Type 5.1: Small fine substrate dominated siliceous highland rivers

Distribution in river landscapes and regions according to Briem (2003):

Buntsandstein sandstone, sandy deposits

Picture:

Kinzig (Hesse). Photograph: E. Briem

Short description of morphology:

Streams of this type run in different valley forms depending on distance to source and the local conditions. Depending on the valley shape – v-shaped valleys, troughs, u-shaped valleys – the stream channel is either straight, sinuous or meandering. Sand and gravel dominate as substrate, locally cobbles can occur. Bank cliffs and slip-off slopes are often developed. The alternation of pool and riffle sequences occurs over relatively short stretches. The channel profile is flat, locally marginal sand or gravel bars develop. As in the somewhat comparable "lowland sand streams" lateral erosion along banks can lead to eroding bank cliffs.

Abiotic profile:

Size class:	10 - 100 km² catchment area
Slope of the valley floor:	4 - 50 ‰
Flow category:	generally calmly flowing current, locally fast and turbulent flow
Channel substrate:	sand and gravel dominate, locally rocks occur; coarse woody debris is the most important hard substrate

Physico-chemical water conditions:

siliceous

Conductivity [µS/cm]: 50 - 180
pH-value: 5,0 - 8,0
Alkalinity [°dH]: <1 - 3
Total hardness [°dH]: 1 - 5

Flow regime & hydrology:

Discharge is relatively steady.

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Characterisation of the macroinvertebrate community:

Functional groups: Compared with other highland stream types, rather poor macroinvertebrate fauna. Rheophile stone-dwelling species dominate in riffles, while pools and stable sand deposits are colonised by fine substrate inhabitants. Generally the species are cold-adapted or cold-stenothermous, adapted to strong current. Colonisers of aquatic moss are frequent. In contrast to the "classic" highland stream (Type 5: Small coarse substrate dominated siliceous highland rivers), gatherers/collectors and shredders dominate.

Selection of type-specific species: Typical species of turbulent riffles are caddis flies of the genera *Micrasema* and *Lype*. The slow flowing, stable sand deposits are rich in detritus and are inhabited by burrowing species like the mayfly *Ephemera danica* or by shallow burrowers like the dragonfly *Cordulegaster boltonii*. Species of the interstitial are completely absent or very rare.

Characterisation of macrophyte and pyhtobenthos communities:

A typical higher plant found in these streams is *Callitriche* spec.. The macrophytes community is dominated by aquatic moss; characteristic for this stream type is the *Scapanietum undulatae* community.

Characterisation of the fish fauna:

This stream type supports a rather species poor fish fauna. In highly acidic streams fish are completely absent. Besides brook trout, bullhead and brook lamprey are characteristic species in these streams. As a result of the high share of fine sediments, brook lamprey can reach high abundances.

Comments:

The sand dominated streams of this type, resemble sand streams of the lowlands.
This stream type has little buffering capacity and is susceptible to acidification.

Examples of typical streams

Macroinvertebrates: Speyerbach, Wellbach, Schwarzbach (Palatinate Forest, Rhineland-Palatinate), Ilme (Lower Saxony), Seebach (Baden-Württemberg)
Macrophytes and phytobenthos: Aubach (Bavaria), Wieslauter (Rhineland-Palatinate)

Comparative literature (selection):

FORSCHUNGSGRUPPE FLIESSGEWÄSSER (1993) „Bachtypen des badischen Buntsandstein-Odenwaldes", LUA NRW (1999) „Colliner Bach", WOLFF (1999