

## **IMPACTS OF SPECIES INTRODUCTIONS ON THE HEALTH OF FISH COMMUNITIES RECEIVING CHRONIC RADIONUCLIDE INPUTS**

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There is widespread interest in gaining further understanding of the relative influences of multiple stressors on aquatic ecosystem structure and function. To address this, work has been done to evaluate the effects of the introduction of an efficient predator (northern pike) on a fish community in a small lake (Perch Lake, Chalk River, Ontario) receiving chronic inputs of radionuclides over a 50-year period. In general, large changes in fish community structure, with corresponding changes in fish health, occurred following the pike introduction. For example, several forage fish species were extirpated from the lake and densities of the past top predator, yellow perch, became greatly reduced, likely due to predation by northern pike and/or other species in the lake. The reduced perch numbers appeared to alleviate an ecological bottleneck, which resulted in significant increases in brown bullhead densities to levels that were much higher than observed in other water bodies under typical conditions. Corresponding changes in the health of the Perch Lake fish community could also be detected, and included decreased fish diversity, shifts in fish community size structure to smaller body sizes, significant reductions in fish condition factors, reduced hepatosomatic indices, depletion of fish internal fat reserves, hardening of the gastrointestinal tract, resorption of gonadal material, degradation of muscle tissue, emaciation and ultimately, mortality of northern pike and brown bullheads. Evaluation of data indicated that female fishes responded more quickly than did males in terms of condition loss, likely due to their higher energetic requirements. In addition, although pike and bullheads were detrimentally affected by the pike introduction, health of forage fish species, such as pumpkinseeds, did not appear to be greatly influenced. No clear relationships existed between fish community health and exposure to radionuclides in the lake.