

Delaware River Basin Commission

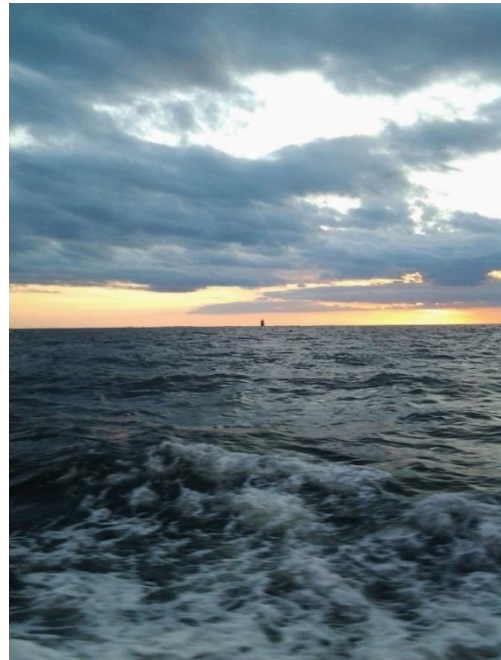
PFAS in Surface Water and Fish Tissue from the Delaware River

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ACS National Meeting

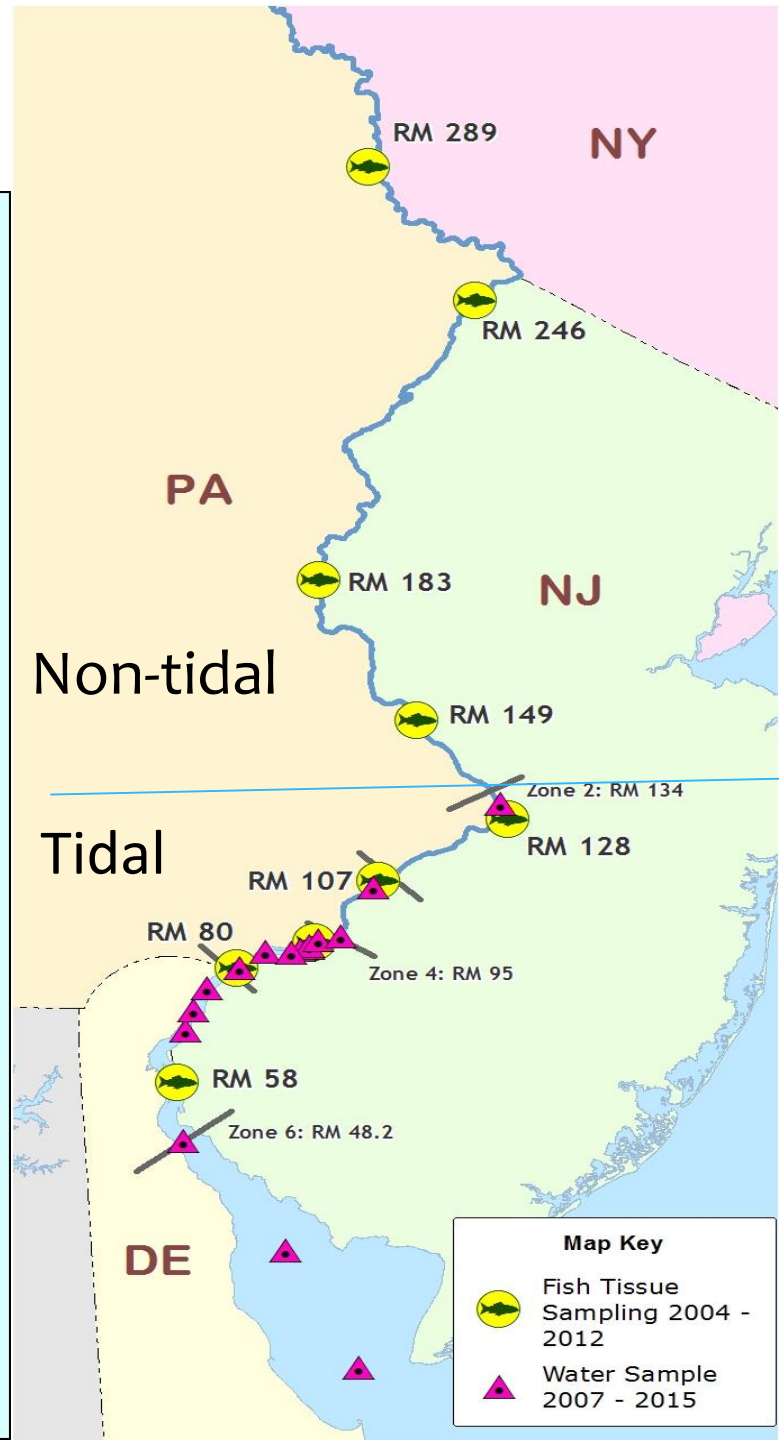
August 21, 2016



Delaware River Basin Commission

DELAWARE • NEW JERSEY
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UNITED STATES OF AMERICA

Delaware River Basin



Map Key	
	Fish Tissue Sampling 2004 - 2012
	Water Sample 2007 - 2015

Analytical Methods

- ❑ Water grab samples in HDPE bottles
- ❑ Fish samples are composites of five standard fillets.
- ❑ Analytical Parameters & Methods: 13 compounds using LC/MS/MS Method
- ❑ Analysis by Axys Analytical LTD

Sulfonates and Sulfonamide

- 4 Perfluorobutanesulfonate (PFBS)
- 6 Perfluorohexanesulfonate (PFHxS)
- 8 Perfluorooctanesulfonate (PFOS)
- Perfluorooctane sulfonamide (PFOSA)
- 8

of carbons

Carboxylates

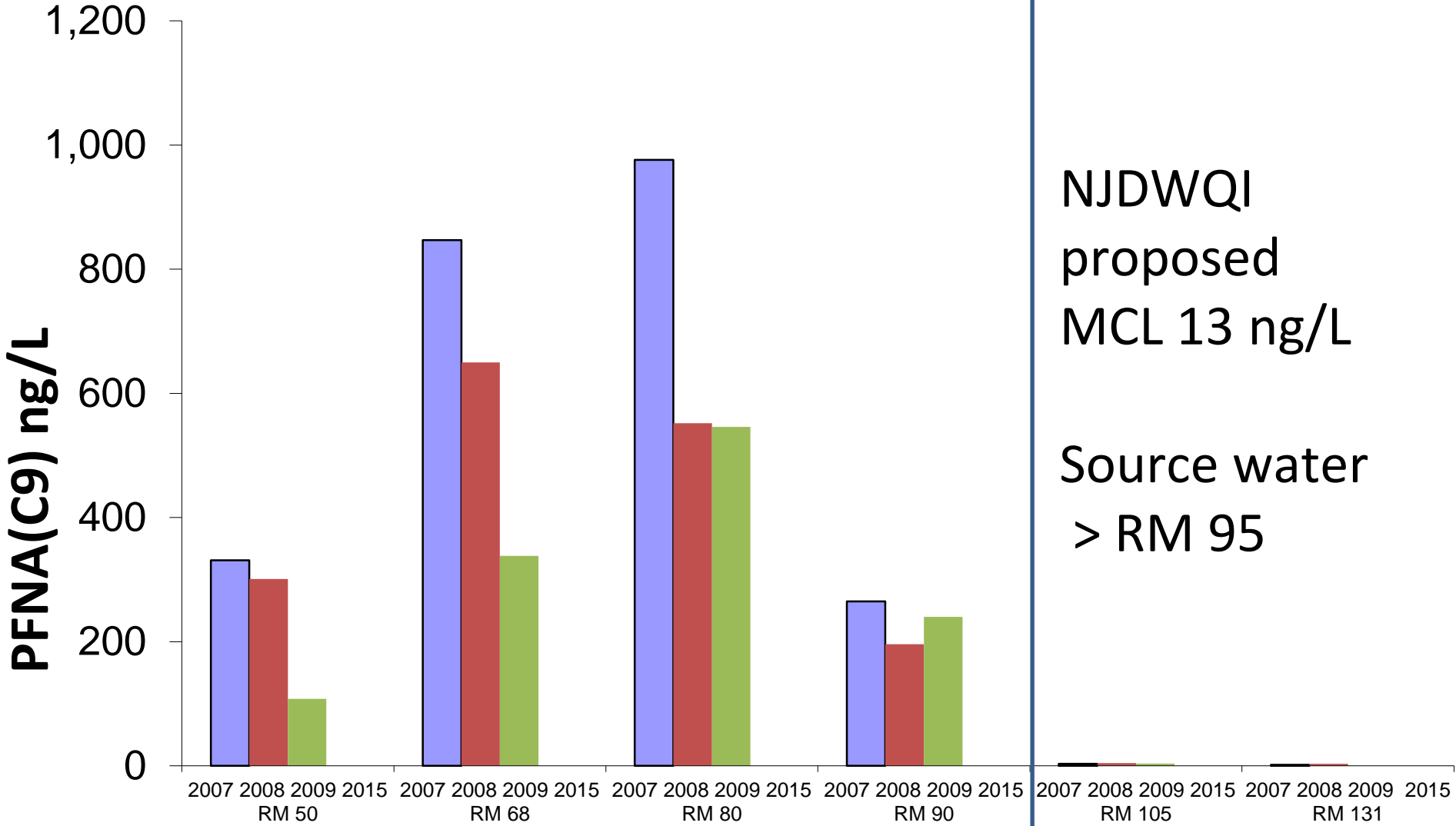
- 4 Perfluorobutanoate (PFBA)
- 5 Perfluoropentanoate (PFPeA)
- 6 Perfluorohexanoate (PFHxA)
- 7 Perfluoroheptanoate (PFHpA)
- 8 Perfluorooctanoate (PFOA)
- 9 Perfluorononanoate (PFNA)
- 10 Perfluorodecanoate (PFDA)
- 11 Perfluoroundecanoate (PFUnA)
- 12 Perfluorododecanoate (PFDoA)

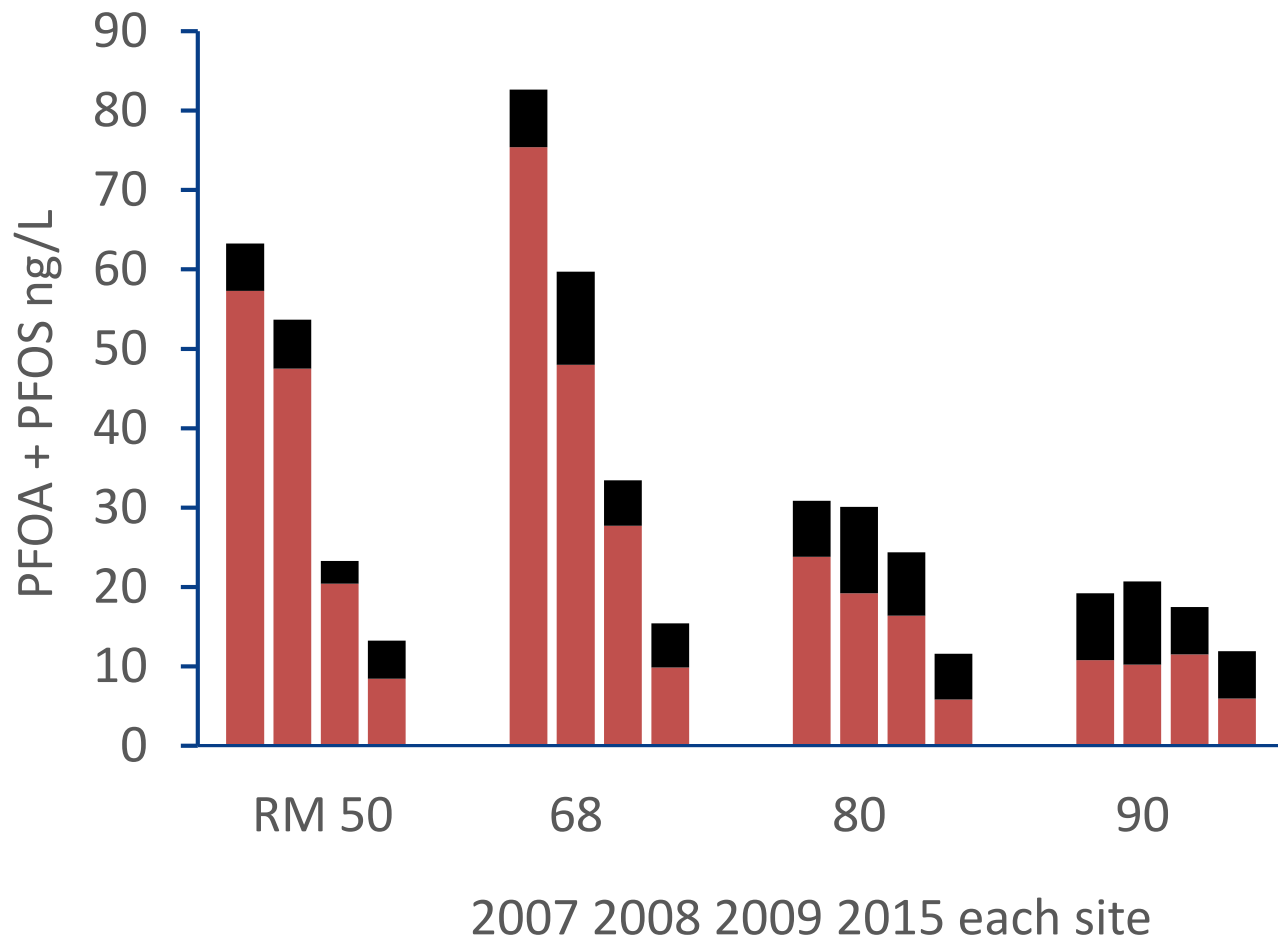
Stewardship Program

www.epa.gov/oppt/pfoa/pubs/stewardship/

In 2006, EPA invited eight major fluoropolymer and telomer manufacturers to join in a global stewardship program

- * Commit to **95 percent reduction in PFOA, precursor chemicals, and higher homologue chemicals by 2010**
- * Commit to working toward the **elimination** of these chemicals from **emissions and products by 2015**
- * Report annual progress
- * Analytical standards and laboratory methods for reporting



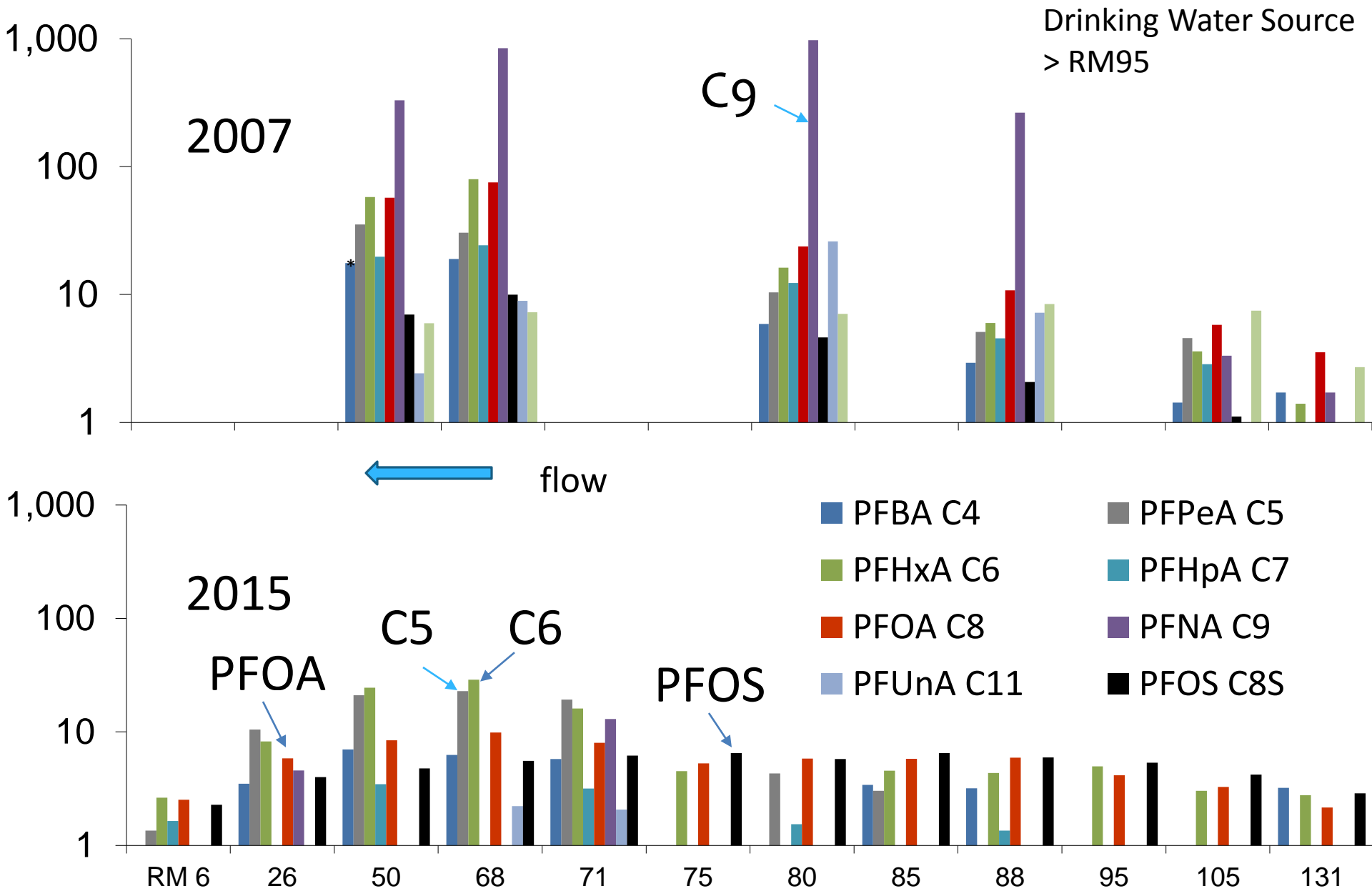


EPA DW
 health advisory
 70 ng/L
 Source water
 >RM 95

■ PFOS
 ■ PFOA

← flow

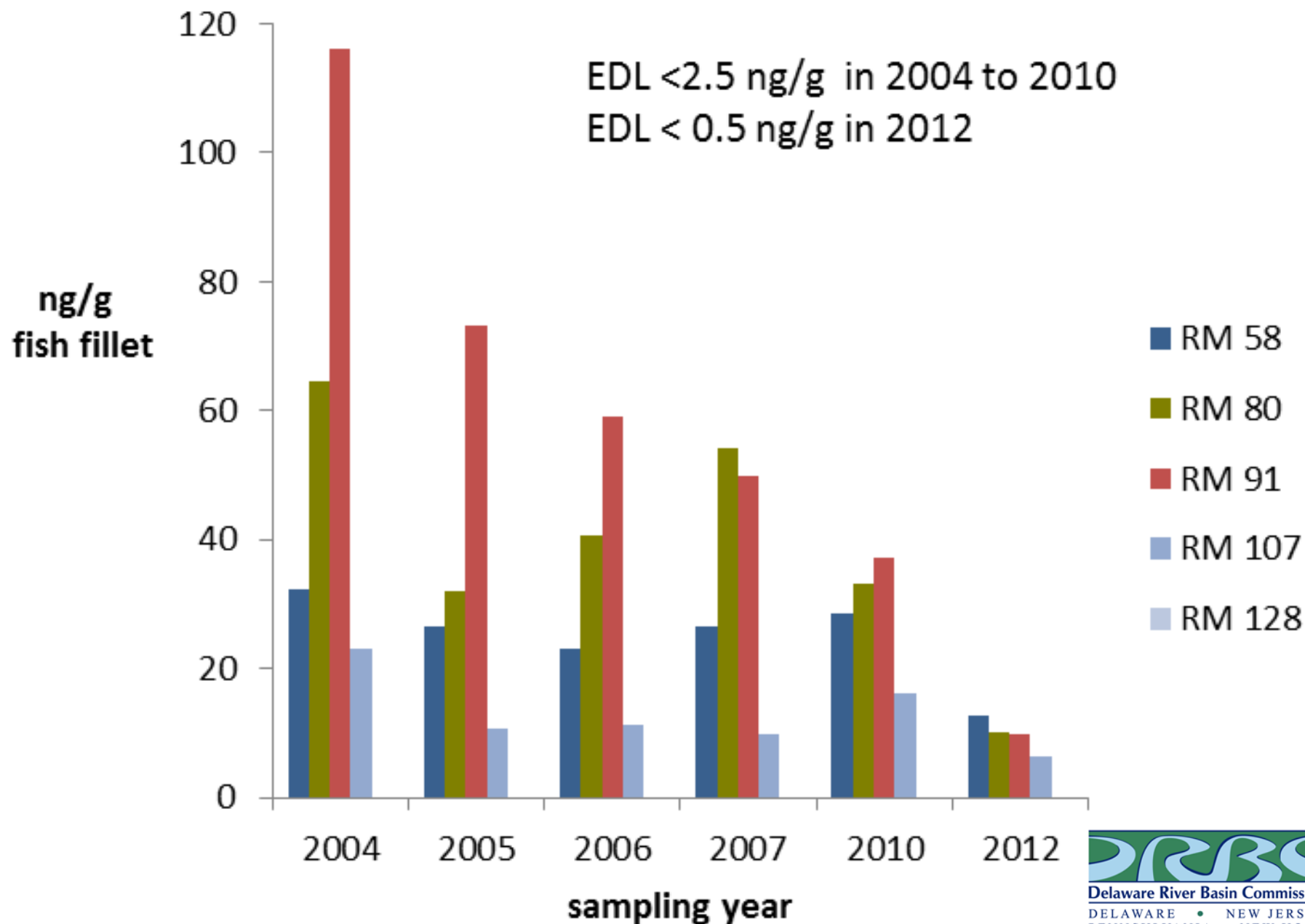
PFAS (ng/L) decreases in surface water vary by compound



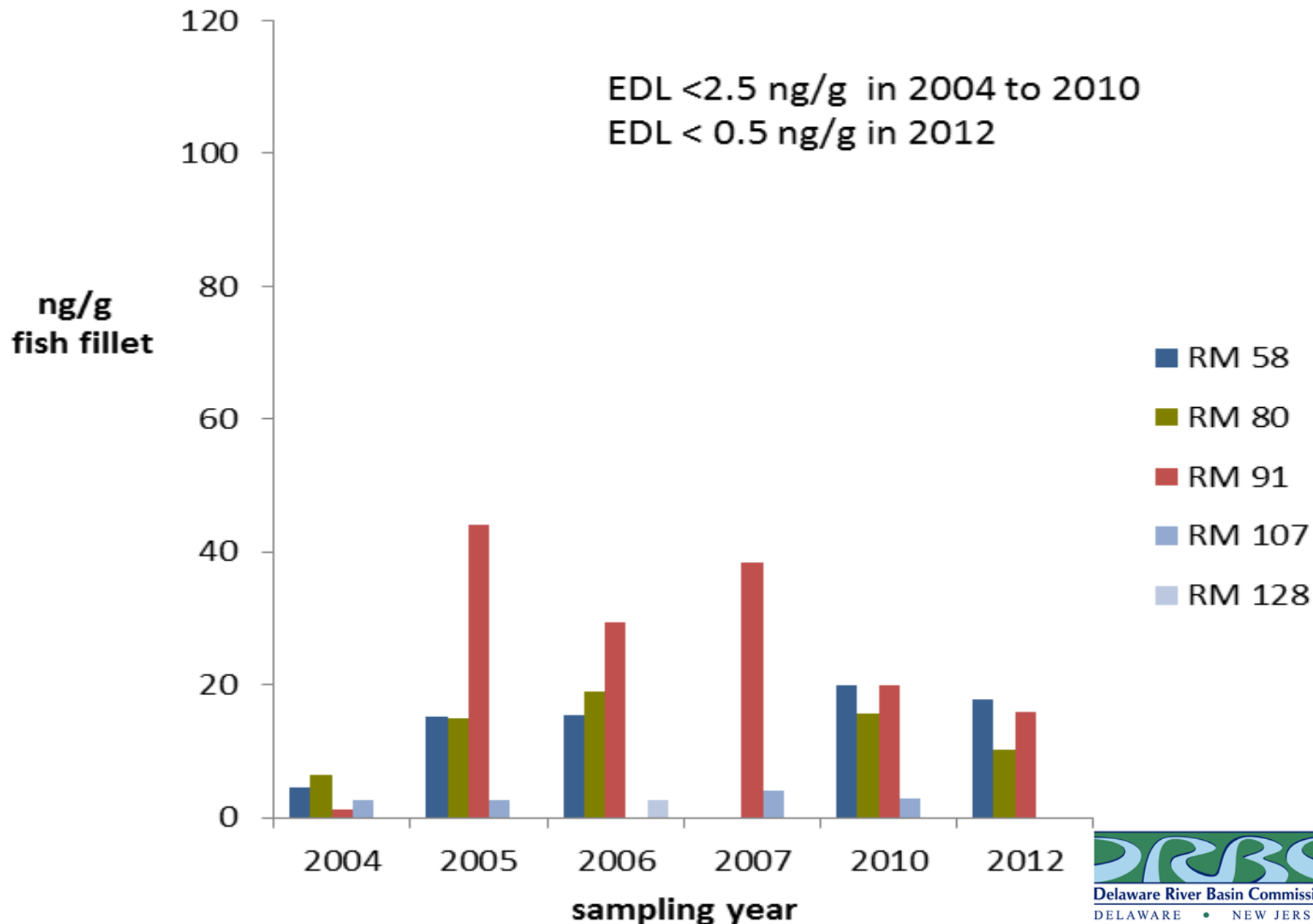
Summary of PFAS in Surface Waters of Delaware Estuary

- * Longer chain
 - * C11, C10, C9, and C8 appear to be decreasing
 - * PFOA & PFOS FOD 100%
- * Shorter chain C4 to C7 decreasing
 - * C6 and C5 highest PFAS conc in 2015
- * Ongoing research into PFAS effects on aquatic life, wildlife and human health

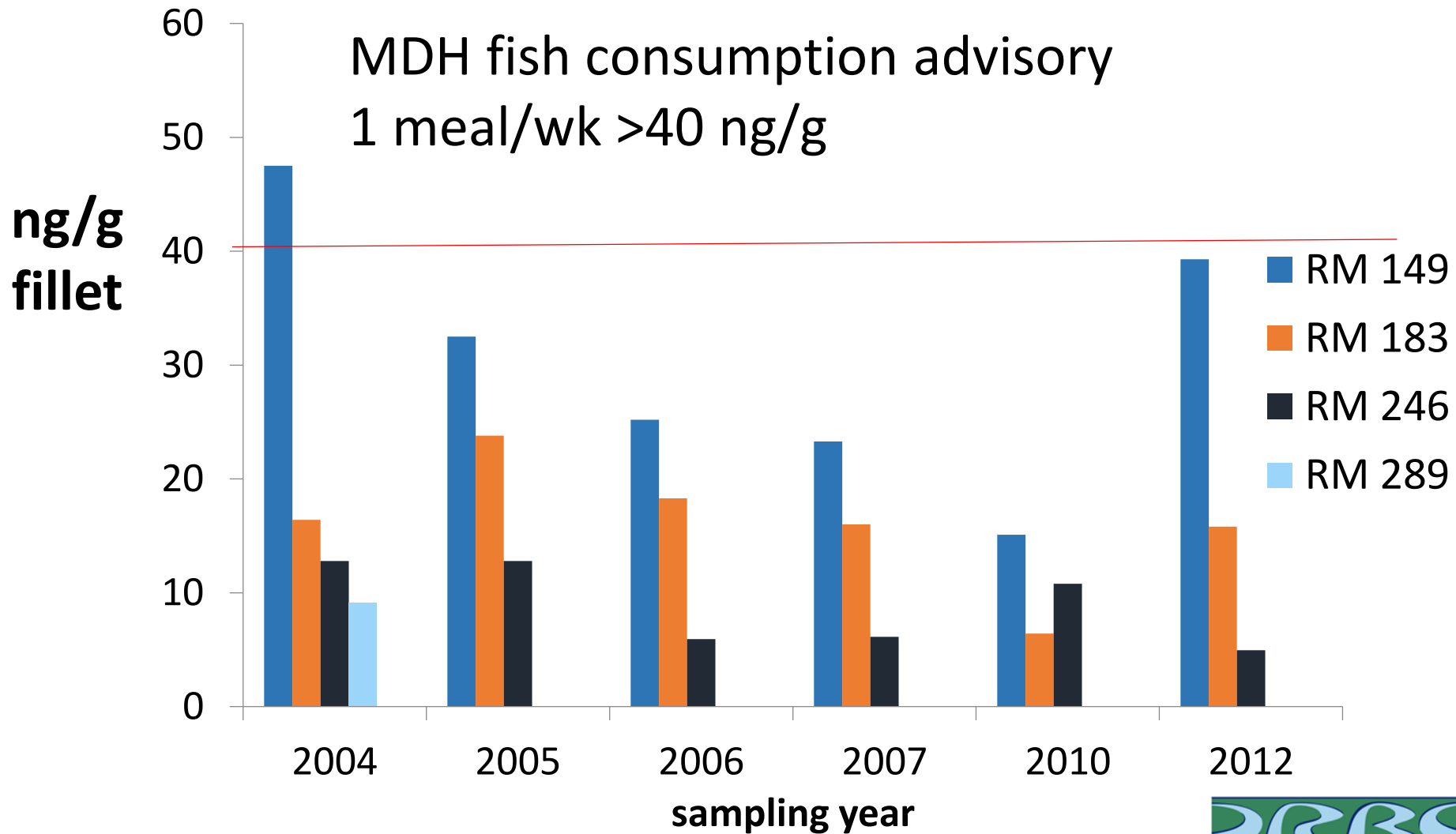
PFUnA (C11) in White Perch from Delaware Estuary



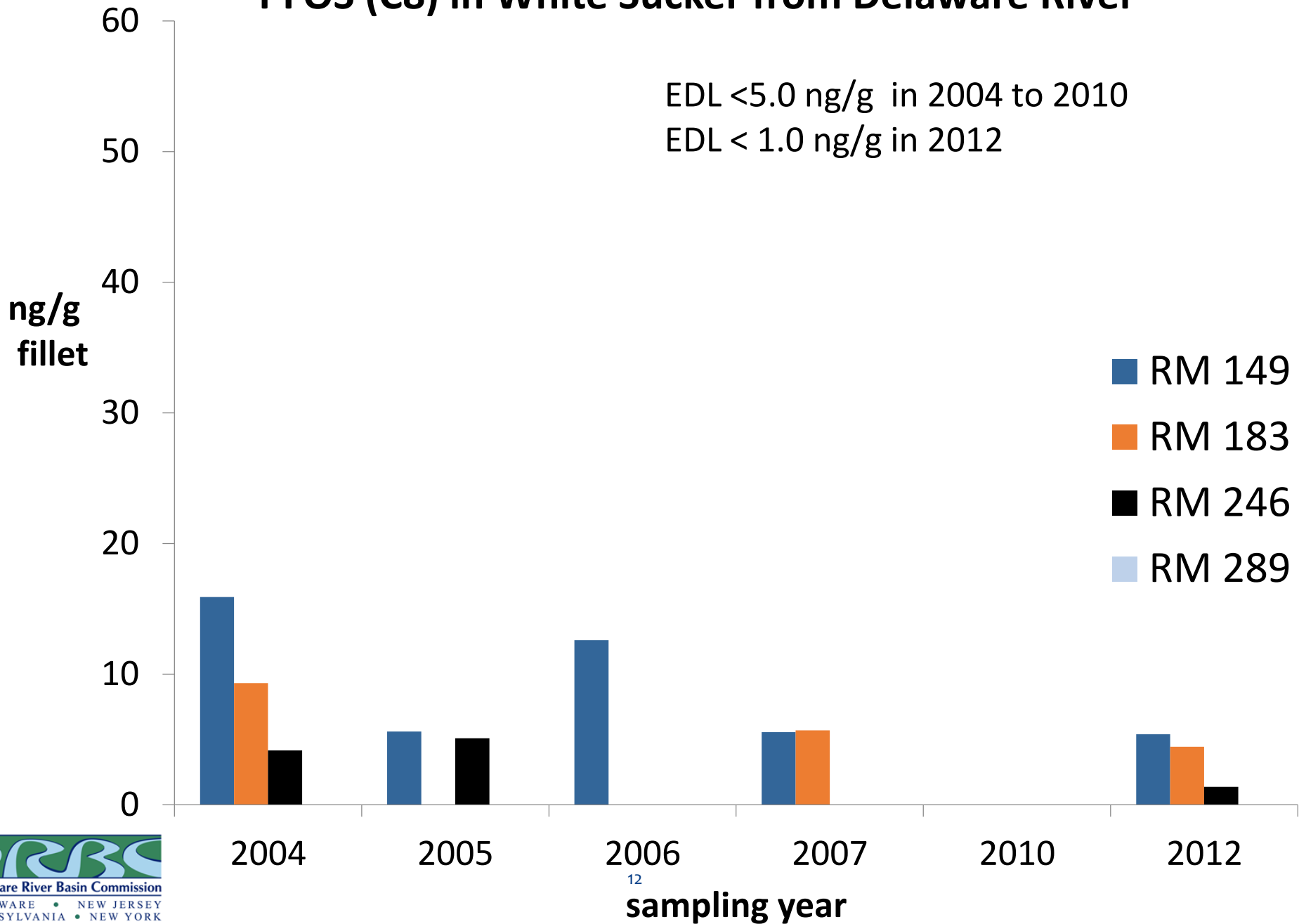
PFUnA (C11) in Channel Catfish from Delaware Estuary



PFOS (C8) Smallmouth Bass From Delaware River



PFOS (C8) in White Sucker from Delaware River



PFAS (ng/g) in fish fillet vary by species, location and year

2004

- White Perch (tidal)
- Channel Catfish (tidal)
- Smallmouth Bass (non-tidal)
- White Sucker (non-tidal)

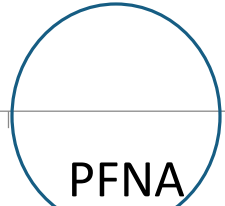
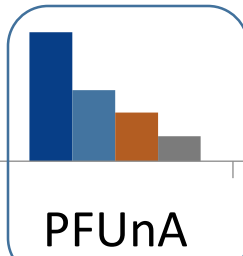
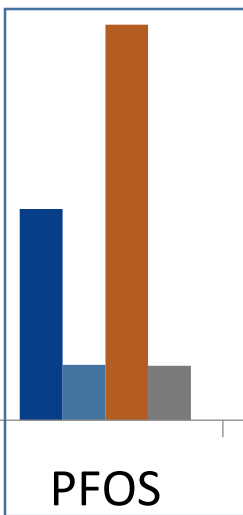
PFOSA PFOS PFDoA PFUnA PFDA PFNA

50
40
30
20
10
0

2012

RM 58 & RM 149

PFOSA PFOS PFDoA PFUnA PFDA PFNA



Summary of PFAS in Fish Filet

- * Concentrations of PFAS in resident fish of the Delaware River vary by species, sample location and sample year.
- * Concentrations appear to be decreasing for longer chain compounds e.g., PFNA (C9) and PFUnA (C11), with some inconsistent results e.g., PFOS and PFOSA.

Next Steps

Surface Water – 2016 sampling in non-tidal river

Fish – compare tidal and non-tidal 2015 data (when available)
to 2004, 2005, 2006, 2007, 2010, 2012 data

Sediment – 2016 sampling in tidal river

Fish – 2016 sampling in Delaware Bay (different species)

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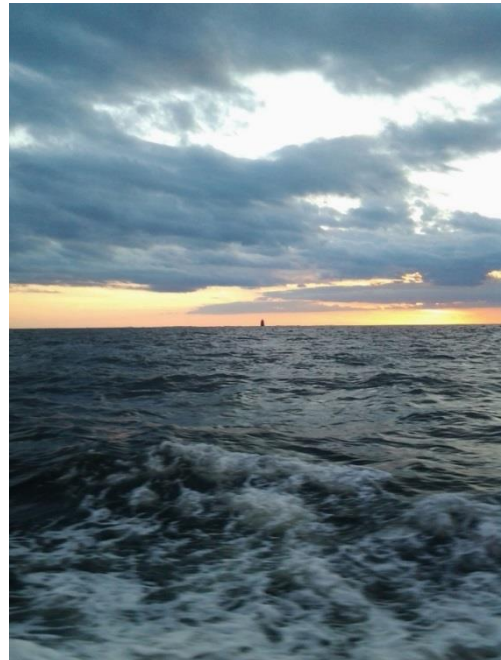
Thank you!

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