

# Contaminants of Emerging Concern in the Tidal Delaware River Pilot Monitoring Survey 2007-2009

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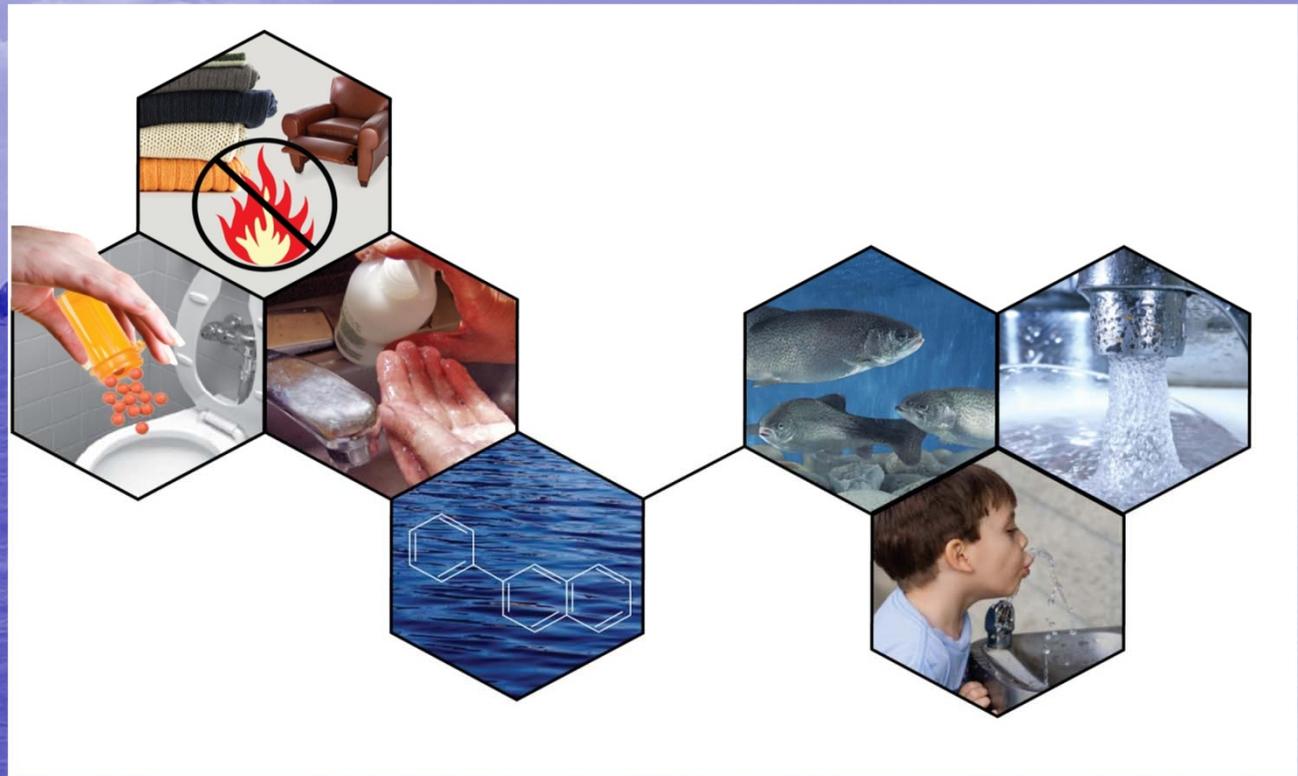
*Delaware River Basin Source Water Collaborative Webinar  
Source Water Protection and Contaminants of Emerging Concern*

September 25, 2012



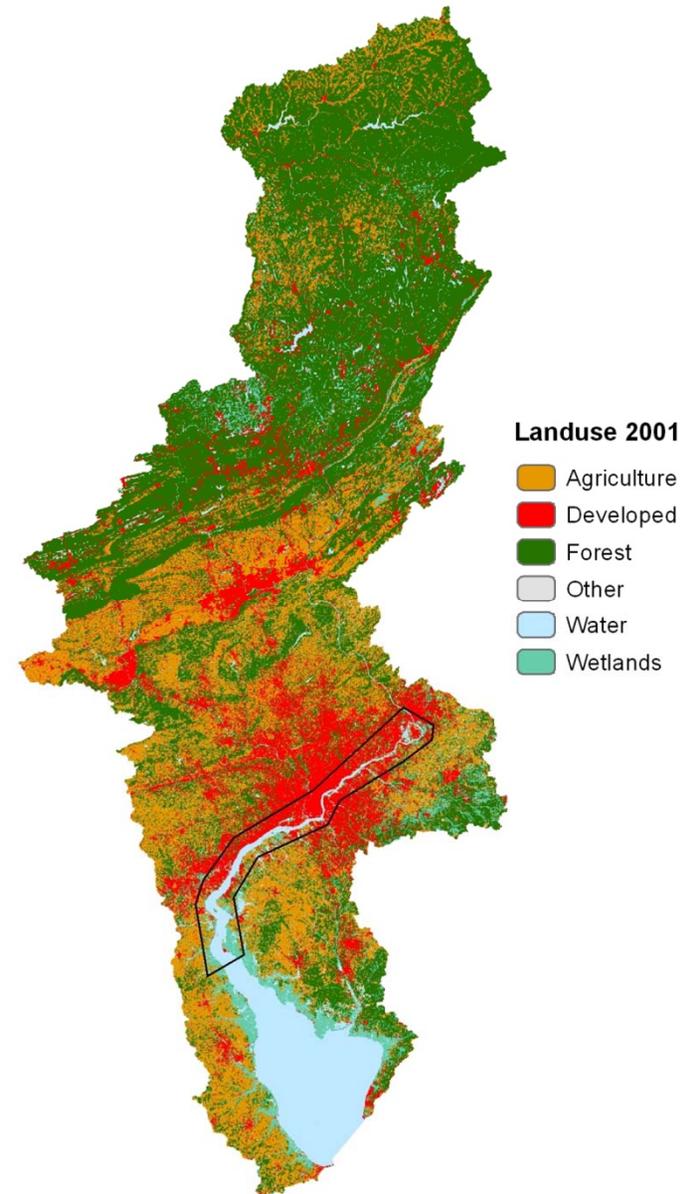
# Contaminants of Emerging Concern

- Pharmaceuticals and Personal Care Products (PPCP)
- Hormones
- Stain repellants/non-stick surfaces [PFAS]
- Flame Retardants [PBDE]
- Detergents [NP]
- Plasticizers [bis-phenol A]

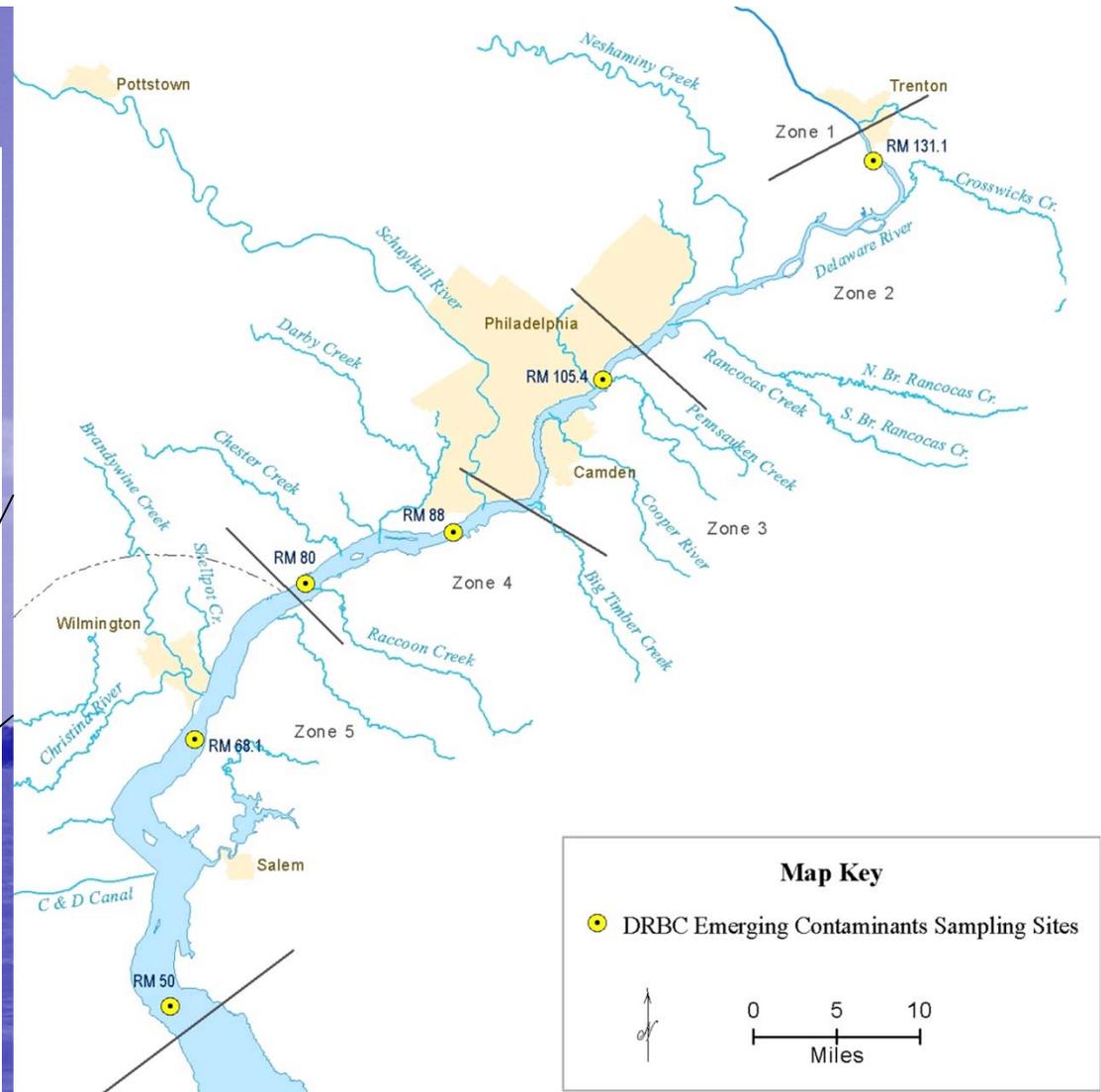


- **Map of Delaware River Basin Land Use**

- from USGS National Land Cover Database
- CEC survey was conducted in the tidal Delaware River (outlined in black)
- urbanized and industrialized area
- Over 6 million residents live in contributing watersheds



# Delaware River Basin

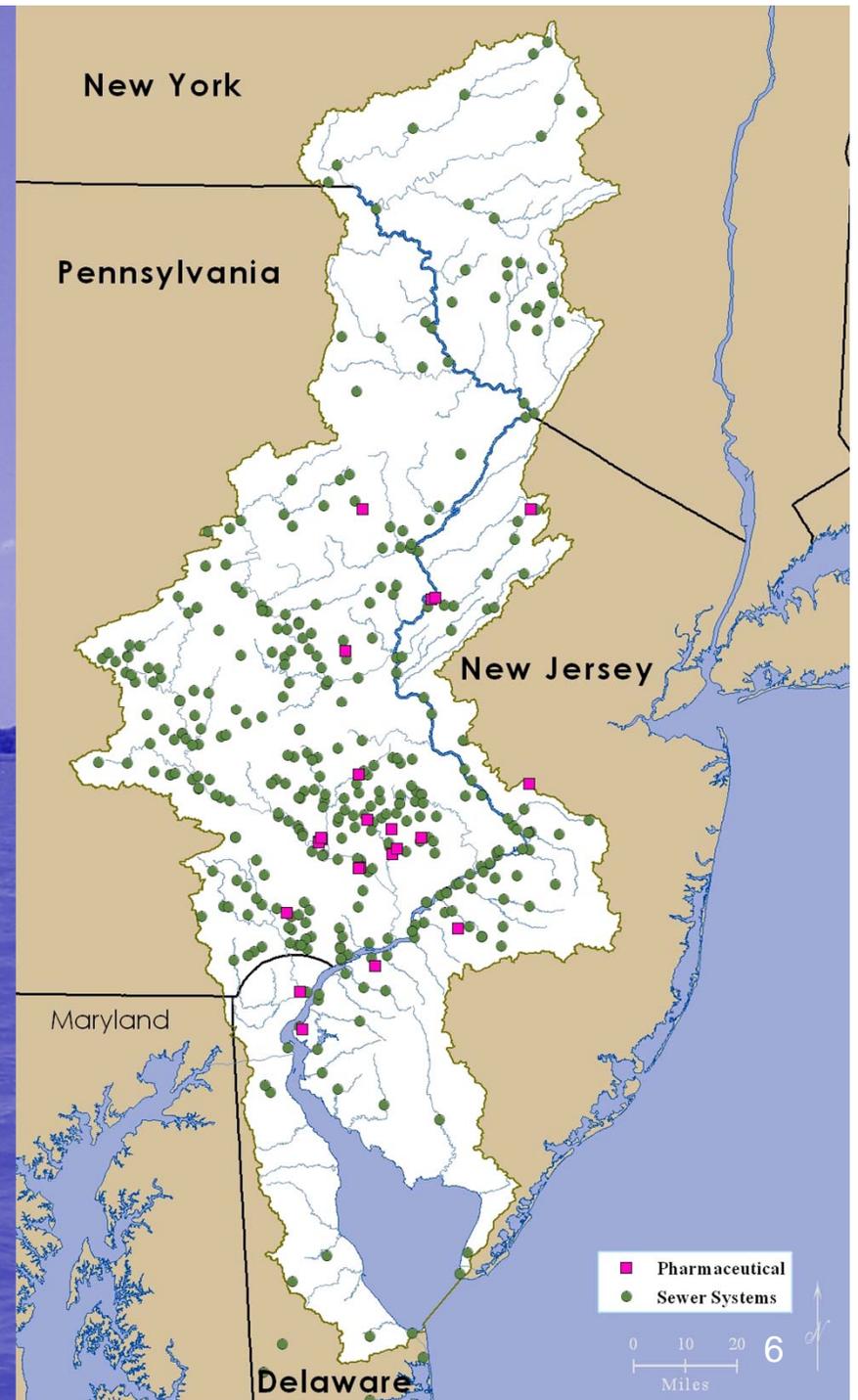


Ambient Water Sampling  
Zones 2 and 3 use public water supply <sup>4</sup>

## Ambient Water Surveys in the Tidal Main Stem Delaware River

	2007 # of analytes / # detected	2008 # of analytes / # detected	2009 # of analytes / # detected
<b>PFAS</b> stain repellants/non-stick surfaces	13/11	13/11	13/11
<b>PPCP</b> EPA Method 1694 plus extended list of analytes - pharma and personal care prod.	54/21	72/49	119/46
<b>Sterols and Hormones</b>	24/6	27/11	17/2 hormones only
<b>NP and NPE</b> nonyl phenols detergents	3/2	4/1	4/2
<b>bis-phenol-A</b> plasticizers	Not monitored	1/0	1/0
<b>PBDE</b> EPA Method 1614 flame retardants	46/24	Not monitored	Not monitored 5

# Pharmaceutical Source Map for the Delaware River Basin



# Criteria for Prioritization of PPCP

- Environmental occurrence
- Aquatic toxicity
- Potential human health effects (sensitive populations)
- Analytical feasibility (EPA Method 1694)

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Results are based on filtered surface water samples prior to additional treatment for drinking water.

Human health risk assessment methodologies differ from ecological assessments and may identify other priorities.

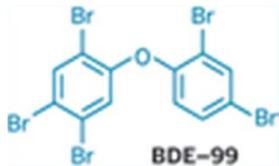


# Summary – PPCP

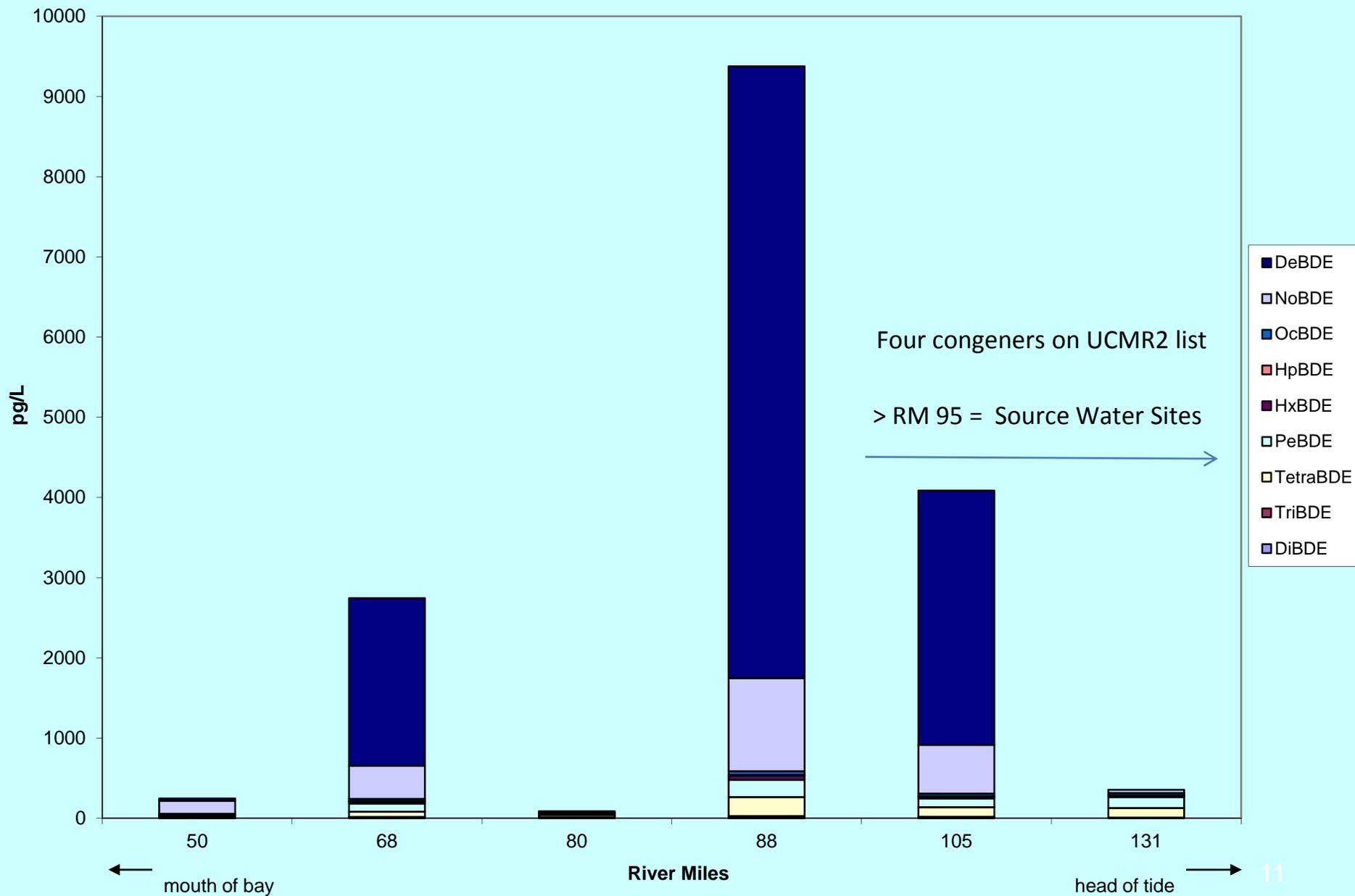
- Similar contaminants and concentrations reported in other fresh and estuarine surface waters with exception of codeine and metformin.
- Recommend monitoring all parameters feasible.
- Fifteen priority PPCP proposed for focused study in Delaware Estuary out of 57 PPCP detected.

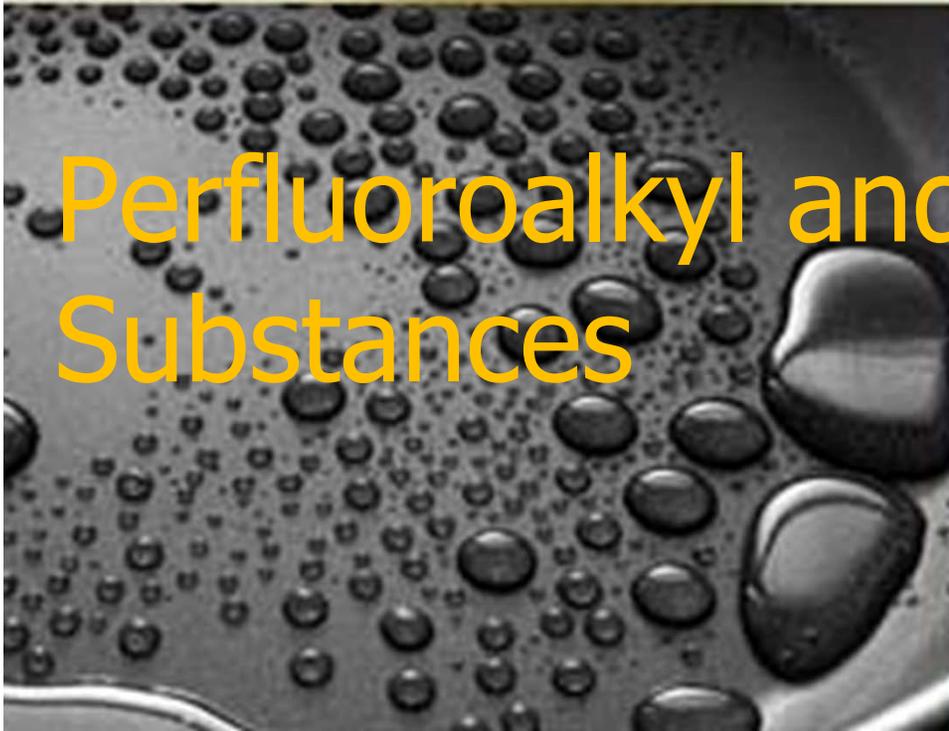
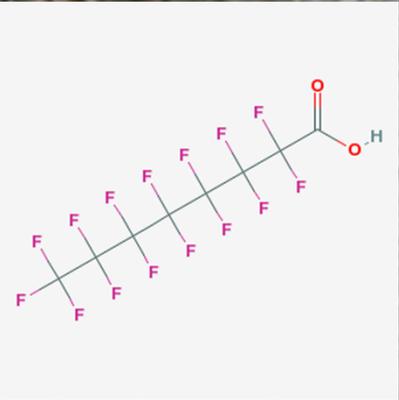
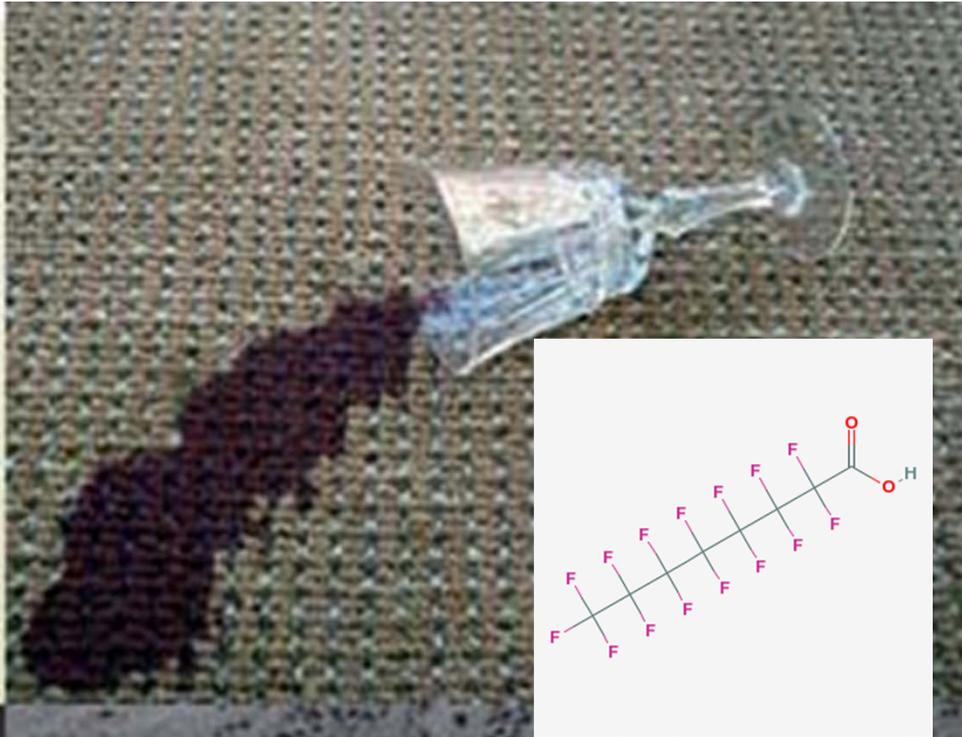
# Hormones

- Natural and synthetic hormones were detected in low ng/L levels at limited locations (e.g, estrone, norethindrone, 17- $\alpha$ -ethynylestradiol, desogestrel and testosterone).
- Concentration for environmental safety are not available for hormones.
- Some hormones are included in SDWA Contaminant Candidate List 3 and Unregulated Contaminants Monitoring Rule 3.
- Hormones warrant further study in the Delaware River Basin.

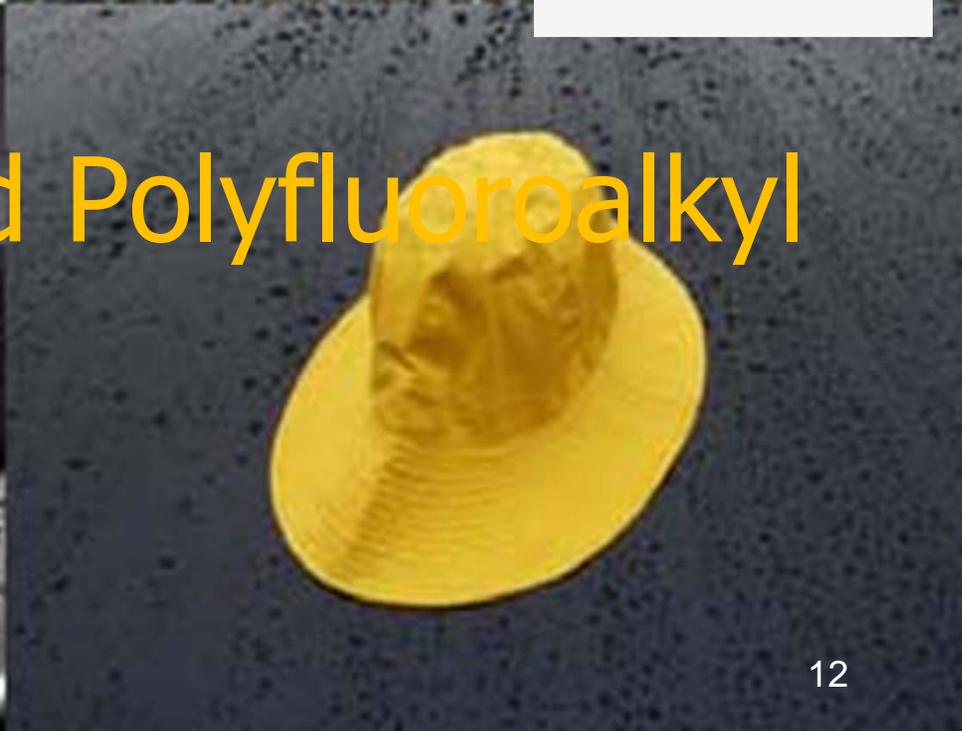


## Polybrominated Diphenyl Ethers (PBDE) Flame Retardants In Ambient Waters Of The Tidal Delaware River Grouped by Homologs

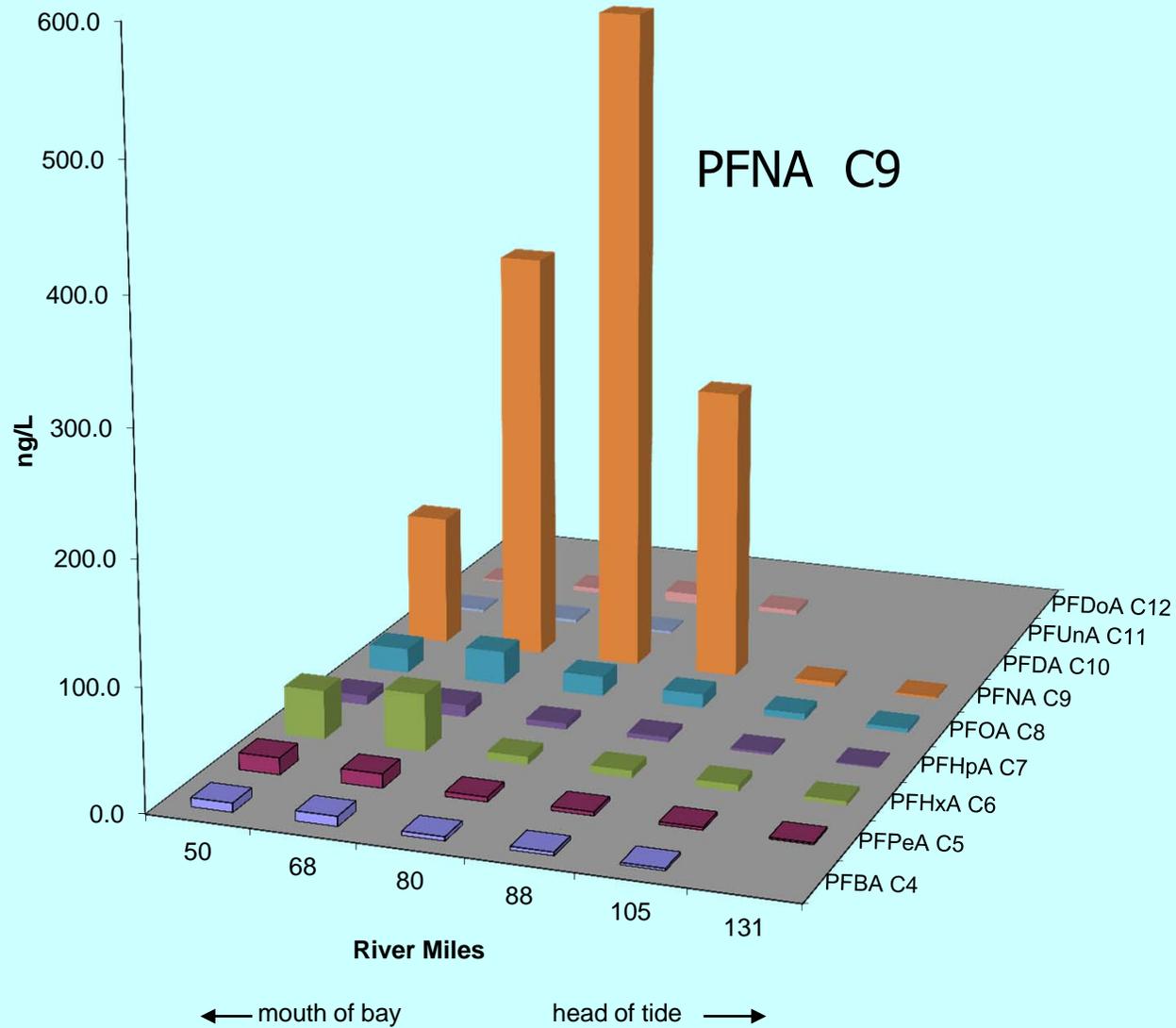




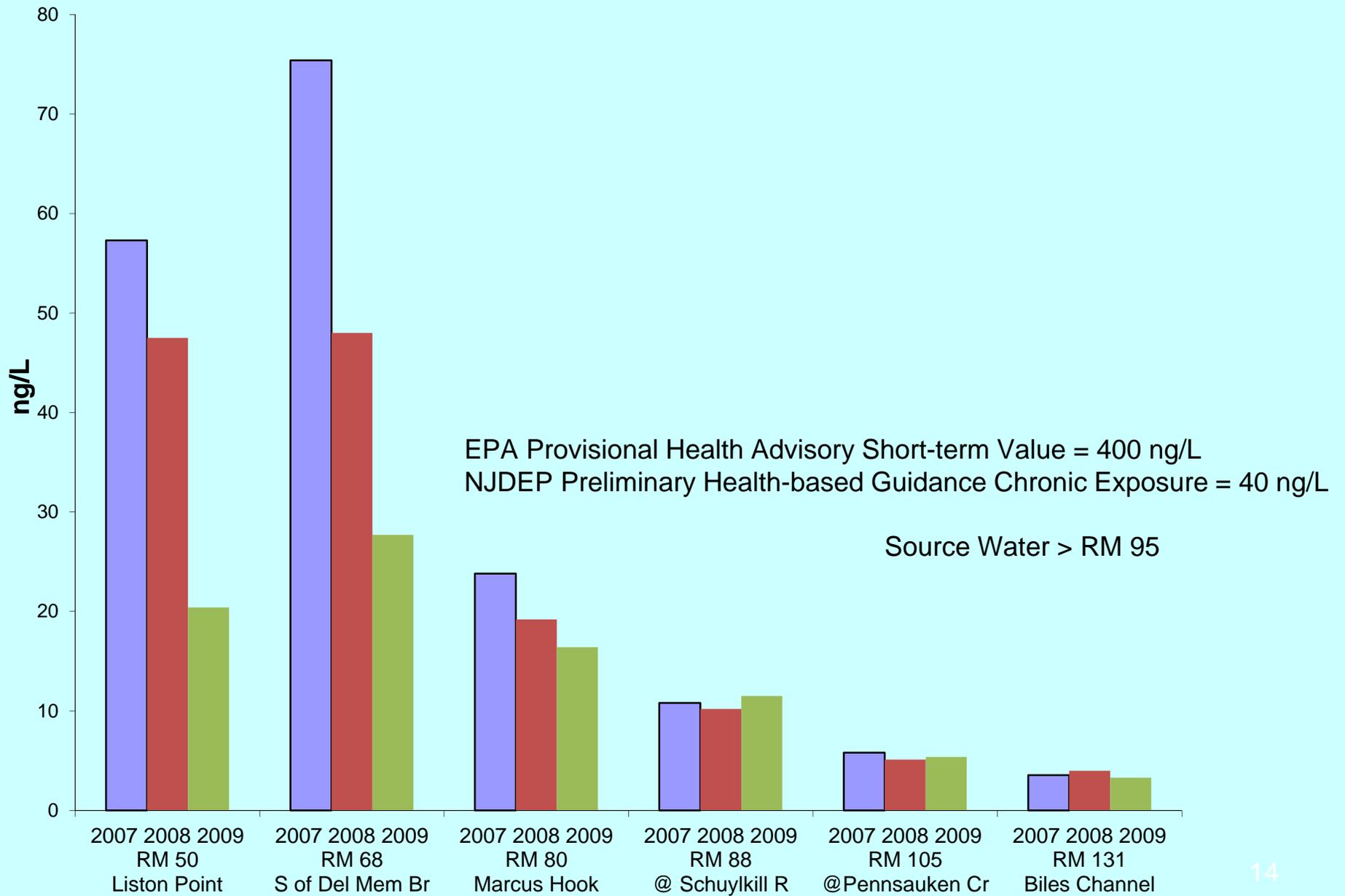
# Perfluoroalkyl and Polyfluoroalkyl Substances



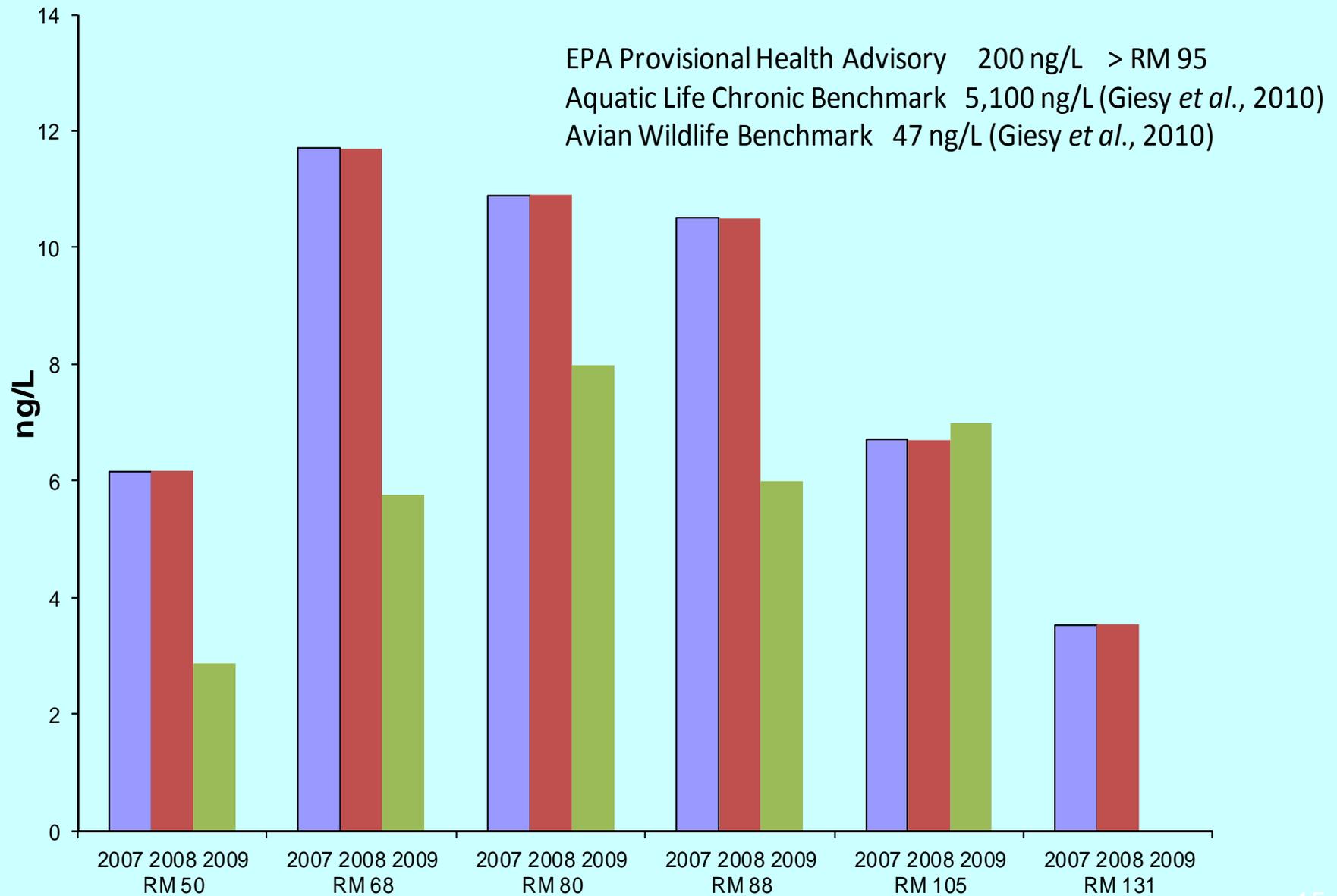
# Perfluoroalkyl Carboxylic Acids (PFCAs) In Ambient Waters Of The Tidal Delaware River 2009



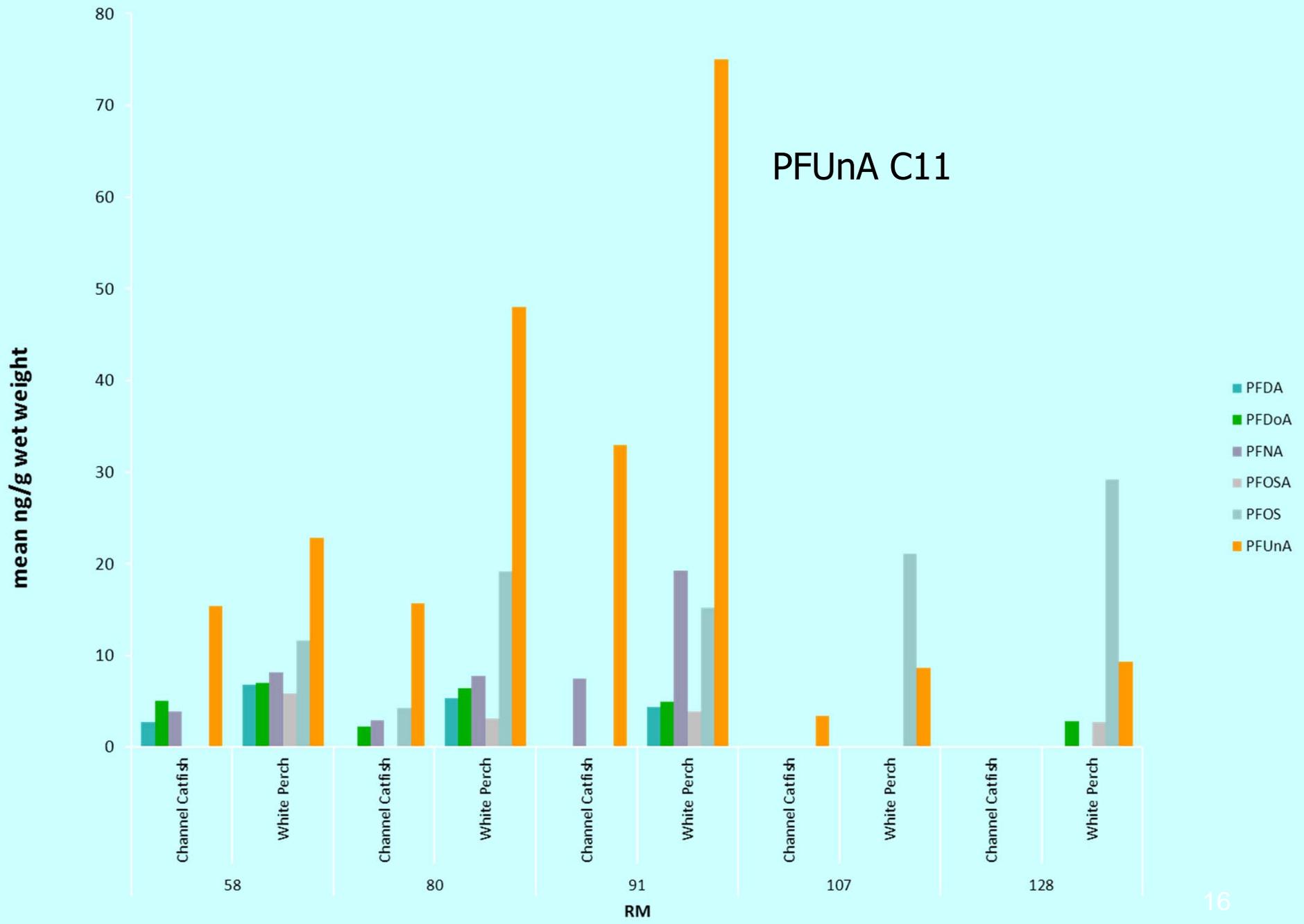
## PFOA (C8) In Ambient Water Of The Tidal Delaware River



## Perfluorooctane sulfonate (PFOS) In Ambient Water Of The Tidal Delaware River



### Fish Fillet 2004 to 2007



# Summary – PFASs

- PFASs detected at ng/L (pptr) levels in water
  - PFNA (C9) highest PFAS concentrations in water
  - Concentrations in water appear to be going down
- PFASs in Delaware River fish fillets at ng/g (ppb) levels
  - PFUnA(C11) > PFOS(C8) > PFNA(C9) > PFDoA(C12) > PFDA(C10)
- Additional ecotoxicology information needed especially on the bioaccumulative and persistent longer chain and sulfonated compounds

## Summation

- Current assessment and regulatory approaches are inadequate for many compounds detected in waters of the estuary.
- Fifteen PPCP are prioritized for focused study.
- Some CEC may require regulation under the SDWA.
- Additional ecotoxicology information is needed for assessment of aquatic life and wildlife protection.

# Acknowledgements

- Tom Fikslin and DRBC MMA staff for support and advice throughout the project
- Greg Cavallo, DRBC for data management support
- AXYS Analytical staff for analytical support

Final report is available online

**Contaminants of Emerging Concern in the Tidal Delaware River Pilot Monitoring Survey 2007-2009, DRBC, July 2012**

<http://www.state.nj.us/drbc/quality/reports/emerging/>

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