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Abstract

Perfluorinated acids, especially those of

accumulate in the livers of fish. Three of six P.

vetulus (English Sole fish) liver samples from

perfluorinated compounds. They were then

chromatograph tandem mass spectrometer.

After all samples have been studied, they will

be used to establish baseline concentrations

in these bottom feeders. A method developed

by the EPA could yield alternative results and

Background

must be considered before future analysis.

Perfluorinated compounds, such as

perfluorooctanoic acid (PFOA) are found in

repellents and non-stick pans (Delinsky et al

They are also used as anti-static agents for

surface treatment and as components of fire

microbial degradation (Weremuik et al 2006).

environment in biological tissues of humans

lower trophic-level organisms (Kannan et al

and wildlife, though concentrations are low in

They are widely distributed throughout the

fighting foams (Becker et al 2008).

Pefluorinated compounds are

Figure 1: Compounds of interest

Figure 2: English Sole Fish in natural environment

anthropogenic, and they are resistant to

various consumer products, such as water

homogenized and analyzed using a liquid

longer chain lengths, are persistent,

compounds. They have been shown to

the Puget Sound were spiked with 17

bioaccumulative, and carcinogenic

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Determining Baseline Concentrations of Perfluorinated Compounds in English Sole Fish (Parophrys vetulus) Livers

Jessica Bryan and Joyce Dinglasan-Panlilio, PhD

Environmental Science, University of Washington Tacoma





Nine 15mL polypropylene centrifuge tubes were labeled with sample names and weighed on an analytical balance with the caps on. 4mL of 0.25M sodium carbonate. 1mL of 0.25 tetrabutylammonium sulfate (TBAS), and 25µL of a Recovery standard were added to each tube.

Approximately 0.5g of P. vetulus liver samples were added to six tubes, but 12.5µL of 200ppb PFAC-MXB in methanol was only added to three tubes.

• 5mL of methyl tertiary butyl ether (MTBE) was added to each tube with a glass pipette, which were then shaken by hand for 5 minutes.



Figure 2: Sole Fish samples prepared with solvents

The remaining contents of each tube was reconstituted with 500µL of methanol and placed in a vortex for 30 seconds.

These were then transferred by syringe to 1mL polypropylene vials and analyzed using a liquid chromatograph tandem mass spectrometer.

• The data was transferred to a computer and then evaluated to determine the concentrations of perfluorinated compounds in each tube



erituorinateo	a compounds



ompounds in each tube.		
C. March	Name	Acro
100	Perfluorobutanoic Acid	PFBA
and the second second	Perfluoropentanoic Acid	PFPe
No. of Lot, House, No. of Lot, H	Perfluorohexanoic Acid	PFHx
_	Perfluoroheptanoic Acid	PFHp
21	Perfluorooctanoic Acid	PFOA
	Perfluorononanoic Acid	PFNA
	Perfluorodecanoic Acid	PFDA
	Perfluoroundecanoic Acid	PFUn
	Perfluorododecanoic Acid	PFUn

Figure 4: Homogenizer for livers

Results



Figure 1: Concentrations of sulfanoic and carboxylic controls



Figure 1: Sole Fish samples

- The organic and aqueous layers were separated for 5 minutes at 3500rpm in a centrifuge system. • The MTBE layer was removed from each tube, and
- placed in a clean centrifuge tube.
- These steps were then repeated, leaving approximately 10mL of MTBE in nine new centrifuge tubes.







ure 3: Sole Fish samples in Nitrogen Evaporator

Structure		Figure 3: Recovery percentages of sulfanoic compounds of interest
C₃F ₇ COOH		Deferreres
C.F.COOH		References
C ₅ F ₁₁ COOH		Becker AM, Gerstmann S, Hartmut F. 2008. Perfluorooctanoic Acid and Perfluorooctane Sulfonate in Two Fish Species Collected from the Rotar
C ₆ F ₁₃ COOH		Main River, Bayreuth, Germany. <u>Bulletin of Environmental Contamination</u> and <u>Toxicology</u> 84: 132-135.
C ₇ F ₁₅ COOH		Delinsky AD, Stryner MJ, McCann PJ, Varns JL, McMillan L, Nakayama SF, Lindstrom AB, Geographical Distribution of Perfluorinated Compounds in
C ₈ F ₁₇ COOH		Fish from Minnesota Lakes and Rivers. Environmental Science and Tachpalam, 44:2540, 2554
C ₉ F ₁₉ COOH	-	Kannan K, Tao L, Sinclair E, Pastva SD, Jude DJ, Giesy JP. Perfluorinated
		Compounds in Aquatic Organisms at Various Trophic Levels in a Great

astva SD, Jude DJ, Giesy JP. Perfluorinated anisms at Various Trophic Levels in a Great Lakes Food Chain. <u>Archives of Environmental Contamination and</u> <u>Toxicology</u> 48:559-566.

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Weremiuk AM, Gerstmann S, Hartmut F, 2006, Quantitative determination of perfluorinated surfactants in water by LC-ESI-MS/MS. <u>Journal of</u> Separation Science 29: 2251-2255.

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U.S. Fish and Wildlife for the opportunity to work on this project

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PFNA/MPFOA

100 150 200 250

Recovery 1

Recovery 2

Recovery 1

Recovery 2

Results

Figure 1: Sample baseline concentration ratios for a sulfonoic and

Figure 2: Recovery percentages of carboxylic compounds of

8

Compounds of Interes

PEOS/MPEOS

carboxvlic acid

1000

800

<u>ک</u> 400

-600

-1000

interest

(%) Alano 250 200

100 150 200 250

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C₁₀F₂₁COOH C₄₄F₂₂COOH

ndA IdoA Figure 5: Compounds of interest and chemical structures