

## Mercury and Methylmercury

Mercury is a globally ubiquitous contaminant, generated primarily through fossil fuel combustion and industrial activities that distribute it atmospherically around the globe. Rates of atmospheric deposition are tightly tied to mercury concentrations in fish, but can be modified through chemical (e.g., pH, DOC, sulfate) and biological (e.g. food web structure) characteristics of lakes. Once deposited in lakes, elemental or ionic mercury is converted into methylmercury by sulfur-reducing bacteria under anoxic conditions. Methylmercury bioaccumulates in aquatic organisms and poses health risks to humans, causing neurological and motor dysfunction, referred to as 'Minamata disease'. Larger fish that often occupy higher trophic levels (e.g., most sportfish) tend to have more methylmercury than mercury in their tissues, but these proportions are lower and often less predictable in fish and invertebrates at lower trophic levels, requiring direct estimates of methylmercury to understand bioaccumulation patterns. Though consumption guidelines for fishes in the Great Lakes are typically dictated by organic contaminants, consumption guidelines in inland lakes are primarily dictated by mercury content. Due to slow and predictable elimination rate of methylmercury from fish tissues, the compound is often used as a tracer of food consumption in wild-ranging fish, and has been combined with bioenergetics models to estimate field rates of active metabolism that are comparable to observational or other enzyme-based methods.

### Key references:

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