

Accumulation of per- and polyfluoroalkyl substances (PFASs) by sharks from two contrasting habitats: New York Bight and The Bahamas

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Sharks are meso-to-apex predators in marine food webs, serving a diversity of functions throughout marine ecosystems. As a result, sharks are often considered sentinel species for evaluating the overall health of a marine habitat and/or ecosystem. Relatively high levels of organic contaminants, such as per- and polyfluoroalkyl substances (PFASs), have often been found in the tissues of many shark species because of their longevity and slow growth and low reproductive rates. In this study, we provide baseline information on 40 PFAS compounds measured in the shark tissues of five different shark species collected from two distinct marine ecosystems: New York Bight (NYB), North Atlantic Ocean and coastal waters of the Bahamas archipelago. The occurrence of PFASs was found 100% in the collected samples (n=62), with 16 out of 40 PFAS compounds detected. The compound with the highest concentration was PFOA (3.63±4.42 ng/g w.w.), followed by PFBA (2.27±2.12 ng/g w.w.), PFBS (2.14±4.57 ng/g w.w.), PFTrDA (1.96±2.75 ng/g w.w.), PFHxA (1.85±1.59 ng/g w.w.), and PFUnA (1.02±1.48 ng/g w.w.). Among the five shark species, Caribbean reef sharks caught in the Bahamas show the lowest overall PFAS accumulation in their tissues. PFAS concentrations measured in the other four shark species caught in NYB followed the order: common thresher > shortfin mako > sandbar ≈ smooth dogfish. Notably, 7:3FTCA was only detected in the NYB sharks. Ultra-long chain (C≥10) PFAS compounds exhibited a close correlation with stable isotope δ¹⁵N. Moreover, we found that the ultra-long PFAS concentration was proportional to the total mercury concentration in Caribbean reef sharks. Lastly, the percentage of linear PFOS (L-PFOS/ΣPFOS) was 79±8% in Caribbean reef sharks, while the other sharks from the NYB contained >90% of linear PFOS. Also, the value of %L-PFOS was positively correlated with δ¹⁵N, indicating preferential accumulation of linear form PFASs in biota. These findings highlight the impact of anthropogenic inputs on PFAS distribution and accumulation in sharks from two important marine ecosystems, and also provide the first baseline information on PFASs in sharks from NW Atlantic and correlate