Integrating Science and Developing Approaches to Inform Management for Chemicals of Concern in Agricultural and Urban Settings

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Management Board, Sept 2020

Final report summary of the STAC Workshop held May 2019

Status of CBP Response

- Workshop: May 2019
- Report: Jan 2020 released
  - request from STAC for CBP response
- Findings and draft actions shared with:
  - TCW, Ag WG, Stormwater WG, Water-Quality Goal Team
- Written response shared with WQ GIT and TCW; revised based on comments
- Approved by TCW, July 9
- Approval from WQ GIT, July 27
- Present to MB and get approval

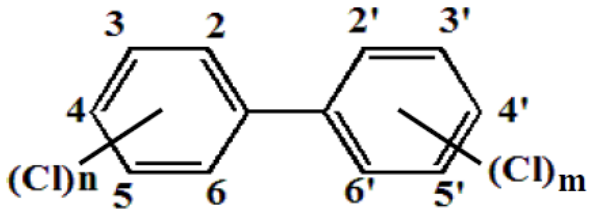
STAC Workshop Objectives

- Discuss contaminants related to fish consumption advisories, fish health, and emerging concern;
- Identify sources, occurrence, and transport of contaminants in agricultural and urban settings;
- Characterize opportunities to mitigate effects of contaminants in each setting by taking advantage of nutrient and sediment reductions, and other innovative approaches;
- Identify future needs for research and more integrated management approaches

What are the chemicals contributing to fish consumption advisors?

- **PCBs & Mercury**: widespread fish consumption advisories
  - Range from “No consumption to 8 meals per month”
- **Organochlorine pesticides**: lesser extent

- **Emerging contaminants**: fish consumption advisories not established
  - Exception of PFAS in NJ



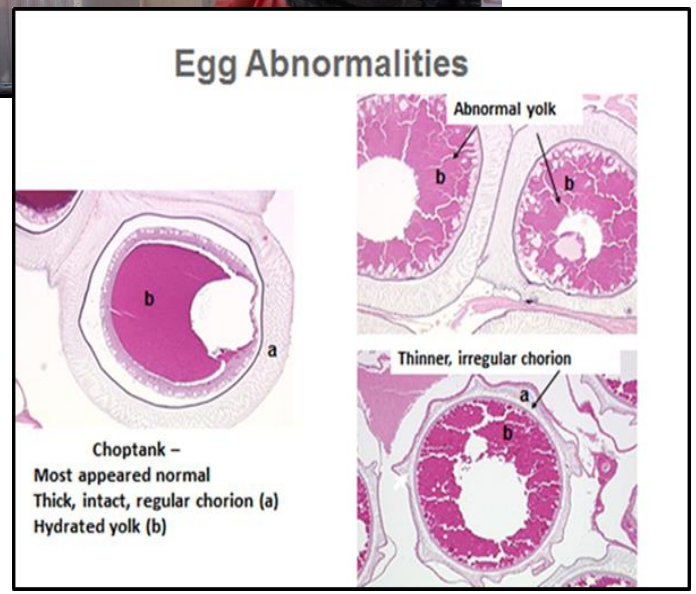
(Photo: Kjellerup, 2019)

How are contaminants affecting fish health?

- **Urban settings**:
  - Abnormal tissue growth
  - Reduced reproductive success

- **Agricultural settings**:
  - Fish kills, low chronic mortality, skin lesions

  - Increased susceptibility to infectious agents and disease susceptibility



Science needs and recommendations

- Fish health
  - Early indicators of sub-lethal effects
  - Risk factors contributing to skin tumors and skin lesion
  - Identify chemical concentration thresholds
- Management actions to reduce exposure
  - Sources of pollutants entering the food chain & causing consumption advisories
  - BMPs and effects on fish health
    - Monitoring in Potomac
    - Small mouth bass populations

Lesions decreasing

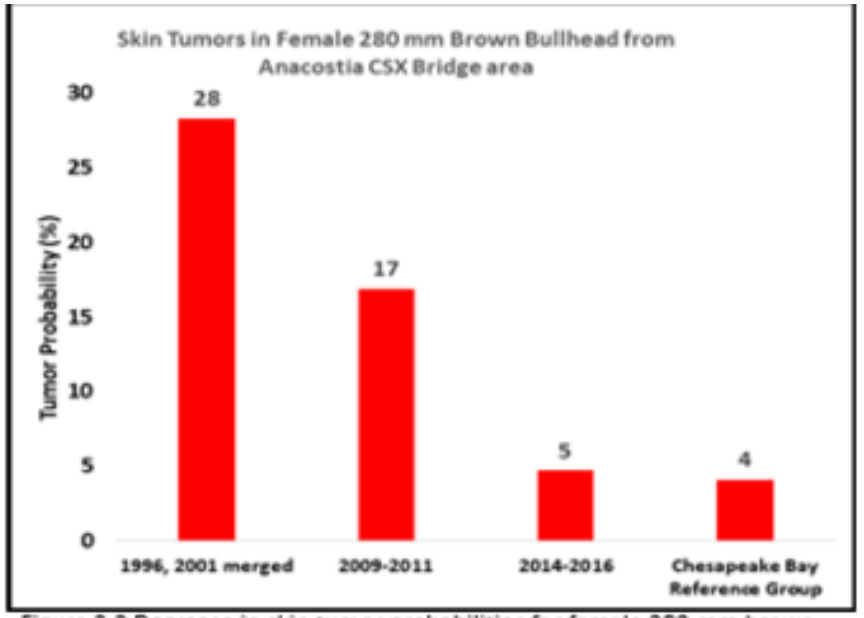
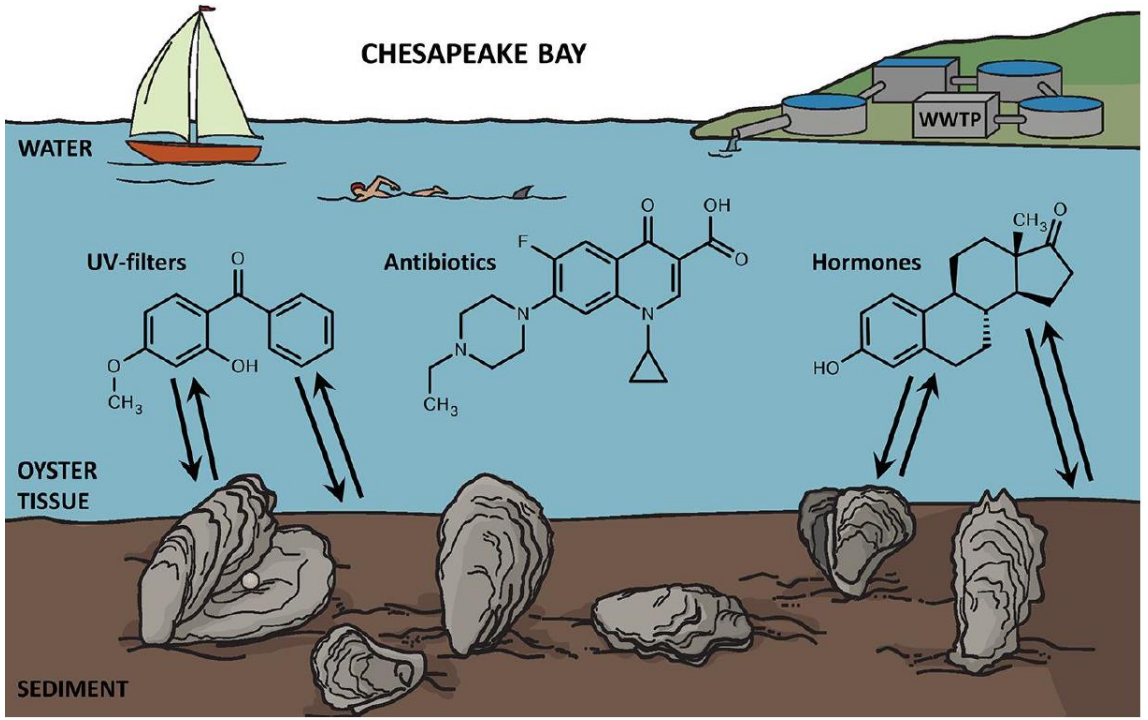
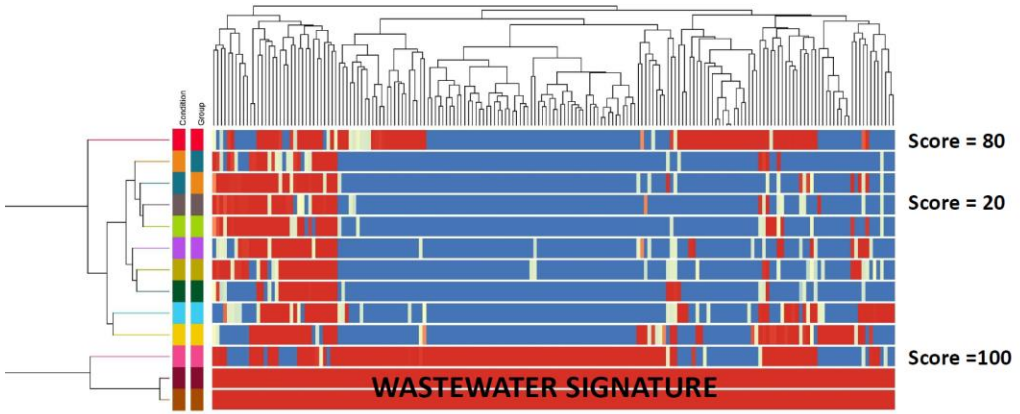


Figure 2.2 Decrease in skin tumor probabilities for female 280 mm brown bullhead from the Anacostia River (Pinkney et al. 2019)

Urban Areas: Contaminant Sources, Fate, Transport

- Complexity of urban systems complicates source definition
- Fate and transport of CECs and transformation products are largely unknown
- Limits selection of appropriate management practices
  - Puget Sound “fingerprinting” sources
  - Hudson R. sediment removal in upper portion has so far resulted in limited impacts to fish in lower portion ($1B effort)





Urban Areas: Opportunities to Reduce Toxic Contaminants

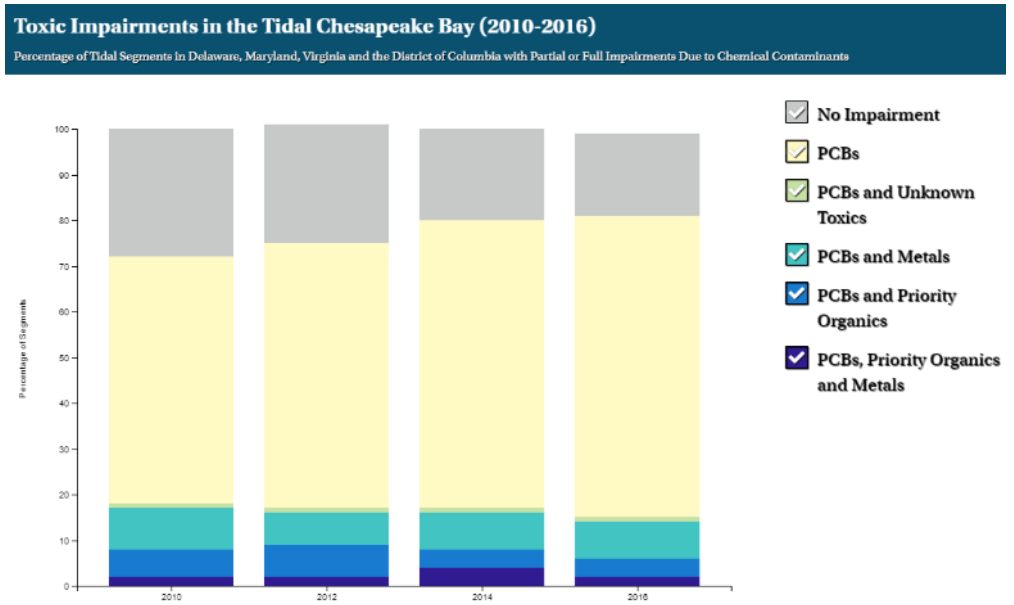
- **Sediment capture and reactive filter BMPs**
  - reduce concentration and toxicity related to urban stormwater runoff
- **Iron-enhanced sand filtration**
  - reduces concentrations of pesticides and wastewater indicators
- **In stream innovative treatment using activated carbon**
  - bioamendments immobilizes and degrades PCBs

Urban Areas: Science Needs and Recommendations

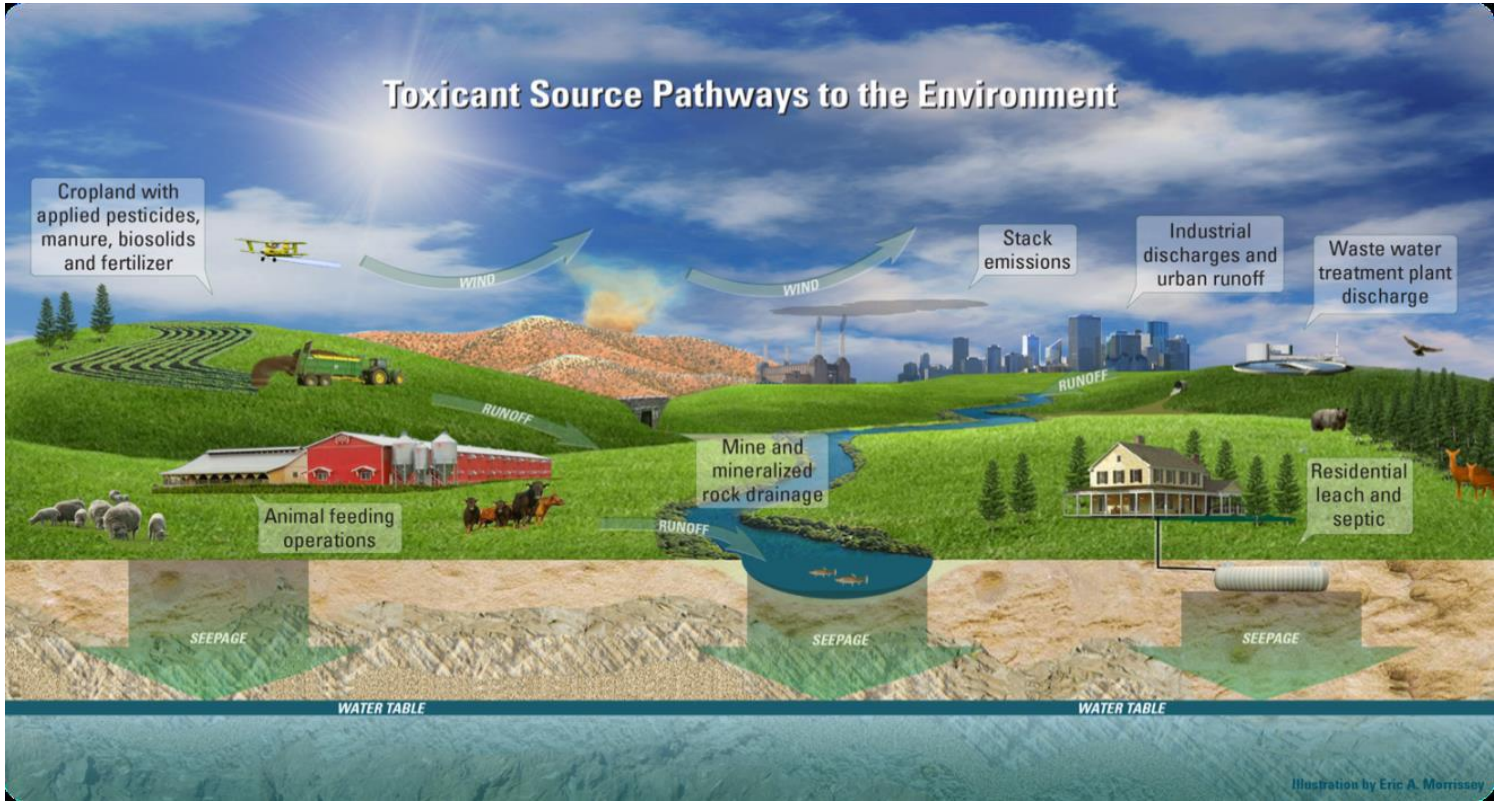
- Improve approaches for source evaluation and conceptual models for management options

- Better define the fate and transport
  - Stormwater control structures

- Compile and communicate efficiencies and effectiveness of BMPs
  - Land based
  - In stream



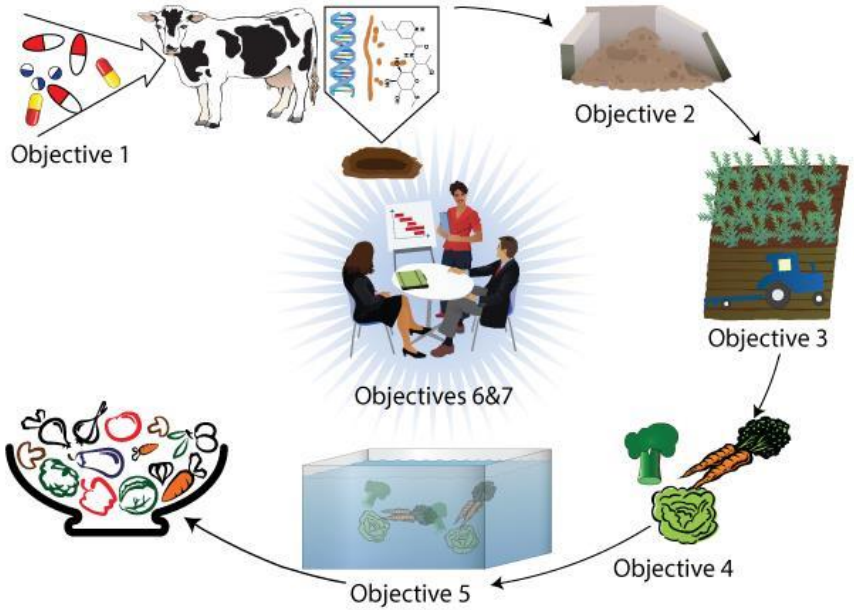
Agricultural Areas: Contaminant Sources, Fate, Transport



- Sources of contaminants are relatively well defined
  - Pesticide use
  - Manure storage/application
  - Biosolid application
  - Irrigation treated WW, septic
- Detailed information on many CECs is currently limited

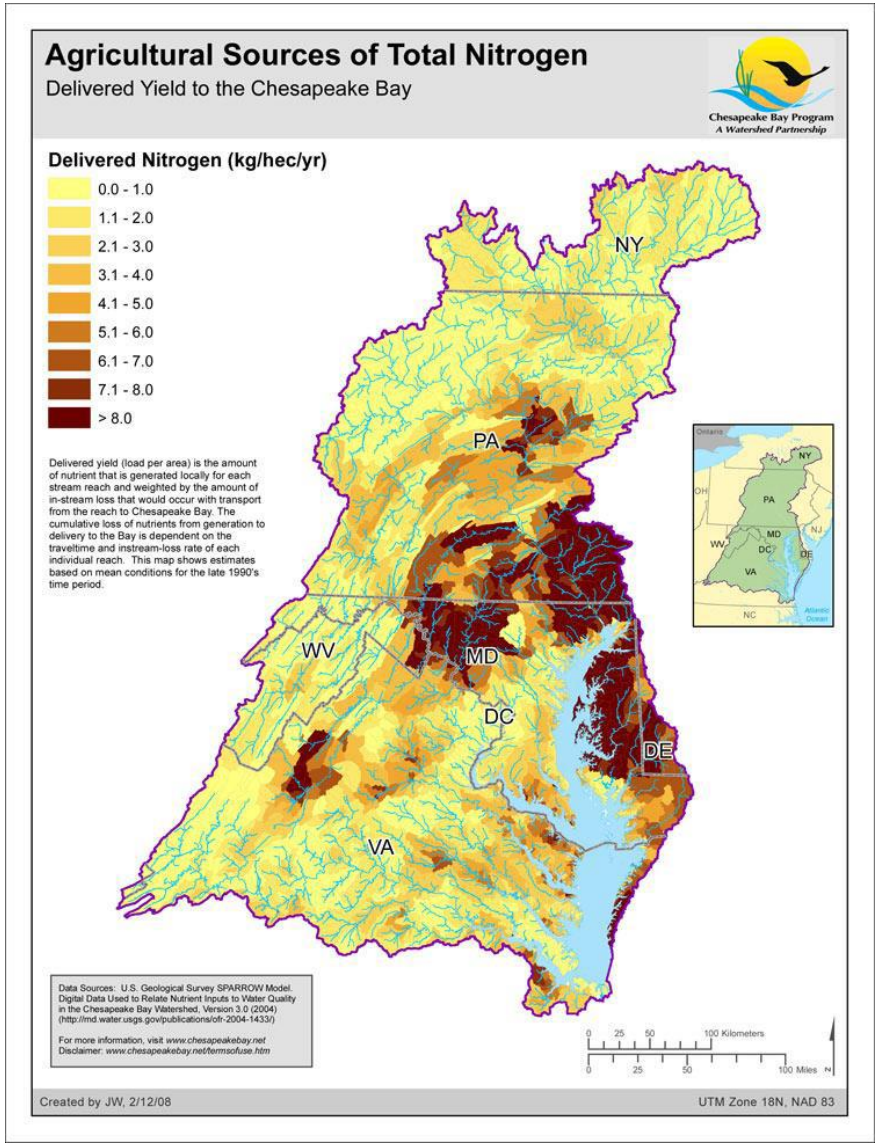
Agricultural Areas: Opportunities to Reduce Toxic Contaminants

- **Activated carbon or biochar to established BMPs** effectively reduces contaminant transport
- **Retention ponds and vegetative treatment** reduces pesticide loading
- **Manure management** including composting, subsurface application, buffer strips, etc. reduce antibiotics and antibiotic resistance



Agricultural Areas: Science Needs and Recommendations

- Help prioritize BMP implementation
  - Identify contaminants that require reduction (exposure)
  - Desired outcome (e.g., fish health)
  - Establish how the BMP functions in relation to this outcome
- Compile/communicate findings of nutrient and sediment BMPs effectiveness to reduce toxic contaminants
- Build qualitative frameworks to answer questions related to co-benefits for toxic contaminants



STAC Letter to CBP

- Gaps in compiling and communicating potential removal efficiencies for contaminants
  - Continued expansion and compilation of BMP studies
  - Examine known and emerging contaminants
  - Capitalize on possible co-benefits
- BMPs are necessary investment to reduce contaminant loads and improve water quality
  - Research investment to understand co-benefits or negative impacts
  - Close working relationship between researches and management community to develop tools
- https://www.chesapeake.org/stac/wp-content/uploads/2020/01/FINAL_STAC-Report_Contaminants-of-Concern.pdf

Potential CBP Responses to STAC

STAC:

- Gaps in compiling and communicating removal efficiencies
- Close working relationship between researches and management community

CBP Action 1: Enhance Interaction with Audiences for Contaminant Information

- Jurisdictions:
  - Implementing Phase 3 WIPs
- Water Quality GIT & workgroups
  - Ag, Stormwater, WWTP
- Local TMDL implementation
  - States, DC, and local jurisdictions
- Barriers to use of findings
- Science providers

Potential CBP Responses

STAC: Close working relationship between researches and management community

CBP Response 2: Take advantage of Phase 3 implementation

- Nutrient and sediment BMPs with contaminant benefits
- Jurisdictions consider BMP planning
- New findings provided 2 years
- Materials to inform decisions

2020	2021	2022	2023	2024	2025
Phase 3 WIPs	New findings		New findings		New findings

Potential CBP Responses

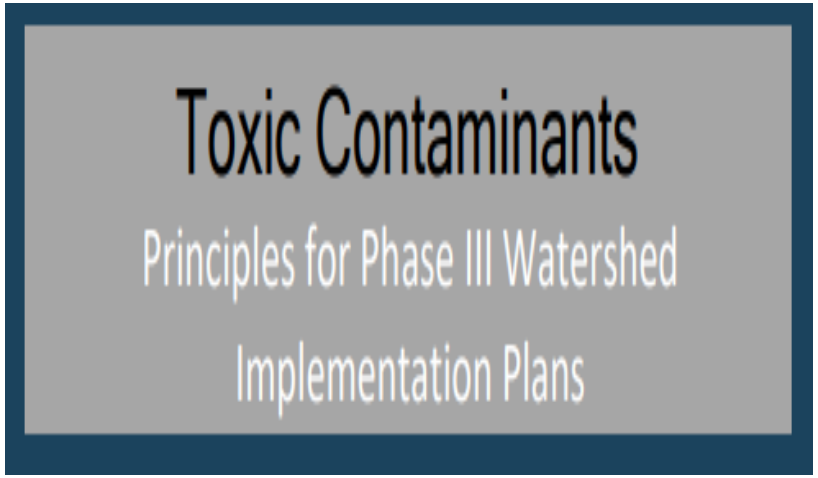
STAC: Gaps in compiling and communicating removal efficiencies; close working relationships

CBP 3: Enhance Communication Materials to Inform Decisions

- Stakeholder input on most useful topics
  - Ag, Urban, WWTP WGs

- Fact Sheets/

Briefing Materials

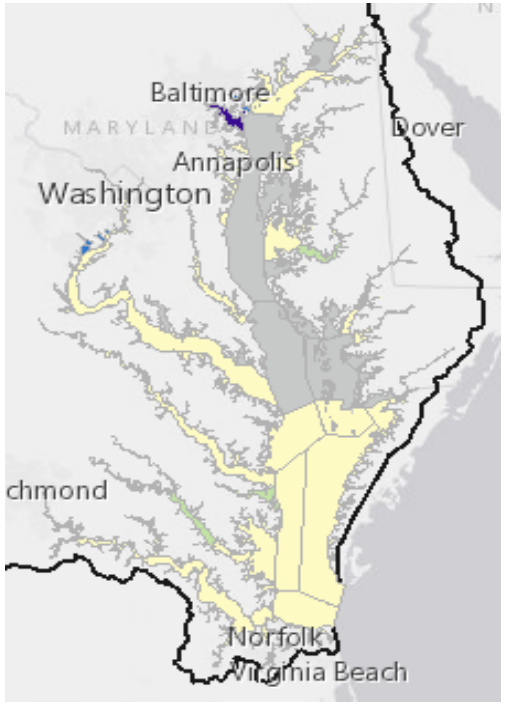


Best Management Practice	Urban Pollutants	Agricultural Pollutants
Ag Forest Buffer		4
Streamside Forest Buffers		3
Narrow Forest Buffer	3	3
Runoff Reduction	2.5	
Wet Ponds	2.5	
Urban Forest Buffers	2.5	
Filtering Practices	2	
Infiltration Practices	2	
Dry Ponds	2	
Bioretention	1.5	

Potential CBP Responses

STAC:

- Research investment to understand co-benefits or negative impacts;
- Gaps in compiling and communicating potential removal efficiencies for contaminants



CBP 4: Compile results and expand BMP studies

- Science needs updated
- Synthesis of BMPs from existing studies
- Expand studies for contaminants of most concern
- Monitoring for progress in reducing contaminants/impacts

CBP 5: Selected BMP results into CBP tools

- Watershed Dashboard, modeling, and CAST

Next Steps and Questions

- Written response shared with WQ GIT and WGs, and TCW; revised based on comments
- Approved by TCW, July 9
- Approval from WQ GIT, July 27
- Present to MB and approval

- Questions?

- Follow-up:
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