Inter-biome comparison of factors controlling stream

7. Our results suggest that light, phosphorus concentration and channel hydraulics

Table 1 (Continued(

oxygen change technique (Marzolf et al., 1994) with the modification suggested by Young & Huryn (1998) for calculating the air–water exchange rate of oxygen. Measurements of dissolved oxygen concentration and water temperature (Orbisphere Model 2607 (Orbisphere Laboratories, Geneva, Switzerland) disvelocity from conservative tracer additions performed within 1 day of the oxygen measurements. We monitored photosynthetically active radiation (PAR)

Variation among values for several of the variables

The daily rate of R was significantly correlated

(1985) for small streams in Pennsylvania, Michigan and Oregon (0.6–2.1 gO significantly higher in studies where open-system methods were used than those using chamber methods. As they have pointed out, however, their comparison was confounded by the fact that open-system methods were generally used where a higher rate of metabolism might be expected (larger, more nutrient-rich streams). Our range in respiration rates was similar to that reported for New Zealand streams (1–8 gO_2 m^{-2} day^{-1}) by Young & Huryn (1999) and that reported over a 2-

streams, a level that could result in uncertainties in metabolism rates of > 30% according to McCutchan et al. (1998).

indicated by canopy cover, is a strong determinant of primary production rate (Naiman, 1983; Bott et al., 1985; Webster et al., 1995; Young & Huryn, 1999). In these studies light availability was primarily a function of stream size or land use, with larger streams or those in grazed pasture having more open canopies (higher light) and higher rates of primary productivity. The streams we studied were all relatively small (average width ranging from 0.8 to 5.8 m) nutrient limited in some streams (Tank & Webster, 1998; Grattan & Suberkropp, 2001). Our study suggestswhole-ecosybstms Graesstreams

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is not surprising because six of the eight streams (all those with low P : R ratios) were in forests with closed or semi-closed canopies. Even when light supply in the forested streams was moderately high, as for Walker Branch (12.6 mol m^{-2} day^{-1}) and Eagle Creek, Michigan (18 mol m^{-2} day^{-1}), NEP and P : R ratios were quite low, presumably because of respiration associated with large allochthonous organic matter inputs.

Our multiple regression results suggested that NEP was controlled primarily by factors influencing production (PAR), probably because rates of GPP varied considerably more than rates of R among our streams. Others have also shown the positive influence of light on NEP. Bott et al. (1985) reported that NEP in0nd U427.5293 -1.3657 TD[(with)5818.6(stre light)58.6(ized)5865.2was reported that was

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