.e., agricultural, wastewater, and stormwater).	Helpful in prioritizing BMP selection and quantifying co-benefits from nutrient and sediment BMPs in urban and agricultural settings. Work	Data gathering		Partially. Upcoming STAC Workshop on contaminants. Research by several academic institutions on reducing PCBs. Sediment remediation in Anacostia (DC).				

				information needed on new issues and potential concerns for action by CBP. Issues include pollutant toxicity, microplastics, and unconventional oil and gas; expand to also inform state of the science for harmful algal bloom toxins, chloride from road salt, perfluorinated compounds (PFAS), and coal combustion residuals.	Helpful to stay informed of emerging issues that may have impacts in the Bay watershed in the years ahead	Other - informational		Partially. Trying to coordinate individual efforts by multiple organizations. PFAS, HABs, (Michelle check minutes).				
Toxics Research	Gather information on issues of emerging concern in the watershed to prioritize and identify related tasks	N										
2017/2015 WIPs	Determine cost and timeline for updating CAST BMP cost info	N		CAST does not have updated state specific BMP cost information beyond 2010.	Needed to improve cost quantification in CAST, and facilitate accurate understanding of funding needs	Data gathering and synthesis, potentially some analysis						
Standards Attainment and Monitoring	Compare observed and expected trends in watershed where differences were identified in the SRS presentation	N		Some divergences were identified between model predicted load trends and monitoring data.	Investigation was requested	Analysis	Fish habitat	None. Previous analysis looking at water quality trends from Phase 5 (USGS). There are no new specific resources targeted at Mod-Mon trend comparisons. USGS has funded commitments to report on river load/conc trends. STAR analysts work on understanding trend patterns.	TBD		Is GIS Team assistance desired to represent trends in attainment geographically? Will this data be made available to partners?	
Standards Attainment and Monitoring	Adjust, sustain and grow monitoring programs that are supporting water quality modeling and monitoring assessments	N		Tidal, (includes long term main channel, shallow water & SAV) and Nontidal WQ Monitoring Programs have been eroding	WQ Stds Attainment support and watershed-bay wq living resource assessment support	Other - network planning	Fish habitat, oysters, blue crabs,	Partially. Non-tidal- Primarily States (CBP grants) with Federal support (USGS Stream gauging). Tidal- States and CBP support. SAV- States and CBP support and academic support.	Citizen science (CMC), remote sensing		High for partnership	
Standards Attainment and Monitoring	Improve understanding of source sector contributions to N,P,S loading	Ongoing (Y, but N)		Ongoing interest in best available understanding of load sources	The models, analyses that track change and inform targeting of BMPs are only as good as the data	Analysis	Fish habitat, oysters, blue crabs,	Fully, CBP Models, Sparrow Models (USGS).				
Standards Attainment and Monitoring	Improve understanding of bay wq response to loads and BMPs	Ongoing		Ongoing interest in restoration progress to management actions/climate influences	Understanding bay response to watershed management is core to our adaptive management framework.	Analysis	Fish habitat, oysters, blue crabs,	Partially. STAR Tidal Trends and integrated trends team efforts. Past and new SAV syntheses. Tidal trib syntheses journal articles in progress. Responsible - STAR teams (CBPO funds).			New specific syntheses may be requested, new monitoring (Ct Sci or other high frequency data) results may reduce uncertainty to improve understanding of relationships	
Standards Attainment and Monitoring	Improve understanding of bay living resources to watershed and bay management effects	Ongoing		Ongoing interest in actual and forecast living resource responses in the ecosystem that affect ecosystem function, commercial and recreational interests.	Understanding bay response to watershed management is core to our adaptive management framework.	Analysis	Fish habitat, oysters, blue crabs, vital habitats, healthy habitats	Partially. Limited work on linking WQ to living resources beyond SAV.			proposed future work of a Liv Res Modeling WG, fish habitat assessment project case studies, oyster restoration site recovery tracking, synthesis of living resource changes in I	
Standards Attainment and Monitoring	Tracking/Explaining attainment/attainment deficit patterns and trends	Ongoing		WQ Indicator needs/ongoing interest in tracking wq progress	Analysis results provides for understanding of progress in bay response to BMPs and directs targeting of monitoring and management resources	Analysis	Fish habitat, oysters, blue crabs, vital habitats, healthy habitats	Partially. (CBP Monitoring team) Recognized questions include how long it will take to meet the standards, etc.				
Standards Attainment and Monitoring	Further analyses comparing expected trends in Bay water quality and watershed	Y										
Standards Attainment and Monitoring	WQ Criteria Attainment patterns summary	Y										
Standards Attainment and Monitoring	Update in patterns in WQ standards attainment DO, clarity/SAV and chlorophyll	Y										
Standards Attainment and Monitoring	Publish WQ Criteria Tech Addendum	Y										
Standards Attainment and Monitoring	Implement new process to quantify trends in tidal WQ parameters	Y										
Standards Attainment and Monitoring	WQ results attained from 2 of 6 high flow events for mid point assessment	Y										
Standards Attainment and Monitoring	Monitor high flow events at Conowingo	Y										
Standards Attainment and Monitoring	Conowingo impacts on WQ monitoring plans	Y										
Standards Attainment and Monitoring	125 sites of nutrient and sediment samples	Y										
Standards Attainment and Monitoring	Update loads and Trends USGS	Y									Is GIS Team assistance desired to update nontidal website and/or WIP data dashboard? Will this data be made available to partners?	
Standards Attainment and Monitoring	USGS to update reporting/communicating of loads to Bay	Y									Is GIS Team assistance desired to update nontidal website and/or WIP data dashboard? Will this data be made available to partners?	
Standards Attainment and Monitoring	expand on BEI report for add'l monitoring needs	Y										
Standards Attainment and Monitoring	Incorporate Citizen Science Monitoring for WQ standards	N		Citizen science monitoring of WQ stds assessments have	Monitoring		Fish habitat, oysters, blue crabs, vital habitats, healthy habitats	Partially. STAR Integrated Monitoring Networks and CBP support with Chesapeake monitoring cooperative. (CBP grant,)			Collaboration, cooperation and coordination with many river keeper organizations is ongoing and expanding.	
Standards Attainment and Monitoring	develop targeted shallow water monitoring strategy	N		Targeting monitoring resources in resources are inc	Monitoring		Fish habitat,	Partially. CBP Monitoring Team and States (CBP grants)			Remote sensing options, Citizen science collaborations	
Standards Attainment and Monitoring	Test watershed factors influencing WQ trends in tidal waters	Y										
Standards Attainment and Monitoring	Release report/communication of nitrogen sources	Y										
Standards Attainment and Monitoring	Compare observed and expected trends in watershed	Y										
Standards Attainment and Monitoring	Improve knowledge of sed and N sources	Y										
Standards Attainment and Monitoring	Use WQ data to assess PA's progress	Y										
Standards Attainment and Monitoring	WQ functions of wetlands	Y										
Standards Attainment and Monitoring	Improve understanding of tidal water response to load changes	Y										
Standards Attainment and Monitoring	Develop land cover dataset	Y										
Standards Attainment and Monitoring	Enhance watershed and SPARROW model	Y										
Standards Attainment and Monitoring	Examine Susquehanna reservoirs' impact on N and sed transport	Y										
Standards Attainment and Monitoring	Assess N and sed response to management practices	Y										
Standards Attainment and Monitoring	Incorporate BMP efficiencies and land cover/use	Y										
Standards Attainment and Monitoring	Conduct STAC peer reviews	Y										
Standards Attainment and Monitoring	run scenarios and modeling tools	Y										
Forest Buffers	monitor forest buffer cover change using hi-res data	N		Complete new analysis of forest buffer cover when new hi res data becomes available in 2020	Direct Outcome progress	Analysis/Monitoring	Water Quality, Land Use and Land Policy Outcome				High	GIS Team Assistance requested
Tree Canopy	monitor forest and tree cover change in developed areas using hi-res data	N		Complete analysis of forest and tree cover on developed land and update this when new hi res data becomes available in 2020	Direct Outcome progress	Analysis/Monitoring	Water Quality, Land Use and Land Policy Outcome				Medium	GIS Team Assistance requested
Healthy Watersheds	Increased capacity for individual jurisdictional efforts to monitor, assess, and determine watershed health	N		Need continued assessments to determine if state-identified healthy watersheds are still healthy and if additional watersheds have become healthy. Lack of funding for increased monitoring for unassessed watersheds. Current progress: Utilize TT PFWA to help assess current conditions and continued health where jurisdictions have identified this need	Speaks directly to outcome and being able to determine whether or not healthy watersheds have remained healthy over time. Available data varies across jurisdictions.	Analysis	Stream health	None, HWGIT, Jurisdictions	unknown		Medium	
Healthy Watersheds	Develop and apply tools or methods that integrate various inputs to characterize watershed vulnerability to future high-level risks including development and climate related stressors.	N		Need more information on watershed condition, urban growth proximity/pressure, energy development trends, water demand forecasts, invasive species threats, upstream activities, land ownership type, future transportation infrastructure plans, climate change, sea level rise, and other factors.	Speaks directly to outcome and being able to determine whether or not healthy watersheds have remained healthy over time and which are most vulnerable and in need of management responses. Available data varies across jurisdictions.	Synthesis and Analysis	Land Use Options Evaluation, Land Use Methods and Metrics, Climate	Partially (Contractor and HW GIT) Current progress: Utilize TT PFWA to help assess vulnerable healthy watersheds (1 GIT funding project with a wealth of data)	Work with GIT to assess contract deliverables and determine next steps (likely additional GIT funding and HW Staff support), ideally this "tool/data" will be integrated with other CBP related geospatial data		High	Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners?
Healthy Watersheds	Work with STAR teams to identify and incorporate key datasets related to watershed health and vulnerability indicators for incorporation into the Tidal Tech PFWA-GIT funding project.	N		The GIT funding project is ongoing. HW Staff and IT contractors worked with jurisdictions to identify and secure datasets.	Speaks directly to outcome and being able to determine whether or not healthy watersheds have remained healthy over time. Available data varies across jurisdictions.	Data Gathering and Coordination						Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners? (No task proposed to be deleted)

protected lands dataset - ha

Healthy Watersheds	Work with TT to train staff on how to utilize, update, and maintain the PHWA to inform progress toward goal.	N	It is becoming clearer that the current core team may not have the technical skill to maintain and independently update the final products (database and associated files). A training workshop and/or additional phase of grant is necessary to ensure independence and understanding. Initially, TT is meeting with Renee Thompson to begin this transfer of knowledge.	Speaks directly to outcome and being able to determine whether or not healthy watersheds have remained healthy over time. Available data varies across jurisdictions.	Training	Cross-GIT, Fish Habitat and Assessment, Stream Health, Protected Lands	Partially	Coordinate with CBP GIS team and other related decision support tool efforts to identify how to integrate this data and information with other efforts.	High	
Healthy Watersheds	Upon completion of TT PHWA GIT funding project work with HW GIT staff to assess results and begin to determine appropriate tracking framework for potential HW sustainability indicator.	N	Could be coupled with training workshop. Additional funding and technical knowledge from the TT contractor may be needed to determine the best way to host, share and provide the information in the CB PHWA.	Speaks directly to outcome and being able to determine whether or not healthy watersheds have remained healthy over time. Available data varies across jurisdictions.	Analysis		Partially (HW GIT and CBP GIS team)	TBD	High	
Healthy Watersheds	Compile and publish bi-annual CBP Protected Lands dataset (Shore-Thompson)	X	STAIRS helps to communicate the completion and availability of the dataset as well as help to coordinate additional analysis to meet the needs of CBP teams. It is not sure what this would be in the Chesapeake Conservation Partnership. Fulls this reach. Most recent dataset was completed on Oct 2018.	Cross-GIT need.	Synthesis, Outreach, Outreach					
Healthy Watersheds	Determine a way to identify and track "marginally healthy" waters and watersheds. Shared data gap with Stream Health workgroup	N	This is a continued data gap and not yet addressed by Stream Health or Healthy Watersheds groups.	Cross-GIT need	Analysis	Stream health	None	This was an identified need in MS however, time and resources have not allowed for in depth exploration.	Low	
Land Use Methods/Metrics	Change in land use needed for informing other Outcomes, particularly Healthy Watersheds, Stream Health, Climate Resilience, Tree Canopy, Forest Buffers, Wetlands, Fish Habitat, Oysters, Brook Trout, and Black Duck.	N (Y for Tree Canopy)	The information produced by this indicator directly inform many other Outcomes either explicitly or implicitly, (listed as a "gap" in MS and SRS)	The "So What" of this Outcome are the impacts to habitats, watersheds, and communities.	Synthesis, Other, GIS	Healthy Watersheds, Stream Health, Climate Resilience, Tree Canopy, Forest Buffers, Wetlands, Fish Habitat, Oysters, Brook Trout, and Black Duck.	USGS, and CBP GIS will likely compute metrics - resources being put towards this	CBP GIS Team	High	
Land Use Methods/Metrics	Engagement from individual outcome representatives to help relate LUMM and interpret what rates of change mean to individual outcomes.	N	Need to determine what the exact metrics are for each outcome. Input is needed to inform customization and sensitivity to the metrics. It matters to some outcomes whether a watershed is 9% or 10% impervious. Precision and accuracy of those metrics are needed. Content, thresholds, level of precision needed by these other outcomes.	To make LUMM relevant and useful for informing other outcomes. Land use change is listed as a key factor for MARY outcomes.	Synthesis, Outreach, analysis GIS	Healthy Watersheds, Stream Health, Climate Resilience, Tree Canopy, Forest Buffers, Wetlands, Fish Habitat, Oysters, Brook Trout, and Black Duck.	CBP GIS and LUWG will need to work with individual workgroups and GITs to get input. It will be the responsibility of the WG or GIT to provide input. Resources are being put towards this, but GITs and WGs need to provide input.	CBP GIS Team, LUWG	High	
Land Use Options	None									
Citizen Stewardship	Training and assistance with strategies on how to integrate social science into work (no action needed at this time)	No	2018 GIT Funding awarded to fund a Cross GIT effort with major support from the CBP Communications Office.	Gaps exist with CBPO knowledge and ability to incorporate behavior change and social science into workplan implementation.	Synthesis	All Watershed Agreement Goals and Outcomes	Fully, CBP Communications, GIT 5	CBPO Staff, Management Board?	High	
Citizen Stewardship	Online Stewardship Tool to access data (no action needed at this time)	Ongoing	2018 GIT Funding awarded to GIT 5 to hire contractor Green Fin Studios to help develop the online tool. This project also includes collaboration from CBP's Creative Team and Communications Office.	Currently, there is not a tool to help stakeholders access and utilize the data does not exist.	Synthesis	Water Quality, Stewardship	Fully, GIT 5, CBP Creative Team, CBP Communications, Green Fin Studios	Practitioners, CBPO staff, watershed advocacy groups	High	
Citizen Stewardship	Stewardship Data collection support every 3-5 years.	No	Potential contract for Stewardship Outcome data collection is being considered and is under development. In response to the survey an online tool was developed, now need to do survey to update baseline score.	Collection of data every 3-5 years is needed to understand behavior change trends and to recalculate indicator.	Data Gathering	Water Quality, Stewardship	None		High	
Citizen Stewardship	Path forward for advancing social science approaches	Might remove, can discuss	2018 GIT Funding awarded to fund a Cross GIT effort with major support from the CBP Communications Office.		Synthesis			Possible workshop with communications workgroup	High	
Citizen Stewardship	Use results from stewardship index to help model relations of human attitudes/behaviors toward consumption, restoration and conservation.	Might remove, can discuss			Synthesis	All Watershed Agreement Goals and Outcomes		CBPO staff, watershed advocacy groups	High	
Public Access	Identify public access sites and potential effects from climate change (sea-level rise and flooding)	No	GIS Project	To assist communities in addressing vulnerable sites.	Monitoring and Analysis	Climate resiliency goal, Stewardship	None	CBPO staff, state agencies, local governments	Medium	Is GIS Team assistance desired? Will this data be made available to partners?
Diversity	Diversity Indicator Target/Goal for 2025 using American Community Survey Data (Overlaying State Demographic and Economic census block data over Chesapeake Bay Watershed) - is this where we left off with diversity SRS outcome?	No	GIS Project	To determine progress on goal.	Monitoring and Analysis	CBPO staff	Partially, EPA: Chesapeake EScreen	EPA, CBPO staff	High	Is GIS Team assistance desired? Will this data be developed or assembled? Will this data be made available to partners?
Student Environmental Literacy	None									
Environmental Literacy Planning	Percentage of Local Education Agencies (LEAs) that are "Well Prepared" or "Somewhat Prepared" to implement environmental education programs).	Ongoing	Information from this tool was used to determine local education agency (LEA) also referred to as school district) capacity to provide systemic environmental education. The Chesapeake Bay Program (CBP) first screened data to include only LEAs that have 25% or more of their geographic area within the Chesapeake Bay Watershed.	Determining the degree of preparedness to offer MREs in public schools across elementary, middle, and high grade bands enables the Education Workgroup and CBP leadership to determine workshop priorities.	Monitoring and Analysis	Environmental Literacy Goal	Fully, Education workgroup, selected contractor	CBPO staff, state departments of education, local education agencies	High	
Sustainable Schools	Quantify and support BMP installation and restoration at schools to contribute directly to Bay restoration goals.	Ongoing	2018 GIT Funding awarded to hire a contractor to help develop a workplan implementation project for metric development and tracking of BMP installation and restoration at schools in the watershed.	Schools are often overlooked as viable options for BMP implementation, and even when BMPs are installed, this data is not often captured for CBP indicators and metrics.	Monitoring and Analysis	CBPO staff	Fully, Education workgroup, contractor TBD	CBPO staff, state agencies, local education agencies	High	
Protected Lands	Expanded analysis and mapping of projected climate impacts	No	Threats to existing protected lands and unprotected high conservation value lands, such as development and climate change.	A changing environment - precipitation regimes, storm patterns, and temperature changes -- will greatly affect the CCP Values (farms, forests, habitat, heritage, and health).	Analysis	CBPO staff	None	CBPO staff, Chesapeake Conservation Partnership	High	
Protected Lands	Filling the Cultural and Scenic Landscapes Documentation Gap	In progress (Additional needs identified)	A recent National Forum on Landscape Conservation identified the enormous gap in documenting scenic and cultural landscapes. While these landscapes are often what many people value the most, the methods for identification and documentation are typically time-consuming, manual, and expensive.	Support more effective and strategic landscape scale conservation in the Chesapeake watershed. This will build on exploratory analysis the Partnership has already conducted using 1.2 million Flickr images from the watershed.	Analysis	Chesapeake Conservation Partnership	Partially, Chesapeake Conservancy, Chesapeake Conservation Partnership has done initial first steps in long list of steps	CBPO staff, Chesapeake Conservation Partnership	High	Is GIS Team assistance desired? Will this data be developed or assembled? Will this data be made available to partners?
Protected Lands	Development of improved methodology for data collection of Chesapeake Bay Protected Lands indicator. There is also a need to improve tracking CCP tracking toward priority layers as well as regular updates of the "Landscape Reporting Tool".	In progress	Data collection, reporting and tracking toward indicator continues to be solely the responsibility of the CBP GIS team, GIT funding project to assist with this effort is underway. In addition, there are other tracking, analysis and reporting needs beyond just the CBP indicator that would benefit from a consolidated approach.	Support more effective and strategic landscape scale conservation in the Chesapeake watershed. Jurisdictions need to improve methods and attributes for tracking land protection and understanding progress toward various conservation related goals.	Analysis	CBPO staff	Fully, Chesapeake Conservation partnership, GIT 4 Healthy Watersheds, contractor TBD		High	Is GIS Team assistance desired? Will this data be developed or assembled? Will this data be made available to partners?
Protected Lands	Chesapeake Watershed Conservation Finance Intensive Workshop	In progress	This multi-day course will offer in-depth information about innovative, sophisticated land and resource conservation funding mechanisms in both the public and private spheres—helping participants explore and begin to implement the most relevant strategies for their land conservation efforts overall and to meet specific project challenges.	Protecting new land requires conservation partners to have the tools and knowledge to access new, innovative, and more complex sources of land protection funding from both public and private sources.	Training		Fully, Chesapeake Conservation Partnership, PA Land Trust Alliance, contractor TBD		High	Is GIS Team assistance desired? Will this data be developed or assembled? Will this data be made available to partners?
Protected Lands	Develop additional health criteria and document those values as key inputs to conservation planning and implementation.	Not Started	CCP has established a core conservation goal associated with human health that encompasses access to the water and to parks. The Partnership seeks to expand this to incorporate additional public health values including protecting source areas for public drinking water, increasing recreation corridors between urban areas and surrounding landscapes, and issues such as equity and environmental justice.		Analysis		None	CBPO staff, Chesapeake Conservation Partnership	High	Is GIS Team assistance desired? Will this data be developed or assembled? Will this data be made available to partners?

	Protected Lands	Improve understanding of indigenous cultural landscapes.	No	The NPS and the Chesapeake Conservation Partnership have been breaking new ground for a decade in working with Chesapeake tribes to identify indigenous cultural landscapes. This project will assemble all of that work, create a composite approach for ICL documentation and use two landscapes -- one in Virginia and one in Maryland -- as test beds for how the protection of ICLs can integrate with and expand upon ongoing habitat conservation and restoration efforts throughout the region.	Improved documentation, conservation and restoration of indigenous cultural landscapes.	Synthesis		None	NPS, Chesapeake Conservation Partnership	High	Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners?
6	Local Leadership	None									
Climate	Climate Resiliency Monitoring	Detailed statement of data/research needs for climate resilient BMPs and siting design	N	Design and function of BMPs under new climate reality. This is a pressing and ongoing research need of the CBP and all coastal watersheds and is in direct response to a PSC directive to the CBP to, "Develop a better understanding of the BMP responses, including new or other emerging BMPs, to climate change conditions". The number of high priority votes received for this topic out of the total number of votes was 100%*.	December 2017 PSC Policy Decision: By 2022/2023, the CWG will provide information to CBP about how BMP efficiencies are changing as a result of climate.	Research, Monitoring, and Modeling	Water Quality, others				
	Climate Resiliency Monitoring	Better understanding of precipitation changes with regards to intensity, annual amounts, seasonal impacts, storm events and stormwater management	N	The number of high priority votes received for this topic out of the total number of votes was 56%*	The work here would be particularly useful for maintaining and supporting the current and future investment that all the CBP partners have in stormwater management facilities by sizing and designing them correctly for future precipitation and flood risk.	Research, Monitoring, and Modeling	Water quality, stream health, flood reduction co-benefit				Is GIS Team assistance desired? Will GIS data be developed or assembled? Will this data be made available to partners?
	Climate Resiliency Monitoring	Detailed list of specific science/data needs for Citizen Science programs	N	Prioritized list of climate research needs for the Chesapeake Bay Program	Essential to determine prioritization for Climate Resiliency Workgroup workplan development and to feed into CBP research needs and prioritization	Analysis	All				
	Climate Resiliency Monitoring	Better understanding of sea level rise and subsidence impacts in changing climatic conditions	N	The number of high priority votes received for this topic out of the total number of votes was 44%*	The management implications of total wetland loss from future sea level rise is important to Bay water quality and ecology	Research and monitoring	Tidal wetlands, SAV, and water quality				
	Climate Resiliency Monitoring	Protocol support and development of indicators.	Y	Completed September 2018							
	Climate Resiliency Adaptation	Social Science - human behavior - implications of the human response (positive and negative) to climate change, flooding, sea level rise as well as motivation and needs of communities to adapt	N	The number of high priority votes received for this topic out of the total number of votes was 50%*		Research	All				
	Climate Resiliency Adaptation	Changing climate conditions and their impacts on SAV	N	The number of high priority votes received for this topic out of the total number of votes was 6%*		Research	SAV				
	Climate Resiliency Adaptation	Changing climate conditions and their impacts on invasive species	N	The number of high priority votes received for this topic out of the total number of votes was 0%*		Research	Vital Habitats, Healthy Watersheds				
	Climate Resiliency Adaptation	Impacts of SLR, coastal storms, increased temperatures and extreme events on BWPS (maintenance, shell life, etc.)	N	Better understanding of precipitation changes with regards to intensity, annual amounts, seasonal impacts, storm events, and stormwater management		Analysis	Water Quality, others				
	Climate Resiliency Adaptation	Green infrastructure performance including increased sediment due to climate change	N	The number of high priority votes received for this topic out of the total number of votes was 33%*		Research	Water Quality, others				
	Climate Resiliency Adaptation	Changing climate conditions and their impacts on wetlands	N	The number of high priority votes received for this topic out of the total number of votes was 19%*		Research	Wetlands				
	Climate Resiliency Adaptation	Climate impacts to key aquatic fish species abundance, life cycle and habitat	N	The number of high priority votes received for this topic out of the total number of votes was 13%*		Research	Sustainable Fisheries				

*percent represents the number of high priority votes received for each topic out of the total number of votes