NMBAQC

NE Atlantic Marine Biological Analytical Quality Control Scheme

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

Fish Annual Report

2015/2016

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FISH COMPONENT REPORT FROM THE CONTRACTOR
SCHEME OPERATION – YEAR 2015 / 2016

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Scheme Year 2015 / 2016 Exercise Reports (hyperlinked in this report)

Reverse Ring Test Report – F_RRT07

Ring Test Bulletin – F_RT09

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

Reverse Ring Test Report – F_RRT04

Reverse Ring Test Report – F_RRT05

Reverse Ring Test Report – F_RRT06

Ring Test Bulletin – F_RT01

Ring Test Bulletin – F_RT02

Ring Test Bulletin – F_RT03

Ring Test Bulletin – F_RT04

Ring Test Bulletin – F_RT05

Ring Test Bulletin – F_RT06

Ring Test Bulletin - F_RT07

Ring Test Bulletin – F_RT08

1. Introduction

The twenty-second year of the National Marine Biological Analytical Quality Control (NMBAQC) Scheme (2015/16) followed the format of the twenty-first 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 twelfth year (2005/06). Thirty one laboratories / fish teams participated in the Fish component of the Year 2015 / 2016 NMBAQC Scheme. Twenty five participants were government laboratories / fish teams, five were private consultancies and one was a research institute from Italy. 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 the major impetus for the fish component exercises.

1.1 Summary of Performance

This report presents the findings of the Fish component for the twenty-second 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-first year of the Scheme. The results for each of the Scheme exercises 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_RRT07) (24 errors for 308 specimens submitted). The majority of specimens were collected by fish teams during their 2015 autumn monitoring surveys. There were a range of families where identification errors occurred including from the herring and grey mullet families and the Gadiformes (cod) order. The gobies were the largest family for errors with eight individuals incorrectly identified. However, there were differences in the approach to this exercise by the individual laboratories; some laboratories 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 directly compare results.

Fish Ring Test (F_RT): Fifteen fish specimens were distributed by Thomson Unicomarine Ltd. This fish ring test (F_RT09) produced good agreement between the identifications made by the participating laboratories and those made by Thomson Unicomarine Ltd. On average each laboratory recorded 0.8 generic differences and 1.2 specific differences, which is an improvement on last year's results.

1.1.1 Statement of Performance

A Statement of Performance will be issued to each participating laboratory / fish team, which includes a summary of results for each of the Scheme 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 fish 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 email, 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 laboratories. 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 2015 each participant was given a confidential, randomly assigned Laboratory Code for the 2015 / 2016 year. Codes followed the previous year's numbering and continued with the prefix of 22. 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 2015/2016 (the twenty-second year) will be recorded as F_2201.

In the present report all references to Laboratory Codes are the post-May 2015 codes (Scheme 2015/2016; in the twenty-second 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; 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 seventh official Fish Reverse Ring Test exercise (F_RRT07). 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. Specimens wherever possible were to be representatives from WFD monitoring surveys.

2.2.1.2 Analysis

A prepared results sheet was distributed with the exercise's instructions and attached labels for the laboratories to identify each of the specimens. Polystyrene produce boxes and ice-strips were also supplied, if requested, to enable the best transportation protocol for frozen fish. Full instructions for the preparation and postage of specimens were provided. Participating laboratories / fish teams 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-four laboratories / fish teams subscribed to F_RRT07, with twenty-three laboratories returning specimens for verification. One laboratory submitted data and specimens after the submission deadline (F_2204). Seven laboratories submitted less than the specified number of taxa (F_2202, F_2211, F_2212, F_2215, F_2217, F_2230 and F_2231). In total three hundred and eight fish samples were submitted for verification.

2.2.2.2 Returns from participating laboratories

Table 1 (Fish Reverse Ring Test Report, F_RRT07) presents a summary of the data sets and specimens received for the F_RRT07 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_RRT07), 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_RRT07) 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 twenty four errors occurring from three hundred and eight identification submissions. Most identification issues were associated with gobies, with misidentifications amongst the following species: *Pomatoschistus microps*; *Pomatoschistus minutus* and *Pomatoschistus pictus.* Eight out of the forty five goby specimens submitted by participating laboratories were identified incorrectly. The herring fishes were another group which caused identification issues. The grey mullets just as previous years have indicated, caused identification issues (*Liza aurata*; *Chelon labrosus* and *Liza ramada*).

There were also discrepancies for species such as bull rout, five-bearded rocking and Corbin's sandeel. Potentially difficult taxa such as the gobies 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 – *Alosa fallax*

A twaite shad was submitted as part of the reverse ring test (F_RRT07). Twaite shad (*Alosa fallax*) and Allis shad (*Alosa alosa*) can be very similar in appearance, especially as juveniles. The key factor when determining between the two are the gill rakers in structure and number. Allis shad have very fine feathery gill rakers while those of the twaite are stout and easily seen as individual structures (Henderson, 2014). It is advised that gill raker structures are analysed prior to reverse ring test submission to contribute to an accurate identification. Gill raker counts should be taken from the first arch and should be carefully removed for analysis but be sent in addition to the fish specimen for future reverse ring test inclusions.

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 errors 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_RT09) was distributed in December 2015 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 laboratory / fish team. Each specimen sent was uniquely identifiable by means of a coded label and all material has been retained for subsequent checking. Where relevant, every effort was made to ensure all specimens of a given species were of the same sex and size. Those specimens obtained from surveys were taken from replicate trawls or grabs within a single survey or fishing trip and in most cases they 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_RT09).

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 specific common 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_RT09 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 sixteen individual data sets in total via multiple data submissions.

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 three examples of this including *Merlangius merlangius* for *Merlangius merlangus.* One spelling error did occur with the example of *Chelidonichthys lucernus* for *Chelidonichthys lucerna*. Errors calculated were just for identification errors, not synonyms or spelling errors. Synonyms and spelling errors were however highlighted in Tables 1 and 2 (Ring Test Bulletin - F_RT09) 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_RT09) present the identifications made by each of the participating laboratories for the fifteen specimens in circulation, arranged by specimen and laboratory respectively. For clarity the name is given only in those instances where the generic or specific name given by the laboratory 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 laboratory 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 laboratory 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 laboratory'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_RT09). 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.

2.3.2.3 Ring Test distribution results

Each participant was notified of the test bulletin (F_RT09) being published on the NMBAQC website. This bulletin outlined the reasons for each individual identification discrepancy and contained images of the test material.

2.3.2.3.1 F_RT09

F_RT09 contained fifteen fish specimens. The results from the circulation are presented in Tables 1 and 2 (F_RT09) in the same manner as for previous circulations. The agreement at the generic level was good; thirteen errors were recorded from the sixteen data sets received via the fifteen participating laboratories. Agreement at the specific level was also good; with nineteen differences recorded. Six laboratories (F_2212, F_2213, F_2214, F_2216, F_2224 and F_2226) correctly identified all of 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 from *Sardina pilchardus* (with four generic and four specific differences). Other differences recorded were for *Liza ramada*, *Mullus surmuletus*, *Chelidonichthys lucerna*, *Hyperoplus lanceolatus*, *Osmerus eperlanus* and *Ammodytes tobianus*.

Eight of the fifteen circulated specimens were correctly identified by all participating laboratories (*Merlangius merlangus*, *Pleuronectes platessa*, *Trachurus trachurus, Solea solea*, *Zeus faber*, *Sparus aurata*, *Sprattus sprattus* and *Clupea harengus*). Further details and analysis of results can be found in the Fish Ring Test Bulletin (Fish Ring Test Bulletin – F_RT09) which was circulated to each laboratory that supplied results for this exercise and was posted on the Scheme's website (www.nmbaqcs.org).

2.3.2.4 Differences between participating laboratories

Figure 1 (F_RT09) 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 eighth fish ring test circulated through the NMBAQC Scheme and the results were comparable with those from the seven previous exercises (RT28 (F_RT01), RT31 (F_RT02), RT33 (F_RT03), F_RT04, F_RT05, F_RT06, F_RT07 and F_RT08) 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 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_RT09 indicated that the majority of laboratories are using the same literature to identify most specimens; Wheeler 1969, Wheeler 1978 and Maitland & Herdson 2009.

Ring test specimens were sent to participating laboratories frozen. Frozen specimens tend to maintain their integrity and preserve colour better than those 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_RRT09) 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_RRT09), 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 by Pete Henderson is recommended to all participating laboratories (Henderson, P. (2014). Identification Guide to the Inshore Fish of the British Isles. Pisces Conservation). 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 FishBase and WoRMS is recommended to check the most recent names are used.

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 faunal groups. 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 errors 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 should 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_RT09) produced seventeen sets of results from sixteen participating laboratories due to the submission of 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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