BIENNIAL STRATEGY REVIEW SYSTEM
Chesapeake Bay Program

Logic and Action Plan: Post Quarterly Progress Meeting

Toxics Research – 2021-22

*[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: Develop a research agenda and further characterize the occurrence, concentrations, sources and effects of toxic contaminants of emerging and widespread concern.
Two-year Target: Completion of performance targets related to key actions

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
What is impacting our ability to achieve our outcome?	*What current efforts are addressing this factor?*	*What further efforts or information are needed to fully address this factor?*	*What actions are essential (to help fill this gap) to achieve our outcome?*	*What will we measure or observe to determine progress in filling identified gap?*	*How and when do we expect these actions to address the identified gap? How might that affect our work going forward?*	*What did we learn from taking this action? How will this lesson impact our work?*
Understanding and defining sources of contamination leading to fish consumption advisories.	Tracking of water-quality impairments, which lead to fish consumption advisories based on jurisdictional	Gaps include: (1): Information on tracking back sources of PCBs contributing to impairments and best management actions for resource	Management Approach 1: Synthesize information to make fish and shellfish safer for human consumption. Selected actions	Action 3 (PFAS): Facilitate technical briefings and discussion to inform partners of options to plan a mercury network	Action 3 (PFAS): Recommendations are anticipated from the STAC workshop and the workgroup will consider these and	

The factor is important for making fish and shellfish safer to consume.	reporting of PCB impairments. Summary of mercury occurrence in freshwater fisheries and comparison to aquatic and consumption thresholds. Mercury concentrations in fish were not consistent with regional patterns of atmospheric mercury deposition, implying other factors need to be understood Rapid expansion of PFAS sampling to support development of fish consumption advisories for specific PFAS compounds	recovery are lacking. (2): Consistent analytical and sampling methodologies for specific outcomes. (3): Lack of integrated monitoring network for mercury so difficult to assess changes in fish and environment due to air emissions controls and understanding of other factors. (4) Lack of consistent sampling and analysis methods for establishment of PFAS advisors.	include (1) Better source tracking of PCBs; understanding of fate and transport in BMPs and sanitary sewer systems. (2) Facilitate interaction between jurisdictions to ensure there is consistent efforts to reduce contaminants, which contribute to fish consumption advisories, including PFAS.	that builds from existing efforts and ongoing PFAS sampling and analysis methods for fish consumption.	how they can contribute directly to addressing the need(s).	
Multiple factors affecting health and mortality of fish and wildlife. There are multiple contaminants and additional factors are causing the degradation (and mortality) of fish so trying to identify specific causes is extremely difficult.	Selected studies addressing the multiple causes of factors affecting fish and shellfish including EDCs, PFAS, and fish health in the watershed; surveys of emerging contaminants.	Gaps include: (1) regional monitoring and study efforts; addressing the multitude of contaminant groups and mixtures; (2) understanding which contaminants are the primary causes of poor fish health. (3) Limited information on wildlife.	Management Approach 2: Understand the influence of contaminants in degrading the health, and contributing to mortality, of fish and wildlife. Selected actions include: (1) Evolve towards a more geographic approach to focus in areas where fish health issues are most prevalent. (2) Increase	Action 3: (PFAS coordination): Present current research on PFAS effects on fish and shellfish health and mortality at TCW meetings. Identify current sampling and lab protocols for fish and shellfish sampling.	Action 3 (PFAS coordination): Identify best practices and lessons learned from presentations to have PFAS investigators move toward comparable sampling and lab protocols in fish and shellfish.	

			workgroup collaboration with academic institutions conducting research on emerging contaminants. (3) Work with partners to coordinate PFAS studies. Explore if selected studies of wildlife can be utilized.			
Lack of data on the occurrence and trends of toxic contaminants. There is no watershed-wide monitoring program on the condition of fish and wildlife that is integrated with water and sediment sampling.	Jurisdictions have monitoring programs for selected toxic contaminants, but mostly not adequate for trends. STAC report that included summary of contaminant occurrence and sources in agricultural and urban settings. Inventory of existing state and federal toxic contaminant data revealed limited number of sites can be used for trends	Primary gaps are: (1) limited number of sites that can be used for trends. (2) Very few sites with fish and water monitoring to relate contaminants to fishery conditions. (3) available data to understand regional patterns of toxic contaminants.	Management Approach 3: Document the occurrence, concentrations, and sources of contaminants in different landscape settings. Actions include: (1) Better utilize jurisdictions monitoring that is used for biannual integrated reports and other toxic contaminant data collection efforts (e.g. PFAS); (2) Explore opportunities to design an integrated monitoring network to improve long-term information and assess methods (sampling and analytical) for desired outcomes for given priority contaminants (e.g., PCBs, mercury, PFAS)	Action 1 (jurisdiction-led monitoring): Have jurisdictions present results related to contaminants from bi-annual integrated reports and other focused studies, discuss how to show results for multiple states. Action 2: Based on presentations from Action 1, identify common and disparate practices in data collection and analysis (e.g., PFAS occurrence in surface water).	Action 1 (jurisdiction-led monitoring): Identify select results that can be used to develop story map(s) for impairments from targeted contaminants in the watershed. Action 2 (integrated network): Identify best practices and lessons learned from presentations in action 1 to have PFAS investigators move toward comparable sampling and lab protocols, and regional emphasis areas (e.g., Potomac).	
Limited information of the practices to mitigate contaminants,	Some jurisdictions and academic partners looking at contaminant	Gaps include: (1): Lack of removal effectiveness of selected BMPs for targeted toxic	Management Approach 4: Synthesize and promote science to help prioritize options	Action 2: Work more closely with other workgroups and Goal Teams to include toxic		

and their potential co-benefits with nutrients and sediment reductions	mitigation from selected BMPs.	contaminants. (2) Lack of products that communicate contaminant co-benefits for WIP milestones	for mitigation to inform policy and prevention Actions include: (1): Focused source-sector approach with emphasis on agricultural and urban settings; (2): Increased interaction with WQ GIT and communications team to develop, promote joint approaches to reduce toxic contaminants, nutrients, and sediment and communicate this information.	contaminants		
Emerging issues There is limited knowledge and capacity to assess understanding state of science, occurrence in the watershed, and implications of emerging issues**.**	Briefings from subject matter experts at TCW meetings to facilitate discussion of prioritization	Number of issues to consider are beyond scope of TCW at current resource levels for in depth consideration	Management Approach 5: Gather and distribute information on issues of emerging concern. Actions include: (1): Limit in depth activities to one or two topics that have been prioritized by the TCW; (2): Increased interaction with scientific experts, particularly in academic and federal agency researchers to help inform prioritization.	Action 1: Limit to microplastics and road salt (chloride) Action 2: Interface with academia, science agencies, and PPAT to deliver relevant information on priority emerging issues		
Resource constraints. The constraints include (1) minimal capacity within the CBP to	Coordination of efforts between members of the Toxic Contaminant WG. GIT funding	Limited capacity within current TCW to adequately address Gaps listed above.	Invite more partners to the TCW to expand capacity. Have more focused interaction between researchers			

address contaminants; (2) an emphasis on nutrients and sediment that limits the opportunity for increased CBP focus on toxic contaminants; and (3) minimal funding opportunities to conduct additional studies.	project. Interaction with other workgroups with WQGIT to find synergies.		and stakeholders such as through workshops (such as STAC, ChesRMS) and GIT WGs. Expand capacity through increased coordination with ongoing academic research, state, and federal efforts. Increase emphasis on toxic contaminants within CBP monitoring and modeling teams. More focus on co-benefits in CBP communication of toxic contaminant concerns.			
Synthesis. Recognition that the findings from technical articles and reports need to be summarized and communicated to be used effectively by resource managers	STAC report on contaminants in urban and agricultural areas. Follow-up presentations and associated CBP article effort	Determining topic and appropriate amount of information that will be most useful to the WQ GIT, jurisdictions, and other stakeholders.	Interact with WQ GIT, workgroups, and jurisdictions and CBP communications team to select topics for summary materials during 2021-22.			

ACTIONS – 2023-2024					
Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
Management Approach 1: Synthesize scientific information to make fish and shellfish safer for human consumption					
1.1	Synthesize science information on mercury to determining whether further Chesapeake Strategies are needed to supplement national efforts to reduce its impact on fish and associated consumption advisories.	Update existing impairments in the watershed through the story map for mercury. Jurisdictions supply information and the CBP GIS team and Monitoring team integrate into a story map. (Supporting documentation summary.)	TCW; MDE, PA DEP, VA DEP, DOEE, WV DEP, DNREC. CBP GIS team and monitoring team.		2023-2024
		Conduct sampling of mercury in young of the year fish. Results will eventually be	MDE and MD DNR		Ongoing; annual

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		used to assess trends. Reported annually.			sampling and reporting
		Collect fish tissue data to reassess the impairment status of the one remaining listing in Maryland.	MDE		2023-2024
		Retain option to explore integrated monitoring network to assess trends in mercury and possible need for management actions	TCW; MDE, PA DEP, VA DEP, DOEE, WV DEP, DNREC, USGS		2023-2024
1.2	Synthesize science information on PCBs to improve understanding of fate and transport, improved source refinement methods and understanding to reduce impact on fish and associated consumption advisories.	Stay informed on progress of models in James River, Anacostia, upper Potomac, any others as they may inform adaptive management decisions/areas of focus for others in the watershed.	TCW members and academic partners conducting modeling (some updates at TMDL roundtable, but not focused meeting)		2023-2024
		Continue to refine methods and improve understanding of sources and fate of PCBs in the environment to inform selection of most appropriate mitigation options through briefing of various site-specific study results. Includes tracking progress and summarizing best practices for PCB track down studies. (e.g., MS4 projects)	State and local jurisdictions, USGS, UMBC, academic partners, CBP communications team		2023-2024
		Review literature and assess need for further study of PCBs in the environment from biosolids land application	Science partner TBD (e.g., CRC, CBP)		2023-2024
		Tracking the implementation of PCB TMDLs in the watershed and associated investigations and progress to inform source identification methods. Cross-walk between guidance documents from MD, VA, and Vision 2.0 EPA to identify commonalities and differences.	All jurisdictions Partner TBD (CRC, CBP)		2023-2024 2023-2024
		Analytical and monitoring methods for PCBs: Work towards development of a hierarchy of PCB analytical methods for	CBP TCW members and leadership		2023-2024

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		desired use to promote comparison of data across the watershed for similar needs (including method 1628). Similarly, develop hierarchy of sampling methods for desired use (e.g., source refinement, BMP effectiveness) to promote comparison of data.			
		Updates on science advances in TMDL implementation such as: • Microcatchment modeling • Subwatershed screening approaches/basis • Conowingo Pool/lower Susquehanna	(DOEE) (MDE)		2023-2024
		Explore the feasibility, design, and funding of enhanced monitoring for PCBs to evaluate recovery of surface water/fish in areas where management for PCBs is occurring (e.g., Anacostia, Baltimore, other)	TCW leadership and members, jurisdiction representatives as needed		2023-2024
1.3	PFAS Methodology and Assessment to support Fish consumption advisors	Gather information and communicate appropriate fish and portions of fish to analyze to assess impacts for consumption advisories, recommended methods, and review of the data. Updates as part of quarterly focus meetings	TCW, academic and federal researchers, and appropriate jurisdictional representatives		2023-2024
1.4	Communication of fish consumption advisories to SFGIT	Present story maps and information about fish consumption advisories due to PCBs and mercury (and PFAS as they evolve) to SFGIT for consideration in management activities.	TCW, leadership of SFGIT		2023-2024
Management Approach 2: Understand the influence of contaminants in degrading the health, and contributing to mortality, of fish and wildlife					
2.1	Assess the effects of contaminants on fish and	Tracking of ongoing regional focus on Anacostia River sediment contaminants	FWS		2023-2024

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	shellfish in tidal waters	effects on fish health including Mummichog/Killifish and Bullhead catfish health and mortality. This assessment will expand upon previous studies in the Anacostia that demonstrated decrease in tumor prevalence in the Anacostia River. Updates will be provided to the workgroup from the additional sampling.			
		Inform results of continuing study and evaluate findings from condition of Yellow Perch in urban areas. Specifically, yellow perch sampling was conducted in Fall 2017-Winter 2018 and repeated in Fall 2018—Winter 2019 in the Severn, Choptank, and Mattawoman. The goal is to determine whether the findings of abnormal yolk and abnormal chorion about ten years ago in the Severn are still apparent.	USGS, UMCP, FWS		2023
		Impacts of PFAS compounds on the health of fish (CB Watershed and elsewhere), including PFAS in fish plasma from some long-term monitoring sites	USGS (Vicki Blazer)		2021-2023

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
		Inform results of studies designed to address temporal and spatial changes in fish health in mixed use watersheds in the freshwater portion of the Watershed. • The first will conduct a temporal assessment of smallmouth bass health and associations with land-use (including BMPs), climatic factors and stressors using existing data. • The second is designed to determine if state collected DELT data can be used to assess how various fish health indicators respond to BMPs and other management actions. This will include a detailed comparison of DELT, health assessment index (HAI) and a more comprehensive assessment that includes both internal and external information.	USGS (Vicki Blazer, Kelly Smalling), WVU		2021-2025
2.2	Generate information to document fish health conditions in the Bay watershed.				
		The data collected at the long-term monitoring sites (2013-2019) is being analyzed and published as a series of journal articles. The first is compiling long term, integrative indicators at the Antietam site, which could be a template for subsequent information. This information will be summarized with other data collected by the USGS and briefed to the TCW	USGS (Vicki Blazer) and CBP Communications team		2023
		Continue monitoring of and communicating results of fish conditions in areas of concern within jurisdictions. Specifically, USGS is working with PA, MD	USGS (Vicki Blazer), PA DEP, MD DNR, WV DEP, WV DNR, PA Fish and Boat Commission		2025

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		and WV. Expanded to include fish health (wild smallmouth bass) as a result of PFAS presence.			
		Identify opportunities to interface with the Sustainable Fisheries GIT such as considering toxic contaminants in tidal and freshwater fish-habitat assessments. Further, the TCW could interface with the Fish Habitat WG to provide an overview of available toxic contaminant data that could be considered for the freshwater and estuary fish habitat assessments.	TCW leadership, NOAA, leadership of SFGIT		2023-2024
2.3	Assess the effects of PFAS on wildlife	PFAS in tree swallows	USGS Patuxent (Chris Custer)		2023-2024
		PFAS in terrapins	USGS Patuxent (Natalie Karouna)		2023-2024
2.4	PFAS Methodology and Assessment	Gather information and communicate appropriate fish and portions of fish to analyze to assess impacts for fish health studies, recommended methods, and interpretation of the data	All		2023-2024
Management Approach 3: Document the occurrence, concentrations, and sources of contaminants in different landscape settings					
3.1	Better define the sources and occurrence of emerging and legacy toxic contaminant groups in different landscape settings	Continue to inform results of studies on the influence of PFAS in wastewater effluent to (nontidal and tidal) receiving waters and model validation and tool development of complex contaminant mixtures in nontidal streams in the Potomac watershed	USGS		2022-2024
		Inform results of the study on associations of PFAS and PCBs with land uses categories via wet pond drainage areas	USGS (Emily Majcher) and MDE		2023
		Sediment source tracking applications for sediment bound PCBs in urban areas	USGS		2023-2024
		Continue to evaluate outcomes from	TCW, DOEE, USGS, UMBC,		2023-2024

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
		Anacostia River sediment investigation to improve understanding of PCBs and other contaminants of concern in urban environments.	FWS		
		Inform results of the USGS-EPA collaborative effort to produce a nation-wide map of PFAS sources	USGS (Kelly Smalling)		2023
		National pilot study using citizen science-based approach to understand the human exposures to PFAS mixtures in residential tapwater from public and private supply.	USGS (Kelly Smalling)		2023
		Susquehanna pilot test with co-located PFAS fish, surface water, and drinking water	USGS, PSU, PA DEP, Fish and Boat		2023-2024
		Continue to inventory state jurisdiction and DC efforts and studies underway to define PFAS occurrence in multiple media (excluding drinking water) in different landscape settings. (include field and analytical methods)	All		2023
Management Approach 4: Synthesize and promote science to help prioritize options for mitigation to inform policy and prevention					
4.1	Gather and summarize further information about direct and co-benefits for mitigation of toxic contaminants, and nutrient and sediment co-reductions	Inventory case studies where innovative remediation of sediments/water have occurred within and outside the watershed and evaluate how they could be adapted or implemented for TMDL compliance.	USGS, academic and state partners		2023-2024
		Study to explore water quality response to BMP implementation in agricultural watersheds using estrogenicity as an indicator of EDCs.	USGS		2021-2024
		Establishing management relevant timelines to detect regional change in stressors following BMP implementation. We will use existing models and available, water quality indicator data that are of interest to managers and stakeholders for	USGS		2021-2024

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		evaluating the effectiveness of management interventions within the Bay including mercury, total PCBs, herbicides (i.e. atrazine and metolachlor), and total estrogenicity. Similar outcomes will also be evaluated for nutrients and sediments.			
4.2	Monitor/survey efficiency of BMPs to remove toxic contaminants (mostly PCBs and other contaminants) (Consistent with CBP STAC workshop recommendations)	Inform results of bioretention efficacy and optimization for removal of toxic contaminants	UMCP		2023-2024
		Inform results of design/testing of enhanced media in stormwater control structures for degradation of toxic contaminants	UMCP		2023-2024
		Investigate impact of wet ponds (as a common, urban stormwater BMP) on PCB capture and association with land use	MDE and USGS		2021-**2023**
		"Parking lot" for other BMP science advances, for PCB and non-PCB contaminants (Inside and outside watershed); ongoing bibliography of case studies	TCW members		2023-2024
4.3	Enhance the interaction with source teams to communicate and apply findings on the co-benefits for mitigation of nutrients, sediment, and toxic contaminants and enhance communication materials to inform decisions in 2-year milestones. (Consistent with CBP STAC workshop recommendations)	Communicate with agricultural, stormwater, and wastewater source teams to identify synergies with nutrient/sediment and toxic contaminant mitigation options in order to promote consideration of toxic contaminants as part of the 2-year milestones. Identify opportunities to prepare Fact Sheets and other briefing materials to best communicate results to different stakeholder groups.	TCW chairs with selected investigators and the workgroup, CBP Communications team		2023-2024
4.4	The Chesapeake Bay Commission will work collaboratively with the Bay Program partners to identify	CBC will, in turn, pursue action within our member state General Assemblies and the United States Congress. See CBC Resolution #14-1 for additional	CBC		2023-2024

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	legislative, budgetary and policy needs to advance the goals of the Chesapeake Watershed Agreement.	information on the CBC's participation in the management strategies.			
Management Approach 5: Gather information on issues of emerging concern.					
5.1	Continue to investigate previously prioritized issues of emerging concern including microplastics and road salt (chloride).	Participate and provide communication to the workgroup on the microplastics risk assessment process within CBP via the Pollution Prevention Action Team (PPAT).	CBP staff (Doug Austin)		2023-2024
		Track continued progress of ongoing studies of microplastics within and outside the watershed in the context of toxicity	TCW partners and academia		2023-2024
		Track continued findings and progress on chloride (road salt) ecotoxicity and establishment of chloride TMDLs, considerations by the stream health workgroup	TCW partners, USGS, academia		2023-2024