MDE Fish Tissue Monitoring Program

Maryland's Fish Tissue Monitoring Program-Basis for Listing

- Collect and analyze fish tissue from waters of the state, including tidal bodies.
- Analytes include metals, pesticides, methyl mercury, and PCB's.
- Results used to generate fish tissue consumption advisories.
- Areas with consumption advisories **(<4 meals/month.)** are listed on States 303(d) list.

Monitoring Network Design and Rationale

- Since its inception in 1977, the core fish tissue sites have expanded to 60.
- Sites are located upstream and downstream of selected land use areas and proximity to potential areas of development.
- Selected stations include both “problem” areas and “clean” areas of interest, including surface water intakes, recreational areas and commercial fishing and shell fishing areas

Monitoring Network Design and Rationale

- Expanded in 1988 to achieve more efficient statewide coverage
- Divided into three regions, each to be sampled in successive years
  - 1) Western Maryland Watersheds 2) Chesapeake Bay Watersheds and 3) Baltimore/Washington Urban Watersheds
- Additional stations were added as necessary to meet additional management needs, (e.g. TMDL, special projects)

Monitoring Network Design and Rationale

- In 2008, the three year cycle was increased to five years to allow room for new stations to be added each year
  - Implemented to better address data gaps related to public safety issues, Total Maximum Daily Load (TMDL) implementation, or 303(d) listing.
  - This breaks down to 60% core and 40% “other” each year (approximately 20 sites total).
  - Core Regions-Western Bay Tribs, Eastern Shore, Harbors and Bay, Metro, Western MD

Sampling Procedure

- Fish are collected by various means
  - Electro-shocking, otter trawl, drift nets, trotlines, hook and line
- Fillet samples- both skin on and skin off, depending on species
- Composite samples- five fish of same species and size class (within 75% length of largest fish)
- Each fish is weighed to the nearest 0.1 gram and measured to the nearest 0.5 cm

Filleting Fish for Analytical Laboratory

1. Take both halves as fillets unless very large fish (i.e., striped bass, >5 lb catfish)

2. Rinse/wash knife and cutting board between all composites with ethanol and deionized water.

Keep ribs and skin after scaling	**Remove skin and ribs**
Sunfish	Largemouth Bass
Striped Bass*	Smallmouth Bass
White Perch	Catfishes
Yellow Perch	Eel
Spot	White Sucker
Croaker	Walleye
Weakfish	Chain Pickerel
Bluefish	Flounder
Trout	
Fallfish	
Black Sea Bass	

updated 02/03/09

*MDE may elect to skin these fillets as most anglers do but may retain the skin to be more protective

Mercury Advisory Thresholds

General Population		Children/Women of Childbearing Age
No Limit= 8/Month	< 127.50 ng/g	< 64.87 ng/g
303 (d) Listing	300.00 ng/g	N/A
7 Meals/Month	145.8 ng/g	74.139 ng/g
6 Meals/Month	170.009 ng/g	86.495 ng/g
5 Meals/Month	204.012 ng/g	103.795 ng/g
4 Meals/Month	255.02 ng/g	129.7 ng/g
3 Meals/Month	340.01 ng/g	172.99 ng/g
2 Meals/Month	510.03 ng/g	259.5 ng/g
One Meal/Month	1019.97 ng/g	518.92 ng/g
1 Meal/Every Other Month	<2039.94 ng/g	<1037.84 ng/g
Avoid	>2039.94 ng/g	>1037.84 ng/g

PCB Advisory Thresholds

General Population		Children/Women of Childbearing Age
No Limit= 8/Month	<21.25 ng/g	< 18.53 ng/g
303 (d) Listing	39.00 ng/g	N/A
7 Meals/Month	24.30 ng/g	21.17 ng/g
6 Meals/Month	28.32 ng/g	24.72 ng/g
5 Meals/Month	34.00 ng/g	29.65 ng/g
4 Meals/Month	42.50 ng/g	37.1 ng/g
3 Meals/Month	56.67 ng/g	49.5 ng/g
2 Meals/Month	85.00 ng/g	74.1 ng/g
One Meal/Month	169.99 ng/g	148.27 ng/g
1 Meal/Every Other Month	<339.99 ng/g	<296.54 ng/g
Avoid	>339.99 ng/g	> 296.54 ng/g

Choptank River

- Currently the lower tidal Choptank River is listed for PCB's on the 303 (d) List (e.g. catfish tissue concentrations are >39ug/g).

Maryland Fish Consumption Advisories

Statewide Fresh Water, Estuarine and Marine Waters

Recommended Meal Size: 8 oz - General Population and Women; 3 oz Children

NOTE: Consumption recommendations based on spacing of meals to avoid elevated exposure levels

1 **Women** = of childbearing age (women who are pregnant or may become pregnant, or are nursing)

2 **Children** = all young children up to age 6

♥ = Fish contains more than 1g beneficial fatty acids in a fillet the size of 2 decks of cards

Contaminant present in fish: * Mercury Δ PCBs + Pesticides

Species	Waterbody	Recommended Meals/Month		
		General Population	Women [1]	Children [2]
 **Channel Catfish Continued**	Bush River Δ	1	1	1 every other month
	Chester River and Tributaries Δ	5	5	4
	Choptank River Δ	2	2	2
	Conococheague *	No Restrictions	8	5
	Elk River (incl. C&D Canal) Δ	1 every other month	1 every other month	1 every other month
	Gunpowder River Δ	1 every other month	1 every other month	Avoid
	Jennings Randolph Reservoir Δ	4	4	4
	Middle River Δ	Avoid	Avoid	Avoid
	Monocacy River Δ *	1	1	1
	Nanticoke River Δ	4	4	3
	Northeast River Δ	1 every other month	1 every other month	1 every other month
	Patapsco River/Baltimore Harbor Δ	Avoid	Avoid	Avoid
	Patuxent River Δ	3	3	3
	Pocomoke River Δ *	3	3	3
	Potomac River (non-tidal):			
	DC Line to Dam #3 Δ *	1	1	1
	Dam #3 to Dam #4 Δ <18"	No Restrictions	No Restrictions	8
	Dam #4 to Dam #5 Δ *	2	2	2
	Potomac River (tidal):			
	301 Bridge to DC Line <18" Δ	1 every other month	1 every other month	Avoid
	301 Bridge to DC Line >18" Δ	Avoid	Avoid	Avoid
	Rewastico Creek Δ	4	4	3
	Rocky Gorge Reservoir *	6	5	3

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Contaminant present in fish: * Mercury Δ PCBs + Pesticides

Species	Waterbody	Recommended Meals/Month		
		General Population	Women [1]	Children [2]
 **White Perch Continued**	Choptank River Δ	6	6	5
	Eastern Bay: Miles & Wye River Δ	No Restrictions	No Restrictions	8
	Elk River (including C&D Canal) Δ	1	1	1 every other month
	Gunpowder River Δ	5	5	5
	Herring Bay Δ	1	1	1
	Liberty Reservoir *	3	2	1
	Magothy River Δ	4	4	3
	Middle River Δ	1 every other month	1 every other month	Avoid
	Mid Chesapeake Bay:			
	Pooles Island to Bodkin Point Δ	1 every other month	1 every other month	Avoid
	Nanticoke River Δ	8	8	7
	Northeast River Δ	2	2	1
	Patapsco River/Baltimore Harbor Δ	1 every other month	1 every other month	1 every other month
	Patuxent River Δ	8	8	7
	Pocomoke River Δ *	5	5	5
	Potomac River (tidal):			
	Mouth to 301 Bridge Δ	6	6	6
	301 Bridge to DC Line Δ	4	4	4
	Rhode & West Rivers Δ	1	1	1
	Sassafras River Δ	2	2	2
	Severn River Δ	2	2	1
	South River Δ	2	2	2
	Triadelphia Reservoir *	6	5	3

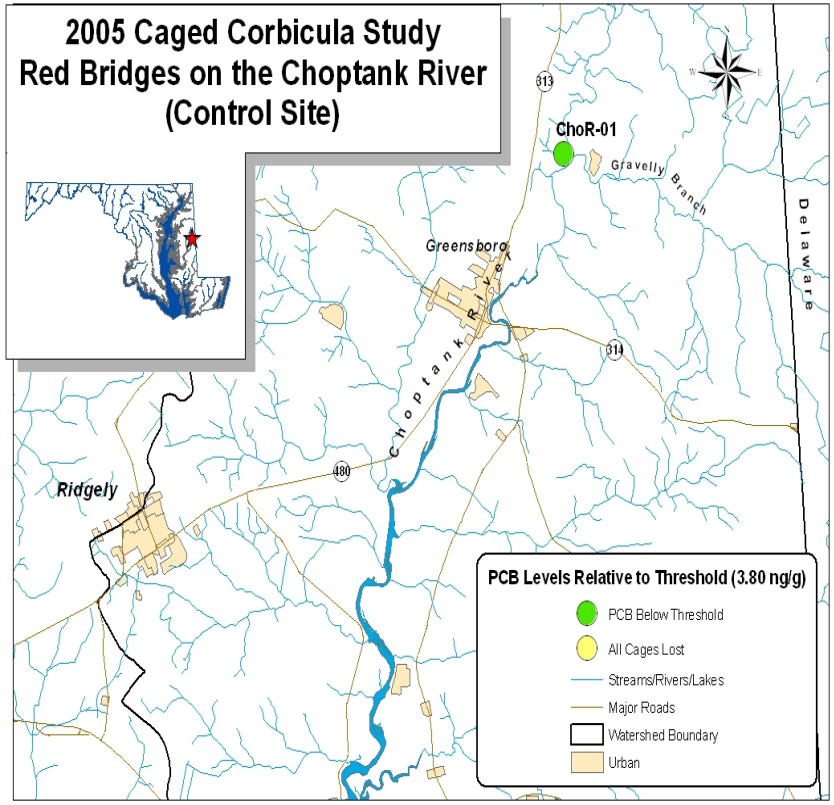
Choptank Reference PCB Station/2005 Caged Clam Study

- Study designed to track sources of PCB's
- Utilized resident Asiatic clam Corbicula fluminea
- Clams were all collected at Red Bridges Riffle in upper Choptank River
- >6000 collected clams for reference, trial and replicate data

2005 Stations:

- Average of five targeted stations per watershed (15 watersheds, 74 total stations).
- Most were in non tidal bay tributaries.
- Primary objective was to bracket sub-tributaries of listed 8-digit watersheds.

Reference & Control Station: Upper Choptank River @ Red Bridges

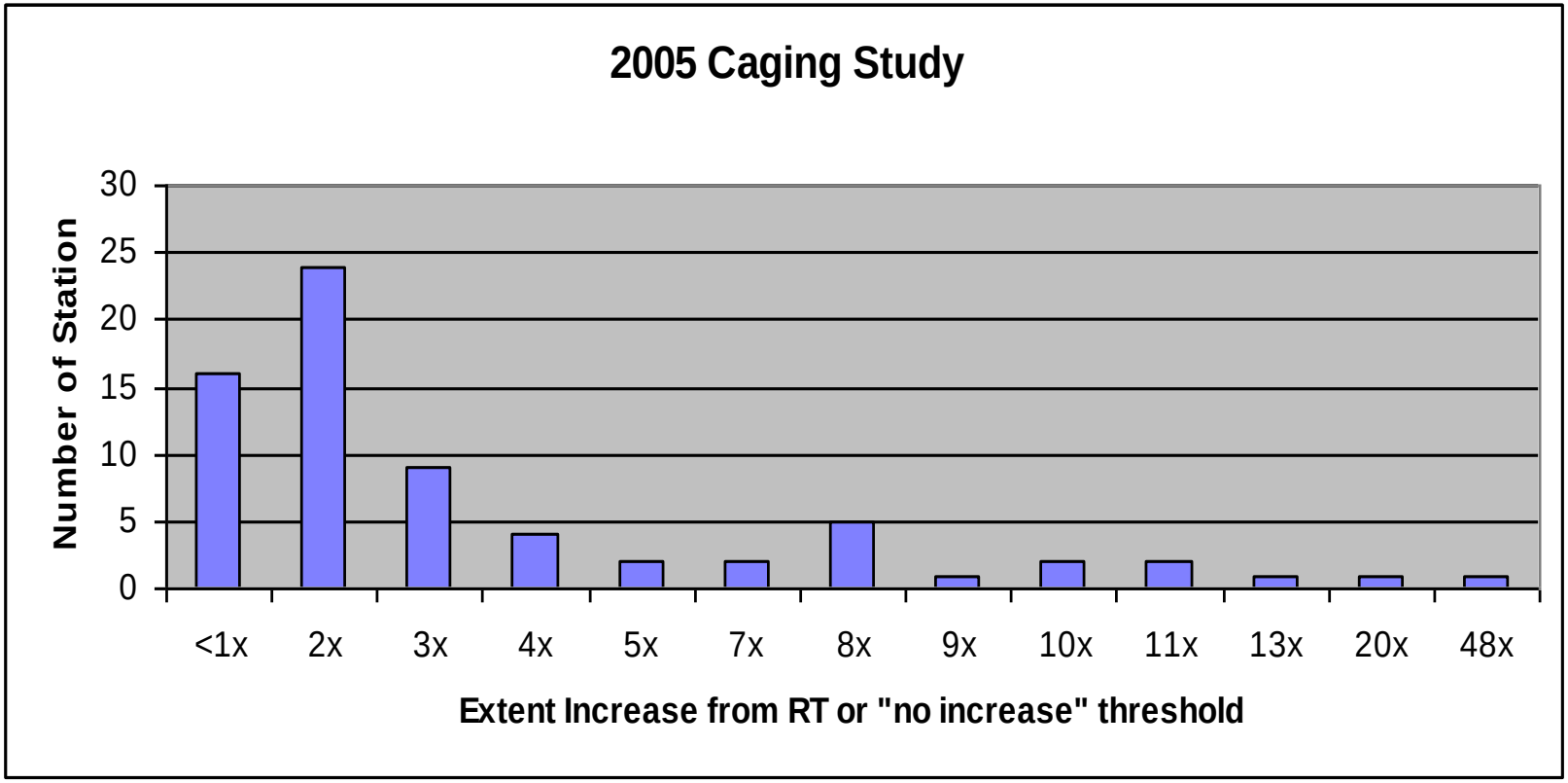


Reference Sites		
ChoR1ref1	2.52	ng/g wet
ChoR1ref2	2.66	ng/g wet
ChoR1ref3	2.49	ng/g wet
ChoR1ref4	2.57	ng/g wet
ChoR1ref5	2.45	ng/g wet
ChoR1ref6	3.32	ng/g wet
ChoR1ref7	2.85	ng/g wet
ChoR1ref8	3.13	ng/g wet
ChoR1ref9	2.89	ng/g wet
ChoR1ref10	3.11	ng/g wet
ChoR1ref_met	2.03	ng/g wet
ChoR1ref_plas	2.45	ng/g wet
Mean	**2.71**	**ng/g wet**
Standard Deviation	**0.363**	**ng/g wet**

Data Interpretation: “Reference Threshold”

- Reference threshold (RT) a bioaccumulation benchmark.
- When exceeded, bioaccumulation occurred. A measurable PCB source exists.
- When not exceeded, insignificant bioaccumulation occurred, NO measurable PCB source exists
- RT = MEAN + (3 x SD)
- RT = 2.71 + (3 x 0.363) = 3.80 ng/g

Data Analysis:
All PCB data compared to the RT.



Other Toxics Studies on the Choptank

- Just completed a water column study on metals levels in the tidal Choptank – Found only trace levels that met water quality criteria
- Other Integrated Report (303d) Impairments
  - Mercury in fish tissue in Tuckahoe Lake

Statewide Summary on Toxics Monitoring

- Primary ongoing toxics monitoring is through Fish Tissue program
- Water column and sediment quality monitoring is conducted in areas of potential impairment
  - Data often used for TMDL development