Legacy and emerging contaminants in blue catfish

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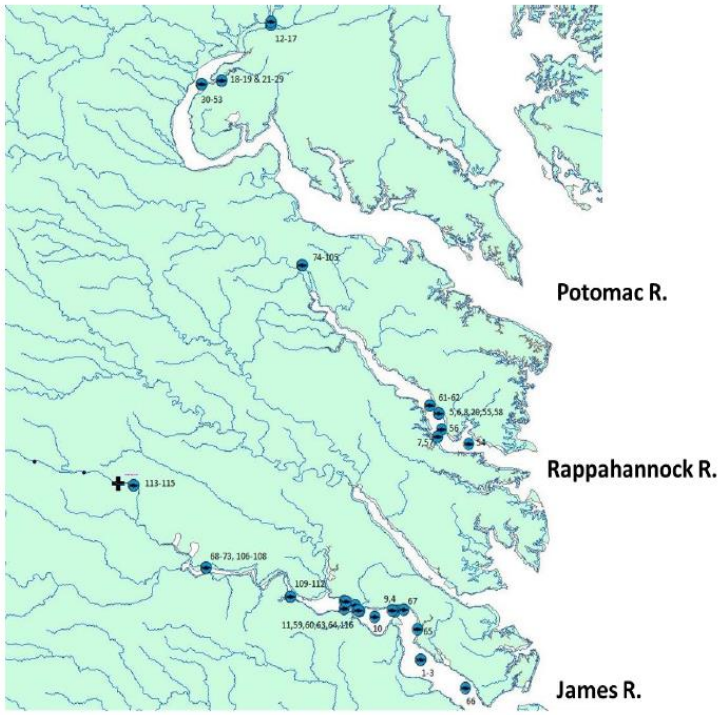
Study Goal

- Determine concentrations of multiple contaminants known to pose human health concerns in blue catfish >300 mm from three Chesapeake Bay tributaries.



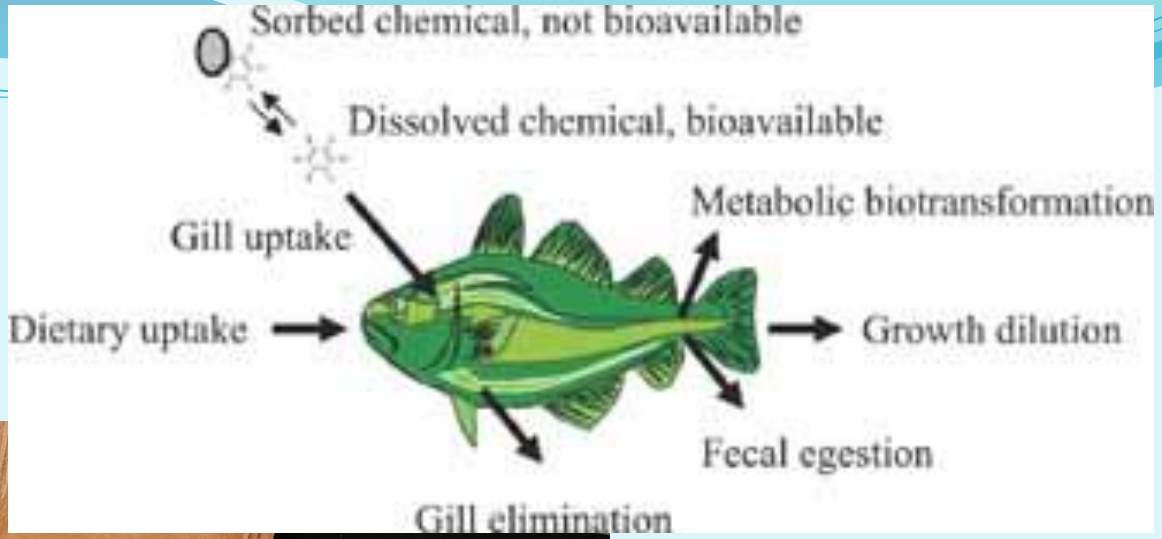
Locations where blue catfish were sampled from VA and MD waters in 2011 and 2012. Numbers refer to individual fish identification numbers from the various locations in the three rivers studied. For some statistical analyses the samples were parsed into five groups: upper Potomac (PU); upper Rappahannock (RU: 74-105); lower Rappahannock (RL: remainder); upper James (JU: 109-112 & those upstream); and the lower James (JL: remainder).

- Fish collected by bottom trawl and electrofishing
- >300mm fork length
- Fillet for small fish
- Vertical subsection for large fish
- No compositing of samples
- FD; ASE; GC/MS & LC/MS; Hg; SI

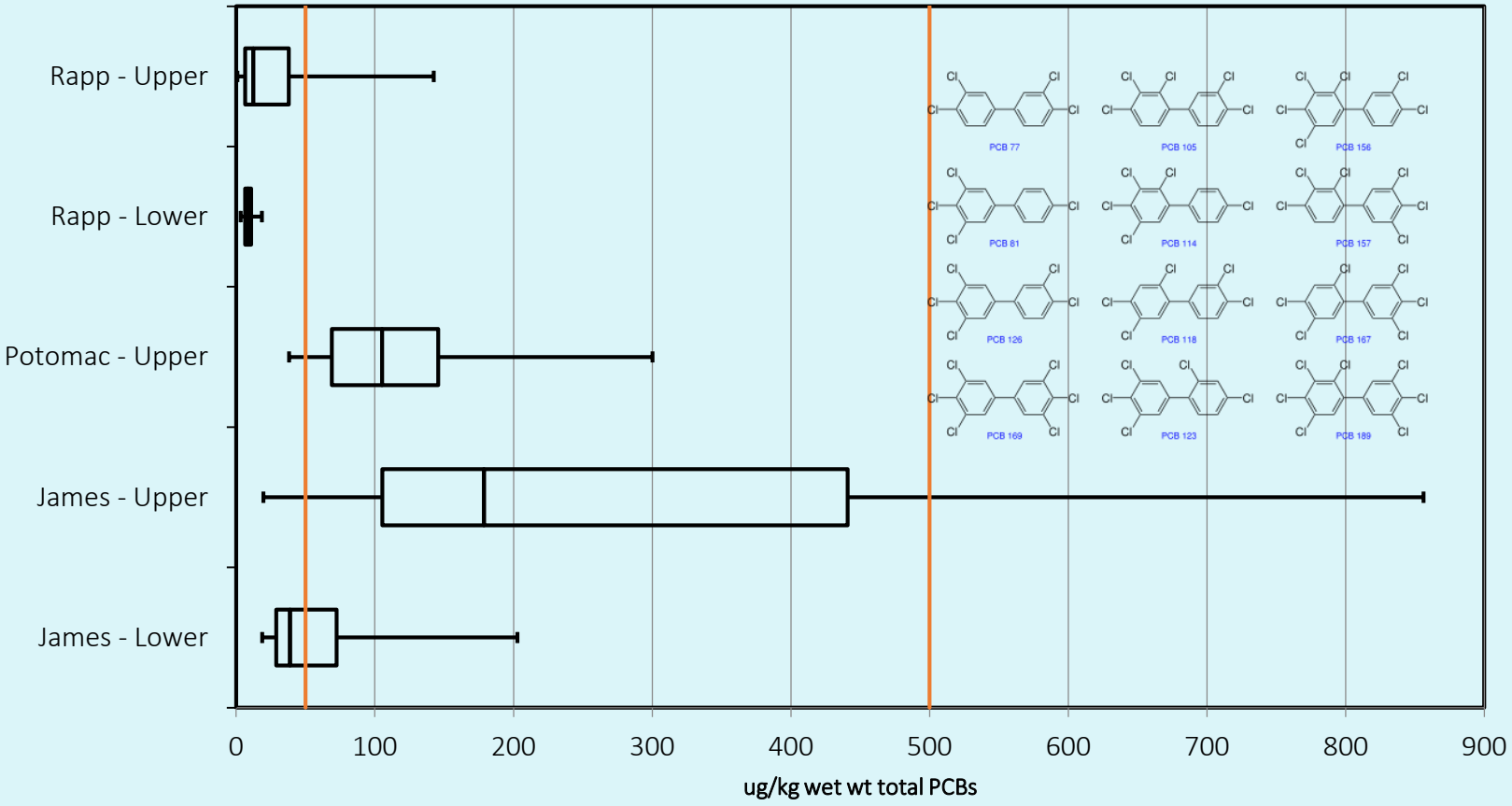
Distribution: Length, Weight & Age

Mean (SE), range, and median of blue catfish length, weight, and age from the James, Rappahannock, and Potomac rivers collected during 2011 and 2012. Otoliths were not available from blue catfish from the Potomac River.

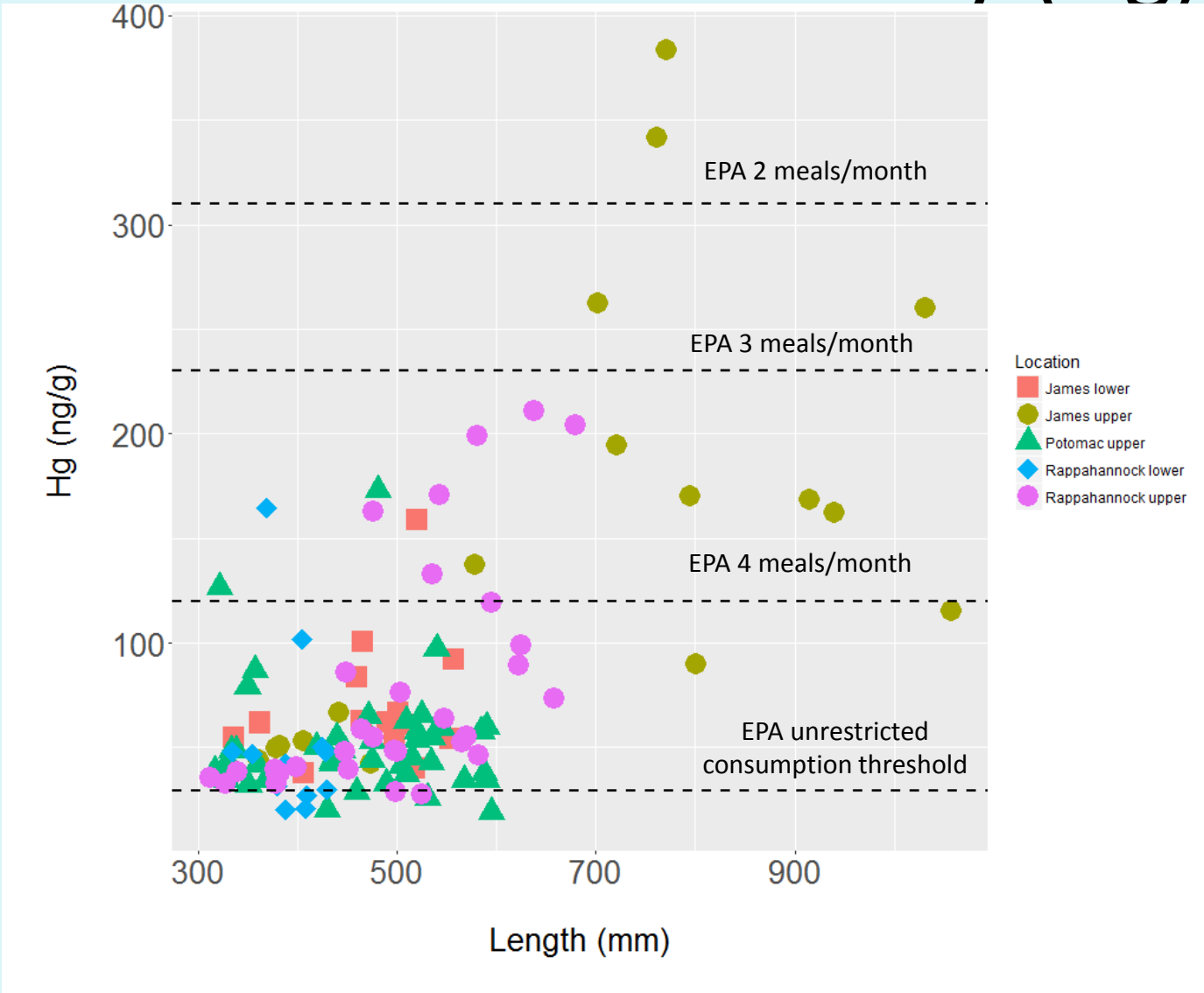
Location	*n*	Fork Length (mm)	Weight (g)	Age (yr)
James River	31	585.9 (36.97)	3640.3 (730.45)	10.2 (0.66)
		336 - 1057	407 - 15250	5 - 18
		513	1702	9.5
Rappahannock River	44	469.4 (14.86)	1730.3 (201.78)	10.5 (0.46)
		312 - 680	408 - 5933	5 - 17
		450	1318	9.5
Potomac River	41	464.0 (13.75)	1316.0 (112.11)	NA
		317 - 595	423 - 2611	-
		475	1048	


Sorbed chemical, not bioavailable
Dissolved chemical, bioavailable
Gill uptake
Metabolic biotransformation
Dietary uptake
Growth dilution
Fecal egestion
Gill elimination

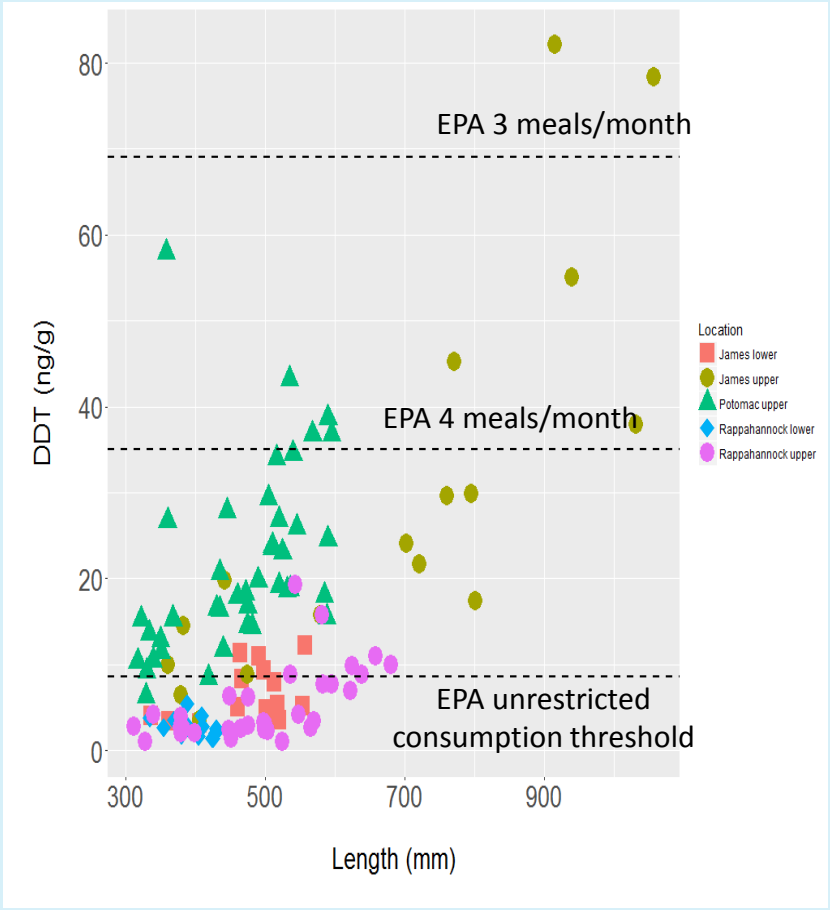
PCB Distribution

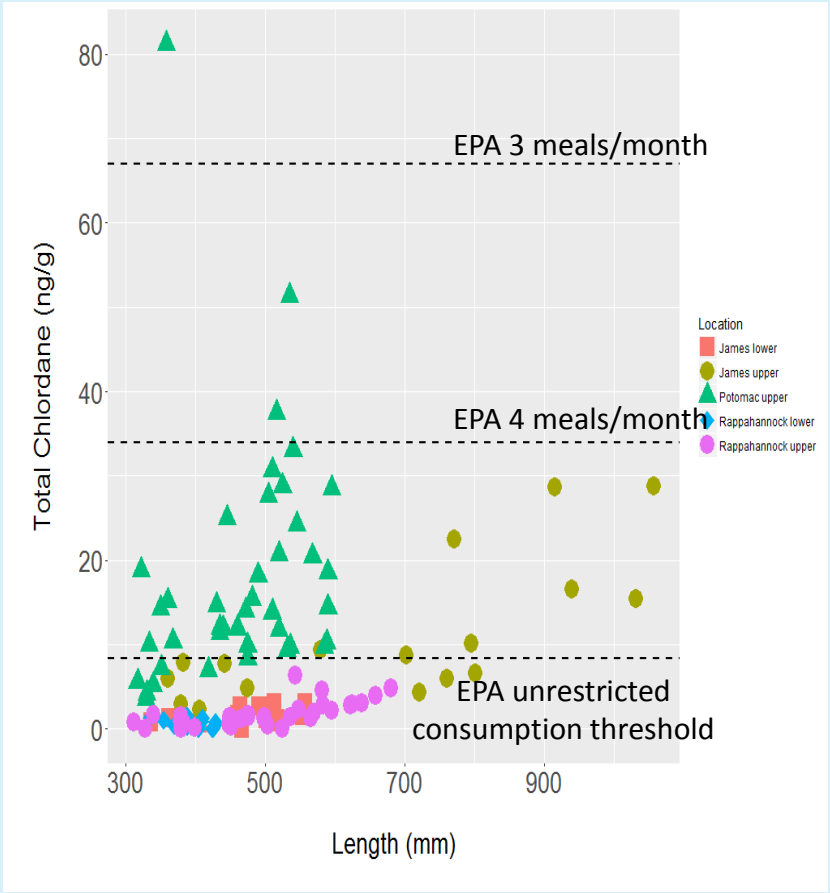


Results – Mercury (Hg)



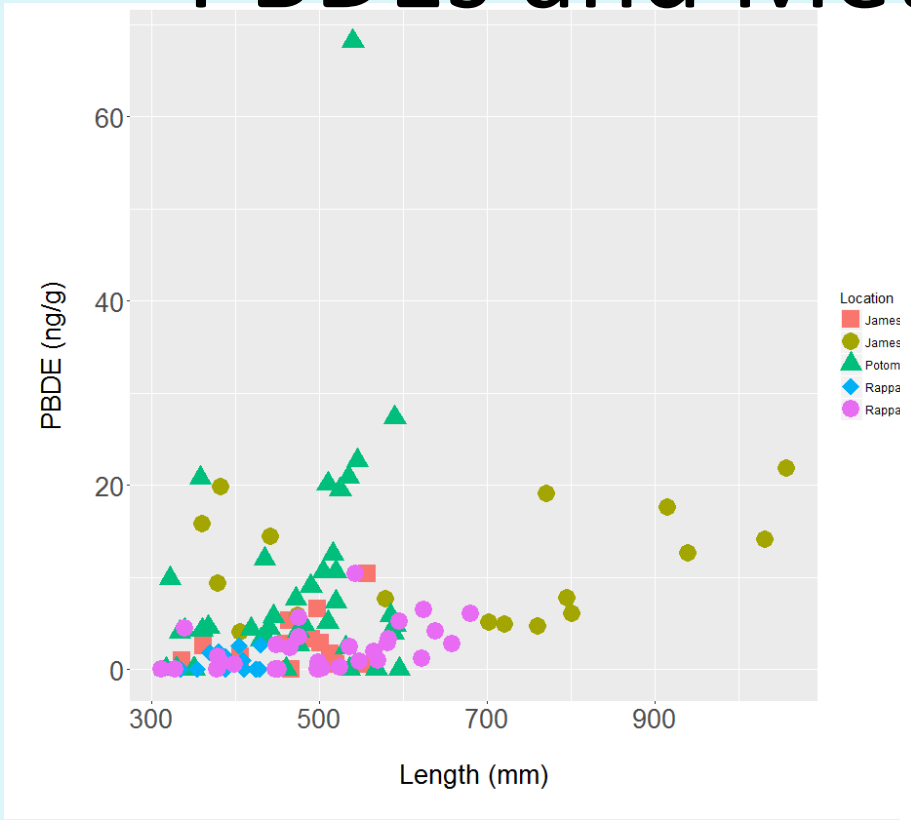
Results – DDT and Chlordanes

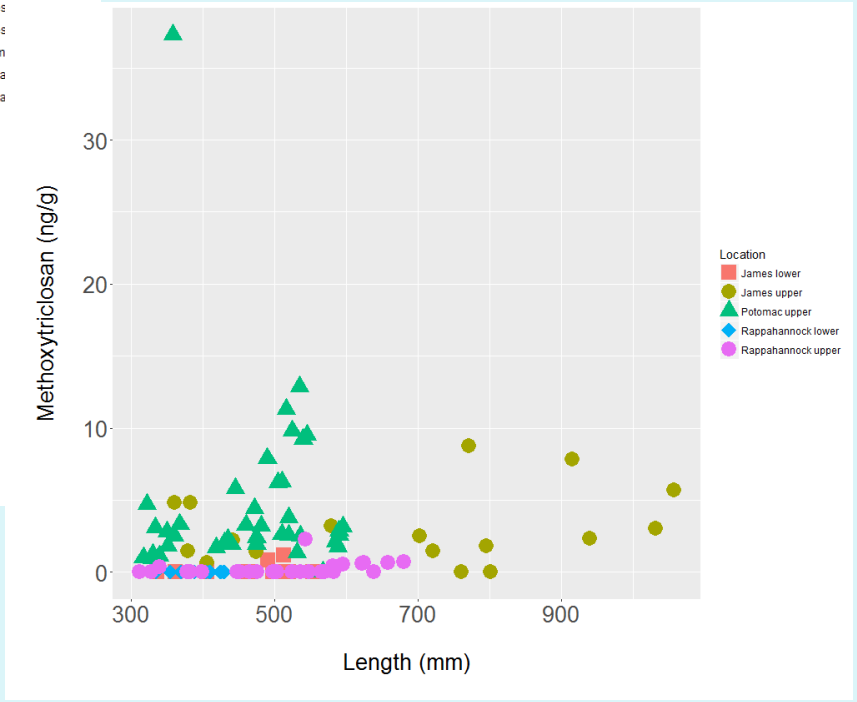




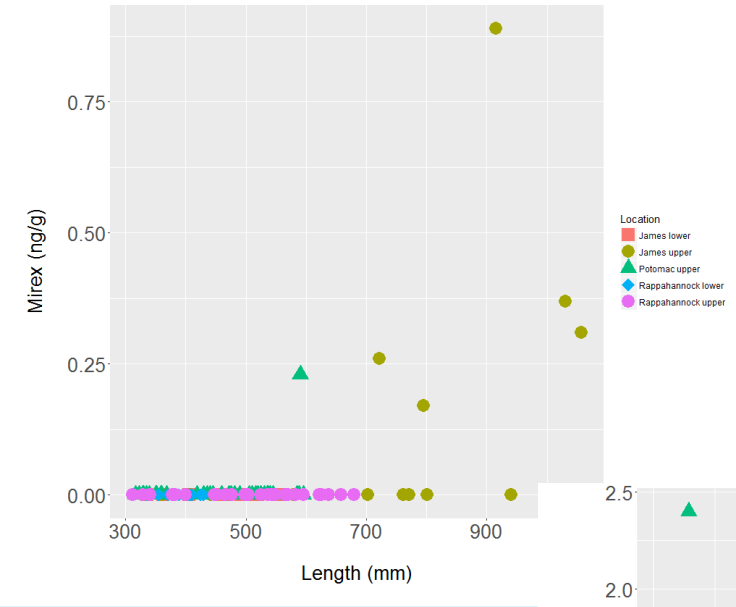
- Differences between upper and lower portions of rivers
- Elevated chlordanes in Potomac River

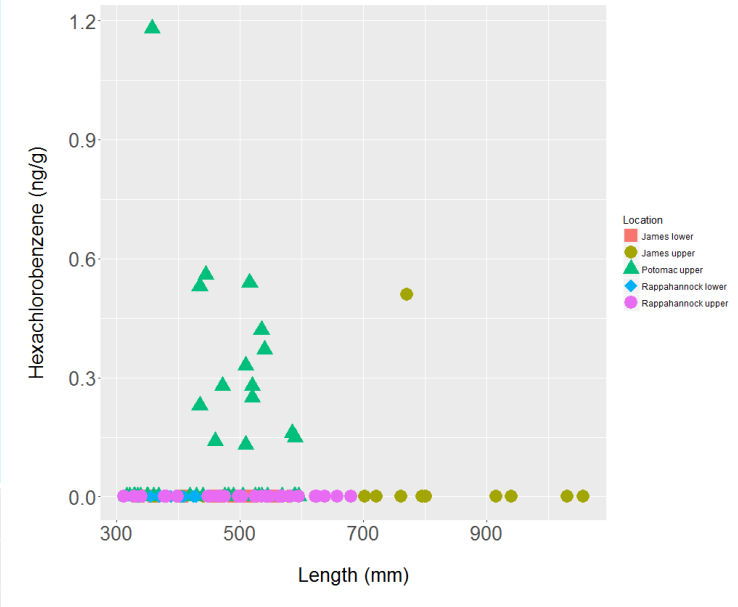
PBDEs and Methoxytriclosan

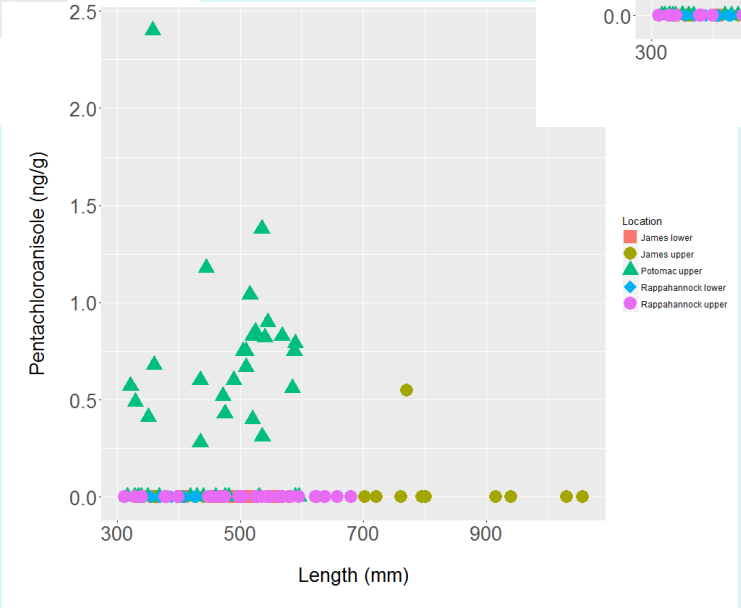




Mirex, HCB, & Pentachloroanisole





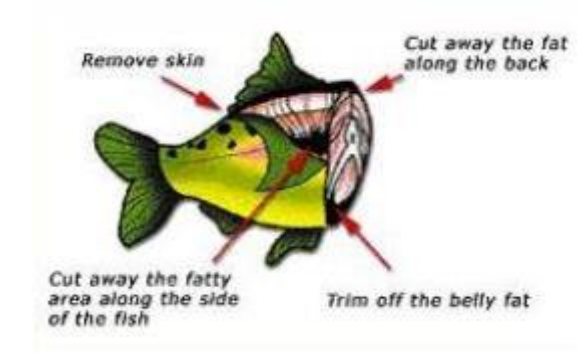


General Trends

- Average [PCB] across all fish: above EPA cancer health endpoint
- Increasing contamination with increasing size for most contaminants
  - > 550 mm fork length
- Rappahannock River: lower levels of contamination
- Upper James and Potomac Rivers: higher levels
- PCBs & Hg concentrations in blue catfish fillets from some locales pose risks to human health
  - this risk varies with fish consumption rate

Data Gaps?

- ~100,000 chemicals used in commerce
  - We looked at <150 (including PCB and PBDE congeners)
- ~1,000 new chemicals every year
- Less than 1% have had human testing
- Few, if any, have been tested for toxic interactions
- PCB distribution in fillet vs belly fat – would that make a difference in exposure? Cooking?



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