C2.3 Permanent non-tidal, smooth-flowing watercourse

Summary

Permanent smooth-flowing waters occur widely through the European lowlands, but relatively less commonly to the south, in slow-flowing rivers, streams, brooks, rivulets, rills and also in stretches of relatively fast-flowing rivers with laminar flow. The waters are typically mesotrophic, the bed is typically composed of sand or mud and the vegetation is mainly aquatic macrophytes and amphibious vascular plants. The habitat is important for many fish species, waterbirds and aquatic insects. Increasing eutrophication and pollution of the water bodies and artificial regulation of the water regime of rivers and streams are major threats and both flora and fauna have seen the arrival of many non-native species. If pollution can be ameliorated, the habitat may be restored in a relatively short time.

Synthesis

The habitat reaches the qualification of Near Threatened (NT) for the EU28, because of a large reduction in quality (criterion C/D1) and quantity (criterion A1) over the last 50 years. For the EU28+ the conclusion is Least Concern (LC). The assessment was carried out using data from about 46% of the EU28 countries and 31% of the additional EU28+ countries.

Overall Category & Criteria			
EU 28		EU 28+	
Red List Category	Red List Criteria	Red List Category	Red List Criteria
Near Threatened	C/D1	Least Concern	-

Sub-habitat types that may require further examination

The habitat may be further differentiated according to ecological conditions as determined by the climatic, geographic and geological conditions in which it develops. Therefore the habitat may be more threatened in some parts of Europe rather than others.

Habitat Type

Code and name

C2.3 Permanent non-tidal, smooth-flowing watercourse

Smooth-flowing watercourse, Pärnu river, Estonia (Photo: John Janssen).

Smooth-flowing watercourse, Clitunno river, central Italy (Photo: Flavia Landucci).

Habitat description

This habitat includes permanent watercourses with non-turbulent water and their associated pelagic and benthic animal, algal and plant communities. The habitat includes slow-flowing rivers, streams, brooks, rivulets, rills and also relatively fast-flowing rivers with laminar flow. The bed is typically composed of sand or mud. Features of the river bed, uncovered by low water or permanently emerging, such as sand or mud islands and bars are treated as littoral zone (C3) and are not included in this habitat. This habitat includes stretches of streams and river at mid and low-altitude with an average flow velocity below 0.2 m/sec. Main physical differences between this habitat type and C.2.2b (Permanent non-tidal, fast, turbulent watercourses of plains and mountain regions with *Ranunculus* ssp.) are the lower flow velocity and the smaller grain size of the sediments. These two habitats may be related as segments of the same stream or river. The water is mesotrophic and buffered.

The vegetation is mainly constituted by rooted and floating Euro-Asiatic macrophytes, mainly with potamid, batrachid and utricularid growth forms, which belong to the *Potamogetonion* and *Batrachion fluitantis* communities. Potamid vegetation can be accompanied in slowly flowing parts of the river bed by nymphaeid species such as *Nymphaea alba* and *Nuphar lutea*. Also amphibian macrophytes may occur in this habitat with their aquatic form. Vegetation cover of the habitat, usually, does not exceed 30% of the total area of a river stretch.

Indicators of good quality:

- Morphologically unaltered river bed and banks
- Natural hydrological regime
- Avoid of dominance of algae and floating algae beds (FLAB)
- No or limited formation of floating mats of organic residuals
- No or limited occurrence of exotic species
- Limited extension of nymphaeid vegetation or species indicating high eutrophication

Characteristic species:

Vascular plants: *Ranunculus aquatilis*, *R. circinatus, R. trichophyllus, Berula erecta, Butomus umbellatus, Callitriche* spp. (e.g. *C. hamulata, C. cophocarpa*), *Helosciadium nodiflorum, Mentha aquatica, Nasturtium officinale, Potamogeton berchtoldii, P. perfoliatus, P. crispus, P. polygonifolius, P. gramineus, P. pusillus, P. lucens, P. pectinatus, P. natans, P. nodosus, P. coloratus, Rorippa amphibia, Sagittaria sagittifolia, Scirpus lacustris, Sium latifolium, Sparganium emersum, S. erectum, Veronica beccabunga, V. anagallis-aquatica, Zannichellia palustris.*

Bryophytes: *Drepanocladus* spp., *Fontinalis antipyretica*, *F. hypnoides*, *Rhynchostegium riparioides*, *Warnstorfia* spp.

Macroinvertebrates: *Potamon fluviatile*, *Austropotamobius pallipes* and benthic invertebrates of the orders *Ephemeroptera, Trichoptera, Odonata, Plecoptera, Amphipoda, Isopoda, Arhynchobdellida.*

Vertebrates: *Salmo trutta*, *S. salar, Cotus gobio, Leuciscus souffia, Squalius cephalus, Barbus barbus, Perca fluviatilis, Lampetra fluviatilis, Coregonus lavaretus, Thymallus thymallus, Aspium aspium, Esox lucius, Castor fiber, Lutra lutra*, *Salamandrina terdigitata, Triturus cristatus, T. carnifex, T. alpestris, Rana* spp.

Classification

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

EUNIS:

C2.3 Permanent non-tidal, smooth-flowing watercourses

EuroVegChecklist:

Potamogetonion Libbert 1931

Nymphaeion albae Oberd. 1957

Batrachion fluitantis Neuhäusl 1959

Ranunculion aquatilis Passarge 1964

Annex 1:

3250 Constantly flowing Mediterranean rivers with Glaucium flavum

3260 Water courses of plain to montane levels with the Ranunculion fluitantis

Emerald:

C2.33 Mesotrophic vegetation of slow-flowing streams

C2.34 Eutrophic vegetation of slow-flowing streams

MAES-2:

Fresh water, Rivers and lakes, Inland surface waters (water coursed and bodies)

IUCN:

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

Water Framework Directive:

R-C1, R-C4, R-C5, R-C6

Does the habitat type present an outstanding example of typical characteristics of one or more biogeographic regions?
No

Justification
This habitat is spread across whole 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)
Austria	Present	unknown Km^2	Decreasing	Decreasing
Belgium	Present	40 Km^2	Stable	Decreasing
Bulgaria	Present	102 Km^2	Decreasing	Decreasing
Croatia	Present	30 Km^2	Decreasing	Decreasing
Cyprus	Uncertain	unknown Km^2	Unknown	Unknown
Czech Republic	Present	80 Km^2	Decreasing	Decreasing
Denmark	Present	unknown Km^2	Unknown	Unknown
Estonia	Present	unknown Km^2	Unknown	Unknown
Finland	Aland Islands: Present Finland mainland: Present	70 Km^2	Unknown	Decreasing
France	Corsica: Present France mainland: Present	unknown Km^2	Stable	Decreasing
Germany	Present	unknown Km^2	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)
Greece	Crete: Present East Aegean: Present Greece (mainland and other islands): Present	0.23 Km^2	Unknown	Unknown
Hungary	Present	5-50 Km^2	Decreasing	Decreasing
Ireland	Present	unknown Km^2	Unknown	Decreasing
Italy	Italy mainland: Present Sardinia: Present Sicily: Present	9 Km^2	Decreasing	Decreasing
Latvia	Present	unknown Km^2	Unknown	Unknown
Lithuania	Present	150-160 Km^2	Decreasing	Decreasing
Luxembourg	Present	unknown Km^2	Unknown	Unknown
Malta	Uncertain	unknown Km^2	Unknown	Unknown
Netherlands	Present	24-60 Km^2	Decreasing	Decreasing
Poland	Present	unknown Km^2	Unknown	Unknown
Portugal	Madeira: Present Portugal Azores: Present Portugal mainland: Present Savage Islands: Present	3.42 Km^2	Increasing	Unknown
Romania	Present	0.3 Km^2	Decreasing	Decreasing
Slovakia	Present	unknown Km^2	Unknown	Unknown
Slovenia	Present	15 Km^2	Decreasing	Decreasing
Spain	Balearic Islands: Present Canary Islands: Present Spain mainland: Present	15 Km^2	Decreasing	Decreasing
Sweden	Present	unknown Km^2	Unknown	Unknown
UK	Gibraltar: Present Northern Island: Present United Kingdom: Present	unknown Km^2	Decreasing	Decreasing

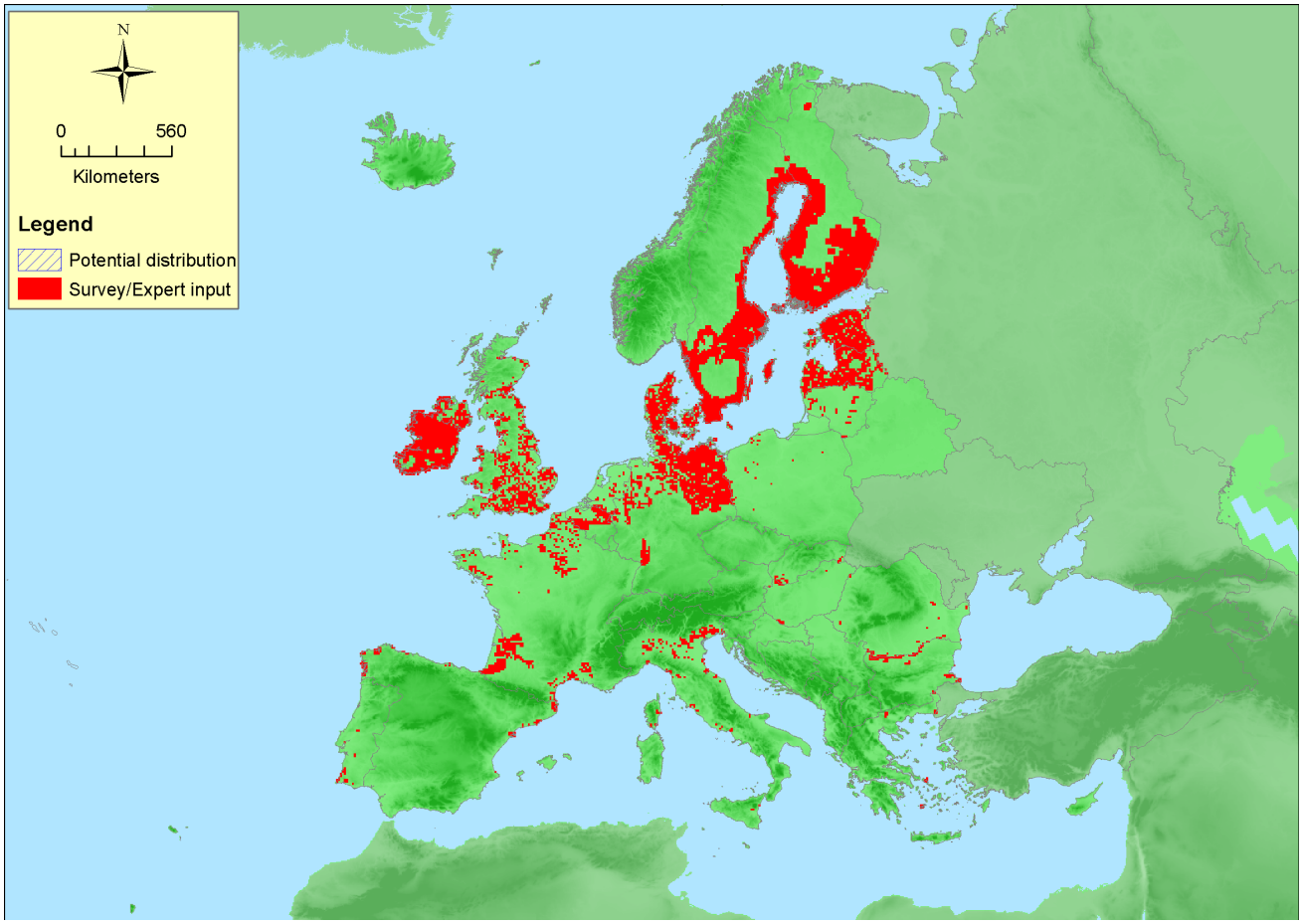
EU 28 +	Present or Presence Uncertain	Current area of habitat	Recent trend in quantity (last 50 yrs)	Recent trend in quality (last 50 yrs)
Albania	Present	unknown Km^2	Unknown	Unknown
Andorra	Uncertain	unknown Km^2	Unknown	Unknown
Bosnia and Herzegovina	Present	400 Km^2	Decreasing	Decreasing
Faroe Islands	Uncertain	unknown Km^2	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)
Former Yugoslavian Republic of Macedonia (FYROM)	Present	unknown Km^2	Unknown	Unknown
Guernsey	Uncertain	unknown Km^2	Unknown	Unknown
Iceland	Uncertain	unknown Km^2	Unknown	Unknown
Isle of Man	Uncertain	unknown Km^2	Unknown	Unknown
Jersey	Uncertain	unknown Km^2	Unknown	Unknown
Kaliningrad	Uncertain	unknown Km^2	Unknown	Unknown
Kosovo	Present	unknown Km^2	Unknown	Unknown
Montenegro	Present	unknown Km^2	Unknown	Unknown
Norway	Jan Mayen: Uncertain Norway Mainland: Uncertain Svalbard: Uncertain	unknown Km^2	Unknown	Unknown
San Marino	Present	unknown Km^2	Unknown	Unknown
Serbia	Present	unknown Km^2	Unknown	Unknown
Switzerland	Present	unknown Km^2	Decreasing	Decreasing

Extent of Occurrence, Area of Occupancy and habitat area

	Extent of Occurrence (EOO)	Area of Occupancy (AOO)	Current estimated Total Area	Comment
EU 28	8070300 Km^2	7998	812-903 Km^2	Only 50% of the countries provided the total area.
EU 28+	8070300 Km^2	7998	1282-1373 Km^2	Only 33% of the countries provided the total area.

Distribution map



Map is rather complete for EU28, but probably incomplete for EU28+, especially in the Balkan. Data sources: Art17, GBIF.

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

The percentage of the habitat type in the EU 28 is (very roughly) estimated to be about 10-20%, based on an assumed Eurasian distribution of the habitat worldwide. In Europe 50-60% of this habitat type lies within the EU 28. The rest is across EU 28+ countries. However the same or very similar habitat type can be found in countries outside EU 28 and EU 28+ like Russia, Ukraine, Belarus, Turkey, etc.

Trends in quantity

Despite the fact that this habitat is expected to occur in 90% of the European countries, only around 50% of the countries within EU 28 and Bosnia and Herzegovina (in EU 28+) provided quantitative data. Most countries stated that the habitat has decreased during the last 50 or 60 years (from 1950 up to now) due to artificial changes in the water regime of rivers. A decrease of the habitat between 20 and 28% has been calculated. Despite this general past trend, 10 countries reported that the habitat is currently stable and 1 (Portugal) that the habitat is presently even increasing. There are not sufficient data regarding the long-term historic (before 1950) and future trend in quantity.

- 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 geographical range of the habitat (EOO) is very wide and seems far to go over 50,000 Km^2.
- Does the habitat have a small natural range by reason of its intrinsically restricted area?

No

Justification

The habitat does not have an intrinsically restricted area. It is of course limited to lowland water courses, but these may stretch over many kilometres.

Trends in quality

Almost all countries that provided data reported a decreasing trend in quality during the last 50 or 60 years (from 1950 up to now) with 20 to 90% of the habitat surface in the country affected by a slight to severe degradation. The trend in quality for whole Europe resulted in a relative severity of degradation of 52% affecting 42% of the total extent of the habitat in EU 28 and in a relative severity of degradation of 33% affecting 44% of the total extent of the habitat in EU 28+. Lack of information about this habitat exists for 50% of the involved European countries.

- Average current trend in quality
  EU 28: Decreasing
  EU 28+: Decreasing

Pressures and threats

The most frequent pressures are alteration of the morphology and hydrology of rivers due to the production of hydroelectric energy, melioration and agricultural uses of the water. Pollution of surface- and groundwater and introduction of exotic plant and fish species are also indicated as very frequent pressures for this habitat type as well as fishing activities.

List of pressures and threats

Mining, extraction of materials and energy production

Sand and gravel extraction

Biological resource use other than agriculture & forestry

Fishing and harvesting aquatic resources

Pollution

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

Invasive, other problematic species and genes

Invasive non-native species

Natural System modifications

Human induced changes in hydraulic conditions

Conservation and management

This habitat is threatened mainly by human activities. The conservation and management actions should involve in all countries the regulation of water abstraction, agricultural and industrial activities in the river basin (that are usually the main source of water pollution), fishing and extraction of sand and gravel from the river bed. Regulations and management actions have been already applied in some countries, favouring in this way the stabilization of the current habitat conditions. Management actions still not adopted by all countries are the maintenance of the environmental flow and the maintenance of natural buffer zones between the river beds and the fields. These zones are very important environmental filters for organic and inorganic pollutants and should be recreated for restoring and managing the habitat quality.

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 hunting, taking and fishing and species management

Regulation/Management of fishery in limnic systems
Specific single species or species group management measures

Measures related to urban areas, industry, energy and transport

Urban and industrial waste management

Conservation status

Annex 1:

3250: ALP XX, ATL XX, CON XX, MED U1

3260: ATL U2, BLS U1, BOR U2, CON U1, MED U2, PAN U1, STE FV

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

The capacity of this habitat to recover naturally differs according to the type of damage that the habitat has undergone. If the damage had an impact on the hydrology and geomorphology the recovery time can be quite long and it is not always possible to restore the habitat. If the damage is represented by pollution of water bodies, the habitat can be restored in a relatively short time (10 years, or even less) through intervention and removal of the causes of pollution.

Effort required

10 years	20 years	50+ years	200+ years
Through intervention	Naturally	Naturally	Naturally

Red List Assessment

Criterion A: Reduction in quantity

Criterion A	A1	A2a	A2b	A3
EU 28	-28 %	unknown %	unknown %	unknown %
EU 28+	-20 %	unknown %	unknown %	unknown %

The calculated trend in quantity resulted in a reduction of 28% of the habitat area in EU 28 and 20% in EU 28+ during the last 50 years that corresponds respectively to the categories Near Threatened for EU 28 and Least Concern for EU 28+. This calculation was performed using the quantitative data available, which however represent probably only 46% of the total countries in which the habitat should occur in EU 28 and 31% in EU 28+. Among the additional countries in EU 28+ only Bosnia and Herzegovina provided data. Data about historic (before 1950) and future are not available for most European countries.

Criterion B: Restricted geographic distribution

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

The habitat is largely extended in Europe therefore both EOO and AOO are far from the thresholds required by criterion B to consider the habitat threatened. However spatial extent, biotic and abiotic quality of the habitat are in continuing decline.

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	42 %	52 %	unknown %	unknown %	unknown %	unknown %
EU 28+	33 %	44 %	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 %	unknown%	unknown %	unknown%	unknown %	unknown%

The reduction in biotic and abiotic quality over the last 50 years affected 42% of the extent of the habitat in EU 28 countries with a severity of 52% and 33% of the extent of the habitat in EU 28+ with a severity of 44%. This calculation is based on data provided by only 39% of the countries in which the habitat is expected to occur in EU 28 and 27% additional countries in EU 28+. According to criterion C/D the habitat is Near Threatened for EU 28 and Least Concern for EU 28+, however an underestimation or overestimation of the reduction in biotic and abiotic quality may be due to the large gap of data. There are not sufficient data to estimate the historic and future trend in quality. No distinct data about biotic and abiotic quality of the habitat exists for most countries.

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 for applying criterion E.

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	NT	DD	DD	DD	LC	LC	LC	NT	DD	DD	DD	DD	DD	DD	DD	DD	DD

	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	LC	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
Near Threatened	C/D1	Least Concern	-

Confidence in the assessment
Medium (evenly split between quantitative data/literature and uncertain data sources and assured expert knowledge)

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