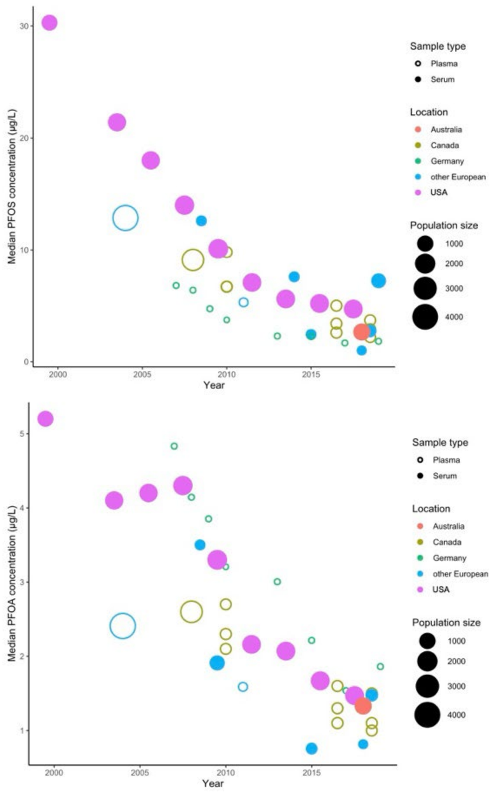
Modelling likely background PFAS levels, potential changes since the 2022 measurement programme and the impact on bile acid sequestrant (BAS) treatment effectiveness.

For the purpose of comparing the relative effectiveness between different interventions the amount of background PFAS in the population was ignored, however to estimate the real impact background levels need to be taken into account. For people with past exposure, for example in the plume area, their serum levels are steadily falling but will not fall to zero but rather to a background serum level reflecting the general ongoing level of PFAS.

We do not know the true average "background" exposure outside the plume area as we have not sampled a random representative population but we can make a reasonable estimate of the average serum level to be expected.

Studies in other countries across Europe, as well as Canada, Australia and the US have measured PFAS in general population samples and these show a trend in serum levels falling over time. A number if these studies have been summarised in the recent IARC monograph (page 107) for PFOS and PFOA (IARC, 2025):

Fig. 1.7 Median PFOA and PFOS concentrations reported in blood samples from the adult general population in several countries



PFOA, perfluorooctanoic acid; PFOS, perfluorooctanesulfonic acid; USA, United States of America.
Data aggregated from HBM4EU (2023), CDC (2023), and Government of Canada (2023).

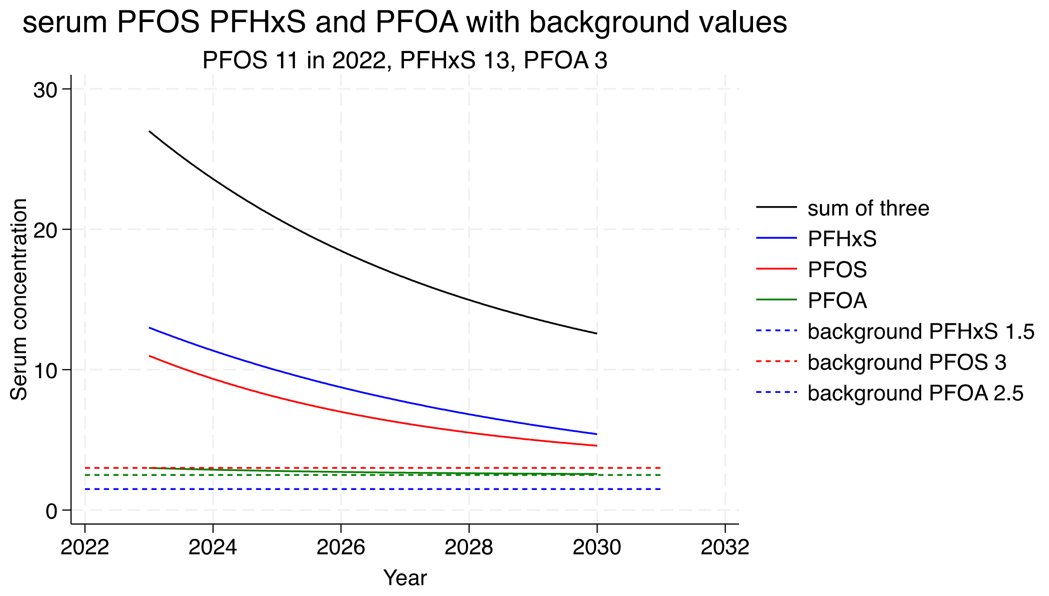
From these figures the recent average levels in various European and other countries are around 2 ng/ml for PFOS and 1.5 ng/ml for PFOA. For PFHxS the recent average shown in the HBM4EU data is around 0.5 ng/ml. This is considered to be mainly due to dietary sources. To this we can add a component from piped drinking water. Annual reports on Jersey water quality have provided concentrations of monitored PFAS, in water supplied by the two water treatment plants. We can estimate recent intake as the average between the two plants over the last 3 reported years 2022 to 2024, and the average concentrations calculated in this way are 6 ng/L for PFOS and PFOA and 4 ng/L for PFHxS. On average a given amount of PFAS in drinking water will lead to an increment in serum concentration at steady state, depending on the average water consumption and half life for each compound. From these water averages the estimated contribution to serum concentrations would be each close to 1 ng/ml (0.8 to 0.95). Putting the general background from food and the local water related background together, one might expect levels for PFOS, PFOA and PFHxS of 3, 2.5 and 1.5 ng/ml respectively, **a sum of 7 ng/ml**. Obviously there will be variability between individuals but this is a reasonable average for the population.

For the islanders living near the airport who were sampled in 2022, the median serum levels measured were 11, 3 and 13 summing to 27 ng/ml (for PFOS, PFOA and PFHxS, respectively). For these individuals and assuming that the background levels were 3, 2.5 and 1.5 ng/ml, the fall in these three can be predicted on the basis of average elimination rates for each substance. The model uses a standard equation for excretion from a single compartment:

$$C_t=C_b + (C_o-C_b)e^{-kt}$$

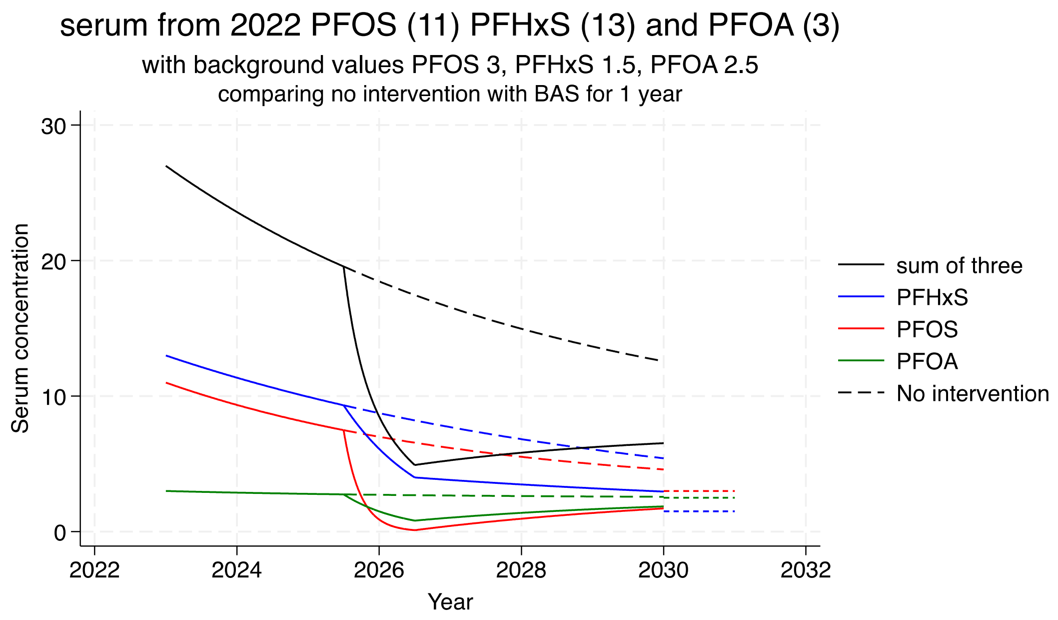
Where C_t is the concentration at time t, C_b is the background serum concentrations due to general background exposure, C_o is the starting concentration and k is the elimination rate constant. (Bartell, 2017) k can be obtained from the half life ($k=\log_e(2)/\text{half-life}$).

The decrease over time, to be expected on average is shown in the following graph. We have assigned the 2022 measurements to the end of the year.



It is noticeable that the PFOA concentration has hardly fallen. This is because the gap between the serum levels 2.5 years earlier and the background level was only 0.5 (3 minus the background estimate of 2.5). PFOA-half life is 2.5 years, and this time has passed between the end of 2023 and now, the gap that has fallen by half. So the modelled PFOA falls from 3 to 2.75 ng/ml over this period. Over this same 2.5 year period, PFHxS falls from 13 to 9.3 and PFOS falls from 11 to 7.5, the sum of the three would therefore be expected to have fallen from 27 to 19.6 ng/ml.

Considering the bile acid sequestrants (BAS) intervention, the following graph shows the likely impact of 12 months of taking BAS starting in mid 2025 (with differing impacts on the different PFAS).



For some this would reduce serum levels even below the background levels, as the more rapid excretion would reduce both the accumulated PFAS from prior AFFF exposure and the ongoing contribution from background exposures in the general diet. Levels would then converge towards the background levels in each PFAS, either from above or below, slowly approaching them over time. As has been noticed, this convergence slows down as the serum levels approach the background levels. We do not have data on how much background levels have fallen over time, presumably falling, and for this estimation we have assumed that the background serum PFAS has stayed constant at the current levels over the years in the graph. The top line is the sum of the three PFAS.

The sum was 27 ng/ml at the end of 2022, having fallen to 19.6 by mid 2025 through normal average decay, falling further to 4.9 after a year of treatment, and then recovering towards the estimated total background of 7 ng/ml, being estimated as 6.5 ng/ml in 2030. Without intervention it would have been 12.6 in 2028.

In round numbers a typical total serum now of 20 ng/ml for PFOS, PFHxS and PFOA would fall to 12 ng/ml through natural excretion by 2030 but would fall to 6 ng/ml if you also had a year of the most effective intervention, the bile acid sequestrants.

Refs

Bartell, S. M. (2017). Online Serum PFOA Calculator for Adults. *Environ Health Perspect*, *125*(10), 104502. https://doi.org/10.1289/EHP2820

IARC. (2025). *Perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). IARC Monographs on the Identification of Carcinogenic Hazards to Humans, Vol 135*.