NMBAQC

NE Atlantic Marine Biological Analytical Quality Control Scheme

Fish Component Annual Report
Scheme Operation 2022/2023 (Year 29)

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FISH COMPONENT ANNUAL REPORT FROM APEM Ltd

SCHEME OPERATION – 2022/2023 (Year 29)

Linked Documents (hyperlinked in this report):

Fish Reverse Ring Test Protocol

Fish Reverse Ring Test Bulletin: FRRT14

Fish Ring Test Protocol

Fish Ring Test Bulletin: FRT16

1. Introduction

1.1 Background

The NE Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme provides a source of external Quality Assurance (QA) for laboratories engaged in the production of marine biological data. This module examines inter-laboratory variation in the participants' ability to identify fish specimens and attempts to determine whether any errors are the result of inadequate keys, lack of reference material (e.g. growth series), or the incorrect use of satisfactory keys.

Production of quality biological data is essential for monitoring ecosystem health and informing management decisions. Participating organisations are involved in monitoring for the Water Framework Directive (WFD), fisheries stock assessments, Environmental Impact Assessments (EIA's), and Marine Strategy Framework Directive (MSFD) assessments amongst others.

This is the 29th year of the NE Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme (2022/2023). The fish component is currently in its 18th year and followed the format of previous years. The fish component comprises two modules each with a single annual exercise; a ring test (RT) where test specimens and images are sent to participating laboratories for identification, and a reverse ring test (RRT) where specimens are submitted by participants to the scheme administrator (APEM Ltd.) to confirm identification. Specific details of the protocols for the fish modules can be found on the NMBAQC scheme website (FRRT Protocol and FRT Protocol).

1.2 Participating laboratories

Thirteen laboratories from seven organisations signed up for Scheme year 2022/2023 for a total of 16 participants. Of those, four were government laboratories, two private consultancies, and one a university-linked laboratory. As in previous years, some laboratories elected to be involved in either one or both exercises of the scheme.

2. Summary of Fish Component

2.1 Description

There are two exercises within the Fish component: Fish Reverse Ring Test (F-RRT14) and Fish Ring Test (F-RT16) exercise.

2.1.1 Fish Reverse Ring Test (FRRT)

This module examines inter-laboratory variation in the participants' ability to identify fish specimens from their own surveys and attempts to improve the examination method by analysing identifications given to fresh specimens instead of preserved encountered by the participant. Laboratories can use this exercise to obtain a second opinion on identifications for difficult or problematic taxa of which they are unsure. Participants are also encouraged to build reference collections to improve identification consistency.

Participants were asked to submit up to 15 species for verification, which have been collected during fish surveys and could include unidentified or problematic taxa. Protected species are photographed only, with images supplied for verification. Participants can also provide images to support their identification of any physical specimens submitted (e.g. focusing upon key features, or other individuals not supplied).

Individual specimen bags, labels and data sheets were distributed for specimen submission in insulated boxes with return address labels and instructions for the exercise. Participants are asked to use their own in-house procedures for the capture and humane killing of fish for submission in this exercise. All specimens should be supplied either preserved or frozen in the individually labelled bags provided with clear information for any chemicals contained in the submission.

2.1.2 Fish Ring Test (FRT)

The Fish Ring Test (FRT) is a training exercise which examines inter-laboratory variation in the participants' ability to identify fish specimens and attempts to determine whether any errors are the result of inadequate keys, lack of reference material (e.g. growth series), or the incorrect use of satisfactory keys.

A set of fifteen fish specimens are distributed in each Scheme year. Details of substratum, salinity, depth and geographical location were provided for all ring test specimens to assist identification.

The specimens distributed are obtained from a range of surveys from around the UK. Specimens are also donated by Scheme participants and other organisations. Every attempt is made to provide animals in good condition and of similar size for each laboratory. All

specimens of a given species are taken from replicate trawls or nets within a single survey and in most cases are derived from replicates at a single sampling location. Where relevant, all specimens of a given species are of the same sex. Each specimen sent is uniquely identifiable by means of a coded label.

The participating laboratories are required to identify each of the RT specimens to species level. If a laboratory would not routinely have identified the specimen to the level of species, then this is detailed in the 'confidence level' field on their results form. Laboratories can also add brief notes and information on the keys or other literature used to determine their identifications. RT specimens can be retained by the participant laboratories for incorporation into their in-house reference collections or for future use as training material.

2.1.3 Logistics

The labelling and distribution procedures employed previously have been maintained. Since scheme year 26 (2018/2019) environmentally sustainable materials have been used for the distribution and receipt of specimens, replacing polystyrene boxes with cardboard boxes and the use of reusable ice packs with natural wool insulation for the transportation of frozen material. If returned these can be reused for future exercises.

E-mail has been the primary means of communication for all participating laboratories subsequent to the initial postal distribution of test material. Changes to customs regulations for Northern Ireland and the EU meant that extra supporting documentation had to be included with those specimens. Where possible specimens were distributed early in the week to avoid potential delays and confirmation was sent to the receiving laboratory. Participants for the FRRT were advised of the same to preserve the integrity of the specimens and reduce time in transit.

2.1.4 Data Returns

Return of data to APEM Ltd. followed the same process as in previous years. Spreadsheet-based forms were distributed to each laboratory via email, paper copies were also supplied. All returned data were compiled in Microsoft Office Excel for storage and analysis. Reminders were distributed shortly before each exercise deadline.

2.1.5 Confidentiality

Participants were randomly assigned a four-digit unique laboratory code. Codes are prefixed with the component initials (i.e. F for Fish component), the Scheme Year (Year 29) and a unique number (between 01 and 25); for example, laboratory number one in Scheme Year 2022/2023 (Year 29) was recorded as F_2901.

2.1.6 Statement of Performance

Each participating laboratory was supplied with a 'Statement of Performance', which included a summary of results for the FRT exercise and details of participation in the FRRT exercise, where appropriate. These statements are for the purpose of providing evidence of Scheme participation and for ease of comparing year on year progress. Currently this scheme does not specify a definite qualifying performance level, and NMBAQC ring tests may be treated as training exercises. These may be used by competent monitoring authorities for internal monitoring of performance. Results have no current bearing on the acceptability of data from such participating laboratories. Ring tests offer a means of assessing personal and laboratory performance from which continued training requirements may be identified, or from which improvements in current field and laboratory procedures may be addressed.

3. Results

3.1 FRRT 14

Six out of eight registered participants, from three laboratories, submitted specimens to the Fish Reverse Ring Test. One problematic specimen was submitted. The results were summarised in the Reverse Ring Test Bulletin FRRT-14. The re-identification of the submitted specimens used a variety of identification literature and in-house reference material. Due to this exercise's emphasis upon training and due to the diversity of submissions, comparison of results is not applicable and as such, no summary statistics are provided in this report.

A preliminary report with individual results was sent to each participant before the Fish Reverse Ring Test Bulletin (FRRT-14) was distributed. Summaries of the species submitted by participants and details on the taxonomic errors and discrepancies observed were reported. Participants were given the option to request the return of specimens following completion of the exercise.

In almost all cases, the identifications made by APEM Ltd. agreed with those made by the participants, only three taxonomic errors from 89 specimens were recorded. Seven taxonomic discrepancies were recorded, these were mostly spelling errors and one instance of obsolete synonym being used. The submission of authorities for species names was optional and, therefore, such omissions were not included as taxonomic discrepancies. One unidentified specimen was submitted, tentatively identified by the submitting laboratory as

possibly being a juvenile herring (*Clupea harengus*), however the specimen was too damaged for a positive, visual/microscopic identification to be made.

3.2 FRT 16

Twelve participants from six laboratories submitted results for the Fish Ring Test. The results were summarised in the Ring Test Bulletin FRT-16. Out of 175 specimens identified there were twenty-three generic and twenty-nine specific differences. Nine out of 15 specimens were identified by all participants correctly. Only one participant correctly identified all specimens

The juvenile flounder, *Platichthys flesus* seemed to cause the most trouble for participants, with one laboratory leaving the identification at order level, two laboratories at family level and four not attempting identification of the specimen at all. The clupeid *Sardina pilchardus* proved to be the second most problematic, with six incorrect identifications. Five participants indicated that the specimen provided for this latter species was damaged or not in good condition. Four of these participants were from a single laboratory that had multiple submissions, it may be the case that specimens were thawed, handled and refrozen multiple times leading to poor condition. Identification of specimen 04 was contested and following re-examination of the batch of specimens it appears a mixture of species were distributed in error. Therefore, none of the results for this specimen were considered taxonomic errors.

Due to difficulties sourcing sufficient specimens for distribution, it was not possible to retain a full set of specimens for photographing, and therefore some representative specimen images from previous ring tests were used in the bulletin.

4. Conclusions and Recommendations

Several observations may be made from the results of the exercises described above. The following is a summary of the major points of importance:

1. The latest fish ring tests suffered significant delays, partly due to difficulties sourcing sufficient specimens for distribution. Other potential sources of specimens are being actively investigated to hopefully avoid such problems in the future. No issues were reported with the existing ring test and reverse ring test formats these will therefore be continued in the next scheme year. **Participants are encouraged to provide feedback to enable protocols and implementation to be improved where possible.**

2. All participating laboratories submitted data/specimens in accordance with the amended Scheme's timetable. **Participants are encouraged to continue to supply data/specimens according to the exercise deadlines to ensure timely summary reporting.**

3. Some identification differences might be the results of inadequate literature. Participants are encouraged to collate fish identification literature for problematic groups or juvenile specimens and follow the most recent taxonomy. **Participants are encouraged to review the NMBAQC bibliography of taxonomic literature available on the NMBAQC website and give details of additions where possible. Reference to online databases for the validity of scientific names (FishBase, WoRMS and Eschmeyer's Catalog of Fishes) is also recommended.**

4. The maintenance of a comprehensive reference collection has numerous benefits for improving identification ability, maintaining consistency of identification between surveys and access to growth series material. The FRRT exercise can be used as a means of verifying reference specimens. Laboratories are strongly recommended to **implement and expand in-house reference collections of fish; these should include images alongside physical specimens.** The inclusion of early-stage juvenile specimens in reference collections is also useful, especially for certain groups (e.g. clupeids). Ideally **all surveys should include a photographic reference of all species encountered as a minimum.**

5. Laboratories participating in the ring test exercises should attempt to identify all specimens to species and **complete the 'confidence level' section of their ring test datasheet** to enable additional information to be gathered regarding the difficulty of ring test specimens.

6. Three species of flatfish (Pleuronectiformes) accounted for sixteen of the taxonomic differences in the FRT. As noted in previous ring tests, clupeids continue to be a group with a high number of differences recorded. Future Fish Ring Test exercises are expected to target taxa that were highlighted as potentially problematic in previous exercises. Participants are encouraged to **provide feedback on problem taxa that could be included in future exercise and are invited to submit specimens for use in future exercises** (approximately 20 specimens of similar size and condition).

7. **The distribution of fresh frozen specimens was for the most part successful**. Following feedback from previous exercises fish were placed in individual bags and packed so the larger fish do not damage smaller specimens in transit.

8. One of the laboratories submitted multiple data sets for the Fish Ring Test. **Participants are encouraged to submit multiple data sets for sub-teams and individual analyst where possible to improve the training aspect of the exercise.**

9. APEM Ltd. always strives to ensure **smooth running and transparency of the Scheme**. APEM Ltd. log and make available all correspondence to the Fish Component Contract Manager (Jim Ellis, CEFAS). Participants can be assured that their anonymity will be protected if this correspondence is required to be shared with the Committee.

5. References

Fricke, R., Eschmeyer, W. N. and Van der Laan, R. (eds) (2020) Eschmeyer's Catalog of Fishes: Genera, Species, References.

(http://researcharchive.calacademy.org/research/ichthyology/catalog/fishcatmain.asp).

Froese, R. and Pauly, D. (eds) (2024) FishBase. World Wide Web electronic publication.
www.fishbase.org , version (02/2022).

WoRMS Editorial Board (2024) World Register of Marine Species. Available from http://www.marinespecies.org at VLIZ.

6. Relevant NMBAQC reports

Pears, S., Walsh, D. and Hall, D. (2024) *NE Atlantic Marine Biological Analytical Quality Control Scheme. Fish Ring Test Bulletin: FRT16*. Report to the NMBAQC Scheme participants. APEM Report NMBAQC FRTB16, 23pp, July 2024.

Pears S., Walsh, D. and Hall, D. (2024) *NE Atlantic Marine Biological Analytical Quality Control Scheme. Fish Reverse Ring Test Bulletin: FRRT14*. Report to the NMBAQC Scheme participants. APEM Report NMBAQC FRRT13, 19pp, July 2024.

Duncombe-Smith, S. and Hall, D. (2021) Fish Component Reverse Ring Test Protocol. Report to the NMBAQC Scheme participants. 6pp, March 2021.

Duncombe-Smith, S. and Hall, D. (2021) Fish Component Ring Test Protocol. Report to the NMBAQC Scheme participants. 7pp, March 2021.

Worsfold, T., Hall, D. and O'Reilly, M. (2020) *Bibliography of taxonomic literature for marine and brackish water Fauna and Flora of the North East Atlantic*. NMBAQC Scheme, 248 pp., May 2020.