

SLOVENSKI STANDARD SIST EN 16859:2017

01-junij-2017

Kakovost vode - Navodilo za spremljanje (monitoring) populacij sladkovodnih školjk potočnih bisernic (Margaritifera margaritifera) in njihovega okolja

Water quality - Guidance standard on monitoring freshwater pearl mussel (Margaritifera margaritifera) populations and their environment

Wasserbeschaffenheit - Anleitung für das Monitoring von Populationen der Flussperlmuschel (Margaritifera Margaritifera) und ihrer Umwelt

Qualité de l'eau - Norme guide sur le suivi des populations de moules perlières d'eau douce (Margaritifera margaritifera) et de leur environnement

https://standards.iteh.ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-

Ta slovenski standard je istoveten z: EN 16859-2017

ICS:

13.060.70 Preiskava bioloških lastnosti Examination of biological

vode properties of water

SIST EN 16859:2017 en,fr,de

SIST EN 16859:2017

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN 16859:2017</u> https://standards.iteh.ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-6a1a03c6b026/sist-en-16859-2017 EUROPEAN STANDARD NORME EUROPÉENNE EUROPÄISCHE NORM EN 16859

February 2017

ICS 13.060.70

English Version

Water quality - Guidance standard on monitoring freshwater pearl mussel (Margaritifera margaritifera) populations and their environment

Qualité de l'eau - Norme guide sur le suivi des populations de moules perlières d'eau douce (Margaritifera margaritifera) et de leur environnement Wasserbeschaffenheit - Anleitung für das Monitoring von Populationen der Flussperlmuschel (Margaritifera Margaritifera) und ihrer Umwelt

This European Standard was approved by CEN on 4 December 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION COMITÉ EUROPÉEN DE NORMALISATION EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword	6 7 12 12 12 12 12 12
Normative references	7 7 12 12 12 12 12 13
Normative references	7 12 12 12 12 12 12
Normative references	7 12 12 12 12 12 12
Terms and definitions	7 12 12 12 12 13
Monitoring and assessing the condition of a Margaritifera population	12 12 12 12 13
4.1.1 Requirements for a sustainable <i>Margaritifera</i> population4.1.1 General4.1.2 Monitoring4.1.2 Monitoring recommended on mussel attributes in rivers with	12 12 12 13
4.1.1 General4.1.2 Monitoring	12 12 13 14
4.1.2 MonitoringTable 1 — Checklist of monitoring recommended on mussel attributes in rivers with	12 13 14
Table 1 — Checklist of monitoring recommended on mussel attributes in rivers with	13 14
	14
Margaritifera	14
4.2 Training and quality assurance for pearl mussel survey and assessment	14
4.2.1 Pearl mussel survey	
4.2.2 Training manuals	
4.2.3 Data entry and validationSTANDARD PREVIEW 4.2.4 Licences	15
	15
Monitoring the environmenta conditions needed to support Margaritifera	
margaritifera populations	15
5.1 General <u>SIST EN. 16859:2017</u> 5.2 Fish hosts https://standards.iteh.ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-	
5.2.1 Fish host species6a1a03c6b026/sist-en-16859-2017	16
Table 2 — Checklist of monitoring recommended on fish hosts in rivers with <i>Margaritifera</i>	
5.2.2 Barriers to fish migration	
5.2.3 Host suitability	
5.3 Water quality	17
5.3.1 General	
5.3.2 Phosphorus	
5.3.3 Nitrogen, including ammonia5.3.4 BOD $_{\rm 5}$ / dissolved oxygen	
5.3.5 pH	
5.3.6 Calcium	
5.3.7 Alkalinity	
5.3.8 Electrical conductivity	
5.3.9 Temperature	
5.3.10 Contaminants	
5.3.11 Turbidity, suspended solids	19
Table 3 — Checklist of monitoring recommended on water quality parameters in rivers	4.0
with <i>Margaritifera</i> 5.3.12 Biotic indicators of water quality	
• •	4 0
Table 4 — Checklist of monitoring recommended on biotic indicators in rivers with	0.4
Margaritifera5.4 Hydromorphology5.4	
5.4.1 Monitoring requirements	41

Table	5 — Checklist of monitoring recommended on flow and physical environmental	
5.4.2	parameters in rivers with <i>Margaritifera</i> Flow	
5.4.2 5.4.3	Physical habitat structure	
Table	6 — Clast sizes relevant to <i>Margaritifera</i> habitat (according to EN ISO 14688-1:2002,	
5.4.4	Table 1) Substrate quality	
5.4.5	Substrate stability	
5.4.6	Trees and wood	25
5.4.7	Instream modifications	
6	Monitoring environmental pressures	25
Table '	7 — Checklist of environmental pressures recommended for risk-based monitoring in rivers with <i>Margaritifera</i>	26
7	Information needed to assess plans or projects on rivers with Margaritifera	27
Table 8	8 — Checklist of questions that should be addressed to ensure that plans or projects do not damage <i>Margaritifera</i> populations	27
Annex	A (informative) Background information on the environmental characteristics important for maintaining populations of <i>Margaritifera margaritifera</i>	29
A.1	Fish hosts	
A.1.1	Fish host species ch. STANDARD PREVIEW	29
A.1.2	Barriers to fish migration tandards.itch.ai)	
A.1.3	Host suitability and stocking practices	
A.2		
A.2.1	SIST EN 16859:2017 Water quality https://standards.iten.arcatalog/standards/sist/f4eff3df-9501-4a84-9fe3- Phosphorus 6a1a03c6b026/sist-en-16859-2017	30
A.2.2	Nitrogen, including ammonia	
A.2.3	BOD ₅ /dissolved oxygen	30
A.2.4	pH	30
A.2.5	Calcium	31
A.2.6	Alkalinity	31
A.2.7	Electrical conductivity	31
A.2.8	Temperature	32
A.2.9	Contaminants	32
A.2.10	Turbidity, suspended solids	32
A.3	Biotic indicators of water quality	33
A.3.1	Macroinvertebrates	33
A.3.2	Diatoms	33
A.3.3	Filamentous algae	33
A.3.4	Macrophytes	33
A.4	Hydromorphology	34
A.4.1	Flow	34

A.4.2	Physical habitat structure	34
A.4.3	Substrate quality	35
A.4.4	Substrate stability	36
A.4.5	Trees and wood	36
A.4.6	Instream modifications	36
A.5	Biotic factors and other interactions	37
A.5.1	Pressures and interferences	37
A.5.2	Human interference	37
A.5.3	Invasive non-native species	37
A.5.4	Non-native fish	37
A.5.5	Non-native molluscs	37
A.5.6	Non-native crayfish	38
A.5.7	Non-native plants	38
A.5.8	Non-native mammals	38
Annex	B (informative) Targets for assessing whether <i>Margaritifera</i> populations are in favourable condition	39
Table	B.1 — Criterions and targets to achieve sustainable Margaritifera populations	39
Annex	C (informative) Range of envi ronmental conditions suppo rting sustainable populations of <i>Margaritifera</i>	40
Table	C.1 — Range of environmental conditions supporting sustainable populations of <i>Margaritifera</i> (with referenced work on which levels are based)	40
Biblio	graphy	

European foreword

This document (EN 16859:2017) has been prepared by Technical Committee CEN/TC 230 "Water analysis", the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

iTeh STANDARD PREVIEW (standards.iteh.ai)

<u>SIST EN 16859:2017</u> https://standards.iteh.ai/catalog/standards/sist/f4efl5df-9501-4a84-9fe3-6a1a03c6b026/sist-en-16859-2017

Introduction

This European Standard provides guidance on monitoring populations of freshwater pearl mussel *Margaritifera margaritifera* and the environmental features on which this species depends. Pearl mussels are endangered throughout their Holarctic range as a result of intensive land-use, pollution, river engineering, abstraction, declining populations of host fish, and exploitation by pearl fishers [1], [2], [3]. Throughout this document, use of the term *Margaritifera* refers only to the species *Margaritifera margaritifera* (Linnaeus, 1758). Within the EU, *Margaritifera* is protected under national legislation as well as by the EC Habitats Directive (Council Directive 92/43/EEC) which requires Special Areas of Conservation to be designated to safeguard this species. The presence of a population of *Margaritifera* with full juvenile recruitment is the sign of a healthy functioning river [4].

Margaritifera has a well-documented but complicated life history, with a larval glochidial stage dependent on a salmonid host. The larvae encyst within the host fish gills following release of glochidia in summer or early autumn. There they overwinter and grow before dropping off in the following spring or early summer. The few that survive initially remain buried in the river-bed substrate for several years where they interact with interstitial water. Older mussels typically have their siphons exposed to filter within the open water. The glochidial and juvenile stages are more demanding of a high-quality environment than adult mussels, emphasizing the importance of defining and maintaining appropriate ecological conditions for the young stages [5].

Margaritifera lives for an unusually long time – over 100 years in much of its range – but life spans can be much shorter at the southern extreme of its range and much longer at the northern extreme. A lack of recruitment of young mussels leads to populations becoming unsustainable, but these problems can be masked by the continued survival of older mussels for many years long after successful recruitment has ended. The requirement for a host salmonid fish to carry the mussel larval stage presents an added challenge in maintaining the condition of freshwater pearl mussel populations.

Although *Margaritifera* is highly demanding in river substrate and water quality, it occurs in a wide range of catchments from small, siliceous, oligotrophic rivers, often with a lake upstream, to large lowland mineral systems. This standard strives to encompass the range of latitudinal and geological factors that affect *Margaritifera* across its range. It is essential to take into consideration the unique pressures on each individual population when setting priorities for monitoring.

NOTE A limited number of key references are given in the Bibliography. A comprehensive list can be consulted by using the following link to the website of the Freshwater Biological Association – http://www.fba.org.uk/cen-pearl-mussel-standard-development-reference-list

The applications of the standard include the provision of site-level data that will contribute to reporting under the Habitats Directive, Article 17, undertaking environmental impact assessment, and restoring pearl mussel populations.

WARNING —Safety issues are paramount when surveying rivers. Surveyors should conform to EU and national Health and Safety legislation, and any additional guidelines appropriate for working in or near rivers.

IMPORTANT — Freshwater pearl mussel surveys are carried out under licence, and the methods used should be fully compliant with any conditions imposed.

1 Scope

This European Standard provides guidance on methods for monitoring freshwater pearl mussel (*Margaritifera margaritifera*) populations and the environmental characteristics important for maintaining populations in favourable condition. The standard is based on best practice developed and used by *Margaritifera* experts in Europe, and describes approaches that individual countries have adopted for survey, data analysis and condition assessment. While it is recommended that the causes for pearl mussel decline should be urgently investigated, standard methods for restoring populations are beyond the scope of this document.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN ISO 14688-1:2002, Geotechnical investigation and testing - Identification and classification of soil - Part 1: Identification and description (ISO 14688-1:2002)

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 iTeh STANDARD PREVIEW

acoustic doppler current profiler

ADCP (standards.iteh.ai)

sonar device that produces a record of water current velocities for a range of depths

SIST EN 16859:2017

3.2 https://standards.iteh.ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-

aquatic macrophyte

6a1a03c6b026/sist-en-16859-2017

larger plant of fresh water which is easily seen with the naked eye, including all aquatic vascular plants, bryophytes, stoneworts (Characeae) and macro-algal growths

Note 1 to entry: This definition includes plants associated with open water or wetlands with shallow water.

[SOURCE: EN 14614:2004, definition 2.1]

3.3

bankfull

maximum point on banks at which floods are held within the channel before spilling over onto the floodplain

[SOURCE: EN 14614:2004, definition 2.5]

3.4

baseline survey

first survey of environmental or biological features by which progress towards rehabilitation or continuing decline can be monitored by subsequent surveys

3.5

bathyscope

bucket with a transparent bottom used for viewing freshwater pearl mussels on the river bed

3.6

biochemical oxygen demand after 5 days

BOD_5

mass concentration of dissolved oxygen consumed under specified conditions by the biochemical oxidation of organic and/or inorganic matter in water after 5 days

Note 1 to entry: For the purposes of this document, "biochemical oxidation" is taken to mean "biological oxidation".

[SOURCE: ISO 5815-1:2003, definition 3.1 modified]

3.7

brooding period

length of time that glochidia remain within the body of a gravid pearl mussel

3.8

colmation

blockage of stream-bed interstitial spaces by the ingress of fine sediments and organic material

3.9

compaction

consolidation of the river bed through physical, chemical or biological processes

[SOURCE: EN 14614:2004, definition 2.10] A RD PREVIEW

3.10

(standards.iteh.ai)

concretion

hard, compact mass of sedimentary rock for<u>med by the precipitation of mineral cement within the spaces between the sediment grains and sitch ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-</u>

6a1a03c6b026/sist-en-16859-2017

3.11

culvert

arched, enclosed or piped structure constructed to carry water under roads, railways and buildings

[SOURCE: EN 15843:2010, definition 3.8]

3.12

ecological quality ratio

EQR

ratio between the value of the observed biological parameter for a given surface water body and the expected value under reference conditions

3.13

ency stment

process in which pearl mussel glochidia attach to the gills of their salmonid hosts

3.14

eutrophication

process by which a body of water acquires an overabundance of nutrients, especially phosphates and nitrates, leading to increased growth of algae and macrophytes

3.15

favourable condition

condition of a population compatible with contributing to 'favourable conservation status'

As defined in Article 1 of the Habitats Directive":- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a longterm basis."

3.16

filter feeding

process by which pearl mussels feed by straining suspended matter and food particles from water, typically passing the water over a specialized filtering structure

3.17

flow duration curve

graphical representation of a ranking of all the flows in a given period, from the lowest to the highest, where the rank is the percentage of time the flow value is equalled or exceeded

Note 1 to entry: These curves may be derived for flows in any time interval, such as daily flows, monthly flows or annual flows

3.18

iTeh STANDARD PREVIEW fluvial audit

method for assessing the condition of a river and its associated human pressures, using information from field survey, remote sensing, historical and recent maps, scientific literature and other sources

SIST EN 16859:2017 3.19

functionally extinct (not currently viable)

pearl mussel population that is incapable of sustaining itself owing to a lack of juvenile recruitment

3.20

glide

moderately-flowing water with undisturbed surface other than occasional swirls or eddies, and with constant depth across part of the channel

[SOURCE: EN 14614:2004, definition 2.17]

glochidium (plural 'glochidia')

larva of *Margaritifera*

3.22

glochidial release

process by which gravid pearl mussels release glochidia into the water

3.23

gravid

carrying eggs or developing young

3.24

hydromorphology

physical and hydrological characteristics of rivers including the underlying processes from which they result

[SOURCE: EN 14614:2004, definition 2.18]

3.25

hyporheic zone

spatio-temporally dynamic ecotone between the surficial benthic sediments and the underlying aquifer

3.26

interstitial habitat

area occupied by aquatic organisms in the spaces between sediment particles

3.27

otoscope

instrument designed for examining the interior of the ear but in the context of this standard used to investigate brooding in freshwater pearl mussels

3.28

penetrometry

method for assessing the resistance of the river-bed substrate in situ using a standard cone or disc penetrometer

Teh STANDARD PREVIEW

3.29

(standards.iteh.ai)

pool

habitat feature characterized by distinctly deeper parts of the channel that are usually no longer than one to three times the channel subankfull widths and where the hollowed river bed profiles are sustained by scouring

6a1a03c6b026/sist-en-16859-2017

[SOURCE: EN 14614:2004, definition 2.24]

3.30

recruitment

survival of juvenile pearl mussels and their addition to a population

3.31

redox potential

Eh

tendency of a substance to gain or lose electrons

Note 1 to entry: In the context of this standard, redox measurements of the stream-bed water at the typical depth of juvenile mussels are used as indicators of oxic (high Eh) or anoxic (low Eh) conditions.

3.32

reference river

river containing viable population of pearl mussels, where the associated environmental characteristics can be used to help define the species' requirements

3.33

reproductively viable

able to maintain a self-sustaining population without the addition of new genetic material from outside the system

3.34

riffle

fast-flowing shallow water with distinctly broken or disturbed surface over gravel/pebble or cobble substrate

[SOURCE: EN 14614:2004, definition 2.28]

3.35

riparian zone

area of land adjoining a river channel (including the river bank) capable of directly influencing the condition of the aquatic ecosystem (e.g. by shading and leaf litter input)

Note 1 to entry: In this European Standard, the term 'riparian zone' does not include the wider floodplain.

[SOURCE: EN 14614:2004, definition 2.29]

3.36

salmonid host

essential host for pearl mussel glochidia, in Europe usually Atlantic salmon (Salmo salar) or brown trout (Salmo trutta)

3.37

salt bridge

device containing a chemically inert electrolyte which is used to increase electrical conductivity locally

3.38 (standards.iteh.ai)

shear stress

measure of the force of friction caused by water flowing around a submerged surface or object

https://standards.iteh.ai/catalog/standards/sist/f4ef15df-9501-4a84-9fe3-

3.39 6a1a03c6b026/sist-en-16859-2017

turbidity

reduction of transparency of a liquid caused by the presence of undissolved matter

[SOURCE: ISO 6107-2:2006, definition 145]

3.40

wade gauging

wading across the river taking measurements at regular intervals (e. g. depth, velocity)

3.41

woody material

material that falls into rivers and streams, ranging in size from leaf fragments (fine woody material) to branches or whole trees (coarse woody material)