



Effects of Mercury on Northern Pike at Voyageurs NP

Why and How We Monitor

- Prior studies have shown that most of the mercury present in Voyageurs National Park arrives by atmospheric deposition, and that most of this mercury comes from human-related sources. Mercury emitted to the atmosphere is transported in air, entering lakes and watersheds in rain and dry deposition.
- Methylmercury (MeHg) is a highly toxic form of mercury that accumulates in organisms and increases greatly in concentration as it moves up aquatic food chains from microscopic plants and small animals to large predatory fish.
- Concerns about mercury pollution stem largely from the effects eating contaminated fish can have on the health of humans and on the reproduction of wildlife.
- Recent studies at Voyageurs National Park have shown that the reproductive biology of predatory fish (northern pike) is also impaired by methylmercury exposure.



Peary Lake is one of the lakes at Voyageurs National Park from which northern pike were sampled and analyzed for mercury.

What We're Finding

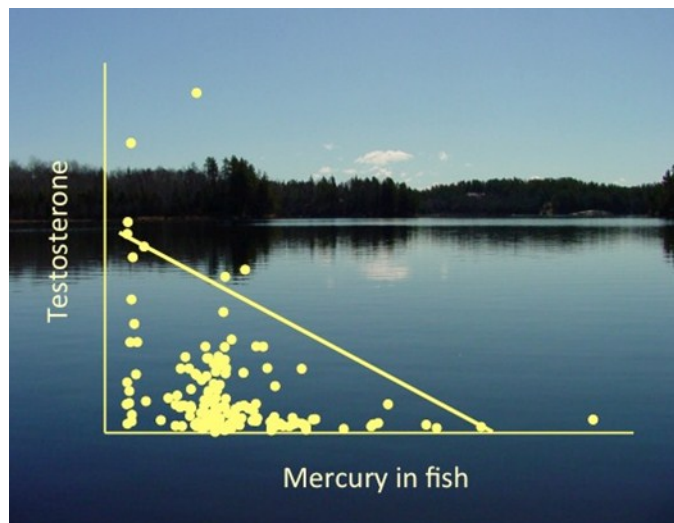
Northern pike sampled from lakes at Voyageurs National Park contain high concentrations of mercury in their muscle tissue. Mercury levels in two-thirds (67%) of the pike analyzed in recent years exceeded 500 parts per billion (ppb) wet weight, an estimated threshold level associated with damage to cells and tissues, altered biochemical processes, and reduced reproduction of fish in laboratory studies.

We determined the amounts of two sex steroid hormones in blood plasma from male northern pike collected from eleven lakes in Voyageurs National Park at the onset of spawning. The two hormones, testosterone and 11-ketotestosterone, play essential roles in fish reproduction. **Concentrations of both hormones in plasma declined greatly as the amount of mercury in plasma increased** (see graph). In addition, mercury concentration in fish was identified statistically as the variable most strongly related to levels of testosterone and 11-ketotestosterone in plasma.

The northern pike contained low to non-detectable levels of other contaminants, such as polychlorinated biphenyls (PCBs). Collectively, these findings provide compelling evidence that methylmercury suppresses sex steroid concentrations and subsequently reproduction in wild freshwater fish.

Management Implications

These findings provide further justification for reducing emissions of mercury to the environment. Monitoring is useful for evaluating future trends in fish contamination in response to controls on mercury emissions.



Testosterone levels in blood plasma of northern pike sampled from lakes in Voyageurs National Park decrease markedly with increasing mercury concentrations in the pike's axial muscle tissue.