TITLE: Development of a dynamic energy budget modeling approach to investigate the effects of temperature and resource limitation on mercury bioaccumulation in *Fundulus heteroclitus*

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ABSTRACT: Dynamic energy budget (DEB) theory provides a generalizable and broadly applicable framework to connect sublethal toxic effects on individuals to changes in population survival and growth. To explore this approach, we are developing growth and bioaccumulation studies that contribute to a DEB model, which allows joint acquisition and interpretation of chemical exposure and stressor effect information that readily translates into demographic rate changes. Ultimately, we hope to develop a test framework that connects molecular mechanistic information to population level fitness. As a test case, we are studying the effects of temperature and resource availability on mercury (Hg) accumulation in the estuarine fish *Fundulus heteroclitus* (mummichog). Methylmercury (MeHg), a potent neurotoxin and global contaminant, accumulates in marine food webs and remains a concern for human exposure. Furthermore, warming temperatures, as are occurring with global climate change, may increase MeHg production and bioaccumulation. Higher temperatures may result in increased food consumption and increased MeHg accumulation. However, higher temperatures may also lead to increased growth and reduced MeHg accumulation through somatic growth dilution. Recent laboratory work in mummichog suggested that Hg accumulation increased with temperature, but further study is needed to understand the interactions between temperature, food availability, growth rate, and bioaccumulation. In the current study, groups of juvenile mummichog were fed tuna naturally contaminated with Hg at one of two feeding rates (3.3% or 10% dry body weight/day) while held at one of two temperatures (15 or 27 °C) for 28 days. Growth was low in most treatments, except in fish fed 10% body weight held at 27 °C (40% weight and 12% length increase). However, from preliminary chemical analyses, MeHg bioaccumulation was similar across feeding conditions but increased with temperature (~17-fold increase in MeHg concentration at 27 °C and ~7-fold increase at 15 °C, regardless of feeding rate). The use of these data in a DEB model may greatly aid in understanding why temperature is the dominant driver of MeHg accumulation at this scale, regardless of feeding or growth rate. Overall, this work contributes to the ongoing development of an ecological modeling framework in an organism with an extensive toxicological and genomic background.