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Catchment land use influences on the reach-scale distribution of carbon and nutrients in sand-bed streams

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Successful restoration of disturbed urban streams requires a good mechanistic understanding of stream functioning, including biogeochemical processes. However, in the urban metropolis of Perth, Western Australia, little is known about the relative importance of catchment versus reach-scale processes on the quality and quantity of nutrients and organic matter or how they change seasonally. Seasonal variation in hydrologic connectivity to groundwater in these Mediterranean-type climates is likely to play an important role in biogeochemical cycling, particularly for sand-bed streams. Here we sought to assess the relative importance of catchment (as reflected by land use and total imperviousness, TI) versus reach-scale structure (e.g., extent of canopy cover, channel attributes, vegetation composition) on the quality and quantity of nutrients and organic matter in the water column and stored in sediments (fluvial, para-fluvial). We compared the biogeochemistry of sites during high flow (winter) and low flow (summer) periods to investigate: (i) if during winter, water chemistry is primarily controlled by land use (urban, agricultural, native vegetation) or TI (off site, larger scale processes that drive flow volumes and rates), and (ii) if during summer, water chemistry is increasingly decoupled from TI and more strongly influenced by local factors (e.g., groundwater upwelling). This study presents the initial findings of a PhD project investigating the links between biogeochemistry and aquatic foodwebs of urban streams.