NMBAQC

NE Atlantic Marine Biological Analytical Quality Control Scheme

The NE Atlantic Marine Biological
Analytical Quality Control Scheme
www.nmbaqcs.org

Fish Annual Report

2016/2017

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FISH COMPONENT REPORT FROM THE CONTRACTOR
SCHEME OPERATION – YEAR 2016 / 2017

Scheme Year 2016 / 2017 Exercise Reports (hyperlinked in this report)

Reverse Ring Test Report – F_RRT08

Ring Test Bulletin – F_RT10

Previous Scheme Exercise Reports (hyperlinked in this report)

Reverse Ring Test Report – F_RRT01

Reverse Ring Test Report – F_RRT02

Reverse Ring Test Report – F_RRT03

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1. Introduction

The twenty-third year of the NE Atlantic Marine Biological Analytical Quality Control (NMBAQC) Scheme (2016/17) followed the format of the twenty-second year. A series of exercises involved the distribution of test materials to participating laboratories and the centralised examination of returned data and samples.

The fish component of the scheme commenced in its thirteenth year (2005/06). Twenty-five laboratories participated in the fish component of the Year 2016 / 2017 NMBAQC Scheme. Twenty participants were government laboratories / fish teams, four were private consultancies and one was a University laboratory. Although some fish are sampled under the Clean Seas Environment Monitoring Programme (CSEMP), the number of target species is relatively few. However, the requirement to monitor fish assemblages in transitional waters for the Water Framework Directive (WFD) provides a major impetus for the fish component exercises.

1.1 Summary of Performance

This report presents the findings of the fish component for the twenty-third year of operation of the NMBAQC Scheme.

This component consisted of two official modules, each with a single exercise:

- Re-identification of a set of fifteen fish specimens supplied by each of the participating laboratories (Fish Reverse Ring Test module).
- Identification of one set of fifteen fish specimens circulated by the scheme contractor (Fish Ring Test module).

The analytical procedures of both modules were the same as for the twenty-second year of the Scheme. The results for each of the modules are presented and discussed.

Fish Reverse Ring Test (F_RRT): The identification of a set of fifteen fish species selected and supplied by the participating laboratories was relatively accurate (F_RRT08) (13 differences for 245 specimens submitted). The majority of specimens were collected by fish teams during their 2016 autumn monitoring surveys. There were a range of families where differences in identification occurred, including the Clupeidae (herrings), Mugilidae (grey mullets) and Gobiidae (gobies). The grey mullet and gobies were the main families where differences occurred. Each had three individuals incorrectly identified and one uncertain or unknown specimen. There were differences in the approach to this exercise used by the individual participants; some participants used this as a test for confirming voucher specimens, whilst others sought a means of having uncertain or unknown specimens identified, making it difficult to compare results directly.

Fish Ring Test (F_RT): Fifteen fish specimens were distributed by Thomson Unicomarine Ltd. This Fish Ring Test (F_RT10) produced good agreement between the identifications made by the participating laboratories and those made by Thomson Unicomarine Ltd. On average, each laboratory recorded 0.4 generic differences and 0.6 specific differences, which is an improvement on last year's results.

1.1.1 Statement of Performance of Fish Component

A Statement of Performance will be issued to each participating laboratory / fish team, which includes a summary of results for each of the modules and details which modules have been completed. These statements were first circulated with the 1998/1999 annual report, for the purpose of providing evidence of Scheme participation and for ease of comparing year on year progress.

2. Summary of the Fish Component

2.1 Introduction

Both modules are described in more detail below. A brief outline of the information to be obtained from each module is given, together with a description of the preparation of the necessary materials and brief details of the processing instructions given to each of the participating laboratories.

2.1.1 Logistics

The labelling and distribution procedures employed previously have been maintained and specific details can be found in the Scheme's annual reports for 1994/95 and 1995/96 (Unicomarine, 1995 & 1996).

2.1.2 Data returns

Return of data to Thomson Unicomarine Ltd. followed the same process as in previous years. Spreadsheet-based forms were distributed via e-mail, with additional hard copies where appropriate. All returned data have been converted to Excel 2003 format for storage and analysis. In this and previous Scheme years, slow or missing returns for exercises led to delays in processing the data, resulting in difficulties with reporting and rapid feedback of results to participants. Reminders were distributed shortly before each exercise deadline.

2.1.3 Confidentiality

To preserve the confidentiality of participating laboratories, each are identified by a four-digit Laboratory Code. In May 2016, each participant was given a confidential, randomly assigned Laboratory Code for the 2016 / 2017 year. Codes followed the previous year's numbering and continued with the prefix of 23. They were also given the letter F to differentiate between NMBAQC components. This number continuation was used to reduce the possibility of obsolete codes being

used inadvertently by laboratories, e.g. Laboratory number one in Scheme 2016/2017 (the twenty-third year) will be recorded as F_2301.

In the present report all references to Laboratory Codes are the post-May 2016 codes (Scheme 2016/2017; in the twenty-third year), unless otherwise stated.

2.2 Fish Reverse Ring Test (F_RRT) Module

2.2.1 Description

The Fish Reverse Ring Test is a training module which enables the identification of fish specimens to be externally verified and encourages laboratories / fish teams to build extensive, verified reference collections to improve identification consistency. The value of reference material / images in assisting with the process of identification cannot be over-emphasised, and the creation and use of reference collections are viewed as best practice. These modules assess the ability of participating laboratories to identify material from their own area, or with which they are familiar, or to have difficult specimens examined externally. This was the eighth official Fish Reverse Ring Test exercise (F_RRT08). The participants were required to submit a reference collection of fifteen specimens for re-examination by Thomson Unicomarine Ltd. Laboratories are also permitted to use this exercise to verify identifications of difficult or problematic taxa about which they were unsure.

2.2.1.1 Selection of fauna

The different geographical distributions of species meant that a request for a uniform set of species from all laboratories was unlikely to be successful. Accordingly, a list of instructions was distributed to participating laboratories. Each laboratory / fish team was permitted to include one unidentified or problematic taxon. Wherever possible, specimens were to be representatives from WFD monitoring surveys.

2.2.1.2 Analysis

Fish Reverse Ring Test packs, which included the exercise instructions, labels for each of the specimens and a prepared results sheet, were distributed to participants. Polystyrene produce boxes and ice-strips were also supplied, if requested, to enable the best transportation for frozen fish. Full instructions for the preparation and postage of specimens were provided. Participating laboratories were permitted approximately fourteen weeks to prepare and submit their reference specimens. All specimens were re-identified and the identification made by Thomson Unicomarine Ltd. compared with that made by the participating laboratories. Specimens were returned to the laboratories after analysis, if requested.

2.2.2 Results

2.2.2.1 General comments

In total twenty laboratories / fish teams subscribed to F_RRT08, with eighteen laboratories returning specimens for verification. Six laboratories submitted data and specimens after the submission deadline (F_2301, F_2308, F_2315, F_2316, F_2321, F_2327). Five laboratories submitted less than the specified number of taxa (F_2307, F_2308, F_2316, F_2321, and F_2323). In total two hundred and forty-five fish samples were submitted for verification.

2.2.2.2 Returns from participating laboratories

Table 1 (Fish Reverse Ring Test Report, F_RRT08) summarises the data sets and specimens received for the F_RRT08 exercise. The identifications of specimens received from the participating laboratories were checked using a variety of identification literature and in-house reference material. Detailed results have been reported to each of the participating laboratories / fish teams via a single exercise report containing the individual report sheets for all participants. Due to this module's emphasis upon training and the diversity of submissions, comparisons of results are not applicable and, as such, no summary statistics are provided in this report.

Each participant received a Fish Reverse Ring Test Report (Fish Reverse Ring Test Report, F_RRT08), outlining the AQC identifications and providing brief notes for identification discrepancies.

Specific details of each participant's results can be found in the Fish Reverse Ring Test Report (Fish Reverse Ring Test Report, F_RRT08) which was circulated to each laboratory that supplied results for this exercise and was also posted on the Scheme's website (www.nmbaqcs.org).

2.2.3 Discussion

2.2.3.1 General Discussion

In the majority of instances, identifications made by Thomson Unicomarine Ltd. were in agreement with those made by the participating laboratories with thirteen differences occurring from two hundred and forty-five identification submissions. Most identification issues were associated with grey mullets and gobies, with misidentifications between *Chelon labrosus, Liza aurata* and *Liza ramada*, and between *Pomatoschistus microps, Pomatoschistus minutus* and *Pomatoschistus pictus.* Three out of the forty-two goby specimens submitted by participating laboratories were identified incorrectly. Identification issues with these taxa have been observed in previous years.

There were also discrepancies for species such as bull rout, topknot, scad, reticulated dragonet, tub gurnard and herring. Potentially difficult taxa such as the gobies and grey mullets could be specifically targeted in future fish ring tests (F_RT exercises) to quantify and resolve problems via the circulation of standardised specimens.

2.2.3.2 Taxonomic discrepancies – *Chelidonichthys lucerna*

Two samples identified as tub gurnard by the participants were submitted as part of the reverse ring test (F_RRT08). One of which was identified as *Trigla lyra* by TU the other confirmed as *Chelidonichthys lucerna*. Piper (*Trigla lyra*) is similar in appearance to tub gurnard (*Chelidonichthys lucerna*), but tends to have a more offshore distribution (Figure 1).

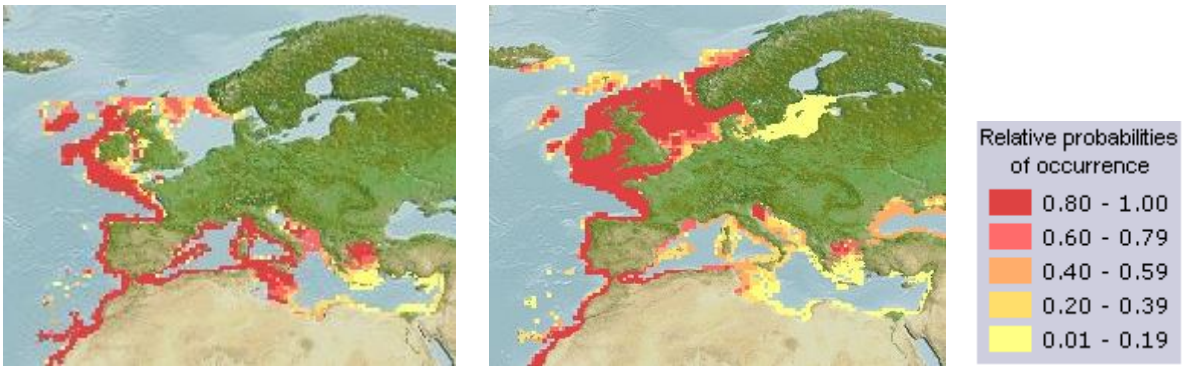

Figure 1: Potential distribution of piper (left) and tub gurnard (right). From www.aquamaps.org, version of Aug. 2016. Accessed 29/03/2017.

Piper are found typically in deeper waters, but can be caught closer to shore in areas close to deeper water. Some of the key factors in determining between the two species are the head profile and the length of the cleithral spine, above the pectoral fin. The cleithral spine is long in piper (extending backwards to the middle of the pectoral fin), and the snout of piper is produced into two flattened and spiny lobes (Wheeler, 1969; Whitehead *et al.,* 1986). The dorsal colouration of piper is often bright red.

2.3 Fish Ring Test (F_RT) Module

2.3.1 Description

The Fish Ring Test is a training module of the Scheme, which examines inter-laboratory variation in participants' ability to identify fish taxa and attempts to determine whether any differences were the result of inadequate keys, lack of reference material (e.g. growth series), or the incorrect use of satisfactory keys. One set of fifteen fish specimens (F_RT10) was distributed in December 2016 to each laboratory.

2.3.1.1 *Preparation of the Samples*

The specimens distributed were obtained from a range of surveys from around the UK or by commercial means. Every attempt was made to provide animals in a similar condition and of similar size for each participant. Each specimen sent was uniquely identifiable by means of a coded label and all material has been retained for subsequent checking. Those specimens obtained from surveys were taken from replicate trawls or grabs within a single survey or fishing trip, and in most cases were replicates from a single sampling station.

2.3.1.2 *Analysis required*

The participating laboratories were required to identify each of the F_RT specimens to species level and provide the respective Species Directory Code (Howson & Picton, 1997) where available. If a laboratory would not routinely have identified the specimen to species level, then this should have been detailed in the confidence level field. Laboratories could also add brief notes and information on the keys or other literature used to determine their identifications. Nine weeks were allowed for the analysis of the fish RT exercise (F_RT10).

2.3.2 Results

2.3.2.1 *General comments*

The implementation of this part of the Scheme was the same as in previous years. The F_RT circulation was accompanied by details of each specimen's habitat details (depth, salinity, substratum, and geographical location). The F_RT circulations are designed as a learning exercise to discover where particular difficulties lie within particular taxa. A number of laboratories use these modules of the Scheme for training purposes and have selected them preferentially over other modules. CSEMP laboratories are required to participate in this component, though it is not used for assigning pass or fail flags.

For F_RT10, fifteen fish specimens were circulated to each of the fifteen participating laboratories. As with previous Scheme years, participating laboratories were permitted to supply multiple data entries for each exercise to maximise results and enhance the training aspect of this module. Other aspects of the circulation, in particular the method of scoring results, were the same as for previous circulations. Fourteen laboratories out of fifteen returned data for this exercise, with fourteen individual data sets in total.

2.3.2.2 *Returns from participating laboratories*

Each laboratory returned a list of their identifications of the taxa. The identifications made by the participating laboratories were then compared with the AQC identifications to determine the number of differences. In the first instance, the correct spelling of the name was checked and then other differences were evaluated.

As previously found, one cause of an identification being different from the AQC identification was through differences in spelling of what was clearly intended to be the same species. There were eleven examples of this, including *Gobuis paganellus* for *Gobius paganellus.* One spelling error did occur with the example of *Chelidonichthys lucernus* for *Chelidonichthys lucerna*. Differences calculated were just for identification differences, not synonyms or spelling errors. Synonyms and spelling errors were however highlighted in Tables 1 and 2 (Ring Test Bulletin - F_RT10) to those participants who need to check names against the FishBase (www.fishbase.org) or WoRMS website (www.marinespecies.org).

Tables 1 and 2 (Ring Test Bulletin – F_RT10) present the identifications made by each of the participating laboratories for the fifteen specimens in circulation, arranged by specimen and participant respectively. For clarity, the name is given only in those instances where the generic or specific name given by the participant differed from the AQC identification. Where it was considered that the name referred to the same species as the AQC identification but differed for one of the reasons indicated above, then the name is presented in square brackets. Spelling errors or the use of a synonym are not bracketed in this way if the species to which the participant was referring was not the same as the AQC identification. A dash ' - ' in the Tables indicates that the name of the genus (and / or species) given by the participant was considered to be the same as the AQC identification.

2.3.2.3 Scoring of RT results

The method of scoring was to increase a participant's score by one for each difference between their identification and the AQC identification, i.e. for each instance where text other than a dash or a bracketed name appears in the appropriate column in the tables (Tables 1 and 2 in F_RT10). Two separate scores were maintained for differences at the genus or species level. The species can be correct even if the genus is incorrect, for example *Blicca bjoerkna* has changed from *Abramis bjoerkna* as illustrated in F_RT06.

2.3.2.4 Ring Test distribution results

Each participant was notified of the test bulletin (F_RT10) being published on the NMBAQC website. This bulletin outlined the reasons for each individual identification discrepancy and contained images of the test material.

2.3.2.5 F_RT10

F_RT10 contained fifteen fish specimens. The results from the circulation are presented in Tables 1 and 2 (F_RT10) in the same manner as for previous circulations. The agreement at the generic level was good; six differences were recorded from the fourteen data sets received via the fifteen participating laboratories. Agreement at the specific level was also good; with eight differences recorded. Six participants (F_2305, F_2306, F_2309, F_2320, F_2321, F_2323, F_2324, and

F_2326) correctly identified all the specimens. Differences were across a relatively broad range of taxa, some of which are described below.

The majority of the generic and specific differences were recorded for *Sardina pilchardus* (two generic and two specific differences). Other differences recorded were for *Osmerus eperlanus, Platichthys flesus, Clupea harengus, Syngnathus rostellatus, Pomatoschistus minutus*, and *Rutilus rutilus.*

Seven of the fifteen circulated specimens were correctly identified by all participating laboratories (*Scomber scombrus, Dicentrarchus labrax, Mullus surmuletus, Merlangius merlangus, Callionymus lyra, Sprattus sprattus,* and *Trisopterus luscus*).

One of the fifteen specimens (specimen 05) was removed from the analysis in the F_RT10 bulletin due to some specimens not being of the intended species. Originally, they were sent out identified as *Trachurus trachurus*. One of the participants provided detailed support for it actually being *Trachurus mediterraneus*. Each participating laboratory was subsequently asked to re-examine their specimen 05. In total, two of the fifteen specimens were identified as *Trachurus mediterraneus* (F_2320 and F_2324). Given the lack of consistency of individuals distributed for specimen 05, the results from each participant for this specimen were not included when analysing generic and specific differences. A description on the differentiating factors for identifying these two species was included in the F_RT10 Bulletin. Further details and analysis of results can be found in the Fish Ring Test Bulletin (Fish Ring Test Bulletin – F_RT10) which was circulated to each participant that supplied results for this exercise and was posted on the Scheme's website (www.nmbaqcs.org).

2.3.2.6 Differences between participating laboratories

Figure 1 (F_RT10) presents the number of differences recorded at genus and species level for each of the participating laboratories. Laboratories are ordered into three bands; Low, Medium and High, according to the increased number of differences at the species and genus level.

2.3.3 Discussion

2.3.3.1 General Discussion

This is the tenth fish ring test circulated through the NMBAQC Scheme and the results were comparable with those from the nine previous exercises (RT28 (F_RT01), RT31 (F_RT02), RT33 (F_RT03), F_RT04, F_RT05, F_RT06, F_RT07, F_RT08, and F_RT09) with a high level of agreement between participating laboratories for the majority of distributed species. The F_RT component is considered to provide a valuable training mechanism and to be an indicator of problematic groups and possible areas for further targeted exercises or inclusion at taxonomic workshops. Multiple data entries from some laboratories and the inclusion of images in the ring

test bulletins (RTB) have further emphasised the learning aspect of these exercises. F_RT10 indicated that most laboratories are using the same literature to identify fish specimens (Wheeler 1969, 1978; Maitland & Herdson 2009; Henderson 2015).

Ring test specimens were sent to participating laboratories frozen. Frozen specimens tend to maintain their integrity and preserve colour better than those preserved in alcohol.

3. Conclusions and Recommendations

A number of 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 Reverse Ring Test (F_RRT10) was successfully implemented and the format can be brought forward for another exercise in the next Scheme year. Participants are encouraged to continue to provide feedback to enable the protocols to be refined.

2. An improved learning structure to the Scheme through detailed individual exercise reports has been successfully implemented and was continued in this Scheme year. After each F_RRT exercise a bulletin is circulated (F_RRT10), reviewing the literature used and detailing the correct identification of the taxa circulated. Participants are encouraged to review the bulletin and provide feedback concerning content and format wherever appropriate.

3. The majority of participating laboratories submitted data before the deadline, however late submissions contributed to delaying the production of the final report. Laboratories should endeavour to submit their results within the requested time; this would greatly facilitate the analysis of results and effective feedback.

4. Whilst not an issue this year, previous Fish Ring Tests (RT28 (F_RT01), RT31 (F_RT02), RT33 (F_RT03), F_RT04, F_RT05, F_RT06, F_RT07) have highlighted instances of differences due to the incorrect translation of a common name. Fish teams are to incorporate scientific names in field data records and/or ensure that common to scientific name translations are correct prior to database submission.

5. Fish teams are encouraged to collate fish identification literature to improve their identification skills and follow the most recent results in taxonomy. The new identification guide Henderson (2015) is recommended to all participating laboratories. For those laboratories / fish teams conducting offshore fish surveys, Quéro *et al.* (2003) and Lloris (2015) also provide important taxonomic information for fish in the North-east Atlantic. Unpublished keys from Scheme workshops could be posted on the Scheme's website. The Scheme has produced a UK

Standard Taxonomic Literature database. Laboratories are encouraged to review the content and give details of additions wherever possible. Referring to websites such as Catalog of Fishes (http://www.calacademy.org/scientists/projects/catalog-of-fishes), FishBase (http://www.fishbase.org), WoRMS (http://www.marinespecies.org) is recommended to check the most recent scientific names.

6. The maintenance of a comprehensive reference collection has numerous benefits, such as improving identification ability, training new staff, maintaining consistency of identification between surveys, and access to growth series material. The inclusion of growth series is extremely useful for certain taxa. Ideally all surveys should have an associated reference collection to enable ease of cross-checking or adopting future taxonomic developments. It is strongly recommended that laboratories implement and expand in-house reference collections of fish; these collections could include images and physical specimens.

7. Recurring differences have been highlighted in the identification of grey mullets (*Liza aurata*; *Chelon labrosus* and *Liza ramada*) and gobies (*Pomatoschistus microps*; *Pomatoschistus minutus* and *Pomatoschistus pictus*) in all reverse ring test exercises. These groups could usefully be targeted at workshops or in future ring test exercises.

8. Future Fish Ring Test (F_RT) circulations will target taxa identified in the Fish Reverse Ring Tests (F_RRT) as potentially problematic. Participants are encouraged to inform Thomson Unicomarine of difficult taxa that should be included in ring tests. Participants are also invited to submit specimens for use in such exercises (approximately 30 specimens of equal size and condition would be required for inclusion).

9. The RT and Reverse RT modules offer training and baseline data for fish; a quality control module should be devised to provide quantifiable data assurance.

10. This year's Fish Ring Test (F_RT10) produced fourteen sets of results from fourteen participating laboratories. No participants submitted multiple data sets. The option of multiple data submissions per participant laboratory will be continued into future F_RT exercises. Participants should not submit multiple sets of data if these data represent a replicated consensus; multiple data submissions are to allow sub-teams and individual analysts to receive specific results and feedback.

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