MODELING THE IMPACTS OF PFAS CONTAMINATION ON GREAT LAKES FISH

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Per- and polyfluoroalkyl substances (PFAS) are a group of anthropogenic chemicals that are known for their water-resistant properties created by their strong carbon-fluorine bonds. These bonds are extremely hard to break and cause these chemicals to bioaccumulate over time in the environment. They have been found in the blood of both humans and wildlife and have known effects on hepatotoxicity, immunotoxicity, hormones and development. Due to the complex nature of these chemicals, there are gaps in our knowledge about how they impact different species at the population level. In attempt to better understand how these chemicals impact fisheries, I have created a Leslie matrix model that will simulate how PFAS contamination affects the population dynamics of lake trout, lake whitefish and steelhead trout. I have also constructed an SIR model that will show how disease spreads through the population when fish are exposed to both PFAS and various pathogens. These models will use data from SCAA models along with data from our lab’s disease challenge experiments. The outputs of these models will show the population levels across all ages, the proportion of susceptible, recovered and infected fish, the yearly egg abundance and mortality levels of both PFAS exposed and non-exposed fish. Overall, these models will be useful tools for making informed management decisions and may be updated as more research is done about how PFAS affects these species.