**ABSTRACT 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 persistence and growth. To explore this approach, we are conducting growth and bioaccumulation studies that contribute to a DEB model, which will allow the joint acquisition and interpretation of chemical exposure and stressor effect information in a format that readily translates into demographic rate changes. Ultimately, we plan to develop a test framework that connects molecular mechanistic information (i.e., transcriptomic and genomic changes) via a DEB model 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, readily accumulates in marine food webs and remains a concern for human exposure through consumption of seafood. Furthermore, there is evidence that warming temperatures, as are occurring with global climate change, may increase MeHg production and bioaccumulation. Increased temperature may result in increased food consumption, with a concurrent increase in MeHg accumulation. However, higher temperatures may also lead to increased growth and reduced MeHg accumulation through somatic growth dilution. Work by Dijkstra et al. (PLoS ONE 8(3):e58401) suggested that Hg accumulation increased with temperature, but further study is needed to understand the interaction between temperature, food availability, growth rate, and bioaccumulation. We have begun parameterization of a DEB growth model using juvenile mummichog (1 g) held at 27°C for 28 days. In addition, we tested the effects of holding density (1 or 4 individuals), feeding rate (3.3% or 10% dry body weight/day), and the use of internally implanted passive integrated transponder (PIT) tags to gather growth data for individual fish held in groups. The PIT tags did not affect growth. In general, feeding rate also did not affect growth. However, fish held in a group and fed the low feed rate grew about 50% less than all other treatment groups, suggesting a behavioral interaction with feeding rate. These studies will aid in understanding the effects of temperature and growth rate on Hg bioaccumulation and contribute to development of a DEB testing framework in an ecological model with an extensive toxicological and genomic background.