Headwater streams are the beginnings of stream networks and because of their high edge to area ratio, a lot of allochthonous material enters them where it is rapidly biogeochemically processed. This organic material is metabolized at the base of a heterotrophic food chain by fungi and bacteria which are then eaten by aquatic invertebrates and then by fish, which are regularly the top predators. The activity of virtually all of these organisms may be summed up with a measure of ecosystem metabolism. On three occasions, I estimated fish biomass using a multiple pass removal population estimate multiplied by the average fish mass, and I estimated ecosystem metabolism using the single station method with a diel oxygen curve and inverse modeling. A critical component in metabolism modeling is the air-water gas exchange value, which I estimated based on stream slope using an empirical relationship from a previously published study. Gross primary production (GPP) across sites and sampling periods ranged from 0.01 to 0.71 g O2 m-2 d-1 and ecosystem respiration (ER) ranged from 4.55 to 24.29 g O2 m-2 d-1. Fish were mostly cutthroat trout (*Oncorhynchus clarkii lewisi*), and biomass ranged from 0 to 8.38 g m-2. GPP varied by sampling period and increased with stream depth while ER increased with stream depth and slope. Overall stream metabolism was probably limited by low levels of photosynthetically active radiation and dissolved inorganic nitrogen. Metabolism predictors were limited to model inputs, possibly because values were unreliable stemming from inaccurate air-water gas exchange estimations. No relationships were found between metabolism metrics and photosynthetically active radiation, dissolved inorganic nitrogen, soluble reactive phosphorus, dissolved organic carbon, or other physical attributes of the streams. Trout biomass increased with colder water especially under more open canopies, but there was no relationship with ecosystem metabolism. Unfortunately, with the methods I used, stream metabolism cannot be used as a proxy for trout populations in headwater streams.

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