Using Bioenergetics to Explore How Winter Conditions Affect Consumption and Growth of Age-0 Largemouth Bass

Russell A. Wright, James. E. Garvey, Aimee H. Fullerton, and Roy A. Stein

ABSTRACT - During the first winter of life, loss of energy reserves as a function of low feeding activity and scarce prey may contribute to high mortality of age-0 largemouth bass *Micropterus salmoides*. To explore how two current bioenergetics models predict winter energy depletion, we first quantified growth and consumption of age-0 largemouth bass from Alabama, Ohio, and Wisconsin fed a maintenance ration in 55-l aquaria in three simulated winters mimicking temperatures and photoperiods at low latitudes (Alabama; 33EN), middle latitudes (Ohio; 40EN), and high latitudes (Wisconsin; 46EN). Inputting observed consumption into both models, we then compared predicted and observed growth. During winter 1995-1996, we further validated one of the models with a separate pool experiment (5,800-l) in which age-0 largemouth bass were either fed at 0.5 x or 1.5 x maintenance ration. In aquaria, energy density (kJ/g) declined in the middle and high, but not in the low, latitude winter. Though error was slight in the low and middle latitude winters for one of the models, both models underestimated growth in the high latitude winter. To fit the model to the data, the intercept for weight-specific resting metabolism had to be reduced by about 16%. In pools, where we predicted consumption from observed growth, the model adequately predicted consumption of largemouth bass fed 1.5 x maintenance but overestimated consumption of 0.5 x maintenance individuals. Current bioenergetics models perform poorly at the cold temperatures (< 6EC), photoperiods, and low prey abundances typical of high latitude lakes, likely because metabolic costs are overestimated.