SLOVENSKI STANDARD
SIST EN 16859:2017

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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

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13.060.70	Preiskava bioloških lastnosti vode	Examination of biological properties of water

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English Version

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

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

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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of an identical text or by endorsement, at the latest by August 2017, and conflicting national standards shall be withdrawn at the latest by August 2017.

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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
acoustic doppler current profiler
ADCP

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

3.2
aquatic macrophyte

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]

3.10
concretion
hard, compact mass of sedimentary rock formed by the precipitation of mineral cement within the spaces between the sediment grains

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
encystment
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'

Note 1 to entry: 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 long-term 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
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

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]

3.21
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

3.29
pool
habitat feature characterized by distinctly deeper parts of the channel that are usually no longer than one to three times the channel's bankfull width, and where the hollowed river bed profiles are sustained by scouring

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

3.39
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)