569c Seasonal and Ontogenetic Diet Changes in Aquatic Food Webs Result in Surprising Bioaccumulation Patterns

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The combined effect of chemical and biological stresses has decimated native wildlife populations in numerous aquatic ecosystems. In the Laurentian Great Lakes, the bioaccumulation of contaminants through these altered food webs has made necessary the institution of widespread fish advisories. Bioaccumulation models used to predict contaminant transfer still employ simplistic trophic descriptions, despite recent efforts to integrate more complete food webs into their design. Here, we develop a detailed food web model of Calumet Harbor, on the southern shore of Lake Michigan. We combine stable isotope and stomach contents analyses to formulate a dynamic food web model that we integrate with a bioaccumulation model to predict contaminant fate. This ecosystem presents a unique opportunity to study food web structure, as its low biodiversity allows us to track trophic relationships through both seasonal and ontogenetic changes. We find these shifts in species diets act to increase effective food web complexity, resulting in surprising patterns of contaminant bioaccumulations that are not predicted by traditional food web models. In Calumet Harbor, the smallest fish are the most highly contaminated, and the invasive forage fish, not the top predator, biomagnifies contaminants to the greatest degree.