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Federal Department of Home Affairs FDHA
Federal Food Safety and Veterinary Office FSV

21FIPF

Trace level analysis of per- and polyfluorinated substances in fish in Switzerland – preliminary results

PFAS-Austausch / November 9th 2021

Alexandra Jaus



Objective

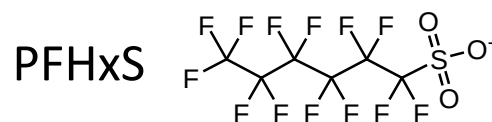
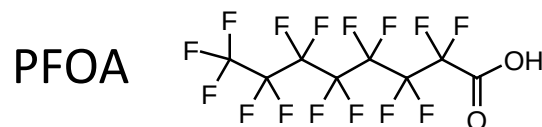
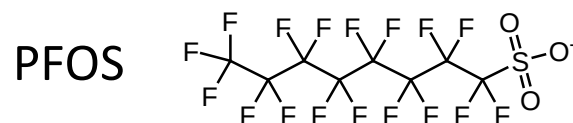
- **Determination** of per- and polyfluorinated substances in fish muscle samples from various lakes in Western Switzerland and Engadin
- **Comparison** of the results for the different species, lakes and regions
- **Trends** over the recent years

**Preliminary
unpublished data –
Internal use only!**

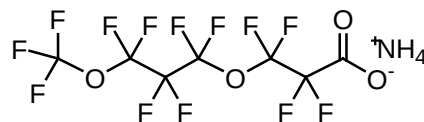


Background

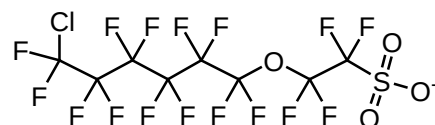
Legacy PFAS (Examples)



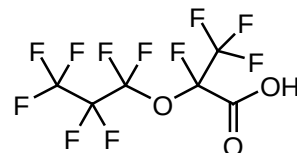
Emerging PFAS (Examples)



ADONA



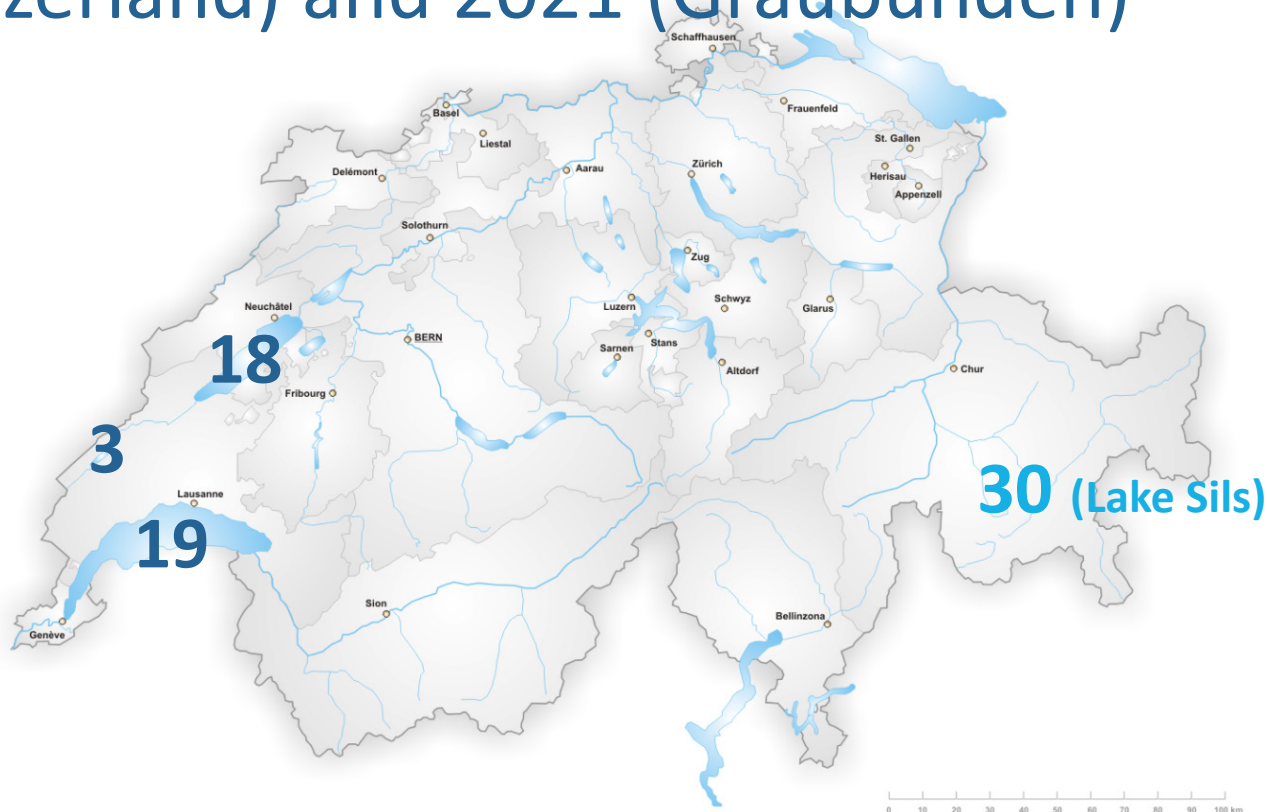
9Cl-PF3ONS



HFPO-DA



Fish muscle samples from 2020 (Western Switzerland) and 2021 (Graubünden)



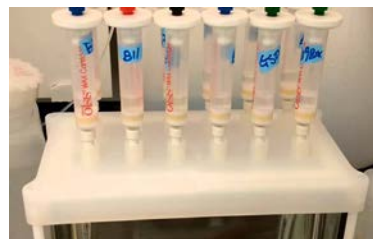
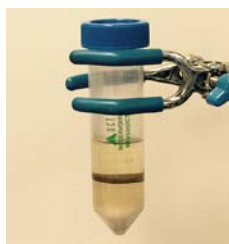


Analytical method

Digestion
with NaOH

Extraction with
acetonitrile

Solid Phase
Extraction (SPE)



....followed by HPLC-MS/MS

Sadia, M. et al., *Environ Pollut.* 2020, 263(Pt A): 113721

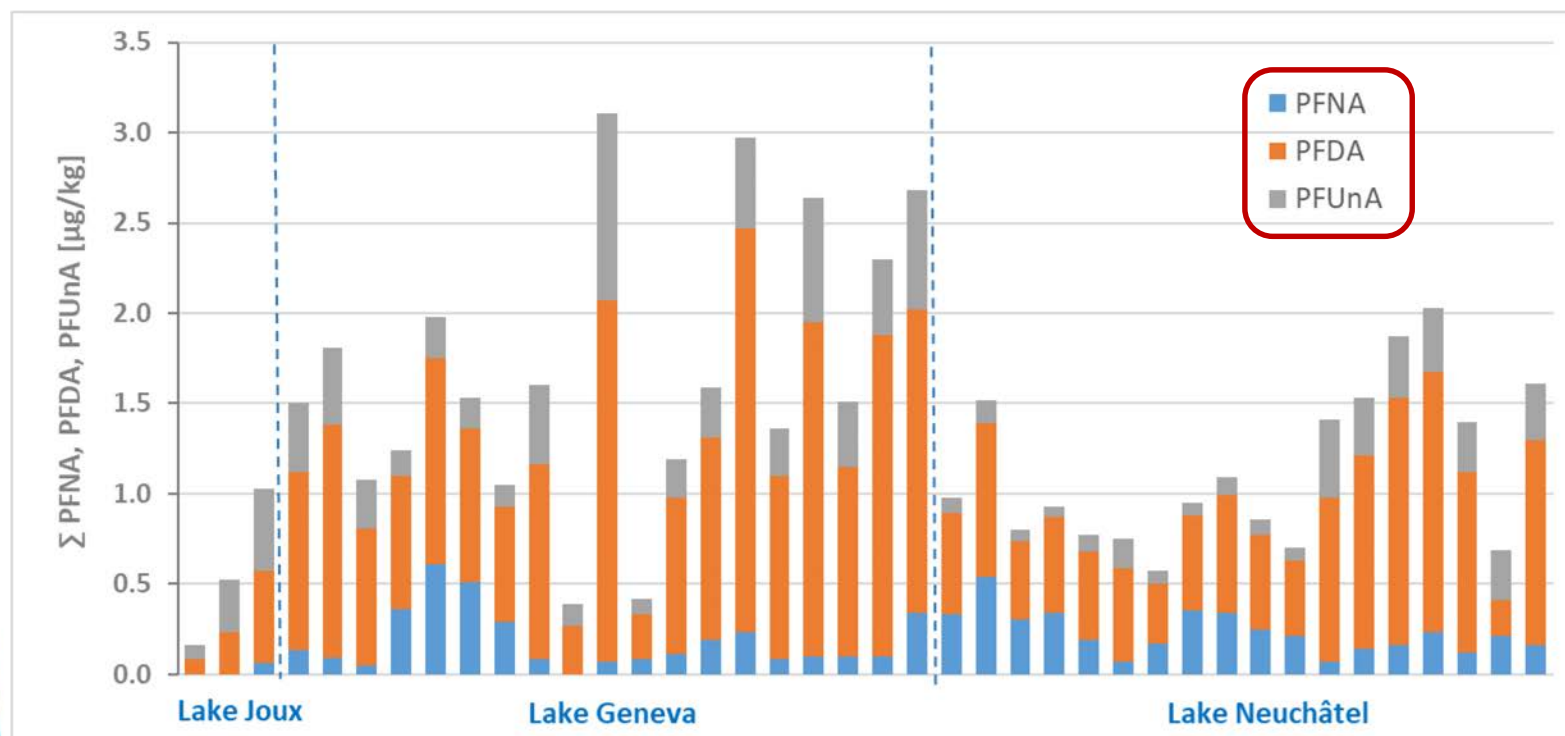


Fish from lakes in Western Switzerland: General

- PFAS detected in all samples!
- PFBA, PFPeA, PFHxA, PFHpA, PFOA, PFBS and PFHxS only present in traces
- «Emerging alternatives» ADONA, HFPO-DA (GenX), 9CL-PF3ONS (F-53B) or 8:2 FTS not found in any sample

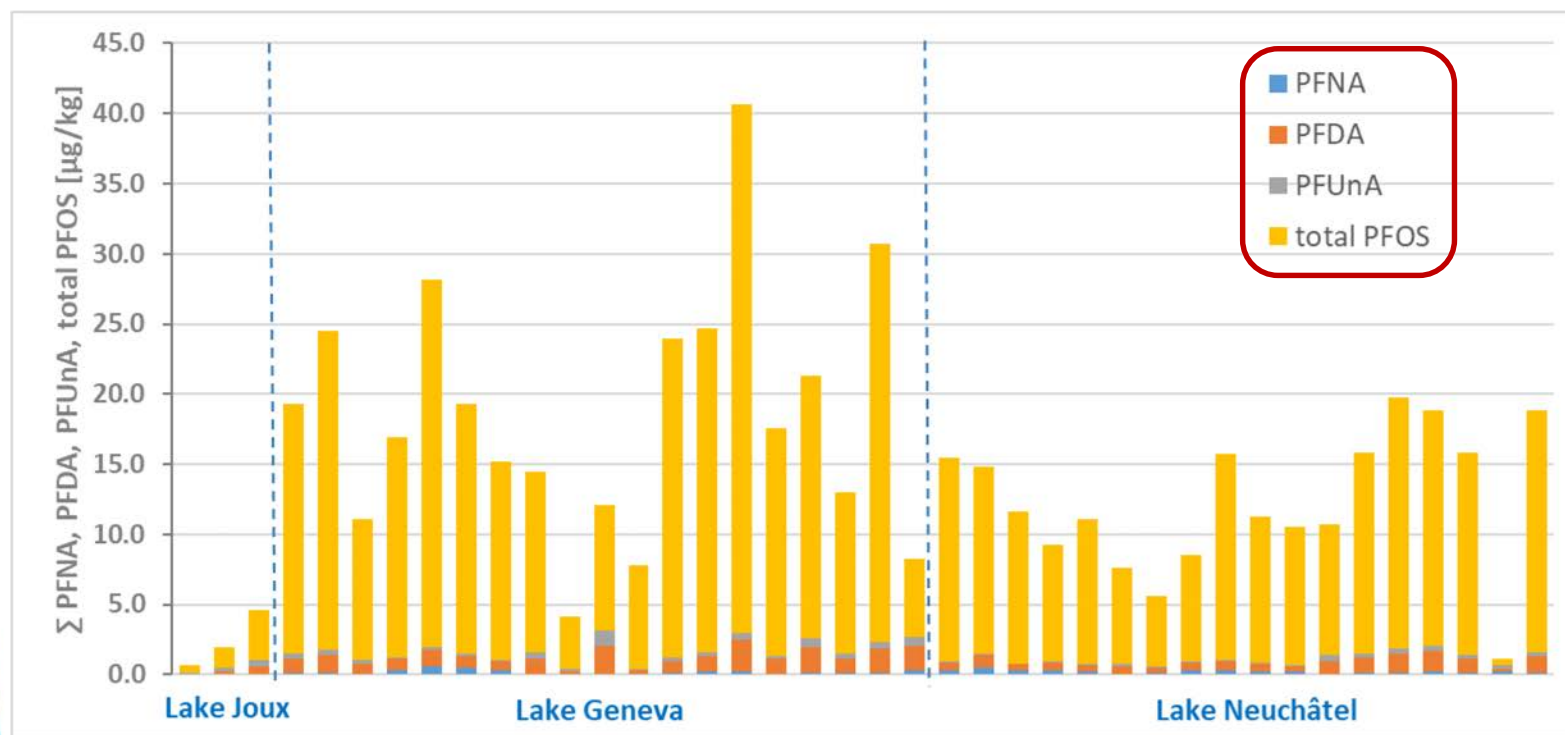


Fish from lakes in Western Switzerland: PFNA, PFDA, PFUnA





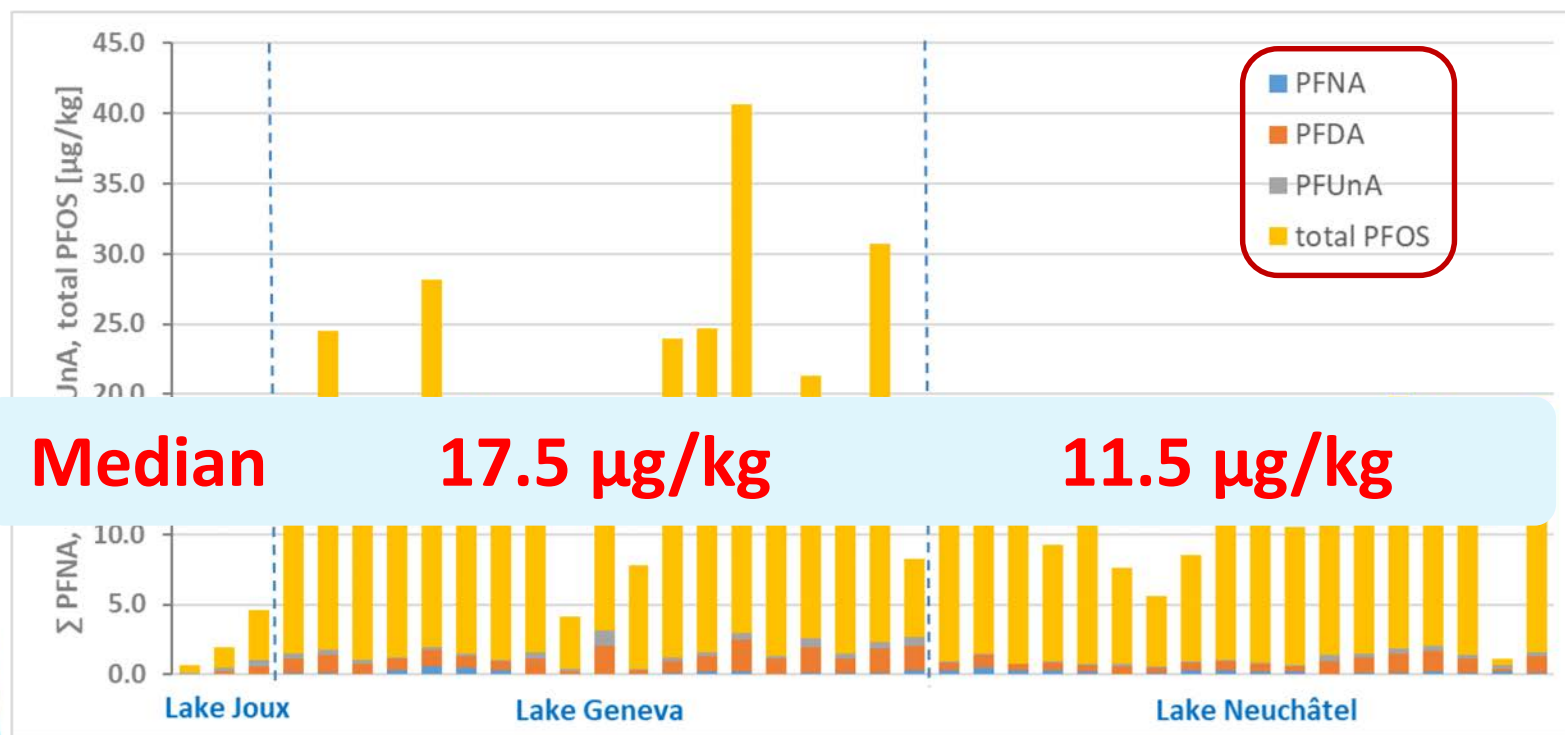
Fish from lakes in Western Switzerland: Total PFAS



➡ PFOS largely dominant!



Fish from lakes in Western Switzerland: Total PFAS



➡ PFOS largely dominant!

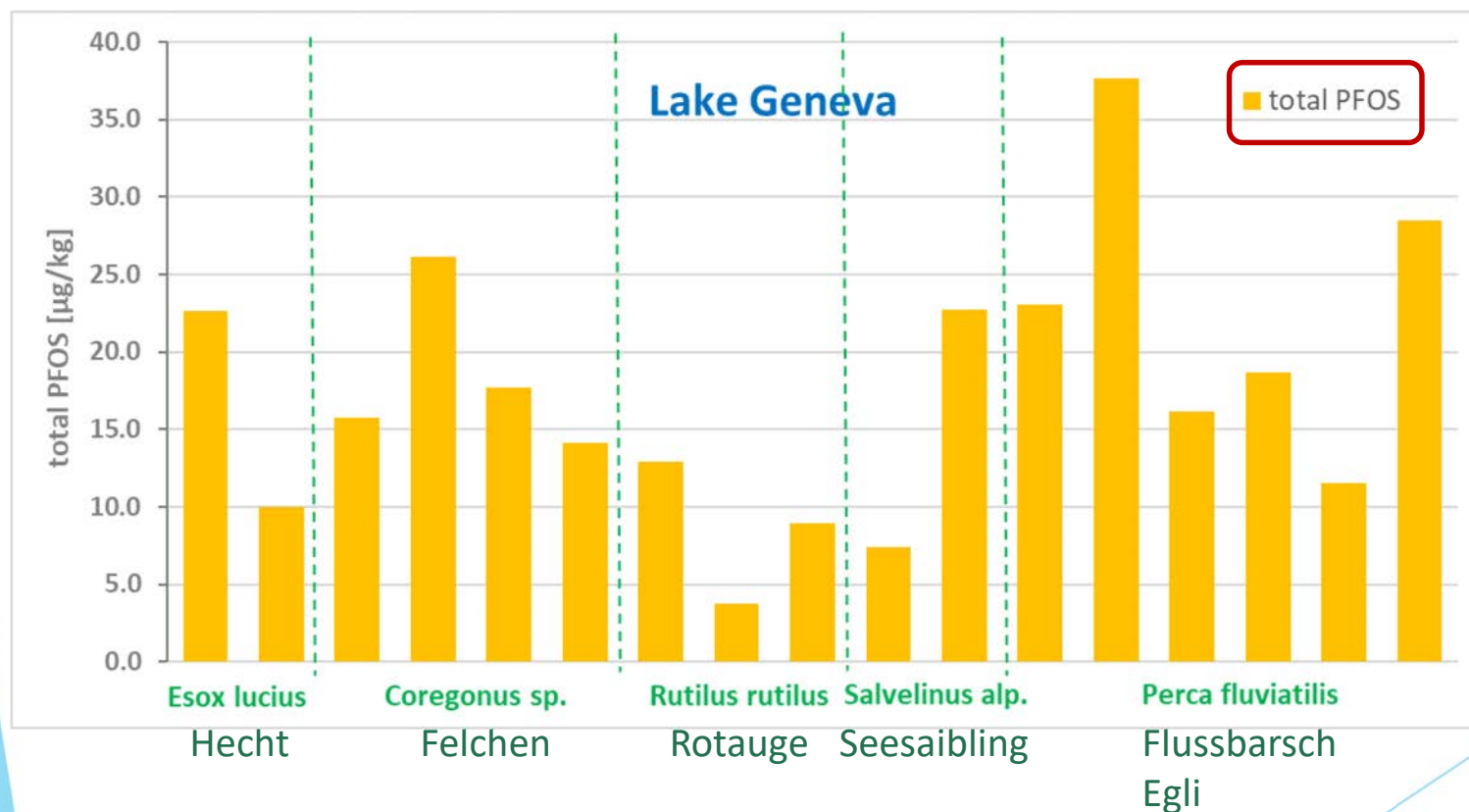


Fish from lakes in Western Switzerland: «Assessment» of the PFAS-results

- EFSA 2020: TWI 4.4 ng/kg bw per week,
with bw = 60 kg Lake Geneva: 16 g fish/week
 Lake Neuchâtel: 24 g fish/week
- Further data from Switzerland (Lake Geneva):
 - 2007/2008: n=19, PFOS 100 % pos (7-94 µg/kg) *Ortelli et al. (2009)*
 - 2011: n=17, PFOS 76 % pos (16-74 µg/kg) *Bugey et al. (2012)*
 - 2012: n=37, PFOS 86 % pos (11-140 µg/kg) *Edder et al. (2013)*
 - 2018: n=14, PFOS 100 % pos (2.4-19.3 µg/kg), PFDA 100 % pos (0.1-1.3 µg/kg), PFUnA 100 % pos (0.03-0.6 µg/kg)
Valsecchi et al. (2020)

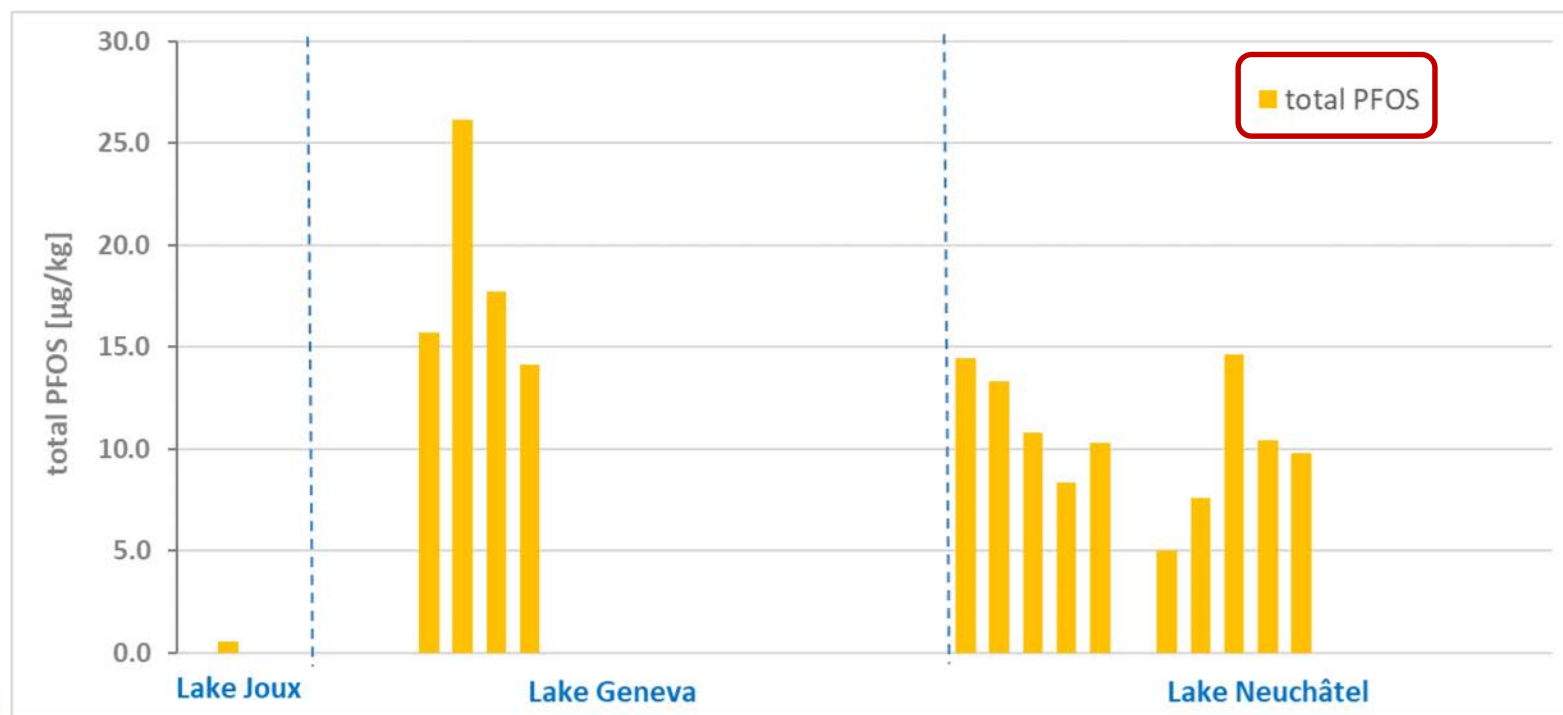


Fish from lakes in Western Switzerland: Total PFOS concentration versus Species





Fish from lakes in Western Switzerland: Total PFOS concentration in Coregonus sp.





Fish muscle samples from Lake Sils in Graubünden

- 10 x *Salvelinus umbla*, 10 x *Salmo trutta*, 10 x *Thymallus thymallus*
- «PFAS concentrations were approximately in the range published for other alpine lakes»
- Graubünden will inform on detailed results in January 2022



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