Lower-trophic-level responses to legacy sedimentary mercury contamination on the St. Lawrence River

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The St. Lawrence River (SLR) at Cornwall, Ontario received substantial inputs of mercury (Hg) from local, shoreline-based industries through much of the 20th century. Although emission controls were implemented in the late-20th century to reduce the influx of Hg and other metals entering the river, legacy contamination of riverine sediments continues to be a local concern. While a great deal of research has investigated the bioavailability and movement of this legacy Hg up the food web, considerably less is understood about its impacts on lower trophic levels, including epipelic algae and benthic invertebrates that live on and in these contaminated sediments. We examined subfossil diatom (Class: Bacillariophyceae) and chironomid (Order: Diptera) responses to a spatiotemporal gradient of sedimentary contamination through analyses of community assemblage shifts in a dated sediment core and in surface sediments from contaminated nearshore areas. Results suggest that modern-day diatom assemblages are moderately structured by legacy sedimentary contamination, particularly of Hg, Pb, and Zn; recent chironomid assemblages appear to be less impacted by elevated sedimentary metal concentrations, though some metal-tolerant taxa were identified. Analysis of the sediment core suggests that excess nutrient loading from waterfront industry may have historically been a more important driver of both diatom and chironomid community assemblage structure than was Hg contamination. We suggest that paleolimnological investigations in contaminated areas consider sedimentary contamination as a source of variation to benthic assemblages, but that other drivers (e.g., nutrient enrichment) may prove more important.