

## C2.2a Permanent non-tidal, fast, turbulent watercourse of montane to alpine regions with mosses

### Summary

This habitat type includes small, shallow, fast and turbulent streams of montane and alpine regions of Europe with highly oxygenated and rather cold waters. The sediments consist almost exclusively of rocks and boulders and vascular plants are often confined to situations where the current is slower and there is temporary accumulation of finer sediments. Species-poor moss communities are the most usual feature but there can be a rich stenothermic fauna. Construction of dams and small power plants, water canalisation and riverbed modifications, pollution from livestock, agriculture and households are serious threats, together with climate change. Restoration measures include the improvement of water quality and the recovery of the hydrological regime and a long time period is needed.

### Synthesis

A full quantitative assessment of the decline in abiotic and biotic quality and quantity was not possible for this habitat. Despite, the assessment according to criterion A1 (trends in quantity over 50 years) and criterion B (restricted geography) resulted to be Least Concern (LC), but the assessment has a relatively low certainty due to large data gaps.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Least Concern	-	Least Concern	-

### Sub-habitat types that may require further examination

No sub-types have been identified.

### Habitat Type

#### Code and name

C2.2a Permanent non-tidal, fast, turbulent watercourse of montane to alpine regions with mosses



Fast running watercourse in the high mountains of the Berner Oberland, Switzerland (Photo: John Janssen).



Fast running mountain stream with mosses in Reinheimen, Norway (Photo John Janssen).

#### Habitat description

This habitat type includes small, shallow, fast-running and turbulent streams of montane and alpine regions of Europe. The water is highly oxygenated and rather cold during all seasons with temperatures

rarely higher than 10°C in summer. The sediments consist almost exclusively of rocks and boulders, because the fast current does not allow the deposition of finer sediments. Vascular plants can occasionally occur in this habitat, especially in those parts of the riverbed where the current is slower and there is temporary accumulation of finer sediments. However no stable vascular plant community can be considered typical of this habitat type. Therefore the habitat does not include any vascular plant alliances, instead, lichens and bryophyte communities with high moss abundance are very characteristic of this habitat. The lichen and bryophytic vegetation is usually rather low in species number, on the contrary the fauna can be very rich including mainly stenothermic species of rheophile fauna.

Indicators of good quality:

- Occurrence of stenothermic and rheophile fauna
- High water velocity
- Thin layer of algae covering the rocks, a thick layer of algae could be symptom of eutrophication in place
- Absence of fine and organic sediments
- Dominance of aquatic lichens and mosses
- Natural hydrology

Characteristic species:

Algae: *Phormidium autumnale*, *Cladophora* spp., *Hydrurus foetidus*, *Bangia atropurpurea*, *Diatoma* spp., *Gomphonema olivaceum*, *Melosira varians*, *Chamaesiphon polonicus*, *C. amethystinus*, *Tolypothrix distorta*, *Navicula* spp., *Nitzschia* spp., *Cocconeis* spp., *Spirogyra* spp., *Mougeotia* spp., *Zygnema* spp., *Oocardium stratum*, *Vaucheria* spp., *Hildenbrandia rivularis*, *Lemanea fluviatilis*, *Audouinella hermannii*, *Heribaudiella fluviatilis*, *Surirella ovata*, *Closterium leibleinii*, *Staurastrum punctulatum*.

Lichens: *Verrucaria* spp., *Porina clorotica*, *Dermatocarpon luridum*

Bryophytes: *Scapania undulata*, *Cratoneuron* spp., *Blindia acuta*, *Brachythecium rivulare*, *B. plumosum*, *Bryum* spp., *Dichodontium pellucidum*, *Fontinalis antipyretica*, *Hydrogrimmia mollis*, *Hygrohypnum molle*, *H. smithii*, *Jungermannia exsertifolia*, *Schistidium rivulare*, *Cinclidotus fontinaloides*, *C. riparius*, *Philonotis fontana*, *Pohlia wahlenbergii*, *Rhacomitrium fasciculare*, *Platyhypnidium riparioides*.

Macroinvertebrates: Mollusca (e.g. *Ancylus fluviatilis*), *Turbellaria*, Crustacea (*Cyclops* spp., *Attheyella* spp., *Bryocamptus* spp., *Maraenobiotus* spp., *Hypocamptus* spp., *Moraria* spp., *Parastenocaris* spp., *Potamocypris* spp., *Cavernocypris* spp., *Cryptocandona* spp.), Ephemeroptera (e.g. *Baetis alpinus*, *B. lutheri*, *B. melanonyx*), Trichoptera (e.g. *Hydropsyche instabilis*, *Potamophylax cingulatus*, *Rhyacophila* spp., *Sericostoma pedemontanum*), Ephemeroptera (e.g. *Epeorus alpicola*, *E. sylvicola*, *Rhithrogena loyolaea*, *R. alpestris*, *Ecdyonurus alpinus*, *Oligoneuriella rhenana*), Odonata (e.g. *Baetis alpinus*, *B. rhodani*, *Calopteryx splendens*, *C. virgo*, *C. haemorrhoidalis*), Plecoptera (e.g. *Dictyogenus fontium*, *Protonemura ausonia*, *P. caprai*, *P. elisabethae*, *P. brevistyla*, *Nemoura mortoni*, *N. obtuse*, *Leuctra rosinae*, *L. festai*, *L. teriolensis*, *Isoperla rivulorum*, *Perlodes intricatus*, *Siphonoperla montana*, *Chloroperla susemicheli*), Diptera (e.g. *Diamesa* spp., *Chironomus* spp., *Orthocladus* spp., *Eukiefferiella* spp., *Tvetenia calvescens*, *Prosimulium* spp., *Simulium* spp., *Dicranota* spp., *Rhypholophus* spp., *Tricyphona* spp., *Thaumalea* spp.)

Vertebrates: Fish: *Salmo trutta*, *Cottus gobio*, *Thymallus thymallus*; Birds: *Cinclus cinclus*

### **Classification**

This habitat may be equivalent to, or broader than, or narrower than the habitats or ecosystems in the following typologies.

EUNIS:

C2.2 Permanent non-tidal, fast, turbulent watercourses

EuroVegChecklist:

*Scapanion undulatae* Philippi 56

*Dermatocarpion rivulorum* Geissler 76

*Fontinalion antipyreticae* W. Koch 1936

*Rhynchostegion riparioides* Waldh. 1944

*Platyhypnidion rusciformis* Philippi 1956

Annex 1:

3220 Alpine rivers and the herbaceous vegetation along their banks

32A0 Tufa cascades of karstic rivers of the Dinaric Alps

Possibly there is also some overlap with 3230 (Alpine rivers and their ligneous vegetation with *Myricaria germanica*) and 3240 (Alpine rivers and their ligneous vegetation with *Salix eleagnos*)

Emerald:

C2.18 Acid oligotrophic vegetation of spring brooks

MAES-2:

Freshwater habitat, rivers and lakes, inland surface water (water courses and bodies)

IUCN:

5.1. Permanent Rivers/Streams/Creeks [includes waterfalls]

Water Framework Directive:

R-E4 (Upland streams)

**Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?**

No

Justification

The habitat is characteristic of montane to alpine regions across whole of Europe.

### **Geographic occurrence and trends**

EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Austria</i>	Present	Unknown Km <sup>2</sup>	Decreasing	Decreasing
<i>Bulgaria</i>	Present	Unknown Km <sup>2</sup>	Decreasing	Decreasing
<i>Croatia</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Czech Republic</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Finland</i>	Aland Islands: Uncertain Finland mainland: Present	68 Km <sup>2</sup>	Stable	Stable
<i>France</i>	Corsica: Uncertain France mainland: Present	Unknown Km <sup>2</sup>	Stable	Decreasing
<i>Germany</i>	Present	1 Km <sup>2</sup>	Decreasing	Decreasing

EU 28	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Ireland</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Italy</i>	Italy mainland: Present Sardinia: Present Sicily: Present	22.9 Km <sup>2</sup>	Decreasing	Decreasing
<i>Luxembourg</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Malta</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Poland</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Portugal</i>	Portugal mainland: Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Romania</i>	Present	0.3 Km <sup>2</sup>	Unknown	Decreasing
<i>Slovakia</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Slovenia</i>	Present	5 Km <sup>2</sup>	Decreasing	Decreasing
<i>Spain</i>	Balearic Islands: Uncertain Canary Islands: Uncertain Spain mainland: Present	64 Km <sup>2</sup>	Decreasing	Unknown
<i>Sweden</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>UK</i>	Gibraltar: Uncertain Northern Island: Uncertain United Kingdom: Present	Unknown Km <sup>2</sup>	Stable	Decreasing

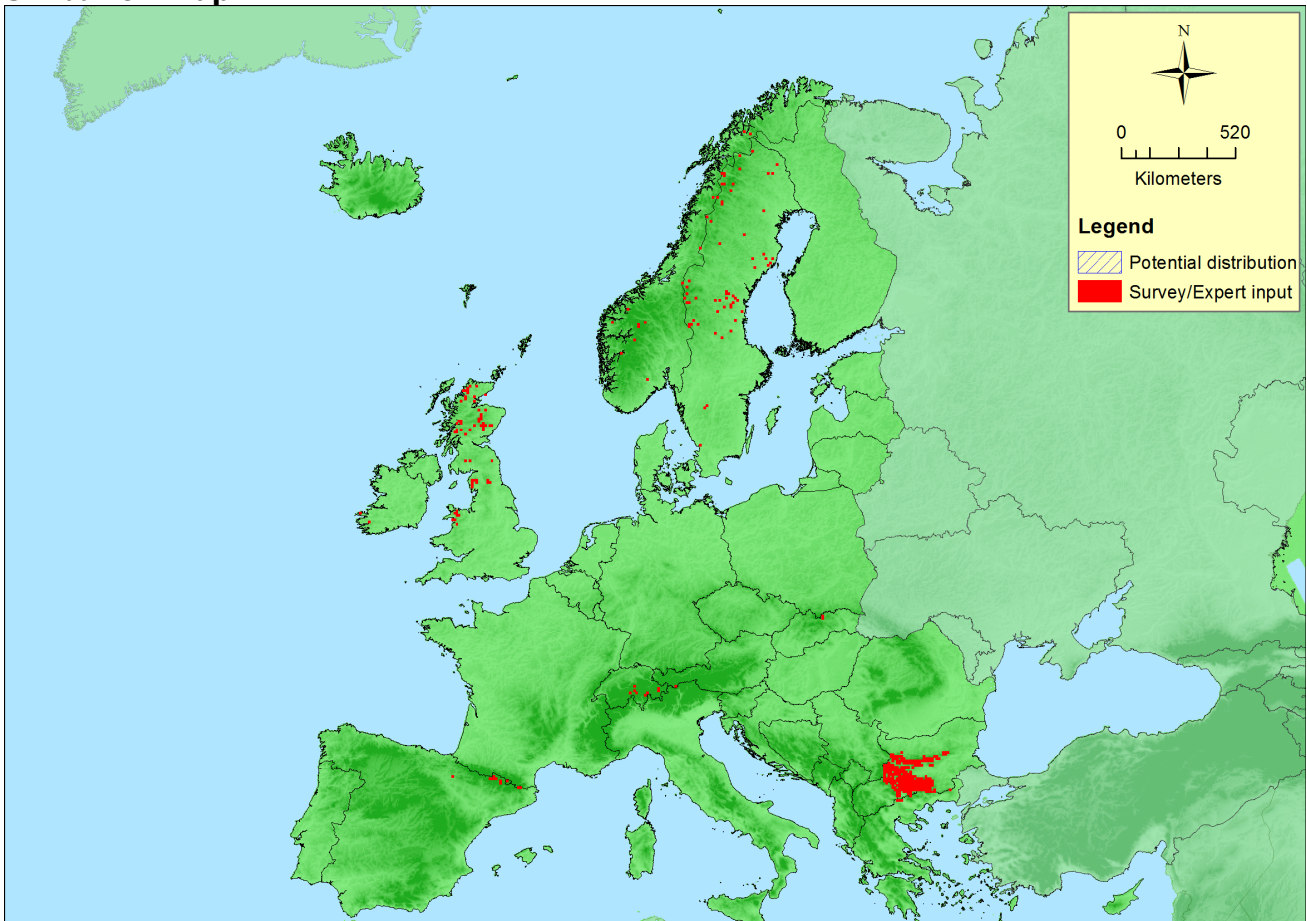
EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
<i>Albania</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Andorra</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Bosnia and Herzegovina</i>	Present	10 Km <sup>2</sup>	Decreasing	Decreasing
<i>Faroe Islands</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Former Yugoslavian Republic of Macedonia (FYROM)</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Guernsey</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Iceland</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Isle of Man</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Jersey</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Kaliningrad</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Kosovo</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Monaco</i>	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown
<i>Montenegro</i>	Present	Unknown Km <sup>2</sup>	Unknown	Unknown

EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Norway	Norway Mainland: Present Svalbard: Present	Unknown Km <sup>2</sup>	Unknown	Unknown
Serbia	Present	Unknown Km <sup>2</sup>	Unknown	Unknown
Switzerland	Present	Unknown Km <sup>2</sup>	Decreasing	Decreasing
Vatican City	Uncertain	Unknown Km <sup>2</sup>	Unknown	Unknown

### Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	5238400 Km <sup>2</sup>	407	161 Km <sup>2</sup>	This is the area in 6 out of 12 countries
EU 28+	5238400 Km <sup>2</sup>	426	171 Km <sup>2</sup>	This is the area in 7 out of 12 countries

### Distribution map



Map is incomplete, with main data gaps in the Alps, Carpathians and Balkan, but rather complete distribution for Bulgaria. Data sources: EVA, GBIF, NAT.

### How much of the current distribution of the habitat type lies within the EU 28?

This habitat type is widely distributed in the mountainous regions of Europe and Asia. Similar habitat types, but characterized by partially or totally different species, may be found across whole Northern hemisphere. Probably only 40% of the habitat in the Euro-Asiatic range lies within EU 28.

## Trends in quantity

The trends in quantity vary among the 13 countries for which territorial data are available have been submitted. In 8 countries the trend is decreasing, and in 3 countries the trend is stable and in 2. For two countries the trend is unknown. However most countries did not reported data about the current area of habitat, therefore an estimation of the trend in quantity at European scale was not possible.

- Average current trend in quantity (extent)

EU 28: Decreasing

EU 28+: Decreasing

- Does the habitat type have a small natural range following regression?

No

*Justification*

The habitat is widely distributed in mountainous and Alpine regions, so it has not a small natural range.

- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

*Justification*

The habitat is widely distributed in mountainous and Alpine regions, so it has not a small natural range.

## Trends in quality

Ten countries (43% of the total countries in which the habitat is expected to occur) reported data about the trend in quantity, consisting of slight to severe degradation of at least 5 to up 70% of the habitat extent. However only 5 countries (only 20% of the total countries in which the habitat is expected to occur) reported the current area of habitat, therefore an estimation of the trend in quality at European scale was not possible.

- Average current trend in quality

EU 28: Decreasing

EU 28+: Decreasing

## Pressures and threats

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The habitat area has decreased due to construction of dams and water accumulation, construction of small power plants and water canalisation and riverbed modifications. Water pollution includes pollution from livestock, agriculture and households. A serious threat includes climate change, especially changes in temperature and precipitation that can alter the physical characteristics of the habitat.

### List of pressures and threats

#### **Mining, extraction of materials and energy production**

Sand and gravel extraction

#### **Pollution**

Pollution to surface waters (limnic, terrestrial, marine & brackish)

Diffuse pollution to surface waters due to agricultural and forestry activities

Diffuse pollution to surface waters due to household sewage and waste waters

Input of contaminants (synthetic substances, non-synthetic substances, radionuclides) - diffuse sources, point sources, acute events

#### **Natural System modifications**

Canalisation & water deviation

Modifying structures of inland water courses

Reservoirs

Small hydropower projects, weirs  
 Surface water abstractions by hydro-energy  
 Other human induced changes in hydraulic conditions

**Climate change**

Changes in abiotic conditions  
 Temperature changes (e.g. rise of temperature & extremes)

**Conservation and management**

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Current restoration measures consist of improving the hydrological regime and restoring water quality. Other measures needed for limiting the eutrophication may be regulating farming and agriculture in proximity of the streams and in the areas upstream. Institution of protected areas may be in some cases a good strategy for managing the land use.

**List of conservation and management needs**

**Measures related to agriculture and open habitats**

Other agriculture-related measures

**Measures related to wetland, freshwater and coastal habitats**

Restoring/Improving water quality  
 Restoring/Improving the hydrological regime  
 Managing water abstraction

**Measures related to spatial planning**

Establish protected areas/sites  
 Manage landscape features

**Conservation status**

Annex 1:

3220: ALP U1, ATL XX, BOR FV, CON U1, MAC FV, MED U1

32A0: no data reported yet

**When severely damaged, does the habitat retain the capacity to recover its typical character and functionality?**

When the habitat is severely damaged, it takes a long time period to restore it. Restoring hydrology might not always be possible. Rises in temperature might not be overcome and might be deleterious to the stenothermic fauna.

**Effort required**

50+ years
Through intervention

**Red List Assessment**

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**Criterion A: Reduction in quantity**

Criterion A	A1	A2a	A2b	A3
EU 28	-16 %	unknown %	unknown %	unknown %

Criterion A	A1	A2a	A2b	A3
EU 28+	-15 %	unknown %	unknown %	unknown %

Quantitative data for area are available for only 4 out of 14 countries reporting about this habitat. Therefore a quantitative assessment has been carried out without weighting for the area. The average trend (non-weighted) over the last 50 years is a decline of -16% (EU28) and -15% (EU28+) with maximum values reported from Austria (<50% decline) and Germany (30-50% decline), and stable situations in the UK, France and Finland.

### Criterion B: Restricted geographic distribution

Criterion B	B1				B2				B3
	EOO	a	b	c	AOO	a	b	c	
EU 28	> 50000 Km <sup>2</sup>	Yes	Unknown	No	> 50	Yes	Unknown	No	No
EU 28+	> 50000 Km <sup>2</sup>	Yes	Unknown	No	> 50	Yes	Unknown	No	No

The habitat is presently largely extended in Europe therefore both EOO and AOO are far from the thresholds required by criterion B to consider the habitat threatened. However a decrease has been observed in spatial extent, biotic and abiotic quality. A future negative trend is expected due to climate change (rise of water temperature).

### Criterion C and D: Reduction in abiotic and/or biotic quality

Criteria C/D	C/D1		C/D2		C/D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %

Criterion C	C1		C2		C3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %
EU 28+	unknown %	unknown %	unknown %	unknown %	unknown %	unknown %

Criterion D	D1		D2		D3	
	Extent affected	Relative severity	Extent affected	Relative severity	Extent affected	Relative severity
EU 28	unknown %	unknown%	unknown %	unknown%	unknown %	unknown%
EU 28+	unknown %	unkown%	unknown %	unknown%	unknown %	unknown%

Only 5 countries (about 20% of the total countries in which the habitat is expected to occur) reported all the data necessary to calculate the trend in quality (current area, extent of degraded area, trend in severity of degradation). Therefore the assessment according to criterion C and D have been considered not reliable at this moment. The habitat is Data Deficient according to this criterion.

### Criterion E: Quantitative analysis to evaluate risk of habitat collapse

Criterion E	Probability of collapse
EU 28	unknown
EU 28+	unknown



No data are available to evaluate risk of habitat collapse.

### Overall assessment "Balance sheet" for EU 28 and EU 28+

	A1	A2a	A2b	A3	B1	B2	B3	C/D1	C/D2	C/D3	C1	C2	C3	D1	D2	D3	E
EU28	LC	DD	DD	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD
EU28+	LC	DD	DD	DD	LC	LC	LC	DD	DD	DD	DD	DD	DD	DD	DD	DD	DD

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Least Concern	-	Least Concern	-

### Confidence in the assessment

Low (mainly based on uncertain or indirect information, inferred and suspected data values, and/or limited expert knowledge)

### Assessors

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### Reviewers

F. Landucci

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20/12/2015

### Date of review

25/04/2016

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