

Spatial and Temporal Trends in PCB Concentrations in Fish Tissue in the Mainstem of the Delaware River



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Presentation Themes

- ✓ Background
 - Program objectives
 - PCB TMDLs Implementation
 - Expectations
- ✓ Sampling Design
- ✓ Results
- ✓ Summary

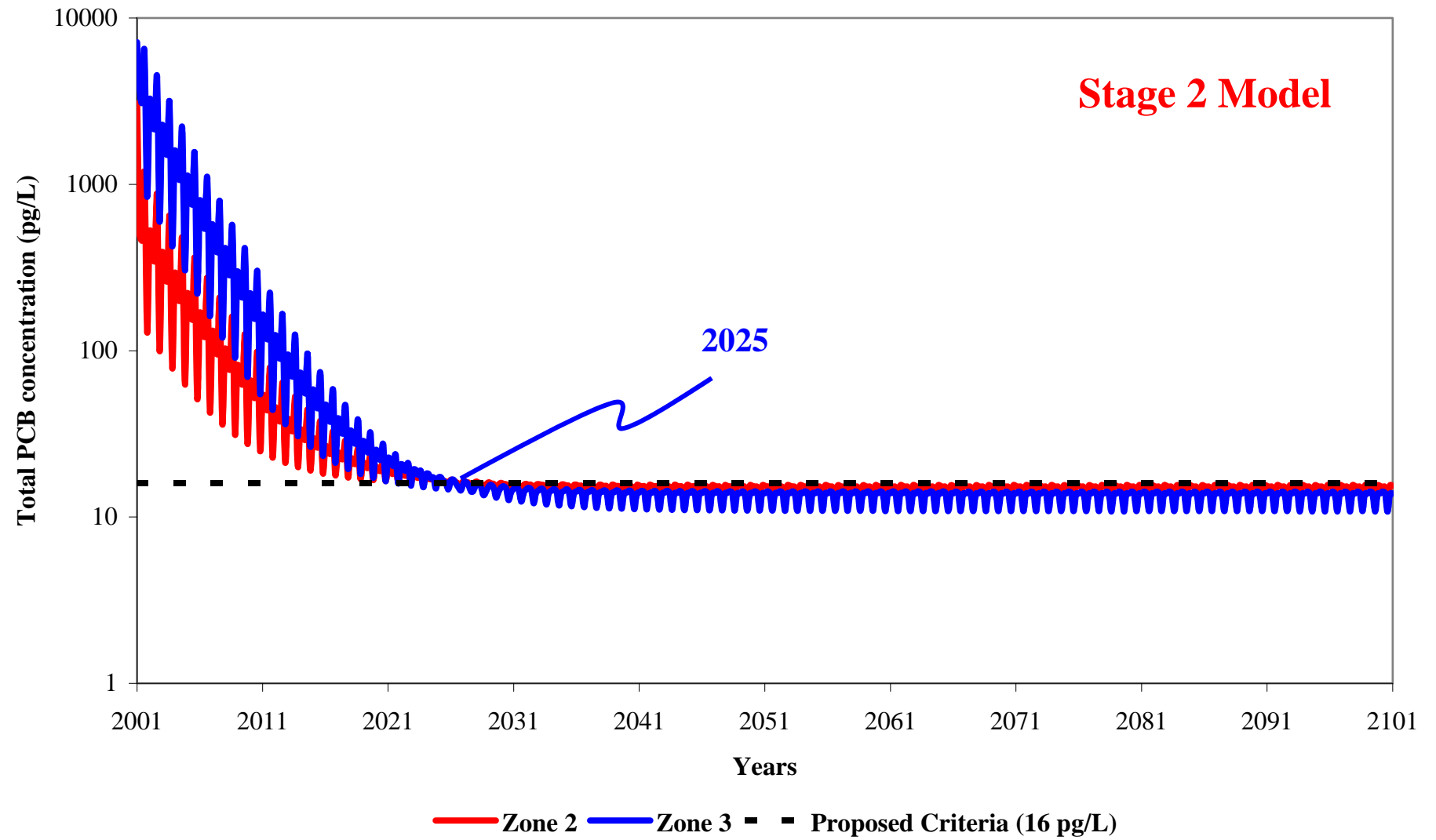
Background

- Why monitor fish?
 - Integrator of exposure.
 - Endpoint for evaluating human health impacts from fish consumption.
 - Interstate waters.
 - Needed for Integrated Assessment of water segments by states and DRBC.
 - Funding for programs is limited.
 - Coordination w/ State partners.

PCB TMDLs Implementation

- ◆ Goal is to achieve the recently adopted uniform water quality criterion of 16 picograms/Liter and eliminate the need for fish consumption advisories for Zones 2 through 6.
- ◆ For PCBs, however, contaminated sediments will continue to bleed PCBs to the water column even if all active sources of PCBs are eliminated, resulting in a significant lag time to reach the water quality criterion.

**Projected, averaged Total PCB concentrations for Zones 2 & 3
Boundaries @ 16pg/L; current sediment condition; 99.97% all load reduction**



PCB TMDLs Implementation

- ◆ TMDLs for certain hydrophobic pollutants like PCBs will require long-term strategies to achieve their goals.

- ◆ **Expectation:**

Ambient water and fish tissue concentrations will not decrease until sources of PCBs are reduced *and* sediment concentrations decline as uncontaminated sediment is deposited in the estuary.

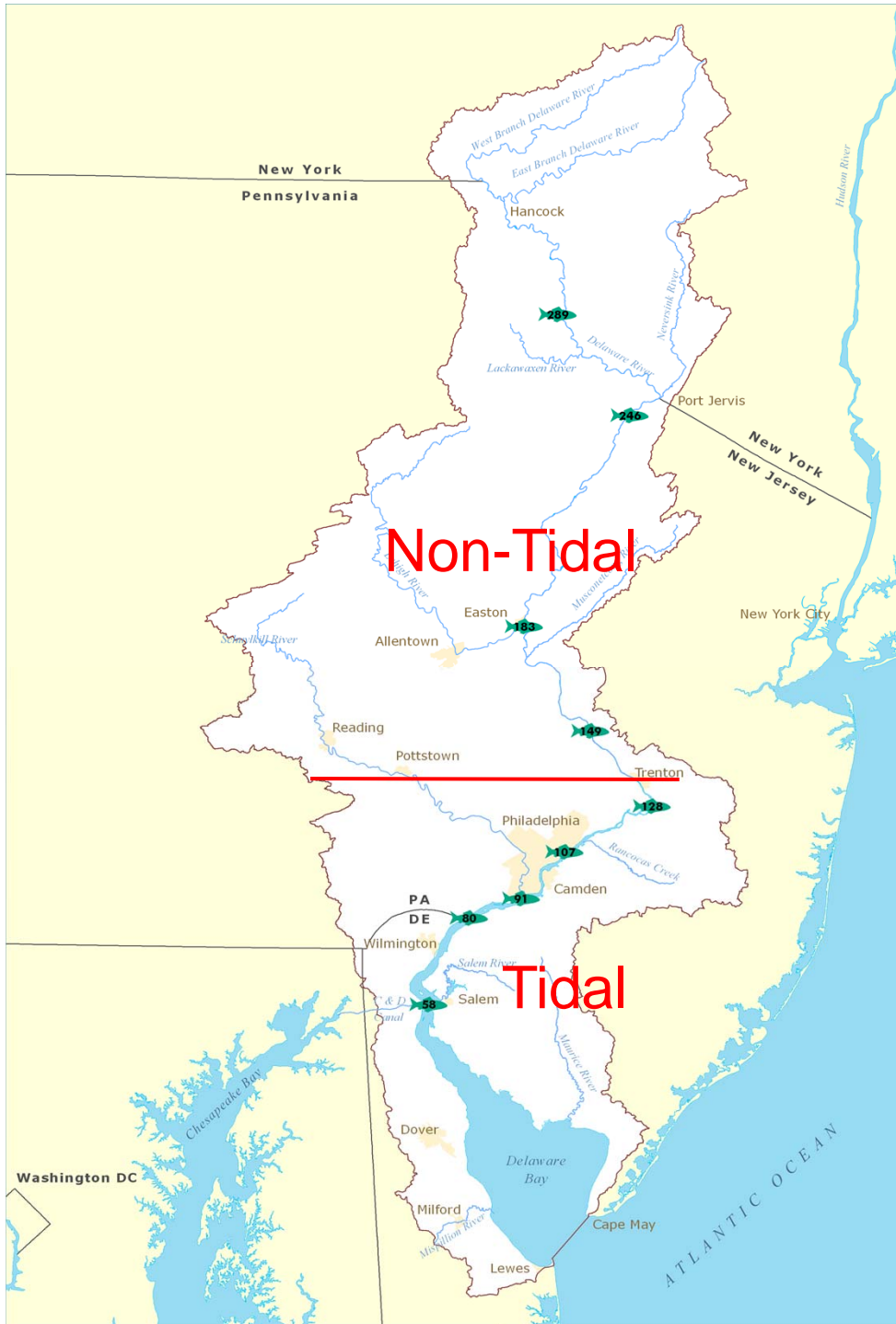
Sampling Design

- Design considerations:
 - Locations – tidal vs. non-tidal?
 - Species – resident or migratory?
 - Analytical parameters?



Sampling Design

- ❑ Fish samples are collected from 8 sites in both the tidal (5 sites) and non-tidal (3 sites) portions of the Delaware River.
- ❑ Frequency: Yearly 2000 - 2007, 2010, 2012
- ❑ Two species of fish are collected at each site representing resident benthic and pelagic trophic levels.
 - Tidal species: white perch, channel catfish
 - Non-tidal species: smallmouth bass, white sucker
- ❑ Samples are collected by electrofishing or hook & line.



Sampling Locations 2004 to 2007, 2010, 2012

Non-Tidal Locations

Narrowsburg, NY	RM 290*
Milford, PA	RM 246
Easton, PA	RM 183
Lambertville, NJ	RM 149

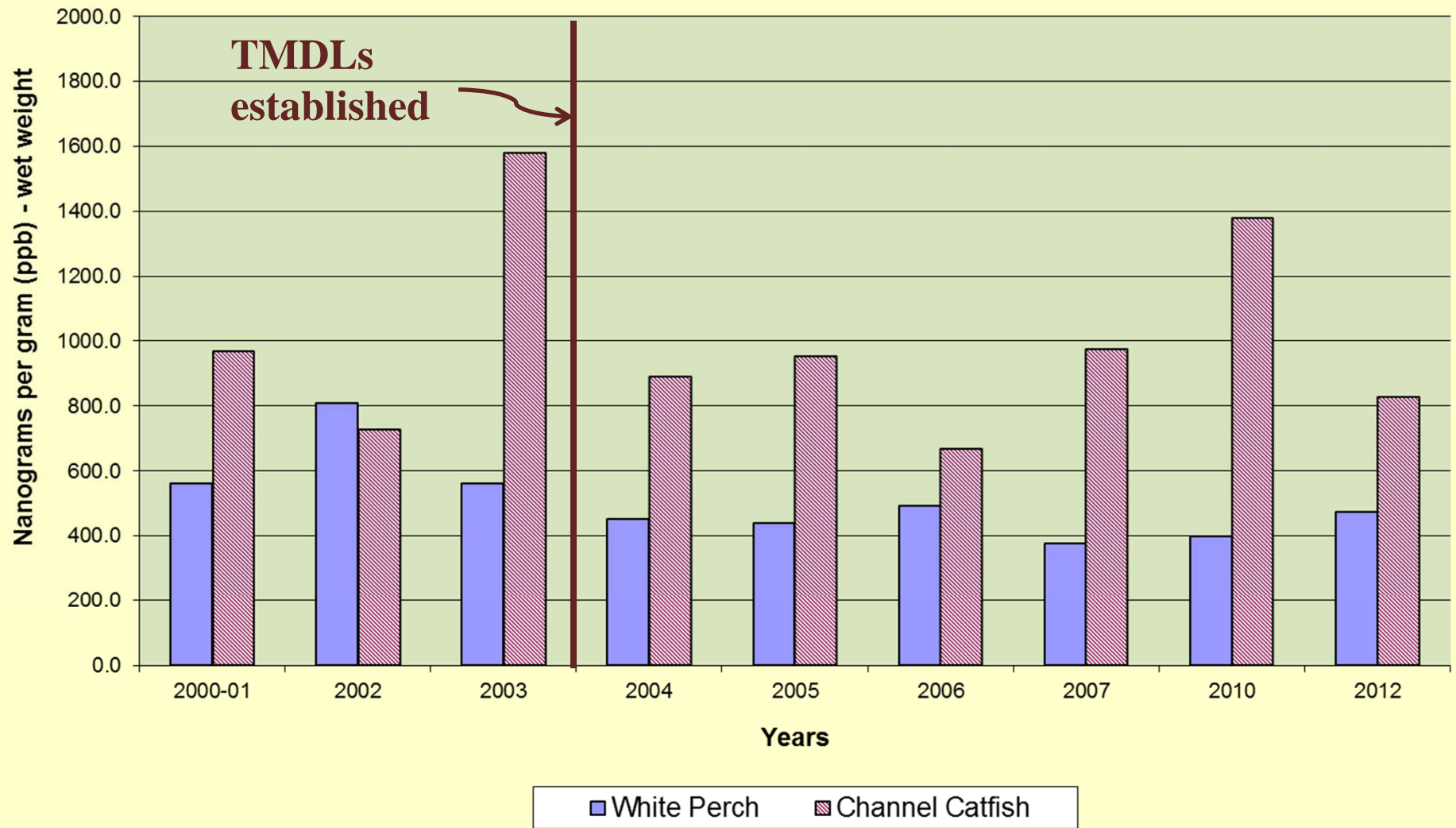
Tidal Locations

Crosswicks Creek	RM 128
Tacony-Palymra Br.	RM 107
Woodbury Creek	RM 91
Raccoon Creek	RM 80
Salem River	RM 58

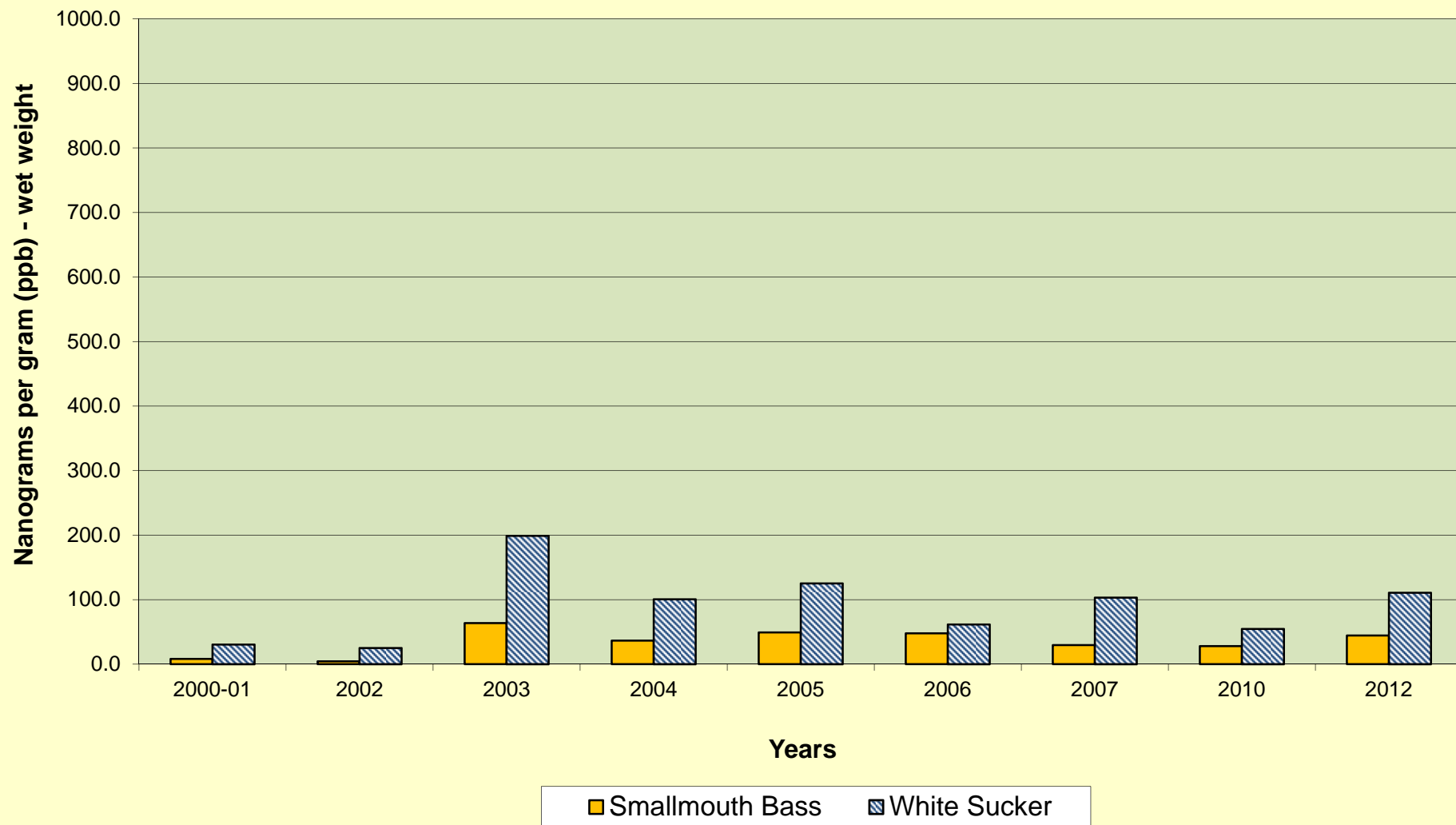
Analytical Methods

- ❑ Samples are composites of standard fillets, and consist of a composite of 4 to 5 fish of similar size and weight.
- ❑ Analytical Parameters & Methods:
 - Starting in 2004, all analyses were conducted by Axys Analytical LTD using Method 1668A.
 - Target analytes: all 209 PCB compounds (i.e., PCB congeners)

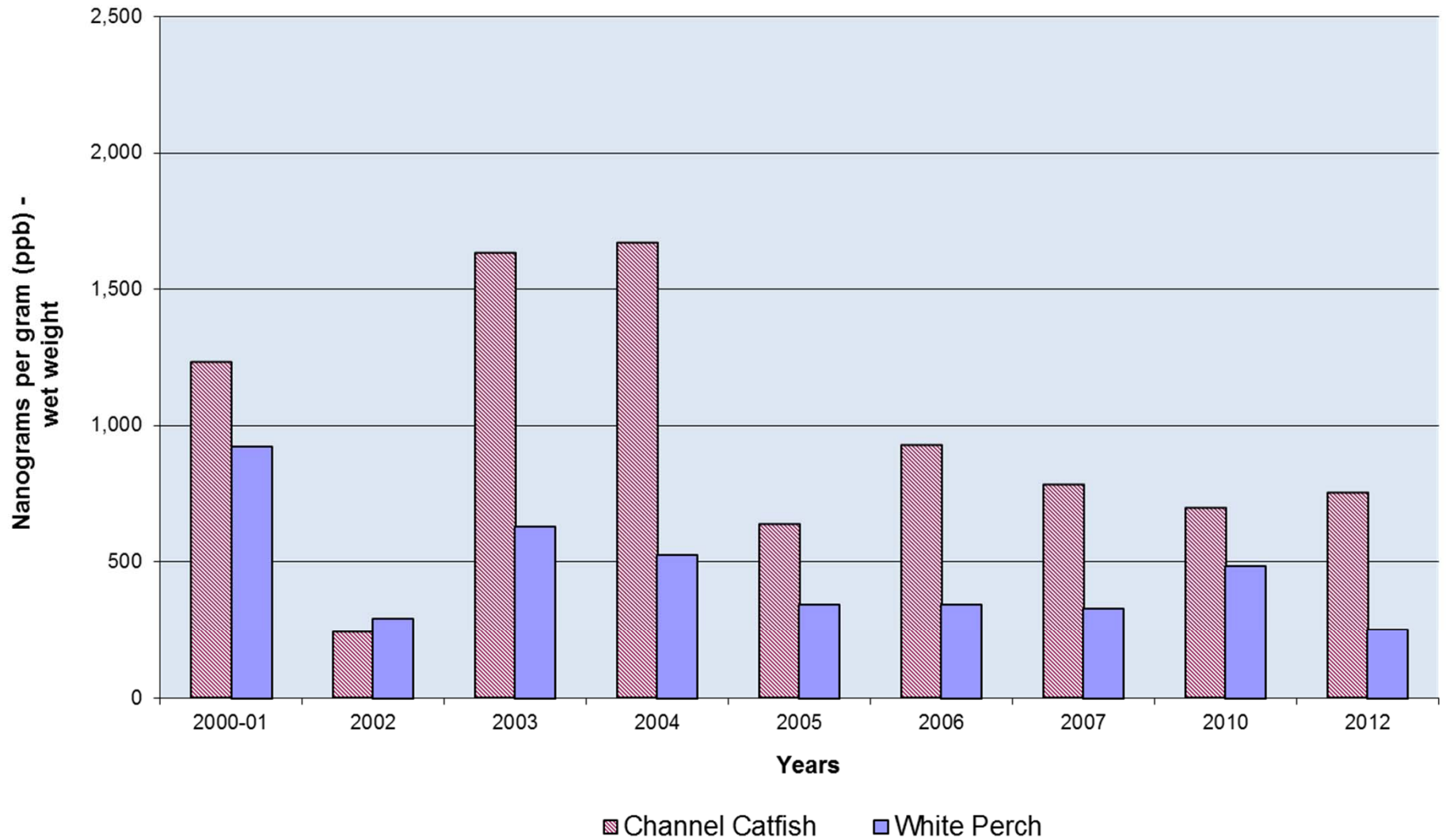
PCBs in Fish Tissue Delaware River Estuary 2000 to 2012



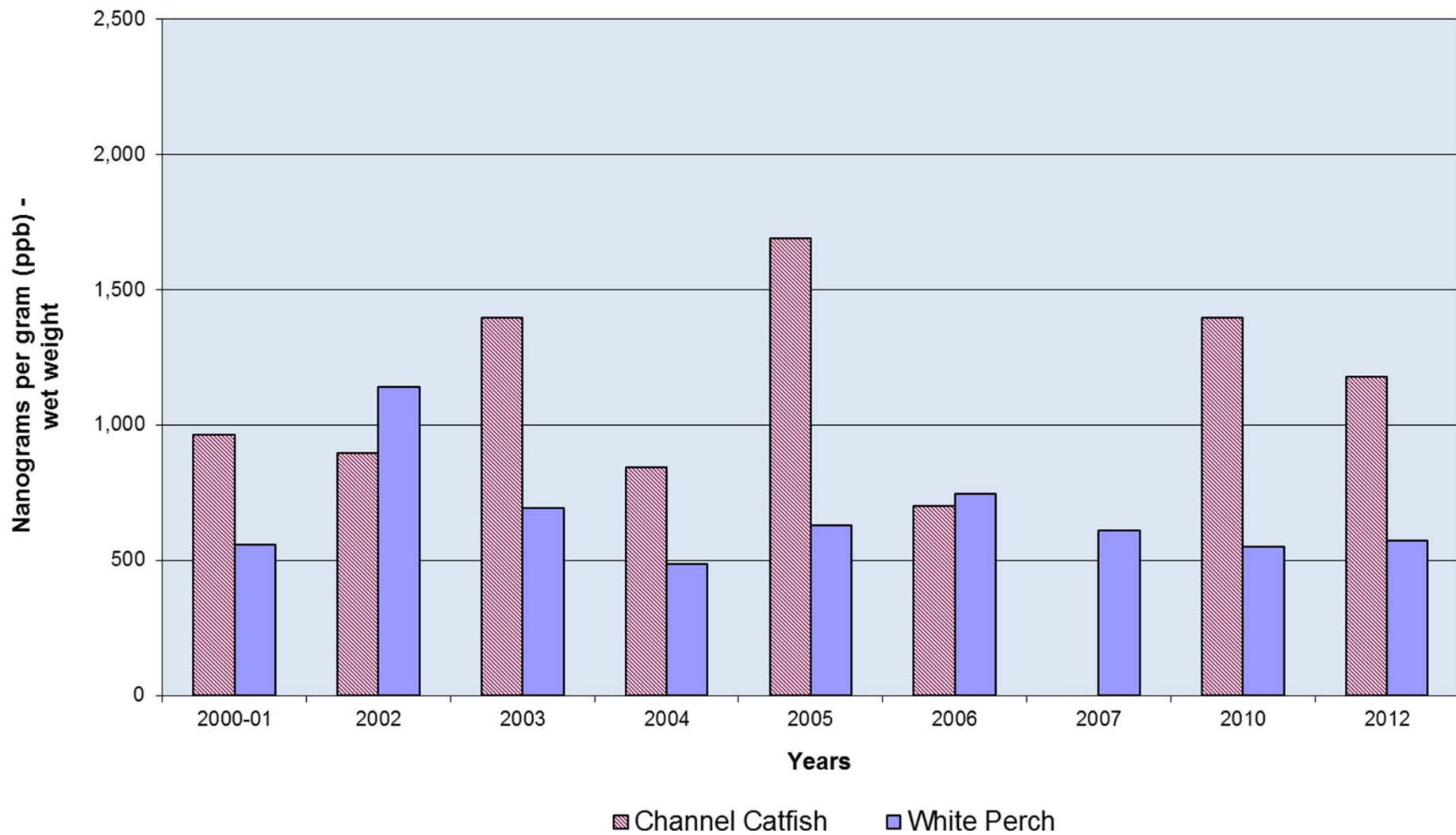
PCBs in Fish Tissue Non-Tidal Delaware River 1991 to 2012



Historical Trend in Total PCBs in Fish Tissue Tacony-Palmyra Bridge - Delaware Estuary



Historical Trend in Total PCBs in Fish Tissue Raccoon Creek - Delaware Estuary



Summary

- ◆ Since the development of the PCB TMDLs in 2003, the DRBC has analyzed fish tissue samples from 9 locations in the non-tidal and tidal portions of the Delaware River.
- ◆ Highest concentrations are observed in the urban areas of the estuary.
- ◆ Concentrations in samples collected in the non-tidal portion of the river had significantly lower concentrations of PCBs.
- ◆ PCB concentrations were higher in benthic species compared to pelagic species tested at all locations.

Summary

- ◆ As expected, tissue concentrations are not declining despite a 46% reduction in the loadings of PCBs from point sources from 2005 to 2011.
- ◆ Declines in fish tissue concentrations can be expected sooner in areas where there is less sediment contamination such as Zone 2 and Delaware Bay.
- ◆ Continued implementation of the long-term strategy developed by the co-regulators is needed to achieve the goal of eliminating the need for fish consumption advisories.

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Information on the TMDLs, model development, sampling and analytical information, and other implementation requirements and resources are available on the DRBC website at:

<http://www.state.nj.us/drbc/quality/toxics/pcbs/>

