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	Information on tracking back sources of PCBs contributing to impairments and best management actions for resource recovery are lacking.	Management Approach 1: Synthesize information to make fish and shellfish safer for human consumption.			

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	Consistent analytical and sampling methodologies for specific outcomes. 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.	Selected actions include better source tracking of PCBs; understanding of fate and transport in BMPs and sanitary sewer systems. Discussions on opportunities for mercury monitoring network Interaction between jurisdictions to ensure there is consistent efforts to reduce contaminants, which contribute to fish consumption advisories.			
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 and fish health in the watershed; surveys of emerging contaminants, STAC report that included summary of fish health issues in agricultural and urban settings.	Gaps include regional monitoring and study efforts; addressing the multitude of contaminant groups; understanding which contaminants are the primary causes of poor fish health. Limited information on wildlife.	Management Approach 2: Understanding the influence of contaminants in degrading the health, and contributing to mortality, of fish and wildlife Selected action include Action include evolving towards a more geographic approach to focus in areas where fish health issues are most prevalent. Increase collaboration with academic institutions conducting research on emerging contaminants. 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; (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 contaminants (e.g., PCBs, mercury, PFAS)			
Limited information of the practices to mitigate contaminants, and their potential co-benefits with nutrients and sediment reductions	STAC report included opportunities to reduce contaminants in agricultural and urban settings. Some jurisdictions and academic partners looking at contaminant mitigation from selected BMPs.	Lack of removal effectiveness of selected BMPs for targeted toxic contaminants. Approaches to get toxic contaminants into decision tools (such as CAST) Products that communicate contaminant co-benefits for WIP milestones	Management Approach 4: Science to help prioritize options for mitigation to inform policy and prevention Actions include: Focused source-sector approach with emphasis on agricultural and urban settings; Generate more information on potential co-benefits and explore use of CBP			

			decision tools (such as CAST). Increased interaction with WQ GIT to develop and promote joint approaches to reduce toxic contaminants, nutrients, and sediment.			
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	Management Approach 5: Gather information on issues of emerging concern. Actions include: Limit activities to one or two topics that have been prioritized rather than including a broad group of topics Increased interaction with scientific experts, particularly in academic and federal agency research			
Resource constraints. The constraints include (1) minimal capacity within the CBP to 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.	Coordination of efforts between members of the Toxic Contaminant WG. GIT funding project. Interaction with other workgroups with WQGIT to find synergies.	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 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.			
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 to select topic and summary materials for 2021-22.			

ACTIONS – 2021-2022					
Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
Management Approach 1: Synthesize 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.	Summarize existing impairments in the watershed through the creation of and updates to a 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.		2021-2022
		Assess usefulness of currently inventoried available mercury monitoring data (water, sediment, fish tissue) to inform status or trends and help inform need for monitoring network.	TCW; USGS		2021-2022
		Conduct sampling of mercury in young of the year fish. Results will eventually be used to assess trends. Reported annually.	MDE and MD DNR		Ongoing; annual sampling and reporting
		Review and obtain information documented during the establishment of Maryland's proposed Mercury TMDL. Additional fish tissue collections conducted in 2018 and 2019. Data is currently being analyzed to determine if	MDE		2021

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		Hg impairments can be delisted. One listing was removed in the 2018 IR. Additional fish collection may be required for reassessment in Fall 2020 if data analysis demonstrates existing data is insufficient for delisting decisions. Hg TMDL development will be delayed until listing reassessment is completed.			
		Explore opportunities, in working with scientists from USGS and other agencies, for integrated monitoring network to assess trends in mercury and possible need for management actions; 1) Define objectives of a monitoring network (and specify media of interest), 2) Review Eagle-Smith publication for integrative monitoring ideas, 3) Assess spatial extent in given media to identify geographic opportunities for integration, 4) Explore other opportunities	TCW; MDE, PA DEP, VA DEP, DOEE, WV DEP, DNREC, USGS		2021-2022
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 partners constructing models.		2021-2022
		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. Communication of the results of a completed study to investigation PCBs in wastewater biosolids, effluent, and sanitary sewer	State and local jurisdictions, USGS, UMBC, academic partners		2021-2022

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		system deposits in aging infrastructure in addition to upland stormwater sources.			
		Review literature and assess need for further study of PCBs in the environment from biosolid and dredged material land application, small combustion sources, and atmospheric deposition.	Science partner TBD (e.g., CRC, CBP)		2021-2022
		Tracking the implementation of PCB TMDLs in the watershed and associated investigations and progress to inform source identification methods and recommendations	All jurisdictions		2021-2023
		Analytical and monitoring methods for PCBs: Work towards development of a hierarchy of PCB analytical methods for desired use to promote comparison of data across the watershed for similar needs. Similarly, develop hierarchy of sampling methods for desired use (e.g., source refinement, BMP effectiveness) to promote comparison of data.	All, CBP TCW members		2021-2022
Management Approach 2: Understanding 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 shellfish in tidal waters	Ongoing regional focus on Anacostia River sediment contaminants 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.	FWS		2021-2022

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
		Continue 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 will update those findings with new data, with additional molecular analysis, analyzing lesions and movement over time.	USGS, UM, FWS		2021
2.2	Generate information to document fish health conditions in the Bay watershed.	Communicate results of study to understand the influence of endocrine disrupting compounds (EDCs) and other factors degrading the health and contributing to mortality of fish. This includes communication of the results of 2 products to the TCW including a retrospective analysis of the relationships between fish health, estrogenicity and land-use and a risk assessment study of EDCs compounds and other environmental stressors on fish populations.	USGS (Vicki Blazer)		2021
		Report and communicate results of study examining the influence of endocrine-disrupting compounds (EDCs) and their effects on fish conditions. 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	USGS (Vicki Blazer)		2021-2022

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		information. This information will be summarized with other data collected by the USGS into a series of synthesis PowerPoint presentations.			
		Continue monitoring of and communicating results of fish conditions in areas of concern within jurisdictions. Specifically, USGS is working with PA, MD and WV. In addition, WV and PA are collaborating with USGS to assess the immune response of wild smallmouth bass. Expanded to include fish health as a result of PFAS presence.	USGS (Vicki Blazer), PA DEP, MD DNR, WV DEP, WV DNR, PA Fish and Boat Commission,		2022
		Initiate 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), WVU		2021-2025
		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**
		Continue studies and evaluate the relationship between the amount of impervious surface and the impact on fish conditions. During 2014 – 2018 the MBSS re-sampled streams that were sampled 20 and 14 years ago. These data will be used to examine for potential change over time in stream biological, physical habitat, and chemical conditions.	MD DNR		
		Continue stream IBI studies as part of the Maryland biological stream survey (MBSS) to evaluate health of fish communities. Data have been collected during 2019 and 2020 from several projects with targeted sampling locations. As part of this, the MBSS Sentinel Sites were sampled annually for the 21st year in 2020. During 2021, the MBSS is planning to add some sampling of sites with randomly selected locations.	MD DNR		2021
2.3	Assess the effects of toxic contaminants on wildlife	PFAS in tree swallows (Andrews AFB)	USGS Patuxent		2021-2022
2.4	PFAS Methodology and Assessment	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	DNREC, TCW, technical experts TBD		2021-2022
Management Approach 3: Document the occurrence, concentrations, and sources of contaminants in different landscape settings					
3.1	Better define the sources and occurrence of EDCs and other toxic contaminant groups in different landscape settings	Communicate results of studies to identify the sources and occurrence of toxic contaminants contributing to degraded fish health.	USGS (Kelly Smalling)		2021
		Continue Pennsylvania studies on occurrence of pesticides and hormones and other toxic contaminants in surface	PA DEP USGS		2021-2022

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		water with a focus on areas of concern. Communication of reported outcomes to the workgroup.			
		Continue studies on the influence of wastewater reuse, urban stormwater ponds and associated contaminants on aquatic resources.	USGS (Emily Majcher)		2021-2023
		Inform presence of select contaminants of emerging concern (including flame retardants, contemporary pesticides, and industrial by-products; and stain-resistant compounds, such as perfluorinated and phenolic compounds (PFCs) and legacy contaminants through monitoring of sediment, water, and bivalves as part of the regional Mussel Watch program (NOAA). Evaluate regional partnership between NOAA and CBP.	NOAA Oxford		2021-2022
		Communicate outcomes of publications and ongoing data collection to inform presence of select UV filters, hormones, and antibiotics in eastern oysters and hooked mussels in urban streams and the Chesapeake Bay mainstem near both agricultural and urban landscapes.	UMBC, USDA FS		2021-2022
		Communicate results of USGS inventory efforts of select toxic contaminants and ability to use data for assessment of status and trends	TCW and states, DOEE, USGS		2021
		Continue to evaluate outcomes from Anacostia River sediment investigation to improve understanding of PCBs and other contaminants of concern in urban environments.	TCW, DOEE, USGS, UMBC, FWS		2021-2022

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
3.2	Better define sources and occurrence of PFAS in the watershed	In collaboration with EPA, USGS will produce a nation-wide map of PFAS sources and a prioritization scheme for identifying DW monitoring sites for pilot study to be conducted in 2022.	USGS (Kelly Smalling)		2021-2022
		Inventory state jurisdiction and DC efforts and studies underway to define occurrence in multiple media (not including drinking water)	TCW and CBP		2021-2022
3.3	Examine the co-occurrence of toxic contaminants with nutrients and sediments to inform co-benefit analysis (see MA 4)	Explore options to use existing databases (CBP Data Dashboard, USGS inventories, others) to spatially assess areas with nutrient and/or sediment impairments and monitoring and toxic contaminant impairments. Assess usefulness of a story map or other graphic within CB Watershed, or geographically focused areas to be determined. Goal would be to spatially identify areas with potential for co-benefit reductions for consideration in 2 year milestones. (This is consistent with CBP STAC workshop recommendations)	TCW; USGS, MDE, VDEQ, DOEE, DNREC, PA All		2021-2022
Management Approach 4: 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 in the watershed and evaluate how they could be adapted or implemented for TMDL compliance.	USGS, working with academic and state partners		2021-2022
		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.	USGS		2021-2023

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
		We will use existing models and available, water quality indicator data that are of interest to managers and stakeholders for 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)	Bioretention efficacy and optimization for removal of toxic contaminants	UMCP		2021-2022
		Design/testing of enhanced media in stormwater control structures for degradation of toxic contaminants	UMCP		2021-2022
		Investigate impact of wet ponds (as a common, urban stormwater BMP) on PCB capture and association with land use	MDE and USGS		2021-2022
		Riparian forest buffer removal of toxic contaminants	PSU		2021-2022
		"Parking lot" for other BMP science advances, for PCB and non-PCB contaminants (Inside and outside watershed); ongoing bibliography of case studies	All, maintained by USGS		2021-2022
4.3	Identify methods to link BMP science advancement (PCB removal in sediment capture BMPs) to stakeholder tools (e.g., CAST) (Consistent with CBP STAC workshop recommendations)	Work with the GIT-funding awardee to ensure project proceeds	EPA, and TCW, GIT-funding proposal awardee		2021-2023
4.4	Enhance the interaction with source teams to communicate and apply findings on the co-benefits for mitigation of	Communicate with agricultural, stormwater, and wastewater source teams to identify synergies with nutrient/sediment and toxic contaminant	TCW chairs with selected investigators and the workgroup		2021-2022

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
	nutrients, sediment, and toxic contaminants and enhance communication materials to inform decisions in 2-year milestones. (Consistent with CBP STAC workshop recommendations)	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.			
4.5	The Chesapeake Bay Commission will work collaboratively with the Bay Program partners to identify legislative, budgetary and policy needs to advance the goals of the Chesapeake Watershed Agreement.	CBC will, in turn, pursue action within our member state General Assemblies and the United States Congress. See CBC Resolution #14-1 for additional information on the CBC's participation in the management strategies.	CBC		2021-2022
Management Approach 5: Gather information on issues of emerging concern.					
5.1	Continue to investigate previously prioritized issues of emerging concern including microplastics and PFAS.	Participate and provide communication to the workgroup on the microplastics risk assessment process within CBP (Internal POC Doug Austin). Improve understanding of toxicity effects of (micro)plastics.	-CBP staff		2021-2022
		Track continued progress USGS NE region microplastics study and identify relevance to CB (Internal USGS POC Shawn Fisher).	USGS, TCW		2021-2022
		Aggregate and analyze recent regulations and management approaches related to UV filters, hormones, and antibiotics in other states to help outline possible strategies for CBP	UMBC, TCW		2021-2022
		Track progress related to fish consumption advisories in neighboring watersheds (DRB) to help outline possible strategies for CB, advances in monitoring and	USGS, TCW		2021-2022

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Action #	**Description**	**Performance Target(s)**	**Responsible Party (or Parties)**	**Geographic Location**	**Expected Timeline**
		analysis of PFAS in environmental media (excluding drinking water)			