SEPA
Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

Measurement Assurance and Certification Scotland

PERFORMANCE STANDARD MACS-FFA-PS-03

Finfish Aquaculture Sector

Biological testing

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Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet.

We call this **One Planet Prosperity**



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1 Introduction

Every day SEPA works to protect and enhance Scotland's environment, helping communities and businesses thrive within the resources of our planet. We call this One Planet Prosperity. If everyone in the world lived as we do in Scotland, we would need three planets. There is only one.

We're changing today, creating a world-class 21st Century EPA fit for the challenges of tomorrow by grounding our regulatory activity across whole sectors.

A fundamental principle of our sector approach is that environmental compliance is non-negotiable. In every sector, we will ensure that all regulated businesses fully meet their environmental compliance obligations.

In certain sectors, this means that operators performing authorised activities have an obligation to monitor and report back to us in support of the regulation of those activities. We will determine compliance from the data and evidence submitted to us.

In order to maintain confidence in our regulatory decision making, all operator monitoring data must meet our minimum quality requirements. To help operators meet those requirements, we have established Measurement Assurance and Certification Scotland (MACS) - our quality assurance certification scheme.

MACS comprises a range of performance standards and technical guidance documents, each designed to ensure that operator monitoring data is fit for regulatory assessment. Its remit extends across the entire monitoring process; from planning and scheduling of monitoring activity to sampling, analysis and data reporting.

Where an organisation conforms with the requirements of MACS, the operator monitoring data they produce will be of a standard that meets our minimum quality requirements. To ensure that this remains the case, those organisations will be routinely audited.

Further information on MACS, operator monitoring, and our sector approach may be found on the SEPA website:

www.sepa.org.uk

2 Scope

2.1 This MACS performance standard is applicable to organisations carrying out biological testing of samples for the assessment of seabed standards relating to marine pen fish farms (MPFFs).

2.2 Sections 5 to 7 along with Annex A lay out the detailed requirements that those organisations **must** adhere to when carrying out those activities.

2.3 Guidance, which may be applied by an organisation in order to meet certain specific requirements, may be found in complementary technical guide MACS-FFA-TG-01 (ref. 3.1 f).

3 References and bibliography

3.1 Text references

a. BS EN ISO 16665:2013 - Water quality - Guidelines for quantitative sampling and sample processing of marine soft-bottom macrofauna, ISBN 978 0 580 85761 4.

b. BS ISO 3310-1:2016 - Test sieves. Technical requirements and testing. Test sieves of metal wire cloth, ISBN 978 0 580 83347 2.

c. BS ISO 3310-2:2013 - Test sieves. Technical requirements and testing. Test sieves of perforated metal plate, ISBN 978 0 580 82112 7.

d. Guidelines for processing marine microbenthic invertebrate samples: a processing requirements protocol, T. Worsfold, D. Hall and M. O'Reilly, NMBAQC, 2010.

e. World Register of Marine Species (WoRMS), WoRMS Editorial Board, 2021 Available from: https://www.marinespecies.org

f. MACS Technical Guide MACS-FFA-TG-01, Finfish Aquaculture Sector - Dealing with non-conformance Scottish Environment Protection Agency, 2022.

3.2 Bibliography

a. BS EN ISO/IES 17025:2017 - General requirements for the competence of testing and calibration laboratories, ISBN 978 0 539 01414 3.

b. MACS Performance Standard MACS-FFA-PS-01, Finfish Aquaculture Sector - Sampling of soft-substrate, Scottish Environment Protection Agency, 2022.

c. MACS Performance Standard MACS-FFA-PS-02, Finfish Aquaculture Sector - Physical and chemical testing, Scottish Environment Protection Agency, 2022.

4 Terms and definitions

For the purpose of this MACS performance standard, and unless the context requires otherwise, the following definitions apply:

benthic macrofauna – bottom-dwelling animals retained on a mesh screen of 0.5 mm or 1 mm aperture size.

concession – a written approval, granted to release a non-conforming product or service for use or delivery. For example, a written agreement from SEPA explicitly permitting the submission of data associated with a quality control failure.

interlaboratory comparison – organisation, performance and evaluation of measurements or tests on the same or similar items by two or more laboratories in accordance with predetermined conditions.

metrological traceability – the property of a measurement result whereby the result can be related to a reference through a documented unbroken chain of calibrations, each contributing to the measurement uncertainty.

NMBAQC – North East Atlantic Marine Biological Analytical Quality Control scheme. See www.nmbaqcs.org for further detail.

operator – an individual or company responsible for the operation of an existing or proposed marine pen fish farm that will be subject to operator monitoring activities.

organisation – an entity performing an activity or activities required under operator monitoring. In the context of this performance standard, this term encompasses an operator, or a body appointed by that operator to undertake testing activity on their behalf.

proficiency testing – evaluation of participant performance against pre-established criteria by means of interlaboratory comparisons.

sample – a volume of water or soft-substrate collected from a sampling station and identified for the assessment or measurement of specific determinand(s).

soft-substrate – areas of sea floor consisting of loose deposited particles including clay, mud, sand and gravel, and shells. Also includes mixed substrata with gravels, small stones and pebbles scattered on a bed of finer material; but excluding cobbles.

sub-sample – a representative portion removed from a sample for separate analysis.

5 Resource requirements

5.1 Personnel

5.1.1 Organisations must ensure that all personnel performing activities relating to the requirements of this performance standard have been deemed competent in, and are authorised to undertake, those activities.

5.1.2 Organisations must document and implement procedure(s) for:

- determining competence requirements;
- the training and supervision of personnel;
- assessing the initial competence of personnel;
- ongoing monitoring of the competence of personnel; and
- authorisation of personnel.

5.2 Testing facilities

5.2.1 Testing facilities must be suitable for the activities being undertaken and must not affect the validity of reported result(s).

5.2.2 Measures put in place to ensure the suitability of those testing facilities must be documented, implemented, monitored and periodically reviewed.

5.3 Equipment

5.3.1 Equipment must be suitable for the activities being undertaken and must not affect the validity of reported result(s).

5.3.2 Organisations must document the equipment necessary for the correct performance of their testing activities.

5.3.3 Organisations must have documented procedure(s) in place for the handling, transport, storage, use and planned maintenance of equipment in order to ensure its proper functioning and to prevent its contamination and deterioration.

5.3.4 Organisations must verify that all equipment is functioning properly before placing or returning it into use.

5.3.5 Measuring equipment used for sample testing must be calibrated when:

- the measurement accuracy or uncertainty will affect the validity of reported result(s), and/or
- calibration is required to establish the metrological traceability of reported result(s).

5.3.6 For all calibrated measuring equipment, organisations must implement an ongoing calibration programme to maintain confidence in the calibration status of that equipment.

5.3.7 All measuring equipment requiring calibration must be clearly labelled, such that the user of the equipment can readily identify its calibration status.

5.4 Control of documents

5.4.1 Organisations must implement a management system for the control of documents.

5.4.2 Such a system must ensure that all documents are:

- uniquely identified;
- suitably marked to indicate their current revision status;
- approved by authorised personnel prior to their issue; and
- periodically reviewed and updated where necessary.

5.4.3 Where obsolete documents are retained for any purpose, they must be clearly marked so as to prevent their unintended use.

5.4.4 Copies of any documents relating to the requirements of this performance standard must be provided to SEPA upon request.

5.5 Control of records

5.5.1 Organisations must establish and retain records to demonstrate fulfilment of the requirements of this MACS performance standard.

5.5.2 Such records must be retained for a minimum period of five years.

5.5.3 Copies of these records must be provided to SEPA upon request.

6 Testing requirements

6.1 Test method selection

6.1.1 Analytical methodologies employed must conform to international standard ISO 16665 (ref. 3.1 a) and adhere to NMBAQC protocols for the processing of benthic macrofauna samples (ref. 3.1 d).

6.1.2 Analysis methods must have fully documented analytical procedure(s). Copies of those procedure(s) must be provided to SEPA upon request.

6.2 Sample processing

6.2.1 A label uniquely identifying a sample, or fractions of a sample, must remain with that sample at all times.

6.2.2 Records must be kept of all information relating to testing activity. Copies of those records must be provided to SEPA upon request.

6.2.3 Rinsing

a. In order to remove fixative solution prior to sorting, each sample must first be thoroughly rinsed with fresh water through a 1 mm metal mesh screen sieve.

b. Sieves used for the rinsing of samples must conform to BS ISO 3310 (refs. 3.1 b & 3.1 c).

6.2.4 Sorting

a. Prior to commencing sorting, the presence of any accumulations of algae, fish bones, fish faeces or feed pellets in the sample residue must be recorded.

b. In samples where particularly abundant fauna are present, it is acceptable to sub-sample before sorting (provided that analysis of a proportion of the sample will accurately identify all fauna present). See section 6.2.5 for further details.

c. For samples, or sub-samples, all countable fauna (see Annex A, Table A1) must be extracted from the residue for identification, including concealed and boring fauna.

d. Representative portions of all other taxa referred to in Annex A (see Annex A, Tables A2 and A3) that are present in the sample must be extracted from the residue for identification, including concealed and boring fauna.

e. Sorted fauna must be transferred to suitable, uniquely labelled containers and preserved in industrial denatured alcohol (IDA) (> 70%).

f. Where a sample has been sorted in successive portions, all portions must be recombined and stored in one clearly labelled sample container before preservation occurs.

6.2.5 Sub-sampling

a. Sub-sampling must be carried out in accordance with ‘Procedural Guideline C’ of the NMBAQC protocols for processing of benthic macrofauna samples (ref. 3.1 d). The fraction of sample sorted, and the sub-sampling technique used, must be recorded.

b. Sorted sub-sample residues must be clearly labelled and stored separately from the remaining part of the sample.

6.3 Taxon determination and quantification

6.3.1 Identification

a. Where large or protected fauna have been identified in-situ during surveying, identification notes made in the field must be combined with those recorded during testing.

b. All fauna collected during a survey, including juveniles and fragments of fauna, must be correctly identified to the lowest taxonomic level possible.

c. The nomenclature used when recording fauna must be compliant with the World Register of Marine Species (ref. 3.1 e).

6.3.2 Quantification

Taxon quantification must be carried out in line with the recording and enumeration policy detailed in Annex A.

6.4 Sample retention

6.4.1 Preserved identified specimens must be retained for a period of 12 months from the date of their collection.

6.4.2 Retained specimens must be provided to SEPA upon request.

6.5 Ensuring the validity of results

6.5.1 Internal analytical quality control

a. Organisations must have an operating and documented internal analytical quality control system. The system must provide for at least 10% of samples to be checked for quality control purposes.

NOTE: Any single-analyst organisations must have equivalent quality control arrangements in place.

6.5.2 Proficiency testing scheme participation

a. Organisations undertaking biological testing must demonstrate the ongoing performance of their analysis methods by participation in the NMBAQC 'Own Sample' modules for both invertebrates and the analysis of particle size (or equivalent proficiency testing (PT) schemes).

b. Organisations must document and implement procedure(s) which provide for review, investigation, and implementation of corrective action when the results submitted for a PT sample are deemed unsatisfactory or questionable by the scheme administrator.

c. Details of an organisation's PT scheme programme, including records of their PT performance, must be provided to SEPA upon request.

7 Control of non-conforming work

7.1 Organisations must have documented procedure(s) which are implemented when any aspect of their testing activity does not conform with the requirements of this performance standard.

7.2 As a minimum, these procedure(s) must provide for incidences of non-conforming work to be recorded, investigated, and evaluated for their significance; and require that a determination is made as to whether the results of that work remain valid.

7.3 Where such an evaluation indicates that a non-conformance could recur, or that there is doubt around the conformity of an activity with either the organisation's own procedure(s) or the requirements of this performance standard, then appropriate corrective action must be implemented.

7.4 SEPA may accept submission of analytical results associated with testing that has not been undertaken according to an organisation's own procedure(s) or the requirements of this performance standard. In each case, a concession to report the affected results must be requested from SEPA.

7.5 Concession requests must include a full assessment of the circumstances of the non-conformance and its potential impacts, and justification as to how the submitted data remains fit for its intended purpose. Where it is not possible to provide a suitable justification, then the non-conforming data will not be accepted by SEPA.

NOTE: For additional guidance on dealing with non-conformance, please refer to complementary technical guide MACS-FFA-TG-01 (ref. 3.1 f).

8 MACS document review and control

8.1 All MACS documentation will be subject to periodic review and may occasionally be amended. For the latest versions of all MACS performance standards, please refer to the SEPA website:

www.sepa.org.uk

Annex A

Taxon recording and enumeration

The recording and enumeration policies detailed in Tables A1, A2 and A3 (below) must be followed during taxon quantification:

Table A1 – Countable fauna (counts of abundance)

Order	Record number(s) of
Bivalves	Umbones
Cirripedia (barnacles)	Individuals with aperture plates
Crustacea	Heads
Echinodermata	Oral discs
Galathowenia/Phoronis	Occupied tubes
Nematoda > 1cm (e.g. *Pontonema*)	Individuals
Polychaetes	Heads
Solitary Ascidians	Individuals

Table A2 – Other fauna (records of presence/absence)

Fauna	Record presence as
Bryozoa	>0
Colonial Anthozoa (e.g. *Alcyonium, Virgularia*)	>0
Colonial Ascidians	>0
Entoprocta	>0
Hydrozoa	>0
Meiofauna	>0
Porifera	>0
Taxa occurring as conspicuous fragments [1]	>0

1. Conspicuous fragments of fauna which do not include heads/umbones etc. and are from taxa which have not already been identified in the sample as 'whole' specimens.

Table A3 – Additional information required

Species/Information	Record	Where
Priority Marine Feature species	Designation (PMF)	ID notes

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If you are a user of British Sign Language (BSL) the Contact Scotland BSL service gives you access to an online interpreter enabling you to communicate with us using sign language.

http://contactscotland-bsl.org/

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