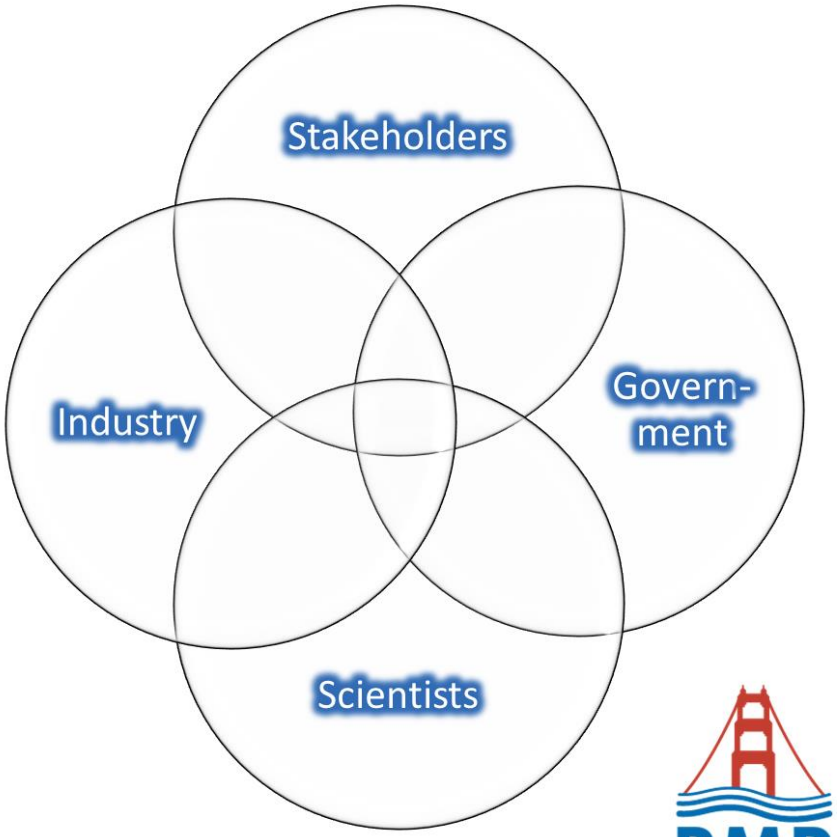
Highlights from the PFAS Synthesis & Strategy Report

Meg Sedlak, Rebecca Sutton, Diana Lin and Adam Wong

RMP's success is to due to collaboration…

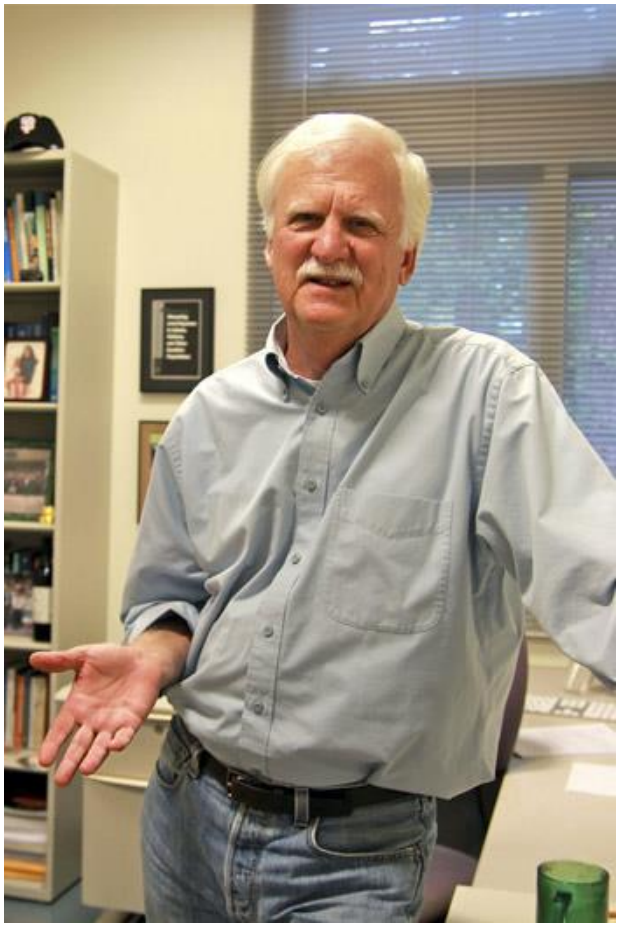


….to do best possible science to inform community of the health of the Bay

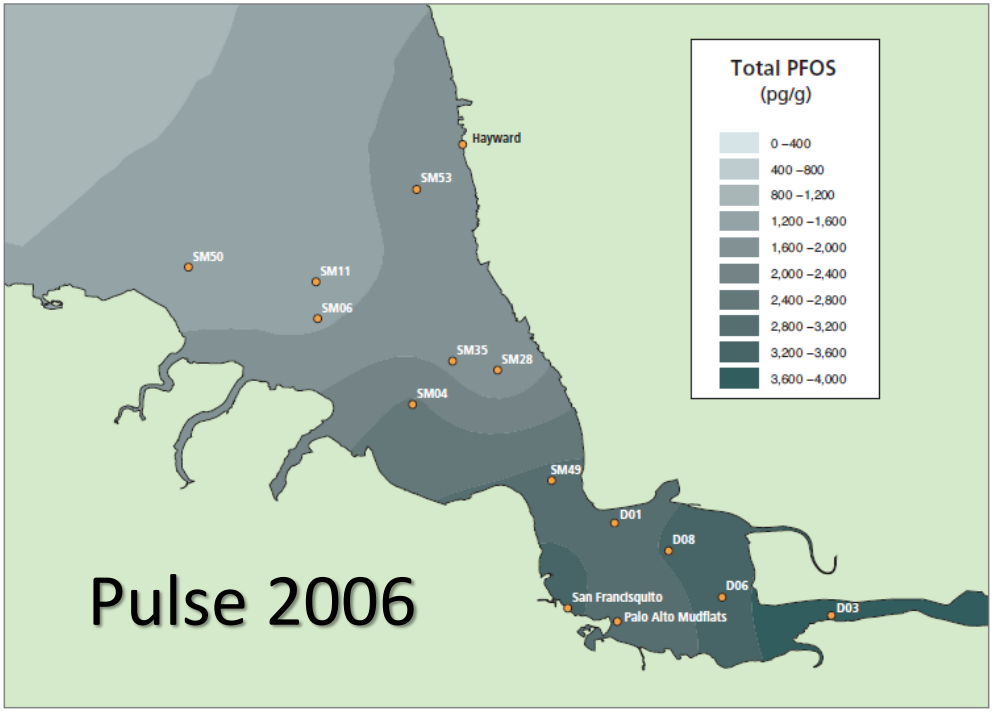
Dissolved trace element cycles in the San Francisco Bay estuary

A.R. Flegal, G.J. Smith, G.A. Gill, S. Sañudo-Wilhelmy and L.C.D. Anderson
Institute of Marine Sciences, University of California Santa Cruz, Santa Cruz, CA 95064, USA

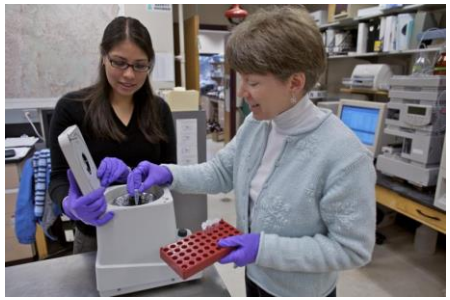
(Received 14 February 1991; revision accepted 28 June 1991)



Dr Russ Flegal



Dr Chris Higgins, Colorado School of Mines



Dr. Jennifer Field, Oregon State

Environmental Science & Technology

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Oxidative Conversion as a Means of Detecting Precursors to Perfluoroalkyl Acids in Urban Runoff

Erika F. Houtz and David L. Sedlak*

Department of Civil and Environmental Engineering, University of California at Berkeley, Berkeley, California, 94720-1710

Berkeley
UNIVERSITY OF CALIFORNIA

Go Bears!

Poly- and perfluoroalkyl substances in wastewater: Significance of unknown precursors, manufacturing shifts, and likely AFFF impacts

Erika F. Houtz [a, b, *], Rebecca Sutton [c], June-Soo Park [a], Margaret Sedlak [c]

[a] Environmental Chemistry Laboratory, California Department of Toxic Substances Control, Berkeley, CA 94710, USA
[b] Sequoia Foundation, La Jolla, CA 92037, USA
[c] San Francisco Estuary Institute, Richmond, CA 94804, USA

Dr. Park, DTSC

Dr. Greig, Cal Academy

Dr. Benskin, Stockholm University

BACWA BAY AREA CLEAN WATER AGENCIES

BAY AREA STORMWATER MANAGEMENT AGENCIES ASSOCIATION

Contents lists available at ScienceDirect

Chemosphere

journal homepage: www.elsevier.com/locate/chemosphere

Per- and polyfluoroalkyl substances (PFASs) in San Francisco Bay wildlife: Temporal trends, exposure pathways, and notable presence of precursor compounds

Margaret D. Sedlak [a, *], Jonathan P. Benskin [b], Adam Wong [a], Richard Grace [c], Denise J. Greig [d]


APPLAUSE

MODERATE OR HIGH IMPACT

None currently

LOW IMPACT

→ **PFOS**

Fipronil

Nonylphenol

NO IMPACT

PBDEs and HBCD

Pyrethroids*

Pharmaceuticals and

Personal Care Products

PBDDs and PBDFs

UNCLEAR

Alternative Flame Retardants

→ **PFAS (Fluorinated Chemicals)**

Pesticides, Plasticizers

Microplastic

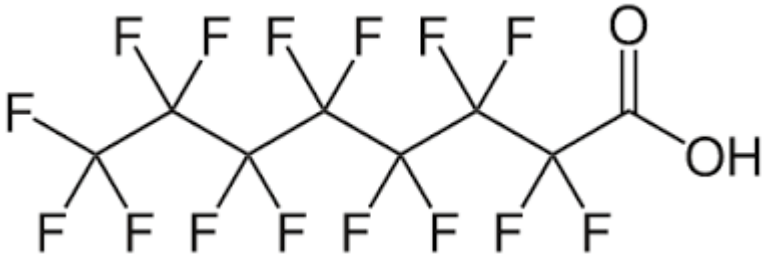
Report Objectives

- Synthesize findings
- Review classifications
- Recommend monitoring strategy

Background

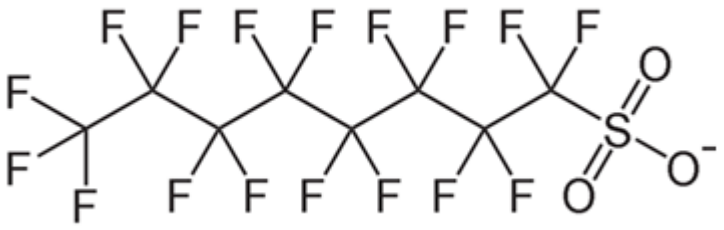
- Nomenclature
- Uses
- Concerns

PFOA – C8

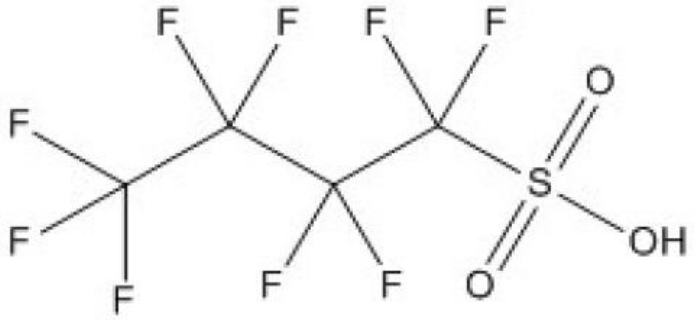


Long-chain
Perfluorocarboxylate

PFOS -C8

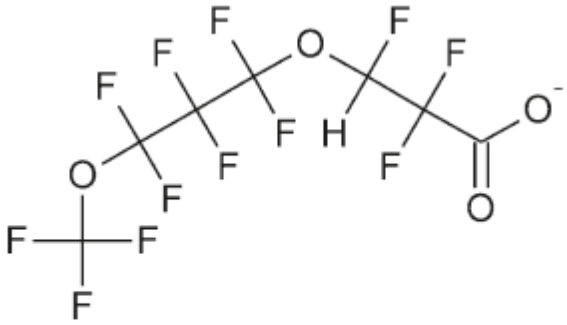


Long-chain
Perfluorosulfonate



Perfluorobutane sulfonic acid (PFBS)

Short-chain
Perfluorosulfonate



Polyfluorinated ether carboxylates
(ex. 4,8-dioxa-3H-perfluorononanoate)

Polyfluoroalkyl Substance

Unique properties result in many uses

- Polymer processing aids for fluoropolymers (PTFE)
- Metal plating
- Oil/gas mining

- Stain/water repellant for textiles and carpets
- Food-packaging

- Fire-fighting foams
- Insecticides
- Paints

Concern

- Toxic
  - PFOS - Wealth of data, some ecotox data
  - PFOA – Considerable human data
  - Long chains - similar mode of action
  - Little data on short-chain/ polyfluorinated

Parkersburg WV

- Resistant to degradation

- Bioaccumulate - Long chain (> C7)

Management Actions

- PFOS, PFOA, and long-chained regulated carboxylates under REACH

- PFOS & related compounds were voluntarily phased out in 2002 in US
- PFOA phased out by 2015 in US
- US Drinking water advisory - PFOS/PFOA
- PFOA & PFOS proposed listing on Prop 65

PFAS Monitoring

Pollution Pathways

Wastewater **

Bay Monitoring

*

*

*

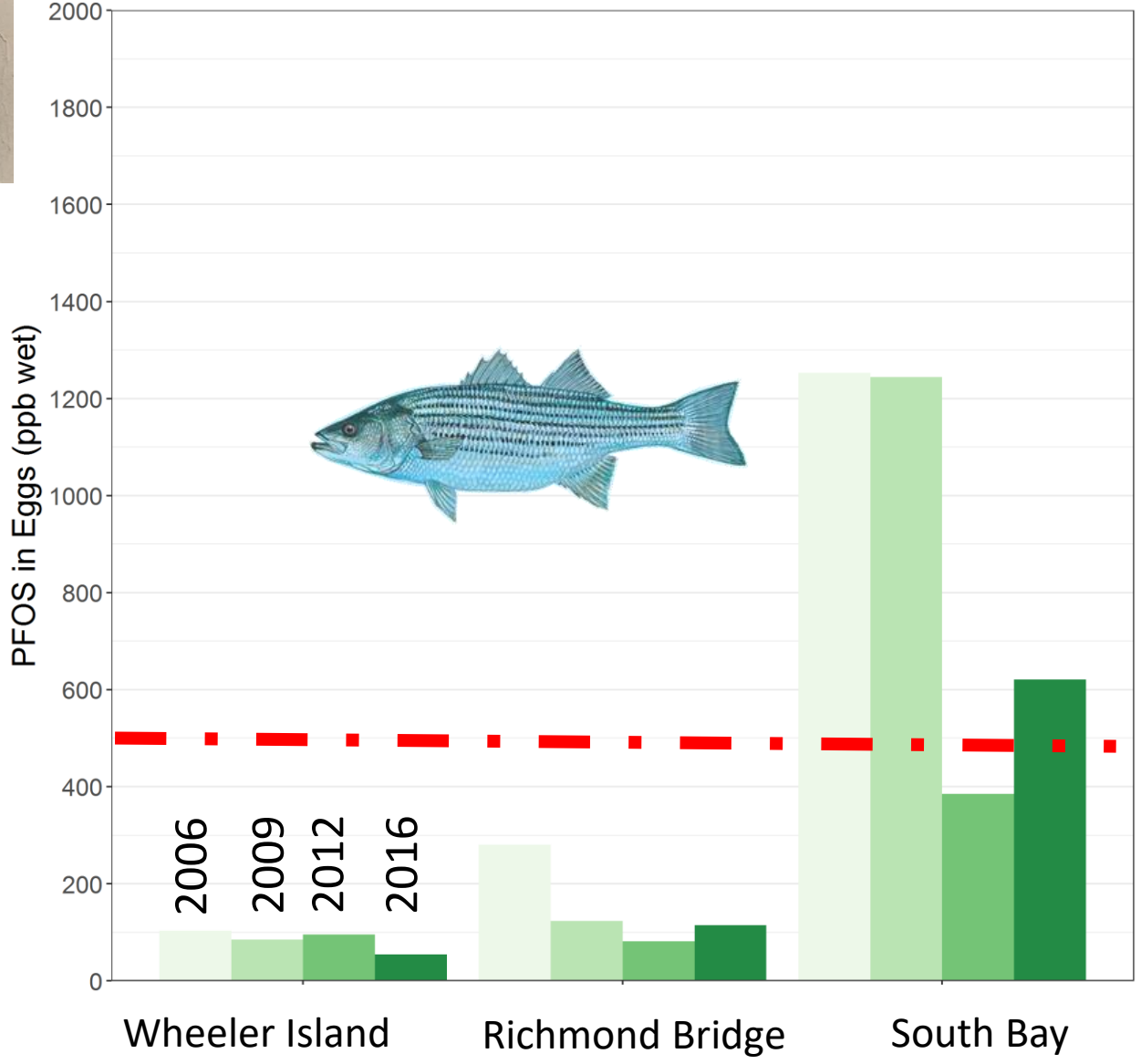
Stormwater *

**

RMP

PFOS Declines in Bird Eggs but Still of Concern

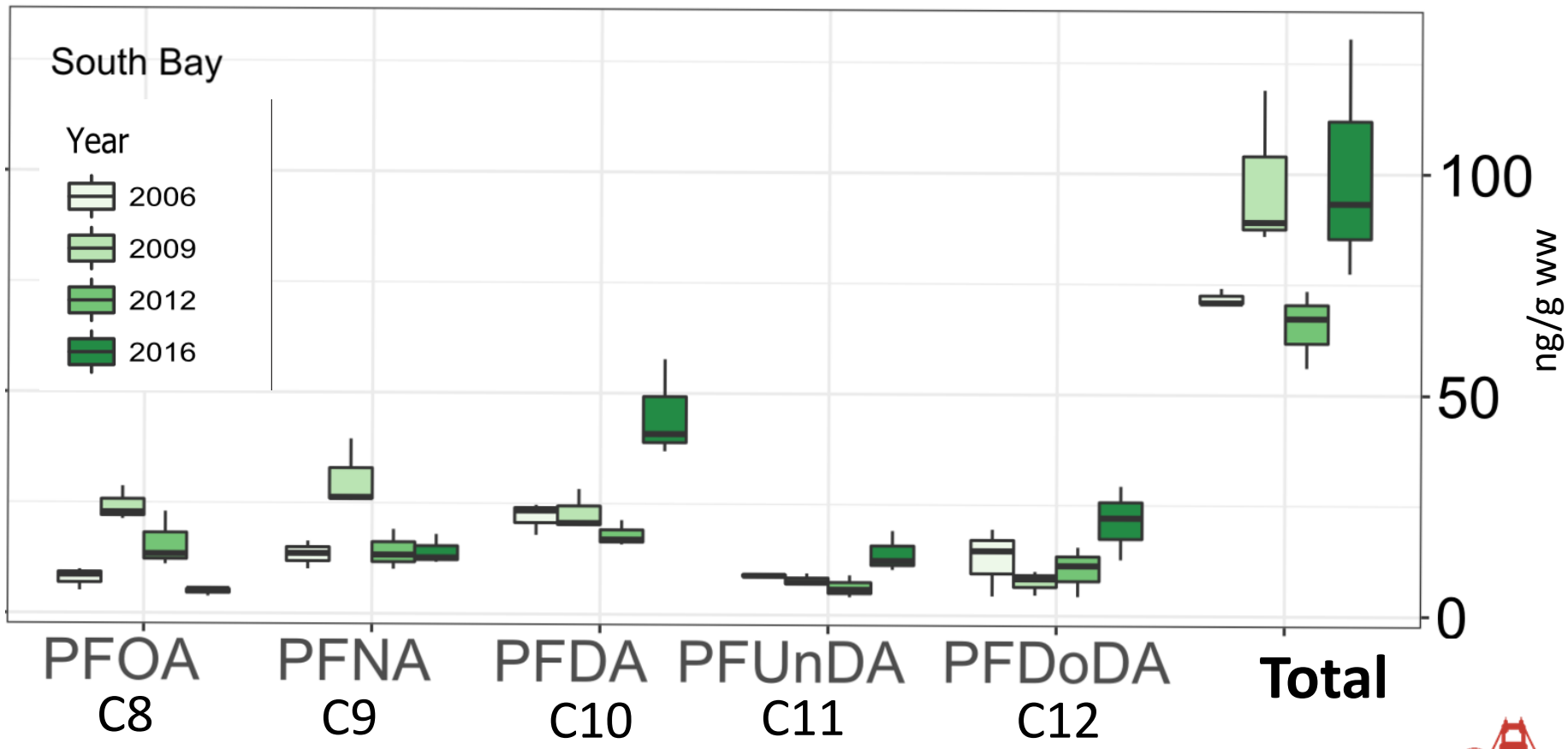
MODERATE CONCERN



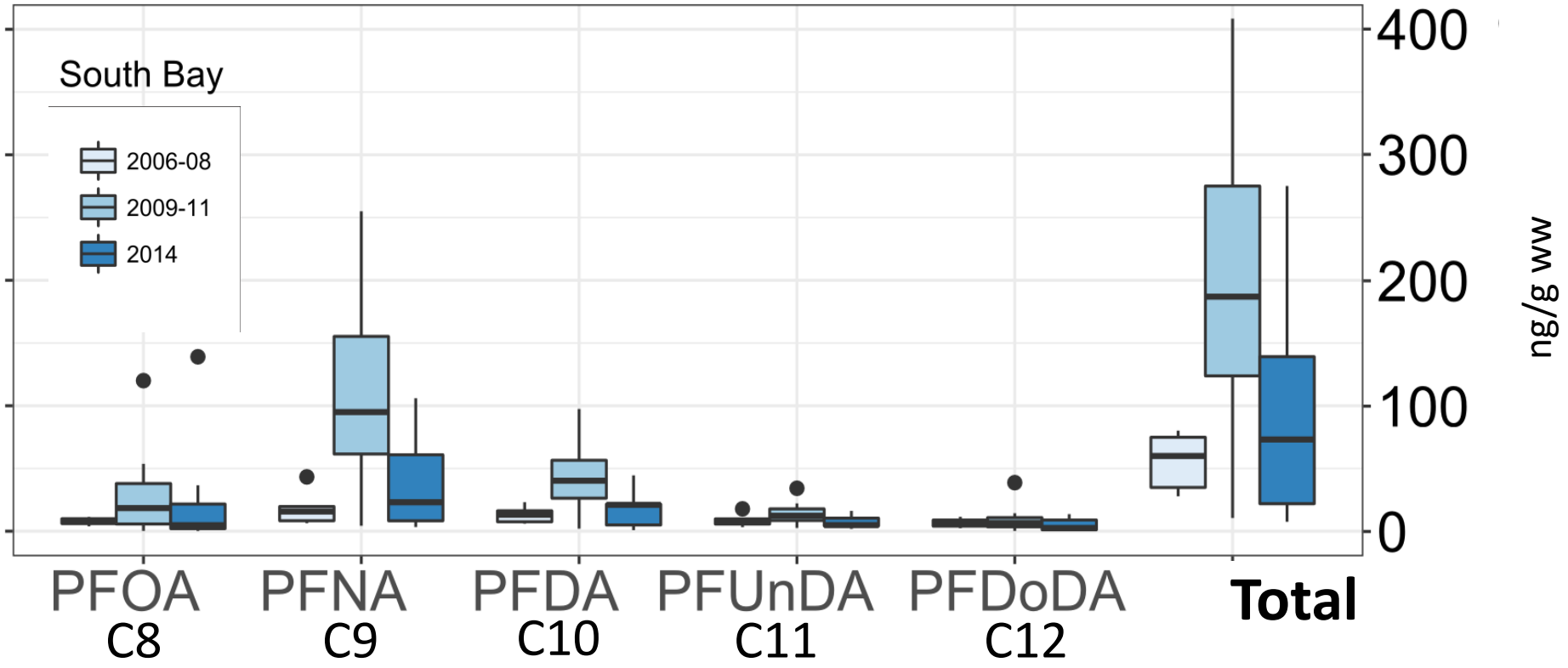
50% reduction in hatching success

RMP

No Decline in PFOA / Long Chain Carboxylates in Bird Eggs



No Decline in PFOA / Long Chain Carboxylates in Seals



MODERATE OR HIGH IMPACT

None currently

LOW IMPACT

PFOS

PFOA/Long Chained Carboxylates

Fipronil

Nonylphenol

NO IMPACT

PBDEs and HBCD

Pyrethroids*

Pharmaceuticals and

Personal Care Products

PBDDs and PBDFs

UNCLEAR

Alternative Flame Retardants

Short Chain and PFASs

Pesticides, Plasticizers

Microplastic

RMP

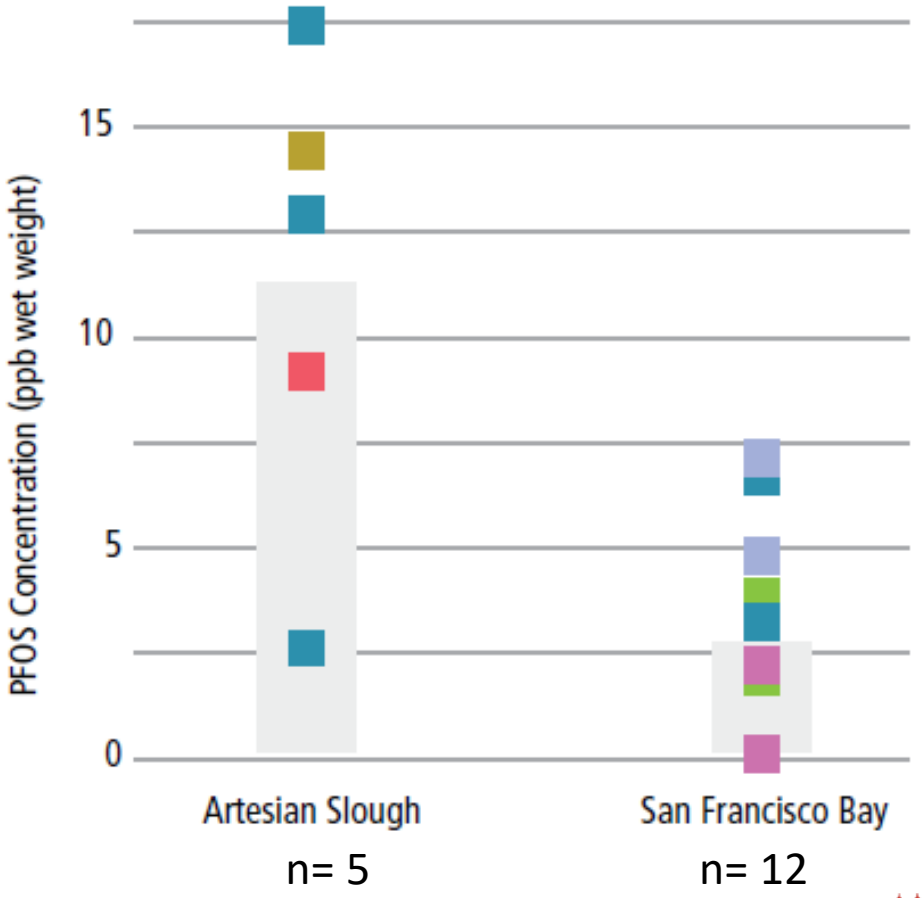
Rationale for Long Chain Classification

- Widely detected in seals, birds, and some fish
- No evidence of a decline
- Do not degrade
- Identification of adverse responses in seals and other mammalian systems
  - Impacts to gene function in range of 10 ng/g in Russian seals (PFNA); Bay seals at 20 ng/g (PFNA)
  - Humans reduced birth weight and head circumference at median 5.6 ng/mL (PFOA); Bay seals range ND to 139 ng/g

RMP

Recommended Monitoring Strategy: RMP S&T

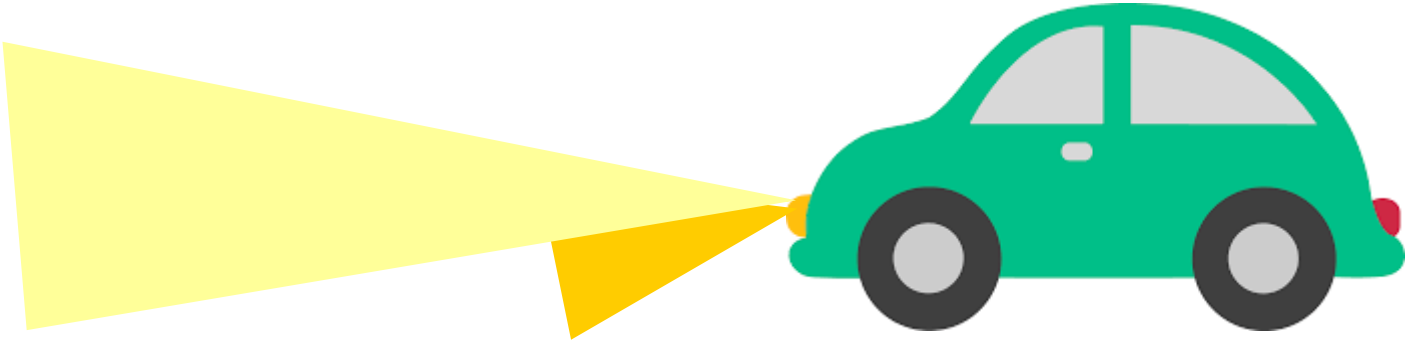
- Continue bird eggs (3 years)
- Continue sport fish (5 years)
  - Continue to monitor Artesian Slough
- Std analyte list



Recommended Monitoring Strategy: Special Study – Sediment and Seals

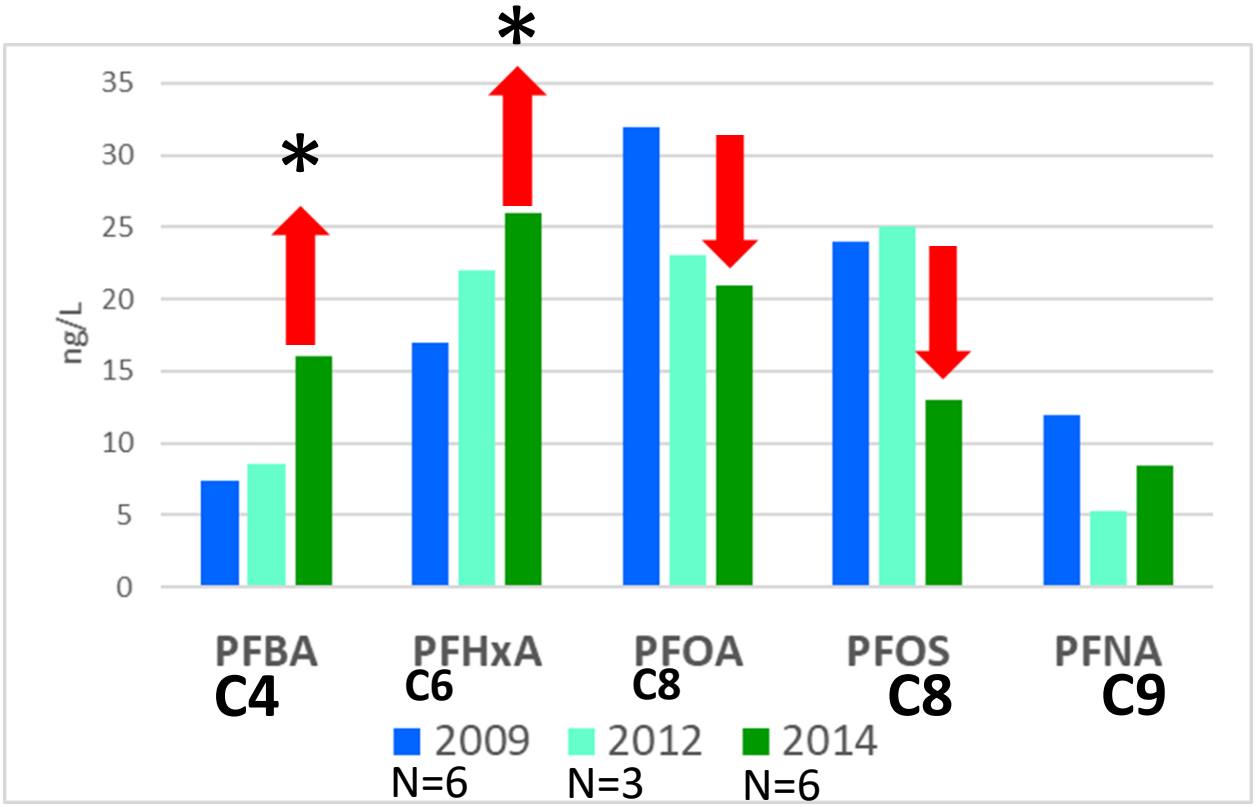
- Confirm PFOS trend in seals
  - South, Central and Tomales bays
- Sediment
  - Margin sites

- Use advanced analytical techniques
  - PFOS is declining, but are the other PFASs as well?



Recommended Monitoring Strategy: Special Studies

- Stormwater monitoring
  - Similar shift as wastewater?
  - Analyze using advanced techniques
  - Coordinate with STLS



Effluent

Source: Houtz et al. 2016 and Sedlak et al. 2017

Schedule

- Draft review by TRC, Emerging Contaminant workgroup and Exposure and Effects workgroup advisors
- Final report by end of November

Questions?

Photo courtesy of Brian Cline, Captain Derek M Baylis