**Linking prey composition to variability of radiocesium contamination in masu salmon: Insights from DNA metabarcoding in a forested river system**

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After the 2011 accident at the Fukushima Daiichi Nuclear Power Plant (FDNPP), radiocesium (¹³⁷Cs) contamination levels in masu salmon (*Oncorhynchus masou*) have remained high. In forested headwater streams, masu salmon primarily acquire radiocesium by ingesting terrestrial and aquatic insects., contamination originating from forest ecosystems strongly influences radiocesium levels in terrestrial and aquatic insects, and subsequently in masu salmon. As a result of persistent cycling of contamination within forests, the decline in radiocesium concentrations in masu salmon has been remarkably slow. Given that individual masu salmon show considerable variation in radiocesium concentrations, examining the relationship between dietary composition and individual radiocesium levels provides a valuable approach for identifying major sources of forest-derived radiocesium in fish inhabiting headwater ecosystems.

This study focused on masu salmon populations from the Ota River, a forested river system located approximately 20 km north of the FDNPP. The Ota River watershed includes upstream areas within the Difficult-to-Return Zone, where high levels of radiocesium contamination persist. We collected masu salmon along with their potential prey, terrestrial and aquatic insects across spring, summer, autumn, and winter during 2018–2019, and measured radiocesium concentrations in these organisms. In addition, we conducted dietary metabarcoding analyses on 114 masu salmon. DNA was extracted from stomach contents, and PCR amplification was performed using universal primers targeting arthropod DNA, followed by high-throughput sequencing. Whereas previous studies of fish feeding ecology have predominantly relied on morphological identification of stomach contents, DNA metabarcoding enables more detailed and accurate taxonomic classification, as well as the detection of prey items that are easily digested and otherwise difficult to identify.

Analysis of prey composition revealed that prey assemblages varied significantly with season, body size, and sampling site, and were also associated with individual radiocesium concentrations in fish. Regarding seasonal and size-related effects on prey composition, our findings were consistent with previous studies, indicating a higher proportion of terrestrial insects in diets during summer and autumn, and a tendency for larger individuals to consume more terrestrial insects. Radiocesium concentrations in terrestrial insects exhibited substantial variability, which was strongly influenced by their functional feeding groups. Our results suggest that variability in diet composition and radiocesium level of prey items contributed to the wide range of radiocesium concentrations observed among individual masu salmon.