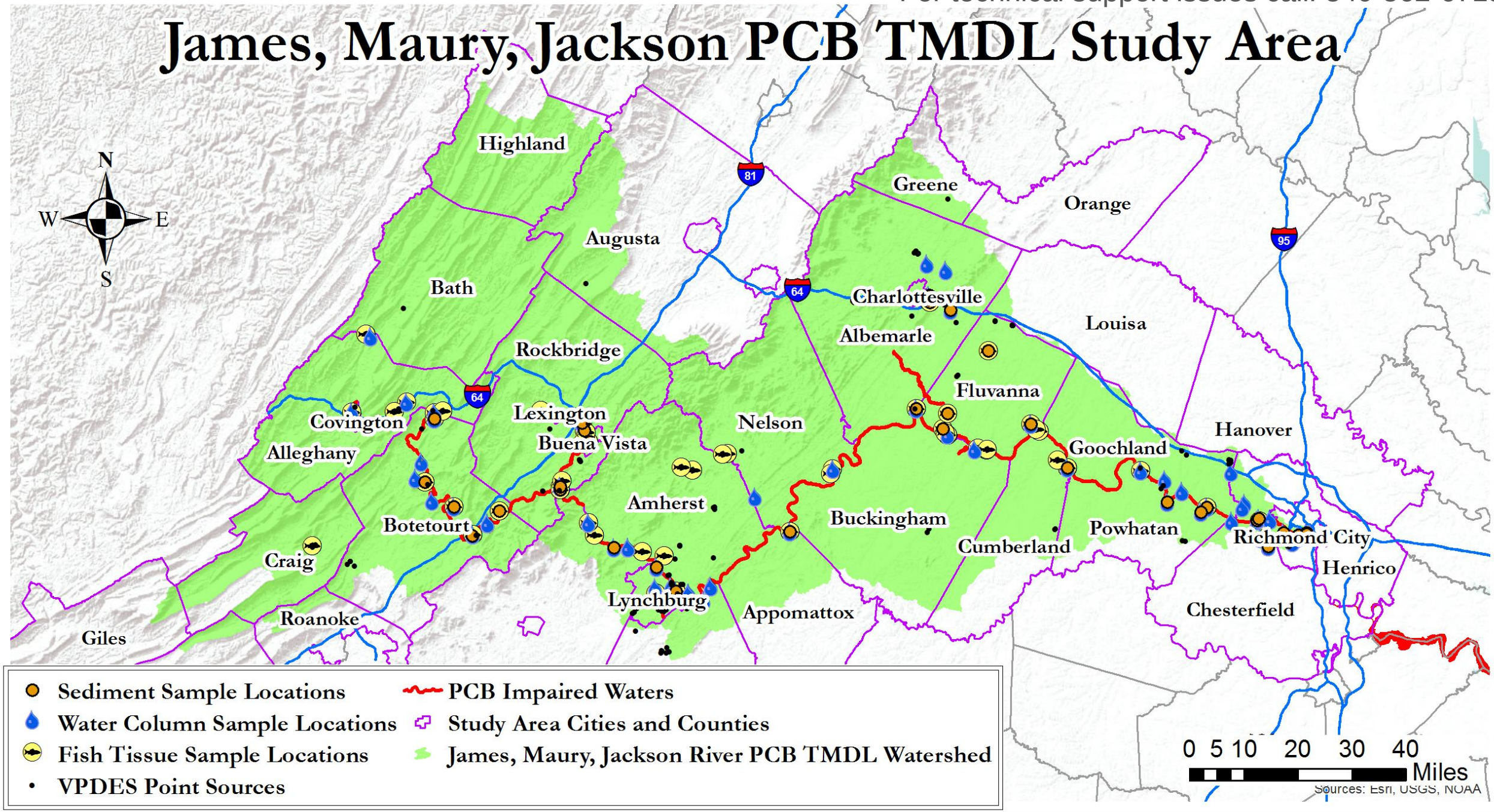
For technical support issues call: 540-562-6718



PC/Laptop View

Minimize the control panel ➔

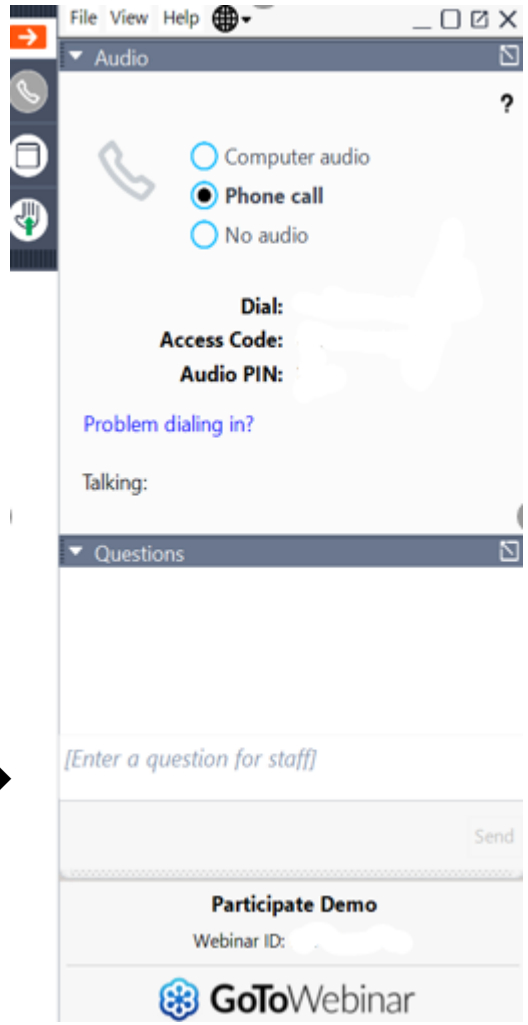
or maximize the control panel

Raise or lower your hand ➔

Select audio method ➚

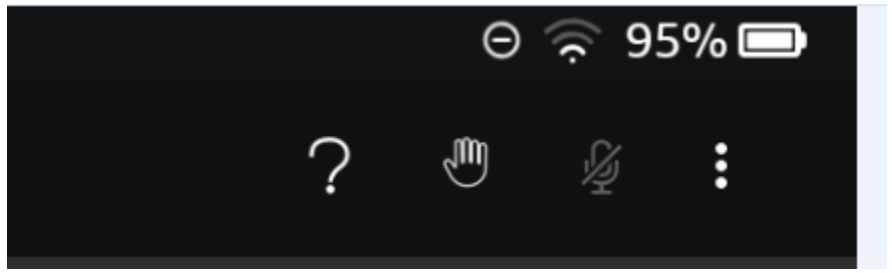
*Phone call provides better quality audio

Enter questions then click send ➔



Mobile Devices View

Android



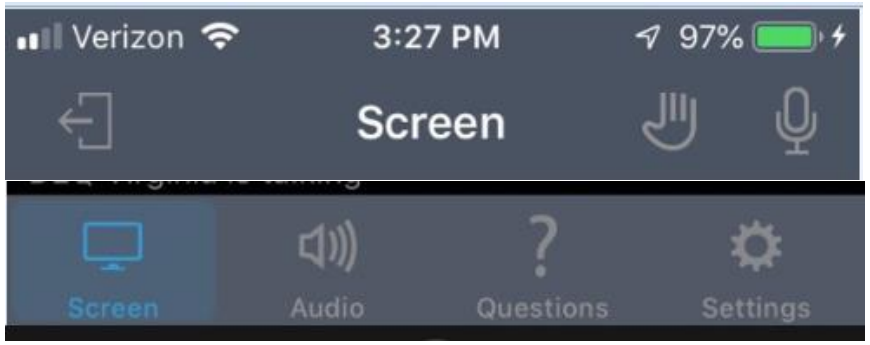
Enter Questions ➚

Raise ➚ Lower Hand

➚ Click 3 dots to open Audio Options

iPhone

Raise ➘ Lower Hand



Audio Options ➚

Enter ➚ Questions

For technical support issues call: 540-562-6718

James River, Maury River, Jackson River PCB Cleanup Plan Development

Community Kick Off Meeting

Will Isenberg

Virginia Department of Environmental Quality

January 12, 2021

Presentation Outline

- Project Basics
- Background on PCBs
- Fish Tissue Monitoring
- The TMDL development process
  - DEQ TMDL Sampling
  - PCB Sources
- TMDL Implementation
- Time for Questions

DEQ

Project Basics

James, Maury, Jackson Rivers PCB Problem Identification

- *1995*: DEQ begins fish tissue monitoring
- *2004*: VA Department of Health issues fish consumption advisory for a variety of fish species on the Maury River and James River (≤ 2 meals/month)
- *2004*: 170 mile James River segment and 16 mile Maury River segment placed on VA's impaired waters list
- *2008:* 13 mile Jackson River segment placed on VA's impaired waters list
- *2005, 2014, & 2017-2019*: DEQ completes additional fish tissue monitoring
- *2017-2019*: DEQ completes water and sediment monitoring to prepare for PCB cleanup plan
- *2020*: 10 mile James River segment, 6 mile Fishing Creek segment, and 1 mile Reedy Creek segment added to VA's impaired waters list
- *2020*: VA Department of Health issues fish consumption advisory for Carp on the Upper James River (≤ 2 meals/month)

Photo: US Fish and Wildlife Service

So What is a TMDL?

Technically, a Total Maximum Daily Load is the maximum amount of a pollutant that a waterbody can receive and still meet water quality standards.

TMDL = WLA + LA + MOS

WLA: Wasteload Allocation (permits)

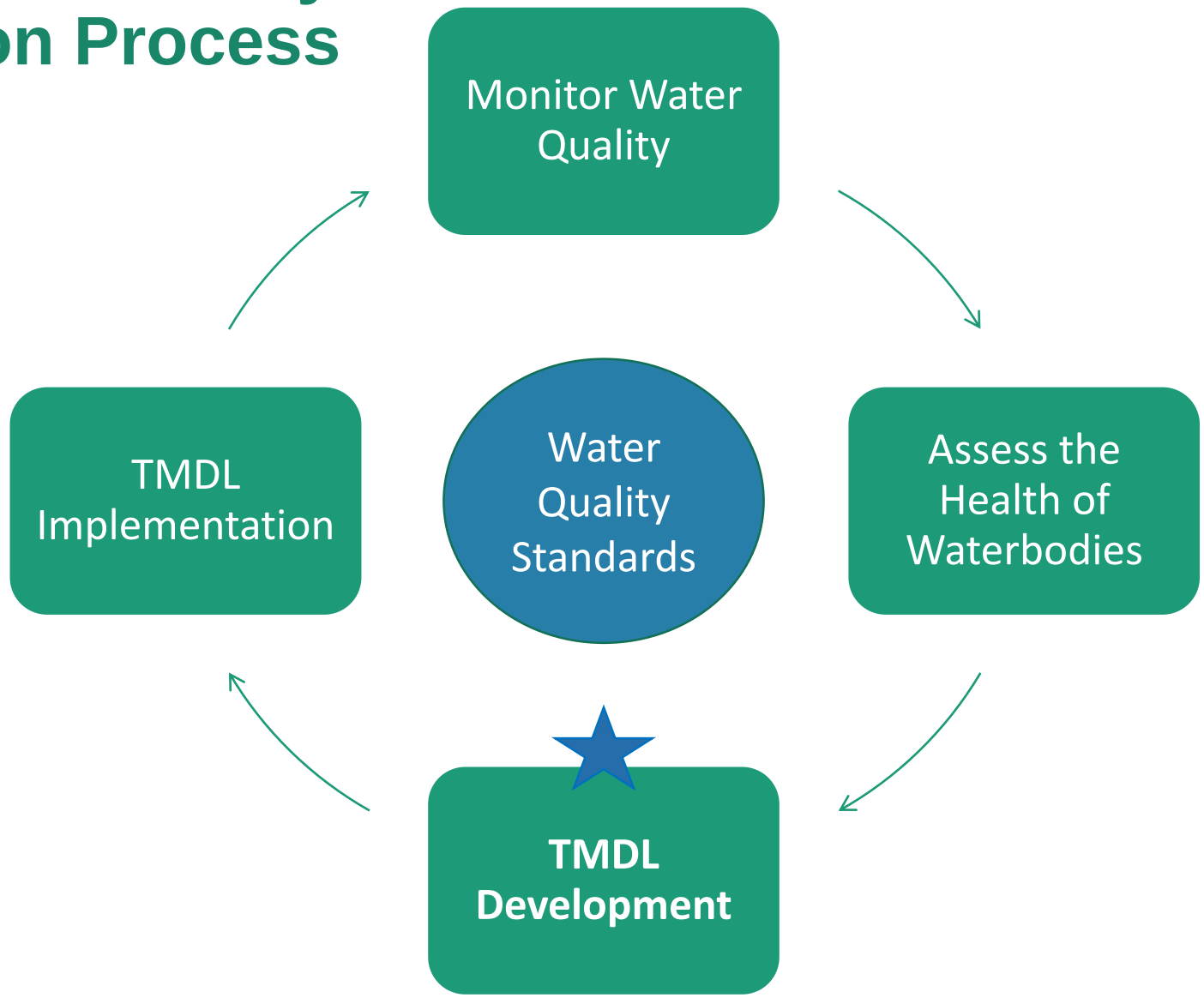
LA: Load Allocation (runoff)

MOS: Margin of Safety

Practically, Total Maximum Daily Loads are a process that we use to clean up our waterways

DEQ

DEQ's Water Quality Restoration Process



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The TMDL Process

- Pollutant inventory
- Model water quality reductions necessary to meet target
- Assign reductions to sources
- Implementation

Photo credit: James River Association

TMDL Process – Stakeholder involvement

- Stakeholder input improves the TMDL process
- Many ways to participate

Anticipated Timing	Portion of TMDL Development Process	Stakeholder Involvement
Winter 2021	Project Kick-off	First Public Meeting 30-day Comment Period
Throughout 2021	TMDL Model Development TMDL endpoint selection Source Assessment TMDL allocation scenarios Draft TMDL Report	Technical Advisory Committee Meetings
Winter 2022	Present Draft TMDL Report	Final Public Meeting 30-day Comment Period
Summer 2022	State Water Control Board Approval	30-day Comment Period

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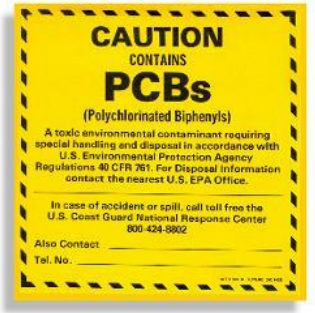
Background on PCBs

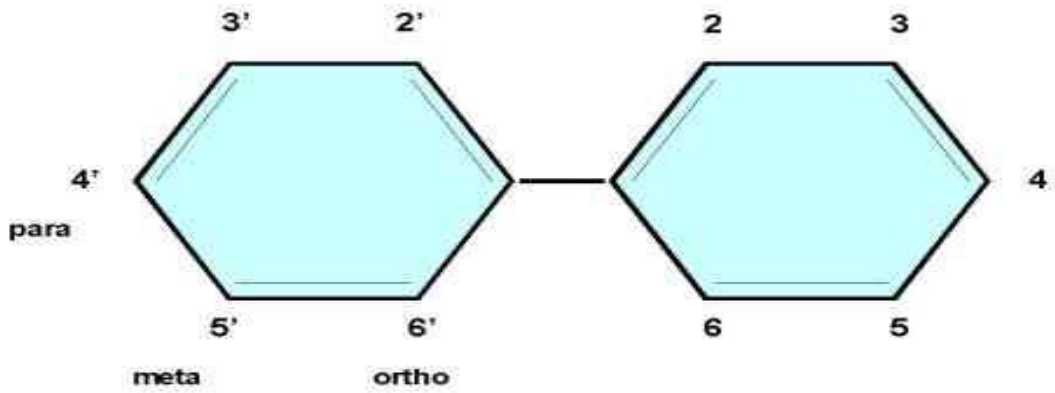
Background: PCBs

- Estimated that > 1.5 Billion lbs. manufactured through 1977 → “Legacy Contaminant”
- Very stable and heat resistant
  - Persistent in environment
- Common uses:
  - Transformers, capacitors, hydraulic fluids, circuit breakers, PVC Products, carbonless copy paper, caulking material, paints, and more!



Background: PCBs

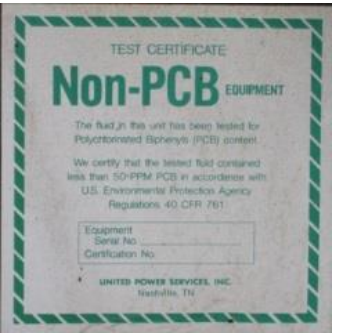
- Biphenyl molecule (1-10 chlorine atoms)
- 209 distinct PCB Compounds
- Regulated by DEQ as Total PCB (tPCB) = 209 compounds summed
- Referred to as PCB Aroclors (Monsanto tradename) = mixture of PCB compounds



Structure of Polychlorinated Biphenyl (PCB) Molecule

Toxics Substances Control Act (TSCA)

- 1976 Law regulates PCBs
  - Bans the manufacture, processing, use and distribution in commerce (1979)
  - Non-PCB Transformer defined as containing < 50 ppm PCB
  - Inadvertent manufacture of PCBs – products up to 50 ppm allowed to leave site as long as annual average is < 25 ppm
    - **Unintentional** by-products of manufacturing processes



50 ppm compared to DEQ's WQC - 6.4 X 10^{-7} ppm (0.00000064)

PCBs in Municipal Products

Prepared by:

City of Spokane
Wastewater Management Department

March, 2015

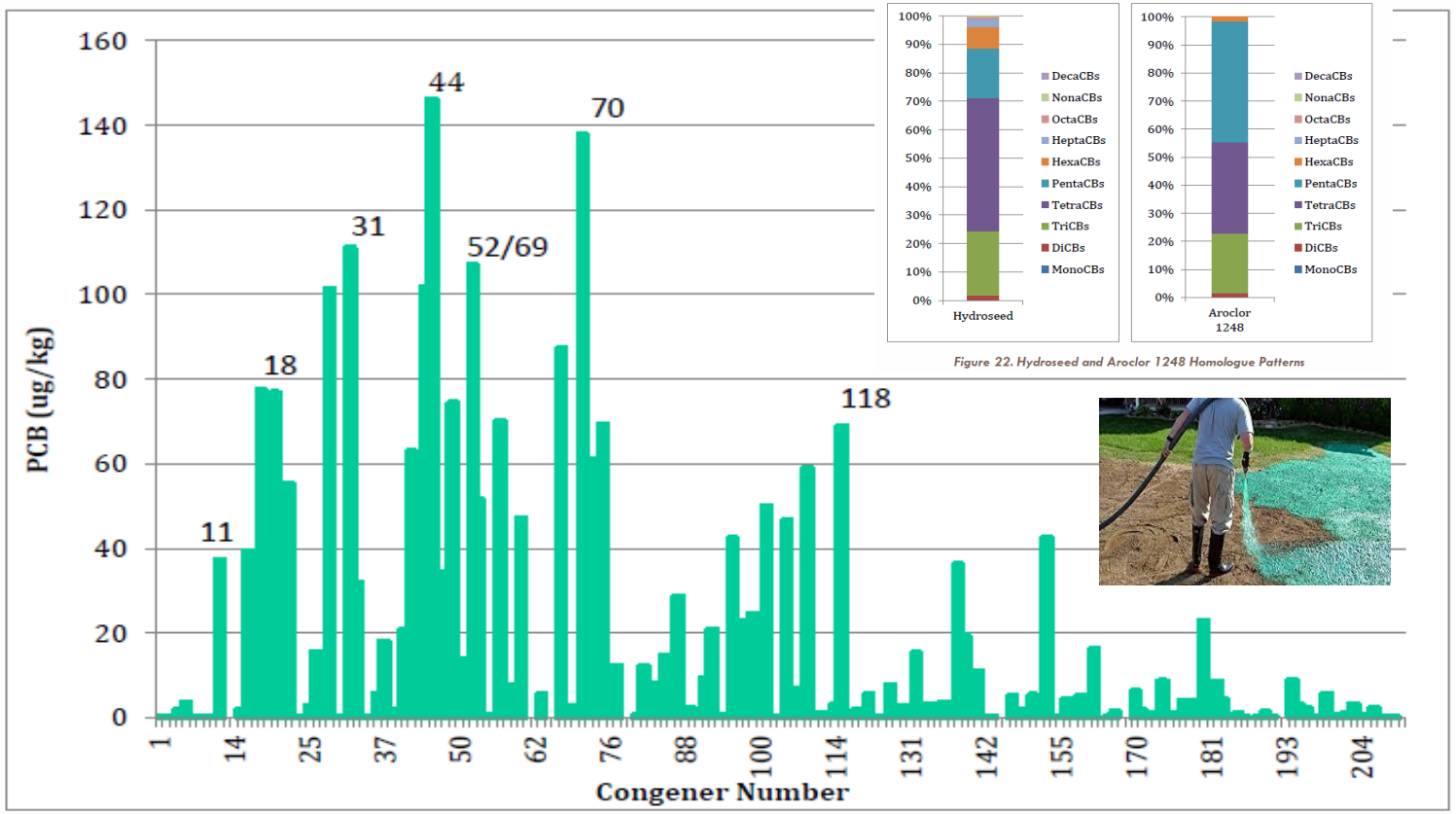


Figure 22. Hydroseed and Aroclor 1248 Homologue Patterns

Figure 21. Hydroseed Congeners

- Examples of other products tested
  - Pennzoil SAE5W-30
  - Valvoline Full Synthetic
  - Road paint

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Fish Tissue Monitoring

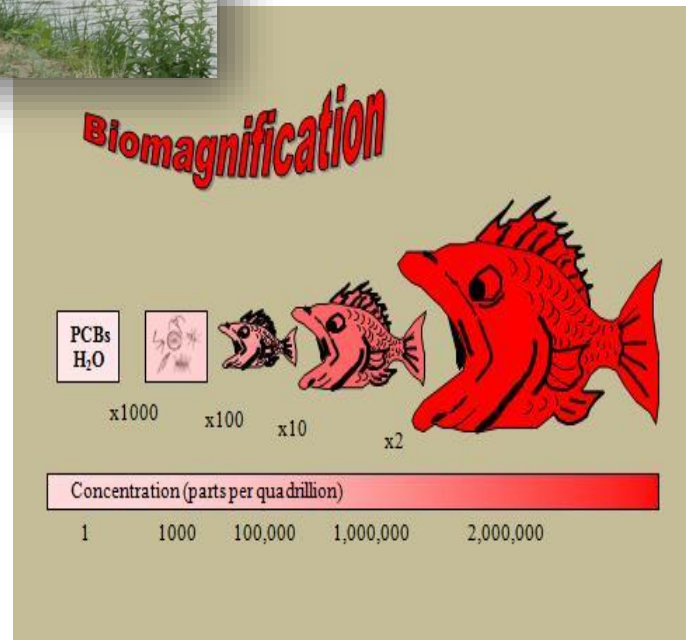
Poll Question: Do you eat fish out of the James River?

1. No, because I do not fish or I release all that I catch
2. No, but I would if they were safe to eat
3. Yes, but I eat 2 or less fish per month
4. Yes, I eat more than 2 fish per month
5. Yes, the fish I catch are a primary part of my diet

DEQ

PCBs in Fish Tissue

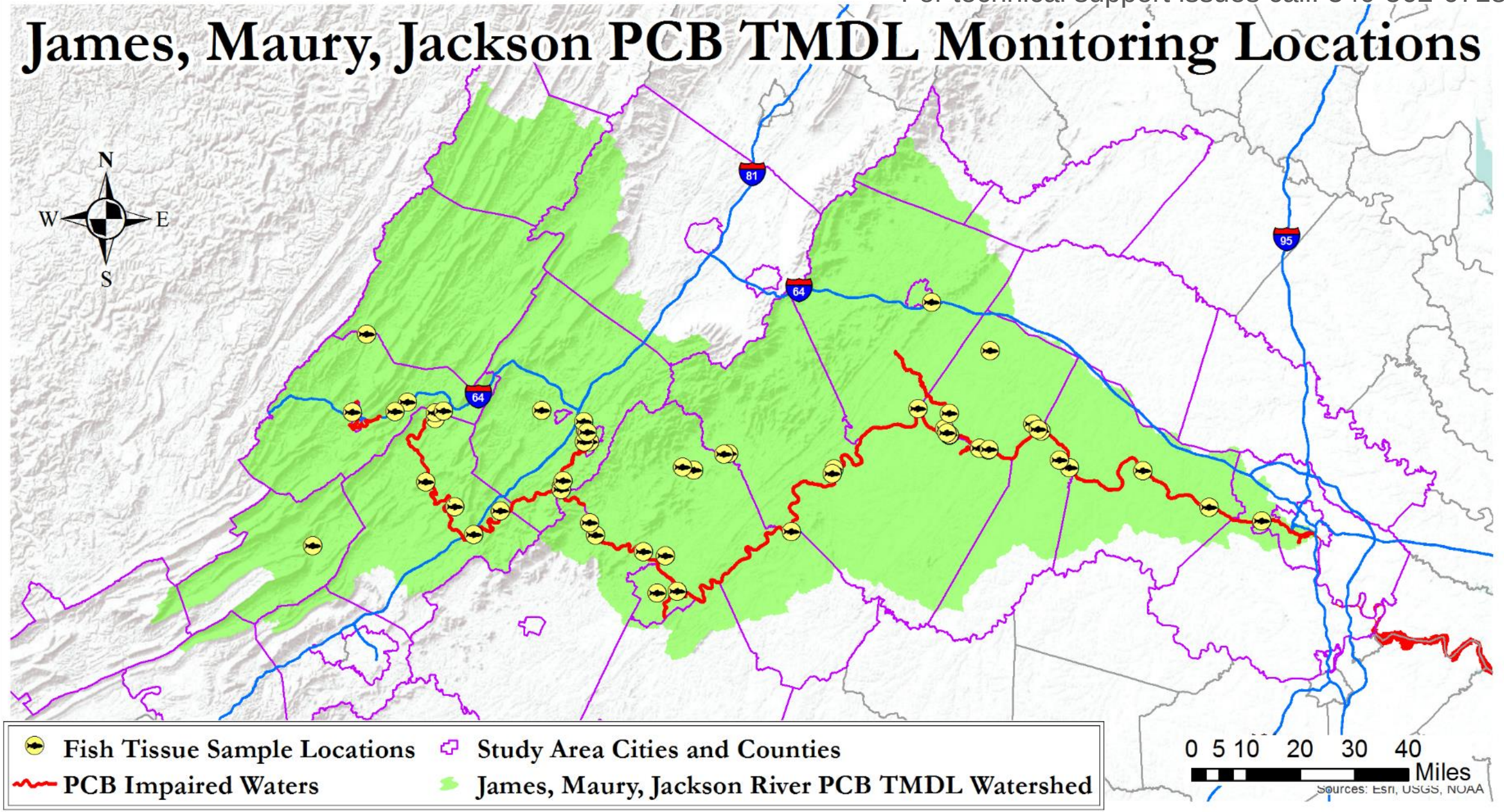
- Fish impairments based on human health concerns
  - Fish consumption significant exposure pathway
    - Suspected carcinogen (EPA)
      - **International Agency on Research for Cancer upgraded to carcinogen**
    - Immunotoxicity, reproduction and development, nervous system, hepatotoxicity (liver), etc.
- Persistent, bioaccumulates at a low conc. (ppq) & biomagnifies



DEQ Fish Tissue Monitoring

- Monitor to assess the “Fishable” Goal of the Clean Water Act - 305(b)
- Target lipophilic or “fat loving” contaminants that accumulate in tissue
  - PCBs, Pesticides, Mercury, etc.
- Compare to trigger values (protect human health)
  - Listed on impaired waters list

James, Maury, Jackson PCB TMDL Monitoring Locations



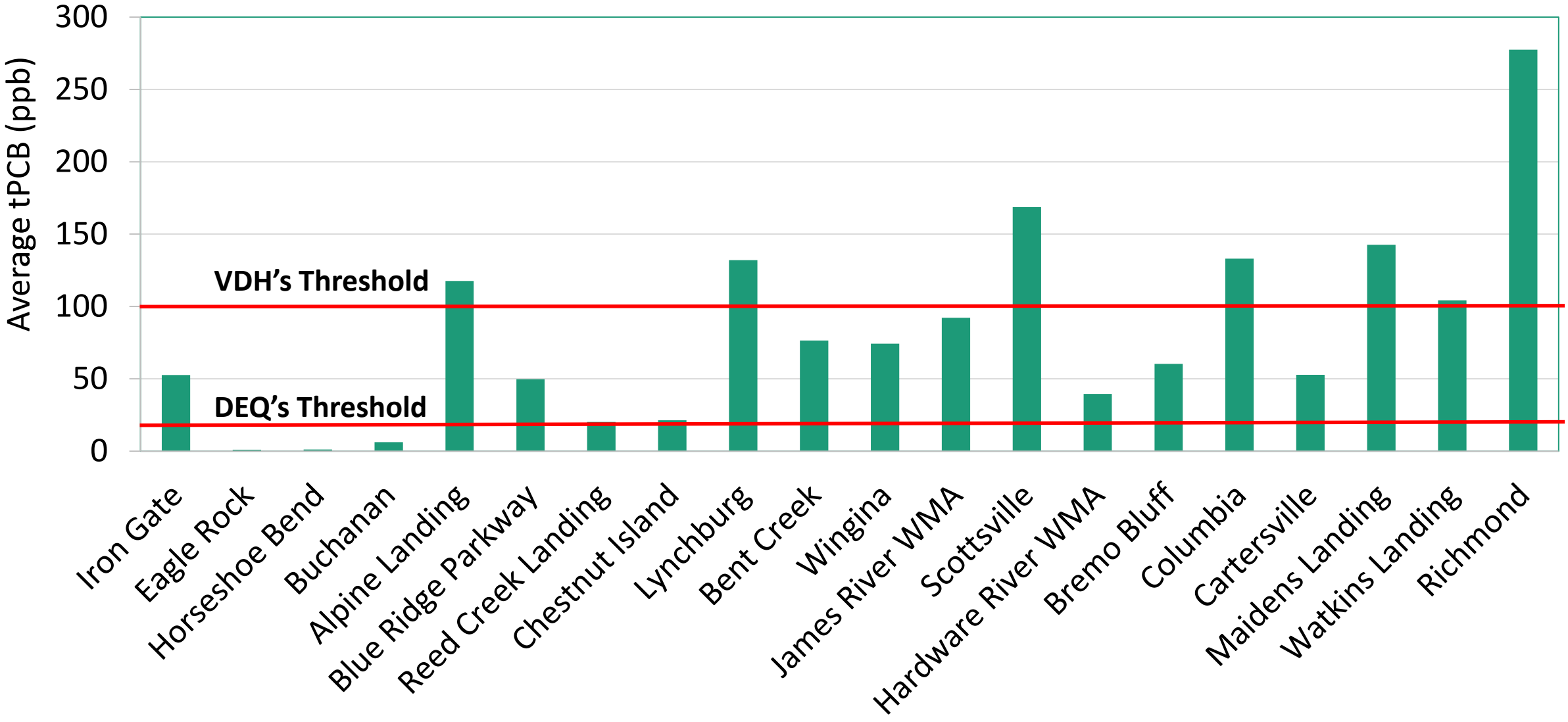
VA Water Quality Criterion – Total PCBs

Agency	Fish Tissue Threshold (ppb)	WQC (ppq)
VDH	100 (Fish Consumption Advisory)	- -
DEQ	18 (Screening Value)*	640

- DEQ's Water Quality Assessment (Integrated Report)
  - VDH - Consumption Advisory = impairment
  - DEQ - two or more fish samples exceed screening value at a site or two water samples exceed criterion at a site = impairment

*From DEQ's 2022 Draft Water Quality Assessment Guidance Manual

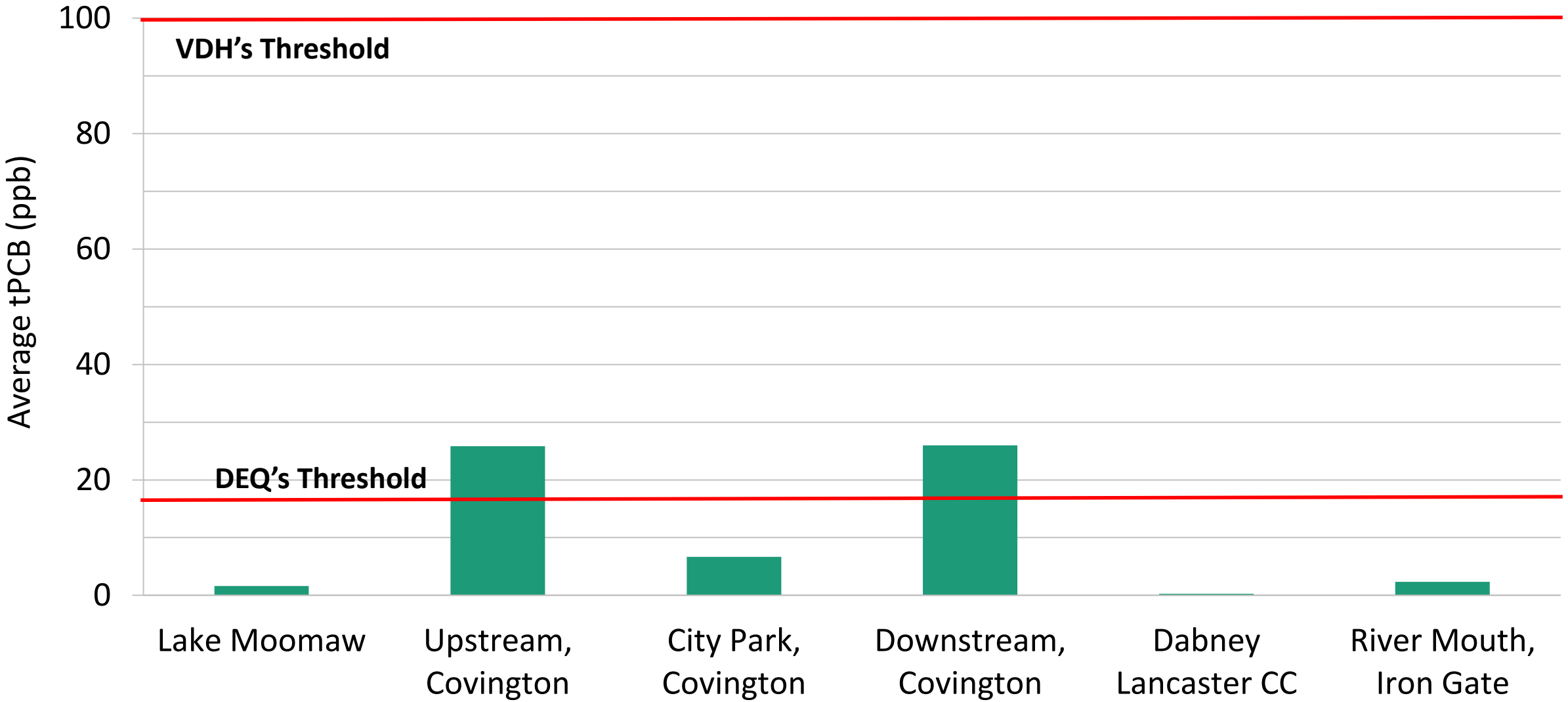
Average James River Fish Tissue Concentrations (1995-2019)*



*Note, all distances between sites are not equal

DEQ

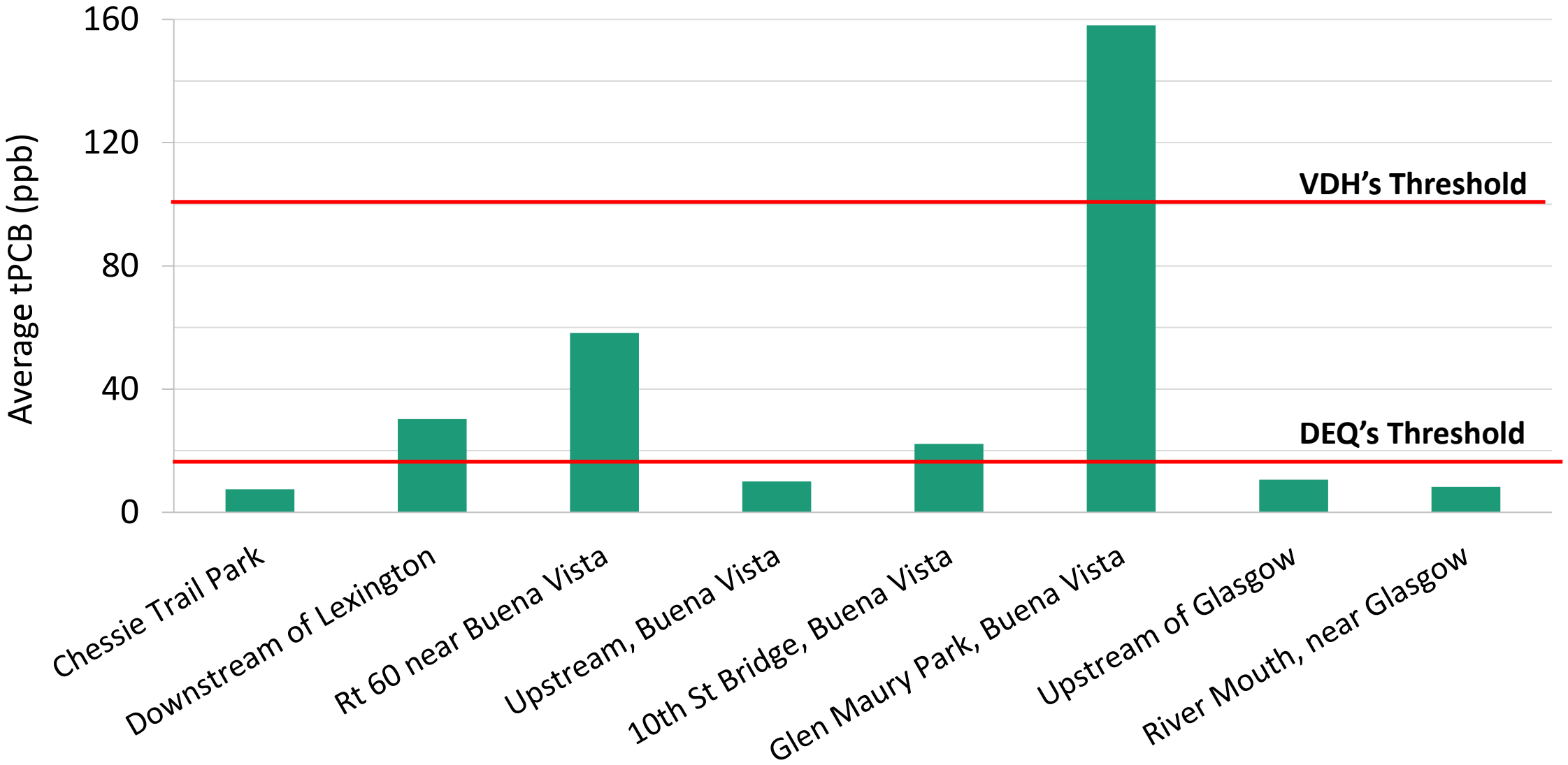
Average Jackson River Fish Tissue Concentrations (1995-2017)*



*Note, all distances between sites are not equal

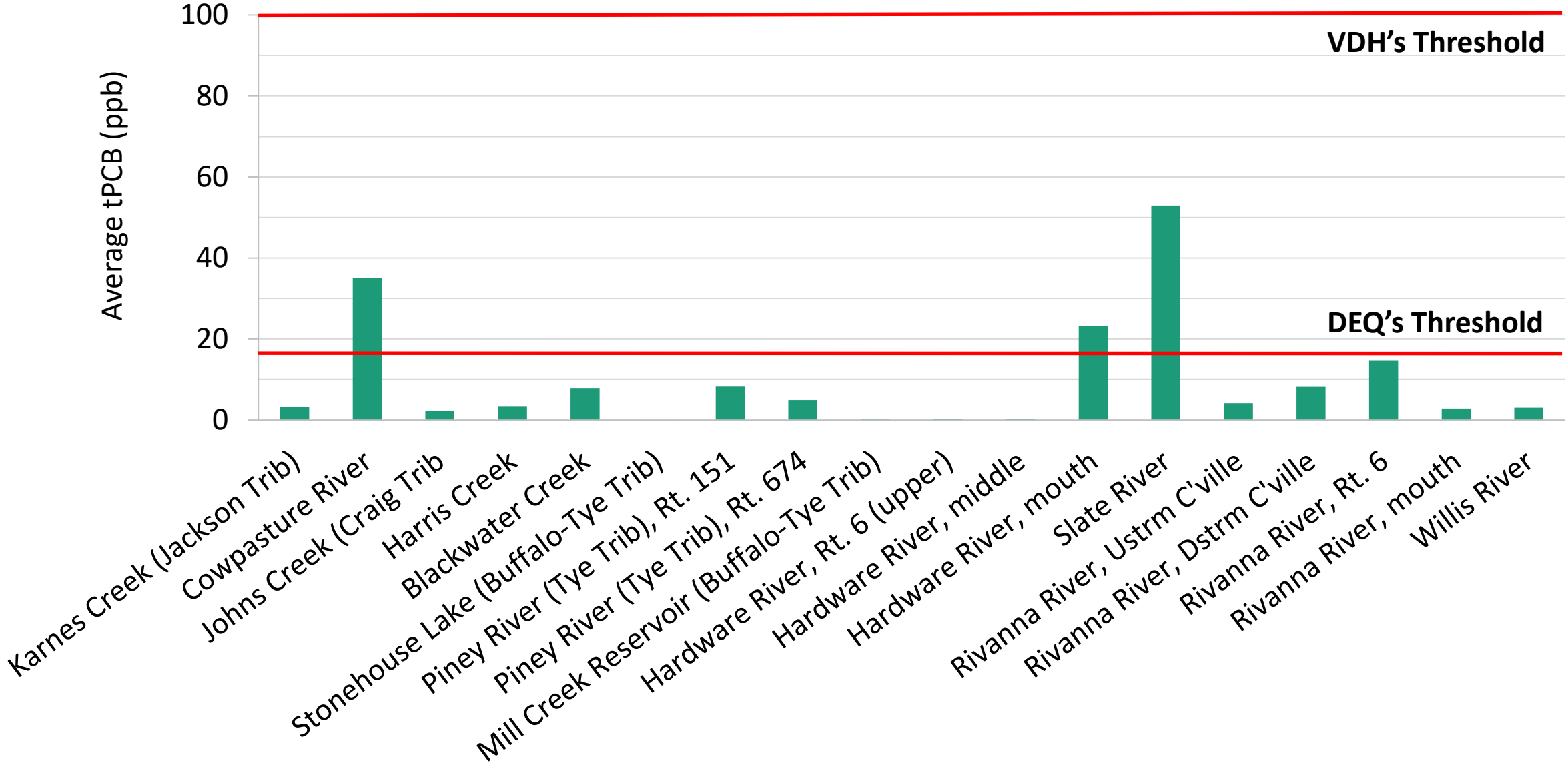
DEQ

Average Maury River Fish Tissue Concentrations (1995-2019)*



*Note, all distances between sites are not equal

Average James River Fish Tissue Concentrations in Other Tributaries (1995-2018)*



*Note, tributaries are arranged from upstream to downstream

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Problem Identification

VDH Fish Consumption Advisories*

Affected Water Body Boundaries	Affected Localities	Listing Year	Species	Advisory description
Upper James River from the head of the James near Iron Gate to Balcony Falls Dam downstream of Glasgow	Botetourt County and Rockbridge County	2020	Carp	≤2 meals/month
Maury River from Buena Vista at Rt. 60 16 miles to James River	Rockbridge County and Buena Vista City	2004	Redbreast Sunfish, Rock Bass, Yellow Bullhead Catfish, Carp	≤2 meals/month
James River from Big Island Dam to I-95 James River Bridge in Richmond.	Amherst County, Bedford County, Lynchburg City, Campbell County, Appomattox County, Nelson County, Buckingham County, Albemarle County, Fluvanna County, Cumberland County, Goochland County, Powhatan County, Henrico County, Chesterfield County, Richmond City	2004	Gizzard Shad, Carp, American Eel, Flathead Catfish, Quillback Carpsucker	≤2 meals/month

http://www.vdh.virginia.gov/environmental-health/public-health-toxicology/fish-consumption-advisory/

***Does not affect swimming**

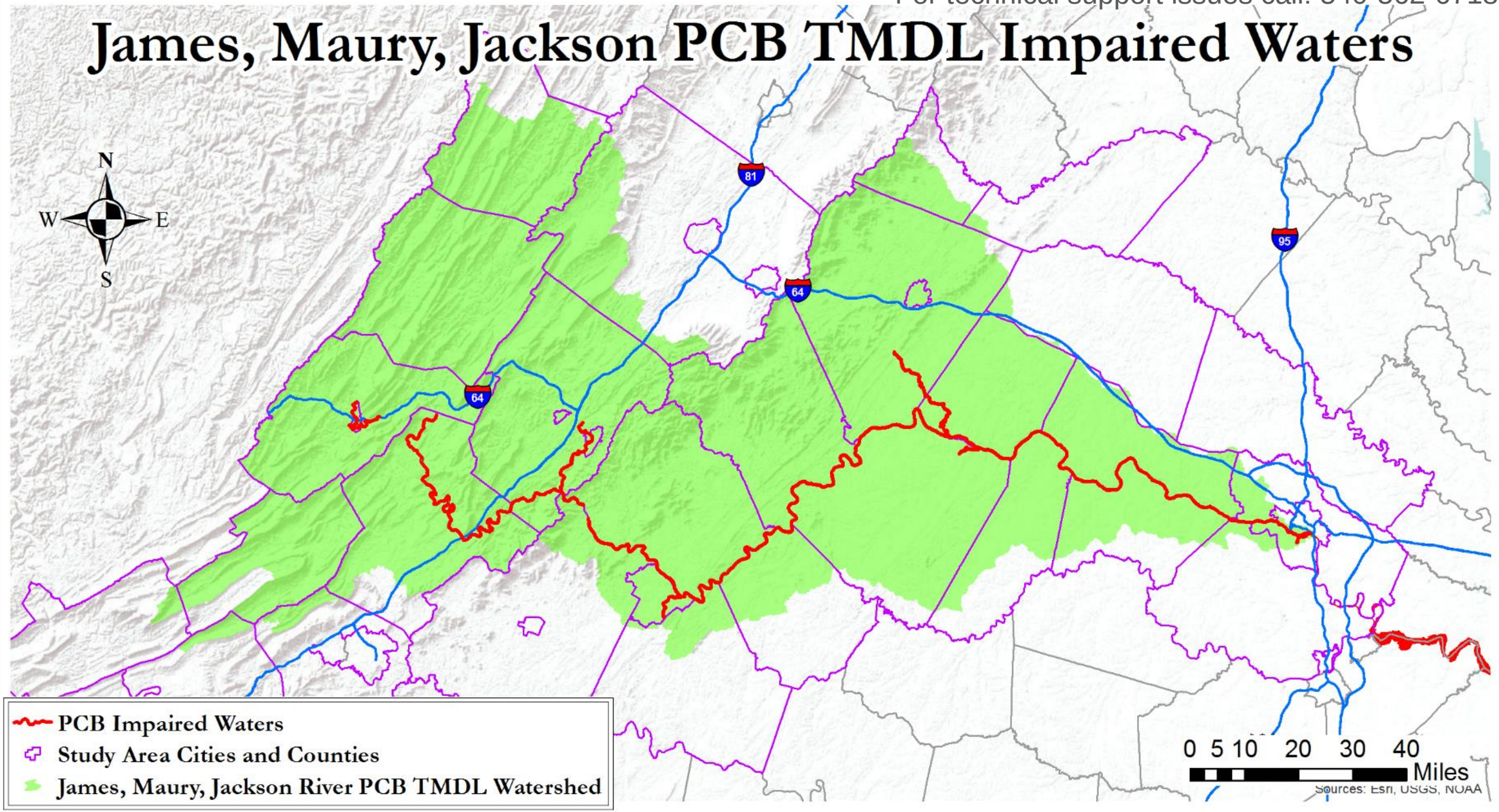
Problem Identification

Additional PCB Impairments Identified by DEQ*

Affected Water Body	Affected Localities	Listing Year	Length
Reedy Creek	City of Richmond	2020	1.08 mi
Fishing Creek	City of Lynchburg	2020	6.32 mi
Slate River	Buckingham County	2008	3.88 mi
Hardware River	Fluvanna and Albemarle counties	2008	23.24 mi
Jackson River	City of Covington and Alleghany County	2008	12.63 mi

***Does not affect swimming**

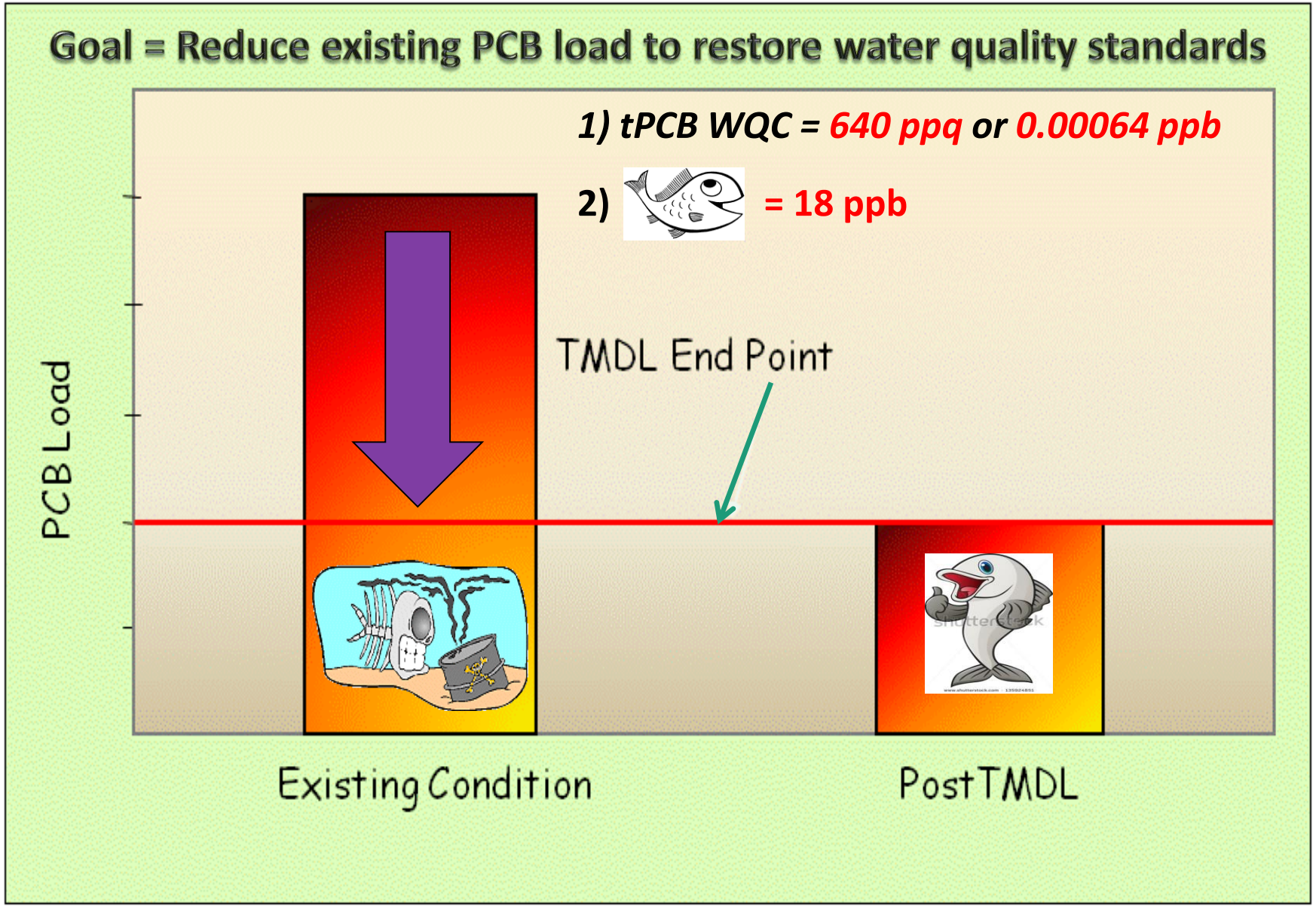
James, Maury, Jackson PCB TMDL Impaired Waters



VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

The TMDL Development Process

An Example TMDL



The TMDL Development Process

For technical support issues call:
540-562-6718

Completed → **Identify Problem**
- Fish Consumption Advisory
- Watershed Monitoring

Low Level PCB Analysis

Under Way → **Develop Numeric Targets**

Under Way → **Source Assessment**
- Identify sources
- Estimate source loading

To be Completed → **Models the watershed**
- Existing condition
- Estimate total loading capacity

To be Completed → **TMDL Allocations**
- Reduce loads from point sources
- Divide remaining loads among sources

TMDL = WLA + LA + MOS

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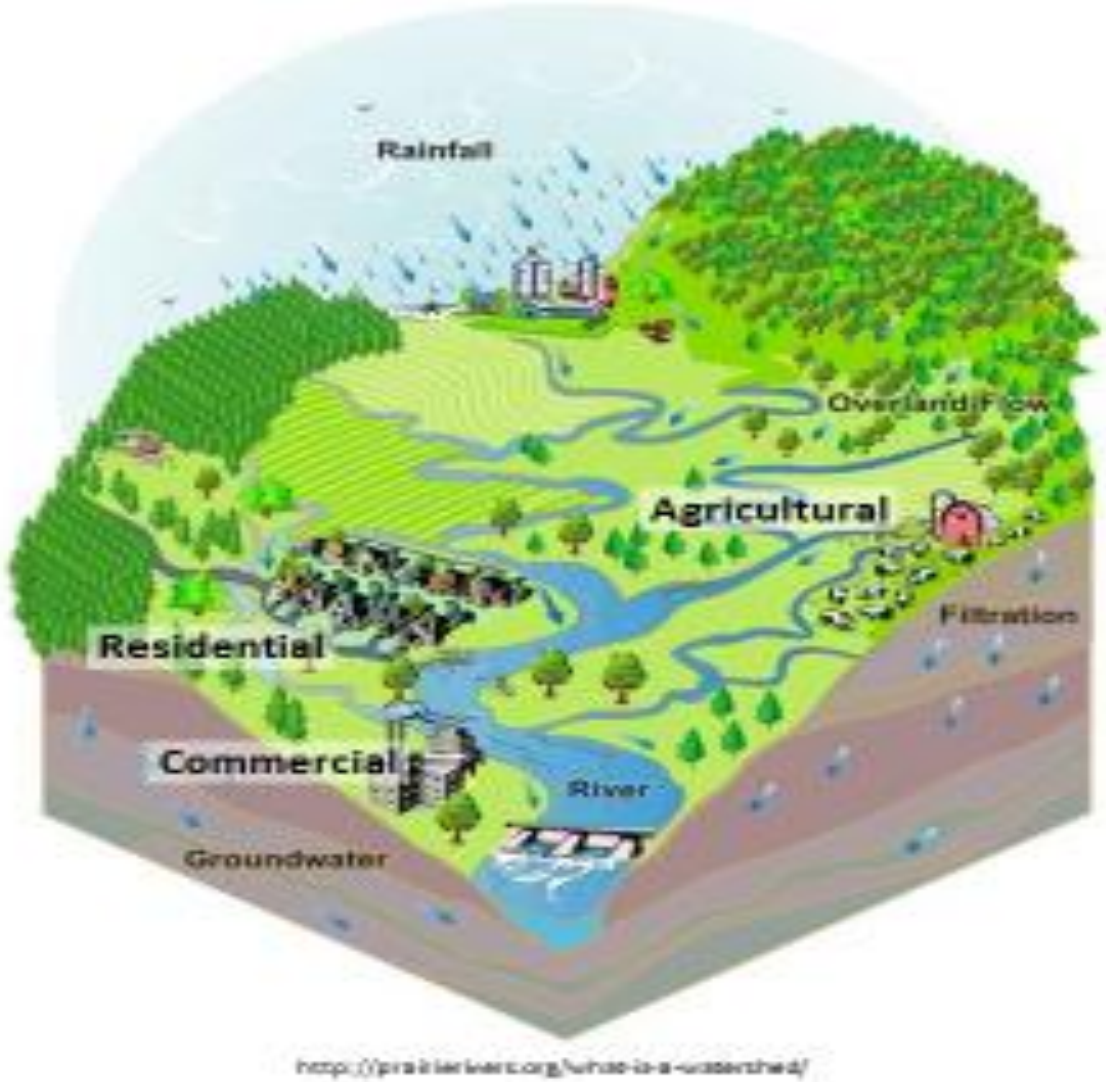
What is a model?

A computational representation of a watershed used to simulate pollutant origin, transport, and fate

The model is developed in three Steps:

1. Model Construction
2. Calibration
3. Validation



VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

The TMDL Development Process
DEQ TMDL Sampling Approach

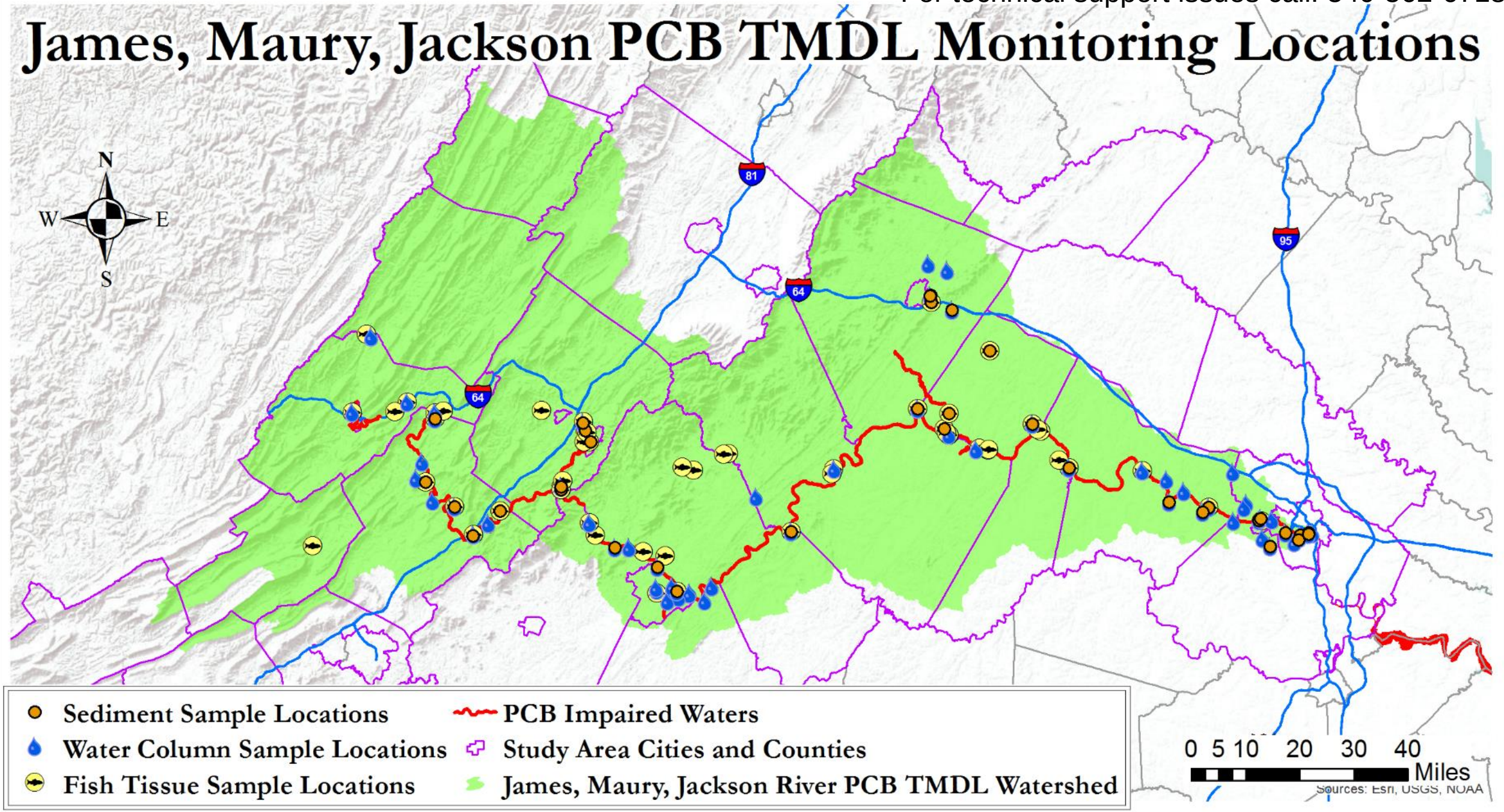
DEQ TMDL Sampling Approach

2017 – 2019

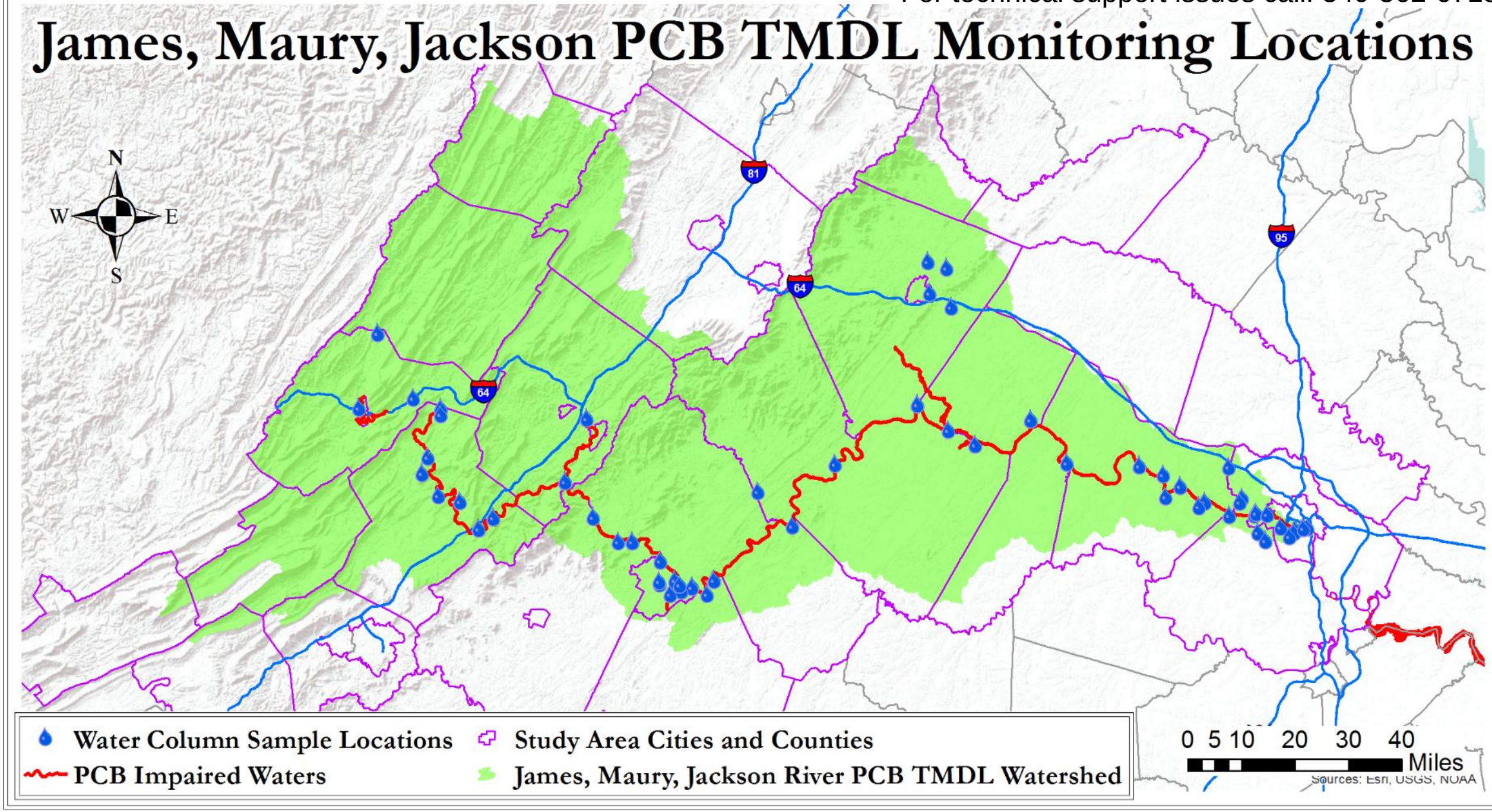
- Source identification
- TMDL model support
  - Calibration/validation
- 2017 – 2019 fish tissue, water column, sediment, flow
  - Fish tissue (n = 93)
  - Water column samples: High and Base Flow (n = 157)
  - Sediment samples (n = 26)

For technical support issues call: 540-562-6718

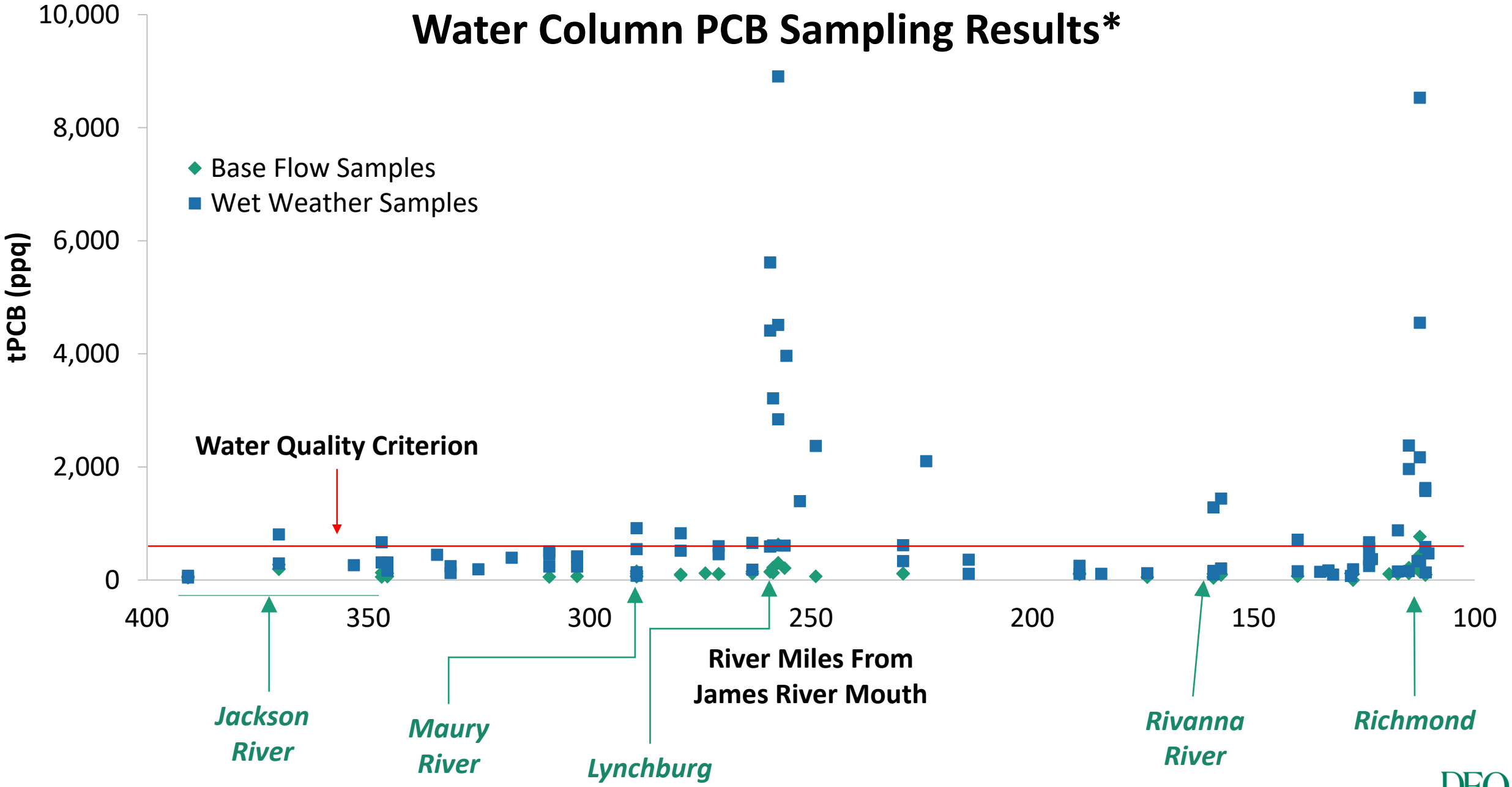
James, Maury, Jackson PCB TMDL Monitoring Locations



For technical support issues call: 540-562-6718



Water Column PCB Sampling Results*



*Tributaries are included where they flow into the James River

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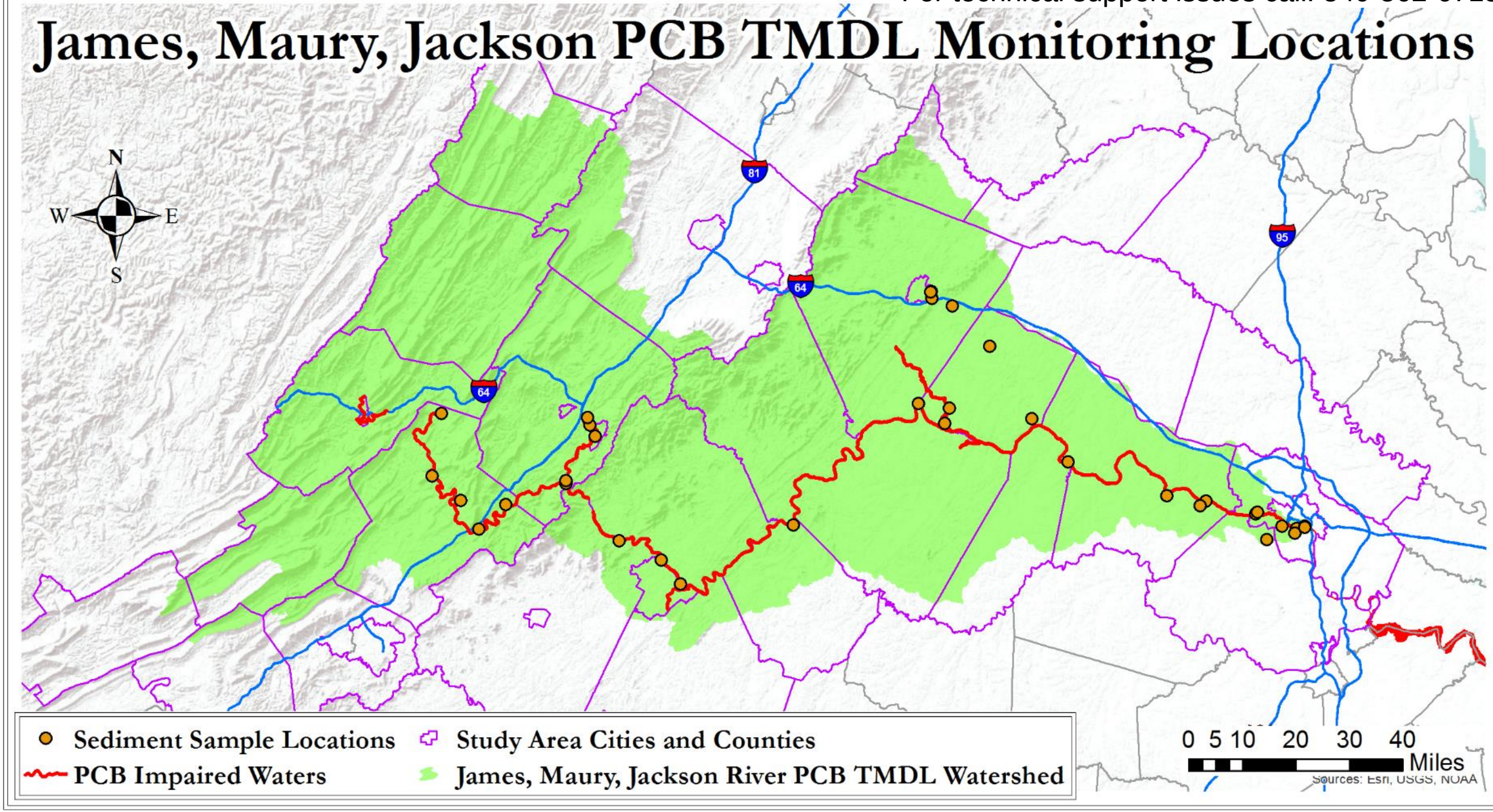
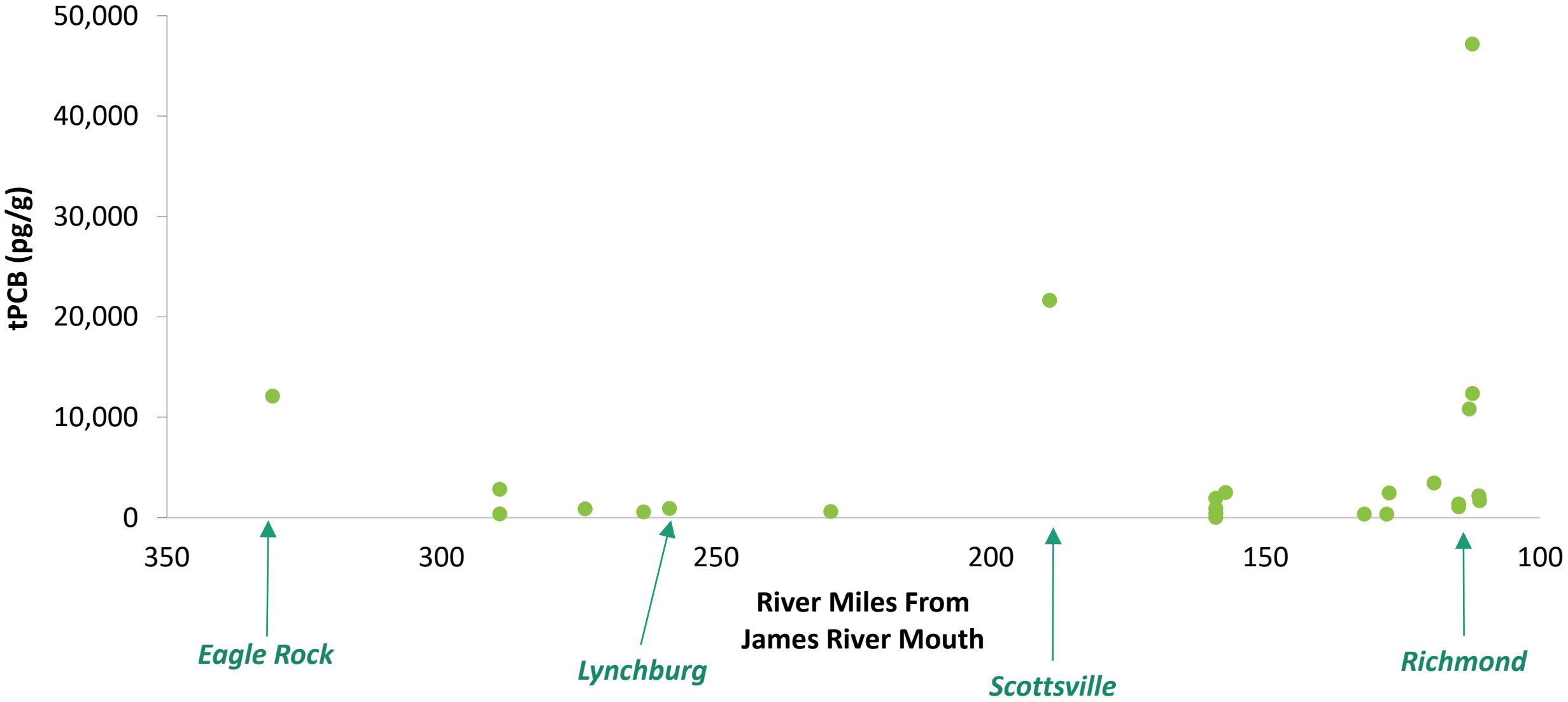
For technical support issues call: 540-562-6718



Sediment PCB Sampling Results



*Tributaries are included where they flow into the James River

The TMDL Development Process
Sources Considered in PCB TMDL Development

Poll Question: How do you think PCBs make it into the water? (select all that apply)

- Runoff from nonpoint sources (e.g., contaminated sites)
- Point source discharges (e.g., wastewater from industry)
- From the atmosphere (e.g., in rain water)
- From the sediments at the bottom of the river or stream

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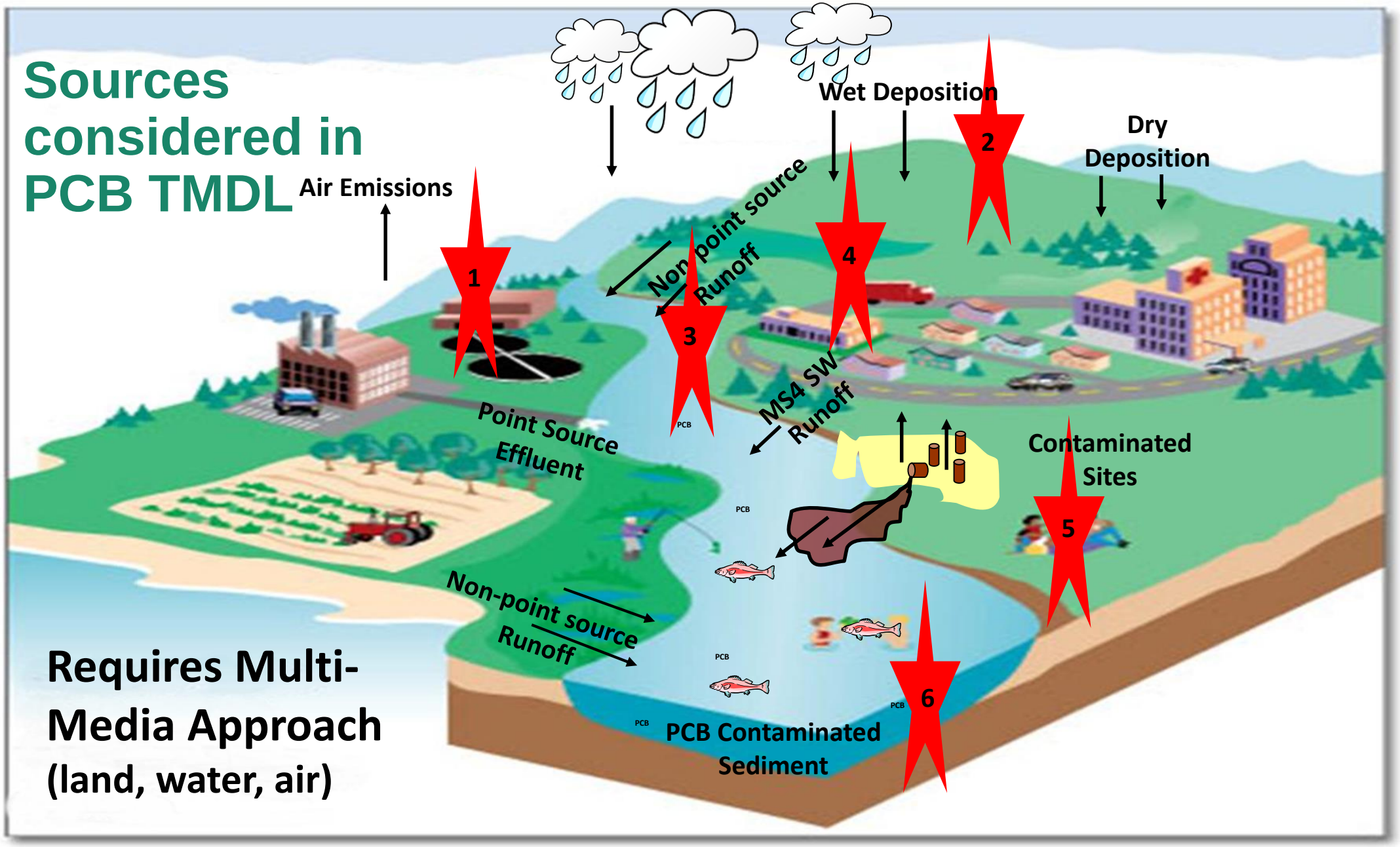
Sources considered in PCB TMDL



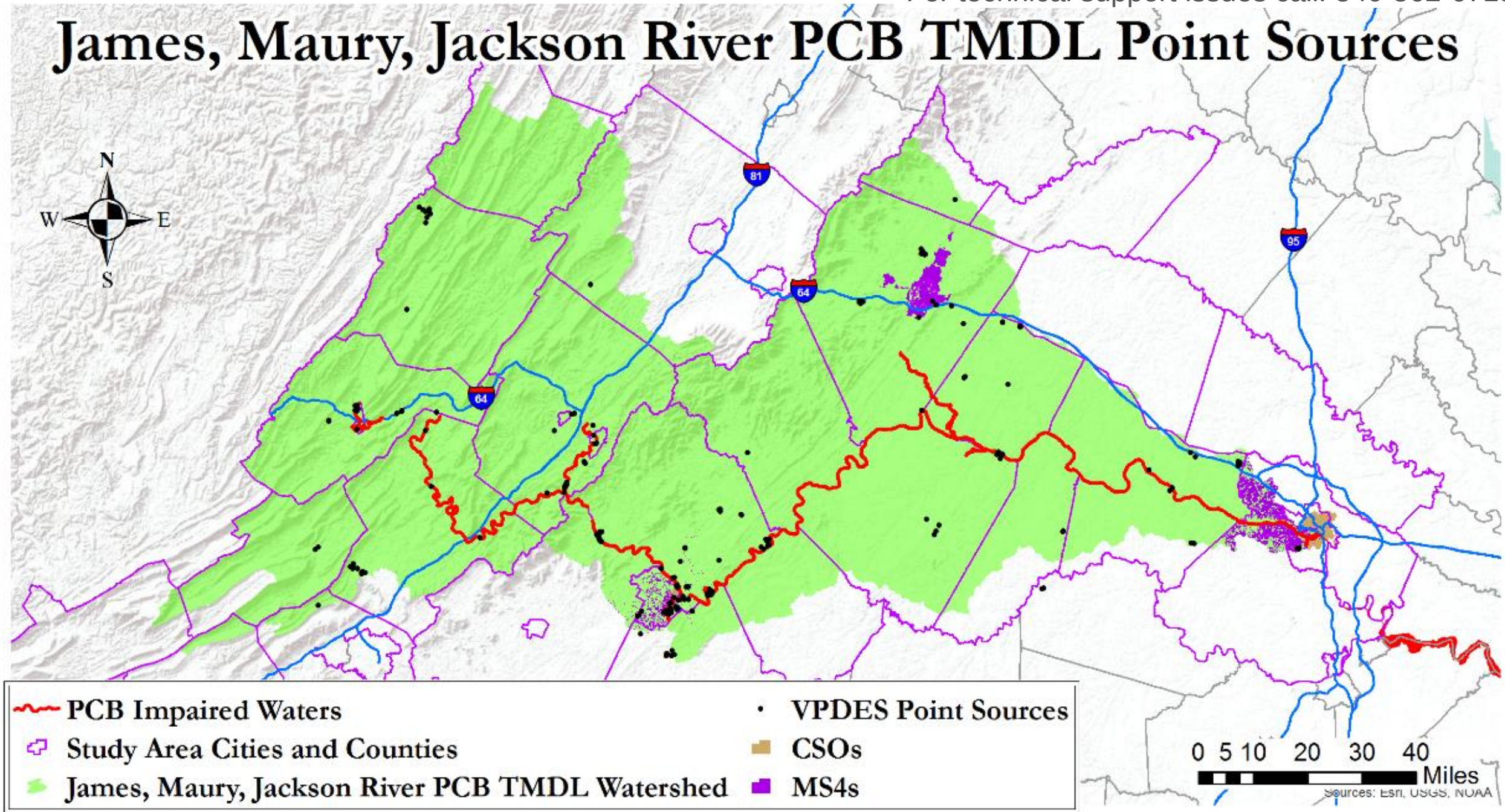
Requires Multi-Media Approach (land, water, air)

TMDL Source Category – Point Sources

- VPDES Permitted facilities
  - Municipal WWTP (n=26)
    - Including two CSOs
  - Industrial sources (n=73)
    - Selected based on Standard Industrial Classification (SIC)
      - Individual Industrial Facilities
      - Industrial Storm Water General Permitted Facilities
  - Municipal Separate Storm Sewer System (MS4; n=11)

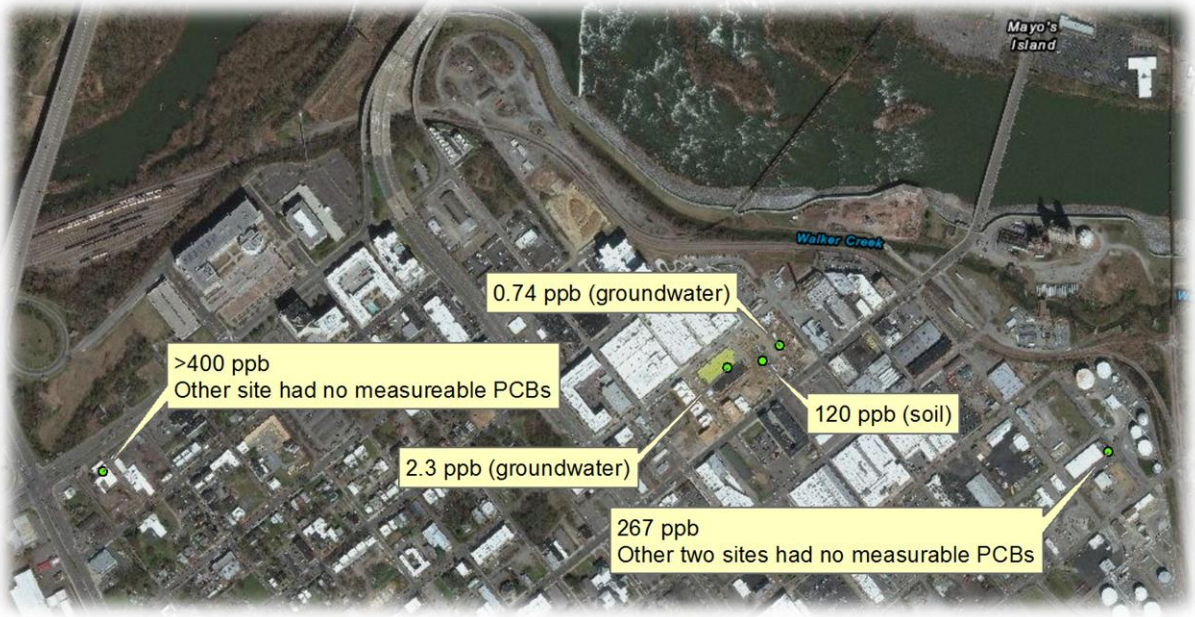
For technical support issues call: 540-562-6718

James, Maury, Jackson River PCB TMDL Point Sources



TMDL Source Category - Contaminated Sites

- TSCA (PCB Clean-up Sites)
- RCRA Corrective Action Facilities, CERCLA
- Former Manufacturing Facilities (EPA Emergency Response)
- Brownfields (w/ PCB contamination)*
- Voluntary Remediation Sites*
- Rail Yards/Spurs*
- Miscellaneous spill sites*
- Electric Utility Transformer Pads*



*Exist in study area

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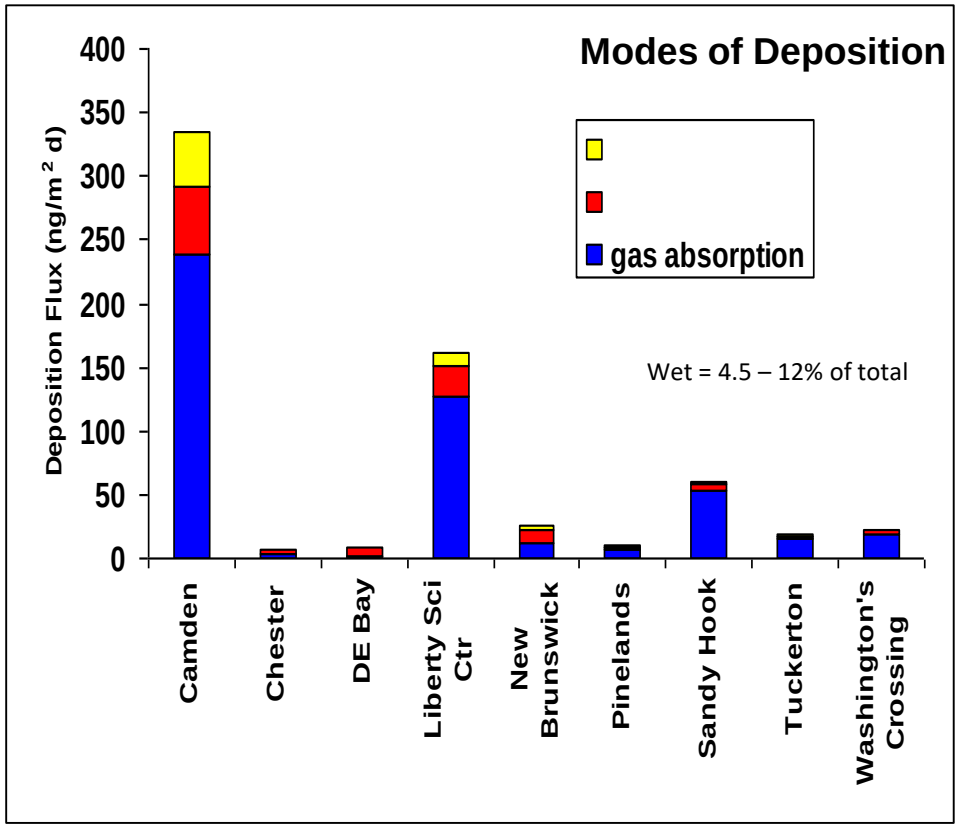
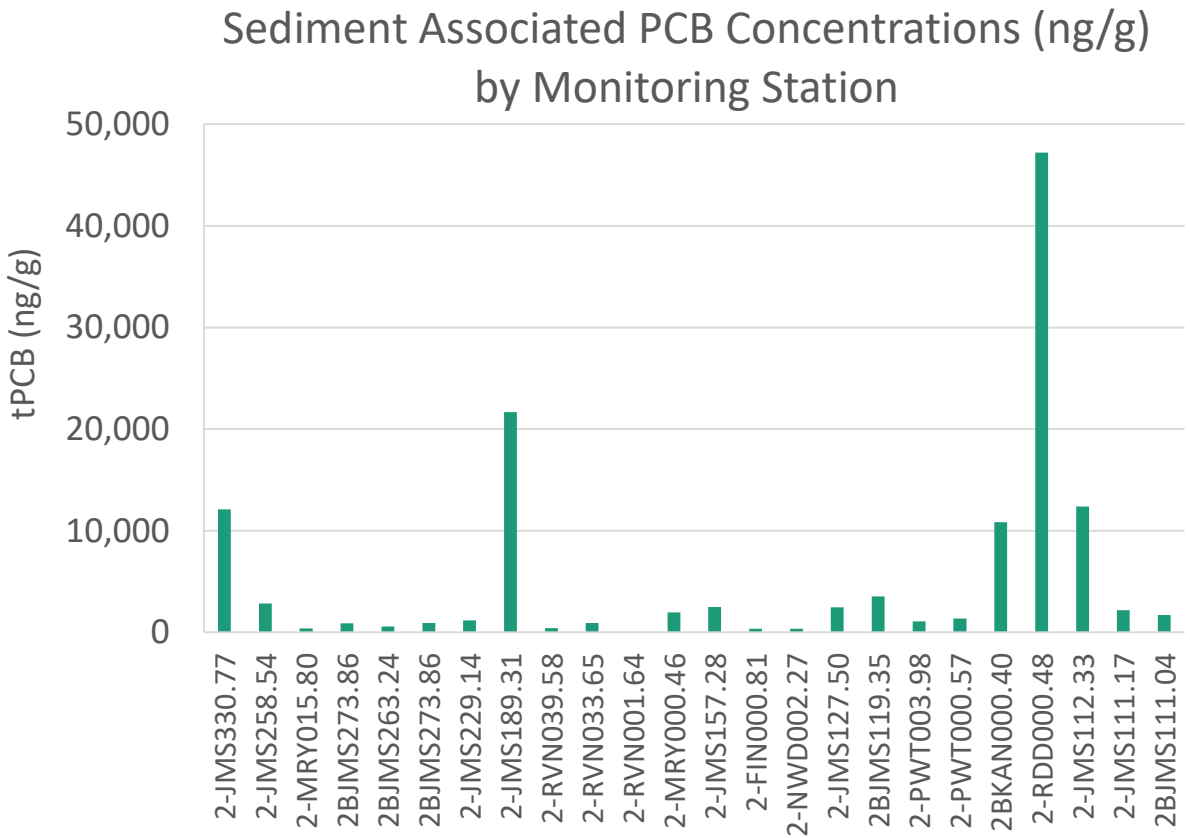
TMDL Source Categories

- Atmospheric Deposition (example)



Rodenburg (Totten), L. A. et al., 2007. Rutgers University

- Contaminated Sediment



DEQ

TMDL Development Timeline

Anticipated Timing	Portion of TMDL Development Process
Winter 2021	Project Kick-off
Throughout 2021	TMDL Model Development
	Source Assessment
	TMDL endpoint selection
	TMDL allocation scenarios
Winter 2022	Present Draft TMDL Report
Summer – Fall 2022	State Water Control Board and EPA Approval
Starting After EPA Approval	TMDL Implementation Permit requirements begin in the next permit cycle

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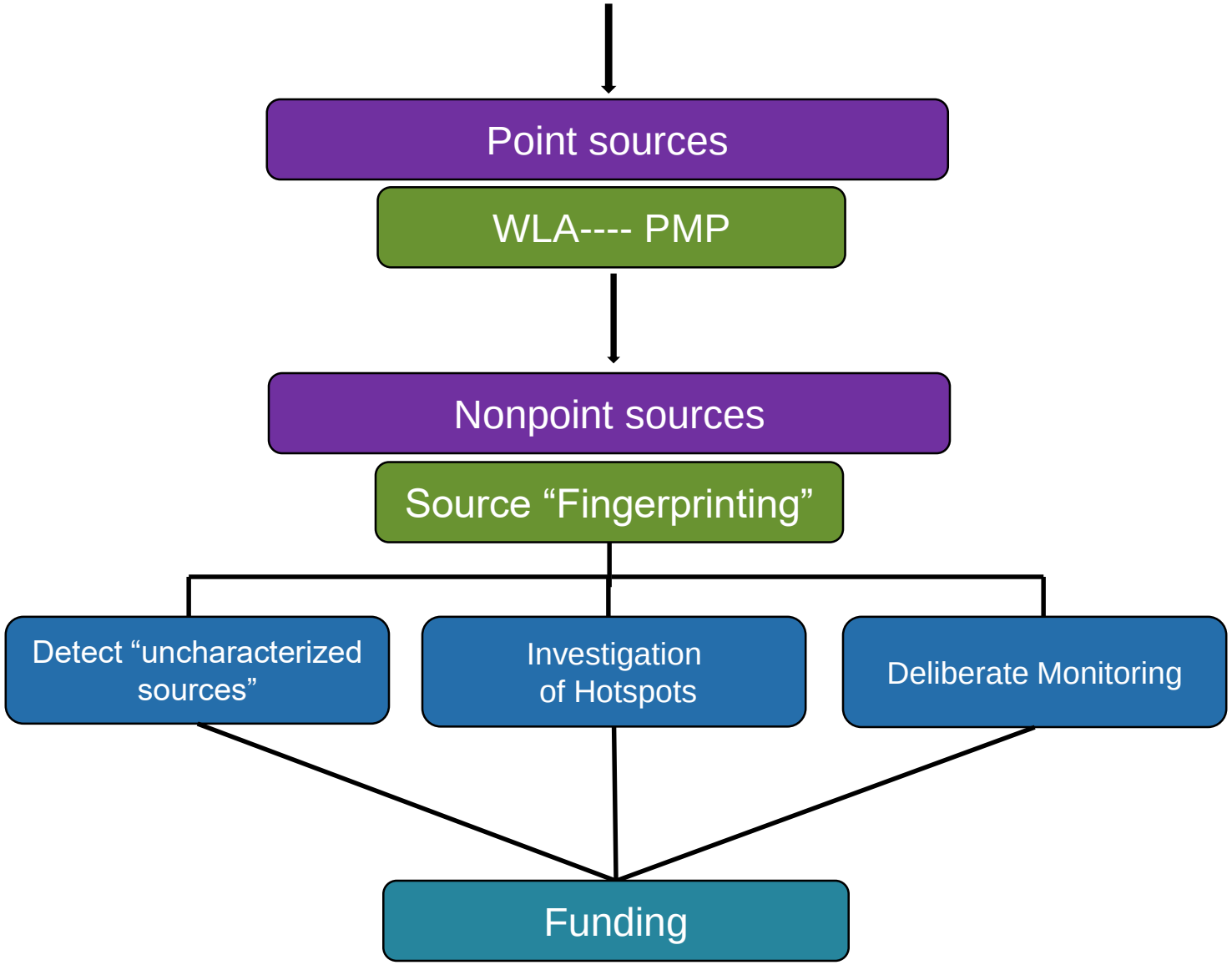
TMDL Implementation

For technical support issues call: 540-562-6718

Implementation Process



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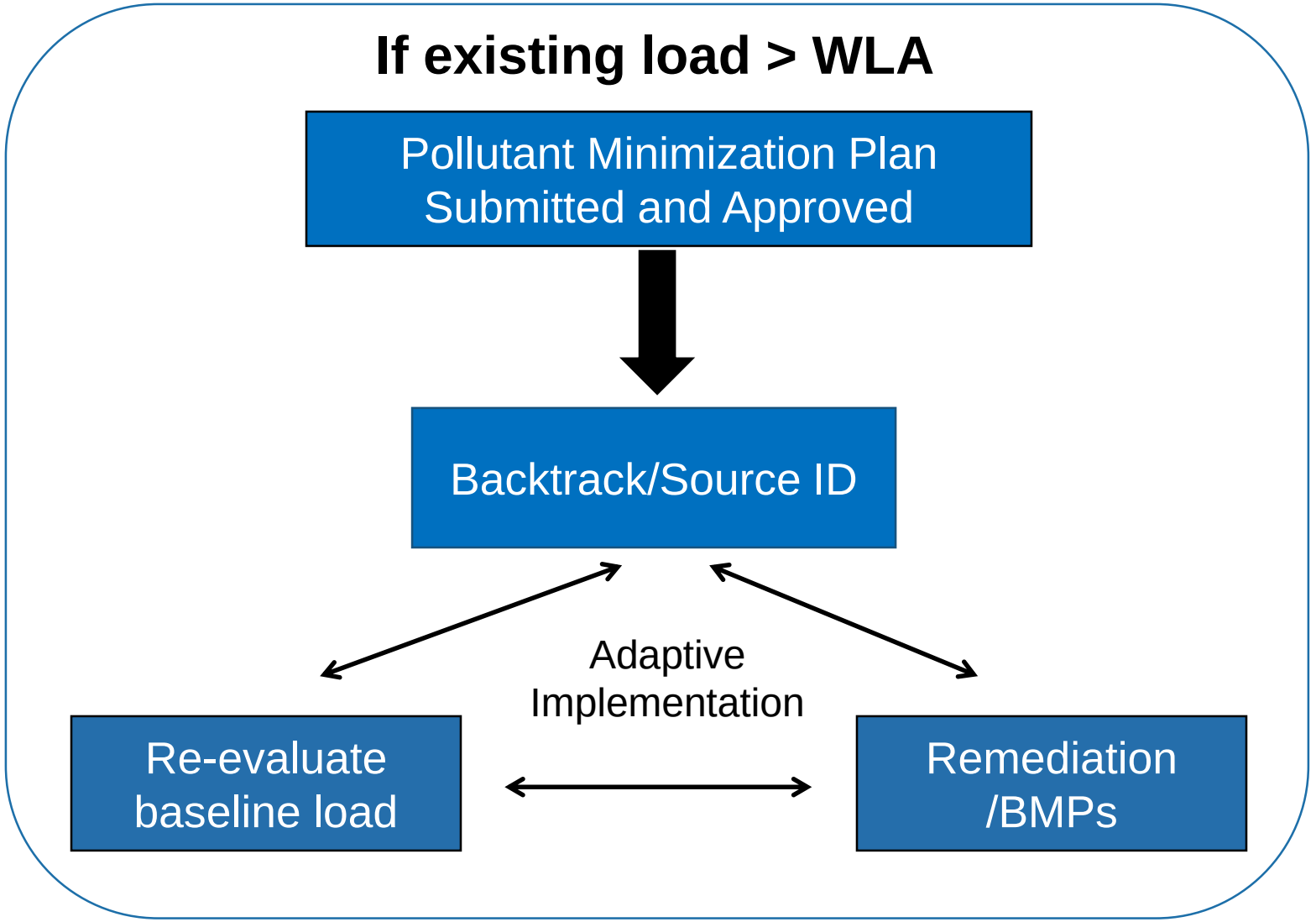
VPDES Point Sources (MS4): Action Plan

For technical support issues call: 540-562-6718



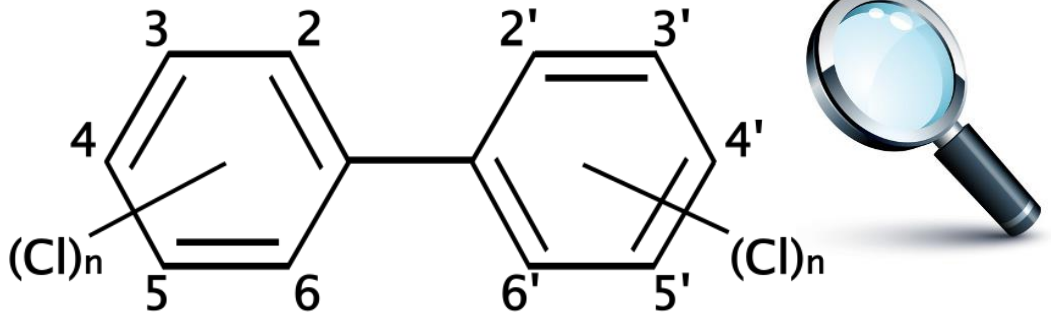
TMDL - Contaminated Sites

- Clean-up standards for land based contaminated sites have no relationship to PCB water quality criterion
  - *Often the PCB clean-up level is 1 ppm*
  - Voluntary, lower clean-up standards and/or engineering approaches can achieve desired results

- How about PCB contaminated runoff that leaves the site?
  - May migrate through MS4s
  - May flow directly into waterbodies

Point Source/Nonpoint Source:

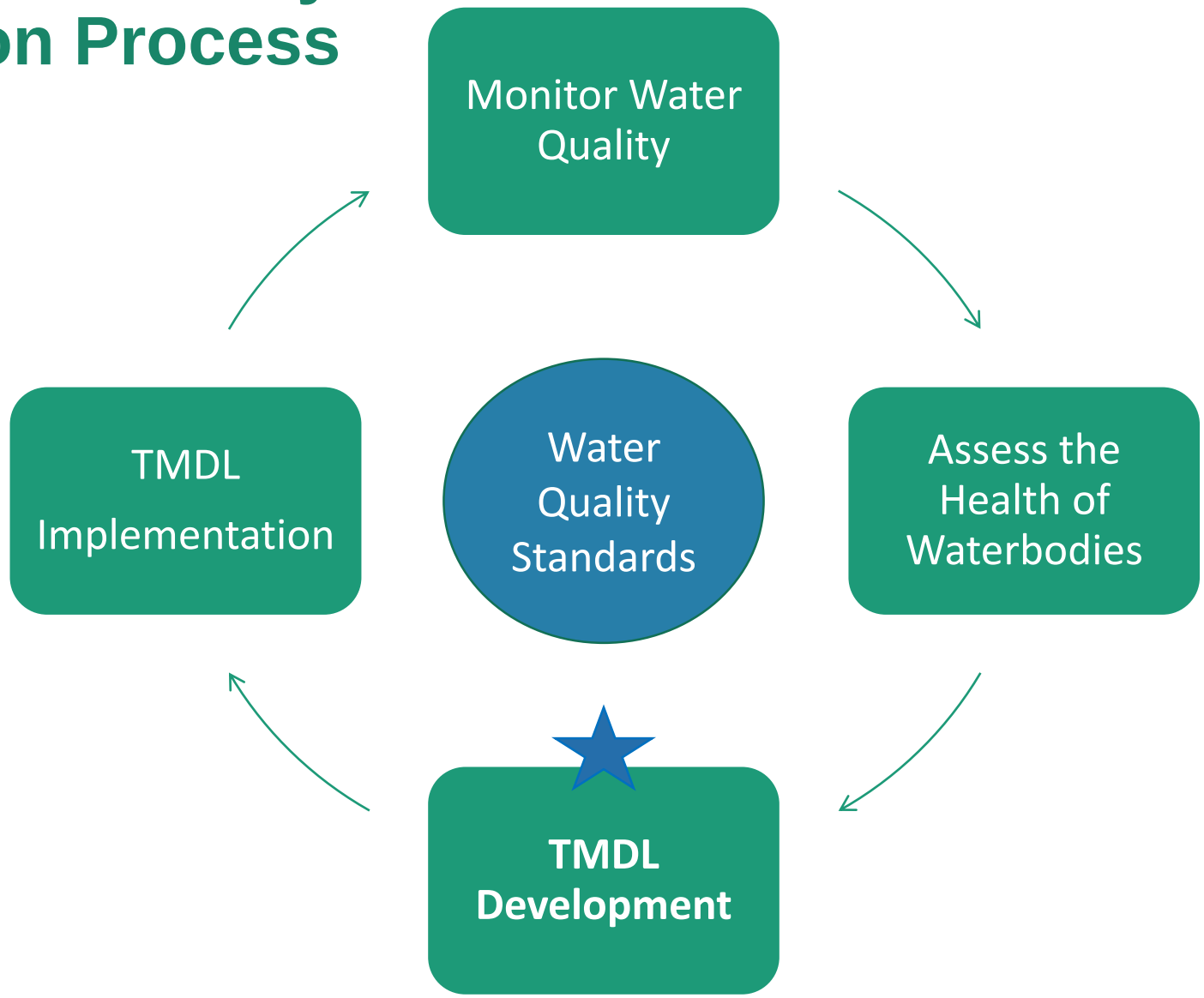
"Fingerprinting"



<u>Objective</u>: To identify a specific pattern or "fingerprint" of congeners that could be indicative of a pollution source

1. **# of fingerprints in the system**
2. **Chemical composition in each fingerprint**
3. **Contribution of each fingerprint in each sample**

DEQ's Water Quality Restoration Process



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Next Steps

- Please join us for the first Technical Advisory Committee Meeting
  - February 24, 2021 at 3:00 p.m., Virtual meeting – GoToMeeting
- Virtual Meeting Comment Form
- Public Comment Period
  - January 13, 2021 – February 11, 2021
  - Written comments may be sent to:
    Will Isenberg, VADEQ
    P.O. Box 1105
    Richmond, 23218
    William.Isenberg@DEQ.Virginia.gov

Overall: William.Isenberg@DEQ.Virginia.gov
Blue Ridge: Lucy.Smith@DEQ.Virginia.gov
Piedmont: Jennifer.Rogers@DEQ.Virginia.gov
Valley: Nesha.McRae@DEQ.Virginia.gov

Questions?