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## Type 9.1:

## Mid-sized fine to coarse substrate dominated calcareous highland rivers

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

Lacustrine limestone, Lower and Middle Jurassic rocks, other limestones, loess regions, Upper Triassic rocks, Cretaceous rocks, large floodplains (over 300 m wide)

**Picture:**



*Werre (North Rhine-Westphalia). Photograph: T. Pottgiesser*

**Short description of morphology:**

In u-shaped valleys, these sinuating to meandering rivers generally flow in a single channel. However, with increasing slope, they can develop a tendency to form side channels. Riffles and pools alternate regularly. Most channel bars are narrow, the profile is shallow and only moderately incised. Steep, unvegetated eroding banks are common. Substrate diversity is principally very high: depending on catchment conditions, the channel substrates are dominated by cobbles, rocks or gravel. Sand can be mixed in as fine sediment, and can reach high shares in permanent streams. The streams are very dynamic, and subject to expansive and very fast lateral channel movements. Occasionally, this stream also occurs as an intermittent variant.

**Abiotic profile:**

**Size class:** 100 - 1.000 km<sup>2</sup> catchment area  
**Slope of the valley floor:** 0,7 - 4,0 ‰  
**Flow category:** predominantly fast flowing, partially turbulent current; longer calmly flowing sections occur  
**Channel substrates:** depending on catchment conditions, cobbles and rocks or gravel dominate

**Physico-chemical water conditions:**

calcareous  
**Conductivity [µS/cm]:** 450 - 800  
**pH-value:** 7,5 - 8,5  
**Alkalinity [°dH]:** 8 - 14  
**Total hardness [°dH]:** 11 - 25

**Flow regime & hydrology:**

High fluctuations in discharge over the year.

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<b>Characterisation of the macroinvertebrate community:</b>	<p><b>Functional groups:</b> Rheophile, hard substrate inhabiting species dominate the coenosis. Colonisers of detritus-rich, stable sand deposits also occur. The macroinvertebrate community also includes calciphilic species and specialists adapted to intermittent flow with dry periods.</p> <p><b>Selection of type-specific species:</b> This stream type is inhabited by rheophilic hard substrate dwellers like the mayfly <i>Caenis macrura</i>, the caddis fly <i>Silo piceus</i> and the Snipe fly <i>Atherix ibis</i>. Expansive sand deposits with high detritus loads are colonised by large mussels like <i>Unio crassus</i> and the caddis fly <i>Sericostoma schneideri</i>. The caddis fly <i>Lasiocephala basalis</i>, is more or less restricted to coarse woody debris.</p>
<b>Characterisation of macrophyte and pyhtobenthos communities:</b>	<p>Typical are pondweeds like <i>Potamogeton lucens</i>, <i>P. perfoliatus</i>, <i>P. alpinus</i> and <i>P. gramineus</i>. In calmer sections close to shore <i>Sparganium emersum</i>, <i>Sagittaria sagittifolia</i>, <i>Nuphar lutea</i> as well as <i>Potamogeton natans</i> occur.</p>
<b>Characterisation of the fish fauna:</b>	<p>In streams of this type the typical fish fauna of the grayling region is developed with rheophilic, gravel-spawning species like grayling and nase. In streams dominated by fine substrates, species like gudgeon, stone loach and river lamprey can be abundant. The well developed mosaic of different currents and connected or abandoned side arms provide suitable habitat for numerous floodplain species. Migrating fish like salmon, occur from time to time.</p>
<b>Comments:</b>	<p>The water of larger „karst rivers“ appears blue in colour.</p>
<b>Examples of typical streams</b>	<p><b>Macroinvertebrates:</b> Bära, Jagst, Wutach (Baden-Württemberg), Bega (North Rhine-Westphalia) <b>Macrophytes and pyhtobenthos:</b> Aufsess, Main (Bavaria)</p>
<b>Comparative literature (selection):</b>	<p>LUA NRW (2001) „Kiesgeprägter Fluss des Deckgebirges“, „Schottergeprägter Karstfluss des Deckgebirges“</p>