

Type 16:

Small gravel-dominated lowland rivers

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

Ground and terminal moraines of young and older moraine landscapes and older river terraces.

Picture:



Kirchweddelbek (Schleswig-Holstein). Photograph: U. Holm

Short description of morphology:

Dependent on valley slope slightly sinuate to meandering channels, with relatively steep stream slope. Quickly flowing streams in v-shaped valleys, troughs or u-shaped valleys. Shallow lotic sections (riffles) alternate with short, deeper channel reaches (pools). There is no channel incision due to stable channel substrates, but there is strong lateral erosion, which causes pronounced, partially deep undercut banks. Slipp-off slopes and bank cliffs are undistinguished. Beside the perceivably dominant gravel fraction, various proportions of sand and loam occur. Especially in young moraine landscapes, erratic cobbles and boulders are washed from the riverbanks and supplement other channel substrates. This is the most dynamic stream type in the lowlands.

Abiotic profile:

Size class:	10 - 100 km ² catchment size
Slope of the valley floor:	3 - 25 (50) ‰
Flow category:	longer, shallow riffle sections, regularly alternating with short pool stretches
Channel substrates:	dominated by gravel and cobbles with a varied portion of sand; dependent on regional variation loam can occur; in late Pleistocene landscapes erratic moraine rocks are common

Physico-chemical water conditions:

Type occurs in siliceous and calcareous variants

	siliceous	calcareous
Conductivity [$\mu\text{S}/\text{cm}$]:	< 400	400 - 900
pH-value:	6,0 - 7,5	7,0 - 8,2
Alkalinity [$^{\circ}\text{dH}$]:	1 - 5	5 - 20
Total hardness [$^{\circ}\text{dH}$]:	3 - 8	8 - 28

Flow regime & hydrology:

Low to high discharge fluctuations over the year; small rivers sometimes have intermittent flow with dry periods in summer.

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Characterisation of the macroinvertebrate community:

Functional groups: Since this type is mainly developed in small rivers, species typical for rhithral (and crenal) regions are characteristic. The regularly occurring riffle sections with dynamic flow result in a dominance of rheophilic species. High share of hard substrates (gravel, cobbles) promote dominance of stone-dwelling species and colonisers of epilithic aquatic moss.

Selection of type-specific species: Species adapted to strong currents and high oxygen levels like the mayflies *Electrogena ujhelyii*, *Heptagenia sulphurea* and *Rhithrogena semicolorata*, and the caddis flies *Rhyacophila fasciata*, *Agapetus fuscipes*, *Potamophylax nigricornis*, *Silo pallipes* and *Silo nigricornis* occur. Examples of accompanying species include *Dugesia gonocephala*, *Ancylus fluviatilis*, *Amphinemura standfussi*, *Leuctra digitata*, *L. hippopus* and *L. nigra*, *Capnia bifrons*, *Elmis aenea*, *Limnius volckmari*, *Hydropsyche saxonica* and *Sericostoma personatum*.

Characterisation of macrophyte and phyto-benthos communities:

Species, which attach to stable streambed substrates, like the moss *Fontinalis antipyretica*, the freshwater red algae *Hildenbrandia rivularis* or the narrow-leaved water parsnip *Berula erecta* dominate. The *Berula erecta*-community is restricted to smaller rivers (< 5 m width). Watercress (*Nasturtium officinale*) is also common.

Young moraines: macrophytes are generally rare; locally flooded or emerging stands occur with streams reeds or pondweed; moss and freshwater algae often colonise hard substrates; amphibious zones are poorly vegetated, with some insular patches of reeds or sedges.

Characterisation of the fish fauna:

Gravel-dominated lowland rivers are characterised by gravel substrates and a large number of microhabitats (sandy-muddy stretches, quickly flowing and calm reaches, accumulations of coarse woody debris). Typical for this stream type is a diverse fish fauna: besides gravel-spawning and phytophilic species, fish with a preference for sandy substrates occur. Typical small fish include the stone loach, a species dependent on the presence of coarse woody debris. Also characteristic is brook lamprey, whose ammocoetes colonise sandy substrates.

Comments:

An especially characteristic and the most dynamic stream type in the lowlands, which in reaches resembles highland streams. In the stream type presented here, numerous variants of gravel-dominated lowland streams as they have been described at the ecoregion scale for the "Northern German Lowlands" or in state typologies have been summarised (see comparative literature).

Possible confusion with other stream types: In the lowlands, this stream is possibly confused with degraded sand-dominated lowland streams, where the gravel substrates have appeared as a result of erosion. Sand-dominated streams have a much higher portion of sand in channel substrates and show a much more meandering channel form with typical slip-off slopes and stable cliff banks. In small streams, the slope of the valley floor is less steep and the regular alternation between riffles and pools is poorly developed.

Examples of typical streams

Macroinvertebrates: Kirchweddelbek, Kremper Au (Schleswig-Holstein), Steinbach (North Rhine-Westphalia), Klasbach, Bäche in der Kühlung (Mecklenburg-West Pomerania), Lachte, Weesener Bach, Wümme (Lower Saxony)

Comparative literature (selection):

LUA NRW (1999) „Kiesgeprägtes Fließgewässer der Verwitterungsgebiete, Flussterrassen und Moränengebiete“, RASPER (2001) „Kiesgeprägtes Fließgewässer des Tieflandes (mit Börden)“, LANU (2001) „Kiesgeprägte, gefällereiche Fließgewässer der Moränenbildungen“, „Kiesgeprägte, gefällearme Fließgewässer der Moränenbildungen“, SOMMERHÄUSER & SCHUHMACHER (2003)