

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

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Delaware County Environmental Summit

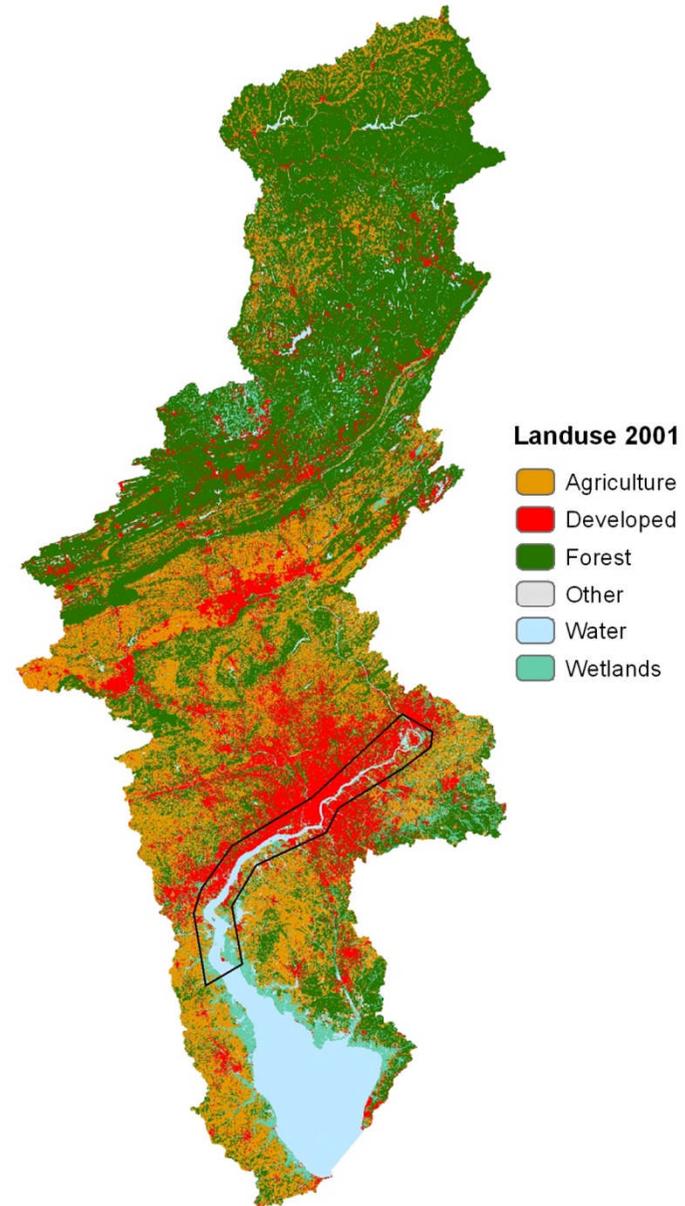


February 16, 2013

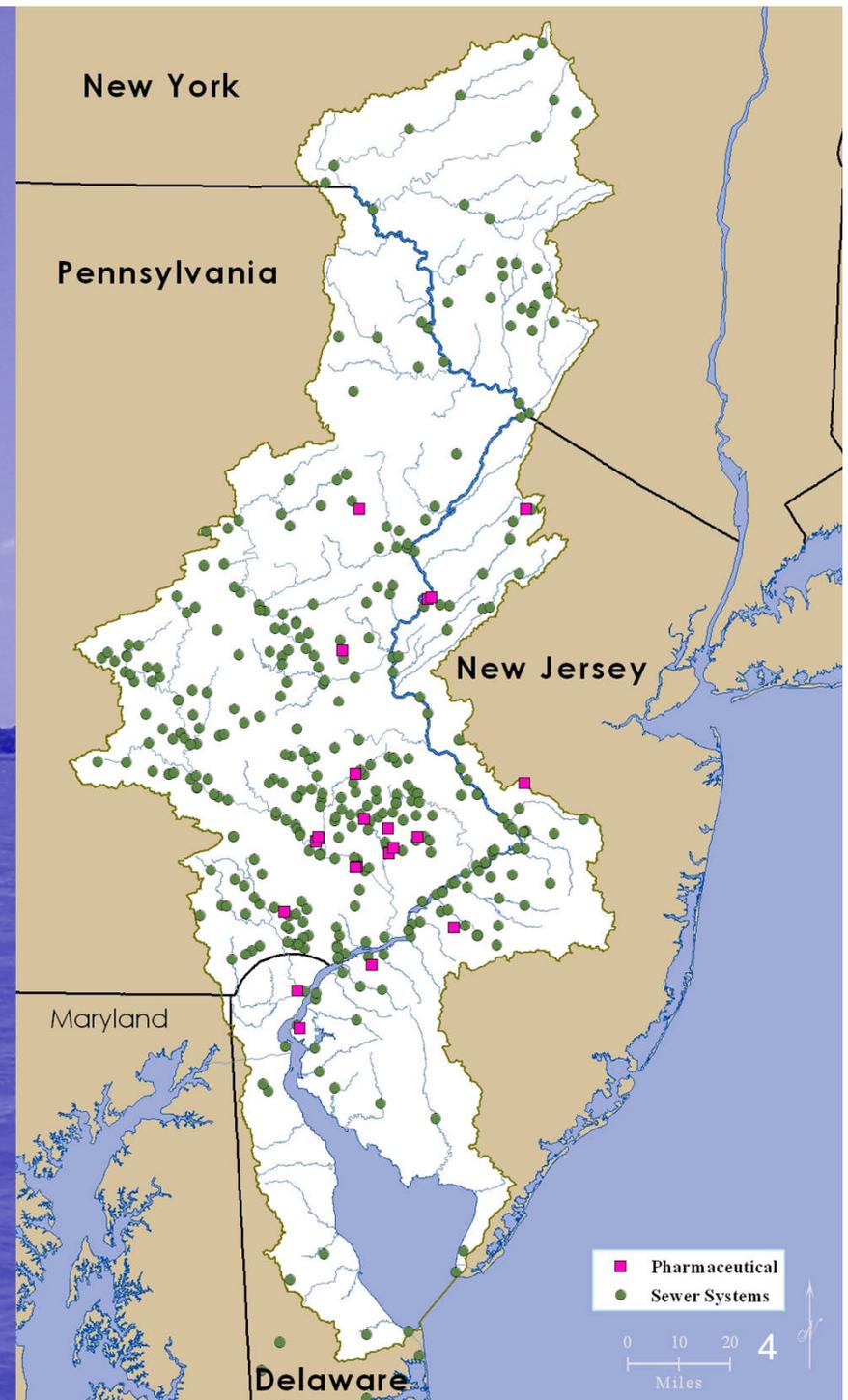


- **Map of Delaware River Basin Land Use**

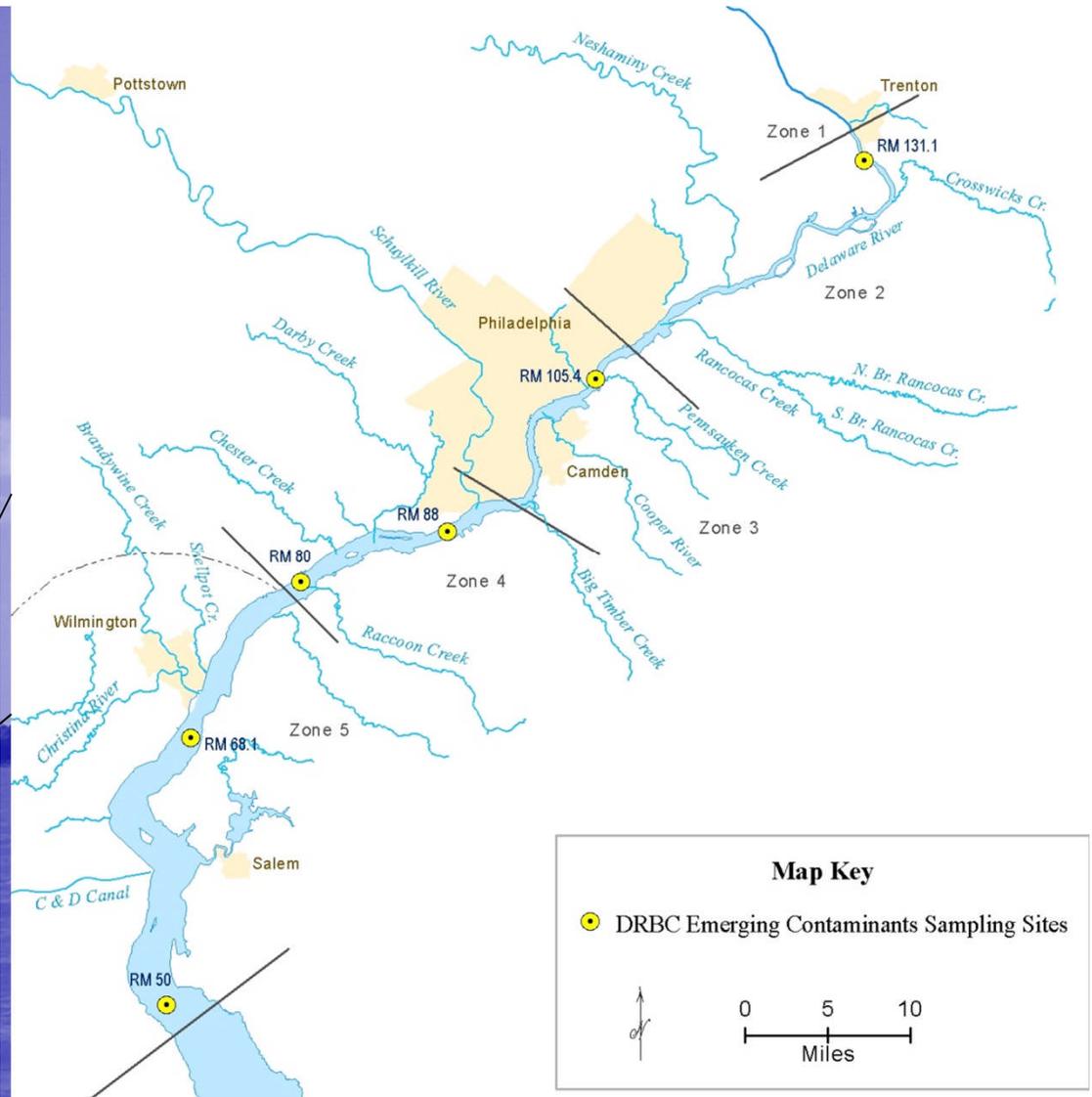
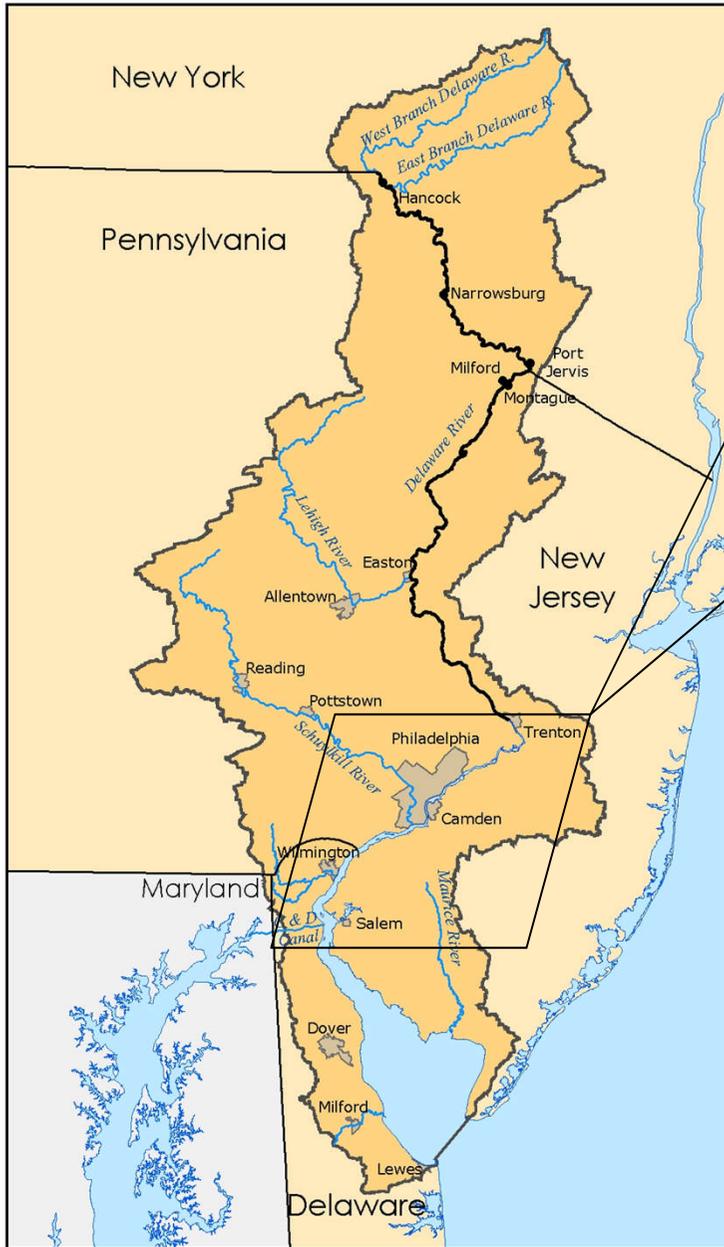
- from USGS National Land Cover Database
- CEC survey was conducted in the tidal Delaware River (outlined in black)
- urbanized and industrialized area
- Over 6 million residents live in contributing watersheds



Pharmaceutical Source Map for the Delaware River Basin



Delaware River Basin



Ambient Water Sampling
Zones 2 and 3 use public water supply ⁵

Ambient Water Surveys in the Tidal Main Stem Delaware River

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

Criteria for Prioritization of PPCP

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

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.

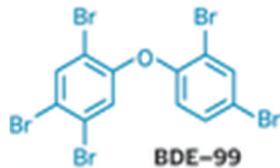
Hormones

- Natural and synthetic hormones were detected in low ng/L levels at limited locations (e.g, estrone, norethindrone, 17- α -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.

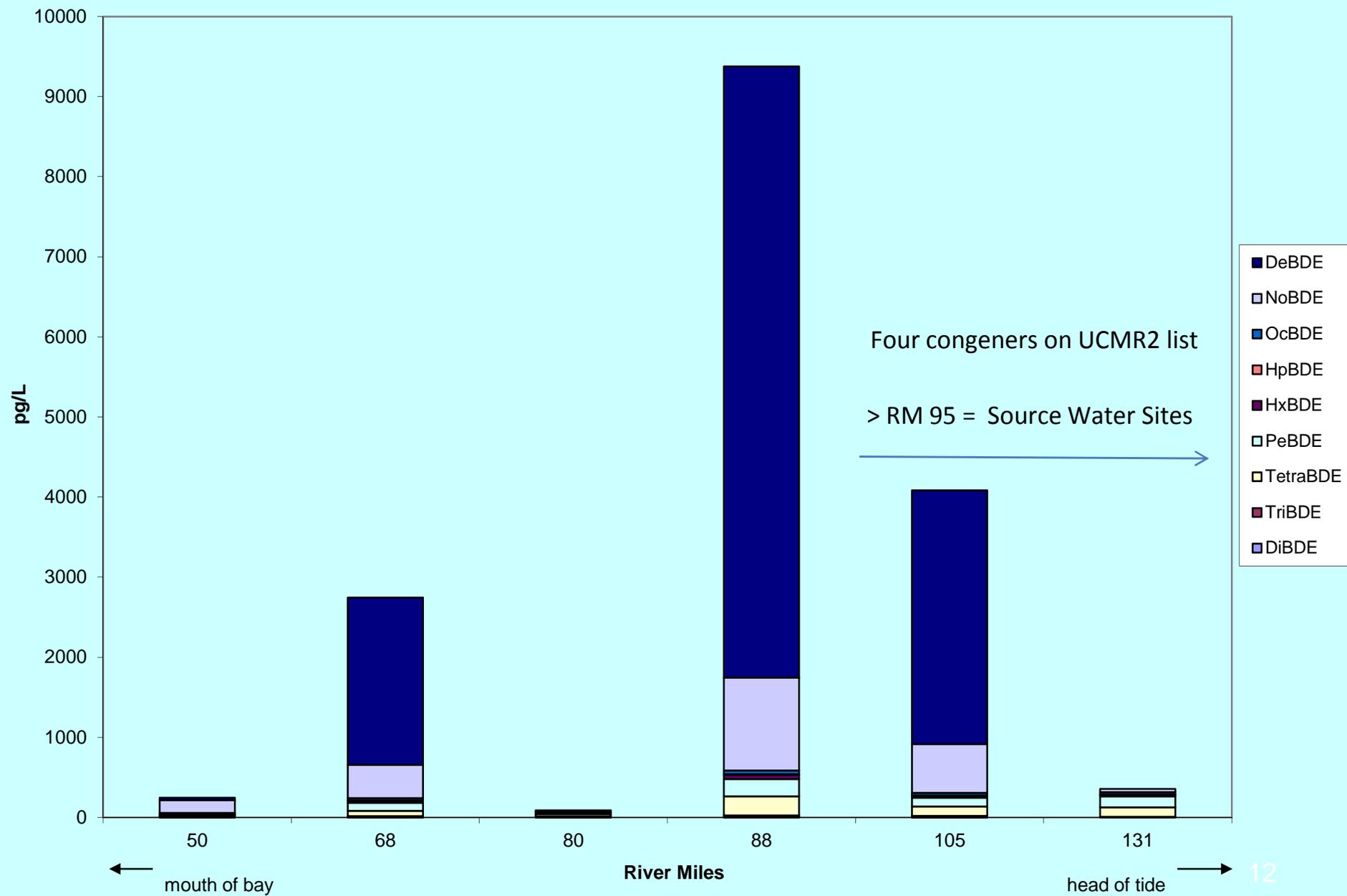
Brominated Flame Retardants

- polybrominated diphenyl ethers (PBDE)
- used in electronics, textiles and polymers

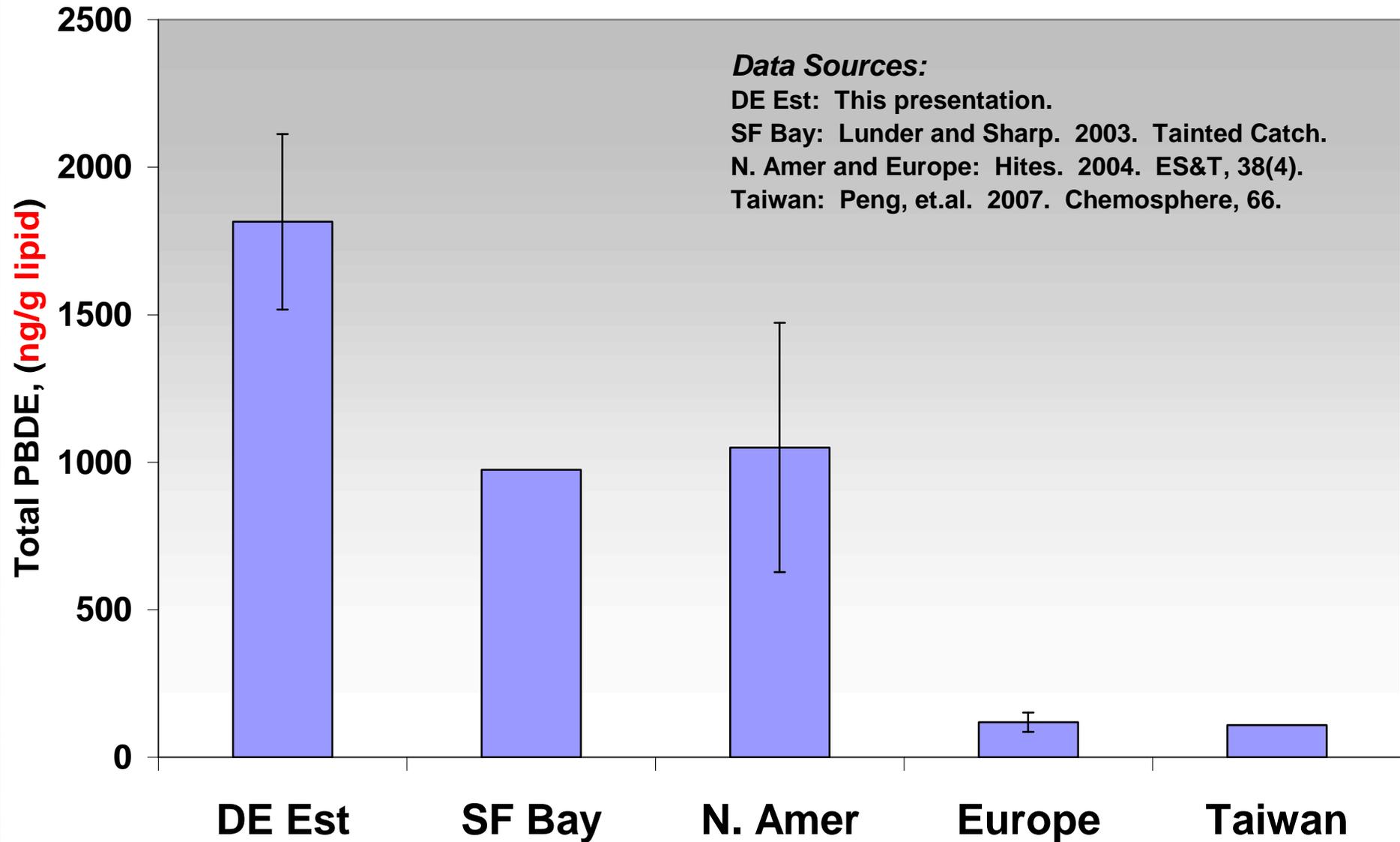




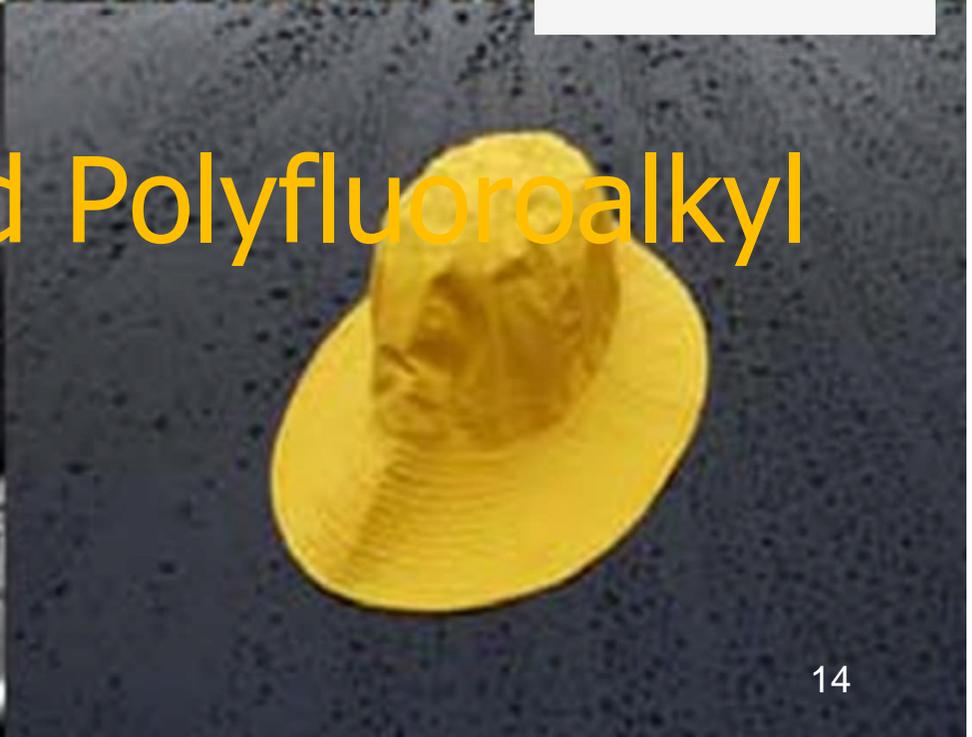
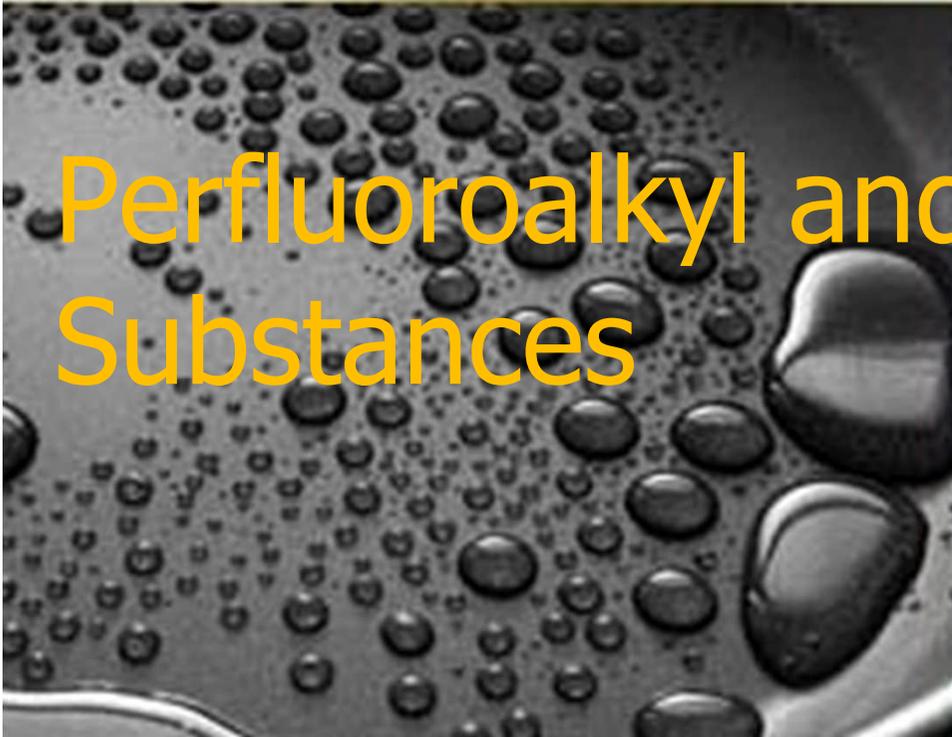
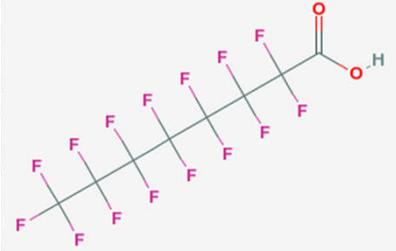
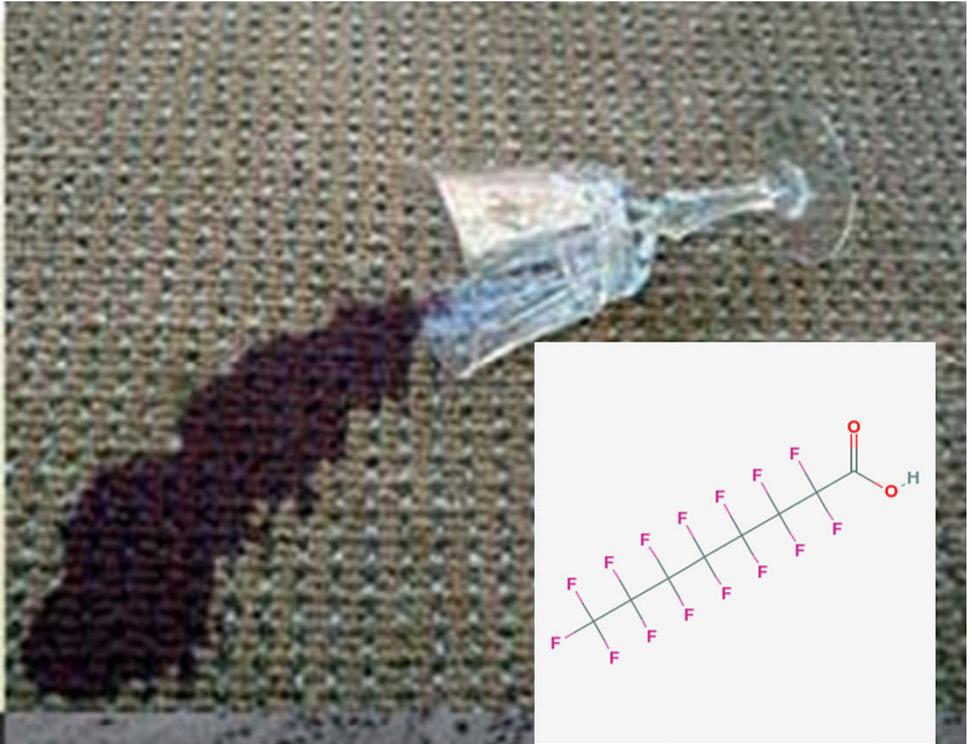
Polybrominated Diphenyl Ethers (PBDE) Flame Retardants In Ambient Waters Of The Tidal Delaware River Grouped by Homologs



Mean PBDE in DE Estuary Fish vs. Fish Elsewhere

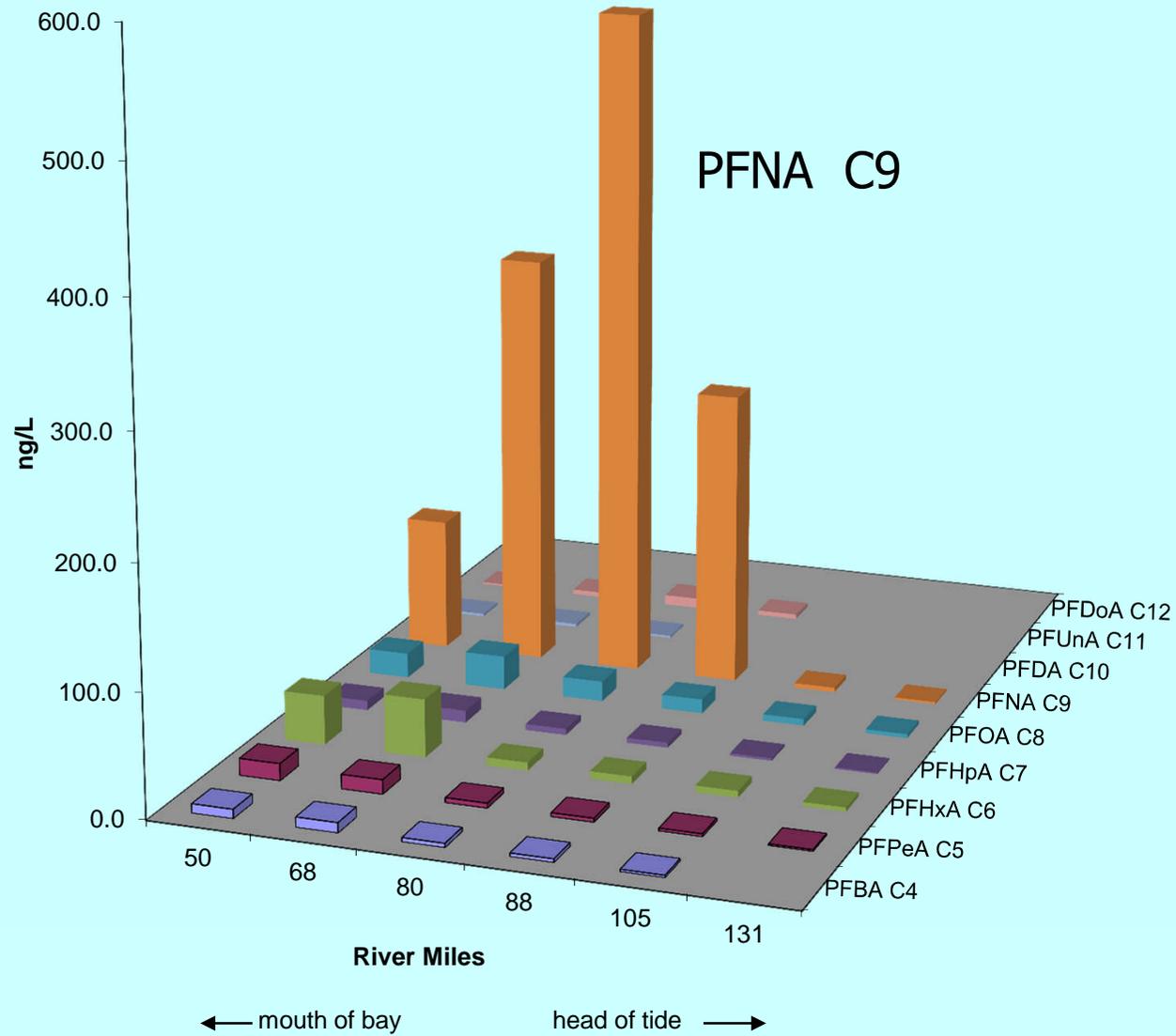


from presentation by Dr. Rick Greene, DNREC

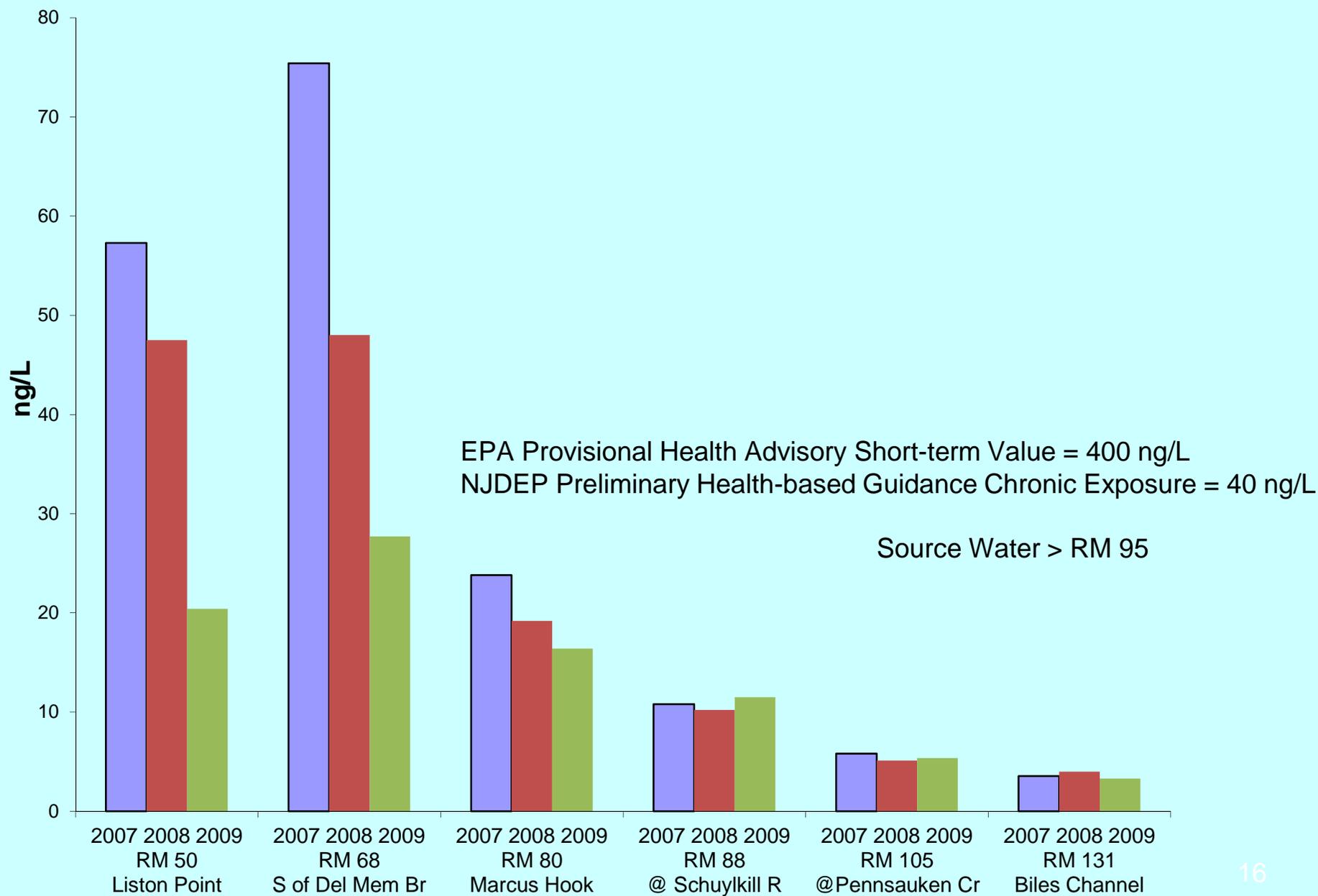


Perfluoroalkyl and Polyfluoroalkyl Substances

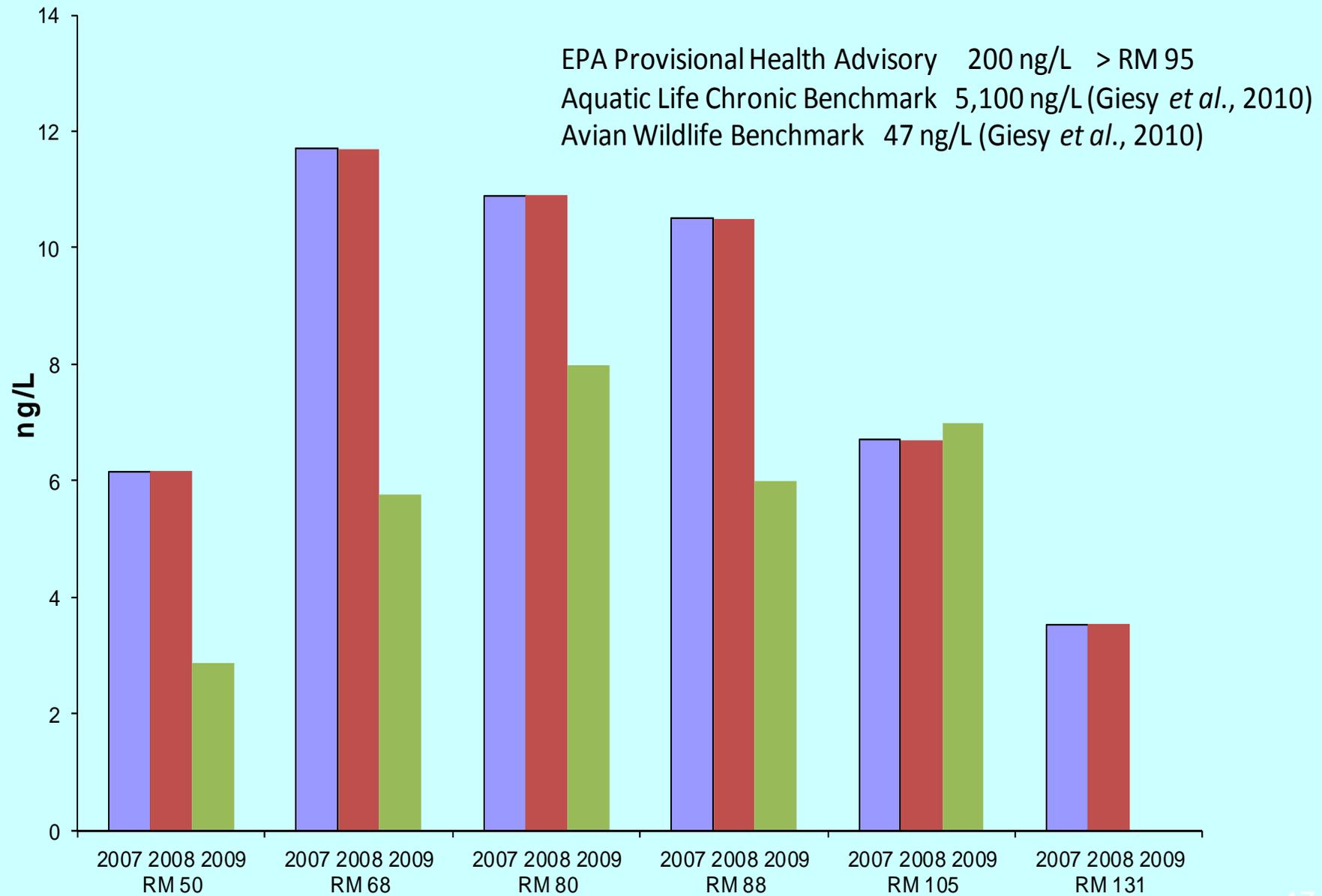
Perfluoroalkyl Carboxylic Acids (PFCAs) In Ambient Waters Of The Tidal Delaware River 2009



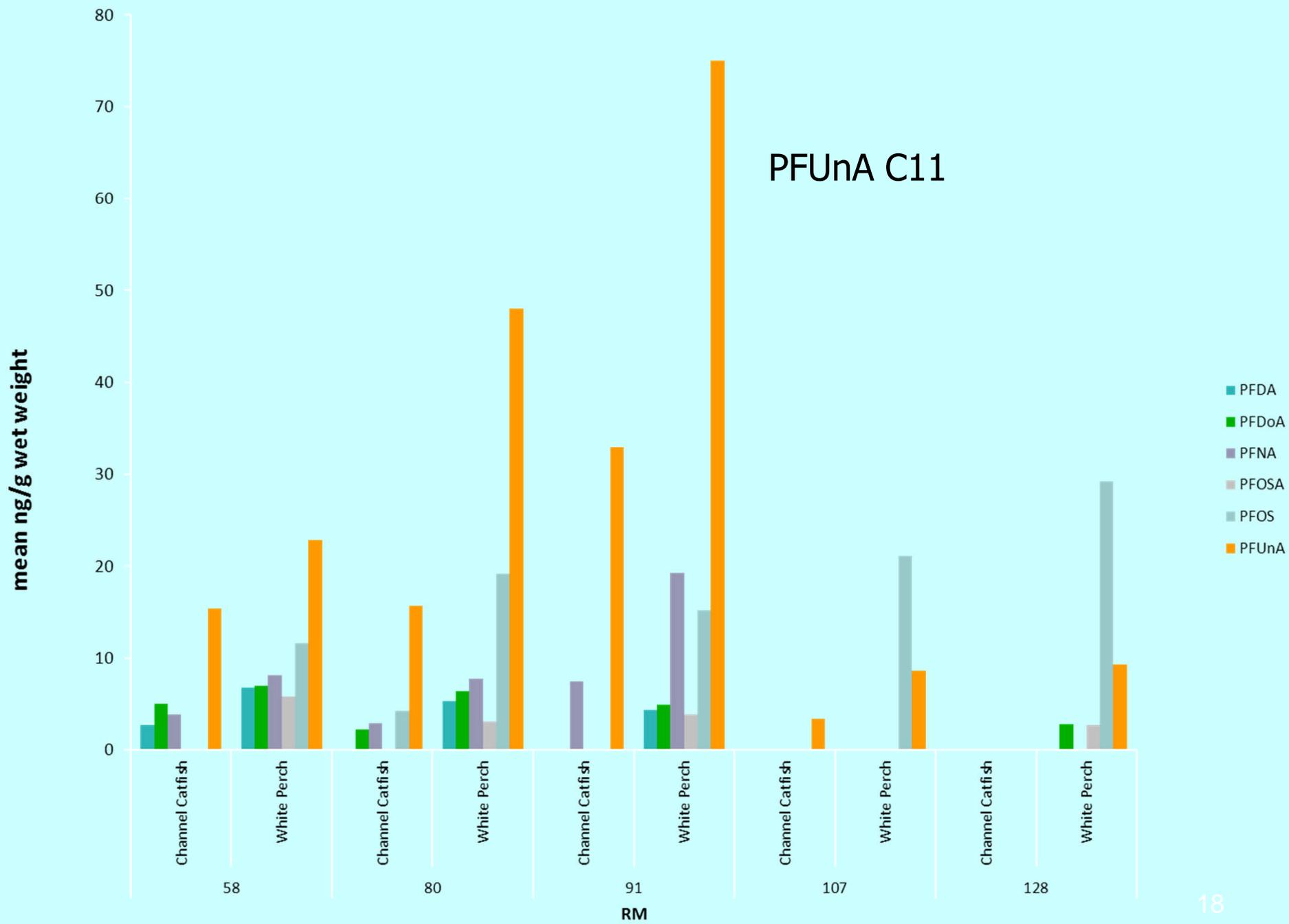
PFOA (C8) In Ambient Water Of The Tidal Delaware River



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.

Next Step

- Pennsylvania Water Resources Research Center
And Pennsylvania Sea Grant Funded Project
- Occurrence Survey for Emerging Contaminants
of Concern in Pennsylvania Tributaries of the
Delaware River
- Temple University and DRBC in 2013

Disposal of Unused Pharmaceuticals

- The Drug Enforcement Administration (DEA)
- NATIONAL TAKE-BACK INITIATIVE
- Upcoming Take-Back Day — April 27, 2013



- http://www.dea diversion.usdoj.gov/drug_disposal/takeback/

Acknowledgements

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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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