
Type 1: Alpine streams

(Sub types 1.1 and 1.2)

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

Calcareous Alps, Flysch-Alps, large coarse material floodplains (over 300 m wide)

Picture:



Photograph: P. Klausmeier

Short description of morphology:

Stream type 1 incorporates calcareous alpine watercourses of various sizes, from small and mid-sized rivers (sub type 1.1) to large rivers (sub type 1.2). Small rivers run straight or sinuous through v-shaped or u-shaped valleys. The large rivers usually flow in braided channels through fluvial deposits in main stem valleys, while mid-sized rivers flow in secondary v-shaped and u-shaped valleys, where fluvial sediments form the valley floor. The dominant substrates in all streams are boulders and cobble (bedload). In some stretches the streambed is cleared of loose substrate and the stream flows over bedrock. Finer substrates are relatively rare.

Abiotic profile:

Size class: 10 - 10.000 km² catchment area
(sub type 1.1 small and mid-sized rivers: 10 - 1.000 km² catchment area)
(sub type 1.2 large rivers: 1.000 - 10.000 km² catchment area)

Slope of the valley floor: 6 - 45 ‰

Flow category: turbulent

Channel substrates: boulders, cobbles, gravel, coarse sand

Physico-chemical water conditions:

calcareous

Conductivity [μS/cm]: 170 - 460

pH-value: 7,7 - 8,5

Alkalinity [°dH]:

Total hardness [°dH]:

Flow regime & hydrology:

Alpine flow regime with severe annual fluctuation and strongly pronounced extreme flow conditions during spates or low-flow periods.

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Characterisation of the macroinvertebrate community:

Functional groups: The benthic macroinvertebrate community is very species-rich. With respect to current, oxygen demand and water temperatures species with very particular demands abound. The prominent substrates (boulders and cobble) are suitable habitat for rheophilic stone-dwelling species, which dominate the benthic macroinvertebrate community. Filter-feeding is the most common functional feeding type. In terms of longitudinal biocoenotic regions, epirhithral species are prevalent, especially in sub type 1.1. Remarkable is the limited number of Crustaceans in the biocoenosis.

Selection of type-specific species in small and mid-sized rivers (sub type 1.1):

Ephemeroptera: *Baetis alpinus*, *Epeorus alpicola*, *Ecdyonurus picteti*, *Ecdyonurus zelleri*, *Rhithrogena alpestris*, *Habroleptoides auberti*. Plecoptera: *Dictyogenus alpinum*, *Isoperla rivulorum*, *Chloroperla susemicheli*, *Siphonoperla montana*, *Taeniopteryx hubaulti*, *Protonemoura nimborum*, *Nemoura minima*, *Capnioneura nemuroides*, *Leuctra cingulata*, *Leuctra rosinae*. Coleoptera: *Deronectes platynotus*, *Ochthebius granulatus*, *Hydraena alpicola*, *H. lapidicola*, *H. truncata*, *Dryops striatopunctatus*, *Elmis aenea*, *E. rietscheli*, *Esolus angustatus*, *Limnius perrisi*. Trichoptera: *Rhyacophila intermedia*, *R. torrentium*, *R. vulgaris*, *Glossosoma conformis*, *Philopotamus ludificatus*, *Hydropsyche tenuis*, *Micrasema morosum*, *Lithax niger*, *Drusus biguttatus*, *D. discolor*, *D. monticola*, *Ecclisopteryx guttulata*, *Metanoea rhaetica*. Diptera: *Hapalothrix lugubris*, *Liponeura cinerascens minor*.

Selection of type-specific species in large rivers (sub type 1.1 and sub type 1.2):

Ephemeroptera: *Siphonurus lacustris*, *Baetis alpinus*, *Epeorus assimilis*, *Ecdyonurus venosus*, *Rhithrogena allobrogica*, *R. circumtatica*, *R. landai*, *R. gratianopolitana*. Plecoptera: *Perla grandis*, *Chloroperla tripunctata*, *Capnia nigra*, *Taeniopteryx kuetreiberi*, *Rhabdiopteryx neglecta*, *Leuctra major*, *L. mortoni*. Coleoptera: *Oreodytes davisii*, *O. septentrionalis*, *Laccobius alternus*, *Ochthebius nobilis*, *Hydraena alpicola*, *H. lapidicola*, *Dryops viennensis*, *Elmis aenea*, *E. rioloides*, *Esolus angustatus*, *E. parallelepipedus*, *Limnius perrisi*, *L. volckmari*. Heteroptera: *Micronecta griseola*, *M. poweri*. Trichoptera: *Rhyacophila dorsalis*, *R. torrentium*, *Glossosoma conformis*, *Hydropsyche dinarica*, *Brachycentrus montanus*, *Drusus biguttatus*, *Ecclisopteryx guttulata*, *Allogamus auricollis*. Diptera: *Liponeura cordata*, *L. decipiens*, *Prosimulium hirtipes*, *Simulium argenteostriatum*, *S. argyreatum*, *S. variegatum*.

Characterisation of macrophyte and phyto-benthos communities:

Selection of type-specific macrophyte species: *Chara aspera*, *C. hispida*, *C. intermedia*, *Mentha aquatica* (submers), *Juncus articulatus*, *Myriophyllum alterniflorum*, *Callitriche hamulata*, *Chiloscyphus polyanthos*, *Potamogeton alpinus*, *Ranunculus peltatus*.

Selection of type-specific diatom species in small and mid-sized rivers (sub type 1.1): *Achnanthes biasoletiana*, *Cymbella delicatula*, *Cymbella affinis*, *Denticula tenuis*, *Gomphonema angustum*. Trophic status: ultra-oligotroph to oligotroph.

Selection of type-specific diatom species in large rivers (sub type 1.2): *Achnanthes biasoletiana*, *Achnanthes minutissima*, *Gomphonema angustum*. Trophic status: ultra-oligotroph to oligo-mesotroph.

Characterisation of the fish fauna:

For the most part, Alpine streams belong to the trout region. Typical inhabitants include the brook trout and bullhead, in mid-sized rivers also grayling. In small rivers, often only brook trout are found. Generally, watercourses with steep slopes only support fish temporarily or not at all.

Comments:

Stream type 1 „Alpine rivers“ is readily distinguished into two subtypes longitudinally, based on the diatom colonisation: Sub type 1.1 „Small and mid-sized rivers of the Calcareous Alps“ and sub type 1.2 „Large rivers of the Calcareous Alps“. For stream assessment purposes longitudinal differentiation of the biocoenoses and/or local particularities should be taken into consideration.

Examples of typical streams

Macroinvertebrates: Lindenbach, Ostrach, Tiroler Achen (Bavaria)
Macrophytes and phyto-benthos: Lauterbach, Isar, Ammer, Inn (Bavaria)

Comparative literature (selection):