Nutrient uptake is a central ecosystem function of streams. Uptake by the stream biota largely controls retention of nutrients, and nutrient uptake is a potential control of rates of autotrophic and heterotrophic metabolism. As a fundamental ecosystem process, nutrient uptake is related to both basic ecological research and management issues concerning transport of nutrients by streams.

Human activities have had a profound effect on the cycling of nutrients in both terrestrial and aquatic ecosystems (e.g., Vitousek et al. 1997). The significance of streams as nutrient vectors from terrestrial catchments to receiving bodies of water (Peterson et al. 2001) is growing as increased deposition has exceeded the capacity of many terrestrial ecosystems to transform nutrients to immobile (insoluble) forms. However, in addition to being nutrient vectors, significant transformation and retention of nutrients may occub;ths if streamd tmns-

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Uptake length is then the inverse of this uptake rate. However, the uptake rate measured in this manner is not the ambient uptake rate. An elevation in stream nutrient concentration may cause an increase in uptake, depending on the functional relationship between uptake rate and concentration (e.g., Eq. 2).

where C is the nutrient concentration in the channel (mass per volume), t is time, x is distance downstream,

2003). At Kings Creek, KS, ammonium was enriched to two levels (Fig. 4A). For the higher level, S_W

Menten parameters can potentially be used to characterize nutrient limitation of steams. For example, the ammonium half saturation concentrations were 6 μg L^{-1} for Ball Creek, 14 μg L^{-1} for Walker Branch, and 32 μg L^{-1} for Kings Creek (Table 2), suggesting that organisms in Ball Creek had more efficient ammonium uptake at lower ammonium concentration than did organisms in the other two streams. Based on the ratio of C_{AMB} to C_{HALF}, uptake in Ball Creek was closer t1gstint limasebyidr ammoniuavailabilitybutt1gcae uio on thvery high32 C

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