

Multiple lines of evidence to assess risk from dioxins and dioxin-like chemicals in sediment and fish from waterbodies along a large prairie river

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Many large inland rivers are contaminated from a history of industrial and agricultural activities along their shorelines. Storage of persistent organic pollutants in sediments and their potential for toxic effects complicates any deliberate (e.g., dredging) or unintended (e.g., flooding) redistribution of sediments in these rivers. We used multiple lines of evidence, including chemical measurements and cell-based bioassays, to determine potential for harm to aquatic biota associated with sediment in three reservoirs and one delta lake in a large prairie river, the Saskatchewan River, in Canada. Concentrations of dioxins and furans (maximum ~ 30 ng/kg dry weight) and polycyclic aromatic hydrocarbons (maximum < 300 µg/kg dry weight) were generally low in sediments, though hotspots were identified in parts of reservoirs rich in clay and organic matter where these chemicals accumulated. There was good agreement between concentration measurements and results of bioassays, as the samples with highest chemical concentrations induced the greatest EROD activity (biological equivalent concentration = 4,010 pg/g). With one exception, all fishes tested were below the tolerable intake for dioxins, and PAH metabolites were only rarely detected in bile, suggesting limited risk to human consumers. We conclude that while overall effects of pollutants on biota in this system are likely limited, any future movement of sediments in this river basin should be done with caution, paying attention to sediment characteristics.